PROJECT OM&A COSTS – NUCLEAR

1.0 PURPOSE

This evidence provides a description of the operations, maintenance and administration ("OM&A") project expenditures for OPG's nuclear facilities (excluding Darlington Refurbishment Program and Pickering Refurbishment Program, which are addressed in Ex. F2-7-1 and Ex. F2-8-1, respectively) for the historical years, bridge years, and IR term. There are no project OM&A expenditures planned for the Darlington New Nuclear Program facilities over the IR term.

2.0 OVERVIEW

OPG is requesting approval of forecast project OM&A expenditures during the IR term of $76.1M in 2027, $82.4M in 2028, $84.0M in 2029, $84.8M in 2030, and $83.2M in 2031, as presented in Ex. F2-3-1, Table 1.

The level of forecast project OM&A expenditures for 2027-2031 reflects work program demands. Project OM&A expenditures remain consistent over the IR term in line with sustaining operations for Darlington and Pickering.

Since the last payment amounts application (EB-2020-0290), OPG has completed two Tier 1 OM&A projects (cost >$20M) and has two Tier 1 ongoing OM&A projects. These projects are discussed in Ex. F2-3-3.

3.0 PROJECT OM&A COMPONENTS

OPG defines a project (whether capital or OM&A) as a temporary, unique endeavour undertaken outside the routine base activities of the normal work program. The final decision on whether work will be classified as a capital project or an OM&A project is based on OPG governance. A description of the initiation, review and approval process for Nuclear Operations projects, including OM&A projects, is provided in Ex. D2-1-1. OPG's capitalization policy is set out in Ex. D4-1-1.

Nuclear project OM&A expenditures for 2020-2031 are shown in Ex. F2-3-1, Table 1 as Project OM&A (Portfolio) and non-portfolio projects. A description of the components of Project OM&A (Portfolio) is set out in Ex. F2-3-2. Non-Portfolio Projects are listed separately from the Project OM&A (Portfolio) due to their extraordinary nature. There are two Non-Portfolio Projects impacting project OM&A expenditures in the IR term: 1) Fuel Channel Life Management Phase V Project; and 2) Darlington Steam Generator Primary Moisture Separators Replacement (Removal). Both of these projects are treated as eligible for the Capacity Refurbishment Variance Account ("CRVA") (Ex. H1-1-1, Section 5.6).

The Darlington Unit 3 Fuel Channel Component Retrieval, Fuel Channel Life Extension Project, Pickering Optimization of Shutdown, and Pickering Extended Operation Non-Portfolio Projects that were presented in EB-2020-0290 have been or are forecast to be completed during the 2020-2026 period.

Section 3.1 below provides additional details on the Project OM&A (Portfolio) and Non-Portfolio Projects.

Project OM&A (Portfolio-Allocated) expenditures have also been categorized in Ex. F2-3-1, Table 2 as regulatory, sustaining or value enhancing/strategic. As indicated in that table, project OM&A expenditures over the IR term relate to sustaining projects required to safely operate and maintain unit reliability at OPG's nuclear facilities.

Exhibit F2-3-3 presents further details of OM&A projects.

3.1 Project OM&A Expenditures

OPG's annual Project OM&A (Portfolio) and Non-Portfolio Project expenditures are in the range of $76.1M (2027) to $84.8M (2030) for the IR term, averaging $82.1M, as shown in Ex. F2-3-1, Table 1. Project OM&A (Portfolio) and Non-Portfolio Project expenditures over this period include the following:

- Project OM&A (Portfolio) expenditures include amounts for Pickering to maintain operability and prepare for “second-life” operations, including expenditures associated with inspections and conceptual design to establish the Pickering Sustaining Project portfolio. Project OM&A (Portfolio) expenditures for Pickering were previously declining since 2017 in anticipation of the planned permanent shutdown of the station. Overall, Project OM&A (Portfolio) expenditures are planned to remain relatively consistent throughout the IR term to support infrastructure costs (e.g., minor modifications and removal costs in connection with capital projects).
- R&D work and technical assessments conducted under the Fuel Channel Life Extension Project have improved the understanding of degradation mechanisms behind the aging of fuel channel components. The Fuel Channel Life Management Phase V Project is being undertaken to support and demonstrate fitness-for-service of fuel channels required to operate to the current and extended Effective Full Power Hours operational targets at Darlington. In general, this project will perform pressure tube burst tests, improve the fracture toughness model and conduct uncertainty analysis.
- Pickering Extended Operations and Pickering Optimization of Shutdown as described in EB-2020-0290 have both been completed within their respective program budgets. The variances of these projects are reconciled within the CRVA (Ex. H1-1-1, Section 5.6).

Within the IR term, the Fuel Channel Life Management Phase V Project, Darlington Steam Generator Primary Moisture Separators Replacement (Removal), and including the following amounts captured under ”Infrastructure” in connection with removal costs for CRVA eligible capital projects in F2-3-1, Table 1 (2027 ($3.8M), 2028 ($0.0M), 2029 ($4.7M), 2030 ($4.3M), 2031 ($4.4M)) are eligible for the Capacity Refurbishment Variance Account (see Ex. H1-1-1, Section 5.6).

Further details of period-over-period comparisons of Nuclear project OM&A expenditures for 2020-2026 and term-over-term changes are provided in Ex. F2-3-2.

Numbers may not add due to rounding.

Table 1
Project OM&A Summary - OPG Nuclear Facilities ($M)

Line No.	Category	2020 Actual	2021 Actual	2022 Actual	2023 Actual	2024 Actual	2025 Budget	2026 Budget	2027 Plan	2028 Plan	2029 Plan	2030 Plan	2031 Plan
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)
	Portfolio Projects (Allocated)												
1	**Darlington NGS**	13.9	30.4	29.1	19.2	30.9	13.9	7.4	5.8	0.5	0.0	0.0	0.0
2	**Pickering NGS**	1.8	1.0	1.5	21.4	22.4	3.1	2.4	1.8	1.0	0.8	1.1	1.8
3	**Operations and Project Support**	7.0	5.1	8.9	4.3	3.2	4.5	4.2	0.2	0.0	0.0	0.0	0.0
4	**Subtotal Portfolio Projects (Allocated)**	22.7	36.5	39.5	45.0	56.5	21.4	14.0	7.7	1.5	0.8	1.1	1.8
5	**Infrastructure**[3]	41.0	47.7	37.6	58.5	41.4	39.9	40.1	42.0	42.8	49.2	51.2	55.1
6	**Portfolio Projects (Unallocated)**[3]	0.0	0.0	0.0	0.0	0.0	9.7	13.7	21.5	38.1	34.1	32.6	26.3
7	**Subtotal Project OM&A (Portfolio)**	63.6	84.2	77.1	103.4	97.9	71.0	67.8	71.2	82.4	84.0	84.8	83.2
	Non Portfolio Projects												
8	**Pickering Extended Operations**	30.0	19.6	0.9	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
9	**Optimization of Pickering Shutdown**	0.3	1.7	4.9	3.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
10	**Darlington Spacer Life Management**[1]	3.0	(1.2)	0.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
11	**Darlington Unit 3 F/C Comp Retrieval**[2]	1.9	2.2	(0.2)	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
12	**Fuel Channel Life Extension Project**	0.7	5.0	3.2	1.9	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
13	**Fuel Channel Life Management Phase V Project**	0.0	0.0	0.0	1.1	5.3	4.5	2.3	0.2	0.0	0.0	0.0	0.0
14	**FCLE Related Ongoing Costs**[4]	0.0	0.0	0.0	26.2	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
15	**Darlington Steam Generator Primary Moisture Separators Replacement Projects**[5]	0.0	0.0	3.3	4.5	3.8	0.0	3.1	4.7	0.0	0.0	0.0	0.0
16	**Total Project OM&A**	99.5	111.6	89.5	141.1	107.9	75.6	73.3	76.1	82.4	84.0	84.8	83.2

Notes:

1 Project #83280 - DN Annulus Spacer Life Mgmt.

2 Project #83926 - IRI DNRU3 FC Component Retrieval.

3 Infrastructure also contains the following removals amounts associated with CRVA eligible capital projects: $3.8M in 2027, $0.0M in 2028, $4.7M in 2029, $4.3M in 2030, and $4.4M in 2031.
Infrastructure and Portfolio Projects (Unallocated) have been allocated among Darlington NGS, Pickering NGS and Operations and Project Support.

Infrastructure by Category

	Category	2020 Actual	2021 Actual	2022 Actual	2023 Actual	2024 Actual	2025 Budget	2026 Budget	2027 Plan	2028 Plan	2029 Plan	2030 Plan	2031 Plan
3a	Darlington NGS	27.2	32.4	22.3	22.5	24.2	30.2	30.8	31.5	32.1	38.1	40.0	40.7
3b	Pickering NGS	5.4	5.9	7.3	10.6	8.9	4.1	3.9	5.0	5.0	5.0	5.0	7.9
3c	Operations and Project Support	8.3	9.4	8.0	25.4	8.4	5.7	5.5	5.6	5.7	6.0	6.2	6.4

Portfolio Projects (Unallocated) by Category

	Category	2020 Actual	2021 Actual	2022 Actual	2023 Actual	2024 Actual	2025 Budget	2026 Budget	2027 Plan	2028 Plan	2029 Plan	2030 Plan	2031 Plan
3d	Darlington NGS	0.0	0.0	0.0	0.0	0.0	0.9	7.4	11.5	21.6	15.7	11.7	13.5
3e	Pickering NGS	0.0	0.0	0.0	0.0	0.0	8.8	6.3	8.2	10.5	13.8	16.9	12.8
3f	Operations and Project Support	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.8	6.0	4.5	4.0	0.0

4 Represents the Pickering Unit 8 Boiler Secondary Side Advancement Scale Conditioning.

5 Project #86873 Darlington Steam Generator Primary Moisture Separators Replacement (Removal).

Numbers may not add due to rounding.

Table 2
Project OM&A Summary - OPG Nuclear Facilities Projects (Allocated) ($M)
By Project Category

Line No.	OM&A Project Category	2020 Actual	2021 Actual	2022 Actual	2023 Actual	2024 Actual	2025 Budget	2026 Plan	2027 Plan	2028 Plan	2029 Plan	2030 Plan	2031 Plan
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)
1	**Regulatory**	5.1	7.5	7.1	8.3	6.8	1.5	0.5	0.0	0.0	0.0	0.0	0.0
2	**Sustaining**	20.6	27.9	32.8	37.2	49.6	19.9	13.6	7.7	1.5	0.8	1.1	1.8
3	**Value Enhancing**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	25.7	35.4	39.8	45.4	56.4	21.4	14.0	7.7	1.5	0.8	1.1	1.8

COMPARISON OF PROJECT OM&A COSTS – NUCLEAR

1.0 PURPOSE

This evidence presents period-over-period comparisons of project OM&A expenditures for OPG's nuclear facilities (excluding Darlington Refurbishment Program and Pickering Refurbishment Program, which are addressed in Ex. F2-7-1 and Ex. F2-8-1, respectively) for 2020-2031. Period-over-period variances are shown in Ex. F2-3-2, Table 1 and are explained below.

2.0 OVERVIEW

As defined in Ex. F2-3-1, Nuclear Project OM&A costs are made up of the following:

1. Nuclear Project OM&A (Portfolio):

- "Portfolio Projects (Allocated)", are OM&A expenditures for projects that have a Project Management Oversight Committee ("PMOC") approved budget and approved Business Case Summary ("BCS"). The approved BCS for these identified projects can vary from a very preliminary development BCS (e.g., Class 5 estimate) to an Execution BCS (e.g., Class 3 or better estimate).
- "Portfolio Projects (Unallocated)", which is the remaining budget available to cover the cost of projects that are progressing through the review and approval process but do not have a PMOC-approved budget or an approved BCS. In effect, it represents the amount of PMOC-approved project OM&A funding that remains available to undertake projects, once those projects move forward with a PMOC-approved budget and an approved BCS. These are projects that are currently in the project identification or project initiation phases. As projects progress beyond the project identification and initiation phases, the annual unallocated amount will decline, typically to zero, as OPG's project OM&A expenditures are allocated to projects with approved budgets. A list of the project OM&A projects being considered for funding through the project portfolio is provided in Ex. F2-3-3, Table 4.

- "Infrastructure", which includes five elements:
  - Funding for staff that do not support specific projects but provide management oversight and direction, administration and coordination of project portfolio activities, and ensure compliance with OPG governance and standards.
  - An amount for minor modifications at each of the two nuclear sites. Minor modifications are lower cost modifications (generally less than $200k per generating unit) for which the full project management process is unwarranted. For administrative efficiency, these modifications are funded via a drawdown of the minor modifications budget allocated to each station and central facilities.
  - An amount for project conceptual funding at the Project Initiation phase, as discussed in Ex. D2-1-1, Attachment 1 ("Project Lifecycle Phases and Gates").
  - An amount for capital project removal costs, which are expensed to Project OM&A in accordance with OPG's capitalization policy (Ex. D4-1-1).
  - An amount for capital projects that have been cancelled and written-off. As the write-off occurs in the year of the cancellation decision and cannot be predicted, there is no budget allocated for these items.

2. Project OM&A (Non-portfolio), which are projects listed separately from the Project OM&A (Portfolio) due to their extraordinary nature.

A description of the initiation, review and approval process for the nuclear project portfolio (Project OM&A and Capital) is provided in Ex. D2-1-1, Section 3.0. As discussed in that exhibit, the PMOC will manage funding to attempt to stay within the overall project portfolio annual budget. For example, a request for additional funding could be accommodated by re-allocating funding from other projects that are completed under budget or by delaying or deferring other projects.

More detailed project information is contained in Ex. F2-3-3.

3.0 TERM-OVER-TERM CHANGES – IR TERM

2027-2031 Plan versus 2022-2026 Actuals and Budget

Planned project OM&A costs for 2027-2031 IR term are $410.6M which is $76.9M (16%) lower than the actual expenditure amount of $487.4M in the 2022-2026 term (2025 and 2026 being forecast).

This decrease is primarily driven by decreased planned expenditures in Project OM&A (Portfolio) of $11.7M and Non-Portfolio Projects of $65.2M. Decreased spend in Darlington (-$20.1M) and Operations and Projects Support (-$8.6M) is offset with increased spend in Pickering ($17.7M) and Infrastructure spending ($22.7M). Non-Portfolio Projects have decreased by $65.2M with $0.2M spend in the 2027-2031 term for Fuel Channel Life Management Phase V Project and $4.7M spend for Project #86873 Darlington Steam Generator Primary Moisture Separators Replacement (Removal). All other Non-Portfolio Projects were completed in the 2022-2026 term.

Details of project OM&A expenditure period-over-period changes are explained below in Section 4.0 for bridge years and Section 5.0 for historical years.

4.0 PERIOD-OVER-PERIOD CHANGES – BRIDGE YEARS

2026 Budget versus 2026 OEB-Approved

The increase in 2026 Budget versus 2026 OEB-approved (+$13.1M) is mainly due to planned increases in spending on Project OM&A (Portfolio Allocated) (+$13.2M), Project OM&A (Non-Portfolio) (+$5.4M), partially offset by reductions Project OM&A (Portfolio Unallocated) (-$5.0M) and Infrastructure (-$2.4M). The total variance also reflects the settlement adjustment (-$1.9M) for EB-2020-0290.

The planned increase in Project Portfolio (Allocated) is due to increased spending at Darlington (+$6.5M), Operations and Project Support (+$4.2M), and Pickering (+$2.4M).

Ongoing projects from EB-2020-0290 account for 94% (+$6.1M) of the increase in Project Portfolio (Allocated) spending at Darlington. The main contributors are Project #84484 Darlington Unit 0 Switchgear Refurbishment (+$3.5M) and Project #84415 Darlington Primary Heat Transport Pump Motor Oil Leak Repair (+$1.2M).

Project Portfolio (Allocated) spending in Operations and Project Support increases primarily due to Project #84850 Matrix Inspection for Tubular Components (+$3.1M) and Project #86174 Laser induced breakdown Spectroscopy for Hydrogen Characterization Tool (+$1.2M).

The increase in Project OM&A (Non-Portfolio) is due to increased spending on Fuel Channel Life Management Phase V Project (+$2.3M) and Darlington Steam Generator Primary Moisture Separators Projects (Removal) (+$3.1M).

The decrease in Project Portfolio (Unallocated) reflects the increased definition of the Project OM&A Portfolio as compared to the EB-2020-0290 submission and decrease in the overall envelope to offset spending on non-portfolio projects. The remaining budget is expected to be allocated for new projects, once approved by PMOC, including those potential projects listed in Ex. F2-3-3, Table 4.

Infrastructure spending decreases mainly due to a reduction in minor modifications spending at Darlington (-$3.7M) and Project #40409 Project Support (-$2.1M). These decreases are partially offset by increases in minor modification spending at Pickering (+$3.5M).

2025 Budget versus 2025 OEB-Approved

The decrease in 2025 Budget versus 2025 OEB-approved (+$2.8M) is due to planned increases in spending on Project OM&A (Portfolio Allocated) (+$18.4M), Project OM&A (Non-Portfolio) (+$4.5M), largely offset by reductions in Project OM&A (Portfolio Unallocated) (-$15.9M) and Infrastructure (-$6.6M). The total variance also reflects the settlement adjustment (-$2.3M) for EB-2020-0290.

The planned increase in Project Portfolio (Allocated) is due to increased spending at Darlington (+$10.9M), Operations and Project Support (+$4.5M), and Pickering (+$3.1M).

Ongoing projects from EB-2020-0290 account for $10.4M of the increase in Project Portfolio (Allocated) spending at Darlington, primarily driven by Project #84415 Darlington Primary Heat Transport Pump Motor Oil Leak Repair (+$8.6M).

Project Portfolio (Allocated) spending in Operations and Project Support increased primarily due to Projects #84850 Matrix Inspection For Tubular Components (+$3.4M) and #86174 Laser induced breakdown Spectroscopy for Hydrogen Characterization Tool (+$1.1M).

The increase in Project OM&A (Non-Portfolio) is due to increased spending on Fuel Channel Life Management Phase V Project.

The decrease in Project Portfolio (Unallocated) reflects the increased definition of the Project OM&A Portfolio as compared to the EB-2020-0290 submission and decrease in the overall envelope to offset spending on non-portfolio projects. The remaining budget is expected to be allocated for new projects, once approved, including those potential projects listed in Ex. F2-3-3, Table 4.

Infrastructure spending decreased mainly due to a reduction in minor modifications at Darlington (-$3.9M) and Project #40409 Project Support (-$2.3M).

5.0 PERIOD-OVER-PERIOD CHANGES – HISTORICAL YEARS

Period-over-period variances are presented in Ex. F2-3-2, Table 1 and are explained below.

2024 Actual versus 2024 OEB-Approved

The increase in spending in 2024 compared to 2024 OEB-approved (+$31.4M) is due to increased spending on Portfolio Projects (Allocated) (+$51.0M) and Non-Portfolio Projects (+$10.0M). This increase is partially offset by reduced spending on the Portfolio Projects

(Unallocated) (-$24.5M) and Infrastructure (-$7.6M). The total variance also reflects the settlement adjustment (-$2.4M) for EB-2020-0290.

The increase in Portfolio Projects (Allocated) spending is mainly due to increased spending at Darlington (+$25.4M) and Pickering (+$22.4M).

Approximately 83% of the increase in Portfolio Projects (Allocated) spending at Darlington was due to new projects started since EB-2020-0290 (+$20.9M). The primary contributor to this variance is Project #87908 Darlington Unit 1 Steam Generator Primary Side Clean (+$20.5M).

Virtually all of the increase in Portfolio Projects (Allocated) spending at Pickering was due to new projects started since EB-2020-0290 (+$22.2M). The primary contributors to this variance were the following projects:

- #87152 Public Address System Core Upgrade (+$7.2M)
- #87996 PBEX Unit 7 Pressure Tube Surveillance (+$6.0M)
- #87885 Incremental Fuel Channel Assessments (+$3.1M)
- #87818 P2451 Control Tube Liquid Injection Safety System De-tensioning (+$2.7M)
- #87921 Pickering Fish Entrainment (+$1.1M)

The increase in Project OM&A (Non-Portfolio) was mainly due to the increased spending on the Fuel Channel Life Management Phase V Project (+$5.3M), and Darlington Steam Generator Primary Moisture Separators Projects (Removal) (+$3.8M).

The reduction (-$24.5M) of the 2024 OEB-approved Portfolio Projects (Unallocated) to zero reflects the elimination, as anticipated, of this component of the Nuclear project portfolio. All 2024 nuclear project portfolio OM&A expenditures are captured within the Portfolio Projects (Allocated) component.

The decrease in Infrastructure spending (-$7.6M) is primarily due to project #83914 Darlington Project Removal Costs (-$5.0M), which is generally used to capture removal costs for a variety of projects at the station.

2023 Actual versus 2023 OEB-Approved

The increase in spending in 2023 compared to 2023 OEB-approved (+$58.7M) is due to increased spending on the Portfolio Projects (Allocated) (+$30.8M), Infrastructure (+$9.5M), and Non-Portfolio Projects (+$37.7M). This increase is partially offset by reduced spending on the Portfolio Projects (Unallocated) (-$21.8M). The total variance also reflects the settlement adjustment (-$2.6M) for EB-2020-0290.

The increase in Portfolio Projects (Allocated) spending is due to increased spending at Darlington (+$5.0M), Pickering (+$21.4M) and in the Operations and Project Support (+$4.3M).

The increase in Portfolio Projects (Allocated) spending at Darlington was driven by ongoing projects from EB-2020-0290. The primary contributors to this variance are Project #83479 Darlington Civil Building Structure Repairs (+$3.3M) and Project #84484 Darlington Unit 0 Switchgear Refurbishment (+$2.1M). These increases were offset by various smaller spending variances within portfolio.

Increase in Portfolio Projects (Allocated) spending at Pickering was primarily due to new projects started since EB-2020-0290 (+$20.4M). The primary contributors to this variance are the following projects:

- #87187 Pickering Forebay Dredging (+$11.1M)
- #87892 Pickering Forebay Dredging (+$4.0M)
- #87885 Incremental Fuel channel (+$2.2M)
- #87571 Auxiliary Irradiated Fuel Bay Liner Repair (+$1.6M)
- #86127 Pickering North Yard Fire Header Repair (+$1.1M)

The increase in Infrastructure spending (+$9.5M) was largely due to written off cancelled capital projects (+$20.0M) and Project #46500 Pickering Minor Modification Projects (+$2.6M). The cancelled capital projects (+$20.0M) include the following projects:

- Project #83299 DN Condenser Steam Discharge Valve Control System Replacement (+$10.7M). The project was cancelled during its definition phase.
- Project #80023 DN Steam Generator Level Control Valve Replacement (+$9.3M). The project was cancelled during its definition phase. Refer to Ex. D2-1-3, Section 3.3 Deferred/Cancelled Projects for further details.

The above increases were offset by reduced spending across a number of projects. The projects mainly contributing to the decrease are:

- #83914 Darlington Project Removal Costs (-$5.5M)
- #38349 Darlington Minor Modification Projects (-$2.8M)
- #40409 Project Support (-$2.7M)
- #62428 Initiation Phase Funding (-$1.5M)

The increase in Project OM&A (Non-Portfolio) spending was due to the increased spending Pickering Optimization of Shutdown (+$3.0M), Fuel Channel Life Extension Related Ongoing Costs (+$26.2M) and Darlington Steam Generator Primary Moisture Separators Projects (Removal) (+$4.5M).

The reduction (-$21.8M) of the 2023 OEB-approved Portfolio Projects (Unallocated) to zero reflects the elimination, as anticipated, of this component of the Nuclear project portfolio. All 2023 Nuclear project portfolio OM&A expenditures are captured within the Portfolio Projects (Allocated) component.

2022 Actual versus 2022 OEB-Approved

The increase in spending in 2022 compared to 2022 OEB-approved (+$3.1M) is due to increased spending on the Portfolio Projects (Allocated) (+$18.1M) and Non-Portfolio Projects (+$4.1M). This increase is partially offset by reduced spending on the Portfolio Projects

(Unallocated) (-$18.0M) and Infrastructure (-$3.9M). The total variance also reflects the settlement adjustment (-$2.7M) for EB-2020-0290.

The increase in Portfolio Projects (Allocated) spending is mainly due to increased spending at Darlington (+$10.1M) and in the Operations and Project Support (+$7.1M).

Approximately 84% of the increase in Portfolio Projects (Allocated) spending at Darlington was driven by ongoing projects from EB-2020-0290 (+$8.5M). The primary contributors to this variance are Project #84484 Darlington Unit 0 Switchgear Refurbishment (+$9.4M) and Project #84415 Darlington Primary Heat Transport Pump Motor Oil Leak Repair (+$2.4M).

Approximately 86% of the increase in Portfolio Projects (Allocated) spending in Operations and Project Support was due to new projects started since EB-2020-0290 (+$6.1M). The primary contributors to this variance are Project #84850 Matrix Inspection for Tubular Components (+$3.5M) and #86139 Pickering Heavy Water Upgrading Plant Pickering A Tower Removal (+$1.4M).

The increase in Project OM&A (Non-Portfolio) spending (+$4.1M) was due to the increased spending on the Fuel Channel Life Cycle Extension Project (+$2.7M) and Darlington Steam Generator Primary Moisture Separators Projects (+$3.3M), partially offset by reductions in Pickering Optimization of Shutdown (-$2.9M).

The reduction (-$18.0M) of the 2022 OEB-approved Portfolio Projects (Unallocated) to zero reflects the elimination, as anticipated, of this component of the Nuclear project portfolio. All 2022 nuclear project portfolio OM&A expenditures are captured within the Portfolio Projects (Allocated) component.

The decrease in Infrastructure spending (-$3.9M) was mainly due to project #40409 Project Support (-$3.7M).

2021 Actual versus 2021 OEB-Approved

The increase in spending in 2021 compared to 2021 OEB-approved (+$24.7M) is due to increased spending on the Portfolio Projects (Allocated) (+$36.5M), Infrastructure (+$18.8M), Non-Portfolio Projects (+$27.3M). This increase is partially offset by decreased spending on the Portfolio Projects (Unallocated) (-$57.9M).

The increase in Portfolio Projects (Allocated) spending was mainly due to increased spending at Darlington (+$30.4M). The increase in Portfolio Projects (Allocated) spending at Darlington was mainly driven by new projects not listed in EB-2016-0152 (+$20.4M) and existing Darlington projects (+$10.0M).

The largest contributor of the projects started in EB-2020-0290, which accounts for 51% of the variance, are Project #84484 Darlington Unit 0 Switchgear Refurbishment (+$6.1M) and Project #84589 Darlington Periodic Safety Review (+$4.3M). The two projects ongoing from EB-2016-0152, which account for 72% of the variance, are #80067 Darlington Irradiated Fuel Bay Stacking Frame Replacement (Long Bundle) (+$4.8M) and #82826 Darlington Fuel Handling Computer Software Release (+$2.4M).

The increase in Infrastructure was primarily due to the following projects:

- #83914 Darlington Project Removal Costs (+$7.1M)
- #46500 Pickering Minor Modification Projects (+$5.9M)
- #40409 Project Support (+$5.5M)

The increase in Project OM&A (Non-Portfolio) spending was mainly due to the increased spending on the Fuel Channel Life Cycle Extension Project (+$5.0M) and Pickering Extended Operations (+$19.6M).

The Pickering Extended Operations variance can be primarily attributed to new projects started since EB-2020-0290, including Project #84506 Feeder Replacements (+$11.1M) and Project #86235 Pickering Extended Operations Unit 8 Main Generator Chemical Clean (+$4.8M).

The reduction of the 2021 OEB-approved Portfolio Projects (Unallocated) to zero reflects the elimination, as anticipated, of this component of the Nuclear project portfolio. All 2021 nuclear project portfolio OM&A expenditures are captured within the Portfolio Projects (Allocated) component.

2020 Actual versus 2020 OEB-Approved

The decrease in spending in 2020 compared to 2020 OEB-approved (-$0.7M) is due to decreased spending on the Portfolio Projects (Unallocated) (-$47.8M). This decrease is offset by increased spending on the Portfolio Projects (Allocated) (+$21.9M), Infrastructure spending (+$8.0M), and Non-Portfolio Projects (+$17.2M).

The reduction of the 2020 OEB-approved Portfolio Projects (Unallocated) to zero reflects the elimination, as anticipated, of this component of the Nuclear project portfolio. All 2020 nuclear project portfolio OM&A expenditures are captured within the Portfolio Projects (Allocated) component.

The increase in Portfolio Projects (Allocated) spending is mainly due to increased spending at Darlington (+$13.1M) and in the Operations and Project Support (+$7.0M).

The increase in Portfolio Projects (Allocated) spending at Darlington was mainly driven by new projects not listed in EB-2016-0152 (+$6.0M) and ongoing projects (+$7.1M).

The largest contributors of the projects started in EB-2020-0290, which accounts for 70% of the variance, are Project #84589 Darlington Periodic Safety Review (+$2.5M) and Project #84872 Darlington Pressure Tube Circumferential Sampling Equipment - Dry Scrape Tooling (+$1.7M).

The projects ongoing from EB-2016-0152, which account for 73% of the variance, are the following:

- #82826 Darlington Fuel Handling Computer Software Release (+$1.3M)
- #Darlington Annunciation Modifications and Post-Accident Monitoring Configuration

Management (+$1.3M)

- #80067 Darlington Irradiated Fuel Bay Stacking Frame Replacement (Long Bundle) (+$4.8M)

The increase in Project OM&A (Allocated) spending on Operations and Project Support was mainly driven by new projects not listed in EB-2016-0152 (+$6.8M). The largest contributor of projects started in EB-2020-0290, which account for 78% of the variance, are Project #83412 Security Project D (+$3.3M) and Project #84999 X-Lab Wireless Sensor Portfolio (+$2.0).

The increase in Infrastructure spending is primarily due to Project #40409 Project Support (+$5.7M) and minor project write-offs (+$2.3M).

The increase in Non-Portfolio Projects spending (+$17.2M) is primarily due to the increased spending on the Darlington Spacer Life Management (+$3.0), Darlington Unit 3 Fuel Channel Component Retrieval (+$1.9M), and Pickering Extended Operations (+$11.3M).

The Pickering Extended Operations variances (+$11.3M) can be primarily attributed to new projects started since EB-2020-0290 (+$15.3M) offset by decreased spending in ongoing projects (-$4.0M).

The increase in new project spending in the Pickering Extended Operations (+$15.3M) was mainly due to the following projects:

- #84284 Pickering Extended Operations U56 Calandria Tube to Liquid Injection Shutdown System Nozzle Contact Mitigation (+$5.4M)
- #84506 Feeder Replacements (+$3.8M)

Numbers may not add due to rounding.

Table 1
Comparison of Project OM&A - OPG Nuclear Facilities ($M)[2]

Line No.	Business Unit	2020 OEB Approved[1]	(c)-(a) Change	2020 Actual	2021 OEB Approved[1]	(f)-(d) Change	2021 Actual	2022 OEB Approved	(i)-(g) Change	2022 Actual	2023 OEB Approved	(l)-(j) Change	2023 Actual
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)
	Portfolio Projects (Allocated)												
1	**Darlington NGS**	0.8	***13.1***	13.9	0.0	***30.4***	30.4	19.0	***10.1***	29.1	14.2	***5.0***	19.2
2	**Pickering NGS**	0.0	***1.8***	1.8	0.0	***1.0***	1.0	0.6	***0.9***	1.5	0.0	***21.4***	21.4
3	**Operations and Project Support**	0.0	***7.0***	7.0	0.0	***5.1***	5.1	1.8	***7.1***	8.9	0.0	***4.3***	4.3
4	**Subtotal Portfolio Projects (Allocated)**	0.8	***21.9***	22.7	0.0	***36.5***	36.5	21.4	***18.1***	39.5	14.2	***30.8***	45.0
5	**Infrastructure**	33.0	***8.0***	41.0	29.0	***18.8***	47.7	41.5	***(3.9)***	37.6	49.0	***9.5***	58.5
6	**Portfolio Projects (Unallocated)**	47.8	***(47.8)***	0.0	57.9	***(57.9)***	0.0	18.0	***(18.0)***	0.0	21.8	***(21.8)***	0.0
7	**Subtotal Project OM&A (Portfolio)**	81.5	***(17.9)***	63.6	86.9	***(2.7)***	84.2	80.8	***(3.7)***	77.1	85.0	***18.4***	103.4
	Non Portfolio Projects												
8	**Pickering Extended Operations**	18.7	***11.3***	30.0	0.0	***19.6***	19.6	0.0	***0.9***	0.9	0.0	***0.4***	0.4
9	**Optimization of Pickering Shutdown**	0.0	***0.3***	0.3	0.0	***1.7***	1.7	7.8	***(2.9)***	4.9	0.0	***3.0***	3.0
10	**Darlington Spacer Life Management[3]**	0.0	***3.0***	3.0	0.0	***(1.2)***	(1.2)	0.0	***0.3***	0.3	0.0	***0.4***	0.4
11	**Darlington Unit 3 F/C Comp Retrieval[4]**	0.0	***1.9***	1.9	0.0	***2.2***	2.2	0.0	***(0.2)***	(0.2)	0.0	***0.1***	0.1
12	**Fuel Channel Life Extension Project**	0.0	***0.7***	0.7	0.0	***5.0***	5.0	0.4	***2.7***	3.2	0.0	***1.9***	1.9
13	**Fuel Channel Life Management Phase V Project**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	***1.1***	1.1
14	**FCLE Related Ongoing Costs[5]**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	***26.2***	26.2
15	**Darlington Steam Generator Primary Moisture Separators Projects[6]**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	***3.3***	3.3	0.0	***4.5***	4.5
16	**Total Project OM&A Before Adjustments**	100.2	(0.7)	99.5	86.9	***24.7***	111.6	89.1	0.4	89.5	85.0	***56.1***	141.1
17	**OEB/Settlement Adjustments**	0.0	0.0	0.0	0.0	0.0	0.0	(2.7)	***2.7***	0.0	(2.6)	***2.6***	0.0
18	**Total Project OM&A Including Adjustments**	100.2	(0.7)	99.5	86.9	***24.7***	111.6	86.4	***3.1***	89.5	82.5	***58.7***	141.1

Line No.	Business Unit	2024 OEB Approved	(c)-(a) Change	2024 Actual	2025 OEB Approved	(f)-(d) Change	2025 Budget	2026 OEB Approved	(i)-(g) Change	2026 Budget	2022-2026 Actuals & Budget	(l)-(j) Change	2027-2031 Plan[4] EB-2025-0297
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)
	Portfolio Projects (Allocated)												
19	**Darlington NGS**	5.5	***25.4***	30.9	3.0	***10.9***	13.9	0.8	***6.5***	7.4	100.5	***(94.2)***	6.3
20	**Pickering NGS**	0.0	***22.4***	22.4	0.0	***3.1***	3.1	0.0	***2.4***	2.4	50.8	***(44.5)***	6.4
21	**Operations and Project Support**	0.0	***3.2***	3.2	0.0	***4.5***	4.5	0.0	***4.2***	4.2	25.1	***(24.9)***	0.2
22	**Subtotal Portfolio Projects (Allocated)**	5.5	***51.0***	56.5	3.0	***18.4***	21.4	0.8	***13.2***	14.0	176.5	***(163.6)***	12.8
23	**Infrastructure**	49.0	***(7.6)***	41.4	46.5	***(6.6)***	39.9	42.5	***(2.4)***	40.1	217.6	***22.7***	240.2
24	**Portfolio Projects (Unallocated)**	24.5	***(24.5)***	0.0	25.6	***(15.9)***	9.7	18.7	***(5.0)***	13.7	23.3	***129.2***	152.6
25	**Subtotal Project OM&A (Portfolio)**	79.0	***18.9***	97.9	75.1	***(4.0)***	71.0	62.0	***5.8***	67.8	417.4	***(11.7)***	405.7
	Non Portfolio Projects												
26	**Pickering Extended Operations**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1.3	***(1.3)***	0.0
27	**Optimization of Pickering Shutdown**	0.0	***0.2***	0.2	0.0	0.0	0.0	0.0	0.0	0.0	8.1	***(8.1)***	0.0
28	**Darlington Spacer Life Management[3]**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.8	***(0.8)***	0.0
29	**Darlington Unit 3 F/C Comp Retrieval[4]**	0.0	***0.1***	0.1	0.0	0.0	0.0	0.0	0.0	0.0	(0.0)	***0.0***	0.0
30	**Fuel Channel Life Extension Project**	0.0	***0.1***	0.1	0.0	0.0	0.0	0.0	0.0	0.0	5.2	***(5.2)***	0.0
31	**Fuel Channel Life Management Phase V Project**	0.0	***5.3***	5.3	0.0	***4.5***	4.5	0.0	***2.3***	2.3	13.3	***(13.1)***	0.2
32	**FCLE Related Ongoing Costs[5]**	0.0	***0.6***	0.6	0.0	0.0	0.0	0.0	0.0	0.0	26.8	***(26.8)***	0.0
33	**Darlington Steam Generator Primary Moisture Separators Replacement Projects[6]**	0.0	***3.8***	3.8	0.0	0.0	0.0	0.0	***3.1***	3.1	14.7	***(10.0)***	4.7
34	**Total Project OM&A Before Adjustments**	79.0	***28.9***	107.9	75.1	0.5	75.6	62.0	***11.3***	73.3	487.4	***(76.9)***	410.6
35	**OEB/Settlement Adjustments**	(2.4)	***2.4***	0.0	(2.3)	***2.3***	0.0	(1.9)	***1.9***	0.0	0.0	0.0	
36	**Total Project OM&A Including Adjustments**	76.6	***31.4***	107.9	72.8	***2.8***	75.6	60.1	***13.1***	73.3	487.4	***(76.9)***	410.6

Notes:
1 As OEB Approved adjustments are applied to Base OM&A in Ex. F2-2-2 Table 1a and Table 1b, the figures presented here are 2017 Plan - 2021 Plan (from EB-2016-0152, Ex. F2-3-2, Table 1).
2 Bold italic font indicates variance of 10% or greater.
3 Project #83280 - DN Annulus Spacer Life Mgmt.
4 Project #83926 - IRI DNRU3 FC Component Retrieval.
5 Represents the Pickering Unit 8 Boiler Secondary Side Advancement Scale Conditioning.
6 Project #86873 Darlington Steam Generator Primary Moisture Separators Replacement (Removal).

DETAILS OF OM&A PROJECTS – NUCLEAR

1.0 PURPOSE

This evidence provides project listings and supporting information, including business case summaries ("BCS"), for allocated Project OM&A expenditures within Nuclear Operations.

2.0 OVERVIEW

The following tiered reporting structure, consistent with the OEB's filing requirements issued in EB-2024-0136, has been used to present the evidence for all allocated OM&A projects that have budgeted expenses in the bridge period or the IR term, or have been completed since EB-2020-0290. The structure of the accompanying tables setting out the project listing details is consistent with EB-2020-0290. The BCS are provided for Tier 1 projects with expenses in the IR term.

Tier 1

This tier comprises individual projects with a total cost of $20M or more. For these projects, summary level information is provided in Ex. F2-3-3, Table 1, and BCS are provided in Attachment 1. There are six Tier 1 projects, of which two are ongoing projects from EB-2020-0290, two are completed projects from EB-2020-0290, and two are new projects. Further information on Tier 1 is provided in Section 3.0.

Tier 2

This tier comprises individual projects with a total cost of more than $5M but less than $20M, for which summary level information is provided in Ex. F2-3-3, Tables 2a, 2b, and 2c. There are 29 Tier 2 projects.

Tier 3

This tier comprises individual projects with a total cost of less than $5M, for which aggregated information is provided in Ex. F2-3-3, Table 3. There are 38 allocated Tier 3 projects, with an average cost of $1.6M.

Unallocated Projects

There are eight unallocated Portfolio Projects which are currently in the project identification or project initiation phases, with a total cost of more than $5M. These projects are presented in Ex. F3-3-3, Table 4. OPG expects in conjunction with its asset management program (Ex. D2-1-1, Section 3.1), that some of these listed projects (or other projects yet to be identified) will move from the project identification and initiation phases into project definition or execution phase as part of the ongoing portfolio management process. One of these projects has the potential to cost more than $20M.

3.0 PROJECT-SPECIFIC INFORMATION – TIER 1 PROJECTS

The following information relates to projects identified in Ex. F2-3-3, Table 1.

3.1 New Projects

There are two new Tier 1 projects undertaken since EB-2020-0290.

Project #87117, PN U8 Boiler Secondary Side Advanced Scale Conditioning

The purpose of this project was to perform a secondary side Advanced Scale Conditioning Agent chemical cleaning in all 12 Pickering Unit 8 boilers (steam generators) to address boiler level oscillations that can limit station operations. Detailed investigations found sludge and deposits on the secondary side as the main contributing cause leading to the oscillations. This project helped reduce the quantity of sludge and deposits at support locations to mitigate the risk of a unit derate before in support of Pickering's extended "first life" operations to September 2026. The total project cost was $26.8M and completion in December 2024. This work was executed under the Fuel Channel Life Extension Ongoing funding category, which covers expenditures for incremental work required to enable fuel channel and other major component (e.g. steam generators) operation until a nuclear station's beyond original design targets, and is Capacity Refurbishment Variance Account eligible (Ex. H1-1-1, Section 5.6).

Project #87908, Darlington Unit 1 Steam Generator Primary Side Clean

The purpose of this project is to perform targeted cleaning of the primary side tubes for the four Darlington Unit 1 Steam Generators. To meet regulatory requirements, inspections are required to be performed on the steam generator tubes to locate and characterize any flaws that may exist, and to demonstrate fitness for service. While performing these inspections on the Darlington Unit 1 Steam Generators, due to a non-uniform layer of inner diameter magnetite masking tube wall conditions, there were challenges in obtaining some of the data planned for collection. This challenge was not present in other units. As a result, a primary side cleaning campaign was required to remove the magnetite profile remaining on the Unit 1 Steam Generators that was affecting the collection of the data by inspection. The total project cost is estimated to be $20.6M, with a planned completion in December 2025.

3.2 Completed Projects

Two Tier 1 projects have been completed since EB-2020-0290.

Project #80014, Fuel Channel Life Extension was completed under budget at $63.6M versus its budget of $69.3M.

Project #80067, DN Irradiated Fuel Bay Stack Frames was completed under budget at $20.9M versus budget of $29.7M.

3.3 Project Cost Variances

There is currently one ongoing Tier 1 project for which total forecast project cost variance currently exceeds 10% as compared to total forecast project cost provided in EB-2020-0290.

Project# 84484, DN U0 Switchgear Refurbishment

The current total project cost is forecast to be $48.2M, which is an increase of $26.9M from the development phase Class 5 estimated total project cost of $21.3M provided in EB-2020-0290. The total project cost is outside the accuracy range of a Class 5 estimate. The total project cost provided in EB-2020-0290 was based on the development phase BCS estimate, which relied on conceptual design. This estimate was provided prior to the completion of

preliminary engineering, in the absence of detailed design inputs and a defined scope of work. The final completion date is targeted for July 2028.

The Darlington Unit 0 Switchgear Station Buses (Classes II, III, and IV) provide power to both nuclear safety and essential economic loads (such as the Tritium Removal Facility ("TRF")). The inspection of this switchgear is committed to the Canadian Nuclear Safety Commission through an Integrated Implementation Plan commitment and must be completed before December 15, 2027. Due to the critical importance of these loads, no maintenance has been performed on these buses since Darlington began operation.

In December 2021, a first-of-a-kind ("FOAK") Class IV bus maintenance initially planned in the TRF T2101 outage was delinked from the outage. This decision, driven by the TRF's critical role in supporting CANDU fleet operations across Canada, led a change in strategy for the project, leading to the following:

1. *Challenges in Securing Execution Windows:*
    - Major shift in execution dates which mandated new pre-requisites and additional temporary modifications ("TMOD").
    - Execution windows to maintain the buses outside the TRF outage resulted in an extended schedule leading to additional oversight and equipment rental costs.
    - Requirement for additional execution permits mandated an increased demand for Operations resources.

Additionally, the following challenges were experienced related to the execution of the Class IV bus maintenance, which led to a further cost increase to the project in order to meet the revised execution schedule:

2. *FOAK Class IV Bus Maintenance and TMOD Installation Challenges*:
    - Additional TMOD engineering required to be completed on a compressed recovery plan.

- Development of new contingency measures by the project to ensure plant reliability (e.g., preparation of a spare TMOD for the station Main Vacuum Pump).
- Installation and commissioning challenges due to inconsistencies between the legacy drawings and field configuration resulted in delays to the bus maintenance.
- Multiple recovery plans were required for the FOAK installation deploying additional resources working on day and night shifts.
- Identifying and updating critical operational manuals and procedures prior to execution
- Onboarding additional subject matter experts to limit delays and rework.

Lessons learned from the pilot Class IV bus maintenance are currently being applied as applicable to improve planning and execution efficiency for the remaining Class II and III scope.

LIST OF ATTACHMENTS

Attachment 1: Business Case Summaries for OM&A Projects of $20M or more[1]

Note: Business Case Summaries included in Attachment 1 are marked “Confidential” or “Internal Use Only”. However, OPG has determined them to be non-confidential either in their entirety or with redactions as indicated.

[1] For projects with spend in the IR term.

ATTACHMENT 1

Business Case Summaries for OM&A Projects of $20M or more[1]

Tab No	Project Number	Title	Date Approved
ONGOING PROJECTS FROM EB-2020-0290			
1	84484	Darlington U0 Switchgear Refurbishment	Jul-25

[1] For projects with spend in the IR term

Business Case Summary

Project #	84484	**BCS Document Number**	NK38-BCS-53130-00001
Project Title	84484 - DN U0 SWITCHGEAR REFURBISHMENT		
Facility	D - DARLINGTON NGD	**Investment Classification**	Sustaining
Project Level (Scalability)	B	**Financial Classification**	62030 - OM&A - PROJECT
Release: Gate and Project Phase	G3 - Execution - a (Superseding)	**Target Project Completion Date**	2028-Jun-30
Estimate Class (Current Request)	Class 3	**Estimate Class (Overall Project)**	Class 3

Recommendation

We recommend release of $10,013k, including [redacted] of contingency.
This will bring the total released to date to $34,972k, including [redacted] of contingency.

The total estimated project cost is $48,167k, including [redacted] of contingency

This project will perform mid-life maintenance on Unit 0 switchgear to increase the reliability of the station and the electrical equipment, and to address commitments made to the CNSC.

This release will fund the following scope of work:
- Additional Costs for Detailed engineering for Class III BU56 in VBI (Vacuum Building Innage - online work program leading up to VBO outage)
- Additional Costs for Execution, Commissioning and AFS for Class III Buses BU51, BU52, BU53, BU54 in VBI
- Additional Costs for Class IV TMOD Removals & Closeout
- LLM Procurement for BU56 in VBI
- Installation planning for BU56 in VBI
- Class II (BUA53, BUB53, BUC53) Thermography Inspections
- Class II (BUA53, BUB53, BUC53) Timer & Fuse Replacements

Investment Cash Flows

Project Number	84484 - DN U0 SWITCHGEAR REFURBISHMENT					**FAC**	62030 - OM&A - PROJECT		
$K	**LT YE last year**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**Future**	**Total**
Previous releases	22,151	1,147	1,011	650					24,959
Currently Requested	0	3,513	5,796	687	17				10,013
Total released to date	22,151	4,660	6,807	1,337	17				34,972
Future required	0		2,282	8,021	2,892				13,195
Total Project Cost	22,151	4,660	9,089	9,358	2,909				48,167
Ongoing Costs	0								0

Total OAR Approval	48,167.0

Approvals	Signatures	Date
The recommendation, including the identified ongoing costs, if any, represents the best option to meet the validated business need.		

Business Case Summary

Recommended by: Direct Report of Line Approver : Allan Grace SVP Darlington SVP Darlington	Allan Grace	2025-07-04
I concur with the business decision as documented in this BCS.		
Finance Approval : Michael Gore SVP Chief Controller & Acctng Offcr	Michael Gore	2025-07-29
I confirm that this investment/project, including the identified ongoing costs, if any, will address the business need, is of sufficient priority to proceed, and provides value for money.		
Line Approval per OAR : OAR Element : 1.1 Shelley Babin Chief Operations Officer	Shelley Babin	2025-07-31

EXECUTIVE SUMMARY – Project Overview

Business Case Summary

This scope of the U0 Switchgear Refurbishment project is to perform mid-life maintenance on the Unit 0 switchgear. Unit 0 Switchgear powers important station loads (i.e. Water Treatment Plant, Fuel Handling, OSB). The Unit 0 switchgear has never been overhauled in the station's life because of the complexity, resource requirements and very high availability requirements of the loads. The primary business driver of this project is equipment reliability for Class II & III buses, and to meet station CNSC commitment for the Class II buses. The project scope also included the Class IV system (BU59, BU60, BU76, BU78, T59 & T60) maintenance, which was completed in 2022 with all CC-010 IIP milestones achieved.

This project is still to complete the following activities for Class II & III:
- Inspection of Class II buses 0-53520-BUA53/BUB53/BUC53 to satisfy CNSC REGM commitment by December 15th, 2027.
- Timer & Fuse Replacements for Class II buses 0-53520-BUA53/BUB53 under the VBI D2521 Program.
- Mid-life maintenance on 5 Class III Unit 0 switchgears buses, relays and circuit breakers under the VBI D2521 Program. The included buses are BU51, BU52, BU53, BU54, BU56.
- BU56 design, installation planning, installation/removal of TMODs required to support the bus maintenance. Design is required for BU56 and is not required for BU51, BU52, BU53 and BU54.

The project strategy is to complete the Class II & III Bus Maintenance under the D2521 VBI Program. The original BU56 plan was to execute in the VBO and was the execution strategy planned in the previous BCS. However, station management requested the project to execute the work in VBI (online) to mitigate the risk of delaying the VBO critical path. The team has benchmarked Bruce Power to develop a plan how Class III bus maintenance could be done online and it was determined that Bruce utilized unit bus power for their TMODs. This is a similar strategy the project with support from the station is planning for the BU56 maintenance. It is anticipated that more effort will be required to execute the Class III Bus Maintenance online than within the VBO.

The sequence of electrical bus maintenance will be coordinated based on the CNSC commitment, criticality, maintenance logistics, station integrated planning and the station outage schedule. Execution order will be driven by availability windows for respective buses and station operating constraints. Maintenance of the buses will be based on the current equipment heath as determined by Performance Engineering.

The previously approved funding for Execution Phase (Gate 3A), was used to complete the Class IV preliminary engineering, design, install planning, installation, AFS and closeout.

This Superseding Execution Phase (Gate 3AS) release will fund the following scope:
- Detailed engineering for Class III BU56 – Additional funds required for executing in VBI rather than VBO
- Execution, Commissioning and AFS for Class III Buses BU51, BU52, BU53, BU54 – Additional funds required to execute in VBI
- Class IV TMOD Removals & Closeout - Additional funds required to execute in VBI
- LLM Procurement for BU56 (VBI) - Scope Advancement
- Installation planning for BU56 (VBI) – Scope Advancement
- Class II (BUA53, BUB53, BUC53) Thermography Inspections – Scope Advancement
- Class II (BUA53, BUB53, BUC53) Timer & Fuse Replacements – Scope Advancement

A future full execution phase (Gate 3B) will include:
- Execution, Commissioning and AFS for Class III BU56
- Design Engineering Change (EC) closeout for Class III BU56
- Project Closeout

The key risks for this project are as follows:
- Overall project cost increase due to the complexity in scope & planning
- Additional TMODs & efforts required to support with BU56 in VBI (online maintenance)
- Procurement costs increase due to tariffs and additional cable runs for executing in VBI (online maintenance)
- Odd station equipment availability to provide redundancy for BU56 (even) maintenance

Contingency has been allocated to address these potential discovery / legacy issues.

Business Need For Project Level A or B

Business Case Summary

The business driver for this project is to maintain plant and equipment reliability, and to address regulatory commitments.

The Unit 0 switchgear buses supply power to nuclear safety and economic loads such as Emergency Coolant Injection (ECI), Negative Pressure Containment (NPC), Water Treatment Plant (WTP), Fuel Handling (FH) and Operations Support Building. Industry experience shows that electrical failures and degradations leading to failure can be difficult to anticipate when preventive maintenance is overdue and can result in high consequences. Further, there is a CNSC commitment due in December 2027 to perform inspections of the Unit 0 Class II 120/208Vac buses, BUA53, BUB53 and BUC53, tracked under CNSC REGM milestone. In addition, Class III Buses have never been maintained throughout the station lifecycle and is required to ensure reliability and availability until station end of life.

The switchgear for the Darlington Unit 0 critical electrical buses (5 Class III, and 3 Class II) have very high bus availability requirements that imposed constraints for implementing maintenance. While there have not been any failures of these buses to date, industry experience reveals that electrical failures and degradations leading to failure can be difficult to anticipate when preventive maintenance is overdue and can result in high consequences. The Electric Power Research Institute (EPRI) recommends 12-year frequency for switchgear maintenance. The buses and transformers have never been maintained (25-30 years) due to equipment availability constraints. These buses are at risk of experiencing elevated failure rates that could affect power supply to critical nuclear safety loads and the operations support building. Since the equipment cannot be run to failure, the mitigation strategy is to perform preventive maintenance (PM).

The Class IV (BU59, BU60, BU76, BU78, T59 & T60) maintenance was completed in 2022 with all CC-010 IIP Commitments met.

Preferred Alternative:	Perform Bus Maintenance	For Project Level A, B or C

Description of Preferred Alternative

The preferred alternative is to perform mid-life maintenance to increase Unit 0 switchgear and overall plant reliability:

OPG Control Maintenance (CTVD) will perform non-intrusive maintenance on the Class II (BUA53, BUB53 and BUC53) Buses to meet the CNSC REGM visual inspection commitment rather than de-energizing the bus through the implementation of TMODs - the non-intrusive approach was agreed upon by Performance Engineering / Operations / Control Maintenance & will minimize the overall cost for the project. The Class II buses (BUA53, BUB53) timer and fuse replacements will be completed by control maintenance CSED during available MCC outages. A design vendor and contractor will be utilized during the Class III detailed design, install planning, TMOD installations / removals, closeout, and bus maintenance phases.

OPG will provide oversight, support planning work and perform commissioning. The scope of work includes performing non-intrusive maintenance & replace the timer/fuses on the Class II (BUA53, BUB53 and BUC53) Buses and take the Class III buses out of service to perform the required maintenance on the related switchgear - this includes buses BU51, BU52, BU53, BU54, BU56. All the Class III Buses will be maintained in VBI (online) under the D2521 program with the strategy being to utilize unit bus power to supply BU56 by leveraging the D2631 or D2721 outages. The previous BU56 strategy was to perform execution in the VBO but was redirected by senior station leadership to execute in VBI (online) to mitigate the risk of delaying the VBO critical path.

This project will be executed as follows:
- Perform thermography inspection of Class II buses 0-53520-BUA53/BUB53/BUC53 to satisfy CNSC REGM commitment
- Replace the timer and fuses of Class II buses 0-53520-BUA53/BUB53 during available MCC outages
- Complete BU56 detail design of the TMODs to supply power to critical loads from different sources
- Layout cable for the BU56 TMODs in accordance with the design
- Coordination of critical loads outages and provision of alternate power supplies for critical loads
- Keep the buses isolated until the maintenance is performed.
- Maintenance activities for Class III include servicing and replacing required parts within switchgears.
- Commissioning of switchgear for the restoration of regular power supply
- Removal of the TMODs after maintenance completion and energize the isolated bus to normal operation

Benefits of this project:
- Completion of regulatory requirements
- Improvement in overall Unit 0 switchgear reliability
- Meet EPRI and industry best practices

Deliverables:

Previous Release:			
Deliverable Type	*Milestones*	*Associated Milestones (if any):*	*Target Date*
Design Contract Awarded/ Issue PO Phase 1A & 1B		84484MS201	2020-09-08
Detailed Design Complete – BU59		84484MS301	2021-04-24
Detailed Design Complete – T60, BU60, BU76, BU78		84484MS207	2021-05-26
Start of Installation – BU59/T59		84484M0318	2022-03-28
Operations Turnover Completed – BU59		84484MS511	2022-04-14
Start of Installation – BU60, BU76, BU78		84484M0319	2022-11-11
Operations Turnover Completed – BU60		84484MS311	2022-12-14
Current Release:			
Deliverable Type	*Milestones*	*Associated Milestones (if any):*	*Target Date*
Finish of Inspection (Thermography) - Class II - G3A		84484MS513	2025-12-31
Detailed Design Complete - Class III - G3A		84484MS300	2026-03-09
Gate G3B Approval		84484MS407	2026-06-30
LL Material Available - Class III - G3A		84484MS306	2026-07-15
Work Plans Issued - Class III - G3A		84484MS390	2026-07-30
Start of Installation - Class III - BU51/52/53/54 - G3A		84484MS503	2027-03-01
Finish of Installation - Class IV - TMOD Removal - G3A		84484MS680	2027-08-17
Finish of Installation - Class III - BU51/52/53/54 - G3A		84484MS710	2027-10-29
Operations Turnover Completed - Class III - BU51/52/53/54 - G3A		84484MS512	2027-11-30
EC Closeout - Class IV - G3A		84484MS517	2027-12-07
Future Release:			
Deliverable Type	*Milestones*	*Associated Milestones (if any):*	*Target Date*
Start of Installation - Class III - BU56 - G3B		84484MS501	2027-03-01
Finish of Installation - Class III - BU56 - G3B		84484MS730	2027-03-19
Operations Turnover Completed - Class III - BU56 - G3B		84484MS510	2027-05-07
EC Closeout - Class III - G3B		84484MS516	2028-02-29
EC Closeout - Class II - G3B		84484MS518	2028-02-29
Project Complete		84484MS520	2028-06-30

Alternative 2:	**Base Case - No Project**	For Project Level A, B or Value-Enhancing

Not Recommended - The Unit 0 switchgear buses supply power to nuclear safety and economic loads. Industry experience shows that electrical failures and degradations leading to failure can be difficult to anticipate when preventive maintenance is overdue and can result in high consequences. In addition, the Electric Power Research Institute (EPRI) recommends 12-year frequency for switchgear maintenance. The "No Project" alternative leaves the buses at risk for failure, in turn exposing the power supply to critical nuclear safety loads and the operations support building to a significant risk of failure as well. Therefore, this option does not maintain plant and equipment reliability or address the Regulatory Commitments to the CNSC.	
Alternative 3:	**Delay Work** For Project Level A, B or Value-Enhancing
Not Recommended - The Delay Work alternative will not satisfy the EPRI Target Performance requirement of 12-year switchgear maintenance frequency (ref. EPRI 1013457). This project has a Regulatory Commitment to fulfill tracked under CNSC REGM milestone is to perform inspections/ maintenance on 0-53520-BUA/ BUB53/ BUC53 by December 2027. This alternative would put fulfillment of these commitments at risk.	
Alternative 4:	For Project Level A, B
N/A	

Key Risk Assessment For Project Level A, B or C

Risk Class	Description of Risk	Response Type / Actions / Final TCD	Residual Ranking
Procurement - Materials	Procurement cost increase for maintenance of future buses	Accept 53278 - Executing in VBI from U2 requires additional TMOD cable; team will plan contingencies accordingly. Team to also check OPG stores for available material to reduce overall OM&A costs. 1/29/2027	Medium
Technical	Discovery Issues during Bus Maintenance in VBI – Odd Supply Equipment Availability	Mitigate 73044 - Team to regularly review the BU56 equipment log (odd equipment to maintain redundancy) with Operations to reduce discovery risks and additional TMOD needs for critical loads. Action: Operations and work control to develop consolidated list of odd redundant equipment required for the even BU56 maintenance and ensure WO tasks are scheduled prior to execution. 12/31/2025	Medium
Technical	Risk of utilizing Unit even buses for BU56 TMOD supply may impact other ongoing station activities / projects	Mitigate 74273 - Team to work alongside station and work control to determine best feasible window to execute with minimal impact to the ongoing station activities. 74274 - Project to continue having challenge meetings & kaizen sessions with key stakeholders during the install planning phase to ensure scope is well defined to minimize the risk of unforeseen station conditions required for execution. 10/31/2025	Medium

Project Management	Risk of overall project cost increase due to scope complexity	Mitigate 71332 - Project to continue having challenge meetings & kaizen sessions with key stakeholders to ensure scope is well defined to minimize the risk of unforeseen station conditions required for execution. 74267 - Coordinate with station stakeholders to use BTU electricians and CSED for TMOD work/bus maintenance, reducing project OM&A costs compared to outsourcing to vendor. 8/29/2025	Medium
Project Management	Risk of Class III Maintenance occurring post 2027 VBO resulting in increase in project cost	Mitigate 74277 - Project to continue having challenge meetings & kaizen sessions with key stakeholders to ensure scope is well defined to minimize the risk of unforeseen station conditions required for execution. 9/30/2025	Medium
Resources	Station resource availability to support installation planning & execution of VBI switchgear maintenance.	Mitigate 74271 - Project to work with work control & station to secure support and resources for the project. 74272 - After SIM, team will issue a memo to secure execution window and the required resources to support the bus maintenance and TMOD planning. 4/30/2026	Medium
Project Management	Delays in identifying execution window for BU51, BU52, BU53 & BU54 (Class III)	Mitigate 70934 - Prepare Execution Strategy Alignment Memo Draft 70935 - Prepare Level 2 Schedule for Future Bus Maintenance Scope 70938 - Benchmark Bruce Power and PNGS Unit 0 Electrical Maintenance 70969 - Secure execution window for BU51, 52, 53, 54 (Class III) Maintenance. 10/31/2025	Medium
Technical	Additional Design (TMODs) and Install Planning Efforts for Executing Class III Bus Maintenance in VBI	Mitigate 74268 - Team will coordinate with station/work control/operations to schedule the scope in the most efficient window to prevent having to prepare additional TMODs. SIM TCD 14JUL to solidify project window. 74269 - Team and DA reviewed maintenance strategy on 04JUN for VBI BU56 TMODs and obtained concurrence on strategy being pursued. Feedback from DA currently being dispositioned 8/29/2025	Medium

Additional Risk Analysis	For Project Level A or B
N/A	

Financial Evaluation		For Project Level A, B (with multiple feasible alternatives) or Value-Enhancing			
$K	**Alternative**	**Base Case (No Project)**	**Delay Work**	**Alternative 4**	**Alternative 5**
N/A					

Analysis of Financial Evaluation – Key Assumptions and Key Results:
- Financial evaluation is not required for Sustaining projects as per the BCS Standard (OPG-STD-0076).

Qualitative Factors	For Project Level A or B
- Reduce Operators, Maintenance staff burden and mitigate future staff complications - Improve switchgear bus system reliability & availability	

Post Implementation Review (PIR) Plan (refer to OPG-GUID-00120-0007)

Is PIR Required?	Yes	**PIR Completion Date**	2028-06-30

PIR KPI's	Current Baseline	Target Result	How to Measure?	Who will measure?
Maintenance & Inspections performed on all Class II & Class III Buses	Reliability to date is acceptable but probability of failure has increased to LOW-TO-MEDIUM because equipment has never been maintained or inspected.	Successful completion of maintenance	No failure of buses and switchgears within the first year of AFS	DNGS Performance Engineering
Meet EPRI recommended 12 year frequency preventive maintenance guidelines	Maintenance has never been performed (i.e. PM is >20 years late).	Execution of 1st iteration of 12 year frequency preventive maintenance by 2027	All PM WOs identified in Project Charter by SRE are completed or dispositioned. No scope is omitted.	DNGS Performance Engineering
Meet CNSC deadline of inspecting U0 Class II buses by December 2027	Team to perform thermography (non-intrusive maintenance) and perform visual inspection by 2025WW36	Meet visual inspection CNSC commitment	CNSC commitment met.	DNGS Performance Engineering & Station Operations
Reduce probability of failure of U0 Class II/III Power	Reliability to date is acceptable but probability of failure has increased too low to medium because equipment has never been maintained.	Probability of failure is low.	All backlog and PM WOs identified in Project Charter are completed or dispositioned. No Scope omitted.	DNGS Performance Engineering

Definitions and Acronyms	
BU	Bus
LLM	Long Lead Material
TMOD	Temporary Modification
DNS	Darlington Nuclear Station
AR	Action Request – An action required in AS7
CNSC	Canadian Nuclear Safety Commission
EC	Engineering Change
PM	Preventive Maintenance
VBO	Vacuum Building Outage

Business Case Summary

APPENDICES

Appendix A1: Summary of Estimate										
Project Number	84484 - DN U0 SWITCHGEAR REFURBISHMENT						**FAC**	62030 - OM&A - PROJECT		
$K	**LT YE last year**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**Future**	**Total**	**%**
0 - Cost Management	1,232	108	219	192	98				1,849	4
1 - Project Management	[redacted]									
2 - Inspection										
3 - Engineering										
4 - Procurement										
5 - Construction										
6 - Commissioning										
Closeout										
Subtotal										
Outside WBS										
Contingency										
Subtotal w/ Contingency										
Interest										
Other										
Total	22,151	4,660	9,089	9,358	2,909				48,167	100
Removal Costs (incl. above)										0

Appendix A2: Summary of Estimate – Notes			
Escalation Rate	**2.75**	**Interest Rate (going-forward)**	**0.00**

Appendix A3: Summary of Estimate - In-Service Estimates				
$K	Only applicable to capital projects. In-Service amount shall include interest but exclude removal costs.			
Project#	**Date**	**Description**	**Amount**	**%**
N/A				
		Total:		

Prepared by		Reviewed and Endorsed by (Execution Authority)	
Joshua Sequeira Assistant Project Leader DN Projects 4.3	2025-06-24	Perrik Le Dreff VP Major Projects Darlington Nuclear Projects	2025-07-03

Appendix B: Total Project Estimate Variance Analysis$K				(Only required when more than one Execution Phase BCS)					
Phase Gate	**LT YE last year**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**Future**	**Total**

G3A POVA	25,672	4,678	4,313	5,636					40,299
G3A SS	22,143	4,656	9,101	9,358	2,909				48,167

Total Project Estimate Variance Explanation

The total project costs have increased by $7,868K due to the following:

- Detailed engineering for Class III BU56 – Additional funds required for implementing a design for executing in VBI rather than VBO
- Execution, Commissioning and AFS for Class III Buses BU51, BU52, BU53, BU54 – Additional funds are required to execute in VBI
- LLM Procurement for BU56 (VBI) - Additional funds are required to execute in VBI rather than VBO
- Installation planning for BU56 (VBI) – Additional funds are required to execute in VBI rather than VBO
- Class IV TMOD Removals & Closeout - Additional funds to execute due to extension in schedule and SRB vote to remove BU60 TMODs in next TRF outage.
- Execution, Commissioning and AFS for Class III - Additional funds are required to execute in VBI rather than VBO

Numbers may not add due to rounding.

Filed: 2025-12-12
EB-2025-0297
Exhibit F2
Tab 3
Schedule 3
Table 1

Table 1
OM&A Project Listing - OPG Nuclear Facilities
Projects ≥ $20M Total Project Cost (Allocated)[1]

Line No.	Facility	Project Name	Project No.	Category	Start Date	Final Completion Date	Total Project Cost[2] (M$)	Partial/Devmt Release ($M)	Initial Full Release ($M)	Superceding Full Release ($M)	2020 Actual ($M)	2021 Actual ($M)	2022 Actual ($M)	2023 Actual ($M)	2024 Actual ($M)	2025 Budget ($M)	2026 Budget ($M)	2027 Plan ($M)	2028 Plan ($M)	2029 Plan ($M)	2030 Plan ($M)	2031 Plan ($M)
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)	(s)	(t)	(u)	(v)
		ONGOING PROJECTS FROM EB-2020-0290																				
1	DN	DN Primary Heat Transport Pump Motor Oil Leak Repair	84415	Sustaining	Jan-20	Apr-27	29.8	47.4	29.8	n/a	0.2	(0.4)	4.9	5.8	3.9	8.8	1.4	0.0	0.0	0.0	0.0	0.0
2	DN	DN U0 Switchgear Refurbishment	84484	Sustaining	Jul-20	Jul-28	48.2	48.2	n/a	n/a	0.5	6.1	11.5	3.5	0.5	1.5	3.8	5.3	0.3	0.0	0.0	0.0
		Subtotal					78.0				0.7	5.7	16.4	9.3	4.4	10.3	5.2	5.3	0.3	0.0	0.0	0.0
		COMPLETED PROJECTS FROM EB-2020-0290																				
3	ENG	Fuel Channel Life Extension Project	80014	Value Enhancing	Nov-13	Dec-25	63.6	105.8	69.3	n/a	0.7	5.0	3.2	1.9	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	DN	DN Irradiated Fuel Bay Stack Frames	80067	Sustaining	Dec-14	May-23	20.9	33.0	29.7	n/a	1.3	4.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		Subtotal					84.5				2.0	9.8	3.2	1.9	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		PROJECTS NOT IN EB-2020-0290																				
5	PN	PN U8 Boiler Secondary Side Advanced Scale Conditioning	87117	Sustaining	Jan-23	Completed	26.8	n/a	n/a	n/a	0.0	0.0	0.0	26.2	0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
6	DN	DN U1 Steam Generator Primary Side Clean	87908	Sustaining	Feb-24	Dec-25	20.6	n/a	25.7	n/a	0.0	0.0	0.0	0.0	20.5	0.1	0.0	0.0	0.0	0.0	0.0	0.0
		Subtotal					20.6				0.0	0.0	0.0	26.2	21.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0

Notes:
1 Projects with expenditures during IR Term AND Completed/Deferred Projects (from EB-2020-0290 or subsequent).
2 Total Project Cost reflects BCS amounts at the time of preparing the 2025-2031 Business Plan, with the exception of Completed/Deferred/Cancelled Projects (for which actual costs are shown). BCS amounts reflect point estimates or, if range estimate or no estimate is provided in lieu of a point estimate, the current estimate of total project cost.

Table 2a
OM&A Project Listing - OPG Nuclear Facilities
Projects $5M - $20M Total Project Cost (Allocated)[1]

Line No.	Facility	Project Name	Project No.	Category	Project Description	Start Date	Final Completion Date	Total Project Cost[2] ($M)
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
		ONGOING PROJECTS FROM EB-2020-0290						
1	AIM	Inspection Qualification	66105	Regulatory	Demonstrate compliance with the Canadian Standards Association Standard N285.4 Periodic Inspection of CANDU Nuclear Power Plant Components by proving a systematic and well-documented approach to non-destructive examination qualification.	Nov-06	Jun-26	15.3
2	DN	DN Reduced HTS Pressure-Temperature Envelope Modifications	80016	Regulatory	Implement modifications necessary to meet the revised pressure-temperature envelope during cooldown arising from results of the Fuel Channel Life Management project.	Jan-14	Jun-26	10.0
3	DN	DN Aging Management Scope Defining Inspections	80110	Sustaining	Oversight for the execution of the Integrated Implementation Plans (IIP) for both Refurbishment and the new D-PSR IIPs.	Feb-15	Dec-28	8.1
4	PN	Pickering 58 Digital Control Computer Hardware Modernization	80135	Sustaining	Test and qualify Digital Control Computer hardware components acquired from other CANDU units to increase reliability of Pickering 58 DCCs.	Oct-16	Dec-28	8.7
5	DN	Darlington DCC/CP/SEM Computers Software Shipments	82825	Sustaining	Software shipments are a new version of the DCC/CP/SEM computer software, created to maintain configuration control over the real time process control and monitoring software changes, to incorporate the existing software patches into program source as final design implementation, to clear outstanding issues, and to implement necessary changes that cannot be addressed through the software patching process.	May-16	Dec-32	8.6
6	DN	DN Fuel Handling Computer Software Release	82826	Sustaining	Modify and update DNGS Fuel Handling Control Computer (FHCC) software to address software deficiencies identified since the previous software update approximately 15 years ago.	Jan-20	Sep-28	11.8
7	DN	DN Annunciation Modifications And Post-Accident Monitoring Configuration Management	83545	Regulatory	Improve control schemes for silencing, acknowledging and resetting annunciations in the Control room to reduce the potential for errors.	Jan-17	Dec-28	9.2
8	AIM	DN PRECISE-D Scrape Tooling	84872	Sustaining	Co-develop and lease/rent a new tooling system and test rig, to reliability perform BOT and RJ scrape at DNGS and testing of tools prior to reactor deployment.	Apr-20	Dec-25	5.3
		Subtotal						**76.9**
	Table continues on Ex. F2-3-3 Table 2b							

Notes:
1 Projects with expenditures during IR Term AND Completed/Deferred Projects (from EB-2016-0152 or subsequent).
2 "Total Project Cost" reflects BCS amounts, with the exception of Completed/Deferred Projects (for which actual costs are shown).

Table 2b
OM&A Project Listing - OPG Nuclear Facilities
Projects $5M - $20M Total Project Cost (Allocated)[1]

Line No.	Facility	Project Name	Project No.	Category	Project Description	Start Date	Final Completion Date	Total Project Cost[2] ($M)
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
		COMPLETED/DEFERRED/CANCELLED FROM EB-2020-0290						
9	DN	DN Boiler Blowdown Piping Replacement	31506	Sustaining	Redesign Boiler Blowdown System piping and supports based on dynamic load analysis to address significant vibration and pipe movement arising from steam/water hammer and thermal shock during intermittent blowdown operations.	Dec-12	Aug-20	19.2
10	DN	DN GFP Sample Delay & Alternative PHT Sampling Point	31514	Sustaining	Modify the sample lines of the Gaseous Fission Product (GFP) Monitoring system to ensure adequate Heat Transport System (HTS) sample delay in order to correct a legacy design deficiency discovered during commissioning of the new system and allow the GFP Monitoring system to function within its design requirements; and provide an alternate HTS sampling point.	Dec-12	Dec-20	5.8
11	DN	DN PHT LRV Modifications (Waterhammer)	38933	Regulatory	Developmental activities to investigate waterhammer and Primary Heat Transport Liquid Relief Valve designs that would address issues with original valves and configuration.	Dec-08	Apr-24	9.7
12	PN	PN Instrumentation & Control Obsolescence	41024	Sustaining	Specify and qualify replacement instrumentation and control devices to replace obsolete components in a number of different systems.	Dec-12	Dec-19	7.9
13	PN	DCC Aging Management	62553	Sustaining	Participate in CANDU Owners' Group joint project to manage the aging of digital control computers vital to the operation of the units.	Mar-04	Mar-24	15.7
14	PN	PN Equipment Reliability Initiatives	80060	Sustaining	Address selected equipment and/or system degradation to ensure improvement in forced loss rate.	Feb-14	Dec-20	16.1
15	DN	DN New Primary Heat Transport Pump Seals	80071	Sustaining	Install new design Heat Transport Pump seals that address the operating deficiencies and poor reliability of the existing seals.	Dec-14	Jul-19	15.1
16	DN	DN Aging Management	80079	Sustaining	Fund a dedicated team initially for 2 years at station to strategize and manage the aging management scope in collaboration with Station and Refurbishment stakeholders and eventually manage these issues into Darlington station business plan.	Nov-14	Dec-19	9.1
17	DN	DN Annulus Spacer Life Management	83280	Sustaining	The project objective is to conduct R&D work to assess Darlington annulus spacer degradation mechanism for extended operations to the start of last unit refurbishment.	Jun-17	Sep-24	15.4
18	PN	Pickering Fuelling Machine Ram Seal Improvement	83302	Sustaining	Participate in CANDU Owners' Group joint project to develop and qualify improved ram seals to improve performance.	Sep-16	Mar-23	10.6
19	DN	DN Civil Building Structure Repairs	83479	Regulatory	Repair degraded civil structures based on inspection findings and assessments performed from 2013 to 2016, to ensure structures can withstand the service conditions safely and reliability throughout their predicted lifetime. The scope is specifically for civil structures specified by the Integrated Improvement Plan (IIP) items. There currently are no other significant civil structures requiring attention.	Mar-20	Jan-25	12.4
20	ENG	Asset Management Implementation	83824	Sustaining	Implement a formal asset investment management program in Nuclear that would optimize allocation of resources within budget constraints and risk tolerances.	Dec-17	Dec-25	5.3
21	DN	DN Resin Transfer Modification	84380	Sustaining	Improve access to the Moderator spent resin transfer station by repositioning existing steam and condensate piping.	May-19	Jul-22	6.8
22	DN	DN Periodic Safety Review	84589	Regulatory	Project in support of DNGS relicensing submission to CNSC that assesses the overall safety of the plant against modern codes and standards and identifies gaps and plans to close the identified gaps.	Feb-20	Nov-24	10.7
23	DN	DN PHT Pump Motor R01 Refurbishment	84766	Sustaining	Replace partially refurbished pump motor Unit 3, PM1 with a refurbished spare, refurbish PM1 and return to spares inventory.	Dec-19	Dec-24	5.6
24	DN	X-Lab Wireless Sensor Portfolio	84999	Sustaining	Development of a portfolio of wireless sensors for use by the Monitoring & Diagnostic (M&D) Centre and to support the broader Enterprise Innovation portfolio.	Jun-20	Feb-25	7.0
		Subtotal						172.1
	Table continues on Ex. F2-3-3 Table 2c							

Notes:
1 Projects with expenditures during IR Term AND Completed/Deferred Projects (from EB-2020-0290 or subsequent).
2 "Total Project Cost" reflects BCS amounts, with the exception of Completed/Deferred Projects (for which actual costs are shown).

Table 2c
OM&A Project Listing - OPG Nuclear Facilities
Projects $5M - $20M Total Project Cost (Allocated)[1]

Line No.	Facility	Project Name	Project No.	Category	Project Description	Start Date	Final Completion Date	Total Project Cost[2] ($M)
	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
		PROJECTS NOT IN EB-2020-0290						
25	AIM	Matrix Inspection For Tubular Components	84850	Sustaining	Development of a next generation inspection tool for tubular components, including fuel channels and large tube heat exchangers based on Matrix Inspection Technique (MIT), OPG's proprietary technology.	Jan-21	Deferred	14.2
26	AIM	Laser Induced Breakdown Spectroscopy Hydride Characterization Tool	86174	Sustaining	Address the issues and challenges presented by current pressure tube hydrogen content measurement methodologies employed by AIM by conducting necessary research and development to determine and optimize the LIBS system parameters for use in HC measurements in CANDU fuel channels,	Apr-22	Jun-28	7.5
27	PN	Public Address System Core Upgrade	87152	Sustaining	Upgrade existing core components of the existing Public Address System (controllers, consoles and amplifiers) to reduce the operational failure risk due to obsolescent issues and lack of critical spare parts.	Mar-23	Dec-25	6.9
28	DN	Fuel Channel Life Management Phase V Project	87175	Sustaining	Complete additional pressure tube Burst Tests and uncertainty analysis work for the Fracture Toughness models recommended by the industry expert panel, approved by the current Phase 4 COG Fuel Channel Joint Project Executive Oversight Committee.	Jun-23	Dec-27	14.6
29	PN	PN Forebay Dredging	87187/ 87892	Sustaining	Perform marine works to dredge the Pickering NGS 058 Forebay to prescribed levels to mitigate the risk of silt ingress into the station during periods of low lake levels.	Mar-23	Dec-25	15.2
		Subtotal						**58.4**

Notes:
1 Projects with expenditures during IR Term AND Completed/Deferred Projects (from EB-2020-0290 or subsequent).
2 "Total Project Cost" reflects BCS amounts, with the exception of Completed/Deferred Projects (for which actual costs are shown).

Numbers may not add due to rounding.

Table 3
OM&A Project Listing - OPG Nuclear Facilities
Projects < $5M Total Project Cost[1]

Line No.	Sponsoring Division	Number of Projects	Total Project Cost ($M)	Average Cost Of All Projects ($M)
		(a)	(b)	(c)
1	**Darlington NGS**	14	13.9	1.0
2	**Pickering NGS**	18	31.6	1.8
3	**Operations and Project Support**	6	14.8	2.5
	Total	38	60.3	1.6

Notes:
1 Projects with expenditures during IR Term.

Table 4
OM&A Project Listing - OPG Nuclear Facilities
Portfolio Projects (Unallocated)[1]

Line No.	Project Name	Category	Potential Start Date
	(a)	(b)	(c)
	Darlington NGS - Projects With Potential Cost >$5M and < $20M		
1	86299 - DN HFD & LISS D2O Feed Line Cut & Cap	Sustaining	2025
2	89280 - DN Software Inventory Management 69000	Sustaining	2025
	Darlington NGS - Projects With Potential Cost ≥ $20M		
3	89223 - DN U2 Primary Heat Transport Pump Motors Oil Leak Repairs	Sustaining	2025
	Pickering NGS - Projects With Potential Cost >$5M and < $20M		
4	89802 - PN Pickering For The Future (P4F)	Sustaining	2026
5	89807 - PN Primary Heat Transport & Auxiliaries Inspections	Sustaining	2029
6	89808 - PN Buried Piping Inspections	Sustaining	2027
	Pickering NGS - Projects With Potential Cost ≥ $20M		
7	89800 - PN Vacuum Building Civil Structures	Sustaining	2026
	Advanced Inspection and Maintenance - Projects With Potential Cost ≥ $20M		
8	89282 - AIM End of Life Fuel Channel Component Retrieval	Sustaining	2027

Notes:
1 Projects with potential expenditures during IR Term.

Table 5
OM&A Projects - OPG Nuclear Facilities
Listing of Business Case Summaries Filed[1]

Line No.	Business Case Summary (BCS) Title	Project Number	BCS Approval Date	Project Stage	BCS Status	BCS Status in EB-EB-2020-0290
	(a)	(b)	(c)	(d)	(e)	(f)
	ONGOING PROJECTS FROM EB-2020-0290					
1	DN U0 Switchgear Refurbishment	84484	Jul-25	Execution	Superseding	Full Development

Notes:
1 For Projects with expenditures in the IR term.