Columbia Generation Station

Bonneville Power Administration Market Test

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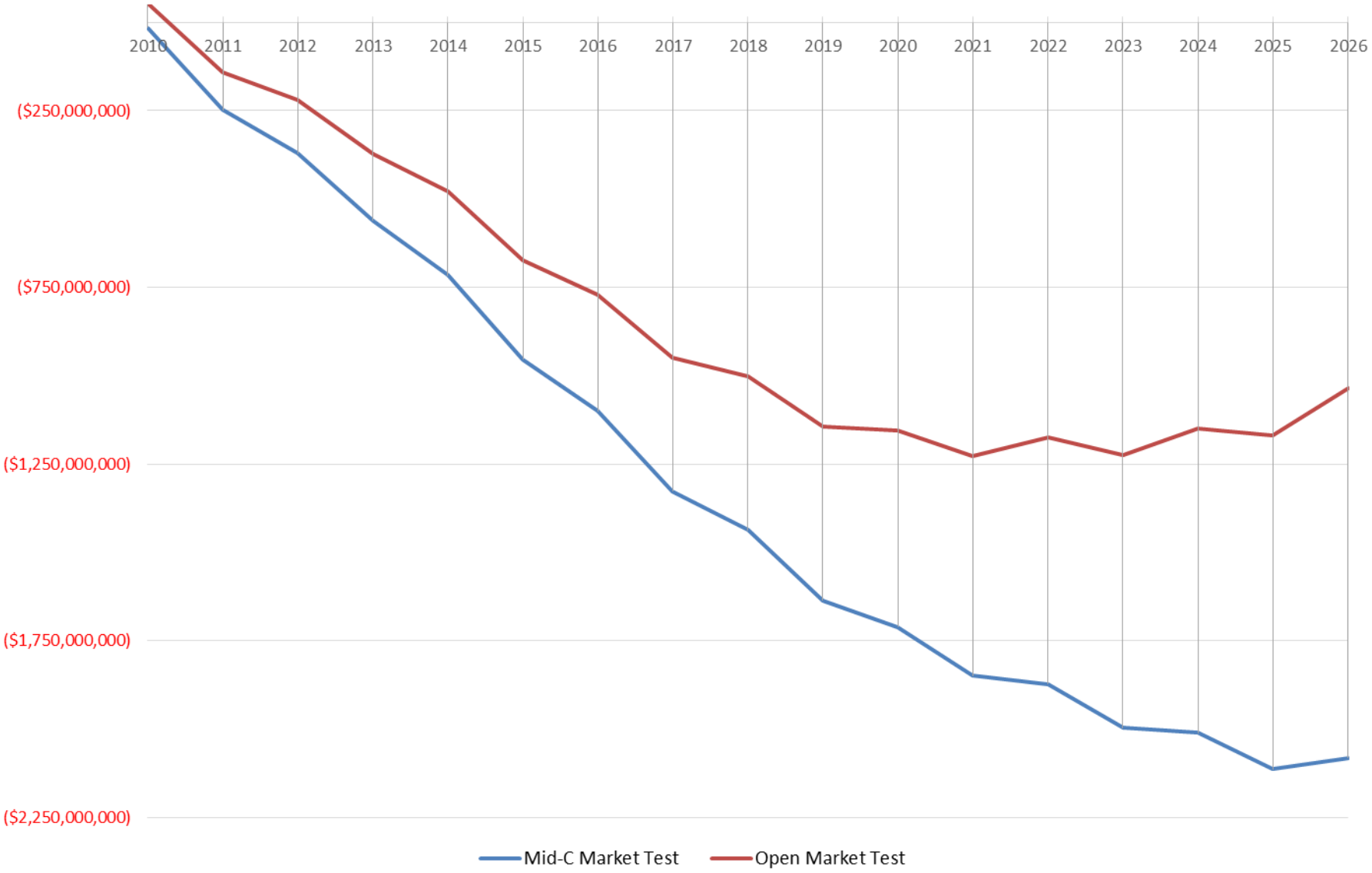
Columbia Generating Station Market Test Summary

- CGS failed both market tests
  - Mid-C Market Test
    - $2,100,000,000 (billion) cumulative loss by 2026
      - Corroborates $1.7 billion cumulative loss projected by McCullough Research
  - Open Market Test
    - $1,000,000,000 (billion) cumulative loss by 2026
      - ~1.5% BPA power cost rate impact

- Seattle City Light cumulative loss ranges between $78,000,000 and $155,000,000
  - SCL share based 7.5% Tier One Cost Allocator (TOCA)

Columbia Generating Station

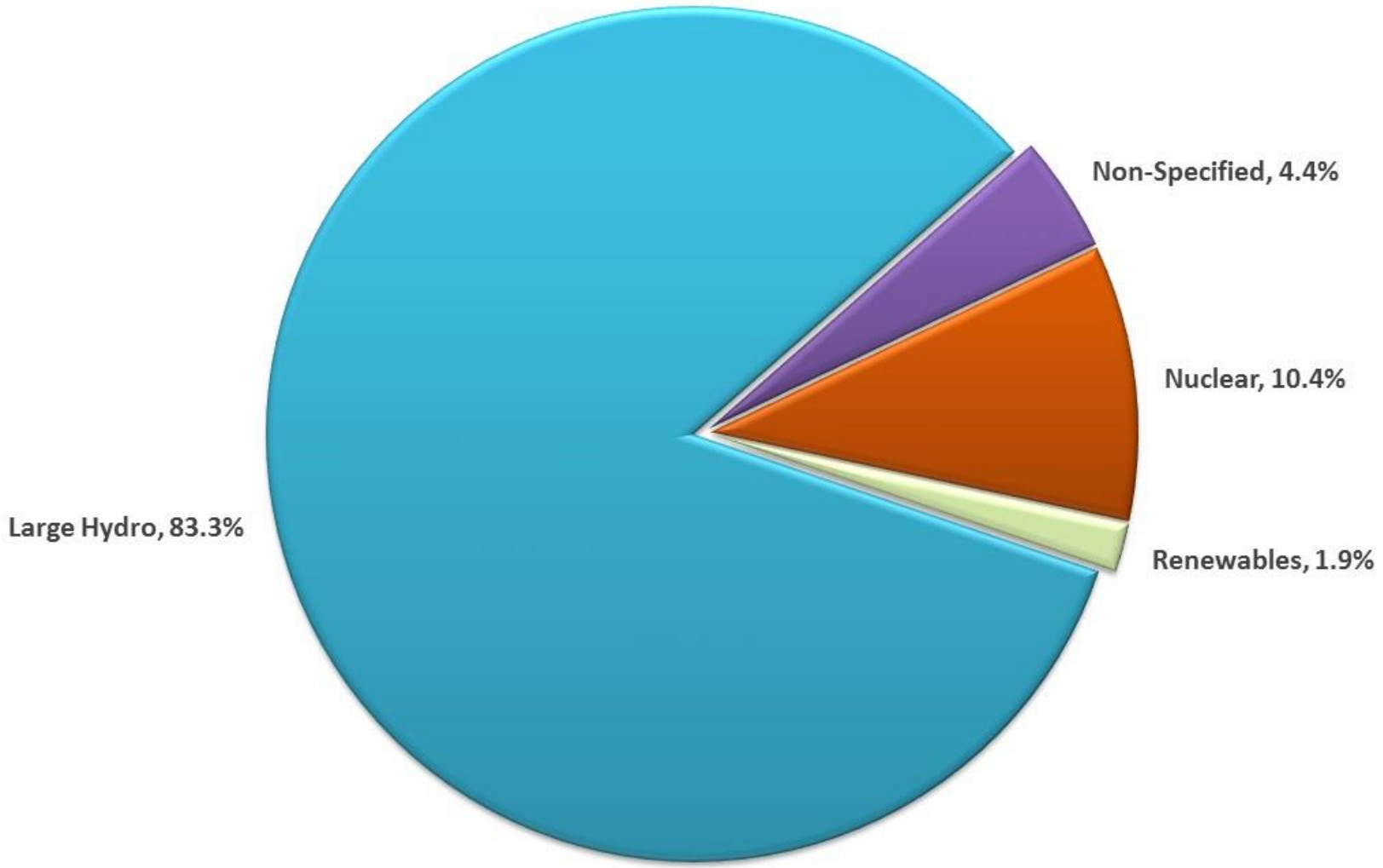
Cumulative Loss/Gain from Market Tests



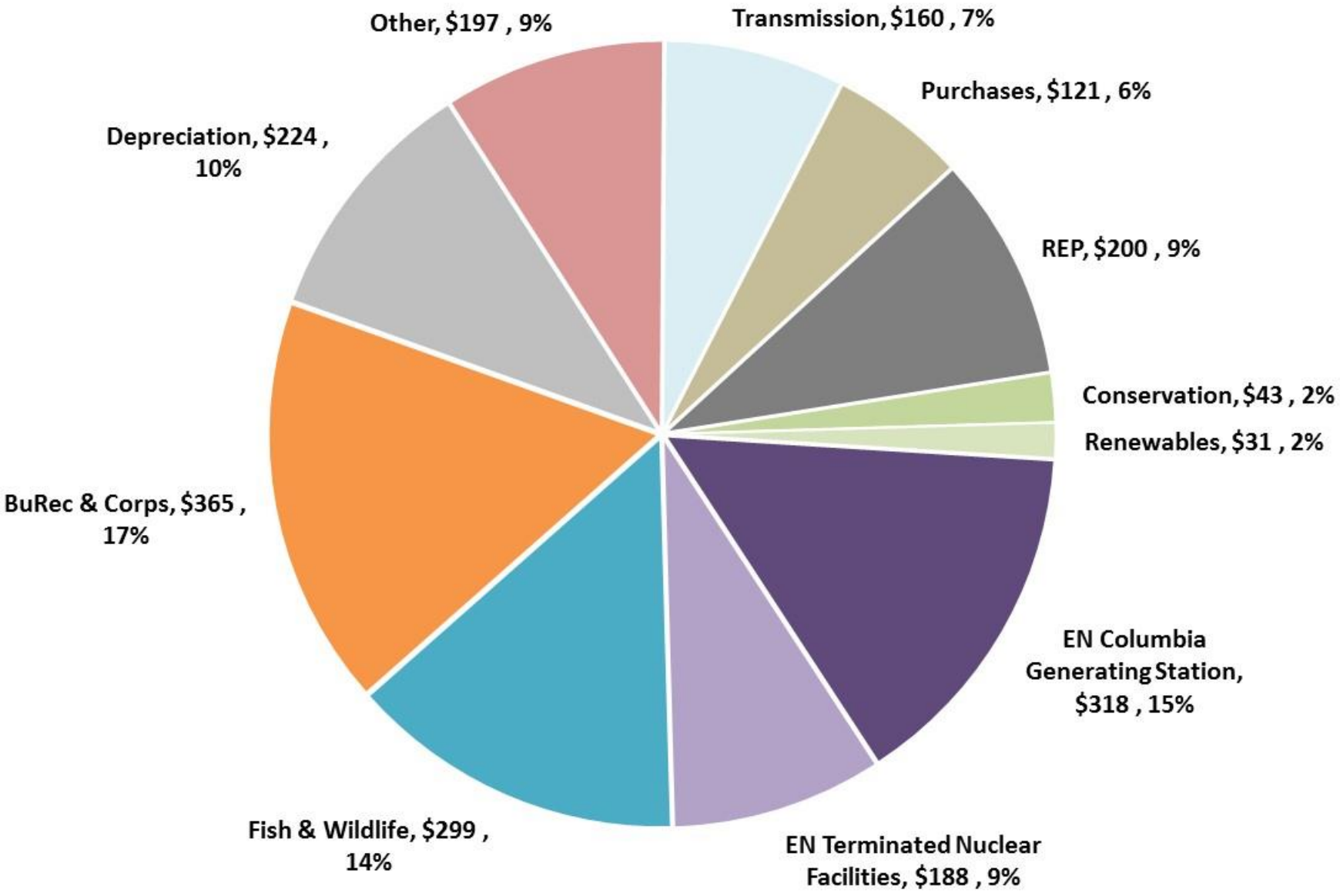
Economic Shutdown Rule

- Stop production when variable cost is greater than price received
  - CGS has variable costs greater than price received
  - CGS, therefore, should stop production

Bonneville Power Administration 2014 Fuel Mix



Bonneville Power Administration FY2015 Operating Expenses ($ Million)



Bonneville Power Administration
Fuel Mix and Operating Expense Summary

- Is a market test warranted?
  - Large hydro provides eight times more energy than nuclear (83.3% / 10.4% = ~8.0)
  - Nuclear costs seven times more to produce than large hydro (8.01 * 15% / 17% = ~7.1)

- Market test could help objectively determine the value of existing thermal power resource

Bonneville Power Administration
Tiered Rate Methodology

- TRM, adopted in 2008, governs the rate design and cost allocation when BPA sets regional power rates
  - *"Customers have rightfully celebrated their continued access to the low-cost power that is provided by the Federal…Power System (FCRPS)"*

SOURCE: BPA's new tiered rate structure offers greater control over power costs
SEE: https://www.bpa.gov/news/pubs/FactSheets/fs-201204-bpa-new-tiered-rate-structure-offers-greater-control-over-power-costs.pdf`

Bonneville Power Administration
Tiered Rate Methodology Summary

- BPA's regional power rates have increased significantly since TRM rates were adopted

- Market test could help objectively determine the rate impact of thermal power resource

SOURCE: BPA's new tiered rate structure offers greater control over power costs
SEE: https://www.bpa.gov/news/pubs/FactSheets/fs-201204-bpa-new-tiered-rate-structure-offers-greater-control-over-power-costs.pdf`

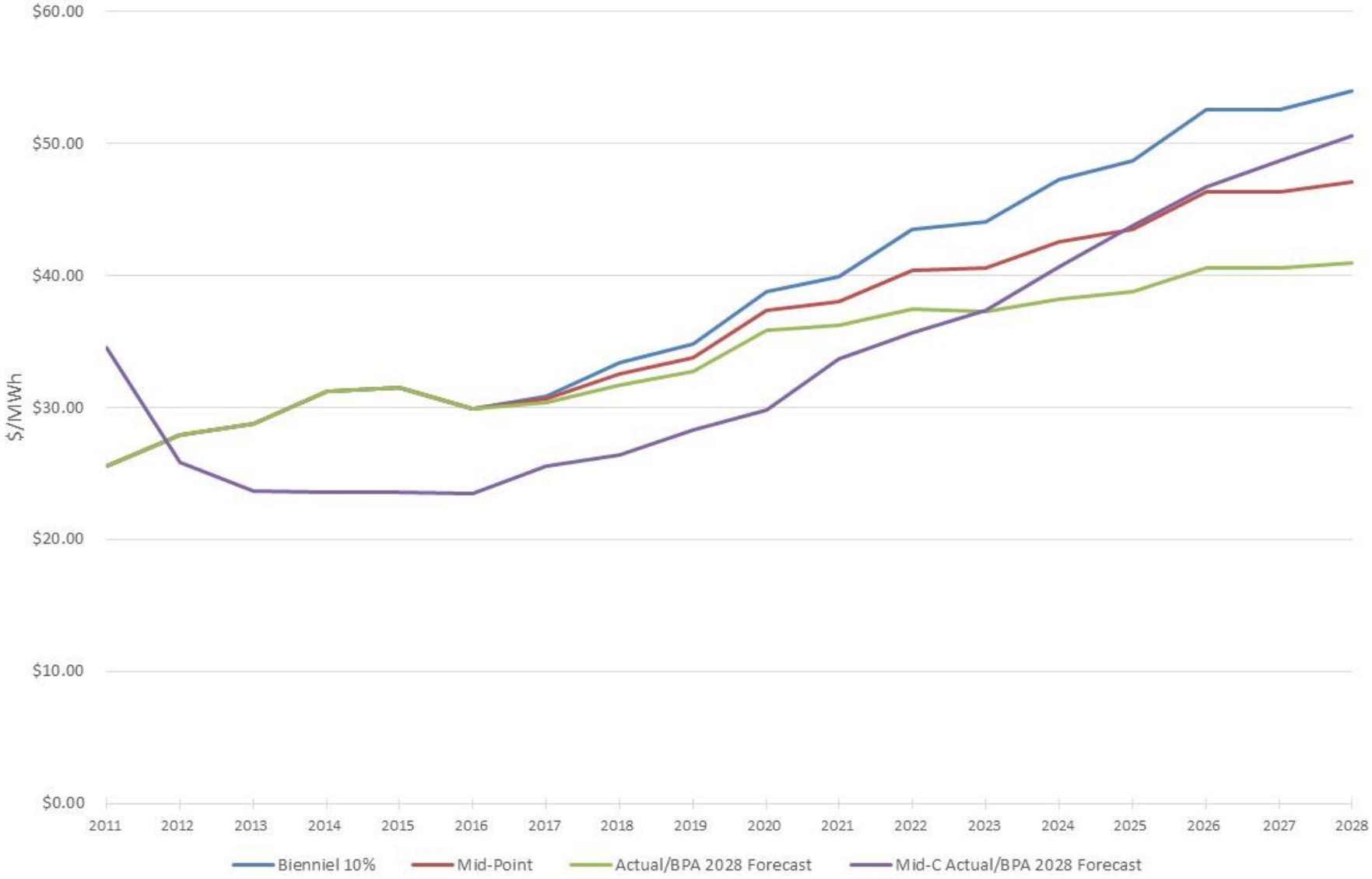
Long-Range Forecast (Focus 2028)

- Compare BPA power costs to market rate
  - Market rate forecast provided by BPA*
  - BPA power cost forecast based on three scenarios
    - BPA Focus 2028
    - Biennial 10% increase for each BPA rate period
    - Midpoint average

*SOURCE: BPA Focus 2028 Mid-C Reference_Case_6_23_2015.XLXS
https://www.bpa.gov/Finance/FinancialPublicProcesses/2028/doc2028/Long-Term%20Financial%20Rates%20and%20Analysis%20Reference%20Case%20Results.pdf

Bonneville Power Administation *vs.* Mid-C Market

Actual & Forecast Wholesale Power Costs for City of Port Angeles



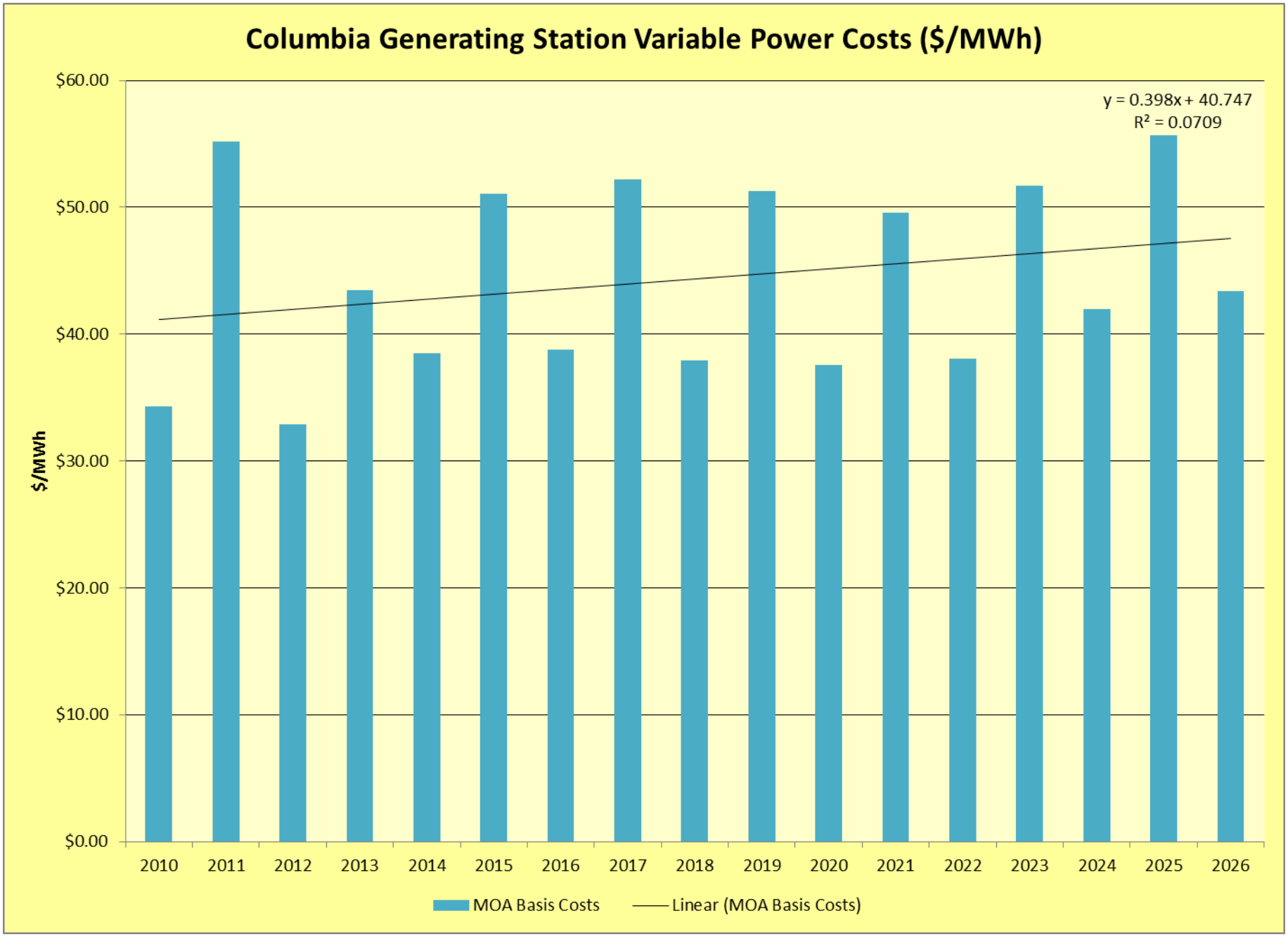
Long-Range Forecast Summary

- BPA rates greater than Mid-C market rate through at least 2023-2025, possibly longer

Columbia Generating Station Market Test

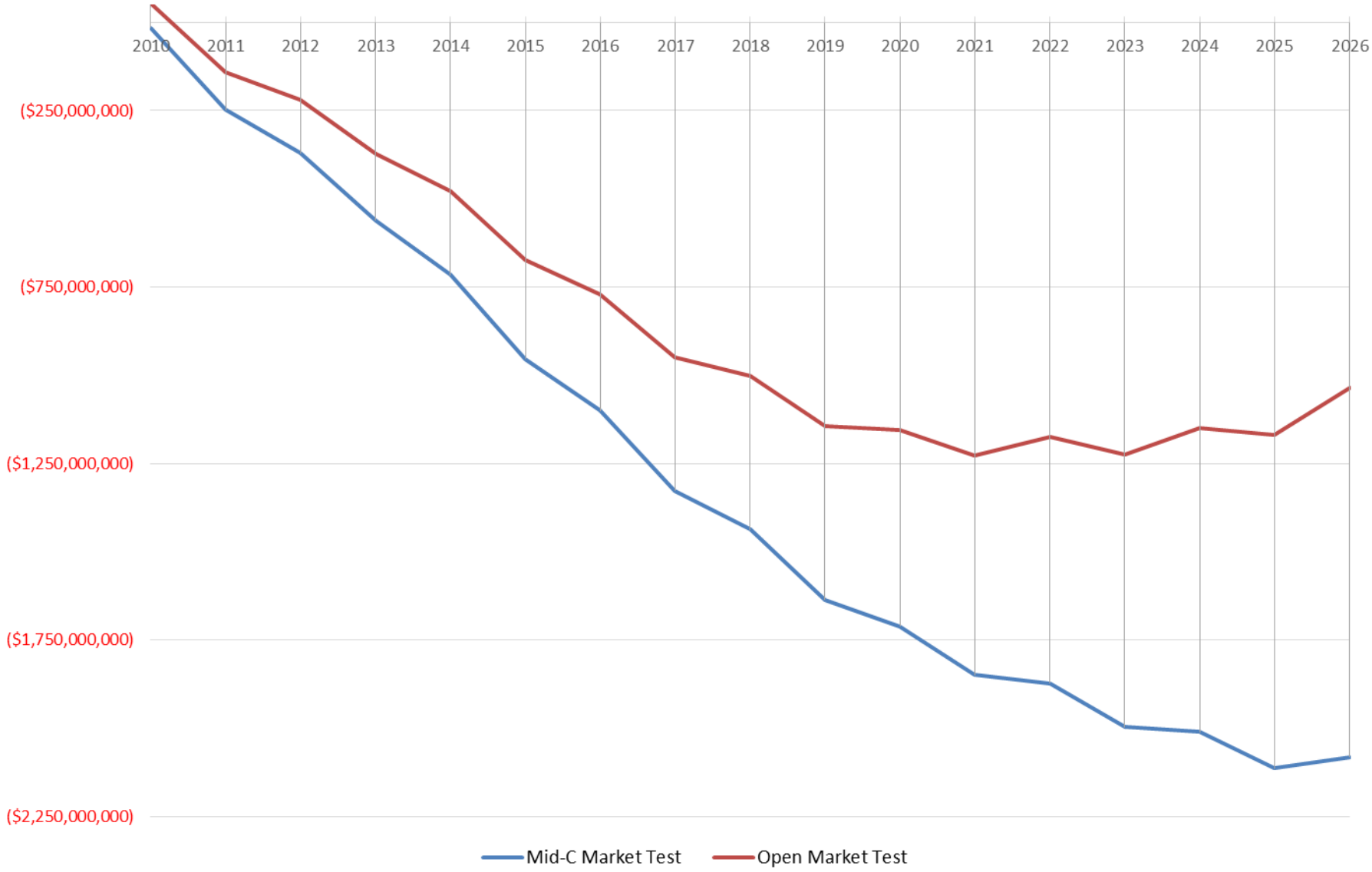
- Compare CGS* variable power cost to two rates
  - Mid-C rate test of McCullough Research projection
  - Open market test impact of higher than Mid-C rates
    - Three key forecast assumptions
      - 75% BPA primary sales
        - » 30% premium over Mid-C rate
      - 25%BPA secondary sales
        - » Mid-C rate

* SOURCE: Fiscal Year 2016 Columbia Generating Station Long Range Plan
http://www.energy-northwest.com/whoweare/finance/Documents/2016%20Budget%20Documents/Final%202016%20CGS%20Long%20Range%20Plan.pdf


Columbia Generating Station Variable Power Costs ($/MWh)
$60.00
$50.00
$40.00
$30.00
$20.00
$10.00
$0.00
$/MWh
y = 0.398x + 40.747
R² = 0.0709
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023
2024
2025
2026
MOA Basis Costs
Linear (MOA Basis Costs)

Columbia Generating Station

Cumulative Loss/Gain from Market Tests



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  - Open Market Test
    - $1,000,000,000 (billion) cumulative loss by 2026
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- Seattle City Light cumulative loss ranges between $75,000,000 and $150,000,000
  - SCL share based 7.15% Tier One Cost Allocator

Economic Shutdown Rule

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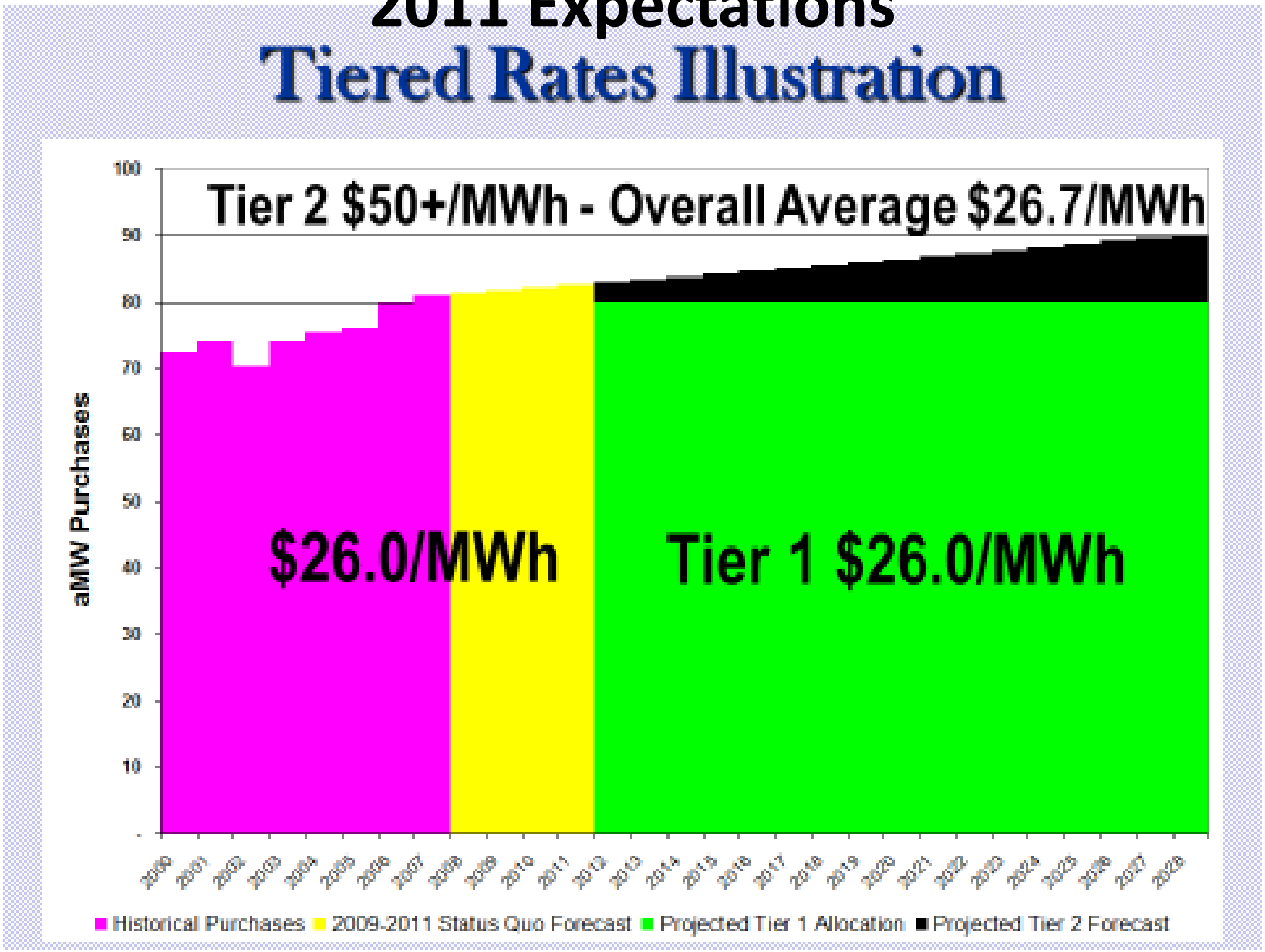
  - CGS, therefore, should stop production

Addendum

Calculations

BPA Tiered Rate Methodology
2011 Expectations



Tiered Rate Methodology
2016 Reality

BPA Power Cost	2011	2012	2013	2014	2015
$/MWh	$25.23	$27.98	$28.50	$31.04	$31.61
Increase ($)	-	$2.75	$0.52	$2.54	$0.57
Increase (%)	0.0%	8.9%	1.6%	7.4%	1.6%
Cumulative Increase	0.0%	8.9%	10.7%	18.8%	20.7%

Bonneville Power Administration
Long-Range Price Forecast

$/MWh	Market	%	Biennial 10%	%	BPA 2028	%	Average	%
BP16	$25.34		$33.75		$33.75		$33.75	
BP18	$28.33	11.8%	$37.13	10.0%	$35.32	4.7%	$36.22	7.3%
BP20	$31.75	12.1%	$40.84	10.0%	$37.80	7.0%	$39.31	8.5%
BP22	$38.03	19.8%	$44.92	10.0%	$38.73	2.5%	$41.75	6.2%
BP24	$43.18	13.5%	$49.41	10.0%	$40.03	3.4%	$44.54	6.7%
BP26	$49.41	14.4%	$54.35	10.0%	$41.96	4.8%	$47.84	7.4%
BP28	$53.31	7.9%	$54.35	0.0%	$41.96	0.0%	$47.84	0.0%
BP29	$57.08	7.1%	$59.79	10.0%	$43.38	3.4%	$51.05	6.7%

Columbia Generating Station Mid-C Market Test Summary

CGS Mid-C Market Test	Mid-C Actuals & Forecast*	CGS Variable Cost**	CGS Loss/Gain to Mid-C	CGS Production**	BPA Sales	CGS Sales	CGS Loss/Gain	CGS Cumulative Loss/Gain
FY	Composite	$/MWh	$/MWh	GWh/Year	%	MWh/Year	$/Year	$
2010	$32.70	$34.32	($1.62)	9,258	100%	9,258,000	($14,972,674)	($14,972,674)
2011	$23.61	$55.18	($31.58)	7,395	100%	7,395,000	($233,502,357)	($248,475,031)
2012	$19.95	$32.90	($12.96)	9,373	100%	9,373,000	($121,427,675)	($369,902,706)
2013	$20.84	$43.47	($22.63)	8,473	100%	8,473,000	($191,736,047)	($561,638,753)
2014	$22.18	$38.49	($16.31)	9,468	100%	9,468,000	($154,439,085)	($716,077,838)
2015	$22.85	$51.08	($28.23)	8,422	100%	8,422,000	($237,754,675)	($953,832,513)
2016	$23.52	$38.80	($15.28)	9,586	100%	9,586,000	($146,511,719)	($1,100,344,232)
2017	$25.53	$52.18	($26.65)	8,511	100%	8,511,000	($226,828,121)	($1,327,172,353)
2018	$26.45	$37.90	($11.45)	9,601	100%	9,601,000	($109,910,912)	($1,437,083,265)
2019	$28.34	$51.25	($22.91)	8,686	100%	8,686,000	($198,974,929)	($1,636,058,194)
2020	$29.79	$37.60	($7.81)	9,601	100%	9,601,000	($74,935,982)	($1,710,994,176)
2021	$33.64	$49.57	($15.93)	8,686	100%	8,686,000	($138,350,301)	($1,849,344,478)
2022	$35.70	$38.06	($2.36)	9,601	100%	9,601,000	($22,687,286)	($1,872,031,764)
2023	$37.32	$51.68	($14.35)	8,686	100%	8,686,000	($124,685,685)	($1,996,717,449)
2024	$40.67	$42.00	($1.33)	9,601	100%	9,601,000	($12,765,546)	($2,009,482,995)
2025	$43.74	$55.69	($11.95)	8,686	100%	8,686,000	($103,780,261)	($2,113,263,256)
2026	$46.75	$43.42	$3.33	9,601	100%	9,601,000	$31,984,522	($2,081,278,734)

*SOURCE: Mid-C Reference_Case_6_23_2015.XLXS

https://www.bpa.gov/Finance/FinancialPublicProcesses/2028/doc2028/Long-Term%20Financial%20Rates%20and%20Analysis%20Reference%20Case%20Results.pdf

** SOURCE: Fiscal Year 2016 Columbia Generating Station Long Range Plan

http://www.energy-northwest.com/whoweare/finance/Documents/2016%20Budget%20Documents/Final%202016%20CGS%20Long%20Range%20Plan.pdf

Columbia Generating Station
Open Market Test Secondary Sales Summary

CGS Open Market Test	Mid-C Actuals & Forecast	CGS Variable Cost*	CGS Loss/Gain	CGS Production*	BPA Secondary Sales	CGS Secondary Sales	CGS Loss/Gain	CGS Cumulative Loss/Gain
FY	Composite	$/MWh	$/MWh	GWh/Year	%	MWh/Year	$/Year	$
2010	$32.70	$34.32	($1.62)	9,258	25%	2,314,500	($3,743,168)	($3,743,168)
2011	$23.61	$55.18	($31.58)	7,395	25%	1,848,750	($58,375,589)	($62,118,758)
2012	$19.95	$32.90	($12.96)	9,373	25%	2,343,250	($30,356,919)	($92,475,676)
2013	$20.84	$43.47	($22.63)	8,473	25%	2,118,250	($47,934,012)	($140,409,688)
2014	$22.18	$38.49	($16.31)	9,468	25%	2,367,000	($38,609,771)	($179,019,460)
2015	$22.85	$51.08	($28.23)	8,422	25%	2,105,500	($59,438,669)	($238,458,128)
2016	$23.52	$38.80	($15.28)	9,586	25%	2,396,500	($36,627,930)	($275,086,058)
2017	$25.53	$52.18	($26.65)	8,511	25%	2,127,750	($56,707,030)	($331,793,088)
2018	$26.45	$37.90	($11.45)	9,601	25%	2,400,250	($27,477,728)	($359,270,816)
2019	$28.34	$51.25	($22.91)	8,686	25%	2,171,500	($49,743,732)	($409,014,549)
2020	$29.79	$37.60	($7.81)	9,601	25%	2,400,250	($18,733,996)	($427,748,544)
2021	$33.64	$49.57	($15.93)	8,686	25%	2,171,500	($34,587,575)	($462,336,119)
2022	$35.70	$38.06	($2.36)	9,601	25%	2,400,250	($5,671,822)	($468,007,941)
2023	$37.32	$51.68	($14.35)	8,686	25%	2,171,500	($31,171,421)	($499,179,362)
2024	$40.67	$42.00	($1.33)	9,601	25%	2,400,250	($3,191,386)	($502,370,749)
2025	$43.74	$55.69	($11.95)	8,686	25%	2,171,500	($25,945,065)	($528,315,814)
2026	$46.75	$43.42	$3.33	9,601	25%	2,400,250	$7,996,131	($520,319,683)

* SOURCE: Fiscal Year 2016 Columbia Generating Station Long Range Plan

* http://www.energy-northwest.com/whoweare/finance/Documents/2016%20Budget%20Documents/Final%202016%20CGS%20Long%20Range%20Plan.pdf

Columbia Generating Station
Open Market Test Primary Sales Summary

CGS Open Market Test	Open Market Forecast	CGS Variable Cost*	CGS Loss/Gain	CGS Production*	BPA Customer Sales	CGS Customer Sales	CGS Loss/Gain	CGS Cumulative Loss/Gain
FY	Composite	$/MWh	$/MWh	GWh/Year	%	MWh/Year	$/Year	$
2010	$42.51	$34.32	$8.19	9,258	75%	6,943,500	$56,886,393	$56,886,393
2011	$30.69	$55.18	($24.49)	7,395	75%	5,546,250	($135,847,023)	($78,960,630)
2012	$25.93	$32.90	($6.97)	9,373	75%	7,029,750	($49,001,758)	($127,962,388)
2013	$27.09	$43.47	($16.38)	8,473	75%	6,354,750	($104,069,746)	($232,032,134)
2014	$28.84	$38.49	($9.66)	9,468	75%	7,101,000	($68,577,083)	($300,609,217)
2015	$29.71	$51.08	($21.37)	8,422	75%	6,316,500	($135,014,684)	($435,623,901)
2016	$30.58	$38.80	($8.23)	9,586	75%	7,189,500	($59,152,976)	($494,776,876)
2017	$33.19	$52.18	($18.99)	8,511	75%	6,383,250	($121,229,293)	($616,006,169)
2018	$34.38	$37.90	($3.51)	9,601	75%	7,200,750	($25,295,765)	($641,301,934)
2019	$36.84	$51.25	($14.41)	8,686	75%	6,514,500	($93,849,006)	($735,150,939)
2020	$38.73	$37.60	$1.13	9,601	75%	7,200,750	$8,152,742	($726,998,197)
2021	$43.74	$49.57	($5.83)	8,686	75%	6,514,500	($38,010,369)	($765,008,566)
2022	$46.41	$38.06	$8.35	9,601	75%	7,200,750	$60,107,721	($704,900,845)
2023	$48.52	$51.68	($3.16)	8,686	75%	6,514,500	($20,571,668)	($725,472,513)
2024	$52.87	$42.00	$10.87	9,601	75%	7,200,750	$78,276,518	($647,195,995)
2025	$56.87	$55.69	$1.18	8,686	75%	6,514,500	$7,654,621	($639,541,374)
2026	$60.78	$43.42	$17.36	9,601	75%	7,200,750	$124,986,059	($514,555,315)

* SOURCE: Fiscal Year 2016 Columbia Generating Station Long Range Plan

* http://www.energy-northwest.com/whoweare/finance/Documents/2016%20Budget%20Documents/Final%202016%20CGS%20Long%20Range%20Plan.pdf

Columbia Generating Station Open Market Test Summary

CGS Market Test	CGS Annual Loss/Gain	CGS Cumulative Loss/Gain
2010	$53,143,224	$53,143,224
2011	($194,222,612)	($141,079,387)
2012	($79,358,677)	($220,438,064)
2013	($152,003,758)	($372,441,822)
2014	($107,186,854)	($479,628,677)
2015	($194,453,352)	($674,082,029)
2016	($95,780,905)	($769,862,934)
2017	($177,936,323)	($947,799,257)
2018	($52,773,493)	($1,000,572,750)
2019	($143,592,738)	($1,144,165,488)
2020	($10,581,253)	($1,154,746,741)
2021	($72,597,944)	($1,227,344,685)
2022	$54,435,900	($1,172,908,786)
2023	($51,743,089)	($1,224,651,875)
2024	$75,085,131	($1,149,566,744)
2025	($18,290,445)	($1,167,857,188)
2026	$132,982,190	($1,034,874,999)