Business Case Summary

Project #	16-84939	**Controlled Doc #**	NK38-BCS-65821-10001
Project Title	DN Revenue Metering Transformer Replacement (Cap)		
Facility	Darlington NGS	**Investment Classification**	Regulatory
Project Level (Scalability)	B	**Financial Classification**	☐ OM&A ☒ Capital ☐ Capital Spare ☐ MFA ☐ CMFA ☐ Provision ☐ Others: [if applicable]
Release: Gate and Project Phase	☐ Choose an item. G0☐: Initiation ☒ Full G1☐: Development		☐ Choose an item. G2☐: Definition ☐ Choose an item. G3☐: Execution
Estimate Class (overall project)	Class 5	**Target Project Completion Date**	OCT-2026

Recommendation

We recommend a release of $978K, including [redacted] of contingency. This will bring the total released-to-date to $978K.

The estimated total project cost will be determined prior to the Execution Phase.

This project will bring the Revenue Metering System into compliance with the Independent Electricity System Operator (IESO) Market Rules and Measurement Canada (MC) regulations as well as ensure continued reliable operation until station end of life. The scope includes replacing the revenue metering Current Transformers (CTs) and Capacitor Voltage Transformers (CVTs) at both the Main Output Transformer (MOT) and Station Service Transformer (SST).

This release is to complete:

- Preliminary Engineering
- Technical Specifications
- Detailed Design Scope of Work
- Contracting Strategy for Engineering, Procurement and Construction
- Project Definition Phase Gate 2 Package

Investment Cash Flows

$K	LTD	2020	2021	2022	2023	2024	2025	Future	Total
Previous releases									-
Current request	-	542	436						978
Total released to date	**-**	**542**	**436**	**-**	**-**	**-**	**-**	**-**	**978**
Future required	-		TBD	TBD	TBD	TBD	TBD	TBD	TBD
Total Project Cost									
Ongoing Costs	-								
					Gate:	**G1**	**OAR Approval:**		$978 K

Approvals	Signatures	Date
The recommendation, including the identified ongoing costs, if any, represents the best option to meet the validated business need.		
Recommended by: Project Sponsor Zar Khansaheb Director, Station Engineering	Z. Khansaheb	April 9, 2020
I concur with the business decision as documented in this BCS.		
Finance Approval: Brett Lemmon Finance Controller	Brett Lemmon	April 11, 2020
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 1.1: Val Bevacqua Director, Operations & Maintenance	Val B	April 14, 2020

EXECUTIVE SUMMARY – Project Overview
This project is for the upgrade and replacement of the Darlington Nuclear Generating Station (DNGS) Revenue Metering System. The project goal is to bring the Revenue Metering System into compliance with the Independent Electricity System Operator (IESO) Market Rules and Measurement Canada (MC) regulations as well as to ensure continued reliable operation until station end of life. The project scope includes replacing the revenue metering Current Transformers (CTs) and Capacitor Voltage Transformers (CVTs) at both the Main Output Transformer (MOT) and Station Service Transformer (SST). The Project Implementation Strategy is as follows for Development Phase (Gate 1) Scope (this release): • Complete Preliminary Engineering • Technical Specifications • Detailed Design Scope of Work • Develop Contracting Strategy for Detailed Engineering, Procurement and Construction • Develop Definition Phase BCS Package for next gate The project implementation plan for the remaining phases will be determined for the Gate 2 Definition Phase. The project has completed the Conceptual Design and the Value Engineering.

Business Need	For Project Level A or B
The Aging Management Program Component Condition Assessment of Darlington Switchyard Voltage Transformer recommended that the revenue metering CTs and CVTs should be upgraded at the next available opportunity due to the aging conditions of the components. The Darlington Nuclear Generating Station (DNGS) Revenue Metering System is currently registered under significant exemptions from the Independent Electricity System Operator (IESO) Market Rules and Measurement Canada (MC) regulations since market opening in 2000. The SST CVTs and CTs are not to the correct accuracy and protection class and have non-compliant neutral connections. The MOT CVTs and CTs are not MC approved, do not meet the required accuracy and protection class and have a non-compliant electrical configuration. Recent revenue metering audits have reinforced the need to address these non-compliances and aging aspects of the equipment. To meet IESO's market rule requirements, DNGS must upgrade its revenue metering system. This will ensure accurate, reliable performance of the revenue metering system and prevent possible sanctions such as fines or loss of Market Participant status.	

Preferred Alternative:	**New Equip. – New Design (MOT/SST RM Inside SST Meter Shack)**	For Project Level A, B or C
Description of Preferred Alternative		
To ensure overall reliability for life extension of the Revenue Metering System and to meet regulatory requirements the preferred alternative is to replace the metering equipment with IESO compliant revenue meters at the Main Output Transformers (MOT) and Station Service Transformers (SST). This includes the following activities: • Remove and Install new free-standing CTs (x12) on the MOT line; • Remove and Install new free-standing CVTs (x12) on the MOT line; • Remove and Install new CTs (x12) on the SST line; • Remove and Install new CVTs (x12) on the SST line; • Procurement of CT (x2) and CVT (x2) project spares, with potential to use existing CTs/CVTs from Nanticoke GS for cost savings to OPG. This recommended alternative will meet the commitment of OPG to comply with the IESO and MC standards/regulations and extend the life of the metering equipment to support the station to end of extended life. The CTs and CVTs are identified long lead materials and have an estimated lead-time of about one year.		

Deliverables:	**Associated Milestones (if any):**	**Target Date:**
Current release:		
Long Lead Material Identified	Long Lead Time Materials Identified (LLT)	15SEP2020
Preliminary Design Complete	Preliminary Design Completed (DES)	16DEC2020

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Deliverables:	Associated Milestones (if any):	Target Date:
Gate 2 OAR Approval	Gate G2 Approval (GR2)	17MAY2021
Future release:		
Final AFS	Final Available for Service (AFS)	15JUN2025
Project Closeout	Closeout Completed (PCO)	01OCT2026

Alternative 1:	**Base Case – No Project**	For Project Level A, B or Value-Enhancing
If not replaced, there is an increased risk of sanctions and fines being imposed on OPG by the IESO and a potential for loss of Market Participant status. Further, this option does not address the aging condition of the equipment and components and does not support safe and reliable continued operation.		

Alternative 2:	**Like-for-Like Replacement**	For Project Level A or B or Value-Enhancing
Like-for-Like Replacement is feasible for reliability extension, however does not address regulatory non-compliance conditions. Like-for-Like Replacement is not considered to be a suitable solution.		

Alternative 3:	**New Equip. – Substantially Same Design (HONI Cyber Secure)**	For Project Level A or B
New equipment replacement is a feasible option, however maintaining device configuration and placement as per existing design, while resolving identified regulatory non-compliances, does not address required separation of OPG and Hydro One Networks Inc. (HONI) assets as per Transmission Connection Agreement (TCA). This is not considered to be a suitable solution.		

Key Risk Assessment — For Project Level A, B or C

Risk Class	Description of Risk	Response Type/ Actions/Final TCD	For Additional Review	Residual Ranking
Cost	Insufficient OPG/Vendor resources to support multiple activities and/or deliverables.	Mitigate: • Engage station & work management to ensure resource availability. • Vendor contractually required to retain adequate skilled resources.	No	Medium
Cost	Change in outage schedule following workforce mobilization.	Mitigate: • Construction Scope of Work highlighted this risk to avoid idle charges from the vendor. During periods of inactivity on this project, the vendor will attempt to retain key skilled resources by assigning them to different projects that are in execution. • Project will attempt to scope into refurbishment outages where possible to minimize risk to the execution window	No	Medium
Schedule	Future Risk: Work tasks are currently unscheduled for selected planned outages, potential for project scope to be rejected for future outage windows.	Mitigate: • Front-load procurement & design work packages in the project schedule to facilitate earliest available outage window. • Early scope injection.	No	Medium
Schedule	Contract Issuance Delay which may impact available execution windows.	Mitigate: • Early engagement of Supply Chain. Ensure awareness of OPG project schedule/milestone requirements through RFP process.	No	Medium

Key Risk Assessment			For Project Level A, B or C	
Risk Class	**Description of Risk**	**Response Type/ Actions/Final TCD**	**For Additional Review**	**Residual Ranking**
Schedule	Long Lead Material Delayed due to manufacturer schedule push resulting in delay or missed outage windows.	Mitigate: • Monthly meeting w Vendor and/or Supplier to track Purchase Order progress.	No	Medium
Schedule/Cost	COVID-19 impacts to field work management, skilled resource availability, and vendor supply chain.	Mitigate: • This document was prepared based on assumptions from the Business Plan, Generation Plan and station work programs prior to the commencement of the COVID-19 pandemic. The associated COVID-19 risk mitigation activities may lead to changes to the assumptions which may impact the overall cost and schedule of this project.	No	Medium

Financial Evaluation			For Project Level A, B (with multiple feasible alternatives) or Value-Enhancing		
$K	Preferred Alternative	Base Case (No Project)	Like-for-Like	New Equipment	
Project Cost	TBD	N/A	N/A	N/A	
NPV					
Other: (e.g., IRR)					
Analysis of Financial Evaluation – Key Assumptions and Key Results:					
A Financial Evaluation is not required for Regulatory Projects.					

Post Implementation Review (PIR) Plan (refer to OPG-PROC-0056)				
Type of PIR Report	Simplified/Standard PIR	**PIR Completion Date**	OCT-2026	
☒ Detailed PIR KPIs will be provided in future BCS(s) when Execution Phase BCS release is requested.				
PIR KPIs	**Current Baseline**	**Target Result**	**How to measure?**	**Who will measure?**

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OPG-FORM-0076-R006
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APPENDICES

Appendix A1: Summary of Estimate - Released to date										
Project Number:	**84939**									
Project Title:	**DN Revenue Metering Transformer Replacement (Cap)**									
$K	**LTD**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**Future**	**Total**	**%**
Project Mgmt		127	76						203	21%
Inspection									-	0%
Engineering	[redacted]									
Procurement										
Construction										
Commissioning										
Closeout										
Subtotal										
Outside WBS										
Contingency										
Subtotal w/ Contingency										
Interest										
Other										
Total	**-**	**542**	**436**	**-**	**-**	**-**	**-**	**-**	**978**	**100%**
Removal Costs (incl. above)									-	0%

Appendix A2: Summary of Estimate – Notes			
Escalation Rate	2%	**Interest Rate (going-forward)**	4.25%

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 (YYYY-MM-DD)**	**Description**	**Amount**	**%**
		TBD		0%
				0%
Total			-	0%

Prepared by:		Reviewed and Endorsed by:	
Jeffrey Denomme/Teodora Tasic Projects & Modifications Project Manager	01-APR-2020 Date	Venkat Parthasarathy Projects &Modifications Section Manager	01-APR-2020 Date