

CI C0061003

POA LP HP IP Turbine Refurbishment

REDACTED

July 7, 2025



NSEB APPROVAL SHEET

Project Title: POA LP HP IP Turbine Refurbishment

CI Number: C0061003

Date: July 7, 2025

Expenditure Profile			Type of Filing	
Year	Budget Amount	Project Estimate	☒	Capital Project Authorization
2024		1,103	☐	Unforeseen and Unbudgeted (U&U)
2025	3,655,131	4,860,158	☐	Planned & Advanced (P&A)
2026	500,000		☒	Subsequent Approval Item
Total	\$4,155,131	\$4,861,261	☐	Authorization to Overspend (ATO)
			☐	Scope Change
			☐	Final Cost (FIN)

COMMENTS

Submitted on behalf of NOVA SCOTIA POWER INCORPORATED

Authorized Signatory
Dave Pickles
Chief Operating Officer

DATE
July 4, 2025

Approved on behalf of NOVA SCOTIA ENERGY BOARD

DATE

CI Number: C0061003

Title: POA LP HP IP Turbine Refurbishment

Start Date:	2024/09
In-Service Date:	2025/12
Final Cost Date:	2026/06
Function:	Steam
Forecast Amount:	\$4,861,261

DESCRIPTION:

This project is for the inspection and refurbishment of the Point Aconi steam turbine Low Pressure (LP), High Pressure (HP), and Intermediate Pressure (IP) turbine components, including the rotor, casings, steam path elements, seals, bearings, and fasteners, to allow for the continued safe and reliable operation of the steam turbine.

The Point Aconi steam turbine consists of low pressure (LP), high pressure (HP), and intermediate pressure (IP) cylinders that convert high-pressure, high-temperature steam, supplied by the Point Aconi boiler, into mechanical energy. This mechanical energy drives the generator, ultimately resulting in the production of electrical power.

Over time, the HP, LP, and IP turbine sections are subjected to harsh operating conditions, including elevated temperatures and pressures. As a result, critical components are susceptible to degradation mechanisms such as solid particle erosion, caused by contaminants within the steam, and creep damage, resulting from prolonged high-temperature operation, as well as frequent cycling and ramping of the unit.

The Board provided the following Directive in its Decision pertaining to the Decarbonization Deferral Account (DDA) (M11220):

NS Power must provide specific notice to all participants in this proceeding upon filing any future capital work order applications involving assets that are forecasted to be included in the DDA and to confirm this was done in its applications to the Board.

In accordance with the Board’s directive, NS Power provided notice of this investment to participants in the DDA proceeding on July 4, 2025.

Summary of Related CIs +/- 2 years:

Pursuant to Section 11.2 of the CEJC, related CIs for Steam projects includes “work completed on the same asset (turbine, boiler, etc.) and on the same unit (Lingan Unit #3, for example).”

- 2025 C0061004 POA Turbine Insulation Rebuild \$276,855
- 2025 C0067944 POA 8th Stage Blade Replacement \$699,519

Depreciation Class: Steam Production Plant – Point Aconi

Retirement Information:

- Categorization of Retirement: Accounting Policy 6420 - Retirement and Disposal of Capital Assets
- Percentage of Asset Pool: 0.56%

Estimated Life of the Asset: 30 Years

JUSTIFICATION:

Justification Criteria: Thermal

Sub Criteria: Equipment Refurbishment

Why do this project?

Steam turbine overhauls are scheduled based on accumulated operating hours, thermal cycles, and known equipment conditions, consistent with industry best practices and risk-based asset management principles. Unit utilization, operating hours, the frequency of start/stop cycles, and the overall risk profile of the turbine assets at Point Aconi have been used to identify the requirement for turbine refurbishment. This project is critical to addressing immediate risks identified through condition assessments of the LP, HP, and IP turbine components. Timely execution of this work is necessary to ensure the continued safe and reliable operation of the Point Aconi turbine in the current operating period. By proactively mitigating known issues, the project helps prevent unplanned outages and supports ongoing operational readiness.

Why do this project now?

The most recent major inspection of these components (LP, HP and IP nozzles, rotor, inner and outer casings, upper and lower bearings, and thermocouples) was conducted in 2014. By 2025, LP, HP and IP turbine will have accumulated over 75,000 operating hours and 80 start/ stop cycles since the previous inspection, reaching the threshold for overhaul as defined by NS Power's asset management strategy for steam turbines. Proceeding with this work in a planned and controlled manner mitigates the increasing risk of unplanned failure, which could result in extended outages, safety concerns, and potential regulatory non-compliance.

Why do this project this way?

Inspection and refurbishment of LP, HP and IP turbine components within appropriate time intervals, in alignment with the asset management strategy and consistent with industry best practices, is the most cost-effective alternative to full turbine replacement. This approach supports the continued safe and reliable operation of the steam turbine while maximizing the life of asset components until retirement. Performing the LP, HP and IP turbine refurbishment during the planned 2025 outage aligns with NS Power's asset management strategy, ensuring operational efficiency and minimizing the risk of future unplanned outages.

Contingency Statement

Contingency for this project has been determined using a combination of internal subject matter expert judgement (professional engineers) based on previous experience with these assets, and the non-binding contingency guidelines. Consistent with the maturity matrix, this project is being filed as a Class 3 estimate with a contingency of 10 percent. Risks intended to be covered by this contingency include cost impacts due to the extent of component wear, unanticipated findings during inspection, market and price variability in material, and additional scope that may be required during the refurbishment.

Reason for Variance

The variance of approximately \$706,000 from the 2025 ACE Plan subsequent submittal estimate of \$4,155,131 is primarily due to the original estimate being a high-level forecast based on historical data and developed prior to detailed project planning. Since then, we have refined the project scope and obtained actual vendor quotes for materials and services, which provided a more accurate cost basis. These updates reflect a more realistic and informed projection aligned with current market conditions and project requirements.

Capital Project Detailed Estimate

Location: Steam C# : C0061003 Title: POA LP HP IP Turbine Refurbishment Execution Year: 2025					
Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference
Regular Labour					
Maintenance Trades	PD	90	\$ 411	\$ 36,953	
Power Engineer	PD	20	\$ 439	\$ 8,785	
Power Plant Technician	PD	40	\$ 422	\$ 16,877	
Utilityworker	PD	30	\$ 286	\$ 8,580	
Technologists	PD	75	\$ 363	\$ 27,214	
			Sub-Total	\$ 98,409	
OT Labour					
Maintenance Trades	PD	50	\$ 821	\$ 41,059	
Power Engineer	PD	5	\$ 878	\$ 4,392	
Power Plant Technician	PD	20	\$ 844	\$ 16,877	
Utilityworker	PD	11	\$ 572	\$ 6,292	
Technologists	PD	30	\$ 726	\$ 21,771	
			Sub-Total	\$ 90,391	
Term Labour					
Maintenance Trades	PD	20	\$ 411	\$ 8,212	
Power Engineer	PD	20	\$ 439	\$ 8,785	
Power Plant Technician	PD	20	\$ 422	\$ 8,438	
Utilityworker	PD	20	\$ 286	\$ 5,720	
			Sub-Total	\$ 31,155	
Materials					
Turbine Parts	lot	1			Attachment 2 TOTAL, Attachment 3 TOTAL, Attachment 4 TOTAL
USD to CAD Conversion	%	37%			
Misc Consumables	lot	1	\$ 20,000	\$ 20,000	
			Sub-Total		
Contracts					
Turbine Contractor	lot	1			Attachment 1 Section 6 - Price, 6.1.1, 6.1.2, 6.1.3, 6.1.4
USD to CAD Conversion	%	37%			
Scaffolding Services	lot	1	\$ 25,000	\$ 25,000	
Rescue Services	lot	1	\$ 25,000	\$ 25,000	
Welding Heat Treatment Services	lot	1	\$ 75,000	\$ 75,000	
Non-Destructive Testing Services	lot	1	\$ 50,000	\$ 50,000	
Mechanical Contractor	lot	1			
Waste Management Services	lot	1	\$ 25,000	\$ 25,000	
			Sub-Total		
Meals					
Meals	lot	1	\$ 5,000	\$ 5,000	
			Sub-Total	\$ 5,000	
Other Goods & Services					
Contingency	%	10%	\$ 4,083,056	\$ 408,306	
			Sub-Total	\$ 408,306	
Interest Capitalized					
AFUDC				\$ 43,473	
			Sub-Total	\$ 43,473	
Administrative Overhead					
Labour AO				\$ 65,554	
Contractor AO				\$ 260,871	
			Sub-Total	\$ 326,426	
SUB-TOTAL (no AO, AFUDC)				\$ 4,491,362	
TOTAL (AO, AFUDC included)				\$ 4,861,261	
Original Cost				\$ 3,301,825	

Note 1: The labour figures noted above are an average of salaries across a variety of jobs within similar classifications including fringe, and are used solely for budgeting purposes.
 Note 2: Small differences in totals are attributable to rounding.



Instructions: Select option in Column B.
Columns C through G will auto-populate.

Document No: XXX-XX-XXXX-XXXX

Project Cost Estimate Input Checklist and Maturity Matrix						
Process Industries	Required fields:	Estimate Classification				
Project Name: POA LP HP IP Turbine Refurbishment	Started or Preliminary	Class 5	Class 4	Class 3	Class 2	Class 1
Maturity Level of Project Definition Deliverables	Defined or Complete					
General Project Data						
A. Scope						
Non-Process Facilities (Infrastructure, Ports, Pipeline, Power Transmission)	Defined (D)	P	P	D	D	D
Project Scope of Work Description	Defined (D)	P	P	D	D	D
Byproduct and Waste Disposal	Not Applicable (NA)	NR				
Site Infrastructure (Access, Construction Power, Camp, etc.)	Defined (D)	NR	P	D	D	D
B. Capacity						
Plant Production/Facility (includes power facilities)	Defined (D)	P	P	D	D	D
Electrical Power Requirements (when not the primary capacity driver)	Defined (D)	NR	P	D	D	D
C. Project Location						
Plant and Associated Facilities	Defined (D)	P	P	D	D	D
D. Requirements						
Codes and/or Standards	Defined (D)	NR	P	D	D	D
Communication Systems	Defined (D)	NR	P	D	D	D
Fire Protection and Life Safety	Defined (D)	NR	P	D	D	D
Environmental Monitoring	Defined (D)	NR	NR	P	P	D
E. Technology Selection						
Process Technology	Defined (D)	P	P	D	D	D
F. Strategy						
Contracting/Sourcing	Defined (D)	NR	P	D	D	D
Escalation	Not Applicable (NA)	NR				
G. Planning						
Logistics Plan	Defined (D)	P	P	P	D	D
Integrated Project Plan	Defined (D)	NR	P	D	D	D
Project Code of Accounts	Preliminary (P)	NR	P			
Project Schedule	Defined (D)	NR	P	D	D	D
Regulatory Approval & Permitting	Not Applicable (NA)	NR				
Risk Register	Defined (D)	NR	P	D	D	D
Stakeholder Consultation/Engagement/Management Plan	Defined (D)	NR	P	D	D	D
Work Breakdown Structure (WBS)	Defined (D)	NR	P	D	D	D
Start-up & Commissioning Plan	Defined (D)	NR	P	P/D	D	D
H. Studies						
Environmental Impact/Sustainability Assessment	Not Applicable (NA)	NR				
Environment/Existing Conditions	Not Applicable (NA)	NR				
Soils & Hydrology	Not Applicable (NA)	NR				
Technical Deliverables (Specifications and/or Drawings)						
Block Flow Diagrams	Complete (C)	S/P	C	C	C	C
Equipment Data Sheets	Complete (C)	NR/S	P	C	C	C
Equipment Lists: Electrical	Complete (C)	NR/S	P	C	C	C
Equipment Lists: Process/Utility/Mechanical	Complete (C)	NR/S	P	C	C	C
Heat & Material Balances	Complete (C)	NR	C	C	C	C
Process Flow Diagrams (PFDs)	Not Applicable (NA)	NR				
Utility Flow Diagrams (UFDs)	Not Applicable (NA)	NR				
Design Specifications	Complete (C)	NR	S/P	C	C	C
Electrical One-Line Drawings	Not Applicable (NA)	NR				
General Equipment Arrangement Drawings	Complete (C)	NR	S/P	C	C	C
Instrument List	Complete (C)	NR	S/P	C	C	C
Piping & Instrumentation Diagrams	Complete (C)	NR	S/P	C	C	C
Plot Plans/Facility Layouts	Complete (C)	NR	S/P	C	C	C
Construction Permits	Not Applicable (NA)	NR				
Civil/Site/Structural/Architectural Discipline Drawings	Not Applicable (NA)	NR				
Demolition Plans and Drawings	Not Applicable (NA)	NR				
Erosion Control Plan & Drawings	Not Applicable (NA)	NR				
Fire Protection & Life Safety Drawings & Details	Complete (C)	NR	S/P	P	C	C
Electrical Schedules	Not Applicable (NA)	NR	NR/S			
Instrument & Control Schedules	Complete (C)	NR	NR/S	P	P/C	C
Instrument Data Sheets	Complete (C)	NR	NR/S	P	P/C	C
Piping Schedules	Not Applicable (NA)	NR	NR/S			
Piping Discipline Drawings	Not Applicable (NA)	NR	NR/S			
Spare Parts Listings	Complete (C)	NR	NR	P	P/C	C
Electrical Discipline Drawings	Complete (C)	NR	NR	S/P	P/C	C
Facility Emergency Communication Plan & Drawings	Complete (C)	NR	NR	S/P	P/C	C
Information Systems/Telecommunication Drawings	Complete (C)	NR	NR	S/P	P/C	C
Instrumentation/Control System Discipline Drawings	Complete (C)	NR	NR	S/P	P/C	C
Mechanical Discipline Drawings	Complete (C)	NR	NR	S/P	P/C	C
Total # Deliverables for this Project		7	30	38	38	38
% Defined/Complete towards Class Estimate		100%	100%	97%	97%	97%

Comments:

This project is being filed as an AACE Class 3 Estimate. The defined deliverables for this project indicate that 97% of Class 3 deliverables are complete. According to AACE Guidelines, a contingency value between 10% and 30% is recommended for Class 3 estimates. A 10% contingency has been used to cover risks that include cost impacts due to the extent of component wear, unanticipated findings during inspection, market and price variability in material, and additional scope that may be required during the refurbishment.

Legend:

The maturity level is an approximation of the completion status of the deliverable. The completion is indicated by the following descriptors:

General Project Data:

- Not Required (NR): May not be required for all estimates of the specified class, but specific project estimates may require at least preliminary development.
- Preliminary (P): Project definition has begun and progressed to at least an intermediate level of completion. Review and approvals for its current status has occurred.
- Defined (D): Project definition is advanced, and reviews have been conducted. Development may be near completion with the exception of final approvals.

Technical Deliverables:

- Not Required (NR): Deliverable may not be required for all estimates of the specified class, but specific project estimates may require at least preliminary development.
- Started (S): Work on the deliverable has begun. Development is typically limited to sketches, rough outlines, or similar levels of early completion.
- Preliminary (P): Work on the deliverable is advanced. Interim, cross-functional reviews have usually been conducted. Development may be near completion except for final reviews and approvals.
- Complete (C): The deliverable has been reviewed and approved as appropriate.

Inclusions

For the purposes of this document, the term *process industries* is assumed to include firms involved with the manufacturing and production of chemicals, petrochemicals, and hydrocarbon processing. The common thread among these industries (for the purpose of estimate classification) is their reliance on process flow diagrams (PFDs), piping and instrument diagrams (P&IDs), and electrical one-line drawings as primary scope defining documents. These documents are key deliverables in determining the degree of project definition, and thus the extent and maturity of estimate input information. This RP applies to a variety of project delivery methods such as traditional design-bid-build (DBB), design-build (DB), construction management for fee (CM-fee), construction management at risk (CM-at risk), and private-public partnerships (PPP) contracting methods.

Estimates for process facilities center on mechanical and chemical process equipment, and they have significant amounts of piping, instrumentation, and process controls involved. As such, this recommended practice may apply to portions of other industries, such as pharmaceutical, utility, water treatment, metallurgical, converting, and similar industries.

Most plants also have significant electrical power equipment (e.g., transformers, switchgear, etc.) associated with them. As such, this RP also applies to electrical substation projects, either associated with the process plant, as part of power transmission or distribution infrastructure, or supporting the power needs of other facilities. This RP excludes power generating facilities and high-voltage transmission.

REDACTED (CONFIDENTIAL INFORMATION REMOVED)

CI C0061003 Attachment 1 has been removed due to confidentiality.

REDACTED (CONFIDENTIAL INFORMATION REMOVED)

**CI C0061003 Attachment 2 has been removed
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**CI C0061003 Attachment 3 has been removed
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**CI C0061003 Attachment 4 has been
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