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 IR term revenue requirements for the nuclear facilities that include depreciation and amortization expense of $553.0M in 2022, $471.5M in 2023, $578.7M in 2024, $521.6M in 2025, and $568.6M for 2026, 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.

In its EB-2016-0152 Decision and Order (p. 86), the OEB stated it had no concerns with OPG's proposal to conduct an independent review of asset service lives after the completion of Darlington Unit 2 refurbishment. Given the anticipated timing of the application, OPG engaged Concentric Advisors, ULC ("Concentric") in 2019 to provide an independent review and assessment of the asset service life estimates for OPG's prescribed nuclear assets based on the net book values as at December 31, 2019 (the "2019 Depreciation Study") and the assets placed in service upon the return to service of Darlington Unit 2 in June 2020. The 2019 Depreciation Study is provided in Attachment 1.

Section 3.0 describes OPG's depreciation and amortization expense, summarizes OPG's depreciation and amortization policy and review process, and outlines the results of the 2019 Depreciation Study, the recommendations of the OPG's Depreciation Review Committee ("DRC") including the changes to the Pickering station accounting end-of-life ("EOL") dates made effective December 31, 2017, and the impact of these recommendations on depreciation and amortization expense.

As discussed in Section 3.5, consistent with past practice, OPG does not propose to reflect any future changes in the Pickering station EOL dates in this application. Instead, OPG

proposes a deferral account to capture the revenue requirement impacts of such changes over the IR term, on terms similar to the deferral accounts established in EB-2015-0374 and EB-2018-0002 for prior changes in station EOL dates for the prescribed nuclear facilities.[1]

Section 4.0 discusses the trend in depreciation and amortization expense over the period 2016-2026.

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-2016-0152 and prior payment amounts proceedings.

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 line of business or to be held centrally for use by both regulated and unregulated businesses. For the use of assets held centrally, generating businesses (both regulated and unregulated) continue to be charged an asset service fee for the use of these assets. This charge is reported as an OM&A cost. The asset service fees are described in Ex. F3-2-1, including for the new corporate campus planned in Clarington.

3.1 Depreciation and Amortization Policy and Review Process

OPG's depreciation and amortization policy and treatment of asset retirements is unchanged from that presented in EB-2016-0152 and EB-2013-0321.

[1] The proposed deferral account is discussed further at Ex. H1-1-1, Section 6.2.

Depreciation and amortization rates for the various classes of OPG's in-service fixed and intangible assets continue to be based on their estimated service lives using the straight-line method. The service life of an asset class is limited by the service life of the station(s) to which it relates. An average EOL date is established for depreciation purposes for all units at a particular station, which is typically based on estimated EOL dates for each operating unit of the station. For the Pickering station, separate EOL dates continue to be maintained for Units 1 and 4 and for Units 5-8. The determination of the station EOL dates for depreciation purposes involves an assessment of the condition and expected remaining life of certain key components (referred to as life-limiting components), in conjunction with an estimate of the expected operation of the station, which includes economic viability considerations. For the nuclear stations, life-limiting components are: fuel channels, steam generators, feeder pipes and reactor components.

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

The current EOL dates for depreciation purposes for the prescribed nuclear facilities and the Bruce stations are provided below in Chart 1. As discussed in EB-2018-0002, effective December 31, 2017, OPG extended the station EOL dates of Pickering Units 1 and 4 and Pickering Units 5-8. These changes impact the depreciation and amortization expense for the historical and bridge years and the IR term and are discussed in Section 3.4. Chart 1 below shows the station EOL dates in effect at the time of EB-2016-0152 (i.e. those effective December 31, 2015) and those reflected in OPG's 2020-2026 Business Plan and this application (i.e. those effective December 31, 2017).

Chart 1: Station End-of-Life Dates at December 31, 2015 and December 31, 2017

	Effective December 31, 2015	Effective December 31, 2017
Darlington	December 31, 2052	December 31, 2052
Pickering Units 1 & 4	December 31, 2020	December 31, 2022
Pickering Units 5-8	December 31, 2020	December 31, 2024
Bruce A (Units 1-4)	December 31, 2052	December 31, 2052
Bruce B (Units 5-8)	December 31, 2061	December 31, 2061

In EB-2013-0321, the OEB accepted the results of an independent assessment of OPG's asset service life estimates and nuclear station EOL dates (the "EB-2013-0321 Depreciation Study") performed by Concentric (then operating as Gannett Fleming Canada ULC), predicated on OPG's continued application of the average life group method.[2] As in EB-2016-0152, OPG continues to apply the average life group method for the purposes of calculating depreciation expense, as most recently recommended by Concentric in finding that this approach "results in a reasonable recovery of OPG's capital investment over time".[3]

As part of its due diligence process, OPG continues to convene an internal DRC to examine the service lives of fixed and intangible assets and therefore the calculation of depreciation and amortization expense. The DRC is comprised of business representatives as well as staff from the Finance and Regulatory Affairs functions. The DRC considers available engineering, technical, operational and financial assessments/information as part of its regular review of the service lives of generating stations (including the Bruce stations) and a selection of asset classes with the general objective of reviewing all significant asset classes for the regulated assets over a five-year cycle. Periodic independent reviews of the service life estimates of significant asset classes for the regulated assets are also performed, as recommended by Concentric.[4]

[2] EB-2013-0321 Decision with Reasons, p. 98
[3] Attachment 1, p. 3-1.
[4] EB-2013-0321 Ex. F4-1-1, Attachment 1, p I-7.

The DRC's scope and recommendations continue to be submitted for approval to OPG's senior executives, including the Chief Financial Officer, the Chief Administrative Officer and the business leaders of Nuclear and Hydroelectric operations (the Approvals Committee). Approved DRC recommendations are used to calculate the depreciation and amortization expense that is reflected in OPG's financial statements and business plan. Any changes to asset service lives resulting from the DRC process are typically implemented prospectively as of the end of the review year or the beginning of the following year. As part of the EB-2013-0321 Depreciation Study, OPG's DRC review process was found by Concentric to be procedurally sound and meeting generally accepted regulatory objectives regarding depreciation.[5] In its 2019 Depreciation Study, Concentric again found the DRC process "to be procedurally sound, reasonable and resulting in valid depreciation rates and generating station lives that accurately reflect the consumption of average service life of OPG's regulated assets."[6]

The DRC recommendations are discussed in Section 3.3.

3.2 Independent Depreciation Study

As discussed above, OPG engaged Concentric in 2019 to conduct an independent assessment of depreciation rates and generating station lives for the regulated nuclear facilities based on the net book values as at December 31, 2019 and the assets placed in service upon the return to service of Darlington Unit 2 from refurbishment in June 2020.

The results of the study are summarized as follows:[7]

> In reviewing depreciation rates for OPG's nuclear plant accounts and having regard to the plant associated with the return to service of Unit 2 at Darlington NGS, Concentric supports the average service lives currently in use, subject to recommended changes for the following accounts:

[5] EB-2013-0321 Ex. F4-1-1, Attachment 1, pp. I-3 and I-4
[6] Attachment 1, p. 1-3.
[7] Attachment 1, pp. 1-3 and 1-4

- Nuclear – Shutdown Cooling System Heat Exchangers – Pickering: from 25 years to 30 years; and
- Nuclear – Building Electric Service Supply – Pickering 1&4 and Bruce: from 40 years to 55 years.
- Nuclear – Fuel Channel Assemblies: from 28 years to 30 years;
- Nuclear – Calandria Tubes – Pickering 5-8 and Darlington: from 28 years to 30 years;
- New Account: Nuclear – Instrumentation and Control – Darlington Refurbishment: 30 years; and,
- New Account: Nuclear – Service Water and Fire Protection System – Darlington Refurbishment: 30 years.

> Concentric also believes that the life span dates currently in place for depreciation purposes for the regulated nuclear generating assets are reasonable for use in this study, recognizing that OPG is in the midst of implementing plans for optimizing the planned shutdown dates for the Pickering NGS.

OPG has accepted and, effective January 1, 2021, will implement the above recommendations from the study pending formal approval through the 2020 DRC process. OPG's forecast depreciation and amortization expense in this application incorporates the estimated impact of these changes effective January 1, 2021, which is a decrease of approximately $5M annually.

With respect to the process followed by OPG to componentize the assets placed in service upon returning Darlington Unit 2 to service, Concentric drew the following conclusion:[8]

> In conjunction with the above asset class changes, Concentric finds the process used by OPG to componentize the capital amount placed in service upon completion of refurbishment for Unit 2 of Darlington NGS in June 2020 to result in reasonable and valid depreciation rates going forward.

3.3 Depreciation Review Committee Recommendations

Since EB-2016-0152, the DRC was convened four times, annually from 2016 to 2019. For the nuclear assets, the DRC recommended, and the Approvals Committee approved, the

[8] Attachment 1, pp. 1-4.

following three changes to asset class lives, in addition to the extension of the Pickering EOL dates discussed in Section 3.4 below:

- In 2016, the DRC recommended a reduction in the average service life for asset class 15511000 (Nuclear – Station Service Main Transformers and AC Power Distribution System – Pickering Units 5- 8 and Darlington) from 55 years to 40 years based on plant condition and engineering assessments.
- In 2016, the DRC recommended establishing a separate asset class for security fencing with an average service life of 20 years that was previously included in asset class 15120000 (Nuclear – Yard Facilities) with a 50-year average service life. This change recognized the shorter design life of fencing compared to other assets in the class.
- In 2017, the DRC recommended a reduction in the average service life for asset class 15411000 (Nuclear – Turbine Blades & Diaphragms – Pickering) from 40 years to 15 years based on engineering assessments and comparison against other nuclear generating facilities.

These changes had a minimal aggregate impact on nuclear depreciation and amortization expense, estimated at less than $2M per year decrease, and are reflected in the depreciation and amortization expense in this application. The changes were reflected in the asset service life estimates reviewed by Concentric as part of the 2019 Depreciation Study, which did not recommend any further changes to these asset classes.

The Nuclear DRC recommendations for 2016 through 2019 are provided in Attachments 2-5 to this schedule.

3.4 Historical Changes in Nuclear Station End-Of-Life Dates

The only change made to nuclear station EOL dates for depreciation and amortization purposes since EB-2016-0152 was an extension of the Pickering EOL dates for Units 1 and 4 and Units 5-8, effective December 31, 2017. The previous and current nuclear station EOL dates can be found in Chart 1 provided in Section 3.1.

In 2017, the DRC concluded that OPG had achieved sufficient high confidence to extend the EOL dates for Pickering Units 1 and 4 to December 31, 2022 and for Pickering Units 5-8 to December 31, 2024. Previously and in EB-2016-0152, the EOL dates were set at December 31, 2020. The DRC made this conclusion on the basis of the high technical confidence associated with the programs and provisions in place to assure fitness-for-service of fuel channel components (including through the results of the Fuel Channel Life Assurance project) and an assessment of the status of the then-pending operating license application to the Canadian Nuclear Safety Commission ("CNSC").[9] These EOL dates were adopted for accounting purposes effective December 31, 2017.

In connection with these changes, OPG recorded an adjustment to the ARO for the nuclear liabilities and associated ARC balances as of December 31, 2017, in accordance with US GAAP. This adjustment is further discussed in Ex. C2-1-1, Section 6.0.

Pursuant to OPG's EB-2018-0002 accounting order application made as required by the EB-2016-0152 Payment Amounts Order, the OEB established the Impact Resulting from Changes to Pickering Station End-of-Life Dates (December 31, 2017) Deferral Account to record, effective January 1, 2018, the revenue requirement impact on the prescribed facilities arising from changes to nuclear liabilities and depreciation and amortization expense as a result of the above changes in the Pickering station EOL dates. The account is to continue recording this revenue requirement impact until the effective date of the next payment amounts order incorporating these changes to the Pickering EOL dates in nuclear payment amounts. The deferral account is further discussed in Ex. H1-1-1, section 5.22.

As provided in EB-2018-0002 and set out in Ex. H1-1-1, the changes in the Pickering stations EOL dates resulted in a total decrease in non-ARC depreciation and amortization expense of $295.7M based on forecast asset values reflected in the EB-2016-0152 payment

[9] In August 2018, OPG obtained a ten-year license renewal for the Pickering GS from the CNSC, valid until August 31, 2028. (Ex. F2-1-1).

amounts over 2018-2021.[10] This was partially offset by the increase in ARC depreciation expense of $98.5M over the same period, inclusive of the corresponding year-end 2017 ARO/ARC adjustment.[11]

Based on the actual net book value of the assets as at December 31, 2017, the changes in the Pickering station EOL dates and the year-end ARO/ARC adjustment resulted in an estimated reduction in depreciation and amortization expense of approximately $78M annually.[12]

3.5 Future Changes in Nuclear Station End-Of-Life Dates

As discussed in Ex. F2-1-1, section 4.0, OPG's Pickering Optimized Shutdown plan includes operating all six units at Pickering through 2024, at which point two units would be shut down (one in September 2024 and one in December 2024) and the remaining four units would operate until the end of 2025. This represents an extension of the planned operating period beyond the current accounting EOL dates of December 31, 2022 for Units 1 and 4 and December 31, 2024 for Units 5-8.

The achievement of the plan to operate Units 5-8 beyond 2024 is subject to the results of ongoing technical assessments and requires the CNSC's approval. The accounting EOL date for Units 5-8 is expected to be reassessed in the future based on the status of this work and the CNSC approval process. This approach is consistent with OPG's past practice and application of US GAAP for its financial statement purposes. Accordingly, these future changes are not reflected in the 2020-2026 Business Plan or this application.

[10] See Ex. H1-1-1, Table 13, line 5. As noted in EB-2018-0002, Interrogatory Schedule-1 Staff-1, p. 3, lines 26-29, these impacts, which are being recorded in the Impact Resulting from Changes to Pickering Station End-of-Life Dates (December 31, 2017) Deferral Account, are determined by applying the revised Pickering station EOL dates to recalculate the corresponding OEB-approved values reflected in the EB-2016-0152 revenue requirement, holding other variables constant. This means that the impacts are calculated using the OEB-approved forecast of in-service assets for the EB-2016-0162 IR term.

[11] Ex. H1-1-1, Table 13, line 4.

[12] Ex. A2-1-1, Attachment 3, p. 23.

The operation of Pickering Units 1 and 4 to December 31, 2024 does not require further CNSC approval and OPG has now achieved high confidence, for depreciation purposes, that the units are expected to operate to December 31, 2024. The high confidence was achieved in 2020 based on inspection and analysis work completed on key components. The 2020 DRC is expected to recommend extending the EOL date for Units 1 and 4 to December 31, 2024, effective December 31, 2020, for financial accounting purposes. As was the case in EB-2015-0374 and EB-2018-0002, OPG is not able to provide the total revenue requirement impact associated with these changes at this time, primarily because the final year-end information required to calculate the December 31, 2020 ARO/ARC adjustment is not yet available. Accordingly, these change are not reflected in the 2020-2026 Business Plan or this application.

As further discussed in Ex. H1-1-1, section 6.2, OPG proposes to address the revenue requirement impacts associated with the Pickering station EOL dates changes as of December 31, 2020 and such future accounting changes related to Pickering Optimized Shutdown in a new deferral account to be established effective January 1, 2021, on terms similar to the deferral accounts established in EB-2015-0374 and EB-2018-0002.

4.0 NUCLEAR DEPRECIATION AND AMORTIZATION EXPENSE TRENDS

Overall, the depreciation and amortization expense for the prescribed nuclear facilities increases from 2016 to 2026 largely due to the impact of in-service additions for the Darlington Refurbishment Project ("DRP") and other capital projects entering rate base for the Darlington station, (see Ex. D2-2-9, Ex. D2-1-3 and Ex. D3-1-2).

The increase in depreciation and amortization expense in 2017 was due to capital in-service additions for the Pickering station as well as the increase in ARC to reflect the year-end 2016 nuclear liabilities adjustment for the approved 2017-2021 Ontario Nuclear Funds Agreement ("ONFA") Reference Plan.[13]

[13] The impacts of the 2017 ONFA Reference Plan adjustment to the ARO and ARC balances was reflected in the EB-2016-0152 Payment Amounts Order, as discussed in Ex. C2-1-1.

As discussed above, the extension of the Pickering station EOL dates effective December 31, 2017 resulted in a decrease in nuclear depreciation and amortization expense in 2018 over 2017. Forecast nuclear depreciation and amortization expense increases in 2020 as capital assets of approximately $4.8 billion are placed in service upon completion of the Darlington Unit 2 refurbishment in June 2020 and increases further in 2021 to reflect the full year depreciation effect of this in-service amount.

The variability in forecast nuclear depreciation and amortization expense over 2023-2026 reflects: Pickering units reaching their current assumed EOL dates of December 31, 2022 for Units 1 and 4 and December 31, 2024 for Units 5-8,[14] and capital assets of approximately $2.5 billion, $1.9 billion and $2.0 billion being placed in service upon completion of Darlington Units 3, 1 and 4 refurbishments in 2024, 2025 and 2026, respectively. The significant decrease in ARC depreciation expense by 2025 is due to the full depreciation of the Pickering portion of the balance by the EOL dates. The non-DRP Darlington plant depreciation expense increases from $34.2M in 2016 to $173.2M in 2026, reflecting the planned capital program.

As discussed in Ex. D2-2-2, for the purposes of setting payment amounts in this application, OPG proposes to limit the DRP-related net plant in rate base for projects completed prior to 2022 (other than the Heavy Water Storage and Drum Handling Facility) to the values approved in EB-2016-0152 as of December 31, 2021, with the revenue requirement impact of the differences continuing to be recorded in the Capacity Refurbishment Variance Account ("CRVA").[15] In conjunction with a lower proposed rate base as of the beginning of the IR term, this results in lower proposed depreciation and amortization expense. The depreciation and amortization values for the historical and bridge years reflect the actual/forecasted DRP-related amounts.

[14] In line with the current station EOL dates, most of the forecast Pickering capital additions from 2020-2024 are assumed to be fully depreciated in 2022 for Pickering Units 1 and 4 and 2024 for Pickering Units 5-8.

[15] OPG proposes to address any resulting DRP-related balances in the CRVA in a future application, which would allow an assessment of the recoverability of DRP-related variances, if any, in the context of the overall performance of the four-unit refurbishment.

ATTACHMENTS

Attachment 1: Concentric Report: Assessment of Regulated Nuclear Asset Depreciation Rates and Generating Station Lives – December 2020

Attachment 2: 2019 Depreciation Review Committee Recommendations for Nuclear

Attachment 3: 2018 Depreciation Review Committee Recommendations for Nuclear

Attachment 4: 2017 Depreciation Review Committee Recommendations for Nuclear

Attachment 5: 2016 Depreciation Review Committee Recommendations for Nuclear