



Portland General Electric Company
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July 14, 2017

Via Electronic Mail
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Filing Center
Public Utility Commission of Oregon
201 High St SE, Suite 100
P.O. Box 1088
Salem, Oregon 97301-1088

**Re: UM-1809 – Portland General Electric Company’s Detailed Depreciation
Study of Electric Utility Properties**
Attention Filing Center:

Enclosed for filing in the above-referenced docket are an original and five copies of
the:

- Stipulation; and
- Joint Testimony in Support of Stipulation (UM 1809 Peng – Mullins –
Spanos / 100)

These documents are being filed by electronic mail with the Filing Center.

Thank you in advance for your assistance.


Stefan Brown

Manager, Regulatory Affairs

Enclosures

**BEFORE THE PUBLIC UTILITY COMMISSION
OF THE STATE OF OREGON**

UM 1809

Joint Testimony in Support of Stipulation

PORTLAND GENERAL ELECTRIC COMPANY

Direct Testimony and Exhibits of

Ming Peng, OPUC

Bradley R. Mullins, ICNU

John Spanos, PGE

July 14, 2017

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I. Introduction

1 **Q. Please state your names and positions.**

2 A. My name is Ming Peng. I am a Senior Economist for the Public Utility Commission of
3 Oregon (Commission). My business address is 201 High St. SE, Suite 100, Salem, Oregon,
4 97301.

5 My name is Bradley Mullins. I am an independent consultant representing large energy
6 and utility customers throughout the western United States. I am appearing on behalf of the
7 Industrial Customers of Northwest Utilities (ICNU). My business address is 333 SW Taylor
8 St., Suite 400, Portland, Oregon, 97204.

9 My name is John J. Spanos. I am Senior Vice President at Gannett Fleming Valuation
10 and Rate Consultants, LLC. My business address is 207 Senate Avenue, Camp Hill,
11 Pennsylvania 17011. I represent Portland General Electric Company (PGE) in this docket.

12 Our qualification statements are found in Exhibits 104, 105 and 106, respectively at the
13 end of this testimony.

14 **Q. What is the purpose of your testimony?**

15 A. Our testimony addresses the depreciation study submitted by PGE to the Commission in
16 December 2016. The purpose of our testimony is to describe our analysis and to support the
17 Stipulation reached between Commission Staff (Staff), PGE, and ICNU, collectively
18 referred to as the “Stipulating Parties”. The adjustments discussed in the Stipulation are
19 reasonable and will yield fair and equitable rates if adopted by the Commission in its final
20 order in this docket. The Citizens Utility Board of Oregon stated that they do not oppose the
21 settlement.

22 **Q. What precipitated this proceeding?**

1 A. Pursuant to ORS 757.140, that requires “Each public utility shall conform its depreciation
2 accounts to the rates so ascertained and determined by the commission” and pursuant to the
3 Commission Order No. 14-297, issued September 2, 2014, PGE is required to file a detailed
4 depreciation study no later than December 31, 2018. In compliance with ORS 757.140 and
5 Order 14-297, PGE filed a new depreciation study on December 23, 2016. All assets in the
6 study are included as of December 31, 2015 in traditional FERC classification of generation,
7 transmission, distribution, and general plant assets.

II. Summary of Proceedings

A. Depreciation Study Results

1 **Q. Please summarize PGE's depreciation study proposal.**

2 A. PGE's depreciation study recommended revisions in depreciation lives, curves, and net
3 salvage rates for various plant accounts.

4 In this filing, PGE requested that the Commission prescribe the depreciation rates
5 derived from, and included with, the Iowa survivor curve and life combinations in this
6 Stipulation, and that the rates be fixed until the effective date of the next depreciation study.

7 The depreciation rates proposed by PGE in UM 1809 would have resulted in an annual
8 depreciation expense of approximately \$286 million – an increase of approximately
9 \$6.6 million. This difference was based upon a comparison of 2015 depreciation expense
10 using filed depreciation study rates to 2015 depreciation expense using previously approved
11 depreciation parameters. Both depreciation estimates incorporate estimated plant in-service
12 balances at December 31, 2015, and do not contain PGE's new Carty generating plant,
13 which went online in July 2016.

B. Stipulated Results

14 **Q. Did Staff and ICNU independently review the depreciation study?**

15 A. Yes. Staff conducted an independent and comprehensive review. Staff developed a set of
16 proposed Iowa Curves, average service lives, and net salvage rates for each of the plant
17 accounts. ICNU also analyzed PGE's depreciation study, and made recommendations at the
18 June 1 settlement conference.

19 **Q. Did Staff suggest adjustments to PGE's proposal?**

1 A. Yes. Staff recommended depreciation parameters for numerous depreciation groups. Staff
2 proposed the following adjustments:

- 3 • Changing the depreciation procedure in this depreciation study from Equal Life
4 Group (ELG) to Average Service Life (ASL) for new generating plants placed in
5 service after December 31, 2012;
- 6 • Adjustments to Iowa survivor curves and projected average service lives;
- 7 • Adjustments to net salvage rates.¹

8 **Q. Were the Stipulating Parties able to resolve the study differences for the electric plant**
9 **accounts?**

10 A. Yes, the differences were resolved in a settlement meeting held on June 1, 2017. The
11 Stipulating Parties recommend that the Commission adopt the position outlined in the
12 attached Stipulation provided in Exhibit 101. The Stipulation discusses the changes in the
13 Staff Settlement Proposal that the Stipulating Parties agreed to at the settlement meeting and
14 provides a table that details the straight line, remaining life, equal life group (ELG), and
15 average service life/vintage group (ASL/VG) depreciation rates derived for each
16 depreciation group, and new plants respectively.

17 **Q. What is the final impact on estimated depreciation expense due to Stipulation?**

18 A. The result of the settlement is a depreciation expense of \$277,324,003 or an aggregated
19 depreciation rate of 3.53 percent, as shown in the Stipulation Exhibit 102 - Depreciation
20 Settlement Summary Report. The net annual difference in depreciation expense, when
21 comparing the Stipulation to the depreciation study as filed of \$286,121,666 in the
22 Company's Application, is a reduction of approximately \$8.8 million.

¹ Net salvage is the difference between gross salvage and cost of removal. Net salvage is positive when gross salvage exceeds the cost of removal and reduces the revenue requirement. Conversely, net salvage is negative when cost of removal exceeds gross salvage and increases the revenue requirement.

1 **Q. Please describe the review that PGE, Staff and ICNU performed regarding PGE's**
2 **depreciation study.**

3 A. PGE, Staff, and ICNU considered Iowa survivor curves, average service and remaining lives
4 as well as net salvage rates. In order to get a better understanding of the characteristics of
5 the plants, PGE and Staff visited the following multiple PGE locations: Carty plant;
6 Boardman plant; Coyote Springs plant; Pelton/Round Butte, Faraday, North Fork and River
7 Mill hydro facilities. The visits were led by PGE engineers and included a discussion of
8 projected life and salvage rate of the assets.

9 The Stipulating Parties held a workshop on April 18, 2017, in Salem to review and
10 discuss the parameters of PGE's filing.

11 **Q. How are depreciation rates determined?**

12 A. Depreciation rates are derived by two depreciation parameters: (1) the combination of
13 Survival Curve and Projection Life (Curve-Life), and (2) Net Salvage Rates. The
14 depreciation filing and settlement discussions were focused on these two parameters, based
15 on which the depreciable asset remaining life and annual depreciation accrual are calculated.

16 **Q. How did PGE and Staff analyze Iowa Curves and Average Service Lives?**

17 A. Both PGE and Staff utilized the actuarial retirement rate methodology to analyze historical
18 retirement data to help determine Iowa curves and average service lives for each
19 depreciation group. Table 2 on the following page shows the depreciation groups for which
20 the Staff analyses produced differing results from PGE, and the final position agreed to by
21 the Stipulating Parties in settlement discussions.

**Table 2: UM 1809 – Settlement Adjustments to Depreciation Study Parameters
June 01, 2017**

ACCOUNT DESCRIPTION	ACCOUNT	DEPRECIATION STUDY AS FILED			SETTLEMENT AGREEMENT			
		Survivor Curve	Net Salvage Percent	ELG Rate	Survivor Curve	Net Salvage Percent	ASL Rate	Annual Change in Depreciation
Other Production Plant								
Structures and Improvements	341.00							
	<i>Port Westward II</i>			2.56			2.43	\$(36,760)
Structures and Improvements -Wind	341.01							
	<i>Tucannon</i>			2.90			2.72	\$(31,054)
Fuel Holders, Producers & Accessories	342.00							
	<i>Beaver – CT</i>	48-R3	(6)		50-R3	(6)		\$(8,665)
	<i>Coyote Springs - CT</i>	48-R3	(5)		50-R3	(5)		\$(15,454)
	<i>Port Westward - CT</i>	48-R3	(7)		50-R3	(7)		\$(3,375)
	<i>Port Westward II</i>	48-R3	(7)	2.88	50-R3	(7)	2.57	\$(20,444)
	<i>KB Pipeline</i>	48-R3	(10)		50-R3	(10)		\$(3,395)
Generators	344.00							
	<i>Beaver – CT</i>	38-R2	(6)		42-R1.5	(6)		\$(7,373)
	<i>Coyote Springs - CT</i>	38-R2	(5)		42-R1.5	(5)		\$(125,934)
	<i>Port Westward - CT</i>	38-R2	(7)		42-R1.5	(7)		\$(167,658)
	<i>Port Westward II</i>	38-R2	(7)	4.02	42-R1.5	(7)	2.93	\$(2,640,113)
Generators - Wind	344.01							
	<i>Tucannon</i>			4.19			3.62	\$(2,572,144)
Generators - Solar	344.02							
	<i>Solar</i>			6.12			5.08	\$(15,257)
Accessory Electric Equipment	345.00							
	<i>Port Westward II</i>			3.27			2.72	\$(52,124)

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Accessory Electric Equipment - Wind	345.01							
	<i>Tucannon</i>			4.54			3.61	\$(145,723)
Miscellaneous Plant Equipment	346.00							
	<i>Port Westward II</i>			2.96			2.57	\$(12,412)
Miscellaneous Plant Equipment - Wind	346.01							
	<i>Tucannon</i>			3.47			2.79	\$(3,296)
Transmission Plant								
Poles & Fixtures	355.00	50-R1	(50)		50-R1	(45)		\$(44,619)
Overhead Conductors & Devices	356.00	65-R2.5	(20)		65-R2.5	(15)		\$(89,328)
Distribution Plant								
Poles, Towers & Fixtures	364.00	45-R1	(50)		48-R0.5	(45)		\$(755,100)
Line Transformers	368.00	50-R2.5	(15)		50-R2.5	(10)		\$(645,131)
Meters - AMI	370.01	15-S2.5	(10)		16-S2.5	(10)		\$(1,066,017)
Circuits - Other	373.01	40-L2.5	(30)		40-L2.5	(27)		\$(32,828)
Fixtures, Ornamental Posts & Devices	373.02	25-L1	(30)		25-L1	(27)		\$(108,461)
Sentinel Lighting Equipment	373.07	29-L0.5	(30)		29-L0.5	(27)		\$(16,301)
General Plant								
Heavy Duty Trucks	392.04	20-S2	5		20-S2	8		\$(38,058)
Medium Duty Trucks	392.05	16-S1.5	5		16-S1.5	8		\$(58,979)
Light Duty Trucks	392.06	13-L2.5	5		13-L2.5	8		\$(55,038)
Trailers	392.08	30-S0	5		30-S0	8		\$(11,652)
Autos	392.09	11-S1.5	5		11-S1.5	8		\$(7,819)
Helicopter	392.10	20-S4	5		20-S4	8		\$(7,151)
Total Depreciation Change								\$(8,797,663)

1 The Staff position for most FERC 300 level accounts that differed from PGE’s filing
2 were reasonably close to those requested by PGE, and PGE accepted Staff’s position in
3 those cases. When PGE did not agree with Staff’s initial recommendations, Staff, PGE and

1 ICNU discussed their differences in order to establish the most appropriate life parameters
2 for each account as shown above.

3 For example, PGE proposed in the filed depreciation study a life of 15-S2.5 for Account
4 370.01 Meters – AMI. The Staff position for Account 370.01 was a 20-R1.5 survivor curve.
5 Staff recommended an average life of 20 years because the average battery life is about
6 18 to 20 years. Given the short time these meters have been in service, an actuarial analysis
7 would not fully describe the full life characteristics of this account. Given these
8 considerations and the curve-life estimates utilized by other utilities, the Stipulating Parties
9 recommend retaining the current curve-life combination of 16-S2.5 (16 year of average
10 service life and S2.5 type of dispersion), that was stipulated in PGE’s previous depreciation
11 study, until more mortality information is available. The Stipulating Parties held similar
12 discussions regarding each of the other accounts to establish the most reasonable life
13 estimates.

14 **Q. How did Staff determine curve-lives?**

15 A. Staff’s Iowa survivor curve-projection life selection was based on PGE’s raw data and data
16 from other electric companies nationwide. The curve-life statistic proposed by Staff is the
17 minimum sum of the normalized squared deviations. Normalization was done by dividing
18 each deviation by the corresponding observed balance.

19 Staff’s proposal recommended several changes to PGE’s proposed curve-life
20 combination for depreciable property groups. The recommended changes were made in the
21 average service life or dispersion curve (or both) for the FERC account categories in the
22 Other Production Plant, Transmission Plant, Distribution Plant, and General Plant.

1 The Staff's curve-life positions were not only based on statistical models specific to
2 PGE's raw data, but also the considerations of the curve-life data from other electric utility
3 companies, as well as the input from site visits.

4 **Q. Could you provide an example of how the Stipulating Parties agreed upon the curve-**
5 **life adjustment?**

6 A. Yes. Consider the Distribution Plant Account 364.00 Poles, Towers, and Fixtures for which
7 PGE proposed in the filed depreciation study a life of 45-R1. The Staff position for Account
8 364.00 was a 50-R1 survivor curve. In settlement discussions, PGE emphasized significant
9 statistical support for specified industry ranges for this type of asset and the potential for
10 future changes for distribution poles. After this discussion, the Stipulating Parties agreed to
11 utilize a 48-R0.5 curve that reflected all the critical factors for life expectancies for PGE's
12 distribution poles.

13 **Q. How did the Stipulating Parties determine net salvage rates?**

14 A. In order to determine net salvage rates for its generation facilities, PGE relied primarily
15 upon site-specific decommissioning studies, historical interim retirement data, and input
16 from in-house engineering personnel.

17 Staff analyzed the net salvage rates submitted by PGE, and examined the asset
18 retirement activities by comparing year-by-year, three-year and five-year moving averages,
19 as well as the most recent five and ten-year averages. Staff used information gained during
20 visits to power plants to evaluate asset retirement patterns and estimate net salvage rates.

21 For non-generation FERC 300 level accounts, both Staff and PGE utilized the statistical
22 methods of overall averages, and rolling and shrinking band analyses to study historical data
23 to help estimate net salvage characteristics. In addition, PGE consulted with in-house
24 engineering personnel to help determine future net salvage trends.

1 **Q. How were net salvage rates set for other production accounts?**

2 A. The net salvage rates for the other production accounts resulted from site-specific
3 decommissioning studies performed between 2002 and 2014. The resulting net salvage rate
4 requested in the Depreciation Study ranged from -5 percent to -10 percent. Staff
5 recommended a net salvage rate consistent with PGE.

6 **Q. How were net salvage rates adjusted for transmission assets?**

7 A. For Account 355.00, Transmission Poles and Fixtures, PGE recommended a net salvage rate
8 of -50 percent, based upon historical data, current expectations from field personnel and the
9 estimates of others. Staff recommended a net salvage rate of -37 percent that reflected the
10 recent downward trend from recent years. The Stipulating Parties agreed to utilize a net
11 salvage rate of -45 percent for this study, based upon the average of other utilities and the
12 lack of recent activity.

13 For Account 356.00, Transmission Overhead Conductor and Devices, PGE
14 recommended a reduction in the currently approved net salvage rate to -20 percent, because
15 there has been very little retirement activity in the past 13 years. The recommended net
16 salvage estimate was based largely upon net salvage experience prior to 2001 and the
17 estimates within the industry for overhead conductor. Staff recommended a net salvage rate
18 of -8 percent based on PGE's actual retirement activities and cost removal level that is less
19 negative than PGE's proposal. The Stipulating Parties agreed to a compromise position of -
20 15 percent for this depreciation study.

21 **Q. How were net salvage rates adjusted for distribution assets?**

22 A. For Account 364.00, Distribution Poles, Towers and Fixtures, PGE recommended a net
23 salvage rate of -50 percent, based upon the overall historical analyses for the period, 1971-
24 2015 and a general knowledge of the effort required to remove distribution poles. Staff

1 recommended a net salvage rate of -40 percent, based upon the recent trend for less net
2 salvage. The Stipulating Parties agreed upon a net salvage rate of -45 percent for this
3 depreciation study.

4 For Account 368.00, Line Transformers, PGE recommended a net salvage rate of -
5 15 percent, based upon the historical data for the period, 1971-2015. Staff recommended a
6 net salvage rate of -7 percent that reflects statistical results in recent years only. The
7 Stipulating Parties agreed upon a net salvage rate of -10 percent, which puts a greater
8 emphasis on the overall net salvage statistics.

9 For all subaccounts in Account 373.00, Street Lighting, PGE recommended a net
10 salvage rate of -30 percent, based upon historical net salvage data, the current prescribed net
11 salvage percent and the expectations of future costs. Staff recommended a net salvage rate
12 of -24 percent, based upon the recent 5-year trend. The Stipulating Parties agreed to
13 compromise on a net salvage position of -27 percent for this depreciation study, which
14 reflects recent trends and the estimates from some of the other comparable utilities.

C. ASL/VG versus ELG

15 **Q. What depreciation procedure did PGE propose for its 2015 Depreciation Study?**

16 A. PGE proposed depreciation rates calculated through the Equal Life Group (ELG) Procedure
17 for all generation plants.

18 **Q. Did Staff suggest a change to PGE's procedure for the depreciation rate calculation?**

19 A. Yes. Staff proposed using the Average Service Life (ASL) Procedure for all generation
20 plants built after December 31, 2012, in accordance with the stipulation approved through
21 Commission Order No. 14-297. ICNU supported Staff's proposal. Staff, CUB and PGE
22 had considerable discussion about the use of the ELG and ASL procedures in the prior
23 depreciation case (UM 1679). Among the six regulated utilities in Oregon, PGE is the only

1 one which uses the ELG procedure to calculate the depreciation. In its treatise known as the
2 “Public Utility Depreciation Practice” by the National Association of Regulatory Utility
3 Commissioners (NARUC), NARUC says that “The use of the ELG procedure has not been
4 approved by the Federal Energy Regulatory Commission (FERC) for use in the gas, oil, and
5 electric industries...since the industries regulated by it could not identify and track the units
6 that would be placed in each equal life group.” Also, “the composite ELG rate did not
7 contain a true-up procedure to correct for the excesses or deficiencies in accumulated
8 depreciation.” *See* page 175. Staff agrees with NARUC that, “The ELG procedure results
9 in annual accruals that are higher during the early years of a vintage's life, thereby causing
10 an increase in depreciation expense and revenue requirements during these years.” *See* page
11 176. For the reasons stated above, Staff recommended in the Company's prior depreciation
12 case that it use the ASL procedure for all new generating facilities that are built after
13 December 31, 2012. PGE ultimately agreed to do so, and the Commission then adopted the
14 parties Stipulation for this purpose in its Order No. 14-297.

15 **Q. Does PGE agree with Staff's proposed change in depreciation methodology?**

16 A. No. However, for settlement purposes, PGE agreed to change the depreciation procedure
17 for this depreciation study from ELG to ASL for generation plants built after December 31,
18 2012 for the 2015 Depreciation Study. Although agreeing to change the depreciation
19 procedure, PGE considers the ELG procedure superior to the ASL procedure because it
20 more accurately matches asset recovery to asset utilization. With the ELG procedure, while
21 depreciation expense is more up front, it is less in the tail of the assets' useful life, hence less
22 risk. Therefore, the ELG procedure is a more accurate and precise procedure compared to
23 ASL. Table 2 above presents the change in depreciation rates after switching from ELG to
24 ASL and the annual change in depreciation expense.

1 Q. Did the Parties propose a change on PGE filed depreciation rates for the Carty
2 facility?

3 A. No. even though the depreciation study was based upon plant in-service balances as of
4 December 31, 2015, and did not contain PGE’s new Carty generating plant, which went
5 online in July 2016, PGE still filed proposed depreciation parameters and rates to be used
6 for the Carty generation facility. *See* Exhibit 102, Table 1. Staff did not propose an
7 adjustment to these rates because (1) Staff compared PGE’s 2012 estimated depreciation
8 parameters for Carty plant (*see* Order No. 14-297, UM 1679, Exhibit 102 Table 1) and
9 found the survivor curves and net salvage rates have been updated at the same level as
10 settled for Port Westward gas generation plants in current case UM 1809, and (2) the
11 depreciation procedure used for Carty was Average Service Life as was approved in Order
12 No. 14-297.

D. Colstrip Plant Decommissioning

13 Q. Please provide depreciation information regarding Colstrip Plant closure.

14 A. PGE owns 20 percent each of the Colstrip Units 3 and 4 coal plant in Montana. Senate Bill
15 1547 (SB 1547) Section 1 requires:

16 (2) “On or before January 1, 2030, an electric company shall eliminate coal-fired resources
17 from its allocation of electricity.”

18 (3)(b) the resource be fully depreciated on or before December 31, 2030;

19 (6) the full recovery of ... costs related to the decommissioning... or the closure of a coal-
20 fired resource ..., at the time those costs are incurred.

21 To comply with SB 1547, and be consistent with the regulatory treatment prescribed in
22 Order No. 16-468 (establishing PGE’s Tariff Schedule 146 to shorten the Colstrip’s
23 Operating Life Expectancy, starting from January 1, 2017, the composite remaining life

1 (weighted average remaining life calculated by FERC accounts) will have 14 years from
2 original 21 years), PGE filed Colstrip depreciation Calculation in this filing, which reflected
3 the accelerated depreciation and plant decommissioning cost.

4 **Q. Has PGE provided the Colstrip demolition cost study for review in this filing?**

5 A. Yes. In this filing, PGE provided the study in the Company's Data Response No. 4B to
6 Staff's Data Request. The study was presented entitled "Colstrip Units 3 & 4 Retirement
7 Study - Demolition Cost Estimates and Site Review" prepared for PGE by HDR
8 Engineering, Inc., in November 2016. This study provides a retirement cost estimate to
9 decommission and demolish each of these generating units upon retirement, and displays a
10 comprehensive list of the facilities to be demolished as well as the tasks associated with each
11 of the demolition activities.

12 **Q. What are decommissioning costs for Colstrip?**

13 A. "Decommissioning" means removing a power plant from service. The Company will incur
14 decommissioning costs related to closure of Colstrip. The company's estimated
15 decommissioning costs is \$15.8 million, which include the costs to remove plant
16 components and a +30 percent contingency factor. A contingency factor is a "reserve" that
17 the cost estimator makes to cover unforeseeable expenses the project may incur. These
18 expenses may result from unpredictable conditions and uncertainties within the demolition
19 of Colstrip.

20 **Q. Have the Parties made adjustments on Colstrip decommissioning cost of a \$15.8**
21 **Million, which including 30 percent contingency factor in the final settlement?**

22 A. No. After reviews and discussions, the Parties did not make an adjustment on Colstrip
23 depreciation expenses and decommissioning costs.

1 **Q. How does PGE get the Colstrip Decommissioning cost recovered and when does this**
2 **cost recovery start?**

3 A. To recover the Colstrip plant closure cost, PGE rolls the decommissioning costs into its
4 depreciation schedule and allocates these costs by FERC account.

5 For doing so, PGE explained that in order to properly recover the full service value over
6 the life of the Colstrip facility, the terminal costs must be consistently recovered as a
7 percentage of plant retired on a terminal basis and the interim net salvage costs recovered
8 consistently with the plant retired on an interim basis (survivor curve).

9 For Colstrip, PGE clarified that the weighted net salvage percent includes interim net
10 salvage and terminal net salvage (Decommissioning Costs). The terminal net salvage
11 amount totals \$15,801,151 (\$10,082,950 + \$5,718,201). The amount is the summation of
12 \$10,082,950 for ash ponds and storage tanks and 20 percent PGE ownership of the
13 \$28,591,005 (5,718,201), which represents deconstruction costs.

14 Since Colstrip decommissioning cost is treated as a part of total net salvage cost and
15 therefore, it would get recovered through depreciation. Consequently, Colstrip's
16 decommissioning cost and accelerated depreciation are recovered simultaneously.

17 Also, given that the terminal cost will not change until final retirement (or a new
18 estimate determined), then the amount accrued can be determined at each test year and
19 subtracted from the established terminal cost amount of \$15,801,151. This process will
20 properly assign the accrual amount and incurred amount on an interim basis due to actual
21 retirements.

22 **Q. Please summarize your recommendations to the Commission.**

23 A. We recommend that the Commission approve the Stipulation. We also recommend that the
24 Commission order PGE to implement the depreciation curve-life and net salvage rates

1 parameters proposed in the Stipulation as of the effective date of the 2018 test year general
2 rate case docketed under Docket No. UE 319.

3 **Q. Does this conclude your testimony?**

4 A. Yes.

List of Exhibits

<u>PGE Exhibit</u>	<u>Description</u>
101	UM 1809 Stipulation
102	Table 1. Settlement Results
103	Table 2. Adjustment-Parameter Comparison
104	Staff Witness Qualification – Ming Peng
105	ICNU Witness Qualification – Bradley Mullins
106	PGE Witness Qualification – John Spanos

**BEFORE THE PUBLIC UTILITY COMMISSION
OF OREGON**

UM 1809

In the Matter of

PORTLAND GENERAL ELECTRIC
COMPANY

Detailed Depreciation Study of Electric
Utility Properties.

STIPULATION

This Stipulation (“Stipulation”) is between Portland General Electric Company (“PGE”), Staff of the Public Utility Commission of Oregon (“Staff”), and the Industrial Customers of Northwest Utilities (“ICNU”) (collectively, the “Stipulating Parties”).

On December 23, 2016, PGE filed with the Public Utility Commission of Oregon (“Commission”) the results of a detailed depreciation study of its utility properties as of December 31, 2015 (the “Study”), which included proposed depreciation lives, curves, and net salvage rates (collectively the “parameters”) and depreciation rates for PGE’s generation, transmission, distribution, and general plant. The depreciation rates initially proposed in UM 1809 would have resulted in an annual depreciation increase of approximately \$6.6 million. The increase is based upon a comparison of 2017 depreciation expense using filed depreciation study rates to 2017 depreciation expense using previously approved depreciation parameters. PGE also filed proposed depreciation rates to be used for the Carty generation facility (Carty).

The depreciation rates, if approved, will be used in the current pending general rate Docket No. UE 319.

The parties to this docket asked and responded to numerous data requests and a workshop was held on April 18, 2017. On June 1, 2017, PGE, Staff, and ICNU participated in a Settlement Conference. The discussions resulted in a compromise settlement by the Parties as set forth

below. The Citizens' Utility Board (CUB) of Oregon is a party to this docket, and has indicated that it does not oppose this Stipulation.

PGE, Staff, and ICNU request that the Commission issue an order in this docket implementing the terms of this Stipulation. As a settlement of the issues in dispute, the Parties have agreed to depreciation parameters and rates that would result in a decrease of approximately \$8.8 million on an annual basis from that originally proposed in this docket based on plant data at December 31, 2015.

TERMS OF STIPULATION

1. This Stipulation resolves all issues in this docket.
2. The Parties agree that the changes shown in Exhibit "103, Table 2" to this Stipulation should be made for the identified lives, curves, net salvage value, and rates. With the exception of the parameters set forth in Exhibit "103, Table 2" to this Stipulation, the parameters should remain as filed in PGE's Study.
3. Exhibit "102, Table 1" to the Stipulation is a complete list of all PGE depreciation parameters for all plant accounts by location, and depreciation parameters for PGE's Carty Plant.
4. As part of the settlement, the Parties agree that for this depreciation study PGE should use the Average Service Life depreciation procedure for the FERC accounts of new generating facilities including Carty Plant placed in service after December 31, 2012. PGE will continue to use the straight-line, Equal Life Group method for all other assets and accounts.
5. The Parties agree that PGE includes Colstrip decommissioning costs of \$15.8 million in the Plant depreciation schedule and allocates these costs by FERC account.
6. The revised depreciation parameters described above and set forth in Exhibit "102, Table 1" are reasonable and should be adopted.
7. The revised depreciation rates shall be implemented on January 1, 2018, the

effective date of PGE's pending general rate request in Docket UE 319.

8. No later than the end of 2022, PGE shall file with the Commission another detailed depreciation study of its utility property. The depreciation parameters detailed in Stipulation Exhibit "102, Table 1" will be utilized until the effective date of the next depreciation study.

9. The Stipulating Parties recommend and request that the Commission approve the adjustments described herein as appropriate and reasonable resolutions of all issues in this docket.

10. The Stipulating Parties agree that this Stipulation is in the public interest and will result in rates that are fair, just and reasonable and, if approved, will meet the standard in ORS 756.040.

11. The Stipulating Parties agree that this Stipulation represents a compromise in the positions of the parties. Without the written consent of all parties, evidence of conduct or statements, including but not limited to term sheets or other documents created solely for use in settlement conferences in this docket, are confidential and not admissible in the instant or any subsequent proceeding, unless independently discoverable or offered for other purposes allowed under ORS 40.190.

12. The Stipulating Parties have negotiated this Comprehensive Settlement as an integrated document. If the Commission rejects all or any material part of this Stipulation, or adds any material condition to any final order that is not consistent with this Stipulation, each Stipulating Party reserves its right to: (i) withdraw from the Stipulation, upon written notice to the Commission and other Parties within five (5) business days of service of the final order that rejects this Stipulation, in whole or material part, or adds such material condition; (ii) pursuant to OAR 860-001-0350(9), to present evidence and argument on the record in support of the

Stipulation, including the right to cross-examine witnesses, introduce evidence as deemed appropriate to respond fully to issues presented, and raise issues that are incorporated in the settlement embodied in this Stipulation; and (iii) pursuant to ORS 756.561 and OAR 860-001-0720, to seek rehearing or reconsideration or to appeal the Commission order under ORS 756.610. Nothing in this paragraph provides any Party the right to withdraw from this Stipulation as a result of the Commission's resolution of issues that this Stipulation does not resolve.

13. This Stipulation will be offered into the record in this proceeding as evidence pursuant to OAR 860-01-0350(7). The Stipulating Parties agree to support this Stipulation throughout this proceeding and in any appeal, provide witnesses to support this Stipulation (if specifically required by the Commission), and recommend that the Commission issue an order adopting the settlements contained herein. The Stipulating Parties also agree to cooperate in drafting and submitting an explanatory brief and written testimony per OAR 860-001-0350(7), unless such requirement is waived. By entering into this Stipulation, no Stipulating Party shall be deemed to have approved, admitted or consented to the facts, principles, methods or theories employed by any other Party in arriving at the terms of this Stipulation. Except as provided in this Stipulation, no Stipulating Party shall be deemed to have agreed that any provision of this Stipulation is appropriate for resolving issues in any other proceeding.

14. This Stipulation may be signed in any number of counterparts, each of which will be an original for all purposes, but all of which taken together will constitute one and the same agreement.

DATED this ^{14th} 17 day of July, 2017.



PORTLAND GENERAL ELECTRIC
COMPANY

STAFF OF THE PUBLIC UTILITY
COMMISSION OF OREGON

INDUSTRIAL CONSUMERS OF
NORTHWEST UTILITIES

DATED this 14th day of July, 2017.

PORTLAND GENERAL ELECTRIC
COMPANY

A handwritten signature in black ink, appearing to be "S. Spanos", written over a horizontal line.

STAFF OF THE PUBLIC UTILITY
COMMISSION OF OREGON

INDUSTRIAL CONSUMERS OF
NORTHWEST UTILITIES

DATED this 14th day of July, 2017.

PORTLAND GENERAL ELECTRIC
COMPANY

STAFF OF THE PUBLIC UTILITY
COMMISSION OF OREGON



INDUSTRIAL CONSUMERS OF
NORTHWEST UTILITIES

PORTLAND GENERAL ELECTRIC
TABLE 1. SUMMARY OF ESTIMATED SURVIVOR CURVES, NET SALVAGE, ORIGINAL COST, BOOK RESERVE AND CALCULATED ANNUAL DEPRECIATION ACCRUALS RELATED TO ELECTRIC PLANT AT DECEMBER 31, 2015

ACCOUNT (1)	SURVIVOR CURVE (2)	NET SALVAGE PERCENT (3)	ORIGINAL COST AS OF DECEMBER 31, 2015 (4)	BOOK RESERVE (5)	FUTURE ACCRUALS (6)	CALCULATED ANNUAL ACCRUAL		COMPOSITE REMAINING LIFE (9)=(6)/(7)	
						AMOUNT (7)	RATE (8)=(7)/(4)		
STEAM PRODUCTION PLANT									
BOARDMAN									
311.00	STRUCTURES AND IMPROVEMENTS	90 - S1.5 *	(1)	107,051,192.27	87,611,884	20,509,820	3,887,862 **	3.63	5.0
312.00	BOILER PLANT EQUIPMENT	65 - R3 *	(1)	258,670,948.24	182,243,279	79,014,379	15,194,946 **	5.87	5.0
312.00	BOARDMAN DECOMMISSIONING ACCRUAL			0.00	38,794,038	29,384,465	5,876,893 ***	-	5.0
312.01	RAIL CARS	28 - S0 *	0	10,039,472.22	8,451,505	1,587,967	317,593 **	3.16	5.0
314.00	TURBOGENERATOR UNITS	55 - R2 *	(1)	87,020,784.20	68,284,747	19,606,245	3,747,237 **	4.31	5.0
315.00	ACCESSORY ELECTRIC EQUIPMENT	60 - R2.5 *	(1)	23,989,831.51	19,749,114	4,480,616	848,144 **	3.54	5.0
316.00	MISCELLANEOUS POWER PLANT EQUIPMENT	60 - R1 *	(1)	6,389,064.18	4,797,377	1,655,578	318,343 **	4.98	5.0
	TOTAL BOARDMAN			493,161,292.62	409,931,944	166,239,070	30,191,017	6.12	5.0
COLSTRIP									
311.00	STRUCTURES AND IMPROVEMENTS	90 - S1.5 *	(4)	114,980,317.08	97,349,652	22,229,878	1,537,718	1.34	14.5
312.00	BOILER PLANT EQUIPMENT	65 - R3 *	(4)	229,441,033.29	171,920,909	66,697,766	4,598,492	2.00	14.5
314.00	TURBOGENERATOR UNITS	55 - R2 *	(4)	73,163,039.84	42,236,284	33,853,277	2,460,818	3.36	13.8
315.00	ACCESSORY ELECTRIC EQUIPMENT	60 - R2.5 *	(4)	23,503,535.66	19,216,964	5,226,713	378,888	1.61	13.8
316.00	MISCELLANEOUS POWER PLANT EQUIPMENT	60 - R1 *	(4)	6,315,521.02	5,013,262	1,554,880	113,521	1.80	13.7
	TOTAL COLSTRIP			447,403,446.89	335,737,071	129,562,514	9,089,437	2.03	14.3
	TOTAL STEAM PRODUCTION PLANT			940,564,739.51	745,669,015	285,801,584	39,280,454	4.18	7.3
HYDRAULIC PRODUCTION PLANT									
331.00	STRUCTURES AND IMPROVEMENTS								
	FARADAY	110 - R2.5 *	(58)	6,507,398.73	1,761,056	8,520,634	231,946	3.56	36.7
	NORTH FORK	110 - R2.5 *	(78)	8,766,845.94	2,804,512	12,800,474	346,484	3.95	36.9
	OAK GROVE	110 - R2.5 *	(57)	7,808,607.05	2,731,475	9,528,038	262,667	3.36	36.3
	PELTON	110 - R2.5 *	(176)	6,081,024.87	2,466,632	14,316,997	393,296	6.47	36.4
	RIVER MILL	110 - R2.5 *	(101)	3,087,139.50	1,204,960	5,000,190	143,068	4.63	34.9
	ROUND BUTTE	110 - R2.5 *	(78)	11,632,778.01	3,211,779	17,494,566	477,852	4.11	36.6
	SULLIVAN	110 - R2.5 *	(31)	9,367,473.54	2,234,868	10,036,522	527,354	5.63	19.0
	TOTAL STRUCTURES AND IMPROVEMENTS			53,251,267.64	16,415,282	77,697,421	2,382,667	4.47	32.6
332.00	RESERVOIRS, DAMS AND WATERWAYS								
	FARADAY	105 - R3 *	(58)	25,710,245.82	13,348,998	27,273,190	740,910	2.88	36.8
	NORTH FORK	105 - R3 *	(78)	82,474,814.59	20,648,726	126,156,444	3,339,631	4.05	37.8
	OAK GROVE	105 - R3 *	(57)	24,250,758.39	20,507,796	17,565,895	476,477	1.96	36.9
	PELTON	105 - R3 *	(176)	10,573,893.13	9,334,743	19,849,202	570,012	5.39	34.8
	RIVER MILL	105 - R3 *	(101)	54,796,423.92	14,177,614	95,963,198	2,541,153	4.64	37.8
	ROUND BUTTE	105 - R3 *	(78)	111,749,067.52	33,150,025	165,763,315	4,393,932	3.93	37.7
	SULLIVAN	105 - R3 *	(31)	23,569,921.71	6,537,779	24,338,818	1,267,803	5.38	19.2
	TOTAL RESERVOIRS, DAMS AND WATERWAYS			333,125,125.08	117,705,681	476,910,062	13,329,918	4.00	35.8

PORTLAND GENERAL ELECTRIC
TABLE 1. SUMMARY OF ESTIMATED SURVIVOR CURVES, NET SALVAGE, ORIGINAL COST, BOOK RESERVE AND CALCULATED
ANNUAL DEPRECIATION ACCRUALS RELATED TO ELECTRIC PLANT AT DECEMBER 31, 2015

ACCOUNT (1)	SURVIVOR CURVE (2)	NET SALVAGE PERCENT (3)	ORIGINAL COST AS OF DECEMBER 31, 2015 (4)	BOOK RESERVE (5)	FUTURE ACCRUALS (6)	CALCULATED ANNUAL ACCRUAL		COMPOSITE REMAINING LIFE (9)=(6)/(7)	
						AMOUNT (7)	RATE (8)=(7)/(4)		
333.00	WATER WHEELS, TURBINES AND GENERATORS								
	FARADAY	90 - S1 *	(58)	6,743,974.26	3,475,327	7,180,152	207,829	3.08	34.5
	NORTH FORK	90 - S1 *	(78)	6,899,509.02	6,282,294	5,998,832	181,063	2.62	33.1
	OAK GROVE	90 - S1 *	(57)	6,507,010.60	3,242,840	6,973,167	202,168	3.11	34.5
	PELTON	90 - S1 *	(176)	4,105,699.33	4,762,863	6,568,867	212,780	5.18	30.9
	RIVER MILL	90 - S1 *	(101)	5,925,913.48	2,853,284	9,057,802	260,583	4.40	34.8
	ROUND BUTTE	90 - S1 *	(78)	21,073,501.20	8,065,470	29,445,362	811,466	3.85	36.3
	SULLIVAN	90 - S1 *	(31)	9,416,266.85	3,831,447	8,503,863	452,491	4.81	18.8
	TOTAL WATER WHEELS, TURBINES AND GENERATORS			60,671,874.74	32,513,525	73,728,045	2,328,380	3.84	31.7
334.00	ACCESSORY ELECTRIC EQUIPMENT								
	FARADAY	60 - R2.5 *	(58)	2,581,008.84	1,266,781	2,811,213	93,695	3.63	30.0
	NORTH FORK	60 - R2.5 *	(78)	1,094,113.25	748,624	1,198,898	39,649	3.62	30.2
	OAK GROVE	60 - R2.5 *	(57)	3,252,567.74	959,520	4,147,011	144,195	4.43	28.8
	PELTON	60 - R2.5 *	(176)	2,526,584.92	1,078,094	5,895,280	191,498	7.58	30.8
	RIVER MILL	60 - R2.5 *	(101)	2,613,282.13	1,196,518	4,056,179	133,436	5.11	30.4
	ROUND BUTTE	60 - R2.5 *	(78)	2,312,032.27	920,949	3,194,468	102,040	4.41	31.3
	SULLIVAN	60 - R2.5 *	(31)	4,287,664.38	1,121,270	4,495,570	244,005	5.69	18.4
	TOTAL ACCESSORY ELECTRIC EQUIPMENT			18,667,253.53	7,291,756	25,798,619	948,518	5.08	27.2
335.00	MISCELLANEOUS PLANT EQUIPMENT								
	FARADAY	55 - R0.5 *	(58)	227,707.67	112,191	247,587	11,218	4.93	22.1
	NORTH FORK	55 - R0.5 *	(78)	490,238.58	345,014	527,611	21,414	4.37	24.6
	OAK GROVE	55 - R0.5 *	(57)	294,816.36	39,533	423,329	17,818	6.04	23.8
	PELTON	55 - R0.5 *	(176)	180,729.78	151,648	347,166	16,153	8.94	21.5
	RIVER MILL	55 - R0.5 *	(101)	20,116.12	7,019	33,414	1,240	6.16	26.9
	ROUND BUTTE	55 - R0.5 *	(78)	775,739.77	352,575	1,028,242	41,755	5.38	24.6
	SULLIVAN	55 - R0.5 *	(31)	109,225.68	30,729	112,357	6,743	6.17	16.7
	TOTAL MISCELLANEOUS PLANT EQUIPMENT			2,098,573.96	1,038,709	2,719,706	116,341	5.54	23.4
336.00	ROADS, RAILROADS, AND BRIDGES								
	FARADAY	75 - R1.5 *	(58)	1,976,298.06	720,109	2,402,442	76,894	3.89	31.2
	NORTH FORK	75 - R1.5 *	(78)	2,579,914.84	899,594	3,692,654	121,331	4.70	30.4
	OAK GROVE	75 - R1.5 *	(57)	2,322,129.51	2,348,085	1,297,658	54,378	2.34	23.9
	PELTON	75 - R1.5 *	(176)	2,148,378.02	918,543	5,010,980	160,335	7.46	31.3
	RIVER MILL	75 - R1.5 *	(101)	458,019.14	173,680	746,938	23,197	5.06	32.2
	ROUND BUTTE	75 - R1.5 *	(78)	1,575,722.57	520,847	2,283,939	76,767	4.87	29.8
	TOTAL ROADS, RAILROADS, AND BRIDGES			11,060,462.14	5,580,858	15,434,611	512,902	4.64	30.1
	TOTAL HYDRAULIC PRODUCTION PLANT			478,874,557.09	180,545,811	672,288,464	19,618,726	4.10	34.3
	OTHER PRODUCTION PLANT								
341.00	STRUCTURES AND IMPROVEMENTS								
	BEAVER - CT	70 - R3 *	(6)	35,405,156.97	28,773,362	8,756,104	617,260	1.74	14.2
	COYOTE SPRINGS - CT	70 - R3 *	(5)	11,227,916.75	7,079,845	4,709,468	202,241	1.80	23.3
	PORT WESTWARD - CT	70 - R3 *	(7)	41,367,466.65	7,883,237	36,379,952	1,119,714	2.71	32.5
	PORT WESTWARD II	70 - R3 *	(7)	28,892,514.71	719,655	30,195,336	702,054	2.43	43.0
	TOTAL STRUCTURES AND IMPROVEMENTS			116,893,055.08	44,456,099	80,040,860	2,641,269	2.26	30.3

PORTLAND GENERAL ELECTRIC
TABLE 1. SUMMARY OF ESTIMATED SURVIVOR CURVES, NET SALVAGE, ORIGINAL COST, BOOK RESERVE AND CALCULATED ANNUAL DEPRECIATION ACCRUALS RELATED TO ELECTRIC PLANT AT DECEMBER 31, 2015

	ACCOUNT (1)	SURVIVOR CURVE (2)	NET SALVAGE PERCENT (3)	ORIGINAL COST AS OF DECEMBER 31, 2015 (4)	BOOK RESERVE (5)	FUTURE ACCRUALS (6)	CALCULATED ANNUAL ACCRUAL		COMPOSITE REMAINING LIFE (9)=(6)/(7)
							AMOUNT (7)	RATE (8)=(7)/(4)	
341.01	STRUCTURES AND IMPROVEMENTS - WIND								
	BIGLOW CANYON WIND FARM	40 - R4 *	(8)	32,892,664.86	8,255,388	27,268,690	878,719	2.67	31.0
	TUCANNON RIVER WIND FARM	40 - R4 *	(7)	17,769,588.29	512,935	18,500,524	483,421	2.72	38.3
	TOTAL STRUCTURES AND IMPROVEMENTS - WIND			50,662,253.15	8,768,323	45,769,214	1,362,140	2.69	33.6
342.00	FUEL HOLDERS, PRODUCERS AND ACCESSORIES								
	BEAVER - CT	50 - R3 *	(6)	51,148,868.32	48,751,107	5,466,693	424,358	0.83	12.9
	COYOTE SPRINGS - CT	50 - R3 *	(5)	36,852,435.94	22,574,432	16,120,626	756,172	2.05	21.3
	PORT WESTWARD - CT	50 - R3 *	(7)	9,474,576.21	4,928,251	5,209,546	174,292	1.84	29.9
	PORT WESTWARD II	50 - R3 *	(7)	6,600,696.56	167,166	6,895,579	169,884	2.57	40.6
	KB PIPELINE	50 - R3 *	(10)	20,488,296.46	16,025,680	6,511,446	474,694	2.32	13.7
	TOTAL FUEL HOLDERS, PRODUCERS AND ACCESSORIES			124,564,873.49	92,446,636	40,203,890	1,999,400	1.61	20.1
344.00	GENERATORS								
	BEAVER - CT	42 - R1.5 *	(6)	105,251,250.10	65,406,021	46,160,304	3,614,287	3.43	12.8
	COYOTE SPRINGS - CT	42 - R1.5 *	(5)	124,431,320.70	59,928,915	70,723,972	3,753,327	3.02	18.8
	PORT WESTWARD - CT	42 - R1.5 *	(7)	193,348,812.60	43,720,635	163,162,594	6,873,526	3.55	23.7
	PORT WESTWARD II	42 - R1.5 *	(7)	241,967,755.26	6,952,288	251,953,210	7,096,623	2.93	35.5
	TOTAL GENERATORS			664,999,138.66	176,007,859	532,000,080	21,337,763	3.21	24.9
344.01	GENERATORS - WIND								
	BIGLOW CANYON WIND FARM	30 - R3 *	(8)	860,739,964.29	225,895,265	703,703,896	34,024,847	3.95	20.7
	TUCANNON RIVER WIND FARM	30 - R3 *	(7)	446,378,931.92	16,920,717	460,704,740	16,148,081	3.62	28.5
	TOTAL GENERATORS - WIND			1,307,118,896.21	242,815,982	1,164,408,636	50,172,928	3.84	23.2
344.02	GENERATORS - SOLAR	20 - L2.5	(2)	1,467,561.85	41,740	1,455,173	74,624	5.08	19.5
345.00	ACCESSORY ELECTRIC EQUIPMENT								
	DISPATCH GENERATION	45 - R2.5	(5)	11,478,510.39	2,344,228	9,708,208	297,666	2.59	32.6
	BEAVER - CT	45 - R2.5 *	(6)	24,145,243.83	11,722,095	13,871,863	1,045,319	4.33	13.3
	COYOTE SPRINGS - CT	45 - R2.5 *	(5)	12,132,732.79	7,630,592	5,108,777	259,310	2.14	19.7
	PORT WESTWARD - CT	45 - R2.5 *	(7)	8,949,403.88	2,625,054	6,950,808	255,940	2.86	27.2
	PORT WESTWARD II	45 - R2.5 *	(7)	9,473,952.07	265,080	9,872,049	258,025	2.72	38.3
	TOTAL ACCESSORY ELECTRIC EQUIPMENT			66,179,842.96	24,587,049	45,511,705	2,116,260	3.20	21.5
345.01	ACCESSORY ELECTRIC EQUIPMENT - WIND								
	BIGLOW CANYON WIND FARM	30 - R2.5 *	(8)	25,496,497.01	5,893,029	21,643,188	1,050,678	4.12	20.6
	TUCANNON RIVER WIND FARM	30 - R2.5 *	(7)	15,801,270.29	585,197	16,322,162	571,104	3.61	28.6
	TOTAL ACCESSORY ELECTRIC EQUIPMENT - WIND			41,297,767.30	6,478,226	37,965,350	1,621,782	3.93	23.4
346.00	MISCELLANEOUS PLANT EQUIPMENT								
	BEAVER - CT	55 - R2.5 *	(6)	4,351,056.14	3,549,989	1,062,131	77,741	1.79	13.7
	COYOTE SPRINGS - CT	55 - R2.5 *	(5)	2,625,081.78	1,288,897	1,467,439	66,534	2.53	22.1
	PORT WESTWARD - CT	55 - R2.5 *	(7)	3,176,638.78	646,833	2,752,170	93,036	2.93	29.6
	PORT WESTWARD II	55 - R2.5 *	(7)	3,137,236.36	77,299	3,279,544	80,598	2.57	40.7
	KB PIPELINE	55 - R2.5 *	(5)	81,794.37	67,349	18,535	1,351	1.65	13.7
	TOTAL MISCELLANEOUS PLANT EQUIPMENT			13,371,807.43	5,630,367	8,579,819	319,260	2.39	26.9

PORTLAND GENERAL ELECTRIC
TABLE 1. SUMMARY OF ESTIMATED SURVIVOR CURVES, NET SALVAGE, ORIGINAL COST, BOOK RESERVE AND CALCULATED ANNUAL DEPRECIATION ACCRUALS RELATED TO ELECTRIC PLANT AT DECEMBER 31, 2015

ACCOUNT (1)	SURVIVOR CURVE (2)	NET SALVAGE PERCENT (3)	ORIGINAL COST AS OF DECEMBER 31, 2015 (4)	BOOK RESERVE (5)	FUTURE ACCRUALS (6)	CALCULATED ANNUAL ACCRUAL		COMPOSITE REMAINING LIFE (9)=(6)/(7)	
						AMOUNT (7)	RATE (8)=(7)/(4)		
346.01 MISCELLANEOUS PLANT EQUIPMENT - WIND									
BIGLOW CANYON WIND FARM	40 - R2.5 *	(8)	1,323,570.90	267,760	1,161,697	41,642	3.15	27.9	
TUCANNON RIVER WIND FARM	40 - R2.5 *	(7)	486,495.43	15,218	505,332	13,577	2.79	37.2	
TOTAL ACCESSORY ELECTRIC EQUIPMENT - WIND			1,810,066.33	282,978	1,667,029	55,219	3.05	30.2	
TOTAL OTHER PRODUCTION PLANT			2,388,365,262.46	601,515,259	1,957,601,756	81,700,645	3.42	24.0	
TOTAL PRODUCTION			3,807,804,559.06	1,527,730,085	2,915,691,804	140,599,825	3.69		
TRANSMISSION PLANT									
352.00 STRUCTURES AND IMPROVEMENTS	65 - R2.5	(15)	19,312,917.31	7,936,981	14,272,874	344,467	1.78	41.4	
353.00 STATION EQUIPMENT	57 - R2	(15)	267,904,091.69	94,367,051	213,722,654	5,918,535	2.21	36.1	
353.00 STATION EQUIPMENT - BOARDMAN	57 - R2 *	(15)	5,908,401.82	4,777,880	2,016,782	415,797	7.04	4.9	
354.00 TOWERS AND FIXTURES	70 - S3	(10)	46,819,259.47	24,217,309	27,283,876	881,028	1.88	31.0	
355.00 POLES AND FIXTURES	50 - R1	(45)	25,714,209.81	11,988,605	25,296,999	844,683	3.28	29.9	
356.00 OVERHEAD CONDUCTORS AND DEVICES	65 - R2.5	(15)	73,514,806.59	60,343,434	24,198,594	515,611	0.70	46.9	
359.00 ROADS AND TRAILS	65 - R3	0	286,332.32	159,587	126,745	3,957	1.38	32.0	
TOTAL TRANSMISSION PLANT			439,460,019.01	203,790,847	306,918,524	8,924,078	2.03	34.4	
DISTRIBUTION PLANT									
361.00 STRUCTURES AND IMPROVEMENTS	65 - R2	(25)	39,801,374.33	14,627,097	35,124,621	884,126	2.22	39.7	
362.00 STATION EQUIPMENT	55 - S0	(20)	472,305,679.82	145,636,170	421,130,646	13,465,426	2.85	31.3	
363.00 STORAGE BATTERY	15 - L3	(5)	387,215.83	51,298	355,279	32,923	8.50	10.8	
364.00 POLES, TOWERS AND FIXTURES	48 - R0.5	(45)	349,610,655.27	253,174,817	253,760,633	9,577,378	2.74	26.5	
365.00 OVERHEAD CONDUCTORS AND DEVICES	50 - S0.5	(70)	587,352,192.37	401,592,869	596,905,858	19,871,601	3.38	30.0	
366.00 UNDERGROUND CONDUIT	80 - R4	(10)	15,385,200.81	9,995,741	6,927,980	144,328	0.94	48.0	
367.00 UNDERGROUND CONDUCTORS AND DEVICES	55 - S1.5	(70)	690,312,080.69	428,571,957	744,958,580	20,951,550	3.04	35.6	
368.00 LINE TRANSFORMERS	50 - R2.5	(10)	357,878,099.44	182,350,295	211,315,614	6,407,644	1.79	33.0	
369.01 SERVICES - OVERHEAD	48 - R2	(30)	61,300,422.74	40,906,305	38,784,245	1,175,241	1.92	33.0	
369.03 SERVICES - UNDERGROUND	50 - R4	(30)	354,770,903.06	274,949,537	186,252,637	5,106,647	1.44	36.5	
370.00 METERS	29 - R2	(10)	5,909,028.71	779,879	5,720,053	353,212	5.98	16.2	
370.01 METERS - AMI	16 - S2.5	(10)	136,195,804.78	41,386,300	108,429,085	10,794,809	7.93	10.0	
370.02 METERS - RETAINED	16 - L0.5	(10)	7,301,494.19	3,414,262	4,617,382	655,312	8.98	7.0	
371.00 INSTALLATIONS ON CUSTOMERS' PREMISES	30 - R4	0	376,133.46	282,975	93,158	6,448	1.71	14.4	
373.01 CIRCUITS - OTHER	40 - L2.5	(27)	21,950,396.75	17,460,094	10,416,910	449,834	2.05	23.2	
373.02 FIXTURES, ORNAMENTAL POSTS AND DEVICES	25 - L1	(27)	52,526,976.74	28,258,893	38,450,367	2,526,872	4.81	15.2	
373.07 SENTINEL LIGHTING EQUIPMENT	29 - L0.5	(27)	8,491,020.98	10,386,209	397,388	25,010	0.29	15.9	
TOTAL DISTRIBUTION PLANT			3,161,854,679.97	1,853,824,698	2,663,640,436	92,428,361	2.92	28.8	

PORTLAND GENERAL ELECTRIC
TABLE 1. SUMMARY OF ESTIMATED SURVIVOR CURVES, NET SALVAGE, ORIGINAL COST, BOOK RESERVE AND CALCULATED
ANNUAL DEPRECIATION ACCRUALS RELATED TO ELECTRIC PLANT AT DECEMBER 31, 2015

ACCOUNT (1)	SURVIVOR CURVE (2)	NET SALVAGE PERCENT (3)	ORIGINAL COST AS OF DECEMBER 31, 2015 (4)	BOOK RESERVE (5)	FUTURE ACCRUALS (6)	CALCULATED ANNUAL ACCRUAL		COMPOSITE REMAINING LIFE (9)=(6)/(7)	
						AMOUNT (7)	RATE (8)=(7)/(4)		
GENERAL PLANT									
390.00	STRUCTURES AND IMPROVEMENTS	40 - R0.5	(5)	94,090,979.72	25,831,389	72,964,140	3,598,550	3.82	20.3
390.10	STRUCTURES AND IMPROVEMENTS - LEASE								
	CSS	SQUARE	0	16,087.41	8,357	7,730	2,577	16.02	3.0
	EASTPORT	SQUARE	0	58,754.96	57,647	1,108	1,108	1.89	1.0
	ERC TUALATIN	SQUARE	0	414,255.32	297,945	116,310	48,061	11.60	2.4
	HILLSBORO	SQUARE	0	93,336.06	44,743	48,593	0	0.00	0.0
	SALEM	SQUARE	0	13,580.71	702	12,879	0	0.00	0.0
	WILSONVILLE	SQUARE	0	272,342.13	149,291	123,051	0	0.00	0.0
	WTC	SQUARE	0	24,503,645.04	6,538,850	17,964,795	647,382	2.64	27.7
	TOTAL STRUCTURES AND IMPROVEMENTS			25,372,001.63	7,097,535	18,274,466	699,128	2.76	26.1
	OFFICE FURNITURE AND EQUIPMENT								
391.10	FURNITURE AND EQUIPMENT	15 - SQ	0	22,059,425.35	7,299,101	14,760,324	1,505,944	6.83	9.8
391.20	COMPUTERS AND EQUIPMENT	5 - SQ	0	88,303,504.10	36,391,147	51,912,357	17,115,351	19.38	3.0
	TOTAL OFFICE FURNITURE AND EQUIPMENT			110,362,929.45	43,690,248	66,672,681	18,621,295	16.87	3.6
	TRANSPORTATION EQUIPMENT								
392.04	HEAVY DUTY TRUCKS	20 - S2	8	16,137,568.72	7,079,625	7,766,938	489,457	3.03	15.9
392.05	MEDIUM DUTY TRUCKS	16 - S1.5	8	14,767,748.37	8,146,081	5,440,248	550,523	3.73	9.9
392.06	LIGHT DUTY TRUCKS	13 - L2.5	8	10,963,150.43	5,118,816	4,967,282	571,196	5.21	8.7
392.08	TRAILERS	30 - S0	8	6,382,394.69	3,024,836	2,846,967	162,116	2.54	17.6
392.09	AUTOS	11 - S1.5	8	1,234,095.27	514,421	620,947	115,573	9.36	5.4
392.10	HELICOPTER	20 - S4	8	2,703,076.25	856,756	1,630,074	134,323	4.97	12.1
	TOTAL TRANSPORTATION EQUIPMENT			52,188,033.73	24,740,535	23,272,456	2,023,188	3.88	11.5
393.00	STORES EQUIPMENT	20 - SQ	0	2,830,641.95	1,410,975	1,419,667	134,666	4.76	10.5
394.00	TOOLS, SHOP AND GARAGE EQUIPMENT	20 - SQ	0	15,411,225.59	5,412,448	9,998,778	814,541	5.29	12.3
395.00	LABORATORY EQUIPMENT	15 - SQ	0	9,245,946.80	4,126,837	5,119,110	1,037,204	11.22	4.9
	POWER OPERATED EQUIPMENT								
396.01	MAN LIFT	14 - S1.5	10	25,700,584.24	13,451,565	9,678,961	1,210,977	4.71	8.0
396.02	DIGGER	16 - R2.5	10	7,108,488.69	4,083,549	2,314,091	250,187	3.52	9.2
396.03	CRANE	22 - S2.5	10	4,701,378.01	3,405,477	825,763	62,930	1.34	13.1
396.07	CONSTRUCTION EQUIPMENT	19 - L1.5	10	7,386,692.68	3,708,898	2,939,125	249,934	3.38	11.8
	TOTAL POWER OPERATED EQUIPMENT			44,897,143.62	24,649,489	15,757,940	1,774,028	3.95	8.9
	COMMUNICATION EQUIPMENT								
397.01	LINE EQUIPMENT	15 - SQ	0	6,771,132.76	1,014,926	5,756,207	469,727	6.94	12.3
397.03	RADIO, MICROWAVE AND TERMINAL EQUIPMENT	15 - SQ	0	90,674,615.01	45,187,175	45,487,440	6,141,122	6.77	7.4
397.06	MOBILE RADIO EQUIPMENT	15 - SQ	0	354,605.46	56,797	297,808	24,804	6.99	12.0
397.07	TELEPHONE EQUIPMENT	15 - SQ	0	848,493.02	661,698	186,795	17,716	2.09	10.5
	TOTAL COMMUNICATION EQUIPMENT			98,648,846.25	46,920,596	51,728,250	6,653,369	6.74	7.8
398.00	MISCELLANEOUS EQUIPMENT	20 - SQ	0	308,112.03	27,915	280,197	15,770	5.12	17.8
	TOTAL GENERAL PLANT			453,355,860.77	183,907,967	265,487,685	35,371,739	7.80	7.5
	TOTAL DEPRECIABLE PLANT			7,862,475,118.81	3,769,253,597	6,151,738,449	277,324,003	3.53	22.2

PORTLAND GENERAL ELECTRIC
TABLE 1. SUMMARY OF ESTIMATED SURVIVOR CURVES, NET SALVAGE, ORIGINAL COST, BOOK RESERVE AND CALCULATED ANNUAL DEPRECIATION ACCRUALS RELATED TO ELECTRIC PLANT AT DECEMBER 31, 2015

ACCOUNT (1)	SURVIVOR CURVE (2)	NET SALVAGE PERCENT (3)	ORIGINAL COST AS OF DECEMBER 31, 2015 (4)	BOOK RESERVE (5)	FUTURE ACCRUALS (6)	CALCULATED ANNUAL ACCRUAL		COMPOSITE REMAINING LIFE (9)=(6)/(7)
						AMOUNT (7)	RATE (8)=(7)/(4)	
NONDEPRECIABLE / ACCOUNTS NOT STUDIED								
302.00	FRANCHISES AND CONSENTS		182,591,124.04	43,095,243				
303.00	MISCELLANEOUS INTANGIBLE PLANT		373,677,186.19	183,671,147				
310.00	LAND AND LAND RIGHTS		4,161,715.00					
317.00	STEAM PRODUCTION PLANT - ARO		64,270,343.08	17,249,036				
330.00	LAND AND LAND RIGHTS		6,047,627.00	1,419,090				
332.00	RESERVOIRS, DAMS AND WATERWAYS (BULL RUN)			683,971				
337.00	HYDRAULIC PRODUCTION PLANT - ARO		5,128.00	3,822				
340.00	LAND AND LAND RIGHTS		48,946.00					
347.00	OTHER PRODUCTION PLANT - ARO		13,851,275.55	375,367				
350.00	LAND AND LAND RIGHTS		11,508,608.06	(6,755)				
359.10	TRANSMISSION PLANT - ARO		34,109.00	68,148				
360.00	LAND AND LAND RIGHTS		23,952,229.58	(1,788,512)				
370.03	METERS - ACCELERATED			(8,218)				
374.00	DISTRIBUTION PLANT - ARO		476,732.00	580,400				
389.00	LAND AND LAND RIGHTS		9,654,596.49	(458,153)				
392.01	TRANSPORTATION EQUIPMENT - UNKNOWN			241,194				
399.00	GENERAL PLANT - ARO		65,289.00	109,957				
TOTAL NONDEPRECIABLE / NOT STUDIED			690,344,908.99	245,235,737				
TOTAL ELECTRIC PLANT			8,552,820,027.80	4,014,489,334	6,151,738,449	277,324,003		

* CURVE SHOWN IS INTERIM SURVIVOR CURVE. EACH FACILITY IN THE ACCOUNT IS ASSIGNED AN INDIVIDUAL PROBABLE RETIREMENT YEAR.

** ANNUAL DEPRECIATION EXPENSE BASED ON METHOD PREVIOUSLY APPROVED BY THE OPUC IN ORDER NO. 10-478.

*** UPDATED PER CURRENTLY-APPROVED SCHEDULE 145.

NOTES:

ACCRUAL RATES FOR FACILITIES TO BE PLACED IN SERVICE AFTER DECEMBER 31, 2015 ARE AS FOLLOWS.

CARTY	RATE	SURVIVOR CURVE	NET SALVAGE PERCENT
341.00	2.45	70 - R3	* (7)
342.00	2.61	48 - R3	* (7)
344.00	3.02	38 - R2	* (7)
346.00	2.58	55 - R2.5	* (7)

Portland General Electric

Table 2. Comparison of Estimated Survivor Curves, Net Salvage, and Calcu

ACCOUNT DESCRIPTION	ACCOUNT	2015 DEPRECIATION		
		STUDY AS FILED		
		Survivor Curve	Net Salvage Percent	ELG Rate
Other Production Plant				
Structures and Improvements	341			
	<i>Port Westward II</i>			2.56
Structures and Improvements - Wind	341.01			
	<i>Tucannon</i>			2.9
Fuel Holders, Producers & Accessories	342			
	<i>Beaver – CT</i>	48-R3	-6	
	<i>Coyote Springs - CT</i>	48-R3	-5	
	<i>Port Westward - CT</i>	48-R3	-7	
	<i>Port Westward II</i>	48-R3	-7	2.88
	<i>KB Pipeline</i>	48-R3	-10	
Generators	344			
	<i>Beaver – CT</i>	38-R2	-6	
	<i>Coyote Springs - CT</i>	38-R2	-5	
	<i>Port Westward - CT</i>	38-R2	-7	
	<i>Port Westward II</i>	38-R2	-7	4.02
Generators - Wind	344.01			
	<i>Tucannon</i>			4.19
Generators - Solar	344.02			
	<i>Solar</i>			6.12
Accessory Electric Equipment	345			
	<i>Port Westward II</i>			3.27
Accessory Electric Equipment - Wind	345.01			
	<i>Tucannon</i>			4.54
Miscellaneous Plant Equipment	346			
	<i>Port Westward II</i>			2.96
Miscellaneous Plant Equipment - Wind	346.01			
	<i>Tucannon</i>			3.47
Transmission Plant				
Poles & Fixtures	355	50-R1	-50	
Overhead Conductors & Devices	356	65-R2.5	-20	
Distribution Plant				

Poles, Towers & Fixtures	364	45-R1	-50	
Line Transformers	368	50-R2.5	-15	
Meters - AMI	370.01	15-S2.5	-10	
Circuits - Other	373.01	40-L2.5	-30	
Fixtures, Ornamental Posts & Devices	373.02	25-L1	-30	
Sentinel Lighting Equipment	373.07	29-L0.5	-30	
General Plant				
Heavy Duty Trucks	392.04	20-S2	5	
Medium Duty Trucks	392.05	16-S1.5	5	
Light Duty Trucks	392.06	13-L2.5	5	
Trailers	392.08	30-S0	5	
Autos	392.09	11-S1.5	5	
Helicopter	392.1	20-S4	5	
Total Depreciation Change				

lated Annual Depreciation Rates

SETTLEMENT			
AGREEMENT			
Survivor Curve	Net Salvage Percent	ASL Rate	Annual Change in Depreciation
		2.43	(\$36,760)
		2.72	(\$31,054)
50-R3	-6		(\$8,665)
50-R3	-5		(\$15,454)
50-R3	-7		(\$3,375)
50-R3	-7	2.57	(\$20,444)
50-R3	-10		(\$3,395)
42-R1.5	-6		(\$7,373)
42-R1.5	-5		(\$125,934)
42-R1.5	-7		(\$167,658)
42-R1.5	-7	2.93	(\$2,640,113)
		3.62	(\$2,572,144)
		5.08	(\$15,257)
		2.72	(\$52,124)
		3.61	(\$145,723)
		2.57	(\$12,412)
		2.79	(\$3,296)
50-R1	-45		(\$44,619)
65-R2.5	-15		(\$89,328)

48-R0.5	-45		(\$755,100)
50-R2.5	-10		(\$645,131)
16-S2.5	-10		(\$1,066,017)
40-L2.5	-27		(\$32,828)
25-L1	-27		(\$108,461)
29-L0.5	-27		(\$16,301)
20-S2	8		(\$38,058)
16-S1.5	8		(\$58,979)
13-L2.5	8		(\$55,038)
30-S0	8		(\$11,652)
11-S1.5	8		(\$7,819)
20-S4	8		(\$7,151)
			(\$8,797,663)

WITNESS QUALIFICATIONS STATEMENT

NAME: Ming Peng (Ms.)
EMPLOYER: Public Utility Commission of Oregon
TITLE: Senior Economist
Energy Rates, Finance and Audit Division
ADDRESS: 201 High Street SE. Suite 100
Salem, OR. 97301

EDUCATION & TRAINING:

M.S. Applied Economics
University of Idaho, Moscow

B.S. Statistics
People's University of China, Beijing

C.R.R.A. Certified Rate of Return Analyst
Society of Utility and Regulatory Financial Analysts

Depreciation studies - the Society of
Depreciation Professionals

NARUC Annual Regulatory Studies Program
Michigan State University, East Lansing

300+ credit hours on 30+ topics trainings in public utility industry

EXPERIENCE: 1/11/1999-Present, Public Utility Commission of Oregon

I have been employed by the Public Utility Commission of Oregon (Commission) for 18.5 years since January 1999. My roles include: Expert Witness, Case Manager, Economist, Policy Analyst, Econometrician, and Principal Analyst

I have testified in various formal state hearings and performed numerous analyses including economic, financial, statistical, mathematical, marketing, and policy analyses in public utility industry.

Principal Analyst & Case Manager, Settlement Leader/Negotiator for Depreciation and Ratemaking:

For the "Depreciation Rate Determination" (fixed cost capital recovery), I have served as a Principal Analyst and Case Manager for the determination of Energy Property Depreciation Rates (Oregon Revised Statute 757.140) and monitoring a significant piece of the revenue requirement for past 10 years.

In this position, I investigate, analyze and calculate “Energy Asset Retirement Cost & Impact” and “Power Plant Decommissioning Cost & Impact” on Customer Rates. I review, calculate, analyze fixed asset depreciation and propose depreciation parameters for each of FERC accounts on Generation, Transmission, Distribution, General, and Coal Mining Plants. The energy sources I have worked on are Steam/Coal, Hydraulic, Natural Gas, Wind, Solar and Geothermal.

My analyses of “Power-Plant-Shutdown” activities include the following cases:

1. PGE closes Boardman Coal-fired plant (UM 1679 & UE 215),
2. PacifiCorp closes Carbon Coal Plant in Utah (UE 246)
3. Multi-state PacifiCorp Klamath Hydro Dam Removal Cost recovery for (1) J. C. Boyle Dam, (2) Copco 1 Dam, (3) Copco 2 Dam, and (4) Iron Gate Dam removal under the ORS 757.734 - Recovery of investment in Klamath River dams in OPUC UE 219.
4. Idaho Power Valmy Coal-fired power plant Shutdown (UE 316)
5. PGE Colstrip Coal-fired power plant Shutdown (UM 1809)

I conduct case investigation and analysis on Utility’s filings, make rate adjustments, lead settlement negotiation, prepare testimony, and appear on behalf of the Commission. The energy companies I work with are: (1) PacifiCorp (serves 6 states), (2) PGE, (3) Northwest Natural Gas (NWN), (4) Idaho Power, (5) Avista Corp (Washington), and (6) Cascade Gas (CNG, Montana).

Lead Analyst and Case Manager on Financial Dockets:

Prior to my present position, I was a lead analyst and case manager for cost of capital, mainly debt capital analysis for nine years. My responsibilities included: review and analyze regulatory policy on Cost of Capital and Market Risks from utility’s financial applications for their Derivative Instruments & Hedging Activities and Capital Raising Activities.

I advised the Commission on over 60 Financial Dockets and obtained the Commission Orders.

I passed the certification test offered by “Society of Utility and Regulatory Financial Analysts”, become a “Certified Rate of Return Analyst” in 2002.

Public Utility & Policy Analyst:

Energy Merger & Acquisition: I have testified in formal state hearings involving Energy Merger & Acquisition, I conducted Acquisition Premiums & Credit Risk Analysis and testified for the Merger case of “PacifiCorp vs. MidAmerican Energy Company” (a subsidiary of Berkshire Hathaway Energy) in UM 1209. My reviews on Energy Merger & Acquisition also include “PacifiCorp vs. Scottish Power”, “PGE vs. Enron”.

Clean Energy – Dollar Impact on Customer Rates: I performed analyses of “Rate Impact Calculation of Oregon Clean Energy Capital Investment, Comparative Advantage of Oregon Clean Energy – Dollar Impact in Rates”.

General Rate Case and Other Cases: I testified and conducted analyses on some subjects in the revenue requirement. I testified on Depreciation and Reserve, Cost of Debt Capital, Fuel Price Forecasting Regarding Property Sales; I reviewed Load Forecasting, Weather Normalization, Integrated Resource Planning (IRP).

Statistical Sampling Design & Procedure Design: My work functions have also included the Statistical Sampling Design & Procedure Design, and I testified on Revenue Issues (UM 1288) by presenting the sampling results.

Utility Auditing: I conducted Energy Utility Auditing for cost of capital component on energy companies and also preformed utility operational auditing. I have conducted “Interest Rate and Late Payment Charge” Survey and Analysis annually for state of Oregon (UM 779).

Telecom Market Survey Analysis: I conducted Telecommunications “Market Competition and Economic Policy Survey Analysis” and write report for House Bill 2577, the report has been published on OPUC web annually for 15 years.

Mentor in the ICER - International Confederation of Energy Regulators

I was selected to act as a mentor in the ICER (International Confederation of Energy Regulators) Women in Energy (ICER WIE) pilot mentoring program. My “Mentoring Topics” were focus on Incentive Regulation; Rate and Economic Impacts of “Cost-of-Service” regulation in US and “Price-Cap” in Europe; Cost of Capital, Energy Demand and Price Forecasting Models; Least Cost Planning; and Regulatory Policy & Renewable Energy issues affecting Utility Rates.

QUALIFICATION STATEMENT OF BRADLEY G. MULLINS

Q. PLEASE STATE YOUR OCCUPATION.

A. I am a consultant representing energy and utility customers in regulatory jurisdictions around the United States, with a primary focus in the Northwest.

Q. PLEASE SUMMARIZE YOUR EDUCATION AND WORK EXPERIENCE.

A. I have a Master of Science degree in Accounting from the University of Utah. After obtaining my Master's degree I was a staff-level tax consultant at Deloitte, where I ultimately specialized in research and development tax incentives. Subsequently, I worked at PacifiCorp as an analyst involved in power supply cost forecasting. I currently provide services to utility customers on regulatory matters such as power costs, revenue requirements, rate spread and rate design.

Q. PLEASE PROVIDE A LIST OF REGULATORY PROCEEDINGS WHERE YOU HAVE SUBMITTED TESTIMONY.

- A. I have submitted testimony in the following regulatory proceedings:
- In re the 2018 General Rate Case of Puget Sound Energy, Wa.UTC, Docket No. 170033 (Cons.).
 - In re PacifiCorp, dba Pacific Power, 2018 Transition Adjustment Mechanism, Or.PUC, Docket No. UE 323.
 - In re Portland General Electric Company, Request for a General Rate Revision, Or.PUC, Docket No. UE 319.
 - In re the Public Utility Commission of Oregon, Investigation to Examine PacifiCorp, dba Pacific Power's Non-Standard Avoided Cost Pricing, Or.PUC, Docket No. UM 1802.
 - In re Pacific Power & Light Co., Revisions to Tariff WN U-75, Advice No. 16-05, to modify the Company's existing tariffs governing permanent disconnection and removal procedures, Wa.UTC, Docket No. UE-161204.
 - In re Puget Sound Energy's Revisions to Tariff WN U-60, Adding Schedule 451, Implementing a New Retail Wheeling Service, Wa.UTC, Docket No. UE-161123.

- 2018 Joint Power and Transmission Rate Proceeding, Bonneville Power Administration, Case No. BP-18.
- In re Portland General Electric Company Application for Approval of Sale of Harborton Restoration Project Property, Or.PUC, Docket No. UP 334 (Cons.).
- In re An Investigation of Policies Related to Renewable Distributed Electric Generation, Ar.PSC, Matter No. 16-028-U.
- In re Net Metering and the Implementation of Act 827 of 2015, Ar.PSC, Matter No. 16-027-R.
- In re the Application of Rocky Mountain Power for Approval of the 2016 Energy Balancing Account, Ut.PSC, Docket No. 16-035-01
- In re Avista Corporation Request for a General Rate Revision, Wa.UTC, Docket No. UE-160228 (Cons.).
- In re the Application of Rocky Mountain Power to Decrease Current Rates by \$2.7 Million to Recover Deferred Net Power Costs Pursuant to Tariff Schedule 95 and to Increase Rates by \$50 Thousand Pursuant to Tariff Schedule 93, Wy.PSC, Docket No. 20000-292-EA-16.
- In re PacifiCorp, dba Pacific Power, 2017 Transition Adjustment Mechanism, Or.PUC, Docket No. UE 307.
- In re Portland General Electric Company, 2017 Annual Power Cost Update Tariff (Schedule 125), Or.PUC, Docket No. UE 308.
- In re PacifiCorp, Request to Initiate an Investigation of Multi-Jurisdictional Issues and Approve an Inter-Jurisdictional Cost Allocation Protocol, Or.PUC, UM 1050.
- In re Pacific Power & Light Company, General rate increase for electric services, Wa.UTC, Docket No. UE-152253.
- In The Matter of the Application of Rocky Mountain Power for Authority of a General Rate Increase in Its Retail Electric Utility Service Rates in Wyoming of \$32.4 Million Per Year or 4.5 Percent, Wy.PSC, Docket No. 20000-469-ER-15.
- In re Avista Corporation, General Rate Increase for Electric Services, Wa.UTC, Docket No. UE-150204.
- In re the Application of Rocky Mountain Power to Decrease Rates by \$17.6 Million to Recover Deferred Net Power Costs Pursuant to Tariff Schedule 95 to Decrease Rates by \$4.7 Million Pursuant to Tariff Schedule 93, Wy.PSC, Docket No. 20000-472-EA-15.

- Formal complaint of The Walla Walla Country Club against Pacific Power & Light Company for refusal to provide disconnection under Commission-approved terms and fees, as mandated under Company tariff rules, Wa.UTC, Docket No. UE-143932.
- In re PacifiCorp, dba Pacific Power, 2016 Transition Adjustment Mechanism, Or.PUC, Docket No. UE 296.
- In re Portland General Electric Company, Request for a General Rate Revision, Or.PUC, Docket No. UE 294.
- In re Portland General Electric Company and PacifiCorp dba Pacific Power, Request for Generic Power Cost Adjustment Mechanism Investigation, Or.PUC, Docket No. UM 1662.
- In re PacifiCorp, dba Pacific Power, Application for Approval of Deer Creek Mine Transaction, Or.PUC, Docket No. UM 1712.
- In re Public Utility Commission of Oregon, Investigation to Explore Issues Related to a Renewable Generator's Contribution to Capacity, Or.PUC, Docket No. UM 1719.
- In re Portland General Electric Company, Application for Deferral Accounting of Excess Pension Costs and Carrying Costs on Cash Contributions, Or.PUC, Docket No. UM 1623.
- 2016 Joint Power and Transmission Rate Proceeding, Bonneville Power Administration, Case No. BP-16.
- In re Puget Sound Energy, Petition to Update Methodologies Used to Allocate Electric Cost of Service and for Electric Rate Design Purposes, Wa.UTC, Docket No. UE-141368.
- In re Pacific Power & Light Company, Request for a General Rate Revision Resulting in an Overall Price Change of 8.5 Percent, or \$27.2 Million, Wa.UTC, Docket No. UE-140762.
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- In re PacifiCorp, dba Pacific Power, 2015 Transition Adjustment Mechanism, Or.PUC, Docket No. UE 287.
- In re Portland General Electric Company, Request for a General Rate Revision, Or.PUC, Docket No. UE 283.
- In re Portland General Electric Company's Net Variable Power Costs (NVPC) and Annual Power Cost Update (APCU), Or.PUC, Docket No. UE 286.
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- In re PacifiCorp, dba Pacific Power, Transition Adjustment, Five-Year Cost of Service Opt-Out (adopting testimony of Donald W. Schoenbeck), Or.PUC, Docket No. UE 267.

WITNESS QUALIFICATIONS STATEMENT

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Completed “Introduction to Public Utility Accounting” program
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President – Society of Depreciation Professionals – 2012
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