NUCLEAR WASTE MANAGEMENT AND DECOMMISSIONING – REVENUE REQUIREMENT IMPACT OF NUCLEAR LIABILITIES

1.0 PURPOSE

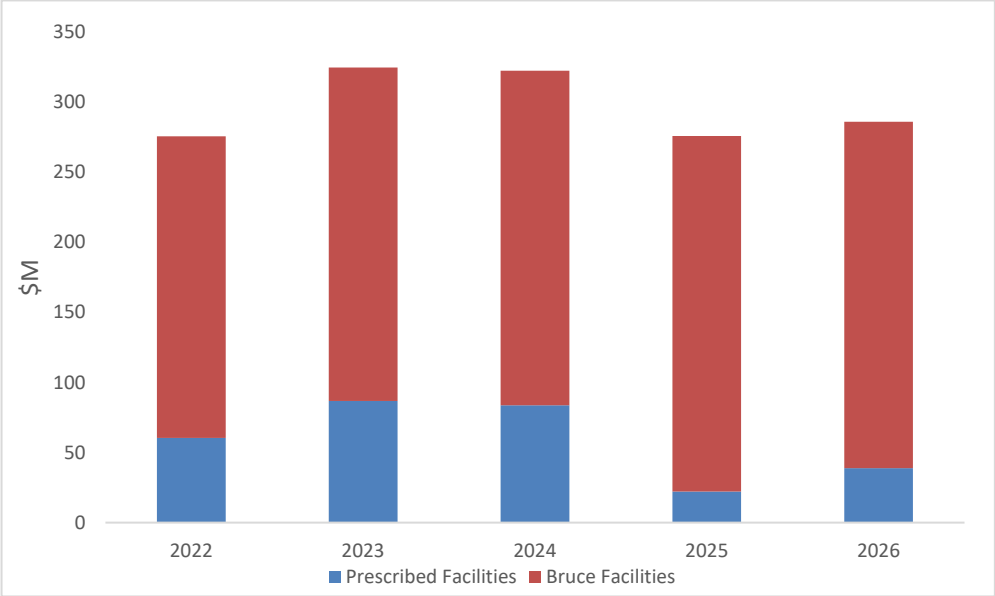
The purpose of this evidence is to outline the OEB-approved revenue requirement treatment of OPG's liabilities for nuclear waste management and decommissioning ("nuclear liabilities") and to present the forecast amounts of nuclear liabilities costs included in the proposed revenue requirements for the 2022-2026 IR term.

2.0 OVERVIEW

OPG is seeking recovery of $1,483.9M, after-tax, over the IR term in respect of nuclear liabilities, with $291.8M for the prescribed facilities and $1,192.1M for the Bruce facilities. These amounts were determined using the methodology approved by the OEB in EB-2007-0905, EB-2010-0008, EB-2013-0321, and EB-2016-0152, and reflect the approved 2017 to 2021 Ontario Nuclear Funds Agreement ("ONFA") Reference Plan effective January 1, 2017 (the "2017 ONFA Reference Plan") and its attendant contribution schedule approved by the Province of Ontario (the "2017 ONFA Contribution Schedule"). The relative contribution of the prescribed facilities and the Bruce facilities to the nuclear liabilities' revenue requirement impacts is illustrated in Figure 1 below.

For the prescribed facilities, OPG is seeking recovery of the following annual amounts: $60.3M in 2022, $86.8M in 2023, $83.6M in 2024, $22.2M in 2025 and $38.9M in 2026 (Ex. C2-1-1, Table 1, line 8). The significant reduction in the recovery amounts over the IR term primarily reflects the depreciation of asset retirement costs for the Pickering station in line with the current accounting end-of-life ("EOL") dates of December 31, 2022 for Units 1 and 4 and December 31, 2024 for Units 5 to 8.

Figure 1: Nuclear Liabilities Revenue Requirement Impact



For the Bruce facilities, the recovery amounts sought comprise (i) a reduction to Bruce Lease net revenues, and (ii) through the impact of Bruce Lease net revenues on regulatory earnings before tax for the prescribed facilities, associated regulatory income tax impacts. The annual Bruce Lease net revenues reductions are as follows: $161.4M in 2022, $178.3M in 2023, $179.0M in 2024, $190.2M in 2025 and $185.2M in 2026 (Ex. C2-1-1, Table 1, line 15). The associated annual regulatory income tax impacts are as follows: $53.8M in 2022, $59.4M in 2023, $59.7M in 2024, $63.4M in 2025 and $61.7M in 2026 (Ex. C2-1-1, Table 1, line 16).

The treatment of Pickering EOL dates is discussed in further detail in Ex. F4-1-1, Section 3.5 and Ex. H1-1-1, Section 6.2. As noted in those exhibits, OPG is applying for a deferral account related to future changes to Pickering station EOL dates for accounting purposes, including associated impacts on nuclear liabilities, as part of this application in line with the OEB's current accounting order requirements, effective January 1, 2021. This includes changes to the Pickering station EOL dates expected effective December 31, 2020, the impact of which cannot be determined pending finalization of the corresponding year-end

2020 adjustment to the nuclear liabilities and therefore has not been reflected in this application. This adjustment will be reflected in OPG's 2020 audited consolidated financial statements to be issued in March 2021.

The remainder of this evidence is structured as follows:

- Section 3.0 provides background on OPG's nuclear waste management and decommissioning obligations, an overview of ONFA, and financial accounting requirements for nuclear liabilities and ONFA segregated funds in accordance with US generally accepted accounting principles ("US GAAP').
- Section 4.0 describes the OEB-approved methodology for recovery of OPG's nuclear liabilities, for the prescribed facilities and the Bruce facilities, that was applied in all prior OPG payment amounts proceedings and has been applied by OPG in this application.
- Section 5.0 discusses main changes in the asset retirement obligation, the corresponding unamortized asset retirement costs and the segregated fund balances set aside for discharging the nuclear liabilities in accordance with the ONFA.
- Section 6.0 presents the impact of the year-end 2017 nuclear liabilities adjustment recorded in connection with the extension of EOL dates for the Pickering station subsequent to EB-2016-0152, for which the prescribed facilities' revenue requirement impact is being recorded in the Impact Resulting from Changes to Pickering End-of-Life Dates (December 31, 2017) Deferral Account established through the EB-2018-0002 accounting order proceeding.
- Section 7.0 provides the status of the 2022 ONFA Reference Plan update, which is under development and has not been reflected in the proposed IR term revenue requirement. Once finalized and implemented, the revenue requirement impact of the 2022 ONFA Reference Plan will be subject to the Nuclear Liability Deferral Account and the Bruce Lease Net Revenues Variance Account.
- Section 8.0 discusses the jurisdictional review of cost recovery methodologies for nuclear liabilities ("Jurisdictional Study") directed by the OEB's Decision and Order in EB-2016-

0152[1]. The Jurisdictional Study itself is provided in Attachment 3.

3.0 BACKGROUND

3.1 Obligations for Nuclear Waste Management and Decommissioning

OPG is responsible for the ongoing and long-term management of irradiated wastes, including used nuclear fuel and less radioactive material, categorized as low and intermediate level waste ("L&ILW"), generated over the life of its nuclear facilities, and for the decommissioning of its nuclear generating and waste management facilities at the end of their useful lives. These obligations are tracked by the following five programs:

- Decommissioning – OPG's nuclear station decommissioning plans consist of preparation and placement of stations into a safe state condition at the end of their useful lives, including removal of fuel and heavy water from the reactors, followed by an assumed 30-year safe store period and subsequent station dismantlement and site restoration.
- Used Fuel Storage – The program encompasses the interim storage of used nuclear fuel in dry storage containers at nuclear station sites prior to their ultimate long-term disposal.
- Used Fuel Disposal – The program encompasses the long-term management of used nuclear fuel, which is based on the Adaptive Phased Management ("APM") concept previously accepted by the Government of Canada on recommendation of the Nuclear Waste Management Organization ("NWMO") in response to the *Nuclear Fuel Waste Act*. The NWMO is responsible for the design and implementation of Canada's plan for the safe long-term management of used nuclear fuel. The APM approach includes the isolation and containment of used nuclear fuel in a proposed deep geologic repository. The NWMO is funded by nuclear fuel waste owners in Canada, including OPG.
- L&ILW Storage – The program includes the transportation, processing, and interim storage, at the OPG-owned and operated Western Waste Management Facility situated at the Bruce nuclear site, of the L&ILW generated at the sites during and following the operation of the nuclear stations, prior to its ultimate long-term disposal.

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[1] EB-2016-0152 Decision and Order, p. 97.

- L&ILW Disposal – The program encompasses the long-term management of the L&ILW generated at the nuclear sites. OPG's long-term disposal strategy previously entailed the permanent emplacement of L&ILW into a separate proposed deep geologic repository adjacent to the Western Waste Management Facility. As a result of the January 2020 vote of the Saugeen Ojibway Nation ("SON") not to support this proposal, OPG is exploring alternative solutions for the safe long-term management of L&ILW. Due to significant inherent uncertainties associated with potential alternative solutions, no adjustments to the estimate of OPG's nuclear liabilities have been made as a result of the SON vote in accordance with US GAAP and under the ONFA.

OPG's obligations include used fuel and L&ILW generated at the Bruce stations and the decommissioning of the Bruce stations.

OPG typically performs a comprehensive update of the cost estimates for the nuclear liabilities every five years, through the ONFA Reference Plan update process outlined in Section 3.2. Given the long-term duration of the nuclear liabilities programs and the evolving technology to handle nuclear waste, there is inherent uncertainty surrounding the cost estimates and economic indices underpinning the nuclear liabilities, which may increase or decrease materially over time as plans, assumptions, methods and technology evolve and economic conditions change.

In accordance with US GAAP, OPG recognizes an accounting obligation for its nuclear liabilities on the balance sheet, known as an asset retirement obligation ("ARO"). The ARO represents the present value of the committed portion of the costs for OPG's nuclear liabilities. The committed costs include the cost components of the above five nuclear waste management and decommissioning programs that are considered to be fixed, as well as the lifetime variable costs for irradiated waste generated to date. The baseline cost estimates underpinning the ARO are those developed through the ONFA Reference Plan update process.

The initial value and each subsequent adjustment to the ARO are known as tranches. In accordance with US GAAP, each tranche is calculated using a discount rate determined at the time of the adjustment, as discussed below, and is not revalued for subsequent changes in the discount rate.

The current ARO balance consists of nine different tranches. The tranches represent the initial ARO and each of the subsequent adjustments (in present value terms), with the latest tranche, recorded at December 31, 2017, related to the 2017 adjustment in connection with the extension of accounting EOL dates for the Pickering station (see Section 6.0).

Each of the ARO tranches increases over time due to accretion expense, which represents growth in the present value of the obligation at the discount rate used to establish each tranche, due to the passage of time. Accretion expense is recognized as a cost in OPG's income statement in accordance with US GAAP.

In accordance with US GAAP, the discount rate for each ARO tranche is determined using a credit adjusted risk-free rate[2] determined as of the date of the revision for each ARO adjustment underpinned by an upward revision in the amount of undiscounted estimated cash flows (for example, for the year-end 2017 ARO adjustment), or the weighted average discount rate of the existing tranches in the case of a downward revision in the amount of undiscounted cash flows (for example, for the 2017 ONFA Reference Plan ARO adjustment). The December 31, 2017 tranche, which was based on an upward revision, was calculated using a discount rate of 2.94% and the 2017 ONFA Reference Plan tranche, which was based on a downward revision, was calculated using a discount rate of 4.95%.

An overall objective of the financial accounting treatment of the ARO is to reflect costs in the periods they are incurred, by matching them to the benefits derived from the asset. ARO costs are typically capitalized as a component of property, plant and equipment ("PP&E") on

[2] The discount rate used by OPG is the Province of Ontario long-term bond yield rate.

the balance sheet and amortized over the useful life of the stations, in order to match the incurrence of these costs to the generation output of the station. The capitalized costs are known as asset retirement cost ("ARC"). As such, a change in the ARO as a result of changes in baseline cost estimates from an approved ONFA Reference Plan or from a change in the accounting estimate or assumptions typically result in an equal amount being recorded as an increase or decrease to the PP&E balances for the corresponding stations, to be amortized, like other capital costs, over their remaining useful lives. The amortization gives rise to depreciation expense. ARC is a component of the net book value of each of the Pickering, Darlington and Bruce nuclear stations.[3] Under the OEB-approved nuclear liabilities recovery methodology for the prescribed facilities discussed in Section 4.1, ARC is included in OPG's nuclear rate base, and associated depreciation expense is included in the total depreciation and amortization expense.

Quantities of used fuel and L&ILW produced over time give rise to incremental committed costs, which are recorded as increases to the ARO. These costs, expressed in present value terms, are known as used fuel variable and L&ILW variable expenses, and are charged to the income statement as incurred, in the period the additional used fuel and L&ILW is generated. The variable expenses are recorded as an increase to the ARO, either as an increase to the most recent tranche or as a separate tranche.[4] They are included in the revenue requirement, as incurred, under the OEB-approved nuclear liabilities recovery methodology for the prescribed facilities and the Bruce facilities.

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[3] For continuities of PP&E and accumulated depreciation and amortization balances for the prescribed facilities over the 2016-2026 period, including ARC, see Ex. B3-3-1 and Ex. B3-4-1.

[4] As incremental variable expenses represent, by definition, increases in undiscounted cash flows underlying the ARO, they are calculated using a credit-adjusted risk-free rate as of the date of the latest ARO adjustment. This approach is followed irrespective of whether the latest ARO adjustment was calculated using a credit-adjusted risk-free rate or a weighted average discount rate of the existing tranches (i.e. depending on the direction of change in the underlying undiscounted cash flows). Therefore, when an ARO adjustment is calculated using a credit-adjusted risk-free rate, variable expenses recorded following that date are added to the same ARO adjustment tranche. When the latest ARO adjustment is calculated using a weighted average discount rate, such variable expenses form a separate tranche, as was the case for the variable expenses recorded during 2017 that were calculated using a discount rate of 3.20%.

OPG maintains a station-level continuity of the ARO balances. The ARO is attributed at the station level for each of the five programs described above. For the Decommissioning and Used Fuel Storage programs, the underlying cost estimates are prepared directly at the station level, with individual estimates prepared for each station. The remaining programs involve central facilities, with cost estimates prepared at the program level and allocated to individual stations in proportion to the lifecycle waste volume estimates.[5]

Continuity schedules showing the opening, closing and average balances of the ARO and ARC are provided in Ex. C2-1-1, Table 2 (for the prescribed facilities) and Ex. C2-1-1, Table 3 (for the Bruce facilities).[6]

3.2 Ontario Nuclear Funds Agreement

The ONFA, a bilateral agreement between OPG and the Province of Ontario ("Province"), sets out OPG's funding obligations for the long-term programs of lifecycle nuclear liabilities, through contributions to two segregated funds, the Decommissioning Segregated Fund ("DF") and the Used Fuel Segregated Fund ("UFF") (collectively, "segregated funds").[7] These funds are set aside in segregated accounts for the express purpose of funding future expenditures on the underlying obligations. The Province established the ONFA as a funding mechanism for OPG's nuclear liabilities consistent with a growing trend in international jurisdictions at the time to place money aside for the long-term management of nuclear liabilities, in recognition of the fact that these liabilities will be discharged many years after the nuclear generating stations have closed. The ONFA was executed in 2003, but includes calculations and contributions effective as of OPG's inception in 1999.

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[5] The allocation of central program costs across the nuclear fleet based on lifecycle waste volume estimates gives rise to circumstances where a change in the assumed operating life of one nuclear station results in changes to the nuclear liabilities of all stations (i.e. both the prescribed facilities and the Bruce facilities).

[6] The average ARO and ARC balances are provided for the prescribed facilities but not the Bruce facilities as these values are required to determine rate base values and the return on rate base used only in the approved revenue requirement methodology for the prescribed facilities (see sections 4.1 and 4.2).

[7] In accordance with the ONFA, the DF is established to pay for costs associated with the Decommissioning program, the L&ILW Disposal program, certain costs of the Used Fuel Storage program incurred after the stations are shut down, and the costs of the L&ILW storage program incurred after the stations are shut down. The UFF funds the costs of the Used Fuel Disposal program and certain costs of the Used Fuel Storage program after the stations are shut down.

The costs for used fuel management and L&ILW storage costs incurred during the stations' operating lives are not funded under the ONFA, cannot be drawn from the segregated funds and therefore are not included in the ONFA funding liabilities. As these costs, referred to as "internally funded", are part of OPG's legal obligation for nuclear waste, they are included in the ARO and are funded from OPG's operating cash flow.

The ONFA funding liabilities reflect a lifecycle view of nuclear wastes forecast over the operating span of OPG's nuclear generating facilities, including wastes not yet generated. Conversely, as discussed above, the ARO considers the committed portion of the costs for OPG's nuclear liabilities, which includes lifetime variable costs associated with the wastes generated to date but excludes such costs for wastes yet to be generated.

OPG's station-level quarterly contributions to the segregated funds are determined periodically with reference to (i) the "ONFA Decommissioning Balance to Complete Cost Estimate" and "Used Fuel Balance to Complete Cost Estimate" (collectively, "funding liabilities") contained in the approved ONFA Reference Plan in effect, and (ii) corresponding segregated fund balances at that point in time. Prescribed funding formulae and rules set out in the ONFA are applied to calculate the contribution amounts based on the difference between the funding liabilities and segregated funds balance. The ONFA reference plan, including all underlying cost estimates and assumptions, is required to be updated every five years or whenever there is a significant change as determined under the ONFA. Station-level continuities of the funding liabilities and segregated funds balances are maintained in accordance with the ONFA. The funded status of the segregated funds at any point in time represents the difference between the funding liabilities per an approved ONFA reference plan then in effect and the value of the segregated funds.

The discount rate used to calculate the funding liabilities is determined in accordance with the ONFA, which prescribes that such rate be set at 3.25% real rate of return plus the long-term term change in the Ontario consumer price index ("CPI"). The resulting rate stands at 5.15% per the 2017 ONFA Reference Plan and establishes the long-term target rate of return on the segregated funds.

Cost estimates and underlying operational, economic and other planning assumptions reflected in the ONFA funding liabilities are determined through a comprehensive process that draws from a variety of sources, including the use of independent third party experts in different fields. Cost estimates and underlying assumptions are reviewed by the Province and their technical consultants prior to approval of an ONFA Reference Plan. In addition to the funding liabilities for the ONFA-eligible costs, an approved ONFA Reference Plan contains cost estimates for internally funded costs, which are also subject to review by the Province.

The ONFA contains several specific features designed to reduce risk for future generations of Ontarians, by ensuring that sufficient funds are available to pay for nuclear liabilities. First, the segregated funds are held in third-party custodial accounts, externally administered and subject to established reporting controls. Second, OPG cannot withdraw monies from the funds unless the withdrawal reimburses OPG for an eligible incurred expenditure related to nuclear waste management and decommissioning activities as specifically defined by the ONFA. These disbursements are subject to a detailed review and approval process by the Province. OPG does not have other rights to withdraw the funds, including on the agreement's termination, as discussed below. Third, as also discussed below, specific funding formulae and rules contained in the ONFA have been structured such that OPG has been required to fund a substantial portion of the underlying used fuel liabilities in earlier years, effectively as a form of funding conservatism.

3.2.1 Funding of ONFA Segregated Funds

Prior to the current approved 2017 ONFA Reference Plan, OPG had been making overall quarterly contributions to the UFF since inception, as the fund was in an underfunded position. These contributions reflected ONFA requirements that result in about three-quarters of the long-term used fuel management costs being funded over the assumed remaining

operating periods of the nuclear stations per the 1999 ONFA Reference Plan.[8] These operating periods did not contemplate subsequent station refurbishment or extended operation decisions and therefore are much shorter than the operating lives expected currently, including those used for accounting purposes. In addition to the overall quarterly contributions, ONFA also required OPG to make a special one-time payment of $334M into the UFF in 2007, which further accelerated the funding of the underlying liabilities.[9] These factors, together with the performance of the fund assets, led to the UFF becoming overall fully funded based on the approved 2017 ONFA Reference Plan.

In 2003, the Province made a substantial contribution to the DF, which, together with fund performance since that time, has been sufficient to ensure that the fund remained fully funded overall each time a new contribution schedule has been established.[10]

Contributions to either or both the UFF or DF may be required in the future should the funds be in an underfunded position relative to the funding requirements of a new approved ONFA Reference Plan, either as a result of changes in underlying cost estimates or due to below target fund investment performance.

Although each of the segregated funds was fully funded in aggregate when setting the 2017 ONFA Contribution Schedule, the portion of the 2017 ONFA Reference Plan funding obligations related to the prescribed facilities was underfunded, while the portion related to the Bruce facilities was overfunded. Specifically, the prescribed facilities' portion of the DF was underfunded and their portion of the UFF was overfunded, while for the Bruce facilities, the DF portion was overfunded and the UFF portion was underfunded. Accordingly, the 2017

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[8] This reflects ONFA requirements that the costs for the first 2.23 million fuel bundles, the estimated lifecycle quantity expected to be produced by the stations as of OPG's inception, be funded over the assumed remaining operating periods of the nuclear stations per the 1999 ONFA Reference Plan. As the estimated fixed costs of the used fuel long-term management program, which are expected to be incurred irrespective of the fuel bundle volume, make up a significant portion of the total used fuel funding liability, the majority of the used fuel liability is funded over the assumed 1999 remaining operating period applicable to the first 2.23 million bundles (or within 5 years of a new approved ONFA reference plan if these operating periods have elapsed).
[9] See EB-2007-0905 Ex. G2-2-1, p. 2, lines 11-20.
[10] The funded status of the DF was noted in EB-2007-0905 Decision with Reasons, p. 66.

ONFA Contribution Schedule included rebalancing of each of the funds via offsetting positive and negative station-level contribution amounts, consistent with the intent of the ONFA that, over time, the funds be fully funded at the station level. This results in overall positive prescribed facilities' contributions and overall negative Bruce facilities' contributions based on the 2017 ONFA Contribution Schedule. The approved contributions to the UFF and the DF are found in Attachments 1 and 2, and are reflected, as applicable, in the revenue requirement impacts proposed in this application under the OEB-approved recovery methodology.

3.2.2 Segregated Funds Assets and Earnings

In accordance with US GAAP, segregated funds are recognized as assets on OPG's balance sheet to the extent that OPG has a right to access the monies based on the terms of the ONFA. OPG does not have the right or access to any portion of the segregated funds that are not recorded on its balance sheet.

The difference between the ARO and the segregated fund assets recorded on OPG's balance sheet represents the unfunded nuclear liability ("UNL"), as defined under the OEB-approved revenue requirement methodology for the prescribed facilities, discussed in section 4.1.

Under the ONFA, the Province guarantees the rate of return earned for the portion of the UFF attributed to the first 2.23 million used fuel bundles at a prescribed real rate of return of 3.25% plus the change in the Ontario CPI as defined in the ONFA ("committed return"). The Province also limits OPG's financial exposure under the ONFA with respect to the lifecycle costs of long-term management of the first 2.23 million used fuel bundles. Any earnings above the guaranteed rate accrue to the Province. The Province has the right to access cumulative excess market earnings above the committed return when a new or amended ONFA reference plan becomes approved, but has not done so to date. If the market earnings are lower than the committed return, the Province is required to make a contribution to the UFF when a new or amended ONFA reference plan is approved.

The portion of the fund attributed to used fuel bundles above the 2.23 million threshold is not

subject to the Province's guarantee and earns a return based on the market performance of the assets. This portion is intended to fund the incremental costs associated with fuel bundles in excess of 2.23 million, which currently represent about one-quarter of the used fuel funding liability.[11]

Upon termination of the ONFA, only the Province has a right to any surplus in the UFF. The ONFA does not allow inter-fund transfers from the UFF to the DF. If there is a surplus in the UFF such that the underlying used fuel funding liability, as defined by the most recently approved ONFA reference plan, is at least 110% funded based on the fair market value of the fund assets and after taking into account the committed return on the guaranteed portion, the Province has the right to access the surplus amount greater than 110% at any time.

There is no Provincial guarantee with respect to the DF, which earns a return based on the market performance of the assets. OPG has the right to direct, solely when a new or amended ONFA reference plan is approved, up to 50% of the surplus, if any, above 120% in the DF to the UFF, with the Province entitled to receive the other 50%. OPG has not directed any portion of the DF surplus to the UFF since the fund's inception. The Province does not have a right to withdraw, at its own discretion, any portion of the surplus amounts in the DF until the termination of the ONFA, at which time all such surplus amounts accrue to the Province.

As OPG does not have the right to any surplus funding in the UFF, in accordance with generally accepted accounting principles, it limits the portion of the UFF recognized as an asset to the underlying funding liability per the approved ONFA reference plan in effect. For the DF, OPG records, as an asset, an amount equal to the underlying funding liability plus the portion of DF surplus funding, if any, equal to 50% of the surplus above the 120% threshold, in recognition of the company's right to direct that portion to the UFF. The portion of the DF surplus recognized as an asset is further limited by the amount of underfunding in

[11] The incremental costs associated with fuel bundles in excess of the 2.23 million threshold do not include the fixed costs of the used fuel long-term management program.

the UFF, such that when the UFF is fully funded, none of the surplus in the DF is recorded as an asset. This additional limitation recognizes that a transfer from the DF to UFF when the UFF is fully funded would increase the surplus in the UFF that OPG cannot access. When the portion of the DF or UFF asset is limited to the underlying funding liability per above, fund earnings are recorded at the rate of growth of that liability (i.e. the discount rate) per the approved ONFA reference plan in effect.[12]

Continuity schedules showing the opening, closing and average balances of the segregated fund assets and UNL are provided in Ex. C2-1-1, Table 2 (for the prescribed facilities) and Ex. C2-1-1, Table 3 (for the Bruce facilities).[13]

4.0 APPROVED METHODOLOGY FOR RECOVERY OF NUCLEAR LIABILITIES

In accordance with section 6(2)8 of O. Reg. 53/05, the OEB is required to ensure that OPG recovers the revenue requirement impact of its nuclear waste management and decommissioning liabilities arising from the current approved ONFA reference plan. The OEB established the methodologies for recovery of OPG's nuclear liabilities costs in OPG's first payment amounts proceeding, EB-2007-0905. Different methodologies were established for prescribed facilities and the Bruce facilities, as discussed below. These methodologies have been applied in all subsequent OPG proceedings.

The revenue requirement methodologies established by the OEB were largely based on accounting values determined in accordance with generally accepted accounting principles. The main difference between the methodology for the prescribed facilities and the Bruce facilities is the application of a return on rate base, a regulatory construct, to the prescribed facilities, as opposed to including the net amount of ARO accretion expense and segregated fund earnings for the Bruce facilities.

4.1 Approved Revenue Requirement Methodology for Prescribed Facilities

[12] The portion of any surplus in the funds not recognized as an asset is recorded as Due to Province in OPG's financial statements. The OEB addressed the matter of the Due to Province amounts in EB-2013-0321 (see EB-2013-0321, 20 Decision with Reasons, p.110).

[13] The average UNL balances are provided for the prescribed facilities but not the Bruce facilities as these values are required to determine rate base values and the return on rate base used only in the approved revenue requirement methodology for the prescribed facilities.

Under the OEB-approved methodology for the prescribed facilities, OPG recovers:

- depreciation expense on the ARC balance;
- used fuel variable expenses;
- L&ILW variable expenses;
- return at the ARO weighted average accretion rate on the lesser of the average unamortized ARC and average UNL; and
- return at the approved weighted average cost of capital ("WACC") on the portion, if any, of average unamortized ARC in excess of average UNL.

Each of these components is discussed separately below. The associated income tax impacts are also summarized below and further discussed in Ex. F4-2-1. Accounting accretion expense on the ARO and earnings on the segregated funds do not directly form part of the revenue requirement for the prescribed facilities, with the return component of the methodology effectively replacing the net amount of accretion expense and segregated fund earnings recorded for financial accounting purposes. One of the implications of this approach is that ratepayers are not exposed to investment performance risk for the prescribed facilities' portion of the segregated funds.

Section 5.2(1) of O. Reg. 53/05 establishes the Nuclear Liability Deferral Account, which records the revenue requirement impact for the prescribed facilities of any change in nuclear liabilities arising from an approved ONFA reference plan. This account is discussed in Ex. H1-1-1, section 5.14.

4.1.1 Depreciation Expense

Depreciation on the unamortized ARC is treated in the same manner as depreciation associated with other capital assets; it is included in annual nuclear depreciation and amortization expense presented in Ex. F4-1-1, Table 2. The ARC is depreciated over the station life. Actual amounts of ARC depreciation expense for the 2016 to 2019 period and the forecast amounts for the 2020 to 2026 period are presented in Ex. C2-1-1, Table 1, line 1.

The OEB's decision for the inclusion of the ARC depreciation expense in the revenue

requirement was related to the following observations in the EB-2007-0905 Decision with Reasons:

> *The Board will accept inclusion in the revenue requirement of depreciation expense for the nuclear plants computed in accordance with GAAP, as proposed by OPG. Under GAAP, ARC included in the net book value of fixed assets is depreciated like any other fixed asset cost. It appears as an expense in OPG's income statement. The Board finds that this approach results in a rational allocation of cost.* (pp. 88-89).

4.1.2 Used Fuel Variable Expenses

The used fuel expense is calculated by reference to the difference between the lifecycle cost estimate and the amount of committed costs included in the nuclear liabilities for the corresponding nuclear waste management programs. This difference represents the variable costs of future fuel waste. The present value of this cost difference is then divided by the forecast number of future fuel bundles to calculate the per bundle cost rate. Used fuel variable expenses are calculated by applying the per bundle cost rate to the forecast used fuel volume. The actual used fuel expenses for the 2016 to 2019 period and the forecast amounts for the 2020 to 2026 period are presented in Ex. C2-1-1, Table 1, line 2, and form part of the nuclear fuel expense presented at Ex. F2-5-1, Table 1. The accounting discount rate of 2.94% associated with the latest ARO tranche was used to determine the forecast used fuel expenses for the 2020 to 2026 period.

4.1.3 Low and Intermediate Level Waste Variable Expenses

The L&ILW variable expenses are a component of the OM&A expenses reflected in Ex. F2-2-1, Table 1 and Ex. F2-7-1, Table 1. Similar to used fuel, the difference between the lifecycle cost estimate and the amount of committed costs included in the nuclear liabilities for the corresponding nuclear waste management programs represents the variable costs of future waste. The present value of this cost difference is then divided by the forecast future L&ILW volume estimates to calculate the dollar per cubic metre rate. L&ILW variable expenses are calculated by applying the dollar per cubic metre rate to the forecast waste volumes. The actual L&ILW expenses for the 2016 to 2019 period and the forecast amounts for the 2020 to 2026 period are presented in Ex. C2-1-1, Table 1, line 3. The accounting

discount rate of 2.94% associated with the latest ARO tranche was used to determine the forecast L&ILW expenses for the 2020-2026 period.

4.1.4 Return on Rate Base

The OEB-approved nuclear liabilities recovery methodology requires that the return on a portion of the rate base be limited to the weighted average accretion rate. This portion is equal to the lesser of: (i) the average UNL related to the Pickering and Darlington facilities, and (ii) the average unamortized ARC included in the fixed asset balances for these facilities. The remainder of OPG's rate base, including the amount, if any, by which average ARC exceeds average UNL, earns the OEB-approved WACC. The average UNL and the average unamortized ARC, including the apportionment of the ARC between amounts subject to the weighted average accretion rate and the WACC rate, are provided for the 2016 to 2026 period in Ex. C2-1-1, Table 1a.

The OEB's decision for splitting the ARC return component between a portion attracting the weighted average accretion rate and a portion attracting the weighted average cost of capital was related to the following observations in the EB-2007-0905 Decision with Reasons:

> *At some point, the unamortized ARC that is included in fixed assets in effect will be funded by debt or equity because OPG is obligated by ONFA to make cash contributions to the segregated funds; however, until those contributions occur, the ARC component of fixed assets has not been funded with capital supplied by investors.* (p. 89)
>
> *Clearly, OPG incurs accretion expense (at an average rate of 5.6%) on its nuclear liabilities whether they are funded or not.* (p. 90)

The UNL balances for the 2020 to 2026 period are projected based on forecast ARO and segregated fund balances, taking into account forecast activity for future years. For the ARO, forecast activity includes accretion expense on the ARO balance, used fuel and L&ILW variable expenses, and expenditures against the ARO. For the segregated funds, forecast activity includes fund earnings at the target rate of 5.15% consistent with the discount rate per the approved 2017 ONFA Reference Plan, and fund disbursements. The forecast activity

for the prescribed facilities' portion of the ARO and segregated funds is shown in Ex. C2-1-1, Table 2.

As seen in Ex. C2-1-1, Table 1a, Note 1, the amount of average unamortized ARC is projected to exceed the amount of average UNL in each year of the IR term. In 2022, the excess of the forecast average unamortized ARC over the forecast average UNL earns WACC of 5.98% and the remainder earns the current weighted average accretion rate of 4.89%. For the 2023-2026 period, the forecast of average UNL is negative and therefore has been set at $0 for the purposes of the revenue requirement calculation.[14] As such, the full amount of the forecast average ARC earns WACC of 5.93% in 2023, 5.99% in 2024 and 6.01% in each of 2025 and 2026. The resulting return on rate base amounts are shown in Ex. C2-1-1, Table 1, lines 4 and 5. The WACC is derived from the deemed capital structure, return on equity and cost of debt proposed by OPG in this application and as set out in Ex. C1-1-1, Tables 1-5 for the corresponding years.

4.1.5 Income Tax Effects

Through the calculation of regulatory income taxes for the prescribed facilities, the nuclear revenue requirement includes income tax impacts associated with the above cost elements for the nuclear liabilities, as well as the tax impacts of the prescribed facilities' contributions to the segregated funds, expenditures on nuclear liabilities and disbursements from the segregated funds.

As further described in Ex. F4-2-1, sections 3.2.1, 3.2.2 and 3.2.6, the cost components of the prescribed facilities' revenue requirement methodology (depreciation, nuclear waste management variable expenses and return components) are not tax deductible and therefore attract a tax gross-up cost. As described in Ex. F4-2-1, sections 3.2.3 and 3.2.4, contributions to the segregated funds and both ONFA-funded and internally funded expenditures on nuclear liabilities are deductible for income tax purposes in accordance with

[14] Setting the average UNL at $0 rather than applying a negative UNL results in a lower revenue requirement impact.

regulations under the *Electricity Act, 1998*, while the disbursements from the segregated funds to cover the ONFA-funded expenditures are correspondingly taxable. The income tax effects of these components are included in the nuclear liabilities' revenue requirement impact at Ex. C2-1-1 Table 1, line 7, as calculated in Ex. C2-1-1 Table 1a, Note 2.

4.2 Approved Revenue Requirement Methodology for the Bruce Facilities

For the Bruce facilities, the OEB determined, by reference to sections 6(2)9 and 6(2)10 of O. Reg. 53/05, that the costs of the nuclear liabilities (as well as other OPG revenues and costs related to the Bruce stations that form part of Bruce Lease net revenues) are to be calculated using generally accepted accounting principles applicable to unregulated entities. Section 6(2)9 requires that the OEB ensure that OPG recovers all the costs it incurs with respect to the Bruce nuclear generating stations. Section 6(2)10 requires that the excess of OPG's revenues over costs related to its lease of these stations be applied to reduce the payment amounts for the prescribed nuclear facilities.

On this matter, the OEB found the following in the EB-2007-0905 Decision with Reasons:

> *The Board finds that the appropriate method to calculate OPG's test period revenues and costs related to the Bruce stations is to use amounts calculated in accordance with GAAP. OPG's investment in Bruce is not rate regulated. In the Board's view, it would be not be a reasonable interpretation of Section 6(2)9 and 6(2)10 to find that OPG should use an accounting method to determine revenues and costs that an unregulated business would otherwise never use.* (p. 109)
>
> *OPG should base its calculation of costs on GAAP. The costs should include all items that would be recognized as expenses under GAAP, including accretion expense on the nuclear liabilities. Forecast earnings on the segregated funds related to the Bruce liabilities should be included as a reduction of costs.* (p. 110)

Under this approach, OPG recovers ARC depreciation expense, used fuel and L&ILW variable expenses and ARO accretion expense, less segregated fund earnings. Each of these components is discussed separately below, as is a summary of the associated income tax impacts.

To give effect to O. Reg. 53/05 requirements, in EB-2007-0905, the OEB established the Bruce Lease Net Revenues Variance Account, which captures the difference between forecast and actual Bruce Lease net revenues, including nuclear liabilities costs. The Bruce Lease Net Revenues Variance Account is discussed in Ex. H1-1-1, Section 5.16.

4.2.1 Depreciation Expense

Depreciation on the unamortized ARC for the Bruce facilities is treated in the same manner as the depreciation associated with other capital assets and the ARC for the prescribed facilities. Total depreciation expense for the Bruce facilities is presented in Ex. G2-2-1, Table 4. Included in these amounts are actual amounts of ARC depreciation expense for 2016 to 2019 and forecast amounts for the 2020 to 2026 period, as presented in Ex. C2-1-1, Table 1, line 9.

4.2.2 Used Fuel Variable Expenses

The used fuel variable expense for the Bruce facilities is determined in the same manner as described in Section 3.3.1.2 for the prescribed facilities. The used fuel expense for the Bruce facilities is presented in Ex. G2-2-1, Table 5. Actual amounts of the expense for the 2016 to 2019 period and forecast amounts for the 2020 to 2026 period are also presented in Ex. C2-1-1, Table 1, line 10.

4.2.3 Low and Intermediate Level Waste Variable Expense

L&ILW variable expenses for the Bruce facilities are determined in the same manner as described in Section 3.3.1.3 for prescribed facilities. The L&ILW expenses for the Bruce facilities are included in amounts shown in Ex. G2-2-1, Table 5. Actual amounts of the expenses for the 2016 to 2019 period and amounts forecast for the 2020 to 2026 period are also presented in Ex. C2-1-1, Table 1, line 11.

4.2.4 Accretion Expense

As discussed above, accretion expense represents the growth in the present value-based ARO due to the passage of time. The attribution of the ARO balances between prescribed facilities and Bruce facilities is discussed in Section 3.1 above. Forecast accretion expense

for the Bruce facilities for the 2020 to 2026 period is derived by applying the corresponding accretion rates to the opening balances of each ARO tranche, using the same methodology as in prior payment amounts applications. The forecast amounts were derived by reference to the June 30, 2020 ARO balances from OPG's second quarter 2020 consolidated financial statements, using the half-year rule and based on projected changes in the Bruce stations' portion of the ARO due to additional used fuel and L&ILW variable expenses and expenditures against the ARO during the forecast period as shown in Ex. C2-1-1, Table 3. Actual amounts of the accretion expense for the 2016 to 2019 period and amounts forecast for the 2020 to 2026 period are presented in Ex. C2-1-1, Table 1, line 12 as well as Ex. G2-2-1, Table 5, line 3.

4.2.5 Earnings on the Segregated Funds

The station-level attribution of the segregated funds balances is discussed in Section 3.1 above. Actual segregated funds earnings for the 2016 to 2019 period and amounts forecast for the 2020 to 2026 period are presented in Ex. C2-1-1, Table 1, line 13 as well as Ex. G2-2-1, Table 5, line 4. Forecast segregated funds earnings were determined using the same methodology as in prior payment amounts applications. In particular, earnings were determined by applying the target rate of 5.15% consistent with the discount rate per the approved 2017 ONFA Reference Plan, to the opening balances of each fund. Such earnings take into account, using the half-year rule, contributions to the segregated funds pursuant to the approved 2017 ONFA Contribution Schedule and projected disbursements from the funds as shown in Ex. C2-1-1, Table 3. The forecast amounts were derived by reference to the June 30, 2020 segregated funds asset balances from OPG's second quarter 2020 consolidated financial statements.

4.2.6 Income Tax Effects

The calculation of Bruce Lease net revenues includes the income tax expense associated

with the above cost elements for the nuclear liabilities.[15] As these items are not deductible for tax purposes, they attract a deferred income tax credit in accordance with generally accepted accounting principles. This credit is included in the nuclear liabilities' revenue requirement impact at Ex. C2-1-1, Table 1, line 14, as calculated in Ex. C2-1-1 Table 1a, Note 3. As part of Bruce Lease net revenues, segregated fund contributions and expenditures on nuclear liabilities (net of disbursements from the segregated funds), as tax deductible items, reduce the current income tax expense but also attract an equal and offsetting deferred income tax cost, with no net effect.[16]

Additionally, Bruce Lease net revenues amounts are subject to regulatory income tax treatment through their impact on regulatory earnings before tax for the prescribed facilities, as shown at Ex. C2-1-1, Table 1, line 16.

5.0 CHANGES IN ARO, UNAMORTIZED ARC AND SEGREGATED FUND BALANCES

With the exception of 2016 and 2017, which include a year-end ARO balance adjustment reflecting approved 2017 ONFA Reference Plan and changes in Pickering station EOL dates, respectively, the actual and forecast growth in the ARO for the period to 2026 is primarily the result of accretion expense. Similarly, with the exception of the year-end ARC balance adjustments in 2016 and 2017 corresponding to the above ARO adjustments, depreciation and, for the prescribed facilities, the planned Pickering shutdown are the drivers of the otherwise declining trend in the ARC balances over the period to 2026.

The 2017 ONFA Reference Plan adjustment to the ARO and ARC balances at the end of 2016 is the same as provided in EB-2016-0152 and reflected in the EB-2016-0152 approved nuclear revenue requirement and payment amounts.[17] The revenue requirement impact of the year-end 2017 ARO and ARC adjustment on the prescribed facilities and the Bruce

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[15] The calculation of the total income tax expense component of Bruce Lease net revenues is discussed further in Ex. G2-2-1, sections 4.8 and 4.9 and presented in Ex. G2-2-1, Tables 7 and 8.
[16] As the net tax effect is nil, these items are not identified in the calculation of the income tax component of Bruce Lease net revenues at Ex. C2-1-1 Tables 1 and 1a.
[17] EB-2016-0152 Decision and Order, pp. 91, 98.

facilities is discussed in Section 6.0.

The actual and forecasted growth in the segregated funds balance for the 2016 to 2026 period is mainly the result of actual and forecasted fund earnings and station-level contribution amounts in accordance with the 2017 ONFA Contribution Schedule.

The proposed IR term revenue requirement reflects the current accounting EOL dates for the Pickering station of December 31, 2022 for Units 1 and 4 and December 31, 2024 for Units 5 to 8. As the Pickering ARC balance fully depreciates by the end of 2024 based on these assumptions, there is significant decrease in the forecast ARC balance and associated depreciation expense for the prescribed facilities. As of the beginning of 2026, the ARC balance for the prescribed facilities is forecast at $96M, compared to $851M at the beginning of 2016 and $447M at the beginning of 2020.

The treatment of Pickering EOL dates is discussed in further detail in Ex. F4-1-1, Section 3.2 and Ex. H1-1-1, Section 6.2. As noted in those exhibits, OPG is applying for a deferral account related to future anticipated changes to Pickering station EOL dates for accounting purposes, including any associated impact on nuclear liabilities for the prescribed facilities, as part of this application in line with the OEB's accounting order requirements, effective January 1, 2021. Any associated impact on nuclear liabilities for the Bruce facilities, through allocation of central program costs across the nuclear fleet based on lifecycle waste volume estimates, will be recorded in the Bruce Lease Net Revenues Variance Account in the normal course.

6.0 YEAR-END 2017 NUCLEAR LIABILITIES ADJUSTMENT

As described in EB-2018-0002 and discussed in Ex. F4-1-1, Section 3.2, OPG implemented changes to accounting EOL date assumptions for the Pickering station, from December 31, 2020 for Pickering Units 1 and 4 and Units 5 to 8 to December 31, 2022 for Pickering Units 1 and 4 and December 31, 2024 for Units 5 to 8, effective December 31, 2017.

Effective December 31, 2017, in accordance with US GAAP, OPG recorded an increase in

the carrying values of the ARO and ARC of $188.4 million, comprising $143.7 million for the prescribed facilities and, through allocation of central program costs across the nuclear fleet based on lifecycle waste volume estimates, $44.7 million for the Bruce facilities, to reflect the changes in the Pickering station EOL date assumptions. The net increase in the ARO was primarily due to the increase in the committed costs associated with used fuel disposal activities resulting from the extension of the Pickering units' operating period and related additional used fuel. The detail of the year-end 2017 ARO adjustment are provided in Ex. C2-1-1, Table 4.

The total revenue requirement impacts from the above change in the ARO and ARC balances over the 2018-2021 period are estimated at $186M for the prescribed facilities, including $47M in associated income tax impacts, as shown at Ex. H1-1-1, Table 13.[18] These impacts are recorded in the Impact Resulting from Changes to Pickering Station End-of-Life Dates (December 31, 2017) Deferral Account pursuant to the EB-2018-0002 Decision and Order and are nearly identical to the estimated impacts provided during that proceeding.[19] [20]

The prescribed facilities' impacts over the period reflect higher ARC depreciation due to the increase in the ARC balance, partially offset by the impact of extending the period over which ARC is being depreciated. The impacts also include a higher return on rate base, due to the increase in the ARC balance, and higher used fuel variable expenses, due to an increase in per bundle cost rates reflecting a lower discount rate of 2.94% (compared to 3.20%[21] in use prior to the year-end 2017 adjustment).

For the Bruce facilities, the above changes in the ARO and ARC balances are estimated to decrease Bruce Lease net revenues by approximately $20M in total over the 2018-2021

[18] These impacts have been determined by applying the revised Pickering station EOL dates, ARO/ARC adjustment and volumetric variable cost rates to recalculate the corresponding OEB-approved values (such as ARC depreciation and used fuel and L&ILW variable expenses) reflected in the EB-2016-0152 revenue requirement, holding other variables constant (such as forecast volumes of used fuel and L&ILW).
[19] EB-2018-0002, OPG's response to Board Staff Interrogatory #1, Attachment 1, Table 1.
[20] The Impact Resulting from Changes in Pickering Station End-of-Life Dates (December 31, 2017) Deferral Account is discussed in Ex. H1-1-1, Section 5.22.
[21] Footnote 3.

period. This is primarily due to higher used fuel variable expenses for the above noted reason. The impacts are recorded in the Bruce Lease Net Revenues Variance Account.

7.0 2022 ONFA REFERENCE PLAN STATUS

As discussed in Section 3.2, OPG reviews and updates the ONFA Reference Plan and associated lifecycle cost estimates and assumptions at least every five years, in line with the ONFA requirements. Updated ONFA Reference Plans are submitted to the Province for review and approval. The next Reference Plan update, effective for the 2022-2026 period, is under development and is expected to be finalized in 2021 for the Province's approval.

The proposed IR term revenue requirement reflects the approved 2017 ONFA Reference Plan. The corresponding revenue requirement impact of the approved 2022 Reference Plan will be recorded in the Nuclear Liability Deferral Account for the prescribed facilities and the Bruce Lease Net Revenues Variance Account for the Bruce facilities, as described in Ex. H1-1-1.[22]

7.0 JURISDICTIONAL STUDY OF COST RECOVERY METHODOLOGIES

In the EB-2016-0152 Decision and Order, the OEB directed OPG to "provide a jurisdictional study of cost recovery methodologies for nuclear liabilities with its next cost based nuclear payment amounts application".[23] OPG retained KPMG LLP to undertake this Jurisdictional Study, which is provided in Attachment 3.

The key findings of the Jurisdictional Study are as set out in the executive summary and Part IV of the Jurisdictional Study.

[22] Any additions to the Nuclear Liability Deferral Account related to the 2022-2026 ONFA Reference Plan and to the proposed deferral account related to future changes to Pickering station EOL dates for accounting purposes (Ex. H1-1-1, section 6.2) would be calculated such that they do not duplicate impacts across the accounts.

[23] EB-2016-0152 Decision and Order, p. 97.