

DEPRECIATION AND AMORTIZATION

1.0 PURPOSE

This evidence describes OPG's depreciation and amortization policy and presents the depreciation and amortization expense for the nuclear facilities.

2.0 OVERVIEW

OPG is seeking approval of test period revenue requirements that include depreciation and amortization expense of \$346.9M in 2017, \$378.7M in 2018, \$384.0M in 2019, \$524.9M in 2020 and \$338.1M in 2021 for the nuclear facilities, as shown in Ex. F4-1-1 Table 2. Exhibit F4-1-1 Table 2 also presents the depreciation and amortization expense for the historical and bridge years for the nuclear facilities.

Section 3.0 describes OPG's depreciation and amortization expense, summarizes OPG's depreciation and amortization policy and review process, and outlines nuclear station life changes effective December 31, 2015 based on the recommendations of OPG's Depreciation Review Committee ("DRC").

Section 4.0 discusses the trend in depreciation and amortization expense over the period 2013 to 2021.

The depreciation expense for the Bruce assets is presented in Ex. G2-2-1.

3.0 DEPRECIATION AND AMORTIZATION EXPENSE

OPG continues to determine depreciation and amortization expense in the same manner as presented in EB-2013-0321.

Allocation of depreciation expense is not required to attribute depreciation and amortization expense to the regulated facilities. Approximately 99 per cent of OPG's in-service fixed and intangible assets are associated with specific generation facilities or plant groups. The remaining in-service fixed and intangible assets, such as information technology assets, continue to be either directly associated with a business unit or to be held centrally for use by

1 both regulated and unregulated generation business units. For the use of assets held
2 centrally, generating business units (both regulated and unregulated) continue to be charged
3 an asset service fee for the use of these assets. This charge continues to be reported as an
4 OM&A cost. The asset service fees are described in Ex. F3-2-1.

5

6 **3.1 Depreciation and Amortization Policy and Review Process**

7 OPG's depreciation and amortization policy and treatment of asset retirements is unchanged
8 from that presented in EB-2013-0321.

9

10 Depreciation and amortization rates for the various classes of OPG's in-service fixed and
11 intangible assets continue to be based on their estimated service lives. The service life of an
12 asset class is limited by the service life of the station(s) to which it relates. An average end-
13 of-life ("EOL") date is established for depreciation purposes for all units at a particular station,
14 which is typically based on estimated EOL dates for each operating unit of the station. The
15 determination of the station EOL dates for depreciation purposes involves an assessment of
16 the condition and expected remaining life of certain key components (referred to as life-
17 limiting components), in conjunction with an estimate of the expected operation of the station,
18 which includes economic viability considerations. For the nuclear stations, the life-limiting
19 components are: fuel channels, steam generators, feeder pipes and reactor components.

20

21 The net book value of the prescribed nuclear facilities and the Bruce assets continues to
22 include asset retirement costs ("ARC") relating to OPG's nuclear decommissioning and
23 nuclear waste management liabilities (asset retirement obligation or "ARO"). Accordingly, the
24 depreciation and amortization expense also includes the depreciation of ARC. The
25 depreciation of ARC forms part of the revenue requirement impact for the recovery of the
26 ARO as discussed and presented in Ex. C2-1-1.

27

28 The EOL dates for depreciation purposes for the prescribed nuclear facilities and the Bruce
29 stations are provided below. As OPG anticipated in EB-2015-0374 and as further discussed
30 in section 3.2, effective December 31, 2015, OPG changed the station EOL dates of Bruce

1 A, Bruce B, Pickering Units 5-8, and Darlington. These changes impact the 2016-2021
 2 depreciation and amortization expense.

	Effective January 1, 2013¹	Effective December 31, 2015
Darlington	December 31, 2051	December 31, 2052
Pickering Units 1 & 4	December 31, 2020	December 31, 2020
Pickering Units 5-8	April 30, 2020	December 31, 2020
Bruce A (Units 1-4)	December 31, 2048	December 31, 2052
Bruce B (Units 5-8)	December 31, 2019	December 31, 2061

3
 4 In EB-2013-0321, the OEB accepted the results of the independent assessment of OPG's
 5 asset service life estimates and nuclear station EOL dates (the "EB-2013-0321 Depreciation
 6 Study") performed by Gannett Fleming Canada ULC ("Gannett Fleming"), predicated on
 7 OPG's continued application of the average life group method.² OPG continues to apply the
 8 average life group method for the purposes of calculating depreciation expense. With the
 9 exception of the changes in nuclear station EOL dates noted above, there have been no
 10 changes in the asset service lives for OPG's regulated business compared to those
 11 recommended by Gannett Fleming in the EB-2013-0321 Depreciation Study.

12
 13 As part of its due diligence process, OPG continues to convene an internal DRC to examine
 14 the service lives of fixed and intangible assets and therefore the calculation of depreciation
 15 and amortization expense. The DRC is comprised of business unit representatives as well as
 16 staff from the Finance and Regulatory Affairs functions. The DRC considers available
 17 engineering, technical, operational and financial assessments/information as part of its
 18 regular review of the service lives of generating stations (including the Bruce stations) and a
 19 selection of asset classes with the general objective of reviewing all significant asset classes
 20 for the regulated assets over a five-year cycle. Periodic independent reviews of the service

¹ These EOL dates are as presented in EB-2013-0321 Ex. F4-1-1 and reflected in the approved revenue requirement in that proceeding.

² EB-2013-0321 Decision with Reasons, p. 98

1 live estimates of significant asset classes for the regulated assets are also performed over a
2 five-year period, as recommended by Gannett Fleming.³

3
4 The DRC's scope and recommendations continue to be submitted for approval to OPG's
5 senior executives, including the Chief Financial Officer and the business unit leader of the
6 Nuclear operations. Approved DRC recommendations are used to calculate the depreciation
7 and amortization expense that is reflected in OPG's financial statements and business plan.
8 As part of the EB-2013-031 Depreciation Study, OPG's DRC review process was found by
9 Gannett Fleming to be procedurally sound and meeting generally accepted regulatory
10 objectives regarding depreciation.⁴

11
12 Since EB-2013-0321, the DRC was convened twice – in 2014 and in 2015. The 2014 DRC
13 review did not recommend any changes to asset classes or station services lives. In 2015,
14 the DRC recommended, and the Approvals Committee approved, changes to the nuclear
15 station EOL dates effective December 31, 2015, as discussed in section 3.2. The 2015 DRC
16 recommendations for the regulated business are found in Attachment 1.

17
18 Effective January 1, 2016, the revenue requirement impact on the prescribed facilities of the
19 differences in depreciation and amortization expense arising from the December 31, 2015
20 nuclear station EOL date changes are being recorded in the Impact Resulting from Changes
21 in Station End-of-Life Dates (December 31, 2015) Deferral Account established in EB-2015-
22 0374, until the effective date of new nuclear payment amounts incorporating the impacts of
23 the revised EOL dates. Any changes in the depreciation expense for the Bruce facilities are
24 subject to the Bruce Lease Net Revenues Variance Account. OPG's deferral and variance
25 accounts are discussed in Ex. H1-1-1.

26
27 As the EB-2013-0321 Depreciation Study, which was based on December 31, 2012 asset
28 net book values, was conducted less than five years ago, OPG has not commissioned a new
29 independent review of the service life estimates for the prescribed assets.

³ EB-2013-0321 Ex. F4-1-1, Attachment 1, p I-7

⁴ EB-2013-0321 Ex. F4-1-1, Attachment 1, pp. I-3 and I-4

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3.2 Changes in Nuclear Station End-Of-Life Dates

As OPG anticipated in EB-2015-0374, OPG changed nuclear station EOL dates for depreciation and amortization purposes effective December 31, 2015 as described below. The previous and current nuclear station EOL dates can be found in the table provided in section 3.1.

Bruce Nuclear Stations

On December 3, 2015, the Province of Ontario announced that it will proceed with the refurbishment of the six not-yet-refurbished units operated by Bruce Power (i.e., Bruce A Units 3 and 4 and Bruce B Units 5 to 8) and that the previous refurbishment implementation agreement between the Independent Electricity System Operator and Bruce Power had been correspondingly updated. The resulting Amended and Restated Bruce Power Refurbishment Implementation Agreement (“ARBPRIA”) was made public in December 2015 following the Province’s announcement.⁵

The ARBRIPA sets out the target refurbishment schedule for the six not-yet-refurbished Bruce units and the corresponding estimated post-refurbishment EOL dates for each of the eight operating Bruce units. The Province’s announcement and the execution of the ARBPRIA provided OPG with the necessary evidence to align the Bruce EOL dates for accounting purposes with the ARBPRIA, effective December 31, 2015. As a result, for OPG’s accounting purposes, the average EOL date of the Bruce A station was extended from December 31, 2048 to December 31, 2052 and the average EOL date of the Bruce B station was extended from December 31, 2019 to December 31, 2061.

The estimated annual impact on depreciation and amortization expense for the Bruce assets from the above revision in station EOL dates is a reduction of approximately \$59 million starting in 2016.⁶ This comprises approximately \$57 million related to the existing ARC balance and approximately \$2 million related to the non-ARC asset balances.

⁵ <https://news.ontario.ca/mei/en/2015/12/ontario-commits-to-future-in-nuclear-energy.html>
⁶ Excluding the depreciation impact of the December 31, 2015 ARC adjustment discussed in Ex. C2-1-1

1

2 **Pickering Nuclear Station**

3 In 2015, OPG achieved high confidence that all four of Pickering Units 5 to 8 are expected to
4 be technically fit to operate until at least the end of 2020. This confidence was achieved
5 through work on the Fuel Channel Life Extension Project and execution of inspection and
6 technical work programs.

7

8 As a result, OPG adopted an average EOL date, for accounting purposes, of December 31,
9 2020 for these units, effective December 31, 2015. This represents an extension from the
10 previous average EOL date of April 30, 2020, which assumed that some of the units would
11 be shut down prior to the end of 2020.

12

13 The estimated annual impact on depreciation and amortization expense for the prescribed
14 assets from the above revision in the station EOL date is a reduction of approximately
15 \$8 million starting in 2016.⁷ This comprises approximately \$4 million related to the existing
16 ARC balance and approximately \$4 million related to the non-ARC asset balances.

17

18 As discussed in Ex. F2-2-3, OPG is undertaking a set of initiatives to extend Pickering
19 operation beyond 2020, which will require the CNSC's approval. The December 31, 2020
20 accounting EOL date for the Pickering units is expected to be reassessed in the future when
21 further technical work confirms that the units would be fit to operate beyond 2020. OPG will
22 seek the OEB's approval of an accounting order related to any future changes to the
23 Pickering EOL date based on the same requirements that underpinned OPG's EB-2015-
24 0374 application.

25

26 **Darlington Nuclear Station**

27 In January 2016, the Province announced that Ontario is moving forward with OPG's
28 refurbishment of the four-unit Darlington Generating Station, with the refurbishment of the
29 last unit scheduled to be completed by 2026. The Province's announcement followed the
30 approval of the project budget and schedule by OPG's Board of Directors in November 2015.

⁷ Ibid.

1 Based on the refurbishment schedule and an assumed post-refurbishment operating life for
2 the units, OPG extended the average station EOL date for Darlington to December 31, 2052,
3 from the previous date of December 31, 2051, effective December 31, 2015. The DRP is
4 discussed in Ex. D2-2-1 and related exhibits.

5
6 The estimated annual impact on depreciation and amortization expense for the prescribed
7 assets from the above revision in the station EOL date is a reduction of approximately \$1
8 million starting in 2016.⁸ This reduction in expense predominantly relates to the ARC
9 balance.

10 11 **4.0 DEPRECIATION AND AMORTIZATION EXPENSE TRENDS**

12 The depreciation and amortization expense for the prescribed nuclear facilities increases
13 moderately from 2013 to 2019, with year-over-year increases largely due to the impact of in-
14 service additions at the Pickering and Darlington stations and for the Darlington
15 Refurbishment Project, which are discussed in Ex. D2-1-2 and Ex. D2-2-1. The projected
16 increase in depreciation and amortization expense in 2016, compared to 2015, is a net of a
17 reduction in prescribed facilities' ARC depreciation as a result of the changes in station EOL
18 dates discussed in section 3.2 as well as the related year-end 2015 adjustments in the ARO
19 and ARC balances. The year-end 2015 ARO and ARC adjustments and related revenue
20 requirement impacts are discussed in Ex. C2-1-1, section 5.0.

21
22 Nuclear depreciation and amortization expense is forecast to increase notably in 2020 when
23 rate base increases in 2020 as a result of Darlington Unit 2's return to service in February
24 2020. Nuclear depreciation and amortization expense declines significantly in 2021,
25 compared to 2020, as the assumed Pickering EOL date of December 31, 2020 is reached.⁹

26

⁸ Ibid.

⁹ In line with the current EOL date, most of the forecast Pickering capital additions in 2021 are assumed, in OPG's business plan and this Application, to be fully depreciated in 2021

ATTACHMENTS

1

2

3 Attachment 1: 2015 Depreciation Review Committee Recommendations for Regulated
4 Business

2015

DEPRECIATION REVIEW COMMITTEE

RECOMMENDATIONS

FOR

REGULATED BUSINESS

DECEMBER 2015

MEMORANDUM

December 2015

2015 Depreciation Review Committee Recommendations – Regulated Business

PURPOSE AND SUMMARY

This memorandum is intended to obtain approval of recommendations resulting from the 2015 Depreciation Review Committee (“DRC”) review of the average asset service lives for OPG’s prescribed nuclear facilities and Bruce nuclear generating stations.

The 2015 DRC review recommends the following changes to OPG’s nuclear station service lives for depreciation purposes, effective December 31, 2015:

- Pickering Units 5-8: extend end-of-life (EOL) date from April 30, 2020 to December 31, 2020
- Darlington: extend EOL date from December 31, 2051 to December 31, 2052
- Bruce A (units 1-4): extend EOL date from December 31, 2048 to December 31, 2052
- Bruce B (unit 5-8): extend EOL date from December 31, 2019 to December 31, 2061

The Pickering Units 1 and 4 EOL date is recommended to remain unchanged at December 31, 2020.

BACKGROUND

The DRC is convened annually to review the service lives for depreciation purposes of OPG’s major facilities and a selection of asset classes in those facilities with the general objective of reviewing all significant asset classes over a five year period. Excluding asset retirement costs, the DRC reviews in 2013 and 2014 are estimated to have covered over half of the in-service net book value of the asset classes in OPG’s regulated business.

In November 2014, the Ontario Energy Board (“OEB”) issued its decision on OPG’s application for 2014/15 regulated rates, in which it approved OPG’s forecast depreciation expense for the regulated and Bruce assets as filed, based on asset service lives then in effect. The OEB also accepted the results of independent depreciation studies filed by OPG as part of the rate application. The latest of these studies was based on in-service balances of OPG’s prescribed assets as at December 31, 2012 as well as the Niagara Tunnel. In its decision, the OEB also accepted OPG’s continued use of the average life group method.

SCOPE OF 2015 DRC REVIEW

The focus of the work of the 2015 DRC was to review the service lives for OPG’s nuclear stations based on the most recent information available including refurbishment plans and schedules, major components service lives, developments related to the Bruce stations and other relevant information available.

SUMMARY OF RECOMMENDATIONS

The DRC is recommending changes to the station service life assumptions for depreciation purposes for each of OPG’s nuclear stations based on the evidence discussed below for each station.

MEMORANDUM

December 2015

2015 Depreciation Review Committee Recommendations – Regulated Business

Prescribed Nuclear Generating Stations

Pickering Station

The DRC is recommending an extension of the Pickering Units 5-8 average EOL date from April 30, 2020 to December 31, 2020. The DRC is not recommending changes to the average EOL date for Pickering Units 1 and 4 of December 31, 2020.

In 2012, the DRC received confirmation of high confidence that Pickering Units 5-8 could be operated until at least 247,000 effective full power hours (“EFPH”) based primarily on the results of the Fuel Channel Life Management project. Pickering Units 5 and 6 in particular were expected to shut down before the end of 2020. The resulting average EOL date for all four Pickering Units 5-8 was established as April 30, 2020, effective December 31, 2012.

As noted in the 2014 DRC recommendations, OPG launched the Fuel Channel Life Extension (“FLCE”) project with the aim of achieving high confidence in operating Pickering Units 5-8 to at least 261,000 EFPH, which would allow all four of the units to operate until at least the end of 2020. In the fourth quarter of 2015, the DRC received technical confirmation of high confidence that all four Pickering Units 5-8 are now expected to be technically fit to safely operate until at least December 31, 2020 based on the results of the FCLE project. This determination forms the basis for the DRC’s recommendation to extend the average station EOL date for Pickering Units 5-8 to December 31, 2020, effective December 31, 2015.

The estimated annual impact on depreciation expense of the above service life change, before the impact of anticipated year-end 2015 adjustments to the asset retirement obligation (“ARO”) estimate and asset retirement costs (“ARC”) is a reduction of approximately \$8M. Of this amount, approximately \$4M relates to the existing ARC balances and approximately \$4M to non-ARC assets.¹

Darlington Station

The DRC recommends extending the Darlington station’s EOL date from December 31, 2051 to December 31, 2052.

Darlington’s current EOL date of December 31, 2051 was established effective January 1, 2010 following the decision to proceed with the definition phase of the Darlington refurbishment. This reflected a preliminary refurbishment outage schedule, which included an assumption of “over-lapped” refurbishment outages for the first two units being refurbished.

In November 2015, OPG’s Board of Directors approved the budget and schedule for the four-unit Darlington refurbishment. The approved schedule includes substantial “un-lapping” of the refurbishment outages for the first two units. Based on the approved refurbishment outage schedule and target return-to-service dates for each unit and continuing to assume a 30-year post-refurbishment operating life, the DRC recommends extending the Darlington EOL date to December 31, 2052, effective December 31, 2015.

The estimated annual impact on depreciation expense of the above service life change, before the impact of anticipated year-end 2015 ARO / ARC adjustments, is a reduction of approximately \$1M related to the

¹ The ARO / ARC change at year-end 2015 is expected to have a material impact on depreciation expense. These impacts will be finalized once all inputs into the calculation of the ARO / ARC change are determined early in 2016.

MEMORANDUM

December 2015

2015 Depreciation Review Committee Recommendations – Regulated Business

existing ARC balance. There is a minimal impact on non-ARC asset depreciation expense of less than \$1M per year.²

Bruce Nuclear Generating Stations

The DRC is recommending an extension to the EOL date for the Bruce A station (Units 1-4) to December 31, 2052 from December 31, 2048 and an extension to the EOL date for the Bruce B station (Units 5-8) to December 31, 2061 from December 31, 2019.

In December 2015, the Province of Ontario (the “Province”) publicly announced that it will proceed with the refurbishment of the six yet-to-be refurbished units (i.e. Bruce Units 3-8) operated by Bruce Power and that the previous refurbishment implementation agreement between the Independent Electricity System Operator (“IESO”) and Bruce Power has been correspondingly updated. The resulting Amended and Restated Bruce Power Refurbishment Implementation Agreement (“ARBPRIA”) made public in December 2015 formally outlines specific refurbishment plans with respect to Bruce Units 3-8 and creates a positive obligation on Bruce Power to refurbish these units. The ARBPRIA includes a target refurbishment schedule for Units 3-8, as well as the following corresponding EOL dates estimated for each of the eight Bruce units:

Bruce A

Unit 1: December 31, 2043
Unit 2: December 31, 2043
Unit 3: December 31, 2061
Unit 4: December 31, 2062

Bruce B

Unit 5: December 31, 2062
Unit 6: December 31, 2058
Unit 7: December 31, 2063
Unit 8: December 31, 2063

The Province’s public announcement and the information contained in the ARBPRIA provide the evidence for the DRC’s recommendation to revise the Bruce A and Bruce B station EOL dates to December 31, 2052 and December 31, 2061, respectively, effective December 31, 2015. The recommended new dates reflect the estimated EOL dates specified in the ARBPRIA.

The estimated annual impact on depreciation expense of the above service life changes, before the impact of anticipated year-end 2015 ARO / ARC adjustments, is a reduction of approximately \$58M. Of this amount, approximately \$57M relates to the existing ARC balances and approximately \$1M to non-ARC assets.³

² See footnote 1

³ See footnote 1

MEMORANDUM

December 2015

2015 Depreciation Review Committee Recommendations – Regulated Business

DRC MEMBERS AND APPROVALS COMMITTEE

The DRC includes representatives from the operating business units as well as representatives having experience in finance and accounting, investment planning, and rate regulation.

The Approvals Committee is responsible for approving the DRC recommendations and is comprised of:

- Glenn Jager, President, OPG Nuclear and Chief Nuclear Officer
- Mike Martelli, Senior Vice President, Hydro Thermal Operations
- Carlo Crozzoli, Senior Vice President and Interim Chief Financial Officer
- Bruce Boland, Senior Vice President, Commercial Operations and Environment

The DRC is comprised of the following members:

- Charanjit Singh (DRC Chair), Vice President, Shared Financial Services
- John Mauti, Vice President, Chief Controller and Accounting Officer
- Carla Carmichael, Vice President, Nuclear Finance
- Lubna Ladak, Vice President, HTO Finance
- Mario Mazza, Vice President, Strategic Operations, Hydro Thermal Operations
- Alex Kogan, Vice President, Business Planning and Reporting
- Randy Pugh, Director, Ontario Regulatory Affairs
- Stephen Rogers, Director, Asset Planning and Integration, Nuclear Finance
- Alec Cheng, Director, External Reporting and Accounting Policy
- Dave Bell, Senior Manager, Accounting and Reporting
- Dwight Zerkee, Senior Manager, Investment Management, Nuclear Finance

Numbers may not add due to rounding.

Filed: 2016-05-27
EB-2016-0152
Exhibit F4
Tab 1
Schedule 1
Table 1

Table 1
Depreciation and Amortization - Regulated Hydroelectric (\$M)

Intentionally left blank (See Ex. A1-3-1)

Numbers may not add due to rounding.

Filed: 2016-05-27
 EB-2016-0152
 Exhibit F4
 Tab 1
 Schedule 1
 Table 2

Table 2
Depreciation and Amortization - Nuclear (\$M)

Line No.	Cost Item	2013 Actual ¹	2014 Actual	2015 Actual	2016 Budget	2017 Plan	2018 Plan	2019 Plan	2020 Plan	2021 Plan
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)
1	Darlington NGS	32.3	34.0	31.5	36.8	44.2	51.3	56.9	62.7	69.1
2	Darlington Refurbishment Project	2.3	4.7	7.0	14.1	25.8	29.9	30.0	159.1	177.6
3	Pickering NGS	127.5	140.9	147.3	165.7	199.9	223.2	226.7	233.3	53.1
4	Nuclear Support Divisions	27.3	27.4	26.6	26.8	26.7	24.1	20.1	19.5	19.6
5	Asset Retirement Costs	80.7	80.7	80.7	50.3	50.3	50.3	50.3	50.3	18.7
6	Other²	(0.0)	(2.5)	4.9	0.0	0.0	0.0	0.0	0.0	0.0
7	Total	270.1	285.3	298.0	293.6	346.9	378.7	384.0	524.9	338.1

Notes:

- 1 2013 Actual from EB-2013-0321 Ex. L-1.0-1 Staff-002, Att. 1, Table 28, col. (d).
- 2 Includes losses on retirements, gains on disposal and other related charges.