



**Written submission from
Ontario Power Generation**

**Mémoire de
Ontario Power Generation**

In the Matter of

À l'égard de

**Consolidated Financial guarantee proposed
by Ontario Power Generation (OPG)**

**Garantie financière consolidée proposée par
Ontario Power Generation (OPG)**

Public Hearing - Hearing in writing based on
written submissions

Audience Publique - Audience fondée sur des
mémoires

November 2022

Novembre 2022

August 2, 2022

CD# N-CORR-00531-23288

MR. D. SAUMURE
Commission Registrar

Canadian Nuclear Safety Commission
P.O. Box 1046
280 Slater Street
Ottawa, ON
K1P 5S9

Dear Mr. Saumure:

Request for Acceptance of OPG's Financial Guarantee

The purpose of this letter is to request Commission acceptance of OPG's proposed Financial Guarantee prior to the expiration of the existing Financial Guarantee on December 31, 2022. The proposed 2023-2027 Financial Guarantee supporting documentation was provided for staff review in References 1-2.

The Documentary Information Summary reflecting a final calculation of the forecasted financial guarantee requirement for the 2023-2027 period, and the draft access agreement, are submitted as Enclosure 1 and Attachment 1 of this letter (identical to the submissions provided in References 2 and 3, respectively).

The operating licences for the Darlington Nuclear Generating Station, the Pickering Generating Station and the Darlington, Pickering and Western Waste Management Facilities, as well as the waste nuclear substance licence for the Radioactive Waste Operations Site 1 facility, all contain conditions relating to decommissioning plans and financial guarantees. Additionally, OPG retains ownership and responsibility for the decommissioning costs associated with Bruce Power's A and B Nuclear Generating Stations.

Conditions in OPG's licences require that OPG have in place acceptable decommissioning plans (Reference 1) and an acceptable financial guarantee which shall remain valid and in effect and sufficient to meet decommissioning needs.

OPG's financial guarantee covers the future decommissioning of the Darlington, Pickering, and Bruce A and B Nuclear Generating Stations (including the Central Maintenance and Laundry Facility and Central Storage Facility); the Darlington,

Pickering and Western Waste Management Facilities, and the Radioactive Waste Operations Site 1. It also covers the cost associated with both used nuclear fuel and low and intermediate level radioactive waste management.

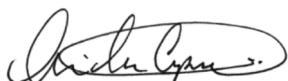
The revised cost estimates of the proposed 2023 financial guarantee requirement from January 1, 2023 onwards in 2023 constant dollars is \$46,117 million, which assumes that expenditure occurs at the time of estimate preparation. These estimates are then escalated to the scheduled expenditure period using economic forecasts prepared by external experts. A 5.15% discount factor is then applied to derive the present value of the future cost of \$20,480 million (January 1, 2023 present value \$). By 2027, it is projected to increase to \$22,303 million (January 1, 2027 present value \$).

It is proposed that the financial guarantee requirement would continue to be satisfied, in part, by the federally mandated Ontario Nuclear Fuel Waste Act (NFWA) Trust. The remainder of the requirement would continue to be satisfied by providing the CNSC with access to the two segregated funds governed by the Ontario Nuclear Funds Agreement between OPG and the Province of Ontario. The Ontario NFWA Trust and the segregated funds (collectively, the "Nuclear Funds") are projected to have a fair market value in excess of the proposed financial guarantee requirement throughout the 2023-2027 period. The fair market value of the Nuclear Funds is projected to be \$25,148 million on January 1, 2023, growing to \$28,250 million by 2027.

The information provided with this request for Financial Guarantee acceptance demonstrates that OPG is qualified to carry out the activities by the licences and make adequate provision for the protection of the environment and the health, safety and security of persons.

If you require further information, please contact Ms. Sara Irvine, Director, Nuclear Regulatory Affairs at 289-314-3367 or at sara.irvine@opg.com

Sincerely,



Aida Cipolla
Chief Financial Officer and Senior Vice President - Finance
Ontario Power Generation Inc.

Att and Enc.

cc: N. Greencorn - CNSC (Ottawa)
J. Burta - CNSC (Ottawa)
R. Richardson - CNSC (Ottawa)
L. Sigouin - CNSC (Ottawa)
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S. Watt - CNSC (Ottawa)

References:

1. OPG Letter, C. Carmichael to N. Greencorn, J. Burta, K. Campbell and L. Sigouin, "Submission of Preliminary Decommissioning Plans", January 28, 2022, CD# N-CORR-00531-23047.
2. OPG Letter, A. Cipolla to N. Greencorn, "OPG Financial Guarantee: Submission of Cost Estimate Summary and Documentary Information Summary Reports", May 2, 2022, CD# N-CORR-00531-23177.
3. OPG Letter, A. Cipolla to N. Greencorn and R. Richardson, "OPG Financial Guarantee: CNSC Staff's Prior Written Notification of Document Changes: Draft CNSC Financial Security and Ontario Nuclear Funds Agreement Access Fifth Amending Agreement", May 30, 2022, CD# N-CORR-00531-23184.

Enclosed with OPG Letter, A. Cipolla to D. Saumure, "Request for Acceptance of OPG's
Financial Guarantee" CD# N-CORR-00531-23288

ENCLOSURE 1

**Documentary Information Summary
2023-2027 CNSC Financial Guarantee
W-REP-00400-10048 R00**

DOCUMENTARY INFORMATION SUMMARY
2023 – 2027 CNSC FINANCIAL GUARANTEE

A Submission to the Canadian Nuclear Safety Commission

In Support of

**Licence Conditions for the Purpose of Decommissioning Plans and
Financial Guarantee for
Nuclear Generating Stations and Waste Management Facilities Owned by OPG**

April 2022

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April 27, 2022

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April 28, 2022

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April 29, 2022

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Approved by:



April 29, 2022

S. Gregoris
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1.0 EXECUTIVE SUMMARY

Ontario Power Generation Inc. (“OPG”), owner of nuclear facilities in Ontario, is required to have in place a financial guarantee acceptable to the Canadian Nuclear Safety Commission (“CNSC”) in support of these nuclear facilities’ licence conditions. The financial guarantee is required to be updated by OPG every five years and reflects all nuclear waste produced to date and the decommissioning required for all OPG nuclear facilities. OPG’s consolidated CNSC financial guarantee currently in place is valid until December 31, 2022. This Documentary Information Summary (“2022 DIS”) report summarizes OPG’s proposed consolidated financial guarantee for its nuclear facilities for the next five years, 2023 to 2027 (“2023 – 2027 CNSC Financial Guarantee”).

The total CNSC financial guarantee requirement (“Total CNSC Requirement”) is based on the present value of cost estimates for nuclear waste management and decommissioning as of year-end in any given year, aggregated in respect of all OPG nuclear facilities. The proposed Total CNSC Requirement for 2023 is \$20,480 million (January 1, 2023 present value dollars) and increases to \$22,303 million (January 1, 2027 present value dollars) in 2027.

It is proposed that the Total CNSC Requirement would continue to be satisfied, collectively, by the federally mandated Ontario Nuclear Fuel Waste Act Trust (“Ontario NFWA Trust”) and by providing the CNSC with access to the two segregated funds governed by the Ontario Nuclear Funds Agreement (“ONFA”) between OPG and the Province of Ontario. The Ontario NFWA Trust and the segregated funds (collectively, the “Nuclear Funds”) are projected to have a fair market value in excess of the proposed Total CNSC Requirement throughout the period. The fair market value of the Nuclear Funds is projected to be \$25,148 million on January 1, 2023 increasing to \$28,250 million by January 1, 2027.

Further details are provided in the body of this document. OPG will continue to provide an annual status report to CNSC staff updating nuclear waste management and decommissioning plans and cost estimates and indicating how the Total CNSC Requirement will be satisfied.

2.0 INTRODUCTION

The 2023 – 2027 CNSC Financial Guarantee associated with nuclear waste management and decommissioning is in support of licence conditions for the nuclear generating stations and nuclear waste management and other nuclear facilities owned by OPG. The nuclear generating stations are Pickering and Darlington, operated by OPG, and Bruce, leased to and operated by Bruce Power L.P (“BP”). The other nuclear facilities are Pickering, Western, and Darlington Waste Management Facilities, the Radioactive Waste Operations Site 1 (“RWOS1”), the Central Storage Facility (“CSF”)¹, and the Central Maintenance Facility (“CMF”). The CSF is a newly constructed facility by BP to store standard shipping containers containing contaminated tooling, equipment, and components in preparation for Major Component Replacement outages at the Bruce nuclear generating stations. The Spent Solvent Treatment Facility (“SSTF”), which was included in the latest Documentary Information Submission (“2017 DIS”) that covered the 2018 to 2022 period (“2018 – 2022 CNSC Financial Guarantee”), has been decommissioned and therefore is not included in the proposed 2023 – 2027 CNSC Financial Guarantee.

Under agreements with BP, OPG retains responsibility for decommissioning of the Bruce nuclear generating stations and other nuclear facilities leased to BP and management of used nuclear fuel and low and intermediate level waste (“L&ILW”) produced by the Bruce nuclear generating stations. OPG is responsible for providing the CNSC financial guarantee required to cover the liability for nuclear waste management and decommissioning related to the Bruce nuclear generating stations and other nuclear facilities leased to BP by OPG.

An initial Documentary Information Summary was completed in July 2003 along with supporting legal agreements. Since the initial submission, there have been subsequent updates, with the latest submission being the 2017 DIS. In addition, annual reports have been submitted to the CNSC to provide the status of the financial guarantee, detailing amounts accumulated in the Nuclear Funds and any material changes in preliminary decommissioning plans and nuclear waste management plans, nuclear waste quantities or cost estimates which might impact the Total CNSC Requirement.

This submission is filed to update projected present value cost estimates of OPG’s proposed preliminary decommissioning plans and nuclear waste management plans, and the associated consolidated financial guarantee for the 2023 to 2027 period. This submission would also serve as a baseline for future CNSC financial guarantee reporting as required by OPG’s licence conditions. The updated cost estimates in this submission are based on the baseline cost estimates and underlying planning and economic assumptions of the current reference plan under the ONFA.

A listing of supporting documentation for preliminary decommissioning plans, nuclear waste management plans and cost estimates as well as a proposed amending legal agreement granting CNSC access to the ONFA segregated funds is included as Appendix C to this document.

¹ The Central Storage Facility is also referred to as the Contaminated Tools Storage Facility or the Contaminated Tooling Storage Facility

An analysis of changes in the Total CNSC Requirement from the 2017 DIS is presented in Appendix D.

3.0 NUCLEAR WASTE MANAGEMENT AND DECOMMISSIONING PLANS

Nuclear waste management and decommissioning plans include interim storage and disposal plans for used nuclear fuel and L&ILW arising from the operation of OPG owned facilities, as well as the decommissioning of OPG nuclear generating stations as well as nuclear waste management and other nuclear facilities.

Used Nuclear Fuel Management Plans

OPG's used nuclear fuel management reference plans include interim storage of used fuel at each nuclear generating station site ("Used Fuel Storage Program") until such time that a national long-term management facility is available ("Used Fuel Long-Term Management Program").

The Used Fuel Storage Program encompasses interim storage of used nuclear fuel in dry storage containers in a dry storage facility after initially being stored in wet bays for a minimum of 10 years. At the time of station shutdown, used nuclear fuel would remain in the wet bays to allow the fuel to be adequately cooled before it is either transferred to dry storage or retrieved for shipment to the permanent disposal facility.

The Used Fuel Long-Term Management Program encompasses the retrieval, transportation and permanent emplacement of used nuclear fuel for long-term management, which is based on the Adaptive Phased Management ("APM") concept accepted by the Government of Canada on recommendation of the Nuclear Waste Management Organization ("NWMO") in response to the *Nuclear Fuel Waste Act* (Canada). 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 deep geologic repository ("Used Fuel DGR") after a collaborative process of communication and engagement with Canadians aimed at selecting a suitable geological site with an informed and willing host community. The NWMO is in the process of undertaking a site selection for the Used Fuel DGR. The proposed Total CNSC Requirement is based on the NWMO's bounding site selection scenario for cost estimating purposes and assumes an in-service date of 2043 for the Used Fuel DGR. The Used Fuel Long-Term Management Program includes OPG's portion of NWMO's costs toward the development and implementation of the Used Fuel DGR.

Low and Intermediate Level Waste Management Plans

OPG's L&ILW management reference plans include interim storage of operational L&ILW at the Western Waste Management Facility ("WWMF") situated at the Bruce nuclear site ("L&ILW Operations Program") prior to the permanent emplacement of these wastes into the assumed L&ILW long-term disposal facilities away from the WWMF ("L&ILW Long-Term Management Program").

The L&ILW Operations Program encompasses activities to transport, process, package and interim store operational L&ILW in adherence to the waste acceptance criteria to allow for emplacement into the long-term disposal facilities. The majority of OPG's

operational low level waste (“LLW”) is transported to the WWMF and is received at the waste volume reduction facilities where it is sorted and either processed (i.e., incineration or compaction) to achieve volume reduction or interim stored as is (i.e., non-processible waste) in storage buildings. Operational intermediate level waste (“ILW”) is also stored centrally at the WWMF within above or in-ground storage structures.

The L&ILW Long-Term Management Program reference plans in the 2017 DIS were based on the retrieval of operational L&ILW for emplacement in OPG’s proposed L&ILW deep geologic repository (“L&ILW DGR”) adjacent to the WWMF. In January 2020, Saugeen Ojibway Nation (“SON”) community members voted not to support this proposed project. OPG upheld its commitment not to proceed with the L&ILW DGR without SON support and has cancelled the project. At this time, OPG is awaiting the results of Natural Resources Canada’s process to modernize Canada’s Radioactive Waste Policy, which includes developing Canada’s integrated strategy for L&ILW. For financial planning purposes, the proposed 2023 – 2027 CNSC Financial Guarantee is based on a conceptual assumption consisting of transportation and emplacement of operational LLW into a near surface disposal facility located away from the WWMF and transportation and emplacement of operational ILW into an expanded Used Fuel DGR.

It should be noted that the above long-term disposal facilities are assumed for cost estimating purposes only, and no project or site selection process has commenced. OPG’s future planning assumptions for the L&ILW Long-Term Management Program will be informed by the outcomes of the Natural Resources Canada’s process to modernize Canada’s Radioactive Waste Policy Framework.

Nuclear Generating Station Decommissioning Plans

Nuclear generating station decommissioning plans are based on a deferred dismantling strategy which assumes a nominal 30-year safe storage period following the shutdown of the final reactor at each station (“Decommissioning Program”). The current nuclear generating stations’ end-of-life assumptions include the refurbishment of Darlington and Bruce and the operation of Pickering to the end of 2025 subject to the CNSC’s regulatory approval, as summarized in Table 1 below. The assumed long-term disposal facilities for operational L&ILW would also accommodate L&ILW arising from station decommissioning activities.

Appendix B shows the assumed nuclear generating station decommissioning timelines from the end of operations through the safe storage period and subsequently through the dismantling period. Also shown are the reference dates for financial planning purposes for the transportation and long-term management of used nuclear fuel.

Table 1: Nuclear Generating Station End of Life Dates Assumed for the Proposed 2023 – 2027 CNSC Consolidated Financial Guarantee

| Nuclear | Unit 1 | Unit 2 | Unit 3 | Unit 4 | Unit 5 | Unit 6 | Unit 7 | Unit 8 |
|----------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|---------------|
| Pickering | 2024 | 2005 | 2005 | 2024 | 2025 | 2025 | 2025 | 2025 |
| Bruce | 2043 | 2043 | 2061 | 2062 | 2062 | 2058 | 2063 | 2063 |
| Darlington | 2055 | 2050 | 2053 | 2056 | N/A | N/A | N/A | N/A |

Nuclear Waste Management and Other Nuclear Facility Decommissioning Plans

The nuclear waste management and other nuclear facilities will be decommissioned after all corresponding nuclear waste and/or used nuclear fuel has been transferred to the long-term disposal facilities. The sites will then be restored and made available for re-use.

4.0 NUCLEAR WASTE MANAGEMENT AND DECOMMISSIONING COST ESTIMATES

In 2021, OPG completed a comprehensive update of the estimate for its obligations for nuclear waste management and nuclear facilities decommissioning which forms the basis of OPG's proposed Total CNSC Requirement in this submission.

As in prior submissions, cost estimates of all nuclear waste management and nuclear facilities decommissioning programs are first prepared in constant dollars, which assume that expenditures occur at the time of estimate preparation. These estimates are then escalated to the scheduled expenditure period using economic forecasts prepared by external experts. Consistent with the 2017 DIS and prior submissions, macroeconomic forecasts from the University of Toronto's Institute of Policy Analysis Economic Forecasting Series ("University of Toronto forecast") continue to be applied as escalators in this submission. The escalation rates applied against the cost estimates in this submission are based on the University of Toronto forecast for Ontario dated February 2021 and are applied to each year of the programs' cost flows. The Ontario forecast is used as the source of the escalation rates given the majority of the work programs is expected to be executed in Ontario. The long-term escalation rate is 3.4% for labour cost, 2.1% for material and equipment costs and 2.0% for other costs. Refer to Appendix E for the annual escalation rates used for each of the three cost categories.

Subsequent to the finalization of the cost estimates, a sensitivity analysis was conducted using the most recent available University of Toronto forecast for Ontario dated February 2022 to confirm that the February 2022 forecast would not result in a higher Total CNSC Requirement.

Consistent with the 2017 DIS, a discount rate of 5.15% is applied to the estimates in escalated dollars in order to determine the present value ("PV") of future costs. This rate is consistent with the discount rate employed under the Ontario Nuclear Funds Agreement and represents the target rate of return on investments held in the Nuclear Funds.

The cost estimates for nuclear waste management and nuclear facilities decommissioning from January 1, 2023 onwards in 2023 constant and present value dollars are summarized in Table 2 below. For nuclear waste management programs, Table 2 reflects OPG's forecasted quantities of operational L&ILW and used nuclear fuel as at December 31, 2023.

Table 2: Proposed 2023 Financial Guarantee Cost Estimate

| Program | Cost Estimate | |
|---|-------------------|---------------------|
| | 2023 Constant M\$ | Jan. 1, 2023 PV M\$ |
| Decommissioning OPG-owned Nuclear Generating Stations | 18,066 | 7,300 |
| Used Fuel Management | 24,301 | 11,073 |
| Low and Intermediate Level Waste Management | 3,462 | 2,002 |
| Decommissioning Pickering Waste Management Facility (PWMF) | 39 | 17 |
| Decommissioning Western Waste Management Facility (WWMF) | 158 | 56 |
| Decommissioning Darlington Waste Management Facility (DWMF) | 28 | 7 |
| Decommissioning RWOS1, CMF and CSF | 63 | 25 |
| Total* | 46,117 | 20,480 |

*Details may not add to total due to rounding.

The nuclear generating station decommissioning cost estimates from January 1, 2023 onwards on a station-by-station basis are summarized in Table 3 below in 2023 constant and present value dollars.

Table 3: Proposed 2023 Cost Estimates for Nuclear Generating Station Decommissioning

| Nuclear Generating Station | Cost Estimate | |
|----------------------------|-------------------|---------------------|
| | 2023 Constant M\$ | Jan. 1, 2023 PV M\$ |
| Pickering A (Units 1 - 4) | 3,401 | 1,960 |
| Pickering B (Units 5 - 8) | 3,410 | 1,934 |
| Bruce A (Units 1 - 4) | 3,594 | 1,109 |
| Bruce B (Units 5 - 8) | 3,542 | 986 |
| Darlington (Units 1 - 4) | 4,119 | 1,312 |
| Total* | 18,066 | 7,300 |

*Details may not add to total due to rounding.

The estimated cost for the Used Fuel Storage Program and the Used Fuel Long-Term Management Program from January 1, 2023 onwards, based on year-end 2023 forecasted 3.0 million used nuclear fuel bundles, are summarized in Table 4 below in 2023 constant and present value dollars.

Table 4: Proposed 2023 Cost Estimates for Used Fuel Management

| Used Fuel Management | Cost Estimate | |
|--|----------------------|------------------------|
| | 2023 Constant M\$ | Jan. 1, 2023 PV M\$ |
| Used Fuel Storage Program | 2,449 | 1,851 |
| Used Fuel Long-Term Management Program | 21,852 | 9,222 |
| Total* | 24,301 | 11,073 |

*Details may not add to total due to rounding.

The estimated cost for the L&ILW Operations Program and the L&ILW Long-Term Management Program from January 1, 2023 onwards, based on year-end 2023 forecasted disposal volume of 94,167 m³ and 11,746 m³ of LLW and ILW respectively, are summarized in Table 5 below in 2023 constant and present value dollars.

Table 5: Proposed 2023 Cost Estimates for L&ILW Management

| Low and Intermediate Level Waste Management | Cost Estimate | |
|---|----------------------|------------------------|
| | 2023 Constant M\$ | Jan. 1, 2023 PV M\$ |
| L&ILW Operations Program | 1,184 | 898 |
| L&ILW Long-Term Management Program | 2,278 | 1,104 |
| Total* | 3,462 | 2,002 |

*Details may not add to total due to rounding.

The nuclear waste management and other nuclear facilities decommissioning cost estimates from January 1, 2023 onwards are summarized in Table 6 below in 2023 constant and present value dollars.

Table 6: Proposed 2023 Cost Estimates for Nuclear Waste Management and Other Nuclear Facility Decommissioning

| Nuclear Waste Management Facility | Cost Estimate | |
|-----------------------------------|----------------------|------------------------|
| | 2023 Constant M\$ | Jan. 1, 2023 PV M\$ |
| PWMF | 39 | 17 |
| WWMF | 158 | 56 |
| DWMF | 28 | 7 |
| RWOS1, CMF and CSF | 63 | 25 |
| Total* | 288 | 105 |

*Details may not add to total due to rounding.

The cost estimates for nuclear waste management and nuclear facilities decommissioning from each of January 1, 2024, January 1, 2025, January 1, 2026 and January 1, 2027 onwards in corresponding year constant and present value dollars can be found in the Cost Estimate Summary Report for the 2023 - 2027 CNSC Financial Guarantee.

5.0 CNSC FINANCIAL GUARANTEE

As summarized in Section 4.0 of this report, the proposed Total CNSC Requirement for 2023 is \$20,480 million (January 1, 2023 present value). It is proposed to be satisfied by the Nuclear Funds, which are projected to have a fair market value of \$25,148 million as at January 1, 2023. The Nuclear Funds consist of the Ontario NFWA Trust and two segregated funds governed by the ONFA.

OPG established the Ontario NFWA Trust on November 15, 2002, in accordance with the requirements of the *Nuclear Fuel Waste Act* (Canada). OPG continues to make annual contributions to the Trust, as required under the Act.

The ONFA, entered into between OPG and the Province of Ontario, governs two segregated funds, the Decommissioning Segregated Fund (“DSF”) and the Used Fuel Segregated Fund (“UFSF”). These segregated funds were established in July 2003 and are held in the custodianship of financial institutions. The DSF was established to pay for costs associated with the Decommissioning Program, the L&ILW Long-Term Management Program, certain costs of the Used Fuel Storage Program incurred after the nuclear generating stations are shut down, and the costs of the L&ILW Operations Program incurred after the nuclear generating stations are shut down. The UFSF pays for the costs of the Used Fuel Long-Term Management Program and certain costs of the Used Fuel Storage Program after the nuclear generating stations are shut down.

CNSC access to segregated funds would continue to be provided in accordance with the CNSC Financial Security and ONFA Access Agreement between the CNSC, OPG and the Province of Ontario. While OPG’s access to the segregated funds under ONFA is limited to the purposes described above for each respective fund, the CNSC has the right to demand, in circumstances and on terms described in the agreement, payment of the balance of both funds up to the applicable Total CNSC Requirement.

The proposed annual Total CNSC Requirements for the 2023 to 2027 period are summarized in Table 7 below. Over the five-year period from 2023 to 2027, the proposed annual Total CNSC Requirement for a given year is based on estimated future program expenditures and includes year-over-year increases in the present value of the cost estimates to reflect the passage of time as well as estimated incremental costs to manage projected additional used nuclear fuel and L&ILW volumes generated by a given year-end.

Table 7: Proposed 2023 – 2027 Total CNSC Requirement

| Year | Total CNSC Requirement M\$ |
|-------------|-----------------------------------|
| 2023 | 20,480 |
| 2024 | 21,149 |
| 2025 | 21,764 |
| 2026 | 22,140 |
| 2027 | 22,303 |

The forecasted fair market value of the Nuclear Funds as of January 1 of each year is summarized in Table 8 below. The forecast is based on the assumed growth in the assets of the Nuclear Funds at the 5.15% target rate of return per annum. There are no planned contributions to the segregated funds during the period.

Table 8: 2023 – 2027 Forecasted Fair Market Value of the Nuclear Funds

| Year | Nuclear Funds M\$ |
|-------------|--------------------------|
| 2023 | 25,148 |
| 2024 | 26,102 |
| 2025 | 27,011 |
| 2026 | 27,768 |
| 2027 | 28,250 |

As illustrated in Tables 7 and 8 above, the proposed Total CNSC Requirement for each year of the 2023 to 2027 period is lower than the forecasted fair market value of the Nuclear Funds. As for 2023, it is proposed that the Total CNSC Requirement for years 2024 to 2027 be satisfied by the Nuclear Funds.

6.0 REPORTING

OPG will continue to provide an annual status report to CNSC staff detailing amounts accumulated in the Nuclear Funds. The report will also identify any material changes in preliminary decommissioning plans, nuclear waste management plans, waste quantities and cost estimates which may impact the Total CNSC Requirement and how this requirement is satisfied.

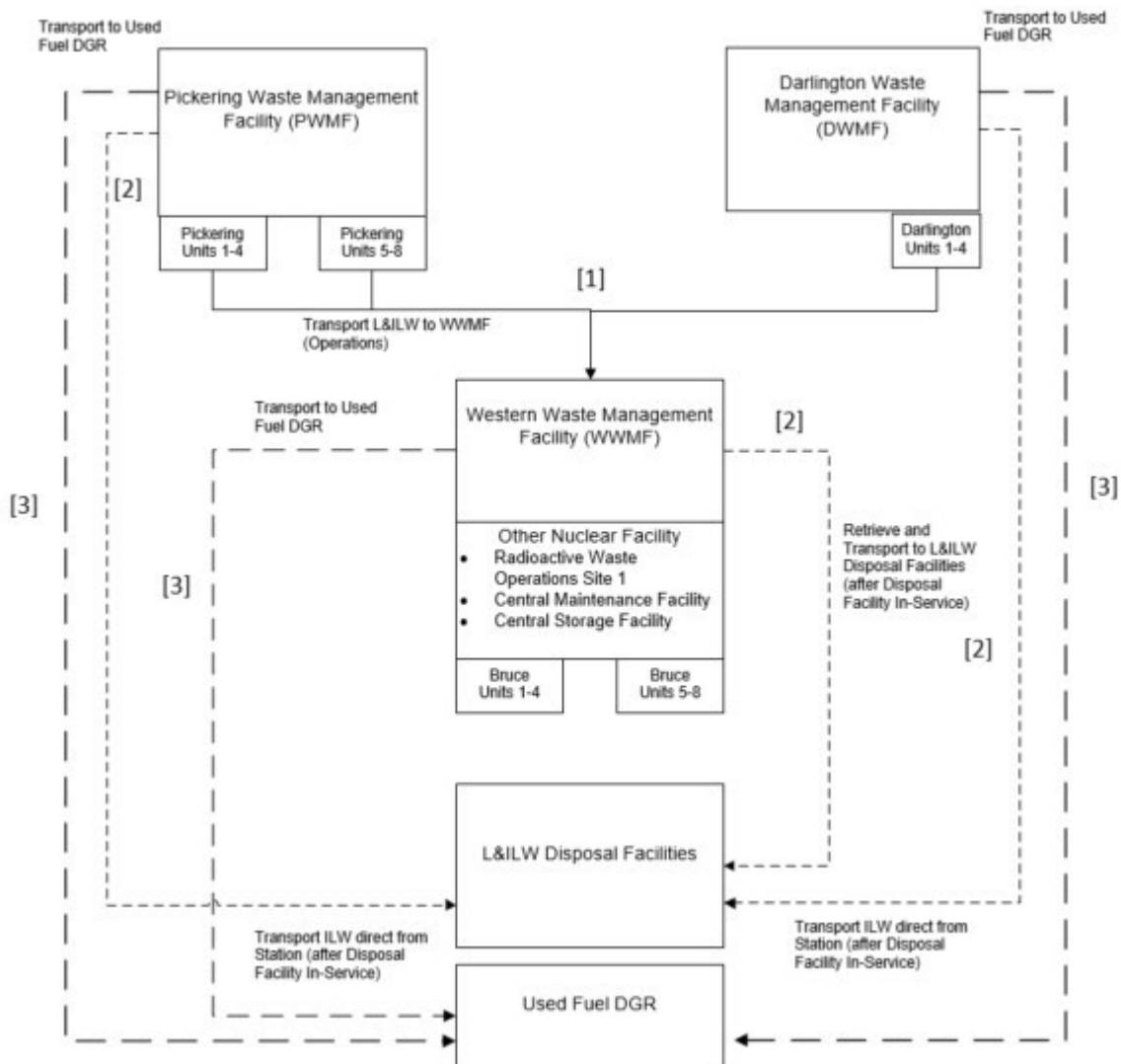
7.0 SUMMARY

OPG requests that the information presented above be considered as the Total CNSC Requirement for Pickering nuclear generating station, Darlington nuclear generating station, Bruce nuclear generating stations, Pickering Waste Management Facility, Western Waste Management Facility, Darlington Waste Management Facility, Radioactive Waste Operations Site 1, Central Storage Facility and Central Maintenance Facility in support of meeting CNSC financial guarantee licence conditions for OPG-owned nuclear facilities for the years 2023 to 2027. OPG proposes that the Total CNSC Requirement be satisfied by the Nuclear Funds pursuant to an amended CNSC Financial Security and ONFA Access Agreement.

8.0 SUPPORTING DOCUMENTATION

Documentation supporting the preliminary decommissioning plans, nuclear waste management plans, cost estimates and a legal agreement for the 2023 – 2027 CNSC Financial Guarantee is listed in Appendix C.

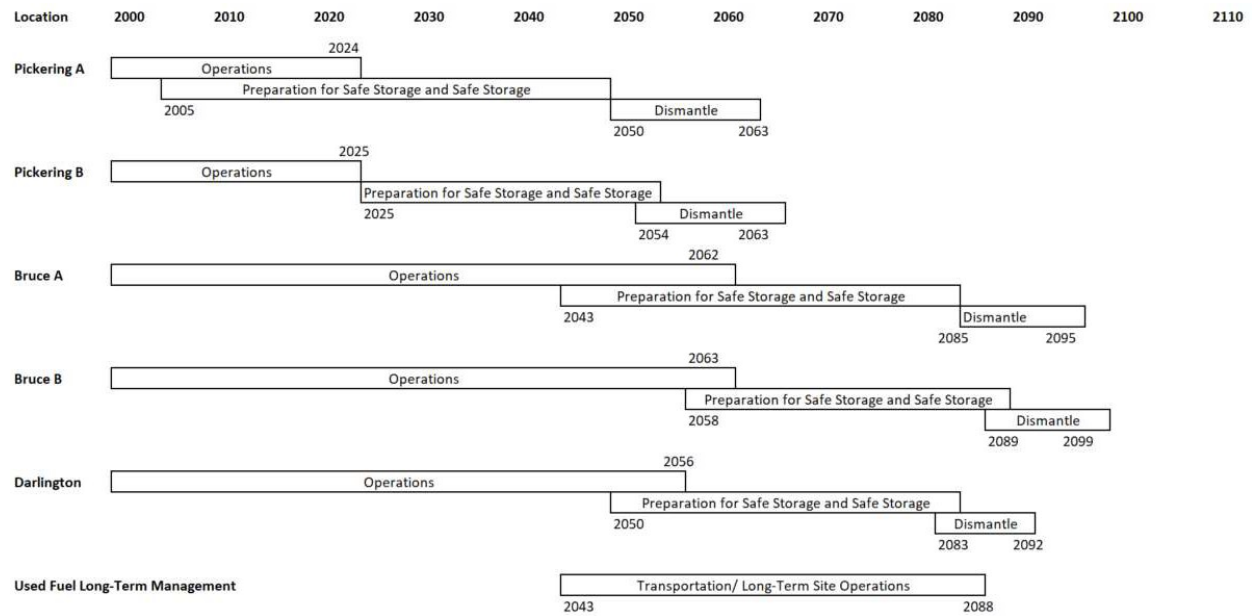
Appendix A: Nuclear Waste Management and Other Nuclear Facilities



Notes

- [1] Prior to the in-service of the assumed long-term disposal facilities, low and intermediate level waste (L&ILW) will be transported from the Pickering and Darlington stations to the Western Waste Management Facility (WWMF) for processing (low level waste or LLW) and then interim stored.
- [2] Interim storage of L&ILW would occur until the assumed long-term disposal facilities are in service. Subsequently, LLW would continue to be transported to the WWMF for processing but would not be interim stored. ILW would be transported directly from the nuclear stations to the long-term disposal facility, once in service.
- [3] Used nuclear fuel stored at the waste management facilities will be transported to the Used Fuel DGR once in service.

Appendix B: Nuclear Generating Stations Decommissioning/ Used Fuel Management Timelines



Notes:

- 1) Operations timeline is to the end of operation of the final unit at each nuclear generating station.
- 2) Start dates shown for safe storage are for the first unit at each nuclear generating station.
- 3) Used nuclear fuel will be stored at nuclear generating station sites until the Used Fuel DGR is operational.
- 4) All dates are nominal and for financial planning purposes only.
- 5) Timelines represent execution only and do not include pre-planning activities. The dismantling timelines include site restoration.
- 6) Although Pickering A was shutdown in 1998, preparation for safe storage activities on Units 2 and 3 commenced in 2005 when the decision was made not to restart these units.

Appendix C: Support Documents Relating to Decommissioning Plans, Cost Estimates and CNSC Financial Guarantee

Documents Pertaining to all Licences

- Documentary Information Summary 2023 - 2027 CNSC Financial Guarantee, W-REP-00400-10048
- Cost Estimate Summary Report for the 2023 - 2027 CNSC Financial Guarantee, W-REP-00400-10047
- CNSC Financial Security and ONFA Access Agreement – Proposed Fifth Amending Agreement between the CNSC, the Province of Ontario and OPG, effective January 1, 2023 (Planned for submission in Q2 2022)

1. Darlington Nuclear Generating Station, PROL 13.03/2025 expires November 30, 2025

- Preliminary Decommissioning Plan - Darlington Nuclear Generating Station, Report No. NK38-PLAN-00960-10001-R003

2. Pickering Nuclear Generating Station, PROL 48.01/2028 expires August 31, 2028

- Preliminary Decommissioning Plan - Pickering Nuclear Generating Stations A & B, Report No. P-PLAN-00960-00001-R003

3. Bruce A and B Nuclear Generating Stations, including the Central Maintenance and Laundry Facility PROL 18.02/2028 expires September 30, 2028

- Preliminary Decommissioning Plan - Bruce Nuclear Generating Stations A & B, 06819-PLAN-00960-00001-R003

4. Western Waste Management Facility, WFOL-W4-314.00/2027 expires May 31, 2027

- Preliminary Decommissioning Plan - Western Waste Management Facility, 0125-PLAN-00960-00001-R004

5. Pickering Waste Management Facility, WFOL-W4-350.00/2028 expires August 31, 2028

- Preliminary Decommissioning Plan - Pickering Waste Management Facility, 92896-PLAN-00960-00001-R004

6. Darlington Waste Management Facility, WFOL-W4-355.01/2023 expires April 30, 2023

- Preliminary Decommissioning Plan - Darlington Waste Management Facility, 00044-PLAN-00960-00001-R005

7. Radioactive Waste Operations Site 1, WNSL-W1-320.05/2029 expires October 31, 2029

- Preliminary Decommissioning Plan – RWOS1, CMLF and CSF, W-PLAN-00960-00001-R002

**Appendix D: Variance Analysis: 2018 – 2022 CNSC Financial Guarantee Submission to
2023 – 2027 CNSC Financial Guarantee Submission**

The 2017 DIS for the accepted 2018 – 2022 CNSC Financial Guarantee submission contained the following annual Total CNSC Requirements as of January 1:

| Year | Total CNSC Requirement M\$ |
|-------------|---------------------------------------|
| 2018 | 16,468 |
| 2019 | 17,094 |
| 2020 | 17,722 |
| 2021 | 18,300 |
| 2022 | 18,836 |

The 2022 DIS for the proposed 2023 – 2027 CNSC Financial Guarantee contains the following proposed annual Total CNSC Requirements as of January 1:

| Year | Total CNSC Requirement M\$ |
|-------------|---------------------------------------|
| 2023 | 20,480 |
| 2024 | 21,149 |
| 2025 | 21,764 |
| 2026 | 22,140 |
| 2027 | 22,303 |

The following table compares the Total CNSC Requirement for year 2022 as contained in the 2017 DIS with the proposed Total CNSC Requirement for year 2023 as contained in the 2022 DIS. For the purposes of this comparison, the Total CNSC Requirement for year 2022 of \$18,836 million in January 1, 2022 present value dollars is normalized to January 1, 2023 present value.

| Program | 2017 DIS 2018 – 2022 CNSC Financial Guarantee | 2022 DIS 2023 – 2027 CNSC Financial Guarantee | Variance |
|---|---|---|--------------|
| | Year 2022 | Year 2023 | |
| | Jan. 1, 2023 | Jan. 1, 2023 | Jan. 1, 2023 |
| | M\$ PV* | M\$ PV | M\$ PV |
| Nuclear Generating Station Decommissioning | 6,639 | 7,300 | 661 |
| Used Fuel Management | 10,755 | 11,073 | 318 |
| L&ILW Management | 2,085 | 2,002 | (83) |
| Decommissioning PWWF | 19 | 17 | (2) |
| Decommissioning WWMF | 42 | 56 | 14 |
| Decommissioning DWMF | 7 | 7 | 0 |
| Decommissioning RWOS1, CMF and CSF | 15 | 25 | 10 |
| Total | 19,562 | 20,480 | 919 |
| Variance Breakdown: | | | |
| Changes in Future Economic Assumptions | | | (99) |
| Changes in Cost Estimates and Planning Assumptions | | | 1,017 |

* To be comparable to the proposed financial guarantee cost estimates for year 2023, financial guarantee cost estimates for year 2022 shown are based on the 2018 - 2022 CNSC Financial Guarantee submission normalized to January 1, 2023 PV dollars and using available actual escalation factors.

**Details may not add to total due to rounding.

Variances for “Future Economic Assumptions” and “Cost Estimates and Planning Assumptions” are due to the following:

a) Future Economic Assumptions

The changes reflect updated University of Toronto Policy and Economic Analysis Program Policy Study forecast. While the long-term escalation rate for labour cost and other costs remains unchanged at 3.4% and 2.0%, respectively, and the long-term escalation rate for material and equipment increased from 2.0% in the 2017 DIS to 2.1% in the 2022 DIS, the net decrease of \$99 million in the Total CNSC Requirement is mainly driven by lower near-term escalation rates for labour cost in the 2022 DIS.

b) Cost Estimates and Planning Assumptions

The net increase of \$919 million in the Total CNSC Requirement is primarily attributable to changes in the following areas:

- i) Nuclear Generating Station Decommissioning – the increase is primarily due to additional assessments for elements such as emptying the fuel bays, long-term management of heavy water and remediation of asbestos at Pickering, as well as a higher risk contingency included as part of the cost estimating process.
- ii) Used Fuel Management – the increase primarily reflects NWMO staffing costs including resources to achieve the site selection milestone and transition to the regulatory decision making phase leading to becoming a qualified licensee, updated transportation costs based on the NWMO’s bounding scenario for Used Fuel DGR site selection, and continued development and demonstration of the engineered barrier system design and components for the Used Fuel DGR.

- iii) L&ILW Management – the decrease mainly reflects the net impact of the new, conceptual long-term disposal facilities' assumption, longer duration of interim storage required until long-term disposal facilities are available, and expansion of OPG's waste minimization (volume reduction through processing) program.

**Appendix E: University of Toronto Policy and Economic Analysis Program
Policy Study Forecast – Escalation Factors**

| | February 2021 | | |
|------|---------------|----------------------|-------|
| Year | Labour | Material & Equipment | Other |
| 2023 | 2.50% | 2.00% | 2.10% |
| 2024 | 2.80% | 2.10% | 2.00% |
| 2025 | 3.30% | 2.00% | 2.00% |
| 2026 | 3.40% | 2.00% | 2.00% |
| 2027 | 3.40% | 2.00% | 2.00% |
| 2028 | 3.40% | 2.00% | 2.00% |
| 2029 | 3.40% | 2.00% | 2.00% |
| 2030 | 3.40% | 2.00% | 2.00% |
| 2031 | 3.40% | 2.10% | 2.00% |
| 2032 | 3.40% | 2.00% | 2.00% |
| 2033 | 3.40% | 2.10% | 2.00% |
| 2034 | 3.40% | 2.10% | 2.00% |
| 2035 | 3.40% | 2.10% | 2.00% |
| 2036 | 3.40% | 2.10% | 2.00% |
| 2037 | 3.40% | 2.10% | 2.00% |
| 2038 | 3.40% | 2.10% | 2.00% |
| 2039 | 3.40% | 2.10% | 2.00% |
| 2040 | 3.40% | 2.10% | 2.00% |
| 2041 | 3.40% | 2.10% | 2.00% |
| 2042 | 3.40% | 2.10% | 2.00% |
| 2043 | 3.40% | 2.10% | 2.00% |
| 2044 | 3.40% | 2.10% | 2.00% |
| 2045 | 3.40% | 2.10% | 2.00% |
| 2046 | 3.40% | 2.10% | 2.00% |
| 2047 | 3.40% | 2.10% | 2.00% |
| 2048 | 3.40% | 2.10% | 2.00% |
| 2049 | 3.40% | 2.10% | 2.00% |
| 2050 | 3.40% | 2.10% | 2.00% |

For years beyond the above forecast period, the escalation factors for year 2050 are applied.

Attached with OPG Letter, A. Cipolla to D. Saumure, "Request for Acceptance of OPG's
Financial Guarantee" CD# N-CORR-00531-23288

ATTACHMENT 1

CNSC Financial Security and ONFA Draft Access Agreement Fifth Amending Agreement

**CNSC FINANCIAL SECURITY AND ONFA ACCESS AGREEMENT
FIFTH AMENDING AGREEMENT**

This Fifth Amending Agreement is made in triplicate effective as of the 1st day of January, 2023.

BETWEEN: CANADIAN NUCLEAR SAFETY COMMISSION, a body corporate established under section 8 of the *Nuclear Safety and Control Act* (Canada) (hereinafter the “**CNSC**”)

AND: HER MAJESTY THE QUEEN IN RIGHT OF ONTARIO as represented by the Minister of Finance (hereinafter the “**Province**”)

AND: ONTARIO POWER GENERATION INC. (hereinafter “**OPG**”)

WHEREAS the CNSC, the Province and OPG wish to amend the CNSC Financial Security and ONFA Access Agreement entered into between the parties as of July 31, 2003, as previously amended effective as of January 1, 2008, March 1, 2010, January 1, 2013, and January 1, 2018 (the “ONFA Access Agreement”);

NOW THEREFORE THIS AGREEMENT WITNESSETH that in consideration of the mutual covenants and agreements contained in it and subject to the terms and conditions set out in it, the parties agree as follows:

Amendments

1. With effect from and after January 1, 2023, the ONFA Access Agreement is amended:
 - a) by deleting Schedule “A” to the ONFA Access Agreement and replacing it with Schedule “A” to this Agreement; and
 - b) by deleting Schedule “B” to the ONFA Access Agreement and replacing it with Schedule “B” to this Agreement.

General

2. Except as set out in this Agreement, all capitalized terms in this Agreement shall have the meanings attributed to them in the ONFA Access Agreement.
3. Except as specifically set out in this Agreement, all other terms, conditions and Schedules of the ONFA Access Agreement shall remain the same and continue in full force and effect.
4. This Agreement shall be governed by and construed in accordance with the laws of the Province of Ontario and the laws of Canada applicable therein. Any dispute arising under this Agreement shall come under the exclusive jurisdiction of the courts of Ontario.
5. This Agreement may be executed in counterparts, each of which shall be deemed an original, and all of which together shall constitute one and the same instrument.

IN WITNESS WHEREOF the parties hereto have executed this Fifth Amending Agreement on the dates set out below, with effect as of the 1st day of January, 2023.

**ONTARIO POWER GENERATION INC.
BY:**

DATE

Ken Hartwick
President and Chief Executive Officer
I have authority to bind the Corporation

**HER MAJESTY THE QUEEN IN RIGHT
OF ONTARIO AS REPRESENTED BY
THE MINISTER OF FINANCE:**

DATE

[Insert Name]

**CANADIAN NUCLEAR SAFETY
COMMISSION BY:**

DATE

Rumina Velshi
President and Chief Executive Officer

Schedule "A"

Stations and Other Facilities

| Name of Station or Other Facility | CNSC Licence No. as of November 1, 2022 |
|---|---|
| Darlington Nuclear Generating Station | PROL 13.03/2025 |
| Pickering Nuclear Generating Station | PROL 48.01/2028 |
| Bruce A and B Nuclear Generating Stations, including the Central Maintenance and Laundry Facility | PROL 18.02/2028 |
| Western Waste Management Facility | WFOL-W4-314.00/2027 |
| Pickering Waste Management Facility | WFOL-W4-350.00/2028 |
| Darlington Waste Management Facility | WFOL-W4-355.01/2023 |
| Radioactive Waste Operations Site-1 | WNSL-W1-320.05/2029 |

Schedule “B”

Amount of Financial Guarantee

| Period | Amount (\$M) |
|-------------------------------------|--------------|
| January 1, 2023 – December 31, 2023 | 20,480 |
| January 1, 2024 – December 31, 2024 | 21,149 |
| January 1, 2025 – December 31, 2025 | 21,764 |
| January 1, 2026 – December 31, 2026 | 22,140 |
| January 1, 2027 – December 31, 2027 | 22,303 |

Effective date of this Schedule: January 1, 2023

Expiry date of this Schedule: December 31, 2027