Nova Scotia Utility and Review Board

IN THE MATTER OF Section 35A of *The Public Utilities Act,* R.S.N.S. 1989, c.380, as amended

- and -

IN THE MATTER OF an Application by Nova Scotia Power Inc. for Approval of the **2023 Annual Capital Expenditure (ACE) Plan**

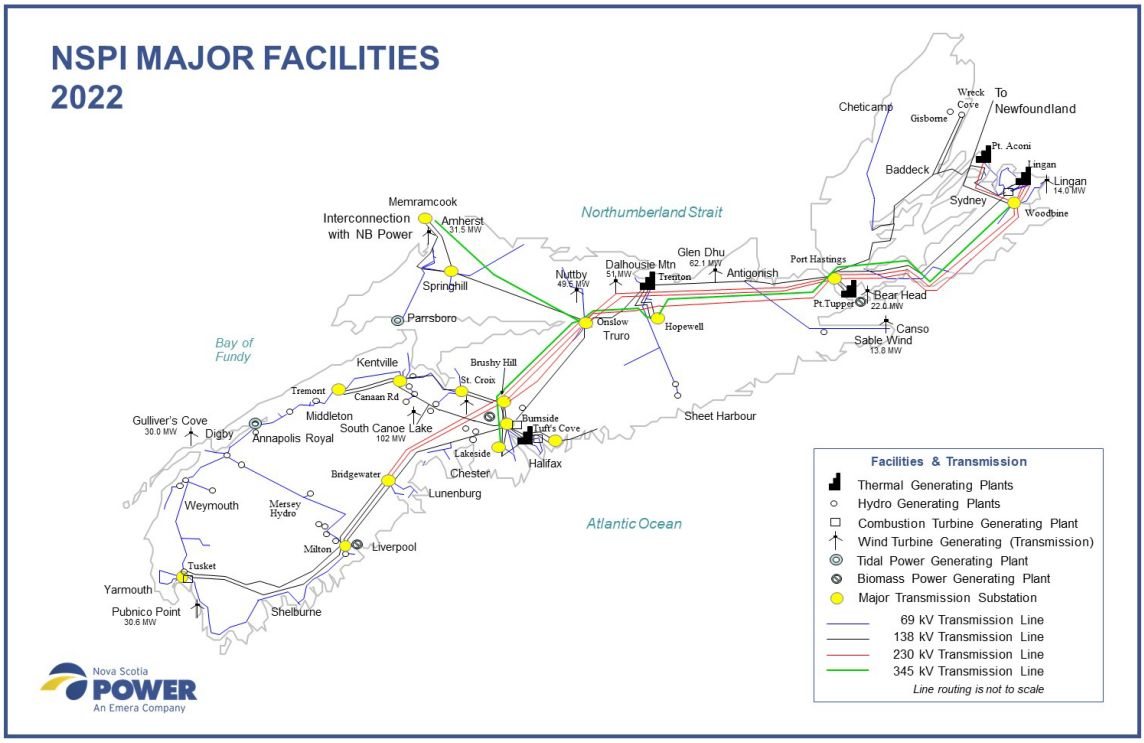
2023 ACE Plan

Date Filed: February 28, 2023

CONFIDENTIAL (Attachments Only)

Nova Scotia Power

2023 Annual Capital Expenditure Plan


NSPI MAJOR FACILITIES
2022
Cheticamp
Wreck Cove
To Newfoundland
Gisborne
Pt. Aconi
Baddeck
Lingan
Lingan 14.0 MW
Sydney
Woodbine
Memramcook
Interconnection with NB Power
Amherst 31.5 MW
Northumberland Strait
Glen Dhu 62.1 MW
Dalhousie Mtn 51 MW
Trenton
Antigonish
Port Hastings
Nuttby 49.5 MW
Springhill
Parrsboro
Onslow
Truro
Hopewell
Pt Tupper
Bear Head 22.6 MW
Canso
Sable Wind 13.8 MW
Bay of Fundy
Kentville
Brushy Hill
St. Croix
Tremont
Canaan Rd
Middleton
Gulliver's Cove 30.0 MW
Digby
Annapolis Royal
South Canoe Lake 102 MW
Burnside
Bluff's Cove
Sheet Harbour
Lakeside
Halifax
Bridgewater
Chester
Lunenburg
Weymouth
Mersey Hydro
Atlantic Ocean
Milton
Liverpool
Tusket
Yarmouth
Pubnico Point 30.6 MW
Shelburne
Facilities & Transmission
Thermal Generating Plants
Hydro Generating Plants
Combustion Turbine Generating Plant
Wind Turbine Generating (Transmission)
Tidal Power Generating Plant
Biomass Power Generating Plant
Major Transmission Substation
69 kV Transmission Line
138 kV Transmission Line
230 kV Transmission Line
345 kV Transmission Line
Line routing is not to scale
Nova Scotia POWER
An Emera Company

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1.0 EXECUTIVE SUMMARY

The Nova Scotia Power Incorporated (NS Power, Company) Annual Capital Expenditure (ACE) Plan Application provides customers, the Nova Scotia Utility and Review Board (NSUARB, Board), and other stakeholders with an overview of the Company's intended capital investments for the year ahead.

On November 9, 2022, Bill 212 was enacted in the Nova Scotia Legislature, amending the *Public Utilities Act* (PUA Amendments). Given the unique circumstances and the continued uncertainty around the Company's future capital investments plans, NS Power has adapted its approach to its ACE Plan submission:

- NS Power has traditionally filed an ACE Plan in November for approval in the subsequent year; however, following the tabling of the PUA Amendments, the Company was required to pause its efforts in compiling the 2023 ACE Plan in order to evaluate the impacts of the PUA Amendments on the Company's capital investment plan.

- NS Power's capital investment plans have been reduced materially. For example, NS Power's 2022 ACE Plan included subsequent submittal capital projects and forecast future investment to assist the Company in its plan to support the Government's climate goals to transition away from coal and achieve 80 percent renewables by 2030. The Company has deferred these projects while it assesses the PUA Amendments, and how they will impact capital investment decisions, and ultimately, customers. The Company also remains engaged with the Federal Government to determine the role it will play in such investments and reducing costs for customers associated with the energy transition.

- NS Power's 2023 capital plan has been developed with value for customers in mind and in line with Bill 212. While the 2023 ACE Plan provides full and transparent information regarding the 2023 capital budget and the projects submitted for approval, it does not address some of the additional longer term view items it has provided in prior ACE Plan

filings, such as future forecast information. In addition, several tables that have historically been included in the main application have been moved to Appendices in order to streamline information: (i) in **Section 4.3**, the 2022 ACE Plan Deferred and Cancelled list can now be found in **Appendix C**; (ii) in **Section 5.4**, the list of capital projects less than $1 million for 2023, without project descriptions, can now be found in **Appendix B**; (iii) in **Section 5.5**, the list of Point Aconi capital projects for 2023 can now be found in **Appendix B**; and (iv) in **Section 11.1.2**, the tables that provide rating categories and values for new projects included in the 2023 ACE Plan can now be found in **Appendix B**.

NS Power's commitment continues to be focused on providing customers with safe and reliable electric service in a cost-effective manner. The capital investments proposed under the 2023 ACE Plan are aligned with these key objectives, incorporate the constraints imposed by the PUA Amendments, and continue to be vetted and planned in compliance with the NSUARB-approved Capital Expenditure Justification Criteria (CEJC).

NS Power's total capital budget for 2023 (inclusive of capital projects under $1,000,000 and Point Aconi projects, as well as previously approved multi-year project profiles) is $382.3 million. In this Application, within the overall 2023 capital budget, NS Power is requesting NSUARB approval of 12 capital work orders with total project investment of $39.9 million and the 2023 capital routine program of $126.0 million for an aggregate total of $165.9 million.

The investments in the 2023 ACE Plan:

- Provide benefits in communities throughout the province, including reliability focused improvements on the transmission and distribution (T&D) system and response to reliability challenges arising from increasingly more severe weather. The focus within T&D is prioritizing capital investment for customer reliability. The investment in targeted reliability projects includes vegetation management, storm hardening and reliability upgrades, targeted device replacements and grid modernization.

- Support NS Power's business priority of safe delivery of electricity service to customers. Safety compliance projects contained in the 2023 ACE Plan include projects such as upgrades to fire suppression systems and guard rail systems.

- Continue to support ongoing environmental compliance, such as the maintenance of hydro and wind renewable energy resources, and the continued remediation of PCBs and management of asbestos through corresponding recurring capital programs aligned with regulation timelines.

The 2023 ACE Plan also addresses the directives arising from the 2022 ACE Plan Decision.[1]

In keeping with its practice in recent years, NS Power proposes to host a technical conference following submission of the 2023 ACE Plan to address any questions following initial review by intervenors prior to the issuance of information requests (IR). NS Power respectfully requests that in establishing its schedule for the 2023 ACE Plan process, the NSUARB incorporate the Company's proposed technical conference prior to the date for the issuance of IRs.

[1] Please refer to Section 4.0.

2.0 2023 ACE PLAN STRUCTURE

The following provides an overview of how the 2023 ACE Plan is organized.

- **Section 3.0** – **Introduction** – This section provides a high-level summary of the overall expenditures in the 2023 ACE Plan, including a breakdown of expenditures into various categories such as sustaining and strategic capital.

- **Section 4.0** – **2022 ACE Plan Follow-Up** – This section addresses the status of items from the 2022 ACE Plan, and the 2022 ACE Plan deferred and cancelled items.

- **Section 5.0** – **2023 ACE Plan** – This section provides a summary of 2023 capital expenditures. These include the list of projects for which NS Power is seeking approval; the list of projects forecast for subsequent submission; the list of projects with a value of less than $1,000,000; and the list of projects for the Point Aconi Generating station. NS Power is not seeking approval of those capital projects identified for subsequent submittal at this time. In addition, capital projects under $1,000,000 undertaken by large-scale utilities and Point Aconi projects do not require NSUARB approval under the PUA; however, the Company includes them in its ACE Plan for informational purposes and to provide a complete picture of annual capital expenditures on NS Power's system.

- **Section 6.0** – **Generation** – This section lists all generation capital projects submitted for approval, as well as related carry-over spending. Generation assets generate electricity through a variety of methods and fuel sources, including hydro, coal, oil and gas, biomass, and wind.

- **Section 7.0** – **Transmission** – This section lists all transmission capital projects submitted for approval, as well as related carry-over spending. Transmission assets transmit electricity from the generation plants to the distribution system throughout the province.

Transmission includes assets and equipment operating at 69 kV level or higher, and also includes substation assets.

- **Section 8.0 – Distribution** – This section lists all distribution capital projects submitted for approval, as well as related carry-over spending. Distribution assets include equipment for delivering electric energy from substations to customers served at voltages below 69 kV.

- **Section 9.0 – General Plant** – This section lists all general plant capital projects submitted for approval, as well as related carry-over spending. General plant assets include computer infrastructure and communication equipment, which comprise the majority of capital expenditures in this category. Other items such as office equipment, vehicles, telecom, construction equipment and buildings (except generating and substation facilities) are also included within this category.

- **Section 10.0 – Routine Capital Program** – This section lists all routine capital items submitted for approval, by generation, transmission, distribution, and general plant. Routine capital items are recurring annual expenditures for replacement of equipment (like-for-like replacement), additions to existing equipment base resulting from system growth, and addition of customers to the system.

- **Section 11.0 – Directives and Miscellaneous –** This section provides information in response to the various directives issued by the Board in respect to the Company's ACE Plan over the years as well as other miscellaneous information previously included in the Company's Application. The Board's directives include requests for information on cost minimization, contingency, transmission and distribution investment reliability impacts, and the ranking of projects submitted in the ACE Plan for approval.

The 2023 ACE Plan also includes the following information provided as separate appendices:

- **Confidentiality Matrix (Appendix A)** – The confidentiality matrix provides a listing of capital items submitted for approval, their attachments, and their confidentiality status so that the Board may evaluate the confidential portions of the ACE Plan. NS Power has minimized the information for which it seeks confidential treatment in this Application in order to facilitate transparency.

- **Listing of all 2023 ACE Plan projects in Excel format (Appendix B)** – This provides the Board and interested parties a convenient reference of all expenditures in 2023, regardless of whether they are submitted for approval in the ACE Plan. Details include Capital Item Numbers (CI #s), names, functional class, and investment details.

- **Updated Q4 Capital Reports (Appendix C)** – NS Power's Q4 capital reports, submitted to the NSUARB on February 13, 2023, have been updated with 2023 ACE Plan projects submitted for approval and subsequent submittal, and provided in Excel format. The updated Q4 capital reports provide a comprehensive listing of the status of all "active" projects (i.e., those that have been submitted to the NSUARB or referenced on the ACE Plan subsequent submittal list and are currently underway).

- **2017-2022 Contingency Report (Appendix D)** – In accordance with the Board's 2019, 2020, 2021, and 2022 ACE Plan directives, a complete listing of projects submitted for approval in 2017-2022 (either through or outside of the ACE Plan proceedings, including projects submitted for subsequent approval, but excluding U&U projects) that have been completed, including information as directed by the Board, is provided in Excel format. Further detail relating to this directive can be found in **Section 11.1.6**.

- **Cost Minimization Project Details (Appendix E)** – In accordance with the Board's 2021 and 2022 ACE Plan directives, supplemental specific project details are provided.

- **Stakeholder Engagement Material (Appendix F)** – In accordance with the Board's 2022 ACE Plan directives, NS Power engaged with stakeholders; the materials associated with this engagement are provided. Please refer to **Section 4.1** for details on the engagement.

3.0 INTRODUCTION

3.1 2023 ACE Plan Summary

The Company's 2023 capital budget has been developed with cost effectiveness in mind. The overall 2023 capital budget (inclusive of capital projects under $1,000,000 and Point Aconi projects that do not require NSUARB approval, carryover spending, capital routines, and subsequent submittal items) is $382.3 million. Within the overall 2023 ACE Plan budget, NS Power is requesting NSUARB approval of 12 capital work orders and the 2023 capital routine program, for a total approval amount of $165.9 million.

Figure 1 below illustrates NS Power's overall capital budget for 2023 as well as NS Power's total annual capital expenditures by function.

Figure 1: Total Annual Capital Expenditures by Function

(Millions of Dollars)

Year	Actuals 2018	2019	2020	2021	2022	2022 ACE Budget	ACE Plan 2023
Generation	$100.2	$129.7	$88.0	$157.7	$194.4	$202.2	$119.1
Transmission	81.3	51.6	43.9	56.9	56.2	149.9	76.6
Distribution	114.6	166.8	143.6	116.1	209.9	107.6	123.2
General Plant	51.8	48.4	40.9	56.9	79.6	71.9	63.3
Total	**$347.9**	**$396.5**	**$316.4**	**$387.6**	**$540.2**	**$531.6**	**$382.3**

Note: Totals may be off by $0.1M due to rounding.

NS Power's capital investments in the 2023 ACE Plan focus on maintaining and improving existing system performance. NS Power continues to make timely investments based on equipment condition and criticality in order to maintain the performance of assets for customers.

Generation, transmission, distribution, and general plant projects in the 2023 ACE Plan are subject to the Board-approved project selection and asset management methodologies pursuant to Section 6.2 of the CEJC. All projects brought forward for approval and completion have been vetted to ensure each provides value to customers per the CEJC.

3.2 Relief Sought from the Board

NS Power respectfully requests Board approval of the following, in accordance with Section 35A of the PUA:

- 12 Capital Items with 2023 budget investment of $20.8 million and total project investment of $39.9 million (please refer to Section 5.2); and
- Capital routine programs with 2023 budget investment of $126.0 million (please refer to Section 10.1).

In addition, the Company requests approval of the revised Summary CEJC as discussed in **Section 4.1**, and provided in **Appendix F**.

4.0 2022 ANNUAL CAPITAL EXPENDITURE PLAN FOLLOW-UP

This section addresses items arising from the 2022 ACE Plan. These items include a summary of the outcome of stakeholder engagement, as well as items from the 2022 ACE Plan that have been deferred or cancelled.

The Board provided the following directives in its 2022 ACE Plan Decision, all of which NS Power has complied with in the 2023 ACE Plan:

- *Provide a table in future ACE Plan applications similar to the table provided in [CA] IR-10(e), modified in accordance with the direction in Paragraph 66 of [the Board's] decision.*[2] Please refer to Section 11.1.6.
- *Continue to track the information referred to and as modified in Paragraph 67 and 68 of [the Board's] decision.*[3] Please refer to **Appendix D**.
- *Continue to provide examples of cost minimization efforts over the previous year in future ACE Plan applications as directed in Paragraphs 94, 95 and 98 of [the Board's] decision.*[4] Please refer to Section 11.1.4 for further details on NS Power's cost minimization efforts, and **Appendix E** for supplemental project details.
- *Implement the Project Delivery Model (PDM) and engage with stakeholders regarding a capital cost estimating process in the PDM as discussed in Paragraphs 99 and 100 [of the Board's decision].*[5] Please refer to Section 4.1.
- *Adopt the proposed criteria and capital cost thresholds to trigger post project reviews as set out in Paragraph 101 of [the Board's] decision.*[6] NS Power confirms the post-project review criteria have been adopted.

[2] M10366, NS Power 2022 Annual Capital Expenditure Plan, NSUARB Decision, June 9, 2022, page 80.
[3] Ibid.
[4] Ibid.
[5] Ibid.
[6] Ibid.

- *Remove information as previously required on the impact of proposed capital spending on revenue requirement in the 2023 ACE Plan.*[7] The information that was previously provided regarding revenue requirement has been removed.
- *Provide greater clarity in its use of the estimated accuracy range from AACE guidelines as guidance to arrive at a contingency amount in the 2023 ACE Plan.*[8] Please refer to Section 11.1.6.
- *Implement the framework and reporting protocols referred to in Paragraph 102 [of the Board's decision] in advance of the 2023 ACE Plan application.*[9] *NS Power confirms the lessons learned framework and reporting protocols have been adopted.*
- *Provide the information outlined in Paragraph 150 for all projects with a capital cost over $1 million in the 2023 ACE Plan.*[10] NS Power confirms all projects included for approval within this Plan include the information requested, as applicable.
- *Regarding Total Cost of Ownership to:*
  a. *Use a TCO timeframe to match the expected useful life of IT software and hardware;*
  b. *Use a TCO analysis for all IT projects over $1 million when an EAM is not provided, whether or not an alternative is available; and*
  c. *Revise the CEJC in consultation with stakeholders and Board staff regarding TCO in time for a revised CEJC to be submitted to the Board with the 2023 ACE Plan application.*[11]

  NS Power confirms that, where applicable and in accordance with the Board's directive, a Total Cost of Ownership (TCO) analysis will be provided with IT projects when they are brought forward for the Board's review and approval. Please also refer to Section 4.1.

[7] Ibid.
[8] Ibid.
[9] Ibid.
[10] Ibid.
[11] M10366, NS Power 2022 Annual Capital Expenditure Plan, NSUARB Decision, June 9, 2022, page 80-81.

4.1 Stakeholder Engagement

As noted above, the NSUARB provided stakeholder engagement directives in its Order approving the 2022 ACE Plan.

In accordance with the NSUARB's directives, on December 22, 2022, NS Power provided the Consumer Advocate (CA), Small Business Advocate (SBA) and counsel for the Industrial Group with documentation for engagement, which included CEJC amendments to add a definition for TCO and an overview of NS Power's capital cost estimating process.

The Industrial Group provided no comments.

The SBA provided comments on January 10, 2023. The SBA requested clarification that NS Power's proposed changes to the CEJC related to TCO for IT software and hardware will cover and apply to all of NS Power's existing and future IT systems including those supported by cloud-based services contracts. NS Power subsequently provided confirmation to the SBA in a follow-up email to all stakeholders that for technology investments requiring Board approval (for new or existing IT systems, including those with cloud-based services contracts), and where the Company does not provide an EAM, NS Power will provide a TCO.

With respect to the CA, NS Power teleconferenced with the CA and its consultants on January 16, 2023. The CA requested updates to the TCO definition to include capital expenditures over the expected useful life of the IT product (i.e., for items such as product "refreshes"). NS Power agreed with this change and updated the TCO definitions in the CEJC accordingly. In addition, the CA questioned the proposed revisions to Section 17.14 of the Detailed CEJC and whether they would preclude providing an EAM where one would be needed. NS Power subsequently provided confirmation to the CA in a follow-up email to all stakeholders that the revisions to Section 17.14 are intended to ensure capital leads are considering TCO, whether in the context of an EAM or standalone TCO, and to ensure TCO is considered in the appropriate framework.

NS Power thanks stakeholders and their consultants for their contributions during this process. The Company continues to believe that the stakeholder engagement process provides an open and collaborative forum to address areas of interest.

4.2 2022 ACE Plan Subsequent Submittal List Status Update

Figure 2 below provides an update to the list of projects that were identified by NS Power in the 2022 ACE Plan for later submission for NSUARB approval.

Figure 2: Subsequent Submittal Project Status Update

		ACE 2022		Updated		
CI#	Project Title	2022 Budget ($)	Project Total ($)	2022 Budget ($)	Project Total ($)	Status
Generation						
39472	HYD - Mersey Redevelopment Phase 1	6,268,288	189,447,076	3,475,247	TBD	Deferred
C0015798	WRC Tunnel T-2 Remediation	15,889,111	43,775,454	20,099,346	22,788,029	2023 ACE Plan Subsequent Submission
C0034486	HYD - WRC LEM Penstock intake	150,655	11,239,851	29,009	TBD	Deferred
C0012838	HYD - Lequille Canal Dyke, Gates and Tailrace Refurbishment	489,872	6,123,004	285,311	7,058,816	2023 ACE Plan Submission
C0000979	HYD - Governor Dam Refurbishment	280,606	2,696,630	507,035	2,866,555	Approved
49634	HYD - Trout River Diversion Structure Replacement	1,365,833	1,822,300	561,567	2,509,894	Awaiting Approval
C0044392	Eastern Clean Energy Initiative (ECEI) - Coal Conversion	9,390,264	32,341,325	1,287,798	TBD	Deferred
C0041651	TUC HFO Tank 4 Refurbishment	1,110,293	1,110,293	2,734,313	2,734,313	Awaiting Approval
C0041507	CT TUS1 Exhaust Stack Replacement	2,031,020	2,031,020	70,366	TBD	Deferred
C0044771	Eastern Clean Energy Initiative (ECEI) - Wind	29,563,744	83,280,972	3,429,192	TBD	Deferred
Transmission						
C0044391	Eastern Clean Energy Initiative (ECEI) - Transmission	20,378,370	351,898,909	164,892	TBD	Deferred
C0045132	Eastern Clean Energy Initiative (ECEI) - Energy Storage	60,413,412	171,207,920	2,811,444	TBD	Deferred
C0032382	Susie Lake Substation Addition	3,605,202	6,225,600	18,920	6,215,516	2023 ACE Plan Subsequent Submission
C0022247	1N-Onslow 138 kV Add Second 42 MVA Power Transformer	293,817	4,500,000	19,882	TBD	Deferred
C0021140	New 138KV-25KV Substation - Stellarton	3,990,799	4,047,925	88,888	TBD	Deferred
C0036826	L8004 Parallel Canso Strait Crossing	970,337	2,139,081	-	TBD	Deferred

Figure 2: Subsequent Submittal Project Status Update

CI#	Project Title	ACE 2022 2022 Budget ($)	ACE 2022 Project Total ($)	Updated 2022 Budget ($)	Updated Project Total ($)	Status
Distribution						
C0008638	Cogswell HRM Redevelopment Program	1,252,201	6,982,854	1,532,863	6,617,148	Approved
C0022662	22C-404GA Lennox Passage Rebuild	1,710,569	2,352,191	2,090,876	2,609,595	Approved
General Plant						
47751	ECC Dynamic Line Rating Implementation	502,306	5,144,525	17,299	TBD	Deferred
C0032202	Sydney T&D Depot Consolidation	200,000	2,815,000	-	TBD	Deferred
C0043910	IT - Customer Energy Management Phase 2	2,154,815	2,154,815	483,481	1,636,480	2023 ACE Plan Subsequent Submission
C0011168	IT - Firewall Refresh	1,020,625	2,112,237	840,804	958,317	Project Less than $1M
C0031024	IT - Security Patch Management	1,400,000	1,700,000	-	-	Cancelled
C0041994	NERC CIP 2022*	371,967	1,379,474	423,695	1,247,663	Approved
50292	Kempt Road and Dartmouth East Depot Truck Bays	608,390	1,333,049	-	-	Cancelled
C0005498	IT - Endpoint Security	815,749	1,064,684	463,101	1,580,572	Approved
C0011167	IT - Backup Infrastructure Upgrade	892,633	1,004,879	117,572	1,557,471	2023 ACE Plan Subsequent Submission
C0042166	IT - Data Loss Prevention Platform	783,551	1,003,551	1,399,519	3,233,905	2023 ACE Plan Subsequent Submission

*Capital Item Related to NERC and/or NPCC Standards

4.3 2022 ACE Plan Capital Items Deferred / Cancelled

NS Power's list of deferred and cancelled capital work orders relative to the 2022 ACE Plan is contained in **Appendix C.**

These 113 projects were originally included in the 2022 ACE Plan with a forecast investment of $164.3 million in 2022. Fourteen of these projects have been cancelled, while 99 have been deferred to future years. NS Power's asset management processes guide the Company's decisions related to project deferrals to ensure risks are being appropriately managed and capital investments are appropriately prioritized.

Of the 113 projects listed, one project was included in the 2022 ACE Plan for approval. Nineteen of these projects were listed in the 2022 ACE Plan subsequent submittal list, to be filed separately

as individual capital items, 92 projects were listed in the 2022 ACE Plan as projects under $1,000,000, and one project was at Point Aconi.

5.0 2023 ANNUAL CAPITAL EXPENDITURE PLAN

5.1 Summary of Expenditures

Figure 3 below provides the proposed capital investment by category for NS Power's 2023 ACE Plan. This Application seeks NSUARB approval of the 2023 routine capital and 12 2023 projects, which total approximately $146.8 million of forecast investment in 2023. Certain items do not require NSUARB approval but are included in NS Power's annual capital plan for transparency and informational purposes. The 2023 ACE Plan budget also includes investment on multi-year projects that were previously approved by the NSUARB (Carryover Projects).

Figure 3: 2023 Capital Investments by Category
(Millions of dollars)

2023 ACE Spend	2023 NSUARB Approval Request	NSUARB Approval Not Required	Capital Items Forecast for Later Filing & Approval in 2023	Previously Approved Capital Projects with 2023 Carryover	2023 ACE Plan
Capital Item Approval Sought through the 2023 ACE Process (Including Routine Capital Projects)	146.8				**146.8**
Capital Items Submitted for Later Approval in 2023			41.8		**41.8**
2023 Carryover Projects				130.5	**130.5**
Capital Items Less Than $1M		53.2			**53.2**
Point Aconi Capital Spend		9.9			**9.9**
2023 ACE Plan	**$146.8**	**$63.2**	**$41.8**	**$130.5**	**$382.3**

Note: NS Power is seeking approval of $126 million of routine investment in 2023.

Note: Figures presented in the ACE Plan document reflect rounding differences on some line items.

5.2 2023 ACE Plan Capital Items Submitted for Approval

Figure 4 below provides the list of 12 new Capital Items for which NS Power seeks NSUARB approval in the 2023 ACE Plan, totaling approximately $20.8 million of spending in 2023, with a total forecast investment of approximately $39.9 million.

Figure 4: 2023 Capital Items Submitted for Approval

Tab #	CI#	Project Title	2023 Budget ($)	Project Total ($)
Generation				
Hydro				
G01	C0012838	HYD - Lequille Canal Dyke, Gates and Tailrace Refurbishment	473,920	7,058,816
		Total New Hydro Spending	**$473,920**	**$7,058,816**
Steam Turbine				
G02	C0051134	TUC2 - L-0 Blade Replacement	4,156,299	4,157,503
G03	C0051135	TUC2 - Turbine Valves Refurbishment	924,366	1,048,924
		Total New Steam Spending	**$5,080,664**	**$5,206,428**
Gas Turbine				
G04	C0041506	LM6000 191-253 Major Engine Refurbishment	8,628,094	8,740,979
G05	C0029682	CT – VJ2 Generator Replacement	575,589	5,397,738
		Total New Gas Turbine Spending	**$9,203,683**	**$14,138,717**
		Total New Generation Spending	**$14,758,268**	**$26,403,961**
Transmission				
T01	C0041788	L6516 Replacements and Upgrades Phase 2	1,260,224	3,123,474
T02	C0055539	10H-T1 Transformer Replacement	142,233	2,420,892
T03	C0052299	2023/2024 Steel Tower Life Extension	663,877	2,195,463
T04	C0055796	2023 EHV Breaker Replacements	1,425,113	2,048,411
T05	C0055696	L5031 Replacement and Upgrades Robinson Corner Tap	1,205,796	1,357,477
T06	C0052654	L5541 Water Crossing Upgrades	922,426	1,047,074
		Total New Transmission Spending	**$5,619,669**	**$12,192,791**

Figure 4: 2023 Capital Items Submitted for Approval

Tab #	CI#	Project Title	2023 Budget ($)	Project Total ($)
Distribution				
D01	C0050836	2023 Padmount Replacement Program	414,581	1,309,551
		Total New Distribution Spending	**$414,581**	**$1,309,551**
		Total New Capital Spending	**$20,792,518**	**$39,906,303**
		Total Routine Capital Spending	**$126,037,338**	**$126,037,338**
		Total Capital Items for which Approval is Sought	**$146,829,856**	**$165,943,641**

5.3 2023 ACE Plan Capital Items Forecast for Subsequent Approval

Figure 5 below identifies 2023 projects forecast in excess of $1 million that are not yet ready for submission to the NSUARB but which NS Power anticipates will be filed for review and approval in 2023. NS Power estimates approximately $41.8 million of investment in 2023 on these projects, which are currently estimated for total investment of approximately $82.1 million. The budget numbers indicated below are estimates as NS Power needs additional time to refine the specific project budget proposals. This section of the application is designed to provide an indication of these anticipated 2023 projects.

Figure 5: 2023 Capital Items Forecast for Subsequent Submittal

CI#	Project Title	2023 Budget ($)	Project Total ($)
Generation			
Hydro			
C0015798	WRC Tunnel T-2 Fall of Ground Remediation	793,925	22,788,029
	This project is for the remediation of rockfall in the T-2 tunnel connecting the Wreck Cove Reservoir and Surge Lake.		
C0047973	HYD - ANN Sluice Gates and Check Refurbishment	1,368,949	1,957,501
	This project is for the refurbishment of the sluice gates and checks at the Annapolis Tidal Plant to ensure effective water control.		
	Total New Hydro Spending for Subsequent Approval	**$2,162,874**	**$24,745,530**

Figure 5: 2023 Capital Items Forecast for Subsequent Submittal

CI#	Project Title	2023 Budget ($)	Project Total ($)
Steam			
C0051894	TUC - HFO Tank 3 Refurbishment *This project is for the refurbishment of Heavy Fuel Oil Tank 3 at the Tufts Cove Generating Station.*	2,034,913	2,053,937
	Total New Steam Spending for Subsequent Approval	**$2,034,913**	**$2,053,937**
Wind			
C0044030	WIN - DIG Haight's Brook Crossing Replacement *This project is for the construction of a new bridge crossing over the Haight's Brook watercourse on the access road to the Gulliver's Cove (Digby) Wind Farm.*	1,523,531	2,046,985
	Total New Wind Spending for Subsequent Approval	**$1,523,531**	**$2,046,985**
	Total New Generation Spending for Subsequent Approval	**$5,721,318**	**$28,846,452**
Transmission			
C0053316	Michelin Voltage Sag Reduction DVR *This project is to address voltage stability of a large industrial customer, Michelin Waterville, in compliance with the Nova Scotia Performance Standard Schedule A, under Section 52A of Chapter 380 of the Revised Statutes of Nova Scotia, 1989, the Public Utilities Act.*	17,385,436	21,007,507
C0032382	Susie Lake Substation Addition *This project is for the construction of a new substation in the Susie Lake area of Bayer's Lake Business Park in Halifax.*	3,076,699	6,215,516
C0050838	2023 Substation Primary Equipment Spares *This project is required to purchase primary equipment spares to support NS Power's ability to continue to respond to unplanned failures in a timely manner and to manage the increasing risk of supply chain challenges.*	1,832,164	2,010,107
C0055557	76V-T1 Transformer Replacement *This project will replace the 76V-T1 Transformer, which serves the Maitland Bridge area.*	752,932	1,751,258
	Total New Transmission Spending for Subsequent Approval	**$23,047,231**	**$30,984,388**
General Plant			
C0047277	IT - GIS Utility Network Migration *This project is for the implementation, data migration, change management and deployment of physical and software assets for the purposes of managing the transmission and distribution power system.*	1,319,730	4,727,187
C0042166	IT - Data Loss Prevention (DLP) Platform *This project will implement a new Data Loss Prevention (DLP) technological platform to mitigate data loss risks.*	1,410,852	3,233,905

Figure 5: 2023 Capital Items Forecast for Subsequent Submittal

CI#	Project Title	2023 Budget ($)	Project Total ($)
C0053699	Renewable to Retail Implementation	2,274,767	2,833,093
	This project is required to provide mechanisms to enable Licensed Retail Suppliers (LRS) to leverage infrastructure for safe and reliable transmission and distribution of energy and to integrate with NS Power systems, and processes to provide seamless transition for impacted customers in order to comply with the NSUARB-issued Board Electricity Retailers Regulations and a Code of Conduct for Renewable Low-Impact Electricity Sales in Nova Scotia. Capital costs associated with the development and implementation of this project will be recovered from the LRS.		
C0054755	IT - Connect My Data (Green Button)	1,271,843	2,059,897
	This project is to enable Connect My Data (CMD) capabilities as directed through Bill 145.		
C0030984	IT - Cisco UCS Lifecycle	1,436,905	2,047,691
	This project will replace the current Cisco Unified Computing System (UCS) environment with newer generation UCS equipment that will allow for continued support from the vendor.		
C0043910	IT - Customer Energy Management Phase 2	1,060,909	1,636,480
	This project will implement proposed time varying pricing tariffs, tariff change functionality and performance testing at scale.		
C0047294	IT - Microsoft Enterprise Agreement Renewal	1,548,458	1,609,423
	This project is for the renewal of Microsoft licensing agreement to maintain license compliance.		
C0011167	IT - Backup Infrastructure Upgrade	1,250,781	1,557,471
	This project will upgrade NS Power's backup infrastructure.		
C0050477	IT - Network Protection - Detection and Response	815,218	1,383,001
	This project will update the network security architecture to reflect the creation of network segmentation enhancing the security of the overall network perimeter and reducing impact in the event of a malicious cybersecurity event.		
C0053215	Sackville Depot Back Up Generator	594,969	1,206,506
	This project will install a new backup generator, including electrical building and associated equipment at the Sackville Depot.		
	Total New General Plant Spending for Subsequent Approval	**$12,984,431**	**$22,294,653**
	Total Capital Items for Subsequent Approval	**$41,752,980**	**$82,125,494**

1

5.4 2023 ACE Plan Capital Items with Estimated Total Project Cost of Less Than $1,000,000

Historical dollar values and numbers of projects for capital items with a total project cost of less than $1,000,000 are provided in **Figure 6** and **Figure 7** below, respectively, in accordance with the agreement reached with stakeholders pursuant to NS Power's report provided to the NSUARB on September 5, 2017 (2017 stakeholder agreement).

Figure 6: Historical Value of Projects Less Than $1M
(Millions of dollars)

Value of Projects Less than $1M ($)				
Function	**2020**	**2021**	**2022**	**2023**
Gas Turbine	2.4	2.2	2.2	1.5
Steam	34.4	28.5	34.2	31.3
Hydro	2.9	1.9	5.1	3.5
Wind	0.0	0.9	0.5	0.6
Transmission	2.8	2.7	5.6	2.9
Distribution	3.7	8.1	11.7	5.6
General Plant	5.1	7.5	8.3	7.8
Total	$51.2	$51.8	$67.7	$53.2

Note: Totals in the tables above may be off due to rounding

Figure 7: Historical Number of Projects Less Than $1M

# of Projects Less than $1M				
Function	**2020**	**2021**	**2022**	**2023**
Gas Turbine	26	12	26	21
Steam	162	137	182	159
Hydro	12	6	20	13
Wind	0	3	3	2
Transmission	12	8	23	13
Distribution	12	23	49	27
General Plant	18	29	34	25
Total	242	218	337	260

In prior ACE Plans, in accordance with the 2017 stakeholder agreement, a list of projects under $1,000,000 was also provided, which included brief descriptions of all projects and rankings of

those projects in accordance with NS Power's asset management methodology as described in Section 6.2 of the CEJC. The list of capital items with a total project cost of less than $1,000,000 is provided in **Appendix B**, tab 'Less than $1M', without project descriptions due to resource constraints, for the 2023 ACE Plan. These projects do not require NSUARB approval but are provided for transparency and informational purposes.

5.5 2023 ACE Plan Capital Items – Point Aconi Generating Station

Please refer to **Appendix B**, tab 'Pt. Aconi' for the Point Aconi capital projects for 2023. These projects do not require NSUARB approval but are provided for transparency purposes.

6.0 GENERATION

Generation includes replacements and additions to NS Power's Thermal, Hydro, Wind, Combustion Turbine and Biomass facilities.

Figure 8 and **Figure 9** provide a breakdown of the 2023 generation investment by investment type.

Figure 8: 2023 Thermal Investment by Investment Type

(Millions of dollars)

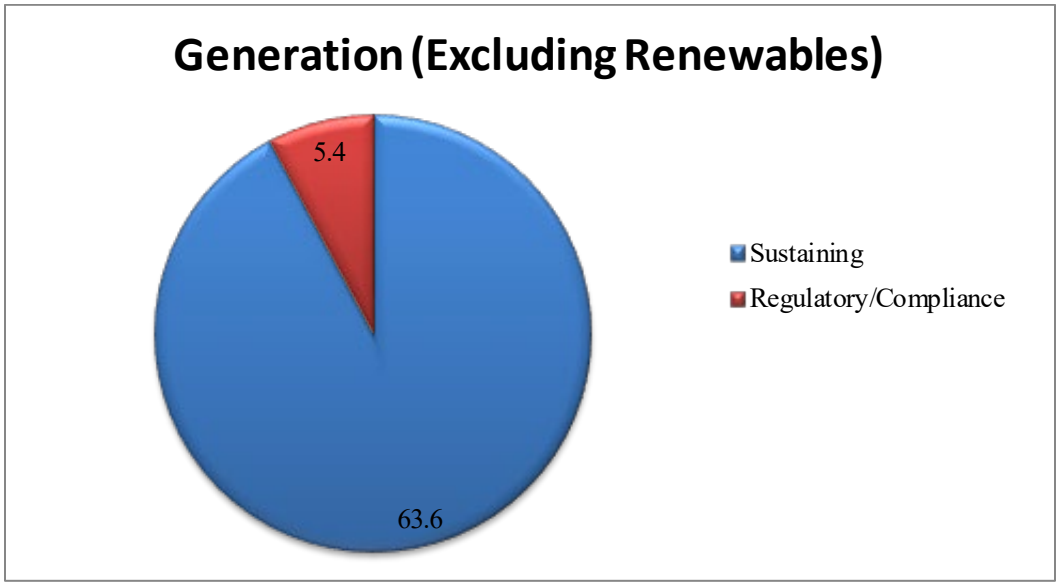
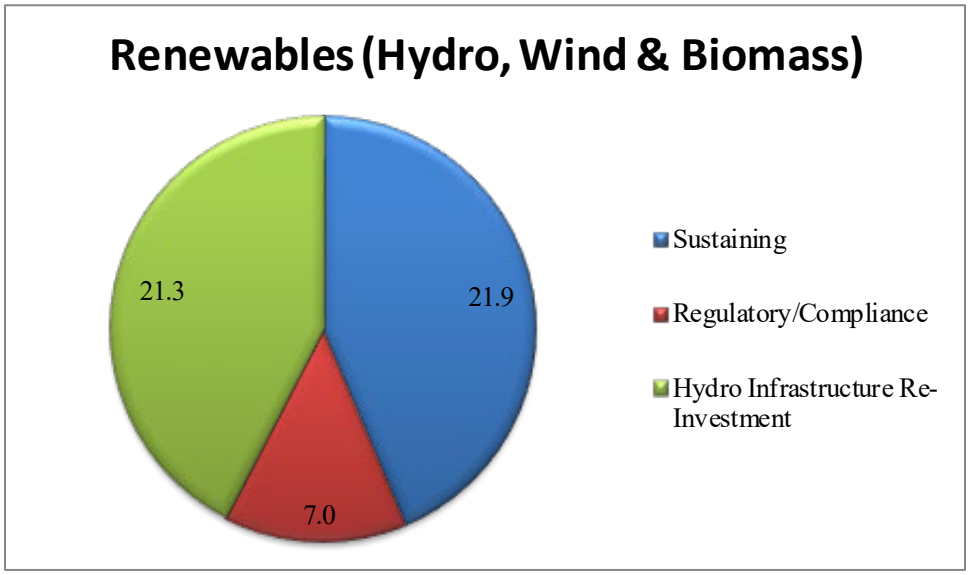


Figure 9: 2023 Renewable Generation Investment by Investment Type

(Millions of dollars)



The Company's asset health and risk profiling methodology determines the condition and criticality of equipment and allows the most appropriate reliability risk mitigation strategy to be implemented, including effective investment of sustaining capital. NS Power's selection of generation related capital investment is based on the asset management approach as described in Section 6.2 of the CEJC. The approach enables NS Power to have the information necessary to prioritize decisions to invest in assets only when necessary to maintain safety and reliability, while managing affordability for customers. All of this is in context of the units' forecast utilization in the near to long term. The Thermal Generation projects in the 2023 ACE Plan have been vetted according to the asset management methodologies in consideration of requirements to provide sufficiently safe and reliable generation performance in the near to medium term, while ensuring levels of investment are aligned with longer-term planning.

Key elements of NS Power's asset management approach include:

- fleet-wide asset class programs;
- application of the latest technologies to enhance understanding of asset health;

- effective operational support tools and infrastructure; and
- risk-based inspection programs.

NS Power engages industry experts to augment the assessment of risks and mitigating measures for the generation fleet.

NS Power's generation asset management approach is focused on optimizing generation resources by mitigating risks through operating procedures, monitoring and assessing assets, and when necessary, capital investment. The approach also focuses on continuing to develop and improve asset health assessment and risk profiling as the utilization of the generating fleet continues to evolve.

The focus for generation capital investments in 2023 is on current requirements to provide for the safe, environmentally compliant, and reliable operation of the thermal assets based on utilization outlooks. The approximately $119 million generation capital investment plan for 2023 is summarized in **Figure 10** below.

Figure 10: Summary of 2023 Generation Capital Investments
(Millions of dollars)

i	New 2023 capital spending for projects with total estimated project spending greater than $1,000,000 and for which approval is sought. (As provided in Section 6.2)	14.8
ii	2023 capital spending for projects with total estimated project spending greater than $1,000,000 for which approval will be sought subsequent to the filing of the 2023 ACE Plan. (As provided in Section 5.3)	5.7
iii	New capital spending for projects with total estimated spending less than $1,000,000 for which approval is not sought. (As provided in Section 5.4)	36.9
iv	Point Aconi Generating Station capital spending. (As provided in Section 5.5)	9.8
v	Carry-over capital spending. (As provided in Section 6.1)	46.4
vi	Routine capital spending. (As provided in Section 10)	5.5
	Total 2023 Generation Capital Investment Plan	119.1
	Request for ACE Approval (Items i and vi)	20.3

Note 1: Totals may be off due to rounding.

6.1 Generation – Carry-over Capital Spending Summary

Figure 11: Generation Carry-over Capital Spending Summary

CI#	Project Title	Start Date	Final Date	Previous Expenditure ($)	2023 Budget ($)	Subsequent Spending ($)	Total Estimate ($)
Hydro Generation Plant							
C0013838	HYD - WRC LEM Unit Rehabilitation and Replacement	2019/01	2025/12	61,168,137	20,521,353	21,937,334	103,626,824
29807	HYD - Tusket Falls Main Dam	2022/01	2022/12	21,814,624	3,639,459	32,423,073	57,877,156
C0014218	Wreck Cove Life Extension and Modernization (LEM) Project - Balance of Plant	2022/01	2022/12	19,507,004	752,085	6,998,614	27,257,703
16374	HYD - Gaspereau Dam Safety Remedial Works	2007/05	2025/12	11,795,900	297,717	9,035,051	21,128,667
50518	HYD - Ruth Falls Main Dam Refurbishment	2017/02	2025/12	4,052,661	321,737	5,386,638	9,761,036
51236	HYD - WRC Tailrace Tunnel Rock Bolting Phase 1	2017/01	2025/12	8,113,117	10,000	759,468	8,882,586
C0002539	HYD - Bridge Remediation 2019	2017/12	2023/08	5,915,859	120,193	-	6,036,053
49756	HYD - Marshall Falls Main Dam Refurbishment	2016/12	2026/04	530,692	186,939	4,522,836	5,240,467
44978	HYD - Wreck Cove Controls Upgrade	2014/01	2024/03	2,541,918	1,512,978	-	4,054,896
C0000979	HYD - Governor Dam Refurbishment	2017/08	2024/04	837,986	2,048,361	21,664	2,908,011
49634	HYD - Trout River Diversion Structure Replacement	2016/08	2023/12	671,447	1,864,529	-	2,535,976
51775	HYD - Fixed Ladder & Machine Guard Upgrades	2017/06	2024/06	1,982,201	78,306	-	2,060,507
48791	HYD - WRC Safety Standards Upgrades	2016/01	2024/04	1,912,393	64,336	-	1,976,729
47551	HYD - SHH Controls Upgrade	2022/01	2022/12	1,563,052	378,958	-	1,942,010
C0036368	HYD - Lower Great Brook Switchgear Replacement	2021/05	2024/06	542,224	751,865	-	1,294,089
C0024484	HYD - Fourth Lake Switchgear Replacement	2021/04	2025/06	583,304	38,071	530,757	1,152,132
49945	HYD - Malay Falls Switchgear Replacement	2017/12	2024/04	498,334	642,922	-	1,141,257
C0019021	HYD - Malay Falls Unit 4 Overhaul	2020/01	2023/12	860,411	84,042	-	944,453
C0019023	HYD - Malay Falls Unit 4 Generator Refurbishment	2020/09	2023/12	926,296	3,950	-	930,246
C0053515	WRC D9 & 11 Safe Access	2022/09	2023/12	478,887	236,059	-	714,946
C0050212	HYD - Donahue Lake Gate Refurbishment	2022/06	2024/02	23,070	573,765	-	596,835
C0022843	HYD - TUS Powerhouse Fish Ladder Upgrade	2019/10	2023/09	568,456	18,305	-	586,762
C0038167	HYD - LEQ Thrust Bearing Replacement	2021/01	2023/06	512,530	72,975	-	585,505
C0038187	HYD - MER Breaker Upgrades Phase 2	2022/01	2023/12	483,595	18,197	-	501,792
C0031093	HYD - SHH Interconnection Protection Panels	2020/10	2024/12	313,924	143,300	-	457,224

Figure 11: Generation Carry-over Capital Spending Summary

CI#	Project Title	Start Date	Final Date	Previous Expenditure ($)	2023 Budget ($)	Subsequent Spending ($)	Total Estimate ($)
C0019025	HYD - Sloane Dam Refurbishment	2022/01	2022/12	97,780	34,038	226,784	358,602
C0039506	HYD - Mersey Log Hoist Partial Refurbishment	2021/05	2024/06	170,278	182,038	-	352,316
C0038129	HYD - AVO 1 Crane Replacement	2021/09	2024/10	127,857	32,524	157,517	317,898
C0010758	WIN - South Lake Turbine Decommission	2020/07	2025/10	66,471	13,250	206,474	286,196
C0039446	HYD - EVH Door Replacements	2021/09	2025/09	35,499	115,749	124,436	275,684
C0021943	AMO Weymouth Enhanced Monitoring	2019/12	2023/07	209,243	33,156	-	242,400
C0040086	HYD - HMS Window Replacement	2021/07	2024/12	129,660	64,243	-	193,903
C0029284	HYD - Fourth Lake Diesel Generator	2022/01	2023/12	96,056	86,371	-	182,427
C0020883	AMO Gulch Enhanced Monitoring	2019/12	2023/12	155,562	18,992	-	174,554
C0054077	HYD - TUS Winch Replacement	2022/09	2024/01	93,034	78,497	-	171,531
C0031464	HYD - WRC Garage Aux Storage	2021/03	2023/12	21,520	1,346	134,418	157,284
C0035827	HYD - Hells Gate Butterfly Valve Refurbishment	2021/01	2023/07	147,024	7,773	-	154,797
C0042466	HYD - STM Garage Refurbishment	2021/09	2025/10	12,930	744	130,140	143,814
C0028444	HYD - SHH Crane Refurbishment	2021/11	2024/12	13,000	705	128,156	141,861
C0039569	HYD - PAR Drainage Penstock Improve	2021/09	2024/04	64,860	66,682	-	131,542
C0039566	HYD - GIS Water Filtration Upgrade	2022/01	2022/12	25,314	97,527	-	122,841
C0046831	HYD - Marshall Falls Spillway Gate	2022/01	2024/12	99,713	5,783	-	105,496
C0054078	HYD - MAL 4 Exciter Rewind	2022/09	2024/12	60,333	10,433	21,466	92,232
C0054576	HYD - MIL 2 Stator Refurbishment	2022/10	2023/12	79,696	5,500	-	85,196
C0048750	HYD - SIS Cable & Bushing Replacement	2022/04	2024/12	13,823	27,153	-	40,975
Total Hydro Generation Plant				**$149,917,676**	**$35,262,909**	**$82,744,827**	**$267,925,412**
Steam Generation Plant							
C0038747	LIN1 - L-0 Blade Replacement	2022/02	2024/01	2,770,038	2,202,694	670,497	5,643,229
C0020385	LIN - Heavy Oil Tank Refurbishment	2022/01	2022/12	923,824	2,035,754	-	2,959,578
C0055376	TUC1 - LP Blade Replacement	2022/01	2022/12	977,643	1,047,797	-	2,025,440
C0054356	TUC - Roof Replacement U&U	2022/10	2023/05	572,788	1,013,931	-	1,586,719
C0054615	LIN - U&U Hurricane Fiona Damage 2022	2022/10	2024/01	701,786	34,402	-	736,188
C0028283	TUC2 - South Vacuum Pump Replacement	2022/08	2024/06	117,297	528,834	-	646,131
C0048092	TRE5 - 5-3 Mill Refurbishment	2022/03	2025/09	607,249	35,945	-	643,193
C0020842	POT - Turbine Generator Fire Protection	2021/01	2023/12	28,671	439,645	-	468,316

Figure 11: Generation Carry-over Capital Spending Summary

CI#	Project Title	Start Date	Final Date	Previous Expenditure ($)	2023 Budget ($)	Subsequent Spending ($)	Total Estimate ($)
C0031222	TRE6 - Partition Valve and Waterbox Refurbishment	2022/05	2023/12	245,411	183,214	-	428,625
49920	AMO Thermal Fleet Life Consumption Analysis Tool	2016/08	2023/06	419,754	1,914	-	421,668
C0041746	POT - Coal Mill Refurbishment 2022	2022/03	2023/12	191,676	219,288	-	410,964
C0041816	POT - Next Cell Development - Bear Head Ash Site	2021/10	2023/12	278,566	120,188	-	398,754
C0041899	POT - Water Treatment Plant Culligan System	2022/01	2022/12	267,295	80,745	-	348,040
C0010943	AMO TRE6 Enhanced Monitoring	2019/07	2023/10	264,327	41,185	-	305,512
C0019499	LIN1 - RH Tube Replacement 2022	2020/03	2023/12	204,638	100,089	-	304,727
C0041664	TUC2 - CW Pump Building Replacement	2022/01	2024/05	-	292,035	-	292,035
C0041798	POT - New Washroom 2022	2022/01	2023/12	101,799	153,617	-	255,417
C0010944	AMO LIN4 Enhanced Monitoring	2022/04	2023/09	233,772	19,454	-	253,225
C0011579	LIN3 - Sequence of Events Recorder	2019/04	2023/12	199,761	46,452	-	246,213
C0010942	AMO LIN3 Enhanced Monitoring	2020/01	2023/06	171,503	9,646	-	181,149
C0020570	ICP Conveyor Hydraulics Refurbishment	2021/04	2024/12	334	84,724	90,079	175,137
C0001538	LIN4 - Sequence of Event Recorder Installation	2019/01	2023/12	153,572	18,168	-	171,740
C0047491	POT-P&A Fire Panel Detectors Upgrades	2022/01	2022/12	83,694	87,467	-	171,161
C0041647	TUC - Dehumidifier Access Improvements	2022/01	2023/09	146,574	23,907	-	170,481
C0030905	POT - GSCW Pump & Motor Replacement	2021/01	2023/12	103,391	65,257	-	168,648
C0030524	TUC2 - Turbine Controls PLC Upgrade	2021/01	2024/05	-	163,518	-	163,518
C0053117	Tufts Cove Lagoon Pump Upgrade	2022/10	2023/11	116,865	45,704	-	162,569
C0030522	TUC2 - TWIP PLC Upgrade	2022/01	2024/06	-	158,773	-	158,773
C0055236	PTMT - P&A PTMT Roadway Refurbishment	2022/11	2023/12	-	151,509	-	151,509
41229	LIN - Cable Spreading Rooms Fire Protection	2022/01	2022/12	108,850	34,684	-	143,534
C0021402	TUC - Oil Tanks Levels and Pump House Controls Upgrade	2021/03	2024/12	-	135,353	-	135,353
C0041986	TUC6 HRSG Refurbishments	2022/01	2023/05	84,290	44,671	-	128,961
C0020568	ICP MCC3 Building Refurbishment	2020/04	2023/12	51,480	61,247	-	112,727

Figure 11: Generation Carry-over Capital Spending Summary

CI#	Project Title	Start Date	Final Date	Previous Expenditure ($)	2023 Budget ($)	Subsequent Spending ($)	Total Estimate ($)
C0030962	POT - Bunker C Pump Replacement	2021/01	2023/12	61,728	42,154	-	103,882
C0021463	TUC - Turbine Bay Louvers Refurbishment	2022/04	2023/12	-	92,274	-	92,274
C0041666	TUC2 - Generator Breaker Synchronizer Replacement	2022/01	2024/06	21,907	69,899	-	91,806
C0041658	TUC - Water Treatment Plant #3 Refurbishment	2022/10	2023/11	56,000	29,620	-	85,620
49657	TUC - SoER SEL	2018/11	2024/06	25,272	52,679	-	77,950
C0028686	LIN1 - Steam Drum Level Controls Upgrade	2021/01	2023/12	19,686	48,140	-	67,826
C0041548	AMO TUC Relay Information Management	2022/01	2023/06	2,248	29,025	-	31,273
Total Steam Generation Plant				**$10,313,688**	**$10,045,602**	**$760,576**	**$21,119,866**
Gas Turbine Generation Plant							
C0029693	CT - VJ1 Generator Replacement	2021/04	2023/12	4,192,525	70,525	-	4,263,050
46483	CT - TUS Control System Upgrade	2021/01	2023/12	589,964	297,130	-	887,094
C0041525	CT VJ1 MCC Upgrades	2022/01	2023/11	366,896	64,688	-	431,584
C0041512	CT TUS Air Compressor & Dryer	2022/01	2024/06	280,860	122,214	-	403,074
C0041537	CT BGT Package Coating Routines	2022/07	2024/12	78,169	128,929	-	207,098
C0041514	CT BGT Fuel Piping / Cable Bridges	2022/01	2023/07	97,024	94,723	-	191,748
C0035648	CT - Fuel Oil Piping Upgrades	2021/01	2023/10	145,828	20,763	-	166,591
C0027509	CT - Protection and Control Upgrade	2020/04	2023/11	74,699	35,415	-	110,114
C0052057	Combustion Turbine TUS Unit Transformer Replacement	2022/08	2023/06	94,682	14,039	-	108,720
C0041522	CT - Harden Control System Grounding	2022/01	2023/12	52,993	26,930	-	79,923
C0041529	CT TUC4 Add SOV in Demin Water Return	2022/01	2024/04	10,811	40,765	-	51,575
C0041531	CT TUC5 Add SOV in Demin Water Return	2022/01	2024/04	8,603	40,483	-	49,086
C0041517	CT TUC 5 Replace Package Hoses	2022/01	2023/12	76	42,763	-	42,839
C0041516	CT TUC 4 Replace Package Hoses	2022/01	2023/12	76	42,763	-	42,839
Total Gas Turbine Generation Plant				**$5,993,205**	**$1,042,130**	**$0**	**$7,035,335**

Figure 11: Generation Carry-over Capital Spending Summary

CI#	Project Title	Start Date	Final Date	Previous Expenditure ($)	2023 Budget ($)	Subsequent Spending ($)	Total Estimate ($)
Wind Generation							
C0029482	WIN - DIG SCADA Replacement	2020/11	2023/06	546,709	2,514	-	549,223
C0035506	WIN - Nuttby Collector Circuit Replacement	2021/01	2024/12	389,024	(57,780)	-	331,244
C0041535	AMO Nuttby Enhanced Monitoring	2022/01	2022/12	100,611	107,780	-	208,391
Total Gas Turbine Generation Plant				**1,036,344**	**52,514**	**-**	**1,088,858**
Total Generation Carry-Over Spending				**167,260,913**	**46,403,154**	**83,505,403**	**297,169,471**

6.2 Generation – New 2023 Capital Items for ACE Plan Approval

Figure 12: Generation - New 2023 Capital Items for ACE Plan Approval

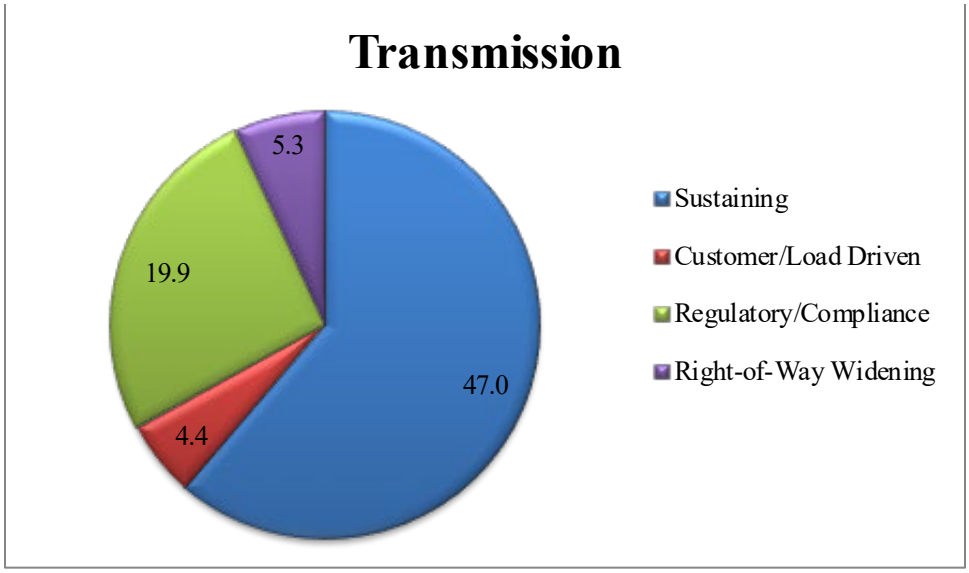
Tab #	CI#	Project Title	2023 Budget	Project Total
	Hydro Generation Plant			
G01	C0012838	HYD - Lequille Canal Dyke, Gates and Tailrace Refurbishment	473,920	7,058,816
		Total Hydro Generation Plant	**$473,920**	**$7,058,816**
	Steam Generation Plant			
Turbine				
G02	C0051134	TUC2 - L-0 Blade Replacement	4,156,299	4,157,503
G03	C0051135	TUC2 - Turbine Valves Refurbishment	924,366	1,048,924
		Total Steam Generation Plant	**$5,080,664**	**$5,206,428**
	Gas Turbine Generation Plant			
G04	C0041506	LM6000 191-253 Major Engine Refurbishment	8,628,094	8,740,979
G05	C0029682	CT – VJ2 Generator Replacement	575,589	5,397,738
		Total Gas Turbine Generation Plant	**$9,203,683**	**$14,138,717**
	Total Generation New Spending		**$14,758,268**	**$26,403,961**

7.0 TRANSMISSION

Transmission includes items for replacement, reinforcement or expansion of the transmission system, which transmits electrical energy from the generation plants to distribution substations throughout the province. Transmission includes assets and equipment operating at 69 kV or higher. NS Power operates over 5,000 km of transmission circuits and related protection, controls and substation equipment.

Figure 13 provides a breakdown of the 2023 transmission investment by investment type.

Figure 13: 2023 Transmission Investment by Investment Type
(Millions of dollars)



Transmission investment is driven by the asset management approach as described in Section 6.2 of the CEJC. The asset management approach evaluates condition and criticality to determine the failure risk of different asset groups and provides priorities for the maintenance and replacement of these assets as appropriate. NS Power's asset management strategy and inspection program results for these assets feed into this selection process, aimed largely at sustaining capital

investments. Please refer to 11.1.5 for additional detail on NS Power's strategy related to reliability.

The focus for transmission capital investments in 2023 is on sustaining and improving system reliability. The approximately $77 million transmission capital investment plan for 2023 is summarized in **Figure 14** below.

Figure 14: Summary of 2023 Transmission Capital Investments

(Millions of dollars)

i	New 2023 capital spending for projects with total estimated project spend greater than $1,000,000 and for which approval is sought. (As provided in Section 7.2)	5.6
ii	2023 capital spending for projects with total estimated project spending greater than $1,000,000 for which approval will be sought subsequent to the filing of the 2023 ACE Plan. (As provided in Section 5.3)	23.0
iii	New capital spending for projects with total estimated spending less than $1,000,000 for which approval is not sought. (As provided in Section 5.4)	2.9
iv	Carry-over capital spending. (As provided in Section 7.1)	31.1
v	Routine capital spending. (As provided in Section 10)	13.9
vi	Total 2023 Transmission Capital Investment Plan	76.6
	Request for ACE Approval (Items i and v)	19.5

Note 1: Totals may be off due to rounding.

7.1 Transmission – Carry-over Capital Spending Summary

Figure 15: Transmission Carry-Over Capital Spending Summary

CI#	Project Title	Start Date	Final Date	Previous Expenditure ($)	2023 Budget ($)	Subsequent Spending ($)	Total Estimate ($)
Transmission Plant							
C0052055	2023/2024 Transmission Right-of-Way Widening 69kV	2023/06	2025/02	-	1,706,868	3,690,922	5,397,790
C0041893	2022/2023 Transmission Right-of-Way Widening 69kV	2022/06	2024/02	1,485,431	3,553,698	-	5,039,129
C0011261	101W Port Mersey Substation Expansion	2022/01	2022/12	3,093,424	1,309,412	-	4,402,836
C0041837	2022/2023 Substation Polychlorinated Biphenyl (PCB) Equipment Removal	2022/03	2024/06	412,414	2,397,617	592,810	3,402,841
C0041793	L7002 Replacements and Upgrades Phase 2	2022/11	2024/04	252,386	2,900,075	-	3,152,461
C0031122	L6539 Replacements and Upgrades	2021/01	2024/04	1,214,904	872,841	779,837	2,867,582
C0041989	2022/2023 Sacrificial Anode Installation Program	2022/07	2025/01	571,116	872,058	1,383,407	2,826,581

Figure 15: Transmission Carry-Over Capital Spending Summary

CI#	Project Title	Start Date	Final Date	Previous Expenditure ($)	2023 Budget ($)	Subsequent Spending ($)	Total Estimate ($)
C0052634	L5016 Replacements and Upgrades	2023/02	2024/12	-	950,736	1,776,254	2,726,990
C0031085	L6516 Line Replacement and Upgrades	2021/10	2023/06	2,495,459	206,852	-	2,702,311
C0041789	L5550 Replacements and Upgrades Phase 2	2021/11	2024/01	1,931,190	732,975	-	2,664,164
C0041796	L6020 Replacements and Upgrades Phase 2	2022/04	2023/12	1,470,237	849,311	-	2,319,548
C0010949	2019/2020 Steel Tower Life Extension	2019/05	2023/05	2,178,232	79,147	-	2,257,379
C0041805	L7005 Replacements and Upgrades Phase 2	2022/05	2024/06	1,187,533	1,020,725	-	2,208,258
C0050835	2023/2024 Steel Tower Refurbishment	2023/02	2025/06	-	482,564	1,596,432	2,078,996
C0041791	L6551 Replacements and Upgrades	2022/06	2024/12	-	1,609,134	395,153	2,004,287
C0010956	78W-Martin's Brook Substation Relocation	2019/10	2023/12	164,411	1,751,859	-	1,916,270
C0041810	L5022 Replacements and Upgrades	2022/01	2023/12	1,538,239	170,042	-	1,708,281
C0043571	2022/2023 Transmission Switch & Breaker Replacement	2022/01	2024/12	309,975	566,138	796,010	1,672,123
C0011241	L5026 Replacements and Upgrades	2019/01	2023/04	1,379,563	236,155	-	1,615,717
C0041807	L5534 Replacements and Upgrades	2023/03	2024/12	-	640,438	801,972	1,442,410
C0045510	20V-T52 Transformer Replacement	2022/03	2023/12	31,406	1,372,660	-	1,404,067
C0041804	2022 Line Retirement Program	2022/01	2023/12	78,966	1,217,722	-	1,296,688
C0049212	L8001 Replacements and Upgrades Phase 3	2022/05	2024/12	374,571	770,638	143,254	1,288,463
C0041790	L8001 Replacements and Upgrades Phase 2	2021/12	2023/12	1,103,612	179,421	-	1,283,033
C0031052	Replenish Spare used at 58C	2021/03	2023/08	4,753	1,247,465	-	1,252,218
C0043010	2022/2023 Wood Pole Retreatment Program	2022/05	2024/12	111,411	1,079,974	-	1,191,385
C0031064	L5054 Replacements and Upgrades	2021/01	2023/07	872,609	211,258	-	1,083,867
C0041800	L5537 Replacements and Upgrades	2022/01	2022/12	537,501	435,669	(0)	973,169
C0031053	L5506 Line Replacements and Upgrades	2021/01	2023/04	197,874	604,896	-	802,770
52317	2020 Line Retirement Program	2020/01	2023/02	677,756	62,887	-	740,643
C0031283	2021 Substation Theft Prevention	2021/03	2023/09	261,813	157,138	-	418,951
C0048114	88S-301 Metal Clad Switchgear Replacement	2022/01	2023/12	17,358	347,296	-	364,654
C0044431	2022/2023 Capacitor Bank Breaker Replacements	2022/01	2024/12	79,615	134,166	133,107	346,888
C0031268	AMO Critical Equipment Online Monitoring	2021/03	2023/10	313,509	14,777	-	328,286
52261	83V-503 & 83V-504 - Bring Switches to Roadside	2018/08	2023/12	183,437	90,559	-	273,996

Figure 15: Transmission Carry-Over Capital Spending Summary

CI#	Project Title	Start Date	Final Date	Previous Expenditure ($)	2023 Budget ($)	Subsequent Spending ($)	Total Estimate ($)
C0022743	Retire 9H-Yale Street Substation	2023/05	2024/01	-	189,055	0	189,055
C0021145	Mobile Substation Low Voltage Cable Trailer	2020/03	2023/12	20,790	66,162	-	86,953
Total Transmission Carry-Over Spending				**$24,551,495**	**$31,090,387**	**$12,089,157**	**$67,731,039**

7.2 Transmission – New 2023 Capital items for ACE Plan Approval

Figure 16: Transmission - New 2023 Capital Items for ACE Plan Approval

Tab #	CI#	Project Title	2023 Budget	Project Total
	Transmission Plant			
T01	C0041788	L6516 Replacements and Upgrades Phase 2	1,260,224	3,123,474
T02	C0055539	10H-T1 Transformer Replacement	142,233	2,420,892
T03	C0052299	2023/2024 Steel Tower Life Extension	663,877	2,195,463
T04	C0055796	2023 EHV Breaker Replacements	1,425,113	2,048,411
T05	C0055696	L5031 Replacement and Upgrades Robinson Corner Tap	1,205,796	1,357,477
T06	C0052654	L5541 Water Crossing Upgrades	922,426	1,047,074
	Total Transmission New Spending		**$5,619,669**	**$12,192,791**

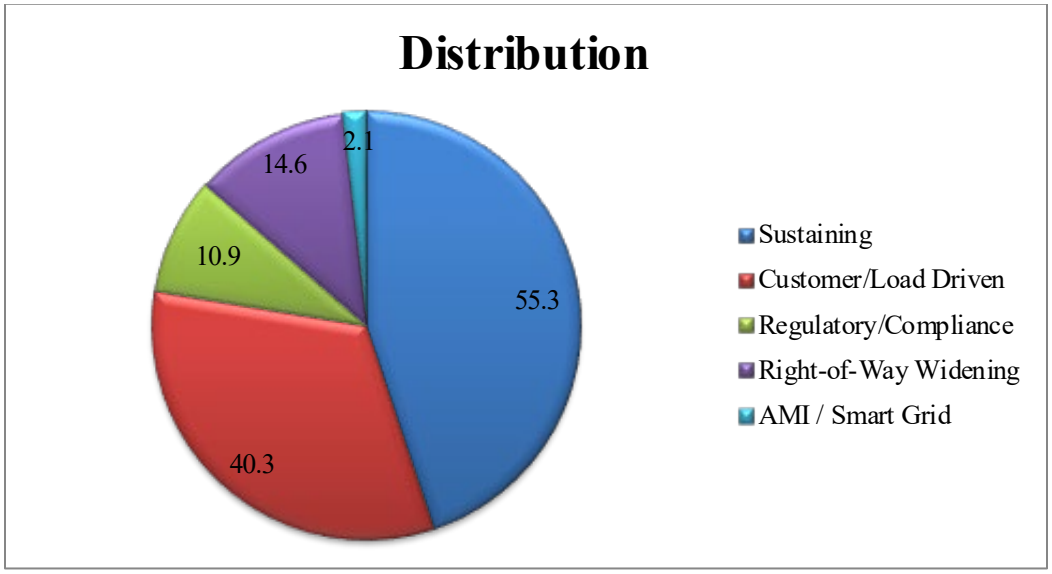
8.0 DISTRIBUTION

Distribution includes replacement of and additions to equipment for delivering electricity from points on the transmission system to customers served at voltages below 69 kV. NS Power operates approximately 28,000 km of distribution circuits and related protection, controls, and transformers.

Figure 17 provides a breakdown of the 2023 distribution investment by investment type.

Figure 17: 2023 Distribution Investment by Investment Type

(Millions of dollars)



Similar to Transmission investment, Distribution investment is driven by the asset management approach as described in Section 6.2 of the CEJC. The asset management approach evaluates both condition and criticality to determine the failure risk of different asset groups and provides priorities for the maintenance and replacement of these assets as appropriate. NS Power's asset management strategy and condition assessments feed into this selection process, aimed largely at sustaining capital investments. Please refer to 11.1.5 for additional detail on NS Power's strategy related to reliability.

The focus for Distribution capital investments in 2023 continues to reflect localized customer load growth and customer reliability. The approximately $123 million Distribution capital investment plan for 2023 is summarized in **Figure 18** below.

Figure 18: Summary of 2023 Distribution Capital Investments

(Millions of dollars)

i	New 2023 capital spending for projects with total estimated project spend greater than $1,000,000 and for which approval is sought. (As provided in Section 8.2)	0.4
ii	New capital spending for projects with total estimated spending less than $1,000,000 for which approval is not sought. (As provided in Section 5.4)	5.6
iii	Carry-over capital spending. (As provided in Section 8.1)	29.0
iv	Routine capital spending. (As provided in Section 10)	88.2
	Total 2023 Distribution Capital Investment Plan	123.2
	Request for ACE Approval (Items i and iv)	88.6

Note 1: Totals may be off due to rounding.

8.1 Distribution – Carry-over Capital Spending Summary

Figure 19: Distribution Carry-Over Capital Spending Summary

CI#	Project Title	Start Date	Final Date	Previous Expenditure ($)	2023 Budget ($)	Subsequent Spending ($)	Total Estimate ($)
Distribution Plant							
47124	Advanced Metering Infrastructure	2015/01	2023/12	141,748,799	1,746,897	-	143,495,695
C0052056	New Distribution Rights-of-Way Phase 8	2023/04	2024/12	-	11,406,140	-	11,406,140
C0041892	New Distribution Rights-of-Way Phase 7	2022/05	2023/12	6,033,680	3,167,049	-	9,200,729
C0010778	Smart Grid Nova Scotia Project	2018/10	2023/12	6,330,715	365,402	-	6,696,117
C0008638	Cogswell HRM Redevelopment Program	2018/07	2025/12	1,521,690	2,536,386	2,537,876	6,595,953
C0020834	2020/2021 Inaccessible PCB Transformer Replacements	2020/06	2025/02	709,595	660,480	1,604,842	2,974,917
C0022662	22C-404GA Lennox Passage Rebuild	2019/11	2025/02	272,473	50,551	2,292,671	2,615,695
C0043130	2022 Padmount Replacement Program	2022/01	2023/08	1,115,772	747,701	-	1,863,473
C0019379	50N-410 - 4C-430 Highway 104 Twinning	2019/10	2023/05	1,306,615	56,364	-	1,362,979
47794	Heckman Island Underwater Cable Replacement	2016/04	2024/05	400,158	941,731	-	1,341,889
C0006319	2019 PCB Pole Top Transformer Replacements	2022/01	2022/12	368,886	345,172	359,189	1,073,246
41350	16W-301 Hebron Rebuild Phase 2	2017/05	2024/12	263,161	156,674	501,737	921,572
52184	37N-412 Glooscap Trail Rebuild Phase 2	2017/09	2024/09	605,833	214,592	86,405	906,830
C0031150	36W-301-Add Third Phase - Allendale	2021/03	2024/06	151,054	409,332	309,254	869,639

Figure 19: Distribution Carry-Over Capital Spending Summary

CI#	Project Title	Start Date	Final Date	Previous Expenditure ($)	2023 Budget ($)	Subsequent Spending ($)	Total Estimate ($)
C0020830	85S-401 Cape Smokey Build to Roadside	2020/10	2024/12	696,038	6,978	151,542	854,558
C0031119	96H-412-Dufferin Mines Rd Rebuild	2021/03	2024/12	6,888	90,328	710,736	807,952
C0027611	67C-411 - Highway 252 BTR	2020/05	2024/09	634,245	121,258	-	755,503
C0031166	2021 Downline PCB Replacements	2021/01	2024/12	359,749	103,378	253,900	717,027
C0036886	65V-303 Lawrencetown Line Extension & Load Transfer	2021/10	2023/05	664,760	41,893	-	706,652
C0033444	63V-312 Stronach Mountain Phase Extension	2021/06	2024/12	109,043	267,482	304,028	680,553
C0011187	5N-301 - Masstown Road Rebuild Phase 2	2022/08	2023/04	643,772	26,626	-	670,398
C0031112	6S-225 - Townsend Street Conversion	2021/02	2024/11	440,302	9,554	208,663	658,519
C0043490	2022 Downline Asset PCB Replacements	2022/01	2024/11	10,028	239,885	385,807	635,720
C0015198	50V Kentville Aluminum Light Pole Replacement	2019/05	2024/12	236,375	73,188	309,652	619,214
C0026043	9H-221 Conversion - Jubilee Road Area	2020/02	2023/02	317,518	257,032	-	574,550
C0042586	59C-402 St. Peters Rebuild	2022/03	2024/10	15,820	430	555,909	572,159
C0043230	65V-301 Nictaux West Reconductor	2022/02	2024/02	162	64,005	477,333	541,501
C0031402	559W-331 Molega Lake Rd Conversion	2022/01	2024/12	550	458,568	64,564	523,681
C0008740	Canso Distribution System Asset Replacement	2019/12	2024/04	284,801	164,499	73,659	522,959
52205	30N-412 Hwy 242 Fundy Shore Rebuild	2018/02	2024/03	437,781	12,750	71,052	521,583
C0004138	50W-412GA Port Medway Line Extension	2021/11	2024/11	5,139	196,202	300,242	501,582
C0042186	100C-421 - Harvre Boucher Rebuild	2022/01	2022/12	17,876	380,312	101,164	499,352
C0042608	2C-402 - Troy BTR	2022/01	2022/12	12,991	14,313	458,131	485,435
52229	14H-New Edinburgh Phase Extension	2019/08	2024/05	51,459	271,924	161,708	485,091
C0042426	11S-411 Coxheath Rebuild Phase 2	2022/01	2024/02	166,478	316,612	-	483,090
C0031113	61N-204 Townsend Avenue Conversion	2021/02	2025/06	26,328	1,277	453,610	481,214
C0039811	2C-402 - Route 19 Insulator Replacement	2021/09	2024/11	330,992	121,756	-	452,748
C0031403	101W Port Mersey Feeder Exits	2022/09	2024/11	2,410	193,752	252,531	448,693
C0031296	67C-411GBA Little Mabou Rebuild	2022/03	2024/12	17,666	45,037	351,905	414,609
C0011189	2H-411 - Cowie Hill UG System Replacements Part 3	2019/05	2024/12	49,941	2,237	352,447	404,625
C0031297	709H-221 Bedford 4kV Conversion	2021/03	2024/10	13,144	262,576	128,198	403,918
C0043951	Washmill Lake Drive Line Extension	2022/01	2022/12	104,366	159,913	98,829	363,108
C0031148	Metro-Stack insulator replacements	2020/10	2024/03	298,678	52,158	-	350,836
C0041955	2022 Hydraulic Recloser Replacements	2022/01	2024/05	80,308	256,651	-	336,958
C0042606	67C-411GBA West Mabou Harbour Rebuild	2022/01	2024/10	25,792	15,150	294,464	335,405

Figure 19: Distribution Carry-Over Capital Spending Summary

CI#	Project Title	Start Date	Final Date	Previous Expenditure ($)	2023 Budget ($)	Subsequent Spending ($)	Total Estimate ($)
C0043110	11S-305 - Kenwood Drive Roundabout	2022/06	2023/10	3,745	330,854	-	334,599
C0031107	55V-314G-Aylesford East Reconductor	2022/07	2024/08	1,207	116,311	208,622	326,141
C0033429	1H-403 Targeted UG Replacements	2020/11	2023/01	294,701	4,475	-	299,176
C0041948	87W-312 Targeted Device Replacements	2022/02	2024/12	3,200	99,544	189,815	292,559
C0031110	89W-303-Oakland Rd Water Crossing	2021/02	2023/05	268,468	5,176	-	273,644
C0043510	2C-402 - Little Judique Reinsulate	2022/03	2024/11	183,856	85,725	-	269,580
C0044090	2022 Vault Upgrade	2022/01	2023/03	160,410	96,560	-	256,969
C0031300	9H-223 North St Conversion	2021/05	2024/10	256	86,502	162,435	249,192
C0033507	Underground Switch Replacements	2020/11	2023/06	65,931	176,805	-	242,736
C0041946	2022 Automatic Sleeve Replacements	2022/01	2024/03	44,620	125,185	34,851	204,656
C0019579	7N-301 ICP	2019/08	2023/04	158,221	38,023	-	196,244
C0031289	10H-231-South Park St and Wright Ave 4kV Conversion	2021/11	2024/12	-	1,120	193,982	195,102
C0039986	2022 113H Feeder Exit Cable Replacements	2021/05	2023/12	125,466	66,633	-	192,099
C0041957	2022 Substation Animal Guards	2022/01	2024/12	5,645	81,519	101,556	188,719
C0038727	22C-402 - Feeder Exit Replacement	2021/04	2024/11	80,322	89,258	-	169,580
C0031305	37N-413-HWY 2 Rebuild - Newville Lake	2021/01	2024/12	12,730	153,030	-	165,759
C0041947	2022 Cutout Replacements	2022/01	2024/06	66,676	90,678	-	157,355
C0041953	2022 Recloser Remote Connectivity	2022/01	2023/12	81,762	62,986	-	144,748
C0041954	2022 New Branchline Reclosers	2022/01	2023/06	97,461	40,709	-	138,170
C0042287	82V-403 Elmsdale River Crossing Rebuild	2022/01	2024/11	21,427	107,454	-	128,881
C0011180	23W Feeder Exit Cable Replacement	2019/10	2024/12	23,358	23,864	75,242	122,464
C0006178	84W-302 Subsea Cable Removal and UG Cable Replacement	2018/02	2023/12	19,191	101,592	-	120,782
Total Distribution Carry-Over Spending				**168,608,483**	**29,016,194**	**15,178,547**	**212,803,224**

8.2 Distribution – New 2023 Capital Items for ACE Plan Approval

Figure 20: Distribution - New 2023 Capital Items for ACE Plan Approval

Tab #	CI#	Project Title	2023 Budget	Project Total
	Distribution Plant			
D01	C0050836	2023 Padmount Replacement Program	414,581	1,309,551
	Total Distribution New Spending		**$414,581**	**$1,309,551**

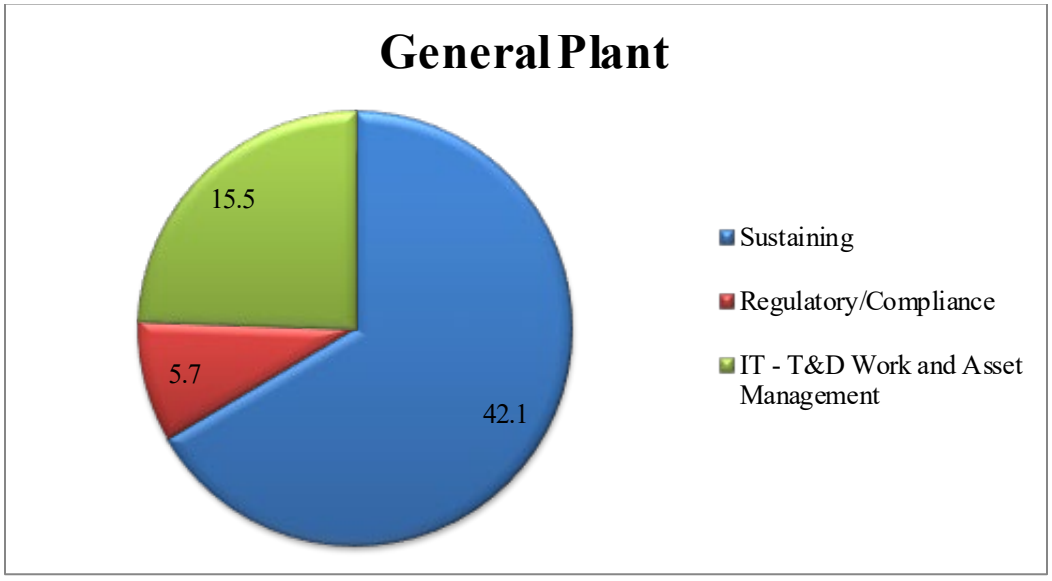
9.0 GENERAL PLANT

General plant includes information technology, computer infrastructure, operational technology (OT), and communication equipment, which comprise the majority of capital expenditures incurred under this function. Other items such as office equipment, vehicles, and construction equipment are also included. General plant also includes buildings except generating and substation facilities. General plant infrastructure investment is required to sustain and enhance NS Power's cross-functional foundational tools and facilities that are critical to continue to provide safe, reliable, and cost effective energy to customers.

Figure 21 provides a breakdown of the 2023 general plant spend by investment type.

Figure 21: 2023 General Plant Spend by Investment Type

(Millions of dollars)



General plant capital investment in 2023 is primarily in Information Technology and Operational Technology. The approximately $63 million general plant capital investment plan for 2023 is summarized in **Figure 22** below.

Figure 22: Summary of 2023 General Plant Capital Investments

(Millions of dollars)

i	2023 capital spending for projects with total estimated project spending greater than $1,000,000 for which approval will be sought subsequent to the filing of the 2023 ACE Plan. (As provided in Section 5.3)	13.0
ii	New capital spending for projects with total estimated spending less than $1,000,000 for which approval is not sought. (As provided in Section 5.4)	7.8
iii	Point Aconi Generating Station capital spending. (As provided in Section 5.5)	0.1
iv	Carry-over capital spending. (As provided in Section 9.1)	24.0
v	Routine capital spending. (As provided in Section 10)	18.5
	Total 2023 General Plant Capital Investment Plan	63.3
	Request for ACE Approval (Item v)	18.5

Note 1: Totals may be off due to rounding.

9.1 General Plant – Carry-Over Capital Spending Summary

Figure 23: General Plant - Carry-Over Spending Summary

CI#	Project Title	Start Date	Final Date	Previous Expenditure ($)	2023 Budget ($)	Subsequent Spending ($)	Total Estimate ($)
C0011378	Route Network Upgrade	2019/07	2024/12	3,756,603	1,394,167	968,915	6,119,684
C0021109	2020 RTU Deployment Project	2020/10	2024/12	2,645,565	2,140,979	744,341	5,530,885
C0041994	NERC CIP 2022*	2022/03	2024/02	318,049	873,263	-	1,191,311
52308	2018/2019 RTU Replacements Program	2022/01	2022/12	648,734	56,310	-	705,044
C0002130	ADMS Distribution Fault Location	2018/01	2023/12	316,369	199,732	-	516,101
C0041546	AMO Lequille Telecom Upgrade	2022/01	2024/02	41,610	331,513	-	373,123
C0032143	GIS Underground Asset Modelling	2021/03	2025/06	63,936	307,891	-	371,827
C0021645	Tusket Telecom Upgrades	2020/01	2023/06	270,606	5,237	-	275,844
	Total Telecommunications			**$8,061,472**	**$5,309,091**	**$1,713,256**	**$15,083,819**
46075	IT - T&D WAM Phase 2 - Work Management and Scheduling & Dispatch	2015/11	2023/12	40,351,833	15,481,160	-	55,832,994
49480	IT - Data Centre Disaster Recovery	2016/05	2023/05	6,252,970	105,165	-	6,358,135
C0005498	IT - Endpoint Security	2018/01	2023/12	755,092	603,673	-	1,358,765
C0030987	IT - NERC CIP Environment Refresh*	2021/01	2023/10	1,233,310	106,041	-	1,339,351
C0011168	IT - Firewall Perimeter Refresh	2019/01	2023/12	877,166	81,150	-	958,317
51483	IT - Public Key Infrastructure Certificate Authority	2017/05	2024/03	908,185	4,791	-	912,977
C0013718	AMO Run-up Optimization Tool	2018/08	2023/05	374,496	21,829	-	396,325
C0011111	IT - ADMS Maintenance Release 2021	2021/06	2023/07	100,013	251,084	-	351,097
C0051996	IT - MFA for VPN	2022/07	2023/07	213,000	97,292	-	310,291

Figure 23: General Plant - Carry-Over Spending Summary

CI#	Project Title	Start Date	Final Date	Previous Expenditure ($)	2023 Budget ($)	Subsequent Spending ($)	Total Estimate ($)
C0046391	IT - Cheque Processing Upgrade	2022/02	2023/07	191,956	108,823	-	300,779
C0048790	IT - Home Electrification	2022/04	2023/05	223,818	68,760	-	292,578
C0052734	IT - Secure System Development Cycle	2022/08	2023/04	148,895	33,459	-	182,354
C0055355	IT - Communications Newsroom	2022/11	2023/06	88,478	68,464	-	156,942
	Total Computers			**$51,719,213**	**$17,031,691**	**$0**	**$68,750,904**
C0023622	AMO Substation and Transmission Asset Performance Management Program	2019/11	2023/07	2,142,299	149,554	-	2,291,853
C0023623	AMO Distribution Asset Performance Management Program	2022/01	2022/12	1,190,155	548,314	-	1,738,470
C0037787	Fish Detection System Pilot	2021/03	2023/12	617,629	132,655	-	750,285
C0020783	AMO Climate Change Management System	2019/07	2023/05	518,840	6,000	-	524,840
C0018485	AMO Wind Asset Management Implementation	2019/05	2023/04	458,287	8,063	-	466,350
C0019038	AMO Hydro Water Management	2019/05	2023/12	278,539	128,268	-	406,807
C0053754	AED Purchases - Field Operations	2022/12	2023/04	312,389	31,697	-	344,087
C0045432	AMO - RBI Program Management System	2021/12	2024/03	303,206	30,721	-	333,927
C0031203	2021 Telecom Building Replacement	2022/01	2022/12	198,843	125,137	-	323,980
C0050692	AMO CMS T&D Expansion	2022/06	2023/12	35,522	222,258	-	257,779
C0021283	AMO T&D Telecom Upgrades	2019/07	2023/11	200,674	37,737	-	238,411
C0044010	Cape Breton Fleet Garage P&A	2022/10	2023/08	208,858	29,278	-	238,136
C0031462	AMO Environmental Event Response Interface	2020/07	2023/04	215,722	2,553	-	218,275
C0026682	EOC Facility Upgrades	2021/01	2023/09	172,251	16,488	-	188,739
C0045850	AMO PP NERC Program Tools*	2022/01	2022/12	106,202	50,929	-	157,131
C0019883	AMO HYD Dam Safety Mobility	2019/06	2023/06	109,582	4,329	-	113,911
C0041966	2022 - Electric Vehicle Transition	2022/01	2022/12	-	105,000	-	105,000
C0043310	AMO Technology Environment Upgrade	2022/04	2023/02	49,765	5,514	-	55,279
C0020339	AMO Risk Repository Tool	2022/10	2023/10	1,999	39,662	-	41,660
	Total Other General Plant			**$7,120,764**	**$1,674,156**	**$0**	**$8,794,920**
	Total General Plant Carry-Over Spending			**$66,901,449**	**$24,014,939**	**$1,713,256**	**$92,629,643**

*Capital Item Related to NERC and/or NPCC Standards

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10.0 ROUTINE CAPITAL PROGRAM

NS Power's routine capital program is for recurring annual expenditures of like-for-like replacement of equipment, additions to existing equipment base resulting from system growth, and addition of customers to the system. This section details all routine capital expenditures for generation, transmission, distribution and general plant asset classes. NS Power seeks NSUARB approval of the 2023 routine capital program in the amount of approximately $126.0 million.

10.1 Routine Capital Spending by Function Yr/Yr

Figure 24: Routine Capital Spending by Function Yr/Yr

	2021 Actual	2022 Budget	2022 Actual	2023 ACE Plan
Generation				
Generation Equipment Replacements	$3,818,224	$4,016,295	$3,967,925	$3,966,819
Generation Other Hydro	787,160	788,225	800,378	1,260,063
Generation Other Thermal	274,342	343,057	295,259	240,188
	$4,879,726	$5,147,576	$5,063,563	$5,467,070
Transmission				
Transmission Substation Replacement, Add'ns/Mod'ns	$3,302,684	$4,005,269	$4,105,825	$4,092,848
Primary Equipment Spares	345,273	300,000	71,543	300,000
Protection Modification & Replacement	1,066,942	978,162	872,765	996,925
Transmission Line Replacement, Add'ns/Mod'ns	7,534,812	7,623,023	10,724,802	7,899,868
Transmission Right-of-Way Widening	696,809	588,035	591,795	595,310
	$12,946,520	$13,494,488	$16,366,730	$13,884,951
Distribution				
Meters	$2,219,927	$2,440,694	$2,414,071	$4,761,442
Distribution Upgrades and Replacement	33,905,909	31,944,113	140,293,555	39,975,883
New Customers	36,456,685	31,245,970	40,829,118	38,463,998
Joint Use	5,578,583	4,387,955	4,084,375	4,437,123
Distribution Right-of-Way Widening	154,753	588,035	(6,015)	591,500
	$78,315,857	$70,606,767	$187,615,103	$88,229,945

Figure 24: Routine Capital Spending by Function Yr/Yr

	2021 Actual	2022 Budget	2022 Actual	2023 ACE Plan
General Plant				
Work Vehicles	$10,811,803	$10,711,180	$10,211,309	$9,800,315
Tools and Test Equipment	1,876,968	1,690,449	1,684,591	2,243,480
Telecommunications	1,097,471	1,300,675	1,204,244	1,325,968
Computing Asset Management**	1,993,268	1,958,756	2,211,257	1,973,143
Property Improvements and Furniture	3,633,729	4,345,000	4,408,189	1,840,504
Other	1,080,107	1,278,686	1,238,404	1,271,963
	$20,493,346	$21,284,746	$20,957,993	$18,455,372
Total Routine Capital Spending	**$116,635,450**	**$110,533,578**	**$230,003,389**	**$126,037,338**

Note: The entire routine program totals $126.6 million including Point Aconi routines. The totals presented above and in the following information do not include Point Aconi routines.

**There was an incorrect charge to this routine to put it into an ATO position as of December 31, 2022. The charge will be reversed in 2023 which will remove the routine from an ATO position.

10.2 Routine Capital Spending Project Breakdown Yr/Yr

Figure 25: Routine Capital Spending Project Breakdown Yr/Yr

Project #	CI #	Project Title	2021 Actual	2022 Budget	2022 Actual	2023 ACE Plan
G001	10634	CT - Routine Equipment Replacements	$545,458	$360,687	$538,457	$308,897
H001	11622	HYD - Routine Equipment Replacement	925,430	795,845	1,033,382	831,544
H004	27867	HYD - Roofing Routine	53,254	100,878	18,346	105,924
	23428	GS - Routine Capital	6,881	-	6,331	-
S001	10645	POT - Routine Equipment Replacement	176,942	169,465	155,270	175,200
	10673	TRE - Routine Equipment Replacement	426,414	427,974	538,503	335,758
	43646	PHB - Routine Equipment Replacement	125,002	98,365	74,648	125,720
	10621	TUC - Routine Equipment Replacement	282,386	250,860	365,126	297,500
	10626	LIN - Routine Equipment Replacement	410,936	389,087	379,712	407,419
S004	27856	TRE - Roofing Routine	6,824	99,622	5,448	91,755
	27855	POT - Roofing Routine	86,159	98,719	39,420	178,185
	27854	TUC - Roofing Routine	4,144	51,495	52,400	-
	27857	LIN - Roofing Routine	90,606	157,959	102,802	-
W001	41830	Wind - Routine Equipment Replacement	677,788	1,015,339	658,080	1,108,916
	Generation Equipment Replacements Total		**$3,818,224**	**$4,016,295**	**$3,967,925**	**$3,966,819**

Figure 25: Routine Capital Spending Project Breakdown Yr/Yr

Project #	CI #	Project Title	2021 Actual	2022 Budget	2022 Actual	2023 ACE Plan
H005	35583	HYD - Oil Release Risk Assessment	$584,450	$599,285	$604,025	$425,153
H006	35584	HYD - Gate Refurbishment	202,711	188,940	196,354	198,390
	C0053718	HYD - Dam Safety Routine*	-	-	-	636,520
	Generation Hydro Total		**$787,160**	**$788,225**	**$800,378**	**$1,260,063**
S005	33871	TUC - Heat Rate Routine	$84,969	$88,920	$81,022	$78,232
	33867	POT - Heat Rate Routine	40,445	88,622	71,172	89,167
	33869	TRE - Heat Rate Routine	107,015	79,732	58,673	72,790
	33863	LIN - Heat Rate Routine	41,914	85,782	84,392	-
	Generation Thermal Total		**$274,342**	**$343,057**	**$295,259**	**$240,188**
T003	23120	Provincial - Trans Substation Primary	$2,316,950	$3,150,711	$3,284,682	$3,220,490
T004	23121	Provincial - Substation Additions & Replacements	985,734	854,557	821,144	872,358
	Transmission Subs Replace, Adds/Mods Total		**$3,302,684**	**$4,005,269**	**$4,105,825**	**$4,092,848**
T018	14973	Primary Equipment Spares	$345,273	$300,000	$71,543	$300,000
	Primary Equipment Spares Total		**$345,273**	**$300,000**	**$71,543**	**$300,000**
T016	14841	Protection Modification & Replacement	$1,066,942	$978,162	$872,765	$996,925
	Protection Modification & Replacement Total		**$1,066,942**	**$978,162**	**$872,765**	**$996,925**
T001	23115	Provincial Transmission Line Replace	$2,017,424	$2,178,529	$5,188,587	$2,355,834
T011	23118	Provincial Planned Trans Line Replacement	5,517,387	5,444,494	5,536,215	5,544,034
	Transmission Line Replacements Total		**$7,534,812**	**$7,623,023**	**$10,724,802**	**$7,899,868**
T010	43827	Transmission Right of Way Widening	$696,809	$588,035	$591,795	$595,310
	Transmission Right-of-Way Widening Total		**$696,809**	**$588,035**	**$591,795**	**$595,310**
D009	26496	Meter Routine	$2,219,927	$2,440,694	$2,414,071	$4,761,442
	Meters Total		**$2,219,927**	**$2,440,694**	**$2,414,071**	**$4,761,442**
D005	23158	Unplanned Replace Deteriorated	$19,781,007	$17,058,077	$17,884,715	$19,914,854
D006	23135	Regulatory Replacements - Province	2,022,473	2,066,763	1,611,963	2,390,288
D008	23361	Provincial Storm	2,565,559	3,901,717	111,949,935	8,513,734
D051	29038	System Performance Improvement Routine	338,283	601,492	158,113	611,148

Figure 25: Routine Capital Spending Project Breakdown Yr/Yr

Project #	CI #	Project Title	2021 Actual	2022 Budget	2022 Actual	2023 ACE Plan
D055	23137	Planned Replacement Of Distribution	9,198,587	8,316,064	8,688,829	8,545,860
	Distribution Upgrades and Replacement Total		**$33,905,909**	**$31,944,113**	**$140,293,555**	**$39,975,883**
D004	26716	New Customer Upgrades	$7,636,889	$7,700,269	$7,695,167	$8,232,273
D018	23511	Primary Equipment Spares - Distribution	159,386	156,337	5,869	153,000
D061	39766	New Customers - Residential	20,782,377	16,353,992	26,053,860	22,121,750
D062	39770	New Customers - Commercial	7,878,034	7,035,373	7,074,222	7,956,975
	New Customers Total		**$36,456,685**	**$31,245,970**	**$40,829,118**	**$38,463,998**
D007	23136	Contractual Replacements (Joint Use)	$5,578,583	$4,387,955	$4,084,375	$4,437,123
	Joint Use Total		**$5,578,583**	**$4,387,955**	**$4,084,375**	**$4,437,123**
D010	23127	Provincial Widening	$154,753	$588,035	($6,015)	$591,500
	Right of Way Widening Total		**$154,753**	**$588,035**	**($6,015)**	**$591,500**
P006	20945	Replacement and Additional Work Vehicles	$332,009	$300,000	$433,011	$300,000
P009	16192	Mobile Transformer & Track Routine	-	-	183	-
P063	39304	Class 3 Work Vehicle Replacements	305,156	300,000	187,938	-
P062	39305	Work Vehicle Replacements	7,949,950	7,831,180	7,459,761	7,250,315
P061	40236	Transportation Vehicle Replacements	2,224,689	2,280,000	2,130,416	2,250,000
	Work Vehicles Total		**$10,811,803**	**$10,711,180**	**$10,211,309**	**$9,800,315**
P002/P016		Meter Shop - Tools and Equipment	$1,763,609	$1,577,054	$1,511,189	$2,124,416
P015		Hydro Production Tools, Test Equipment	113,360	113,395	173,402	119,064
	Tools and Test Equipment Total		**$1,876,968**	**$1,690,449**	**$1,684,591**	**$2,243,480**
P025	16365	Mobile Radio Routine	$208,595	$243,772	$169,036	$248,232
P027	16551	Telecommunication Radio and Fibre Optics	188,994	197,971	245,602	201,550
P028	16550	Telecommunication Systems Replace & Modifications	526,365	673,933	612,497	691,186
P814	38243	Telecommunications Spares	173,517	185,000	177,108	185,000
	Telecommunications Total		**$1,097,471**	**$1,300,675**	**$1,204,244**	**$1,325,968**
P010	16073	SCADA Improvements Routine	$103,166	$112,268	$95,462	$108,300
P031	29114	NS Power IT Infrastructure**	1,745,038	1,633,218	1,985,014	1,699,910
P040	28522	CT's DCMS Routine	15,906	21,951	5,473	18,658

Figure 25: Routine Capital Spending Project Breakdown Yr/Yr

Project #	CI #	Project Title	2021 Actual	2022 Budget	2022 Actual	2023 ACE Plan
	25667	POT - DCMS Equipment Replacement Routine	49,864	50,000	4,665	34,000
	25626	TRE - DCMS Equipment Replacement Routine	28,710	45,000	3,044	27,525
	25646	TUC - DCMS Equipment Replacement Routine	39,295	61,320	74,868	55,000
	25668	LIN - DCMS Equipment Replacement Routine	11,290	35,000	42,731	29,750
	Computing Asset Management Total		**$1,993,268**	**$1,958,756**	**$2,211,257**	**$1,973,143**
P001/P030		Property Improvement and Furniture	$3,633,729	$4,345,000	$4,408,189	$1,840,504
	Property Improvement and Furniture Total		**$3,633,729**	**$4,345,000**	**$4,408,189**	**$1,840,504**
P012/P041		Other (HYD - Security Improvement & FAC - Land Acquisition)	$457,541	$549,286	$741,338	$566,696
P018		Environment Equipment Replacement Routine	68,886	100,000	126,291	100,000
P816		FAC Enviro Property Remed Routine	202,344	215,400	71,934	215,400
P815		FAC Environment Site Assess Routine	145,282	214,000	142,231	214,000
P032		Purchasing Equip & Warehouse Routine	206,053	200,000	156,609	175,867
	Other Total		**$1,080,107**	**$1,278,686**	**$1,238,404**	**$1,271,963**
	Routine Capital Spending		**$116,635,450**	**$110,533,578**	**$230,003,389**	**$126,037,338**

Note: Point Aconi amounts have been removed to represent the spend amount that requires NSUARB approval.

*In 2023, NS Power has added a Hydro Dam Safety Routine. This routine is required to address dam safety items such as upgrading dam crests and replacing rip rap/dam protection that have been identified in dam safety reviews and inspections.

**There was an incorrect charge to this routine to put it into an ATO position as of December 31, 2022. The charge will be reversed in 2023 which will remove the routine from an ATO position

10.3 Like-for-Like Routine Replacements

The NSUARB's 2013 ACE Plan Order Directive 2 provided as follows:

> The Board directs NSPI, in the next ACE Plan application, to analyze the routine expenditures to determine what are the "like-for-like" totals. NSPI is further

directed to explain why those totals, if they are similar in magnitude to the Board's analysis, are growing at an annual rate in excess of inflation. [12]

A summary of NS Power's total routine and like-for-like routine spending is provided in **Figure 26** below.

Figure 26: Annual Cost of Like-for-Like Routine Replacements

NOVA SCOTIA POWER ($M)	2019 Actuals	2020 Actuals	2021 Actuals	2022 Actuals	2023 ACE
Total Routine Spending	$116.3	$99.3	$116.6	$230.0	$126.0
Less:					
New Customers	23.9	29.2	36.5	40.8	38.5
System Growth and Performance	2.8	1.8	2.4	1.9	2.9
Other	1.3	1.2	1.5	1.7	1.5
Like-for-Like	$88.4	$67.2	$76.3	$185.6	$83.1
Work Vehicles (Like-for-like)	9.7	6.1	10.8	10.2	9.8
Net (Like-for-like)	$78.6	$61.0	$65.5	$175.4	$73.3

Routine classifications are determined by the primary classification of each routine project. If the majority of the work completed under the routine is like-for-like replacements, the routine is classified as like-for-like. New Customer routines, System Growth and Performance routines (such as heat rate, system improvement, and right-of-way widening routines), and other routines (such as environmental assessment routines) were not included in the like-for-like totals.

10.4 2023 Routine Capital Spending Project Details

Transmission

Figure 27: Transmission Substation Replacements, Additions and Modifications	**2023 ACE Plan Forecast**
T003 Provincial: Transmission Substation Primary Equipment	
Unplanned Replacements	$2,170,490

[12] NSUARB-P-128.13, 2013 Annual Capital Expenditure Plan, NSUARB Order, June 4, 2013.

Transmission

Figure 27: Transmission Substation Replacements, Additions and Modifications	2023 ACE Plan Forecast
Transformer Gasket Replacement	150,000
Substation Insulator Replacement	60,000
Breaker Gas Seal Replacements	40,000
Insulating Fluids Replacement	80,000
Structure and Footing Remediation	320,000
Substation Ground Grid Replacements	220,000
Battery Bank and Charger Replacements	180,000
Total T003 Provincial: Transmission Substation Primary Equipment	**$3,220,490**
T004 Provincial: Substation Additions & Replacements	
Unknown Additions	$412,358
Backup Station Services	180,000
Lightning Arrestors	150,000
Add Substation Switches	130,000
Total T004 Provincial: Substation Additions & Replacements	**$872,358**
Total Transmission Substation Replacements, Additions and Modifications	**$4,092,848**

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Figure 28: Primary Equipment Spares

T018 Primary Equipment Spares	2023 ACE Plan Forecast
Spare Current Transformer (CT) Replenishment	$80,000
Spare Pressure Release Devices	40,000
Transformer Auxiliary Devices	50,000
Spare Capacitor Bank Breaker	130,000
Total Primary Equipment Spares	**$300,000**

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Figure 29: Protection Modification and Replacement

T016 Protection Modification & Replacement	2023 ACE Plan Forecast
Replace LCBII relays at 50W, 104W, 101W	$30,000
Replace LCBII relays on L-6507 at 50N and 79N	55,000
Replace LCBII relays on L-6508 at 50N and 79N	55,000

Figure 29: Protection Modification and Replacement

T016 Protection Modification & Replacement	2023 ACE Plan Forecast
L-5512 Protection Replacement at 95H	65,000
50W L-6020 Replace Protection Panel	80,000
1C Replace L-6521 Primary Protection	15,000
101S Replace SER/RTU	30,000
9W Replace SER	20,000
67N 230 KV SPS Replacement	8,000
85S Replace Pilot Wire Relay for GT2	40,000
103H-T81 Replace "A" Protection	30,000
67N 345 kV Replace Terminal Server 67N2-TS1	2,000
UFLS Modifications	8,000
67N 230 kV Replace Terminal Server 67N1-TS1	2,000
5S Replace SER	75,000
5S Replace L-6545 Line Protection	80,000
5S Replace L-6549 Line Protection	80,000
103H GIC Monitor Replacement	20,000
47C SPS Modification	15,000
6P-MS Replace Relays	40,000
101S-R411 Relay Replacement	40,000
101S-R412 Relay Replacement	40,000
120H Replace L-7009 A Protection	20,000
85S/5S Replace Teleprotection	20,000
15V Automate L-5535 Summer/Winter Setting Change	8,162
99W Replace SER	80,000
Unplanned Relay Failure	38,763
Total Protection Modification & Replacement	**$996,925**

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Figure 30: Transmission Line Replacement, Additions, Modifications

		2023 ACE Plan Forecast
T001 Provincial Transmission Line Replacement (Unplanned)		
This routine is budgeted based on historical T001 investment		**$2,355,834**
T011 Provincial- Planned Transmission Line Replacement		
LINE #	**Description**	
L5036	Berwick Tap 57V to Berwick 52V	$76,422
L5039	Lakeside 103H to Spryfield 20H	$66,417
L5042	Farrell St. 99H to Albro Lake 62H	$30,119
L5050	Sissiboo Hydro 15V to Fourth Lake Hydro 91V	$357,974

Figure 30: Transmission Line Replacement, Additions, Modifications

		2023 ACE Plan Forecast
L5533	Gulch Hydro 13V to Conway 77V	$298,993
L5560	Victoria Jct. 2S to Townsend St. 4S	$237,206
L5561	Victoria Jct. 2S to Seaboard 1S	$364,530
L5564	Victoria Jct. 2S to Keltic Dr. 11S	$256,870
L5571	Victoria Jct. 2S to Whitney Pier 82S	$123,599
L5573	Victoria Jct. 2S to Lingan Mine 80S	$638,295
L5576	Gannon Rd. 3S to Keltic Dr. 11S	$116,769
L6005B	Sackville 90H to Lucasville 131H	$228,445
L6050	6001 Holland Rd. Tap L to Aerotech Park 127H	$309,704
L6051	Brushy Hill 120H to St. Croix 17V	$259,346
L6543	Port Hastings 2C to Port Hastings 3C	$56,538
L6548	Port Hastings 2C to Port Hastings 3C	$220,439
L6552	Antigonish 4C to Glen Dhu 93N	$321,319
Various	1-6 Month Inspection Driven Work	$1,581,049
T011 Provincial- Planned Transmission Line Replacement		**$5,544,034**
	Transmission Line Replacement Total	**$7,899,868**

T010 – Provincial: Transmission Right of Way Widening

In its 2017 ACE Plan Order, the Board directed NS Power as follows:

> The Board directs NSPI to update the cost estimates for vegetation management and right-of-way widening projects in the 2018 ACE Plan (and future years) based on actual historical costs incurred for this project.[13]

NS Power confirms that the cost estimates for vegetation management and right-of-way widening projects in the 2023 ACE Plan are based on actual historical costs incurred. This forecast is also developed based on the known level of widening in the current year as set out in **Figure 31** below:

[13] M07745, NS Power 2017 Annual Capital Expenditure Plan, NSUARB Order, April 4, 2017.

Figure 31: T010 Forecast by Line

> 69 kV	
L-7003	$154,781
L-6516	200,024
L-6012	89,297
L-6020	151,209

Total T010	$595,310

The Board's 2016 ACE Plan Order provided the following directive:

> The Board directs that the Routine for Transmission widening be treated as a separate project, and not a routine, in future ACE Plan Applications. NSPI is to provide an annual progress report on the expenditure, works undertaken, results achieved and future plans as part of the annual ACE Plan submissions.[14]

CI C0052055 - 2023/2024 Transmission Right-of-Way Widening 69kV was submitted on December 5, 2022 in compliance with the Board's directive. With the addition of a separate capital work order for transmission Right-of-Way widening, the transmission vegetation management program is now carried-out under three broad initiatives:

1. Operating activities for transmission vegetation management;
2. Capital routine T010 - Transmission Right-of-Way Widening (for 138kV, 230kV and 345kV RoWs); and
3. New transmission rights-of-way widening individual capital projects (i.e. CI C0052055 for 69kV RoWs and subsequent phases).

Capital routine T010 remains for the widening of 138kV, 230kV and 345kV rights-of-way. This is the traditional scope of T010, but it has also previously included 69kV rights-of-way which are now assumed under CI C0052055 and subsequent phases. This was the scope of work included in

[14] M07176, NS Power 2016 Annual Capital Expenditure Plan, NSUARB Order, June 8, 2016, page 2. NS Power's annual progress report on the expenditure, works undertaken, results achieved and future plans can be found in the 2023 ACE Plan Reliability Directive in Section 11.1.5.

the $43.2 million eight-year program ($5.4 million per year), which the NSUARB approved in principle and directed NS Power to include in ACE Plan filings for final approval.[15] The 69kV work was removed from T010 but the budget for T010 remains approximately the same due to increased North America Electric Reliability Corporation (NERC) requirements at the other voltage levels (specifically 138kV).

Distribution

[15] M06321, Review of Nova Scotia Power Inc.'s (NSPI) state of preparedness and response to Post-Tropical Storm Arthur, NSUARB Supplemental Decision, September 21, 2015, page 16. M07176, NS Power 2016 Annual Capital Expenditure Plan, NSUARB Decision, June 8, 2016, pages 26-28.

Figure 32: Meters - D009 Meter Routine

Item#	Prg#	Meter Type	Meter Style	Description	2023 Forecast	Current Unit Cost ($)	Capital for meters ($)
1.0 Element, 120-240 volt							
	103	Form 3S (5 Jaw)	3450560	CP3SRA (HW4.1) 3S CL20 OPENWAY RIVA CENTRON POLYPHASE METER. 120V-277V. BID	480	159.60	76,608
	104	Form 3S (5 Jaw)	3450564	CP3SRA (HW4.1) 3S CL20 OPENWAY RIVA CENTRON POLYPHASE METER. 120V-277V. (TOU)BID	192	159.60	30,643
1.5 Element, 120-240 volt							
	102	C2SRD TOU/BID	3450512	C2SRD (HW 4.1) 2S CL200 OPENWAY RIVA CENTRON W/ DISCONNECT (TOU)BID	7500	111.72	837,900
	102	C2SR	3450569	C2SR (HW4.1) 2S CL200 OPENWAY RIVA CENTRON "NO DISCONNECT"	1440	111.72	160,877
2.0 Element, 120-480 volt							
	101		3450511	CN2SRD (HW 4.1) 12S CL200 OPENWAY RIVA CENTRON W/ DISCONNECT	5040	126.35	636,804
	102		3450513	CN2SRD (HW 4.1) 12S CL200 OPENWAY RIVA CENTRON W/ DISCONNECT (TOU)	240	126.35	30,324
	0		3450559	CP3SRA (HW4.1), 12S CL200 OPENWAY RIVA CENTRON POLYPHASE METER. 120V-277V	96	196.84	18,897
	103	45s	3450565	CP3SRA (HW4.1) 45S CL20 OPENWAY RIVA CENTRON POLYPHASE METER. 120V-277V	48	196.84	9,448
	103	45s	3450566	CP3SRA (HW4.1) 45S CL20 OPENWAY RIVA CENTRON POLYPHASE METER. 240-480V	4	196.84	787
3.0 Element, 120-347 volt							
	103	9s	3450561	CP3SRA (HW4.1) 9S/36S CL20 OPENWAY RIVA CENTRON POLYPHASE METER. 120V-277V	576	196.84	113,380
	104	9s	3450567	CP3SRA (HW4.1) 9S/36S CL20 OPENWAY RIVA CENTRON POLYPHASE METER. 120V-277V (TOU)	4	196.84	787
	103	16s	3450562	CP3SRA (HW4.1) 16S CL200 OPENWAY RIVA CENTRON POLYPHASE METER. 120V-277V	384	196.84	75,587
	103	16s	3450563	CP3SRA (HW4.1) 16S CL200 OPENWAY RIVA CENTRON POLYPHASE METER. 240V-480V	480	196.84	94,483

Figure 32: Meters - D009 Meter Routine

Item#	Prg#	Meter Type	Meter Style	Description	2023 Forecast	Current Unit Cost ($)	Capital for meters ($)
				Total Meters	**16484**		**2,086,525**
				Misc Meters "ION"	8	8,000	64,000
				Cellular Meters	20	900	18,000
				CT and PT requirements			320,000
				Wire, Adapters and switches			160,000
				CGR Batteries			250,000
				Total Materials			**2,898,525**
				Freight			**107,146**
				Applied Overhead			**970,971**
				Labour			**784,800**
				D009 Meters Total			**4,761,442**

1

1

Distribution Upgrades and Replacement

Figure 33: Distribution Upgrades and Replacement	2023 ACE Plan Forecast
D005 Unplanned Replacement Deteriorated Equipment	
This forecast is developed based on a five-year historical average of prior spending levels with an annual inflation of 3.5%, resulting in an estimated 9,317 persondays of work at a unit cost of $2,137/personday.	**$19,914,854**
D006 Regulatory Replacements	
This forecast is developed based on past experience or information from various government agencies. This amount could vary based on current year decisions by these agencies. This forecast is developed based on a five-year historical average of prior spending levels with an annual inflation of 3.5%.	**$2,390,288**
D008 Provincial Storm	
This forecast is developed based on a five-year historical average of prior spending levels with Extreme Event Day storms removed and an annual inflation of 3.5%. There can be significant variation in this amount based on yearly storm activity.	**$8,513,734**
D051 System Performance Improvement	
40H-304-Commodore Park Conductor Upgrade	235,608
59C-402 Chapel Island Recloser Upgrades	122,098
Recloser Control Upgrades	111,985
100C-421 Harvre Boucher Protection Upgrade	82,516
11S-411GA-Eskasoni Protection Upgrades	58,940
Total D051 System Performance Improvement	**$611,148**
D055 Planned Replacement of Distribution Equipment	
Bin Work (Work resulting from NS Power's distribution line inspection program that has been identified as requiring follow up within one year.)	3,278,247
Streetlight/service installation & removal (This funding is to support system upgrades required for streetlight installations and upgrades. This includes transformer installs, service upgrades and/or new pole installations.)	1,093,909
Field Driven Work	2,230,778
13N-311-Outram and HaveLock Rebuild	288,255
83V-303G-Black River Lake Build to Roadside	207,210
127H-Feeder Exit Cable Replacement	200,000
4C-432-Highway 4 Pole Replacement	190,000
2023 Manhole Covers Replacement	160,000
82V-403- Carroll's Corner bridge crossing	145,891
66V-201-Commercial Street Rebuild	141,621
2023 Manhole Equipment Replacement	128,000

Distribution Upgrades and Replacement

Figure 33: Distribution Upgrades and Replacement	2023 ACE Plan Forecast
33N-201-Canaan Rd-Stepdown Removal	125,476
62N-415-Trafalgar Road ICP	100,000
50N-410-Piedmont BTR	100,000
126H-312G-Murphy Rd Rebuild	88,273
82V-402H-Kelly Rd-Pole Replacement	68,200
Total D055 Planned Replacement of Distribution Equipment	**$8,545,860**
Distribution Upgrades and Replacement Total	**$39,975,883**

D005 Forecasting Approach

In its Decision relating to the 2019 Distribution Routines ATO, the Board directed NS Power as follows:

1. NS Power is to provide further breakdown of forecasting and overtime within future ACE/ATO filings in order to improve the transparency of reporting provided for the D005 Routine.

2. NS Power is to improve transparency in future ACE/ATO filings by including further information on how the historical large storm events have been incorporated into this Routine, and how they affect the ongoing forecast.[16]

In its Decision relating to the 2020 Distribution Routines ATO, regarding the D005 Routine, the Board directed NS Power to "provide further details on failed and damaged devices in future ACE Plan and ATO filings, including current and historical operational and financial data"[17].

The forecast for D005 for 2023 was developed based on the previous 5-year average for spend from 2018-2022 plus an annual inflation of 3.5%. This forecast resulted in an estimated 9,317

[16] M09656, NS Power 2019 Distribution Routines ATO, NSUARB Decision, October 21, 2020.
[17] M10182, NS Power 2020 Distribution Routines ATO, NSUARB Decision, December 13, 2021.

person days of work at a unit cost of $2,137/person day. Asset failures included in this routine can occur at any time of day, including outside of normal business hours. Failures necessitating a reactive response at these times results in crews responding to restore service on an overtime basis. Accordingly, this contribution from overtime labour is specifically included in the development of D005 forecasts. Historical details on failed equipment are provided in **Section 11.1.5**, Figure 59. While this information is not broken down by sub-routine (therefore does not provide specific details for D005), it provides a directional view of the most impactful equipment failures the Company is experiencing. Further detail will be provided as part of future ATO filings, as required. The following breakdown of annual regular labour and overtime spend are inputs into the 5-year average forecast.

Figure 34: 2018-2022 Spend in D005

Year	Regular Labour (PH)	Regular Labour $/PH	Overtime Labour (PH)	Overtime Labour $/PH
2018	45,199	$ 46.53	19,308	$ 93.06
2019	40,148	$ 47.46	23,723	$ 94.92
2020	43,864	$ 48.42	23,915	$ 96.83
2021	44,165	$ 49.38	29,630	$ 98.77
2022	38,170	$ 49.19	27,966	$ 98.38

This results in a forecast 2023 spend in D005 of the following:

Figure 35: Forecast 2023 Spend in D005

Year	Regular Labour (PH)	Regular Labour $/PH	Overtime Labour (PH)	Overtime Labour $/PH
2023	47,934	$ 50.36	26,604	$ 100.72

This forecasting approach inherently includes an accounting for the impacts of previous years' events, such as an increase of extreme event days, through the influence on the overall D005 spending in each previous reference year detailed above. This ultimately results in budgeted amounts for D005 that reflect the trend of impacts from individual reference years from 2018-2022. The resulting forecast D005 spend is dynamically adjusted as the number of impacts increase (or decrease) in the previous reference years. This supports an evolving response to

cumulative effects as trends emerge. The nature of individual replacements undertaken in a reactive manner under D005 do not support clear attribution specifically to cumulative effects from previous years but result in work in the current year as opposed to in-year effects. However, NS Power believes that the 5-year budgeting methodology presented here is a reasonable approach to account for the overall effects on D005 from storm activity in prior years.

New Customers

Figure 36: New Customers

	2023 ACE Plan Forecast
D004 New Customer Upgrades This forecast is developed based on a five-year historical average of prior spending levels for New Customer Upgrades with an annual inflation of 3.5%.	**$8,232,273**
D018 Primary Equipment Spares Distribution This forecast is developed based on the probable amount of distribution spare equipment required during the year.	**$153,000**
D061 New Customers - Residential This forecast is for the costs associated with new residential customers net of capital contributions. Costs include metered services, unmetered services, line extensions and underground services. This forecast is developed based on a three-year historical average of prior spending levels with an annual inflation of 3.5%.	**$22,121,750**
D062 New Customers - Commercial This forecast is for the costs associated with new commercial customers net of capital contributions. Costs include metered services, unmetered services, line extensions and underground services. This forecast is developed based on a five-year historical average of prior spending levels with an annual inflation of 3.5%.	**$7,956,975**
Total New Customers	**$38,463,998**

Joint Use

Figure 37: Joint Use

D007 Joint Use	2023 ACE Plan Forecast
This forecast is developed based on prior spending levels for both Joint Use requests from Nova Scotia Power's Joint Use Partner, Bell and communication utility requests and reflects the continued activities associated with the Internet for NS Program rolled out by the Province of Nova Scotia. This forecast is developed based on a three-year historical average of prior spending levels with an annual inflation of 3.5%.	**$4,437,123**

Distribution Right-of-Way Widening

In its 2017 ACE Plan Order, the Board directed NS Power as follows:

> The Board directs NSPI to update the cost estimates for vegetation management and right-of-way widening projects in the 2018 ACE Plan (and future years) based on actual historical costs incurred for this project.[18]

NS Power confirms that the cost estimates for vegetation management and right-of-way widening projects in the 2023 ACE Plan are based on actual historical costs incurred. This forecast is also developed based on the known level of widening in the current year.

The spend in this routine reflects the work that will be required to widen the rights-of-way to standard is noted in **Figure 38**.

Figure 38: Distribution of Right-of-Way Widening

Feeder Section	Geographic Location	Length (Km)	Managed Length (Km)	Avg Cost per Km	Cost	Contract Overhead	Total Segment Cost
4C-441	Antigonish	6.00	6.00	21,600	129,600	24,704	154,304
2C-402	Route 19, Inverness County	3.00	3.00	21,600	64,800	12,352	77,152
58C-403	Margaree	3.00	3.00	21,600	64,800	12,352	77,152
62N-413	Stellarton	4.00	4.00	21,600	86,400	16,470	102,870
73W-411	Bridgewater	5.00	5.00	21,600	108,000	20,587	128,587
Provincial	Various	2.00	2.00	21,600	43,200	8,235	51,435
Total Distribution Right-of-Way Widening							**$591,500**

Pursuant to CI 49611 - New Distribution Rights-of-Way Phase I, submitted to the NSUARB on November 1, 2016, Liberty Consulting Group's report on its review of NS Power's response to Post Tropical Storm Arthur (PTSA) included a recommendation that for distribution rights-of-way NS Power should "develop a comprehensive plan for reclaiming and/or widening the overgrown

[18] M07745, NS Power 2017 Annual Capital Expenditure Plan, NSUARB Order, April 4, 2017.

ROW corridors".[19] In its Supplemental Decision on September 21, 2015, the Board directed NS Power as follows:

> [36] A circumstance where it will take 32 years for the distribution vegetation management program to become sustainable causes the Board significant concern.
>
> //
>
> [38] The Board is intrigued by the stakeholder discussion concerning innovative financing options and directs NSPI to pursue that issue and report back to the Board the results of those discussions.[20]

In response to the Board's concerns, and in order to further reduce the likelihood of tree contact related outages like those during the PTSA event, NS Power increased the budget for the 2016 ACE Plan. NS Power's 2016 ACE Plan provided the following:

> NS Power is seeking approval as part of the 2016 ACE Plan of $3 million for the distribution widening routine, D010, in 2016. The $3 million comes from the portion of the annual $10.4 million that is spent on managing the vegetation in distribution ROWs to a sustainable state.[21]

In its 2016 ACE Plan Decision regarding D010, the Board directed NS Power as follows:

> …the Board assumes that NSPI has increased the distribution Routine budget by an amount of $2.4 million from the operating budget over the $600,000 in the 2015 ACE Plan. This means that NSPI is reducing its operating expenses by $2.4 million in 2016, thus increasing profits, with a corresponding increase in its rate base. This action will only increase rates which the Board does not approve. Accordingly, the Board reduces the routine budget for D010 to $600,000, to be in line with the 2015 ACE Plan amount.[22]

[19] M06321, Review of Nova Scotia Power Inc.'s (NSPI) state of preparedness and response to Post-Tropical Storm Arthur, Liberty Consulting Group, Comments on Review of NS Power's Storm Response, Exhibit A-4, September 9, 2014, page 7.
[20] M06321, Review of Nova Scotia Power Inc.'s (NSPI) state of preparedness and response to Post-Tropical Storm Arthur, NSUARB Supplemental Decision, September 21, 2015, page 14. NS Power responded with its proposal to increase spend in D010 in the 2016 ACE Plan.
[21] M07176, NS Power 2016 Annual Capital Expenditure Plan, November 12, 2015, page 72.
[22] M07176, NS Power 2016 Annual Capital Expenditure Plan, NSUARB Decision, June 8, 2016, page 18.

Consistent with prior ACE Plans, for the 2023 ACE Plan, NS Power has not increased the budget for D010 in response to the PTSA findings; rather, additional investment has been broken out into a separate capital work order, CI C0052056 - New Distribution Rights-of-Way Phase 8, which was filed with the Board on December 5, 2022. The distribution vegetation management program is now carried-out under three broad initiatives:

1. Operating activities for distribution vegetation management;
2. Capital Routine D010 - Distribution Right-of-Way Widening; and
3. New distribution rights-of-way individual capital projects (i.e. C0052056 and subsequent phases).

The scope of work completed under operating activities will continue to focus on existing right-of-way asset reclamation, urban cycle trimming in municipalities, reactive maintenance, hazard tree mitigation, vegetation removal during storm events, customer requested tree trimming, and maintaining sustainability of existing rights-of-way.

The scope of work completed under the D010 routine will continue to focus on widening of existing rights-of-way to the current standard beyond the Department of Nova Scotia Transportation and Infrastructure Renewal (NSTIR) right-of-way.

CI C0052056 and subsequent phases will establish new rights-of-way where none have previously existed.

General Plant

Figure 39: Work Vehicles	Quantity	Avg Unit Price	2023 ACE Plan Forecast
P006 Replacement and Additional Work Vehicles			
Reel and Pole Trailers	8	25,000	200,000
ATV / RTV	4	27,500	110,000
		Salvage	(10,000)
Total P006 Replacement and Additional Work Vehicles			**$300,000**

General Plant

Figure 39: Work Vehicles

	Quantity	Avg Unit Price	2023 ACE Plan Forecast
P061 Transportation Vehicle Replacements	41	57,878	2,373,000
		Salvage	(123,000)
			$2,250,000
P062 Work Vehicle Replacements	16	469,145	7,506,315
		Salvage	(256,000)
			$7,250,315
	Total Work Vehicles		**$9,800,315**

1

Figure 40: Tools and Test Equipment

Meter Shop Tools and Equipment	**$143,004**
Provincial Line Tools & Equipment	
Western Territory	125,000
North Eastern Territory	125,000
Cape Breton Territory	228,780
Central Territory	125,000
T&D Asset	526,491
System Maintenance	554,594
P002 Tools and Equipment Total	**$1,827,870**
P015 Hydro Production Tools & Test Equipment	**$119,064**
P016 Thermal Production Tools & Test Equipment	
POT Tools & Equipment	63,750
TUC Tools & Equipment	60,000
TRE Tools & Equipment	68,000
LIN Tools & Equipment	51,000
CT Tools & Equipment	23,796
PHB Tools & Equipment	30,000
P016 Thermal Production Tools & Test Equipment Total	**$296,546**
Tools and Test Equipment Total	**$2,243,480**

2

Figure 41: Telecommunication	2023 ACE Plan Forecast
P025 Mobile Radio	
Replacement radio equipment hardware and upgrades	87,000
Equipment repairs, antenna replacements and repairs	75,232
Mobile radio servers repairs and upgrades	45,000
Miscellaneous support for system	41,000
	$248,232
P027 Telecommunication Radio & Fibre Ops	
HVAC & Generator Upgrades	110,000
Radio Site repairs - Miscellaneous	54,550
Add Generator Alarms and Controls	17,000
Miscellaneous Upgrades and Replacements	20,000
	$201,550
P028 Telecommunication Systems Replace & Modifications	
Miscellaneous teleprotection equipment upgrades (as required)	28,000
Upgrade miscellaneous radio links (as required)	31,000
Misc. Telecom Equipment (as required)	42,836
Nokia Equipment Repairs and Support	21,000
Telecom engineering services	56,000
Telecom engineering support services	26,100
Battery Replacements	78,000
Replace Miscellaneous Power Supplies	8,000
UPS Replacements Various Sites	7,000
Network standardization documentation	26,000
Cable & Entrance Protection - Positron	16,000
Switched Communications - System Operations Phones	6,000
Replace Fibre Optic Equipment (NEC & ADC)	33,750
Install Fibre Links for telecom sites	125,000
Network Monitoring Upgrades	55,000
Alarm Commissioning for new sites into SCADA	55,000
Review and Update System Drawings and Records	30,450
Support Services for Nokia/ALU	27,200
Tower Lighting Upgrades	18,850
	$691,186

Figure 41: Telecommunication	2023 ACE Plan Forecast
P814 Telecommunications Spares	
Alcatel-Lucent MPR9500 Microwave Radio	50,000
Net Guardian Alarm Monitoring Equipment	15,000
7705 MPLS Router Spares	25,000
Ethernet Spares	4,000
MDS SD9, Transnet, INet	10,000
SEL 2505, 2506 Spares	10,000
RFL IMUX and 9745 Spares	10,000
Battery Charger Spare	10,000
RTU and Misc. Spares	51,000
	$185,000
Telecommunications Total	**$1,325,968**

1

Figure 42: Computing Asset Management	2023 ACE Plan Forecast
P010 SCADA Improvements	
This forecast is developed based on SCADA equipment/operator interfaces failures or modifications	
P010 SCADA Improvements Total	**$108,300**

P031 NS Power IT Infrastructure

Infrastructure Component	Asset Management Plan	Volume to be Refreshed	2023 ACE Plan Forecast
Voice and Data Network	Network Infrastructure & Equipment		90,000
Servers	Servers Refresh, Licenses, & Storage		115,000
Laptop and Desktop Computers, Personal Devices	Computers that have or will reach four (4) years old	400	750,000
	New laptop or desktop computers	100	200,000
	Mobile Devices	250	298,168
	Software & software licenses		30,000
	Application enhancements/development		100,536
Power Supplies	Replaced after 10 years		35,000
Accessories	Accessories		81,206
P031 NS Power IT Infrastructure Total			**1,699,910**

Figure 42: Computing Asset Management

		2023 ACE Plan Forecast
P040 DCMS Equipment Replacement		
	CT's DCMS Equipment Replacement	18,658
	POT DCMS Equipment Replacement	34,000
	TRE DCMS Equipment Replacement	27,525
	TUC DCMS Equipment Replacement	55,000
	LIN DCMS Equipment Replacement	29,750
		$164,933
	Computing and Asset Management Total	**$1,973,143**

1

Figure 43: Property Improvement and Furniture

		2023 ACE Plan Forecast
Property Improvement and Furniture		
P001	Building Protective Coatings	57,000
	Roofing & Emergency Refurbishment	127,500
	Grading / Drainage	121,000
	Fencing	67,500
	Pole Brow	28,000
	General Refurbishment Work	455,004
	Asphalt / Paving	95,000
	HVAC Improvements	303,500
	Substations	120,000
	Security Improvements	55,000
	Transformer Dock Improvements	40,000
	1H General Refurbishments	271,000
	Substation / Depot Improvements	100,000
	Property Improvement and Furniture Total	**$1,840,504**

2

Figure 44: Other

		2023 ACE Plan Forecast
Other		
P012	HYD - Security Improvements	524,196
P018	Environmental Equipment Replacement	100,000
P041	FAC - Land Acquisition Routine	42,500
P816	FAC - Environment Property Remediation	215,400
P815	FAC - Environment Site Assessment	214,000
P032	FAC - Equipment & Warehouse	175,867
	Other Total	**$1,271,963**

11.0 DIRECTIVES AND MISCELLANEOUS

11.1 NSUARB ACE Plan Directives and Stakeholder Commitments

NS Power has received a number of Directives from prior ACE Plan Decisions. The Company has also made a number of commitments to interested parties. Responses to each of these Directives and commitments are provided below.

11.1.1 Sustaining Capital – 2023 ACE Plan Alignment with the 2020 Integrated Resource Plan (IRP)

Starting with the 2021 ACE Plan, NS Power has provided comparisons to capital assumptions used in the 2020 IRP. This approach continues for the 2023 ACE Plan.

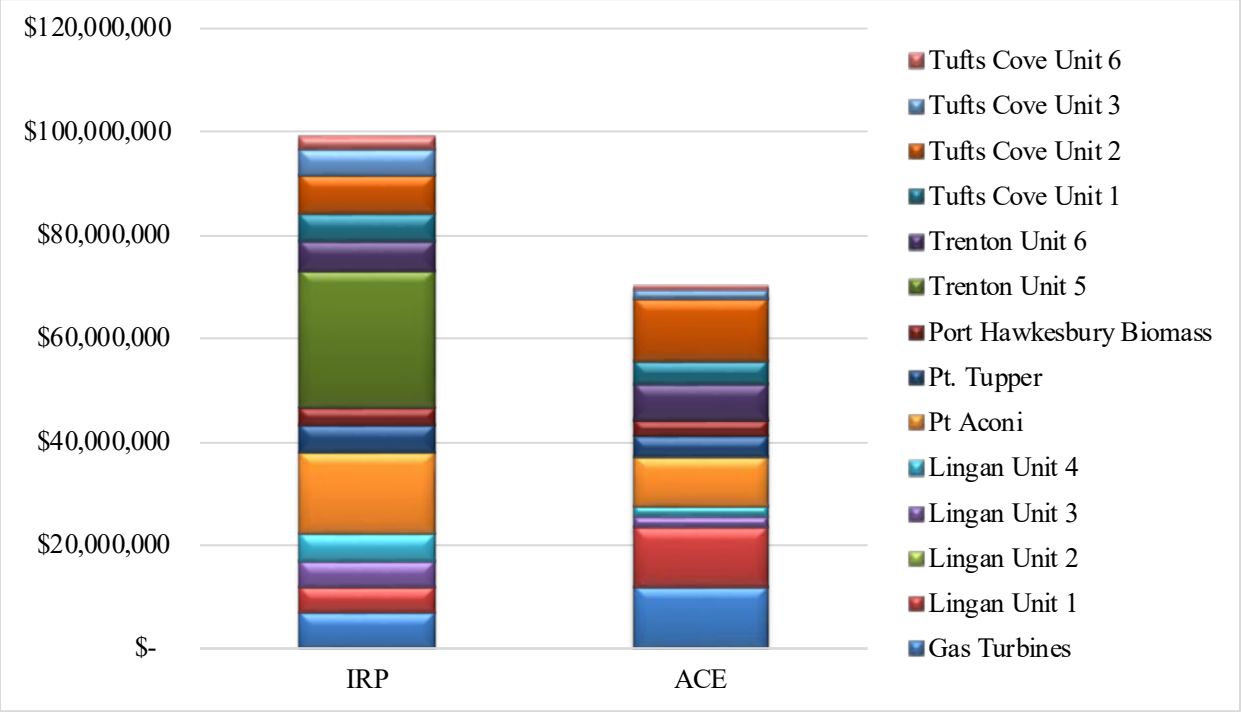
The 2023 ACE Plan was derived using the same asset management practices used for the capital investment forecast assumptions for the 25 year planning period of the 2020 IRP. NS Power confirms that the 2023 investment plan aligns with a 2030 coal phase out scenario, due to the short interval of many refurbishment intervals and the requirement to sustain safe reliable operation of assets.

When comparing a single capital year from an ACE Plan to a long term planning exercise such as the IRP, it is important to take into consideration the leveling of investment used for the 25 year capital forecast used within the IRP. With respect to investment profile, it should be expected that the timing of investments will change from long term projections, as annual assessments based on the latest operational information are essential to optimizing investment in the shorter-term.

As shown in **Figure 45**, NS Power thermal generation investment is below the IRP capital forecast for 2023. This variance is expected as the IRP used a top down approach with unit-specific high utilization factors for all the units (to ensure higher capital thresholds were tested in the IRP), while the ACE Plan is built bottom up from current risk assessments with projected utilization factors.

While the snapshot in 2023 shows a lower investment level than the IRP sustaining capital profile, this investment level is appropriately aligned with current projected utilization factors and reliability/risk tolerances. There will be differences in unit investment profiles in future years based on actual utilization and present conditions, which drives the timing of major refurbishment intervals, causing the investment to be lower or higher than the long term IRP projection in a given year.

Figure 45: 2020 IRP vs. 2023 ACE Plan Forecast Comparison by Unit



NS Power is currently undertaking an evergreen IRP update which will update anticipated unit retirement trajectories and utilization factors. These updates will be incorporated into the 2024 ACE Plan.

11.1.2 Annual Rating/Prioritization of Capital Projects

In accordance with the NSUARB's 2011 ACE Plan Directive 11 and 2013 ACE Plan Directive 7, below is NS Power's capital project rating criteria.

Pursuant to Section 6.1 of the CEJC, NS Power's generation, transmission and distribution capital projects are rated according to the following criteria:

- Health and Safety: Regulatory Requirements, Operating Permits, Protection of Equipment and Personnel Safety, and JOHSC actions.

- Environment/Regulatory Compliance: Renewable Energy Standards, Greenhouse Gas (GHG) Regulations, or Air Emission Regulations.

- Business Sustainability: SAIDI, SAIFI, CAIDI; unit reliability; system upgrade requirements; code requirements; NERC/NPCC Requirements, or economics (based on payback period, and revenue requirement); requirement to serve.

Technically justified IT projects are broadly rated using the following criteria:

- Customer: service impacts to customers as a result of technical failure

- Finance: financial impacts to the Company as a result of technical failure

- Compliance: safety, environmental, security, legal or regulatory requirements (e.g. NERC/CIP and NI-52 compliance).

- Operating Sustainability: ability for NS Power staff or contractor to perform critical functions of the business.

NS Power's project rating methodology is described in Section 6.2 of the CEJC. This methodology uses a rating matrix which results in a final rating of 1 to 25. The rating (also termed risk) is developed by determining the "Criticality" (ranked 1 to 5) and "Condition" (ranked 1 to 5) of each asset and multiplying the two to determine the overall risk.

Criticality and Condition values are typically influenced by one predominant factor and rated accordingly. However, other factors may also influence the rating of a project. In the event that multiple factors are present for a project, individual ratings will be taken into consideration in determining the overall Criticality ratings. For example, Health and Safety considerations for a project may warrant a Criticality rating of serious (3), while Environmental considerations for the same project may also independently warrant a Criticality rating of serious (3); this project may therefore warrant a higher Criticality rating of 4 or 5 due to multiple influencing factors.

Multiple influencing factors, ratings, and the order of completion of projects ahead of others, are subject to the evaluation and professional judgment of NS Power staff and third-party industry experts.

Please refer to **Appendix B**, tab 'Risk Rating', which identifies the new projects included in the 2023 ACE Plan, their rating categories and rating values, where applicable.

11.1.3 2023 to 2027 Forecast ACE Plan Expenditures by Functional Class and Spending Program

Pursuant to 2011 ACE Plan Directive 12, NS Power historically provided its forecast investments by functional class and spending program. As a result of the continued uncertainty around future capital plans impacts the Company's ability to forecast capital investments over the typical 5-year period displayed in an ACE Plan. Therefore, the sustaining capital projections that have historically been included in this section cannot be provided at this time.

11.1.4 Cost Minimization

The NSUARB's 2019 ACE Plan Order Directive 5 provided as follows:

> NS Power is directed, in subsequent ACE Plan applications, to provide specific examples of project execution cost minimization efforts for the prior year, complete with a description of the cost savings accrued by these efforts.

The NSUARB's 2020 ACE Plan Order Directive 6 provided as follows:

> NS Power is directed in subsequent ACE Plan applications, to provide examples of cost minimization efforts during execution and construction from the prior year's projects, with project specific cost minimization examples being fully described.

The NSUARB's 2021 ACE Plan Order Directive 4 provided as follows:

> In subsequent ACE Plan applications, NS Power is to continue to provide specific examples of cost minimization practices used during execution and construction of the prior year's projects, with specific cost minimization efforts being fully described. In particular, the Board directs that this information continues to be presented in the format used in Section 11.1.5 of the 2021 ACE Plan application. This material is to be supplemented with additional specific project details in the format used in Attachment 1 of NS Power's response to the CA's IR-1 in the 2021 ACE Plan proceeding.

The NSUARB's 2022 ACE Plan Order Directive 3 provided as follows:

> Continue to provide examples of cost minimization efforts over the previous year in future ACE Plan applications as directed in Paragraphs 94, 95 and 98 of the decision.

Paragraphs 94, 95 and 98 of the Board's 2022 ACE Plan Decision provided as follows:

> [94] In Section 11.1.5 and Appendix F of its 2022 ACE Plan application, NS Power provided examples of cost minimization efforts over the past year. The Board finds these examples and related supporting information to be useful and informative. The Board directs NS Power to continue to provide such information in subsequent

ACE Plan applications. This is to include specific examples of cost minimization practices used during execution and construction of the prior year's projects, fully describing specific cost minimization efforts, complete with a description of the cost savings accrued by these efforts. In particular, the Board directs that this information continue to be presented in the format used in Section 11.1.5 and Appendix F of the 2022 ACE Plan application. Further, as agreed by NS Power, the Board directs the company to report on any new cost minimization techniques that it adopts.

[95] During the 2021 ACE Plan hearing, NS Power revealed that it selected at random the 35 projects used to produce the cost minimization data in Figure 69 of the 2021 ACE Plan application. As such, the Board directed NS Power to engage with stakeholders to develop criteria for the selection of projects to be included as specific examples of NS Power's cost minimization efforts in future ACE Plan applications. NS Power presented these proposed criteria in its 2021 Stakeholder Engagement Report. The Board finds them to be reasonable and effectively balancing satisfactory reporting that provides the Board and stakeholders with a sample size of cost minimization achievements while not adding to regulatory inefficiencies or costly reporting. The Board, therefore, directs NS Power to use these criteria (including those for projects less than $1 million) in future ACE Plan applications to select projects to be included as specific examples of the company's cost minimization efforts. The Board also directs NS Power to monitor the process for effectiveness and solicit feedback internally and through stakeholder engagement through future ACE Plan processes and consider updates as a continuing improvement activity.

//

[98] NS Power's noted cost savings in Appendix F for the eight capital projects referenced in the preceding two paragraphs amounts to a total of approximately $8.2 million. If these savings are deducted from the total Appendix F project cost savings of $13.4 million, the Appendix F savings would be $5.2 million. This would represent only 4% of the approved project costs in Appendix F. The Board trusts that in future ACE Plan applications NS Power will not weight its Appendix F reporting so heavily to these types of minimization and savings examples. As such, the Board partially supports Mr. Wilson's recommendation, and encourages NS Power to provide cost minimization information in future ACE Plan applications that is more useful for identifying lessons learned. Ideally, NS Power's new criteria to include projects as specific examples of the company's cost minimization efforts will help to address this issue.

Cost minimization is embedded into all stages of capital project development and execution. NS Power continues to follow its processes through project development and execution and leveraging

resources and procurement across multiple projects to minimize costs. These practices continue to be the primary means of achieving cost minimization with the largest merit of these achieved in early stages of project planning.

NS Power continues to reinforce and further imbed best practice for cost minimization for the overall capital program. Cost minimization expectations are included in the Project Delivery Model (PDM) gated framework. The PDM serves as the overarching framework that provides guidance on documenting and sharing cost minimization expectations and practices within NS Power's business. The PDM describes the process for the proactive review and tracking of cost minimization opportunities during all stages of the project life cycle. This proactive review and tracking process is being piloted on new large projects that were initiated in 2022.

In response to this directive, NS Power has identified a number of areas where costs were minimized and has categorized specific cost savings into the three categories outlined in **Figure 46** below:

Figure 46: Cost Minimization Savings [23]

Savings Category	Savings ($M)
A: Design & Project Scoping	7.6
B: Procurement Process/Negotiated Savings	1.1
C: Project Execution/Construction Efficiencies	3.0
Total	**11.7**

The items in **Figure 46** are presented in the order in which they occur over the course of completing capital projects. In accordance with the Project Management Institute's (PMI) Project Management Body of Knowledge (PMBOK), "the ability to influence cost is greatest at the early

[23] In addition to the savings summarized in **Figure 46**, NS Power's cost minimization efforts related to the Wreck Cove Life Extension Modernization (LEM) project resulted in substantive savings for customers (approximately $0.5M in 2022) as provided in NS Power's Contingency and Cost Minimization Reports under matter number M009596.

stages of the project, and this is why early scope definition is critical".[24] Cost minimization efforts are embedded into NS Power's processes at the early scope definition and design phases of projects. Consistent with the PMI's PMBOK, NS Power's ability to influence cost outcomes for its projects is greatest at these early stages of the project and why the total amount for cost minimization efforts (line-item A in **Figure 46**) is greater than line items B and C.

As cost minimization efforts through all phases of a project are shared, considered, and actively included in the budgeting process for future capital projects, this results in diminishing opportunities to further reduce costs for similar projects going forward. As such, this may result in fewer, or less impactful examples of cost minimization as the Company continues to track this information.

In accordance with the Board's direction in the 2021 ACE Plan Order, please refer to **Appendix E** for specific examples of cost minimization efforts with savings categories identified as summarized in **Figure 46**.

11.1.5 Impact of Reliability Projects

The NSUARB's 2013 ACE Plan Decision provided the following directive:

> …the Board expects NSPI to monitor the impact of the deferral of reliability projects in the original 2013 ACE Plan closely and to provide a report on the results in the next ACE Plan.[25]

Pursuant to NS Power's commitment noted in the 2015 ACE Plan Terms of Consensus, this directive is expanded to include additional information regarding continued sustaining capital investments and maintaining reliability performance.

[24] A Guide to the Project Management Body of Knowledge (PMBOK) Sixth Edition, page 231.

[25] M05339, NS Power 2013 Annual Capital Expenditure Plan, NSUARB Decision, May 27, 2013, page 44, line 174.

The NSUARB's 2017 ACE Plan Order provided the following directive:

> The Board directs NSPI to identify and list any proposed capital investments related to performance standards established by the Board in future ACE Plan applications. [26]

The majority of T&D projects in the 2023 ACE Plan will contribute to having a net positive impact on the metrics tracked under performance standards. They are selected based on the asset management methodology pursuant to Section 6.2 of the CEJC, guiding investments to where they are needed most.

The NSUARB directed NS Power to continue providing the same information with respect to reliability and severe weather events notwithstanding the NSUARB's approval of the performance standards in 2017 and the Company's obligations to report on those standards:

> …[T]o what extent, if any, certain aspects of the information set out in Section 8.1.7 of the 2017 ACE Plan will be reproduced in the report required by the Performance Standards Decision remains to be seen.
>
> It is not clear such items as, for example, plans for replacement of aging transmission and distribution equipment, and storm performance information, beyond the 48-hour restoration metric, will be fully explored in the context of performance standard metrics reporting.
>
> As there is some uncertainty, and a part of the information provided in Section 8.1.7 is derived from an agreement between stakeholders, as part of the 2015 ACE Plan process, the Board will not direct any changes to the current ACE Plan reporting related to reliability at this time. The Board will monitor the ongoing relevancy of this part of the ACE Plan.
>
> The first report arising from the Performance Standards Decision is due March 31, 2018. Once that report has been filed and analyzed, the matter should be revisited in the context of a future ACE Plan. [27]

[26] M07745, NS Power 2017 Annual Capital Expenditure Plan, NSUARB Order, April 4, 2017.
[27] M07745, NS Power 2017 Annual Capital Expenditure Plan, NSUARB Decision, April 4, 2017, paragraphs 98 to 101.

Reliability Strategy

To meet reliability challenges from severe weather and climate change and achieve reliability improvements on the T&D system, improved reliability performance analysis, technological innovation, targeted mitigating measures, and new approaches to the way we work are necessary. This approach is driven by an overall asset management strategy for T&D projects.

The Company's approach to customer reliability is focused on balancing optimized investments with affordability and is built on four elements:

- Technology & Data: Utilize data and analytic tools to gain new insights into system performance and identify opportunities to improve performance. Continue the integration of operational/health data into risk profiles to better align with mitigation strategies. Gather the latest climate science data to update NS Power's transmission line design, factoring in the latest climate models on wind, ice loading, and temperature factors. Asses coastal flood risks for critical assets based on climate projections for storm surge and sea level rise.

- Innovation: Explore innovative technologies such as battery storage and micro grids, and supporting systems such as enhanced vegetation condition assessments, and advanced measures and indicators of overall asset health used for decision-making.

- New ways of Working: Implement enhanced risk-based decision making through the creation of focused reliability teams which identify and prioritize work with a customer first lens. Deployment of drones to collect condition data through inspections of transmission and distribution equipment. Deployment of telecommunications to assets throughout the distribution system and integration of visibility and control into operational systems as part of the connected asset strategy. These investments will support management of the future state of a grid with energy transition challenges brought on by technology advancements including Distributed Energy Resource (DER) proliferation, transportation electrification and bi-directional power flow.

- Communication: Engage in proactive, meaningful and continual communication with customers and key stakeholders.

Cross-functional reliablity teams utilitize outage data, device performance data, and asset condition information to realize a comprehensive view of each feeder. This information is used to identify both risks and options for mitigating them as appropriate. Reliability teams leverage not only traditional investment tools such as equipment replacement, but also incorporate opportunities available through emerging technologies, including on-line asset monitoring.

Building from these four key elements of Technology & Data, Innovation, New Ways of Working, and Communication, the analysis and corresponding programs for the distribution system were developed with opportunities identified in the following key areas:

- Smart Grid and Intelligent Devices Deployment
- Targeted Priority Device Replacement
- Storm Hardening and Reliability Upgrades
- Enhanced Vegetation Management

Further integration of asset management processes, tools, and data contribute to enhanced understanding of asset condition, criticality, and risk across the T&D system. Detailed analysis of this intelligence allows for targeting areas of concern and identification of appropriate corrective actions. Incorporating new technologies and asset programs such as additional protection equipment, use of intelligent devices, targeted asset replacements and upgrades, and enhanced vegetation management increases the number of options available to NS Power to reduce both the frequency and duration of unplanned outages for customers. Finally, a strong focus on risk-based decision making, enhanced work prioritzation, and further reliability team initiatives will help to realize improved customer experience.

Proposed investments associated with achieving these improvements in the 2023 ACE Plan are targeted and optimized to efficiently mitigate reliability risk in a cost effective manner. In general,

NS Power assesses the reliability investments that prioritize the mitgation of the highest risks on the system for the greatest number of customers.

Reliability Statistics

As shown in **Figure 47** and **Figure 48** below, with the exception of 2016, 2018, and 2019 largely due to challenging weather conditions, NS Power's annual outage frequency and duration continues to be better than the average of Atlantic Canada utilities. Over the ten year period 2012-2021 for the Atlantic Canada utilities, NS Power ranked as the best for SAIFI performance and second best for SAIDI performance. For outage duration, the data for 2019 exceeded the average due to the significant challenges posed by Hurricane Dorian in September of that year. Dorian contributed nearly 80 percent of all customer hours of interruption in 2019, which is a significant outlier from typical performance trends.

Figure 47: Annual Atlantic Canada Outage Frequency

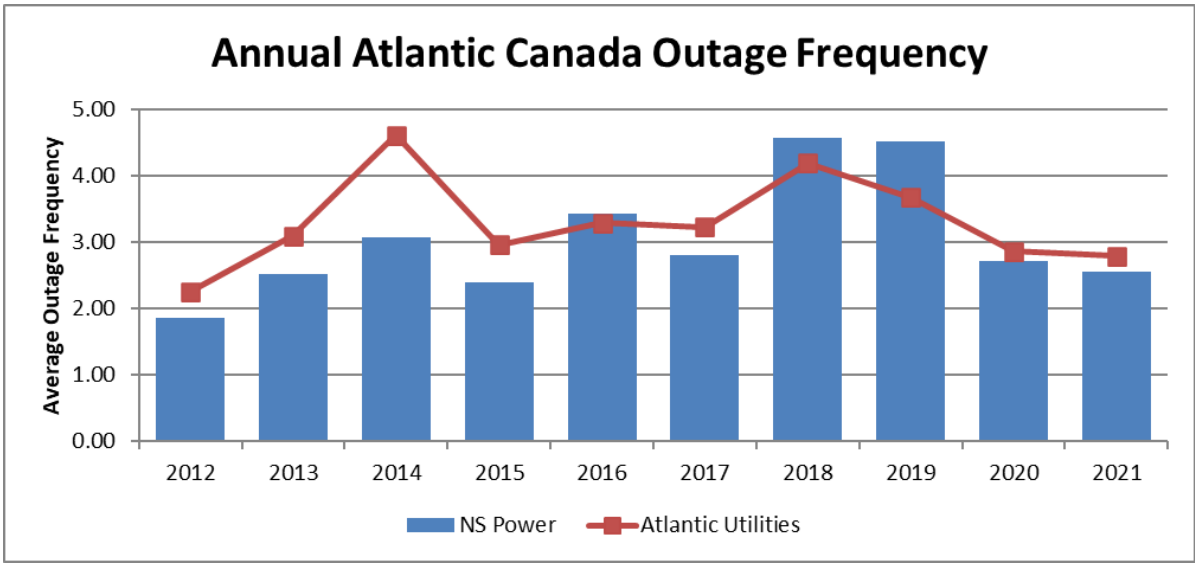


Figure 48: Annual Atlantic Canada Outage Duration

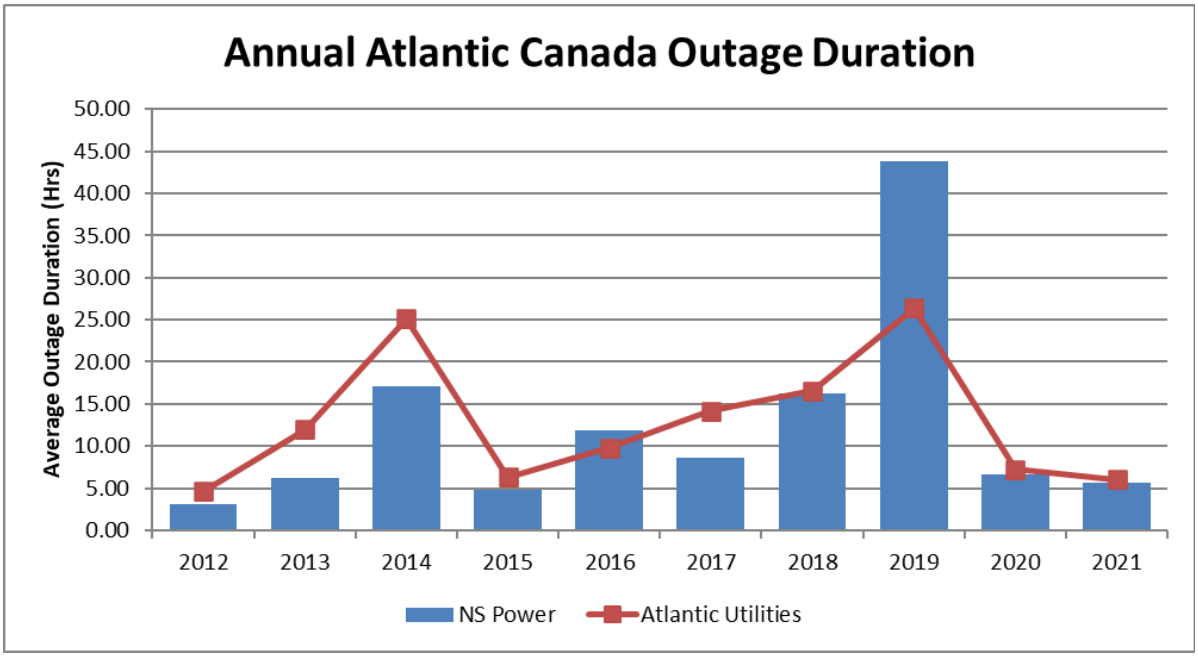


Figure 49 and **Figure 50** below represent NS Power's reliability statistics with Major and Extreme Events (such as Hurricane Dorian and as defined by IEEE-1366) removed from the data. This shows a largely normalized comparison between yearly reliability performance. Performance observed in 2014, 2016, 2018, 2019, and in particular 2021 were largely the result of a significant number of localized storm events, that while falling short of the IEEE-1366 standard for a major event, lead to more frequent and longer outages than would have been experienced in previous years. This in turn led to an increase in both SAIFI and SAIDI. 2022 performance has been similarly influenced by eight Significant Event Days (SEDs) leading to above normal outage impacts not excluded by IEEE-1366, as well as lingering impacts from severe weather events through the year. The 10 year trend shows the impact of SEDs and overall challenging weather conditions in recent years.

Figure 49: NS Power Annual SAIFI (Major/Extreme Events Excluded)

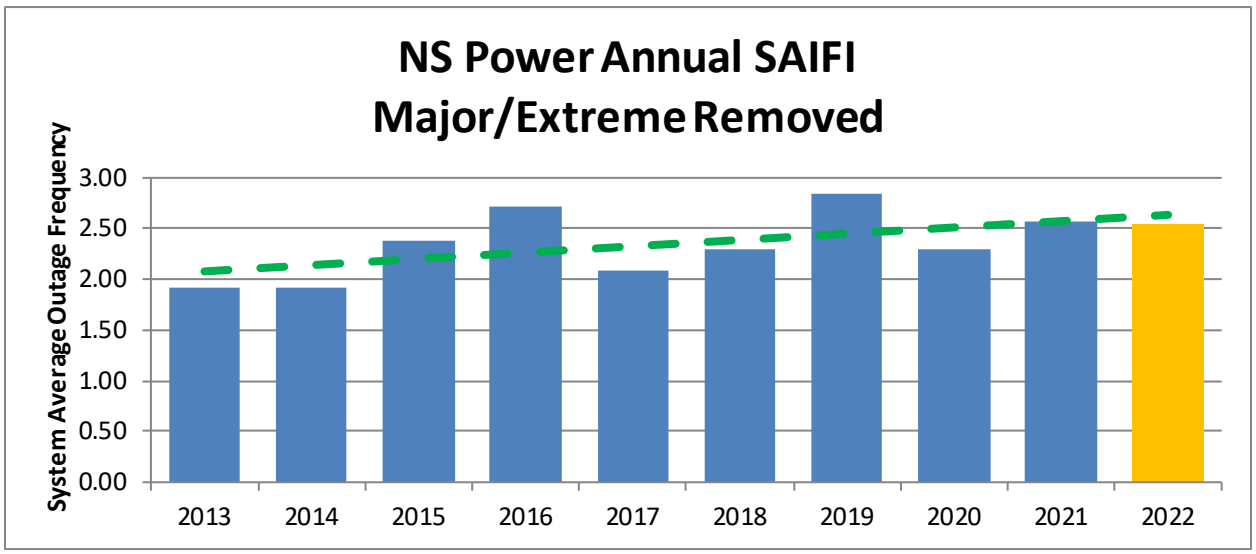


Figure 50: NS Power Annual SAIDI (Major/Extreme Events Excluded)

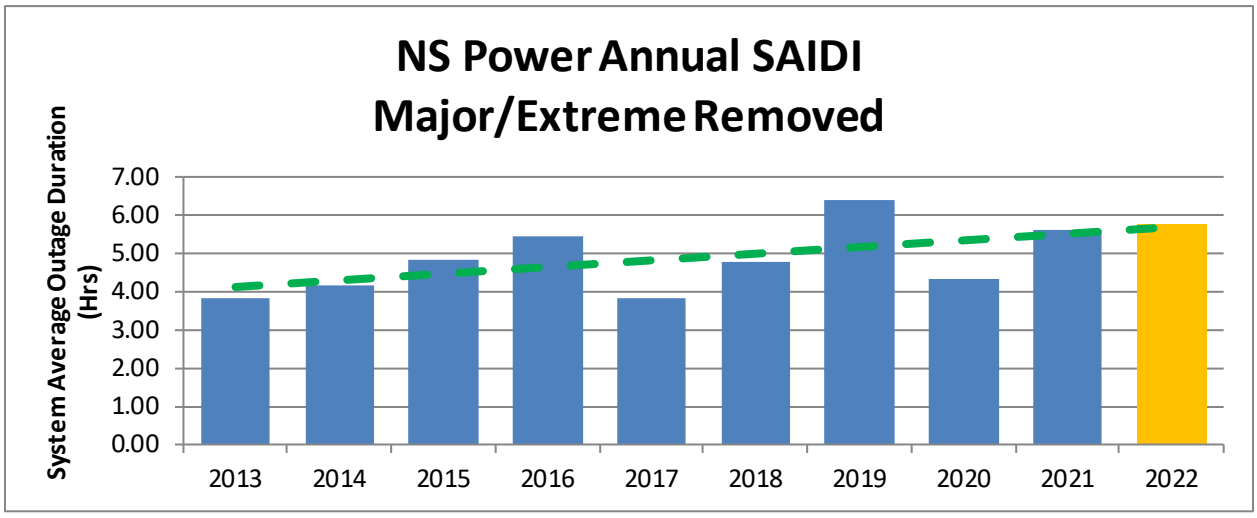


Figure 51 and **Figure 52** below represent NS Power's reliability statistics with Major and Extreme Events included.

Figure 51: NS Power Annual SAIFI (Major and Extreme Events Included)

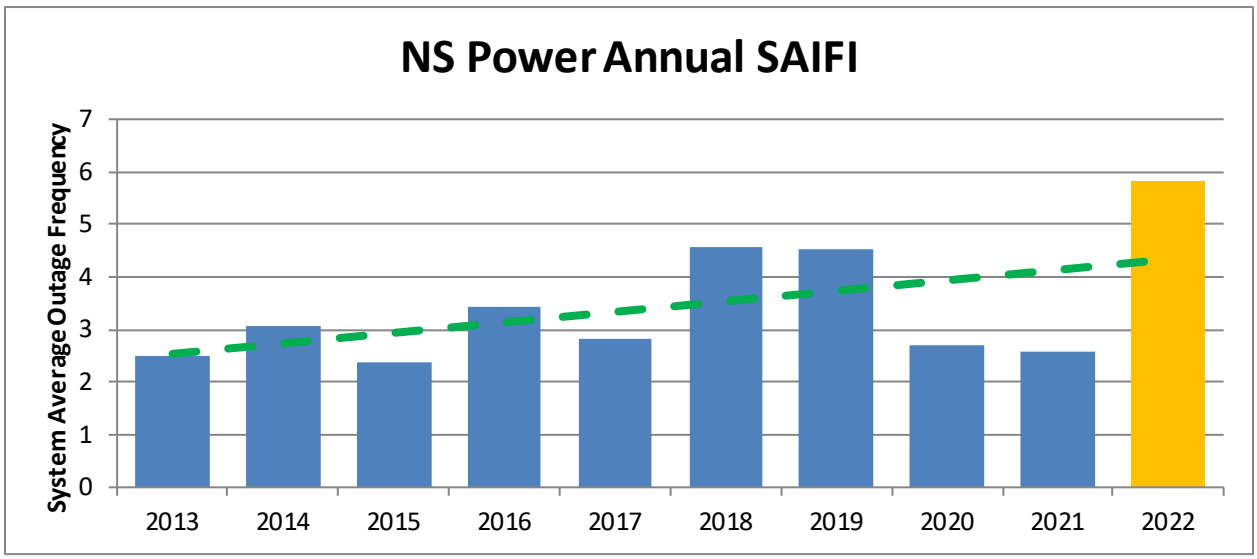
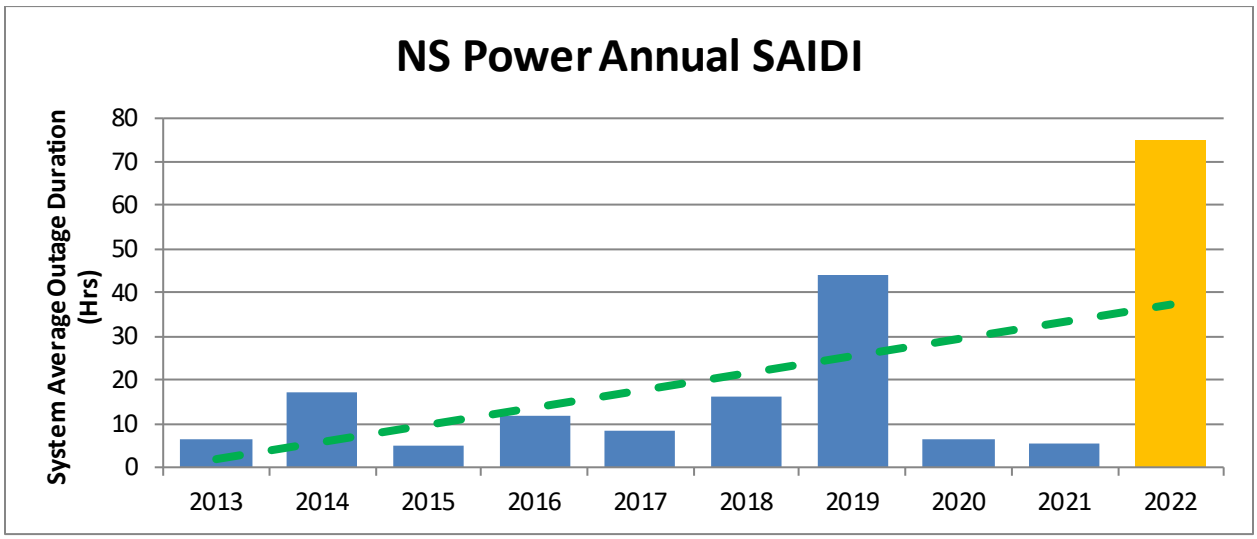


Figure 52: NS Power Annual SAIDI (Major and Extreme Events Included)

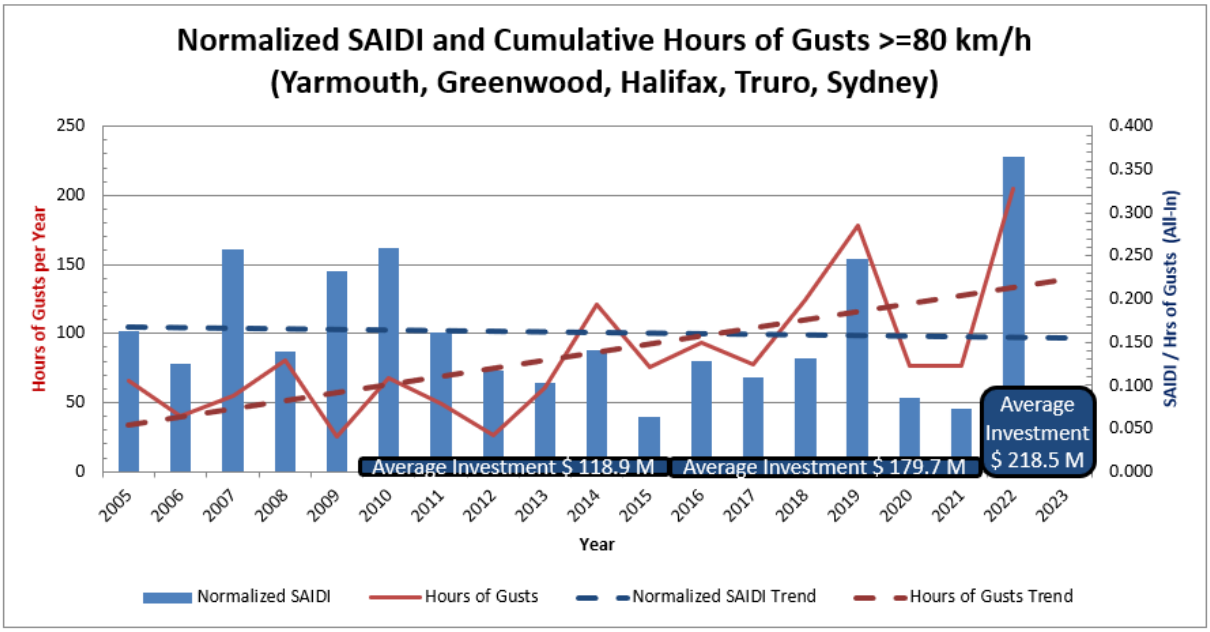


The reliability performance for overall SAIFI and SAIDI are strongly correlated with the number of major and extreme events that occur during the calendar year. NS Power continues to see severe and more frequent weather events (Arthur 2014, Matthew 2016, Dorian 2019, Fiona 2022) as a trend which is expected to continue into the future. However, NS Power's typical performance compares favourably with the Atlantic Canada outage average for frequency and duration, and the Company continues to see positive indications in consideraiton of the weather condition overall

for SAIFI and SAIDI. Continued investment in annual rights-of-way clearing and other capital investment initiatives noted herein are expected to continue to support sustaining reliablity over the long term.

Figure 53 details the SAIDI performance normalized for hours of wind gusts greater or equal to 80 km/h. Over the 2005-2022 time period, NS Power's normalized SAIDI result has trended downward (i.e. improving) notwithstanding the increasing trend of wind gusts greater or equal to 80 km/h over that same period. The graph also highlights the 51 percent increase in NS Power's average annual investment in the transmission and distribution system over the 2010 to 2015 period ($118.9 million) as compared to the 2016 to 2021 period ($179.7 million). The average investment for the 2022 to 2023 period is estimated to be approximately $218.5 million. This illustrates the clear trend of increasing investment in reliability and the overall transmission and distribution system in response to a changing climate.

Figure 53: Normalized SAIDI and Cumulative Hours of Gusts >= 80km/hr



Outage Causes

Historically, two of the leading causes of NS Power customer outages for all days (all significant event days included) are tree contacts and defective equipment. Outage analysis of these causes and NS Power's associated investments are described in more detail below. As elaborated in these sections, both tree contact and defective equipment related outages are influenced by the prevailing weather conditions, further contributing to the overall effects of adverse weather on system performance.

Tree Contacts

Since 2013, tree contacts continue to be one of the largest sources of outage hours for NS Power's customers. **Figure 54** and **Figure 55** below show both customer interruptions and customer hours of interruption due to tree contacts under normal and severe weather conditions.

Figure 54: Annual Tree Contact – Customer Interruptions

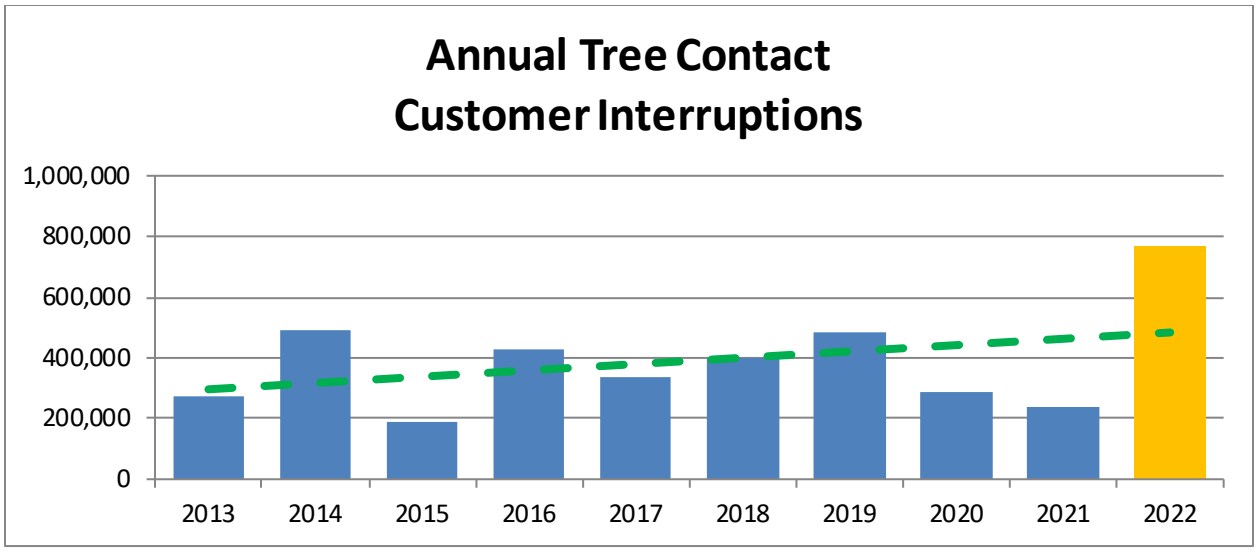


Figure 55: Annual Tree Contact – Customer Hours of Interruption

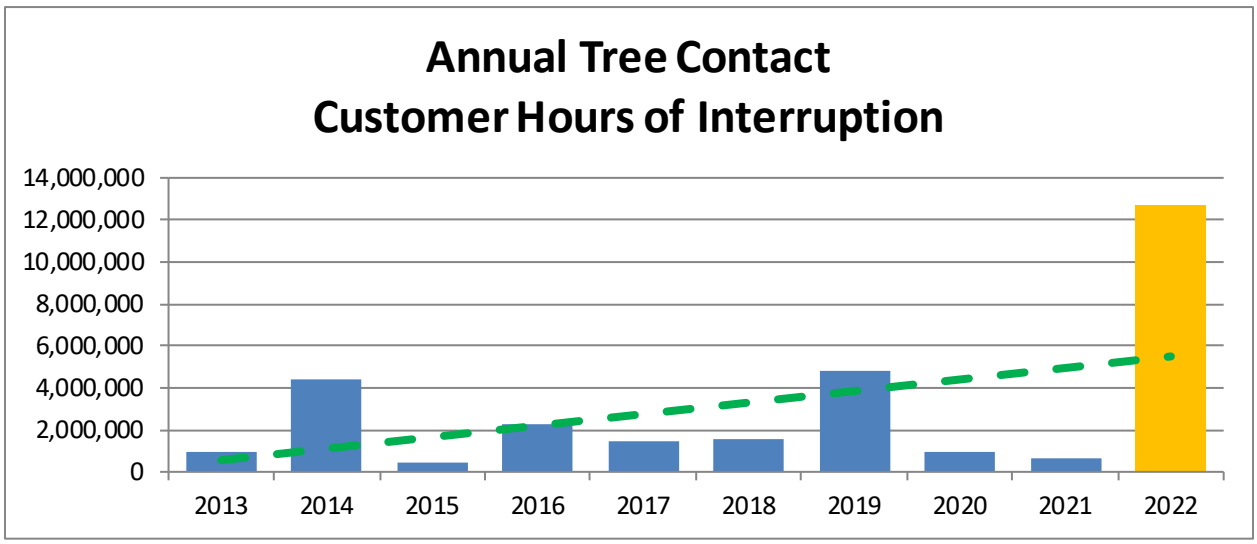


Figure 56 and **Figure 57** below show the tree contact data normalized with Major and Extreme Events removed. With these events removed, the data demonstrates the vegetative effects of major storms and their impact for months following the extreme event.

Figure 56: Annual Tree Contact – Customer Interruptions (Major/Extreme Events Removed)

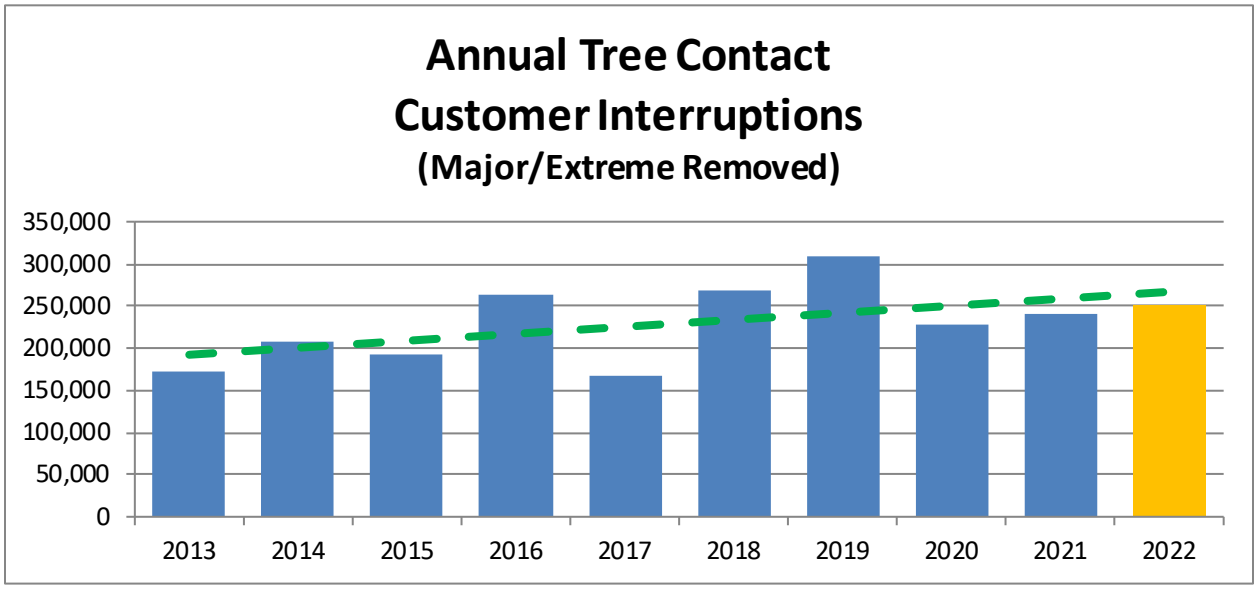
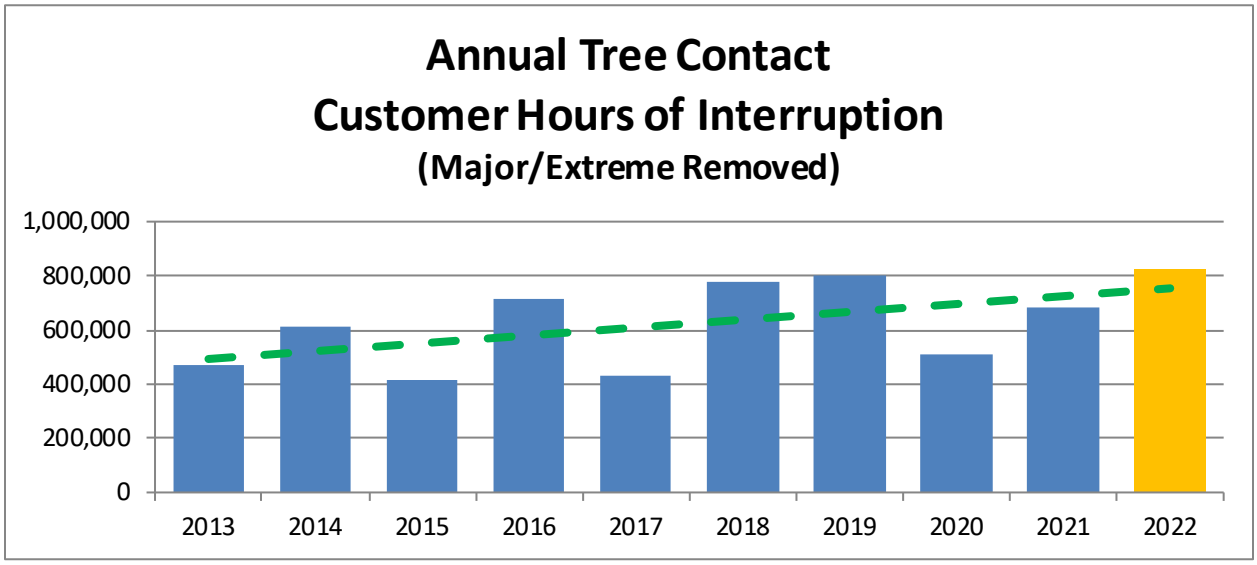


Figure 57: Annual Tree Contact – Customer Hours of Interruption (Major/Extreme Events Removed)



In a continued effort to minimize storm effects on overall reliability, NS Power has proposed the following spending in 2023 for transmission and distribution vegetation management. These targeted investments for managing vegetation aim to mitigate outage frequency and duration, while seeking to improve access to the system.

- CI C0052056 - New Distribution Rights-of-Way Phase 8
- CI C0052055 - 2023/2024 Transmission Right-of-Way Widening 69kV
- D010 Distribution Right-of-Way Routine
- T010 Transmission Right-of-Way Routine

Defective Equipment

Figure 58 and **Figure 59** below show both the reliability results realized through upgrades and replacements of targeted distribution equipment as well as the significant impact of adverse weather on equipment. 2022 results show the effect of Hurricane Fiona, especially on Customer Hours of Interruption.

Reliability teams are continuing to investigate improvements in maintenance strategies to identify failure modes for asset classes with the highest contributions to customer impacts. In 2018 and 2019, NS Power experienced an increase of primary aerial conductor failures leading to a higher than typical contribution of frequency and duration of outages caused by defective equipment in recent history. These years were also the most challenging years for severe weather events. The increase in failed primary aerial conductors is believed to be attributed in large part to the added stress on existing infrastructure due to the high number of hours winds have exceeded warning levels. The Company observed similar trends in 2022, aligned with the severe weather events experienced during the year including the most significant adverse weather event in Nova Scotia's history, Hurricane Fiona in September 2022. Fortunately, the combination of targeted asset investments has contributed to overall improved equipment reliability performance in recent lower weather years 2020 and 2021.

Figure 58: Annual Defective Equipment – Customer Interruptions

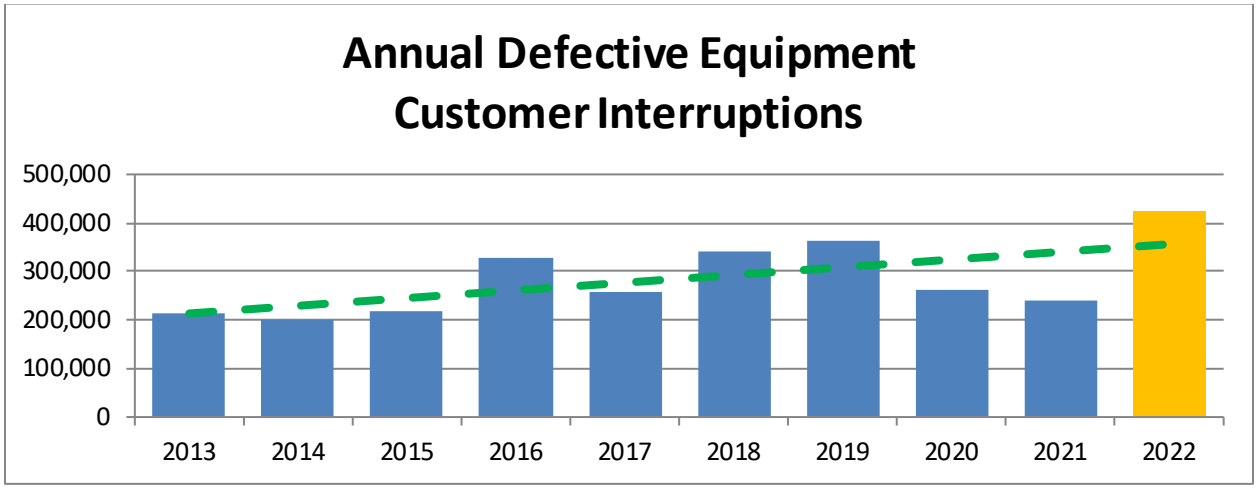
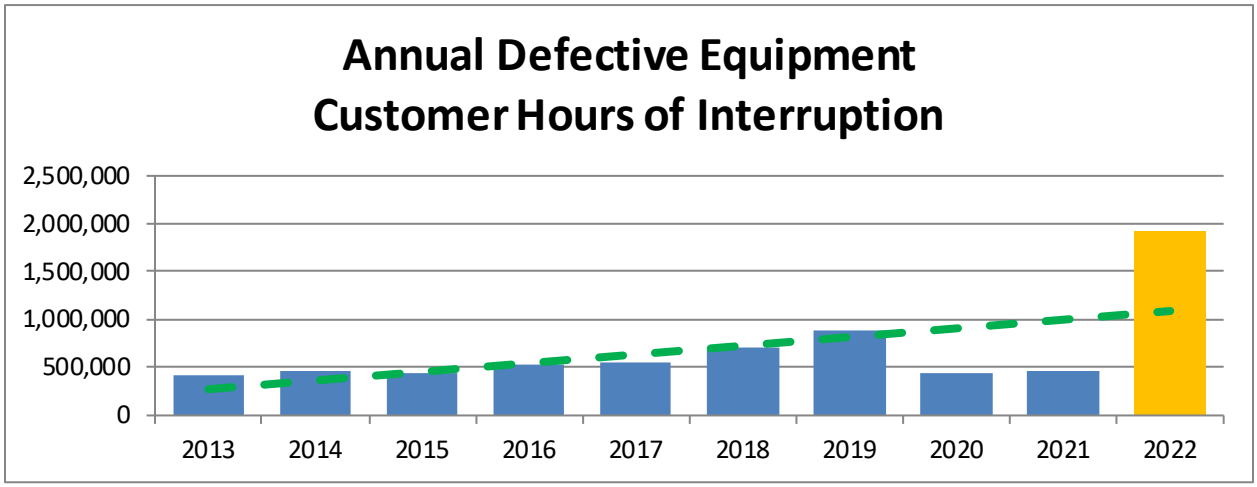


Figure 59: Annual Defective Equipment – Customer Hours of Interruption



Taking a further look into the 2021 reliability data, defective equipment outages can be classified by device type. This is shown in **Figure 60** below.

Figure 60: Customer Hours of Interruption

Customer Hours of Interruption		
Device Type	**2021**	**% of Hours**
Primary Aerial Conductor	84,305	18.10%
Pin Insulator	77,167	16.57%
Recloser	42,384	9.10%
Wood Pole	29,078	6.24%
Cutout	25,646	5.51%
Crossarm	24,679	5.30%
Lead	24,120	5.18%
Suspension Insulator	21,209	4.55%
Tie Wire	19,810	4.25%
Automatic Splice	16,080	3.45%

All distribution capital projects and routines that replace deteriorated equipment will sustain system reliability and address the device failures referenced in the table above.

The scope of the following capital projects include elements that will result in sustaining reliability by reducing outage frequency and improving outage response:

- C0052818 – 10C-212-Arichat Conversion and Reconfiguration
- C0053174 – 73W-411GCA-Gilberts Ln Rebuild
- C0053855 – 1H-415-Reinsulate Marginal Rd

Update on storm performance and related capital investments

The effect of storms and storm response varies storm-to-storm and year-to-year. The wind speeds, rainfalls, time of year, time of day and weather forecast accuracy all contribute to a storm's impact. NS Power anticipates that the impacts of a changing climate over the medium and long term will result in increasing weather risks for the system that must be mitigated. The number of hours of wind gusts greater than 80 km/h in 2022 is the highest since at least 1994, and is consistent with the elevated levels experienced over the past five years. The average hours of wind gusts greater than 80 km/h tracked by NS Power during the five-year period from 2018-2022 (132.2 hours) reflected a 50 percent increase over the previous five-year period from 2013-2017 (85.8 hours). Targeted investments in traditional reliability-focused projects as well as innovative technologies, contribute to positioning NS Power to meet the challenges of a changing climate.

NS Power uses the 2.5 Beta Method (IEEE-3366 Standard) to classify Major Event Days. The same methodology is applied to further classify Significant Event Days (2.0 Beta) and Extreme Event Days (3.5 Beta).

As of December 31, 2022, NS Power experienced nine significant event days (including one following an MED), 16 major event days, and three extreme event days. This is the largest total of event days in a single year on record, and more than two times the average annual event days from 2017-2021.

NS Power has the following capital programs for storm response and reactive work for 2023:

- D008 – Provincial Storm Distribution
- T001 – Transmission Line Unplanned

As noted above, NS Power continues to invest on vegetation management and works extensively with landowners and municipalities to gain permission to trim and remove trees. These investments aim to minimize tree contact and maximize access to our transmission and distribution systems as provided for in routines T010 and D010, as well as capital work orders CI C0052056 and CI C0052055.

2022 Storm Performance vs. Previous Years

Figure 61 to **Figure 64** below show the count of the previously identified event day[28] classifications, and their SAIFI and SAIDI contributions annually. They outline the frequency and impact of Significant, Major, and Extreme event days[29] to customers. As discussed above, 2022 was a historic year for the frequency and severity of event days. The graphs below illustrate the significant impact that adverse weather events, in particular Hurricane Fiona (3 EEDs, 4 MEDs, and 1 SED) have on the overall system performance.

[28] The term "Event Day", rather than the previous term "Storm Day" is used here to refer to those events significantly exceeding normal operations, in order to better reflect that event thresholds determined using the IEEE 1633 methodology are not exclusively due to storms or other inclement weather.
[29] The term "Significant Event Day", rather than the previous term "Storm Day" is used here to reflect that event thresholds determined using the IEEE 1633 methodology, in this case the 2β threshold, are not exclusively due to storms or other inclement weather.

Figure 61: Historical Year End Event Days

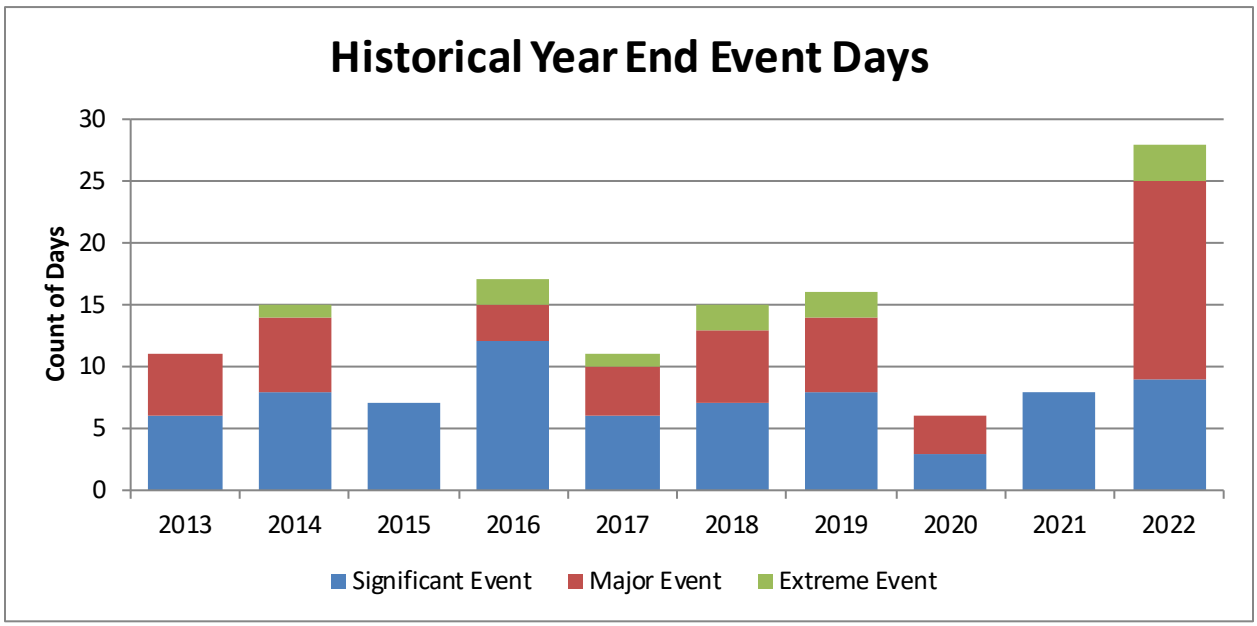


Figure 62: SAIFI- Event Class Contribution

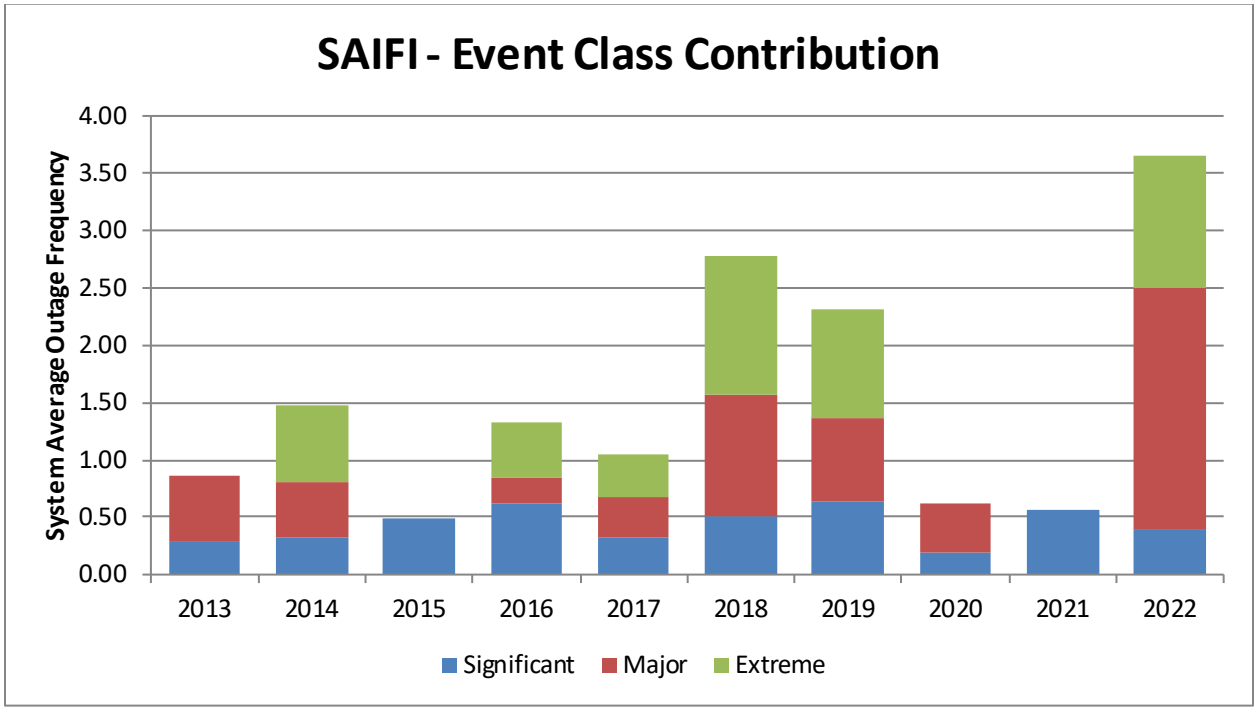


Figure 63: SAIDI – Event Class Contribution

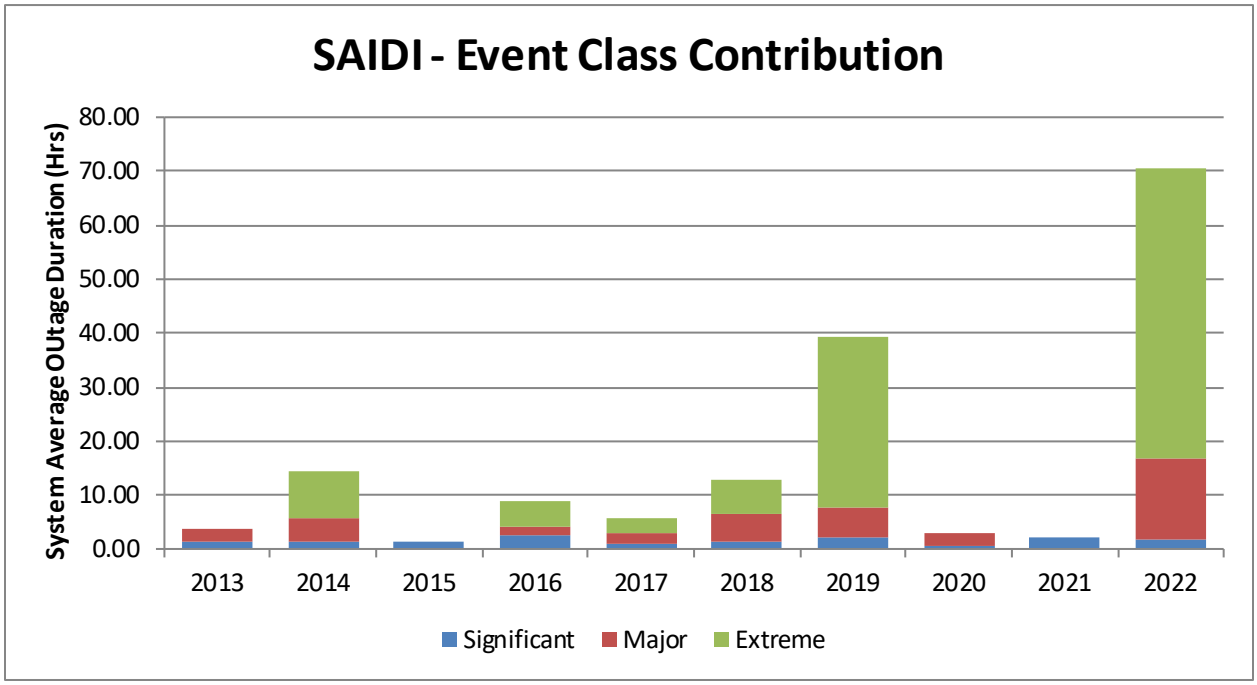


Figure 64 below provides detail on outage causes for the 26 event days experienced in 2022.

Figure 64: Detail on Outage Causes for identified Event Days

		Significant	Major	Extreme	
CEA Cause Code	**Description**	**Hours of Interruption**	**Hours of Interruption**	**Hours of Interruption**	**% of Hours**
0	Unknown/Other	23,640	105,381	42,261	0.46%
1	Scheduled Outage	24,792	2,693	1,111	0.08%
2	Loss of Supply	262,464	399,988	1,586,879	6.01%
3	Tree Contacts	286,605	3,038,944	8,823,571	32.45%
4	Lightning	0	12,370	4,440	0.04%
5	Damaged Equipment	73,630	427,602	953,145	3.88%
6	Adverse Weather	226,598	3,784,705	17,177,253	56.59%
7	Adverse Environment	56	122,115	0	0.33%
8	Human Element	18	31	0	0.00%
9	Foreign Interference	11,038	34,458	14,394	0.16%
	Total	**908,841**	**7,928,287**	**28,603,054**	

Over 32 percent of all identified event day outage hours in 2022 have been caused by tree contacts. Furthermore, a significant portion of events coded as adverse weather are likely related to intermittent tree contacts that may clear on their own or not be physically lying on the conductor once crews arrive. While NS Power always strives to minimize tree caused outages, the importance is further stressed in storm conditions. Continued investment for vegetation management and right-of-way widening will help minimize these outages in all weather conditions.

The following capital projects are identified to address vegetation management and right-of-way widening for 2023:

- CI C0052056 - New Distribution Rights-of-Way Phase 8
- CI C0052055 - 2023/2024 Transmission Right-of-Way Widening 69kV
- D010 Distribution Right-of-Way Routine
- T010 Transmission Right-of-Way Routine

T010 and D010 Report

In the 2016 ACE Plan Order, the NSUARB directed as follows:

> The Board approves the 2016 Routine capital expenditures, with the exception of the Distribution ROW widening (D010) which is reduced to $600,000. The Board directs that the Routine for Transmission widening be treated as a separate project, and not a routine, in future ACE Plan Applications. NSPI is to provide an annual progress report on the expenditure, works undertaken, results achieved and future plans as part of the annual ACE Plan submissions.[30]

In accordance with the Board's directive, NS Power provides its progress report on D010 and T010 below as of December 31, 2022.

[30] M07176, NS Power 2016 Annual Capital Expenditure Plan, NSUARB Order, June 8, 2016.

In its 2017 ACE Plan Order, the Board directed as follows:

> The Board directs NSPI to update the cost estimates for vegetation management and right-of-way widening projects in the 2018 ACE Plan (and future years) based on actual historical costs incurred for this project.[31]

NS Power confirms that the cost estimates for vegetation management and right-of-way widening projects in the 2023 ACE Plan are based on actual historical costs incurred.

Expenditures, Works Undertaken, and Results

The following progress was made on 69kV transmission widening under C0041893:

- 100 percent of planned work has been completed as of December 31, 2022
- Year end spend was approximately $2,500,000
- Substitutions have been made from the original plan, due to revised priorities:
  - L-5581 has been substituted by L-5565

The following progress was made on >69kV transmission widening under T010:

- 100 percent of planned work has been completed as of December 31, 2022
- Year end spend was approximately $600,000
- Substitutions have been made from the original plan, due to revised priorities:
  - L-6020 has been substituted by L-7004

The following progress was made on distribution widening under D010:

- 0 percent of planned work has been completed as of December 31, 2022
- Year end spend was approximately $0

[31] M07745, NS Power 2017 Annual Capital Expenditure Plan, NSUARB Order, April 4, 2017.

- Due to Hurricane Fiona in September 2022 and its related response, the planned widening work under D010 was deferred to 2023 and future years.

Plans for Replacement of Aging T&D Equipment & Storm Performance

The 2015 ACE Plan Terms of Consensus included two commitments with respect to reliability:

(4) As part of the reliability directive in future ACE Plans, NS Power will provide additional information regarding its plans for replacement of aging transmission and distribution equipment in accordance with the following recommendation on this matter made by the SBA's consultant, Mary Neal, at page 12 of her evidence in this proceeding dated January 16, 2015:

> "I recommend NSPI provide more information regarding its plans for replacement of aging transmission and distribution equipment to better show how it justified the target investments. This should include (where possible):
>
> - Descriptions of assets to be replaced and their ages,
> - Goals for strategic replacement programs, such as targets for age profiles of different asset classes,
> - Expected improvements in asset age profiles due to each ACE Plan project involving replacement of transmission and distribution equipment considered at end-of-life,
> - More detailed descriptions of how NSPI targets specific assets every year, whether based on age, performance degradation, or other factors, and
> - Any recent, relevant inspection data"

(5) As part of the reliability directive in future ACE Plans, NS Power will provide an update on its storm performance and related capital investment strategies to improve storm performance.[32]

The Terms of Consensus were approved by the NSUARB on May 5, 2015. These two commitments are addressed below.

[32] M06514, NS Power 2015 Annual Capital Expenditure Plan, Terms of Consensus, February 18, 2015, page 2 of 5.

Plans for Replacement of Aging Transmission and Distribution Equipment

As part of its asset management strategy, NS Power continually monitors outages and performance of transmission, substation and distribution assets, with future investments continuing at an appropriate level to provide affordable and reliable service. To sustain reliability performance improvements, NS Power follows its asset management principles to prioritize investments in T&D plant in accordance with Section 6.2 of the CEJC. The project risk rating methodology found therein determines condition and criticality to rate projects for the replacement and refurbishment of T&D assets. This reduces the overall risk for the asset class.

Annual estimated replacement ranges developed based on asset age profiles, and the Iowa Survivor curves for equipment failure are used as a guide in reducing the overall risk for each asset class. While the suitable investments for a specific asset class may vary from year to year depending on system performance, the estimated replacements analysis provides a working range in which to evaluate the appropriateness of proposed sustaining capital investments.

NS Power uses a variety of factors to determine the specific assets targeted for replacement as part of the annual capital investment program. Generally, targeted assets have experienced degradation in performance manifesting in decreased reliability, increased maintenance frequency and cost, or reduced functionality. These effects are identified through reliability tracking, field inspections, and test results of the impacted assets. Criticality of the asset to continued operations of the NS Power system and any risks posed to people and the environment contribute to determining specific assets for replacement.

Asset age is a concern when the frequency of required maintenance is increased, the availability of replacement parts or critical spares is limited, or performance is negatively impacted. This information can be used to inform project prioritization. However, age profiles are used only in concert with asset condition, performance, and legislated requirements; it is never the single determining element in an investment decision. Capital project justifications outline the specific reasoning behind a given replacement program considering all relevant elements.

In 2014, NS Power embarked on further formalizing the identification and prioritization of assets for replacement by creating a regimented framework to determine the condition, criticality, and risk individual assets within a given class pose to the NS Power system. While the risk score of an asset does not determine its suitability for replacement alone, it can aid in identifying assets requiring more detailed investigation by technical experts and subsequent risk mitigation activities.

The target ranges for T&D assets covered by this analysis is provided in **Figure 65** below.

Figure 65: Age Based Replacement Ranges for T&D Assets

		High Range Replacements		Low Range Replacements	
Asset Classification	**Quantity on Grid**	**Estimated Useful Life (Years)**	**Annual Replacements**	**Estimated Useful Life (Years)**	**Annual Replacements**
Distribution Conductor (km)	44,272	45	984	55	805
Distribution Structure	365,989	50	7,320	60	6,100
Pole Top Transformer	130,626	35	3,732	45	2,903
Underground Conductor (km)	422	45	9	55	8
Padmount Transformers	4,209	35	120	45	94
Transmission Conductor (km)	5,429	55	99	65	83
Transmission Structure	31,321	55	569	65	482
Substation Breakers	587	45	13	55	11
Substation Transformer	425	50	8	60	7

Age demographics information is presently not available for all transmission and distribution asset classes. Substation transformers, substation breakers, transmission conductor, downline reclosers and padmount transformers are asset classes for which this information is available at this time.

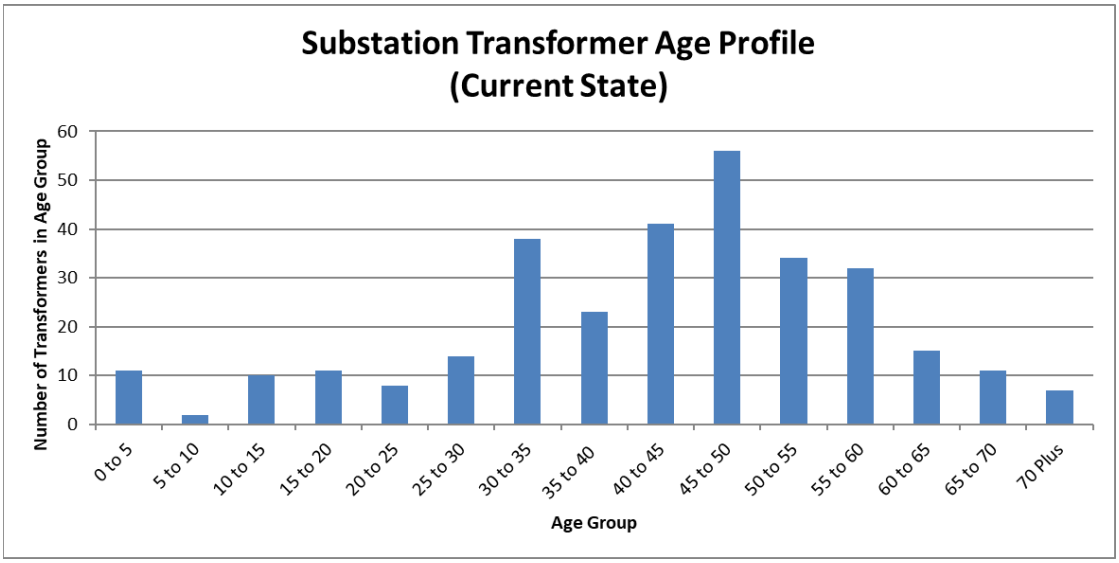
As asset information improves for individual asset classes, their age profiles provide a more complete picture of the current state across the T&D system.

As T&D equipment reaches end-of-life, capital investments are used to mitigate impacts related to aging infrastructure. This being said, it is important to note here, and for context with the following sections (**Figure 66-Figure 75**), that age is not the only determinent of useful life and therefore reliability or risk; older equipment can have lower risk ratings than newer equipment due to design or utilization or other operating conditions and there continues to be advancements in technologies to enable re-validation of useful life. Therefore, in addition to age-driven identification and justification for capital replacements or upgrades, observed or calculated condition, risk, reliability impact, and other factors are considered in deteriming a given asset class' capital program in any given year. The noted expected ranges of replacement per asset class per year serve as a guide or calibration range and are based on the age arithmetic; actual replacement plans will vary depending on the assessment of the assets' conditions and priorities in the context of each year's overall plan.

Substation Transformers

Figure 66 below shows the substation transformer age profile (current state).

Figure 66: Substation Transformers Age Profile (Current State)



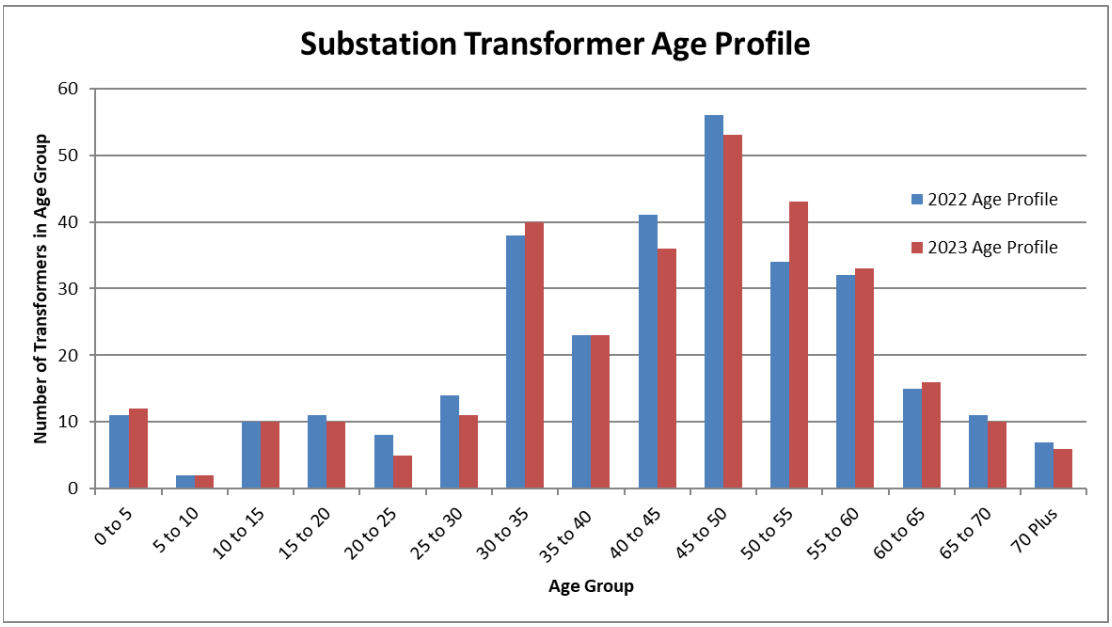
- Expected useful life of 50-60 years depending on the transformer type, utilization, and environmental conditions.

- Age Demographics – 31.6 percent of Transformers are beyond 50 years of service and 10.5 percent are beyond 60 years of service.

- Calculated range of annual replacement using the expected useful life only – 7-8 units per year.

- Changes to age demographics – As a result of the proposed 2023 capital investments in substation transformers, the age profile for this asset class will experience an increase of 3.2 percent in assets beyond 50 years of age and a decrease of 0.2 percent above 60 years of age. Age is only one of multiple factors in determining targeted assets in a given year. To support mitigation of risk associated with this asset class, continuation of the strategic transformer spares program and mobile substation program is planned. Proactive transformer replacements in future years will again focus on the overall condition of each unit and system criticality. **Figure 67** illustrates the overall change in asset age profile for Substation Transformers between 2022 and 2023.

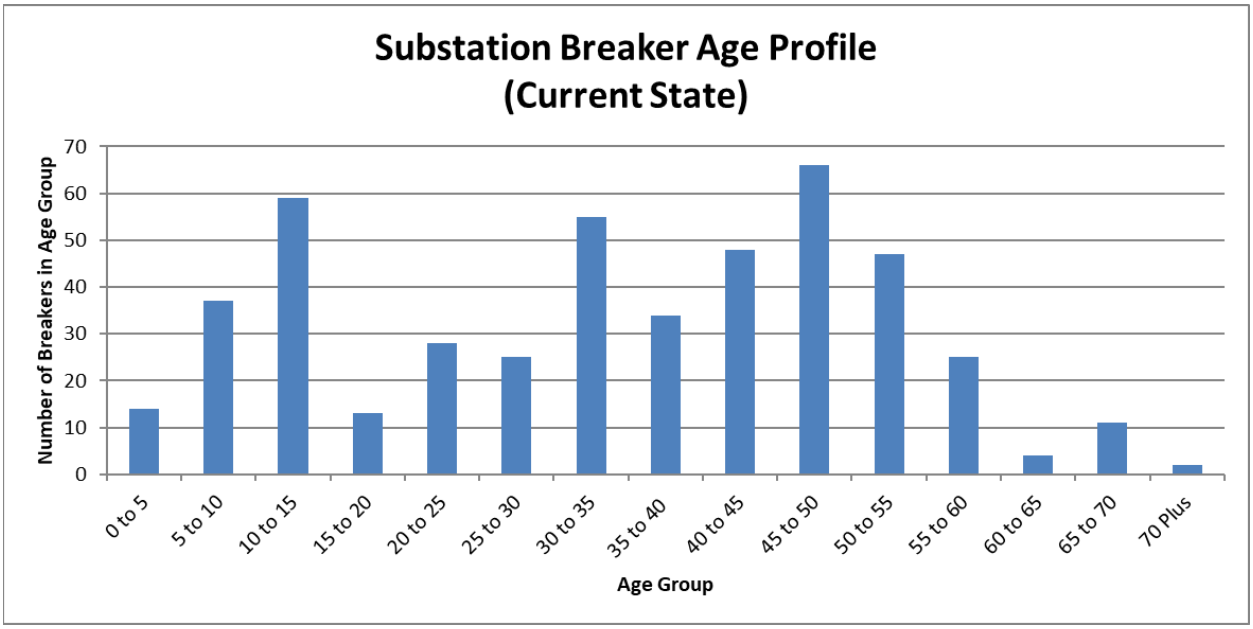
Figure 67: Substation Transformer Age Profile



Substation Breakers

Figure 68 below shows the substation breaker age profile (current state).

Figure 68: Substation Breakers Age Profile (Current State)



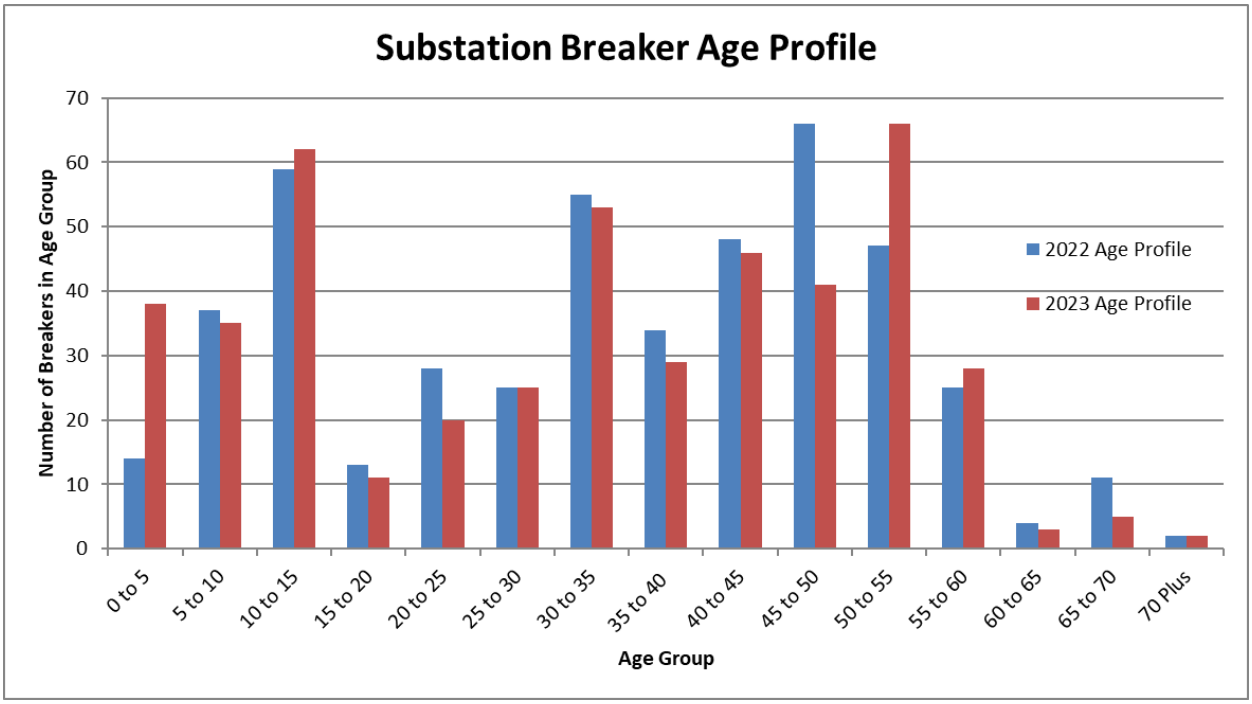
- Expected useful life of 45-55 years depending on the breaker type, operations count, and environmental conditions.

- Age Demographics – 33.1 percent of breakers are beyond 45 years of service and 9.0 percent are beyond 55 years of service.

- Calculated range of annual replacement using the expected useful life only – 11-13 units per year.

- Changes to age demographics – As a result of the proposed capital investments in Substation Breakers during 2023, the age profile for this asset class will experience a 1.9 percent decrease of assets beyond 45 years of age and 0.8 percent decrease beyond 55 years of age. Age is only one of multiple factors in determining targeted assets in a given year. To support mitigation of risk associated with this asset class, continuation of the strategic breaker spares program is planned. **Figure 69** illustrates the overall change in asset age profile for Substation Breakers between 2022 and 2023.

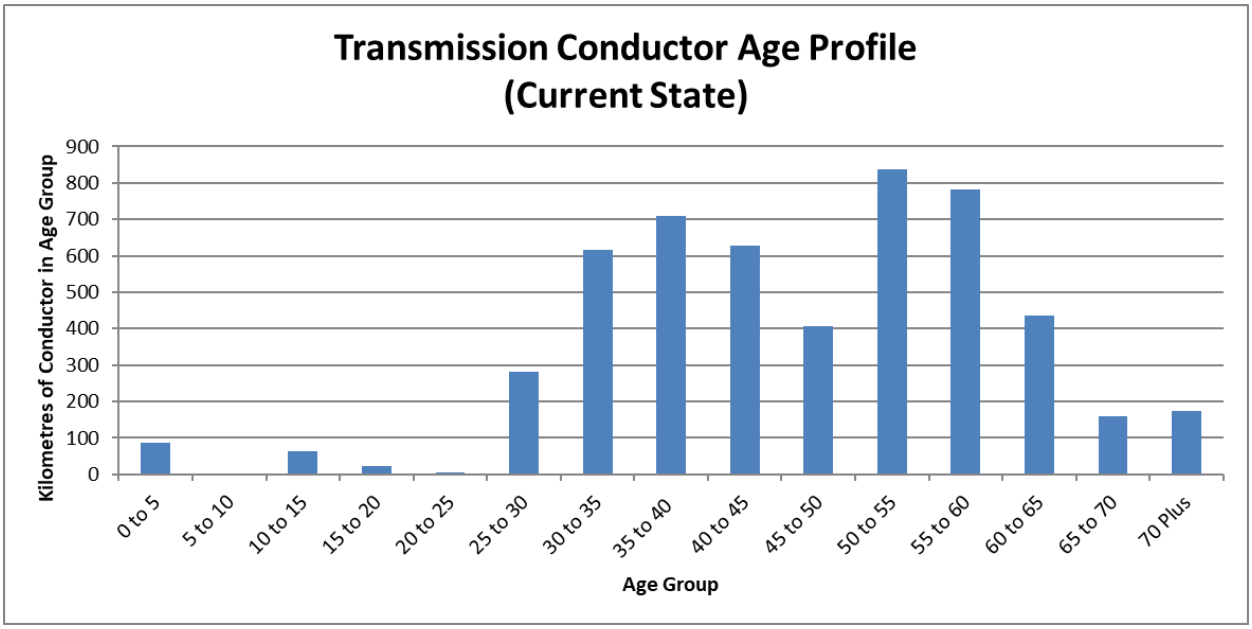
Figure 69: Substation Breaker Age Profile



Transmission Conductor

Figure 70 below shows the transmission conductor age profile (current state).

Figure 70: Transmission Conductor Age Profile (Current State)



- Expected useful life of 55-65 years depending on the conductor design and environmental conditions.

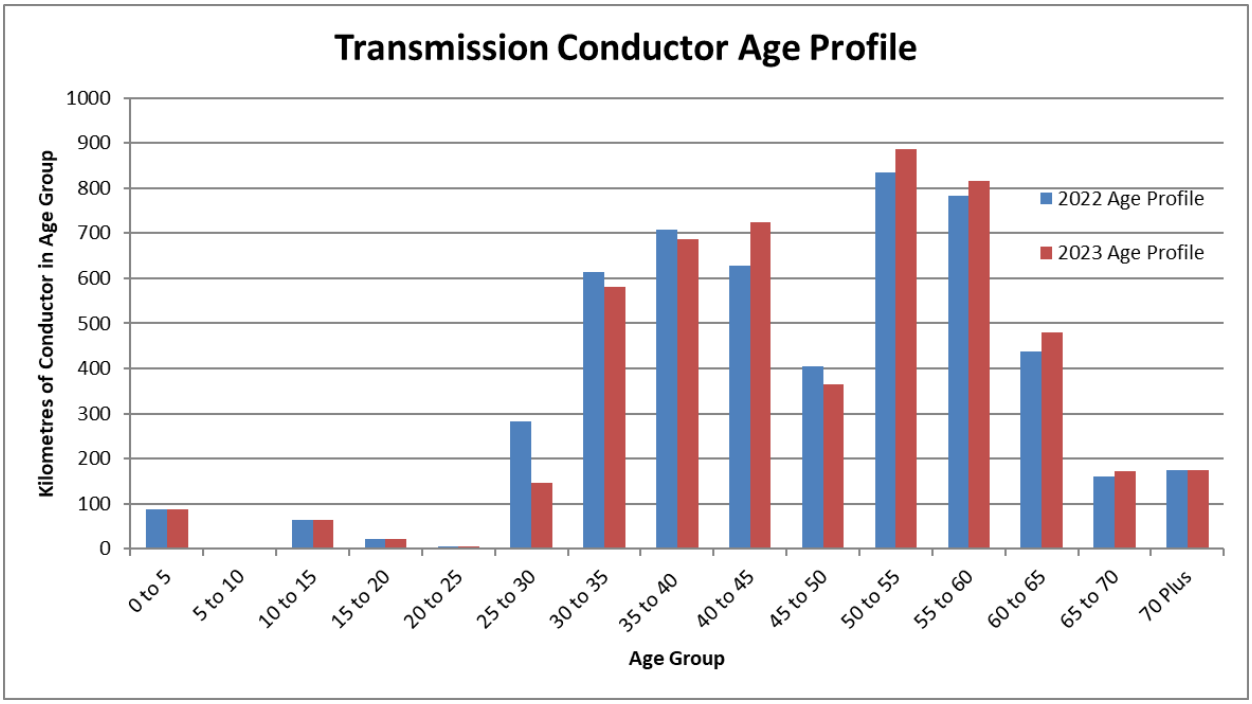
- Age Demographics – 29.9 percent of conductor is beyond 55 years of service and 6.4 percent beyond 65 years of service.

- Calculated range of annual replacement using the expected useful life only – 83 to 99 km per year.

- Changes to age demographics – As a result of proposed capital investments in transmission conductor in 2023, the age profile for this asset class will experience an approximately 1.6 percent increase in assets beyond 55 years of age and 0.2 percent increase beyond 65 years of age. Age is only one of multiple factors in determining targeted assets in a given year.

Figure 71 illustrates the overall change in asset age profile for transmission conductor between 2022 and 2023.

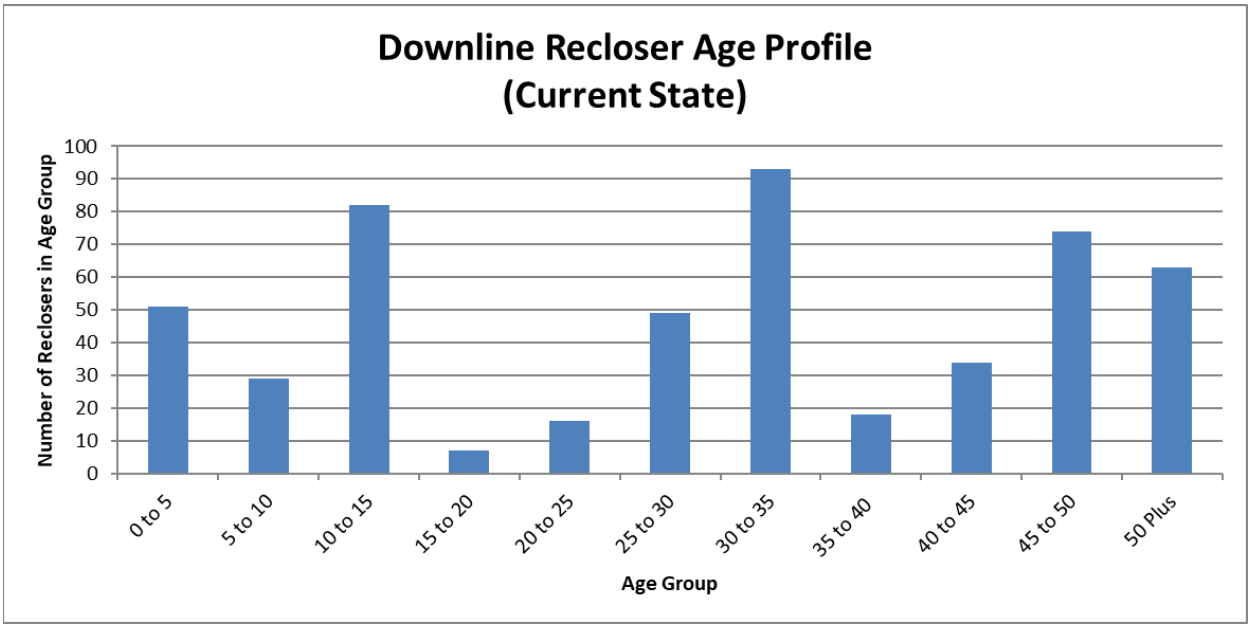
Figure 71: Transmission Conductor Age Profile



Downline Reclosers

Figure 72 below shows the downline reclosers age profile (current state).

Figure 72: Downline Reclosers Age Profile (Current State)



- Expected useful life of 30-40 years depending on the downline recloser design, loading, and environmental conditions.

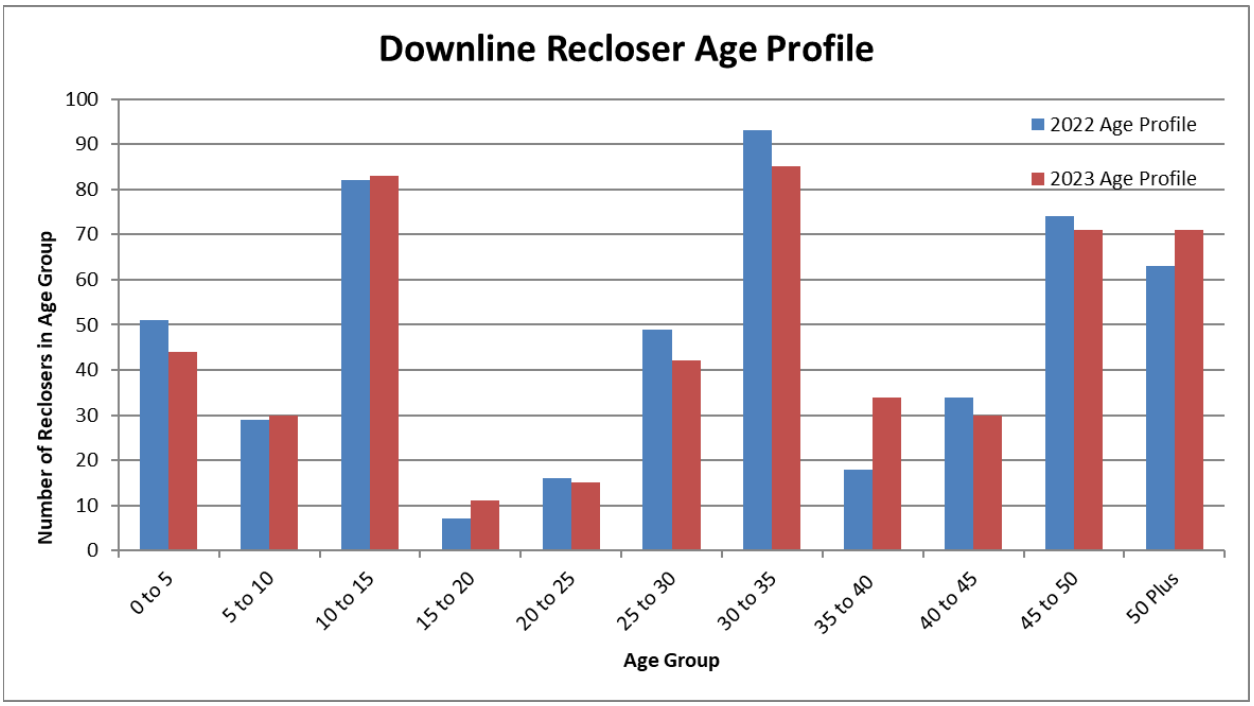
- Age Demographics – 54.7 percent of Downline Reclosers are beyond 30 years of service and 33.1 percent are beyond 40 years of service.

- Calculated range of annual replacement using the expected useful life only – 16 to 21 units per year.

- Changes to age demographics – As a result of the proposed capital investments in Downline Reclosers during 2023, the age profile for this asset class will experience an approximately 1.7 percent increase in assets beyond 30 years of age and 0.2 percent increase beyond 40 years of age. Age is only one of multiple factors in determining targeted assets in a given year. To support mitigation of risk associated with this asset class, continuation of the strategic transformer Downline Recloser spares program is

planned. **Figure 73** below illustrates the overall change in asset age profile for Downline Reclosers between 2022 and 2023.

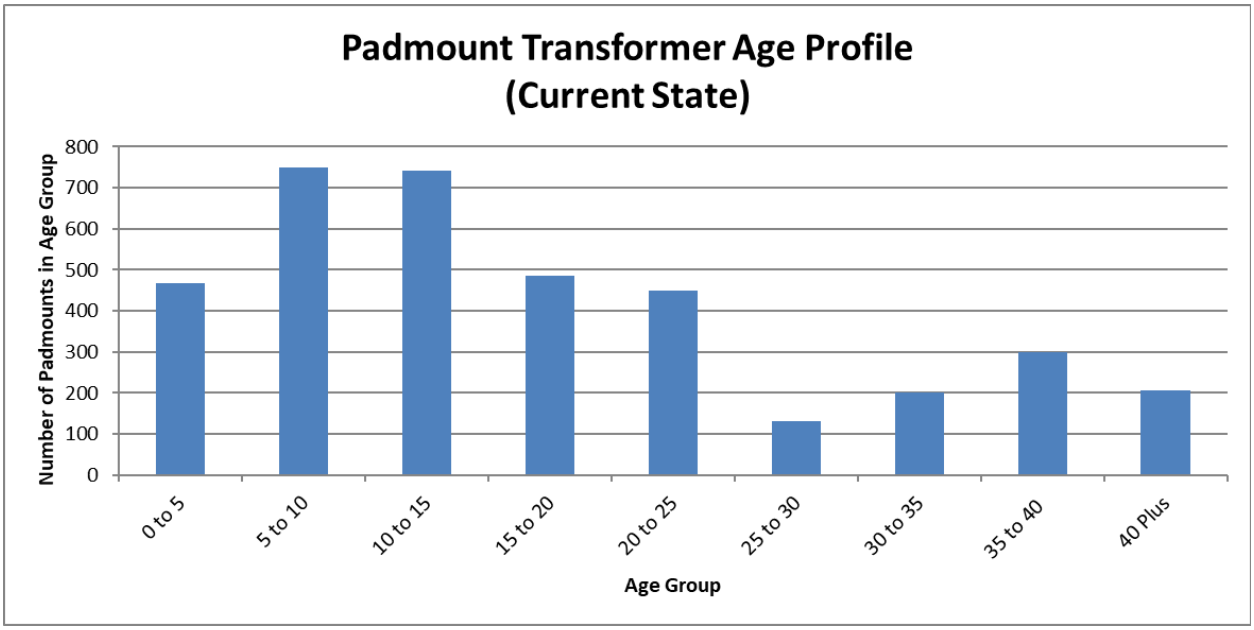
Figure 73: Downline Recloser Age Profile



Padmount Transformers

Figure 74 below shows the Padmount Transformer age profile (current state).

Figure 74: Padmount Transformers Age Profile (Current State)



- Expected useful life of 35-45 years depending on the padmount design, loading, and environmental conditions.

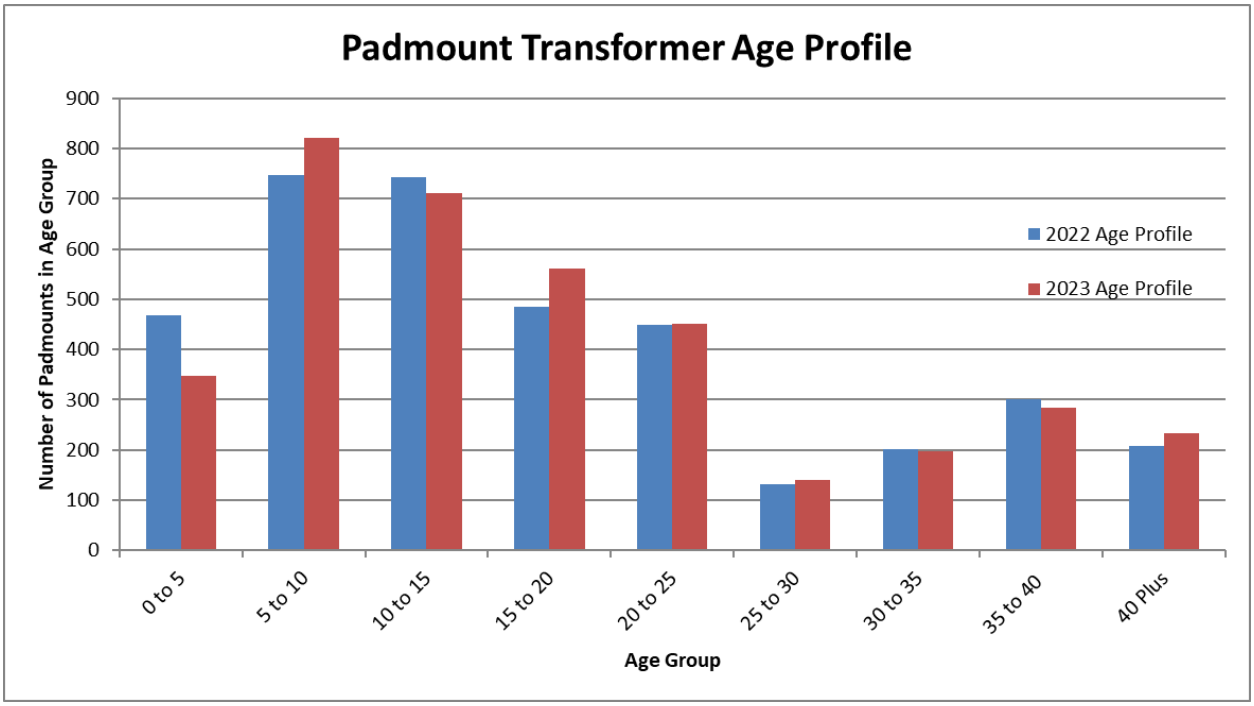
- Age Demographics – 13.6 percent of padmounts are beyond 35 years of service and 2.2 percent beyond 45 years of service.

- Calculated range of annual replacement using the expected useful life only – 94 to 120 units per year.

- Changes to age demographics – As a result of the proposed capital investments in Padmount Transformers during 2023, the age profile for this asset class will experience an approximately 0.1 percent decrease in assets beyond 35 years of age and a 0.6 percent increase beyond 45 years of age.

Figure 75 below illustrates the overall change in asset age profile for Padmount Transformers between 2022 and 2023.

Figure 75: Padmount Transformer Age Profile



11.1.6 Contingency Information

The NSUARB's 2019 ACE Plan Order Directive 4 provided as follows:

> For each capital project submitted for Board approval in 2017, 2018 and 2019 (either through or outside of the ACE Plan proceedings), that has been completed, NS Power is directed to provide the following information in its 2020 ACE Plan application:
>
> - The Board approved original project cost (i.e., not Board approved ATO's or Final Costs);
> - The total contingency amount included in the original Board approved project cost;
> - The actual final incurred project cost;
> - The variance between the final incurred project cost and the original Board approved project cost;

- The proposed in-service date identified in the original Board approved project application; and,
- The actual in-service date for the project.

The NSUARB's 2020 ACE Plan Order Directives 8 and 9 updated this requirement as follows:

> 8. NS Power is directed to continue to track the information related to contingency spending noted in Paragraph 73 of the Board's 2019 ACE Plan Decision, with the following modifications: For each capital project submitted for Board approval in 2017, 2018, 2019 and 2020 (either through or outside of the ACE Plan proceedings, including projects submitted for subsequent approval, but excluding U&U projects) that has been completed, the Board directs NS Power to provide the following information in its 2021 ACE Plan application:
>
> - The Board approved original project cost (i.e., not Board approved ATO's or Final Costs). For projects that were originally estimated to be under $250k in the 2017 to 2019 ACE Plans and under $1M in 2020 ACE Plan but exceeded these thresholds and required Board approval, the original project cost is to be the ACE Plan estimate (note that NS Power can identify the subsequently Board approved amount in a "Notes" column);
> - The total contingency amount included in the original Board approved project cost;
> - The actual final incurred project cost;
> - The variance between the final incurred project cost and the original Board approved project cost;
> - The proposed in-service date identified in the original Board approved project application; and,
> - The actual in-service date for the project.
>
> 9. NS Power is directed to continue to track the information related to contingency spending, including information related to projects approved by the Board after 2020, and report it in subsequent ACE Plan applications. This reporting shall also categorize projects by function (i.e., generation, transmission, distribution and general plant), with "generation" projects further categorized by type of project (i.e., hydro, steam, gas, other renewables).

The NSUARB's 2021 ACE Plan Order Directive 3 updated this requirement as follows:

> Continue to track the information noted in Paragraph 92 of the Board's 2020 ACE Plan decision for each completed capital project that was submitted for Board approval in 2017, 2018, 2019, 2020 and 2021 (either through or outside of the ACE Plan proceedings, including projects submitted for subsequent approval, but excluding U&U projects). Further the Board directs that the following additional information be included in the related 2022 ACE Plan reporting:
>
> - NS Power is to identify all new projects that have been added to the report; and
> - For any capital projects that have a negative variance greater than or equal to 25% of the Board approved capital cost estimate, NS Power shall provide an explanation detailing the reasons for the variance.
>
> The Board directs NS Power to continue to track this information, including information related to projects approved by the Board after 2021, and report it in subsequent ACE Plan applications. The Board finds the format of Appendix E of the 2021 ACE Plan application a useful means of presenting this data. The Board, therefore, directs that the data continue to be presented in this format in subsequent ACE Plan applications (subject to the modifications noted in the preceding paragraph). This reporting shall also categorize projects by function (i.e., generation, transmission, distribution, and general plant), with "generation" projects further categorized by type of project (i.e., hydro, steam, gas, other renewables).

The NSUARB's 2022 ACE Plan Order Directive 2 updated this requirement as follows:

> Continue to track the information referred to and as modified in Paragraph 67 and 68 of the decision.

Paragraphs 67 and 68 of the Board's 2022 ACE Plan Decision provided as follows:

> [67] The Board directs NS Power to continue to track the information noted in Paragraph 92 of the Board's 2020 ACE Plan decision for each completed capital project that was submitted for Board approval in 2017, 2018, 2019, 2020, 2021 and 2022 (either through or outside of the ACE Plan proceedings, including projects submitted for subsequent approval, but excluding U&U projects). Further the Board directs that the following additional information be included in the related 2023 ACE Plan reporting:

- NS Power is to identify all new projects that have been added to the report; and
- For any capital projects that have a negative variance greater than or equal to 25% of the Board approved capital cost estimate, NS Power is to provide an explanation detailing the reasons for the variance.

[68] The Board directs NS Power to continue to track this information, including information related to projects approved by the Board after 2022, and report it in future ACE Plan applications. The Board directs that the data continue to be presented in the 2022 ACE Plan application Appendix E format in future ACE Plan applications (subject to the modifications noted in the preceding paragraph). This reporting is to also categorize projects by function (i.e., generation, transmission, distribution, and general plant), with "generation" projects further categorized by type of project (i.e., hydro, steam, gas, other renewables).

Please refer to **Appendix D** for the updated contingency directive file.

The NSUARB's 2022 ACE Plan Order Directives 1 and 7 directed additional information pertaining to contingency as follows:

1. Provide a table in future ACE Plan applications similar to the table provided in CA IR-10(e), modified in accordance with the direction in Paragraph 66 of the Board's decision.

//

7. Provide greater clarity in its use of the estimated accuracy range from AACE guidelines as guidance to arrive at a contingency amount in the 2023 ACE Plan.

Please refer to **Figure 76** for a summary of the data in **Appendix D**.

Figure 76: Summary of Appendix D Data

Year	Total # of projects placed in service	Percentage of projects under-spent by greater than 20%	Percentage of projects with total spending between -20% and +30% of budget	Percentage of Projects over-spent by greater than 30%
2016	4	0%	25%	75%
2017	71	8%	63%	28%
2018	91	10%	73%	18%
2019	84	10%	82%	8%
2020	30	10%	73%	17%
2021	26	8%	73%	19%
2022	8	38%	50%	13%
All Years	**314**	**10%**	**72%**	**18%**

The data presented in **Appendix D** and summarized in the table above indicates that the total cost for 72 percent of the projects in **Appendix D** was within the expected range of accuracy of -20 percent to +30 percent of the approved budget amounts for an AACE Class 3 estimate and that 18 percent of projects had spending more than 30 percent over their budget amounts.

While the number of projects over spent by more than 30 percent slightly exceeds what can be expected from a portfolio of projects with Class 3 estimates (10 percent of projects over-spent by 30 percent or more), the trend is continuing in a positive direction and NS Power's performance is approaching the expected range.

NS Power continues to apply its non-binding contingency guidelines as developed in consultation with Stakeholders in the execution of its capital program. In addition, NS Power has further enhanced its Project Delivery Model (PDM), creating additional tools and guidelines for project teams to ensure consistency in development and standardization in delivery. As demonstrated in

Appendix D, the contingency applied to all projects is within the ranges set out in the non-binding contingency guidelines. On average, the amount of contingency that NS Power has applied to the projects for approval in the 2023 ACE Plan is 13 percent. This is near the lower end of the range for projects with a Class 3 estimate as detailed in the non-binding contingency guidelines. For larger, more complex projects, in addition to expert judgment and range estimating, simulation analysis has been applied to ensure a data driven response to the appropriate values of contingency and management reserve is applied to the estimates, based on project-specific and systemic risks.

11.2 2023 Capital Spending by Justification Criteria

Items in the 2023 ACE Plan have been developed in accordance with the CEJC. Definitions of the various criteria referenced in **Figure 77** below are included in the CEJC.

Figure 77: Capital Expenditures by Justification Criteria

(Millions of dollars)

Justification Criteria	2023 Budget	Projects included for Approval	Routine Spend	Less than $1M	Items for Subsequent Submission	Carryover	Pt. Aconi
Innovation	$ 0.4	-	-	-	-	$ 0.4	-
Health & Safety	10.2	0.5	0.6	1.1	-	7.5	0.4
Environment	9.3	-	0.5	1.1	-	4.0	3.7
Hydro, Wind and Biomass	39.2	-	3.2	3.9	3.7	28.4	-
Thermal	66.1	14.3	2.3	31.2	2.0	10.4	5.8
Transmission Plant	73.1	5.6	13.9	2.8	23.0	27.8	-
Distribution System	115.3	0.4	83.5	5.4	-	26.1	-
Pole Retreatment	1.1	-	-	-	-	1.1	-
Metering Equipment	6.5	-	4.8	-	-	1.7	-
Work Support Facilities	14.7	-	5.6	0.3	2.9	6.0	-
Information Technology Application and Hardware System	36.5	-	1.8	7.5	10.1	17.0	-
Vehicles	9.9	-	9.8	-	-	0.1	-
Total	**$382.3**	**$20.8**	**$126.0**	**$53.2**	**$41.8**	**$130.5**	**$9.9**

*Note: Details of justification sub-criteria are provided in the following section.

Note: Figures presented may include $0.1M in rounding differences on some line items

11.3 2023 Capital Spending by Justification Sub-Criteria

Figure 78 below provides 2023 capital spending by justification sub-criteria.

Figure 78: 2023 Capital Spending by Justification Sub-Criteria

(Millions of dollars)

Justification Sub-Criteria	2023 Budget	Projects included for Approval	Routine Spend	Less than $1M	Items for Subsequent Submission	Carryover
Distribution System						
Requirement to Serve	$81.5	$0.0	$78.4	$0.2	$0.0	$2.9
Pole Strength	1.2	-	-	0.4	-	0.8
Service Voltage	3.2	-	-	2.2	-	1.1
Deteriorated Conductor	2.8	-	-	0.1	-	2.7
Outage Performance	15.8	-	0.6	0.2	-	15.0
Joint Use Agreement	4.4	-	4.4	-	-	-
Other Distribution System	4.8	0.4	-	1.1	-	3.3
Total	**$115.3**	**$0.4**	**$83.5**	**$5.4**	**$0.0**	**$26.1**
Work Support Facilities						
Building Facilities/Furniture	$2.1	$0.0	$2.0	$0.0	$0.0	$0.0
Building Replacement/Modifications	0.7	-	-	-	0.6	0.1
Telecontrol & Telecommunications	6.9	-	1.3	0.3	-	5.3
Other Work Support Facilities	5.0	-	2.2	-	2.3	0.5
Total	**$14.7**	**$0.0**	**$5.6**	**$0.3**	**$2.9**	**$6.0**

Note: Figures presented may include $0.1M in rounding differences on some line items

11.4 Quick Reference Sheet

2022 AFUDC Rate for Capital 6.33%

In the Board's Weighted Average Cost of Capital (WACC) and Allowance for Funds Used During Construction (AFUDC) Order dated December 16, 2021, the NSUARB directed NS Power as follows:

1. The WACC and AFUDC rates are established at 6.33%, effective January 1, 2022;
2. NS Power is directed to continue to file an application annually, (no later than November 30), for approval of the calculation of WACC/AFUDC, unless there is a general rate application in the same year, using the principles set out in the Board's Decision in M07215.
3. NS Power is directed to file a notification to the Board if its credit rating changes, and to provide an assessment of the impact this change may have on its borrowing rates. [33]

Consistent with the Board's Order, the 2023 ACE Plan projects use the Board's approved AFUDC rate of 6.33 percent.

2023 O/H Rates

Generation		**Customer Operations**		**Shared Services**	
PP Regular	27.63%	Regular	82.32%	IT	56.95%
Hydro	55.46%	Contract	19.06%		
Contract	11.36%	Vehicle	41.40%		

[33] M10355, NS Power WACC/AFUDC Application, NSUARB Order, December 16, 2021.

11.5 2023 Depreciation Rates

Figure 79: 2023 Depreciation Rates

	2023
Steam Production Plant	
Lingan	
Lingan 1-2	4.12%
Lingan 3-4	2.28%
Lingan – Common	4.48%
Total Lingan	3.35%
Point Aconi 1	2.27%
Point Tupper	
Point Tupper 1 (Common)	3.97%
Point Tupper 2	2.82%
Total Point Tupper	2.89%
Trenton	
Trenton 5	3.10%
Trenton 6	2.34%
Trenton – Common	0.47%
Total Trenton	2.47%
Tufts Cove	
Tufts Cove 1	4.24%
Tufts Cove 2	3.68%
Tufts Cove 3	2.33%
Tufts Cove – Common	3.44%
Total Tufts Cove	3.27%
Port Hawkesbury Biomass	2.50%
Point Tupper Marine Terminal	4.06%
International Coal Pier	2.60%
General	2.82%

Figure 79: 2023 Depreciation Rates

	2023
Total Steam Production Plant	**2.82%**

	2023
Hydro Production Plant	
Avon	3.02%
Bear River	1.80%
Black River	2.04%
Dickie Brook	3.16%
Fall River	1.82%
Harmony	4.55%
Lequille System	2.33%
Roseway	2.29%
Mersey	2.00%
St. Margaret's	2.85%
Sheet Harbour	3.38%
Tusket	2.64%
Wreck Cove System	1.67%
Annapolis Tidal	2.32%
General	2.10%
Total Hydro Production	**2.10%**

	2023
Other Production - Combustion Turbines	
Burnside	2.40%
Tusket	6.42%
Victoria Junction	3.17%
Tufts Cove Unit 4	2.55%
Tufts Cove Unit 5	2.77%
Tufts Cove Unit 6	3.03%
Wind Turbines	
Pre 2009 Wind	5.52%
Post 2009 Wind	4.00%

Figure 79: 2023 Depreciation Rates

	2023
Transmission Plant	
Land Rights - Easements	1.26%
Station Equipment	2.14%
Towers & Fixtures	1.26%
Poles & Fixtures	4.32%
Overhead Conductors & Devices	1.96%
Underground Conduit	1.53%
Underground Conductors & Devices	2.61%
Roads, Trails & Bridges	1.74%
Total Transmission Plant	**2.35%**

	2023
Distribution Plant	
Land Rights - Easements, Surveys & Clearing	1.56%
Structures & Improvements	5.31%
Station Equipment	1.28%
SCADA Equipment	9.68%
Remote Monitoring Equipment	10.32%
Station Equipment – Miscellaneous	12.49%
Poles, Towers & Fixtures	3.79%
Overhead Conductors & Devices	3.33%
Underground Conduit	1.51%
Underground Conductors & Devices	3.17%
Line Transformers	4.09%
Services	5.33%
Meters	6.87%
Street Lighting & Signal Systems	5.33%
Total Distribution Plant	**3.89%**

	2023
General Plant	
Land Rights - General Plant	1.93%
Structures & improvements	2.85%
Office Furniture & Equipment	9.26%
Office Furniture & Equip - Comp Hardware	20.00%
Office Furniture & Equip - Comp Software	10.00%
Transportation Equipment	9.55%
Stores Equipment	14.97%

Figure 79: 2023 Depreciation Rates

	2023
Communication Equipment	4.38%
Communication Equipment - SCADA Eq	1.33%
Remote Monitoring Equipment	10.27%
Miscellaneous Equipment	5.02%
Roads, Bridges & Trails (Kelly Rock)	2.58%
Mining Equipment (Kelly Rock)	2.92%
Total General Plant	**8.16%**

	2023
Smart Grid Project	
Solar Generation	4.00%
Batteries	10.00%
EV Chargers	6.67%

1

CI Number: C0012838

Title: HYD – Lequille Canal Dyke, Gates and Tailrace Refurbishment

Start Date: 2018/10
In-Service Date: 2024/10
Final Cost Date: 2025/04
Function: Hydro
Forecast Amount: $7,058,816

DESCRIPTION:

This project is for the refurbishment of the Lequille power canal embankments, replacement of the powerhouse intake gate and hoist, and replacement of the tailrace gate and retaining structure.

The Lequille hydroelectric system, located in Annapolis County, was constructed in the late 1950s and early 1960s and upgraded in 1967. It includes three storage reservoirs: Dargie Lake, Grand Lake and Lequille Headpond (Grand Lake Flowage). Water in the Lequille Headpond is diverted through a canal intake structure into the power canal. The power canal is 15,840 feet (4,828 m) long and terminates at the forebay, where a gated concrete intake structure conveys water via a 7-foot diameter penstock to the powerhouse. After passing through the generating unit, the water is discharged through a concrete pipe and tailrace structure to the Alain River and out of the system. The generating capacity from the Lequille system is 11 MW.

The Board provided the following in its January 24, 2023 Decision regarding CI C0045210 – LEQ Embankment Refurbishment:

> According to NS Power's 2022 Annual Capital Expenditure (ACE) Plan, refurbishment of the Lequille power canal embankments is also included in the scope of CI C0012838, HYD – Lequille Canal Dyke, Gates and Tailrace Refurbishment. The project was listed as one of the capital items forecast for subsequent approval, for $6,123,004. NS Power's Third Quarter Capital Item Status Update for 2022 shows that $782,041 had been already spent by September 30, 2022. The Board directs that, in any approval request for CI C0012838, NS Power shall identify the work that has already been included in CI C0045210. The budgeted amount for any related costs included in the approved work order CI C0045210, HYD - LEQ Embankment [Refurbishment] must be excluded from an approval request under CI C0012838.

NS Power confirms that there is no work scope or cost overlap between these projects, and there is no scope or costs included in this capital work order for the work completed under CI C0045210.

Summary of Related CIs +/- 2 years:
Pursuant to Section 11.2 of the Detailed CEJC, related CIs for Hydro projects include "work completed on the same generating unit and dam structures, but not necessarily the same asset."

- 2022 – CI C0045210 HYD – LEQ Embankment Refurbishment - $1,456,242

Depreciation Class: Hydraulic Production Plant - Lequille

Estimated Life of the Asset: 50 Years

Retirement Information:

- Categorization of Retirement: Accounting Policy 6420 - Retirement and Disposal of Capital Assets
- Percentage of Asset Pool: 2.1%

JUSTIFICATION:

Justification Criteria: Hydro, Wind and Biomass

Why do this project?

Canal Embankment

In 2018, the main dam, wingdams and spillway of the Lequille headpond were refurbished (CI 48533 HYD – Lequille Headpond Refurbishment) to withstand the Inflow Design Flood (IDF) and prevent overtopping of the earthfill main dam and wing dams as recommended in the 2011 Dam Safety Review (DSR) and the 2016 Freeboard Addendum. The reconfiguration of the headpond infrastructure improved the hydraulic conditions of the headpond, reducing the peak elevation of the IDF to 404.6 feet. However, the crest elevation of the power canal embankment varies from 403.0 feet to 409.5 feet and as such for the majority of its length, the canal is at risk of overtopping the embankment during the IDF.

Intake Gate and Hoist

The Lequille intake houses the original steel gate and hoist installed in 1967.

The current slide gate has a screw stem operator and does not close under its own weight and may not reliably close under full flow. Closure under full flow is necessary to provide overspeed protection for the generator in emergency situations and to prevent draining of the headpond and environmental damage in the event of a penstock rupture. The ability to close under its own weight allows the gate to close during a power failure.

Tailrace (Discharge) Gate

The original tailrace gate was removed because of difficulty achieving a tight seal with the gate and de-watering the draft tube area. In the absence of a permanently installed tailrace gate, NS Power has installed a steel gate at the downstream end of the tailrace discharge pipe on an as needed basis for routine inspections and maintenance, and during emergency situations. This requires a mobile crane to carry out the installation and removal of the temporary tailrace gate between tidal cycles. The discharge pipe also must be pumped out. This limits the ability to install the gate efficiently and in a timely manner. There are also safety concerns with personnel accessing the downstream end of the pipe because the banks are steep and covered with slippery, loose rocks. Personnel are working in an area with a high tidal influence which has been classified as a confined space and the work must be coordinated/scheduled around the tides.

Tailrace Retaining Structure

The timber crib retaining structures located on each side of the discharge pipe outlet and tailrace weir are in poor physical condition. The timbers have deteriorated and are no longer able to retain the rock and fill behind them. This material is falling into the tailrace, and partially blocking the discharge which results in raised tailwater levels. Raised tailwater levels influence turbine operation and reduce the output from the unit.

Why do this project now?

Canal Embankment

The Lequille canal embankments were identified as a high priority within NS Power's dam safety risk prioritization due to the deteriorated condition of the impervious clay blanket on the face of the canal embankment. During the geotechnical investigation carried out in 2019 as part of preliminary engineering it was determined that the blanket had been eroded or was missing from several sections of the canal embankment, presenting a risk to the dam's reliability in preventing leakage through the dam and in preventing a dam breech.

Intake Gate and Hoist

The intake gate and hoist assembly is 55 years old, and has had no major upgrades over its life. Lequille is also one of NS Power's highest head hydro plants with an operating head of 400 feet. The gate and hoist need to be replaced to provide reliable operation. Without the ability to shut off flow, the generating unit can spin at excessive speeds potentially leading to turbine-generator damage/failure and safety risk to personnel. The intake gate also serves as a means to shut off flow under emergency situations such as a penstock rupture.

Tailrace (Discharge) Gate

Currently to dewater the generating unit, a temporary steel gate must be installed at the downstream end of the tailrace discharge pipe. Since 2017 there have been multiple occasions that required dewatering of the unit. Each time necessitated use of a mobile crane to install the temporary gate, and then pumping out the discharge pipe. This process takes approximately 8 hours, and therefore does not allow the work to be carried out in the most timely and efficient manner. In addition, this creates safety risk with personnel accessing the downstream end of the pipe because the banks are steep and covered with slippery, loose rocks and work is in an area which has a high tidal influence and has been designated a confined space.

Tailrace Retaining Structure

The timber crib retaining structure has deteriorated to the point where it no longer can continue to perform its design function of providing an unobstructed tailrace and must be replaced. Due to the age and the condition of the wood, refurbishment of the structure is not an option.

Why do this project this way?

Canal Embankment

During preliminary engineering, several options were considered to refurbish the canal embankment:

- Option 1 - install stop logs in a refurbished canal intake structure during the IDF to prevent inflow into the canal.
- Option 2 - construct a side spillway near the upstream end of the canal embankment to redirect the flow via an armored tailrace channel into the old riverbed.
- Option 3 - raise the canal embankment with low permeability fill with frost cover.
- Option 4 - install a geomembrane on the embankment to create an impermeable barrier
- Option 5 – install plastic sheet piles along the embankment alignment.
- Option 6 - raise the crest embankment using non-frost susceptible semi-impervious fill (no frost cover requirement).

Of the six possible options, four options were not feasible for the following reasons:

- Option 1 - required labour and equipment for stoplog installation during the IDF and therefore its reliability cannot be guaranteed. This option also does not address the deteriorated clay blanket.
- Option 2 – spillway required a tailrace channel constructed to the old riverbed which is an archaeologically high potential area. This option also does not address the deteriorated clay blanket.
- Option 4 –five different zoning geometries are present along the length of the canal embankment. The geometry varies based on the foundation material, with additional geometries adjacent to the “lake” and where repairs have been undertaken. Installation of a geomembrane is not suited to all sections of the canal and it is technically difficult to tie all sections together because the impervious section of the geometries varies between an upstream clay blanket, an impervious central core and an impervious embankment.
- Option 5 - technical difficulties in driving the sheet piles due to the presence of large cobbles and boulders in the embankment.

Of the six possible options, only Options 3 and Option 6 are feasible. The Economic Analysis Model (EAM) indicated that Option 6 was the preferred option because it is the most economical alternative. The preferred design option is less conservative than conventional designs because at the IDF, there will be temporary seepage allowed through this fill. CDA guidelines allow for this if analysis can demonstrate that it does not result in risk of dam failure. Seepage and stability analysis were conducted to determine this meets the CDA guidelines of not endangering the dam.

Intake Gate and Hoist

Two options for intake equipment refurbishment/replacement were considered:

- Option 1 – general refurbishment of the existing slide gate, replacement of the existing hoist with a two speed or larger screw stem hoist, and the installation of a backup generator.
- Option 2 – replacement of the slide gate with a wheeled gate, and replacement of the screw stem hoist with a wire rope hoist.

The refurbished gate in Option 1 will not close under its own weight and a backup generator in a remote location is difficult to service to maintain operational reliability. Screw stem hoists frequently incur damage to the stems which results in jamming of gates, and the lowering rate for screw stem hoists is slower than a wire rope hoist. As well, to inspect or do maintenance on the slide gate the 5km long canal must be dewatered. Therefore, this option was not selected.

The wheeled gate and wire rope hoist in Option 2 provides a system that will close under full flow under its own weight, and the gate can be raised above the deck elevation for future inspection and maintenance. Therefore, the recommended approach is to replace the existing gate and hoist with a roller gate that will close under full flow under its own weight. The platform will also be replaced to provide safe access for raking debris from the trash racks.

Tailrace (Discharge) Gate

The tailrace gate will be located adjacent to the powerhouse as it has safer access because the hoist can be operated from level ground which does not require entering the tailrace., It also requires a smaller gate and does not require that the discharge pipe be pumped out.

Tailrace Retaining Structure

The only option to address the deterioration of the timber crib tailrace retaining structure is the construction of a cast in place concrete structure along the same alignment as the existing timber structure. Timber was not considered because provincial regulators do not recommend using treated timber in water courses. Untreated timber was considered but more excavation would be required behind the headwall which would have resulted in the parking area between the tailrace and the Dugway Road being excavated, increasing the risk of the road being undercut.

CI Number : C0012838 - HYD - Lequille Canal Dyke, Gates and Tailrace Refurbishment **Project Number** C0012838

Parent CI Number : -

Asset Location : 1356 - 1356 Lequille, 11Mwh; 1968 on the Lequille River System **Budget Version** 2023 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	2700 - HGP - Waterways	6,891,859
Retirements	2700 - HGP - Waterways	166,958
	Total Cost:	7,058,816
	Original Cost:	864,296

Capital Project Detailed Estimate

Location: Hydro
CI# : C0012838
Title: HYD – Lequille Canal Dyke, Gates and Tailrace Refurbishment
Execution Year: 2023-2024

Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#'s)
Regular Labour						
Engineering	PD	154	$ 413	$ 63,699		
Environment & First Nations Advisor	PD	96	$ 390	$ 37,264		
Financial Assistance	PD	149	$ 300	$ 44,570		
			Sub-Total	$ 145,533		
Travel Expense						
Travel	Lot	1	$ 12,887	$ 12,887		
			Sub-Total	$ 12,887		
Materials						
Canal embankment	Lot	1	[redacted]		Attachment 1: 60% of Items 3.3, 3.4, 3.5	
Intake gate and hoist	Lot	1			Attachment 2: Items 3.2, 3.3, 3.4, 3.5, 3.6	
Intake structure	Lot	1			Attachment 2: 80% of Items 3.8, 3.9;60% of Item 3.11; 100% of Items 3.12, 3.13	
Intake Electrical	Lot	1			Attachment 2: 60% of Items 4.2, 4.3, 4.4, 4.5, 4.6	
Discharge gate	Lot	1	$ 212,106	$ 212,106		
Discharge structure	Lot	1	$ 314,730	$ 314,730		
			Sub-Total	$ 2,373,856		
Contracts						
Technical Project Management	PD	249	$ 800	$ 199,500		
Geotechnical - Test Pits & Boreholes	Lot	1	$ 15,037	$ 15,037		
Canal embankment	Lot	1	[redacted]		Attachment 1: Items 1.1, 1.2, 1.4, 2.1, 2.2, 3.1, 3.2; 40% of Items 3.3, 3.4, 3.5	
Intake gate & hoist	Lot	1			Attachment 2: Items 1,1, 1.2, 2.1, 2.2, 2.3,.2.4, 2.5, 3.7	
Intake structure	Lot	1			Attachment 2: 20% Items 3.8, 3.9; 40% of Items 3.11; 100% of Items 3.10, 3.14	
Intake Electrical	Lot	1			Attachment 2: 40% of Items 4.2, 4.3, 4.4, 4.5, 4.6; Item 4.1	
Intake Removals	Lot	1			Attachment 2: Item 3.1	
Discharge gate	Lot	1	$ 101,320	$ 101,320		
Discharge structure	Lot	1	$ 309,820	$ 309,820		
Construction Manager	PD	237	$ 650	$ 154,343		
Archaeology	Lot	1	$ 20,000	$ 20,000		
			Sub-Total	$ 2,128,119		
Consulting						
Canal Embankment Engineering Design	Lot	1	$ 160,287	$ 160,287		
Intake Engineering Design	Lot	1	$ 154,427	$ 154,427		
Gate Inspection	Lot	1	$ 46,005	$ 46,005		
Tailrace Engineering Design	Lot	1	$ 138,973	$ 138,973		
Engineering Support during Construction	Lot	1	$ 130,000	$ 130,000		
Archeology/Shovel testing	Lot	1	$ 13,323	$ 13,323		
HAS Allocation	Lot	1	$ 12,941	$ 12,941		
			Sub-Total	$ 655,956		
First Nations Commitments						
First Nations Consultation (KMKNO)	Lot	1	$ 81,925	$ 81,925		
First Nations Consultation/ Monitoring (Bear River)	Lot	1	$ 75,000	$ 75,000		
			Sub-Total	$ 156,925		
Meals						
Meals	Lot	1	$ 2,341	$ 2,341		
			Sub-Total	$ 2,341		
Other Goods & Services						
Contingency determined via the simulation analysis	%	14%	$ 5,475,617	$ 773,585		
Project Management Reserve determined via simulation analysis	1	4%	$ 5,475,617	$ 221,089		
			Sub-Total	$ 994,674		
Interest Capitalized						
AFUDC				$ 277,426		
			Sub-Total	$ 277,426		
Administrative Overhead						
Labour AO				$ 72,180		
Contractor AO				$ 238,919		
			Sub-Total	$ 311,099		
			SUB-TOTAL (no AO, AFUDC)	$ 6,470,291		
			TOTAL (AO, AFUDC included)	$ 7,058,816		
Original Cost				$ 864,296		

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.

Note 3: Contingency and Management Reserve determined using simulation analysis. Main risks that require contingency include civil materials and contracts. These risks are well understood. The project is based on a Class 3 estimate. The management reserve is required to cover unknowns mainly related to civil works (water management, unknown material findings, supply and pricing changes due to geopolitical conditions).

HYD - Lequille Canal Dyke, Gates and Tailrace Refurbishment
Summary of Alternatives

Division :	Power Production	**Date :**	**21-Feb-23**
Department :	Hydro	**CI Number:**	C0012838
		Project No. :	

	Alternative	After Tax WACC	PV of Revenue Requirement	PV of EVA / NPV	Rank (based on PV of RR)	IRR	Disc Pay
A	Raise canal embankment with non-frost	5.47%	6,180,114	-5,184,615	1	-7.76%	0.0 years
B	Raise canal embankment with low perm	5.47%	6,336,827	-5,313,116	2	-7.76%	0.0 years
	0	NA	NA	NA	NA	#NUM!	0.0 years
	0	NA	NA	NA	NA	#NUM!	0.0 years

Recommendation :

The option to raise the canal embankment with non-frost susceptible fill is the recommended alternative.

Notes/Comments :

Raise canal embankment with non-frost susceptible fill

Costs include the project costs for raising the canal embankment with non-frost susceptible fill, replacing the intake and tailrace gates and replacing the timber tailrace retaining structure with a concrete structure.

Raise canal embankment with low permeability fill

Costs include the project costs for raising the canal embankment with low permeability fill (frost cover required), replacing the intake and tailrace gates and replacing the timber tailrace retaining structure with a concrete structure.

0

0

HYD - Lequille Canal Dyke, Gates and Tailrace Refurbishment
Summary of Sensitivities

Division :	Power Production	**Date :**	**21-Feb-23**
Department :	Hydro	**CI Number:**	C0012838
		Project No. :	

	Alternative	After Tax WACC	PV of Revenue Requirement	PV of EVA / NPV	Rank	IRR	Disc Pay
A	Raise canal embankment with non-frost susceptibl	5.47%	6,180,114	-5,184,615	1	-7.76%	0.0 years
B	Raise canal embankment with low permeability fill	5.47%	6,336,827	-5,313,116	2	-7.76%	0.0 years
	0	NA	NA	NA	NA	#NUM!	0.0 years
	0	NA	NA	NA	NA	#NUM!	0.0 years

	Alternative Variance on Capital Spend	Variance (%)	PV of Revenue Requirement	PV of EVA / NPV	Rank	IRR	Disc Pay
A	Raise canal embankment with non-frost susceptibl	10%	6,798,126	-5,703,076	1	-7.76%	0.0 years
B	Raise canal embankment with low permeability fill	10%	6,970,509	-5,844,428	2	-7.76%	0.0 years
	0	10%	NA	NA	NA	#NUM!	0.0 years
	0	10%	NA	NA	NA	#NUM!	0.0 years
Change:	**A**		618,011	-518,461	0	0.00%	0.0 years
	B		633,683	-531,312	0	0.00%	0.0 years
			NA	NA	NA	#NUM!	0.0 years
			NA	NA	NA	#NUM!	0.0 years

	Alternative Variance on Avoided Expenses	Variance (%)	PV of Revenue Requirement	PV of EVA / NPV	Rank	IRR	Disc Pay
A	Raise canal embankment with non-frost susceptibl	-10%	6,180,114	-5,184,615	1	-7.76%	0.0 years
B	Raise canal embankment with low permeability fill	-10%	6,336,827	-5,313,116	2	-7.76%	0.0 years
	0	-10%	NA	NA	NA	#NUM!	0.0 years
	0	-10%	NA	NA	NA	#NUM!	0.0 years
Change:	**A**		0	0	0	0.00%	0.0 years
	B		0	0	0	0.00%	0.0 years
			NA	NA	NA	#NUM!	0.0 years
			NA	NA	NA	#NUM!	0.0 years

Alternative Variance on Avoided Expenses - Change in Revenue Requirement		PV of Revenue Requirement	PV of Revenue Requirement	PV of Revenue Requirement	Delay?
	Yrs Delay:	1	2	3	
	A	-251,668	-493,088	-724,677	3+ Years
	B	-258,050	-505,592	-743,053	3+ Years
		0	0	0	No
		0	0	0	No

HYD - Lequille Canal Dyke, Gates and Tailrace Refurbishment
Avoided Cost Calculations

Division :	Power Production	**Date :**	21-Feb-23
Department :	Hydro	**CI Number:**	C0012838
		Project No. :	

Raise canal embankment with non-frost susceptible fill

	Avoided Replacement Energy Costs		Avoided Unplanned Repair Costs		Total Annual Avoided Costs	
Year	**2022**	**2023**	**2022**	**2023**	**2022**	**2023**
Replacement Energy Cost ($/MWh)	65.90	67.10				
Repair Cost ($)			0	0		
Events/Outages (#)	0	0	0	0		
Probability of Occurance (%)	0%	0%	0%	0%		
Capacity Factor (%)	100%	100%				
Energy Replaced (MW)	0.0	0.0				
Duration (Hours or Years)	0	0				
Totals	$0	$0	$0	$0	$0	$0

Total Capital Cost of Alternative $7,058,816

Raise canal embankment with low permeability fill

	Avoided Replacement Energy Costs		Avoided Unplanned Repair Costs		Total Annual Avoided Costs	
Year	**2022**	**2023**	**2022**	**2023**	**2022**	**2023**
Replacement Energy Cost ($/MWh)	65.90	67.10				
Repair Cost ($)			0	0		
Events/Outages (#)	0	0	0	0		
Probability of Occurance (%)	0%	0%	0%	0%		
Capacity Factor (%)	100%	100%				
Energy Replaced (MW)	0.0	0.0				
Duration (Hours or Years)	0	0				
Totals	$0	$0	$0	$0	$0	$0

Total Capital Cost of Alternative $7,238,780

0

	Avoided Replacement Energy Costs		Avoided Unplanned Repair Costs		Total Annual Avoided Costs	
Year	**2022**	**2023**	**2022**	**2023**	**2022**	**2023**
Replacement Energy Cost ($/MWh)	65.90	67.10				
Repair Cost ($)			0	0		
Events/Outages (#)	0	0	0	0		
Probability of Occurance (%)	0%	0%	0%	0%		
Capacity Factor (%)	100%	100%				
Energy Replaced (MW)	0.0	0.0				
Duration (Hours or Years)	0	0				
Totals	$0	$0	$0	$0	$0	$0

Total Capital Cost of Alternative $0

0

	Avoided Replacement Energy Costs		Avoided Unplanned Repair Costs		Total Annual Avoided Costs	
Year	**2022**	**2023**	**2022**	**2023**	**2022**	**2023**
Replacement Energy Cost ($/MWh)	65.90	67.10				
Repair Cost ($)			0	0		
Events/Outages (#)	0	0	0	0		
Probability of Occurance (%)	0%	0%	0%	0%		
Capacity Factor (%)	100%	100%				
Energy Replaced (MW)	0.0	0.0				
Duration (Hours or Years)	0	0				
Totals	$0	$0	$0	$0	$0	$0

Total Capital Cost of Alternative $0

HYD - Lequille Canal Dyke, Gates and Tailrace Refurbishment

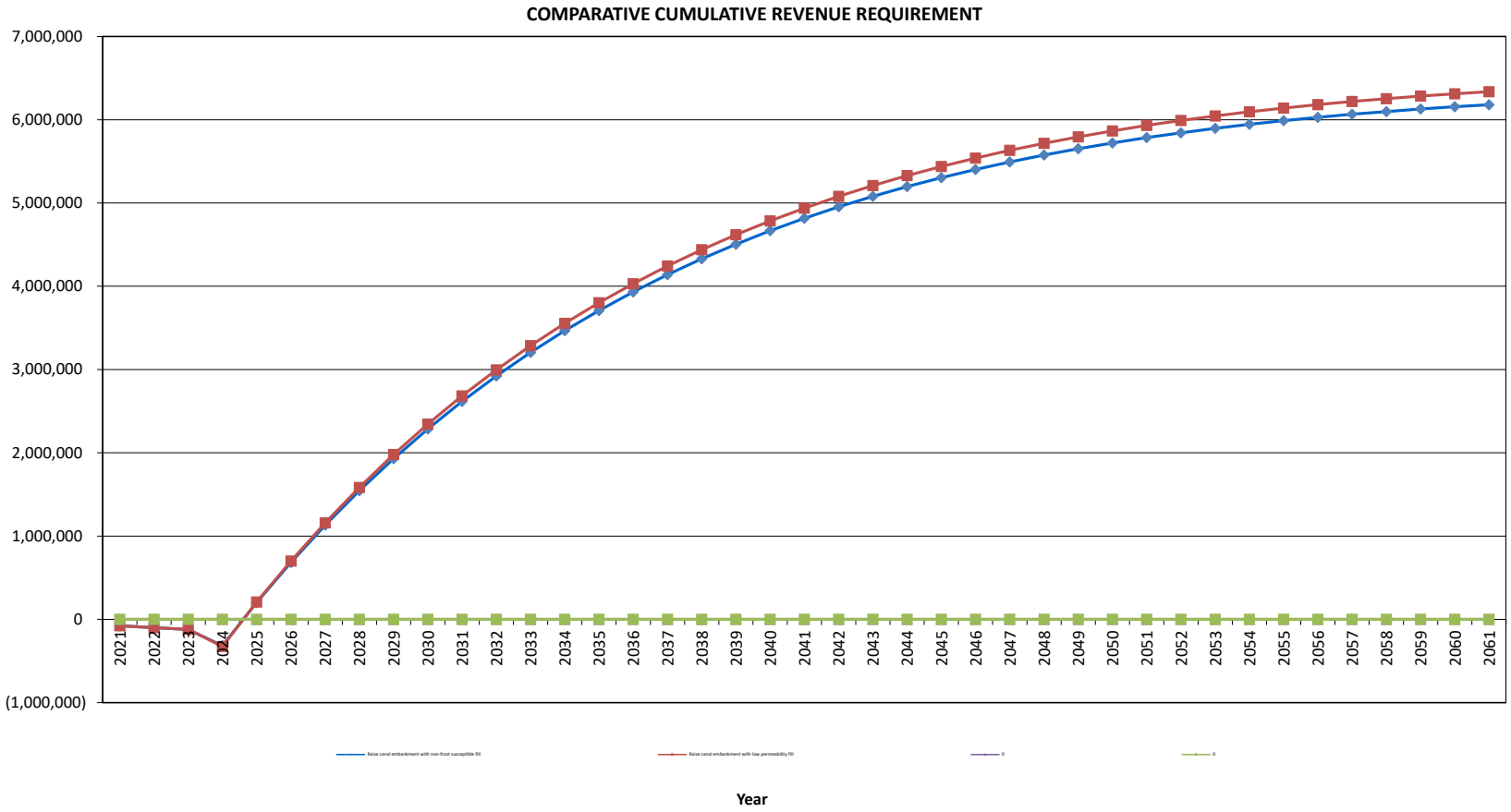
Raise canal embankment with non-frost susceptible fill

Year	Total Revenue	Operating Costs	Avoided Expenses	Capital	CCA	UCC	CFBT	Applicable Taxes	CFAT	PV of CF	Discount Factor	CNPV
2021	-	-	-	(529,774.0)	-	-	(529,774.0)	-	(529,774.0)	(529,774.0)	1.00	(529,774.0)
2022	-	-	-	(271,602.0)	-	-	(271,602.0)	-	(271,602.0)	(257,515.9)	0.95	(787,289.9)
2023	-	-	-	(461,965.6)	-	-	(461,965.6)	-	(461,965.6)	(415,290.3)	0.90	(1,202,580.2)
2024	-	-	-	(5,484,375.7)	258,811.6	6,297,342.7	(5,484,375.7)	75,055.4	(5,409,320.3)	(4,610,583.2)	0.85	(5,813,163.3)
2025	-	-	-	-	248,459.2	6,041,715.8	-	72,053.2	72,053.2	58,228.7	0.81	(5,754,934.6)
2026	-	-	-	-	238,520.8	5,796,314.0	-	69,171.0	69,171.0	53,000.4	0.77	(5,701,934.2)
2027	-	-	-	-	228,980.0	5,560,728.3	-	66,404.2	66,404.2	48,241.6	0.73	(5,653,692.6)
2028	-	-	-	-	219,820.8	5,334,566.0	-	63,748.0	63,748.0	43,910.1	0.69	(5,609,782.5)
2029	-	-	-	-	211,027.9	5,117,450.1	-	61,198.1	61,198.1	39,967.4	0.65	(5,569,815.0)
2030	-	-	-	-	202,586.8	4,909,018.9	-	58,750.2	58,750.2	36,378.8	0.62	(5,533,436.2)
2031	-	-	-	-	194,483.4	4,708,925.0	-	56,400.2	56,400.2	33,112.4	0.59	(5,500,323.8)
2032	-	-	-	-	186,704.0	4,516,834.8	-	54,144.2	54,144.2	30,139.3	0.56	(5,470,184.5)
2033	-	-	-	-	179,235.9	4,332,428.2	-	51,978.4	51,978.4	27,433.1	0.53	(5,442,751.3)
2034	-	-	-	-	172,066.4	4,155,397.9	-	49,899.3	49,899.3	24,970.0	0.50	(5,417,781.4)
2035	-	-	-	-	165,183.8	3,985,448.8	-	47,903.3	47,903.3	22,727.9	0.47	(5,395,053.4)
2036	-	-	-	-	158,576.4	3,822,297.7	-	45,987.2	45,987.2	20,687.2	0.45	(5,374,366.2)
2037	-	-	-	-	152,233.4	3,665,672.6	-	44,147.7	44,147.7	18,829.8	0.43	(5,355,536.5)
2038	-	-	-	-	146,144.0	3,515,312.5	-	42,381.8	42,381.8	17,139.1	0.40	(5,338,397.4)
2039	-	-	-	-	140,298.3	3,370,966.8	-	40,686.5	40,686.5	15,600.2	0.38	(5,322,797.2)
2040	-	-	-	-	134,686.3	3,232,394.9	-	39,059.0	39,059.0	14,199.5	0.36	(5,308,597.8)
2041	-	-	-	-	129,298.9	3,099,366.0	-	37,496.7	37,496.7	12,924.5	0.34	(5,295,673.3)
2042	-	-	-	-	124,126.9	2,971,658.1	-	35,996.8	35,996.8	11,764.0	0.33	(5,283,909.2)
2043	-	-	-	-	119,161.9	2,849,058.6	-	34,556.9	34,556.9	10,707.8	0.31	(5,273,201.5)
2044	-	-	-	-	114,395.4	2,731,363.1	-	33,174.7	33,174.7	9,746.3	0.29	(5,263,455.2)
2045	-	-	-	-	109,819.6	2,618,375.4	-	31,847.7	31,847.7	8,871.2	0.28	(5,254,584.0)
2046	-	-	-	-	105,426.8	2,509,907.2	-	30,573.8	30,573.8	8,074.7	0.26	(5,246,509.3)
2047	-	-	-	-	101,209.7	2,405,777.7	-	29,350.8	29,350.8	7,349.7	0.25	(5,239,159.6)
2048	-	-	-	-	97,161.3	2,305,813.4	-	28,176.8	28,176.8	6,689.7	0.24	(5,232,469.9)
2049	-	-	-	-	93,274.9	2,209,847.7	-	27,049.7	27,049.7	6,089.1	0.23	(5,226,380.8)
2050	-	-	-	-	89,543.9	2,117,720.6	-	25,967.7	25,967.7	5,542.4	0.21	(5,220,838.4)
2051	-	-	-	-	85,962.1	2,029,278.6	-	24,929.0	24,929.0	5,044.7	0.20	(5,215,793.7)
2052	-	-	-	-	82,523.6	1,944,374.3	-	23,931.9	23,931.9	4,591.8	0.19	(5,211,201.9)
2053	-	-	-	-	79,222.7	1,862,866.1	-	22,974.6	22,974.6	4,179.5	0.18	(5,207,022.5)
2054	-	-	-	-	76,053.8	1,784,618.3	-	22,055.6	22,055.6	3,804.2	0.17	(5,203,218.3)
2055	-	-	-	-	73,011.6	1,709,500.4	-	21,173.4	21,173.4	3,462.6	0.16	(5,199,755.6)
2056	-	-	-	-	70,091.2	1,637,387.2	-	20,326.4	20,326.4	3,151.7	0.16	(5,196,603.9)
2057	-	-	-	-	67,287.5	1,568,158.5	-	19,513.4	19,513.4	2,868.7	0.15	(5,193,735.2)
2058	-	-	-	-	64,596.0	1,501,699.0	-	18,732.8	18,732.8	2,611.2	0.14	(5,191,124.0)
2059	-	-	-	-	62,012.2	1,437,897.8	-	17,983.5	17,983.5	2,376.7	0.13	(5,188,747.3)
2060	-	-	-	-	59,531.7	1,376,648.7	-	17,264.2	17,264.2	2,163.3	0.13	(5,186,584.0)
2061	-	-	-	-	57,150.4	1,317,849.6	-	16,573.6	16,573.6	1,969.1	0.12	(5,184,615.0)
Total	**-**	**-**	**-**	**(6,747,717.3)**	**5,098,681.0**		**(6,747,717.3)**	**1,478,617.5**	**(5,269,099.8)**	**(5,184,615.0)**		

HYD - Lequille Canal Dyke, Gates and Tailrace Refurbishment

Raise canal embankment with low permeability fill

Year	Total Revenue	Operating Costs	Avoided Expenses	Capital	CCA	UCC	CFBT	Applicable Taxes	CFAT	PV of CF	Discount Factor	CNPV
2021	-	-	-	(529,774.0)	-	-	(529,774.0)	-	(529,774.0)	(529,774.0)	1.00	(529,774.0)
2022	-	-	-	(271,602.0)	-	-	(271,602.0)	-	(271,602.0)	(257,515.9)	0.95	(787,289.9)
2023	-	-	-	(461,965.6)	-	-	(461,965.6)	-	(461,965.6)	(415,290.3)	0.90	(1,202,580.2)
2024	-	-	-	(5,656,235.0)	265,531.6	6,730,221.6	(5,656,235.0)	77,004.2	(5,579,230.9)	(4,755,404.8)	0.85	(5,957,985.0)
2025	-	-	-	-	254,910.4	6,198,594.7	-	73,924.0	73,924.0	59,740.6	0.81	(5,898,244.4)
2026	-	-	-	-	244,714.0	5,946,820.5	-	70,967.0	70,967.0	54,376.6	0.77	(5,843,867.8)
2027	-	-	-	-	234,925.4	5,705,117.2	-	68,128.4	68,128.4	49,494.2	0.73	(5,794,373.6)
2028	-	-	-	-	225,528.4	5,473,082.1	-	65,403.2	65,403.2	45,050.2	0.69	(5,749,323.4)
2029	-	-	-	-	216,507.3	5,250,328.4	-	62,787.1	62,787.1	41,005.2	0.65	(5,708,318.2)
2030	-	-	-	-	207,847.0	5,036,484.8	-	60,275.6	60,275.6	37,323.4	0.62	(5,670,994.8)
2031	-	-	-	-	199,533.1	4,831,195.0	-	57,864.6	57,864.6	33,972.2	0.59	(5,637,022.6)
2032	-	-	-	-	191,551.8	4,634,116.7	-	55,550.0	55,550.0	30,921.9	0.56	(5,606,100.7)
2033	-	-	-	-	183,889.7	4,444,921.6	-	53,328.0	53,328.0	28,145.4	0.53	(5,577,955.3)
2034	-	-	-	-	176,534.1	4,263,294.3	-	51,194.9	51,194.9	25,618.3	0.50	(5,552,337.0)
2035	-	-	-	-	169,472.7	4,088,932.1	-	49,147.1	49,147.1	23,318.1	0.47	(5,529,018.9)
2036	-	-	-	-	162,693.8	3,921,544.4	-	47,181.2	47,181.2	21,224.4	0.45	(5,507,794.6)
2037	-	-	-	-	156,186.1	3,760,852.2	-	45,294.0	45,294.0	19,318.7	0.43	(5,488,475.9)
2038	-	-	-	-	149,938.6	3,606,587.6	-	43,482.2	43,482.2	17,584.1	0.40	(5,470,891.8)
2039	-	-	-	-	143,941.1	3,458,493.7	-	41,742.9	41,742.9	16,005.2	0.38	(5,454,886.6)
2040	-	-	-	-	138,183.4	3,316,323.5	-	40,073.2	40,073.2	14,568.1	0.36	(5,440,318.5)
2041	-	-	-	-	132,656.1	3,179,840.1	-	38,470.3	38,470.3	13,260.1	0.34	(5,427,058.4)
2042	-	-	-	-	127,349.9	3,048,816.1	-	36,931.5	36,931.5	12,069.5	0.33	(5,414,988.9)
2043	-	-	-	-	122,255.9	2,923,033.0	-	35,454.2	35,454.2	10,985.8	0.31	(5,404,003.1)
2044	-	-	-	-	117,365.6	2,802,281.2	-	34,036.0	34,036.0	9,999.4	0.29	(5,394,003.7)
2045	-	-	-	-	112,671.0	2,686,359.5	-	32,674.6	32,674.6	9,101.6	0.28	(5,384,902.2)
2046	-	-	-	-	108,164.2	2,575,074.7	-	31,367.6	31,367.6	8,284.3	0.26	(5,376,617.8)
2047	-	-	-	-	103,837.6	2,468,241.3	-	30,112.9	30,112.9	7,540.5	0.25	(5,369,077.3)
2048	-	-	-	-	99,684.1	2,365,681.2	-	28,908.4	28,908.4	6,863.4	0.24	(5,362,213.9)
2049	-	-	-	-	95,696.7	2,267,223.5	-	27,752.1	27,752.1	6,247.2	0.23	(5,355,966.7)
2050	-	-	-	-	91,868.9	2,172,704.1	-	26,642.0	26,642.0	5,686.3	0.21	(5,350,280.4)
2051	-	-	-	-	88,194.1	2,081,965.5	-	25,576.3	25,576.3	5,175.7	0.20	(5,345,104.7)
2052	-	-	-	-	84,666.3	1,994,856.5	-	24,553.2	24,553.2	4,711.0	0.19	(5,340,393.8)
2053	-	-	-	-	81,279.7	1,911,231.8	-	23,571.1	23,571.1	4,288.0	0.18	(5,336,105.8)
2054	-	-	-	-	78,028.5	1,830,952.0	-	22,628.3	22,628.3	3,903.0	0.17	(5,332,202.8)
2055	-	-	-	-	74,907.4	1,753,883.5	-	21,723.1	21,723.1	3,552.5	0.16	(5,328,650.3)
2056	-	-	-	-	71,911.1	1,679,897.7	-	20,854.2	20,854.2	3,233.6	0.16	(5,325,416.7)
2057	-	-	-	-	69,034.6	1,608,871.4	-	20,020.0	20,020.0	2,943.2	0.15	(5,322,473.5)
2058	-	-	-	-	66,273.2	1,540,686.1	-	19,219.2	19,219.2	2,679.0	0.14	(5,319,794.5)
2059	-	-	-	-	63,622.3	1,475,228.2	-	18,450.5	18,450.5	2,438.4	0.13	(5,317,356.1)
2060	-	-	-	-	61,077.4	1,412,388.6	-	17,712.5	17,712.5	2,219.5	0.13	(5,315,136.6)
2061	-	-	-	-	58,634.3	1,352,062.6	-	17,004.0	17,004.0	2,020.2	0.12	(5,313,116.4)
	-	**-**	**-**	**(6,919,576.7)**	**5,231,067.3**		**(6,919,576.7)**	**1,517,009.5**	**(5,402,567.1)**	**(5,313,116.4)**		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Instructions: Select option in Column B.
Columns C through G will auto-populate.

Project Cost Estimate Input Checklist and Maturity Matrix

Hydropower	Required fields:	Estimate Classification				
Project Name: Lequille Canal, Dyke, Gates, Tailrace Refurbishment	Started or Preliminary	Class 5	Class 4	Class 3	Class 2	Class 1
Maturity Level of Project Definition Deliverables	Defined or Complete	0% to 2%	1% to 15%	10% to 40%	30% to 75%	65% to 100%
General Project Data						
A. Scope						
Project Scope of Work Definition	Defined (D)			D	D	D
Site Infrastructure (Access, Construction Power, Camp, etc.)	Defined (D)			D	D	D
B. Capacity						
Facility Output / Production Profile	Not Required (NR)					
Electrical Power Requirements (when not the primary capacity driver)	Defined (D)			D	D	D
C. Project Location						
Plant and Associated Facilities	Defined (D)			D	D	D
D. Requirements						
Codes and/or Standards	Defined (D)			D	D	D
Communication Systems	Defined (D)			D	D	D
Fire Protection and Life Safety	Defined (D)			D	D	D
Environmental Monitoring	Defined (D)					D
E. Technology Selection						
Not Applicable						
F. Strategy						
Contracting/Sourcing	Defined (D)			D	D	D
Escalation	Defined (D)			D	D	D
G. Planning						
Regulatory Approval & Permitting	Defined (D)			D	D	D
Material Utilization (Borrow Sources)	Preliminary (P)	P	P	P/D		
Logistics Plan	Preliminary (P)	P	P	P		
Work Breakdown Structure (WBS)	Defined (D)			P/D	D	D
Decommissioning/Demolition Plan	Preliminary (P)		P			
Integrated Project Plan	Preliminary (P)		P			
Project Code of Accounts	Defined (D)			D	D	D
Project Master Schedule	Preliminary (P)		P			
Risk Register	Defined (D)			D	D	D
Stakeholder Engagement & Management Plan	Preliminary (P)		P			
Start-up & Commissioning Plan	Preliminary (P)		P	P/D		
H. Studies						
Hydraulics	Defined (D)			D	D	D
Topography & Bathymetry	Defined (D)			P/D	D	D
Environmental Impact/Sustainablity Assessment	Not Required (NR)	NR				
Environment/Existing Conditions	Defined (D)			D	D	D
Soils & Hydrology	Defined (D)			D	D	D
Geotechnical Investigation	Defined (D)			P/D	D	D
Technical Deliverables (Specifications and/or Drawings)						
Block Flow Diagrams	Not Required (NR)					
Hydraulic Design & Probable Maximum Flood (PMF)	Complete (C)			C	C	C
Equipment Data Sheets	Preliminary (P)		P			
Equipment Lists: Electrical	Preliminary (P)		P			
Equipment Lists: Process/Utility/Mechanical	Preliminary (P)		P			
Design Specifications	Preliminary (P)		S/P			
Electrical One-Line Drawings	Preliminary (P)		S/P			
General Equipment Arrangement Drawings	Preliminary (P)		S/P			
Instrument List	Not Required (NR)	NR				
Construction Permits	Not Required (NR)	NR				
Civil/Site/Structural/Architectural Discipline Drawings	Preliminary (P)		S/P	P		
Demolition Plans and Drawings	Preliminary (P)		S/P	P		
Erosion Control Plan & Drawings	Preliminary (P)		S/P	P		
Fire Protection & Life Safety Drawings & Details	Not Required (NR)	NR				
Mitigation Measures (Aquatic, Terrestrial, Heritage, etc.)	Preliminary (P)			P		
Dam Design & Drawings	Preliminary (P)			P	P/C	
De-silting Basins	Not Required (NR)	NR				
Gates & Cranes Design & Drawings	Preliminary (P)			P	P/C	
Intake Design & Drawings	Preliminary (P)			P	P/C	
Penstock Design & Drawings	Not Required (NR)	NR				
Power House Design & Drawings	Not Required (NR)	NR				
Spillway Design & Drawings	Not Required (NR)	NR				
Turbine and Generator Design & Drawings	Not Required (NR)	NR				
Electrical Schedules	Not Required (NR)	NR	NR/S			
Instrument & Control Schedules	Not Required (NR)	NR	NR/S			
Instrument Data Sheets	Not Required (NR)	NR	NR/S			
Spare Parts Listings	Not Required (NR)	NR	NR			
Electrical Discipline Drawings	Preliminary (P)			S/P	P/C	

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

Project Cost Estimate Input Checklist and Maturity Matrix						
Hydropower	**Required fields:**	**Estimate Classification**				
Project Name: Lequille Canal, Dyke, Gates, Tailrace Refurbishment	**Started or Preliminary**	**Class 5**	**Class 4**	**Class 3**	**Class 2**	**Class 1**
Maturity Level of Project Definition Deliverables	**Defined or Complete**	**0% to 2%**	**1% to 15%**	**10% to 40%**	**30% to 75%**	**65% to 100%**
Facility Emergency Communication Plan & Drawings	Not Required (NR)	NR	NR			
Information Systems/Telectommunication Drawings	Not Required (NR)	NR	NR			
Instrumentation/Control System Discipline Drawings	Not Required (NR)	NR	NR			
Mechanical Discipline Drawings	Preliminary (P)			S/P	P/C	
Auxiliary Electrical Design & Drawings	Not Required (NR)	NR	NR			
Auxiliary Mechanical Design & Drawings	Not Required (NR)	NR	NR			
Protection & Controls System Design & Drawings	Not Required (NR)	NR	NR			
		2	16	31	24	20
		4%	31%	61%	47%	39%

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 *hydropower industries* is assumed to include private and public utilities involved with the production of electrical power, exclusive of transmission and distribution, using natural gravitational force of falling or flowing water, excluding tidal forces, to drive a turbine that powers a generator.

The common thread among private and public utilities (for the purpose of estimate classification) is their reliance on user requirements, statement of objectives, design reports (i.e. geotechnical investigations, sourcing borrow materials and hydraulic design/modeling) and/or environmental data collection and studies 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.

Cost estimates for hydropower facilities are typically composed of key features such as:

- Reservoir area preparation (e.g., clearing, removal of structures and earthmoving).
- River management (e.g., cofferdams, diversion channels or tunnels, sediment management plans, environmental monitoring programs).
- Principal structures (e.g., dams, dykes, intakes, penstocks, powerhouse(s), low level outlet(s), power tunnel(s), de-silting basin(s), and spillway structure(s)).
- Permanent infrastructure (e.g., access roads, railroads, bridges, offices, warehouse and housing).
- Temporary infrastructure (e.g., construction camp, site access roads, airport, workshops, construction power etc).
- Environmental mitigation features (e.g. fish ladder(s), water bypass and creation of new fish or wildlife habitat).
- Owner's costs (e.g., stakeholder involvement, licensing, studies and investigations, administration and overhead, catering.).

Some, but not all, of these features are unique to the hydropower industries.

Typical hydropower facilities may include: turbines, generators, exciters, governors, transformers, gates for intake, spillway and draft tubes, and supporting electrical, mechanical, telecom, protection, and control systems. The water storage reservoir is typically required to support the operations of the hydropower facility.

HATCH

Construction Cost Estimate
(Canal Embankment Raise)

Client: Nova Scotia Power Inc.
Project Name: Lequille Canal Raise
Project Number: H-363208

Date: 4-Aug-21
Prepared by: A. Bridgeman, N. Warrier
Reviewed by: E. Teidje

Description: Construction cost estimate for canal raise to elevation 405.6'.

Item	Description	Estim. Quantity	Unit	Unit Price	Amount	Notes
1	**Contractor's Construction Indirects**					
1.1	Mobilization & Demobilization	1	LS	[redacted]		
1.2	Construction Facilities (office, site trailers, site services)	1	LS			
1.3	Site Supervision & Site Safety/Admininstration	1	LS			Included in unit rates below
1.4	Site Surveys & Quality Control	1	LS			
	Subtotal					
2	**General Items**					
2.1	Access Road Upgrading and Maintenance	1	LS			
2.2	Environmental Protection	1	LS			
2.3	Water Control	1	LS			Gate for dewatering covered under another project.
	Subtotal					
3	**Earthworks - Canal**					
3.1	Clearing, Grubbing, and Stripping	5	acre			Only stripping required
3.2	Excavation - General	10000	yd^3			
3.3	Road Topping	2700	yd^3			
3.4	Semi-Impervious Fill	18000	yd^3			
3.5	Rock Fill	4000	yd^3			
	Subtotal					
Total Estimated Construction Cost without Contingency						

Exclusions:

- Engineering design and environmental studies
- Owner's engineering costs (project management, tendering, site supervision, QA testing)
- Owner's other costs (financing/IDC, taxes, land acquisition, legal surveys)
- Escalation beyond March 2021
- Mitigative measures for protection of archaeological areas or other sensitive areas (if applicable)
- moving power lines and poles (if applicable)
- Bulkhead gate for canal intake and installation covered under another project

Available Information:

- Unit prices from recent NSPI penstock and dam refurbishment projects
- Actual pricing from similar dam refurbishment projects (by others)

Other Notes/Assumptions:

- 4 month construction schedule
-Assumed bedrock and bathymetry (not currently available)

Construction Cost Estimate

Rev C

Client: Nova Scotia Power Inc. Date: 17-Aug-21 updated Jan 23 Project: Lequille Intake Refurbishment

Prepared by: A. Bridgeman, I. Castano, S. Qureshi Project Number: H- 364064

Description: Intake Modifications

Item	Description	Estim. Quantity	Unit	Unit Price	Amount
1	**Contractor's Construction Indirects**				
1.1	Construction Facilities, Mobilization & Demobilization	1	LS		
1.2	Site Surveys (Pre & Post Construction)	1	LS		
	Subtotal				
2	**General Items**				
2.1	Access Road Improvements (Allowance)	1	LS		
2.2	Preparation of Laydown Area	1	LS		
2.3	Environmental Protection	1	LS		
2.4	Canal Intake Bulkhead Gates (install)	1	LS		
2.5	Water Control (sandbags downstream of canal intake + pumping allowance)	1	LS		
	Subtotal				
3	**Intake / Gatehouse**				
3.1	Removal of Existing Gate Equipment, Building, Platform, Trashrack and Guides (working zone)	1	LS		
3.2	Supply and Installation Supervision of Intake Gate	2500	kg		
3.3	Supply and Installation Supervision of Embedded Parts	4000	kg		
3.4	Supply and Installation Supervision of Wire Rope Hoist	1	LS		
3.5	Supply and Installation Supervision of Monorail Hoist	1	LS		
3.6	Supply and Installation Supervision of Hoist Frame	1	LS		
3.7	Installation of Gate Equipment (gate, hoist, guides/embedded parts)	1	LS		
3.8	Trashrack Platform	1	LS		
3.9	Supply and Installation of HDPE Trashrack Extension and Support Beams	1	LS		
3.10	Reinstallation of the existing trashracks and supports	1	LS		
3.11	New Reinforced Concrete Slab (Including Formwork, Anchors, Reinforcing)	12	m^3		
3.12	Miscellaneous Steel (grating for deck openings)	1	LS		
3.13	Supply of New Fiberglass Gatehouse, Including Air Vents and Heaters	1	LS		
3.14	Installation of Gatehouse	1	LS		
	Subtotal				
4	**Electrical**				
4.1	Electrical Works (removals)	1	LS		
4.2	Supply and Install Gate Hoist Electrical	1	LS		
4.3	Supply and Install Grounding Materials	1	LS		
4.4	Supply and Install Building Lighting System, Heaters and Low Voltage Distribution	1	LS		
4.5	Supply and Install Low Voltage Power Supply	1	LS		
4.6	Supply and Install PVC Embedments for Water Level Indication	1	LS		
	Subtotal				
Total Estimated Construction Cost					

Exclusions:

- Engineering design and environmental studies
- Owner's engineering costs (project management, tendering, site supervision, QA testing)
- Owner's other costs (financing/IDC, taxes, land acquisition, legal surveys)
- Construction Insurance and Bonds
- Escalation beyond August 2024
- Mitigation measures for protection of archaeological areas (if applicable)

Available Information:

- Unit prices based on other recent NSPI intake rehabilitation projects
- Escalation for steel prices based on ENR Price Index, Power Advocate and supplier information and recent project experience

Other Notes/Assumptions:

- Unit Prices for concrete include formwork, reinforcing steel, dowels, excavation/backfill
- Concrete surface preparation is considered incidental to the work (not a separate pay item)
- Canal to intake structure can be dewatered using bulkhead gates and a sandbag cofferdam downstream of intake to control leakage
- Existing power supply and cabling adequate
- No allowance for gate/guide heaters
- Existing stoplog guides are in acceptable condition to allow for the use of wood stoplogs
- Stoplog guides to remain inside gatehouse
- 3 month construction schedule

CI Number: C0051134

Title: TUC2 L-0 Blade Replacement

Start Date: 2022/12
In-Service Date: 2023/12
Final Cost Date: 2024/06
Function: Steam
Forecast Amount: $4,157,503

DESCRIPTION:

This project is for the replacement of the Tufts Cove Unit 2 Last Pass (L-0) turbine blades in the low pressure (LP) rotor section of the turbine to allow for the continued safe and reliable operation of the steam turbine. The LP turbine converts the energy in the steam into electrical energy by the rotation of the turbine blades, which further results in the rotation of the generator shaft, producing electricity.

Summary of Related CIs +/- 2 years:
Pursuant to Section 11.2 of the Detailed 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)."

- 2023 – CI C0051135 - TUC2 Turbine Valves Refurbishment - $1,048,924

Depreciation Class: Steam Production Plant – Tufts Cove 2

Estimated Life of the Asset: 25 Years

Retirement Information:

- Categorization of Retirement: Accounting Policy 6420 - Retirement and Disposal of Capital Assets
- Percentage of Asset Pool: 4.6%

JUSTIFICATION:

Justification Criteria: Thermal

Sub Criteria: Equipment Refurbishment/Replacement

Why do this project?

Evaluation of Tufts Cove Unit 2 L-0 turbine blades life expectancy calculations based on the manufacturer's recommendations and inspection by the NS Power Turbine Generator Asset Management Team in corroboration with third party experts indicates that the L-0 turbine blades are now at the end of their service life. The Tufts Cove Unit 2 LP Turbine has accumulated more than 275,000 hours of service and 2,755 starts since commissioning. In 2000, the original life expired L-0 blades were replaced with refurbished blades that had previously been taken out of Trenton Unit 5. The LP section of the turbine was last inspected in 2017 and these blades are now estimated to be at end of fatigue life in the root of the blade that connects to the rotor shaft. The final stages of the LP rotor have also accumulated excessive material loss from erosion increasing the operating risk of the blades. Blade failure could result in collateral damage to the turbine leading to costly refurbishment and lengthy downtime in addition to potential safety consequences to personnel.

Why do this project now?

Tufts Cove Unit 2 LP Turbine section is planned to undergo an outage in 2023. The LP turbine will be open for removal of the L-0 blades for inspection. and allow enough time to replace the blades. These blades are now estimated to be at the end of fatigue life and also have accumulated excessive material loss from water droplet erosion and need to be replaced now to mitigate these risks of failure. NS Power can not extend this refurbishment interval beyond 2023 due to the unacceptable risk to safe reliable operation.

Why do this project this way?

Repair of individual blades or replacement of individual blades versus replacement of the blade set is not a feasible option because it does not provide an adequate measure to restore integrity. Due to the failure mechanism and condition of the last pass blades, full replacement is required.

CI Number : C0051134 - TUC2 L-0 Blade Replacement **Project Number** C0051134

Parent CI Number : -

Asset Location : 1172 - 1172 Tufts Cove Unit 2; Commissioned 1972, 97 Mwh **Budget Version** 2023 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	1000 - SGP - Turbo Gen.Instal.	3,960,658
Retirements	1000 - SGP - Turbo Gen.Instal.	196,845
	Total Cost:	4,157,503
	Original Cost:	2,501,605

Capital Project Detailed Estimate

Location: Tufts Cove Generating Station
CI# : C0051134
Title: TUC2 L-0 Blade Replacement
Execution Year: 2023

Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#'s)
Regular Labour						
Electrician	PD	10	$ 388	$ 3,878		
Engineering	PD	252	$ 439	$ 110,810		
Maintenance Trades	PD	240	$ 395	$ 94,752		
Power Engineer	PD	10	$ 422	$ 4,224		
Power Plant Technician	PD	10	$ 406	$ 4,057		
Utilityworker	PD	15	$ 275	$ 4,125		
			Sub-Total	$ 221,845		
OT Labour						
Electrician	PD	5	$ 776	$ 3,878		
Maintenance Trades	PD	160	$ 776	$ 124,086		
Power Engineer	PD	5	$ 790	$ 3,948		
Power Plant Technician	PD	5	$ 845	$ 4,224		
Utilityworker	PD	5	$ 811	$ 4,057		
			Sub-Total	$ 140,193		
Materials						
LP L-0 Laser Hardened HTBs - Tip Struts & Locking Wedges	lot	1	[redacted]		Attachment 1, Item 1001	
Misc L-0 Blading Hardware	lot	1			Attachment 1, Item 1002	
U2 P Turbine Misc Materials	lot	1			Attachment 2	
Consumables	lot	1	$ 20,000	$ 20,000		
Gasket Supplies	lot	1	$ 15,000	$ 15,000		
			Sub-Total	$ 1,805,716		
Contracts						
PM+ DS TFA	lot	1	[redacted]		Attachment 3, Item 1a	
DS EIT	lot	1			Attachment 3, Item 1b	
Disc Bore NDE	lot	1			Attachment 3, Item 1c	
LP Visual Inspection / Contingency Repairs	lot	1			Attachment 3, Item 1f	
Tooling / Shipping	lot	1			Attachment 3, Item 1g	
4A LP L-0 Blade Replacement	lot	1			Attachment 3, Item 4a	
4B LP L-0 Blade Replacement Tooling	lot	1			Attachment 3, Item 4b	
4D Low Speed Balancing & Tooling	lot	1			Attachment 3, Item 4d	
4E Startup/ Trim Balancing & Tooling	lot	1			Attachment 3, Item 4e	
Scaffolding	lot	1	$ 35,000	$ 35,000		
Insulation	lot	1	$ 15,000	$ 15,000		
Bearing NDE	lot	1	$ 25,000	$ 25,000		
Rigging Inspections	lot	1	$ 10,000	$ 10,000		
Onsite Consulting/Engineering	lot	1	$ 20,000	$ 20,000		
Machining	lot	1	$ 20,000	$ 20,000		
AML Blasting Services	lot	1	$ 30,000	$ 30,000		
Borescope	lot	1	$ 30,000	$ 30,000		
			Sub-Total	$ 1,343,937		
Consulting						
Technical Specialist	lot	1	$ 30,000	$ 30,000		
			Sub-Total	$ 30,000		
Other Goods & Services						
Contingency	%	10%	$ 3,541,691	$ 354,169		
			Sub-Total	$ 354,169		
Interest Capitalized						
AFUDC				$ 28,382		
			Sub-Total	$ 28,382		
Administrative Overhead						
Labour AO				$ 80,604		
Contractor AO				$ 152,658		
			Sub-Total	$ 233,262		
			SUB-TOTAL (no AO, AFUDC)	$ 3,895,860		
			TOTAL (AO, AFUDC included)	$ 4,157,503		
Original Cost				$ 2,501,605		

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.
Note 3: Contingency determined using a combination of internal subject matter expert judgment and predetermined guidelines which have been gained over many years, including greater uncertainty for actual site conditions. Risks are well understood based on past experience.

Nova Scotia POWER An Emera Company

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

Project Cost Estimate Input Checklist and Maturity Matrix

Process Industries	Required fields:	Estimate Classification				
Project Name: TUC2 L-0 Blade Replacement	Started or Preliminary	Class 5	Class 4	Class 3	Class 2	Class 1
Maturity Level of Project Definition Deliverables	Defined or Complete	0% to 2%	1% to 15%	10% to 40%	30% to 75%	65% to 100%
General Project Data						
A. Scope						
Non-Process Facilities (Infrastructure, Ports, Pipeline, Power Transmission)	Not Required (NR)					
Project Scope of Work Description	Defined (D)			D	D	D
Byproduct and Waste Disposal	Not Required (NR)	NR				
Site Infrastructure (Access, Construction, Power, Camp, etc)	Not Required (NR)	NR				
B. Capacity						
Plant Production/Facility (includes power facilities)	Not Required (NR)					
Electrical Power Requirements (when not the primary capacity driver)	Not Required (NR)	NR				
C. Project Location						
Plant and Associated Facilities	Defined (D)			D	D	D
D. Requirements						
Codes and/or Standards	Defined (D)			D	D	D
Communication System	Not Required (NR)	NR				
Fire Protection and Life Safety	Not Required (NR)	NR				
Environmental Monitoring	Not Required (NR)	NR	NR			
E. Technology Selection						
Process Technology	Not Required (NR)					
F. Strategy						
Contracting / Sourcing	Defined (D)			D	D	D
Escalation	Not Required (NR)	NR				
G. Planning						
Logistics Plan	Not Required (NR)					
Integrated Project Plan	Not Required (NR)	NR				
Project Code of Accounts	Not Required (NR)	NR				
Project Master Schedule	Not Required (NR)	NR				
Regulatory Approval & Permitting	Not Required (NR)	NR				
Risk Register	Not Required (NR)	NR				
Stakeholder Consultation/Engagement/Management Plan	Not Required (NR)	NR				
Work Breakdown Structure	Not Required (NR)	NR				
Startup and Commissioning Plan	Defined (D)			P/D	D	D
H. Studies						
Environmental Impact/Sustainability Assessment	Not Required (NR)	NR				
Environmental/Existing Conditions	Not Required (NR)	NR				
Soils and Hydrology	Not Required (NR)	NR				
Technical Deliverables (Specifications and/or Drawings)						
Block Flow Diagram	Not Required (NR)					
Equipment Datasheets	Complete (C)			C	C	C
Equipment Lists: Electrical	Not Required (NR)	NR/S				
Equipment Lists: Process / Utility / Mechanical	Complete (C)			C	C	C
Heat & Material Balances	Not Required (NR)	NR				
Process Flow Diagrams (PFDs)	Not Required (NR)	NR				
Utility Flow Diagrams (UFDs)	Not Required (NR)	NR				
Design Specifications	Complete (C)			C	C	C
Electrical One-Line Drawings	Complete (C)			C	C	C
General Equipment Arrangement Drawings	Complete (C)			C	C	C
Instrument List	Not Required (NR)	NR				
Piping & Instrumentation Diagrams	Not Required (NR)	NR				
Plot Plans / Facility Layouts	Not Required (NR)	NR				
Construction Permits	Not Required (NR)	NR				
Civil / Site / Structural / Architectural Discipline Drawings	Not Required (NR)	NR				
Demolition Plan and Drawings	Not Required (NR)	NR				
Erosion Control Plan and Drawings	Not Required (NR)	NR				
Fire Protection and Life Safety Drawings and Details	Not Required (NR)	NR				
Electrical Schedules	Not Required (NR)	NR	NR/S			
Instrument and Control Schedules	Not Required (NR)	NR	NR/S			
Instrument Datasheets	Not Required (NR)	NR	NR/S			
Piping Schedules	Not Required (NR)	NR	NR/S			
Piping Discipline Drawings	Not Required (NR)	NR	NR/S			
Spare Parts Listings	Complete (C)				P/C	C
Electrical Discipline Drawings	Not Required (NR)	NR	NR			
Facility emergency Communication Plan and Drawings	Not Required (NR)	NR	NR			
Informtion Systems / Telecommunication Drawings	Not Required (NR)	NR	NR			
Instrumentation / Control System Discipline Drawings	Not Required (NR)	NR	NR			
Mechanical Discipline Drawings	Not Required (NR)	NR	NR			
		0	0	10	11	11
		0%	0%	16%	17%	17%

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.

SIEMENS energy

SCL Ref: SF221954982
Cust Ref: email
Date: 2022-10-31

To: Greg Carlin
CC: .
NSPI

Subject: **BUDGETARY PROPOSAL FOR LP L-0 Blades and Fixings**

With reference to your RFQ email dated 14-Jun-22 , we are pleased to provide the following budgetary proposal for your consideration.

RFQ ITEM	DESCRIPTION	QTY	UNIT PRICE	TOTAL PRICE	EST DELIVERY (ARO)
1001	LP L-0 Laser Hardened HTB's, inc. Tip Struts & Locking Wedges CUSTOMER CAT ID: TBD ASSY DWG NO.: TBD DETAIL DWG NO.:TBD	1 Sets	[redacted]		54 Weeks
1002	Misc L-0 Blading Hardware	1 Sets			54 Weeks

Note:
1. The L-0 blades quoted in this proposal are able to be installed in either Tufts Cove Unit 2 or Tufts Cove Unit 3 (M/C 3942 and M/C 4333) without modification. The blades are not compatible with Point Tupper Unit 2.
2. Cancellation charges from PO placement through to March 31, 2023 will be 45% of the price quoted. Cancellation charges from April 1, 2023 and onwards will be 100% of the price quoted.

Prices: Price shown is in Canadian funds, include any import duties that may be applicable, DDP Tufts Cove, NSPI, but do not include any taxes. Price shown is also based on the quantities quoted. Should the order quantity differ from the quoted quantity, we reserve the right to amend the prices.

Siemens Energy's pricing is subject to adjustment for the impact of any new or modified taxes, duties, tariffs or equivalent measures imposed by any local or foreign governmental authority which is applicable to our offering, including any portions or components contained within the offering.

Validity: This proposal is valid for a period of 7 days from date of submission, unless extended, modified or withdrawn by Siemens Energy Canada Limited and limits acceptance to the terms set forth herein. The return of a purchase order or any other reasonable manner of acceptance communicated to Siemens during such validity period will be sufficient to form an agreement on the terms and conditions of this offer.

Due to recent significant movements in material costs and availability, our offer is subject to review beyond the validity period.

Quality Program: This offer is based on a Quality Program in accordance with: ISO 9001 2015

Conditions of Sale: This confidential budgetary proposal is provided for informational purposes only, is not an offer and may be revoked or amended at any time, without notice. No good faith duty to negotiate a definitive agreement exists, and any liability or binding legal obligations arising from this proposal, including the ability to rely on the information are conditioned on negotiating and executing a formal contract and management approval.

The worldwide outbreak of the coronavirus disease ("COVID-19") may affect usual business activities and/or the execution of work under the Contract. As the impacts from COVID-19 are continuously changing, their impacts on the Contract are unknown at this time. To avoid potentially unnecessary contingency, matters such as procurement lead-time, delivery date, resources, and schedule are provided without consideration of impacts from COVID-19 other than as specifically set out in the Contract/this offer. Siemens Energy is closely monitoring the development of COVID-19 and its associated impacts and will endeavor to inform you of the impacts that COVID-19 has or may have on the Contract. If required to overcome the consequences directly or indirectly caused by the outbreak of COVID-19, Siemens Energy reserves the right to adjust its obligations related to schedule, price, or any other reasonably required adjustment of the Contract, including postponing or providing partial deliveries to the extent Siemens Energy's ability to supply or deliver is impacted.

The Parties acknowledge that there is an uncertain political and security situation in the world, in particular due to the invasion of Ukraine ("Uncertain Situation"), for which effects are difficult to foresee at the time of Contract signing and which can directly and indirectly affect the execution of this Contract including but not limited to the availability of certain equipment, commodities, metals, and materials as well as the availability of transportation means and services. In the light of the above, the Parties agree that Siemens Energy shall be entitled to reasonable adjustments of the delivery term(s) and/or the Contract price(s) to the extent any delay and costs are caused directly or indirectly by the above-mentioned Uncertain Situation and/or any related consequences.

Siemens Energy's obligation to fulfill this agreement is subject to the proviso that the fulfillment is not prevented by any impediments arising out of national or international foreign trade and customs requirements or any embargos [or other sanctions].

Feel free to contact us should you have any questions. We look forward to receive your instructions to proceed.

Regards,

Imran Ijaz
Digitally signed by Imran Ijaz
DN: cn=Imran Ijaz, c=CA, o=Siemens Energy Canada Limited, email=imran.ijaz@siemens-energy.com
Date: 2022.10.31 12:45:18 -04'00'

Imran Ijaz
Manager - Parts Sales
imran.ijaz@siemens-energy.com

Wilkin Bryan
Digitally signed by Wilkin Bryan
DN: cn=Wilkin Bryan, c=DE, o=Siemens, email=bryan.wilkin@siemens-energy.com
Date: 2022.10.31 13:17:06 -04'00'

Bryan Wilkin
BU Head - Generation Services

KOTWAL ASHTAD
Digitally signed by KOTWAL ASHTAD
DN: cn=KOTWAL ASHTAD, o=Siemens, email=ashtad.kotwal@siemens-energy.com
Date: 2022.10.31 12:53:24 -04'00'

Ashtad Kotwal

Digitally signed by Luzzi Scott
DN: cn=Luzzi Scott, c=DE, o=Siemens, email=scott.luzzi@siemens-energy.com
Date: 2022.10.31 13:39:22 -04'00'

Scott Luzzi

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Director of Sales, Generation Services Canada

Country Head Finance

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SIEMENS energy

SCL Ref: SF221974614 - Part 2
Cust Ref: Email
Date: 2022-10-24

To: Greg Carlin
CC: .
NSPI

Subject: PROPOSAL FOR Tufts Cove U2 LP Turbine Spares 2023

With reference to your RFQ Email dated 03-Aug-22 , we are pleased to provide the following proposal for your consideration.

RFQ ITEM	DESCRIPTION	QTY	UNIT PRICE	TOTAL PRICE	EST DELIVERY (ARO)
1053	Gland Ring 3/4" Pitch (5 Contacts) for No.5 & 6 GLAND ASSEMBLY CUSTOMER CAT ID: N/A ASSY DWG NO.: SL29522 MK 7 DETAIL DWG NO.: N/A	2 EA	[redacted]	[redacted]	38 Weeks
1054	Gland Ring 3/4" Pitch (7 Contacts) for No.5 & 6 GLAND ASSEMBLY CUSTOMER CAT ID: N/A ASSY DWG NO.: SL29522 MK 8 DETAIL DWG NO.: N/A	1 EA			38 Weeks
1055	Gland Ring 7/8" Pitch (5 Contacts) for No.5 & 6 GLAND ASSEMBLY CUSTOMER CAT ID: N/A ASSY DWG NO.: SL29522 MK 9 DETAIL DWG NO.: N/A	2 EA			38 Weeks
1056	Gland Ring 7/8" Pitch (7 Contacts) for No.5 & 6 GLAND ASSEMBLY CUSTOMER CAT ID: N/A ASSY DWG NO.: SL29522 MK 10 DETAIL DWG NO.: N/A	2 EA			38 Weeks
1057	Spring for MK 7 for No.5 & 6 GLAND ASSEMBLY CUSTOMER CAT ID: N/A ASSY DWG NO.: SL29522 MK 11 DETAIL DWG NO.: N/A	36 EA			38 Weeks
1058	Spring for MK 8 & 9 for No.5 & 6 GLAND ASSEMBLY CUSTOMER CAT ID: N/A ASSY DWG NO.: SL29522 MK 12 DETAIL DWG NO.: N/A	72 EA			38 Weeks
1059	Spring for MK 10 for No.5 & 6 GLAND ASSEMBLY CUSTOMER CAT ID: N/A ASSY DWG NO.: SL29522 MK 29 DETAIL DWG NO.: N/A	36 EA			38 Weeks
1060	1-1/8" Dia BSF Studbolts for LP INTERCONNECTION PIPES CUSTOMER CAT ID: N/A ASSY DWG NO.: 86AL1083 MK 9 DETAIL DWG NO.: N/A	4 EA			38 Weeks
1061	1-3/4" BSF Stud for Horizontal Joint for LP Exhaust Assembly CUSTOMER CAT ID: N/A ASSY DWG NO.: SL29521 MK 19 DETAIL DWG NO.: N/A	10 EA			38 Weeks
1062	1" BSF Studs for Tie Plate for LP Exhaust Assembly CUSTOMER CAT ID: N/A ASSY DWG NO.: SL29521 MK 91 DETAIL DWG NO.: N/A	4 EA			38 Weeks
1063	1-1/8" BSF Bolts for Steam Inlet Branch Pieces for LP Exhaust Assembly CUSTOMER CAT ID: N/A ASSY DWG NO.: SL29521 MK 94 DETAIL DWG NO.: N/A	4 EA			38 Weeks
1064	1-1/8" BSF Studs for Steam Inlet Branch Pieces for LP Exhaust Assembly CUSTOMER CAT ID: N/A ASSY DWG NO.: SL29521 MK 95 DETAIL DWG NO.: N/A	3 EA			38 Weeks
1065	2" BSF Studbolt for Half Joint for LP CS CYLINDER CENTRE CUSTOMER CAT ID: N/A ASSY DWG NO.: 20AL1946 MK 6 DETAIL DWG NO.: N/A	3 EA			38 Weeks
1066	2" BSF Stud for Half Joint for LP CS CYLINDER CENTRE CUSTOMER CAT ID: N/A ASSY DWG NO.: 20AL1946 MK 7 DETAIL DWG NO.: N/A	2 EA			38 Weeks
1067	1-1/2" BSF Special Stud for Internal Joint for LP CS CYLINDER CENTRE CUSTOMER CAT ID: N/A ASSY DWG NO.: 20AL1946 MK 8 DETAIL DWG NO.: N/A	1 EA			38 Weeks
1068	1" BSF Stud for Inlet Branches for LP CS CYLINDER CENTRE CUSTOMER CAT ID: N/A ASSY DWG NO.: 20AL1946 MK 10 DETAIL DWG NO.: N/A	4 EA			38 Weeks
1069	LP SPL.LACING WIRE - R2 LH & RH -25% QTY CUSTOMER CAT ID: N/A ASSY DWG NO.: SL29512.027 DETAIL DWG NO.: 35AA413631	3 EA			17 Weeks
1070	LP SPL.LACING WIRE - R3 LH & RH -25% QTY CUSTOMER CAT ID: N/A ASSY DWG NO.: SL29512.028 DETAIL DWG NO.: 35AA413631	3 EA			17 Weeks

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SIEMENS energy

1071	LP SPL. INNER LACING WIRE - R4 LH & RH CUSTOMER CAT ID: N/A ASSY DWG NO.: SL29512.029 DETAIL DWG NO.: 35AA413631	3 EA	[redacted]	17 Weeks
1072	LP SPL. 'D' SECT.OUTER LACING WIRE - R4 CUSTOMER CAT ID: N/A ASSY DWG NO.: SL29512.029 & 35AM9025 DETAIL DWG NO.: 35AA413338	8 EA		21 Weeks
1073	LP SPL. LACING WIRE FERRULE - R4 LH & R CUSTOMER CAT ID: N/A ASSY DWG NO.:SL29512 DETAIL DWG NO.: 35AA4224	10 EA		17 Weeks

Note: **Quote for the following line items will be submitted separately:-**

1. Lacing Wire for Row 5 LH & RH Blades
2. Outer Erosion Shields for Row 5 LH & RH Blades
3. Inner Erosion Shields for Row 5 LH & RH Blades
4. Lacing Tubes for Row 6 LH & RH Blades (original)
5. Joint Ferrules for Row 6 LH & RH Blades (original)
6. Key Plates for Row 6 LH & RH Blades (original)
7. Outer Erosion Shields for Row 6 LH & RH Blades (original)
8. Inner Erosion Shields for Row 6 LH & RH Blades (original)

Prices: Price shown is in Canadian funds, include any import duties that may be applicable, DDP TUFTS COVE, NSPI, but do not include any taxes. Price shown is also based on the quantities quoted. Should the order quantity differ from the quoted quantity, we reserve the right to amend the prices.

Siemens Energy's pricing is subject to adjustment for the impact of any new or modified taxes, duties, tariffs or equivalent measures imposed by any local or foreign governmental authority which is applicable to our offering, including any portions or components contained within the offering.

Validity: This proposal is valid for a period of 30 days from date of submission, unless extended, modified or withdrawn by Siemens Energy Canada Limited and limits acceptance to the terms set forth herein. The return of a purchase order or any other reasonable manner of acceptance communicated to Siemens during such validity period will be sufficient to form an agreement on the terms and conditions of this offer.

Due to recent significant movements in material costs and availability, our offer is subject to review beyond the validity period.

Quality Program: This offer is based on a Quality Program in accordance with: ISO 9001 2015

Payment Terms: Net 30 days.

Conditions of Sale: Terms and Conditions as defined and agreed upon in the Master Services Agreement (MSA), between Nova Scotia Power Inc. and Siemens Canada Ltd. effective April 2, 2019 shall apply, except as modified in this proposal.

The worldwide outbreak of the coronavirus disease ("COVID-19") may affect usual business activities and/or the execution of work under the Contract. As the impacts from COVID-19 are continuously changing, their impacts on the Contract are unknown at this time. To avoid potentially unnecessary contingency, matters such as procurement lead-time, delivery date, resources, and schedule are provided without consideration of impacts from COVID-19 other than as specifically set out in the Contract/this offer. Siemens Energy is closely monitoring the development of COVID-19 and its associated impacts and will endeavor to inform you of the impacts that COVID-19 has or may have on the Contract. If required to overcome the consequences directly or indirectly caused by the outbreak of COVID-19, Siemens Energy reserves the right to adjust its obligations related to schedule, price, or any other reasonably required adjustment of the Contract, including postponing or providing partial deliveries to the extent Siemens Energy's ability to supply or deliver is impacted.

The Parties acknowledge that there is an uncertain political and security situation in the world, in particular due to the invasion of Ukraine ("Uncertain Situation"), for which effects are difficult to foresee at the time of Contract signing and which can directly and indirectly affect the execution of this Contract including but not limited to the availability of certain equipment, commodities, metals, and materials as well as the availability of transportation means and services. In the light of the above, the Parties agree that Siemens Energy shall be entitled to reasonable adjustments of the delivery term(s) and/or the Contract price(s) to the extent any delay and costs are caused directly or indirectly by the above-mentioned Uncertain Situation and/or any related consequences.

Siemens Energy's obligation to fulfill this agreement is subject to the proviso that the fulfillment is not prevented by any impediments arising out of national or international foreign trade and customs requirements or any embargos [or other sanctions].

Feel free to contact us should you have any questions. We look forward to receive your instructions to proceed.

Regards,

Imran Ijaz

Digitally signed by Imran Ijaz
DN: cn=Imran Ijaz, c=CA, o=iemens Energy Canada Limited, email=imran.ijaz@siemens-energy.com
Date: 2022.10.24 15:41:35 -04'00'

Imran Ijaz
Manager - Parts Sales
imran.ijaz@siemens-energy.com

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Proposal

Siemens Energy Reference Number SF221963919 R.3

Customer	Nova Scotia Power
Proposal Description	NSPI TUC2 Fall 2023 Outage
Submission Date	October 21, 2022
Prepared By	Andrew Forrester Service Business Leader

Siemens Energy Canada Limited
Power Generation Services
1577 North Service Road East
Oakville, Ontario L6H 0H6

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October 21, 2022

Josh Hyslop
Maintenance Superintendent
Nova Scotia Power Inc.
315 Windmill Road
Dartmouth, NS B3A 1H3
JOSH.HYSLOP@nspower.ca

Subject: **NSPI TUC2 Fall 2023 Outage**
Siemens Energy Reference Number SF221963919 R.3

Dear Mr. Hyslop,

Siemens Energy Canada Limited (hereinafter, "Siemens Energy") appreciates the opportunity to present this proposal to Nova Scotia Power for the services described therein.

A review of this proposal will demonstrate the overall value of working with Siemens Energy on your unit and our significant value-added benefits to customers. As the original equipment manufacturer (OEM) of these units, Siemens Energy possesses all the original design and baseline information, which enable us to recommend the most appropriate maintenance and service offerings that will yield the highest unit availability and reliability. Our field engineers and technicians are fully trained and qualified on Siemens Energy generating equipment and represent the best personnel in the industry for servicing and maintaining that equipment. We are confident of our ability to deliver the highest quality service.

The information contained in this proposal and all related documents is proprietary and confidential information that belongs to Siemens Energy. This information is being disclosed to you for the specific purpose of your evaluation of Siemens Energy as a contractor for a particular project. By reviewing the information contained in these documents, you agree to be bound to a confidentiality obligation with respect to this information. Specifically, you hereby agree that (1) you will treat this information with the same level of care as you treat your own proprietary information; (2) you will not disclose this information to third parties without the prior written consent of Siemens Energy; and (3) you will not use this information for any purpose beyond evaluating Siemens Energy as a contractor and/or contracting with Siemens Energy for the particular project quoted herein.

The above terms supersede any click-wrap or other terms not expressly set forth in a signed agreement between the parties covering the proposal. All such click-wrap or other terms are expressly rejected by Siemens Energy.

Thank you for considering Siemens Energy to perform this service. We look forward to working on Nova Scotia Power's unit. Siemens Energy will be pleased to discuss this proposal, at your convenience, or any questions about our experience or capabilities. Please feel free to contact me, or Chris Holloway, Atlantic Sales Manager at (709) 727-2526, if you have any questions regarding this proposal.

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With best regards,
Ashtad Kotwal, P. Eng

Director of Sales
Siemens Energy Canada Limited
1577 North Service Road East Oakville
Oakville ON L6H 0H6, Canada
Mobile: +1 905 580-0241
ashtad.kotwal@siemens-energy.com

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Revision History

Date	Rev	Summary	Issued By
September 2, 2022	0	Original Budgetary Issue	C. Holloway
September 19, 2022	1	Updated Budgetary Issue for LP and VLV	C. Holloway
October 11, 2022	2	Updated duration from 7 weeks to 6.5 weeks Changed working shift from 1x12x7 to 1x10x6 Extracted EIT pricing and added price notes Added proposed outage Org Chart	C. Holloway
October 21, 2022	3	Added detailed outage scope from TMS Split base scope and optional scope / tooling Updated base scope from Budgetary to T&M and Fixed Price.	C. Holloway

1.0 Scope of Work

Siemens Energy is pleased to present the work scopes outlined below.

1.1 Pre-planning

The following preplanning activities will be conducted prior to the outages with support from the Siemens Energy Project Manager, Engineering, Quality, and EHS:

- Planning for special activities and general outage support
- Creation of Priority One Plan (P1P) for project EHS implementation
- ITP preparation and final issue to site
- Drawing compiling and validation
- Pre-outage site visits, site walkdowns, inventory support
- Outage schedule creation and publication
- Coordination and administration of 3rd party and internal support

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1.2 Steam Turbine Major Inspection

LP Turbine Scope:

- Disassembly
  - Rig and remove the upper exhaust hood per rigging drawing
  - Unbolt inner-outer case horizontal joint bolts
  - Rig per rigging drawing and remove the inner-outer upper half casing
  - Unbolt inner-inner casing while supporting lower half
  - Rig inner-inner upper half casing per rigging drawing and remove
  - Remove TE and EE upper gland casing to pedestal cover
- Clean and Inspect
  - Perform complete visual inspection of blade path, rotor gland areas, journals, fillets and couplings.
  - Map and inspect all balance weights for tightness.
  - Clean horizontal and vertical joints (hood, inner-outer, inner-inner)
  - Perform visual inspection of welded joints, including Exhaust hood base
  - Hand clean blades for NDE
  - General NDE blades in-situ (rotating and stationary) – NSPI Scope
- Reassembly
  - Measure and record rotor radial and axial clearances, record rotor axial set back and oil bores to reference clearances
  - Rig and install upper half of inner casing (after FME closeout)
  - Torque upper half to lower half inner-inner casing
  - Install upper half of inner-outer casing (after FME closeout)
  - Record axial and radial rotor setbacks with the rotor in final aligned cold position
  - Measure and record last stage blade radial tip clearances with rotor in cold axial position
  - After alignment of the LP inner casing is complete, install horizontal joint bolts, torque inner-outer casing
  - Measure and record radial clearances at top and horizontal joint left & right, inboard and outboard locations of the TE and EE gland casing
  - Rig upper half of exhaust hood per rigging drawing and level
  - Torque outer casing horizontal bolts
- Contingency Scopes
  - Contingency / Optional: LP L-0 Blade replacement and cylinder modifications
  - Contingency / Optional: LP Rotor Boresonics
  - Contingency / Optional: Low Speed Balancing
  - Contingency / Optional: Startup Trim Balancing

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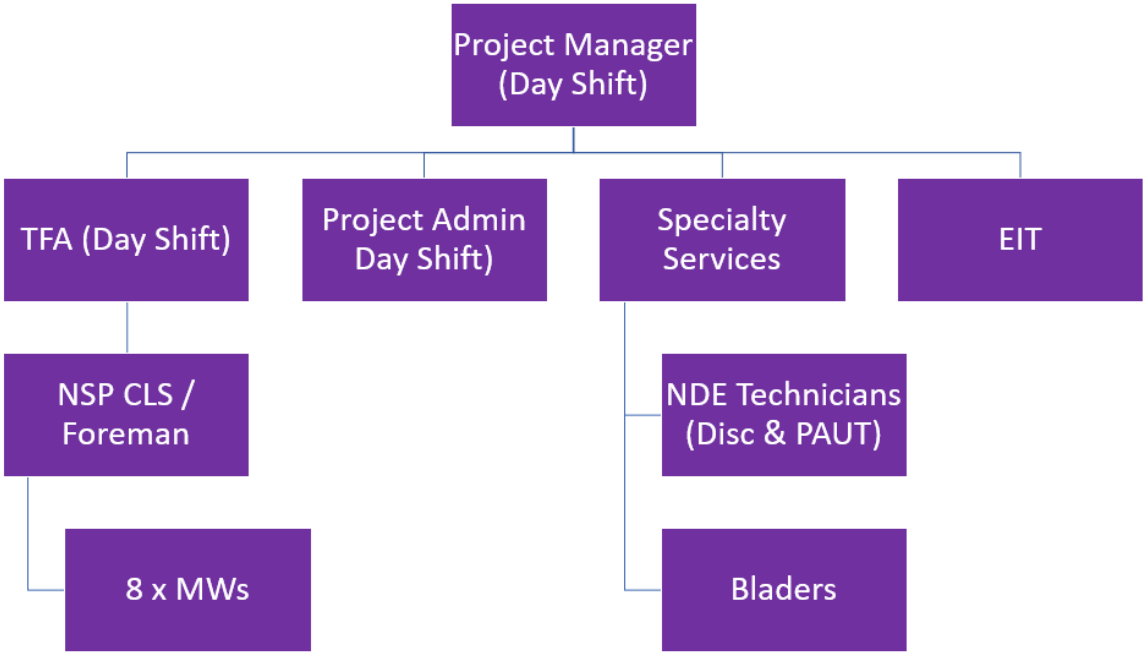
- Note: LP In-situ L-0 Blade Root NDE Inspection is recommended but has been excluded from this Proposal. Siemens Energy is working to develop the inspection procedure and will quote via change order.

1.3 ST Valves:

ST Valves Base Scope:

- Full scope on Reheat valves (Steam Side only, Oil Side per customer request)
  - Dismantle Reheat chests fully
  - Inspect all components and replace as necessary
  - Rebuild Reheat chest and commission
- Full scope on HP steam chests (Steam Side only, Oil Side per customer request)
  - Dismantle HP chests fully
  - Inspect all components and replace as necessary
  - Rebuild HP chest and commission
- All NDE to be conducted by NSPI or 3rd party and will be reviewed by Siemens Energy

1.4 Proposed Outage Org Chart:



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2.0 Commercial Considerations / Pricing

2.1 Pricing

Siemens Energy is pleased to offer the following pricing to Nova Scotia Power to perform the scopes of work as detailed in Section 1 of this proposal.

Item	Work Scope Description	Price Basis	Price
	LP Turbine		
1a	PM + DS TFA	T&M	[redacted]
1b	DS EIT	T&M	
1c	Disc Bore NDE	Fixed	
1d	DS Craft	T&M	
1e	NS Craft	T&M	
1f	LP Visual Inspection / Contingency Repairs	T&M	
1g	Tooling / Shipping	Fixed	
		Total	
	Valves		
2a	PM + DS TFA	T&M	
2b	DS EIT	T&M	
2c	DS Craft	T&M	
2d	NS Craft	T&M	
2e	Tooling / Shipping	Fixed	
		Total	
	Other		
3a	Project Admin	T&M	
3b	Planning	Fixed	
		Total	
		Base Scope Grand Total	
	Optional / Contingency Scopes		
4a	LP L-0 Blade Replacement	Budgetary	
4b	LP L-0 Blade Replacement Tooling	Budgetary	
4c	LP Rotor Boresonics & Tooling	Fixed	
4d	Low Speed Balancing & Tooling	Fixed	
4e	Startup / Trim Balancing & Tooling	Fixed	
4f	Offsite Pre Outage Scheduler	Fixed	
4g	Outage Scheduler	T&M	
4h	Mob 4 Offshore Bladers (minimum cancellation cost)	Fixed	
		Optional Scope Grand Total	

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(1) All prices are quoted in 2023 Canadian dollars and do not include any sales tax. Applicable taxes will be added at time of invoice.
(2) 2022 MSA rates, with 5% escalation, have been used for T&M Estimates. MSA rate in effect at the time of execution shall apply.
(3) T&M work scope will be invoiced on a monthly basis per MSA payment terms.
(4) Fixed work scope will be invoiced 20% upon receipt of PO, 80% upon completion of work scope.
(5) All parts required to execute work scope shall be free issued by NSPI.
(6) Items 1b and 2b include only EIT overtime hours and expenses. Siemens Energy will fund the regular hours.
(7) Item 1f includes 2 UK Bladers for 1 week in order to perform the visual inspections and perform contingency repairs which requires 2 Bladers.
(8) Item 4h identifies the minimum amount Siemens Energy will invoice for the mobilization and subsequent cancellation of 4 Offshore Bladers. This amount shall be credited to 4a in the event of the L-0 blade replacement execution.
(9) Item 4d includes 4 day shifts to complete balancing. Additional balancing time will be considered Extra Work.
(10) Item 4e includes 5 day shifts to complete trim balancing during start up. Additional balancing time will be considered Extra Work.
(11) Item 4g includes 80 hours for the schedule development of Siemens Energy work scopes.
(12) Item 4a and 4b are considered confidential budgetary pricing provided for informational purposes only, is not an offer and may be revoked or amended at any time, without notice. No good faith duty to negotiate a definitive agreement exists, and any liability or binding legal obligations arising from this pricing, including the ability to rely on the information are conditioned on negotiating and executing a formal contract and management approval.

2.2 Quality Program

This offer is based on a Quality Program in accordance with ISO 9001:2015.

2.3 Environmental, Health & Safety

This offer is based on Siemens Energy "Zero Harm" program and in accordance with COR Certification Requirements.

2.4 Terms and Conditions

Terms and Conditions as defined and agreed upon in the Master Services Agreement (MSA), between Nova Scotia Power Inc. and Siemens Energy Canada Ltd., shall apply to the work scope in this proposal.

2.5 COVID Impacts

The worldwide outbreak of the coronavirus disease ("COVID-19") may affect usual business activities and/or the execution of work under the Contract. As the impacts from COVID-19 are

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continuously changing, their impacts on the Contract are unknown at this time. To avoid potentially unnecessary contingency, matters such as procurement lead-time, delivery date, resources, and schedule are provided without consideration of impacts from COVID-19 other than as specifically set out in the Contract/this offer. Siemens Energy is closely monitoring the development of COVID-19 and its associated impacts, and will endeavor to inform you of the impacts that COVID-19 has or may have on the Contract. If required to overcome the consequences directly or indirectly caused by the outbreak of COVID-19, Siemens Energy reserves the right to adjust its obligations related to schedule, price, or any other reasonably required adjustment of the Contract, including postponing or providing partial deliveries to the extent Siemens' Energy ability to supply or deliver is impacted.

The foregoing provision shall form an integral part of any contract resulting from this offer and shall supersede any other terms and conditions of the Contract which may otherwise be applicable to the subject matter described in the provision.

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CI Number: C0051135

Title: TUC2 Turbine Valves Refurbishment

Start Date: 2023/08
In-Service Date: 2023/12
Final Cost Date: 2024/06
Function: Steam
Forecast Amount: $1,048,924

DESCRIPTION:

This project is for component refurbishment on the Turbine Main Steam and Reheat Steam Valves. The project scope will include the replacement/refurbishment of valve stems and bushings, hydraulic valves, and control oil pressure regulator.

The primary function of the Main Steam Valves is to regulate the steam flow to the turbine, control the power output and provide overspeed protection of the steam turbine generator. The Reheat Steam Valves are also required for overspeed protection. All of these valves are critical components of the steam turbine. Their functionality is crucial to the safe and reliable operation of the unit.

Summary of Related CIs +/- 2 years:
Pursuant to Section 11.2 of the Detailed 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)."

- 2023 – CI C0051134 - TUC2 LP Turbine Refurbishment - $4,157,503

Depreciation Class: Steam Production Plant – Tufts Cove 2

Estimated Life of the Asset: 25 Years

Retirement Information:

- Categorization of Retirement: Accounting Policy 6420 - Retirement and Disposal of Capital Assets
- Percentage of Asset Pool: 1.5%

JUSTIFICATION:

Justification Criteria: Thermal

Sub Criteria: Equipment Refurbishment/Replacement

Why do this project?

The turbine valves must be refurbished to avoid valve malfunctioning issues during operation. Thermal maintenance practices determine the maintenance schedule and are developed to avoid valve issues during operation which could potentially harm the turbine. This project is required to maintain the Tufts Cove Unit 2 Steam Turbine in accordance with NS Power's Maintenance Strategy, which aligns with industry standards.

This project is justified primarily on unit safety and reliability.

Why do this project now?

The accumulated operating service interval has been reached, completing this project as part of the 2023 planned outage will mitigate the risk of unplanned outages due to valve failures. Valve failures are likely to occur if the unit is operated with 'out-of-tolerance' (i.e. physical dimensions exceeding OEM standards) components. A component failure could result in an extended outage to repair the valve due to an over-speed event, which could cause significant damage to the turbine and other plant equipment. An over-speed event would also put the safety of NS Power personnel at risk.

Why do this project this way?

The refurbishment work is recommended by NS Power Subject Matter Experts and the OEM to allow for the safe and reliable operation of the turbine. Total valve replacement is a viable alternative but is not required at this time.

CI Number : C0051135 - TUC2 Turbine Valves Refurbishment **Project Number** C0051135

Parent CI Number : -

Asset Location : 1172 - 1172 Tufts Cove Unit 2; Commissioned 1972, 97 Mwh **Budget Version** 2023 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	1000 - SGP - Turbo Gen.Instal.	980,190
Retirements	1000 - SGP - Turbo Gen.Instal.	68,735
	Total Cost:	1,048,924
	Original Cost:	837,419

Capital Project Detailed Estimate

Location: Tufts Cove Generating Station
CI# : C0051135
Title: TUC2 Turbine Valves Refurbishment
Execution Year: 2023

Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#'s)
Regular Labour						
Electrician	PD	4	$ 388	$ 1,551		
Engineering	PD	20	$ 439	$ 8,786		
Maintenance Trades	PD	100	$ 395	$ 39,480		
Power Engineer	PD	8	$ 422	$ 3,379		
Power Plant Technician	PD	8	$ 406	$ 3,246		
Utilityworker	PD	16	$ 275	$ 4,400		
Technologists	PD	10	$ 359	$ 3,591		
			Sub-Total	$ 64,432		
OT Labour						
Electrician	PD	4	$ 776	$ 3,102		
Maintenance Trades	PD	80	$ 776	$ 62,043		
Power Plant Technician	PD	8	$ 845	$ 6,758		
			Sub-Total	$ 71,903		
Term Labour						
Maintenance Trades	PD	60	$ 776	$ 46,560		
			Sub-Total	$ 46,560		
Materials						
Valves & Relay Spares	Lot	1	[redacted]		Attachment 1; Items 1001, 1004, 1007-1017, 1021-1022, 1028	
Misc Materials & Consumables	Lot	1				
			Sub-Total	$ 225,860		
Contracts						
Siemens PM + DS + TFA + EIT	lot	1	[redacted]		Attachment 2, Page 7, Item 2a	
NS TFA + EIT	lot	1			Attachment 2, Page 7, Item 2b	
Tooling / Shipping	lot	1			Attachment 2, Page 7, Item 2e	
NDE Services	lot	1				
Replication Services	lot	1	$ 15,000	$ 15,000		
Scaffolding Services	lot	1	$ 25,000	$ 25,000		
Insulation Services	lot	1	$ 25,000	$ 25,000		
Boroscope Services	lot	1	$ 12,000	$ 12,000		
			Sub-Total	$ 371,637		
Consulting						
TG Advisers/ENTRUST Solutions Group	lot	1	$ 50,000	$ 50,000		
			Sub-Total	$ 50,000		
Other Goods & Services						
Contingency	%	15%	$ 830,392	$ 124,559		
			Sub-Total	$ 124,559		
Interest Capitalized						
AFUDC				$ 11,159		
			Sub-Total	$ 11,159		
Administrative Overhead						
Labour AO				$ 40,600		
Contractor AO				$ 42,214		
			Sub-Total	$ 82,815		
			SUB-TOTAL (no AO, AFUDC)	$ 954,951		
			TOTAL (AO, AFUDC included)	$ 1,048,924		
Original Cost				$ 837,419		

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.

Note 3: Contingency determined using a combination of internal subject matter expert judgment and predetermined guidelines which have been gained over many years, including greater uncertainty for actual site conditions. Risks are well understood based on past experience.

Nova Scotia POWER An Emera Company

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

Project Cost Estimate Input Checklist and Maturity Matrix

Process Industries	Required fields:	Estimate Classification				
Project Name: TUC2 Turbine Valves Refurbishment	Started or Preliminary	Class 5	Class 4	Class 3	Class 2	Class 1
Maturity Level of Project Definition Deliverables	Defined or Complete	0% to 2%	1% to 15%	10% to 40%	30% to 75%	65% to 100%
General Project Data						
A. Scope						
Non-Process Facilities (Infrastructure, Ports, Pipeline, Power Transmission)	Not Required (NR)					
Project Scope of Work Description	Defined (D)			D	D	D
Byproduct and Waste Disposal	Not Required (NR)	NR				
Site Infrastructure (Access, Construction, Power, Camp, etc)	Not Required (NR)	NR				
B. Capacity						
Plant Production/Facility (includes power facilities)	Not Required (NR)					
Electrical Power Requirements (when not the primary capacity driver)	Not Required (NR)	NR				
C. Project Location						
Plant and Associated Facilities	Defined (D)			D	D	D
D. Requirements						
Codes and/or Standards	Defined (D)			D	D	D
Communication System	Not Required (NR)	NR				
Fire Protection and Life Safety	Not Required (NR)	NR				
Environmental Monitoring	Not Required (NR)	NR	NR			
E. Technology Selection						
Process Technology	Not Required (NR)					
F. Strategy						
Contracting / Sourcing	Defined (D)			D	D	D
Escalation	Not Required (NR)	NR				
G. Planning						
Logistics Plan	Not Required (NR)					
Integrated Project Plan	Not Required (NR)	NR				
Project Code of Accounts	Not Required (NR)	NR				
Project Master Schedule	Not Required (NR)	NR				
Regulatory Approval & Permitting	Not Required (NR)	NR				
Risk Register	Not Required (NR)	NR				
Stakeholder Consultation/Engagement/Management Plan	Not Required (NR)	NR				
Work Breakdown Structure	Not Required (NR)	NR				
Startup and Commissioning Plan	Defined (D)			P/D	D	D
H. Studies						
Environmental Impact/Sustainability Assessment	Not Required (NR)	NR				
Environmental/Existing Conditions	Not Required (NR)	NR				
Soils and Hydrology	Not Required (NR)	NR				
Technical Deliverables (Specifications and/or Drawings)						
Block Flow Diagram	Not Required (NR)					
Equipment Datasheets	Complete (C)			C	C	C
Equipment Lists: Electrical	Not Required (NR)	NR/S				
Equipment Lists: Process / Utility / Mechanical	Complete (C)			C	C	C
Heat & Material Balances	Not Required (NR)	NR				
Process Flow Diagrams (PFDs)	Not Required (NR)	NR				
Utility Flow Diagrams (UFDs)	Not Required (NR)	NR				
Design Specifications	Complete (C)			C	C	C
Electrical One-Line Drawings	Complete (C)			C	C	C
General Equipment Arrangement Drawings	Complete (C)			C	C	C
Instrument List	Not Required (NR)	NR				
Piping & Instrumentation Diagrams	Not Required (NR)	NR				
Plot Plans / Facility Layouts	Not Required (NR)	NR				
Construction Permits	Not Required (NR)	NR				
Civil / Site / Structural / Architectural Discipline Drawings	Not Required (NR)	NR				
Demolition Plan and Drawings	Not Required (NR)	NR				
Erosion Control Plan and Drawings	Not Required (NR)	NR				
Fire Protection and Life Safety Drawings and Details	Not Required (NR)	NR				
Electrical Schedules	Not Required (NR)	NR	NR/S			
Instrument and Control Schedules	Not Required (NR)	NR	NR/S			
Instrument Datasheets	Not Required (NR)	NR	NR/S			
Piping Schedules	Not Required (NR)	NR	NR/S			
Piping Discipline Drawings	Not Required (NR)	NR	NR/S			
Spare Parts Listings	Complete (C)				P/C	C
Electrical Discipline Drawings	Not Required (NR)	NR	NR			
Facility emergency Communication Plan and Drawings	Not Required (NR)	NR	NR			
Informtion Systems / Telecommunication Drawings	Not Required (NR)	NR	NR			
Instrumentation / Control System Discipline Drawings	Not Required (NR)	NR	NR			
Mechanical Discipline Drawings	Not Required (NR)	NR	NR			
		0	0	10	11	11
		0%	0%	16%	17%	17%

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.

SIEMENS energy

SCL Ref: SF221974614
Cust Ref: Email
Date: 2022-10-12

To: Greg Carlin
CC: .
NSPI

Subject: **PROPOSAL FOR Tufts Cove U2 Valve & Relay Spares 2023**

With reference to your RFQ Email dated 03-Aug-22 , we are pleased to provide the following proposal for your consideration.

RFQ ITEM	DESCRIPTION	QTY	UNIT PRICE	TOTAL PRICE	EST DELIVERY (ARO)
1001	ESV Seat CUSTOMER CAT ID: N/A ASSY DWG NO.: SL16378.035 DETAIL DWG NO.: 41AM5021SPARE	1 EA			29 Weeks
~~1002~~	No.1 Gov Seat CUSTOMER CAT ID: N/A ASSY DWG NO.: SL16378.019 DETAIL DWG NO.: 41AS1794	1 EA			29 Weeks
~~1003~~	No.2 Gov Seat CUSTOMER CAT ID: N/A ASSY DWG NO.: SL16378.026 DETAIL DWG NO.: 41AS1630	1 EA			29 Weeks
1004	3/4" BSF Slotted Head Screw CUSTOMER CAT ID: N/A ASSY DWG NO.: SL16378.015 DETAIL DWG NO.: TU189-04	6 EA			15 Weeks
~~1005~~	3/4" BSF Slotted Head Screw CUSTOMER CAT ID: N/A ASSY DWG NO.: SL16378.020 DETAIL DWG NO.: TU189-04	12 EA			15 Weeks
~~1006~~	Master ESV Spindle Assy CUSTOMER CAT ID: N/A ASSY DWG NO.: SL16378.003, 004, 005, 014, 036 DETAIL DWG NO.: N/A	1 EA			39 Weeks
1007	No.2 ESV Spindle CUSTOMER CAT ID: N/A ASSY DWG NO.: SL16378.010 DETAIL DWG NO.: 41AS5088	1 EA			39 Weeks
1008	No.1 Gov Valve Spindle CUSTOMER CAT ID: N/A ASSY DWG NO.: SL16378.021 DETAIL DWG NO.: 41AS1795	1 EA			39 Weeks
1009	No.2 Gov Valve Spindle CUSTOMER CAT ID: N/A ASSY DWG NO.: SL16378.027 DETAIL DWG NO.: 41AS1631	1 EA			39 Weeks
1010	Bush 2.1/2" CUSTOMER CAT ID: N/A ASSY DWG NO.: SL16772.015 DETAIL DWG NO.: 8U6734	2 EA			15 Weeks
1011	Fulcrum Pin CUSTOMER CAT ID: N/A ASSY DWG NO.: SL16772.010 DETAIL DWG NO.: 42AU248	1 EA			19 Weeks
1012	ESV Relay Bush CUSTOMER CAT ID: N/A ASSY DWG NO.: SL16772.037 DETAIL DWG NO.: 42AU248	2 EA			19 Weeks
1013	Top Spindle Nut CUSTOMER CAT ID: N/A ASSY DWG NO.: SL16772.027 DETAIL DWG NO.: 8U6269	4 EA			19 Weeks
1014	Locking Plate CUSTOMER CAT ID: N/A ASSY DWG NO.: SL16772.028 DETAIL DWG NO.: 441243-01	4 EA			15 Weeks
1015	Relay Bush 2" CUSTOMER CAT ID: N/A ASSY DWG NO.: SL16828.016 DETAIL DWG NO.: 8U6972	4 EA			15 Weeks
1016	Bush 2.1/4" CUSTOMER CAT ID: N/A ASSY DWG NO.: SL16828.108 DETAIL DWG NO.: 8U6734	4 EA			15 Weeks
1017	Governor Pilot Piston CUSTOMER CAT ID: N/A ASSY DWG NO.: SL16828.018 DETAIL DWG NO.: 8U6001SPARE	1 EA			19 Weeks
~~1018~~	ICV Valve Spindle & Head CUSTOMER CAT ID: N/A ASSY DWG NO.: SL16838.001 DETAIL DWG NO.: 47AS1346	2 EA			39 Weeks

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~~1019~~	RESV Cover Bottom Bush CUSTOMER CAT ID: N/A ASSY DWG NO.: SL16838.021 DETAIL DWG NO.: 47AU1361SPARE	2 EA	[redacted]	19 Weeks
~~1020~~	RESV Cover Top Bush CUSTOMER CAT ID: N/A ASSY DWG NO.: SL16838.024 DETAIL DWG NO.: 47AU1358SPARE	2 EA		19 Weeks
1021	Bush 2.3/4" CUSTOMER CAT ID: N/A ASSY DWG NO.: SL16785.021 DETAIL DWG NO.: 48AU135	2 EA		19 Weeks
1022	5/16" Head Socket Set Screw CUSTOMER CAT ID: N/A ASSY DWG NO.: SL16785.022 DETAIL DWG NO.: 21413223	4 EA		11 Weeks
~~1023~~	3" Pin CUSTOMER CAT ID: N/A ASSY DWG NO.: SL16774.100 DETAIL DWG NO.: 48AU117	4 EA		19 Weeks
~~1024~~	3" Bush CUSTOMER CAT ID: N/A ASSY DWG NO.: SL16774.102 DETAIL DWG NO.: 48AU119	9 EA		19 Weeks
~~1025~~	2" Pin CUSTOMER CAT ID: N/A ASSY DWG NO.: SL16774.092 DETAIL DWG NO.: 48AU112	2 EA		19 Weeks
~~1026~~	3.3/4" Bush CUSTOMER CAT ID: N/A ASSY DWG NO.: SL16774.105 DETAIL DWG NO.: 48AU122	2 EA		19 Weeks
~~1027~~	2.3/4" Bush CUSTOMER CAT ID: N/A ASSY DWG NO.: SL16774.008 DETAIL DWG NO.: 48AS78	2 EA		19 Weeks
1028	3/8" CSK Screw CUSTOMER CAT ID: N/A ASSY DWG NO.: SL16774.009 DETAIL DWG NO.: 21415250	12 EA		11 Weeks

Prices: Price shown is in Canadian funds, include any import duties that may be applicable, DDP Tufts Cove, NSPI, but do not include any taxes. Price shown is also based on the quantities quoted. Should the order quantity differ from the quoted quantity, we reserve the right to amend the prices.

Siemens Energy's pricing is subject to adjustment for the impact of any new or modified taxes, duties, tariffs or equivalent measures imposed by any local or foreign governmental authority which is applicable to our offering, including any portions or components contained within the offering.

Validity: This proposal is valid for a period of 30 days from date of submission, unless extended, modified or withdrawn by Siemens Energy Canada Limited and limits acceptance to the terms set forth herein. The return of a purchase order or any other reasonable manner of acceptance communicated to Siemens during such validity period will be sufficient to form an agreement on the terms and conditions of this offer.

Due to recent significant movements in material costs and availability, our offer is subject to review beyond the validity period.

Quality Program: This offer is based on a Quality Program in accordance with: ISO 9001 2015

Payment Terms: Net 30 days.

Conditions of Sale: Terms and Conditions as defined and agreed upon in the Master Services Agreement (MSA), between Nova Scotia Power Inc. and Siemens Canada Ltd. effective April 2, 2019 shall apply, except as modified in this proposal.

The worldwide outbreak of the coronavirus disease ("COVID-19") may affect usual business activities and/or the execution of work under the Contract. As the impacts from COVID-19 are continuously changing, their impacts on the Contract are unknown at this time. To avoid potentially unnecessary contingency, matters such as procurement lead-time, delivery date, resources, and schedule are provided without consideration of impacts from COVID-19 other than as specifically set out in the Contract/this offer. Siemens Energy is closely monitoring the development of COVID-19 and its associated impacts and will endeavor to inform you of the impacts that COVID-19 has or may have on the Contract. If required to overcome the consequences directly or indirectly caused by the outbreak of COVID-19, Siemens Energy reserves the right to adjust its obligations related to schedule, price, or any other reasonably required adjustment of the Contract, including postponing or providing partial deliveries to the extent Siemens Energy's ability to supply or deliver is impacted.

The Parties acknowledge that there is an uncertain political and security situation in the world, in particular due to the invasion of Ukraine ("Uncertain Situation"), for which effects are difficult to foresee at the time of Contract signing and which can directly and indirectly affect the execution of this Contract including but not limited to the availability of certain equipment, commodities, metals, and materials as well as the availability of transportation means and services. In the light of the above, the Parties agree that Siemens Energy shall be entitled to reasonable adjustments of the delivery term(s) and/or the Contract price(s) to the extent any delay and costs are caused directly or indirectly by the above-mentioned Uncertain Situation and/or any related consequences.

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Siemens Energy's obligation to fulfill this agreement is subject to the proviso that the fulfillment is not prevented by any impediments arising out of national or international foreign trade and customs requirements or any embargos [or other sanctions].

Feel free to contact us should you have any questions. We look forward to receive your instructions to proceed.

Regards,

Imran Ijaz

Digitally signed by Imran Ijaz
DN: cn=Imran Ijaz, c=CA, o=iemens Energy Canada Limited, email=imran.ijaz@siemens-energy.com
Date: 2022.10.12 13:40:16 -04'00'

Imran Ijaz
Manager - Parts Sales
imran.ijaz@siemens-energy.com

KOTWAL ASHTAD

Digitally signed by KOTWAL ASHTAD
DN: cn=KOTWAL ASHTAD, o=Siemens, email=ashtad.kotwal@siemens-energy.com
Date: 2022.10.12 21:36:55 -04'00'

Ashtad Kotwal
Director of Sales, Generation Services Canada

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Proposal

Siemens Energy Reference Number SF221963919 R.3

Customer	Nova Scotia Power
Proposal Description	NSPI TUC2 Fall 2023 Outage
Submission Date	October 21, 2022
Prepared By	Andrew Forrester Service Business Leader

Siemens Energy Canada Limited
Power Generation Services
1577 North Service Road East
Oakville, Ontario L6H 0H6

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October 21, 2022

Josh Hyslop
Maintenance Superintendent
Nova Scotia Power Inc.
315 Windmill Road
Dartmouth, NS B3A 1H3
JOSH.HYSLOP@nspower.ca

Subject: **NSPI TUC2 Fall 2023 Outage**
Siemens Energy Reference Number SF221963919 R.3

Dear Mr. Hyslop,

Siemens Energy Canada Limited (hereinafter, "Siemens Energy") appreciates the opportunity to present this proposal to Nova Scotia Power for the services described therein.

A review of this proposal will demonstrate the overall value of working with Siemens Energy on your unit and our significant value-added benefits to customers. As the original equipment manufacturer (OEM) of these units, Siemens Energy possesses all the original design and baseline information, which enable us to recommend the most appropriate maintenance and service offerings that will yield the highest unit availability and reliability. Our field engineers and technicians are fully trained and qualified on Siemens Energy generating equipment and represent the best personnel in the industry for servicing and maintaining that equipment. We are confident of our ability to deliver the highest quality service.

The information contained in this proposal and all related documents is proprietary and confidential information that belongs to Siemens Energy. This information is being disclosed to you for the specific purpose of your evaluation of Siemens Energy as a contractor for a particular project. By reviewing the information contained in these documents, you agree to be bound to a confidentiality obligation with respect to this information. Specifically, you hereby agree that (1) you will treat this information with the same level of care as you treat your own proprietary information; (2) you will not disclose this information to third parties without the prior written consent of Siemens Energy; and (3) you will not use this information for any purpose beyond evaluating Siemens Energy as a contractor and/or contracting with Siemens Energy for the particular project quoted herein.

The above terms supersede any click-wrap or other terms not expressly set forth in a signed agreement between the parties covering the proposal. All such click-wrap or other terms are expressly rejected by Siemens Energy.

Thank you for considering Siemens Energy to perform this service. We look forward to working on Nova Scotia Power's unit. Siemens Energy will be pleased to discuss this proposal, at your convenience, or any questions about our experience or capabilities. Please feel free to contact me, or Chris Holloway, Atlantic Sales Manager at (709) 727-2526, if you have any questions regarding this proposal.

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With best regards,
Ashtad Kotwal, P. Eng

Director of Sales
Siemens Energy Canada Limited
1577 North Service Road East Oakville
Oakville ON L6H 0H6, Canada
Mobile: +1 905 580-0241
ashtad.kotwal@siemens-energy.com

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Revision History

Date	Rev	Summary	Issued By
September 2, 2022	0	Original Budgetary Issue	C. Holloway
September 19, 2022	1	Updated Budgetary Issue for LP and VLV	C. Holloway
October 11, 2022	2	Updated duration from 7 weeks to 6.5 weeks Changed working shift from 1x12x7 to 1x10x6 Extracted EIT pricing and added price notes Added proposed outage Org Chart	C. Holloway
October 21, 2022	3	Added detailed outage scope from TMS Split base scope and optional scope / tooling Updated base scope from Budgetary to T&M and Fixed Price.	C. Holloway

1.0 Scope of Work

Siemens Energy is pleased to present the work scopes outlined below.

1.1 Pre-planning

The following preplanning activities will be conducted prior to the outages with support from the Siemens Energy Project Manager, Engineering, Quality, and EHS:

- Planning for special activities and general outage support
- Creation of Priority One Plan (P1P) for project EHS implementation
- ITP preparation and final issue to site
- Drawing compiling and validation
- Pre-outage site visits, site walkdowns, inventory support
- Outage schedule creation and publication
- Coordination and administration of 3rd party and internal support

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1.2 Steam Turbine Major Inspection

LP Turbine Scope:

- Disassembly
  - Rig and remove the upper exhaust hood per rigging drawing
  - Unbolt inner-outer case horizontal joint bolts
  - Rig per rigging drawing and remove the inner-outer upper half casing
  - Unbolt inner-inner casing while supporting lower half
  - Rig inner-inner upper half casing per rigging drawing and remove
  - Remove TE and EE upper gland casing to pedestal cover
- Clean and Inspect
  - Perform complete visual inspection of blade path, rotor gland areas, journals, fillets and couplings.
  - Map and inspect all balance weights for tightness.
  - Clean horizontal and vertical joints (hood, inner-outer, inner-inner)
  - Perform visual inspection of welded joints, including Exhaust hood base
  - Hand clean blades for NDE
  - General NDE blades in-situ (rotating and stationary) – NSPI Scope
- Reassembly
  - Measure and record rotor radial and axial clearances, record rotor axial set back and oil bores to reference clearances
  - Rig and install upper half of inner casing (after FME closeout)
  - Torque upper half to lower half inner-inner casing
  - Install upper half of inner-outer casing (after FME closeout)
  - Record axial and radial rotor setbacks with the rotor in final aligned cold position
  - Measure and record last stage blade radial tip clearances with rotor in cold axial position
  - After alignment of the LP inner casing is complete, install horizontal joint bolts, torque inner-outer casing
  - Measure and record radial clearances at top and horizontal joint left & right, inboard and outboard locations of the TE and EE gland casing
  - Rig upper half of exhaust hood per rigging drawing and level
  - Torque outer casing horizontal bolts
- Contingency Scopes
  - Contingency / Optional: LP L-0 Blade replacement and cylinder modifications
  - Contingency / Optional: LP Rotor Boresonics
  - Contingency / Optional: Low Speed Balancing
  - Contingency / Optional: Startup Trim Balancing

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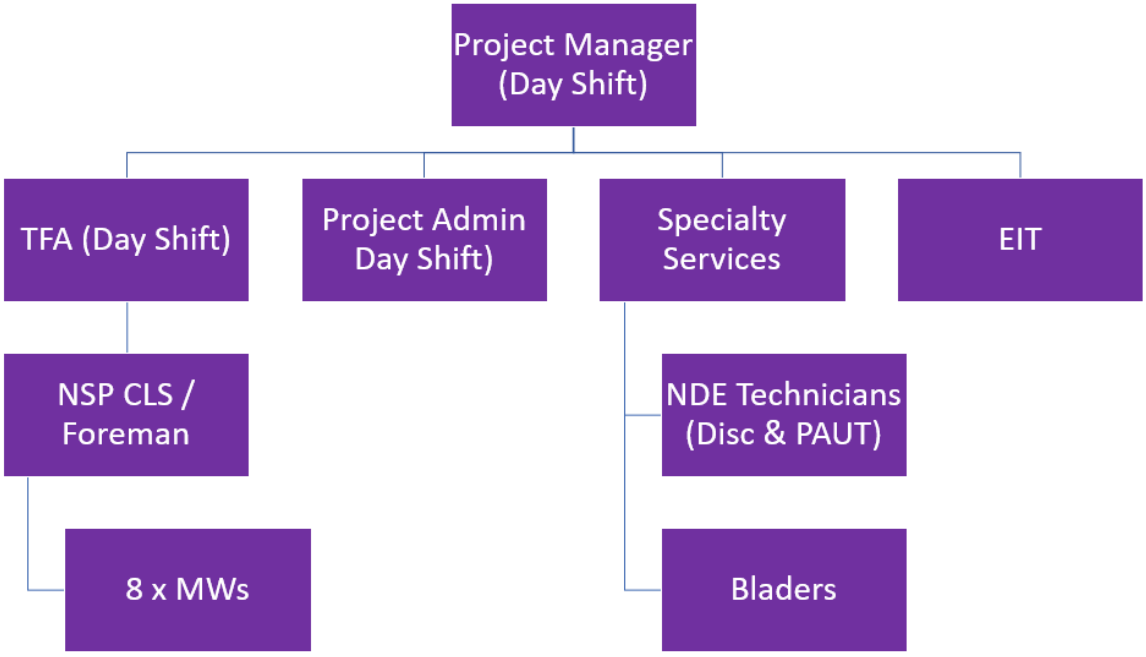
- Note: LP In-situ L-0 Blade Root NDE Inspection is recommended but has been excluded from this Proposal. Siemens Energy is working to develop the inspection procedure and will quote via change order.

1.3 ST Valves:

ST Valves Base Scope:

- Full scope on Reheat valves (Steam Side only, Oil Side per customer request)
  - Dismantle Reheat chests fully
  - Inspect all components and replace as necessary
  - Rebuild Reheat chest and commission
- Full scope on HP steam chests (Steam Side only, Oil Side per customer request)
  - Dismantle HP chests fully
  - Inspect all components and replace as necessary
  - Rebuild HP chest and commission
- All NDE to be conducted by NSPI or 3rd party and will be reviewed by Siemens Energy

1.4 Proposed Outage Org Chart:



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2.0 Commercial Considerations / Pricing

2.1 Pricing

Siemens Energy is pleased to offer the following pricing to Nova Scotia Power to perform the scopes of work as detailed in Section 1 of this proposal.

Item	Work Scope Description	Price Basis	Price
	LP Turbine		
1a	PM + DS TFA	T&M	[redacted]
1b	DS EIT	T&M	
1c	Disc Bore NDE	Fixed	
1d	DS Craft	T&M	
1e	NS Craft	T&M	
1f	LP Visual Inspection / Contingency Repairs	T&M	
1g	Tooling / Shipping	Fixed	
		Total	
	Valves		
2a	PM + DS TFA	T&M	
2b	DS EIT	T&M	
2c	DS Craft	T&M	
2d	NS Craft	T&M	
2e	Tooling / Shipping	Fixed	
		Total	
	Other		
3a	Project Admin	T&M	
3b	Planning	Fixed	
		Total	
		Base Scope Grand Total	
	Optional / Contingency Scopes		
4a	LP L-0 Blade Replacement	Budgetary	
4b	LP L-0 Blade Replacement Tooling	Budgetary	
4c	LP Rotor Boresonics & Tooling	Fixed	
4d	Low Speed Balancing & Tooling	Fixed	
4e	Startup / Trim Balancing & Tooling	Fixed	
4f	Offsite Pre Outage Scheduler	Fixed	
4g	Outage Scheduler	T&M	
4h	Mob 4 Offshore Bladers (minimum cancellation cost)	Fixed	
		Optional Scope Grand Total	

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(1) All prices are quoted in 2023 Canadian dollars and do not include any sales tax. Applicable taxes will be added at time of invoice.
(2) 2022 MSA rates, with 5% escalation, have been used for T&M Estimates. MSA rate in effect at the time of execution shall apply.
(3) T&M work scope will be invoiced on a monthly basis per MSA payment terms.
(4) Fixed work scope will be invoiced 20% upon receipt of PO, 80% upon completion of work scope.
(5) All parts required to execute work scope shall be free issued by NSPI.
(6) Items 1b and 2b include only EIT overtime hours and expenses. Siemens Energy will fund the regular hours.
(7) Item 1f includes 2 UK Bladers for 1 week in order to perform the visual inspections and perform contingency repairs which requires 2 Bladers.
(8) Item 4h identifies the minimum amount Siemens Energy will invoice for the mobilization and subsequent cancellation of 4 Offshore Bladers. This amount shall be credited to 4a in the event of the L-0 blade replacement execution.
(9) Item 4d includes 4 day shifts to complete balancing. Additional balancing time will be considered Extra Work.
(10) Item 4e includes 5 day shifts to complete trim balancing during start up. Additional balancing time will be considered Extra Work.
(11) Item 4g includes 80 hours for the schedule development of Siemens Energy work scopes.
(12) Item 4a and 4b are considered confidential budgetary pricing provided for informational purposes only, is not an offer and may be revoked or amended at any time, without notice. No good faith duty to negotiate a definitive agreement exists, and any liability or binding legal obligations arising from this pricing, including the ability to rely on the information are conditioned on negotiating and executing a formal contract and management approval.

2.2 Quality Program

This offer is based on a Quality Program in accordance with ISO 9001:2015.

2.3 Environmental, Health & Safety

This offer is based on Siemens Energy "Zero Harm" program and in accordance with COR Certification Requirements.

2.4 Terms and Conditions

Terms and Conditions as defined and agreed upon in the Master Services Agreement (MSA), between Nova Scotia Power Inc. and Siemens Energy Canada Ltd., shall apply to the work scope in this proposal.

2.5 COVID Impacts

The worldwide outbreak of the coronavirus disease ("COVID-19") may affect usual business activities and/or the execution of work under the Contract. As the impacts from COVID-19 are

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continuously changing, their impacts on the Contract are unknown at this time. To avoid potentially unnecessary contingency, matters such as procurement lead-time, delivery date, resources, and schedule are provided without consideration of impacts from COVID-19 other than as specifically set out in the Contract/this offer. Siemens Energy is closely monitoring the development of COVID-19 and its associated impacts, and will endeavor to inform you of the impacts that COVID-19 has or may have on the Contract. If required to overcome the consequences directly or indirectly caused by the outbreak of COVID-19, Siemens Energy reserves the right to adjust its obligations related to schedule, price, or any other reasonably required adjustment of the Contract, including postponing or providing partial deliveries to the extent Siemens' Energy ability to supply or deliver is impacted.

The foregoing provision shall form an integral part of any contract resulting from this offer and shall supersede any other terms and conditions of the Contract which may otherwise be applicable to the subject matter described in the provision.

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CI Number: C0041506

Title: LM6000 191-253 Major Engine Refurbishment

Start Date: 2022/03
In-Service Date: 2023/05
Final Cost Date: 2023/11
Function: Gas Turbine
Forecast Amount: $8,740,979

DESCRIPTION:

This project involves the major refurbishment of LM6000 engine serial number 191-253, including the hot section assemblies. Engine 191-253 was first installed in the Tufts Cove Unit 4 enclosure in 2012. The scope of this project includes engine removal, shipment to the vendor's depot, disassembly of the entire engine, refurbishment of all required components based on condition, engine testing and return shipment and installation at Tufts Cove.

In May 2022, the engine was removed from operation as it was exhibiting early signs of bearing failure. The decision to remove the engine from service during the planned annual outage helped to avoid a potential unplanned outage and supported the installation of the rotable spare engine (191-443 at the time), while keeping 191-253 preserved onsite as an emergency spare until the major refurbishment is completed at the depot.

An LM6000 engine is made up of a hot section (low pressure turbine, high pressure turbine and combustor end of the engine), and a cold section (high pressure compressor, low pressure compressor and inlet end of the engine). As the engine is disassembled to complete the hot section refurbishment, components other than the hot section specific materials will be exposed. This equipment will be inspected and compared to OEM and industry expert's limits and tolerances to determine if additional refurbishment activities are required.

Summary of Related CIs +/- 2 years:
Pursuant to Section 11.2 of the Detailed CEJC, related CIs for Gas Turbine projects includes "work completed on the same asset (turbine, boiler, etc.) and on the same unit (Lingan Unit #3, for example)."

- No related capital projects in 2021, 2022, 2023, 2024 or 2025

Depreciation Class: Other Production – Gas Turbines – Tufts Cove CT Unit 4

Estimated Life of the Asset: 5-7 years

Retirement Information:

- Categorization of Retirement: Accounting Policy 6420 - Retirement and Disposal of Capital Assets
- Percentage of Asset Pool: 11.9%

JUSTIFICATION:

Justification Criteria: Thermal

Sub Criteria: Equipment Replacement/Refurbishment

Why do this project?

The hot section is among the higher stressed areas of the engine due to the high temperatures, pressures, and rotational forces to which these components are subjected during normal operation. As a result of these factors, the hot section requires refurbishment at shorter intervals than other engine components. A hot section refurbishment was last completed on this engine in 2018. A condition-based engine refurbishment completed on 191-253 in 2018 (CI 52008 LM6000 – Engine 191-253 Hot Section & Engine Refurbishment) did not include refurbishment for all of the components included in this project. This project needs to be completed in order to support the the engine's ability to continue to operate reliably until the next major reinvestment interval in the next five to seven years.

Why do this project now?

In early 2021, NS Power began seeing indications of increased vibrations associated with a bearing in the engine. NS Power then increased the level of monitoring on the engine due to the heightened risk, and in the subsequent months there were signs of increased metal particles in the oil sump associated with this bearing. Based on the condition of engine 191-253, and the early signs of the potential for bearing failure, NS Power swapped engine 191-253 with the newly refurbished spare engine (191-443) in May 2022, and engine 191-253 became the spare engine. With the forecast unit utilization for the LM6000 fleet, and the engine showing signs of a bearing failure, it has been determined that a Major Engine Refurbishment is required in 2023.

Why do this project this way?

Refurbishment of this engine through component replacement is the most cost-effective alternative, as a full engine replacement is significantly more costly and not considered to be required at this time.

CI Number : C0041506 - LM6000 191-253 Major Engine Refurbishment

Project Number C0041506

Parent CI Number : -

Asset Location : 1174 - 1174 Tufts Cove 4 LM6000, 47 Mwh

Budget Version 2023 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	3000 - GTG - Gas Turbine Engines	8,675,927
Retirements	3000 - GTG - Gas Turbine Engines	65,052
	Total Cost:	8,740,979
	Original Cost:	6,868,206

Capital Project Detailed Estimate

Location: Gas Turbine
C#: C0041506
Title: LM6000 191-253 Major Engine Refurbishment
Execution Year: 2023

Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#'s)
Regular Labour						
Engineering	PD	50	$ 439	$ 22,141		
Gas Turbine Operators	PD	75	$ 388	$ 28,907		
			Sub-Total	$ 51,048		
OT Labour						
Gas Turbine Operators	PD	25	$ 879	$ 21,965		
			Sub-Total	$ 21,965		
Term Labour						
Gas Turbine Operations	PD	25	$ 388	$ 9,694		
			Sub-Total	$ 9,694		
Travel Expense						
Travel Expense - GT Operators	lot	1	$ 7,500	$ 7,500		
Travel Expense - Engine Assessment Acceptance	lot	1	$ 10,000	$ 10,000		
			Sub-Total	$ 17,500		
Materials						
TransCanada Turbines Supply Hot Section	Lot	1	[redacted]		Attachment 1, Item 2	
Engine Mount Kit	Kit	1				
Engine Change Kit	Kit	1				
US to CDN Exchange	%	33%	$ 4,704,646	$ 1,552,533		
			Sub-Total	$ 6,257,179		
Contracts						
TransCanada Turbines site support	Lot	1	[redacted]		Attachment 1, Item 1	
US to CDN Exchange	%	33%				
Loading and unloading engine; Assembling	Lot	1	$ 11,000	$ 11,000		
Load Testing Lifting Gear	Lot	1	$ 12,500	$ 12,500		
Scaffolding and Insulation	Lot	1	$ 15,000	$ 15,000		
Engine Removal	Lot	1	$ 68,293	$ 68,293		
			Sub-Total	$ 183,933		
Freight Postage Delivery						
Transporting Engine	Lot	1	$ 40,000	$ 40,000		
			Sub-Total	$ 40,000		
Consulting						
US to CDN Exchange	%	33%	$ 25,000	$ 8,250		
3rd Party Technical Support	Lot	1	$ 25,000	$ 25,000		
			Sub-Total	$ 83,250		
Meals & Entertainment						
Meals	Lot	1	$ 3,000	$ 3,000		
			Sub-Total	$ 3,000		
Overtime Meals						
OT Meals	Lot	1	$ 600	$ 600		
			Sub-Total	$ 600		
Rental Equipment						
Engine Removal Rentals	Lot	1	$ 6,730	$ 6,730		
			Sub-Total	$ 6,730		
Other Goods & Services						
Contingency	%	30%	$ 6,627,570	$ 1,988,271		
			Sub-Total	$ 1,988,270.90		
Interest Capitalized						
AFUDC				$ 39,901		
			Sub-Total	$ 39,901		
Administrative Overhead						
Labour AO				$ 19,010		
Contractor AO				$ 18,898		
			Sub-Total	$ 37,908		
			SUB-TOTAL (no AO, AFUDC)	$ 8,663,170		
			TOTAL (AO, AFUDC included)	$ 8,740,979		
Original Cost				$ 6,868,206		

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.
Note 3: Contingency determined using a combination of internal subject matter expert judgment and predetermined guidelines which have been gained over many years, including greater uncertainty for unique site conditions. Risks are well understood based on past experience.

Nova Scotia POWER An Emera Company

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

Project Cost Estimate Input Checklist and Maturity Matrix

Process Industries	Required fields:	Estimate Classification				
Project Name: LM6000 191-253 Major Engine Refurbishment	Started or Preliminary	Class 5	Class 4	Class 3	Class 2	Class 1
Maturity Level of Project Definition Deliverables	Defined or Complete	0% to 2%	1% to 15%	10% to 40%	30% to 75%	65% to 100%
General Project Data						
A. Scope						
Non-Process Facilities (Infrastructure, Ports, Pipeline, Power Transmission)	Not Required (NR)					
Project Scope of Work Description	Preliminary (P)	P	P			
Byproduct and Waste Disposal	Not Required (NR)	NR				
Site Infrastructure (Access, Construction, Power, Camp, etc)	Not Required (NR)	NR				
B. Capacity						
Plant Production/Facility (includes power facilities)	Not Required (NR)					
Electrical Power Requirements (when not the primary capacity driver)	Not Required (NR)	NR				
C. Project Location						
Plant and Associated Facilities	Defined (D)			D	D	D
D. Requirements						
Codes and/or Standards	Defined (D)			D	D	D
Communication System	Not Required (NR)	NR				
Fire Protection and Life Safety	Not Required (NR)	NR				
Environmental Monitoring	Not Required (NR)	NR	NR			
E. Technology Selection						
Process Technology	Not Required (NR)					
F. Strategy						
Contracting / Sourcing	Defined (D)			D	D	D
Escalation	Defined (D)			D	D	D
G. Planning						
Logistics Plan	Not Required (NR)					
Integrated Project Plan	Not Required (NR)	NR				
Project Code of Accounts	Not Required (NR)	NR				
Project Master Schedule	Preliminary (P)		P			
Regulatory Approval & Permitting	Not Required (NR)	NR				
Risk Register	Preliminary (P)		P			
Stakeholder Consultation/Engagement/Management Plan	Defined (D)			D	D	D
Work Breakdown Structure	Not Required (NR)	NR				
Startup and Commissioning Plan	Defined (D)			P/D	D	D
H. Studies						
Environmental Impact/Sustainability Assessment	Not Required (NR)	NR				
Environmental/Existing Conditions	Not Required (NR)	NR				
Soils and Hydrology	Not Required (NR)	NR				
Technical Deliverables (Specifications and/or Drawings)						
Block Flow Diagram	Not Required (NR)					
Equipment Datasheets	Not Required (NR)	NR/S				
Equipment Lists: Electrical	Not Required (NR)	NR/S				
Equipment Lists: Process / Utility / Mechanical	Not Required (NR)	NR/S				
Heat & Material Balances	Not Required (NR)	NR				
Process Flow Diagrams (PFDs)	Not Required (NR)	NR				
Utility Flow Diagrams (UFDs)	Not Required (NR)	NR				
Design Specifications	Not Required (NR)	NR				
Electrical One-Line Drawings	Complete (C)			C	C	C
General Equipment Arrangement Drawings	Complete (C)			C	C	C
Instrument List	Not Required (NR)	NR				
Piping & Instrumentation Diagrams	Complete (C)			C	C	C
Plot Plans / Facility Layouts	Not Required (NR)	NR				
Construction Permits	Not Required (NR)	NR				
Civil / Site / Structural / Architectural Discipline Drawings	Not Required (NR)	NR				
Demolition Plan and Drawings	Not Required (NR)	NR				
Erosion Control Plan and Drawings	Not Required (NR)	NR				
Fire Protection and Life Safety Drawings and Details	Not Required (NR)	NR				
Electrical Schedules	Complete (C)				P/C	C
Instrument and Control Schedules	Complete (C)				P/C	C
Instrument Datasheets	Complete (C)				P/C	C
Piping Schedules	Not Required (NR)	NR	NR/S			
Piping Discipline Drawings	Not Required (NR)	NR	NR/S			
Spare Parts Listings	Complete (C)				P/C	C
Electrical Discipline Drawings	Not Required (NR)	NR	NR			
Facility emergency Communication Plan and Drawings	Not Required (NR)	NR	NR			
Informtion Systems / Telecommunication Drawings	Not Required (NR)	NR	NR			
Instrumentation / Control System Discipline Drawings	Not Required (NR)	NR	NR			
Mechanical Discipline Drawings	Not Required (NR)	NR	NR			
		1	3	9	13	13
		2%	5%	14%	21%	21%

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.

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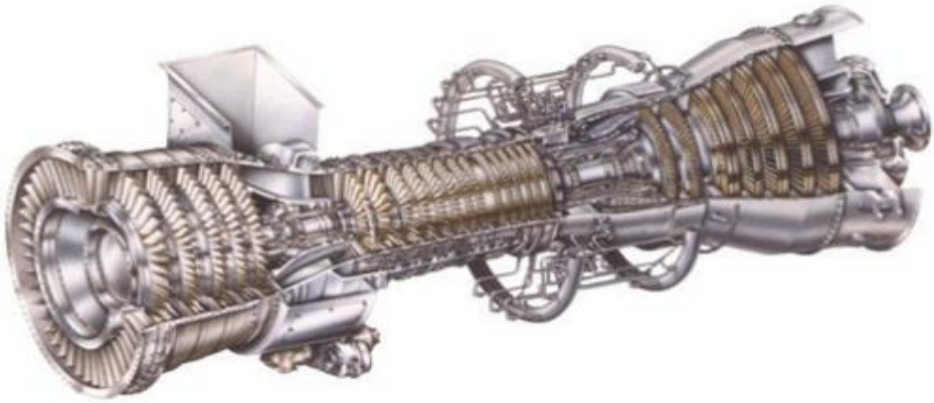
Website: www.tcturbines.com

LM6000PC Major Maintenance

Tender Reference: Engine Serial Number 191-253

Nova Scotia Power Incorporated



TCT Proposal #: RFQ-22-0093

Submitted: August 30, 2022

TRANSCANADA TURBINES

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TRANSCANADA TURBINES

August 30, 2022

VIA EMAIL

Attention: Banpreet Singh
Nova Scotia Power Incorporated
Tufts Cove Generating Station
315 Windmill Road
Dartmouth, Nova Scotia

CC: Sharmilla Tymchen
Darcy Simonelli
William Green
Frank Henry

RE: LM6000PC Major Maintenance
Tender Reference: Engine Serial Number 191-253

Dear Mr.: Singh

TransCanada Turbines Ltd. ("TCT") would like to thank Nova Scotia Power Incorporated ("NSPI" or "Customer") for the opportunity to submit a proposal regarding the LM6000PC Major Maintenance. This Proposal has been submitted in accordance with the requirements specified in your request for proposal email: Engine Serial Number 191-253, received by TCT on August 19, 2022.

This Proposal has been prepared in good faith, and TCT requests that NSPI hold the contents and all supporting documentation confidential. TCT looks forward to working with NSPI on this project. Should you have any questions concerning the proposal or the scope of our services, please feel free to contact me directly at the information listed below.

This proposal #:RFQ-22-0093, dated August 30, 2022 is valid for 30 days from the date of issuance.

Sincerely,

Ron Inzana

Regional Sales Manager Eastern US & Eastern Canada
Email: ron_inzana@tcturbines.com
Phone / Cell: 518-796-0588

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TRANSCANADA TURBINES

Nova Scotia Power Incorporated
Tender Reference: Engine Serial Number 191-253

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TRANSCANADA TURBINES

Nova Scotia Power Incorporated
Tender Reference: Engine Serial Number 191-253

History of Project

Engine 191-253 is an LM6000PC Gas Turbine (GT) and was last at the Depot when it had 16,810 hours (July 10, 2017-TCT, Hot Section and conditional engine refurbishment). In 2021 NSPI were seeing an increase in particle counts on B sump MetalScan, bearing cage and gear tooth material in a scavenge filter debris analysis, and vibration fault frequencies specific to the #4R and #4B assemblies.

There have been a variety of major depot level work to this engine over the years; however, this will be the engine's first scheduled full (zero time) Overhaul.

Engine Information
Engine 191-253 specific statistics are as follows:

U4 Start Attempts	4486
U4 Fired Starts	4405
U4 Fired Engine Hours	89251
U4 T3 Base Hours	116
U4 Normal Stops	4077
U4 Step To Idle Shutdowns	61
U4 Fast Stop Lockout Shutdowns	79
U4 Fast Stop Motor	132
U4 Slow To Min Load	102
U4 Cool Down Shutdowns	0
U4 LP SPRINT Hours	17863.8
U4 HP SPRINT Hours	1195.9

Scope of Work

- Field Service – TCT to provide field service support for removal of engine 191-253 and installation of NSPI's spare engine
- Major Overhaul
- Engine test

Project Schedule

[redacted]

Transportation and Field Service is not included in the above TAT.

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Nova Scotia Power Incorporated
Tender Reference: Engine Serial Number 191-253

Scope of Supply & Pricing

All quoted amounts are in United States Dollars (USD).

Item	*Qty*	*Description*	***Estimated Price***
1	1	Field Service Labor (1 Mechanical Technician; 12-hr shifts; 5 days only)	[redacted]

~ Remove engine 191-253 (est. 2 days), and place in customer provided shipping container
~ Install spare engine (est. 3 days) and align upon completion of repair
~ Includes tooling
~ Includes travel and living expenses
~ Assumes work and travel is completed using weekday rates
~ Actual work will be charged per the rates in Note 11
~ Any additional work will be charged accordingly per Note 11
~ NSPI to provide crane services to load and offload engines
~ NSPI is responsible for erecting H-frame and load test (see Note 3)
~ NSPI is responsible for transportation to and from TCT Level 4 Depot in Airdrie, Alberta, Canada
~ Includes consumables (engine install kit, etc.)

Item	*Qty*	*Description*	***Estimated Price***
2	1	Major Overhaul	[redacted]

~ Conducted in accordance with the attached LM6000PC Overhaul workscope
~ Estimated pricing for this SOW, based on the following fall-out rates. Actual charges will be based on the rates listed in Note 12.

Module	*Fallout Rate*
LPC Rotor	5%
LPC Stator	0%
HPC Rotor	5%
HPC Stator	3%
HPT Stg 1 Blades	10%
HPT Stg 2 Blades	5%
HPT Stg 1 Nozzles	5%
HPT Stg 2 Nozzles	5%
HPT Stg 1 Shrouds	0%
HPT Stg 2 Shrouds	0%
LPT Rotor	5%
LPT Stator	3%

~ Confirm SB compliance and prepare revised estimate
~ Route removed engine parts and components for overhaul as required
~ Establish a firm Turn Around Time upon confirmation of work scope
~ Reassembly of GT including labor and consumables and perform engine test

Total Estimated Price (Items 1 & 2) [redacted]

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Additional Notes

Note 1 **Availability**
All required parts, technicians and tooling are subject to availability. Availability must be confirmed by Customer with TCT, prior to the issuance of a purchase order.

Note 2 **Support Equipment**
Unless otherwise specified in writing, the supply of any cranes, forklifts and additional support equipment required to support portions of the work performed at Customer's site will be supplied by Customer.

Note 3 **Safe Lifting and Customer Engine Lifting and Support**
Upon award of the gas turbine work and prior to removing and/or re-installing the GT, the customer owned lifting equipment such as, but not limited to, the package hoist, customer GT lift fixture, and package 'H' frame beam must comply and be tested in accordance with [redacted] and have a valid certificate of physical load test inspection. The customer shall produce the certificate(s) and documented evidence of such compliance upon TCT's request and prior to any lifts made at the customer site. [redacted]

Note 4 **Currency**
All quoted amounts are in United States Dollars (USD).

Note 5 **Rotable Exchange**
TCT's Rotable Exchange Agreement will need to be executed to document the title transfer of the assets subject to the hot section exchange. Once an agreement is executed and after full payment has been received by TCT, the installed rotable hot section asset(s) shall become the property of Customer, and all removed rotable hot section asset(s) shall become the property of TCT.

Note 6 **Rotable Major Components**
All major assemblies from the Customer's removed hot section asset are assumed to be in repairable condition. Should any major assemblies be deemed to be in non-repairable condition, they will be charged back to the Customer at list price. Major Assemblies: Disks, Thermal Shield, and Combustor (including cowl, dome, and liners).

Note 7 **Scrap**
All parts from Customer's engine which are replaced and declared as scrap, will be disposed of by TCT within 30 days from completion of the work. If Customer wishes to retain any parts declared as scrap, Customer is required to inform TCT prior to the commencement of services. Customer will be responsible for all costs associated with the preservation, crating, shipment and/or storage of these items.

Note 8 **Transportation Responsibilities**
Unless otherwise specified in writing, all costs including but not limited to taxes, duties, and customs charges, associated with transporting the engine from Customer's site to TCT's facility, and from TCT's facility back to Customer's site will be the responsibility of NSPI.

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Note 9 **Responsibility Matrix**

The scope of service has been itemized detailing the responsibility between TCT and Customer. Please refer to the Responsibility Matrix section of this proposal.

Note 10 **Terms of Payment**

Unless otherwise stated in the writing, payment shall be made in United States Dollars (USD) and invoiced as per below:

- 30% of the Purchase Order price at the time work commences, payment to be made within net thirty (30) days of receipt of invoice.
- 45% of the Purchase Order price upon completion of the engine test, payment to be made within net thirty (30) days of receipt of invoice.
- 25% of the Purchase Order price upon delivery, remaining payment to be within net thirty (30) days of receipt of invoice.
- Field Service work (Item 1) will be payment to be made within net thirty (30) days of receipt of invoice.

Note 11 **Time and Material Rates**

After disassembly and inspection of the parts from ESN 191-253, TCT will provide a comprehensive cost estimate based on the rates listed below.

Field Service Turbine Technician – 2022 Labour Rates		
	Mechanical Repair	Mapping, Controls & Instrumentation
Straight Time	[redacted]	
Overtime (payable after 8 hours)		
Travel / Standby Time		
Weekend and Holiday Travel		
Depot/Shop Rates (Straight Time)		
Depot/Shop Rates (Overtime)		
Parts Rates		
New Parts	[redacted]	
Zero-Timed Hardware (repaired)		
Repairs		

Note 12 **Taxes and Duties**

All amounts payable are exclusive of all federal, provincial, state, county, local, municipal, or other excise, sales, use, value-added, stamp, property or similar taxes and fees and all export or import fees, customs duties, tariffs or consular fees, now in force or enacted in the future. All such costs, duties, tariffs, taxes and fees shall be paid by Customer unless Customer provides a certificate of exemption or similar document exempting a payment from a particular tax.

Note 13 **Reporting and Project Management**

TCT will assign a project manager at the time of Purchase Order issue. TCT will provide weekly status updates to Customer, including digital photos. An interim report will be delivered to customer approximately 28 days after induction. Interim report will include inspection findings, scope of work revisions (as required) and any revisions to the estimated invoice total. Customer will be informed of any required or recommended scope of work revisions. During the weeks when TCT is awaiting material from subcontractors or building

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the engine, an e-mail providing status updates will be issued. All of the above will be included in the "Final Report" which TCT will submit to Customer several weeks following the completion of the work and return of the engine. Additionally, TCT can comply with any special reporting requirements of Customer.

Note 14 **General Terms and Conditions of Sale**

Terms and Conditions are in accordance with the Master Service Agreement and Amendments in effect as of the 1st day of August 2017 between Nova Scotia Power Incorporated and TransCanada Turbines Limited.

Note 15 **Validity**

This proposal is valid for 30 days from date of August 30, 2022.

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TRANSCANADA TURBINES

Nova Scotia Power Incorporated
Tender Reference: Engine Serial Number 191-253

Responsibility Matrix

Scope of Services Breakdown	Customer	TCT	Comments/Details
Transportation of engine to and from site	x		
On-site proof load test of on-site crane, engine lift fixture, package H-frame assembly, package beams (all), package hoist	x		
On-site mobile crane	x		
Qualified crane operator, supervision & direction of	x		
Offloading of engine (truck to pad site)	x		
Site forklift, forklift operator, and site material handling	x		
Management of TCT employees on site		x	
Management/Supervision of Customer employees and their activities	x		
Comprehensive LOTO program in which TCT employees can review, sign-on/sign-off, and apply/remove TCT lock	x	x	
Plant specific HSE Orientation and Emergency Response (including site HSE rep and spill response)	x		
GT Package enclosure condition suitable for safe work (removal of accumulated oil/water/fuel), and lighting	x		
Fitting engine in transport dolly and/or placement under package hoist	x	x	
Erection of package out-rigger beam and external H-frame & I-beam structures	x		
Lifting engine with package hoist		x	
Transitioning engine into berth and fitting into mounts		x	
Engine to generator alignment		x	
Contracted gas turbine package inspections or maintenance		x	

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Contracted gas turbine inspection, repairs, or maintenance		x	
Engine to package mechanical connections		x	
Engine to package electrical connections (other than cannon plug connectors)	x		If specifically requested by customer, TCT can supply additional I&C support for engine electrical
Pre-start leak check during crank cycle		x	
Pre-start calibrations	x		If specifically requested by customer, TCT can supply additional I&C support for calibrations
Engine idle inspection leak checks (if permitted access by customer)		x	
Gas Turbine Water wash (if required)	x		
Final review & release of LOTO	x		
Final release of GT for start-up per OEM guidelines	x		
Start-up & operations of GT in accordance with OEM specification	x		
Review of engine operating data at idle and customer identified load set points (if engine dispatched with TCT reps on site)		x	
Return of GT for service/dispatch	x		
Field service reports for contracted site activities		x	

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TRANSCANADA TURBINES

Nova Scotia Power Incorporated
Tender Reference: Engine Serial Number 191-253

Attachments

A. Master Services Agreement and Amendment 1
B. LM6000PC Overhaul Workscope

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CI Number: C0029682

Title: CT – VJ2 Generator Replacement

Start Date: 2023/06
In-Service Date: 2024/06
Final Cost Date: 2024/12
Function: Gas Turbine
Forecast Amount: $5,397,738

DESCRIPTION:

This project is for the replacement of the generator assembly at the Victoria Junction Unit 2 Combustion Turbine (CT). The generator assembly includes: one generator rotor assembly, one generator stator assembly, one generator exciter assembly, one generator permanent magnet generator, one lube oil system and one enclosure to house the lube oil system. The generator assembly being replaced is original equipment and was commissioned in 1976, therefore has approximately 47 years of operation.

In the 2020 Integrated Resource Plan (IRP), NS Power identified that firm capacity resources will be a key requirement of the developing NS Power system in both the near and long term.[1] These combustion turbines are critical to providing firm capacity for intermittent energy sources (e.g. wind power). NS Power also determined that sustaining its existing combustion turbine resources was the economic choice for customers as one part of meeting that firm capacity requirement[2] and that as a result, NS Power should pursue economic reinvestment in existing combustion turbines with individual capital applications as applicable.[3] This investment in Victoria Junction Unit 2 is consistent with the results of the 2020 IRP.

The seven CT units located at Burnside, Victoria Junction and Tusket are fast-acting generation that provide important resources to the NS Power System Operator to address a range of requirements on the power system. Among these is the provision of 230MW of firm generating capacity and operating reserves. These units are capacity assets and critical to system reliability.

Summary of Related CIs +/- 2 years:
Pursuant to Section 11.2 of the Detailed CEJC, related CIs for Gas Turbine projects include "work completed on the same asset (turbine, boiler, etc.) and on the same unit (Lingan Unit #3, for example)."

- No other projects in 2021, 2022, 2023, 2024 or 2025

Depreciation Class: Other Production – Gas Turbines – Victoria Junction

Estimated Life of the Asset: 40 Years

Retirement Information:

- Categorization of Retirement: Accounting Policy 6420 - Retirement and Disposal of Capital Assets
- Percentage of Asset Pool: 5.6%

JUSTIFICATION:

Justification Criteria: Thermal

Sub Criteria: Equipment Replacement/Refurbishment

[1] M08929, Exhibit N-9, Powering a Green Nova Scotia, Together, 2020 Integrated Resource Plan, NS Power, November 27, 2020 (2020 IRP Report), Finding 3, page 109.
[2] M08929, Exhibit N-9, Powering a Green Nova Scotia, Together, 2020 Integrated Resource Plan, NS Power, November 27, 2020 (2020 IRP Report), Finding 3b, page 109.
[3] M08929, Exhibit N-9, Powering a Green Nova Scotia, Together, 2020 Integrated Resource Plan, NS Power, November 27, 2020 (2020 IRP Report), Roadmap 3, page 115.

Why do this project?

Completion of this project will reliably extend the life of the generating unit with new equipment that is consistent with the generator design installed at the other Burnside and Tusket locations. Not completing this project would increase the risk of generator condition-driven forced outage due to the age of the generator, which exposes the NS Power system to the potential of a lengthy loss of ancillary services and peak generation supply provided by Victoria Junction Unit 2. A "run to failure" strategy is not appropriate because of the risk of collateral damage to the rest of the unit as well as the long lead time for a replacement generator (upwards of 12 months in an unplanned manner). The unit would be inoperable for that extended timeframe, with no firm capacity replacement available.

The Victoria Junction Combustion Turbine Generating Station Unit 2 provides the following necessary services to NS Power's system:

- Peaking Generation
- Spinning, 10, and 30-minute operating reserves
- Volt-Ampere Reactive (var) support
- Black Start capability

Why do this project now?

TG Advisors Inc (TGA) assists NS Power in updating fleet-wide comparative condition-based risk assessments on a periodic basis for the combustion turbine fleet, as well as developing a long-term investment strategy to support NS Power's strategic investment in the combustion turbine fleet. TGA provides third-party global experience to turbine generator condition assessment. In its latest review in 2020, TGA continued to recommend the Victoria Junction Unit 2 generator assembly be replaced at the earliest possible opportunity.

Why do this project this way?

Based on the potential known failure modes in VJ2 generator design, refurbishing the generator is not recommended since this activity will not adequately mitigate these risks. Victoria Junction Unit 2 generator assembly, which was installed in 1976, is expected to be in similar condition to that of the Victoria Junction Unit 1 generator assembly prior to the completion of CI C0029693 CT – VJ1 Generator Replacement that was completed in 2022. Replacement of the generator at this time is the only technically feasible alternative. NS Power also evaluated using contract labour versus internal resources with internal resources being significantly less expensive.

CI Number : C0029682 - CT - VJ2 Generator Replacement

Project Number C0029682

Parent CI Number : -

Asset Location : 1202 - 1202 Victoria Junction Unit 2, 30 Mwh unit

Budget Version 2023 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	3000 - GTG - Gas Turbine Engines	5,236,217
Retirements	3000 - GTG - Gas Turbine Engines	161,521
	Total Cost:	5,397,738
	Original Cost:	1,091,021

Capital Project Detailed Estimate

Location: Gas Turbine
CI# : C0029682
Title: CT - VJ2 Generator Replacement
Execution Year: 2023-2024

Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#'s)
Regular Labour						
Engineering	PD	100	$ 439	$ 43,930		
Project Management	PD	100	$ 440	$ 44,030		
Gas Turbine Operators	PD	225	$ 388	$ 87,248		
CADD Operators	PD	30	$ 318	$ 9,539		
			Sub-Total	$ 184,747		C0029693
OT Labour						
Gas Turbine Operators	PD	72	$ 776	$ 55,839		
			Sub-Total	$ 55,839		C0029693
Term Labour						
Electrician	PD	96	$ 388	$ 37,226		
Gas Turbine Operator	PD	75	$ 388	$ 29,083		
			Sub-Total	$ 66,309		C0029693
Travel						
Travel and Accommodations	lot	1	$ 35,000	$ 35,000		
			Sub-Total	$ 35,000		C0029693
Materials						
New Generator Rotor, Stator & Exciter	Lot	1	[redacted]		Attachment 1	
Installation and Commissioning Parts Kit (new kit)	Lot	1				C0029693
USD Conversion	%	33%	$ 2,200,482	$ 726,159		
Rotor Earth Fault Monitor Kit Sensor Kit	Kit	1	$ 24,065	$ 24,065		
Clutch refurbishment	Lot	1	$ 25,000	$ 25,000		
Clutch input shaft refurbishment	Lot	1	$ 20,000	$ 20,000		
New drivetrain hardware	Kit	1	$ 15,000	$ 15,000		
New Generator Oil	Lot	1	$ 17,500	$ 17,500		
Oil Catch/ Dashpot Overhaul	Lot	1	$ 12,500	$ 12,500		
Bus duct and conductors	Lot	1	$ 25,000	$ 25,000		
DAS interface cards and hardware	Lot	1	$ 15,000	$ 15,000		
Consumables	Lot	1	$ 5,000	$ 5,000		
Lube Oil/Compressed Air System Valve Overhaul	Lot	1	$ 1,500	$ 1,500		
			Sub-Total	$ 3,087,206		
Contracts						
OEM Site support	Lot	1	$ 387,970	$ 387,970		C0029693
USD Conversion	%	33%	$ 387,970	$ 128,030		
Rotor Removal Tooling - Rail Type System	Lot	1	$ 30,000	$ 30,000		
Replace bus duct and conductors	Lot	1	$ 30,000	$ 30,000		
Enclosure baseline	Lot	1	$ 26,000	$ 26,000		
Enclosure roof modifications (clutch	Lot	1	$ 25,000	$ 25,000		
Specialized welding services	Lot	1	$ 35,000	$ 35,000		
Crane Support	Lot	1	$ 78,000	$ 78,000		
Generator oil system clean	Lot	1	$ 27,500	$ 27,500		
Generator enclosure oil containment coating	Lot	1	$ 7,500	$ 7,500		
Fire system modifications	Lot	1	$ 5,000	$ 5,000		
Scaffolding/enclosure	Lot	1	$ 39,000	$ 39,000		
Sea Can/Site Trailer Setup & Support	Lot	1	$ 27,500	$ 27,500		
Non-Destructive Testing	Lot	1	$ 6,000	$ 6,000		
Input Shaft Inspection	Lot	1	$ 7,500	$ 7,500		
			Sub-Total	$ 860,000		C0029693
Freight Postage Delivery						
Generator shipment to VJ	Lot	1	$ 75,000	$ 75,000		
Parts shipment to VJ	Lot	1	$ 5,000	$ 5,000		
Tooling shipment to VJ	Lot	1	$ 5,000	$ 5,000		
USD Conversion	%	33%	$ 85,000	$ 28,050		
Shipping within NS for parts overhaul	Lot	1	$ 4,500	$ 4,500		
			Sub-Total	$ 117,550		C0029693
Consulting						
TGA CT Fleet Health Assessment	Lot	1	$ 5,000	$ 5,000		
Electrical Engineering Support	Lot	1	$ 5,000	$ 5,000		
Alignment Oversight	Lot	1	$ 19,000	$ 19,000		
DAS engineering support	Lot	1	$ 7,000	$ 7,000		
Vibration Baseline Analysis	Lot	1	$ 20,000	$ 20,000		
			Sub-Total	$ 56,000		C0029693
External Legal & Audit						
Terms and Conditions review/approval	Lot	1	$ 5,000	$ 5,000		
			Sub-Total	$ 5,000		C0029693
Meals						
Meals	lot	1	$ 7,500	$ 7,500		
			Sub-Total	$ 7,500		C0029693
Overtime Meals						
OT Meals	lot	1	$ 7,500	$ 7,500		
			Sub-Total	$ 7,500		C0029693
Rental/Maint of Equipment						
Telehandler Rental	Lot	1	$ 10,000	$ 10,000		
Site Washrooms and Office Trailers	Lot	1	$ 35,000	$ 35,000		
			Sub-Total	$ 45,000		C0029693
Other Goods & Services						
Contingency	%	10%	$ 1,440,445	$ 144,044		
Contingency Materials	%	15%	$ 3,087,206	$ 463,081		
			Sub-Total	$ 607,125		
Interest Capitalized						
AFUDC				$ 88,193		
			Sub-Total	$ 88,193		
Administrative Overhead						
Labour AO				$ 77,081		
Contractor AO				$ 97,687		
			Sub-Total	$ 174,768		
			SUB-TOTAL (no AO, AFUDC)	$ 5,134,776		
			TOTAL (AO, AFUDC included)	$ 5,397,738		
Original Cost				$1,091,021		

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.

Note 3: Contingency determined using a combination of internal subject matter expert judgment and predetermined guidelines which have been gained over many years, including greater uncertainty for unique site conditions. Risks are well understood based on past experience.

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

Project Cost Estimate Input Checklist and Maturity Matrix

Process Industries	Required fields:	Estimate Classification				
Project Name: VJ2 Generator Replacement	Started or Preliminary	Class 5	Class 4	Class 3	Class 2	Class 1
Maturity Level of Project Definition Deliverables	Defined or Complete	0% to 2%	1% to 15%	10% to 40%	30% to 75%	65% to 100%
General Project Data						
A. Scope						
Non-Process Facilities (Infrastructure, Ports, Pipeline, Power Transmission)	Not Required (NR)					
Project Scope of Work Description	Defined (D)			D	D	D
Byproduct and Waste Disposal	Not Required (NR)	NR				
Site Infrastructure (Access, Construction, Power, Camp, etc)	Not Required (NR)	NR				
B. Capacity						
Plant Production/Facility (includes power facilities)	Not Required (NR)					
Electrical Power Requirements (when not the primary capacity driver)	Defined (D)			D	D	D
C. Project Location						
Plant and Associated Facilities	Defined (D)			D	D	D
D. Requirements						
Codes and/or Standards	Defined (D)			D	D	D
Communication System	Not Required (NR)	NR				
Fire Protection and Life Safety	Defined (D)			D	D	D
Environmental Monitoring	Not Required (NR)	NR	NR			
E. Technology Selection						
Process Technology	Not Required (NR)					
F. Strategy						
Contracting / Sourcing	Defined (D)			D	D	D
Escalation	Preliminary (P)		P			
G. Planning						
Logistics Plan	Not Required (NR)					
Integrated Project Plan	Not Required (NR)	NR				
Project Code of Accounts	Not Required (NR)	NR				
Project Master Schedule	Not Required (NR)	NR				
Regulatory Approval & Permitting	Not Required (NR)	NR				
Risk Register	Not Required (NR)	NR				
Stakeholder Consultation/Engagement/Management Plan	Not Required (NR)	NR				
Work Breakdown Structure	Not Required (NR)	NR				
Startup and Commissioning Plan	Defined (D)			P/D	D	D
H. Studies						
Environmental Impact/Sustainability Assessment	Not Required (NR)	NR				
Environmental/Existing Conditions	Not Required (NR)	NR				
Soils and Hydrology	Not Required (NR)	NR				
Technical Deliverables (Specifications and/or Drawings)						
Block Flow Diagram	Not Required (NR)					
Equipment Datasheets	Complete (C)			C	C	C
Equipment Lists: Electrical	Complete (C)			C	C	C
Equipment Lists: Process / Utility / Mechanical	Complete (C)			C	C	C
Heat & Material Balances	Not Required (NR)	NR				
Process Flow Diagrams (PFDs)	Not Required (NR)	NR				
Utility Flow Diagrams (UFDs)	Not Required (NR)	NR				
Design Specifications	Complete (C)			C	C	C
Electrical One-Line Drawings	Complete (C)			C	C	C
General Equipment Arrangement Drawings	Complete (C)			C	C	C
Instrument List	Complete (C)			C	C	C
Piping & Instrumentation Diagrams	Complete (C)			C	C	C
Plot Plans / Facility Layouts	Complete (C)			C	C	C
Construction Permits	Not Required (NR)	NR				
Civil / Site / Structural / Architectural Discipline Drawings	Not Required (NR)	NR				
Demolition Plan and Drawings	Not Required (NR)	NR				
Erosion Control Plan and Drawings	Not Required (NR)	NR				
Fire Protection and Life Safety Drawings and Details	Not Required (NR)	NR				
Electrical Schedules	Not Required (NR)	NR	NR/S			
Instrument and Control Schedules	Not Required (NR)	NR	NR/S			
Instrument Datasheets	Not Required (NR)	NR	NR/S			
Piping Schedules	Not Required (NR)	NR	NR/S			
Piping Discipline Drawings	Not Required (NR)	NR	NR/S			
Spare Parts Listings	Preliminary (P)			P	P/C	
Electrical Discipline Drawings	Not Required (NR)	NR	NR			
Facility emergency Communication Plan and Drawings	Not Required (NR)	NR	NR			
Informtion Systems / Telecommunication Drawings	Not Required (NR)	NR	NR			
Instrumentation / Control System Discipline Drawings	Not Required (NR)	NR	NR			
Mechanical Discipline Drawings	Not Required (NR)	NR	NR			
		0	1	17	17	16
		0%	2%	27%	27%	25%

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.

QUOTATION

TITLE	NSPI Victoria Junction – Swapout No. 2
CUSTOMER	Nova Scotia Power Corporation
CUSTOMER REFERENCE	Dean Webb
BRUSH REFERENCE	Q-07471 OPP-113911

REVISION 3 **DATE** 25/Aug/2022

www.brush.eu

EXECUTIVE SUMMARY

TITLE	NSPI Victoria Junction – Swapout No. 2
CUSTOMER & REFERENCE	Nova Scotia Power Corporation
	Dean Webb
CUSTOMER CONTACT	Dean Webb (902) 428-7649 dean.webb@nspower.ca
VENDOR	BRUSH SEM s.r.o. Edvarda Beneše 564/39 Tel: +420 378 210717 Doudlevce www.brush.eu Plzeň ISO 9001:2015 301 00 ISO 45001:2018 Czech Republic ISO 14001:2015
REGIONAL SALES	**Julius Daxner** 514.794.5242 Julius.Daxner@brush.eu
24/7 TECHNICAL SUPPORT	SERVICE 24 provides a Technical Support Service 24/7/365, operated by highly experienced BRUSH Engineers with wide-ranging experience covering both mechanical and electrical disciplines. To access the service, simply provide the model and serial number of your equipment, plant name and your technical question. SERVICE 24 will provide answers with suggested next steps. Contact For immediate 24/7 Technical Support: +44 1509 612 612 +1 888 723 2975 (Americas) Service24@Brush.eu

BRUSH, with over 125 years of experience designing and manufacturing turbo-generators, are able to provide a full and bespoke turnkey solution, backed with a comprehensive lifecycle support, to meet and exceed your exacting requirements and specifications. With over 3,000 active installations, the time-proven DAX range built in European ISO accredited sites are specified by leading industrialists, EPC's and facility operators.

Features include but not limited to
•Simple foundation design with a modular construction
•Factory tested, reducing the on-site testing and commissioning time
•Fully developed system readily adapted to any turbine design

With a world-class manufacturing plant located in the Czech Republic, and backed by an extensive aftermarket network across the world, including major repair facilities across the globe, BRUSH can offer far ranging solutions whether it is a new generator for a greenfield project or a complete swap-out of an existing generator on an FPSO.

CONFIDENTIALITY	The information contained within this Quotation is deemed to be commercially sensitive and confidential in nature and as such shall not be reproduced in whole or in part for whatever reason (except for internal administrative purposes) or be disclosed to any third parties without the prior written consent of BRUSH SEM s.r.o.

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COMMERCIAL PROPOSAL

PRICE SCHEDULE

ITEM	REFERENCE	DESCRIPTION	QTY	UNIT	UNIT PRICE	EXTENDED PRICE
1	FP10040	Supply replacement Wound Stator Assembly: DAX	1.00	Each	[redacted]	[redacted]
	FP10019	Supply replacement Balanced Wound Rotor Assembly: DAX	1.00	Each	[redacted]	[redacted]
	FP10026	Supply replacement Exciter and PMG Assembly: DAX	1.00	Each	[redacted]	[redacted]

TOTAL: [redacted]

DELIVERY SCHEDULE

ITEM	REFERENCE	DESCRIPTION	LEAD TIME	INCOTERMS 2020
1	FP10040	Supply replacement Wound Stator Assembly: DAX	39 Weeks	FCA, BRUSH Plzen Facility
	FP10019	Supply replacement Balanced Wound Rotor Assembly: DAX		
	FP10026	Supply replacement Exciter and PMG Assembly: DAX		

NOTES FOR DELIVERY SCHEDULE

LEAD TIME	BRUSH's lead time is estimated only and will be subject to confirmation at the time or order placement.

FINANCIAL TERMS

INVOICE COMPANY & ADDRESS	Nova Scotia Power Corporation 1223 Lower Water St Halifax NS B3J 3S8 Canada
CURRENCY	United States Dollar
INVOICE TERMS	30% Upon acceptance of purchase order. 20% Upon receipt of long lead items. 50% Upon Completion of Incoterms
PAYMENT TERMS	100% net, 30 days after invoice date
BASIS OF PRICE	All prices are exclusive of Value Added Tax (VAT) and any other taxes duties or similar charges not mentioned within our offer.
BANK GUARANTEES	Not included within our scope of supply.

CONTRACT TERMS & CONDITIONS

VALIDITY	30 days
TERMS & CONDITIONS	Terms and conditions stipulated in Asset Purchase Agreement - NSPI and Brush - VICTORIA - (proposed by Brush; 1st April 2021)
LIQUIDATED DAMAGES FOR LATE DELIVERY OF GOODS	Unless stated otherwise in the Terms and Conditions referred to in this tender, and if a fixed time is quoted for delivery and we fail to delivery within that time or within any extension thereof, we undertake to pay for each week of delay liquidated damages at the rate of 0.5 per cent of the value of the delayed goods up to a maximum of 5 per cent of the value of the delayed goods. Such payment shall be in full satisfaction of our liability for delay.
PURCHASE ORDER TO BE ISSUED TO	BRUSH SEM s.r.o.
PURCHASE ORDER DETAIL	Please be aware that, to be valid and processed, a purchase order needs to clearly identify the following information (as a minimum): • Reference to our quote number and revision. • Works scope. • Quantity and units required. • Price and rates. • Payment terms including currency. • Reference to the agreed terms and conditions. • Delivery date and duration. • Delivery method. • Invoicing address and method. • Any special requirements.
FORCE MAJEURE	Force Majeure means war, hostilities, (whether war be declared or not), acts of terrorism, riots or civil disorder, industrial disputes, acts of God, epidemics or pandemics, or any circumstances beyond the reasonable control of BRUSH SEM s.r.o. If BRUSH SEM s.r.o. is prevented or delayed in performing its contractual obligations by any Force Majeure event, it shall be excused the non-performance of its contractual obligations until a reasonable period following the cessation of the Force Majeure event.
SPLIT ORDERS	In the event of a split order i.e., 'engineering and long lead items' plus 'full order', then the full order is to be received no later than six weeks from the 'engineering and long lead item' order. If the full purchase order is received after this period, then BRUSH may put on hold engineering and production activities.

TECHNICAL PROPOSAL

ITEM 1) SUPPLY NEW GENERATOR STATOR, ROTOR & EXCITER ASSEMBLY BDAX 7-193PR

SUMMARY OF SUPPLY

STATOR	The Wound Stator Assembly will match the electrical and mechanical interfaces of the existing generator. The stator will be supplied working on the assumption that the existing bedplate, bearing pedestal, bearing bushes and line and neutral cubicles will be in a sufficient condition to be re-used.
ROTOR	The Wound Rotor Assembly will match the electrical and mechanical interfaces of the existing generator. The rotor will be designed and manufactured to the latest modern specifications and as such will incorporate technical improvements whilst offering total compatibility with the rotor it replaces. The supply will be inclusive of; Balanced wound rotor, Rectifier assembly, Exciter Armature and PMX Rotor.
EXCITER FIELD	The Exciter Field will match the electrical and mechanical interfaces of the existing generator. The Exciter Field and PMX Stator Assembly will be electrically tested at BRUSH before being packed for FCA collection.

OPERATING CONDITIONS AND ENVIRONMENT

ENVIRONMENT	Safe area, covered	**DESIGN AMBIENT TEMERATURE RANGE**	-25°C to +40°C
ALTITUDE	Up to 1000m above sea level	**SEISMIC ZONE**	None specified
H2S REQUIREMENTS	None required	**LOCATION**	Nova Scotia, Canada, onshore

TECHNICAL SPECIFICATION (BRUSH DESIGN REFERENCE - AB0006362A1)

GENERATOR FRAME SIZE	BDAX 7-193PR		**RATED OUTPUT**	35.06 MVA	29.80 MW
TERMINAL VOLTAGE	13.80 kV		**RATED COOLANT INLET TEMPERATURE**	15.0 °C	
FREQUENCY & SPEED	60 Hz	3600 rev/min	**POWER FACTOR LAGGING**	0.850	
NUMBER OF POLES	2		**INSULATION SYSTEM**	Class 155 (F)	
NUMBER OF PHASES	3		**STATOR INSULATION**	Resin rich	
MOUNTING	IM 1005 to BS EN 60034-7		**TEMPERATURE RISE**	Class 130 (B)	
INGRESS PROTECTION	IP 54 to IEC 60034-5		**DUTY TYPE**	S1 Continuous running duty to IEC 60034-1	

PERFORMANCE DATA

REACTANCES	Direct axis synchronous reactance, Xd(i)	211 %
	Direct axis saturated transient reactance, X'd(v)	18.4 % +-15%
	Direct axis saturated sub transient reactance, X"d(v)	13.4 % +-15%
	Unsaturated negative sequence reactance, X2(i)	16.4 %
	Unsaturated zero sequence reactance, X0(i)	8.6 %
	Quadrative axis synchronous reactance, Xq(i)	193 %

	Quadrative axis saturated transient reactance, X'q(v)	22.0 %
	Quadrative axis saturated sub transient reactance, X"q(v)	16.0 %
	Short circuit ratio	0.54
TIME CONSTANTS AT 20 °C	Transient O.C. time constant, T'd0	10.30 seconds
	Transient S.C. time constant, T'd	0.72 seconds
	Sub transient O.C. time constant, T"d0	0.05 seconds
	Sub transient S.C. time constant, T"d	0.04 seconds
RESISTANCE AT 20 °C	Rotor resistance	0.1050 Ohms
	Stator resistance per phase	0.0101 Ohms
INERTIA	Moment of inertia WR2 (see note 2)	726 kgm^2
	Inertia constant H	1.47 kWsecs/kVA
CAPACITANCE	Capacitance per phase of stator winding to earth	0.10 Microfarads
EXCITATION	Current at no load rated voltage	274 Amps
	Voltage at no load rated voltage	29 Volts
	Current at rated load and power factor	736 Amps
	Voltage at rated load and power factor	88 Volts
	Inherent voltage regulation, F.L. to N.L.	32 %

NOTES

1. The electrical details provided are measured or calculated values. Unless otherwise stated, all values are subject to tolerances as given in the relevant national standards.
2. The rotor inertia value may vary slightly with generator to turbine interface. In the event of conflict, the figure quoted on the rotor geometry drawing takes precedence.

EXCITATION SYSTEM

EXCITATION	Brushless with PMG		
MAIN EXCITER MOUNTING	Outboard of non-drive end bearing	**PILOT EXCITER MOUNTING**	Outboard of non-drive end bearing
FIELD	BXF 10.20-3S (SE 30-32) [MXI 44.07-A1]	**ARMATURE**	BXF 10.20-3S (SE 30-32) [MXI 44.07-A1]

BEARING SYSTEM

DRIVE END
Bearings not included in BRUSH scope of supply. Original pedestal bearing arrangement to be re-used.
NON DRIVE END
Bearings not included in BRUSH scope of supply. Original pedestal bearing arrangement to be re-used.

DRIVE ARRANGEMENT

SHAFT END	Single end drive	**DIRECTION OF ROTATION (VIEWED FROM DRIVE END)**	Clockwise
DRIVE END			
COUPLING TYPE	Fitted half coupling		
OUTSIDE DIAMETER (mm)	Customer to advise	**NUMBER OF BOLTS**	Customer to advise

OVERHANG FROM BEARING TO CENTRELINE (mm)	Customer to advise	**PITCH CIRCLE DIAMETER OF BOLTS (mm)**	Customer to advise

TORSIONAL ANALYSIS	Following the reception of an order, Brush will supply shaft system drawings and information to enable a torsional analysis to be carried out by others with whom the responsibility for the torsional aspects of the full train system lies. Any changes to the drive train design as a result of this torsional analysis could result in both a price and lead-time impact, which will be borne by the purchaser.

MONITORING, AUXILIARIES AND INSTRUMENTATION

FUNCTION	DEVICE	QUANTITY
EXCITER AIR OUTLET	RTD - PT100 : Duplex 3-wire	1 per outlet
EXCITER HEATERS	Finned element	1 set
STATOR WINDING	RTD - PT100 : Simplex 3-wire	9
STATOR AIR INLET	RTD - PT100 : Duplex 3-wire	1 per inlet
STATOR AIR OUTLET	RTD - PT100 : Duplex 3-wire	1 per outlet
STATOR FRAME EARTHING	Earthing posts	1 set
STATOR HEATERS	Finned element	1 set
ROTOR EARTH FAULT MONITOR	PRISMIC R10	1

MAIN ELECTRICAL TERMINATION

LINE TERMINAL LOCATION	Side of stator	**NEUTRAL TERMINAL LOCATION**	Side of stator
LINE TERMINAL 'HANDING'	As original supply (753251)	**NEUTRAL TERMINAL 'HANDING'**	As original supply (753251)
LINE TERMINAL IDENTIFICATION	As original supply (753251)	**NEUTRAL TERMINAL IDENTIFICATION**	As original supply (753251)
LINE CONNECTIONS	As original supply (753251)	**NEUTRAL CONNECTIONS**	As original supply (753251)

ELECTRICAL PHASE SEQUENCE	As original supply (753251)

AUXILIARY TERMINATION BOXES

LOCATION	As original supply (753251)

AUXILIARY SUPPLIES

AC VOLTAGE – THREE PHASE	As original supply (753251)
AC VOLTAGE – SINGLE PHASE	As original supply (753251)
DC VOLTAGE	As original supply (753251)

PAINT SPECIFICATION

SPECIFICATION	PS 2892 General System. C3-M medium corrosivity system for surfaces exposed to urban and industrial (non-corrosive) environments with low to medium levels of pollutant e.g. sulphur dioxide, salinity, and a medium durability range of 7 to 15 years.
COLOUR	As original supply (753251)

WORKSHOP TESTS

SPECIFICATION	DI 0000210 - BRUSH design information for Generator DAX Routine check tests for stator and rotor assemblies when supplied separately. Full test on test bed excluded from scope.

INSPECTION

INSPECTION & TEST PLAN	BRUSH Standard - DAX Generator Routine Check Tests for components supplied separately. Stator and field to undergo static electrical testing. Rotor to be oversped in balancing pit. Full machine test on test bed not included.
WITNESS TESTS & INSPECTION	Witness test excluded

PACKING AND PRESERVATION

SPECIFICATION	DI 0000206 BRUSH design information - Generators & Motors; method 3 – Packing case protected for long-term storage.

QUALITY, STANDARDS AND CERTIFICATION

DESIGN STANDARDS	IEEE C50.13		
WELD PROCEDURES	EN 15614		
THIRD PARTY CERTIFICATION	None		
NDT PROCEDURE	Generally to international standards	**NDT OPERATORS**	Approved to PCN / ASNT level 2 or equivalent SNT-TC1A
MATERIAL CERTIFICATION	EN 10204 as applicable		
ADDITIONAL STANDARDS	When installed in accordance with instructions defined within the manual, generator(s) will comply with the following EU directives: The appropriate standards of protection required by the European Community Machinery Directive 2006/42/EC. Low Voltage Directive 2006/95/EC. EMC Directive 2004/1 08/EC.		
DECLARATION OF CONFORMITY	Conformity certificates are included in the generator's quality dossier. Certificates for associated first and third-party equipment are included in attached manuals where appropriate/available / required.		

EQUIPMENT & LOCATION

SERIAL NUMBER	FRAME DESIGNATION OR MODEL	CUSTOMER REFERENCE	LOCATION NAME & ADDRESS
753251	BDAX 70-76P		Victoria Junction Peaking Station (Canada) 1075 Grand Lake Road Sydney Nova Scotia B1P6G6

CUSTOMER TO ADVISE OR CONFIRM SERIAL NUMBER AND LOCATION OF THE EQUIPMENT

DOCUMENTATION

APPROVALS	To ensure smooth execution of the contract, approval of, or comment on, submitted documentation is required within 14 days of submission, or any earlier requirement that may be indicated in the document submittal form. In the event of no response being received within the above time, your approval shall be deemed to have been given and manufacture will proceed in line with the documentation submitted If there is no response within the specified time period, then the lead time of the project is subject to increase and further costs may be incurred.
MANUFACTURING INFORMATION	Where additional information is requested that is critical for manufacturing purposes, this should be provided to us within 5 working days of submission of request. In the event of no response being received within the above time, we reserve the right to renegotiate the contract price and delivery date. We require any documentation provided in electronic format to be in two dimensional, dwg (AutoCAD version 2015 or earlier) or .dxf format. For documentation other than drawings, BRUSH utilise "Microsoft Office" standard software package.
SCOPE DOCUMENTS AND DRAWINGS	The documents that are included within our scope of supply are outlined below. The times quoted are taken from the release of a workable scope of supply and our acceptance of your purchase order with agreed terms and conditions and is based on the order being received during the validity period of this tender. These times are subject to change after this period. Drawings will be provided in mm. All dates given are subject to BRUSH having enough detailed data to proceed with the engineering phase without any delays. Where documentation is provided in a language other than English, we will only provide the translated documentation once the English version has been fully accepted and approved. Third party equipment and documentation will only be provided in languages other than English where available.

	TITLE	LEAD TIME	FILE FORMAT	QUANTITY
GENERATOR STATOR, ROTOR & EXCITER STATOR	Generator general arrangement drawing	16 weeks	.dwg	1
	Rotor geometry drawing	4 weeks	.dwg	1
	Auxiliary terminal box connection diagrams	10 weeks	.dwg	1
	Foundation loading and assembly details	2 weeks	.dwg	1
	Rotor withdrawal procedure	12 weeks	.dwg	1

OTHER	Quality dossier including final test sheets.	On dispatch	Pdf	1
	Interfacing concessions (customer release notes).	On dispatch	Pdf	1
	Operation and maintenance manuals	On dispatch	Pdf on CD	3
	Technical data sheets and performance curves when applicable.	On dispatch	Pdf	1
	Packing lists	On dispatch	Pdf	1

CI Number: C0041788

Title: L6516 Replacements and Upgrades Phase 2

Start Date: 2023/08
In-Service Date: 2023/08
Final Cost Date: 2024/12
Function Class: Transmission
Forecast Amount: $3,123,474

DESCRIPTION:

L6516 is a 127 kilometre (508 Structures) 138kV transmission line, built in 1964, that connects 2C Port Hastings to 2S Victoria Junction substations. This project is required to replace deteriorated assets that have been identified through NS Power's transmission line inspection program. The second phase of this project includes the replacement of deteriorated assets on 125 structures.

The project scope includes:

- Structure Replacements: 54 Structures
- Timber and Insulator Replacements: 14 Structures
- Insulator Replacements: 53 Structures
- Other Deteriorated Assets: 4 Structures

Summary of Related CIs +/- 2 years:
Pursuant to Section 11.2 of the CEJC, related CIs for Transmission include "Work completed on the same asset class (Padmount transformers, Breakers, etc.) or in the same location (feeder, Transmission Line)."

- 2021 CI C0031085 – L6516 Replacements and Upgrades Phase 1 $2,730,592
- 2024 CI TBD - L6516 Replacements and Upgrades Phase 3 $TBD
- 2025 CI TBD - L6516 Replacements and Upgrades Phase 4 $TBD

Depreciation Class: Distribution Plant – Poles, Towers and Fixtures
Distribution Plant – Overhead Conductors and Devices

Estimated Life of the Asset: 45 years

Retirement Information:

- Categorization of Retirement: Accounting Policy 6420 - Retirement and Disposal of Capital Assets
- Percentage of Asset Pool: 0.1%

JUSTIFICATION:

Justification Criteria: Transmission Plant

Why do this project?

The NS Power transmission line inspection program identified deteriorated assets on this line that require replacement to avoid transmission interruptions. Failure to complete this project would compromise the reliable operation of this transmission line. Asset failures on this transmission line would decrease system redundancy.

Why do this project now?

This work has been prioritized based on the condition of the transmission line assets as determined through NS Power's transmission line inspection program results, as well as the criticality of the line to the overall system operation. This project is required to support the reliable operation of the transmission line.

This project is deemed in-service when the first portion of work is completed (August 2023), therefore the Final Cost Date (forecast to be December 2024) is listed as six months after the last portion of work is completed (forecast to be June 2024).

Why do this project this way?

Replacing the existing deteriorated assets is the only technically feasible option to accomplish the intended scope of this project.

CI Number : C0041788 - L6516 Replacements and Upgrades Phase 2 **Project Number** C0041788

Parent CI Number : -

Asset Location : 1455 - 1455 Transmission General **Budget Version** 2023 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	3500 - TP - Wood Poles	1,233,076
Additions	3800 - TP - Insulators	329,760
Additions	3900 - TP - O/H Cond.	1,128,495
Retirements	3500 - TP - Wood Poles	266,308
Retirements	3800 - TP - Insulators	76,982
Retirements	3900 - TP - O/H Cond.	88,853
	Total Cost:	3,123,474
	Original Cost:	291,458

Capital Project Detailed Estimate

Location: Transmission
CI#: C0041788
Title: L6516 Replacements and Upgrades Phase 2
Execution Year: 2023

Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#'s)
Regular Labour						
T&D Labour - Planning	PD	18	$ 354	$ 6,331		
T&D Labour - Site Supervision	PD	90	$ 429	$ 38,509		
			Sub-Total	$ 44,840		
Materials						
Wood Poles	Lot	1	$ 223,656	$ 223,656		
Insulators	Lot	1	$ 60,668	$ 60,668		
O/H Conductor	Lot	1	$ 32,212	$ 32,212		
			Sub-Total	$ 316,536		
Contracts						
Wood Poles	Lot	1	$ 885,228	$ 885,228		
Insulators	Lot	1	$ 240,720	$ 240,720		
O/H Conductor	Lot	1	$ 852,551	$ 852,551		
			Sub-Total	$ 1,978,499		
Other Goods & Services						
Contingency	%	15%	$ 2,339,875	$ 350,981		
			Sub-Total	$ 350,981		
Vehicle Overhead						
Vehicle AO				$ 18,565		
			Sub-Total	$ 18,565		
Administrative Overhead						
Labour AO				$ 36,911		
Contract AO				$ 377,141		
			Sub-Total	$ 414,053		
			SUB-TOTAL (no AO, AFUDC)	$ 2,690,856		
			TOTAL (AO, AFUDC included)	$ 3,123,474		
Original Cost				$ 291,458		

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.
Note 3: Contingency determined using a combination of internal subject matter expert judgment and predetermined guidelines which have been gained over many years, including greater uncertainty for actual site conditions. Risks are well understood based on past experience.

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

Project Cost Estimate Input Checklist and Maturity Matrix

Transmission Line Infrastructure	Required fields:	Estimate Classification				
Project Name: L6516 Replacements and Upgrades Phase 2	Started or Preliminary	Class 5	Class 4	Class 3	Class 2	Class 1
Maturity Level of Project Definition Deliverables	Defined or Complete	0% to 2%	1% to 15%	10% to 40%	30% to 75%	65% to 100%
General Project Data						
A. Scope						
Project Scope of Work Description	Defined (D)			D	D	D
Site Infrastructure (Access, Construction, Power, Camp, etc)	Preliminary (P)		P			
B. Capacity						
Voltage (kV) and Circuits	Defined (D)			D	D	D
C. Project Location						
Not Applicable						
D. Requirements						
Codes and/or Standards	Defined (D)			D	D	D
Environmental Monitoring	Defined (D)					D
E. Technology Selection						
Not Applicable						
F. Strategy						
Right-of-Way (ROW)	Defined (D)			D	D	D
Contracting / Sourcing	Defined (D)			D	D	D
Escalation	Defined (D)			D	D	D
G. Planning						
System / Grid Planning (including substation and interconnect locations)	Defined (D)			D	D	D
Logistics Plan	Preliminary (P)	P	P	P		
Integrated Project Plan	Preliminary (P)		P			
Project Code of Accounts	Defined (D)			D	D	D
Project Master Schedule	Preliminary (P)		P			
Regulatory Approval & Permitting	Preliminary (P)		P			
Risk Register	Preliminary (P)		P			
Stakeholder Consultation/Engagement/Management Plan	Not Required (NR)	NR				
Work Breakdown Structure	Not Required (NR)	NR				
Startup and Commissioning Plan	Not Required (NR)	NR				
H. Studies						
Routing Options	Defined (D)			D	D	D
Topography and/or Bathymetry	Defined (D)			P/D	D	D
Environmental Impact / Sustainability Assesment	Not Required (NR)	NR				
Environmental / Existing Conditions	Preliminary (P)		P			
Meteorology and/or Oceanographic / Subsea	Defined (D)			D	D	D
Soils and Hydrology	Not Required (NR)	NR				
Technical Deliverables (Specifications and/or Drawings)						
Conductor, Insulator, Grounding, Joint Design (including protection for buried or subsea)	Complete (C)			C	C	C
Foundation / Structure (Tower) Design	Preliminary (P)		P			
Route Mapping / Survey	Complete (C)		P/C	C	C	C
Design Specifications	Complete (C)			C	C	C
Instrument List	Not Required (NR)	NR				
Construction Permits	Preliminary (P)		S/P	P/C		
Geometric Layout, Alignment, Profile, Cross Section	Preliminary (P)		S/P	P/C		
Land / ROW Title Negotiation	Not Required (NR)	NR				
Civil / Site / Structural / Architectural Discipline Drawings	Complete (C)				C	C
Crossings and Borings Designs and Drawings	Preliminary (P)		S/P	P		
Demolition Plan and Drawings	Not Required (NR)	NR				
Erosion Control Plan and Drawings	Preliminary (P)		S/P	P		
Foundation / Structure (Tower) Discipline Drawings	Not Required (NR)	NR				
Tower / Structure Location / Spotting	Complete (C)				C	C
Instrument Datasheets	Not Required (NR)	NR	NR/S			
Electrical Discipline Drawings	Not Required (NR)	NR	NR			
Instrumentation / Control System Discipline Drawings	Not Required (NR)	NR	NR			
Total Responses		1	13	19	16	17
Percentage		3%	33%	49%	41%	44%

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 *power transmission line infrastructure industries* is assumed to include greenfield or brownfield sites for overhead, buried and submarine transmission of electrical power in the infrastructure industries. High voltage is typically >100kV but may be less (e.g., 33 or 66kv) if long distance with light electrical loads. This excludes power supply and distribution scope within a process plant, mining facility, building complex or other facility site. It also excludes power generation facilities and substations. The defining deliverables of those excluded project scopes are covered in other RPs (e.g., 18R-97 for process plants [2]).

Power transmission is considered an element of the infrastructure industry. The Construction Industry Institute has provided a good definition of infrastructure in its Project Definition Rating Index for Infrastructure Projects as follows [3]:

"A capital project that provides transportation, transmission, distribution, collection or other capabilities supporting commerce or interaction of goods, services, or people. Infrastructure projects generally impact multiple jurisdictions, stakeholder groups and/or a wide area. They are characterized as projects with a primary purpose that is integral to the effective operation of a system. These collective capabilities provide a service that is made up of nodes and vectors into a grid or system."

Using this definition, power transmission lines are a vector or linear scope element that connects substation or other facility nodes at its terminations. The substation nodes may be part of or associated with a generation, consuming or interconnection facility. As such, transmission projects are often executed as part of a program that also involves node project scope or facility operational changes (or at least considerations for integrated system commissioning and startup). As the definition states, a distinguishing feature of these projects is that they often traverse wide areas, cross country or subsea, which puts an emphasis on the definition of routing, land ownership and conditions, and establishing right-of-way (ROW). Associated scope definition challenges include defining stakeholder, permitting and regulatory requirements. Buried and submarine installations increase the focus on the protection philosophy and strategies affecting cable selection, armoring and joint considerations. While many distinguish power transmission (higher voltage, long distances) from power distribution (short distance, lower voltage connections to retail customers), the principles of estimating these elements are similar; i.e., the RP applies to both.

The main physical power transmission line scope elements are conductors and their support structures if installed overhead. Main installation elements include land clearing if over land (including forestry if applicable), foundation and structure erection and conductor stringing if overhead, or trenching, laying and horizontal boring if subsurface or subsea. Special scope elements are involved with crossings of water, road, rail and so on and at terminations. Because conductor (e.g., aluminum) and structure (e.g., steel) material costs are usually a significant cost element, these project estimates are particularly sensitive to escalation uncertainty. In general, the more developed the route,

the more complex the installation will be. In urban areas, visual appeal and concern for safety and health can be major issues. Installation in remote location and/or difficult or environmentally sensitive terrain creates its own challenges. Subsea installation adds the need for bathymetry[1] and metocean[2] studies and specialized installation equipment and vessels. Before any installation work can begin in an area, stakeholder consultation must be advanced (sometimes requiring agreements with local populations with rights), and appropriate land and ROW must be acquired which creates unique scheduling as well as cost challenges.

For the purpose of estimate classification then, the main scope definition deliverables are associated with defining the power requirements (i.e., kV), the conductors and structure, and the routing. Conductors can vary widely in content (copper, aluminum, etc.) and insulation. Overhead structures may be wood, concrete, composite or steel in various configurations with various foundation designs including pilings, concrete and so on. The route's land or subsea characteristics and the nature of developments drive the need for special design features and execution strategies. Operability and maintainability considerations may also affect ROW and access design. Brownfield and revamp projects add their own concerns for interface with existing elements, crowded working conditions, etc. For each scope definition decision, stakeholder requirements need to be considered.

Power substation projects are usually associated with transmission projects. However, substations being equipment-centric and located on a facility site have physical and defining characteristics similar to process plant projects (e.g., reliance on one-line diagrams, plot plans, etc.).

CI Number: C0055539

Title: 10H-T1 Transformer Replacement

Start Date:	2023/04
In-Service Date:	2024/10
Final Cost Date:	2025/04
Function:	Transmission
Forecast Amount:	$2,420,892

DESCRIPTION:

This project is for the replacement of the 10H-T1 transformer which serves the Victoria General Hospital and the IWK Children's Hospital in Halifax. Recent test results from the condition assessment indicate that this transformer is nearing end of life and a replacement is required to support the continued reliable service for the hospital. The project scope includes procurement, transport, installation, commissioning, as well as removal of the existing transformer.

Summary of Related CIs +/- 2 years:
Pursuant to Section 11.2 of the CEJC, related CIs for Transmission projects include "Work completed on the same asset class (Padmount transformers, Breakers, etc.) or in the same location (feeder, Transmission Line)."

- No other projects in 2021, 2022, 2023, 2024 or 2025

Depreciation Class: Transmission Plant – Station Equipment
Transmission Plant – Underground Conductors and Devices

Estimated Life of the Asset: 40 Years

Retirement Information:
• Categorization of Retirement: Accounting Policy 6420 - Retirement and Disposal of Capital Assets
• Percentage of Asset Pool: 0.04%

JUSTIFICATION:

Justification Criteria: Transmission Plant

Why do this project?

Transformer 10H-T1 has been in service at NS Power's 10H – V G Hospital Substation since 1965, safely and reliably providing power over that period to a critical customer. Recent oil samples indicate signs of insulation degradation within the transformer, which occurs when a transformer is near the end of life. In addition, the transformer has also been experiencing tapchanger issues resulting in the tapchanger being placed in a fixed position as a short term workaround to keep it in operation. That has resulted in limiting the ability to operate the transformer across the broader voltage range being requested by the hospital.

Why do this project now?

The 10H-T1 transformer needs to be maintained in a reliable state to reliability supply power to the Victoria General Hospital and the IWK Children's Hospital in Halifax. The insulation degradation results from the oil testing are the initial signals that this transformer is beginning to fail, and a replacement needs to occur before failure. A replacement transformer will include a new tapchanger with the functionality to automatically adjust the voltage, restoring full voltage control functionality to the substation.

Why do this project this way?

The critical nature of the Victoria General Hospital and the IWK Children's Hospital in Halifax means that a run to failure option for this transformer is not feasible. The replacement of this transformer needs to occur in a planned and expedient way, as will be executed with this project. The transformer is deteriorated beyond a reasonable point to expect anything other than replacement to be a viable long term solution. To continue to meet the needs of these critical customers, a new site-specific transformer must be purchased and installed. The second transformer at this substation

(10H-T2) is of a similar vintage to this transformer, and is likely approaching end-of-life as well. Replacing 10H-T1 with a new unit will bring the risk level of this substation within an acceptable risk level.

CI Number : C0055539 - 10H-T1 Transformer Replacement

Project Number C0055539

Parent CI Number : -

Asset Location : 1455 - 1455 Transmission Plant General

Budget Version 2023 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	0300 - TP - Bldg.,Struct.Grnd.	47,466
Additions	0700 - TP - Environmental	109,613
Additions	2200 - TP - Elec Contr.Equip.	40,395
Additions	4300 - TP - Substn Dev.	21,917
Additions	4400 - TP - Substn.Transf.	1,974,483
Additions	4600 - TP - U/G Conductor	152,114
Additions	6100 - TP - Switched Telecomm. Sys	21,592
Retirements	4400 - TP - Substn.Transf.	53,312
	Total Cost:	2,420,892
	Original Cost:	231,239

Capital Project Detailed Estimate

Location: Transmission
CI#: C0055539
Title: 10H-T1 Transformer Replacement
Execution Year: 2023-2024

Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#'s)
Regular Labour						
T&D Labour - Site Supervision	PD	63	$ 418	$ 26,224		
T&D Labour - PLT	PD	109	$ 403	$ 43,740		
Design	PD	148	$ 418	$ 61,843		
Commissioning	PD	68	$ 418	$ 28,464		
			Sub-Total	$ 160,271		
Overtime Labour						
T&D OT Labour - PLT	PD	10	$ 806	$ 8,250		
			Sub-Total	$ 8,250		
Materials						
Bldg.,Struct.Grnd.	Lot	1	$ 2,250	$ 2,250		
Elec Contr.Equip.	Lot	1	$ 9,500	$ 9,500		
Substn.Transf.	Lot	1	$ 1,101,200	$ 1,101,200		
Environmental	Lot	1	$ 12,150	$ 12,150		
U/G Conduc	Lot	1	$ 86,700	$ 86,700		
Switched Telecom Sys	Lot	1	$ 15,000	$ 15,000		
Design	Lot	1	$ 500	$ 500		
			Sub-Total	$ 1,227,300		
Travel						
Travel	Lot	1	$ 592	$ 592		
			Sub-Total	$ 592		
Contracts						
Bldg.,Struct.Grnd.	Lot	1	$ 29,900	$ 29,900		
Substn.Transf.	Lot	1	$ 291,400	$ 291,400		
Environmental	Lot	1	$ 64,000	$ 64,000		
Design	Lot	1	$ 14,500	$ 14,500		
Substn Dev.	Lot	1	$ 1,600	$ 1,600		
Field Supervision	Lot	1	$ 21,000	$ 21,000		
			Sub-Total	$ 422,400		
Consulting						
Substn.Transf.	Lot	1	$ 20,000	$ 20,000		
			Sub-Total	$ 20,000		
Other Goods & Services						
Contingency	%	15%	$ 1,838,813	$ 275,822		
			Sub-Total	$ 275,822		
Interest Capitalized						
AFUDC				$ 22,345		
			Sub-Total	$ 22,345		
Vehicle Overhead						
Vehicle AO				$ 68,067		
			Sub-Total	$ 68,067		
Administrative Overhead						
Labour AO				$ 135,328		
Contract AO				$ 80,518		
			Sub-Total	$ 215,845		
			SUB-TOTAL (no AO, AFUDC)	$ 2,114,635		
			TOTAL (AO, AFUDC included)	$ 2,420,892		
Original Cost				$ 231,239		

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.
Note 3: Contingency determined using a combination of internal subject matter expert judgment and predetermined contingency guidelines. Risks are well understood based on past experience.

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

Project Cost Estimate Input Checklist and Maturity Matrix

Transmission Line Infrastructure	Required fields:	Estimate Classification				
10H-T1 Transformer Replacement	Started or Preliminary	Class 5	Class 4	Class 3	Class 2	Class 1
Maturity Level of Project Definition Deliverables	Defined or Complete	0% to 2%	1% to 15%	10% to 40%	30% to 75%	65% to 100%
General Project Data						
A. Scope						
Project Scope of Work Description	Defined (D)			D	D	D
Site Infrastructure (Access, Construction, Power, Camp, etc)	Preliminary (P)		P			
B. Capacity						
Voltage (kV) and Circuits	Defined (D)			D	D	D
C. Project Location						
Not Applicable						
D. Requirements						
Codes and/or Standards	Defined (D)			D	D	D
Environmental Monitoring	Defined (D)					D
E. Technology Selection						
Not Applicable						
F. Strategy						
Right-of-Way (ROW)	Not Required (NR)					
Contracting / Sourcing	Preliminary (P)		P			
Escalation	Defined (D)			D	D	D
G. Planning						
System / Grid Planning (including substation and interconnect locations)	Defined (D)			D	D	D
Logistics Plan	Preliminary (P)	P	P	P		
Integrated Project Plan	Preliminary (P)		P			
Project Code of Accounts	Defined (D)			D	D	D
Project Master Schedule	Preliminary (P)		P			
Regulatory Approval & Permitting	Not Required (NR)	NR				
Risk Register	Preliminary (P)		P			
Stakeholder Consultation/Engagement/Management Plan	Preliminary (P)		P			
Work Breakdown Structure	Not Required (NR)	NR				
Startup and Commissioning Plan	Preliminary (P)		P	P/D		
H. Studies						
Routing Options	Not Required (NR)					
Topography and/or Bathymetry	Not Required (NR)					
Environmental Impact / Sustainability Assesment	Not Required (NR)	NR				
Environmental / Existing Conditions	Not Required (NR)	NR				
Meteorology and/or Oceanographic / Subsea	Not Required (NR)	NR				
Soils and Hydrology	Not Required (NR)	NR				
Technical Deliverables (Specifications and/or Drawings)						
Conductor, Insulator, Grounding, Joint Design (including protection for buried or subsea)	Complete (C)			C	C	C
Foundation / Structure (Tower) Design	Started (S)	S				
Route Mapping / Survey	Not Required (NR)					
Design Specifications	Complete (C)			C	C	C
Instrument List	Not Required (NR)	NR				
Construction Permits	Not Required (NR)	NR				
Geometric Layout, Alignment, Profile, Cross Section	Complete (C)			P/C	C	C
Land / ROW Title Negotiation	Not Required (NR)	NR				
Civil / Site / Structural / Architectural Discipline Drawings	Started (S)		S/P			
Crossings and Borings Designs and Drawings	Not Required (NR)	NR				
Demolition Plan and Drawings	Started (S)		S/P			
Erosion Control Plan and Drawings	Not Required (NR)	NR				
Foundation / Structure (Tower) Discipline Drawings	Started (S)		S/P			
Tower / Structure Location / Spotting	Not Required (NR)	NR				
Instrument Datasheets	Not Required (NR)	NR	NR/S			
Electrical Discipline Drawings	Preliminary (P)			S/P	P/C	
Instrumentation / Control System Discipline Drawings	Preliminary (P)			S/P	P/C	
Total Responses		2	11	13	11	10
Percentage		6%	32%	38%	32%	29%

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 *power transmission line infrastructure industries* is assumed to include greenfield or brownfield sites for overhead, buried and submarine transmission of electrical power in the infrastructure industries. High voltage is typically >100kV but may be less (e.g., 33 or 66kv) if long distance with light electrical loads. This excludes power supply and distribution scope within a process plant, mining facility, building complex or other facility site. It also excludes power generation facilities and substations. The defining deliverables of those excluded project scopes are covered in other RPs (e.g., 18R-97 for process plants [2]).

Power transmission is considered an element of the infrastructure industry. The Construction Industry Institute has provided a good definition of infrastructure in its Project Definition Rating Index for Infrastructure Projects as follows [3]:

"A capital project that provides transportation, transmission, distribution, collection or other capabilities supporting commerce or interaction of goods, services, or people. Infrastructure projects generally impact multiple jurisdictions, stakeholder groups and/or a wide area. They are characterized as projects with a primary purpose that is integral to the effective operation of a system. These collective capabilities provide a service that is made up of nodes and vectors into a grid or system."

Using this definition, power transmission lines are a vector or linear scope element that connects substation or other facility nodes at its terminations. The substation nodes may be part of or associated with a generation, consuming or interconnection facility. As such, transmission projects are often executed as part of a program that also involves node project scope or facility operational changes (or at least considerations for integrated system commissioning and startup). As the definition states, a distinguishing feature of these projects is that they often traverse wide areas, cross country or subsea, which puts an emphasis on the definition of routing, land ownership and conditions, and establishing right-of-way (ROW). Associated scope definition challenges include defining stakeholder, permitting and regulatory requirements. Buried and submarine installations increase the focus on the protection philosophy and strategies affecting cable selection, armoring and joint considerations. While many distinguish power transmission (higher voltage, long distances) from power distribution (short distance, lower voltage connections to retail customers), the principles of estimating these elements are similar; i.e., the RP applies to both.

The main physical power transmission line scope elements are conductors and their support structures if installed overhead. Main installation elements include land clearing if over land (including forestry if applicable), foundation and structure erection and conductor stringing if overhead, or trenching, laying and horizontal boring if subsurface or subsea. Special scope elements are involved with crossings of water, road, rail and so on and at terminations. Because conductor (e.g., aluminum) and structure (e.g., steel) material costs are usually a significant cost element, these project estimates are particularly sensitive to escalation uncertainty. In general, the more developed the route, the more complex the installation will be. In urban areas, visual appeal and concern for safety and health can be major issues. Installation in remote location and/or difficult or environmentally sensitive terrain creates its own challenges. Subsea installation adds the need for bathymetry[1] and metocean[2] studies and specialized installation equipment and vessels. Before any installation work can begin in an area, stakeholder consultation must be advanced (sometimes requiring agreements with local populations with rights), and appropriate land and ROW must be acquired which creates unique scheduling as well as cost challenges.

For the purpose of estimate classification then, the main scope definition deliverables are associated with defining the power requirements (i.e., kV), the conductors and structure, and the routing. Conductors can vary widely in content (copper, aluminum, etc.) and insulation. Overhead structures may be wood, concrete, composite or steel in various configurations with various foundation designs including pilings, concrete and so on. The route's land or subsea characteristics and the nature of developments drive the need for special design features and execution strategies. Operability and maintainability considerations may also affect ROW and access design. Brownfield and revamp projects add their own concerns for interface with existing elements, crowded working conditions, etc. For each scope definition decision, stakeholder requirements need to be considered.

Power substation projects are usually associated with transmission projects. However, substations being equipment-centric and located on a facility site have physical and defining characteristics similar to process plant projects (e.g., reliance on one-line diagrams, plot plans, etc.).

CI Number: C0052299

Title: 2023/2024 Steel Tower Life Extension

Start Date: 2023/06
In-Service Date: 2023/06
Final Cost Date: 2025/06
Function Class: Transmission
Amount: $2,195,463

DESCRIPTION:

This project is to apply protective coating to 30 lattice steel towers throughout the province to extend the life of the structures. The towers to be coated will be prioritized based on inspection data. Inspection results indicate the towers require recoating in order to prevent further degradation and extend the expected useful life of the assets. The cost includes the removal, collection, and disposal of lead paint where required, working at heights in proximity to energized lines, as well as material costs for coating the towers. Applying protective coatings on steel transmission structures is a common and accepted form of corrosion control used in the utility industry.

Summary of Related CIs +/- 2 years:
Pursuant to Section 11.2 of the CEJC, related CIs for Transmission include "Work completed on the same asset class (Padmount transformers, Breakers, etc.) or in the same location (feeder, Transmission Line)."

- 2021 CI C0033644 2021/2022 Steel Tower Life Extension $2,332,746
- 2025 CI TBD 2025/2026 Steel Tower Life Extension $TBD

Depreciation Class: Transmission Equipment – Towers and Fixtures

Estimated Useful Life: 55 years (65 years with coating)

JUSTIFICATION:

Justification Criteria: Transmission Plant

Why do this project?

The environmental conditions that these towers are exposed to have led to the deterioration of the protective coating on the structures. These structures are an average age of 51 years old and are showing signs of steel structure corrosion.

Why do this project now?

Inspection results indicate that 30 steel towers are due to be recoated in order to extend the expected useful life of the assets. These towers require recoating to be completed in order to reduce corrosion and material loss, which will extend the life of the towers beyond their originally estimate useful life of 50-55 years. A conservative estimate for the life extension from coating the tower is 10 years, resulting in a revised useful life of 60-65 years. The towers are selected based on the age and condition of the structures. Restoration of protective coating before failure of the coating system prevents corrosion damage to structural steel tower components.

This project is deemed in-service when the first tower is completed (June 2023), therefore the Final Cost Date (June 2025) is listed as six months after the last tower is forecast to be completed (December 2024).

Why do this project this way?

The most cost effective approach is to recoat the steel towers prior to the failure of the protective coating which would lead to corrosion damage to the structural steel. If corrosion damage occurs in the structural steel components of a transmission tower, costly replacement of steel members may be necessary to preserve the integrity of the tower. The average cost of a tower replacement is $500,000 and protective coating costs approximately $60,000 per tower. The protective coating extends the expected useful life of the steel tower by 10 years (from 55 years to 65 years). The average cost per year of service for a steel tower without a protective coating is $9,090 ($500,000 / 55 years); with the protective coating applied, the average cost per year for the additional 10 years of service is reduced to $6,000 ($60,000 / 10 years).

CI Number : C0052299 - 2023 2024 Steel Tower Life Extension

Project Number C0052299

Parent CI Number : -

Asset Location : 1455 - 1455 Transmission Plant General

Budget Version 2023 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	3700 - TP - Steel Towers	2,195,463
	Total Cost:	2,195,463
	Original Cost:	

Capital Project Detailed Estimate

Location: Transmission
CI#: C0052299
Title: 2023/2024 Steel Tower Life Extension
Execution Year: 2023-2024

Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#'s)
Regular Labour						
T&D Labour - Site Supervision	PD	45	$ 418	$ 18,810		
T&D Labour - PLT	PD	5	$ 403	$ 2,015		
Procurement / Financial Support	Lot	1	$ 5,000	$ 5,000		
			Sub-Total	$ 25,825		
Overtime Labour						
T&D Labour - Site Supervision	PD	15	$ 840	$ 12,600		
T&D Labour - PLT	PD	12	$ 810	$ 9,720		
			Sub-Total	$ 22,320		
Travel						
Travel	Lot	1	$ 8,000	$ 8,000		
			Sub-Total	$ 8,000		
Materials						
Coating for Towers	EA	30	$ 5,000	$ 150,000		
			Sub-Total	$ 150,000		
Contracts						
Coating of Towers - External Contracts	EA	30	$ 43,301	$ 1,299,030		
External Engineering Assessments	EA	80	$ 1,050	$ 84,000		
External Quality Auditing	EA	30	$ 950	$ 28,500		
Vegetation Removal - External Contracts	EA	30	$ 2,500	$ 75,000		
			Sub-Total	$ 1,486,530		
Meals						
Meals	Lot	1	$ 4,000	$ 4,000		
			Sub-Total	$ 4,000		
Other Goods & Services						
Contingency	%	10%	$ 1,696,675	$ 169,668		
			Sub-Total	$ 169,668		
Vehicle Overhead						
Vehicle AO				$ 15,313		
			Sub-Total	$ 15,313		
Administrative Overhead						
Labour AO				$ 30,445		
Contract AO				$ 283,362		
			Sub-Total	$ 313,807		
			SUB-TOTAL (no AO, AFUDC)	$ 1,866,343		
			TOTAL (AO, AFUDC included)	$ 2,195,463		
Original Cost				$ -		

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.
Note 3: Contingency determined using a combination of internal subject matter expert judgment and predetermined contingency guidelines. Risks are well understood based on past experience.

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

Project Cost Estimate Input Checklist and Maturity Matrix

Transmission Line Infrastructure	Required fields:	Estimate Classification				
Project Name: 2023/2024 Steel Tower Life Extension	Started or Preliminary	Class 5	Class 4	Class 3	Class 2	Class 1
Maturity Level of Project Definition Deliverables	Defined or Complete	0% to 2%	1% to 15%	10% to 40%	30% to 75%	65% to 100%
General Project Data						
A. Scope						
Project Scope of Work Description	Defined (D)			D	D	D
Site Infrastructure (Access, Construction, Power, Camp, etc)	Preliminary (P)		P			
B. Capacity						
Voltage (kV) and Circuits	Defined (D)			D	D	D
C. Project Location						
Not Applicable						
D. Requirements						
Codes and/or Standards	Defined (D)			D	D	D
Environmental Monitoring	Defined (D)					D
E. Technology Selection						
Not Applicable						
F. Strategy						
Right-of-Way (ROW)	Defined (D)			D	D	D
Contracting / Sourcing	Defined (D)			D	D	D
Escalation	Defined (D)			D	D	D
G. Planning						
System / Grid Planning (including substation and interconnect locations)	Not Required (NR)					
Logistics Plan	Preliminary (P)	P	P	P		
Integrated Project Plan	Preliminary (P)		P			
Project Code of Accounts	Defined (D)			D	D	D
Project Master Schedule	Preliminary (P)		P			
Regulatory Approval & Permitting	Not Required (NR)	NR				
Risk Register	Preliminary (P)		P			
Stakeholder Consultation/Engagement/Management Plan	Not Required (NR)	NR				
Work Breakdown Structure	Not Required (NR)	NR				
Startup and Commissioning Plan	Not Required (NR)	NR				
H. Studies						
Routing Options	Not Required (NR)					
Topography and/or Bathymetry	Not Required (NR)					
Environmental Impact / Sustainability Assesment	Not Required (NR)	NR				
Environmental / Existing Conditions	Preliminary (P)		P			
Meteorology and/or Oceanographic / Subsea	Not Required (NR)	NR				
Soils and Hydrology	Not Required (NR)	NR				
Technical Deliverables (Specifications and/or Drawings)						
Conductor, Insulator, Grounding, Joint Design (including protection for buried or subsea)	Not Required (NR)					
Foundation / Structure (Tower) Design	Not Required (NR)					
Route Mapping / Survey	Not Required (NR)					
Design Specifications	Not Required (NR)	NR				
Instrument List	Not Required (NR)	NR				
Construction Permits	Not Required (NR)	NR				
Geometric Layout, Alignment, Profile, Cross Section	Not Required (NR)	NR				
Land / ROW Title Negotiation	Not Required (NR)	NR				
Civil / Site / Structural / Architectural Discipline Drawings	Not Required (NR)	NR				
Crossings and Borings Designs and Drawings	Not Required (NR)	NR				
Demolition Plan and Drawings	Not Required (NR)	NR				
Erosion Control Plan and Drawings	Not Required (NR)	NR				
Foundation / Structure (Tower) Discipline Drawings	Not Required (NR)	NR				
Tower / Structure Location / Spotting	Not Required (NR)	NR				
Instrument Datasheets	Not Required (NR)	NR	NR/S			
Electrical Discipline Drawings	Not Required (NR)	NR	NR			
Instrumentation / Control System Discipline Drawings	Not Required (NR)	NR	NR			
Total Responses		1	6	8	7	8
Percentage		4%	25%	33%	29%	33%

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.
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- 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 *power transmission line infrastructure industries* is assumed to include greenfield or brownfield sites for overhead, buried and submarine transmission of electrical power in the infrastructure industries. High voltage is typically >100kV but may be less (e.g., 33 or 66kv) if long distance with light electrical loads. This excludes power supply and distribution scope within a process plant, mining facility, building complex or other facility site. It also excludes power generation facilities and substations. The defining deliverables of those excluded project scopes are covered in other RPs (e.g., 18R-97 for process plants [2]).

Power transmission is considered an element of the infrastructure industry. The Construction Industry Institute has provided a good definition of infrastructure in its Project Definition Rating Index for Infrastructure Projects as follows [3]:

"A capital project that provides transportation, transmission, distribution, collection or other capabilities supporting commerce or interaction of goods, services, or people. Infrastructure projects generally impact multiple jurisdictions, stakeholder groups and/or a wide area. They are characterized as projects with a primary purpose that is integral to the effective operation of a system. These collective capabilities provide a service that is made up of nodes and vectors into a grid or system."

Using this definition, power transmission lines are a vector or linear scope element that connects substation or other facility nodes at its terminations. The substation nodes may be part of or associated with a generation, consuming or interconnection facility. As such, transmission projects are often executed as part of a program that also involves node project scope or facility operational changes (or at least considerations for integrated system commissioning and startup). As the definition states, a distinguishing feature of these projects is that they often traverse wide areas, cross country or subsea, which puts an emphasis on the definition of routing, land ownership and conditions, and establishing right-of-way (ROW). Associated scope definition challenges include defining stakeholder, permitting and regulatory requirements. Buried and submarine installations increase the focus on the protection philosophy and strategies affecting cable selection, armoring and joint considerations. While many distinguish power transmission (higher voltage, long distances) from power distribution (short distance, lower voltage connections to retail customers), the principles of estimating these elements are similar; i.e., the RP applies to both.

The main physical power transmission line scope elements are conductors and their support structures if installed overhead. Main installation elements include land clearing if over land (including forestry if applicable), foundation and structure erection and conductor stringing if overhead, or trenching, laying and horizontal boring if subsurface or subsea. Special scope elements are involved with crossings of water, road, rail and so on and at terminations. Because conductor (e.g., aluminum) and structure (e.g., steel) material costs are usually a significant cost element, these project estimates are particularly sensitive to escalation uncertainty. In general, the more developed the route, the more complex the installation will be. In urban areas, visual appeal and concern for safety and health can be major issues. Installation in remote location and/or difficult or environmentally sensitive terrain creates its own challenges. Subsea installation adds the need for bathymetry[1] and metocean[2] studies and specialized installation equipment and vessels. Before any installation work can begin in an area, stakeholder consultation must be advanced (sometimes requiring agreements with local populations with rights), and appropriate land and ROW must be acquired which creates unique scheduling as well as cost challenges.

For the purpose of estimate classification then, the main scope definition deliverables are associated with defining the power requirements (i.e., kV), the conductors and structure, and the routing. Conductors can vary widely in content (copper, aluminum, etc.) and insulation. Overhead structures may be wood, concrete, composite or steel in various configurations with various foundation designs including pilings, concrete and so on. The route's land or subsea characteristics and the nature of developments drive the need for special design features and execution strategies. Operability and maintainability considerations may also affect ROW and access design. Brownfield and revamp projects add their own concerns for interface with existing elements, crowded working conditions, etc. For each scope definition decision, stakeholder requirements need to be considered.

Power substation projects are usually associated with transmission projects. However, substations being equipment-centric and located on a facility site have physical and defining characteristics similar to process plant projects (e.g., reliance on one-line diagrams, plot plans, etc.).

CI Number: C0055796

Title: 2023 EHV Breaker Replacements

Start Date: 2023/01
In-Service Date: 2023/11
Final Cost Date: 2024/05
Function: Transmission
Forecast Amount: $2,048,411

DESCRIPTION:

This project is for the replacement of four extra high voltage (EHV) circuit breakers at the 3C Port Hastings and 67N Onslow substations, specifically 3C-710, 3C-720, 67N-702 and 67N-704. Over half of NS Power's EHV breaker fleet is approaching 40 years old and some are starting to have component failures that require replacement parts to repair. These four breakers were identified as the highest priority for replacement as they have known deficiencies in their mechanisms and have previously had to be refurbished, with the expectation that additional EHV breaker replacement projects will likely be executed in the coming years for other high-risk breakers.

The scope of this project includes the removal of the breakers and associated switches. Spare parts from the decommissioned breakers will then be added to NS Power's inventory to support repairs on similar vintage breakers across the province.

Summary of Related CIs +/- 2 years:
Pursuant to Section 11.2 of the CEJC, related CIs for Transmission projects include "Work completed on the same asset class (Padmount transformers, Breakers, etc.) or in the same location (feeder, Transmission Line)."

- 2024 – CI TBD – 2024 EHV Breaker Replacements - $TBD
- 2025 – CI TBD – 2025 EHV Breaker Replacements - $TBD

Depreciation Class: Transmission Plant – Station Equipment

Estimated Life of the Asset: 40 years

Retirement Information:

- Categorization of Retirement: Accounting Policy 6420 - Retirement and Disposal of Capital Assets
- Percentage of Asset Pool: 0.7%

JUSTIFICATION:

Justification Criteria: Transmission Plant

Why do this project?

The 3C and 67N substation breakers are over 40 years old and condition assessments indicate that they are at the end of their expected useful life as they have known deficiencies in their mechanisms and have previously had to be refurbished. For breakers of this vintage, it is becoming increasingly difficult to obtain Original Equipment Manufacturer (OEM) support for troubleshooting when issues arise or to procure replacement parts when components fail. This project will help modernize the EHV breakers at these highly critical substations, as well as allow spare parts to be harvested from the retired breakers to allow for more timely repairs to other similar breakers that may experience failures.

Why do this project now?

These circuit breakers are required to be in a safe and reliable state at the 3C Port Hastings and 67N Onslow substations as they are critical components to the bulk-power transmission system. Completing this replacement now will mitigate the risk of a breaker failure causing an extended unplanned outage on the bulk-power transmission system.

NS Power has already observed several cases of breakers of this vintage experiencing component failures and have observed an upward trend in difficulty sourcing OEM replacement parts as these designs are now obsolete. Beginning

this multi-year modernization now with these four breakers will enable a sustainable approach to replace similar EHV breakers and mitigate risk in the coming years.

Why do this project this way?

Proactively replacing these circuit breakers allows NS Power to maintain safe and reliable circuit breaker operation at these two highly critical substations on the bulk power transmission system. NS Power has had difficulty obtaining sufficient OEM support and spare parts to continue to troubleshoot and repair these breakers in a timely manner in the case of a future failure.

CI Number : C0055796 - 2023 EHV Breaker Replacements **Project Number** C0055796

Parent CI Number : -

Asset Location : 1455 - 1455 Transmission Plant General **Budget Version** 2023 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	0300 - TP - Bldg.,Struct.Grnd.	158,059
Additions	2200 - TP - Elec Contr.Equip.	122,031
Additions	4300 - TP - Substn Dev.	1,650,511
Retirements	4300 - TP - Substn Dev.	117,809
	Total Cost:	2,048,411
	Original Cost:	750,330

Capital Project Detailed Estimate

Location: Transmission
CI#: C0055796
Title: 2023 EHV Breaker Replacements
Execution Year: 2023

Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#'s)
Regular Labour						
T&D Labour - Site Supervision	PD	21	$ 418	$ 8,741		
T&D Labour - PLT	PD	244	$ 403	$ 98,182		
Design	PD	200	$ 418	$ 83,674		
Commissioning	PD	163	$ 418	$ 68,067		
			Sub-Total	$ 258,664		
Materials						
Bldg.,Struct.Grnd.	Lot	1	$ 680	$ 680		
Elec Contr.Equip.	Lot	1	$ 38,860	$ 38,860		
Substn Dev.	Ea	4	[redacted]	[redacted]	Attachment 1, Item 25	
USD Conversion	%	33%				
Design	Lot	1				
			Sub-Total	$ 1,106,228		
Travel						
Travel	Lot	1	$ 1,140	$ 1,140		
			Sub-Total	$ 1,140		
Contracts						
Bldg.,Struct.Grnd.	EA	1	$ 106,840	$ 106,840		
Elec Contr.Equip.	EA	1	$ 12,800	$ 12,800		
Substn Dev.	EA	1	$ 43,600	$ 43,600		
			Sub-Total	$ 163,240		
Meals						
Meals	Lot	1	$ 1,000	$ 1,000		
			Sub-Total	$ 1,000		
Other Goods & Services						
Contingency	%	10%	$ 1,530,272	$ 153,027		
			Sub-Total	$ 153,027		
Interest Capitalized						
AFUDC				$ 13,972		
			Sub-Total	$ 13,972		
Vehicle Overhead						
Vehicle AO				$ 107,097		
			Sub-Total	$ 107,097		
Administrative Overhead						
Labour AO				$ 212,927		
Contract AO				$ 31,117		
			Sub-Total	$ 244,043		
			SUB-TOTAL (no AO, AFUDC)	$ 1,683,299		
			TOTAL (AO, AFUDC included)	$ 2,048,411		
Original Cost				$ 750,330		

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.
Note 3: Contingency determined using a combination of internal subject matter expert judgment and predetermined contingency guidelines. Risks are well understood based on past experience.

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

Project Cost Estimate Input Checklist and Maturity Matrix

Transmission Line Infrastructure	Required fields:	Estimate Classification				
Project Name: 2023 EHV Breaker Replacements	Started or Preliminary	Class 5	Class 4	Class 3	Class 2	Class 1
Maturity Level of Project Definition Deliverables	Defined or Complete	0% to 2%	1% to 15%	10% to 40%	30% to 75%	65% to 100%
General Project Data						
A. Scope						
Project Scope of Work Description	Defined (D)			D	D	D
Site Infrastructure (Access, Construction, Power, Camp, etc)	Preliminary (P)		P			
B. Capacity						
Voltage (kV) and Circuits	Defined (D)			D	D	D
C. Project Location						
Not Applicable						
D. Requirements						
Codes and/or Standards	Defined (D)			D	D	D
Environmental Monitoring	Defined (D)					D
E. Technology Selection						
Not Applicable						
F. Strategy						
Right-of-Way (ROW)	Not Required (NR)					
Contracting / Sourcing	Preliminary (P)		P			
Escalation	Defined (D)			D	D	D
G. Planning						
System / Grid Planning (including substation and interconnect locations)	Not Required (NR)					
Logistics Plan	Preliminary (P)	P	P	P		
Integrated Project Plan	Preliminary (P)		P			
Project Code of Accounts	Defined (D)			D	D	D
Project Master Schedule	Preliminary (P)		P			
Regulatory Approval & Permitting	Not Required (NR)	NR				
Risk Register	Preliminary (P)		P			
Stakeholder Consultation/Engagement/Management Plan	Not Required (NR)	NR				
Work Breakdown Structure	Not Required (NR)	NR				
Startup and Commissioning Plan	Preliminary (P)		P	P/D		
H. Studies						
Routing Options	Not Required (NR)					
Topography and/or Bathymetry	Not Required (NR)					
Environmental Impact / Sustainability Assesment	Not Required (NR)	NR				
Environmental / Existing Conditions	Not Required (NR)	NR				
Meteorology and/or Oceanographic / Subsea	Not Required (NR)	NR				
Soils and Hydrology	Not Required (NR)	NR				
Technical Deliverables (Specifications and/or Drawings)						
Conductor, Insulator, Grounding, Joint Design (including protection for buried or subsea)	Complete (C)			C	C	C
Foundation / Structure (Tower) Design	Started (S)	S				
Route Mapping / Survey	Not Required (NR)					
Design Specifications	Complete (C)			C	C	C
Instrument List	Not Required (NR)	NR				
Construction Permits	Not Required (NR)	NR				
Geometric Layout, Alignment, Profile, Cross Section	Complete (C)			P/C	C	C
Land / ROW Title Negotiation	Not Required (NR)	NR				
Civil / Site / Structural / Architectural Discipline Drawings	Started (S)		S/P			
Crossings and Borings Designs and Drawings	Not Required (NR)	NR				
Demolition Plan and Drawings	Complete (C)				C	C
Erosion Control Plan and Drawings	Not Required (NR)	NR				
Foundation / Structure (Tower) Discipline Drawings	Started (S)		S/P			
Tower / Structure Location / Spotting	Not Required (NR)	NR				
Instrument Datasheets	Not Required (NR)	NR	NR/S			
Electrical Discipline Drawings	Preliminary (P)			S/P	P/C	
Instrumentation / Control System Discipline Drawings	Preliminary (P)			S/P	P/C	
Total Responses		2	9	12	11	10
Percentage		6%	28%	38%	34%	31%

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.
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- Defined (D): Project definition is advanced, and reviews have been conducted. Development may be near completion with the exception of final approvals.

Technical Deliverables:

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Inclusions:

For the purposes of this document, the term *power transmission line infrastructure industries* is assumed to include greenfield or brownfield sites for overhead, buried and submarine transmission of electrical power in the infrastructure industries. High voltage is typically >100kV but may be less (e.g., 33 or 66kv) if long distance with light electrical loads. This excludes power supply and distribution scope within a process plant, mining facility, building complex or other facility site. It also excludes power generation facilities and substations. The defining deliverables of those excluded project scopes are covered in other RPs (e.g., 18R-97 for process plants [2]).

Power transmission is considered an element of the infrastructure industry. The Construction Industry Institute has provided a good definition of infrastructure in its Project Definition Rating Index for Infrastructure Projects as follows [3]:

"A capital project that provides transportation, transmission, distribution, collection or other capabilities supporting commerce or interaction of goods, services, or people. Infrastructure projects generally impact multiple jurisdictions, stakeholder groups and/or a wide area. They are characterized as projects with a primary purpose that is integral to the effective operation of a system. These collective capabilities provide a service that is made up of nodes and vectors into a grid or system."

Using this definition, power transmission lines are a vector or linear scope element that connects substation or other facility nodes at its terminations. The substation nodes may be part of or associated with a generation, consuming or interconnection facility. As such, transmission projects are often executed as part of a program that also involves node project scope or facility operational changes (or at least considerations for integrated system commissioning and startup). As the definition states, a distinguishing feature of these projects is that they often traverse wide areas, cross country or subsea, which puts an emphasis on the definition of routing, land ownership and conditions, and establishing right-of-way (ROW). Associated scope definition challenges include defining stakeholder, permitting and regulatory requirements. Buried and submarine installations increase the focus on the protection philosophy and strategies affecting cable selection, armoring and joint considerations. While many distinguish power transmission (higher voltage, long distances) from power distribution (short distance, lower voltage connections to retail customers), the principles of estimating these elements are similar; i.e., the RP applies to both.

The main physical power transmission line scope elements are conductors and their support structures if installed overhead. Main installation elements include land clearing if over land (including forestry if applicable), foundation and structure erection and conductor stringing if overhead, or trenching, laying and horizontal boring if subsurface or subsea. Special scope elements are involved with crossings of water, road, rail and so on and at terminations. Because conductor (e.g., aluminum) and structure (e.g., steel) material costs are usually a significant cost element, these project estimates are particularly sensitive to escalation uncertainty. In general, the more developed the route, the more complex the installation will be. In urban areas, visual appeal and concern for safety and health can be major issues. Installation in remote location and/or difficult or environmentally sensitive terrain creates its own challenges. Subsea installation adds the need for bathymetry[1] and metocean[2] studies and specialized installation equipment and vessels. Before any installation work can begin in an area, stakeholder consultation must be advanced (sometimes requiring agreements with local populations with rights), and appropriate land and ROW must be acquired which creates unique scheduling as well as cost challenges.

For the purpose of estimate classification then, the main scope definition deliverables are associated with defining the power requirements (i.e., kV), the conductors and structure, and the routing. Conductors can vary widely in content (copper, aluminum, etc.) and insulation. Overhead structures may be wood, concrete, composite or steel in various configurations with various foundation designs including pilings, concrete and so on. The route's land or subsea characteristics and the nature of developments drive the need for special design features and execution strategies. Operability and maintainability considerations may also affect ROW and access design. Brownfield and revamp projects add their own concerns for interface with existing elements, crowded working conditions, etc. For each scope definition decision, stakeholder requirements need to be considered.

Power substation projects are usually associated with transmission projects. However, substations being equipment-centric and located on a facility site have physical and defining characteristics similar to process plant projects (e.g., reliance on one-line diagrams, plot plans, etc.).

MITSUBISHI ELECTRIC POWER PRODUCTS, INC.
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512 KEYSTONE DRIVE
WARRENDALE, PA 15086-7537, U.S.A.

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Home page: www.meppi.com

February 8, 2018

NSPI & NBP Advancing Collaboration and Delivering on Commitments

ATTN: Sonja Macqueen – Nova Scotia Power (NSP/NBP Evaluation Team)

SUBJECT: RFP Event 69830, NBP and NSPI Switching Components - **Best and Final Offer**

MEPPI Ref. #: EQ07344

REV 6 – 8/3/22 – 245kV and 345kV IPO pricing for Nova Scotia Power has been added to Attachment A (REV 4) per customer request.

REV 5 – 6/9/22 – all pricing in "Attachment A" has been updated (REV 3) for future orders and a 245kV gang breaker was added for Nova Scotia Power. Note that due to the recent market volatility and the ongoing supply chain and labor issues, this pricing is subject to the following conditions:

1. All MEPPI provided proposals are valid for 30 days unless otherwise discussed and agreed to by MEPPI. MEPPI reserves the right to review, and if necessary, change pricing or delivery 30 days from the date on the proposal, or from the pre-negotiated validity date.
2. All Purchase Orders (PO) must include a delivery date. If the delivery date is longer than 180 days from the date of the PO, MEPPI will review the pricing 120 days prior to delivery of the equipment and provide an updated proposal. At that time, MEPPI will require either an updated purchase order or a cancellation notice of the order. MEPPI will only update the pricing on the purchase order if MEPPI receives significant and unexpected price increases from its vendors.
3. Delivery of drawings and approvals, where required, will remain unaffected. MEPPI will continue to issue drawings within six to eight weeks from the date of the PO. Where approvals are required, we respectfully request these be reviewed and approved within two weeks from the date of submittal. Delays in approval drawings will likely result in shipping delays, in which case, additional fees may apply per section 4 below.
4. If requested to extend the delivery date from the date stated on the PO, MEPPI will review the request. If approved, MEPPI will provide an updated delivery date, as well as an appropriate adder (if applicable) 120 days prior to the new shipment date in accordance with section 2 above. (Note that MEPPI will try to align the new date as closely as possible to the requested date, but it may differ due to factory loading at the time of the request.)

REV 4 – 2/1/22 – all pricing in “Attachment A” has been updated (REV 2) for orders placed in 2022 with deliveries up to, and including, 3/31/23. Note that this includes previous increases for NSP items 14, 16, and 17 due to a customer request to modify the ground pad height on the breakers’ lower frame. Also, EDD signature and contact information was updated to show Jerry Swain.

REV 3 – 3/9/21 – MEPPI has agreed to hold 2020 pricing for orders placed in 2021 with deliveries by 3/31/22 so that it could be incorporated into the contract, which is still being finalized.

REV 2 – 10/28/19 – updated the pricing table, “Attachment A”, to REV 1 to include pricing for orders placed in 2019 and 2020 so that it could be incorporated into the contract which is still in negotiations.

REV 1 – 02/12/18 – revised pricing in items 12-18 to clarify that freight is included. Also moved pricing table from within the document and added a more detailed table as “Attachment A”.

Mitsubishi Electric Power Products, Inc. (MEPPI) was honored to offer a proposal for the subject inquiry in November of 2017 and we remain proud of the quality and value for each product submitted. We appreciated the opportunity to have a follow-up conference call in January of 2018, and as a result of that call, we put forth additional information as well as price reductions for most of the breakers. Shortly thereafter, we received feedback that our pricing was still not at the expected level of the NSP/NBP team, so we have reviewed this proposal in its entirety once again, and we will provide a reduction in an effort to continue our longstanding relationship with NSP and NBP.

First, let’s briefly review MEPPI’s initial offering:

- [redacted]

- [redacted]

After our conference call in January, the offer was amended as follows:

- [redacted]

After the amended offer was received, the request for double-digit percentage reductions was re-emphasized from the NSP/NBP procurement team earlier this month. Although we felt that we submitted a fair and generous offer, we elected to review our pricing one last time. As a result of that, MEPPI is prepared to submit a best and final proposal. The table in Attachment A depicts historical numbers, initial offerings, the first reduction, and best and final pricing. Regarding the final pricing, the following conditions apply:

1. USD only.
2. Full truckloads on all deliveries.
3. Firm for orders placed in calendar year 2018.

4. Pricing for 2019 and 2020 will be mutually agreed upon by December 31st of the prior year with any changes capped at ±2% per year.

In closing, MEPPI would, again, like to thank you for the opportunity to bid on this unique RFP. We feel that we have been a solid and consistent supplier to NSP and NBP and we welcome the opportunity to continue our relationship and even take it to the next level. We hope that these additional items offered show our desire and commitment to continue our partnership.

Should you require additional information about our organization or products, or should you have any questions whatsoever, please do not hesitate to contact our Sales Representatives, Jim Walsh or Matt Ross of CT Sales.

Sincerely,

Jerry Swaln
Mitsubishi Electric Power Products Inc.
Sales Engineer II
520 Keystone Drive (Medium Voltage Circuit Breakers)
Warrendale, PA 15086-7537
724.772.2186
www.meppi.com

Larry Price
Mitsubishi Electric Power Products Inc.
Sr. Sales Engineer
512 Keystone Drive (High Voltage Circuit Breakers)
Warrendale, PA 15086
724-779-3348
larry.price@meppi.com

cc: Jim Walsh and Matt Ross – CTS
Noah Tai – MEPPI RVP

Attachment A - REV 4 - 8/3/22

ITEM	DESCRIPTION	U/M	Discount from 2017 Price	2018 Orders: Delivered Unit Price 2018	2019 Orders: Delivered Unit Price 2019	2020 Orders: Delivered Unit Price 2020	2022 Orders: Delivered Unit Price 2022	2023 Orders: Delivered Unit Price 2023
12	BREAKER CIRCUIT 15KV 20KA VACUUM TYPE FOR REACTOR SWITCHING NB-POWER TECH SPEC #STDT-51830-3000-001-TS-A	Each	[redacted]					
13	BREAKER CIRCUIT 15KV 20KA VACUUM TYPE TO BE USED FOR CAPACITOR BANK SWITCHING AT TERMINAL STATIONS REFER TO NB-POWER TECH SPEC #STDT-51830-3001-001-TS-A	Each						
14	Circuit Breaker, SF6, 27.5kV, 1200A, 12 BCT, 1200:5 CT Ratio, 150 kV BIL	Each						
15	Circuit Breaker, Vacuum, 27.5kV, 1200A, 12 BCT, 1200:5 CT Ratio, 150 kV BIL	Each						
16	Circuit Breaker, SF6 Dead Tank, 72kV, 2000 A, 12 BCT, 1200:5 CT Ratio, 350 kV BIL	Each						
17	Circuit Breaker, SF6 Dead Tank, 72kV, 2000 A, 12 BCT, 2000:5 CT Ratio, 350 kV BIL	Each						
18	BREAKER CIRCUIT 72.5KV 2000A 40KA DEAD TANK (SF6) TYPE (70-SFMT-40E) GALVANIZED CABINET 12 BCT COMPLETE WITH FRAME FOR HEIGHT OF CENTER BUSHING OF 147IN AS PER NB-POWER SPEC #STDT-51530-3000-001-T	Each						
19	Circuit Breaker, SF6 Dead Tank, 145kV, 2000 A, 12 BCT, 1200:5 CT Ratio, 650 kV BIL	Each						
20	Circuit Breaker, SF6 Dead Tank, 145kV, 2000 A, 12 BCT, 2000:5 CT Ratio, 650 kV BIL	Each						
21	BREAKER CIRCUIT 145KV 2000A 31.5KA DEAD TANK (SF6) TYPE (120-SFMT-32) GALVANIZED CABINET 12BCT COMPLETE WITH FRAME FOR HEIGHT OF CENTER BUSHING OF 170" AS PER NB-POWER TRANSMISSION SPEC #STDT-51430-3000-001-TS-A	Each						
22	BREAKER CIRCUIT 245KV 2000A DEAD TANK TYPE (SF6) TYPE (200-SFMT-40FM) GALVANIZED CABINET 12 BCT COMPLETE WITH STANDARD FRAME D100865G02)HEIGHT TO CENTER BUSHING OF 191.55" AS PER NB-POWER SPEC #STDT-51330-3001-001-TS-A	Each						
23	Circuit Breaker, SF6 Dead Tank, 245kV, 2000 A, 18 BCT, 2000:5 CT Ratio	Each						
24	Circuit Breaker, SF6 Dead Tank, 245kV, 2000 A, 12 BCT, 2000:5 CT Ratio	Each						
25	Circuit Breaker, SF6 Dead Tank, SYNCH-IPO 245kV, 2000 A, 12 BCT, 2000:5 CT Ratio	Each						
26	362KV,40KA,2000A,K, SYNCH-IPO, 12 BCT, 2000:5 CT RATIO	Each						

CI Number: C0055696

Title: L5031 Replacement and Upgrades Robinson Corner Tap

Start Date: 2023/03
In-Service Date: 2023/03
Final Cost Date: 2024/06
Function Class: Transmission
Forecast Amount: $1,357,477

DESCRIPTION:

L5031 is a 19.75 kilometre (146 structures) 69kV transmission line, built in 1966, that connects 87W Hubbards to the 84W Robinsons Corner substations. This project is required to replace deteriorated assets that have been identified through NS Power's transmission line inspection program. This project includes the replacement of deteriorated assets on 29 structures.

The project scope includes:

- Structure Replacements: 29 Structures

Summary of Related CIs +/- 2 years:
Pursuant to Section 11.2 of the CEJC, related CIs for Transmission include "Work completed on the same asset class (Padmount transformers, Breakers, etc.) or in the same location (feeder, Transmission Line)."

- No other CIs in 2021, 2022, 2023, 2024 or 2025

Depreciation Class: Transmission Plant – Poles and Fixtures
Transmission Plant – Overhead Conductors and Devices

Estimated Life of the Asset: 45 years

Retirement Information:

- Categorization of Retirement: Accounting Policy 6420 - Retirement and Disposal of Capital Assets
- Percentage of Asset Pool: 0.04%

JUSTIFICATION:

Justification Criteria: Transmission Plant

Why do this project?

The NS Power transmission line inspection program identified deteriorated assets on this line that require replacement to mitigate the risk of transmission interruptions. Failure to complete this project would compromise the reliable operation of this line. Unplanned asset failures on this line, serving approximately 1,800 customers, would result in unplanned outages to these customers.

Why do this project now?

This work has been prioritized based on the condition of the transmission line assets as determined through NS Power's transmission line inspection program results, as well as the criticality of the line to the overall system operation. This project is required to support the reliable operation of the transmission line.

This project is deemed in-service when the first portion of the work is complete (forecast to be March 2023), therefore the Final Cost Date (June 2024) is listed as six months after the work is forecast to be completed (December 2023).

Why do this project this way?

Replacing the existing deteriorated assets is the only technically feasible option to accomplish the intended scope of this project.

CI Number : C0055696 - L5031 Replacement and Upgrades Robinson Corner Tap

Project Number C0055696

Parent CI Number : -

Asset Location : 1455 - 1455 Transmission Plant General

Budget Version 2023 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	3500 - TP - Wood Poles	1,192,148
Additions	3900 - TP - O/H Cond.	37,715
Retirements	3500 - TP - Wood Poles	122,817
Retirements	3900 - TP - O/H Cond.	4,797
	Total Cost:	1,357,477
	Original Cost:	137,825

Capital Project Detailed Estimate

Location: Transmission
CI#: C0055696
Title: L5031 Replacement and Upgrades Robinson Corner Tap
Execution Year: 2023

Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#'s)
Regular Labour						
T&D Labour - Planning	PD	5	$ 354	$ 1,939		
T&D Labour - Site Supervision	PD	41	$ 429	$ 17,468		
			Sub-Total	$ 19,407		
Materials						
Wood Poles	Lot	1	$ 96,676	$ 96,676		
O/H Conductor	Lot	1	$ 265	$ 265		
			Sub-Total	$ 96,941		
Contracts						
Wood Poles	Lot	1	$ 863,967	$ 863,967		
O/H Conductor	Lot	1	$ 30,892	$ 30,892		
			Sub-Total	$ 894,860		
Other Goods & Services						
Contingency	%	15%	$ 1,011,207	$ 151,681		
			Sub-Total	$ 151,681		
Vehicle Overhead						
Vehicle AO				$ 8,035		
			Sub-Total	$ 8,035		
Administrative Overhead						
Labour AO				$ 15,975		
Contract AO				$ 170,578		
			Sub-Total	$ 186,553		
			SUB-TOTAL (no AO, AFUDC)	$ 1,162,889		
			TOTAL (AO, AFUDC included)	$ 1,357,477		
Original Cost				$ 137,825		

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.
Note 3: Contingency determined using a combination of internal subject matter expert judgment and predetermined guidelines which have been gained over many years, including greater uncertainty for actual site conditions. Risks are well understood based on past experience.

Nova Scotia POWER An Emera Company

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

Project Cost Estimate Input Checklist and Maturity Matrix						
Transmission Line Infrastructure	**Required fields:**	**Estimate Classification**				
Project Name: L5031 Replacement and Upgrades Robinson Corner Tap	**Started or Preliminary**	**Class 5**	**Class 4**	**Class 3**	**Class 2**	**Class 1**
Maturity Level of Project Definition Deliverables	**Defined or Complete**	**0% to 2%**	**1% to 15%**	**10% to 40%**	**30% to 75%**	**65% to 100%**
General Project Data						
A. Scope						
Project Scope of Work Description	Defined (D)			D	D	D
Site Infrastructure (Access, Construction, Power, Camp, etc)	Preliminary (P)		P			
B. Capacity						
Voltage (kV) and Circuits	Defined (D)			D	D	D
C. Project Location						
Not Applicable						
D. Requirements						
Codes and/or Standards	Defined (D)			D	D	D
Environmental Monitoring	Defined (D)					D
E. Technology Selection						
Not Applicable						
F. Strategy						
Right-of-Way (ROW)	Defined (D)			D	D	D
Contracting / Sourcing	Defined (D)			D	D	D
Escalation	Defined (D)			D	D	D
G. Planning						
System / Grid Planning (including substation and interconnect locations)	Defined (D)			D	D	D
Logistics Plan	Preliminary (P)	P	P	P		
Integrated Project Plan	Preliminary (P)		P			
Project Code of Accounts	Defined (D)			D	D	D
Project Master Schedule	Preliminary (P)		P			
Regulatory Approval & Permitting	Not Required (NR)	NR				
Risk Register	Preliminary (P)		P			
Stakeholder Consultation/Engagement/Management Plan	Not Required (NR)	NR				
Work Breakdown Structure	Not Required (NR)	NR				
Startup and Commissioning Plan	Not Required (NR)	NR				
H. Studies						
Routing Options	Defined (D)			D	D	D
Topography and/or Bathymetry	Defined (D)			P/D	D	D
Environmental Impact / Sustainability Assesment	Not Required (NR)	NR				
Environmental / Existing Conditions	Preliminary (P)		P			
Meteorology and/or Oceanographic / Subsea	Not Required (NR)	NR				
Soils and Hydrology	Not Required (NR)	NR				
Technical Deliverables (Specifications and/or Drawings)						
Conductor, Insulator, Grounding, Joint Design (including protection for buried or subsea)	Complete (C)			C	C	C
Foundation / Structure (Tower) Design	Complete (C)			C	C	C
Route Mapping / Survey	Complete (C)		P/C	C	C	C
Design Specifications	Complete (C)			C	C	C
Instrument List	Not Required (NR)	NR				
Construction Permits	Preliminary (P)		S/P	P/C		
Geometric Layout, Alignment, Profile, Cross Section	Preliminary (P)		S/P	P/C		
Land / ROW Title Negotiation	Not Required (NR)	NR				
Civil / Site / Structural / Architectural Discipline Drawings	Complete (C)				C	C
Crossings and Borings Designs and Drawings	Preliminary (P)		S/P	P		
Demolition Plan and Drawings	Not Required (NR)	NR				
Erosion Control Plan and Drawings	Preliminary (P)		S/P	P		
Foundation / Structure (Tower) Discipline Drawings	Not Required (NR)	NR				
Tower / Structure Location / Spotting	Complete (C)				C	C
Instrument Datasheets	Not Required (NR)	NR	NR/S			
Electrical Discipline Drawings	Not Required (NR)	NR	NR			
Instrumentation / Control System Discipline Drawings	Not Required (NR)	NR	NR			
Total Responses		1	11	19	16	17
Percentage		3%	30%	51%	43%	46%

Legend:

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

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Using this definition, power transmission lines are a vector or linear scope element that connects substation facility nodes at its terminations. The substation nodes may be part of or associated with a generation, cor or interconnection facility. As such, transmission projects are often executed as part of a program that also node project scope or facility operational changes (or at least considerations for integrated system commis and startup). As the definition states, a distinguishing feature of these projects is that they often traverse wid cross country or subsea, which puts an emphasis on the definition of routing, land ownership and conditic establishing right-of-way (ROW). Associated scope definition challenges include defining stakeholder, permit regulatory requirements. Buried and submarine installations increase the focus on the protection philoso strategies affecting cable selection, armoring and joint considerations. While many distinguish power trans (higher voltage, long distances) from power distribution (short distance, lower voltage connections t customers), the principles of estimating these elements are similar; i.e., the RP applies to both.

The main physical power transmission line scope elements are conductors and their support structures if installed overhead. Main installation elements include land clearing if over land (including forestry if applicable), foundation and structure erection and conductor stringing if overhead, or trenching, laying and horizontal boring if subsurface or subsea. Special scope elements are involved with crossings of water, road, rail and so on and at terminations. Because conductor (e.g., aluminum) and structure (e.g., steel) material costs are usually a significant cost element, these project estimates are particularly sensitive to escalation uncertainty. In general, the more developed the route, the more complex the installation will be. In urban areas, visual appeal and concern for safety and health can be major issues. Installation in remote location and/or difficult or environmentally sensitive terrain creates its own challenges. Subsea installation adds the need for bathymetry[1] and metocean[2] studies and specialized installation equipment and vessels. Before any installation work can begin in an area, stakeholder consultation must be advanced (sometimes requiring agreements with local populations with rights), and appropriate land and ROW must be acquired which creates unique scheduling as well as cost challenges.

For the purpose of estimate classification then, the main scope definition deliverables are associated with defining the power requirements (i.e., kV), the conductors and structure, and the routing. Conductors can vary widely in content (copper, aluminum, etc.) and insulation. Overhead structures may be wood, concrete, composite or steel in various configurations with various foundation designs including pilings, concrete and so on. The route's land or subsea characteristics and the nature of developments drive the need for special design features and execution strategies. Operability and maintainability considerations may also affect ROW and access design. Brownfield and revamp projects add their own concerns for interface with existing elements, crowded working conditions, etc. For each scope definition decision, stakeholder requirements need to be considered.

Power substation projects are usually associated with transmission projects. However, substations being equipment-centric and located on a facility site have physical and defining characteristics similar to process plant projects (e.g., reliance on one-line diagrams, plot plans, etc.).

CI Number: C0052654

Title: L5541 Water Crossing Upgrades

Start Date: 2023/05
In-Service Date: 2023/05
Final Cost Date: 2024/06
Function Class: Transmission
Forecast Amount: $1,047,074

DESCRIPTION:

L5541 is a 15.3 kilometre (118 structures) 69kV transmission line, built in 1988, that connects 50W Milton to 4W Lower Great Brook to the 3W Big Falls substations. This project is required to replace deteriorated assets that have been identified through NS Power's transmission line inspection program at two water crossings near Deep Brook. This project will target replacement of deteriorated assets on 7 structures.
The project scope includes:

- Structure Replacements: 7 Structures

Summary of Related CIs +/- 2 years:
Pursuant to Section 11.2 of the CEJC, related CIs for Transmission include "Work completed on the same asset class (Padmount transformers, Breakers, etc.) or in the same location (feeder, Transmission Line)."
- No other CIs in 2021, 2022, 2023, 2024 or 2025

Depreciation Class: Transmission Plant – Towers and Fixtures

Estimated Life of the Asset: 45 years

Retirement Information:
- Categorization of Retirement: Accounting Policy 6420 - Retirement and Disposal of Capital Assets
- Percentage of Asset Pool: 0.2%

JUSTIFICATION:

Justification Criteria: Transmission Plant

Why do this project?

The NS Power transmission line inspection program identified deteriorated assets on this line that require replacement to mitigate the risk of transmission interruptions. Failure to complete this project would compromise the reliable operation of this line. Unplanned asset failures on this line would decrease system redundancy.

Why do this project now?

This work has been prioritized based on the condition of the transmission line assets as determined through NS Power's transmission line inspection program results, as well as the criticality of the line to the overall system operation. This project is required to support the reliable operation of the transmission line.

This project is deemed in-service when the first portion of the work is complete (forecast to be May 2023), therefore the Final Cost Date (June 2024) is listed as six months after the final work is forecast to be completed (December 2023).

Why do this project this way?

Replacing the existing deteriorated assets is the only technically feasible option to accomplish the intended scope of this project.

CI Number : C0052654 - L5541 Water Crossing Upgrades **Project Number** C0052654

Parent CI Number : -

Asset Location : 1455 - 1455 Transmission Plant General **Budget Version** 2023 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	3500 - TP - Wood Poles	140,915
Additions	3700 - TP - Steel Towers	397,433
Additions	3900 - TP - O/H Cond.	388,411
Retirements	3500 - TP - Wood Poles	35,617
Retirements	3900 - TP - O/H Cond.	84,698
	Total Cost:	1,047,074
	Original Cost:	247,277

Capital Project Detailed Estimate

Location: Transmission
CI#: C0052654
Title: L5541 Water Crossing Upgrades
Execution Year: 2023

Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#'s)
Regular Labour						
T&D Labour - Planning	PD	2	$ 354	$ 701		
T&D Labour - Site Supervision	PD	15	$ 429	$ 6,352		
			Sub-Total	$ 7,053		
Materials						
O/H Conductor	Lot	1	$ 60,000	$ 60,000		
Wood Poles	Lot	1	$ 80,000	$ 80,000		
Steel Monopoles	Lot	2	$ 50,000	$ 100,000		
Steel Monopole Foundations	Lot	2	$ 50,000	$ 100,000		
Hardware	Lot	1	$ 50,000	$ 50,000		
			Sub-Total	$ 390,000		
Contracts						
Wood Poles	Lot	1	$ 14,550	$ 14,550		
Framing	Lot	1	$ 14,945	$ 14,945		
Anchors and Guys	Lot	1	$ 10,360	$ 10,360		
O/H Conductor	Lot	1	$ 128,770	$ 128,770		
ROW Access	Lot	1	$ 21,920	$ 21,920		
Flagging	Lot	1	$ 30,000	$ 30,000		
Rock Breaking	Lot	1	$ 50,000	$ 50,000		
Pole Transport	Lot	1	$ 4,000	$ 4,000		
Waste Disposal	Lot	1	$ 25,000	$ 25,000		
Environment	Lot	1	$ 74,385	$ 74,385		
Monopole Installation	Lot	1	$ 60,000	$ 60,000		
			Sub-Total	$ 433,930		
Other Goods & Services						
Contingency	%	15%	$ 830,984	$ 124,648		
			Sub-Total	$ 124,648		
Vehicle Overhead						
Vehicle AO				$ 2,920		
			Sub-Total	$ 2,920		
Administrative Overhead						
Labour AO				$ 5,806		
Contract AO				$ 82,716		
			Sub-Total	$ 88,522		
			SUB-TOTAL (no AO, AFUDC)	$ 955,631		
			TOTAL (AO, AFUDC included)	$ 1,047,074		
Original Cost				$ 247,277		

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 3: Contingency determined using a combination of internal subject matter expert judgment and predetermined guidelines which have been gained over many years, including greater uncertainty for actual site conditions. Risks are well understood based on past experience.

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

Project Cost Estimate Input Checklist and Maturity Matrix						
Transmission Line Infrastructure	**Required fields:**	**Estimate Classification**				
Project Name: L5541 Water Crossing Upgrades	**Started or Preliminary**	**Class 5**	**Class 4**	**Class 3**	**Class 2**	**Class 1**
Maturity Level of Project Definition Deliverables	**Defined or Complete**	**0% to 2%**	**1% to 15%**	**10% to 40%**	**30% to 75%**	**65% to 100%**
General Project Data						
A. Scope						
Project Scope of Work Description	Defined (D)			D	D	D
Site Infrastructure (Access, Construction, Power, Camp, etc)	Preliminary (P)		P			
B. Capacity						
Voltage (kV) and Circuits	Defined (D)			D	D	D
C. Project Location						
Not Applicable						
D. Requirements						
Codes and/or Standards	Defined (D)			D	D	D
Environmental Monitoring	Defined (D)					D
E. Technology Selection						
Not Applicable						
F. Strategy						
Right-of-Way (ROW)	Defined (D)			D	D	D
Contracting / Sourcing	Preliminary (P)		P			
Escalation	Defined (D)			D	D	D
G. Planning						
System / Grid Planning (including substation and interconnect locations)	Defined (D)			D	D	D
Logistics Plan	Preliminary (P)	P	P	P		
Integrated Project Plan	Preliminary (P)		P			
Project Code of Accounts	Defined (D)			D	D	D
Project Master Schedule	Preliminary (P)		P			
Regulatory Approval & Permitting	Defined (D)			D	D	D
Risk Register	Preliminary (P)		P			
Stakeholder Consultation/Engagement/Management Plan	Not Required (NR)	NR				
Work Breakdown Structure	Not Required (NR)	NR				
Startup and Commissioning Plan	Not Required (NR)	NR				
H. Studies						
Routing Options	Defined (D)			D	D	D
Topography and/or Bathymetry	Defined (D)			P/D	D	D
Environmental Impact / Sustainability Assesment	Not Required (NR)	NR				
Environmental / Existing Conditions	Preliminary (P)		P			
Meteorology and/or Oceanographic / Subsea	Not Required (NR)	NR				
Soils and Hydrology	Not Required (NR)	NR				
Technical Deliverables (Specifications and/or Drawings)						
Conductor, Insulator, Grounding, Joint Design (including protection for buried or subsea)	Complete (C)			C	C	C
Foundation / Structure (Tower) Design	Complete (C)			C	C	C
Route Mapping / Survey	Complete (C)		P/C	C	C	C
Design Specifications	Complete (C)			C	C	C
Instrument List	Not Required (NR)	NR				
Construction Permits	Preliminary (P)		S/P	P/C		
Geometric Layout, Alignment, Profile, Cross Section	Preliminary (P)		S/P	P/C		
Land / ROW Title Negotiation	Not Required (NR)	NR				
Civil / Site / Structural / Architectural Discipline Drawings	Complete (C)				C	C
Crossings and Borings Designs and Drawings	Complete (C)				C	C
Demolition Plan and Drawings	Not Required (NR)	NR				
Erosion Control Plan and Drawings	Preliminary (P)		S/P	P		
Foundation / Structure (Tower) Discipline Drawings	Preliminary (P)		S/P	P		
Tower / Structure Location / Spotting	Complete (C)				C	C
Instrument Datasheets	Not Required (NR)	NR	NR/S			
Electrical Discipline Drawings	Not Required (NR)	NR	NR			
Instrumentation / Control System Discipline Drawings	Not Required (NR)	NR	NR			
Total Responses		1	12	19	17	18
Percentage		3%	31%	49%	44%	46%

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 *power transmission line infrastructure industries* is assumed to include greenfield or brownfield sites for overhead, buried and submarine transmission of electrical power in the infrastructure industries. High voltage is typically >100kV but may be less (e.g., 33 or 66kv) if long distance with light electrical loads. This excludes power supply and distribution scope within a process plant, mining facility, building complex or other facility site. It also excludes power generation facilities and substations. The defining deliverables of those excluded project scopes are covered in other RPs (e.g., 18R-97 for process plants [2]).

Power transmission is considered an element of the infrastructure industry. The Construction Industry Institute has provided a good definition of infrastructure in its Project Definition Rating Index for Infrastructure Projects as follows [3]:

"A capital project that provides transportation, transmission, distribution, collection or other capabilities supporting commerce or interaction of goods, services, or people. Infrastructure projects generally impact multiple jurisdictions, stakeholder groups and/or a wide area. They are characterized as projects with a primary purpose that is integral to the effective operation of a system. These collective capabilities provide a service that is made up of nodes and vectors into a grid or system."

Using this definition, power transmission lines are a vector or linear scope element that connects substation or other facility nodes at its terminations. The substation nodes may be part of or associated with a generation, consuming or interconnection facility. As such, transmission projects are often executed as part of a program that also involves node project scope or facility operational changes (or at least considerations for integrated system commissioning and startup). As the definition states, a distinguishing feature of these projects is that they often traverse wide areas, cross country or subsea, which puts an emphasis on the definition of routing, land ownership and conditions, and establishing right-of-way (ROW). Associated scope definition challenges include defining stakeholder, permitting and regulatory requirements. Buried and submarine installations increase the focus on the protection philosophy and strategies affecting cable selection, armoring and joint considerations. While many distinguish power transmission (higher voltage, long distances) from power distribution (short distance, lower voltage connections to retail customers), the principles of estimating these elements are similar; i.e., the RP applies to both.

The main physical power transmission line scope elements are conductors and their support structures if installed overhead. Main installation elements include land clearing if over land (including forestry if applicable), foundation and structure erection and conductor stringing if overhead, or trenching, laying and horizontal boring if subsurface or subsea. Special scope elements are involved with crossings of water, road, rail and so on and at terminations. Because conductor (e.g., aluminum) and structure (e.g., steel) material costs are usually a significant cost element, these project estimates are particularly sensitive to escalation uncertainty. In general, the more developed the route, the more complex the installation will be. In urban areas, visual appeal and concern for safety and health can be major issues. Installation in remote location and/or difficult or environmentally sensitive terrain creates its own challenges. Subsea installation adds the need for bathymetry[1] and metocean[2] studies and specialized installation equipment and vessels. Before any installation work can begin in an area, stakeholder consultation must be advanced (sometimes requiring agreements with local populations with rights), and appropriate land and ROW must be acquired which creates unique scheduling as well as cost challenges.

For the purpose of estimate classification then, the main scope definition deliverables are associated with defining the power requirements (i.e., kV), the conductors and structure, and the routing. Conductors can vary widely in content (copper, aluminum, etc.) and insulation. Overhead structures may be wood, concrete, composite or steel in various configurations with various foundation designs including pilings, concrete and so on. The route's land or subsea characteristics and the nature of developments drive the need for special design features and execution strategies. Operability and maintainability considerations may also affect ROW and access design. Brownfield and revamp projects add their own concerns for interface with existing elements, crowded working conditions, etc. For each scope definition decision, stakeholder requirements need to be considered.

Power substation projects are usually associated with transmission projects. However, substations being equipment-centric and located on a facility site have physical and defining characteristics similar to process plant projects (e.g., reliance on one-line diagrams, plot plans, etc.).

CI Number: C0050836

Title: 2023 Padmount Replacement Program

Start Date: 2023/05
In-Service Date: 2023/05
Final Cost Date: 2024/12
Function Class: Distribution
Forecast Amount: $1,309,551

DESCRIPTION:

This project will replace 55 padmount transformers identified through the padmount inspection program to be at or near end of expected useful life. NS Power has approximately 4,000 padmount transformers across its system which are inspected annually. The expected useful life of these assets is between 35-45 years. This is an ongoing program as part of lifecycle and condition management of the in-service distribution padmount transformer inventory.

NS Power anticipates that a portion of the costs associated with this capital item will contribute toward settling the Company's Asset Retirement Obligation for Polychlorinated Biphenyls (PCB) contaminated oil.

Summary of Related CIs +/- 2 years:
Pursuant to Section 11.2 of the CEJC, related CIs for Distribution include "Work completed on the same asset class (Padmount transformers, Breakers, etc.) or in the same location (feeder, Transmission Line)."2021

- 2021 CI C0031145 2021 Padmount Replacement Program $1,636,153
- 2022 CI C0043130 2022 Padmount Replacement Program $1,807,359
- 2024 CI TBD 2024 Padmount Replacement Program $TBD
- 2025 CI TBD 2025 Padmount Replacement Program $TBD

Depreciation Class: Distribution Plant – Line Transformers
Distribution Plant – Underground Conductors and Devices

Estimated Useful Life: 40 years

Retirement Information:

- Categorization of Retirement: Accounting Policy 6420 - Retirement and Disposal of Capital Assets
- Percentage of Asset Pool: 0.4%

JUSTIFICATION:

Justification Criteria: Distribution System

Why do this project?

Padmount transformer inspections have identified transformers that need to be replaced in 2023 due to asset condition. Proactive, planned replacement of end of expected useful life padmount transformers mitigates the potential for prolonged, unplanned customer outages from transformer failure.

This project will also reduce the risk of environmental incidents, as padmount transformer failures can result in an oil release, which is governed by environmental regulations and would result in remediation costs.

Why do this project now?

Padmount transformers at or near the end of useful life were identified through the padmount inspection process and prioritized for replacement. They will be replaced in a planned manner as part of NS Power's environmental due diligence.

This project is deemed in-service when the first transformer is completed (May 2023), therefore the Final Cost Date (December 2024) is listed as six months after the last transformer is forecast to be completed (June 2024).

Why do this project this way?

Padmount transformers are typically used in the service that NS Power provides to commercial customers. Planned replacement of padmount transformers that are at or nearing the end of their expected useful life is conducted during an outage coordinated with the customer. The planned replacement of these padmount transformers as part of this project will reduce unplanned customer outages and mitigate the potential environmental impact.

CI Number : C0050836 - 2023 Padmount Replacement Program **Project Number** C0050836

Parent CI Number : -

Asset Location : 1456 - 1456 Distribution Plant General **Budget Version** 2023 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	4600 - DP - U/G Conductor	74,487
Additions	4800 - DP - U/G Line Transf.	1,157,073
Retirements	4800 - DP - U/G Line Transf.	77,991
	Total Cost:	1,309,551
	Original Cost:	447,412

Capital Project Detailed Estimate

Location: Distribution
CI#: C0050836
Title: 2023 Padmount Replacement Program
Execution Year: 2023-2024

Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#'s)
Regular Labour						
T&D Labour - Design	PD	127	$ 426	$ 54,238		
T&D Labour - PLT	PD	102	$ 395	$ 40,300		
			Sub-Total	$ 94,538		
OT Labour						
T&D Labour - PLT	PD	110	$ 734	$ 80,600		
			Sub-Total	$ 80,600		
Materials						
U/G Conductor	Lot	1	$ 55,759	$ 55,759		
U/G Line Transformer	Lot	1	$ 717,931	$ 717,931		
			Sub-Total	$ 773,690		
Contracts						
U/G Line Transformer	Lot	1	$ 76,720	$ 76,720		
			Sub-Total	$ 76,720		
Other Goods & Services						
Contingency	%	10%	$ 1,025,548	$ 102,555		
			Sub-Total	$ 102,555		
Vehicle Overhead						
Vehicle AO				$ 55,828		
			Sub-Total	$ 55,828		
Administrative Overhead						
Labour AO				$ 110,996		
Contract AO				$ 14,624		
			Sub-Total	$ 125,620		
			SUB-TOTAL (no AO, AFUDC)	$ 1,128,103		
			TOTAL (AO, AFUDC included)	$ 1,309,551		
Original Cost				$ 447,412		

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.
Note 3: Contingency determined using a combination of internal subject matter expert judgment and predetermined guidelines which have been gained over many years. Risks are well understood based on past annual program experience.

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

Project Cost Estimate Input Checklist and Maturity Matrix

Equipment Replacement	Required fields:	Estimate Classification				
Project Name: Padmount Replacement Program	Started or Preliminary	Class 5	Class 4	Class 3	Class 2	Class 1
Maturity Level of Project Definition Deliverables	Defined or Complete	0% to 2%	1% to 15%	10% to 40%	30% to 75%	65% to 100%
General Project Data						
A. Scope						
Project Scope Work Description	Defined (D)			D	D	D
Site Infrastructure (Access, Construction Power, Camp etc.)	Defined (D)			D	D	D
B. Capacity						
Not Applicable						
C. Project Location						
Building, Tower and/or Other Project Elements	Defined (D)			D	D	D
D. Requirements						
Codes and/or Standards	Defined (D)			D	D	D
Communication Systems	Not Required (NR)	NR				
Fire Protection and Life Safety	Not Required (NR)	NR				
Environmental Monitoring	Preliminary (P)			P	P	
E. Technology Selection						
New or Existing Design/Technology	Defined (D)			D	D	D
F. Strategy						
Contracting / Sourcing	Defined (D)			D	D	D
Escalation	Not Required (NR)	NR				
G. Planning						
Logistics Plan	Defined (D)				D	D
Integrated Project Plan	Defined (D)			D	D	D
Project Code of Accounts	Defined (D)			D	D	D
Project Master Schedule	Defined (D)			D	D	D
Regulatory Approval & Permitting	Defined (D)			D	D	D
Risk Register	Defined (D)			D	D	D
Stakeholder Consultation / Engagement/ Management Plans	Not Required (NR)	NR				
Work Breakdown Structure	Preliminary (P)		P			
Startup and Commissioning Plan	Not Required (NR)	NR				
H. Studies						
Environmental / Existing Conditions	Defined (D)			D	D	D
Soils and Hydrology	Defined (D)			D	D	D
Technical Deliverables (Specifications and/or Drawings)						
Site Plan	Complete (C)			C	C	C
Equipment Design Specifications	Complete (C)			C	C	C
General Equipment Arrangement Drawings	Not Required (NR)	NR				
Plot Plans / Facility Layouts	Not Required (NR)	NR				
Construction Permits	Not Required (NR)	NR				
Codes and Standards Drawings	Not Required (NR)	NR				
Demolition Plan and Drawings	Not Required (NR)	NR				
Erosion Control Plan and Drawings	Not Required (NR)	NR				
Fire Protection and Life Safety Drawings and Details	Not Required (NR)	NR				
Equipment Datasheets	Not Required (NR)	NR	NR/S			
Equipment Lists: Electrical	Not Required (NR)	NR	NR/S			
Equipment Lists: Process / Utility / Mechanical	Not Required (NR)	NR	NR/S			
Instrument List	Not Required (NR)	NR	NR			
Instrument and Control Schedules	Not Required (NR)	NR	NR/S			
Instrument Datasheets	Not Required (NR)	NR	NR/S			
Spare Parts Listing	Not Required (NR)	NR	NR			
Electrical Discipline drawings	Not Required (NR)	NR	NR			
Information Systems / Telecommunication Drawings	Not Required (NR)	NR	NR			
Instrumentation / Control System Discipline Drawings	Not Required (NR)	NR	NR			
Mechanical Discipline Drawings	Not Required (NR)	NR	NR			
Total Responses		0	1	16	17	16
Percentage		0%	2%	32%	34%	32%

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.

Note: This checklist is intended to be used for "brownfield" projects for the replacement of "end of life" equipment. In lieu of specific AACE guidelines for these types of projects, this checklist was developed by NSPI following the principles of the guidelines to demonstrate confidence in the cost estimate maturity.

CONFIDENTIALITY MATRIX

LEGEND	
Confidential in Entirety (shaded)	TS = Technical Support
Partially Confidential (Italicized)	CS = Cost Support
(1) = Commercial/Cost Information	
(2) = Third Party Proprietary Information	*Includes Description, PowerPlant (PP), Detailed Cost Estimate (DCE), and Economic Analysis Model (EAM).
(3) = System Security	

Function/Tab	Capital Work Order	Work Order Main Body*	Attachment 1	Attachment 2	Attachment 3
Generation					
	Hydro Projects				
G01	C0012838 - HYD – Lequille Canal Dyke, Gates and Tailrace Refurbishment	*DCE (1)*	*CS: Vendor Estimate (1)*	*CS: Vendor Estimate (1)*	
	Steam Projects				
	Steam Turbine				
G02	C0051134 - TUC2 L-0 Blade Replacement	*DCE (1)*	*CS: Vendor Proposal (1)*	*CS: Vendor Proposal (1)*	*CS: Vendor Proposal (1)*
G03	C0051135 - TUC2 Turbine Valves Refurbishment	*DCE (1)*	*CS: Vendor Proposal (1)*	*CS: Vendor Proposal (1)*	
	Gas Turbine				
G04	C0041506 - LM6000 191-253 Major Engine Refurbishment	*DCE (1)*	*CS: Vendor Proposal (1, 2)*		
G05	C0029682 - CT – VJ2 Generator Replacement	*DCE (1)*	*CS: Vendor Quote (1)*		
Transmission					
T01	C0041788 - L6516 Replacements and Upgrades Phase 2				
T02	C0055539 - 10H-T1 Transformer Replacement				
T03	C0052299 - 2023/2024 Steel Tower Life Extension				
T04	C0055796 - 2023 EHV Breaker Replacements	*DCE (1)*	*CS: Vendor Quote (1, 2)*		
T05	C0055696 - L5031 Replacement and Upgrades Robinson Corner Tap				
T06	C0052654 - L5541 Water Crossing Upgrades				
Distribution					
D01	C0050836 - 2023 Padmount Replacement Program				

1 - Commercial Information

To protect value for customers and mitigate the risk of prospective proponents having access to the information itemized in the confidentiality matrix, and maintain good business relations with vendors, this information is confidential.

The more a supplier is aware of NS Power's specific requirements and a competing vendor's costs, the better the supplier's ability to obtain the highest price, reduce competition and ultimately increase the cost for NS Power and its customers. The cost of such transparency is not always immediately evident. Information from regulatory proceedings can provide competitive advantages over other suppliers, and that could be advantageous in bidding or negotiation. Higher prices, or avoidable contractual constraints, will result in unnecessary higher costs to customers.

NS Power seeks to keep the terms and conditions of suppliers pricing and arrangements confidential from their other customers or potential competitors. This prevents competitors from using the information to gain a competitive advantage. This is equally true for NS Power, which desires to protect its ability to acquire services and equipment on the most competitive terms. Those "best" terms may not be available if there is a risk that they will be disclosed to the customers or competitors of the supplier.

Since NS Power customer rates are cost-based, the maintenance of confidentiality for this item is to the direct benefit of customers.

2 - Third Party Proprietary Information

This is information belonging to third parties for which those third parties have asserted confidentiality over proprietary cost and technical information.

3 - System Security

One-Line diagrams frequently included in system planning studies are confidential due to system security concerns. Protection of the power system preserves reliability and reduces the risks associated with external threats.

2023 ACE Plan Appendix B has been filed electronically.

NS Power 2022 Capital Spend Detail - As per 2022 ACE Plan

4th Quarter Overview - as of December 31, 2022

	Generation	Distribution	Transmission	General Property	Total NS Power
2022 ACE Plan Total	***$ 202,168,457***	***$ 107,623,976***	***$ 149,912,786***	***$ 71,908,711***	***$ 531,613,930***
Total 2022 ACE Plan Spend (note 1)	140,201,784	207,678,565	50,023,768	68,662,757	466,566,873
Other 2022 Capital Spending					
Preliminary Spending (note 2)	5,840,610	317,792	854,971	5,053,079	12,066,452
Spending on projects started prior to 2022, not in 2022 ACE Plan (note 3)	13,296,440	1,617,986	5,284,764	1,339,205	21,538,395
Spending on 2022 U&Us/P&As submitted to the Board (note 4)	35,094,746	309,891	43,104	4,588,986	40,036,726
2022 Capital Spend	**$ 194,433,580**	**$ 209,924,234**	**$ 56,206,607**	**$ 79,644,026**	**$ 540,208,447**

Note 1 - Top 10 2022 spend projects are listed in following report

Note 2 - Top 10 2022 preliminary spending projects are listed in following report

Note 3 - Top 10 2022 spend for projects started prior to 2022, not in 2022 ACE Plan are listed in following report

Note 4 - Top 10 2022 spend for U&U and P&A projects in are listed in following report

Top 10 Projects

This report provides the Top 10 projects by the categories included in the preceding report

(1) Total 2022 Spend: Top 10 projects that were included in the 2022 ACE Plan

CI	Project Title	Functional Class	2022
C0053975	Sept 23, 2022 Level 4 Storm Fiona (D008)	Distribution Plant	$ 89,043,204
C0013838	HYD WRC LEM Unit Rehabilitation	Hydro Generation Plant	$ 33,715,679
46075	IT – T&D WAM Phase 2 – Work Management and Scheduling & Dispatch	General Plant	$ 27,161,289
C0015798	WRC Tunnel T-2 Fall of Ground Remediation	Hydro Generation Plant	$ 20,099,346
C0047032	Feb 4, 2022 Storm (D008)	Distribution Plant	$ 8,402,146
39767	New Customers - Residential - Central (D061)	Distribution Plant	$ 7,874,063
39305	Work Vehicle Replacements (P062)	General Plant	$ 7,459,761
C0046372	Jan 14, 2022 Storm (D008)	Distribution Plant	$ 7,090,272
39769	New Customers - Residential West (D061)	Distribution Plant	$ 6,647,690
C0041892	New Distribution Rights-of-Way Phase 7	Distribution Plant	$ 6,350,941

(2) Preliminary Spending: Top 10 preliminary spending on projects that have not been brought forward to the NSUARB, are awaiting NSUARB approval, or are included in the 2023 ACE Plan

CI	Project Title	Functional Class	2022
51761	AMO PE LIN2 Retirement Planning	Steam Generation Plant	$ 2,550,188
C0049652	2022 Transmission Inspection Program	Transmission Plant	$ 2,244,730
C0026148	Eastern Clean Energy Initiative (ECEI)	General Plant	$ 1,851,654
C0049672	2022 Distribution Inspection Program	Distribution Plant	$ 1,431,386
47650	HYD - Annapolis Decision Analysis	Hydro Generation Plant	$ 1,191,977
C0034209	1C-GT2 Transformer Failure	Transmission Plant	$ 795,455
C0050477	IT - Network Protection	General Plant	$ 594,563
C0050474	IT - SIEM Architecture and Monitoring	General Plant	$ 466,912
C0049772	IT - Firewall Core Refresh	General Plant	$ 439,288
C0049212	L8001 Replacements and Upgrades Phase 3	Transmission Plant	$ 376,348

(3) Spending on projects started prior to 2022, not in the 2022 ACE Plan: Top 10 projects that were included in prior ACE Plans or approved prior to 2022

CI	Project Title	Functional Class	2022
C0001900	Mount Hope 69-25kV Substation	Transmission Plant	$ 1,346,586
C0010948	2019/2020 Sacrificial Anode Installation Program	Transmission Plant	$ 1,186,646
C0045210	HYD – LEQ Embankment Refurbishment	Hydro Generation Plant	$ 1,053,758
44267	TRE Ash Lagoon Site Closure	Steam Generation Plant	$ 874,805
C0031225	POA Light Oil Line Replacement	Steam Generation Plant	$ 872,342
C0031064	L5054 Line Replacements and Upgrade	Transmission Plant	$ 842,222
C0044910	LIN3 U&U Condenser Tube Refurb 2021	Steam Generation Plant	$ 620,050
C0022843	HYD - TUS Fish Ladder Upgrade	Hydro Generation Plant	$ 533,640
C0019379	50N-410 - 4C-430 Highway 104 Twinning	Distribution Plant	$ 520,081
C0027362	2020 Petroleum Storage Tank Replacement	Transmission Plant	$ 511,097

(4) Spending on 2022 U&Us/P&As submitted to the NSUARB or initiated: Top 10 projects not included in the 2022 ACE Plan that were initiated in 2022

CI	Project Title	Functional Class	2022
C0048591	CT VJ1 Engine P686621 Refurbishment	Gas Turbine Generation Plant	$ 2,244,761
C0053355	TUC2 Main Steam Line Leak 2022	Steam Generation Plant	$ 1,458,935
C0051312	TUC Blowdown Pipe Concrete Trench	Steam Generation Plant	$ 1,377,984
C0048610	CT VJ1 Free Turbine P600531 Refurbishment	Gas Turbine Generation Plant	$ 1,020,907
C0055376	TUC1 LP Blade Refurbishment U&U	Steam Generation Plant	$ 977,643
C0054855	TUC3 Generator Stator Refurbishment 2022	Steam Generation Plant	$ 977,514
C0050643	TUC3 Generator Retaining Ring Refurbishment	Steam Generation Plant	$ 947,446
C0054476	POA U&U RH1 Refurbishment 2022	Steam Generation Plant	$ 938,133
C0045930	WRC Tunnel Structural Rock-Bolting	Hydro Generation Plant	$ 930,911
C0048590	IT - IBM Licensing Agreement	General Plant	$ 845,078

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4th Quarter Overview - as of December 31, 2022

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Status	Category	CI Number	Title	ACE Plan Reference (or U&U and P&A)	Submission/Date	ACE Amount	Submission or Approved Amount	Actual Spend	FIN Submission Date	FIN Amount	Variance
Deferred	Hydro	39472	HYD - Mersey Redevelopment Phase 1	2022 ACE Plan (for Subsequent Approval)		$ 189,447,076		$ 19,641,412			
Not Approved at this time	General Plant	47751	ECC Dynamic Line Rating Implementation	2022 ACE Plan (for Subsequent Approval)	OTQ - December 2, 2019	$ 5,144,525	$ 4,978,090	$ 286,279			
Awaiting Approval	Hydro	49634	HYD - Trout River Diversion Structure Replacement	2022 ACE Plan (for Subsequent Approval)	Q3 - November 7, 2022	$ 1,822,300	$ 2,509,894	$ 632,931			
Approved	Distribution	C0008638	Cogswell HRM Redevelopment Program	2022 ACE Plan (for Subsequent Approval)	OTQ - June 6, 2022	$ 6,982,854	$ 6,617,148	$ 1,419,632			
Deferred	Transmission	C0021140	New 138KV-25KV Substation - Stellarton	2022 ACE Plan (for Subsequent Approval)		$ 4,047,925		$ 88,888			
Deferred	Transmission	C0022247	1N-Onslow 138 kV Add Second 42 MVA Power Transformer	2022 ACE Plan (for Subsequent Approval)		$ 4,500,000		$ 110,213			
Approved	Transmission	43267	13V Gulch Hydro Replace 13V-GT1 and 13V-VR1	2015 ACE Plan	2015 ACE Plan	$ 1,061,902	$ 1,061,902	$ 1,011,993			
Approved	Transmission	52314	1C-GT1/UT1 Replacement	2018 ACE Plan	2018 ACE Plan	$ 2,032,393	$ 2,032,393	$ 1,676,929			
Approved	Transmission	49815	2017 / 2018 Steel Tower Refurbishment	2017 ACE Plan	2017 ACE Plan	$ 2,003,317	$ 2,003,317	$ 1,937,433			
Approved	Distribution	49919	2017 PCB Pole Top Transformer Replacement	2017 ACE Plan	2017 ACE Plan	$ 2,446,051	$ 2,446,051	$ 2,507,656			
Approved	Transmission	49818	2017/2018 Transmission Switch & Breaker Replacement	2017 ACE Plan	2017 ACE Plan	$ 1,074,472	$ 1,074,472	$ 1,096,991			
Approved	Distribution	51493	2018 PCB Pole Top Transformer Replacement	2018 ACE Plan	2018 ACE Plan	$ 1,360,354	$ 1,360,354	$ 1,384,076			
Approved	Transmission	51403	2018 PCB Removal Program	2018 ACE Plan	2018 ACE Plan	$ 4,402,342	$ 4,402,342	$ 3,491,693			
Approved	Transmission	52258	2018/2019 Isolated Structure Replacement	2018 ACE Plan	2018 ACE Plan	$ 4,818,521	$ 4,818,521	$ 294,849			
Approved	Transmission	51398	2018/2019 Steel Tower Refurbishment	2018 ACE Plan	2018 ACE Plan	$ 1,992,692	$ 1,992,692	$ 2,045,977			
Approved	Transmission	51406	2018/2019 Transmission Switch & Breaker Replacement	2018 ACE Plan	2018 ACE Plan	$ 1,405,891	$ 1,405,891	$ 1,136,173			
Approved	Distribution	47787	2H Armdale New Feeders	2017 ACE Plan (for Subsequent Approval)	OTQ - April 6, 2020	$ 1,285,679	$ 1,734,221	$ 1,723,894			
Approved	Transmission	52328	56N-T1 Transformer Upgrades	2018 ACE Plan	2018 ACE Plan	$ 1,279,271	$ 1,279,271	$ 1,307,910			
Approved	Transmission	51975	5P Mobile Substation Replacement	2018 ACE Plan	2018 ACE Plan	$ 4,829,458	$ 4,829,458	$ 1,435,308			
Approved	Transmission	51956	6P Mobile Substation Rewind U&U	U&U	Q3 2017 - October 30, 2017	$ -	$ 1,516,121	$ 1,034,922			
Approved	Distribution	47124	Advanced Metering Infrastructure	2017 ACE Plan (for Subsequent Approval)	OTQ - October 19, 2017	$ 8,274,738	$ 132,276,549	$ 141,959,419			
Approved	Generation	48914	HYD - Malay Falls Facility Repair	2017 ACE Plan (for Subsequent Approval)	Q3 2017 - October 30, 2017	$ 446,237	$ 1,034,045	$ 91,227			
Approved	Generation	47551	HYD - SHH Controls Upgrade	2016 ACE Plan (for Subsequent Approval)	Q4 2015 - January 29, 2016	$ 1,092,851	$ 1,749,212	$ 1,782,222			
Deferred	Generation	49942	HYD - Tidewater Facility Refurbishment	2018 ACE Plan	2018 ACE Plan	$ 1,234,178	$ 1,234,178	$ 77,460			
Withdrawn	Generation	29807	HYD - Tusket Falls Main Dam	2017 ACE Plan (for Subsequent Approval)	OTQ - July 23, 2021	$ 9,940,664	$ 36,826,119	$ 21,814,624			
Approved	Generation	51234	HYD - WRC HVAC Upgrade	2018 ACE Plan	2018 ACE Plan	$ 1,876,537	$ 1,876,537	$ 1,853,129			
Approved	Generation	51235	HYD - WRC Main Access Rd Refurbishment	2018 ACE Plan	2018 ACE Plan	$ 2,686,075	$ 2,686,075	$ 2,668,947			
Approved	Generation	48791	HYD - WRC Safety Standards Upgrades	2018 ACE Plan (for Subsequent Approval)	OTQ - June 4, 2018	$ 1,019,928	$ 1,760,570	$ 1,882,618			
Approved	Generation	51236	HYD - WRC Tailrace Rock Bolting	2018 ACE Plan	2018 ACE Plan	$ 8,861,996	$ 8,861,996	$ 8,113,117			
Approved	Generation	48052	HYD Annapolis HVAC Upgrade	2017 ACE Plan (for Subsequent Approval)	OTQ - March 8, 2017	$ 1,498,367	$ 1,573,596	$ 1,681,664			
Approved	Generation	51775	HYD Fixed Ladder & Machine Guard	2018 ACE Plan (for Subsequent Approval)	OTQ - June 4, 2018	$ 999,149	$ 1,985,179	$ 1,963,517			
Approved	Generation	44978	HYD-Wreck Cove Automation	2015 ACE Plan (for Subsequent Approval)	Q2 2015 - July 31, 2015	$ 2,379,999	$ 3,802,446	$ 2,541,918			
Deferred	General Plant	49600	IT - Network Architecture Redesign	2017 ACE Plan (for Subsequent Approval)		$ 1,183,826		$ 296,526			
Approved	General Plant	49855	IT Desktop SW Modernization	2017 ACE Plan (for Subsequent Approval)	Q3 2017 - October 30, 2017	$ 2,013,034	$ 4,620,516	$ 4,501,621			
Approved	Transmission	47950	L5017 Replacements & Upgrades	2016 ACE Plan	Q1 2018 - May 7, 2018	$ 2,182,142	$ 3,062,664	$ 3,011,657			
Approved	Transmission	47949	L5028 Replacements and Upgrades	2016 ACE Plan	2016 ACE Plan	$ 1,144,355	$ 1,144,355	$ 943,253			
Approved	Transmission	49790	L5505 Replacements and Upgrades	2017 ACE Plan	2017 ACE Plan	$ 1,223,571	$ 1,223,571	$ 818,204			
Approved	Transmission	49778	L5535 Replacements and Upgrades	2017 ACE Plan	OTQ - April 16, 2018	$ 1,261,920	$ 2,590,269	$ 2,839,928			
Approved	Transmission	49779	L6537 Replacements and Upgrades	2018 ACE Plan	OTQ - March 4, 2019	$ 1,255,220	$ 2,331,474	$ 2,173,745			
Approved	Transmission	52320	L6549 2018 Replacements & Upgrades	2018 ACE Plan	2018 ACE Plan	$ 1,406,535	$ 1,406,535	$ 1,452,523			
Approved	Transmission	44987	L7003 Lidar Upgrades	2015 ACE Plan (for Subsequent Approval)	OTQ - August 31, 2015	$ 6,885,817	$ 11,032,275	$ 10,842,094			
Approved	Transmission	49793	L7011 Replacements and Upgrades	2017 ACE Plan	OTQ - April 1, 2019	$ 3,343,484	$ 4,810,276	$ 4,591,706			
Approved	Transmission	47954	L7012 Replacements and Upgrades	2017 ACE Plan	2017 ACE Plan	$ 4,428,520	$ 4,428,520	$ 4,392,086			
Approved	Generation	49940	LM6000 TUC5 Control System Upgrade	2017 ACE Plan (for Subsequent Approval)	OTQ - July 3, 2018	$ 1,018,769	$ 1,275,559	$ 1,070,506			
Approved	Transmission	C0001900	Mount Hope 69-25kV Substation	2018 ACE Plan	2018 ACE Plan	$ 2,982,338	$ 2,982,338	$ 2,993,676			
Approved	Transmission	48061	New Mobile Substation 7.5MVA	2016 ACE Plan (for Subsequent Approval)	OTQ - June 30, 2016	$ 1,728,234	$ 2,390,744	$ 2,534,319			
Approved	Transmission	52323	Port Hastings 2C BPS Upgrade	P&A	Q2 - August 7, 2018	$ -	$ 4,201,449	$ 3,997,283			
Approved	General Plant	50153	Self Serve Development Phase 2	2017 ACE Plan (for Subsequent Approval)	OTQ - September 15, 2017	$ 1,827,720	$ 1,160,528	$ 1,316,269			
Not Approved at this time	Transmission	43678	Separate L8004/L7005 on Canso Crossing Double Circuit Tower(DCT)	2017 ACE Plan (for Subsequent Approval)	OTQ - January 27, 2022*	$ 16,183,691	$ 20,387,278	$ 20,387,278			
Not Approved at this time	Transmission	45066	Upgrade L6511 and L7019 Thermal Rating	2015 ACE Plan (for Subsequent Approval)	OTQ - January 27, 2022*	$ 3,693,033	$ 2,691,017	$ 2,691,017			
Not Approved at this time	Transmission	43324	Replace L6513 / Upgrade Line Terminals	2015 ACE Plan (for Subsequent Approval)	OTQ - January 27, 2022*	$ 23,429,902	$ 18,626,428	$ 18,625,082			
Not Approved at this time	Transmission	45067	67N Onslow 345 KV Node Swap	2014 ACE Plan (for Subsequent Approval)	OTQ - January 27, 2022*	$ 3,006,487	$ 2,982,714	$ 2,983,507			
Approved	Transmission	48022	Spider Lake Substation Addition	2016 ACE Plan (for Subsequent Approval)	OTQ - March 4, 2019	$ 6,348,981	$ 9,158,260	$ 9,066,398			
Partial Approval	Generation	44267	TRE Ash Lagoon Site Closure	2015 ACE Plan	OTQ - July 7, 2017 (partially approved)	$ 7,994,849	$ 8,993,879	$ 9,307,338			
Approved	Generation	50518	HYD - Ruth Falls Main Dam Refurbishment	2019 ACE Plan	2019 ACE Plan	$ 7,244,422	$ 7,244,422	$ 4,069,476			
Approved	Generation	C0002539	HYD - Bridge Remediation 2019	2019 ACE Plan	2019 ACE Plan	$ 6,843,686	$ 6,843,686	$ 5,934,077			
Approved	Generation	48638	TRE - Rail Car Fuel Delivery Upgrade	2019 ACE Plan	2019 ACE Plan	$ 1,236,623	$ 1,236,623	$ 1,198,627			
Approved	Transmission	C0010042	2019 Transmission Right-of-Way Widening 69kV	2019 ACE Plan	2019 ACE Plan	$ 5,650,794	$ 5,650,794	$ 5,627,652			
Approved	Transmission	C0010948	2019/2020 Sacrificial Anode Installation Program	2019 ACE Plan	2019 ACE Plan	$ 3,099,862	$ 3,099,862	$ 3,146,552			
Approved	Transmission	C0010952	2019/2020 Substation Polychlorinated Biphenyl (PCB) Equipment Removal	2019 ACE Plan	2019 ACE Plan	$ 2,786,245	$ 2,786,245	$ 2,629,555			
Approved	Transmission	C0010949	2019/2020 Steel Tower Life Extension	2019 ACE Plan	2019 ACE Plan	$ 2,414,140	$ 2,414,140	$ 2,178,231			
Approved	Transmission	C0011339	L6549 - Replacements and Upgrades Phase 2	2019 ACE Plan	2019 ACE Plan	$ 2,209,907	$ 2,209,907	$ 1,695,036			
Approved	Transmission	C0010950	2019/2020 Steel Tower Refurbishment	2019 ACE Plan	2019 ACE Plan	$ 2,009,268	$ 2,009,268	$ 2,168,601			
Approved	Transmission	C0011338	L5548 - Replacements and Upgrades	2019 ACE Plan	2019 ACE Plan	$ 1,699,381	$ 1,699,381	$ 1,796,549			
Approved	Transmission	C0011241	L5026 - Replacements and Upgrades	2019 ACE Plan	2019 ACE Plan	$ 1,498,789	$ 1,498,789	$ 1,379,563			
Approved	Transmission	C0010978	2019/2020 Transmission Switch & Breaker Replacement	2019 ACE Plan	2019 ACE Plan	$ 1,044,148	$ 1,044,148	$ 1,026,803			
Approved	Transmission	C0011243	L5551 - Replacements and Upgrades	2019 ACE Plan	2019 ACE Plan	$ 1,014,077	$ 1,014,077	$ 997,067			
Approved	Distribution	C0011208	2019 Padmount Replacement Program	2019 ACE Plan	2019 ACE Plan	$ 1,413,544	$ 1,413,544	$ 1,459,613			
Approved	Distribution	C0006319	2019 PCB Pole Top Transformer Replacements	2019 ACE Plan	2019 ACE Plan	$ 1,177,592	$ 1,177,592	$ 350,937			
Approved	General Plant	C0013438	IT - T&D WAM Phase 1 - GIS and Field Design System	2019 ACE Plan (2018 Pending Submission)	OTQ - December 7, 2018	$ 7,978,434	$ 7,978,434	$ 8,098,223			
Partial Approval	Generation	C0013838	HYD WRC LEM Unit Rehabilitation	2020 ACE Plan (2019 Pending Submission)	OTQ - February 21, 2020	$ 109,691,967	$ 101,787,264	$ 60,770,376			
Approved	Distribution	47794	Heckman's Island Submarine Cable Replacement	2021 ACE Plan (for Subsequent Approval)	Q1 2021 - May 3, 2021	$ 1,296,112	$ 1,338,364	$ 395,886			
Approved	General Plant	C0011378	Route Network Upgrades	2020 ACE Plan (2019 Pending Submission)	OTQ - December 2, 2019	$ 5,724,240	$ 5,717,752	$ 3,867,047			
Approved	General Plant	49093	IT - Security Operations Center (SOC) and Security Information Event Monitoring (SIEM)	2019 ACE Plan (for Subsequent Approval)	OTQ - July 2, 2019	$ 2,489,673	$ 4,074,948	$ 4,146,181			
Approved	General Plant	49480	IT - Data Centre Disaster Recovery	2020 ACE Plan (2019 Pending Submission)	OTQ - December 2, 2019	$ 6,103,798	$ 6,335,162	$ 6,204,207			
Approved	General Plant	C0010838	MCC - HVAC Replacement	2019 ACE Plan (for Subsequent Approval)	OTQ - October 4, 2021	$ 1,071,364	$ 1,606,254	$ 1,523,300			
Approved	General Plant	C0002137	ECC - Map Board and Technology Modernization	2019 ACE Plan (for Subsequent Approval)	Q3 - November 4, 2019	$ 2,568,789	$ 2,506,268	$ 2,032,635			

NS Power Capital Item Status Update

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Status	Category	CI Number	Title	ACE Plan Reference (or U&U and P&A)	Submission/Date	ACE Amount	Submission or Approved Amount	Actual Spend	FIN Submission Date	FIN Amount	Variance
Approved	General Plant	C0021006	IT - Microsoft Exchange Upgrade (replaces CI 49858)	2019 ACE Plan (for Subsequent Approval)	Q2 - August 6, 2019	$ 1,517,875	$ 1,013,478	$ 1,073,325			
Approved	Transmission	C0021105	L7002 Replacements and Upgrades Phase 2	P&A	Q3 - November 4, 2019	$ -	$ 3,121,442	$ 3,093,810			
Approved	Hydro	C0006358	HYD - Lake Mulgrave Dam Refurbishments	2020 ACE Plan	2020 ACE Plan	$ 5,853,650	$ 5,853,650	$ 5,879,886			
Approved	Distribution	C0020623	New Distribution Rights-of-Way Phase 5	2020 ACE Plan	2020 ACE Plan	$ 10,015,266	$ 10,015,266	$ 9,930,358			
Approved	Transmission	C0020627	2020 Transmission Right-of-Way Widening 69kV	2020 ACE Plan	2020 ACE Plan	$ 5,489,820	$ 5,489,820	$ 5,609,719			
Approved	Transmission	52285	L5524 Replacements and Upgrades	2020 ACE Plan	2020 ACE Plan	$ 2,161,314	$ 2,161,314	$ 2,274,545			
Approved	Hydro	C0012878	HYD - Weymouth Falls Unit 1 Generator Refurbishment	2020 ACE Plan	2020 ACE Plan	$ 2,264,326	$ 2,264,326	$ 2,378,083			
Approved	Transmission	C0011261	101W Port Mersey Substation Expansion	2020 ACE Plan	2020 ACE Plan	$ 4,651,384	$ 4,651,384	$ 3,024,631			
Approved	Transmission	C0021123	2020/2021 Substation Polychlorinated Biphenyl (PCB) Equipment Removal	2020 ACE Plan	2020 ACE Plan	$ 5,197,372	$ 5,197,372	$ 5,261,213			
Approved	Transmission	C0021106	L7005 Replacements and Upgrades Phase 1	2020 ACE Plan	2020 ACE Plan	$ 3,576,991	$ 3,576,991	$ 3,091,137			
Approved	Transmission	C0021102	L5029 Replacements and Upgrades	2020 ACE Plan	2020 ACE Plan	$ 6,206,677	$ 6,206,677	$ 254,002			
Approved	Gas Turbine	49949	LM6000 TUC4 Control System Replacement	2020 ACE Plan	2020 ACE Plan	$ 1,149,996	$ 1,149,996	$ 901,522			
Approved	Transmission	C0011321	L5031 Replacements and Upgrades Phase 1	2020 ACE Plan	2020 ACE Plan	$ 2,147,212	$ 2,147,212	$ 365,940			
Approved	Transmission	C0021104	L5550 Replacements and Upgrades Phase 1	2020 ACE Plan	2020 ACE Plan	$ 2,234,816	$ 2,234,816	$ 1,920,282			
Approved	Transmission	C0021107	L8001 Replacements and Upgrades Phase 1	2020 ACE Plan	2020 ACE Plan	$ 2,292,093	$ 2,292,093	$ 2,516,470			
Approved	Distribution	C0020835	2020 Padmount Replacement Program	2020 ACE Plan	2020 ACE Plan	$ 1,612,389	$ 1,612,389	$ 1,506,979			
Approved	Transmission	C0021122	2020/2021 Transmission Switch & Breaker Replacement	2020 ACE Plan	2020 ACE Plan	$ 1,312,643	$ 1,312,643	$ 1,498,404			
Approved	Transmission	C0010955	2020/2021 Wood Pole Retreatment Program	2020 ACE Plan	2020 ACE Plan	$ 1,410,561	$ 1,410,561	$ 960,716			
Approved	Distribution	C0020834	2020/2021 Inaccessible PCB Transformer Replacements	2020 ACE Plan	2020 ACE Plan	$ 2,950,294	$ 2,950,294	$ 708,331			
Approved	General Plant	C0021109	New RTU Deployment Project	2020 ACE Plan	2020 ACE Plan	$ 8,028,097	$ 8,028,097	$ 2,619,072			
Approved	Transmission	52303	L7019 Replacements and Upgrades	2020 ACE Plan	2020 ACE Plan	$ 1,374,092	$ 1,374,092	$ 1,383,196			
Approved	Transmission	C0021323	Trenton 50N-T13 Replacement	2020 ACE Plan	2020 ACE Plan	$ 1,516,880	$ 1,516,880	$ 1,333,287			
Approved	Transmission	C0021026	Willow Lane 15N-T3 Replacement	2020 ACE Plan	2020 ACE Plan	$ 1,326,647	$ 1,326,647	$ 1,171,163			
Approved	Hydro	49756	HYD - Marshall Falls Main Dam Refurbishment	2020 ACE Plan	2020 ACE Plan	$ 5,452,794	$ 5,452,794	$ 529,325			
Approved	Transmission	C0021142	19W-T51 Transformer Replacement	2020 ACE Plan	2020 ACE Plan	$ 1,512,336	$ 1,512,336	$ 1,462,563			
Approved	Distribution	C0021182	93V-313-Meteghan Rebuild	2020 ACE Plan	2020 ACE Plan	$ 1,075,625	$ 1,075,625	$ 926,188			
Approved	General Plant	46075	IT - T&D WAM Phase 2 – Work Management and Scheduling & Dispatch	2022 ACE Plan (2021 Pending Submission)	OTQ - December 21, 2021	$ 55,899,483	$ 60,904,140	$ 41,502,860			
Approved	Distribution	C0010778	Smart Grid Nova Scotia Project	2020 ACE Plan (for Subsequent Approval)	OTQ - December 5, 2019	$ 6,740,589	$ 7,053,622	$ 6,811,647			
Approved	General Plant	C0010019	IT - ADMS Upgrade	2020 ACE Plan (for Subsequent Approval)	OTQ - March 2, 2020	$ 8,962,442	$ 9,626,891	$ 10,032,234			
Approved	General Plant	C0021826	IT - Enterprise Data Lake	2021 ACE Plan (2020 Pending Submission)	OTQ - December 7, 2020	$ 1,260,147	$ 1,260,147	$ 1,475,738			
Approved	Distribution	C0019379	50N-410 - 4C-430 Highway 104 Twinning	2020 ACE Plan (for Subsequent Approval)	OTQ - June 1, 2020	$ 1,361,237	$ 1,137,223	$ 1,320,544			
Approved	Steam	C0020385	LIN Heavy Oil Tank Refurbishment	2020 ACE Plan (for Subsequent Approval)	OTQ - January 28, 2021	$ 1,162,325	$ 3,396,731	$ 929,232			
Approved	General Plant	C0023622	AMO Substation and Transmission APM Program	2020 ACE Plan (for Subsequent Approval)	OTQ - April 6, 2020	$ 2,087,848	$ 2,217,589	$ 2,147,399			
Partial Approval	Hydro	C0014218	HYD WRC LEM Balance of Plant	2021 ACE Plan (2020 Pending Submission)	OTQ - April 30, 2021	$ 21,186,378	$ 29,720,037	$ 19,539,708			
Approved	General Plant	C0023623	AMO Distribution APM Program	2020 ACE Plan (for Subsequent Approval)	OTQ - April 6, 2020	$ 1,708,240	$ 1,721,484	$ 1,190,155			
Deferred	General Plant	C0021108	2020/2021 LIIR Deployment Project	2020 ACE Plan (for Subsequent Approval)		$ 5,092,708		$ -			
Approved	General Plant	49859	IT - Windows Server 2008 Upgrade	2020 ACE Plan (for Subsequent Approval)	OTQ - December 2, 2019	$ 1,183,310	$ 1,183,310	$ 1,274,016			
Approved	Transmission	C0024486	2S-T1 Transformer Replacement	U&U	Q1 2020 - May 4, 2020	$ -	$ 2,648,403	$ 2,821,175			
Approved	Hydro	16374	HYD Gaspereau Dam Safety	2008 ACE Plan	OTQ - February 23, 2020	$ 4,354,889	$ 22,703,451	$ 11,791,039			
Approved	General Plant	C0017098	Ragged Lake Generator Replacement	P&A	Q2 2020 - August 4, 2020	$ -	$ 2,229,267	$ 1,103,972			
Approved	Distribution	C0031083	New Distribution Rights-of-Way Phase 6	2021 ACE Plan	2021 ACE Plan	$ 9,762,735	$ 9,762,735	$ 10,038,773			
Approved	Transmission	C0031263	2021/2022 Substation Polychlorinated Biphenyl (PCB) Equipment Removal	2021 ACE Plan	2021 ACE Plan	$ 7,512,226	$ 7,512,226	$ 6,305,949			
Approved	Gas Turbine	C0020944	LM6000 - 191-443 Hot Section Engine Refurbishment	2021 ACE Plan	2021 ACE Plan	$ 5,749,282	$ 5,749,282	$ 4,542,874	Q3 - November 7, 2022	$ 4,542,874	$ (1,206,408)
Approved	Transmission	C0031089	2021/2022 Transmission Right-of-Way Widening 69kV	2021 ACE Plan	2021 ACE Plan	$ 5,288,520	$ 5,288,520	$ 5,476,480			
Approved	General Plant	49094	IT - Privilege Access Management (PAM)	2021 ACE Plan	2021 ACE Plan	$ 3,211,166	$ 3,211,166	$ 3,033,080			
Approved	Transmission	C0031122	L6539 Replacements and Upgrades	2021 ACE Plan	2021 ACE Plan	$ 2,821,842	$ 2,821,842	$ 1,212,893			
Approved	Transmission	C0031085	L6516 Line Replacement and Upgrades	2021 ACE Plan	2021 ACE Plan	$ 2,730,592	$ 2,730,592	$ 2,499,004			
Approved	Steam	C0030528	TUC3 HP Turbine Refurbishment	2021 ACE Plan	2021 ACE Plan	$ 2,085,094	$ 2,085,094	$ 2,136,518			
Approved	Transmission	C0031050	New Spare Large Autotransformer	2021 ACE Plan	2021 ACE Plan	$ 2,398,564	$ 2,398,564	$ 1,619,486			
Approved	Transmission	C0033644	2021/2022 Steel Tower Life Extension	2021 ACE Plan	2021 ACE Plan	$ 2,332,746	$ 2,332,746	$ 1,605,261			
Approved	Transmission	C0033645	2021/2022 Steel Tower Refurbishment	2021 ACE Plan	2021 ACE Plan	$ 1,944,005	$ 1,944,005	$ 2,022,801			
Approved	Transmission	C0031069	L6020 Replacements and Upgrades	2021 ACE Plan	2021 ACE Plan	$ 1,825,300	$ 1,825,300	$ 1,471,520			
Approved	Distribution	C0031145	2021 Padmount Replacement Program	2021 ACE Plan	2021 ACE Plan	$ 1,636,153	$ 1,636,153	$ 1,215,518			
Approved	Transmission	C0031262	2020/2021 Transmission Switch and Breaker Replacement	2021 ACE Plan	2021 ACE Plan	$ 1,483,048	$ 1,483,048	$ 1,377,204			
Approved	Transmission	C0031064	L5054 Replacements and Upgrades	2021 ACE Plan	2021 ACE Plan	$ 1,134,737	$ 1,134,737	$ 900,177			
Approved	Gas Turbine	46483	CT - TUS Control System Upgrade	2021 ACE Plan	2021 ACE Plan	$ 1,046,322	$ 1,046,322	$ 589,980			
Approved	General Plant	C0021839	IT - Customer Energy Insights Management	2021 ACE Plan (for Subsequent Approval)	OTQ - June 22, 2021	$ 2,560,958	$ 6,672,521	$ 6,648,253			
Deferred	Hydro	48913	HYD - Tusket Facility Refurbishment	2021 ACE Plan (for Subsequent Approval)		$ 2,544,240		$ 199,627			
Approved	Steam	C0026285	TRE Heavy Fuel Oil Tank Refurbishment	2021 ACE Plan (for Subsequent Approval)	OTQ - June 10, 2021	$ 1,732,921	$ 2,979,546	$ 2,275,101			
Approved	General Plant	C0030987	IT - NERC CIP Environment Refresh	2022 ACE Plan (2021 Pending Submission)	OTQ - March 7, 2022	$ 1,446,131	$ 1,259,927	$ 1,218,916			
Approved	Distribution	C0041892	New Distribution Rights-of-Way Phase 7	2022 ACE Plan	2022 ACE Plan	$ 9,854,291	$ 9,854,291	$ 6,350,941			
Approved	Steam	C0038747	LIN1 L-0 Blade Replacement	2022 ACE Plan	2022 ACE Plan	$ 6,066,800	$ 6,066,800	$ 2,429,705			
Approved	Gas Turbine	C0029693	CT - VJ1 Generator Replacement	2022 ACE Plan	2022 ACE Plan	$ 5,942,640	$ 5,942,640	$ 4,194,588			
Approved	Transmission	C0041893	2022/2023 Transmission Right-of-Way Widening 69kV	2022 ACE Plan	2022 ACE Plan	$ 5,312,315	$ 5,312,315	$ 1,574,607			
Approved	Transmission	C0041837	2022/2023 Substation Polychlorinated Biphenyl (PCB) Equipment Removal	2022 ACE Plan	2022 ACE Plan	$ 3,805,434	$ 3,805,434	$ 521,840			
Approved	Steam	C0041906	PHB – 2022 Turbine Refurbishment	2022 ACE Plan	2022 ACE Plan	$ 3,729,597	$ 3,729,597	$ 2,801,099			
Approved	Transmission	C0041793	L7002 Replacements and Upgrades Phase 2	2022 ACE Plan	2022 ACE Plan	$ 3,640,960	$ 3,640,960	$ 1,056			
Approved	Transmission	C0041805	L7005 Replacements and Upgrades Phase 2	2022 ACE Plan	2022 ACE Plan	$ 3,182,518	$ 3,182,518	$ 1,706,635			
Approved	Transmission	C0041989	2022/2023 Sacrificial Anode Installation Program	2022 ACE Plan	2022 ACE Plan	$ 3,015,107	$ 3,015,107	$ 633,357			
Deferred	Transmission	C0041794	L5031 Replacements and Upgrades Phase 2	2022 ACE Plan	2022 ACE Plan	$ 2,905,019	$ 2,905,019	$ -			
Approved	Transmission	C0041789	L5550 Replacements and Upgrades Phase 2	2022 ACE Plan	2022 ACE Plan	$ 2,698,515	$ 2,698,515	$ 1,934,503			
Approved	Transmission	C0041796	L6020 Replacements and Upgrades Phase 2	2022 ACE Plan	2022 ACE Plan	$ 2,518,243	$ 2,518,243	$ 1,553,928			
Approved	Transmission	C0041810	L5022 Replacements and Upgrades	2022 ACE Plan	2022 ACE Plan	$ 2,172,200	$ 2,172,200	$ 1,538,239			
Approved	Transmission	C0041791	L6551 Replacements and Upgrades	2022 ACE Plan	2022 ACE Plan	$ 1,988,246	$ 1,988,246	$ -			
Approved	Distribution	C0043130	2022 Padmount Replacement Program	2022 ACE Plan	2022 ACE Plan	$ 1,807,359	$ 1,807,359	$ 1,045,831			
Approved	Steam	C0030529	TUC3 Generator Refurbishment	2022 ACE Plan	2022 ACE Plan	$ 1,629,926	$ 1,629,926	$ 1,608,180			
Approved	Transmission	C0043571	2022/2023 Transmission Switch & Breaker Replacement	2022 ACE Plan	2022 ACE Plan	$ 1,612,638	$ 1,612,638	$ 996,462			
Approved	Transmission	C0041790	L8001 Replacements and Upgrades Phase 2	2022 ACE Plan	2022 ACE Plan	$ 1,395,537	$ 1,395,537	$ 1,104,458			
Approved	Hydro	C0036368	HYD - Lower Great Brook Switchgear Replacement	2022 ACE Plan	2022 ACE Plan	$ 1,362,281	$ 1,362,281	$ 605,928			

NS Power Capital Item Status Update

4th Quarter Overview - as of December 31, 2022

This report includes all projects submitted to the NSUARB and remain active, as well as ACE Plan subsequent submittal projects. Projects are removed from this report once the project has been final costed (internal or external), cancelled, or falls below $1M.

Status	Category	CI Number	Title	ACE Plan Reference (or U&U and P&A)	Submission/Date	ACE Amount	Submission or Approved Amount	Actual Spend	FIN Submission Date	FIN Amount	Variance
Approved	Transmission	C0043010	2022/2023 Wood Pole Retreatment Program	2022 ACE Plan	2022 ACE Plan	$ 1,300,037	$ 1,300,037	$ 62,468			
Approved	Transmission	C0041800	L5537 Replacements and Upgrades	2022 ACE Plan	2022 ACE Plan	$ 1,270,698	$ 1,270,698	$ 552,210			
Approved	Transmission	C0041804	2022 Line Retirement Program	2022 ACE Plan	2022 ACE Plan	$ 1,242,178	$ 1,242,178	$ -			
Approved	Hydro	C0024484	HYD - Fourth Lake Switchgear Replacement	2022 ACE Plan	2022 ACE Plan	$ 1,145,245	$ 1,145,245	$ 576,184			
Approved	Gas Turbine	C0029691	CT - VJ1 Control System Upgrade	2022 ACE Plan	2022 ACE Plan	$ 1,016,225	$ 1,016,225	$ 1,003,347			
Deferred	Transmission	C0044391	Eastern Clean Energy Initiative (ECEI) - Transmission	2022 ACE Plan (for Subsequent Approval)		$ 351,898,909		$ 164,892			
Deferred	Transmission	C0045132	Eastern Clean Energy Initiative (ECEI) - Energy Storage	2022 ACE Plan (for Subsequent Approval)		$ 171,207,920		$ 2,811,444			
Deferred	Wind	C0044771	Eastern Clean Energy Initiative (ECEI) - Wind	2022 ACE Plan (for Subsequent Approval)		$ 83,280,972		$ 3,429,192			
Deferred	Steam	C0044392	Eastern Clean Energy Initiative (ECEI) - Coal Conversion	2022 ACE Plan (for Subsequent Approval)		$ 32,341,325		$ 1,287,798			
Deferred	Hydro	C0034486	HYD - WRC LEM Penstock intake	2022 ACE Plan (for Subsequent Approval)		$ 11,239,851		$ 1,067,105			
Deferred	General Plant	C0032202	Sydney T&D Depot Consolidation	2022 ACE Plan (for Subsequent Approval)		$ 2,815,000		$ -			
Approved	Hydro	C0000979	HYD - Governor Dam Refurbishment	2022 ACE Plan (for Subsequent Approval)	OTQ - March 7, 2022	$ 2,696,630	$ 2,866,555	$ 641,524			
Approved	Distribution	C0022662	22C-404GA Lennox Passage Rebuild	2022 ACE Plan (for Subsequent Approval)	OTQ - July 4, 2022	$ 2,352,191	$ 2,609,595	$ 278,679			
Deferred	Transmission	C0036826	L8004 Parallel Canso Strait Crossing	2022 ACE Plan (for Subsequent Approval)		$ 2,139,081		$ -			
Less than $1M	General Plant	C0011168	IT - Firewall Refresh	2022 ACE Plan (for Subsequent Approval)		$ 2,112,237		$ 764,464			
Deferred	Gas Turbine	C0041507	CT TUS1 Exhaust Stack Replacement	2022 ACE Plan (for Subsequent Approval)		$ 2,031,020		$ 70,366			
Approved	General Plant	C0041994	NERC CIP 2022	2022 ACE Plan (for Subsequent Approval)	OTQ - April 4, 2022	$ 1,379,474	$ 1,247,663	$ 237,457			
Cancelled	General Plant	50292	Kempt Road and Dartmouth East Depot Truck Bays	2022 ACE Plan (for Subsequent Approval)	OTQ - June 6, 2022	$ 1,333,049	$ 1,363,449	$ -			
Awaiting Approval	Steam	C0041651	TUC HFO Tank 4 Refurbishment	2022 ACE Plan (for Subsequent Approval)	Q4 - February 6, 2023	$ 1,110,293	$ 2,734,313	$ 2,734,313			
Approved	General Plant	C0005498	IT - Endpoint Security	2022 ACE Plan (for Subsequent Approval)	OTQ - April 4, 2022	$ 1,064,684	$ 1,580,572	$ 756,852			
Approved	Transmission	C0010956	78W-Martin's Brook Substation Relocation	P&A	OTQ - September 6, 2022	$ -	$ 3,146,109	$ 149,189			
Approved	Transmission	C0045510	20V-T52 Transformer Replacement	U&U	Q3 - November 7, 2022	$ -	$ 1,506,566	$ 22,871			
Approved	Hydro	C0045210	HYD – LEQ Embankment Refurbishment	U&U	Q3 - November 7, 2022	$ -	$ 1,456,242	$ 1,151,604			
Awaiting Approval	Transmission	C0041807	L5534 Replacements and Upgrades	P&A	OTQ - December 5, 2022	$ -	$ 1,426,418	$ -			
Awaiting Approval	Transmission	C0049212	L8001 Replacements and Upgrades Phase 3	P&A	OTQ - December 5, 2022	$ -	$ 1,263,906	$ 376,348			
Awaiting Approval	Transmission	C0050835	2023/2024 Steel Tower Refurbishment	P&A	OTQ - December 5, 2022	$ -	$ 2,056,635	$ -			
Awaiting Approval	Transmission	C0052055	2023/2024 Transmission Right-of-Way Widening 69kV	P&A	OTQ - December 5, 2022	$ -	$ 5,332,315	$ -			
Awaiting Approval	Distribution	C0052056	New Distribution Rights-of-Way Phase 8	P&A	OTQ - December 5, 2022	$ -	$ 9,796,663	$ -			
Awaiting Approval	Transmission	C0052634	L5016 Replacements and Upgrades	P&A	OTQ - December 5, 2022	$ -	$ 2,697,637	$ -			
Awaiting Approval	Gas Turbine	C0001222	CT BGT1 Engine Exchange	P&A	OTQ - January 9, 2023	$ -	$ 2,338,747	$ 2,335,852			
Awaiting Approval	Steam	C0055376	TUC1 - LP Blade Refurbishment U&U	U&U	Q4 - February 6, 2023	$ -	$ 2,025,440	$ 977,643			
Awaiting Approval	Gas Turbine	C0041506	LM6000 Engine 191-253 Refurbishment	2023 ACE Plan	2023 ACE Plan	$ 8,742,590		$ 112,885			
Awaiting Approval	Hydro	C0012838	HYD - Lequille Canal Dyke, Gates and Tailrace Refurbishment	2023 ACE Plan	2023 ACE Plan	$ 7,058,816		$ 841,887			
Awaiting Approval	Gas Turbine	C0029682	CT VJ2 - Replace Generator Assembly	2023 ACE Plan	2023 ACE Plan	$ 5,397,738		$ -			
Awaiting Approval	Steam	C0051134	TUC2 - L-0 Blade Replacement	2023 ACE Plan	2023 ACE Plan	$ 4,157,503		$ 1,205			
Awaiting Approval	Transmission	C0041788	L6516 Replacements and Upgrades Phase 2	2023 ACE Plan	2023 ACE Plan	$ 3,123,474		$ -			
Awaiting Approval	Transmission	C0055539	10H-T1 Transformer Replacement	2023 ACE Plan	2023 ACE Plan	$ 2,420,892		$ -			
Awaiting Approval	Transmission	C0052299	2023/2024 Steel Tower Life Extension	2023 ACE Plan	2023 ACE Plan	$ 2,195,463		$ -			
Awaiting Approval	Transmission	C0055796	2023 EHV Breaker Replacements	2023 ACE Plan	2023 ACE Plan	$ 2,048,411		$ -			
Awaiting Approval	Transmission	C0055696	L5031 Replacement and Upgrades Robinson Corner Tap	2023 ACE Plan	2023 ACE Plan	$ 1,357,477		$ -			
Awaiting Approval	Distribution	C0050836	2023 Padmount Replacement Program	2023 ACE Plan	2023 ACE Plan	$ 1,309,551		$ -			
Awaiting Approval	Steam	C0051135	TUC2 - Turbine Valves Refurbishment 2023	2023 ACE Plan	2023 ACE Plan	$ 1,206,263		$ -			
Awaiting Approval	Transmission	C0052654	L5541 Water Crossing Upgrades	2023 ACE Plan	2023 ACE Plan	$ 1,047,074		$ -			
Pending Submission	Hydro	C0015798	WRC Tunnel T-2 Fall of Ground Remediation	2023 ACE Plan (for Subsequent Approval)		$ 22,791,784		$ 21,994,104			
Pending Submission	Transmission	C0053316	Michelin Voltage Sag Reduction DVR	2023 ACE Plan (for Subsequent Approval)		$ 21,007,507		$ -			
Pending Submission	Transmission	C0032382	Susie Lake Substation Addition	2023 ACE Plan (for Subsequent Approval)		$ 6,215,516		$ 61,636			
Pending Submission	General Plant	C0047277	IT - GIS Utility Network Migration	2023 ACE Plan (for Subsequent Approval)		$ 4,727,187		$ 104,817			
Pending Submission	General Plant	C0042166	IT - Data Loss Prevention (DLP) Platform	2023 ACE Plan (for Subsequent Approval)		$ 3,233,905		$ 1,399,519			
Pending Submission	General Plant	C0053699	Renewable to Retail Implementation	2023 ACE Plan (for Subsequent Approval)		$ 2,833,093		$ -			
Pending Submission	General Plant	C0054755	IT - Connect My Data (Green Button)	2023 ACE Plan (for Subsequent Approval)		$ 2,059,897		$ -			
Pending Submission	Steam	C0050901	TUC - HFO Tank 3 Refurbishment	2023 ACE Plan (for Subsequent Approval)		$ 2,053,937		$ -			
Pending Submission	General Plant	C0030984	IT - Cisco UCS Lifecycle	2023 ACE Plan (for Subsequent Approval)		$ 2,047,691		$ 616,396			
Pending Submission	Wind	C0044030	WIN - DIG Haight's Brook Crossing Replacement	2023 ACE Plan (for Subsequent Approval)		$ 2,046,985		$ 83,740			
Pending Submission	Transmission	C0050838	2023 Substation Primary Equipment Spares	2023 ACE Plan (for Subsequent Approval)		$ 2,010,107		$ -			
Pending Submission	Hydro	C0047973	HYD - ANN Sluice Gates and Check Refurbishment	2023 ACE Plan (for Subsequent Approval)		$ 1,957,501		$ 109,753			
Pending Submission	Transmission	C0055557	76V-T1 Transformer Replacement	2023 ACE Plan (for Subsequent Approval)		$ 1,751,258		$ -			
Pending Submission	General Plant	C0043910	IT - Customer Energy Management Phase 2	2023 ACE Plan (for Subsequent Approval)		$ 1,713,266		$ 428,126			
Pending Submission	General Plant	C0047294	IT - Microsoft Enterprise Agreement Renewal	2023 ACE Plan (for Subsequent Approval)		$ 1,609,423		$ 60,965			
Pending Submission	General Plant	C0011167	IT - Backup Infrastructure Upgrade	2023 ACE Plan (for Subsequent Approval)		$ 1,557,471		$ 136,523			
Pending Submission	General Plant	C0050477	IT - Network Protection - Detection and Response	2023 ACE Plan (for Subsequent Approval)		$ 1,383,001		$ 594,563			
Pending Submission	General Plant	C0053215	Sackville Depot Back Up Generator	2023 ACE Plan (for Subsequent Approval)		$ 1,206,506		$ -			

* Maritime Link Transmission capital work orders were filed as part of the Company's General Rate Application. They were not approved at the time of the GRA Decision.

NS Power 2022 ACE Plan Items – Deferred or Cancelled
4th Quarter Overview - as of December 31, 2022
This report includes any deferred or cancelled projects that were included in the 2022 ACE Plan.

CI	Project Title	2022 ACE Amount	2022 ACE Project Total	Cancelled / Deferred	Deferred To	Prior Approval	2022 ACE Plan Reference	2023 ACE Plan Reference	Commentary
Generation									
C0038874	HYD - FAR Spillway Culvert Replacement	66,457	78,028	Deferred	2023		Less than $1M	Less than $1M	Deferred due to unplanned carry-over and U&U capital work utilizing available project management resources. The existing approach to management of this asset is expected to address near term risks.
C0039386	HYD - Bloody Creek Safety Improvements	98,779	98,779	Deferred	2024		Less than $1M		Deferred due to unplanned carry-over and U&U capital work utilizing available project management resources. The existing approach to management of this asset is expected to address near term risks.
C0023682	TRE6 6A Mill Bullgear and Pinion Refurbishment	548,231	548,231	Deferred	2024		Less than $1M		The refurbishment Interval can be extended based on updated vibration analysis and assessment. The existing approach to management of this asset is expected to address near term risks.
C0036348	LIN4 Steam Drum Level Controls Upgrade	121,412	121,412	Deferred	2023		Less than $1M	Less than $1M	Deferred due to on-going carry-over work on the Lingan Unit 3 steam drum level controls project (CI 49447). Learnings from CI 49447 will be applied to the LIN4 controls upgrade.
C0036349	LIN1 RH Tube Replacement 2022	305,309	305,309	Deferred	2023		Less than $1M	Less than $1M	Deferred due to unplanned carry-over as a result of reduced length of planned 2021 LIN1 outage. The existing approach to management of this asset is expected to address near term risks and replacement will be completed in 2023.
C0041206	LIN JD Gator Replacement 2022	26,270	26,270	Cancelled*			Less than $1M		Replaced by CI Number C0046853.
C0041314	TRE Fish Barrier Screen Replacement	112,820	112,820	Deferred	2023		Less than $1M	Less than $1M	Deferred the replacement of the existing refurbished screen due to higher than anticipated stainless steel costs from current market conditions. The existing screen will remain in-use and will be monitored for condition. Will continue to evaluate and monitor material costs.
C0041707	POT - Ladder Swing Gates & Guarding 2022	98,641	98,641	Cancelled			Less than $1M		The scope of this project will now be included in C0042711.
C0041528	CT TUC4/5 Confined Space Attachment Points	17,500	17,500	Cancelled			Less than $1M		Catwalk work expected to take place in 2023 will create a rescue route for confined space work and will remove the need for the confined space attachment points.
C0029684	TUS - Fuel Piping Coating Refurbishment	30,203	32,796	Cancelled			Less than $1M		Based on updated condition assessments the fuel piping requires replacement instead of only a coating refurbishment
C0029924	LIN4 BFP Check Valve Replacement	214,753	214,753	Deferred	2024		Less than $1M		Deferred due to delays in the supply of materials. The existing approach to management of this asset is expected to address near term risks.
C0039166	LIN CW Valve Refurbishment 2022	193,600	193,600	Deferred	2023		Less than $1M	Less than $1M	Updated condition assessment was completed and risks are able to mitigated with consideration of the remaining mission of the unit.
C0041507	CT TUS1 Exhaust Stack Replacement	2,031,020	2,031,020	Deferred	2024		Subsequent Submittal		Deferred due to delays in the supply of materials. The existing approach to management of this asset is expected to address near term risks.
C0041051	LIN Roof Hatch Redesign 2022	151,267	151,267	Cancelled			Less than $1M		Modifications to existing roof hatches were able to be completed more cost effectively rather than completing a redesign.
C0039028	LIN1 Ash Incline Refurbishment 2022	247,363	247,363	Deferred	2024		Less than $1M		Updated condition assessment was completed and risks are able to mitigated with consideration of the remaining mission of the unit.
C0010331	TRE6 Precipitator Controls Upgrade	165,881	165,881	Deferred	2023		Less than $1M	Less than $1M	Deferred due to delays in the supply of materials. The existing controls will remain in-use until 2023 when the upgrade can be completed.
C0041324	TRE6 6B Mill Bullgear and Pinion Refurbishment	545,453	545,453	Deferred	2024		Less than $1M		The refurbishment interval can be extended based on updated vibration analysis and assessment. The existing approach to management of this asset is expected to address near term risks.
C0037747	WIN - South Canoe Continuous Monitoring System Upgrade	152,672	180,673	Deferred	2024		Less than $1M		Due to higher priority operational CMS work utilizing available wind turbine operators the upgrade of the existing CMS has been deferred to 2023.
C0041891	POT - Ash Site Collection Stair Structure	64,440	64,440	Cancelled			Less than $1M		During detailed engineering design review an alternative mitigation measure was determined that no longer requires building a structural steel walkway down to the outfall.
C0044150	PTMT - Cathodic Protection 2022	207,132	207,132	Deferred	2024		Less than $1M		Deferred to better define project scope and requirements.
C0042088	PTMT - E-Crane Travel Pump Replacement	44,659	44,659	Deferred	2024		Less than $1M		Deferred due to U&U capital work utilizing available project management resources. The existing approach to management of this asset is expected to address near term risks.
C0019339	TRE6 Main Steam Piping Refurbishment	535,174	744,302	Deferred	2023		Less than $1M	Less than $1M	Deferred due to U&U capital work utilizing available project management resources. The existing approach to management of this asset is expected to address near term risks.
C0044392	Eastern Clean Energy Initiative (ECEI) - Coal Conversion	9,390,264	32,341,325	Deferred			Subsequent Submittal		Under Evaluation
C0044771	Eastern Clean Energy Initiative (ECEI) - Wind	29,563,744	83,280,972	Deferred			Subsequent Submittal		Under Evaluation
39472	HYD Mersey Redevelopment Phase 1	6,268,288	189,447,076	Deferred			Subsequent Submittal		Under Evaluation
C0034486	HYD - WRC LEM Penstock intake	150,655	11,239,851	Deferred			Subsequent Submittal		Under Evaluation
C0012838	HYD - Lequille Canal Dyke, Gates and Tailrace Refurbishment	489,872	6,123,004	Deferred	2023		Subsequent Submittal	Request Approval	Deferred to better define project scope and requirements.
C0039147	LIN Coal Feeder Drive Replacement 2022	98,854	98,854	Deferred	2024		Less than $1M		Deferred due to U&U capital work utilizing available project management resources. The existing approach to management of this asset is expected to address near term risks.
C0030062	LIN3 HIP Insulation Replacement	146,253	146,253	Deferred	2024		Less than $1M		Deferred due to U&U capital work utilizing available project management resources. The existing approach to management of this asset is expected to address near term risks.
C0030943	ICP Pumphouse Refurbishment	89,955	89,955	Deferred	2023		Less than $1M	Less than $1M	Deferred due to U&U capital work utilizing available project management resources. The existing approach to management of this asset is expected to address near term risks.
C0031086	TRE TAMS Toe Buttress Habitat Restoration	35,203	35,203	Deferred	2023		Less than $1M	Less than $1M	Deferred due to U&U capital work utilizing available project management resources. The existing approach to management of this asset is expected to address near term risks.
C0027583	POA Ash Cell Capping 2021	45,090	95,349	Cancelled			Pt. Aconi		This project is cancelled as it was determined that the POA Cell Capping Project (CI C0050679) will complete the intended scope included in this CI.
C0020310	TRE Roofing Anchor Points	136,204	136,204	Deferred	2024		Less than $1M		Deferred due to U&U capital work utilizing available project management resources.

NS Power 2022 ACE Plan Items – Deferred or Cancelled
4th Quarter Overview - as of December 31, 2022
This report includes any deferred or cancelled projects that were included in the 2022 ACE Plan.

CI	Project Title	2022 ACE Amount	2022 ACE Project Total	Cancelled / Deferred	Deferred To	Prior Approval	2022 ACE Plan Reference	2023 ACE Plan Reference	Commentary
C0021462	TUC Plant Siding Refurbishment	77,195	77,195	Cancelled			Less than $1M		It has been determined that the refurbishment of the plant siding is not needed at this time. The siding condition will continue to be monitored.
C0041656	TUC Portable Furnace Viewing Camera	74,320	74,320	Cancelled			Less than $1M		During detailed engineering design review it was determined that the available cameras will not provide the information required.
C0021466	TUC Underground Water Lines Replacement	78,879	78,879	Cancelled			Less than $1M		It has been determined that the replacement of the underground water lines is not needed at this time. The condition of the lines will continue to be monitored.
C0041993	TUC2 CW Inlet Concrete Refurbishment	173,119	173,119	Deferred	2024		Less than $1M		Deferred due to align with planned 2024 capital work on related assets. The existing approach to management of this asset is expected to address near term risks.
C0030782	ICP #1 Belt Take-up Replacement	240,473	273,973	Deferred	2024		Less than $1M		Deferred due to unplanned carry-over and U&U capital work utilizing available project management resources. The existing approach to management of this asset is expected to address near term risks.
C0020603	ICP Locomotive Traction Motor Refurbishment	70,621	70,621	Deferred	2024		Less than $1M		Deferred due to unplanned carry-over and U&U capital work utilizing available project management resources. The existing approach to management of this asset is expected to address near term risks.
C0020602	ICP Silo Liner Replacement	97,540	97,540	Deferred	2024		Less than $1M		Deferred due to unplanned carry-over and U&U capital work utilizing available project management resources. The existing approach to management of this asset is expected to address near term risks.
Transmission									
C0032382	Susie Lake Substation Addition	3,605,202	6,225,600	Deferred	2023		Subsequent Submittal	Subsequent Submittal	Deferred to refine project scope and requirements. Negotiations for land acquisition for this project is ongoing and the project is not expected to begin execution until 2023. In the near term, ongoing monitoring of customer load in the area will help to mitigate overall risks.
C0021140	New 138KV-25KV Substation - Stellarton	3,990,799	4,047,925	Deferred	2024		Subsequent Submittal		This project has been deferred to better align with expected procurement and execution timelines for the project. In the near term, risk will be mitigated through regular condition monitoring as well as load checks.
C0036826	L8004 Parallel Canso Strait Crossing	970,337	2,139,081	Deferred	2024		Subsequent Submittal		This project has been deferred to better define the overall requirements, a complex project scope, and investigate the viability of alternative options. Ongoing risk mitigation for asset reliability and system security will be undertaken through the transmission inspection program and ad hoc condition assessments as appropriate.
C0041794	L5031 Replacements and Upgrades Phase 2	644,038	2,905,019	Deferred	2024		Request Approval		This project has been deferred to accommodate ongoing phase 1 work on L5031. This deferral will allow for further refinement of the scope in consideration of the work completed in phase 1. Condition monitoring through the existing transmission inspection program will contribute to mitigation of risk on L5031 in the near term.
C0044391	Eastern Clean Energy Initiative (ECEI) - Transmission	20,378,370	351,898,909	Deferred			Subsequent Submittal		Under Evaluation
C0045132	Eastern Clean Energy Initiative (ECEI) - Energy Storage	60,413,412	171,207,920	Deferred			Subsequent Submittal		Under Evaluation
C0031047	85S Generator Breaker Replacements	153,831	305,201	Deferred	2023		Less than $1M	Less than $1M	This project has been deferred to better align with expected procurement and execution timelines for the project.
C0041822	Wreck Cove Cable Storage System	357,100	590,610	Deferred	2023		Less than $1M	Less than $1M	This project has been deferred to better define the overall requirements and complete additional testing on the existing cable before proceeding.
C0021132	24C-T54G Grounding Bank Replacement	723,299	784,561	Deferred	2023		Less than $1M	Less than $1M	This project has been deferred to better align with expected procurement and execution timelines for the project.
C0041812	L6040 Replacements and Upgrades	336,712	673,424	Deferred	2023		Less than $1M	Less than $1M	This project has been deferred to better define the overall requirements and complete additional engineering before proceeding.
C0022247	1N-Onslow 138 kV Add Second 42 MVA Power Transformer	293,817	4,500,000	Deferred	2024				Deferred to refine project scope and requirements. In the near term, ongoing monitoring of customer load in the area will help to mitigate overall risks.
C0011117	17V-T1 Power Transformer Replacement	75,704	278,093	Cancelled			Less than $1M		A more detailed analysiswas completed that determined the replacement wasn't required at this time.
C0041838	Animal Deterrents/Pest Mitigation for Cable Trenches	101,426	252,747	Deferred	2024		Less than $1M		This project has been deferred due to higher priority capital work utilizing available line services resources in 2022. Ongoing risk mitigation for asset reliability and system security will be undertaken through the transmission inspection program and ad hoc condition assessments as appropriate.
C0041830	Spare Power Production Unit Transformer	883,700	883,700	Deferred	2024		Less than $1M		This project has been deferred due to higher priority capital work utilizing available line services resources in 2022. Ongoing risk mitigation for asset reliability and system security will be undertaken through the transmission inspection program and ad hoc condition assessments as appropriate.
C0031043	10W Radiator Replacements	179,690	179,690	Deferred	2024		Less than $1M		This project has been deferred to better define the overall requirements and investigate the viability of alternative options. Ongoing risk mitigation for asset reliability and system security will be undertaken through the transmission inspection program and ad hoc condition assessments as appropriate.
C0031294	16V Low Side Switch Addition	47,878	47,878	Deferred	2024		Less than $1M		This project has been deferred due to higher priority capital work utilizing available line services resources in 2022. Ongoing risk mitigation for asset reliability and system security will be undertaken through the transmission inspection program and ad hoc condition assessments as appropriate.
C0041840	Legacy Oil Containment Refurbishments	169,887	253,114	Deferred	2023		Less than $1M	Less than $1M	This project has been deferred due to higher priority capital work utilizing available line services resources in 2022. Ongoing risk mitigation for asset reliability and system security will be undertaken through the transmission inspection program and ad hoc condition assessments as appropriate.
C0041844	Upgrade Mobile Protection Relays	126,782	252,883	Deferred	2023		Less than $1M	Less than $1M	This project has been deferred due to higher priority capital work utilizing available line services resources in 2022. Ongoing risk mitigation for asset reliability and system security will be undertaken through the transmission inspection program and ad hoc condition assessments as appropriate.

NS Power 2022 ACE Plan Items – Deferred or Cancelled
4th Quarter Overview - as of December 31, 2022
This report includes any deferred or cancelled projects that were included in the 2022 ACE Plan.

CI	Project Title	2022 ACE Amount	2022 ACE Project Total	Cancelled / Deferred	Deferred To	Prior Approval	2022 ACE Plan Reference	2023 ACE Plan Reference	Commentary
C0041841	Onslow Spares Yard Grade/Storage Pads	152,138	152,138	Deferred	2023		Less than $1M	Less than $1M	This project has been deferred due to higher priority capital work utilizing available line services resources in 2022. Ongoing risk mitigation for asset reliability and system security will be undertaken through the transmission inspection program and ad hoc condition assessments as appropriate.
C0041842	Bird Deterrents for 2S and 50N	101,426	101,426	Deferred	2023		Less than $1M	Less than $1M	This project has been deferred due to higher priority capital work utilizing available line services resources in 2022. Ongoing risk mitigation for asset reliability and system security will be undertaken through the transmission inspection program and ad hoc condition assessments as appropriate.
C0041835	50W Radiator Replacements	81,141	81,141	Deferred	2023		Less than $1M	Less than $1M	This project has been deferred due to higher priority capital work utilizing available line services resources in 2022. Ongoing risk mitigation for asset reliability and system security will be undertaken through the transmission inspection program and ad hoc condition assessments as appropriate.
C0031044	67N-713 230 kV Breaker Replacement	272,277	277,963	Deferred	2023		Less than $1M	Less than $1M	This project has been deferred due to higher priority capital work utilizing available line services resources in 2022. Ongoing risk mitigation for asset reliability and system security will be undertaken through the transmission inspection program and ad hoc condition assessments as appropriate.
C0041831	Lingan Spare Potential Transformers	138,805	138,805	Deferred	2024		Less than $1M		This project has been deferred due to higher priority capital work utilizing available line services resources in 2022. Ongoing risk mitigation for asset reliability and system security will be undertaken through the transmission inspection program and ad hoc condition assessments as appropriate.
Distribution									
C0043650	57C-426 - Eight Island Lake Rebuild	77,066	83,233	Deferred	2023		Less than $1M	Less than $1M	This project has been deferred due to higher priority capital work utilizing available line services resources in 2022. Existing monitoring of condition for emerging risks through the distribution inspection program will remain in place until this project can be executed.
C0042969	59C-401 - Greenville Street Rebuild	248,969	471,478	Deferred	2023		Less than $1M	Less than $1M	This project has been deferred due to higher priority capital work utilizing available line services resources in 2022. Continued monitoring of condition to manage emerging risks through the distribution inspection program will remain in place until this project can be executed.
C0042847	61N-204 High Street Conversion	168,309	317,616	Deferred	2024		Less than $1M		This project has been deferred due to higher priority capital work utilizing available line services resources in 2022. Continued monitoring of condition to manage emerging risks through the distribution inspection program will remain in place until this project can be executed.
C0042687	15N-202 Arthur St Conversion	669,772	718,195	Deferred	2023		Less than $1M	Less than $1M	This project has been deferred due to higher priority capital work utilizing available line services resources in 2022. Continued monitoring of condition to manage emerging risks through the distribution inspection program will remain in place until this project can be executed.
C0031121	104S-313 - Re-Conductor Big Hill	51,733	743,778	Deferred	2023		Less than $1M	Less than $1M	This project has been deferred due to higher priority capital work utilizing available line services resources in 2022. Continued monitoring of condition to manage emerging risks through the distribution inspection program will remain in place until this project can be executed.
C0042927	103C-314 – Grand Etang Water Crossing	12,456	99,755	Deferred	2023		Less than $1M	Less than $1M	This project has been deferred due to higher priority capital work utilizing available line services resources in 2022. Continued monitoring of condition to manage emerging risks through the distribution inspection program will remain in place until this project can be executed.
C0043651	4C-441G - Rear Monastery Road Reconductor	260,793	282,005	Deferred	2023		Less than $1M	Less than $1M	This project has been deferred due to higher priority capital work utilizing available line services resources in 2022. Continued monitoring of condition to manage emerging risks through the distribution inspection program will remain in place until this project can be executed.
C0043330	88W-314-Vancouver St Rebuild	103,881	415,764	Deferred	2024		Less than $1M		This project has been deferred due to higher priority capital work utilizing available line services resources in 2022. Continued monitoring of condition to manage emerging risks through the distribution inspection program will remain in place until this project can be executed.
C0031304	37N-413G-South Athol Rebuild	68,421	643,312	Deferred	2024		Less than $1M		This project has been deferred due to higher priority capital work utilizing available line services resources in 2022. Continued monitoring of condition to manage emerging risks through the distribution inspection program will remain in place until this project can be executed.
C0042846	15C-211 - Deepdale Conversion	120,240	312,286	Deferred	2023		Less than $1M	Less than $1M	This project has been deferred due to higher priority capital work utilizing available line services resources in 2022. Continued monitoring of condition to manage emerging risks through the distribution inspection program will remain in place until this project can be executed.
C0042326	101H-413 Balsam Circle Rebuild	148,327	160,846	Deferred	2024		Less than $1M		This project has been deferred due to higher priority capital work utilizing available line services resources in 2022. Continued monitoring of condition to manage emerging risks through the distribution inspection program will remain in place until this project can be executed.
C0042910	101H-413 Aspen Ct Rebuild	83,740	180,691	Deferred	2023		Less than $1M	Less than $1M	This project has been deferred due to higher priority capital work utilizing available line services resources in 2022. Continued monitoring of condition to manage emerging risks through the distribution inspection program will remain in place until this project can be executed.
C0041949	59C-402 Targeted Device Replacements	184,735	184,735	Deferred	2023		Less than $1M	Less than $1M	This project has been deferred due to higher priority capital work utilizing available line services resources in 2022. Continued monitoring of condition to manage emerging risks through the distribution inspection program will remain in place until this project can be executed.
C0041950	67C-411 Targeted Device Replacements	205,861	205,861	Deferred	2023		Less than $1M	Less than $1M	This project has been deferred due to higher priority capital work utilizing available line services resources in 2022. Continued monitoring of condition to manage emerging risks through the distribution inspection program will remain in place until this project can be executed.
C0042946	113H-441G Ashgrove Ave Rebuild	111,357	133,086	Deferred	2023		Less than $1M	Less than $1M	This project has been deferred due to higher priority capital work utilizing available line services resources in 2022. Continued monitoring of condition to manage emerging risks through the distribution inspection program will remain in place until this project can be executed.

NS Power 2022 ACE Plan Items – Deferred or Cancelled
4th Quarter Overview - as of December 31, 2022
This report includes any deferred or cancelled projects that were included in the 2022 ACE Plan.

CI	Project Title	2022 ACE Amount	2022 ACE Project Total	Cancelled / Deferred	Deferred To	Prior Approval	2022 ACE Plan Reference	2023 ACE Plan Reference	Commentary
C0041951	92H-331 and 332 Targeted Device Replacements	184,735	184,735	Deferred	2023		Less than $1M	Less than $1M	This project has been deferred due to higher priority capital work utilizing available line services resources in 2022. Continued monitoring of condition to manage emerging risks through the distribution inspection program will remain in place until this project can be executed.
C0043930	1H-419 Targeted Underground Device Replacements	584,333	584,333	Deferred	2024		Less than $1M		This project has been deferred due to higher priority capital work utilizing available line services resources in 2022. Continued monitoring of condition to manage emerging risks through the distribution inspection program will remain in place until this project can be executed.
C0041952	48H-302 Targeted Device Replacements	127,071	127,071	Deferred	2024		Less than $1M		This project has been deferred due to higher priority capital work utilizing available line services resources in 2022. Continued monitoring of condition to manage emerging risks through the distribution inspection program will remain in place until this project can be executed.
General Plant									
C0011170	IT - JSCAPE MFT Upgrade	100,814	100,814	Deferred	2024		Less than $1M		This project has been deferred due to higher priority carryover work using available resources in 2022. Existing approach to management of this asset is expected to meet near term requirements.
C0021833	IT - CIS - Data Archive	200,263	200,263	Deferred	2024		Less than $1M		This project has been deferred due to higher priority carryover work using available resources in 2022. Existing approach to management of this asset is expected to meet near term requirements.
C0030989	IT - Server Configuration Management	77,427	102,427	Deferred	2024		Less than $1M		This project has been deferred due to higher priority carryover work using available resources in 2022. Existing approach to management of this asset is expected to meet near term requirements.
C0042151	IT - Expand Network Core	246,815	246,815	Deferred	2024		Less than $1M		This project has been deferred due to higher priority carryover work using available resources in 2022. Existing approach to management of this asset is expected to meet near term requirements.
C0042686	IT - ADMS Maintenance Release 2022	234,039	234,039	Deferred	2024		Less than $1M		This project has been deferred due to higher priority carryover work using available resources in 2022. Existing approach to management of this asset is expected to meet near term requirements.
C0029925	AMO CMS Expansion	51,796	51,796	Cancelled			Less than $1M		The scope of this project will now be included as part of a future CMS upgrade.
C0041566	AMO Application Modernization	30,162	30,162	Cancelled*			Less than $1M		Replaced by CI Number C0050693.
C0041928	AMO Distribution Configuration Management	131,392	147,342	Deferred	2024		Less than $1M		Deferred to better define project scope and requirements.
C0041926	AMO T&D Risk Evaluation Automation	114,435	114,435	Deferred	2024		Less than $1M		Deferred to better define project scope and requirements.
C0041907	AMO CT Component Life Management System	52,866	52,866	Deferred	2024		Less than $1M		Deferred to better define project scope and requirements.
C0021133	SCADA Mobile Application	101,090	101,090	Deferred	2023		Less than $1M	Less than $1M	The 2020 SCADA Upgrade(CI C0011819) has experienced delays which has impacted the timeline of this project. The SCADA upgrade was originally expected to be completed in Q1 of 2022 but it will be completed in Q4 of 2022.
C0042168	IT - Web Application Firewall Uplift	304,484	304,484	Deferred	2024		Less than $1M		Deferred to better define project scope and requirements.
C0011159	IT - PI System Upgrade	353,996	353,996	Deferred	2024		Less than $1M		This project has been deferred due to higher priority carryover work using available resources in 2022. Existing approach to management of this asset is expected to meet near term requirements.
C0042162	IT - Oracle Linux 6	100,921	100,921	Deferred	2024		Less than $1M		This project has been deferred due to higher priority carryover work using available resources in 2022. Existing approach to management of this asset is expected to meet near term requirements.
C0031027	IT - Multi-Factor Authentication	514,820	564,820	Cancelled			Less than $1M		This project is cancelled as it was determined other CyberSecurity projects achieve this project's original purpose.
C0031022	IT - Identity & Access Management	739,385	907,938	Deferred	2024		Less than $1M		Deferred to better define project scope and requirements.
C0043911	IT - Courtesy Callback/Virtual Hold	77,663	77,663	Deferred	2023		Less than $1M	Less than $1M	This project has been deferred due to higher priority carryover work using available resources in 2022. Existing approach to management of this asset is expected to meet near term requirements.
C0031002	IT - Customer Billing & Payment Solution	286,083	687,972	Deferred	2023		Less than $1M	Less than $1M	This project has been deferred due to higher priority carryover work using available resources in 2022. Existing approach to management of this asset is expected to meet near term requirements.
C0011167	IT - Backup Infrastructure Upgrade	892,633	1,004,879	Deferred	2023		Subsequent Submittal	Subsequent Submittal	Deferred due to delays in the supply of required hardware. The existing hardware will remain in-use until 2023 when the upgrade can be completed.
C0031028	IT - Network Access Control	337,998	531,848	Deferred	2023		Less than $1M	Less than $1M	This project has been deferred due to higher priority carryover work using available resources in 2022. Existing approach to management of this asset is expected to meet near term requirements.
C0031169	IT - GIS Upgrade 2022	351,814	351,814	Deferred	2024		Less than $1M		This project has been deferred due to higher priority carryover work using available resources in 2022. Existing approach to management of this asset is expected to meet near term requirements.
C0021843	IT - Upgrade Oracle OBIA	166,006	170,483	Deferred	2023		Less than $1M	Less than $1M	This project has been deferred due to higher priority carryover work using available resources in 2022. Existing approach to management of this asset is expected to meet near term requirements.
C0043550	IT - Itron Collection Manager	671,162	671,162	Deferred	2023		Less than $1M	Less than $1M	This project has been deferred due to higher priority carryover work using available resources in 2022. Existing approach to management of this asset is expected to meet near term requirements.
51963	IT - Adept Upgrade	291,870	319,298	Deferred	2024		Less than $1M		This project has been deferred due to higher priority carryover work using available resources in 2022. Existing approach to management of this asset is expected to meet near term requirements.
C0030983	IT - User File Services Upgrade	346,858	346,858	Deferred	2023		Less than $1M	Less than $1M	This project has been deferred due to higher priority carryover work using available resources in 2022. Existing approach to management of this asset is expected to meet near term requirements.
C0030984	IT - Cisco UCS Lifecycle	891,243	891,243	Deferred	2023		Less than $1M	Subsequent Submittal	This project has been deferred due to higher priority carryover work using available resources in 2022. Existing approach to management of this asset is expected to meet near term requirements.
C0042166	IT - Data Loss Prevention Platform	783,551	1,003,551	Deferred	2023		Subsequent Submittal	Subsequent Submittal	Deferred to better define project scope and requirements.
C0031024	IT - Security Patch Management	1,400,000	1,700,000	Cancelled			Subsequent Submittal		This project is cancelled as it was determined other CyberSecurity projects achieve this project's original purpose.
C0032202	Sydney T&D Depot Consolidation	200,000	2,815,000	Deferred	2024		Subsequent Submittal		Deferred to better define project scope, requirements and investigate alternative options.
C0043551	IT - Oracle MDMS Maintenance Release	103,590	103,590	Deferred	2024		Less than $1M		This project has been deferred due to higher priority carryover work using available resources in 2022. Existing approach to management of this asset is expected to meet near term requirements.

NS Power 2022 ACE Plan Items – Deferred or Cancelled
4th Quarter Overview - as of December 31, 2022
This report includes any deferred or cancelled projects that were included in the 2022 ACE Plan.

CI	Project Title	2022 ACE Amount	2022 ACE Project Total	Cancelled / Deferred	Deferred To	Prior Approval	2022 ACE Plan Reference	2023 ACE Plan Reference	Commentary
C0043910	IT - Customer Energy Management Phase 2	2,154,815	2,154,815	Deferred	2023		Subsequent Submittal	Subsequent Submittal	Deferred to better define project scope and requirements.
50292	Kempt Road and Dartmouth East Depot Truck Bays	608,390	1,333,049	Cancelled			Subsequent Submittal		This project was not approved by the NSUARB.
47751	ECC Dynamic Line Rating Implementation	502,306	5,144,525	Deferred	2024		Less than $1M		Deferred to better define project scope and requirements.
49832	Victoria Junction Substations Fiber Links	61,755	61,755	Deferred	2024		Less than $1M		Deferred due to U&U capital work utilizing available project management resources. The existing approach to management of this asset is expected to address near term risks.
Previously listed as deferred, now active in 2022.									
49634	HYD - Trout River Diversion Structure Replacement	1,365,833	1,822,300	Deferred	2023		Subsequent Submittal		This project is no longer deferred and will begin in Q4 2022.

* These projects have been cancelled and replaced with a new CI. They are still required and included in the 2022 ACE Plan.

NS Power Final Cost Report

4th Quarter Overview - as of December 31, 2022

This report includes a list of all FIN capital work orders that have fallen outside the timelines under the CEJC. (Within six months of in-service.)
These projects have either been completed and are outside the FIN tolerances or forecast to be outside of the FIN tolerances. (The greater of +/- 5% or +/- $250,000.)
Projects that have been in-service for 6 months, but have a project forecast within the allowed FIN tolerance, are not included on this list.

Project #	Project	In-service Date	NSUARB Approval	Spend to December 31, 2022	Comment
40648	IT - Field Mobility System	9/30/2015	3,332,515	2,024,988	The remaining work on this project is included in the WAM Phase 2 project (CI 46075) which has been approved by the NSUARB. Accordingly, a Final Cost Application for CI 40648 is planned for submission in 2023.
C0029693	CT - VJ1 Generator Replacement	6/17/2022	5,942,640	4,194,588	This project is now complete and a Final Cost Application is planned for submission in 2023.
C0002539	HYD Bridge Remediation	1/15/2020	6,843,686	5,934,077	This project is expected to complete the final bridge replacment in Q2 2023 and a Final Cost Application is planned for submission in 2023.
51403	2018/2019 PCB Equipment Removal	4/30/2018	4,402,342	3,491,693	This project is now complete and a Final Cost Application is planned for submission in 2023.

NS Power Unapproved Spending

As of December 31, 2022

This report includes all projects that have been removed from rate base per the conditions as established and approved in the CEJC and Accounting Policy 1520 - Rate Base, and their associated 2021 Income Statement impact.
Note 1: This report has been amended to include the new columns titled "Forgone Earning Potential" in compliance with the NSUARB's direction by letter of August 30, 2017 (M07568)
Note 2: This report has been amended to reflect the new Board approval threshold of $1,000,000, effective October 30, 2019.

(1) Capital Items with NSUARB unapproved plant in service above $1,000,000 ($250,000 prior to October 30, 2019), where a capital work order has not been filed with the NSUARB within 6 months of the project's completion:

CI	Project Title	Functional Class	2022 Periods not Included in Rate Base	Approval Threshold	Spend	Unapproved Balance	Depreciation Expense on Unapproved Balance	Interest Expense on Unapproved Balance	AFUDC on Unapproved Spending	Total Income Tax Impact	2022 Income Statement Impact	Forgone Earning Potential 2022	Filing Date

(2) Capital Spend above $1,000,000 ($250,000 prior to October 30, 2019) associated with a preliminary engineering project that has been inactive (i.e. no internal or external engineering or scoping work, exceeding $10,000, being carried out within the last 12 month period) and is not yet submitted for approval to the NSUARB:

CI	Project Title	Functional Class	2022 Periods not Included in Rate Base	Approval Threshold	Spend	Unapproved Balance	Depreciation Expense on Unapproved Balance	Interest Expense on Unapproved Balance	AFUDC on Unapproved Spending	Total Income Tax Impact	2022 Income Statement Impact	Forgone Earning Potential 2022	Expected/ Actual Filing Date

(3) Any other capital projects that are not filed with the NSUARB for approval within six months of the project exceeding $1,000,000 ($250,000 prior to October 30, 2019) will have all costs in excess of $1,000,000 ($250,000 prior to October 30, 2019) removed from rate base in the quarter after the six month timeframe until these costs are submitted for approval to the NSUARB:

CI	Project Title	Functional Class	2022 Periods not Included in Rate Base	Approval Threshold	Spend	Unapproved Balance	Depreciation Expense on Unapproved Balance	Interest Expense on Unapproved Balance	AFUDC on Unapproved Spending	Total Income Tax Impact	2022 Income Statement Impact	Forgone Earning Potential 2022	Expected/ Actual Filing Date
C0001222	CT BGT1 Engine Exchange	Gas Turbine	Q3 2022 - Q4 2022	1,000,000	2,335,852	1,335,852	-	-	-	-	-	15,253	9-Jan-23
C0015798	WRC Tunnel T-2 Fall of Ground Remediation	Hydro Plant	Q4 2022 - Q4 2022	1,000,000	21,994,104	20,994,104	-	-	-	-	-	135,665	Q1 2023

(4) Previously approved capital projects exceeding the allowable variance of the greater of 5% or $250,000 and are not filed within six months of exceeding the approved amount:

CI	Project Title	Functional Class	2022 Periods not Included in Rate Base	Approval Threshold	Spend	Unapproved Balance	Depreciation Expense on Unapproved Balance	Interest Expense on Unapproved Balance	AFUDC on Unapproved Spending	Total Income Tax Impact	2022 Income Statement Impact	Forgone Earning Potential 2022	Expected/ Actual Filing Date
47124	Advanced Meter Infrastructure	Distribution Plant	Q3 2021 - Q4 2022	132,241,493	141,959,419	9,717,926	-	-	-	-	-	268,863	Q1 2023
29807	Tusket Main Dam Refurbishment	Hydro Plant	Q2 2022 - Q4 2022	18,157,609	21,814,624	3,657,015	-	-	-	-	-	64,796	Q2 2023

(5) Other Unapproved Spending:

CI	Project Title	Functional Class	2022 Periods not Included in Rate Base	Approval Threshold	Spend	Unapproved Balance	Depreciation Expense on Unapproved Balance	Interest Expense on Unapproved Balance	AFUDC on Unapproved Spending	Total Income Tax Impact	2022 Income Statement Impact	Forgone Earning Potential 2022	Expected/Actual Filing Date
45066	Upgrade L6511 and L7019	Transmission Plant	Q4 2019 - Q4 2022	-	2,691,017	2,691,017	69,765	68,450	-	(56,833)	81,382	74,905	TBD*
45067	67N Onslow 345 KV Node Swap	Transmission Plant	Q4 2019 - Q4 2022	-	2,982,713	2,982,713	63,830	79,707	-	(62,247)	81,290	87,201	TBD*
43324	L6513 Rebuild/upgrade line terminal	Transmission Plant	Q4 2019 - Q4 2022	-	18,625,082	18,625,082	717,040	474,575	-	(423,732)	767,883	519,658	TBD*
43678	Separate L8004/L7005	Transmission Plant	Q4 2019 - Q4 2022	-	20,387,278	20,387,278	485,136	543,584	-	(466,028)	562,692	594,796	TBD*
50113	Customer Experience Streetlight Improvements	General Property	Q4 2019 - Q4 2022	-	59,367	59,367	-	1,757	-	(510)	1,248	1,921	TBD
47751	ECC Dynamic Line Rating Implementation	General Property	Q2 2020 - Q4 2022	-	286,278	286,278	-	8,237	(17,299)	-	(9,061)	8,980	2024
C0050414	HYD Roseway Site Stabilization	Hydro Plant	Q4 2022 - Q4 2022	-	120,159	120,159	-	-	-	-	-	777	TBD

* Maritime Link Transmission capital work orders were filed as part of the Company's General Rate Application. They were not approved at the time of the GRA Decision.

Total Impact to 2022	1,485,433	1,772,815

Unapproved Spending Over $1M

As of December 31, 2022

This report includes all capital projects greater than $1 million that are within the rate base thresholds as established and approved in the CEJC and Accounting Policy 1520 - Rate Base, that have not been approved by the Board at December 31, 2022. This is distinct from the preceding Unapproved Spending report, as that report includes projects removed from Rate Base.

Note 1: This report has been included in compliance the NSUARB's direction by letter of August 30, 2017 (M07568)

Note 2: This report has been amended to reflect the new Board approval threshold of $1,000,000, effective October 30, 2019.

Project #	Project	Status as at December 31, 2022	Budget	Spend as at December 31, 2021	Spend as at December 31, 2022	Comment
C0041651	TUC HFO Tank 4 Refurbishment	Awaiting Approval		-	2,734,313	Subsequent submittal item filed on February 6, 2023. Work began prior to filing.
C0001222	CT BGT1 Engine Exchange	Awaiting Approval		1,967,562	2,335,852	Planned & Advanced (P&A) project completed in 2022, filed on January 9, 2023.
C0042166	IT - Data Loss Prevention Platform	Pending Submission		-	1,399,519	ACE Subsequent submittal item to be filed in Q1 2023. Work began prior to filing.
C0053355	TUC2 Main Steam Line Leak 2022	Less than $1M		-	1,458,935	Project originally forecasted to be completed for less than $1M, therefore not filed. Project exceeded $1M in spend during construction, but will remain less than $1M
C0051312	TUC Blowdown Pipe Concrete Trench	Less than $1M		-	1,377,984	Project originally forecasted to be completed for less than $1M, therefore not filed. Project exceeded $1M in spend during construction, but will remain less than $1M
C0019023	HYD - MAL4 Generator Refurbishment	Less than $1M		59,174	1,050,747	Project originally forecasted to be completed for less than $1M, therefore not filed. Project exceeded $1M in spend during construction, but will remain less than $1M
C0048610	CT VJ1 Free Turbine P600531 Refurbishment	Less than $1M		-	1,020,907	Project originally forecasted to be completed for less than $1M, therefore not filed. Project exceeded $1M in spend during construction, but will remain less than $1M
C0048591	CT VJ1 Engine P686621 Refurbishment	P&A		-	2,244,761	Planned & Advanced (P&A) project completed in 2022, to be filed in Q1 2023.
39472	HYD Mersey Redevelopment Phase 1	PE		16,166,166	19,641,412	Preliminary Engineering (PE) efforts to determine the scope / cost of the project. This PE will inform multiple dam safety and power house projects on the Mersey Hydro system.
C0026148	Eastern Clean Energy Initiative (ECEI)	PE		5,106,036	6,957,690	Preliminary Engineering efforts to determine the scope / cost of the project.
C0044771	ECEI - Wind Install	PE		-	3,429,192	Preliminary Engineering efforts to determine the scope / cost of the project.
C0045132	ECEI - Energy Storage	PE		-	2,811,444	Preliminary Engineering efforts to determine the scope / cost of the project.
51761	AMO PE LIN2 Retirement Planning	PE		9,289	2,559,477	Preliminary Engineering efforts to determine the scope / cost of the project.
C0049652	2022 Transmission Inspection Program	PE		-	2,244,730	This project includes inspection costs, which may be subsequently allocated to applicable capital projects.
47650	HYD - Annapolis Decision Analysis	PE		1,003,144	2,195,120	Preliminary Engineering efforts to determine the scope / cost of the project.

Unapproved Spending Over $1M

As of December 31, 2022

This report includes all capital projects greater than $1 million that are within the rate base thresholds as established and approved in the CEJC and Accounting Policy 1520 - Rate Base, that have not been approved by the Board at December 31, 2022. This is distinct from the preceding Unapproved Spending report, as that report includes projects removed from Rate Base.

Note 1: This report has been included in compliance the NSUARB's direction by letter of August 30, 2017 (M07568)

Note 2: This report has been amended to reflect the new Board approval threshold of $1,000,000, effective October 30, 2019.

Project #	Project	Status as at December 31, 2022	Budget	Spend as at December 31, 2021	Spend as at December 31, 2022	Comment
C0049672	2022 Distribution Inspection Program	PE		-	1,431,386	This project includes inspection costs, which may be subsequently allocated to applicable capital projects.
C0044392	ECEI - Coal Conversion	PE		-	1,287,798	Preliminary Engineering efforts to determine the scope / cost of the project.
C0034486	HYD WRC LEM Penstock intake	PE		1,038,097	1,067,105	Preliminary Engineering efforts to determine the scope / cost of the project.

2022 Capital Write Offs in Excess of $1,000,000

This report includes capital write offs in excess of $1,000,000. A write-off occurs typically when a capital project is no longer feasible and will not proceed. The costs associated with these projects are written-off to operating expenses. This report is included in compliance to NS Power's commitment as noted in its letter of August 15, 2016. This report has been amended to reflect the new Board approval threshold of $1,000,000, effective October 30, 2019.

CI Number	Project Title	Value	Description
There were no write-offs in excess of $1,000,000 in 2022.			

NS Power 2022 Capital Spend Detail - As per ACE

Routine Capital Reconciliation to 2022 ACE - as of December 31, 2022

This report includes an overview of routine expenditures showing actual 2022 spending compared to the 2022 ACE Plan.

	2022 ACE Plan Amount (2022)	2022 Spend	Variance Actual/ACE	
Generation				
Generation Equipment Replacements	$4,016,295	$3,967,925	($48,369)	
Generation Other Hydro	788,225	800,378	12,154	
Generation Other Thermal	343,057	295,259	(47,797)	
	5,147,576	5,063,563	(84,013)	
Transmission				
Transmission Substation Replacement, Add'ns/Mod'ns	$4,005,269	$4,105,825	$100,557	
Primary Equipment Spares	300,000	71,543	(228,457)	
Protection Modification & Replacement	978,162	872,765	(105,397)	
Transmission Line Replacement, Add'ns/Mod'ns	7,623,023	10,724,802	3,101,780	
Transmission Right-of-Way Widening	588,035	591,795	3,760	
	13,494,488	16,366,730	2,872,242	
Distribution				
Meters	$2,440,694	$2,414,071	($26,623)	
Distribution Upgrades and Replacement	31,944,113	140,293,555	108,349,442	
New Customers	31,245,970	40,829,118	9,583,148	
Joint Use	4,387,955	4,084,375	(303,580)	
Distribution Right-of-Way Widening	588,035	(6,015)	(594,050)	
	70,606,767	187,615,103	117,008,335	
General Plant				
Work Vehicles	$10,711,180	$10,211,309	($499,871)	
Tools and Test Equipment	1,690,449	1,684,591	(5,858)	
Telecommunications	1,300,675	1,204,244	(96,432)	
Computing Asset Management	1,958,756	2,211,257	252,501	**
Property Improvements and Furniture	4,345,000	4,408,189	63,171	
Other	1,278,686	1,238,404	(40,282)	
	21,284,746	20,957,993	(326,771)	
Total Routine Capital Spending	**$110,533,578**	**$230,003,389**	**$119,469,793**	

*2022 Routine spend excludes amounts related to Point Aconi. Total 2022 routine spend including Point Aconi is $230,708,995

*Any routine actual spending which exceeds the CEJC ATO thresholds will have ATO applications submitted to the NSUARB in due course.

**There was an incorrect charge to this routine to put it into an ATO position as of December 31, 2022. The charge will be reversed in 2023 which will remove the routine from an ATO position.

NS Power 2022 Capital Spend Detail - As per ACE

2022 ACE Carryover Spending - as of December 31, 2022

This report includes an overview of carryover expenditures showing actual 2022 spending compared to the 2022 ACE Plan.

Project Number	CI #	Title	2022 ACE Plan Amount (2022)	2022 ACE Plan Amount (Project Total)	2022 Actual Spend	Variance Actual/ACE
Generation						
	C0013838	HYD WRC LEM Unit Rehabilitation and Replacement	$ 28,159,089	$ 83,142,128	$ 33,715,679	$ 5,556,591
	29807	HYD - Tusket Falls Main Dam	11,452,688	36,887,705	3,320,081	(8,132,607)
	C0014218	Wreck Cove Life Extension and Modernization (LEM) Project - Balance of Plant	6,730,606	26,609,897	2,696,108	(4,034,498)
	16374	HYD - Gaspereau Dam Safety Remedial Works	301,388	18,940,332	319,604	18,216
	50518	HYD - Ruth Falls Main Dam Refurbishment	4,993,455	7,753,920	1,521,159	(3,472,297)
	C0002539	HYD - Bridge Remediation 2019	316,801	5,189,512	1,218,957	902,156
	49756	HYD - Marshall Falls Main Dam Refurbishment	332,273	4,916,625	59,102	(273,171)
	44978	HYD - Wreck Cove Controls Upgrade	1,512,979	4,054,897	-	(1,512,979)
	51235	HYD - Wreck Cove Main Access Road Refurbishment	1,576,100	2,929,413	1,263,801	(312,299)
	C0020385	LIN Heavy Oil Tank Refurbishment	1,971,917	2,794,370	767,384	(1,204,533)
	47551	HYD - SHH Controls Upgrade	458,607	2,018,144	322,414	(136,194)
	48791	HYD - WRC Safety Standards Upgrades	136,788	1,868,182	(138,403)	(275,191)
	51234	HYD - Wreck Cove HVAC Upgrade	578,649	1,857,468	631,579	52,930
	51775	HYD - Fixed Ladder & Machine Guard Upgrades	418,042	1,829,446	677,781	259,739
	48638	TRE - Rail Car Fuel Delivery Upgrade	82,433	1,144,955	153,400	70,967
	46483	CT - TUS - Control System Upgrade	107,698	1,027,856	77,807	(29,892)
	48914	HYD - Malay Falls Facility Refurbishment	140,892	936,577	-	(140,892)
	49945	HYD - Malay Falls Switchgear Replacement	711,692	787,870	397,987	(313,705)
	C0019023	HYD - Malay Falls Unit 4 Generator Refurbishment	533,365	765,144	991,573	458,208
	C0019021	HYD - Malay Falls Unit 4 Overhaul	646,635	752,814	749,334	102,699
	C0030082	CT - Generator Bearings Replacement	341,527	559,429	(11,372)	(352,900)
	C0018941	LIN - CW Pump Refurbishment 2020	94,794	549,046	207,377	112,583
	C0021982	ICP U&U Unloading Hopper Replacement	222,176	529,049	(8,272)	(230,448)
	C0032083	HYD - Mersey System Headcover Refurbishment	467,226	487,486	96,142	(371,083)
	C0015760	HYD - D4 Riparian Flow Measurement	175,423	458,170	97,428	(77,995)
	48712	HYD - Dam Instrumentation Upgrade	268,329	446,216	81,096	(187,233)
	49546	TRE6 FW Heater Level Control	55,663	296,152	61,502	5,839
	C0020842	POT Turbine Generator Fire Protection	283,313	285,152	11,522	(271,791)
	C0021423	TUC Aux Boiler PLC/DCS Upgrades	180,740	281,749	257,439	76,698
	C0031093	HYD - SHH Interconnection Protection Panels	136,841	280,266	77,405	(59,435)
	C0019025	HYD - Sloane Dam Refurbishment	209,515	272,564	17,048	(192,467)
	48850	AMO Fleet Mobile Technology Advancement	8,000	250,059	1,907	(6,093)
	C0039506	HYD - Mersey Log Hoist Partial Refurbishment	81,604	246,574	15,298	(66,306)
	49555	TRE6 Water Treatment Plant PLC Upgrades	217,983	231,443	130,876	(87,107)
	51394	LIN34 Operator Control Panel Button Upgrade	218,727	226,688	-	(218,727)
	C0020263	LIN Coal Stacker MCC Upgrade	142,849	211,305	101,717	(41,133)
	C0030622	LIN Wastewater Piping Replacement	206,177	210,723	212,629	6,452
	C0020644	AMO TUC3 Turbine Supervisory System Upgrade	119,781	122,319	63,658	(56,123)
	C0010758	WIN - South Lake Turbine Decomission	87,244	111,956	145	(87,099)
	C0010335	TRE Waste Water Treatment Plant Chemical Feed System Upgrade	56,839	108,209	6,431	(50,408)
	C0030962	POT - Bunker C Pump Replacement	35,197	98,350	27,137	(8,060)
	C0035506	WIN - Nuttby Collector Circuit Repl	(65,767)	83,045	207,896	273,663
	49657	TUC Sequence of Events Recorder Upgrade	54,217	79,489	-	(54,217)
		Generation Total	**64,760,495**	**212,632,692**	**50,400,354**	**(14,360,142)**

NS Power 2022 Capital Spend Detail - As per ACE

2022 ACE Carryover Spending - as of December 31, 2022

This report includes an overview of carryover expenditures showing actual 2022 spending compared to the 2022 ACE Plan.

Project Number	CI #	Title	2022 ACE Plan Amount (2022)	2022 ACE Plan Amount (Project Total)	2022 Actual Spend	Variance Actual/ACE
Transmission						
	C0021102	L5029 Replacements and Upgrades	$ 1,936,146	$ 5,989,864	$ 254,002	$ (1,682,144)
	C0031089	2021/2022 Transmission Right-of-Way Widening 69kV	2,799,525	5,376,817	2,991,218	191,693
	49793	L7011 Replacements and Upgrades	216,727	4,809,879	-	(216,727)
	47954	L7012 Replacements and Upgrades	625,251	4,429,129	(4,279)	(629,531)
	C0011261	101W Port Mersey Substation Expansion	2,166,027	3,861,214	1,008,134	(1,157,893)
	C0031263	2021/2022 Substation Polychlorinated Biphenyl (PCB) Equipment Removal	1,976,483	3,799,372	3,589,694	1,613,211
	C0021106	L7005 Replacements and Upgrades Phase 1	788,562	3,652,536	41,005	(747,556)
	C0021105	L7002 Replacements and Upgrades Phase 1	1,639,870	3,263,151	401,900	(1,237,970)
	C0031085	L6516 Line Replacement and Upgrades	1,393,631	2,780,231	2,477,905	1,084,274
	51975	5P Mobile Substation Replacement	76,997	2,660,902	(2,538)	(79,535)
	C0033644	2021/2022 Steel Tower Life Extension	1,207,114	2,431,950	843,235	(363,879)
	49779	L6537 Replacements and Upgrades Phase 2	455,354	2,394,624	227,979	(227,375)
	C0021104	L5550 Replacements and Upgrades Phase 1	537,853	2,351,608	145,327	(392,526)
	C0031050	New Spare Large Autotransformer	457,674	2,348,489	1,619,486	1,161,812
	C0021107	L8001 Replacements and Upgrades Phase 1	314,019	2,274,057	201,562	(112,457)
	C0011321	L5031 Replacements and Upgrades Phase 1	2,001,074	2,126,432	(10,690)	(2,011,764)
	C0011339	L6549 Replacements and Upgrades Phase 2	484,831	2,104,950	48,842	(435,989)
	C0031122	L6539 Replacements and Upgrades	1,563,394	1,847,464	171,899	(1,391,495)
	C0033645	2021/2022 Steel Tower Refurbishment	744,164	1,703,685	1,290,812	546,647
	C0011241	L5026 Replacements and Upgrades	233,513	1,608,369	(18)	(233,531)
	C0021122	2020/2021 Transmission Switch & Breaker Replacement	55,097	1,500,689	39,681	(15,416)
	52320	L6549 Replacements & Upgrades	25,831	1,480,383	-	(25,831)
	C0031262	2020/2021 Transmission Switch and Breaker Replacement	876,922	1,144,445	989,491	112,569
	C0011243	L5551 - Replacements and Upgrades	130,389	1,074,959	44,373	(86,016)
	C0010978	2019/2020 Transmission Switch & Breaker Replacement	155,588	1,054,760	25,552	(130,036)
	C0010955	2020/2021 Wood Pole Retreatment Program	228,039	981,787	257,624	29,585
	C0031052	Replenish Spare used at 58C	174,720	973,524	4,383	(170,337)
	47915	L5053 Replacements and Upgrades	314,122	726,811	-	(314,122)
	52059	L5039 Replacements and Upgrades	88,754	724,584	33,234	(55,520)
	C0031283	2021 Substation Theft Prevention	390,481	701,852	84,160	(306,321)
	C0031042	5P-MS Rewind	627,159	698,452	9,592	(617,567)
	C0031053	L5506 Line Replacements and Upgrades	654,235	687,087	162,089	(492,146)
	C0031274	2021 Cap Bank Breaker Replacements	166,589	381,717	77,153	(89,436)
	C0031268	AMO Critical Equipment Online Monitoring	213,864	374,871	296,723	82,860
	43268	9W-B53 Tusket Support Structure Replacement	339,002	353,552	(1)	(339,003)
	C0022783	2021 Generation Related Power Transformer Refurbishments	277,850	296,000	1,072	(276,779)
	52261	83V-503 & 83V-504 - Bring Switches to Roadside	88,157	254,486	-	(88,157)
	C0011039	Lumsden 5V Generating Transformer Replacement	164,375	250,465	245,261	80,886
	C0026342	AMO Substation Test Equipment	10,355	218,264	42,453	32,099
	C0021145	Mobile Substation Low Voltage Cable Trailer	72,045	194,812	(82,459)	(154,504)
		Transmission Total	**26,671,782**	**75,888,220**	**17,525,853**	**(9,145,928)**

NS Power 2022 Capital Spend Detail - As per ACE

2022 ACE Carryover Spending - as of December 31, 2022

This report includes an overview of carryover expenditures showing actual 2022 spending compared to the 2022 ACE Plan.

Project Number	CI #	Title	2022 ACE Plan Amount (2022)	2022 ACE Plan Amount (Project Total)	2022 Actual Spend	Variance Actual/ACE
Distribution						
	47124	Advanced Metering Infrastructure	$ 3,080,960	$ 144,737,366	$ 1,589,931	$ (1,491,030)
	C0031083	New Distribution Rights-of-Way Phase 6	5,651,016	10,201,172	4,156,381	(1,494,635)
	C0010778	Smart Grid Nova Scotia Project	550,835	4,441,649	(771,879)	(1,322,714)
	C0020834	2020/2021 Inaccessible PCB Transformer Replacements	566,887	2,987,077	40,042	(526,845)
	C0031145	2021 Padmount Replacement Program	459,191	1,370,888	314,771	(144,420)
	C0006319	2019 PCB Pole Top Transformer Replacements	430,578	1,226,116	154,453	(276,126)
	C0020830	85S-401 Cape Smokey Build to Roadside	84,372	1,144,796	143,407	59,035
	41350	16W-301 Hebron Rebuild Phase 2	285,638	915,042	4,598	(281,040)
	52184	37N-412 Glooscap Trail Rebuild Phase 2	315,120	850,837	139,209	(175,911)
	C0031150	36W-301-Add Third Phase - Allendale	462,306	833,914	107,919	(354,387)
	C0031119	96H-412-Dufferin Mines Rd Rebuild	146,067	795,366	3,147	(142,919)
	C0027611	67C-411 - Highway 252 BTR	341,432	751,954	360,193	18,761
	49841	23H-Rockingham Voltage Conversion-Phase 2	42,644	732,676	1,013	(41,630)
	C0033444	63V-312 Stronach Mountain Phase Extension	293,144	714,748	113,211	(179,933)
	C0016183	2020 Downline Asset PCB Replacements	97,303	698,412	(787)	(98,090)
	C0031166	2021 Downline Asset PCB Replacements	402,642	685,574	48,243	(354,398)
	C0031164	515W-211-New Germany Conversion	577,791	655,557	519,976	(57,815)
	C0015198	50V Kentville Aluminum Light Pole Replacement	186,581	616,419	340	(186,240)
	C0031112	6S-225 - Townsend Street Conversion	79,324	609,832	74,141	(5,183)
	C0014019	2019 Substation Recloser Replacements	311,372	586,457	223,758	(87,614)
	52205	30N-412 Hwy 242 Fundy Shore Rebuild	72,329	551,502	2,423	(69,906)
	C0011187	5N-301 - Masstown Road Rebuild Phase 2	337,809	540,326	360,519	22,710
	C0037858	2021 Hydraulic Recloser Replacements	232,262	519,486	188,562	(43,700)
	C0008740	Canso Distribution System Asset Replacement	71,654	485,634	27,139	(44,514)
	C0026043	9H-221 Conversion - Jubilee Road Area	283,910	484,358	140,226	(143,684)
	52229	16V-314H-New Edinburgh Phase Extension	253,763	429,195	3,151	(250,612)
	C0031148	Metro-Stack insulator replacements	130,115	387,028	5,927	(124,189)
	C0011206	102W-311 Jedediah Rd Rebuild	108,334	386,371	165,684	57,350
	C0031297	709H-221 Bedford 4kV Conversion	288,769	364,893	4,483	(284,286)
	C0011189	2H-411 - Cowie Hill UG System Replacements Part 3	123,365	353,228	-	(123,365)
	C0033305	Branch-Line Recloser Additions - Part 1	10,846	337,582	45,170	34,324
	C0020839	101H-411-Sackville rear lot Rebuild	99,258	323,031	664,459	565,201
	C0031299	88H-402 Trafalgar Line Extension and Offload	186,114	313,924	256,378	70,265
	C0031120	76V-301-Maitland Bridge Build to Roadside	174,122	309,537	882	(173,240)
	49877	23H-302 Clayton Park Rebuild Phase II	234,676	236,454	-	(234,676)
	47775	58C 67C Inverness Automatic Transfer Scheme	10,507	234,102	-	(10,507)
	C0031300	9H-223 North St Conversion	132,921	227,971	2,037	(130,884)
	C0019579	7N-301 ICP	60,129	225,060	105	(60,024)
	C0031113	61N-204 Townsend Avenue Conversion	2,037	198,052	27,562	25,525
	C0031289	10H-231-South Park St and Wright Ave 4kV Conversion	151,751	193,334	-	(151,751)
	C0038727	22C-402 - Feeder Exit Replacement	139,802	183,794	36,457	(103,345)
	C0006178	84W-302 Subsea Cable Removal and UG Cable Replacement	150,534	169,723	-	(150,534)
	C0031110	89W-303-Oakland Rd Water Crossing	24,546	164,587	151,182	126,636
	C0031305	37N-413-HWY 2 Rebuild - Newville Lake	129,235	160,256	808	(128,427)
	C0033427	Underground Fault Indicators	55,111	152,959	34,063	(21,047)
	C0031149	Targeted Automatic Sleeve Replacements	29,044	134,251	1,076	(27,969)

NS Power 2022 Capital Spend Detail - As per ACE

2022 ACE Carryover Spending - as of December 31, 2022

This report includes an overview of carryover expenditures showing actual 2022 spending compared to the 2022 ACE Plan.

Project Number	CI #	Title	2022 ACE Plan Amount (2022)	2022 ACE Plan Amount (Project Total)	2022 Actual Spend	Variance Actual/ACE
	C0011180	23W Feeder Exit Cable Replacement	111,259	133,295	1,320	(109,939)
	C0033304	Downline Recloser Additions - Part 1	21,754	125,831	(10,329)	(32,084)
	C0030944	1N-402 1N-405 Targeted Asset Replacements	13,210	94,841	(504)	(13,715)
	C0028804	20H-301 Targeted Asset Replacements	7,294	81,191	14,296	7,001
	C0030486	3S - Targeted Asset Replacements	22,798	52,582	7,674	(15,124)
	C0028564	92H-331 Targeted Asset Replacements	5,052	49,793	62,302	57,250
	C0033449	Substation Animal Contact Prevention	5,036	46,611	3,465	(1,571)
	C0028982	104H-411 412 422 423 Targeted Asset Replacements	5,563	34,211	6,915	1,351
	C0028803	139H-414 Targeted Asset Replacements	1,680	31,742	5,577	3,897
		Distribution Total	**18,051,791**	**184,272,584**	**9,431,076**	**(8,620,715)**

NS Power 2022 Capital Spend Detail - As per ACE

2022 ACE Carryover Spending - as of December 31, 2022

This report includes an overview of carryover expenditures showing actual 2022 spending compared to the 2022 ACE Plan.

Project Number	CI #	Title	2022 ACE Plan Amount (2022)	2022 ACE Plan Amount (Project Total)	2022 Actual Spend	Variance Actual/ACE
General Plant						
	C0021839	IT - Customer Energy Management(CEM)	$ 667,694	$ 6,119,991	$ 1,341,053	$ 673,358
	49480	IT - Data Centre Disaster Recovery	391,686	5,913,843	676,122	284,435
	C0011378	Route Network Upgrade	1,703,655	4,721,157	1,363,066	(340,589)
	49093	IT - Security Operations Center (SOC) and Security Information Event Monitoring (SIEM)	112,227	4,233,742	81,570	(30,657)
	C0021109	New RTU Deployment Project	1,553,416	3,583,974	1,703,259	149,843
	C0023622	AMO Substation and Transmission Asset Performance Management Program	729,181	2,652,273	515,267	(213,914)
	49094	IT - Privilege Access Management (PAM)	1,349,610	2,574,244	2,215,281	865,671
	C0002137	ECC Map Board and Technology Modernization	447,842	1,885,368	1,675,758	1,227,917
	C0017098	RAL Generator Replacement	1,438,835	1,737,870	842,380	(596,455)
	C0010838	MCC - HVAC Replacement	495,874	1,679,762	964,028	468,154
	C0023623	AMO Distribution Asset Performance Management Program	896,300	1,539,159	393,628	(502,672)
	C0011087	IT - Customer Identity & Access Management	147,227	993,294	2,536	(144,690)
	48837	AMO Fleet Environmental Data Management	9,007	906,665	91,667	82,660
	51483	IT - Public Key Infrastructure Certificate Authority	438,196	809,976	559,455	121,259
	C0037787	Fish Detection System Pilot	345,208	762,106	650,561	305,353
	C0011819	2020 SCADA Upgrade*	7,337	514,826	408,726	401,389
	C0029928	AMO Weymouth Telecom Upgrade	476,790	494,255	13,147	(463,642)
	C0020341	Static Equipment Program Management System	47,754	458,527	126	(47,628)
	C0018485	AMO Wind Asset Management Implementation	30,147	420,708	55,312	25,166
	C0002130	ADMS Distribution Fault Location	48,321	385,536	19,117	(29,204)
	C0011111	IT - ADMS Maintenance Release 2021	201,121	352,607	41,849	(159,272)
	C0019038	AMO Hydro Water Management	119,843	338,565	93,702	(26,141)
	C0031203	2021 Telecom Building Replacement	271,717	297,332	202,077	(69,640)
	C0031178	IT - Arc FM DXI Hot Fix	162,201	239,096	307	(161,895)
	C0011820	Damage Assessment Mobile Data Collection Device Replacement	47,362	218,219	-	(47,362)
	C0026682	EOC Facility Upgrades	2,988	197,207	95,092	92,104
	C0031462	AMO Environmental Event Response Interface	61,164	197,024	76,911	15,747
	C0043011	IT - Website Map Integration	53,957	194,273	119,924	65,967
	C0021283	AMO T&D Telecom Upgrades	94,893	191,309	96,461	1,568
	51095	AMO Corporate Dashboard Development	4,800	176,577	78,352	73,552
	C0019883	AMO HYD Dam Safety Mobility	4,865	86,354	28,904	24,039
	48035	AMO PP NERC Management System*	42,000	84,779	(16,278)	(58,278)
	C0035666	EV Charging Station Installations 2021	43,437	78,294	67,838	24,402
	General Plant Total		**12,446,655**	**45,038,912**	**14,457,196**	**2,010,542**
Grand Total			**$ 121,930,722**	**$ 517,832,408**	**$ 91,814,479**	**$ (30,116,244)**

2022 Asset Retirement Values Greater than $1M by Capital Item

This report includes retirements in excess of $1,000,000, where NS Power has not sought or received explicit Board approval for the retirement of original cost. This report is included pursuant to the Board's directive relating to M09229 dated May 5, 2020.

Project	Retirement Amount	Percentage of GBV of Asset Pool Retired	Nature of Retirement and Life Cycle	Policy	Accounting Treatment of Retirement Amount
Distribution Plant - D					
D008 - Storm Routine	(38,688,202)	2.0% of Total Distribution Asset Pool	Retirements among various classes primarily driven by Hurricane Fiona.	6420 - Retirement and Disposal of Capital Assets*	No gains or losses were recognized. Retirement amount debited to Accumulated Depreciation
47124-D635 - Advanced Meter Infrastructure	(7,470,850)	8.5% of Total Meters Asset Pool	Retirements of meters at various stages of life cycle.	6350 - Assets Not Used and Useful	Retirement amount debited to Accumulated Depreciation and undepreciated net book value was added to the Non-Standard Meter Regulated Asset. No gains or losses were recognized.
D005 REPLACE DETERIORATED PLANT ROU	(4,026,239)	0.2% of Total Distribution Asset Pool	Retirements among various classes and of assets at various stages of life cycle.	6420 - Retirement and Disposal of Capital Assets	No gains or losses were recognized. Retirement amount debited to Accumulated Depreciation
D061-New Customers - Residential	(1,401,486)	0.1% of Total Distribution Asset Pool	Retirements among various classes and of assets at various stages of life cycle.	6420 - Retirement and Disposal of Capital Assets	No gains or losses were recognized. Retirement amount debited to Accumulated Depreciation
D055-Identified Deteriorated Plant	(1,371,350)	0.1% of Total Distribution Asset Pool	Retirements among various classes and of assets at various stages of life cycle.	6420 - Retirement and Disposal of Capital Assets	No gains or losses were recognized. Retirement amount debited to Accumulated Depreciation
General Plant - P					
P061-Transportation Vehicle Replace	(1,078,943)	1.1% of Transportation Equipment Asset Pool	Retirements of work vehicles that went into service in various years.	6420 - Retirement and Disposal of Capital Assets	No gains or losses were recognized. Retirement amount debited to Accumulated Depreciation
Transmission Plant - T					
T001-TRANSMISSION LINE REPLACEMENTS	(2,330,403)	0.2% of Total Transmission Asset Pool	Retirements among various classes and of assets at various stages of life cycle.	6420 - Retirement and Disposal of Capital Assets	No gains or losses were recognized. Retirement amount debited to Accumulated Depreciation
T011-Provincial Planned Trans Line	(1,387,326)	0.1% of Total Transmission Asset Pool	Retirements among various classes and of assets at various stages of life cycle.	6420 - Retirement and Disposal of Capital Assets	No gains or losses were recognized. Retirement amount debited to Accumulated Depreciation
Hydro Generation Plant - H					
C0014218 - HYD WRC LEM Balance of Plant	(4,323,642)	2.0% of Total Wreck Cove Asset Pool	Retirements of various components of the power plant water and air piping systems, electrical, and HVAC system.	6420 - Retirement and Disposal of Capital Assets	No gains or losses were recognized. Retirement amount debited to Accumulated Depreciation
Steam Generation Plant - S					
C0041651 - TUC HFO Tank 4 Refurbishment	(1,491,496)	1.7% of Tufts Cove Common Asset Pool	Retirements of various components of the heavy fuel oil tank including the withdrawal heater, chime, fiberglass lining, and column.	6420 - Retirement and Disposal of Capital Assets	No gains or losses were recognized. Retirement amount debited to Accumulated Depreciation

* An application will be filed in Q1 2023 regarding Hurricane Fiona costs.

					Original Submission Amounts		
Filing Type	CI Number	Project Title	Function Class	Status	Estimated In-Service Date	Approved Estimate	Contingency on Approved Estimate
2015 ACE Plan	44716	TUC2 North Boiler Feedwater Pump Refurbishment	Steam Generation Plant - S	Complete - Final Costed	3/15/2017	191,007	-
2016 ACE Plan	48111	East Switch Upgrades 15S	Transmission Plant - T	Complete - Final Costed	8/31/2017	122,220	8,400
2016 ACE Plan	47874	LIN Ash Scale Replacement	Steam Generation Plant - S	Complete - Final Costed	10/31/2017	237,241	-
2016 ACE Plan	47933	LIN4 Turbine Vibration Monitoring Upgrade	Steam Generation Plant - S	Complete - Final Costed	6/19/2016	238,216	-
2016 ACE Plan	47947	TUC6 Condenser Waterbox Coating Replacement	Steam Generation Plant - S	Complete - Final Costed	10/26/2016	225,210	-
2016 ACE Plan	47600	TRE Asbestos Abatement (2016)	Steam Generation Plant - S	Complete - Final Costed	12/15/2016	154,303	-
2016 ACE Plan	47606	TRE5 Sootblower Controls Upgrade	Steam Generation Plant - S	Complete - Final Costed	12/15/2016	158,399	-
2016 ACE Plan	47756	36V-303 Reconductor Middle Dyke Rd	Distribution Plant - D	Complete - Final Costed	1/31/2017	226,303	9,878
2017	49039	HYD Lequille Controls Upgrades	Hydro Generation Plant - H	**Complete - Final Costed**	9/30/2017	762,912	117,200
2017	48396	HYD Bridge Remediation	Hydro Generation Plant - H	Complete - Final Costed	12/30/2017	677,591	40,615
2017	43202	Replace Mobile Radio System	General Plant - P	**Complete - Final Costed**	7/31/2017	6,296,878	407,840
2017	48893	TUC3 IP Turbine Refurbishment	Steam Generation Plant - S	Complete - Final Costed	12/1/2017	4,871,454	-
2017	48773	VOIP Expansion	General Plant - P	Complete - Final Costed	1/31/2018	1,708,923	153,459
2017	38931	HYD Harmony Stabilization	Hydro Generation Plant - H	Complete - Final Costed	1/30/2018	931,942	112,492
2017	50295	Electric Vehicle Infrastructure Deployment	General Plant - P	Complete - Final Costed	3/31/2018	419,908	-
2017	**50341**	**2017 Substation Recloser Replacements**	**Distribution Plant - D**	**Complete - Final Costed**	**5/30/2017**	**604,889**	**49,695**
2017	46499	Stator Rewind Kit Capital Spare	Steam Generation Plant - S	Complete - Final Costed	3/4/2018	2,871,003	-
2017	47786	129H Kearney Lake Load Transfer	Distribution Plant - D	Complete - Final Costed	10/30/2017	286,280	-
2017	49857	IT - Storage Infrastructure Upgrade	General Plant - P	Complete - Final Costed	2/28/2018	1,901,189	88,961
2017	49953	IT - CIS High Availability	General Plant - P	Complete - Final Costed	12/31/2017	519,023	64,771
2017	47682	HYD Lequille Switchgear Replacement	Hydro Generation Plant - H	Complete - Final Costed	10/31/2017	776,391	91,199
2017	47876	HYD - Lequille Overhaul	Hydro Generation Plant - H	Complete - Final Costed	11/30/2017	1,395,229	111,626
2017	47648	HYD - Lequille Pipeline Replacement	Hydro Generation Plant - H	Complete - Final Costed	9/30/2017	1,121,253	194,400
2017	47553	TRE6 Turbine Valve Refurbishment	Steam Generation Plant - S	Complete - Final Costed	10/15/2017	570,600	22,480
2017	44776	TUC#5 LM6000 Generator Stator Re-wedge	Gas Turbine Generation Plant - G	Complete - Final Costed	8/31/2017	1,361,301	106,055
2017	47654	HYD - Gulch Penstock & Surge Tank Replacement	Hydro Generation Plant - H	Complete - Final Costed	11/15/2017	4,970,542	597,463
2017	49538	TRE6 Generator Rotor Flux Probe Installation	Steam Generation Plant - S	Complete - Final Costed	10/15/2017	784,610	-
2017	49596	HYD - Hells Gate 2 Overhaul	Hydro Generation Plant - H	Complete - Final Costed	11/30/2017	1,204,263	150,476
2017	49674	TUC2 Boiler Selective Waterwall Tube Replacements	Steam Generation Plant - S	Complete - Final Costed	5/30/2017	421,518	-
2017	51053	TRE6 HIP Turbine Diaphragm Partition Refurbishment	Steam Generation Plant - S	Complete - Final Costed	10/15/2017	1,185,445	-
2017	49273	BGT2 Engine Refurbishment	Gas Turbine Generation Plant - G	Complete - Final Costed	10/31/2017	2,170,157	98,005
2017	**44749**	**Tiverton Tower Replacement**	**Distribution Plant - D**	**Complete - Final Costed**	**10/31/2018**	**1,465,132**	**81,415**
2017	49860	IT - Sharepoint Upgrade	General Plant - P	Complete - Final Costed	7/1/2018	3,903,594	333,223
2017	51052	TRE6 Generator High Voltage Bushings Critical Spare	Steam Generation Plant - S	Complete - Final Costed	8/15/2017	264,250	-
2017	49499	PHB - Boiler Refurbishment 2017	Steam Generation Plant - S	Complete - Final Costed	8/31/2017	593,740	50,552
2017	49922	Western Switching Upgrades	Transmission Plant - T	Complete - Final Costed	8/30/2017	378,843	29,475
2017	**50153**	**Customer Experience Self-Serve Development Phase 2**	**General Plant - P**	**In-service Complete**	**6/30/2018**	**1,160,528**	**142,122**
2017	49438	LIN A Gallery Floor Replacement	Steam Generation Plant - S	Complete - Final Costed	11/16/2017	591,761	44,548
2017	**49855**	**IT - Desktop SW Modernization**	**General Plant - P**	**In-service Complete**	**1/31/2018**	**4,620,516**	**481,610**
2017	49787	Intelligent Feeder Project	General Plant - P	**Complete - Final Costed**	9/30/2017	2,782,384	-
2017	**49929**	**Tap Changer Replacements**	**Transmission Plant - T**	**Complete - Final Costed**	**6/30/2017**	**318,236**	**15,513**
2017	**49928**	**3S Gannon Road – Bus Reconfiguration**	**Transmission Plant - T**	**In-service Complete**	**12/30/2017**	**371,395**	**27,372**
2017	47531	TRE6 LP Turbine Diaphragm Tip Seal Replacement	Steam Generation Plant - S	Complete - Final Costed	10/15/2017	1,704,784	-
2017	47760	85S-402 Re-Insulate	Distribution Plant - D	Complete - Final Costed	8/31/2018	1,551,859	101,256
2017	49111	POT Air Heater Refurbishment	Steam Generation Plant - S	Complete - Final Costed	5/30/2017	272,538	23,538
2017	49598	HYD - Gisborne Switchgear Replacmnt	Hydro Generation Plant - H	Complete - Final Costed	6/30/2017	747,450	90,525
2017	**47787**	**2H Armdale New Feeders**	**Distribution Plant - D**	**In-service Complete**	**11/30/2017**	**988,498**	**42,628**
2017 ACE Plan	50020	LIN CEMS Replacement	Steam Generation Plant - S	Complete - Final Costed	9/30/2017	170,281	-
2017 ACE Plan	49553	TRE Asbestos Abatement 2017	Steam Generation Plant - S	Complete - Final Costed	7/15/2017	226,451	-
2017 ACE Plan	49551	TRE5 CEMS Replacement	Steam Generation Plant - S	Complete - Final Costed	11/15/2017	162,647	-
2017 ACE Plan	49862	50N-410 Rebuild Trenton	Distribution Plant - D	Complete - Final Costed	6/30/2017	247,773	15,996
2017 ACE Plan	49693	TUC HFO Tank Dyke Piping Refurbishments	Steam Generation Plant - S	Complete - Final Costed	12/30/2017	219,022	-
2017 ACE Plan	49806	2017 Padmount Replacement Program	Distribution Plant - D	Complete - Final Costed	1/20/2017	1,703,774	129,960
2017 ACE Plan	49902	2017 Telecom Building Replacement - Wittenburg	General Plant - P	Complete - Final Costed	12/30/2017	294,000	18,550
2017 ACE Plan	49992	2017 Transmission Right of Way Widening	Transmission Plant - T	Complete - Final Costed	12/30/2017	5,400,855	-
2017 ACE Plan	49867	55V-313-Berwick North Replacements	Distribution Plant - D	Complete - Final Costed	10/30/2017	345,565	16,882
2017 ACE Plan	47769	509V-301 Overcove Rd Replacements	Distribution Plant - D	Complete - Final Costed	5/31/2017	402,493	28,300
2017 ACE Plan	50073	4S-332 Bernard Lind Drive Conversion	Distribution Plant - D	Complete - Final Costed	7/1/2017	302,893	15,284
2017 ACE Plan	49799	532N Elm Street Conversion Phase 1	Distribution Plant - D	Complete - Final Costed	6/30/2017	548,688	28,106
2017 ACE Plan	49880	Meter Shop Test Console Replacement	General Plant - P	Complete - Final Costed	2/15/2017	410,457	-
2017 ACE Plan	49861	IT - PI System Upgrade	General Plant - P	Complete - Final Costed	12/31/2017	801,253	64,155
2017 ACE Plan	48774	HYD - Milton Shop HVAC Upgrade	Hydro Generation Plant - H	Complete - Final Costed	10/31/2017	564,347	98,240
2017 ACE Plan	49707	TUC2 Generator Bushing Replacement	Steam Generation Plant - S	Complete - Final Costed	7/25/2017	440,082	-
2017 ACE Plan	47953	LIN Railcar Positioner Refurbishment	Steam Generation Plant - S	Complete - Final Costed	9/20/2017	566,619	-
2017 ACE Plan	49821	Mersey River Hydro Spare Transformer	Transmission Plant - T	Complete - Final Costed	3/1/2018	519,994	44,006
2017 ACE Plan	49818	2017/2018 Transmission Switch & Breaker Replacement	Transmission Plant - T	In-service Complete	4/30/2017	1,074,472	81,794
2017 ACE Plan	49792	2017 Transmission Line Retirement Program	Transmission Plant - T	Complete - Final Costed	3/1/2017	526,064	37,660
2017 ACE Plan	49466	PTMT - Dock and Inhaul Conveyor Replacement	Steam Generation Plant - S	In-service Complete	7/1/2017	467,607	42,068
2017 ACE Plan	49815	2017 / 2018 Steel Tower Refurbishment	Transmission Plant - T	In-service Complete	2/28/2017	2,003,317	143,733
2017 ACE Plan	49533	TRE6 Boiler Refurbishment	Steam Generation Plant - S	Complete - Final Costed	10/15/2017	1,259,454	-
2017 ACE Plan	**48057**	**Replace 69kV cables between 2S and 83S**	**Transmission Plant - T**	**Complete - Final Costed**	**10/1/2017**	**459,931**	**36,585**
2017 ACE Plan	49537	TRE6 Analytical Panel Upgrade	Steam Generation Plant - S	**Complete - Final Costed**	10/15/2017	438,216	37,764
2017 ACE Plan	**46572**	**2017 RTU Replacement Program**	**General Plant - P**	**In-service Complete**	**10/1/2017**	**693,354**	**47,984**

					Original Submission Amounts		
Filing Type	CI Number	Project Title	Function Class	Status	Estimated In-Service Date	Approved Estimate	Contingency on Approved Estimate
2017 ACE Plan		49431 LIN Mill Refurbishment 2017	Steam Generation Plant - S	Complete - Final Costed	10/16/2017	665,839	-
2017 ACE Plan		49918 54H-303 Underground Device Replacements Phase I	Distribution Plant - D	Complete - Final Costed	12/30/2017	469,604	-
2017 ACE Plan		49057 TRE6 Excitation System Replacement	Steam Generation Plant - S	Complete - Final Costed	10/15/2017	904,011	84,695
2017 ACE Plan		49419 POT Boiler Refurbishment 2017	Steam Generation Plant - S	Complete - Final Costed	6/30/2017	969,292	82,805
2017 ACE Plan		47687 POT Boiler Chemical Reconditioning	Steam Generation Plant - S	Complete - Final Costed	6/30/2017	974,604	81,610
2017 ACE Plan		49430 LIN CW Pump Refurbishment 2017	Steam Generation Plant - S	Complete - Final Costed	6/16/2017	516,270	-
2017 ACE Plan		49532 TRE6 Air Heater Refurbishment	Steam Generation Plant - S	Complete - Final Costed	10/15/2017	1,428,236	60,066
2017 ACE Plan		49536 TRE5 Boiler Refurbishments 2017	Steam Generation Plant - S	Complete - Final Costed	5/15/2017	717,589	60,017
2017 ACE Plan		49836 11S-302 11S-401 Rebuild Coxheath Phase 2	Distribution Plant - D	Complete - Final Costed	4/1/2017	807,456	53,550
2017 ACE Plan		49434 LIN CW Screen Refurbishment 2017	Steam Generation Plant - S	Complete - Final Costed	10/16/2017	347,062	-
2017 ACE Plan		49774 L5527 Replacements and Upgrades	Transmission Plant - T	Complete - Final Costed	6/30/2017	1,537,852	96,401
2017 ACE Plan		**49437 LIN Vacuum Pump Cooler Refurbishment**	**Steam Generation Plant - S**	**In-service Complete**	**9/16/2017**	**282,034**	**17,400**
2017 ACE Plan		49535 TRE6 Mills Refurbishment 2017	Steam Generation Plant - S	Complete - Final Costed	10/15/2017	822,141	47,605
2017 ACE Plan		49675 TUC2 Cooling Water Piping Refurbishment	Steam Generation Plant - S	Complete - Final Costed	6/30/2017	568,673	-
2017 ACE Plan		49866 512N-Toney River Replacements	Distribution Plant - D	Complete - Final Costed	11/3/2017	285,219	-
2017 ACE Plan		49463 POT Coal Mill Overhauls 2017	Steam Generation Plant - S	Complete - Final Costed	7/30/2017	328,410	40,597
2017 ACE Plan		**47954 L7012 Replacements and Upgrades**	**Transmission Plant - T**	**In-service Complete**	**9/30/2017**	**4,428,520**	**292,352**
2017 ACE Plan		49782 L5027B Replacements and Upgrades	Transmission Plant - T	Complete - Final Costed	4/14/2017	1,093,542	74,727
2017 ACE Plan		41511 TRE6 - Condenser Waterbox and Cooling Water Piping Refurbishment	Steam Generation Plant - S	Complete - Final Costed	9/15/2017	700,809	51,878
2017 ACE Plan		**49948 2017/2018 Isolated Structure Replacements**	**Transmission Plant - T**	**Complete - Final Costed**	**10/30/2017**	**3,822,487**	**264,287**
2017 ACE Plan		49878 2017 Substation Insulator Replacement Program	Transmission Plant - T	Complete - Final Costed	2/15/2017	508,893	34,971
2017 ACE Plan		49833 2017 Oil Containment Program	Transmission Plant - T	Complete - Final Costed	11/1/2017	432,518	34,525
2017 ACE Plan		49776 L7008 Replacements and Upgrades	Transmission Plant - T	**Complete - Final Costed**	9/13/2017	876,277	50,528
2017 ACE Plan		47956 L7004 Replacements and Upgrades	Transmission Plant - T	Complete - Final Costed	9/28/2017	672,131	42,872
2017 ACE Plan		49591 3S Feeder Exit Cable Replacement	Distribution Plant - D	Complete - Final Costed	9/30/2017	335,842	-
2017 ACE Plan		49798 2017 / 2018 Capacitor Bank Breaker Replacements	Transmission Plant - T	Complete - Final Costed	4/1/2018	378,150	26,923
2017 ACE Plan		49789 L6515 Replacements and Upgrades	Transmission Plant - T	Complete - Final Costed	9/30/2017	2,340,989	152,937
2017 ACE Plan		**49793 L7011 Replacements and Upgrades**	**Transmission Plant - T**	**In-service Complete**	**6/1/2017**	**3,343,484**	**206,757**
2017 ACE Plan		49814 2017 / 2018 Steel Tower Life Extension	Transmission Plant - T	Complete - Final Costed	6/1/2017	1,462,100	103,000
2017 ACE Plan		**49838 2017/2018 Substation Polychlorinated Biphenyl (PCB) Equipment Removal Program**	**Transmission Plant - T**	**Complete - Final Costed**	**3/1/2017**	**4,127,023**	**335,210**
2017 ACE Plan		**49919 2017 PCB Pole Top Transformer Replacement**	**Distribution Plant - D**	**In-service Complete**	**1/30/2017**	**2,446,051**	**188,449**
2017 ACE Plan		49791 3N Oxford Conversion Phase 3	Distribution Plant - D	Complete - Final Costed	3/1/2017	358,369	-
2017 ACE Plan		49813 2017 Sacrificial Anode Installation Program	Transmission Plant - T	Complete - Final Costed	1/31/2017	1,532,340	105,000
2017 ACE Plan		**49775 L5004 Replacements and Upgrades**	**Transmission Plant - T**	**In-service Complete**	**3/13/2017**	**995,712**	**63,953**
2017 ACE Plan		50071 T&D Inspection Application Upgrade Phase 1	General Plant - P	Complete - Final Costed	9/30/2017	411,191	24,170
2017 ACE Plan		47893 TUC3 PE Generator Hydrogen Panel Replacement	Steam Generation Plant - S	Complete - Final Costed	10/12/2017	423,798	-
2017 ACE Plan		49427 LIN Coal Plant Structural Refurbishment Phase 3	Steam Generation Plant - S	Complete - Final Costed	8/16/2017	365,003	-
2017 ACE Plan		49433 LIN1 SH5 Boiler Tube Replacement	Steam Generation Plant - S	Complete - Final Costed	5/16/2017	493,396	-
2017 ACE Plan		**49897 POT - Fire System Upgrades 2017**	**Steam Generation Plant - S**	**In-service Complete**	**10/30/2017**	**538,437**	**46,163**
2017 ACE Plan		47597 TRE6 Bottom Ash Chain Replacement	Steam Generation Plant - S	Complete - Final Costed	10/15/2017	793,792	12,303
2017 ACE Plan		49891 509V Recloser and Voltage Regulator Replacement	Distribution Plant - D	In-service Complete	11/1/2017	319,649	12,091
2017 ACE Plan		48535 HYD Scragg Lake Dam and Spillway Refurbishment	Hydro Generation Plant - H	Complete - Final Costed	10/30/2017	1,956,298	227,841
2017 ACE Plan		48631 HYD - Gulch Spillway Refurbishment	Hydro Generation Plant - H	Complete - Final Costed	10/30/2017	617,034	72,153
2017 ACE Plan		**49841 23H-Rockingham Voltage Conversion-Phase 2**	**Distribution Plant - D**	**In-service Complete**	**6/1/2017**	**743,213**	**-**
2018		**48837 AMO Fleet Environmental Data Management**	**General Plant - P**	**In-service Complete**	**3/31/2019**	**423,356**	**38,487**
2018	**C0013438**	**IT - T&D WAM Phase 1 - GIS and Field Design System**	**General Plant - P**	**In-service Complete**	**9/30/2019**	**7,978,434**	**1,300,667**
2018		51481 IT - Content Management System Replacement	General Plant - P	Complete - Final Costed	7/31/2019	2,213,246	326,562
2018	C0002241	IT – Generation Operations Upgrade	General Plant - P	Complete - Final Costed	2/28/2019	565,466	88,765
2018		52143 LM6000 - 191-332 Hot Section and Engine Refurbishment	Gas Turbine Generation Plant - G	Complete - Final Costed	11/30/2019	3,140,533	283,503
2018		**49594 LM6000 TUC5 Airhouse upgrade**	**Gas Turbine Generation Plant - G**	**In-service Complete**	**8/31/2019**	**980,668**	**156,929**
2018		**49926 LM6000 TUC4 Airhouse Upgrade**	**Gas Turbine Generation Plant - G**	**In-service Complete**	**7/31/2019**	**987,141**	**157,050**
2018		51808 TUC HFO Piping Refurbishment	Steam Generation Plant - S	Complete - Final Costed	11/30/2018	1,239,933	187,656
2018		52107 TUC6 CW Screen Replacement	Steam Generation Plant - S	Complete - Final Costed	12/30/2018	856,984	46,607
2018		**49940 LM6000 TUC5 Control System Upgrade**	**Gas Turbine Generation Plant - G**	**In-service Complete**	**12/31/2019**	**1,275,559**	**197,236**
2018 ACE Plan		52239 TUC6 Main and Induction Stop Valve Refurbishment	Steam Generation Plant - S	Complete - Final Costed	7/27/2018	160,053	-
2018 ACE Plan	**C0002103**	**HYD WRC Unit 1 Wicket Gate Thrust Assembly Refurbishment**	**Hydro Generation Plant - H**	**Complete - Final Costed**	**12/30/2018**	**200,574**	**-**
2018 ACE Plan		52271 2018 Padmount Replacement	Distribution Plant - D	Complete - Final Costed	1/25/2018	1,657,205	135,231
2018 ACE Plan		52192 54H-303 Underground Device Replacement	Distribution Plant - D	Complete - Final Costed	12/31/2018	309,230	19,273
2018 ACE Plan		51969 2018 Transmission ROW Widening 69kV	Transmission Plant - T	Complete - Final Costed	1/30/2018	5,487,686	-
2018 ACE Plan		49943 HYD - Ruth Falls Facility Refurbishment	Hydro Generation Plant - H	Complete - Final Costed	7/31/2018	1,234,931	143,550
2018 ACE Plan		52207 678H-211 McNab's Island Replacement	Distribution Plant - D	Complete - Final Costed	3/31/2019	350,176	26,624
2018 ACE Plan		51500 2018 Pin Insulator Replacements	Distribution Plant - D	Complete - Final Costed	1/1/2018	350,100	20,156
2018 ACE Plan		52267 16W-302H-Brenton Rd Rebuild	Distribution Plant - D	Complete - Final Costed	4/28/2019	387,767	28,642
2018 ACE Plan		49946 HYD - Fourth Lake Overhaul	Hydro Generation Plant - H	Complete - Final Costed	11/30/2018	1,025,769	81,354
2018 ACE Plan		52093 ICP Rail Crossing Refurbishment	Steam Generation Plant - S	Complete - Final Costed	8/20/2018	592,402	50,144
2018 ACE Plan		51825 POT Boiler Refurbishment 2018	Steam Generation Plant - S	In-service Complete	4/30/2018	568,740	36,375
2018 ACE Plan		51839 LIN Coal Plant Structural Refurbishment	Steam Generation Plant - S	Complete - Final Costed	8/21/2018	354,067	-
2018 ACE Plan		51866 HYD - 4th Lake Penstock Refurbishment	Hydro Generation Plant - H	Complete - Final Costed	9/30/2018	696,963	56,683
2018 ACE Plan		51805 LIN4 Boiler Refurbishment 2018	Steam Generation Plant - S	Complete - Final Costed	4/29/2018	739,657	-
2018 ACE Plan		52156 LIN Vaccuum Pump Upgrades	Steam Generation Plant - S	Complete - Final Costed	9/25/2018	302,714	-
2018 ACE Plan		51835 TUC2 H2 Panel Upgrades	Steam Generation Plant - S	Complete - Final Costed	6/21/2018	454,886	-
2018 ACE Plan		52253 LIN3 Economizer Header Refurbishment	Steam Generation Plant - S	Complete - Final Costed	3/27/2018	499,951	38,000
2018 ACE Plan		51803 TUC2 Generator Flux Probe Installation	Steam Generation Plant - S	Complete - Final Costed	6/21/2018	840,158	-

						Original Submission Amounts		
Filing Type	CI Number		Project Title	Function Class	Status	Estimated In-Service Date	Approved Estimate	Contingency on Approved Estimate
2018 ACE Plan		52252	LIN1 SH5 Tube Replacement	Steam Generation Plant - S	Complete - Final Costed	10/27/2018	521,259	38,000
2018 ACE Plan		51853	LIN3 Turbine Valve Refurb 2018	Steam Generation Plant - S	Complete - Final Costed	4/21/2018	295,709	-
2018 ACE Plan		51804	LIN3&4 ACW Duplex Strainer Replacement	Steam Generation Plant - S	Complete - Final Costed	8/21/2018	333,808	34,800
2018 ACE Plan		51815	LIN CW Pump Refurbishment 2018	Steam Generation Plant - S	Complete - Final Costed	10/21/2018	520,436	-
2018 ACE Plan		51851	LIN CW Screen Refurbishment 2018	Steam Generation Plant - S	Complete - Final Costed	10/21/2018	350,534	-
2018 ACE Plan		51402	2018/2019 Sacrificial Anode Installation	Transmission Plant - T	Complete - Final Costed	1/31/2018	3,023,668	210,000
2018 ACE Plan		51820	TRE5 Reheat Turbine Valves	Steam Generation Plant - S	Complete - Final Costed	6/15/2018	450,408	38,066
2018 ACE Plan		51860	TRE5 PF Mill Line Replacement	Steam Generation Plant - S	Complete - Final Costed	7/31/2018	258,761	21,442
2018 ACE Plan		51836	TRE5 Mill Refurbishments 2018	Steam Generation Plant - S	Complete - Final Costed	6/15/2018	409,458	4,394
2018 ACE Plan		43218	88W-323A Tusket Islands Phase 3	Distribution Plant - D	Complete - Final Costed	2/28/2019	654,721	46,671
2018 ACE Plan		**51400**	**2018 Sub Recloser Replacements**	**Distribution Plant - D**	**In-service Complete**	**4/30/2018**	**644,710**	**49,632**
2018 ACE Plan		51972	HYD Nictaux Canal Embank Refurbishment	Hydro Generation Plant - H	Complete - Final Costed	8/31/2018	789,918	69,141
2018 ACE Plan		51797	2018 Oil Containment Program	Transmission Plant - T	In-service Complete	12/31/2018	331,507	23,304
2018 ACE Plan	C0001419		TRE HFO Refurbishment Phase 1	Steam Generation Plant - S	Complete - Final Costed	10/15/2018	340,618	28,708
2018 ACE Plan		**49534**	**TRE6 EHG/Turbine Controls Upgrade**	**Steam Generation Plant - S**	**Complete - Final Costed**	**11/15/2018**	**2,725,344**	**51,416**
2018 ACE Plan		51861	TRE6 CW Screen Replacement 2018	Steam Generation Plant - S	Complete - Final Costed	8/15/2018	513,192	23,439
2018 ACE Plan		52194	6S-223-Harold Street Conversion	Distribution Plant - D	In-service Complete	8/31/2018	642,368	50,793
2018 ACE Plan		51824	LIN3 ID Fan Damper and VIV Refurbishment	Steam Generation Plant - S	Complete - Final Costed	4/4/2018	443,311	-
2018 ACE Plan		**49788**	**L5564 Replacements and Upgrades**	**Transmission Plant - T**	**In-service Complete**	**12/31/2018**	**738,853**	**47,436**
2018 ACE Plan		**49783**	**L5027A Replacements and Upgrades**	**Transmission Plant - T**	**Complete - Final Costed**	**3/30/2018**	**648,292**	**39,383**
2018 ACE Plan		**49777**	**L7002 Replacements and Upgrades**	**Transmission Plant - T**	**Complete - Final Costed**	**6/28/2018**	**926,777**	**55,579**
2018 ACE Plan		**52059**	**L5039 - 2018 Replacements and Upgrades**	**Transmission Plant - T**	**In-service Complete**	**5/31/2018**	**719,825**	**49,468**
2018 ACE Plan		**51744**	**30N-411 Maccan River Rebuild**	**Distribution Plant - D**	**Complete - Final Costed**	**10/31/2018**	**473,044**	**33,302**
2018 ACE Plan		51849	LIN3 RH Tube Replacement	Steam Generation Plant - S	Complete - Final Costed	4/21/2018	399,546	-
2018 ACE Plan		51811	LIN Reclaim Refurbishment Phase 2	Steam Generation Plant - S	Complete - Final Costed	10/21/2018	534,666	11,500
2018 ACE Plan		**51398**	**2018/2019 Steel Tower Refurbishment**	**Transmission Plant - T**	**In-service Complete**	**2/28/2018**	**1,992,692**	**146,980**
2018 ACE Plan		52224	532N-Elm Street Conversion Phase 2	Distribution Plant - D	Complete - Final Costed	3/30/2019	722,113	56,276
2018 ACE Plan		**52185**	**50N-410 Rebuild Phase 2**	**Distribution Plant - D**	**In-service Complete**	**7/31/2018**	**695,098**	**52,838**
2018 ACE Plan		**52186**	**4S Feeder Exit Cable Replacement Phase 1**	**Distribution Plant - D**	**Complete - Final Costed**	**12/31/2018**	**293,509**	**17,379**
2018 ACE Plan		**52233**	**2018 Telecom Building Replacement**	**General Plant - P**	**In-service Complete**	**11/30/2018**	**314,929**	**21,860**
2018 ACE Plan		52241	16V-T2 Weymouth Hydro Transformer Replacement	Transmission Plant - T	Complete - Final Costed	12/31/2018	889,253	67,694
2018 ACE Plan		49033	HYD WRC Tunnel T-2 Intake Replacement	Hydro Generation Plant - H	Complete - Final Costed	10/31/2018	2,851,582	367,813
2018 ACE Plan		52206	20V-311-Bishop Ville Rd	Distribution Plant - D	Complete - Final Costed	8/31/2018	303,533	17,367
2018 ACE Plan		48533	HYD Lequille Headpond Refurbishment	Hydro Generation Plant - H	Complete - Final Costed	10/2/2018	4,472,369	537,354
2018 ACE Plan		51863	2018 Tap Changer Replacements	Transmission Plant - T	Complete - Final Costed	6/30/2018	306,102	14,466
2018 ACE Plan	C0001802		54C-211 Queen Street Conversion	Distribution Plant - D	Complete - Final Costed	4/30/2018	705,316	55,296
2018 ACE Plan		51802	TRE5 Boiler Refurbishment 2018	Steam Generation Plant - S	Complete - Final Costed	6/15/2018	1,212,228	46,694
2018 ACE Plan		49547	TRE5 5-1 BFP Refurbishment	Steam Generation Plant - S	Complete - Final Costed	6/15/2018	345,523	23,628
2018 ACE Plan		51816	TRE Asbestos Abatement 2018	Steam Generation Plant - S	Complete - Final Costed	10/31/2018	509,035	20,747
2018 ACE Plan		52208	3S Feeder Exit Cable Replacement Phase 2	Distribution Plant - D	Complete - Final Costed	12/31/2018	293,228	19,861
2018 ACE Plan		52119	L5054 2018 Replacements and Upgrades	Transmission Plant - T	Complete - Final Costed	11/30/2018	560,143	37,063
2018 ACE Plan		51850	LIN4 RH Tube Replacement	Steam Generation Plant - S	Complete - Final Costed	4/21/2018	399,546	-
2018 ACE Plan		51405	2018 Wood Pole Retreatment Program	Transmission Plant - T	Complete - Final Costed	5/31/2018	1,361,076	97,480
2018 ACE Plan		**52305**	**2018 Substation Insulator Replacement**	**Transmission Plant - T**	**In-service Complete**	**2/1/2018**	**316,348**	**19,191**
2018 ACE Plan		52102	L5014-2018 Replacements and Upgrades	Transmission Plant - T	Complete - Final Costed	10/31/2018	849,700	56,264
2018 ACE Plan		**51403**	**2018 PCB Removal Program**	**Transmission Plant - T**	**In-service Complete**	**3/31/2018**	**4,402,342**	**316,487**
2018 ACE Plan	C0001950		New Distribution Rights-of-Way Ph 3	Distribution Plant - D	Complete - Final Costed	3/30/2018	9,822,493	-
2018 ACE Plan		**52320**	**L6549 2018 Replacements & Upgrades**	**Transmission Plant - T**	**In-service Complete**	**10/31/2018**	**1,406,535**	**91,115**
2018 ACE Plan		51852	POT Coal Mill Overhaul 2018	Steam Generation Plant - S	Complete - Final Costed	11/1/2018	327,267	39,997
2018 ACE Plan		51818	PHB Boiler Refurbishment 2018	Steam Generation Plant - S	Complete - Final Costed	9/30/2018	440,315	38,681
2018 ACE Plan		**51493**	**2018 PCB Pole Top Transformer Replacement**	**Distribution Plant - D**	**In-service Complete**	**2/23/2018**	**1,360,354**	**100,313**
2018 ACE Plan		51806	LIN Mill Refurbishment 2018	Steam Generation Plant - S	Complete - Final Costed	10/21/2018	673,153	-
2018 ACE Plan		50577	TRE6 CEMS Replacement	Steam Generation Plant - S	Complete - Final Costed	8/15/2018	715,562	60,558
2018 ACE Plan		51857	TRE5 Burner Refurbishments 2018	Steam Generation Plant - S	Complete - Final Costed	6/15/2018	332,497	27,571
2018 ACE Plan		49676	TUC2 CEMS Replacement	Steam Generation Plant - S	Complete - Final Costed	7/30/2018	380,140	-
2018 ACE Plan		51807	TUC2 Boiler Lower Vestibule Refurbishment	Steam Generation Plant - S	Complete - Final Costed	6/6/2018	412,872	25,114
2018 ACE Plan		**52314**	**1C-GT1/UT1 Replacement**	**Transmission Plant - T**	**In-service Complete**	**12/31/2019**	**2,032,393**	**155,490**
2018 ACE Plan		**52328**	**56N-T1 Transformer Upgrades**	**Transmission Plant - T**	**In-service Complete**	**3/31/2019**	**1,279,271**	**102,094**
2018 ACE Plan		**52262**	**HYD - Hells Gate 1 Overhaul**	**Hydro Generation Plant - H**	**Complete - Final Costed**	**11/30/2018**	**854,993**	**63,676**
2018 ACE Plan		**47871**	**LIN Stack Re-Coating**	**Steam Generation Plant - S**	**In-service Complete**	**8/31/2018**	**381,034**	**62,744**
2018 ACE Plan		47684	LIN3 - Boiler Refurbishment 2018	Steam Generation Plant - S	Complete - Final Costed	4/4/2018	739,657	-
2018 ACE Plan		**52200**	**65V-301 Brickton Reconductor**	**Distribution Plant - D**	**Complete - Final Costed**	**4/30/2019**	**594,362**	**44,264**
2018 ACE Plan		**49944**	**HYD - Dickie Brook Penstock Refurbishment**	**Hydro Generation Plant - H**	**Complete - Final Costed**	**9/30/2018**	**478,820**	**39,405**
2018 ACE Plan		**52204**	**87W-312G-Tancook Island Replacement**	**Distribution Plant - D**	**Complete - Final Costed**	**6/30/2019**	**454,096**	**34,316**
2018 ACE Plan		**52205**	**30N-412 Hwy 242 Fundy Shore Rebuild**	**Distribution Plant - D**	**In-service Complete**	**6/30/2018**	**536,670**	**32,766**
2018 ACE Plan		**52018**	**HYD - RES Revenue Meter Replacement**	**Hydro Generation Plant - H**	**In-service Complete**	**12/31/2018**	**378,248**	**29,916**
2018 ACE Plan		51862	TRE6 Lube Oil Cooler Refurbishment	Steam Generation Plant - S	Complete - Final Costed	9/15/2018	341,769	29,721
2018 ACE Plan		**43429**	**TRE5 Lube Oil Cooler Retube**	**Steam Generation Plant - S**	**Complete - Final Costed**	**6/15/2018**	**338,398**	**29,526**
2018 ACE Plan		**52238**	**2018/2019 Capacitor Bank Breaker Replacement**	**Transmission Plant - T**	**In-service Complete**	**1/31/2019**	**433,719**	**29,049**

						Original Submission Amounts		
Filing Type	CI Number		Project Title	Function Class	Status	Estimated In-Service Date	Approved Estimate	Contingency on Approved Estimate
2018 ACE Plan		**52201**	**55V-314GA-Welsford Reconductor**	**Distribution Plant - D**	**In-service Complete**	**9/30/2018**	**275,161**	**21,019**
2018 ACE Plan		**48131**	**48H-T1 Replacement**	**Transmission Plant - T**	**Complete - Final Costed**	**6/30/2019**	**1,281,449**	**97,775**
2018 ACE Plan		49898	15N-202 Victoria St Replace Deteriorated Assets	Distribution Plant - D	Complete - Final Costed	8/31/2018	242,253	11,843
2019		52292	TUC Heavy Fuel Oil Tank Dyke Refurbishment	Steam Generation Plant - S	Complete - Final Costed	11/28/2019	495,317	18,981
2019	**C0011679**		**AMO T&D Asset Management Performance Tool**	**General Plant - P**	**Complete - Final Costed**	**12/31/2019**	**699,974**	**78,926**
2019		**49093**	**IT - Security Operations Center (SOC) and Security Information Event Monitoring (SIEM)**	**General Plant - P**	**In-service Complete**	**1/31/2020**	**4,074,948**	**351,781**
2019	**C0011059**		**IT - Database Infrastructure Segregation**	**General Plant - P**	**In-service Complete**	**4/30/2020**	**721,816**	**58,706**
2019	**C0011380**		**2019 Telecom Building Replacement**	**General Plant - P**	**In-service Complete**	**5/31/2020**	**299,657**	**-**
2019	**C0021006**		**IT – Microsoft Exchange Upgrade (Replaces CI 49858)**	**General Plant - P**	**In-service Complete**	**1/31/2020**	**1,013,478**	**114,504**
2019 ACE Plan	**C0017920**		**PTMT – Shuttle Belt Replacement**	**Steam Generation Plant - S**	**In-service Complete**	**8/30/2019**	**197,219**	**17,000**
2019 ACE Plan	**C0011208**		**2019 Padmount Replacement Program**	**Distribution Plant - D**	**In-service Complete**	**2/1/2019**	**1,413,544**	**115,580**
2019 ACE Plan		**49991**	**TUC1 - CEMS Installation**	**Steam Generation Plant - S**	**Complete - Final Costed**	**11/19/2019**	**404,343**	**33,253**
2019 ACE Plan	**C0010950**		**2019/2020 Steel Tower Refurbishment**	**Transmission Plant - T**	**Complete - Final Costed**	**9/1/2019**	**2,009,268**	**152,560**
2019 ACE Plan		50632	TRE - (Bunker C) HFO Refurbishment Project Phase 2	Steam Generation Plant - S	Complete - Final Costed	9/15/2019	2,573,137	187,155
2019 ACE Plan		51238	TRE - Asbestos Abatement 2019	Steam Generation Plant - S	Complete - Final Costed	11/15/2019	1,030,841	81,795
2019 ACE Plan	**C0011209**		**85S-401 Cabot Trail Rebuild**	**Distribution Plant - D**	**Complete - Final Costed**	**5/31/2019**	**1,305,919**	**101,095**
2019 ACE Plan	C0011088		POT - Coal Mill Refurbishment 2019	Steam Generation Plant - S	Complete - Final Costed	11/30/2019	472,973	56,006
2019 ACE Plan	C0011064		PHB - Boiler Refurbishment 2019	Steam Generation Plant - S	Complete - Final Costed	8/31/2019	565,707	48,681
2019 ACE Plan		49656	TUC - Waste Water Treatment Plant Controls Upgrade	Steam Generation Plant - S	Complete - Final Costed	10/29/2019	305,851	19,987
2019 ACE Plan	C0011458		ICP - Rail System Refurbishment Program 2019	Steam Generation Plant - S	In-service Complete	8/15/2019	620,192	50,144
2019 ACE Plan	C0010369		TRE5 - Baghouse Filter Replacement Phase 2	Steam Generation Plant - S	Complete - Final Costed	11/15/2019	542,340	24,491
2019 ACE Plan	C0009059		LIN - Coal Plant Structural Refurbishment Phase 5	Steam Generation Plant - S	Complete - Final Costed	9/1/2019	375,902	-
2019 ACE Plan	C0009080		LIN - CW Screen Refurbishment 2019	Steam Generation Plant - S	Complete - Final Costed	7/1/2019	354,651	-
2019 ACE Plan	C0009092		LIN3 - Reheat Tube Replacement 2019	Steam Generation Plant - S	Complete - Final Costed	4/1/2019	412,548	-
2019 ACE Plan	C0009099		LIN3 - Boiler Refurbishment 2019	Steam Generation Plant - S	Complete - Final Costed	6/10/2019	788,176	-
2019 ACE Plan	C0009079		LIN - CW Pump Refurbishment 2019	Steam Generation Plant - S	Complete - Final Costed	7/1/2019	522,011	-
2019 ACE Plan	C0010141		POT - IP-LP Turbine Refurbishment	Steam Generation Plant - S	Complete - Final Costed	7/31/2019	2,938,990	245,840
2019 ACE Plan	C0010498		POT - Turbine Valve Refurbishment	Steam Generation Plant - S	Complete - Final Costed	7/5/2019	698,497	59,090
2019 ACE Plan	C0011076		POT - Boiler Refurbishment 2019	Steam Generation Plant - S	Complete - Final Costed	5/30/2019	1,388,434	115,014
2019 ACE Plan		**46254**	**HYD - Mill Lake Surge Tank Replacement**	**Hydro Generation Plant - H**	**Complete - Final Costed**	**10/30/2020**	**3,598,193**	**466,975**
2019 ACE Plan		47591	TRE5 - Bottom Ash Seal Replacement	Steam Generation Plant - S	Complete - Final Costed	10/31/2019	350,562	29,272
2019 ACE Plan	C0010372		TRE5 - Post Cooler Conveyor Refurbishment	Steam Generation Plant - S	Complete - Final Costed	10/15/2019	319,596	18,128
2019 ACE Plan	**C0011300**		**L7005 -Replacements and Upgrades**	**Transmission Plant - T**	**Complete - Final Costed**	**1/1/2019**	**1,346,026**	**103,826**
2019 ACE Plan	C0009088		LIN - 1&2 CEMS Replacement	Steam Generation Plant - S	Complete - Final Costed	9/1/2019	757,499	65,359
2019 ACE Plan	C0009082		LIN - Reclaim Feeder Refurbishment Phase 3	Steam Generation Plant - S	Complete - Final Costed	8/1/2019	542,948	11,500
2019 ACE Plan	C0010718		TRE5 - Turbine Main Valve Refurbishment	Steam Generation Plant - S	Complete - Final Costed	10/30/2019	730,005	54,500
2019 ACE Plan	C0010319		TRE5 - Boiler Refurbishment 2019	Steam Generation Plant - S	Complete - Final Costed	11/15/2019	518,302	22,347
2019 ACE Plan	**C0010949**		**2019/2020 Steel Tower Life Extension**	**Transmission Plant - T**	**In-service Complete**	**6/1/2019**	**2,414,140**	**179,886**
2019 ACE Plan		48536	HYD - Wreck Cove Brook Dam D-9 Refurbishment	Hydro Generation Plant - H	Complete - Final Costed	9/30/2019	597,697	67,330
2019 ACE Plan	C0010323		TRE6 - Mills Refurbishment 2019	Steam Generation Plant - S	Complete - Final Costed	8/15/2019	796,370	43,504
2019 ACE Plan	C0010318		TRE6 - Boiler Refurbishment 2019	Steam Generation Plant - S	Complete - Final Costed	8/15/2019	1,016,388	43,291
2019 ACE Plan	C0010326		TRE6 - Parallel Slide Valve Replacement	Steam Generation Plant - S	Complete - Final Costed	8/15/2019	256,080	20,261
2019 ACE Plan		51790	TRE6 - Generator High Voltage Bushings Replacement	Steam Generation Plant - S	Complete - Final Costed	8/15/2019	694,334	46,883
2019 ACE Plan	**C0011339**		**L6549 - Replacements and Upgrades Phase 2**	**Transmission Plant - T**	**In-service Complete**	**1/1/2019**	**2,209,907**	**168,543**
2019 ACE Plan	**C0011851**		**2019 Tap Changer Replacements/Refurbishments**	**Transmission Plant - T**	**In-service Complete**	**8/31/2019**	**326,937**	**21,010**
2019 ACE Plan	C0009093		LIN4 - Reheat Tube Replacement 2019	Steam Generation Plant - S	Complete - Final Costed	4/30/2019	412,548	-
2019 ACE Plan	C0009100		LIN4 - Boiler Refurbishment 2019	Steam Generation Plant - S	Complete - Final Costed	4/30/2019	754,772	-
2019 ACE Plan	C0009108		LIN4 - Economizer Header Refurbishment	Steam Generation Plant - S	Complete - Final Costed	4/30/2019	509,373	38,000
2019 ACE Plan	C0009113		LIN4 - Burner Front Refurbishment	Steam Generation Plant - S	Complete - Final Costed	4/30/2019	373,290	-
2019 ACE Plan	**C0009111**		**LIN4 - Bottom Ash Refurbishment**	**Steam Generation Plant - S**	**In-service Complete**	**4/30/2019**	**448,240**	**-**
2019 ACE Plan	C0007638		POT - Generator Auxiliary Equipment Refurbishment	Steam Generation Plant - S	Complete - Final Costed	7/31/2019	3,473,920	288,627
2019 ACE Plan	C0010142		POT - HP Turbine refurbishment	Steam Generation Plant - S	Complete - Final Costed	7/31/2019	1,813,421	152,665
2019 ACE Plan	C0011085		POT - Hydrogen Panel Replacement	Steam Generation Plant - S	Complete - Final Costed	7/31/2019	464,252	39,933
2019 ACE Plan	**C0009094**		**LIN Fly Ash Precipitator Component Refurbishment**	**Steam Generation Plant - S**	**In-service Complete**	**7/1/2019**	**414,046**	**-**
2019 ACE Plan	C0007398		POT - Air Heater Refurbishment	Steam Generation Plant - S	Complete - Final Costed	5/30/2019	669,205	55,206
2019 ACE Plan	C0009096		LIN - Mill Refurbishment 2019	Steam Generation Plant - S	Complete - Final Costed	7/1/2019	677,819	-
2019 ACE Plan	**C0011240**		**L5511 - Replacements and Upgrades**	**Transmission Plant - T**	**Complete - Final Costed**	**1/1/2019**	**1,255,087**	**94,732**
2019 ACE Plan	**C0011241**		**L5026 -Replacements and Upgrades**	**Transmission Plant - T**	**In-service Complete**	**1/1/2019**	**1,498,789**	**113,286**
2019 ACE Plan	**C0010042**		**2019 Transmission Right-of-Way Widening 69kV**	**Transmission Plant - T**	**In-service Complete**	**1/1/2019**	**5,650,794**	**-**
2019 ACE Plan	C0010040		New Distribution Rights-of-Way Widening Phase 4	Distribution Plant - D	Complete - Final Costed	1/1/2019	10,275,861	-
2019 ACE Plan	C0004058		HYD - Tidewater 2 Overhaul	Hydro Generation Plant - H	Complete - Final Costed	8/31/2019	1,916,321	217,535
2019 ACE Plan	**C0011242**		**L5541 -Replacements and Upgrades**	**Transmission Plant - T**	**Complete - Final Costed**	**1/1/2019**	**1,624,850**	**124,588**
2019 ACE Plan		49874	CT - BGT Replace Halon Fire Protection	Gas Turbine Generation Plant - G	Complete - Final Costed	10/31/2019	1,149,153	96,944
2019 ACE Plan	C0012158		HYD - Malay Falls Unit 6 Generator Refurbishment	Hydro Generation Plant - H	Complete - Final Costed	7/30/2019	835,854	96,817
2019 ACE Plan	C0010957		HYD - Malay Falls Unit 6 Overhaul	Hydro Generation Plant - H	Complete - Final Costed	7/31/2019	1,273,280	77,376
2019 ACE Plan	**C0006859**		**HYD - Wreck Cove Crane Refurbishment**	**Hydro Generation Plant - H**	**Complete - Final Costed**	**6/30/2019**	**498,167**	**59,191**
2019 ACE Plan	**C0008098**		**TRE - Sludge Dewatering Infrastructure**	**Steam Generation Plant - S**	**In-service Complete**	**7/31/2019**	**663,486**	**53,282**
2019 ACE Plan		**49714**	**TUC - UT3 and ST34 Cable Replacement**	**Steam Generation Plant - S**	**Complete - Final Costed**	**9/13/2019**	**606,863**	**52,293**
2019 ACE Plan	**C0003998**		**HYD - Wreck Cove Station Service Cable Replacement**	**Hydro Generation Plant - H**	**Complete - Final Costed**	**11/30/2019**	**429,384**	**44,011**
2019 ACE Plan	**C0011309**		**54H-304 - Underground Device Replacement**	**Distribution Plant - D**	**Complete - Final Costed**	**12/31/2019**	**685,268**	**43,961**
2019 ACE Plan	C0011320		22W-311GA - Hawk Point Road Reconductor Replacement	Distribution Plant - D	Complete - Final Costed	8/31/2019	465,758	35,473

					Original Submission Amounts		
Filing Type	CI Number	Project Title	Function Class	Status	Estimated In-Service Date	Approved Estimate	Contingency on Approved Estimate
2019 ACE Plan	C0011091	POT - Asbestos Abatement 2019	Steam Generation Plant - S	In-service Complete	5/31/2019	270,498	32,734
2019 ACE Plan	C0010325	TRE5 - CW Screen Refurbishment	Steam Generation Plant - S	Complete - Final Costed	10/31/2019	382,776	25,548
2019 ACE Plan	**C0011182**	**15N-202 - Dominion St and Arthur St Rebuild**	**Distribution Plant - D**	**In-service Complete**	**6/30/2019**	**328,292**	**22,626**
2019 ACE Plan	**C0004165**	**70W-311G - Crousetown Road Phase Extension**	**Distribution Plant - D**	**In-service Complete**	**6/30/2019**	**285,117**	**22,004**
2019 ACE Plan	**C0011188**	**23H-303 - Willett Street Underground Replacement**	**Distribution Plant - D**	**In-service Complete**	**12/31/2019**	**286,624**	**18,466**
2019 ACE Plan	**C0008559**	**POT Diesel Generator and Essential Services Switchgear Replacement**	**Steam Generation Plant - S**	**In-service Complete**	**10/30/2019**	**294,571**	**10,047**
2019 ACE Plan	**48638**	**TRE - Rail Car Fuel Delivery Upgrade**	**Steam Generation Plant - S**	**In-service Complete**	**10/31/2019**	**1,236,623**	**95,081**
2019 ACE Plan	**C0011197**	**64N Lourdes Street Conversion Phase 1**	**Distribution Plant - D**	**In-service Complete**	**2/28/2020**	**576,031**	**45,579**
2019 ACE Plan	**C0011200**	**6S-224 - Birch Hill Drive Conversion**	**Distribution Plant - D**	**Complete - Final Costed**	**4/30/2019**	**542,026**	**42,186**
2020 ACE Plan	**C0021102**	**L5029 Replacements and Upgrades**	**Transmission Plant - T**	**In-service Complete**	**6/1/2020**	**6,206,677**	**480,523**
2020 ACE Plan	**C0006358**	**HYD - Lake Mulgrave Dam Refurbishments**	**Hydro Generation Plant - H**	**In-service Complete**	**11/30/2020**	**5,853,650**	**613,185**
2020 ACE Plan	**C0021106**	**L7005 Replacements and Upgrades Phase 1**	**Transmission Plant - T**	**In-service Complete**	**7/1/2020**	**3,576,991**	**277,387**
2020 ACE Plan	**C0012878**	**HYD - Weymouth Falls Unit 1 Generator Refurbishment**	**Hydro Generation Plant - H**	**Complete - Final Costed**	**9/30/2020**	**2,264,326**	**184,388**
2020 ACE Plan	**49949**	**LM6000 TUC4 Control System Replacement**	**Gas Turbine Generation Plant - G**	**In-service Complete**	**6/30/2020**	**1,149,996**	**181,947**
2020 ACE Plan	**52285**	**L5524 Replacements and Upgrades**	**Transmission Plant - T**	**Complete - Final Costed**	**1/1/2020**	**2,161,314**	**165,309**
2020 ACE Plan	**52303**	**L7019 Replacements and Upgrades**	**Transmission Plant - T**	**In-service Complete**	**6/1/2020**	**1,374,092**	**107,112**
2020 ACE Plan	**C0021130**	**48H Metalclad Switchgear Replacement**	**Transmission Plant - T**	**Complete - Final Costed**	**9/30/2020**	**1,210,706**	**79,076**
2020 ACE Plan	**C0021584**	**TUC3 Turbine Valves Refurbishments**	**Steam Generation Plant - S**	**Complete - Final Costed**	**10/31/2020**	**1,041,020**	**76,619**
2020 ACE Plan	**C0020623**	**New Distribution Rights-of-Way Phase 5**	**Distribution Plant - D**	**In-service Complete**	**2/1/2020**	**10,015,266**	**-**
2020	**C0010019**	**IT – ADMS Upgrade**	**General Plant - P**	**In-service Complete**	**10/31/2020**	**9,626,891**	**393,274**
2020	C0021805	IT - Microsoft Enterprise Agreement 2020	General Plant - P	Complete - Final Costed	7/31/2020	3,139,727	-
2020	**C0021826**	**IT Enterprise Data Lake**	**General Plant - P**	**In-service Complete**	**2/28/2021**	**1,260,417**	**146,847**
2021 ACE Plan	**C0031083**	**New Distribution Rights-of-Way Phase 6**	**Distribution Plant - D**	**In-service Complete**	**5/1/2021**	**9,762,735**	**-**
2021 ACE Plan	**C0020944**	**LM6000 - 191-443 Hot Section Engine Refurbishment**	**Gas Turbine Generation Plant - G**	**Complete - Final Costed**	**5/30/2022**	**5,749,282**	**1,257,375**
2021 ACE Plan	**C0030528**	**TUC3 HP Turbine Refurbishment**	**Steam Generation Plant - S**	**In-service Complete**	**12/15/2021**	**2,085,094**	**83,763**
2022 ACE Plan	**C0029693**	**CT - VJ1 Generator Replacement**	**Gas Turbine Generation Plant - G**	**In-service Complete**	**6/30/2022**	**5,942,640**	**862,313**
2022 ACE Plan	**C0041906**	**PHB – 2022 Turbine Refurbishment**	**Steam Generation Plant - S**	**In-service Complete**	**11/30/2022**	**3,729,597**	**452,851**
2022 ACE Plan	**C0029691**	**CT - VJ1 Control System Upgrade**	**Gas Turbine Generation Plant - G**	**In-service Complete**	**6/30/2022**	**1,016,225**	**43,895**
							26,026,606

	Actual Amounts				
Project Title	Actual In-Service Date	Actual Spend (as of 12/31/2022)	Variance to Approved Estimate	Comments/Notes	Variance Explanation Less Than 25% Variance
TUC2 North Boiler Feedwater Pump Refurbishment	5/31/2019	784,759	593,752	Subsequently approved >$250 in 2017 for $274,951. NSUARB letter dated November 8, 2019 advised NSUARB approval of ATO not required due to PUA changes.	
East Switch Upgrades 15S	7/31/2019	290,265	168,045	Subsequently approved >$250 in 2017 for $304,379.	
LIN Ash Scale Replacement	6/30/2017	520,573	283,333	Subsequently approved >$250 in 2017 for $481,252.	
LIN4 Turbine Vibration Monitoring Upgrade	6/30/2016	291,238	53,022	Subsequently approved >$250 in 2017 for $280,095.	
TUC6 Condenser Waterbox Coating Replacement	10/28/2016	368,637	143,427	Subsequently approved >$250 in 2017 for $366,978.	
TRE Asbestos Abatement (2016)	11/29/2016	2,088,671	1,934,368	Subsequently approved >$250 in 2017 for $2,096,391.	
TRE5 Sootblower Controls Upgrade	12/31/2016	286,649	128,251	Subsequently approved >$250 in 2017 for $285,301.	
36V-303 Reconductor Middle Dyke Rd	1/30/2017	287,678	61,375	Subsequently approved >$250 in 2017 for $287,779.	
HYD Lequille Controls Upgrades	3/30/2018	722,822	(40,090)		
HYD Bridge Remediation	12/1/2018	714,834	37,243		
Replace Mobile Radio System	2/1/2018	6,498,994	202,115		
TUC3 IP Turbine Refurbishment	1/31/2018	5,466,520	595,066	ATO approved October 9, 2018.	
VOIP Expansion	1/1/2018	1,837,566	128,643		
HYD Harmony Stabilization	10/31/2017	777,750	(154,192)		
Electric Vehicle Infrastructure Deployment	6/15/2018	509,295	89,387	2017 submission was not approved by NSUARB.	
2017 Substation Recloser Replacements	**1/10/2017**	**720,013**	**115,124**		
Stator Rewind Kit Capital Spare	8/17/2018	2,917,466	46,462		
129H Kearney Lake Load Transfer	2/28/2018	315,886	29,606		
IT - Storage Infrastructure Upgrade	5/31/2018	1,954,220	53,032		
IT - CIS High Availability	6/18/2018	560,760	41,737		
HYD Lequille Switchgear Replacement	3/22/2018	739,474	(36,916)		
HYD - Lequille Overhaul	3/22/2018	2,378,233	983,004	ATO approved April 10, 2018.	
HYD - Lequille Pipeline Replacement	12/15/2017	925,167	(196,087)		
TRE6 Turbine Valve Refurbishment	11/14/2017	601,996	31,396		
TUC#5 LM6000 Generator Stator Re-wedge	8/31/2017	1,213,520	(147,781)		
HYD - Gulch Penstock & Surge Tank Replacement	4/18/2018	5,067,474	96,931		
TRE6 Generator Rotor Flux Probe Installation	11/15/2017	852,045	67,435		
HYD - Hells Gate 2 Overhaul	2/20/2018	1,144,529	(59,734)	FIN approved October 26, 2018.	
TUC2 Boiler Selective Waterwall Tube Replacements	6/30/2017	656,906	235,388		
TRE6 HIP Turbine Diaphragm Partition Refurbishment	11/15/2017	1,313,762	128,317		
BGT2 Engine Refurbishment	11/30/2017	1,981,224	(188,933)		
Tiverton Tower Replacement	**6/30/2019**	**2,174,543**	**709,410**	**ATO approved May 23, 2019.**	
IT - Sharepoint Upgrade	2/26/2019	4,141,059	237,465		
TRE6 Generator High Voltage Bushings Critical Spare	1/17/2018	265,783	1,533		
PHB - Boiler Refurbishment 2017	8/4/2017	401,915	(191,825)		Due to less scope of boiler work required than was originally estimated. Contingency was not required.
Western Switching Upgrades	6/30/2018	650,674	271,831	ATO approved June 11, 2019.	
Customer Experience Self-Serve Development Phase 2	**6/15/2018**	**1,316,269**	**155,741**		
LIN A Gallery Floor Replacement	8/31/2017	404,299	(187,462)		Due to contractor costs being less than initially estimated. Contingency was not required.
IT - Desktop SW Modernization	**1/31/2018**	**4,501,621**	**(118,895)**		
Intelligent Feeder Project	1/31/2018	3,031,525	249,141		
Tap Changer Replacements	**10/31/2017**	**518,589**	**200,353**		
3S Gannon Road – Bus Reconfiguration	**10/1/2017**	**835,572**	**464,177**	**ATO approved June 6, 2018.**	
TRE6 LP Turbine Diaphragm Tip Seal Replacement	11/15/2017	1,784,166	79,382	FIN approved June 12, 2018.	
85S-402 Re-Insulate	3/31/2017	1,700,924	149,066		
POT Air Heater Refurbishment	6/1/2017	363,699	91,161		
HYD - Gisborne Switchgear Replacmnt	2/6/2020	914,413	166,964		
2H Armdale New Feeders	**2/29/2020**	**1,723,894**	**735,396**	**ATO approved June 19, 2020.**	
LIN CEMS Replacement	10/31/2018	689,032	518,750	Subsequently approved >$250 in 2017 for $633,355.	
TRE Asbestos Abatement 2017	8/2/2017	684,184	457,733	Subsequently approved >$250 in 2017 for $728,886.	
TRE5 CEMS Replacement	5/11/2018	759,657	597,009	Subsequently approved >$250 in 2017 for $679,922.	
50N-410 Rebuild Trenton	7/31/2017	486,542	238,769	Subsequently approved >$250 in 2017 for $440,329.	
TUC HFO Tank Dyke Piping Refurbishments	12/15/2017	884,473	665,451	Subsequently approved >$250 in 2017 for $664,753.	
2017 Padmount Replacement Program	4/30/2017	1,719,177	15,403		
2017 Telecom Building Replacement - Wittenburg	5/31/2018	301,948	7,948		
2017 Transmission Right of Way Widening	1/1/2017	5,494,423	93,568		
55V-313-Berwick North Replacements	2/2/2018	417,926	72,361		
509V-301 Overcove Rd Replacements	2/28/2018	360,036	(42,458)		
4S-332 Bernard Lind Drive Conversion	11/30/2017	345,727	42,834		
532N Elm Street Conversion Phase 1	1/31/2018	525,501	(23,187)		
Meter Shop Test Console Replacement	11/30/2017	400,133	(10,324)		
IT - PI System Upgrade	7/21/2018	814,726	13,473		
HYD - Milton Shop HVAC Upgrade	8/20/2018	721,810	157,463		
TUC2 Generator Bushing Replacement	6/15/2018	726,401	286,319	ATO approved July 26, 2018.	
LIN Railcar Positioner Refurbishment	10/31/2017	607,545	40,926		
Mersey River Hydro Spare Transformer	10/31/2018	439,280	(80,715)		
2017/2018 Transmission Switch & Breaker Replacement	1/31/2018	1,096,991	22,519		
2017 Transmission Line Retirement Program	6/1/2017	544,382	18,318		
PTMT - Dock and Inhaul Conveyor Replacement	12/22/2017	928,290	460,683	ATO approved January 26, 2018.	
2017 / 2018 Steel Tower Refurbishment	2/28/2017	1,937,433	(65,884)		
TRE6 Boiler Refurbishment	11/14/2017	1,490,498	231,045		
Replace 69kV cables between 2S and 83S	**10/31/2019**	**598,079**	**138,148**		
TRE6 Analytical Panel Upgrade	8/15/2019	534,927	96,711		
2017 RTU Replacement Program	**7/31/2019**	**585,319**	**(108,035)**		

	Actual Amounts				
Project Title	Actual In-Service Date	Actual Spend (as of 12/31/2022)	Variance to Approved Estimate	Comments/Notes	Variance Explanation Less Than 25% Variance
LIN Mill Refurbishment 2017	6/22/2017	763,974	98,135		
54H-303 Underground Device Replacements Phase I	7/31/2017	521,501	51,897		
TRE6 Excitation System Replacement	11/30/2017	893,489	(10,522)		
POT Boiler Refurbishment 2017	6/5/2017	1,180,397	211,105		
POT Boiler Chemical Reconditioning	6/5/2017	1,588,495	613,891	ATO approved November 2, 2017.	
LIN CW Pump Refurbishment 2017	6/22/2017	560,231	43,962		
TRE6 Air Heater Refurbishment	11/14/2017	1,548,759	120,523		
TRE5 Boiler Refurbishments 2017	5/8/2017	925,492	207,903		
11S-302 11S-401 Rebuild Coxheath Phase 2	12/29/2017	774,528	(32,928)		
LIN CW Screen Refurbishment 2017	8/31/2017	334,390	(12,672)		
L5527 Replacements and Upgrades	5/31/2018	1,784,759	246,907		
LIN Vacuum Pump Cooler Refurbishment	**12/15/2017**	**262,436**	**(19,598)**		
TRE6 Mills Refurbishment 2017	11/14/2017	860,580	38,439		
TUC2 Cooling Water Piping Refurbishment	6/30/2017	812,353	243,680		
512N-Toney River Replacements	12/29/2017	453,402	168,182		
POT Coal Mill Overhauls 2017	12/14/2017	501,140	172,730		
L7012 Replacements and Upgrades	**8/1/2017**	**4,392,086**	**(36,434)**		
L5027B Replacements and Upgrades	12/31/2017	1,532,096	438,554	ATO approved July 19, 2018.	
TRE6 - Condenser Waterbox and Cooling Water Piping Refurbishment	12/1/2017	949,194	248,385		
2017/2018 Isolated Structure Replacements	**11/1/2017**	**4,813,197**	**990,710**	**ATO approved October 18, 2022.**	
2017 Substation Insulator Replacement Program	3/31/2017	353,315	(155,578)		Replacements focused on lower voltage classes which reduced material and labour costs. Contingency was not required.
2017 Oil Containment Program	12/31/2017	339,360	(93,159)		
L7008 Replacements and Upgrades	8/31/2017	733,884	(142,393)		
L7004 Replacements and Upgrades	7/31/2017	481,723	(190,408)		Due to labour and contract costs being less than initially estimated. Contingency was not required.
3S Feeder Exit Cable Replacement	12/31/2017	581,561	245,719		
2017 / 2018 Capacitor Bank Breaker Replacements	6/30/2017	209,820	(168,329)		Due to labour costs being less than initially estimated. Contingency was not required.
L6515 Replacements and Upgrades	6/30/2017	2,590,653	249,664		
L7011 Replacements and Upgrades	**6/1/2017**	**4,591,706**	**1,248,222**	**ATO approved August 19, 2019.**	
2017 / 2018 Steel Tower Life Extension	6/1/2017	1,643,871	181,771		
2017/2018 Substation Polychlorinated Biphenyl (PCB) Equipment Removal Program	**4/30/2017**	**4,334,512**	**207,489**		
2017 PCB Pole Top Transformer Replacement	**3/31/2017**	**2,507,656**	**61,605**		
3N Oxford Conversion Phase 3	3/31/2017	604,785	246,416		
2017 Sacrificial Anode Installation Program	3/31/2017	1,749,977	217,637		
L5004 Replacements and Upgrades	**2/1/2017**	**1,003,333**	**7,621**		
T&D Inspection Application Upgrade Phase 1	1/31/2018	652,957	241,766		
TUC3 PE Generator Hydrogen Panel Replacement	12/15/2017	468,010	44,211		
LIN Coal Plant Structural Refurbishment Phase 3	9/18/2017	466,204	101,201		
LIN1 SH5 Boiler Tube Replacement	6/22/2017	930,561	437,165	ATO approved September 12, 2017.	
POT - Fire System Upgrades 2017	**12/12/2022**	**630,894**	**92,457**		
TRE6 Bottom Ash Chain Replacement	11/14/2017	1,159,004	365,212	ATO approved January 29, 2018.	
509V Recloser and Voltage Regulator Replacement	12/31/2017	263,426	(56,223)		Due to lower than estimated materials and contractor costs. Contingency was not required.
HYD Scragg Lake Dam and Spillway Refurbishment	11/30/2017	1,625,672	(330,626)	FIN approved December 6, 2018.	
HYD - Gulch Spillway Refurbishment	10/25/2018	637,103	20,069		
23H-Rockingham Voltage Conversion-Phase 2	**12/31/2017**	**657,043**	**(86,170)**		
AMO Fleet Environmental Data Management	**1/1/2022**	**991,445**	**568,089**		
IT - T&D WAM Phase 1 - GIS and Field Design System	**12/15/2019**	**8,098,223**	**119,789**		
IT - Content Management System Replacement	11/26/2019	2,193,507	(19,739)		
IT – Generation Operations Upgrade	10/25/2019	383,086	(182,380)		The number of servers required to complete this project was lower than estimated.
LM6000 - 191-332 Hot Section and Engine Refurbishment	8/9/2019	3,364,401	223,868		
LM6000 TUC5 Airhouse upgrade	**7/25/2019**	**1,029,085**	**48,418**		
LM6000 TUC4 Airhouse Upgrade	**6/28/2019**	**899,875**	**(87,265)**		
TUC HFO Piping Refurbishment	12/31/2018	3,666,539	2,426,607	ATO approved August 14, 2019.	
TUC6 CW Screen Replacement	9/14/2018	1,058,298	201,313		
LM6000 TUC5 Control System Upgrade	**4/15/2021**	**1,070,506**	**(205,053)**		
TUC6 Main and Induction Stop Valve Refurbishment	9/14/2018	300,398	140,344	Subsequently approved >$250 in 2018 for $335,693.	
HYD WRC Unit 1 Wicket Gate Thrust Assembly Refurbishment	**10/9/2019**	**906,132**	**705,557**	**Subsequently approved >$250 in 2018 for $928,320.**	
2018 Padmount Replacement	2/28/2018	1,571,077	(86,128)		
54H-303 Underground Device Replacement	5/31/2018	388,517	79,287		
2018 Transmission ROW Widening 69kV	2/20/2018	5,542,106	54,421		
HYD - Ruth Falls Facility Refurbishment	11/19/2019	1,448,446	213,515		
678H-211 McNab's Island Replacement	7/31/2018	263,145	(87,031)		
2018 Pin Insulator Replacements	6/30/2019	321,249	(28,851)		
16W-302H-Brenton Rd Rebuild	12/13/2018	344,278	(43,488)		
HYD - Fourth Lake Overhaul	1/30/2019	1,145,995	120,225		
ICP Rail Crossing Refurbishment	9/5/2018	450,582	(141,821)		
POT Boiler Refurbishment 2018	5/4/2018	639,401	70,661		
LIN Coal Plant Structural Refurbishment	9/5/2018	427,548	73,481		
HYD - 4th Lake Penstock Refurbishment	9/1/2018	902,399	205,436		
LIN4 Boiler Refurbishment 2018	8/1/2018	828,067	88,410		
LIN Vaccuum Pump Upgrades	4/14/2018	322,107	19,393		
TUC2 H2 Panel Upgrades	6/21/2018	501,488	46,602		
LIN3 Economizer Header Refurbishment	5/16/2018	560,687	60,736		
TUC2 Generator Flux Probe Installation	6/15/2018	863,302	23,144		

	Actual Amounts				
Project Title	Actual In-Service Date	Actual Spend (as of 12/31/2022)	Variance to Approved Estimate	Comments/Notes	Variance Explanation Less Than 25% Variance
LIN1 SH5 Tube Replacement	10/2/2018	600,706	79,447		
LIN3 Turbine Valve Refurb 2018	4/14/2018	351,882	56,173		
LIN3&4 ACW Duplex Strainer Replacement	6/24/2019	327,212	(6,596)		
LIN CW Pump Refurbishment 2018	4/14/2018	613,339	92,902		
LIN CW Screen Refurbishment 2018	10/31/2018	306,646	(43,887)		
2018/2019 Sacrificial Anode Installation	4/30/2018	3,073,174	49,506		
TRE5 Reheat Turbine Valves	9/14/2018	549,705	99,297		
TRE5 PF Mill Line Replacement	9/14/2018	264,575	5,814		
TRE5 Mill Refurbishments 2018	6/1/2018	479,323	69,865		
88W-323A Tusket Islands Phase 3	9/30/2019	703,299	48,578		
2018 Sub Recloser Replacements	**9/30/2019**	**584,292**	**(60,418)**		
HYD Nictaux Canal Embank Refurbishment	9/13/2019	601,443	(188,475)		
2018 Oil Containment Program	8/31/2019	344,911	13,404		
TRE HFO Refurbishment Phase 1	8/15/2019	387,756	47,139		
TRE6 EHG/Turbine Controls Upgrade	**8/15/2019**	**1,255,107**	**(1,470,237)**		**Primarily due to using a non-OEM vendor, which had successfully completed implementation of the Trenton Unit 5&6 DCS upgrades, and the contingency amount not being required.**
TRE6 CW Screen Replacement 2018	8/15/2019	621,143	107,951		
6S-223-Harold Street Conversion	7/31/2019	727,382	85,014		
LIN3 ID Fan Damper and VIV Refurbishment	4/14/2018	464,603	21,292		
L5564 Replacements and Upgrades	**7/31/2019**	**783,944**	**45,091**		
L5027A Replacements and Upgrades	**7/31/2019**	**791,305**	**143,013**		
L7002 Replacements and Upgrades	**6/30/2019**	**1,141,256**	**214,480**		
L5039 - 2018 Replacements and Upgrades	**6/30/2019**	**686,487**	**(33,337)**		
30N-411 Maccan River Rebuild	**6/30/2019**	**747,752**	**274,708**		
LIN3 RH Tube Replacement	4/14/2018	499,759	100,213		
LIN Reclaim Refurbishment Phase 2	5/31/2019	671,695	137,029		
2018/2019 Steel Tower Refurbishment	**8/31/2018**	**2,045,977**	**53,286**		
532N-Elm Street Conversion Phase 2	1/31/2019	859,625	137,512		
50N-410 Rebuild Phase 2	**12/31/2018**	**822,178**	**127,080**		
4S Feeder Exit Cable Replacement Phase 1	**12/31/2018**	**391,593**	**98,085**		
2018 Telecom Building Replacement	**11/30/2018**	**260,403**	**(54,526)**		
16V-T2 Weymouth Hydro Transformer Replacement	11/30/2018	674,829	(214,424)		
HYD WRC Tunnel T-2 Intake Replacement	11/22/2018	2,759,407	(92,175)		
20V-311-Bishop Ville Rd	10/31/2018	167,853	(135,680)		Labour and traffic control required was less than originally estimated. Contingency was not required.
HYD Lequille Headpond Refurbishment	10/30/2018	4,653,541	181,171		
2018 Tap Changer Replacements	9/30/2018	417,340	111,238		
54C-211 Queen Street Conversion	9/27/2018	953,678	248,363		
TRE5 Boiler Refurbishment 2018	9/14/2018	1,384,485	172,257		
TRE5 5-1 BFP Refurbishment	9/14/2018	190,208	(155,314)		The scope of this project was to refurbish the BFP cartridge and bearings. Only the Cartridge was required leading to a reduction in contractor costs and contingency not being required.
TRE Asbestos Abatement 2018	9/7/2018	729,996	220,962		
3S Feeder Exit Cable Replacement Phase 2	8/31/2018	540,984	247,755		
L5054 2018 Replacements and Upgrades	7/31/2018	784,720	224,578		
LIN4 RH Tube Replacement	7/9/2018	522,749	123,203		
2018 Wood Pole Retreatment Program	6/30/2018	924,521	(436,555)		Due to contractor costs being less than initially estimated. Contingency was not required.
2018 Substation Insulator Replacement	**6/30/2018**	**323,842**	**7,494**		
L5014-2018 Replacements and Upgrades	5/31/2018	1,038,850	189,150		
2018 PCB Removal Program	**4/30/2018**	**3,491,693**	**(910,649)**		
New Distribution Rights-of-Way Ph 3	2/1/2018	10,288,858	466,365		
L6549 2018 Replacements & Upgrades	**10/31/2018**	**1,452,523**	**45,987**		
POT Coal Mill Overhaul 2018	8/31/2018	392,517	65,250		
PHB Boiler Refurbishment 2018	7/31/2018	517,202	76,887		
2018 PCB Pole Top Transformer Replacement	**6/30/2017**	**1,384,076**	**23,722**		
LIN Mill Refurbishment 2018	10/31/2018	791,432	118,279		
TRE6 CEMS Replacement	10/12/2018	736,211	20,649		
TRE5 Burner Refurbishments 2018	9/14/2018	214,410	(118,088)		Replacement of the refractory originally included in the estimate was not completed as it was not required at that time. Contingency was not required.
TUC2 CEMS Replacement	2/26/2019	411,019	30,878		
TUC2 Boiler Lower Vestibule Refurbishment	6/29/2018	193,683	(219,189)		Components of the boiler that were estimated as requiring replacement did not need to be replaced upon inspection. This reduced contractor costs and contingency was not required.
1C-GT1/UT1 Replacement	**11/30/2020**	**1,676,929**	**(355,464)**		
56N-T1 Transformer Upgrades	**11/30/2020**	**1,307,910**	**28,639**		
HYD - Hells Gate 1 Overhaul	**5/17/2022**	**1,011,573**	**156,579**		
LIN Stack Re-Coating	**10/22/2021**	**415,777**	**34,744**		
LIN3 - Boiler Refurbishment 2018	4/14/2018	791,058	51,401		
65V-301 Brickton Reconductor	**4/30/2020**	**678,994**	**84,632**		
HYD - Dickie Brook Penstock Refurbishment	**12/31/2021**	**1,225,280**	**746,460**	**ATO Approved December 15, 2021**	
87W-312G-Tancook Island Replacement	**12/30/2020**	**986,488**	**532,393**		
30N-412 Hwy 242 Fundy Shore Rebuild	**8/31/2021**	**437,781**	**(98,888)**		
HYD - RES Revenue Meter Replacement	**12/23/2021**	**846,239**	**467,991**		
TRE6 Lube Oil Cooler Refurbishment	9/1/2020	307,870	(33,899)		
TRE5 Lube Oil Cooler Retube	**9/15/2021**	**466,175**	**127,777**		
2018/2019 Capacitor Bank Breaker Replacement	**10/31/2020**	**300,508**	**(133,211)**		**Due to contractor and material costs being less than initially estimated. Contingency was not required.**

	Actual Amounts				
Project Title	Actual In-Service Date	Actual Spend (as of 12/31/2022)	Variance to Approved Estimate	Comments/Notes	Variance Explanation Less Than 25% Variance
55V-314GA-Welsford Reconductor	**7/31/2020**	**432,861**	**157,700**		
48H-T1 Replacement	**11/30/2020**	**1,517,266**	**235,817**		
15N-202 Victoria St Replace Deteriorated Assets	8/31/2018	388,998	146,745	Subsequently approved >$250 in 2019 for $394,528.	
TUC Heavy Fuel Oil Tank Dyke Refurbishment	11/28/2019	482,963	(12,354)		
AMO T&D Asset Management Performance Tool	**6/19/2020**	**930,933**	**230,959**		
IT - Security Operations Center (SOC) and Security Information Event Monitoring (SIEM)	**1/31/2020**	**4,146,181**	**71,233**		
IT - Database Infrastructure Segregation	**2/19/2021**	**716,130**	**(5,686)**		
2019 Telecom Building Replacement	**5/31/2021**	**331,625**	**31,968**		
IT – Microsoft Exchange Upgrade (Replaces CI 49858)	**6/30/2020**	**1,073,325**	**59,847**		
PTMT – Shuttle Belt Replacement	**12/31/2021**	**661,037**	**463,818**	**Subsequently approved >$250 in 2019 for $658,560. Previously submitted in 2019 ACE under CI C0011418**	
2019 Padmount Replacement Program	**2/28/2019**	**1,459,613**	**46,070**		
TUC1 - CEMS Installation	**12/31/2019**	**454,204**	**49,861**		
2019/2020 Steel Tower Refurbishment	**12/31/2019**	**2,168,601**	**159,333**		
TRE - (Bunker C) HFO Refurbishment Project Phase 2	12/15/2019	2,113,228	(459,909)		
TRE - Asbestos Abatement 2019	12/15/2019	1,113,337	82,496		
85S-401 Cabot Trail Rebuild	**11/30/2019**	**1,539,815**	**233,896**		
POT - Coal Mill Refurbishment 2019	11/30/2019	579,947	106,974		
PHB - Boiler Refurbishment 2019	11/30/2019	545,270	(20,437)		
TUC - Waste Water Treatment Plant Controls Upgrade	11/28/2019	366,139	60,288		
ICP - Rail System Refurbishment Program 2019	11/22/2019	593,193	(26,998)		
TRE5 - Baghouse Filter Replacement Phase 2	11/1/2019	485,730	(56,610)		
LIN - Coal Plant Structural Refurbishment Phase 5	5/31/2019	470,748	94,846		
LIN - CW Screen Refurbishment 2019	5/31/2019	395,892	41,240		
LIN3 - Reheat Tube Replacement 2019	5/31/2019	482,716	70,168		
LIN3 - Boiler Refurbishment 2019	5/31/2019	865,166	76,990		
LIN - CW Pump Refurbishment 2019	4/24/2019	544,550	22,540		
POT - IP-LP Turbine Refurbishment	6/28/2019	2,956,698	17,708		
POT - Turbine Valve Refurbishment	6/28/2019	724,495	25,998		
POT - Boiler Refurbishment 2019	6/21/2019	1,442,731	54,297		
HYD - Mill Lake Surge Tank Replacement	**10/31/2019**	**3,419,300**	**(178,894)**		
TRE5 - Bottom Ash Seal Replacement	10/31/2019	344,136	(6,425)		
TRE5 - Post Cooler Conveyor Refurbishment	10/31/2019	264,402	(55,195)		
L7005 -Replacements and Upgrades	**10/31/2019**	**1,571,512**	**225,486**		
LIN - 1&2 CEMS Replacement	10/17/2019	760,179	2,680		
LIN - Reclaim Feeder Refurbishment Phase 3	10/17/2019	586,460	43,512		
TRE5 - Turbine Main Valve Refurbishment	9/30/2019	675,642	(54,363)		
TRE5 - Boiler Refurbishment 2019	9/26/2019	613,921	95,619		
2019/2020 Steel Tower Life Extension	**8/30/2019**	**2,178,231**	**(235,909)**		
HYD - Wreck Cove Brook Dam D-9 Refurbishment	8/22/2019	618,980	21,283		
TRE6 - Mills Refurbishment 2019	8/15/2019	894,077	97,707		
TRE6 - Boiler Refurbishment 2019	8/15/2019	1,114,668	98,279		
TRE6 - Parallel Slide Valve Replacement	8/15/2019	227,590	(28,491)		
TRE6 - Generator High Voltage Bushings Replacement	8/15/2019	392,917	(301,416)		Materials savings resulted from a competitive RFP process and contingency was not required.
L6549 - Replacements and Upgrades Phase 2	**8/1/2019**	**1,695,036**	**(514,871)**		
2019 Tap Changer Replacements/Refurbishments	**7/31/2019**	**283,024**	**(43,912)**		
LIN4 - Reheat Tube Replacement 2019	7/23/2019	497,095	84,546		
LIN4 - Boiler Refurbishment 2019	7/23/2019	811,487	56,716		
LIN4 - Economizer Header Refurbishment	7/23/2019	415,461	(93,913)		
LIN4 - Burner Front Refurbishment	7/23/2019	268,475	(104,814)		The conditions of the burner fronts were favorable and allowed for a quicker refurbishment reducing contract costs.
LIN4 - Bottom Ash Refurbishment	**7/23/2019**	**285,981**	**(162,259)**		**Due to contractor and material costs being less than initially estimated.**
POT - Generator Auxiliary Equipment Refurbishment	6/28/2019	3,601,411	127,491		
POT - HP Turbine refurbishment	6/28/2019	1,942,027	128,607		
POT - Hydrogen Panel Replacement	6/23/2019	698,908	234,656		
LIN Fly Ash Precipitator Component Refurbishment	**5/31/2019**	**325,993**	**(88,053)**		
POT - Air Heater Refurbishment	5/31/2019	817,083	147,878		
LIN - Mill Refurbishment 2019	4/24/2019	873,091	195,272		
L5511 - Replacements and Upgrades	**2/28/2019**	**1,485,116**	**230,029**		
L5026 -Replacements and Upgrades	**1/31/2019**	**1,379,563**	**(119,226)**		
2019 Transmission Right-of-Way Widening 69kV	**1/1/2019**	**5,627,652**	**(23,142)**		
New Distribution Rights-of-Way Widening Phase 4	11/30/2018	10,356,561	80,700		
HYD - Tidewater 2 Overhaul	2/28/2020	1,959,940	43,619		
L5541 -Replacements and Upgrades	**6/30/2020**	**1,822,761**	**197,911**		
CT - BGT Replace Halon Fire Protection	5/20/2020	1,116,164	(32,989)		
HYD - Malay Falls Unit 6 Generator Refurbishment	2/24/2020	557,834	(278,020)		Generator refurbishment was able to be completed offsite resulting in both labour and contract savings. Contingency was not required.
HYD - Malay Falls Unit 6 Overhaul	2/24/2020	1,117,203	(156,077)		
HYD - Wreck Cove Crane Refurbishment	**2/15/2020**	**906,276**	**408,109**		
TRE - Sludge Dewatering Infrastructure	**9/15/2022**	**772,001**	**108,515**		
TUC - UT3 and ST34 Cable Replacement	**3/31/2021**	**659,512**	**52,649**		
HYD - Wreck Cove Station Service Cable Replacement	**6/28/2021**	**387,145**	**(42,239)**		
54H-304 - Underground Device Replacement	**1/31/2021**	**827,472**	**142,204**		
22W-311GA - Hawk Point Road Reconductor Replacement	3/30/2020	542,223	76,465		

	Actual Amounts				
Project Title	Actual In-Service Date	Actual Spend (as of 12/31/2022)	Variance to Approved Estimate	Comments/Notes	Variance Explanation Less Than 25% Variance
POT - Asbestos Abatement 2019	1/3/2020	227,075	(43,423)		
TRE5 - CW Screen Refurbishment	10/9/2020	236,964	(145,812)		Tail sprockets and bushings did not require replacement as initially estimated. Contingency was not required.
15N-202 - Dominion St and Arthur St Rebuild	**8/31/2021**	**454,827**	**126,535**		
70W-311G - Crousetown Road Phase Extension	**4/30/2021**	**259,635**	**(25,482)**		
23H-303 - Willett Street Underground Replacement	**7/31/2021**	**298,767**	**12,144**		
POT Diesel Generator and Essential Services Switchgear Replacement	**12/31/2021**	**324,955**	**30,384**		
TRE - Rail Car Fuel Delivery Upgrade	**3/20/2020**	**1,198,627**	**(37,996)**		
64N Lourdes Street Conversion Phase 1	**8/31/2020**	**496,295**	**(79,736)**		
6S-224 - Birch Hill Drive Conversion	**11/30/2020**	**615,811**	**73,785**		
L5029 Replacements and Upgrades	**7/31/2022**	**254,002**	**(5,952,676)**		**Due to reduced scope following engineering assesments.**
HYD - Lake Mulgrave Dam Refurbishments	**11/30/2020**	**5,879,886**	**26,236**		
L7005 Replacements and Upgrades Phase 1	**6/30/2021**	**3,091,137**	**(485,854)**		
HYD - Weymouth Falls Unit 1 Generator Refurbishment	**12/15/2021**	**2,378,083**	**113,757**		
LM6000 TUC4 Control System Replacement	**7/22/2021**	**901,522**	**(248,474)**		
L5524 Replacements and Upgrades	**1/31/2020**	**2,274,545**	**113,231**		
L7019 Replacements and Upgrades	**4/30/2021**	**1,383,196**	**9,105**		
48H Metalclad Switchgear Replacement	**11/30/2020**	**1,391,009**	**180,304**		
TUC3 Turbine Valves Refurbishments	**12/15/2021**	**1,113,051**	**72,030**		
New Distribution Rights-of-Way Phase 5	**2/29/2020**	**9,930,358**	**(84,908)**		
IT – ADMS Upgrade	**4/30/2021**	**10,032,234**	**405,343**		
IT - Microsoft Enterprise Agreement 2020	10/31/2020	3,307,541	167,814		
IT Enterprise Data Lake	**5/20/2021**	**1,475,738**	**215,321**		
New Distribution Rights-of-Way Phase 6	**7/31/2021**	**10,038,773**	**276,039**		
LM6000 - 191-443 Hot Section Engine Refurbishment	**12/22/2021**	**4,542,874**	**(1,206,408)**		
TUC3 HP Turbine Refurbishment	**12/15/2021**	**2,136,518**	**51,423**		
CT - VJ1 Generator Replacement	**6/17/2022**	**4,194,588**	**(1,748,053)**		**Due to savings in contract and labour costs. Contingency was not required.**
PHB – 2022 Turbine Refurbishment	**12/14/2022**	**2,801,099**	**(928,498)**		**Due to savings in contract and materials costs. Contingency was not required.**
CT - VJ1 Control System Upgrade	**6/17/2022**	**1,003,347**	**(12,878)**		
		415,035,767	**18,779,165**		

Business Area	Total Project Savings	CI Number	Project Title	Attributed To	Reason for Savings	Details of Cost Savings
Distribution	$ 500,000	C0041892	New Distribution Rights-of-Way Phase 7	Contracts	Efficiencies - Process	As part of the Internet for Nova Scotia initiative throughout the province, there have been certain areas that had trimming completed in order to run new fibre optic communication cables. This trimming gains smaller clearances than standard trimming operations, but NS Power followed up on this work to achieve full ROW clearances after the trimming for communication wires was completed. This led to a more efficient trimming process and resulting cost savings.
Distribution	$ 141,680	C0008638	Cogswell HRM Redevelopment Program	Contracts	Procurement Negotiations	A change order by the development owner requested costs for their contractor to build manhole grates to NS Power required spec on the basis that NS Power's 2022 requirement differed from approved 2019 tender approved designs. NS Power successfully challenged the cost application based on engineering records / requirements and negotiated the cost to zero while still having the change implemented.
Distribution	$ 20,000	C0008638	Cogswell HRM Redevelopment Program	Contracts	Design Engineering Adjustment	NS Power identified an opportunity to implement an engineering change (switching location) and thereby utilize an existing ductbank. This avoided the requirement for demolition and new duct construction, providing contractor savings plus savings through reduced electrical materials.
Gas Turbine	$ 241,675	C0029693	CT - VJ1 Generator Replacement	Materials	Efficiencies - Material	Rotor Earth Fault Monitor (REFM) kit and partial discharge kit included in the generator purchase and therefore not needed to be purchased separately as originally budgeted.
Gas Turbine	$ 165,000	C0029693	CT - VJ1 Generator Replacement	Other	Design Engineering Adjustment	In order to provide access to the unit enclosure to remove the original generator and replace it with a newly fabricated unit, access for heavy equipment (i.e. crane) would be required alongside the package. The original estimate assumed that construction of a separate roadway would be required in order to be able to provide the space and ensure the ground materials were sufficient to support that loading. At project handover for execution, then engineer reviewed access requirements and found an alternative solution. The existing roadway was suitable for access into the facility and the gravel driveway was extended parallel to the enclosure and filled with engineered material to support the weight of the crane and with load. External engineering firm was contracted to provide a geotechnical report and design for the build of a crane pad alongside of the enclosure as opposed to a separate access route.
Gas Turbine	$ 100,000	C0029693	CT - VJ1 Generator Replacement	Labour	Efficiencies - Process	Labour savings due to resources shared across projects.
Gas Turbine	$ 62,500	C0029693	CT - VJ1 Generator Replacement	Contracts	Efficiencies - Process	Minimized crane mobilizations related to critical lifts allowing for a 50% savings on the crane contract.
Gas Turbine	$ 24,000	C0029693	CT - VJ1 Generator Replacement	Consulting	Efficiencies - Process	NS Power Electrical Engineer with Tufts Cove eliminated the requirement for a consultant role.
General Plant	$ 230,000	C0005498	IT - Endpoint Security	Other	Procurement Negotiations	Procurement team negotiated reductions.
General Plant	$ 120,000	C0005498	IT - Endpoint Security	Labour	Efficiencies - Person Hours	Leveraging the centralized control features of the selected SentinelOne product will decrease the labour cost required to operate the system.
General Plant	$ 73,100	49094	IT - Privilege Access Management (PAM)	Consulting	Procurement Negotiations	Negotiated 50% reduction to cost of change request.
General Plant	$ 27,817	C0021839	IT - Customer Energy Insights Management	Consulting	Procurement Negotiations	Ensured MSA rates were in place for the duration of the project, and beyond. In particular, the MSA arranged with TransLab for Data Lake resource augmentation resulted in a discounted rate (10%) for the initial SOW. Rates for Quality Assurance resources were the same to previous years and remain competitive.
General Plant	$ 17,000	C0046391	IT - Cheque Processing Replacement	Labour	Efficiencies - Person Hours	Determined during the opportunity assessment that outsourcing the project would be less costly than completing with internal resources.
General Plant	$ 5,000	C0021834	IT - CIS OS upgrade	Other	Efficiencies - Process	Reduced schedule from 4-5 months to 2 months.
General Plant	$ 1,200	C0030987	IT - NERC CIP Environment Refresh	Travel/Accommodations	Efficiencies - Process	Vendor delivery of hardware shifted multiple times resulting in replanning. Managed to plan some deployments on remote sites to coincide with previously planned contractor travel. This in turn avoided having to pay for that travel twice.
Hydro	$ 200,000	C0000979	HYD - Governor Dam Refurbishment	Contracts	Efficiencies - Process	Work on the Governor access road completed by the contractor for the access road work is lower compared to what was quoted by other RFP proponents for the main dam refurbishment scope.

Business Area	Total Project Savings	CI Number	Project Title	Attributed To	Reason for Savings	Details of Cost Savings
Hydro	$ 124,440	50518	HYD - Ruth Falls Main Dam Refurbishment	Materials	Efficiencies - Material	Ruth Falls Dam is a known Barn Swallow Nesting habitat location. Barn Swallows are listed as a endangered species in Nova Scotia. It was proposed to the project team to use a covering (net or liner) to cover the 490 foot dam structure to prevent "active nests" from being built, at an estimated cost of approximately $150,000. Instead, employees guarded the dam from active nesting twice daily from April-June (90 days) to remove potential nests at a cost of approximately $25,560.
Hydro	$ 124,440	C0002539	HYD - Bridge Remediation 2019	Materials	Efficiencies - Material	Big Falls Bridge is a known Barn Swallow Nesting habitat location. Barn Swallows are listed as a endangered species in Nova Scotia. It was proposed to the project team to use a covering (net or liner) to cover the bridge structure to prevent "active nests" from being built, at an estimated cost of approximately $150,000. Instead, employees guarded the dam from active nesting twice daily from April-June (90 days) to remove potential nests at a cost of approximately $25,560.
Hydro	$ 98,880	C0014218	Wreck Cove LEM - Balance of Plant	Other	Design Engineering Adjustment	The Contractor was challenged on their proposed solution to install a dehumidifier. The Contractor planned to install it on the wall and the team challenged that approach and ultimately the unit was installed on the floor, resulting in savings.
Hydro	$ 62,066	C0008003	NIC Canal Cres Rebuild	Contracts	Procurement Negotiations	Procurement process resulted in lower pricing.
Hydro	$ 50,000	C0039467	HYD - AVO1 Headgate Refurbishment	Contracts	Efficiencies - Process	Work completed using in house resources rather than contracting out.
Hydro	$ 46,500	C0002539	HYD - Bridge Remediation 2019	Materials	Design Engineering Adjustment	The Big Falls bridge replacement included upgrade of approach guard rails to meet NS TIR highway specifications per the design by CBCL. Initial layout per design required the use of expensive tri-beams to traverse the poor founding area at the transition from roadway to bridge guard rails. Through value engineering with CBCL, we adjusted the approach corridor width to 1 lane from 2 (bridge is only 1 lane) to allow for use of standard guard rail materials and forego the expense tri-beam system. Of the 3 bridges with the Tri-beam design requirement, 2 were modified to facilitate the less expensive option.
Hydro	$ 41,974	29807	HYD - Tusket Falls Main Dam	Contracts	Procurement Negotiations	Two vendors were contacted to provide quotations for sonar survey work associated with the revised water management plans. Least cost vendor was selected.
Hydro	31,343	29807	HYD - Tusket Falls Main Dam	Contracts	Procurement Negotiations	Negotiated a project cost less than the contracted daily rental/operating rate due to the duration of the equipment rental/operation.
Hydro	$ 29,000	C0014218	Wreck Cove LEM - Balance of Plant	Contracts	Efficiencies - Process	Survey of the draft tube stop logs was planned to be carried out by a contractor. To reduce the cost, the project team utilized the NS Power ROV to complete a portion of the work. The contractor was still required to complete the full scope, but the use of the NS Power ROV resulted in a cost reduction.
Hydro	$ 21,510	29807	HYD - Tusket Falls Main Dam	Contracts	Procurement Negotiations	Ensured that the submitted change order request for premium time worked was consistent with the terms of the established contract for extra work, delay, and schedule recovery.
Hydro	$ 20,000	35583-H005	HYD PAR ORRA Mitigation	Contracts	Procurement Negotiations	Received quote from our typical contractor but requested similar quote from a contractor already on site. Work was completed for less.
Hydro	$ 20,000	C0014218	Wreck Cove LEM - Balance of Plant	Contracts	Procurement Negotiations	NS Power was renting a diesel generator to support the project and negotiated a lower rate with the supplier. This was due to a delayed delivery of the permanent generator, from the same supplier, as a result of supply chain issues driven by the pandemic. NS Power's position was that the extended rental period was as a result of delays from the same supplier, and while these were driven by major supply chain disruptions, these risks, and therefore additional costs, should be shared. The supplier agreed and the rental rates were reduced.
Hydro	$ 16,725	50518	HYD - Ruth Falls Main Dam Refurbishment	Materials	Efficiencies - Material	Barn Swallow habitat infrastructure was requested by NSDNR to NS Power, Species at Risk Permit requirement. External designs, Ontario Species at Risk Best Practices suggested a Barn Swallow habitat design requiring concrete footings. PM suggested a pre-fab baby barn on concrete blocks to lower infrastructure cost.

Business Area	Total Project Savings	CI Number	Project Title	Attributed To	Reason for Savings	Details of Cost Savings
Hydro	$ 16,300	C0002539	HYD - Bridge Remediation 2019	Other	Efficiencies - Process	Higher than normal spring freshet flows created a full flow situation in the Big Falls bypass channel, which is spanned by Bridge #15. Since installation of Bridge #15 required the access of the piers from the water's surface as part of the plan it could not proceed under these flow conditions which could have led to a delay of work. To maintain schedule and eliminate paying for a mob/demob (estimated at approximately $25,000), NS Power agreed to pay for the use of a small crane and personnel basket to achieve the same goal as working from the water. The crane cost $8,700 resulting in a savings of $16,300 and 6 months of time vs. demob/remob.
Hydro	$ 16,098	29807	HYD - Tusket Falls Main Dam	Contracts	Efficiencies - Person Hours	Selected vendor was travelling from Ontario to complete sonar survey work associated with the revised water management plan. Found an opportunity to cost share the mob/demob costs for the work with another NS Power capital project requiring the same type of data near the project site.
Hydro	$ 11,000	C0014218	Wreck Cove LEM - Balance of Plant	Labour	Efficiencies - Process	There were PT wiring issues for the diesel generator and the contractor technician's planned arrival time to resolve the issue would have resulted in additional rental costs. To mitigate the additional rental costs the work was performed in-house.
Hydro	$ 7,376	29807	HYD - Tusket Falls Main Dam	Travel/Accommodations	Efficiencies - Process	Original proposal for services received from engineering consulting firm included an allowance for travel to NS Power's offices to present their preliminary results. It was later determined that an in-person meeting was not necessary and a virtual meeting would be sufficient. The proposal for services was revised.
Hydro	7,061	29807	HYD - Tusket Falls Main Dam	Contracts	Procurement Negotiations	Work was completed at NS Power's direction before a change order was approved. Removed an expense as it was covered in another change order. Negotiated a reduced rental rate for some equipment based on market conditions and use of the equipment.
Hydro	6,466	C0050414	Roseway Site Stabilization	Consulting	Efficiencies - Person Hours	The Hatch Project Team was able to complete project deliverables at a lower cost than originally estimated. NS Power team was able to effectively work with Hatch to ensure they were provided with detailed information as requested; as well as a quick response time for all requests.
Hydro	$ 6,000	C0038167	HYD - LEQ Thrust Bearing Redesign	Contracts	Efficiencies - Process	Bearing supplier was set to spend 2 weeks onsite supporting the install of the bearing. The install took less time and support was only required for 1 week.
Hydro	$ 3,840	47551	HYD - SHH Controls Upgrade	Consulting	Design Engineering Adjustment	Used hydro engineer used instead of a consultant to tune the Automatic Voltage Regulators (AVRs). Learnings were taken from a previous similar project and applied to this one.
Hydro	$ 2,700	C0014218	Wreck Cove LEM - Balance of Plant	Contracts	Efficiencies - Process	The stop log supplier contract pricing included sending a trucking company to offload the equipment at site. Instead NS Power used their own equipment to offload the equipment and as a result obtained a credit.

From: Curry, Brian
Sent: Thursday, December 22, 2022 11:27 AM
To: bill@washingtonmahody.com; Nelson Blackburn; Melissa P. Macadam; 'Nancy G Rubin'; Zatezalo, Branko
Cc: Myatt, Lana; Willett, Michael; Pavlidis, Alexandra; Petcoff, Rachel
Subject: 2022 ACE Plan Directive
Attachments: Capital Cost Estimating Process in PDM.pdf; List of CEJC Revisions.xlsx; 20221222 CEJC Summary.pdf; 20221222 CEJC Detailed.pdf

The Board's 2022 ACE Plan Order and Decision provided the following directives requiring stakeholder engagement:

4. Implement the Project Delivery Model (PDM) and engage with stakeholders regarding a capital cost estimating process in the PDM as discussed in Paragraphs 99 and 100 of the decision.

Excerpts from the Decision:
[99] The Board looks forward to implementation of the company's new PDM in the second quarter of 2022. As per the documentation included in the 2021 Stakeholder Engagement Report, the Board expects the PDM will include development and execution of a planned and documented forward-looking cost minimization review process to be applied to projects indicated for cost minimization review. The Board also expects that the process will utilize a simple running cost minimization tracker of key project elements with status for cost avoidance and cost reduction opportunities.

*[100] **Moving forward, the Board would like to see a capital project cost estimating process incorporated into the PDM. The intent of this process would be to help NS Power improve its capital cost estimating/budgeting practices, with the goal of reducing the company's overall spending variance. If this process has not yet been incorporated into the PDM, the Board directs NS Power to engage with stakeholders to solicit input**.*

10. Regarding Total Cost of Ownership to:
(a) Use a TCO timeframe to match the expected useful life of IT software and hardware;
(b) Use a TCO analysis for all IT projects over $1 million when an EAM is not provided, whether or not an alternative is available; and
(c) Revise the CEJC in consultation with stakeholders and Board staff regarding TCO in time for a revised CEJC to be submitted to the Board with the 2023 ACE Plan application.

Please find attached is a pdf which addresses the capital cost estimating process item. Also attached a list of CEJC revisions, and updates in track changes for the Detailed and Summary CEJC, which incorporate changes to include a total cost of ownership definition.

Please review these items, and provide any feedback/comments by January 9, 2023. Once feedback has been considered, NS Power will follow up with stakeholders to confirm how their feedback has been incorporated.

Regards,

Brian

Brian C Curry | Director Regulatory & Corporate Secretary | Nova Scotia Power

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Blackburn Law

January 10, 2023

VIA EMAIL

Mr. Brian Curry
Director Regulatory & Corporate Secretary
Nova Scotia Power Inc.
PO Box 910
Halifax, Nova Scotia
Canada B3J 2W5

Dear Brian:

Re: 2022 ACE Plan Directive Materials

On December 22, 2022, NS Power emailed materials pursuant to the Board's 2022 ACE Plan Order and Decision that directed NS Power to obtain stakeholder comments on proposed changes to the Capital Expenditure Justification Criteria (CEJC). One specific proposed change to the CEJC is the estimate and monitoring of Total Cost of Ownership (TCO) of Information Technology (IT) software and hardware investments.

Traditionally most software investments included licenses for critical IT software applications and systems that reside and are fully operated on NS Power premises. More recently, however, NS Power has entered into long term contracts to access services that are maintained and provide remotely by third parties, and there may be some software applications that are maintained in a hybrid format.

The SBA would like to receive clarification that NS Power's proposed changes to the CEJC related to Total Cost of Ownership for IT software and hardware will cover and apply to all NS Power's existing and future IT systems including those supported by cloud based services contracts.

Sincerely,

S Dunlop, for

E.A. Nelson Blackburn, K.C.
Blackburn Law
Small Business Advocate

T: 902-835-8544 F: 902-835-4310 E: info@blackburnlaw.ca www.blackburnlaw.ca
SUITE 231 BEDFORD HOUSE, SUNNYSIDE MALL, 1595 BEDFORD HIGHWAY, BEDFORD, NOVA SCOTIA B4A 3Y4

From: Curry, Brian
Sent: Tuesday, January 17, 2023 12:52 PM
To: Nelson Blackburn; Melissa P. Macadam; 'Nancy G Rubin'; David Roberts; Michael Murphy
Cc: Petcoff, Rachel; Pavlidis, Alexandra; Myatt, Lana; Willett, Michael; Dandurand, Paul
Subject: RE: 2022 ACE Plan Directive
Attachments: 20230117 CEJC Detailed.pdf; 20230117 CEJC Summary.pdf; List of CEJC Revisions.xlsx

We received comments from the SBA and had a call with the CA. The IG had no comments.

NS Power appreciates the input and the provides the responses below. Attached are updated versions of the proposed CEJC Detailed and Summary documents.

SBA

SBA Comment: The SBA would like to receive clarification that NS Power's proposed changes to the CEJC related to Total Cost of Ownership for IT software and hardware will cover and apply to all NS Power's existing and future IT systems including those supported by cloud based services contracts.

NS Power Response: Confirmed. For technology investments requiring Board approval (for new or existing IT systems, including those with cloud-based services contracts), and where we do not provide an EAM, NS Power will provide a TCO.

CA

CA Comment: Re definition of TCO on page 6, recommended revision to definition to include capital expenditures over the life of the product (i.e. product "refreshes").

NS Power Response: Agreed – the definition is meant to capture the upfront capital costs, and capital and operating costs over the expected useful life of the asset. Amended definition on p6 to read (new text underlined) "The upfront capital cost of a new or upgraded capital asset plus all capital costs and operating expenses over its expected useful life." Similar amendment in Section 6.3.3 (Summary CEJC)/6.7.5 (Detailed CEJC).

CA Comment: Re amendments on pages 87/88, concerned that language precludes providing an EAM where one is needed. The Board's 2022 ACE Plan order provided that where there are alternatives, we would provide an EAM. But the language provided on p 87/88 seems like we're saying that TCO is now the only method.

NS Power Response: NS Power's intent is to follow the Board's Order, and provide an EAM where technically feasible alternatives exist, or a TCO where there is only one technically feasible alternative. The amendments on pages 87 and 88 are under the heading "Information Application and Hardware Systems – Economic Justification Procedure", and are intended to ensure capital leads are considering TCO, whether in the context of an EAM, or standalone TCO. The amendments do not preclude providing an EAM, but to provide additional guidance to ensure TCO is considered in the appropriate framework. As such, no changes were made.

If there are any further questions regarding the above, please reach out.

Regards,
Brian

From: Curry, Brian
Sent: Tuesday, January 10, 2023 9:16 AM
To: Nelson Blackburn <nblackburn@blackburnlaw.ca>; Melissa P. Macadam <mmacadam@blackburnlaw.ca>; 'Bill Mahody' <bill@mjswm.com>; 'Nancy G Rubin' <nrubin@stewartmckelvey.com>
Cc: Petcoff, Rachel <Rachel.Petcoff@nspower.ca>; Pavlidis, Alexandra <Alexandra.Pavlidis@nspower.ca>; Myatt, Lana <Lana.Myatt@nspower.ca>; Willett, Michael <MICHAEL.WILLETT@nspower.ca>
Subject: FW: 2022 ACE Plan Directive

I am just following up on my email of December 22, 2022 to see if there is any feedback/comments on the materials.

Regards,
Brian

Brian C Curry | Director Regulatory & Corporate Secretary | Nova Scotia Power
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From: Curry, Brian <Brian.Curry@nspower.ca>
Sent: Thursday, December 22, 2022 11:27 AM
To: bill@washingtonmahody.com; Nelson Blackburn <nblackburn@blackburnlaw.ca>; Melissa P. Macadam <mmacadam@blackburnlaw.ca>; 'Nancy G Rubin' <nrubin@stewartmckelvey.com>; Zatezalo, Branko <Branko.Zatezalo@novascotia.ca>
Cc: Myatt, Lana <Lana.Myatt@nspower.ca>; Willett, Michael <MICHAEL.WILLETT@nspower.ca>; Pavlidis, Alexandra <Alexandra.Pavlidis@nspower.ca>; Petcoff, Rachel <Rachel.Petcoff@nspower.ca>
Subject: 2022 ACE Plan Directive

The Board's 2022 ACE Plan Order and Decision provided the following directives requiring stakeholder engagement:

4. Implement the Project Delivery Model (PDM) and engage with stakeholders regarding a capital cost estimating process in the PDM as discussed in Paragraphs 99 and 100 of the decision.

Excerpts from the Decision:
[99] The Board looks forward to implementation of the company's new PDM in the second quarter of 2022. As per the documentation included in the 2021 Stakeholder Engagement Report, the Board expects the PDM will include development and execution of a planned and documented forward-looking cost minimization review process to be applied to projects indicated for cost minimization review. The Board also expects that the process will utilize a

simple running cost minimization tracker of key project elements with status for cost avoidance and cost reduction opportunities.

[100] Moving forward, the Board would like to see a capital project cost estimating process incorporated into the PDM. The intent of this process would be to help NS Power improve its capital cost estimating/budgeting practices, with the goal of reducing the company's overall spending variance. If this process has not yet been incorporated into the PDM, the Board directs NS Power to engage with stakeholders to solicit input.

10. Regarding Total Cost of Ownership to:
    (a) Use a TCO timeframe to match the expected useful life of IT software and hardware;
    (b) Use a TCO analysis for all IT projects over $1 million when an EAM is not provided, whether or not an alternative is available; and
    (c) Revise the CEJC in consultation with stakeholders and Board staff regarding TCO in time for a revised CEJC to be submitted to the Board with the 2023 ACE Plan application.

Please find attached is a pdf which addresses the capital cost estimating process item. Also attached a list of CEJC revisions, and updates in track changes for the Detailed and Summary CEJC, which incorporate changes to include a total cost of ownership definition.

Please review these items, and provide any feedback/comments by January 9, 2023. Once feedback has been considered, NS Power will follow up with stakeholders to confirm how their feedback has been incorporated.

Regards,
Brian

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2022 ACE Plan Decision/Order Excerpts

Order:

> 4. Implement the Project Delivery Model (PDM) and engage with stakeholders regarding a capital cost estimating process in the PDM as discussed in Paragraphs 99 and 100 of the decision.

Decision PDF page 41:

> [99] The Board looks forward to implementation of the company's new PDM in the second quarter of 2022. As per the documentation included in the 2021 Stakeholder Engagement Report, the Board expects the PDM will include development and execution of a planned and documented forward-looking cost minimization review process to be applied to projects indicated for cost minimization review. The Board also expects that the process will utilize a simple running cost minimization tracker of key project elements with status for cost avoidance and cost reduction opportunities.
>
> [100] Moving forward, the Board would like to see a capital project cost estimating process incorporated into the PDM. The intent of this process would be to help NS Power improve its capital cost estimating/budgeting practices, with the goal of reducing the company's overall spending variance. If this process has not yet been incorporated into the PDM, the Board directs NS Power to engage with stakeholders to solicit input.

PDM Progress Update

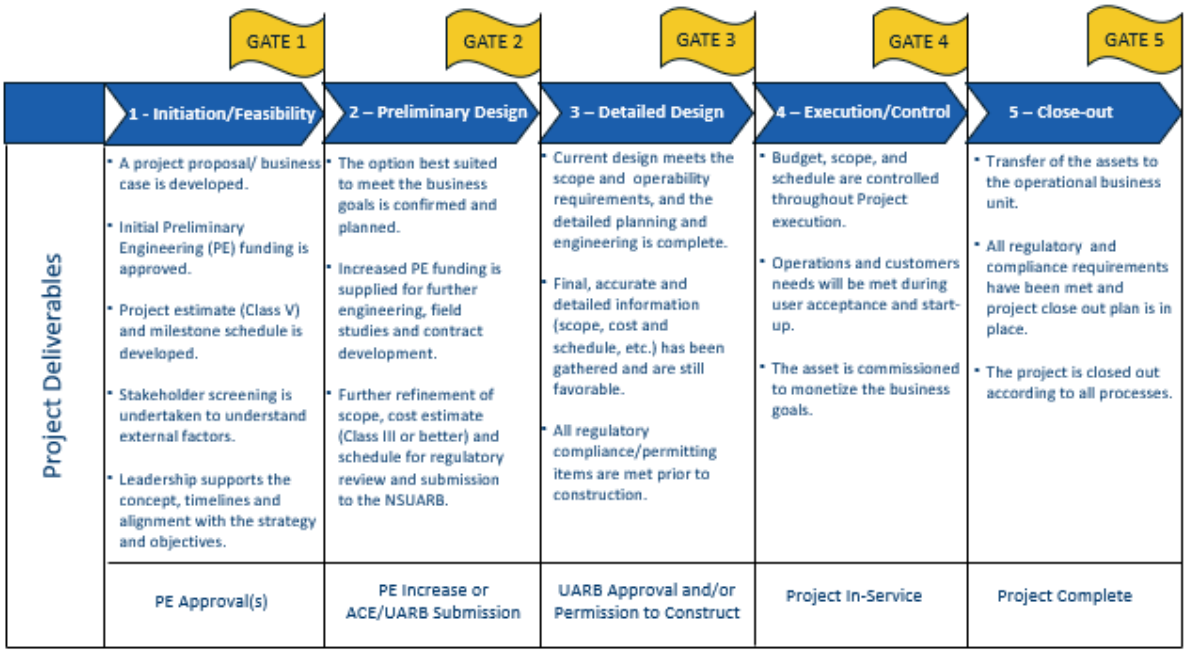
A draft PDM has been developed. Nova Scotia Power Inc. (NS Power) is continuing to develop the various processes and frameworks which form the PDM, including the tools and templates to support required project elements such as cost minimization tracking. The PDM is currently being piloted on new projects, using an iterative process to support processes that are clear, concise, and scalable for various types of projects. An internal PDM workshop to communicate new and process change plans was delivered to employees who work on capital projects in June 2022, and further details and supporting documentation was provided to those employees in October 2022.

Capital Cost Estimating Process

NS Power has incorporated a capital cost estimating process in the PDM, and guidelines are provided within various tools throughout the PDM. As a project progresses through its lifecycle, its cost estimate classification evolves through various levels of accuracy, in alignment with the Non-Binding Contingency Guidelines that incorporate guidance from Association for the Advancement of Cost Engineering (AACE)

and best practices in project management. NS Power's PDM outlines the various project gates and provides scalable parameters and conditions to move through each gate as shown in Figure 1.

Figure 1: Project Delivery Model (PDM)



Gate 1

- The progression of a cost estimate starts early in the project once there is definition to the scope of work and Subject Matter Experts (SMEs) are engaged.
- The cost estimate is at a Class V level as defined within AACE guidelines whereas only 0-2% of project definition has occurred to date. The estimate is further defined following an agreed to Work Breakdown Structure (WBS) which would include categories such as internal labour, contracts, materials, consulting, administrative overhead (AO) and Allowance for Funds Used During Construction (AFUDC) to give an initial view of the potential cost of the project.
- Similarly, the schedule at this point is high-level and focused on major milestones such as engineering/design, permitting/studies, regulatory, procurement, Mi'kmaq consultation, construction, commissioning, and an in-service time frame.
- This will give the project team an indication of project length and potential resource requirement. The milestone schedule will also give a timeframe over which the project cost can be profiled.
- Together, the Cost Estimate and Milestone Schedule allow the project team to focus on required information to further the project details through Gate 2.

Gate 2 & 3

- The scope of work is further defined with analysis and information gained from SMEs (Internal and external) resulting in a greater level of detail available to further develop the cost estimate and schedule.
- As more information is added to the cost estimate it will advance through the estimate classes to signify the progression of activities such as engineering, design and permitting. As the project matures and this work progresses, the overall accuracy of the estimate continues to improve as described in the Non-Binding Contingency Guidelines.
- Once a Class III estimate is achieved, the estimate is considered to have the confidence level required to submit to the NSUARB for approval of the project.
- At this point, the contingency and management reserve can be estimated to align with a Class III estimate.
- The project cost estimate will then be populated to align with the Project Baseline Schedule resulting in the total project cost estimate with AO and AFUDC determined. This information is used to complete the Detailed Cost Estimate (DCE) and form part of the submission for project approval to the NSUARB.

Gate 4 & 5

- Throughout the execution of the project to completion and close out of the project, the budget and schedule are actively monitored to control the status of the project. Throughout this process there is a view of the expected cost of the project at completion, and this view continues to mature and be refined over the course of the project.
- Approval of changes in cost and schedule follow change management and established governance processes.
- Once the project is complete and actual costs are realized, the project is final costed and closed out using established processes. When required, final cost applications are submitted to the NSUARB for the Board's review and approval.

CEJC Revisions

Section (Summary/Detailed)	Summary CEJC Page #	Detailed CEJC Page #	Substantive/ Non-Substantive	Revision Description
Definitions (1.0)	6 of 55	6 of 114	Substantive	Edit to add definition for Total Cost of Ownership
Total Cost of Ownership (6.3.3/6.7.5)	22 of 55	25 of 114	Substantive	Edit to add definition for Total Cost of Ownership
Information Technology Application and Hardware System (NA/17.14)	NA	87-88 of 114	Substantive	Edits to add reference to Total Cost of Ownership

NOVA SCOTIA POWER INC. CAPITAL PLANNING & CAPITAL EXPENDITURE JUSTIFICATION CRITERIA
Summary Document

Effective Date:

Deleted: April 16, 2020¶

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Nova Scotia Power Inc. Capital Planning & Capital Expenditure Justification Criteria
Detailed Document

1.0 Definitions

Annual Capital Expenditure (ACE) Plan: A document containing details regarding all of NS Power's capital projects planned for a given calendar year. The ACE Plan is submitted to the UARB every year.

Authorization to Overspend (ATO): A capital work order package for submission to the UARB should the project forecast final costs with a variance of more than the greater of 5% or $250,000.

Bulk Power System: The interconnected electrical systems within northeastern North America comprising generation and transmission facilities on which faults or disturbances can have a significant adverse impact outside of the local area.

Carry Over Project: A capital project that is approved and initiated in one calendar year, but the investment of capital carries over into the subsequent year(s).

Capital Cost: The cost required to complete a capital project.

Capital Cost Allowance: A yearly deduction of depreciation that can be claimed for income tax purposes on the cost of certain assets.

Capital Expenditure Justification Criteria (CEJC): The criteria contained in this manual defining matters related to capital expenditures. The CEJC contains the criteria defining what, why and when a project qualifies as a capital project.

Capital Identification (CI) Number: The unique identification number associated with a capital project.

Capital Lead: Employee responsible for technical and financial justification of capital work from a particular area (e.g. generation), program (e.g. reliability), or function (e.g. system reinvestment).

Discounted Payback Period: This is a measure of economic value. It represents the number of years required to pay back the initial capital cost of a project. It measures the levered payback period.

Discretionary Project: Investments that are incremental to an essential capital investment and which are made solely on the basis of economics, and there is an acceptable "do-nothing" alternative. Discretionary projects may yield defined benefits that minimize the revenue requirements of NS Power.

Do Nothing Alternative: A "do nothing" alternative refers to the alternative to not proceed with a discretionary capital project with corresponding acceptable outcomes. Whereas discretionary projects are based solely on economics, they are not addressing safety, legal, reliability or technical scenarios, and therefore "doing nothing" results in little or no risk to NS Power's system.

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Economic Analysis Model (EAM): The standard software model used by NS Power to calculate the present value of revenue requirement and economic value of any project. The software takes capital costs, avoided costs, revenue, expenses, and taxes into consideration to give a Net Present Value (NPV), internal rate of return (IRR), and discounted payback period.

Economically Justified Project: A capital project that is justified, in part, on economic benefits. The Economic Analysis Model (EAM) is used to derive the economic benefits of all economically justified projects. Economically justified projects may also be justified on other technical justifications.

Environmental Project: A capital project that is justified on the basis of environmental criteria. These criteria include operating permit approval, Environmental Act or regulation compliance, regulatory standards and industry standard compliance.

Essential Project: A capital addition or replacement which must be made to satisfy technical, legal, safety, regulatory or environmental directives.

Executive: A member of the NS Power Executive Team including General Managers, Vice Presidents, Executive Vice Presidents and the President and CEO.

Final Cost (FIN): A capital work order package for submission to the UARB should the project experience a scope change or if final costs result in a variance of more than the greater of +/- % or +/- $250,000. FIN capital work orders consist of final cost details and a variance analysis.

Individual Capital Item: Individual capital items, typically of a non-repetitive nature, and justified and budgeted separately from capital routines.

Integrated Resource Plan: A long-term planning process and framework within which the costs and benefits of both demand and supply side resources are evaluated to develop the least total cost mix of utility resource options.

Information Request (IR): A request from the Utility and Review Board (UARB), or other intervenors, for additional information pertaining to a capital project.

Internal Rate of Return (IRR): The discount rate used in capital budgeting that makes the net present value of all cash flows from a particular project equal to zero. Generally speaking, the higher a project's internal rate of return, the more desirable it is to undertake the project. As such, IRR can be used to rank prospective projects. Assuming all other factors are equal among the various projects, the project with the highest IRR would likely be considered the best and undertaken first.

Investment Review Team (IRT): The IRT is composed of a diverse group of Directors and Managers who offer expertise and experience from different functional areas within NS Power. The IRT manages NS Power's capital program in an integrated manner ensuring that projects are

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prioritized across NS Power. Investment initiatives are continuously monitored and the status of the capital program is communicated to NS Power's Leadership Team.

Leadership Team: Senior Managers, Directors and Executive of NS Power.

Planned and Advanced (P&A): A capital item that is planned (foreseen and budgeted) in future years but advanced for commencement and/or completion in the current year. They are not U&Us despite not being referenced in prior ACE Plans.

PowerPlan (software): The software that is used to manage all aspects of capital projects including project scope, justification, budget, approvals and actual project information. The software can be used to research information on past projects and forecast project activity into the future.

Production Costing Model: A system modelling tool which provides detailed forecasts of fleet dispatch and production costing, reflecting the increasing complexity of the system. Used in the calculation of replacement energy costs.

Routine Capital Item: A capital item containing a number of projects that are high volume, repetitive, like-for-like capital replacements, enhancements, or additions that are expected to continue into the foreseeable future.

Safety Project: A project that is justified based on the basis of health and safety criteria. Some of these criteria include regulatory requirements, Nova Scotia Department of Labour orders, NS Power safe work methods/practices, revisions to industry standards, Joint Occupational Health and Safety Committee (JOHSC) actions and mitigating risk of potential health and safety incidents.

Special Protection System (SPS): A protection system designed to detect abnormal system conditions, and take corrective action other than the isolation of faulted elements. Such action may include changes in load, generation, or system configuration to maintain system stability, acceptable voltages or power flows. Automatic underfrequency load shedding, as defined in the NPCC Emergency Operation Criteria A-3, is not considered a Special Protection System. Conventionally switched, locally controlled shunt devices are not Special Protection Systems.

Total Cost of Ownership (TCO): The upfront capital cost of a new or upgraded capital asset plus all capital costs and operating expenses over its expected useful life.

Unforeseen and Unbudgeted (U&U): A capital item that develops throughout the year, typically in response to discoveries made through routine inspections, maintenance, and/or unplanned failures, and was not included in prior ACE Plans or the current ACE plan. Projects foreseen and budgeted for future years, but advanced for commencement and/or completion in the current year, are not U&Us despite not being referenced in prior ACE Plans (these are designated as P&A projects). A U&U is submitted because the capital item cannot wait until the next ACE Plan for approval.

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Utility and Review Board (UARB): Pursuant to the Public Utilities Act, the Nova Scotia Utility and Review Board ("NSUARB" or "Board") exercises general supervision over all electric utilities operating as public utilities within the Province.

Weighted Average *Cost of Capital (WACC)*: The cost of capital (discount rate or interest rate) determined by the weighted average, at forecasted book value, of the cost of all financing sources (debt, corporate bonds, equity) in the capital structure of NS Power. The weighted average cost of capital (WACC) is determined by the Finance Team and incorporated into the Economic Analysis Model (EAM) in order to determine the Net Present Value (NPV) and discounted payback of a capital project

Acronyms

ACE	Annual Capital Expenditure
ACHI	Avoided Customer Hours of Interruption
AFUDC	Allowance for Funds Used During Construction
AO	Administrative Overhead
ASTM	American Society for Testing and Materials
ATO	Authorization to Overspend
CAIDI	Customer Average Interruption Duration Index
CCA	Capital Cost Allowance
CEJC	Capital Expenditure Justification Criteria
CI	Capital Item
CO	Carry Over
CSA	Canadian Standards Association
EAM	Economic Analysis Model
FIN	Final Cost
DEP	Distribution Engineering Practices
IR	Information Request
IRP	Integrated Resource Plan
IRR	Internal Rate of Return
IRT	Investment Review Team
MC	Measurement Canada
NERC	North American Electric Reliability Corporation
NPCC	Northeast Power Coordinating Council
NPV	Net Present Value
NS Power	Nova Scotia Power Incorporated, “the Company”
P&A	Planned and Advanced
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SCADA	Supervisory Control and Data Acquisition
SPS	Special Protection System
UARB	Nova Scotia Utility and Review board, “UARB” or “Board”

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U&U	Unforeseen and Unbudgeted
WACC	Weighted Average Cost of Capital

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Nova Scotia Power Inc. Capital Planning & Capital Expenditure Justification Criteria
Detailed Document

2.0 Introduction

In its 1995 ACE Plan Decision, the Board provided the following:

> By an Order dated January 5, 1995 the Board directed that Nova Scotia Power Inc. (NS Power, the Utility, the Company) file evidence relating to its 1995 Annual Capital Expenditure (ACE) Plan by January 12, 1995, and set March 6, 1995 as the commencement date for a hearing.
>
> In an exchange of correspondence between the Company and the Board in early 1994, an understanding was reached that NS Power would make a yearly presentation of its Annual Capital Expenditure Plan and that NS Power would ensure work orders for projects less than $1 million meet Board approved technical and financial capital expenditure justification criteria. The Board indicated that it would undertake periodic audits on samples of work orders to ensure that such criteria had been satisfied.[1]

Those technical and financial justification criteria are contained in this document, the Capital Expenditure Justification Criteria (CEJC).

NS Power is a public utility, subject to the provisions of the Public Utilities Act (the Act). NS Power is subject to general supervisory oversight of the UARB. Prior to October 30, 2019, each capital item in excess of $250,000 required approval by the UARB. Section 35 of the Act was amended on that date to raise this limit to $1,000,000 for "large scale public utilities", which is defined under the Act as a public utility with an annual revenue of one hundred million dollars or more. Accordingly, NS Power can carry-out capital work on projects of $1,000,000 or less in value without UARB approval. The UARB can perform periodic audits to ensure that the criteria are being properly applied. Projects found to be inappropriately justified or imprudent can be excluded from NS Power's rate base.

[1] 1995 ACE Plan UARB Decision (March 31, 1995) NS Power-P-866-DEC.

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Nova Scotia Power Inc. Capital Planning & Capital Expenditure Justification Criteria
Detailed Document

3.0 Administration

This document will be maintained by NS Power. Pursuant to the Board's 2016 ACE Plan Decision directives, revisions to the CEJC will be reviewed by stakeholders prior to filing with the UARB. The CEJC will be filed with the Board, with revisions noted for the Board's approval, as required. Revisions to this document will be accompanied by a brief review of the updates or changes. A corresponding Detailed CEJC will be provided for the Board's information.

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4.0 NS Power Commitment

NS Power will manage its capital expenditures in accordance with the principles and guidelines contained within this document. The CEJC is applicable during all phases of the capital approval process. This begins during the development and submittal of the ACE Plan and continues until the project is complete and receives final cost approval.

NS Power is committed to:

- Delivering effective and efficient service to NS Power customers;
- Providing the assurance that NS Power is using sound and consistent economic, financial and technical criteria to justify capital expenditures;
- Effectively responding to changing environmental, operational, technical, safety and financial conditions in compliance with legislative and regulatory requirements; and
- Providing complete and timely capital filings for Board consideration and approval.

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5.0 Objectives

The objectives of the CEJC are as follows:

- To provide assurance that NS Power is using consistent economic, financial and technical criteria to justify all capital expenditures;
- To provide assurance that the capital expenditures result in the maximum benefit for customers and minimum impact to rates;
- To communicate the NS Power's justification requirements to all personnel involved in the execution and approval of capital projects in a clear and structured manner;
- To provide the assurance NS Power has appropriate levels of accountability regarding the oversight of the capital processes;
- To ensure that the justification criteria reflect a multi-disciplined approach to justifying capital expenditures using current financial and technical standards; and
- To support the use of consistent practices within NS Power.

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Nova Scotia Power Inc. Capital Planning & Capital Expenditure Justification Criteria
Detailed Document

6.0 Overview of Capital Planning

6.1 Summary of Capital Planning, Budgeting & Execution Process

NS Power's capital program is overseen by the Company's Investment Review Team (IRT). The IRT is chaired by a senior NS Power employee in the capital planning business function, and the team is composed of a diverse group of Directors and Managers who offer expertise and experience from different functional areas within NS Power. The IRT manages NS Power's capital program in an integrated manner ensuring that projects are prioritized across the Company, investment initiatives are continuously monitored and the status of the capital program is communicated to NS Power's Leadership Team.

The initial phase in the preparation of the ACE Plan is compiling a project list to collect all pertinent information about the capital projects that may be included in the ACE Plan. This requires coordination between the generation, transmission, distribution and corporate groups, Asset Management, Finance and Regulatory Affairs.

In Generation, Transmission, Distribution, and Information Technology (IT), the process begins at the start of each year with the functional groups compiling information about projects that require consideration for the following year.

As this information is gathered, each functional lead will input information into NS Power's capital management system, PowerPlan. The addition of a project to PowerPlan requires the inclusion of a project title, project description, project justification, capital cost spending profile and identification of primary and secondary justification criteria (ranking category).

Projects identified within PowerPlan are reviewed by capital planning and division management for each function. There is a standard ranking methodology for Generation, Transmission, Distribution, and Information Technology, which is described in further detail below.

Generation, Transmission and Distribution projects are broadly ranked using the following criteria:

- Health and Safety: Regulatory requirements, Operating Permits, Protection of Equipment and Personnel Safety, and JOHSC actions.
- Environmental/Regulatory Compliance: Renewable Energy Standards, Greenhouse Gas (GHG) Regulations, or Air Emission Regulations.
- Business Sustainability: SAIDI, SAIFI, CAIDI; unit reliability; system upgrade requirements; code requirements; NERC/NPCC Requirements, or economics (based on payback period, and revenue requirement); requirement to serve.

Technically justified IT projects are broadly ranked using the following criteria:

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- Customer: service impacts to customers as a result of technical failure
- Finance: financial impacts to the Company as a result of technical failure
- Compliance: safety, environmental, security, legal or regulatory requirements (e.g. NERC/CIP and NI-52 compliance)
- Operating Sustainability: ability for NS Power staff or contractor to perform critical functions of the business.

Each year, the capital program includes those projects which are essential for health and safety objectives, regulatory compliance, those which are required to provide service to a given area, and mitigate risks. Projects which serve to improve customer reliability are evaluated based on the probability factors related to performance targets (SAIDI, SAIFI, CAIDI). Economic initiatives are evaluated based on their economic and performance ranking. The capital program can be constrained by a number of factors including the ability to effectively execute the annual program with the available time and resources, the maintenance cycle of the generating facilities and company cash flow.

The NS Power Executive approval process involves a detailed review of the consolidated ACE Plan. Division management work with the executive team to address any comments or concerns which may arise from this review.

Following this review and approval, final changes to the capital plan are made and the ACE Plan is compiled for submission to the UARB. Included as part of this process is the identification of projects that are not ready for formal submission to the UARB for review and approval. These projects are noted on the Subsequent Submittal list in the ACE Plan. While these projects continue to form part of the total ACE Plan budget, submission to the UARB for review and approval is deferred until they are filed separately later in the year.

NS Power's capital program is intended to be dynamic and flexible in accordance with a complex business. Revisions may include scope changes, timing changes, costing updates, new project additions, etc.

6.2 Ranking Process

Generation, Transmission, Distribution, and Information Technology

Each Generation, Transmission, Distribution, and Information Technology capital project is ranked using the criteria provided in the matrices below. The ranking process is completed first in the early stages of project development and continues to be refined as the scope and estimated costs for the capital project are further defined. All rankings are reviewed by a centralized Investment Review Team to ensure the projects are justified and appropriate for

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inclusion in the ACE Plan.

The scale of the rankings is detailed in the matrices below.

Criticality and Condition values are typically influenced by one predominant factor and ranked accordingly. However, other factors may also influence the ranking of a project. In the event that multiple factors are present for a project, individual rankings will be taken into consideration in determining the overall Criticality rankings. For example, Health and Safety considerations for a project may warrant a Criticality ranking of serious (3), while Environmental considerations for the same project may also independently warrant a Criticality ranking of serious (3); this project may therefore warrant a higher Criticality ranking due to multiple influencing factors.

The four colours of the ranking matrix are a visual representation of the likelihood of a capital project being completed. A project falling within the red rankings is considered a high priority and should be completed. Projects falling within the orange and yellow rankings represent projects that carry a higher risk than the projects in the green rankings. While the colours provide a visual illustration of risk, the ranking numbers are the focus of the ranking process.

A lower ranking suggests a lower level of risk and urgency, but not always a lower level of priority. Lower ranked projects that fall in the green, yellow or orange rankings may be completed in certain cases. For example, a project that does not carry a high enough ranking may be completed during a planned outage if the condition of the asset is expected to deteriorate such that action would be required prior to the next available outage.

Considerations of multiple influencing factors, all rankings applied to projects under the ranking methodology noted above, and the order of completion of projects ahead of others, are all subject to the evaluation and professional judgment of NS Power staff and third party industry experts.

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Nova Scotia Power Inc. Capital Planning & Capital Expenditure Justification Criteria

Detailed Document

ASSET MANAGEMENT CRITICALITY & CONDITION RISK ALIGNMENT MATRIX

Criticality (Based on Consequence)				CRITICALTY VALUE	RISK MATRIX				
Health & Safety	Environment	Business Sustainability	Consequence						
• Regulatory requirement breached. •Critical safety incident requiring support from external resources •Fatality or Permanent Disability.	• Regulatory requirement breached. • Loss of generating station or facility operating permit. • Critical liquid, chemical or particulate release with off-site or off-facility impact.	Business Sustainability Criticality Ranking is informed through factors such as replacement energy costs, Regulatory Requirements, SAIFI, SAIDI, DAFOR, System Upgrade Requirements, Code Requirements and Project Economics (payback period, NPV, Revenue Requirement).	Critical	5	5	10	15	20	25
• Major safety incident leading to JOHSC actions and controllable by internal resources. • Lost time Injury	• Corporate environmental target exceedence. • Major reportable environmental incident with off-site or off-facility impact.		Major	4	4	8	12	16	20
• Serious safety incident leading to JOHSC actions and controllable by internal resources. • Recordable injury, >1 medical Aid	• Serious reportable environmental release causing license exceedance and off-site or off-facility impact.		Serious	3	3	6	9	12	15
• Moderate safety incident controllable by internal resources and no JOHSC actions required. • Recordable injury, < 1 Medical Aid	• Moderate reportable environmental release without license exceedance and internal impact only.		Moderate	2	2	4	6	8	10
• Minor safety incident controllable by internal resources and no JOHSC actions required • First Aid Injury	• Minor non-reportable environmental release with internal impact only and no license exceedance.		Minor	1	1	2	3	4	5
					1	2	3	4	5
					Rare	Unlikely	Possible	Likely	Almost Certain

LEGEND

	Acceptability of Risk
High Risk	Requires Mitigation
Medium-High Risk	Considered for Mitigation
Moderate Risk	Acceptable
Low Risk	Acceptable

CONDITION

Condition Description	
Rare 1	Failure or occurrence is rare (0-10%). Available data, past experience and or subject matter expert input indicates an expected occurrence rate of less than 1 in 100 operating years.
Unlikely 2	Failure or occurrence is unlikely (11-25%). Available data, past experience and or subject matter expert input indicates an expected occurrence rate of less than 1 in 75 operating years.
Possible 3	Failure or occurrence is possible (26-75%). Available data, past experience and or subject matter expert input indicates an expected occurrence rate between 1 in 10 and 1 in 75 operating years.
Likely 4	Failure or occurrence is likely (76-90%). Available data, past experience and or subject matter expert input indicates an expected occurrence rate between once per year and 1 in 10 operating years.
Almost Certain 5	Failure or occurrence is almost certain (91-100%). Available data, past experience and or subject matter expert input indicates an expected occurrence rate of greater than once per year.

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Nova Scotia Power Inc. Capital Planning & Capital Expenditure Justification Criteria

Detailed Document

Nova Scotia POWER
An Emera Company

INFORMATION TECHNOLOGY ASSETS CRITICALITY & CONDITION RISK ALIGNMENT MATRIX

Business Criticality (Based on Consequence)					Criticality Value
Customer	Finance	Compliance	Operational Sustainability	Criticality	
Loss of a service for all customers	Financial Impact > $30m	Breach of compliance with any of safety, environmental, security, legal or regulatory requirement	Employees could not perform their role or an employee / contractor could not perform their role safely	Critical	5
Customer Experience is significantly degraded for majority of customers but not complete loss of service	Financial Impact - $5M -$30m	Non-compliant with internal Corporate safety, security policies	Significant impact to employees; work arounds require excessive time and additional resources	Major	4
Customer Experience degradation is minor for all customers	Financial Impact - $1M-$5M	Non-compliant with other internal Corporate policies (non-safety , non-security related)	Moderate impact to employees; work arounds require some increase in time with same resources	Serious	3
Customer Experience degradation is minor for small group of customers	Financial Impact - $0.1M-$1M	Non-compliant with internal departmental policy	Minimum impact to employees; work around in place with minimum impact to time	Moderate	2
No impact to the Customer Experience	Financial Impact <$0.1M	No impact on compliance	Nuisance / inconvenience for employees but with no impact on time	Minor	1

RISK MATRIX				
5	10	15	20	25
4	8	12	16	20
3	6	9	12	15
2	4	6	8	10
1	2	3	4	5
1	2	3	4	5
Rare	Unlikely	Possible	Likely	Almost Certain

CONDITION

LEGEND

	Acceptability of Risk
High Risk	Requires Mitigation
Medium-High Risk	Considered for Mitigation
Moderate Risk	Acceptable
Low Risk	Acceptable

	Support	Reliability	Vendor contract	Fit for Purpose
Rare	Expertise is readily available from authorized support sources to meet the service level targets for the business	Service has a high reliability rate with minimal downtime ; Operating as designed.	Licensing is compliant; versions are up to date to comply with vendor support requirements	Features, functionality, performance meets business expectations and requirements and is suitable to meet 5 yr technology road map requirements
Unlikely	Local resources readily available to source as needed; skills training available	Small number of failures reported.Minimal downtime	Licensing is compliant; Current service will be considered "end of life" in 3 years	Features, functionality, performance will not meet the business requirements planned in the next 4 years
Possible	Resourcing options available within North America at a premium cost.	Increase in number of failures reported over previous year; downtime hours impacting business operations.	Licensing is compliant; Current service will be considered "end of life" in 2 years;	Features, functionality, performance will not meet the business requirements planned within the next 3 years
Likely	No resource options within North America; limited availability outside of North America at premium cost	Material number of failures reported. Replacement parts difficult to source	Licensing is compliant; Current service will be considered "end of life" in 1 year	Features, functionality, performance will not meet the business requirements planned within the next 2 years
Almost Certain	Minimal to no options for resources that can provide support; training not available	Diagnostics predicting eminent hardware failure ; Priority software defects that vendor is not able to correct and no acceptable work around is available; hardware replacement parts cannot be sourced	Non- compliance with licensing requirements; Service is considered "end of life" by the vendor	Features, functionality, performance will not meet the business requirements planned within the next year

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General Plant

Projects under General Plant primarily involve information technology, communications and facilities initiatives. With the exception of IT which is ranked according to the matrix above, these other areas are too diverse to develop a comparable and useful ranking system across the groups, and therefore the determination of whether a project will proceed is based upon technical justifications, or economic benefit.

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6.3 Economic Analysis

6.3.1 Economic Analysis Model

The Economic Analysis Model (EAM) is an electronic spreadsheet which calculates and compares the revenue requirement by comparing alternatives to complete the project and avoided costs.

With respect to alternatives to completing the project, all else being equal, the alternative with the lowest discounted revenue requirement will be the preferred alternative. A cash flow analysis determining net present value (NPV) of the alternative cash flows is also incorporated into the EAM to further evaluate the economics of the project.

The following are typical inputs into the model:

- Capital investment profile
- Operating cash flows, including avoided costs

The model calculates the following:

- Revenue requirement
- Income tax associated with the capital expenditures
- Discounted net cash flow at the after-tax weighted average cost of capital (WACC)
- Net present value (NPV), Internal Rate of Return (IRR) and discounted payback period for each alternative

Each year an updated version of the model is provided to users with current tax rates, depreciation rates and WACC.

With respect to avoided costs, avoided costs are calculated using probabilities of failure, unit capacity factors, avoided maintenance costs, and avoided replacement energy costs. Capacity factors and avoided replacement energy costs are forecasted for five years, beginning in the year of project construction. If the avoided costs outweigh the capital costs of the project, the project is considered economic. The timeframe in which the benefit of the project equals the avoided costs is considered the “pay-back period”. NS Power will use an estimate of inflation as an escalator for year six (6) onward to determine future year avoided replacement energy costs.

On an annual basis, NS Power will compare its estimated inflation escalator to fuel forecasts for years 6 onward. If results materially vary, the continued use of inflation as an escalator will be more closely examined and discussed with stakeholders.

The benefits of the model are that it is relatively simple to use, promotes consistency of

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capital analysis across the organization and provides immediate information regarding the economics of alternatives. The model does not allow monthly cash flow entry. In this regard, where the results of alternatives are close, further review may be required.

Sensitivity analyses are incorporated into the model as adjustable variances for capital spend, avoided expenses, and timing of the project. These are adjustable to further test whether reasonable variances in those categories affect the rankings and therefore preference of alternatives.

With respect to various alternatives considered within an EAM, project developers will endeavour to provide realistic alternatives, and clarity on what is included in the costs comprising each alternative. Additional clarifying notes, if necessary, can be written onto the "Notes/Comments" section on the first page/tab of the EAM.

Administrative Overhead (AO) - Project capital cost and the revenue requirement analysis include Administrative Overhead (AO). While it is understood that costs included in NS Power's eligible expenses used to determine the AO rate are largely fixed, NS Power will examine further those projects where elimination of the AO credit from the revenue requirement analysis could affect the recommended alternative for economically justified projects. Where this occurs, NS Power will examine the effect of the AO amount more closely to determine the level of reduction to the AO credit which would change the recommended project, and based on this, provide appropriate comment on this in the Capital Item justification.

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6.3.2 Revenue Requirement Directive in Annual Capital Expenditure Plan

In the UARB's 2011 ACE Plan decision, the Board provided the following directive:

> In future ACE Plan applications, NSPI is directed to make an approximate calculation of how the Plan will affect revenue requirements.

Beginning in the 2012 ACE Plan NS Power has provided the overall approximate impact of the ACE Plan on revenue requirement. Beginning in the 2017 ACE Plan and pursuant to the 2016 ACE Plan Terms of Consensus, NS Power also provides a version of the overall revenue requirement table based on stakeholder assumptions and calculation methodology.

The underlying principle in calculating NS Power's revenue requirement table and impact is that capital expenditures that equal NS Power's depreciation expense do not change the customer revenue requirement. The premise is that rate base is not growing or declining if capital expenditures equal the rate of depreciation. To the extent depreciation expense equals capital expenditures in a given year, there is minimal effect on rate base or associated revenue requirement and therefore it is excluded from the calculation.

The revenue requirement impact considers the following inputs:

- Capital expenditures compared to forecasted depreciation expense annually.
- Administrative overhead credit based on proportion of capital expenditures in excess of depreciation expense in each year.
- Depreciation expense of assets added during the examined timeframe based on the proportion of capital expenditures in excess of depreciation expense of all assets in each year.
- Incremental interest based on the cost of debt multiplied by the portion of debt to total capital of the incremental rate base
- AFUDC based on the proportion of capital expenditures in excess of depreciation expense of all assets in each year.
- Income taxes based on the resultant effects and prorated Capital Cost Allowance for tax purposes.
- Net earnings based on the rate of return multiplied by the portion of equity to total capital of the incremental rate base.

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- Additional fixed cost recovery received from customer growth achieved through capital investment to serve these customers.

Depreciation expense and additional fixed cost recoveries are delineated in the overall revenue requirement calculation presented in the ACE Plan.

An important consideration is that this method does not address the revenue requirement impact should the capital projects not be completed. This includes avoided costs such as increased fuel costs, increased repair costs, and other risks or implications. The Economic Analysis Model used to decide whether an economically justified capital project is the best option for customers includes estimates of the avoided expenses, but these are not included in this revenue requirement calculation. Similarly, any resulting operating savings associated with a capital project are not incorporated. The revenue requirement calculation examines solely the incremental effects with rate base.

To expand on the methodology for revenue requirement impact described above, a separate table examining the impact on revenue requirement of economically justified (i.e. discretionary) projects is provided. The table presents the effect on revenue requirement of the project alternatives compared to the recommended options for the period presented in the ACE Plan. The project alternative revenue requirements are totaled to demonstrate the effect on annual revenue requirement of selecting other than the recommended alternative.

6.3.3 Total Cost of Ownership

In the UARB's 2022 ACE Plan decision, the Board provided the following directive:

> [T]he Board directs NS Power to use a TCO for IT projects over $1 million when an EAM is not provided, whether or not an alternative is available.

Total cost of ownership (TCO) is the cost of a new or upgraded capital asset plus all capital costs and operating expenses over its expected useful life. It accounts for all the capital and operating costs, including the upfront capital costs. In addition to providing a comprehensive understanding of the total cost of a capital investment over the course of its useful life, a TCO is also a useful tool for comparing capital investment options to determine the best value for money.

The TCO timeframe should match that of the expected useful life of the IT software or hardware. This allows for the flexibility to select an appropriate timeframe for a TCO analysis that is in keeping with the useful life of an investment rather than a prescribed timeline.

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Nova Scotia Power Inc. Capital Planning & Capital Expenditure Justification Criteria
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7.0 Capital Planning Financial Criteria & Policies

- NS Power will be responsible for creating financial criteria for the Company;
- Accountability to develop and maintain the general and function-specific justification criteria resides in identified areas of NS Power;
- Capital planning, as a function, is distributed throughout NS Power, but is centrally managed. The respective functional areas of NS Power are accountable for developing, analysing and documenting projects and submitting all items to the Capital Planning group for review and approval;
- Accounting policies and procedures will be presented to the UARB for their approval prior to implementation. These policies and criteria are presented to the Board for approval through a separate proceeding, or can be incorporated within a proceeding, such as the Annual Capital Expenditure Plan.

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8.0 Financial Parameters

The capital program is financed through a combination of debt and equity. The weighted average cost of capital (WACC) is the average of the costs of these sources of financing, each of which is weighted by its respective use to fund the activities of NS Power. The weighted average calculation identifies the cost NS Power has to pay for every dollar it finances. WACC is used to calculate Allowance for Funds Used During Construction (AFUDC) applied to eligible capital projects. The WACC used by NS Power to calculate AFUDC will be the WACC most recently approved by the UARB. NS Power applies for approval of an AFUDC rate annually through a separate proceeding.

In making investments in capital projects, NS Power must be aware of a number of financial factors which are important in economic analysis:

- Cost of capital
- Depreciation
- Inflation
- Taxes
- Competition for investment capital in capital markets
- Investment risk

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9.0 Economic Analysis Of Alternatives

The guiding principle of economic analysis is to seek the most economic alternative based on establishing which alternative, among a number of alternatives that satisfy basic requirements, yields the best value for customers and NS Power. Alternatives, where applicable, must be reviewed prior to initiating a capital item.

The essentials of conducting an economic analysis of alternatives may include, when appropriate:

- Analysis methodology
- Financial parameters
- Cost components for analysis
- Analysis period
- Calculating the present worth
- Sensitivity analysis

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Nova Scotia Power Inc. Capital Planning & Capital Expenditure Justification Criteria
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10.0 NS Power Capital: Types of Capital Applications Submitted for UARB Approval

- Capital projects submitted to the Board in the Annual Capital Expenditure Plan (ACE).
- Capital projects identified in the ACE Plan requiring subsequent submission to the Board.
- Capital projects included in the ACE Plan, but for which the Board has withheld approval in the ACE Decision; (typically requires a filing by NS Power of additional supporting information, in a separate, or revised capital application).
- Unforeseen and Unbudgeted (U&U) capital projects. These projects are not included in the ACE Plan and are filed separately for Board approval.
- Planned and Advanced (P&A) capital projects. These projects are not included in the ACE Plan and are filed separately for Board approval.
- Authority to Overspend (ATO) applications. These applications represent request for UARB approval of over-expenditure on a capital project or routine.
- Scope Change applications. These applications represent request for UARB approval of scope changes within a previously UARB approved capital project. This is independent of any variances in costs.
- Final Cost (FIN) applications: These applications are required for UARB approval if final costs of the project are over or under the specified spend thresholds. They consist of final cost details and variance analysis.

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11.0 Requirements for UARB Approval

11.1 General Requirements

NS Power is a public utility, subject to the provisions of the Public Utilities Act (the Act). NS Power is subject to general supervisory oversight of the UARB. Section 35 and Section 35AA (effective October 30, 2019) of the Act provide the following:

> 35 No public utility shall proceed with any new construction, improvements or betterments in or extensions or additions to its property used or useful in furnishing, rendering or supplying any service which requires the expenditure of more than two hundred and fifty thousand dollars without first securing the approval thereof by the Board.
>
> 35AA (1) In this Section, "large-scale public utility" means a public utility with an annual revenue of one hundred million dollars or more.
>
> (2) A large-scale public utility is not required to secure the approval of the Board under Section 35 for new construction, improvements or betterments in or extensions or additions to its property used or useful in furnishing, rendering or supplying any service that requires the expenditure of one million dollars or less.

The Board may approve, or disallow capital projects requested by NS Power. The Board's approval may be in the amount applied for by NS Power or another amount the Board considers appropriate. The form of Board review is determined by the Board and may involve direct review by the Board, its staff and consultants and/or a public hearing, either oral or written.

NS Power retains the discretion to defer or cancel capital projects submitted and/ or approved by the Board based on condition reassessment and reprioritization in accordance with engineering, business judgment and resource availability. Any projects cancelled or deferred are reported in the Quarterly Capital Reports.

11.2 Capital Application Requirements

Supporting documentation is provided with each capital work order application. The following information will be filed with each capital application in the project description, as relevant:

- Project Start Date
- Project In Service Date
- Project Final Cost Date
- Utility Function
- Forecast Amount
- Projects Estimated Useful Life

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- Depreciation Class

Related Projects approved or having taken place in the past 2 years, current year or anticipated for the next 2 years including the projects' estimated costs. When multiple projects relate to the same asset, or initiative they should be grouped as a package.

Project Description

Justification Criteria Including:

- Sub Criteria (when applicable)
- Description of why the project is being undertaken (i.e. Why do this project?)
- Description of why the project is necessary at the time proposed (i.e. Why do this project now?)
- Description of why the project will be carried out in the manner proposed (i.e. Why do this project this way?)
- Whether the work will be undertaken by an affiliate and reason for affiliate involvement

Summary of Related Capital Items

A list of related capital projects that have been or are scheduled to be completed within +/- 2 years of the submitted project will be included in capital applications.

A project can be considered related if it meets the following parameters:

Steam/Gas Turbine – Work completed on the same asset (turbine, boiler, etc.) and on the same unit (Lingan Unit #3, for example).

Hydro – Work completed on the same generating unit and dam structures, but not necessarily the same asset.

Wind – Work completed on the same Wind Farm site.

Transmission & Distribution – Work completed on the same asset class (Padmount transformers, Breakers, etc.) or in the same location (feeder, Transmission Line).

General Plant – Work completed on the same asset (application, building, etc.).

Cost Support - This may include but is not limited to:

- Supplier quotes, or estimates
- Significant contract terms & conditions
- Management's best estimate based on previous experience or related projects

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Additional Information required to justify the project - This may include but is not limited to:

- Engineering/condition assessment reports
- Independent consultant reports
- Planning studies
- Business cases

Cost Benefit Analysis - This may include but is not limited to:

- The Economic Analysis Model; including inputs, assumptions, and results for all alternatives
- The Levelized Cost Model; including inputs, assumptions, and results for all alternatives
- Production Costing Modelling Results
- NS Power procurement documentation and recommendations; (i.e. Requests for Expressions of Interest and Requests for Proposals)

Project Due Diligence Summaries

Industry Information

Real Estate Information - This may include but is not limited to:

- Lease agreements
- Property evaluations and assessments

NS Power Performance Data - This may include but is not limited to:

- Load statistics
- Outage performance data
- Annual maintenance schedules
- Historical results for multi-year projects
- Internal NS Power reviews
- Operating performance indicators

Technical Details - This may include but is not limited to:

- Substation drawings
- Line drawings
- System Impact Studies
- Generation Interconnection Agreement

Stakeholder Information - This may include but is not limited to:

- Government legislation

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- Letters of project support
- Stakeholder engagement communication

11.3 Capital Costs Incurred Prior to Application

NS Power strives to submit all capital applications to the UARB for review and approval on a timely basis. Capital costs incurred prior to application submission will be subject to the criteria noted below with respect to their inclusion into rate base.

Preliminary Engineering Projects

Each quarter, any spend above $1,000,000 associated with a preliminary engineering project that has been inactive (i.e. no internal or external engineering or scoping work, exceeding $10,000, being carried out within the last 12 month period) will be removed from rate base until such time as the preliminary engineering becomes active again or these costs are submitted for approval to the UARB.

Under $1,000,000 Projects Subsequently Exceeding $1,000,000

Projects originally budgeted at less than $1,000,000, but subsequently exceeding that threshold during project execution, must be filed with the UARB for approval no later than within six months of the project exceeding $1,000,000. Any projects that do not get filed within this timeframe will have all costs in excess of $1,000,000 removed from rate base in the quarter after the six month timeframe until these costs are submitted for approval to the UARB.

Capital Projects in ATO Position

If a previously approved capital project exceeds the allowable variance of the greater of 5% or $250,000 and is not filed within six months of exceeding the approved amount, then the costs in excess of Board approval will be removed from rate base each quarter until these costs are approved by the UARB.

Unapproved Plant in Service Spending

Any capital item with unapproved plant in service above $1,000,000 that does not fall under any of the above categories, and where a capital work order has not been filed with the Board within 6 months of the project's completion, the spend to date on that project in excess of $1,000,000 will be excluded from rate base each quarter until such time as the work order is filed.

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12.0 Authorization to Overspend (ATO) Requirements

12.1 Individual Capital Item ATO

Approval to Overspend (ATO) applications are intended to request Board approval prior to incurring additional expenditures above the approved amount. Individual capital items (non-routine) that are tracking final costs with a variance of more than the greater of 5% or $250,000 must be submitted as ATO applications, within 6 months, if NS Power intends to include costs in excess of Board approval in its regulated rate base.

The reporting included with the Quarterly submission of capital project applications will provide the budget, forecast and actual financial details in a one line format for all projects. Those projects that are tracking final costs with a variance of more than the greater of 5% or $250,000 will be specifically identified.

The following documentation shall be filed with the Board in an individual capital item ATO application:

- Updated UARB approval sheet reflecting the revised project amount;
- Revised Capital Item Description Page reflecting the revised project amount;
- Cost support for the ATO request; and
- Updated economic analysis and / or production costing modelling results (if applicable).

12.2 Individual Capital Item Scope Change

Scope Change applications are intended to request Board approval prior to proceeding with a change in scope as compared to the previously Board approved scope. Scope Change applications may experience cost variances from the original application, but are submitted regardless of whether the thresholds for ATO and FIN applications have been exceeded. In the event a project has exceeding the ATO and FIN cost thresholds and has also experienced a scope change, the project will be submitted as a combined ATO or FIN and Scope Change application.

The following documentation shall be filed with the Board in an individual capital item Scope Change application:

- Updated UARB approval sheet reflecting the revised project amount if applicable;
- Revised Capital Item Description Page reflecting the revised scope change;
- Cost support for the ATO request (if applicable); and

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- Updated economic analysis and / or production costing modelling results (if applicable).

12.3 Routine Capital ATO

Routine capital ATOs are based on the annual budget of individual sub-routines noted in the preceding ACE Plan.

Those sub-routines with variances compared to the annual budget of more than the greater of 5% or $250,000 will require submission to the UARB for review and approval in the first half of the following year.

The following documentation shall be filed with the Board in a sub-routine capital ATO application:

- UARB approval sheet including the sub-routines subject to overspend, the revised sub-routine amount, variance amounts, and detailed variance explanations for each in the comments section.

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13.0 Final Cost Application (FIN) Requirements

Individual capital item projects that have realized a scope change or have final costs with a variance of more than the greater of +/-5% or +/-$250,000 will require that a final cost application be submitted to the Board for approval.

Projects not falling within this threshold may require final cost applications as requested by the UARB.

The information provided in these submissions includes:

- Updated UARB approval sheet reflecting the Final Cost amount;
- Revised Capital Item Description Page reflecting the Final Cost of the project;
- Line by line project account variances explanations will be provided for those accounts with material variances; and
- Project scope variances.

All projects should be final costed within six months of their in-service date. Exceptions to this requirement will be required on occasion. A final cost submission may be delayed due to certain circumstances or unique projects. Circumstances may include not receiving final vendor invoicing in a timely fashion. Unique projects may include projects for which in-service dates are well in advance of project completion. In all cases where final costing capital work orders are submitted past six months after their in-service, justifications for the delay will be provided.

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14.0 Retirement of Capital Assets

NS Power retires capital assets for various reasons, including:

Normal Wear and Tear

This is referred to as normal deterioration of physical plant caused by use over time and usually occurs because of the physical deterioration of the asset. This type of retirement usually causes an asset to be scrapped.

Inadequacy

This usually occurs because of such items as customer safety, employee safety, public safety, increased customer demand.

The asset can no longer be used safely or cannot supply the customers adequately. The asset is retired but could be reused in another location.

Technical and Economic Obsolescence

The asset is technically obsolete or becomes redundant and no longer economically supplies customers' needs. The asset is retired but could be reused in another location.

Public Authority Requirements

The asset is required to be removed and or replaced for some of the following reasons:

- Environmental regulations (e.g. PCBs)
- Regulatory requirements (e.g. meter replacement)
- Highway relocations

The asset is retired but could be reused in another location.

Customer Requirements

The asset currently serving the customer does not meet customer requirements in a manner other than adequacy and efficiency of supply (e.g. customer requests underground service).

The customer usually pays for any of these requests but the assets must be retired. However they could be reused elsewhere.

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Nova Scotia Power Inc. Capital Planning & Capital Expenditure Justification Criteria
Summary Document

Procedures

When capital assets reach the end of their useful life and are no longer able to contribute to the service of customers, they must be retired from the Plant in Service records at their original cost. In doing so, they are removed from rate base.

For retirements of property, plant and equipment other than land and entire production plants, the original cost plus any costs of removal less salvage proceeds is charged to accumulated depreciation, with no immediate gain or loss recognized.

Gains or losses on capital assets, with the exception of land, are deferred and depreciated over the remaining life of the assets, in accordance with depreciation rate filings with the Nova Scotia Utility and Review Board.

The only exception to this policy concerns the sale of land, in which the resulting gain or loss is recognized immediately.

In those cases where the disposal of land requires expenditures to address environmental issues, then this transaction will be viewed on its own merit, as per approved financial policies.

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15.0 Routine Expenditures

15.1 Foreword

NS Power's Routine Program (the Program) is organized and managed through a subset of capital items (Routines) which are provided below. The Program provides for recurring annual allocations of funds for high volume, repetitive, like-for-like capital replacements, enhancements, or additions that are expected to continue into the foreseeable future.

The Program is held to the same standards as individual ACE Plan projects with regards to compliance with Capital Expenditure Justification Criteria and NS Power's Financial Policies and Procedures.

On an annual basis NS Power requests UARB approval for the Program and its component Routines through NS Power's ACE Plan. Within the approval request further context and justification is provided to support the annual funding levels of the Routines. This information includes specific project budget details, historical trending and year over year variances.

15.2 Definition

Routines include recurring annual capital expenditures for:

- Replacement of worn out or technologically deficient stand-alone equipment.
- Additions/improvements to existing capital assets to raise or improve productivity levels and asset value.
- Additions to existing equipment base resulting from system growth.
- Addition of customers to the system.

15.3 Unit Cost Materiality Limits

The threshold for capitalizing smaller asset purchases is to be consistent with the materiality limits contained in the financial policies. Expenditures for amounts less than the stated capitalization limits should be charged to operations as they are incurred, regardless of the volume purchased.

Exceptions:

Where smaller components are implicit within the scope of a capital project they will be capitalized as part of the overall project.

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IT Infrastructure:

NS Power's computer platforms are made up of the following components:

- Keyboards
- Monitors
- Docking stations
- Peripheral communication devices
- Desktop and laptop computers
- Software
- Licenses
- Servers
- Networks
- Data Storage

Each of these assets is integral to the operation of the computer systems which allow employees to perform their daily work functions. NS Power's annual IT capital investment allows for the periodic refresh of certain components to ensure that each platform is functioning at its intended potential. As these purchases are included in and required to ensure the adequate performance of each employee's computer system, the investments will be capitalized.

15.4 Routine Classification

Routines are classified into four functional categories:

- Generation
- Transmission
- Distribution
- General Plant

The Routines included in the Program are as follows:

Generation Routines

Generation Equipment Replacements
Generation Other Hydro
Generation Other Thermal

Transmission Routines

Transmission Substation Replacements, Additions, Modifications
Primary Equipment Spares
Protection Modification & Replacement
Transmission Line Replacements, Additions, Modifications

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Distributions Routines

Meters
Distribution Upgrades and Replacement
New Customers
Joint Use
Right-of-Way Widening

General Plant Routines

Work Vehicles
Tools and Test Equipment
Telecommunications
Computing Asset Management
Property Improvements and Furniture
Other

15.5 Approval

Routines are provided for Board approval on an Annual basis through the ACE Plan. As part of the ACE Plan proceeding, stakeholders are provided the opportunity to evaluate each Routine. If a new Routine is required, NS Power will file for Board approval of the Routine prior to or by including it in the ACE Plan. If there are new projects added to an existing Routine, NS Power will identify the projects within the ACE Plan documentation.

Over-expenditure

Please refer to section 12.2.

Limits

All individual expenditures are tracked separately within the routine.

Routine Expenditure Reporting

The Board is kept apprised of the actuals incurred during a given year through the ACE Plan process and in the Q4 capital reports provided to the Board.

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16.0 Confidentiality

Where the above documentation packages provide confidential information (e.g. commercially sensitive information such as vendor quotes, cost estimates, and internal procurement recommendations; proprietary third party information such as consultant reports and standards documentation; and security sensitive information such as transmission one-line diagrams), NS Power will justify and request the Board, in accordance with Rule 12 of the Board's Rules, maintain portions of the capital filings as confidential. NS Power will minimize such requests for increased transparency and to support the Board's objective in issuing transparent, non-confidential, public decisions.

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17.0 Capital Expenditure Justification Criteria

17.1 Introduction - General Considerations

The following considerations are used to evaluate the economic justification for procurement and replacement of equipment, materials and services on the NS Power system.

- Examination of basic needs and alternatives (e.g. why is this required, why now, what other options are available, what are the consequences of doing nothing?).
- Examination of suitable technologies to provide an appropriate solution(s).
- Evaluation of alternative means of acquiring technologies including: design and build NS Power owned facilities and provide services using NS Power staff; rent or lease facilities and provide services using NS Power staff; rent or lease facilities and contract to others for services; and variants of the above as appropriate.
- The alternatives will be ranked using the most appropriate measure (e.g. Revenue Requirement or Net Present Value (NPV)), and the best alternative will be chosen (i.e. lowest Revenue Requirement or highest NPV or lowest Net Present Cost, etc.)
- Capability to meet industry norms for performance, such that NS Power's ability to provide its customers with the required levels of service are not compromised.
- Obsolescence and/or lack of support from facility, spare parts and service suppliers, such that NS Power incurs unacceptable risk of financial loss and/or liability.
- Ability to provide the lowest overall operating costs to NS Power.
- Required to ensure compliance with NPCC and, or NERC Reliability Standards.

The least cost option meeting the requirements and constraints specified above shall be selected.

17.1.1 Integrated Resource Plan

An Integrated Resource Plan (IRP) assesses various supply and demand scenarios to determine the best ways for NS Power to meet future requirements (including emission standards) in a cost-effective and reliable manner, while maintaining a minimum 20% capacity reserve margin above firm loads. The IRP is an important resource document used in the development of the capital plan.

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Nova Scotia Power Inc. Capital Planning & Capital Expenditure Justification Criteria
Summary Document

NS Power's IRP is:

- A strategic document;
- A planning document that helps NS Power and governing bodies create long-term sustainable plans based on in-depth analysis;
- A result of broad consultation with stakeholders;
- A roadmap that outlines the primary demand and supply options to be used by NS Power to meet future electricity and emission requirements;
- An analysis framework that integrates demand and supply options to meet future electricity requirements reliably and cost effectively in compliance with current and emerging operational and environmental constraints;
- A reference against which to assess demand and supply-side applications;
- A living document that will be updated as conditions change materially; and
- Developed using models that incorporate the best information available at the time of planning, as well as predictions about potential decisions that are subject to change as societal and technology priorities evolve.

NS Power's IRP:

- Is based on current information about basic assumptions;
- Sources include:
    - Recognized experts and consultants
    - UARB staff and UARB consultants
    - Proprietary information sources
    - Publicly available trends
    - Stakeholders / suppliers
    - NS Power's professional experience and judgment;
- Has a 25-year planning horizon;
- Provides ranges of realistic values based on current information.

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NS Power's IRP is not:

- An application for UARB approval of specific NS Power initiatives;
- A commitment by NS Power to undertake specific initiatives;
- A prohibition against specific third-party initiatives; or
- A review of regulatory or accounting treatment for NS Power assets or costs.

17.2 Innovation

Justification Criteria

Innovation capital projects are justified on the basis that there is a reasonable expectation that they will provide customer value in some or all of the areas of reducing upward pressure on revenue requirement, reliability and grid stability, government policy compliance, and customer experience, through the deployment of proven technologies in innovative ways. In addition, innovation capital investments may be justified on the basis that they are reasonably expected to allow for testing before deploying at scale, provide valuable data and learnings, or aid in the development of business cases where applicable.

Sub-Justification Criteria

Innovation capital projects may be justified under one or more of the following sub-criteria:

- reduce upward pressure on revenue requirement
- reliability and grid stability
- environmental and other compliance
- customer experience improvements

Reduce Upward Pressure on Revenue Requirement

Innovation capital projects justified under reducing upward pressure on revenue requirement must (1) be reasonably expected to reduce upward pressure on revenue requirement, based on known issues increasing pressure on revenue requirement, through the deployment of proven technologies in innovative ways; or (2) be reasonably expected to allow for testing before deploying at scale, provide valuable data and learning, or aid in the development of business cases where applicable, regarding the efficacy of innovation technology in reducing upward pressure on revenue requirement.

Reliability and Grid Stability

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Innovation capital projects justified under reliability and grid stability must (1) be reasonably expected to improve reliability and grid stability, based known issues affecting the same, through the deployment of proven technologies in innovative ways; or (2) be reasonably expected to allow for testing before deploying at scale, provide valuable data and learnings, or aid in the development of business cases where applicable, regarding the efficacy of innovation technology in improving the reliability of the system.

Environmental and Other Compliance

Innovation capital projects justified under environmental and other compliance must (1) be reasonably expected to support environmental or other compliance, based on environmental compliance or other legislation and regulation, through the deployment of proven technologies in innovative ways; or (2) be reasonably expected to allow for testing before deploying at scale, provide valuable data and learnings, or aid in the development of business cases where applicable, regarding the efficacy of innovation technology in complying with environmental or other policy.

Customer Experience

Innovation capital projects justified under customer experience must (1) be reasonably expected to improve the customer experience, based on either stated or predicted needs of customers, through the deployment of proven technologies in innovative ways; or (2) be reasonably expected to allow for testing before deploying at scale, provide valuable data and learnings, or aid in the development of business cases where applicable, regarding the efficacy of innovation technology in improving the customer experience.

17.3 Health & Safety

This criteria applies to capital projects undertaken to comply with applicable laws and accepted industrial practices, including but not restricted to:

- Nova Scotia Occupational Health and Safety Act and Regulations
- NS Power standards and work practices
- Orders issued by the N.S. Department of Labour, or Environment
- Accepted industrial practice or codes
- Exercise of due diligence

As well as applying to active NS Power sites, the Health and Safety criterion is applicable to temporarily or permanently decommissioned NS Power sites. Examples of such expenditures include the following:

- Demolition of physical plant to eliminate all liability

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- Alterations to a site or physical plant to render it secure against public intrusion in order to limit liability (e.g. signage, fencing, boarding of windows and doors, electrical isolation, etc.)

- Security devices to alarm intruders

- Alterations to a site or physical plant in preparation for sale or disposal

Projects where compliance with such requirements is the primary driver for the investment will utilize the Health and Safety justification criteria. There are often projects where other (discretionary) asset management criteria may be major drivers in addition to Safety improvements that will be accomplished through a capital upgrade. The intent is to code the project to its primary driver but judgment is often required to ensure consistency.

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17.4 Environment

As an industrial enterprise, NS Power is obligated to act in a manner which is respectful and protective of the environment in accordance with Company policy, environmental legislation and regulations and agreements with governments. Subsequent to appropriate analysis of its existing and proposed operations, NS Power may need to make capital expenditures to achieve the required environmental performance. NS Power is committed to an environmental ethic which supports environmental and economic sustainability.

The environmental justification criteria include the following:

Environmental Permit, License, Regulation Criteria

These criteria refer to the specific law(s) and the enabling legislation which is enacted to provide for processes, project approvals, environmental monitoring, and standards of performance.

Resulting from regulations, laws and legislation are instruments which require a certain level of environmental performance. They can significantly impact capital expenditures.

These instruments are:

- permits
- licenses
- regulations

NS Power's capital expenditure criteria will include justification based on the type of instrument placing the requirements.

Environmental Agreement, Guidelines, International Standards and Voluntary Action Criteria

These criteria respond to agreements between governments, government guidelines, international standards developed for various industrial sectors and voluntary action that bind the owner/operator to carry out its business in a certain way so as to meet agreed environmental performance.

These instruments may be more flexible than those described in section 1.0 above. However, there is usually little choice given the expectations of performance under international trade agreements. These agreements have provisions which can be used to punish and/or reward industries, economic sectors and countries based on environmental performance.

NS Power's capital expenditure criteria will include justification to make such an expenditure by reference to the specific instrument in question.

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17.5 Land and Right-Of-Way

NS Power needs to occupy and access land to enable the Company's operations. Land can be held as a fee simple title or through some other interest or type of right over land. Fee simple ownership is normally taken for facilities where permanent exclusive occupation is required, for example a thermal generating plant. Where these requirements are lessened in some way, NS Power can acquire interests which are less than the fee simple interest in land, including rights-of-way or easements for power lines, or utility corridors and leases or licences for the occupation of land.

Land and Rights owned by NS Power are managed according to their use, with the main distinction being between those in current use for company operations and those where there is no operational use. Sites without an operational use can be held to mitigate or protect adjoining operational uses, allow management of the remnants of past use, or to allow for future activities or to generate revenue.

The criteria governing NS Power land transactions are as follows:

Land Acquisition

Land is normally acquired as part of a capital project associated with the five year capital budget. Occasionally land that will satisfy the requirements of a future capital project that is beyond the five year capital budget will become available on the open market. In such instances the property may be acquired if no economically practical alternative property is available to satisfy the requirements of the future project in question.

Land Disposal

NS Power can dispose of, lease or grant rights over surplus land. Land associated with hydro projects is generally retained to protect the safety and usability of the whole system. Land to be disposed of will be investigated to ensure compliance with NS Power environmental criteria and provincial regulations.

Land and Building Disposal

A building, land or rights surplus to NS Power requirements and which can be sold will be sold with its associated lands assuming all environmental criteria have been met. If the land and building cannot be sold as one entity, then the building or facility will be removed or retired under NS Power retirement of capital asset criteria and, depending upon requirements, the land will be retained or sold.

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Abandoned Rights-of-Way

NS Power normally retains rights-of-way which are not in current use to allow for future use. If a right-of-way is determined to be surplus to NS Power requirements, then the right-of-way may be released, usually to the owner of the property over which the right-of-way exists.

17.6 Hydro, Wind and Biomass

The principles set out hereunder shall be used by NS Power in determining the methods used and timing of purchase and replacement of its hydro, wind and biomass production assets.

These production assets may be purchased, replaced, or modified for any of the following conditions:

- To eliminate conditions which, in the opinion of NS Power, constitute hazards to operating personnel or the general public.
- To meet NS Power's obligations to third parties or to conform with applicable laws and regulations - including Nova Scotia's Renewable Electricity Standards and Canadian Dam Safety Guidelines.
- To produce an economic benefit by reducing or minimizing operating costs, or improving generating equipment efficiency.
- To maintain reliability and quality of supply to the bulk power system.
- When the probability of failure is high enough that:
    - Making the proposed capital investment reduces the costs compared to continuing to repair the existing asset;
    - The estimated cost reduction is of significant magnitude to meet NS Power's financial criteria; and
    - The timing of investment is optimized to maximize customer net benefits.

For projects justified on the basis of economics, it must be demonstrated that the value of energy to the system is greater than the cost of the capital project in question or the next most cost effective renewable energy option to replace the renewable generation. The latter is required to ensure NS Power remains compliant with Nova Scotia's Renewable Energy Standards.

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17.7 Thermal

The principles set out hereunder shall be used by NS Power in determining the methods used and timing of purchase and replacement of its thermal production assets.

Equipment Replacement / Refurbishment

Capital expenditures to purchase, replace, or refurbish equipment must be justified by an engineering and economic evaluation which incorporates information from planned inspection/performance programs and industry standards. An economic analysis is carried out such that the least cost option meeting all the requirements and constraints specified shall be selected.

Thermal production assets shall be purchased, replaced, or modified when the probability of failure is high enough that:

- Making the proposed capital investment reduces the costs compared to continuing to repair the existing asset;
- The estimated cost reduction is of significant magnitude to meet NS Power's financial criteria; and
- The timing of investment is optimized to maximize customer net benefits.

Heat Rate

For capital expenditures resulting in Unit heat rate improvements, an annual cost saving is calculated using the system dispatch production models (i.e. production costing model) (for major improvements) or calculated on a BTU/kWh basis using current production forecasts and current cost of fuel forecast (for minor improvements < 1% improvement in heat rate).

Capacity

For capital expenditures that result in an increase in net Unit capacity, the value of a kW is calculated using system planning models.

Labour

Impacts on present or future labour requirements are calculated on an annual savings/cost basis taking overtime and fringe benefits into account.

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Forced Outage Rate

Unplanned outages result in replacement generation, often at a higher cost than the existing generation. These costs are estimated using the probabilistic production model and incorporated into the Economic Analysis Model.

17.8 System Design

The Nova Scotia Power Inc. interconnected system is divided into several classifications, each of which is governed by different design criteria.

NS Power is a member of the Northeast Power Coordinating Council (NPCC). Those portions of the NS Power Bulk Power System, wherein single contingencies can potentially adversely affect the interconnected NPCC system, are designed and operated in accordance with NPCC Directory #1, Design and Operation of the Bulk Power System.

NS Power is required to follow the standards of the North American Electric Reliability Corporation (NERC). NERC is a non-government organization which regulates Bulk Power System users, owners, and operators through the adoption and enforcement of standards for fair, ethical, and efficient practices. NERC standards are filed with the UARB through a regulatory approval process where they become mandatory and enforceable in the province of Nova Scotia. NS Power designs its Bulk Electric System to meet the requirements of the in-force NERC standards. NS Power utilizes a set of deterministic criteria for its interconnected transmission system that combines protection performance specifications with system dynamics and steady state performance requirements. The NS Power Bulk Electric System is planned, designed, and operated in accordance with single contingency criteria.

NS Power System Design Criteria are applied for all other portions of the interconnected system.

NERC standards and NPCC criteria are continually evolving. NS Power system design practices are constantly updated to meet the requirements of new and evolving standards.

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17.9 Transmission Plant

Conditions for Purchase

Transmission plant may be upgraded, rerouted, or otherwise modified for any of the following conditions:

- To eliminate conditions which, in NS Power's opinion, constitute hazards to operating personnel or to the general public.
- To meet NS Power's obligation to third parties or to conform with the provisions of applicable laws and regulations.
- To reduce or minimize operating costs of the transmission system.
- To maintain reliability and quality of supply to the distribution bus.

Conditions for Replacement

Transmission plant shall be replaced, if still required to meet minimum industry standard system design requirements. Additional details pertaining to the conditions for replacement are provided in the NS Power Capital Planning & Capital Expenditure Justification Criteria Detailed Document.

17.10 Distribution System

NS Power's Distribution System connects the majority of NS Power's customers to the Transmission System. (Some of the larger customers are supplied directly from the transmission network.) As such the Distribution System criteria bridge the gap between the Transmission System and the customer's service entrance. The need for distribution projects is driven by the considerations provided below.

- Requirement to Serve
- Pole Strength Compliance with Standard CAN/CSA-C22.3 No. 1-10 - Overhead Systems
- Service Voltage Outside CSA Standard CAN3-C235-83 (C2010)
- Overloaded Equipment
- Deteriorated Conductor
- Outage Performance
- Distribution System Protection
- Prevention of Catastrophic Failure of Distribution Transformers/Capacitors
- Grounding Criteria

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- Joint Use Agreement
- Highway Relocation
- Radio Interference Voltage
- Voltage Unbalance
- Voltage Flicker Due to Motor Starting
- CATV Agreement

17.11 Pole Retreatment

The principles set out hereunder shall be used by NS Power in determining the methods used and the timing of retreatment of its transmission and distribution wood poles.

Conditions for Retreatment

Wood poles originally treated with pentachlorophenol and creosote preservatives may be retreated with approved wood preservatives to reinforce the preservative retention levels in the ground line area thereby maintaining acceptable toximetric thresholds necessary for protection against fungal and insect attack.

Criteria for Wood Pole Retreatment

NS Power undertakes on a line basis, retreatment of many species of wood poles that have been in service for 15 years or more to meet minimum industry standard requirements. Additional details pertaining to the conditions for retreatment are provided in the NS Power Capital Planning & Capital Expenditure Justification Criteria Detailed Document.

17.12 Metering Equipment

Conditions for Purchase

For revenue metering, NS Power purchases only those meters having Measurement Canada (MC) type approval. Meters are sealed by NS Power, or accredited verifier, to the Standard proclaimed in document S-E-02, "Specifications for Verification and Re-verification of Electricity Meters", before being placed in service. Meters are also brought in from active service on a periodic basis for re-verification according to this standard.

Meters being purchased at the present time for kWh measurement will be of the standard type, or have been determined to be the most economic choice when all factors related to metering cost have been considered. MC allows selective sampling of standard induction type meters both in verification and re-verification.

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Conditions for Replacement

Metering equipment may be replaced, upgraded or otherwise modified when meters fail the criteria specified in the Standard, or when a rate class for a given customer changes, requiring a meter with greater or lesser capability. Additional details pertaining to the conditions for replacement are provided in the NS Power Capital Planning & Capital Expenditure Justification Criteria Detailed Document.

17.13 Work Support Facilities

Building Facilities/Furniture

NS Power owns and operates buildings and associated systems, equipment and furniture to support the delivery of service to customers (i.e. other than that associated with generation facilities, the costs of which are included in the related function costs). These facilities are operated in a manner which provides the most suitable environment for employees to carry out their work in a safe and efficient manner and protects the asset and extends its original useful life.

Facilities may be constructed, replaced, upgraded, renovated, leased, retired or otherwise modified for any of the following purposes;

- To eliminate conditions which, in NS Power's opinion, constitute hazards to NS Power's personnel or to the general public;
- To meet NS Power's obligations to third parties or to conform with the provision of applicable laws and regulations there under;
- To protect facility assets by maintaining them in a reasonable operating condition;
- To comply with regulations and legislation.

The least cost option meeting all the requirements and constraints specified above shall generally be selected.

Telecontrol & Telecommunications

Telecontrol Facilities includes equipment which is used to provide supervisory control and data acquisition (SCADA), remote control, special protection systems and teleprotection.

Telecommunication Facilities includes broadband transport mediums such as: fibre optics, microwave radio, UHF and VHF radio, metallic-pair cable, power line carrier, and systems which employ these mediums to transfer voice and data communications from one location to another such as: telephone, mobile radio, telecontrol equipment, computer networks, video, etc.

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Telecontrol and telecommunications are essential for the protection and control of the Bulk Power System. They allow for remote monitoring and control of the power system through SCADA and provide for high speed protection of generation and transmission facilities through teleprotection and special protection systems (SPS). Telecontrol and telecommunications are also required to ensure compliance with Northeast Power Coordinating Council (NPCC) and the North American Electric Reliability Corporation (NERC) Reliability Standards. Telecontrol and telecommunication facilities are not used directly for the supply of electricity to NS Power customers. They are enabling technologies which help to satisfy NS Power's business requirements to serve its customers in the most economical, effective and safe manner possible. The need for the application of this technology is driven by the above requirements.

17.14 Information Technology Application and Hardware System

Information Technology (IT) is subject to rapid evolution, obsolescence, and evolving customer expectations. Accordingly, categories and justifications for IT capital investments vary, from mitigating risks associated with obsolescence to meeting customer needs and expectations. IT projects can be broadly justified under the following sub-criteria:

- Technical
- Economic
- Customer Experience

IT capital projects may be justified primarily under one of these sub-criteria or under a combination of them all. These categories and their justifications are expanded upon below.

Technical

Technical projects are driven by criticality and condition based risk assessments of in-service assets. They are most frequently associated with mitigating risks associated with obsolescence, security, and system performance to meet requirements of the utility to serve customers. Technical projects are ranked according to the ranking matrix and methodology outlined in Section 6.2.

Economic

Economic projects are driven by opportunities to operate in a more cost effective manner. Economics may also be associated with Technical, and Customer Experience projects.

Customer Experience

Customer experience projects are driven by either stated or predicted needs of customers, and are reasonably expected to provide improvements to their experience and interactions with NS Power.

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Nova Scotia Power Inc. Capital Planning & Capital Expenditure Justification Criteria
Summary Document

17.15 Vehicles

Nova Scotia Power requires vehicles for the effective delivery of its services. There are two broad classifications used for vehicle identification; transportation and work vehicles.

Vehicle Replacement Process

The first step in the review of any vehicle for potential replacement is that it meet the life cycle costing methodology initial screening criteria.

Vehicles proposed for replacement based on the screening criteria of vehicle age, kilometres and maintenance history are then subject to a mechanical inspection and analysis by the Fleet Services group.

The premise of vehicle replacement is to achieve the most economical decision based on life cycle costing, which includes predictive maintenance, age and kilometres.

NS Power follows the life cycle costing methodology to establish units that are a potential for replacement. Vehicle replacements are ranked and scheduled based on the overall benefits to all operating units.

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NOVA SCOTIA POWER INC. CAPITAL PLANNING & CAPITAL EXPENDITURE JUSTIFICATION CRITERIA
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Detailed Document

1.0 Definitions

Annual Capital Expenditure (ACE) Plan: A document containing details regarding all of NS Power's capital projects planned for a given calendar year. The ACE Plan is submitted to the UARB every year.

Authorization to Overspend (ATO): A capital work order package for submission to the UARB should the project forecast final costs with a variance of more than the greater of 5% or $250,000.

Bulk Power System: The interconnected electrical systems within northeastern North America comprising generation and transmission facilities on which faults or disturbances can have a significant adverse impact outside of the local area.

Carry Over Project: A capital project that is approved and initiated in one calendar year, but the investment of capital carries over into the subsequent year(s).

Capital Cost: The cost required to complete a capital project.

Capital Cost Allowance: A yearly deduction of depreciation that can be claimed for income tax purposes on the cost of certain assets.

Capital Expenditure Justification Criteria (CEJC): The criteria contained in this manual, defining matters related to capital expenditures. The CEJC contains the criteria defining what, why and when a project qualifies as a capital project.

Capital Identification (CI) Number: The unique identification number associated with a capital project.

Capital Lead: Employee responsible for technical and financial justification of capital work from a particular area (e.g. generation), program (e.g. reliability), or function (e.g. system reinvestment).

Discounted Payback Period: This is a measure of economic value. It represents the number of years required to pay back the initial capital cost of a project. It measures the levered payback period.

Discretionary Project: Investments that are incremental to an essential capital investment and which are made solely on the basis of economics, and there is an acceptable "do-nothing" alternative. Discretionary projects may yield defined benefits that minimize the revenue requirements of NS Power.

Do Nothing Alternative: A "do nothing" alternative refers to the alternative to not proceed with a discretionary capital project with corresponding acceptable outcomes. Whereas discretionary projects are based solely on economics, they are not addressing safety, legal, reliability or technical scenarios, and therefore "doing nothing" results in little or no risk to NS Power's system.

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Economic Analysis Model (EAM): The standard software model used by NS Power to calculate the present value of revenue requirement and economic value of any project. The software takes capital costs, avoided costs, revenue, expenses and taxes into consideration to give a Net Present Value (NPV), internal rate of return (IRR), and discounted payback period.

Economically Justified Project: A capital project that is justified, in part, on economic benefits. The Economic Analysis Model (EAM) is used to derive the economic benefits of all economically justified projects. Economically justified projects may also be justified on other technical justifications.

Environmental Project: A capital project that is justified on the basis of environmental criteria. These criteria include operating permit approval, Environmental Act or regulation compliance, regulatory standards and industry standard compliance.

Essential Project: A capital addition or replacement which must be made to satisfy technical, legal, safety, regulatory or environmental directives.

Executive: A member of the NS Power Executive Team including General Managers, Vice Presidents, Executive Vice Presidents and the President and CEO.

Final Cost (FIN): A capital work order package for submission to the UARB should the project experience a scope change or if final costs result in a variance of more than the greater of +/- 5% or +/- $250,000. FIN capital work orders consist of final cost details and a variance analysis.

Individual Capital Item: Individual capital items, typically of a non-repetitive nature, and justified and budgeted separately from capital routines.

Integrated Resource Plan: A long-term planning process and framework within which the costs and benefits of both demand and supply side resources are evaluated to develop the least total cost mix of utility resource options.

Information Request (IR): A request from the Utility and Review Board (UARB), or other intervenors, for additional information pertaining to a capital project.

Internal Rate of Return (IRR): The discount rate used in capital budgeting that makes the net present value of all cash flows from a particular project equal to zero. Generally speaking, the higher a project's internal rate of return, the more desirable it is to undertake the project. As such, IRR can be used to rank prospective projects. Assuming all other factors are equal among the various projects, the project with the highest IRR would likely be considered the best and undertaken first.

Investment Review Team (IRT): The IRT is composed of a diverse group of Directors and Managers who offer expertise and experience from different functional areas within NS Power. The IRT manages NS Power's capital program in an integrated manner ensuring that projects are

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prioritized across NS Power. Investment initiatives are continuously monitored and the status of the capital program is communicated to NS Power's Leadership Team.

Leadership Team: Senior Managers, Directors and Executive of NS Power.

Planned and Advanced (P&A): A capital item that is planned (foreseen and budgeted) in future years but advanced for commencement and/or completion in the current year. They are not U&Us despite not being referenced in prior ACE Plans.

PowerPlan (software): The software that is used to manage all aspects of capital projects including project scope, justification, budget, approvals and actual project information. The software can be used to research information on past projects and forecast project activity into the future.

Production Costing Model: A system modelling tool which provides detailed forecasts of fleet dispatch and production costing, reflecting the increasing complexity of the system. Used in the calculation of replacement energy costs.

Routine Capital Item: A capital item containing a number of projects that are high volume, repetitive, like-for-like capital replacements, enhancements, or additions that are expected to continue into the foreseeable future.

Safety Project: A project that is justified on the basis of health and safety criteria. Some of these criteria include regulatory requirements, Nova Scotia Department of Labour orders, NS Power safe work methods/practices, revisions to industry standards, Joint Occupational Health and Safety Committee (JOHSC) actions and mitigating risk of potential health and safety incidents.

Special Protection System (SPS): A protection system designed to detect abnormal system conditions, and take corrective action other than the isolation of faulted elements. Such action may include changes in load, generation, or system configuration to maintain system stability, acceptable voltages or power flows. Automatic under-frequency load shedding as defined in the NPCC Emergency Operation Criteria A-3, is not considered a Special Protection System. Conventionally switched, locally controlled shunt devices are not Special Protection Systems.

Total Cost of Ownership (TCO): The upfront capital cost of a new or upgraded capital asset plus all capital costs and operating expenses over its expected useful life.

Unforeseen and Unbudgeted (U&U): A capital item that develops throughout the year, typically in response to discoveries made through routine inspections, maintenance, and/or unplanned failures, and was not included in prior ACE Plans or the current ACE Plan. Projects foreseen and budgeted for future years, but advanced for commencement and/or completion in the current year, are not U&Us despite not being referenced in prior ACE Plans (these are designated as P&A projects). A U&U is submitted because the capital item cannot wait until the next ACE Plan for approval.

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Utility and Review Board (UARB): Pursuant to the Public Utilities Act, the Nova Scotia Utility and Review Board ("NSUARB" or "Board") exercises general supervision over all electric utilities operating as public utilities within the Province.

Weighted Average Cost of Capital (WACC): The cost of capital (discount rate or interest rate) determined by the weighted average, at forecasted book value, of the cost of all financing sources (debt, corporate bonds, equity) in the capital structure of NS Power. The weighted average cost of capital (WACC) is determined by the Finance Team and incorporated into the Economic Analysis Model (EAM) in order to determine the Net Present Value (NPV) and discounted payback of a capital project.

Acronyms

ACE	Annual Capital Expenditure
ACHI	Avoided Customer Hours of Interruption
AFUDC	Allowance for Funds Used During Construction
AO	Administrative Overhead
ASTM	American Society for Testing and Materials
ATO	Authorization to Overspend
CAIDI	Customer Average Interruption Duration Index
CCA	Capital Cost Allowance
CEJC	Capital Expenditure Justification Criteria
CI	Capital Item
CO	Carry Over
CSA	Canadian Standards Association
EAM	Economic Analysis Model
FIN	Final Cost
DEP	Distribution Engineering Practices
IR	Information Request
IRP	Integrated Resource Plan
IRR	Internal Rate of Return
IRT	Investment Review Team
MC	Measurement Canada
NERC	North American Electric Reliability Corporation
NPCC	Northeast Power Coordinating Council
NPV	Net Present Value
NS Power	Nova Scotia Power Incorporated, “the Company”
P&A	Planned and Advanced
SAIDI	System Average Interruption Duration Index
SAIFI	System Average Interruption Frequency Index
SCADA	Supervisory Control and Data Acquisition
SPS	Special Protection System
UARB	Nova Scotia Utility and Review Board, “UARB” or “Board”

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U&U	Unforeseen and Unbudgeted
WACC	Weighted Average Cost of Capital

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2.0 Introduction

In its 1995 ACE Plan Decision, the Board provided the following:

> By an Order dated January 5, 1995 the Board directed that Nova Scotia Power Inc. (NS Power, the Utility, the Company) file evidence relating to its 1995 Annual Capital Expenditure (ACE) Plan by January 12, 1995, and set March 6, 1995 as the commencement date for a hearing.
>
> In an exchange of correspondence between the Company and the Board in early 1994, an understanding was reached that NS Power would make a yearly presentation of its Annual Capital Expenditure Plan and that NS Power would ensure work orders for projects less than $1 million meet Board approved technical and financial capital expenditure justification criteria. The Board indicated that it would undertake periodic audits on samples of work orders to ensure that such criteria had been satisfied.[1]

Those technical and financial justification criteria are contained in this document, the Capital Expenditure Justification Criteria (CEJC).

NS Power is a public utility, subject to the provisions of the Public Utilities Act (the Act). NS Power is subject to general supervisory oversight of the UARB. Prior to October 30, 2019, each capital item in excess of $250,000 required approval by the UARB. Section 35 of the Act was amended on that date to raise this limit to $1,000,000 for "large scale public utilities", which is defined under the Act as a public utility with an annual revenue of one hundred million dollars or more. Accordingly, NS Power can carry-out capital work on projects of $1,000,000 or less in value without UARB approval. The UARB can perform periodic audits to ensure that the criteria are being properly applied. Projects found to be inappropriately justified or imprudent can be excluded from NS Power's rate base.

[1] 1995 ACE Plan UARB Decision (March 31, 1995) NS Power-P-866-DEC.

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3.0 Administration

This document will be maintained by NS Power. Pursuant to the Board's 2016 ACE Plan Decision directives, revisions to the CEJC will be reviewed by stakeholders prior to filing with the UARB. The CEJC will be filed with the Board, with revisions noted for the Board's information, as required. Revisions to this document will be accompanied by a brief review of the updates or changes. A corresponding Summary CEJC will be provided for the Board's approval.

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4.0 NS Power Commitment

NS Power will manage its capital expenditures in accordance with the principles and guidelines contained within this document. The CEJC is applicable during all phases of the capital approval process. This begins during the development and submittal of the ACE Plan and continues until the project is complete and receives final cost approval.

NS Power is committed to:

- Delivering effective and efficient service to NS Power customers;
- Providing the assurance that NS Power is using sound and consistent economic, financial and technical criteria to justify capital expenditures;
- Effectively responding to changing environmental, operational, technical, safety and financial conditions in compliance with legislative and regulatory requirements; and
- Providing complete and timely capital filings for Board consideration and approval.

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5.0 Objectives

The objectives of the CEJC are as follows:

- To provide assurance that NS Power is using consistent economic, financial and technical criteria to justify all capital expenditures.
- To provide assurance that the capital expenditures result in the maximum benefit for customers and minimum impact to rates.
- To communicate NS Power's justification requirements to all personnel involved in the execution and approval of capital projects in a clear and structured manner.
- To provide the assurance NS Power has appropriate levels of accountability regarding the oversight of the capital processes.
- To ensure that the justification criteria reflect a multi-disciplined approach to justifying capital expenditures using current financial and technical standards.
- To support the use of consistent practices within NS Power.

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6.0 Overview of Capital Planning

6.1 Summary of Capital Planning, Budgeting & Execution Process

NS Power's capital program is overseen by the Company's Investment Review Team (IRT). The IRT is chaired by a senior NS Power employee in the capital planning business function, and the team is composed of a diverse group of Directors and Managers who offer expertise and experience from different functional areas within NS Power. The IRT manages NS Power's capital program in an integrated manner ensuring that projects are prioritized across the Company, investment initiatives are continuously monitored and the status of the capital program is communicated to NS Power's Leadership Team.

The initial phase in the preparation of the ACE Plan is compiling a project list to collect all pertinent information about the capital projects that may be included in the ACE Plan. This requires coordination between the generation, transmission, distribution and corporate groups, Asset Management, Finance and Regulatory Affairs.

In Generation, Transmission, Distribution, and Information Technology (IT), the process begins at the start of each year with the functional groups compiling information about projects that require consideration for the following year.

As this information is gathered, each functional group will input information into NS Power's capital management system, PowerPlan. The addition of a project to PowerPlan requires the inclusion of a project title, project description, project justification, capital cost spending profile and identification of primary and secondary justification criteria (ranking category).

Projects identified within PowerPlan are reviewed by capital planning and division management for each function. There is a standard ranking methodology for Generation, Transmission, Distribution, and Information Technology, which is described in further detail below.

Generation, Transmission and Distribution projects are broadly ranked using the following criteria:

- Health and Safety: Regulatory requirements, Operating Permits, Protection of Equipment and Personnel Safety, and JOHSC actions.
- Environment/Regulatory Compliance: Renewable Energy Standards, Greenhouse Gas (GHG) Regulations, or Air Emission Regulations.
- Business Sustainability: SAIDI, SAIFI, CAIDI; unit reliability; system upgrade requirements; code requirements; NERC/NPCC Requirements, or economics (based on payback period, and revenue requirement); requirement to serve.

Technically justified IT projects are broadly ranked using the following criteria:

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- Customer: service impacts to customers as a result of technical failure
- Finance: financial impacts to the Company as a result of technical failure
- Compliance: safety, environmental, security, legal or regulatory requirements (e.g. NERC/CIP and NI-52 compliance)
- Operating Sustainability: ability for NS Power staff or contractor to perform critical functions of the business.

Each year, the capital program includes those projects which are essential for health and safety objectives, regulatory compliance, those which are required to provide service to a given area, and mitigate risks. Projects which serve to improve customer reliability are evaluated based on the probability factors related to performance targets (SAIDI, SAIFI, CAIDI). Economic initiatives are evaluated based on their economic and performance ranking. The capital program can be constrained by a number of factors including the ability to effectively execute the annual program with the available time and resources, the maintenance cycle of the generating facilities and company cash flow.

The NS Power Executive approval process involves a detailed review of the consolidated ACE Plan. Division management work with the executive team to address any comments or concerns which may arise from this review.

Following this review and approval, final changes to the capital plan are made and the ACE Plan is compiled for submission to the UARB. Included as part of this process is the identification of projects that are not ready for formal submission to the UARB for review and approval. These projects are noted on the Subsequent Submittal list in the ACE Plan. While these projects continue to form part of the total ACE Plan budget, submission to the UARB for review and approval is deferred until they are filed separately later in the year.

NS Power's capital program is intended to be dynamic and flexible in accordance with a complex business. Revisions may include scope changes, timing changes, costing updates, new project additions, etc.

6.2 Ranking Process

Generation, Transmission, Distribution, and Information Technology

Each Generation, Transmission, Distribution, and Information Technology capital project is ranked using the criteria provided in the matrices below. The ranking process is completed first in the early stages of project development and continues to be refined as the scope and estimated costs for the capital project are further defined. All rankings are reviewed by a centralized Investment Review Team to ensure the projects are justified and appropriate for inclusion in the ACE Plan.

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The scale of the rankings is detailed in the matrices below.

Criticality and Condition values are typically influenced by one predominant factor and ranked accordingly. However, other factors may also influence the ranking of a project. In the event that multiple factors are present for a project, individual rankings will be taken into consideration in determining the overall Criticality rankings. For example, Health and Safety considerations for a project may warrant a Criticality ranking of serious (3), while Environmental considerations for the same project may also independently warrant a Criticality ranking of serious (3); this project may therefore warrant a higher Criticality ranking due to multiple influencing factors.

The four colours of the ranking matrix are a visual representation of the likelihood of a capital project being completed. A project falling within the red rankings is considered a high priority and should be completed. Projects falling within the orange and yellow rankings represent projects that carry a higher risk than the projects in the green rankings. While the colours provide a visual illustration of risk, the ranking numbers are the focus of the ranking process.

A lower ranking suggests a lower level of risk and urgency, but not always a lower level of priority. Lower ranked projects that fall in the green, yellow or orange rankings may be completed in certain cases. For example, a project that does not carry a high enough ranking may be completed during a planned outage if the condition of the asset is expected to deteriorate such that action would be required prior to the next available outage.

Considerations of multiple influencing factors, all rankings applied to projects under the ranking methodology noted above, and the order of completion of projects ahead of others, are all subject to the evaluation and professional judgment of NS Power staff and third party industry experts.

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ASSET MANAGEMENT CRITICALITY & CONDITION RISK ALIGNMENT MATRIX

Criticality (Based on Consequence)				CRITICALTY VALUE	RISK MATRIX				
Health & Safety	Environment	Business Sustainability	Consequence						
• Regulatory requirement breached. •Critical safety incident requiring support from external resources •Fatality or Permanent Disability.	• Regulatory requirement breached. • Loss of generating station or facility operating permit. • Critical liquid, chemical or particulate release with off-site or off-facility impact.	Business Sustainability Criticality Ranking is informed through factors such as replacement energy costs, Regulatory Requirements, SAIFI, SAIDI, DAFOR, System Upgrade Requirements, Code Requirements and Project Economics (payback period, NPV, Revenue Requirement).	Critical	5	5	10	15	20	25
• Major safety incident leading to JOHSC actions and controllable by internal resources. • Lost time Injury	• Corporate environmental target exceedence. • Major reportable environmental incident with off-site or off-facility impact.		Major	4	4	8	12	16	20
• Serious safety incident leading to JOHSC actions and controllable by internal resources. • Recordable injury, >1 medical Aid	• Serious reportable environmental release causing license exceedance and off-site or off-facility impact.		Serious	3	3	6	9	12	15
• Moderate safety incident controllable by internal resources and no JOHSC actions required. • Recordable injury, < 1 Medical Aid	• Moderate reportable environmental release without license exceedance and internal impact only.		Moderate	2	2	4	6	8	10
• Minor safety incident controllable by internal resources and no JOHSC actions required • First Aid Injury	• Minor non-reportable environmental release with internal impact only and no license exceedance.		Minor	1	1	2	3	4	5
					1	2	3	4	5
					Rare	Unlikely	Possible	Likely	Almost Certain

CONDITION

LEGEND

	Acceptability of Risk
High Risk	Requires Mitigation
Medium-High Risk	Considered for Mitigation
Moderate Risk	Acceptable
Low Risk	Acceptable

Condition Description	
Rare 1	Failure or occurrence is rare (0-10%). Available data, past experience and or subject matter expert input indicates an expected occurrence rate of less than 1 in 100 operating years.
Unlikely 2	Failure or occurrence is unlikely (11-25%). Available data, past experience and or subject matter expert input indicates an expected occurrence rate of less than 1 in 75 operating years.
Possible 3	Failure or occurrence is possible (26-75%). Available data, past experience and or subject matter expert input indicates an expected occurrence rate between 1 in 10 and 1 in 75 operating years.
Likely 4	Failure or occurrence is likely (76-90%). Available data, past experience and or subject matter expert input indicates an expected occurrence rate between once per year and 1 in 10 operating years.
Almost Certain 5	Failure or occurrence is almost certain (91-100%). Available data, past experience and or subject matter expert input indicates an expected occurrence rate of greater than once per year.

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INFORMATION TECHNOLOGY ASSETS CRITICALITY & CONDITION RISK ALIGNMENT MATRIX

Business Criticality (Based on Consequence)					Criticality Value
Customer	Finance	Compliance	Operational Sustainability	Criticality	
Loss of a service for all customers	Financial Impact > $30m	Breach of compliance with any of safety, environmental, security, legal or regulatory requirement	Employees could not perform their role or an employee / contractor could not perform their role safely	Critical	5
Customer Experience is significantly degraded for majority of customers but not complete loss of service	Financial Impact - $5M -$30m	Non-compliant with internal Corporate safety, security policies	Significant impact to employees; work arounds require excessive time and additional resources	Major	4
Customer Experience degradation is minor for all customers	Financial Impact - $1M-$5M	Non-compliant with other internal Corporate policies (non-safety , non-security related)	Moderate impact to employees; work arounds require some increase in time with same resources	Serious	3
Customer Experience degradation is minor for small group of customers	Financial Impact - $0.1M-$1M	Non-compliant with internal departmental policy	Minimum impact to employees; work around in place with minimum impact to time	Moderate	2
No impact to the Customer Experience	Financial Impact <$0.1M	No impact on compliance	Nuisance / inconvenience for employees but with no impact on time	Minor	1

RISK MATRIX				
5	10	15	20	25
4	8	12	16	20
3	6	9	12	15
2	4	6	8	10
1	2	3	4	5
1	2	3	4	5
Rare	Unlikely	Possible	Likely	Almost Certain

CONDITION

LEGEND

	Acceptability of Risk
High Risk	Requires Mitigation
Medium-High Risk	Considered for Mitigation
Moderate Risk	Acceptable
Low Risk	Acceptable

	Support	Reliability	Vendor contract	Fit for Purpose
Rare	Expertise is readily available from authorized support sources to meet the service level targets for the business	Service has a high reliability rate with minimal downtime ; Operating as designed.	Licensing is compliant; versions are up to date to comply with vendor support requirements	Features, functionality, performance meets business expectations and requirements and is suitable to meet 5 yr technology road map requirements
Unlikely	Local resources readily available to source as needed; skills training available	Small number of failures reported Minimal downtime	Licensing is compliant; Current service will be considered "end of life" in 3 years	Features, functionality, performance will not meet the business requirements planned in the next 4 years
Possible	Resourcing options available within North America at a premium cost.	Increase in number of failures reported over previous year; downtime hours impacting business operations.	Licensing is compliant; Current service will be considered "end of life" in 2 years;	Features, functionality, performance will not meet the business requirements planned within the next 3 years
Likely	No resource options within North America; limited availability outside of North America at premium cost	Material number of failures reported. Replacement parts difficult to source	Licensing is compliant; Current service will be considered "end of life" in 1 year	Features, functionality, performance will not meet the business requirements planned within the next 2 years
Almost Certain	Minimal to no options for resources that can provide support; training not available	Diagnostics predicting eminent hardware failure ; Priority software defects that vendor is not able to correct and no acceptable work around is available; hardware replacement parts cannot be sourced	Non- compliance with licensing requirements; Service is considered "end of life" by the vendor	Features, functionality, performance will not meet the business requirements planned within the next year

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General Plant

Projects under General Plant primarily involve information technology, communications and facilities initiatives. With the exception of IT which is ranked according to the matrix above, these other areas are too diverse to develop a comparable and useful ranking system across the groups, and therefore the determination of whether a project will proceed is based upon technical justifications or economic benefit.

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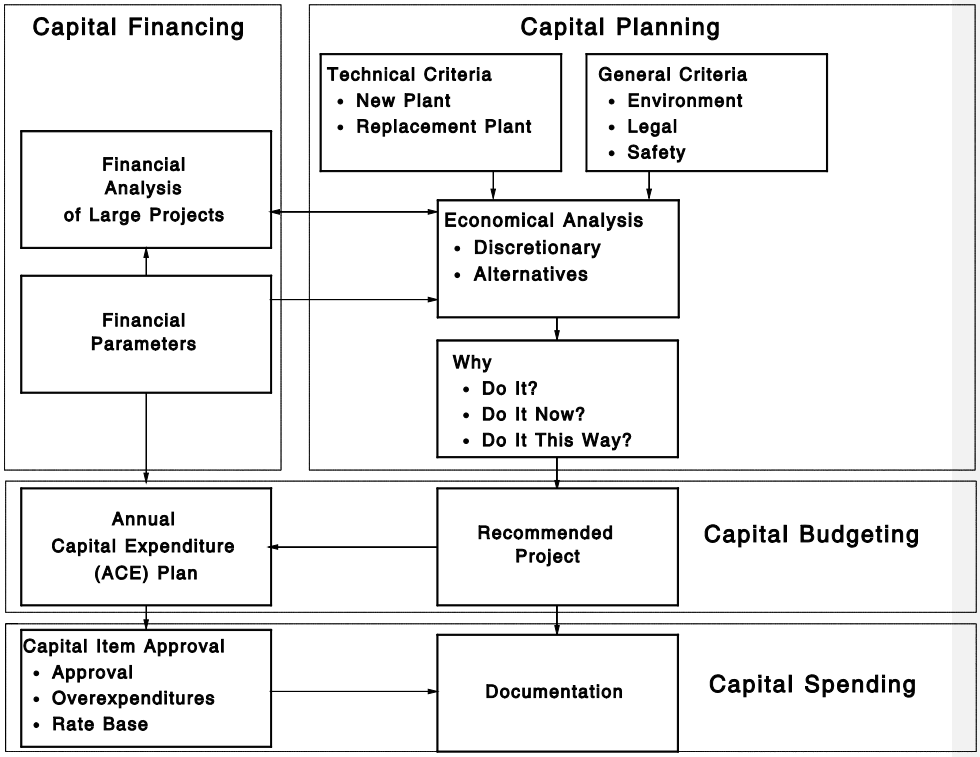
6.3 Capital Planning Process

Originators and approver(s) of all capital projects follow disciplined capital planning, budgeting and execution processes.

Figure 1.0: Summary of NS Power Capital Planning, Financing & Budgeting



6.4 Accounting Policies and Procedures

NS Power's Accounting Policies and Procedures and Chart of Accounts require Board approval. Revisions to the Accounting Policies and Procedures and Chart of Accounts are submitted to the UARB for approval on an as needed basis. The NS Power *Accounting Policies and Procedures Manual* contains the guidelines for determining whether an expenditure is a capital or operating expense. NS Power began using United States Generally Accepted Accounting Principles (USGAAP) for external financial reporting on January 1, 2011.

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The following Accounting Policies and Procedures guide and direct NS Power's capital expenditure program:

- Rate Base (1520)
- Materiality (1560)
- Capitalization Limits (1560A)
- Generic Accounts (3350)
- Generic Accounts - Cross Reference to Capital Activities (3350A)
- Depreciation and Amortization Expense (5300)
- Amortization - Capital Contributions in Aid of Construction (5310)
- Capitalization of Cost (6000)
- Cost (6100)
- Cost Elements (6140)
- Construction Work in Progress (6200)
- Capital Expenditures - Land (6210)
- Capital Expenditures - Computer Hardware, Software and Telecommunications Equipment (6215)
- Capital Contributions in Aid of Construction (6220)
- Intangible Assets (6225)
- Application of Administrative Overhead (Self-Constructed Assets) (6230)
- Application of Administrative Overhead (Constructed Assets) (6235)
- Allowance for Funds Used During Construction (6240)
- Purchase Price Discrepancy (6250)
- Transfer Values (6260)
- Asset Retirement Obligations (ARO) (6320)
- Redundant Assets (6340)
- Assets - Not Used and Useful (6350)
- Long Lived Assets to be Disposed of by Sale (6360)
- Accumulated Depreciation (6400)
- Retirement and Disposal of Capital Assets (6420)
- Gain or Loss on Disposition of Capital Assets (6440)

Current and future interpretations of accounting policies and procedures will be made by the Corporate Accounting Department within the Controllers Division.

6.5 Capital Planning

Capital planning is a centralized function and ensures the capital projects included in the ACE Plan are those which provide maximum benefit to customers while allowing NS Power to meet its objectives. The capital planning cycle for any given year typically begins early in the preceding year and concludes at the filing of the ACE Plan.

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Although the oversight and management of the capital planning process is a centralized function, many capital projects are identified at the functional level (Generation, Transmission, Distribution, and General Plant) and brought forward for centralized review and approval. Centralized review and approval of all capital projects ensures the projects included in the ACE Plan are fully justified and consistent with NS Power's strategy.

There is a standard ranking methodology for Generation, Transmission and Distribution which is described in detail above. On an annual basis, projects identified are broadly ranked using the following criteria:

- Health and Safety: Operating Permits, Protection of Equipment and Personnel Safety
- Regulatory Compliance: Renewable Electricity Standards, GHG Regulations, Air Emission Regulations, NERC/ NPCC Requirements
- Customer Reliability: SAIDI, SAIFI, CAIDI
- Requirement to Serve
- Economics: Based on Revenue Requirement, Net Present Value of the Project, Levelized Cost Analysis, $/ Avoided Customer Hours of Interruption (ACHI)

Each year, the capital program includes those projects which are essential for health and safety objectives, regulatory compliance, and those which are required to provide service to a given area. Projects which serve to improve customer reliability are evaluated based on the probability factors related to performance targets (SAIDI, SAIFI, CAIDI, etc.). Economically justified projects are evaluated based on their economic and performance ranking. The capital program can be constrained by a number of factors including the ability to effectively execute the annual program with the available time and resources, the maintenance cycle of the generating facilities and company cash flow.

6.6 Capital Expenditure Justification Categories

All projects have a justification category. Some categories are specific to functional areas of NS Power that develop capital items, while others are more general in nature and affect capital decisions across the Company.

Examples of area-specific criteria:

- Work Support Systems
- Vehicles
- System Design

Examples of general criteria:

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- Environment
- Health and Safety

6.7 Economic Analysis

6.7.1 Economic Analysis Model

The Economic Analysis Model (EAM) is an electronic spreadsheet which calculates and compares the revenue requirement by comparing alternatives to complete the project and avoided costs.

With respect to alternatives to completing the project, all else being equal, the alternative with the lowest discounted revenue requirement will be the preferred alternative. A cash flow analysis determining net present value (NPV) of the alternative cash flows is also incorporated into the EAM to further evaluate the economics of the project.

The following are typical inputs into the model:

- Capital investment profile
- Operating cash flows, including avoided costs

The model calculates the following:

- Revenue requirement
- Income tax associated with the capital expenditures
- Discounted net cash flow at the after-tax weighted average cost of capital (WACC)
- Net present value (NPV), Internal Rate of Return (IRR) and discounted payback period for each alternative

Each year an updated version of the model is provided to users with current tax rates, depreciation rates and WACC.

With respect to avoided costs, avoided costs are calculated using probabilities of failure, unit capacity factors, avoided maintenance costs, and avoided replacement energy costs. Capacity factors and avoided replacement energy costs are forecasted for five years, beginning in the year of project construction. If the avoided costs outweigh the capital costs of the project, the project is considered economic. The timeframe in which the benefit of the project equals the avoided costs is considered the “pay-back period”. NS Power will use an estimate of inflation as an escalator for year six (6) onward to determine future year avoided replacement energy costs.

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On an annual basis, NS Power will compare its estimated inflation escalator to fuel forecasts for years 6 onward. If results materially vary, the continued use of inflation as an escalator will be more closely examined and discussed with stakeholders.

The benefits of the model are that it is relatively simple to use, promotes consistency of capital analysis across the organization and provides immediate information regarding the economics of alternatives. The model does not allow monthly cash flow entry. In this regard, where the results of alternatives are close, further review may be required.

Sensitivity analyses are incorporated into the model as adjustable variances for capital spend, avoided expenses, and timing of the project. These are adjustable to further test whether reasonable variances in those categories affect the rankings and therefore preference of alternatives.

With respect to various alternatives considered within an EAM, project developers will endeavour to provide realistic alternatives, and clarity on what is included in the costs comprising each alternative. Additional clarifying notes, if necessary, can be written onto the "Notes/Comments" section on the first page/tab of the EAM.

Administrative Overhead (AO) - Project capital cost and the revenue requirement analysis include Administrative Overhead (AO). While it is understood that costs included in NS Power's eligible expenses used to determine the AO rate are largely fixed, NS Power will examine further those projects where elimination of the AO credit from the revenue requirement analysis could affect the recommended alternative for economically justified projects. Where this occurs, NS Power will examine the effect of the AO amount more closely to determine the level of reduction to the AO credit which would change the recommended project, and based on this, provide appropriate comment on this in the Capital Item justification.

6.7.2 Revenue Requirement Directive in Annual Capital Expenditure Plan

In the UARB's 2011 ACE Plan decision, the Board provided the following directive:

> In future ACE Plan applications, NSPI is directed to make an approximate calculation of how the Plan will affect revenue requirements.

Beginning in the 2012 ACE Plan NS Power has provided the overall approximate impact of the ACE Plan on revenue requirement. Beginning in the 2017 ACE Plan and pursuant to the 2016 ACE Plan Terms of Consensus, NS Power also provides a version of the overall revenue requirement table based on stakeholder assumptions and calculation methodology.

The underlying principle in calculating NS Power's revenue requirement table and impact is that capital expenditures that equal NS Power's depreciation expense do not change

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the customer revenue requirement. The premise is that rate base is not growing or declining if capital expenditures equal the rate of depreciation. To the extent depreciation expense equals capital expenditures in a given year, there is minimal effect on rate base or associated revenue requirement and therefore it is excluded from the calculation.

The revenue requirement impact considers the following inputs:

- Capital expenditures compared to forecasted depreciation expense annually.
- Administrative overhead credit based on the proportion of capital expenditures in excess of depreciation expense in each year.
- Depreciation expense of assets added during the examined timeframe based on the proportion of capital expenditures in excess of depreciation expense of all assets in each year.
- Incremental interest based on the cost of debt multiplied by the portion of debt to total capital of the incremental rate base.
- AFUDC based on the proportion of capital expenditures in excess of depreciation expense of all assets in each year.
- Income taxes based on the resultant effects and prorated Capital Cost Allowance for tax purposes.
- Net earnings based on the rate of return multiplied by the portion of equity to total capital of the incremental rate base.
- Additional fixed cost recovery received from customer growth achieved through capital investment to serve these customers.

Depreciation expense and additional fixed cost recoveries are delineated in the overall revenue requirement calculation presented in the ACE Plan.

An important consideration is that this method does not address the revenue requirement impact should the capital projects not be completed. This includes avoided costs such as increased fuel costs, increased repair costs, and other risks or implications. The Economic Analysis Model used to decide whether an economically justified capital project is the best option for customers includes estimates of the avoided expenses, but these are not included in this revenue requirement calculation. Similarly, any resulting operating savings associated with a capital project are not incorporated. The revenue requirement calculation examines solely the incremental effects with rate base.

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To expand on the methodology for revenue requirement impact described above, a separate table examining the impact on revenue requirement of economically justified (i.e. discretionary) projects is provided. The table presents the effect on revenue requirement of the project alternatives compared to the recommended options for the period presented in the ACE Plan. The project alternative revenue requirements are totaled to demonstrate the effect on annual revenue requirement of selecting other than the recommended alternative.

6.7.3 Production Costing Model

A system modelling tool used by NS Power to provide detailed forecasts of fleet dispatch and production costing which reflect the increasing complexity of the system.

6.7.4 Levelized Cost

NS Power also periodically utilizes levelized cost methodology to justify capital investments. This approach employs an economic modelling methodology used to provide a present value of the total cost of a project (and alternatives) over its economic life converted to a levelized unit cost (typically in $/MWh). The levelized cost model as used by NS Power calculates the present value based upon the annual revenue requirement for the project throughout the term. The levelized cost analysis is useful when comparing generation projects of different technologies and/or comparison to Power Purchase Agreements.

6.7.5 Total Cost of Ownership

In the UARB's 2022 ACE Plan decision, the Board provided the following directive:

> [T]he Board directs NS Power to use a TCO for IT projects over $1 million when an EAM is not provided, whether or not an alternative is available.

Total cost of ownership (TCO) is the cost of a new or upgraded capital asset plus all capital costs and operating expenses over its expected useful life. It accounts for all the capital and operating costs, including the upfront capital costs. In addition to providing a comprehensive understanding of the total cost of a capital investment over the course of its useful life, a TCO is also a useful tool for comparing capital investment options to determine the best value for money.

The TCO timeframe should match that of the expected useful life of the IT software or hardware. This allows for the flexibility to select an appropriate timeframe for a TCO analysis that is in keeping with the useful life of an investment rather than a prescribed timeline.

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6.8 Capital Financing

Capital financing is a centralized function of NS Power, which deals with the affordability of capital expenditures on both an individual project and aggregate capital program basis. Control is achieved through determining the financial parameters for economic analysis and providing and coordinating financial analysis for large capital projects.

Financial Parameters: that influence economic analysis include the cost of capital (calculated as the weighted average cost of capital), depreciation rates for service life, depreciation rates for tax purposes (capital cost allowance - CCA), inflation rates and income taxes. To assist in selecting projects that are economic, other financial guidelines are employed. For projects that are otherwise equal in their net present value, benefits for customers are judged on payback characteristics and rate effects.

Financial Analysis: examines the impacts of the projects that are most likely to have an effect on NS Power's financial position, including debt/equity ratio, rate effects on customers, financing plan, financial plan, share prices, bond rating, etc.

The investing decision is separated from the financing decision in the sense that the cost of capital rather than the cost of the expected source for financing is used in the analysis of the investment.

6.9 Capital Budgeting

Capital budgeting is a vital part of the corporate planning process because it is at this stage that NS Power assesses future scenarios and commits the financial and physical resources needed to achieve its objectives. The process consists of the following:

1. Consolidating the estimated cost for all the individual projects approved for inclusion in the ACE Plan from the functional areas of NS Power. Consolidation is a centralized function;

2. Developing an Annual Capital Expenditure Plan (ACE Plan); and

3. Continual re-evaluation of projects after their acceptance.

The ACE Plan is comprised of those capital projects and programs that NS Power is able to and prepared to fund. The process for finalizing the ACE Plan gives consideration to financial matters that govern NS Power's ability to fund the aggregate capital program, and the Capital Expenditure Justification Criteria included herein.

The ACE Plan is approved by NS Power's Executive Team and submitted to the UARB for approval.

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6.10 ACE Plan Projects

ACE Plan projects are those that are individually justified in accordance with the CEJC and allow NS Power to meet its objectives. All ACE Plan projects must answer the following questions in order to be considered justified:

1. Why do this project?
2. Why do this project now?
3. Why do this project this way?

A capital expenditure is not justified until the need is established and it is demonstrated that the proposed project is the best alternative being implemented at the optimal timeframe.

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6.11 Additional Perspectives on Capital

Capital Functions

To enable appropriate cost allocation among customer classes and consistent depreciation practices across asset groups, NS Power capital expenditures are categorized according to the following utility functions:

Generation: Includes expenditures for NS Power Thermal, Hydro, Natural Gas and Renewables.

Transmission: Includes expenditures for the replacement, reinforcement or expansion of the transmission system, which transmits electrical energy from the generation plants and the NB Power/NS Power interconnection throughout the Province. Transmission includes facilities operating at voltages of 69 kV or higher.

Distribution: Includes expenditures for the replacement of and additions to equipment for delivering electrical energy from points on the transmission system to customers served at voltages below 69 kV.

General Plant: Includes expenditures for computer software, computer infrastructure, communication equipment, furniture, office equipment, tools, vehicles, land and buildings (other than generating and substation facilities).

6.11.1 Essential and Discretionary Capital

Within these categories, capital expenditures may be viewed as either:

Essential: A capital addition or replacement which must be made to satisfy technical, legal, safety, or environmental directives. Capital projects that are deemed to be essential generally meet one of the following criteria:

1. Required by law or regulation

These are capital projects that must be undertaken to conform with laws or regulations that govern NS Power's operations.

Examples: New customer connections
Environmental projects
Civic responsibility
Safety projects

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2. *Emergency*

   Projects that usually arise as a result of an unforeseen event. These projects must be undertaken in order to maintain NS Power operations.

3. *Technical Criteria*

   Technical criteria are established on the basis of the need to continue reliable supply of service. Failure to meet these criteria will result in a loss or degradation of service below acceptable levels.

Discretionary: Capital expenditures that are deemed to be discretionary are:

- Investments made solely on the basis of economics.
- There is a "do nothing" alternative.

The decision to pursue discretionary projects may yield defined benefits that minimize the revenue requirements of NS Power.

Alternatively, not proceeding with the project, the "do nothing" alternative, is an acceptable option whereas discretionary projects are based solely on economics, and the project is not addressing a pressing safety, legal, reliability or technical scenario.

For example, an acceptable "do nothing" alternative may be not proceeding with a generation capital project designed to increase the heat rate efficiency of the unit. Not proceeding with such a project, and therefore foregoing increased heat rate efficiency, does not impact the safe and reliable operation of NS Power's system.

Generally with discretionary investments, NS Power seeks projects that provide returns which minimize or reduce revenue requirement. Financial and strategic priorities may not permit NS Power to undertake all, or even any, discretionary capital expenditures in any given year.

This perspective links capital expenditures to the priorities of NS Power. Certain capital expenditures are essential and sufficient capital funds must be available to undertake them. NS Power has the discretion to request approval for funding for additional capital projects based on the economics of the projects.

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NS Power has the flexibility of setting objectives for discretionary projects so as to achieve financial or strategic objectives, for example minimizing investment risk or achieving rate reductions. The financial parameters established for the economic evaluation of alternatives and for determining the maximum capital budget comprise the internal controls for limiting spending on discretionary capital projects.

6.11.2 **Documentation**

Internal NS Power documentation is prepared and retained for every capital project. Refer to Appendix B.

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Nova Scotia Power Inc. Capital Planning & Capital Expenditure Justification Criteria
Detailed Document

7.0 Capital Planning Financial Criteria & Policies

- NS Power will be responsible for creating financial criteria for the Company.
- Accountability to develop and maintain the general and function-specific justification criteria resides in identified areas of NS Power.
- Capital planning, as a function, is distributed throughout NS Power, but is centrally managed. The respective functional areas of NS Power are accountable for developing, analysing and documenting projects and submitting all items to the Capital Planning group for review and approval.
- Accounting policies and procedures will be presented to the UARB for their approval prior to implementation. These policies and criteria are presented to the Board for approval through a separate proceeding, or can be incorporated within a proceeding, such as the Annual Capital Expenditure Plan.

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8.0 Financial Parameters

8.1 Introduction

The capital program is financed through a combination of debt and equity. The weighted average cost of capital (WACC) is the average of the costs of these sources of financing, each of which is weighted by its respective use to fund the activities of NS Power. The weighted average calculation identifies the cost NS Power has to pay for every dollar it finances. WACC is used to calculate Allowance for Funds Used During Construction (AFUDC) applied to eligible capital projects. The WACC used by NS Power to calculate AFUDC will be the WACC most recently approved by the UARB. NS Power applies for approval of an AFUDC rate annually through a separate proceeding.

In making investments in capital projects, NS Power must be aware of a number of financial factors which are important in economic analysis:

- Cost of capital
- Depreciation
- Inflation
- Taxes
- Competition for investment capital in capital markets
- Investment risk

The rationale for each factor and the basis for its use in determining the economics of capital projects is presented below.

8.1.1 Cost of Capital

NS Power finances capital expenditures through:

- Debt
- Preferred shares
- Common shares
- Retained earnings

Each of these sources of financing has a cost. Debt-holders require semi-annual payments of interest, preferred shareholders expect quarterly dividends, and common shareholders require both a quarterly dividend as well as a future return on the earnings reinvested in the business as retained earnings. The cost associated with each source of financing varies according to the financial risk represented by each type of capital.

The weighted average cost of capital in today's financial markets for NS Power represents the minimum acceptable return the Company must earn on its capital investments to compensate investors for the use of their funds to finance capital projects.

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NS Power Capitalization Structure

The mid-point of capital structure ranges approved by the UARB is used as the basis for calculation of Cost of Capital.

Long Term Debt Structure

The debt structure is based on the target structure accepted by the Board of Directors of NS Power. The annual rates for new debt capital will be calculated from the Treasury Division's long term forecast of the cost of debt.

Equity Structure

NS Power's equity structure consists of common equity with a range of allowed return established by the UARB and preferred equity with a return established by the prevailing market conditions at the point in time when it was issued. The cost of new common equity used in the calculation of the weighted average cost of capital is the point of the range used to set rates on common equity allowed by the UARB. The cost of preferred equity used is the Treasury Division's long term forecast of the cost of new preferred equity issues.

Cost of Capital

The Cost of Capital is calculated as the weighted average cost of capital (WACC) based on the capitalization structure.

The Cost of Capital is the rate of return on capital investments that is required by NS Power to pay for the use of the investors' capital employed by the Company. It is NS Power's long term Cost of Capital.

NS Power revises its Cost of Capital annually. NS Power submits the revised WACC calculation as part of the AFUDC rate approval request. Economic Analysis Models for projects included in the ACE Plan will also incorporate NS Power's proposed WACC.

8.1.2 **Depreciation**

When NS Power acquires financing for its capital program, it takes on an obligation to repay the investment. This is accomplished through the setting aside, from an accounting perspective, of a certain amount of funds annually for the purpose of repayment of the investment. This amount is called depreciation. The estimated useful life of the capital asset forms the basis for calculating the annual depreciation rate.

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Two general approaches are used to establish the annual depreciation rate – life span (production plant) and mass property (transmission, distribution and general plant). The life span approach applies generally to large single investments such as a thermal generating plant. The mass property approach applies generally to such assets as distribution lines that, through interim replacements, might be expected to have an indefinite life.

In the latter instance the characteristics of the on-going failures of the materially significant components of the asset are important to calculating the depreciation rate. NS Power uses the Iowa Curves to establish annual depreciation rates that account for the dispersion characteristics of plant failures.

The specifics of the depreciation rates employed for each type of plant are provided in NS Power's Accounting Policies and Procedures Manual, Section 5300.

8.1.3 Inflation

The cost of goods and services tend to increase over time, an effect called inflation. This is taken into account in calculating future costs for economic analyses. NS Power will estimate the general inflation rate and escalate the costs used in its analyses accordingly. Special inflation rates may be developed for particular costs (e.g. fuel) and these escalations will be justified individually.

8.1.4 Taxes

NS Power is subject to Provincial and Federal income tax on its earnings, and Federal Part VI.1 tax on its preferred dividends. The economic analysis must include the effects of these taxes.

In addition NS Power pays annual grants to municipalities of Nova Scotia, in lieu of all municipal taxation other than Deed Transfer Tax. These grants bear no relationship to NS Power's capital assets and they are not included in the economic analysis of the alternatives.

NS Power also pays the Harmonized Sales Tax on certain goods and services. Because this tax is fully refundable, it is not a relevant cost for capital budgeting purposes since it does not result in any differential costs to NS Power.

8.1.4.1 Taxes in Economic Analyses

Income tax is included in the economic analysis of capital projects.

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Taxes on the earnings associated with the capital expenditure are included in the economic analysis of alternative projects. The Federal and Provincial taxes on earnings are calculated on taxable income. This is derived from gross income by allowing certain deductions. These deductions include operating and maintenance expenses, capital cost allowance (tax depreciation), preferred dividend tax credits and interest on debt.

Depreciation expense is treated differently for tax purposes than for rate-making purposes.

Depreciation

For rate making purposes, depreciation is the process by which capital invested is recovered. The useful life estimations and other significant assumptions are periodically reviewed and the results filed with the UARB for approval. Depreciation expense is not included in the calculation of taxable income or cash flows. It is recognized in the calculation of revenue requirement.

Capital Cost Allowance

CCA is depreciation for tax purposes. CCA is a deduction against taxable income. Capital Cost Allowance is based on the classification of the asset for tax purposes

Allowance

As per Schedule II - Capital Cost Allowances, of the Income Tax Regulations, CCA is established on the basis of specific classifications for tax purposes, whereas depreciation expense is based on the useful life of the plant.

8.1.5 Competition for Capital

NS Power must compete in the financial markets for the investment capital that it needs to fund its capital program. It must maintain the confidence of investors so that it has access to capital at attractive rates. The market will demand increased returns, either through higher coupon rates or lower share prices, for investments in which it has less confidence (perceives higher risk). Decisions regarding the individual projects in which NS Power invests, and the total capital investment made by the Company, must respect this market confidence. Because of their larger impact, each significant individual capital investment will receive a thorough financial analysis to satisfy NS Power that, in addition to being economic, it is a financially sound investment.

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In evaluating any particular capital project, it is helpful to create a hierarchy to provide a preliminary ranking of prospective projects. As all projects can be classified as being either essential or discretionary, essential capital projects will receive first priority in the allocation of capital. Refer to Section 6.11 - Additional Perspectives On Capital - for further information regarding these classifications.

8.1.6 Investment Risk

Risk exists in capital budgeting when more than one outcome may occur. A quantitative evaluation of a capital expenditure proposal requires that several predictions be made, often far into the future. As a general rule, the risk associated with achieving an expected cash inflow or outflow in a given year increases as one moves further into the future, as there are more factors in the long term which cannot be foreseen but which will affect cash flows.

There are essentially two types of project investment risk:

Inherent Risk: varies with the nature of the project and generally relates to unknowns about successful performance.

Traditional Risk: results from errors in estimates and assumptions that affect the probable revenue requirement associated with the project.

In addition, the decision to undertake a project may involve certain corporate strategic risks where the outcomes of the decision could affect business flexibility or create other costs not directly related to the project.

In order to minimize NS Power's exposure to inherent risk, the Company may establish a project-level cut-off rate for individual discretionary projects. This will occur if the perceived investment risk for the project differs substantially from the general risk levels of NS Power. This limits the overall investment risk exposure of NS Power from the project level perspective. However, corporate priorities may dictate that individual projects will be accepted at cutoff rates as low as the cost of capital despite the investment risks at the project level.

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9.0 Economic Analysis of Alternatives

9.1 Introduction

The guiding principle of economic analysis is to seek the most economic alternative based on establishing which alternative, among a number of alternatives that satisfy basic requirements, yields the best value for customers and NS Power. Within the analysis, both traditional and non-traditional alternatives are reviewed prior to initiating a capital item. This guideline will review relevant factors and their use in identifying the most economic alternative.

An outcome of the analysis is that, when estimates of revenues are included, an estimate of the amount of contribution towards lower costs offered by the alternative is produced. Certain investments required of NS Power may have no lower cost contribution; that is, they return no revenues beyond that required to exactly recover costs. The minimum revenue requirement method serves, in this case, to identify the alternative that results in the least amount of cost to NS Power and its customers.

The essentials of conducting an economic analysis of alternatives may include, when appropriate:

- Analysis methodology
- Financial parameters
- Cost components for analysis
- Analysis period
- Calculating the net present value
- Sensitivity analysis

9.1.1 Analysis Methodology

Production-costing models are used by NS Power to estimate replacement energy costs and generator capacity factors in the EAMs for a period of five years. NS Power uses an estimate of inflation as an escalator for years six (6) onward to determine future year avoided costs.

On an annual basis, NS Power will compare its estimated inflation escalator to fuel forecasts for years 6 onward. If results materially vary, the continued use of inflation as an escalator will be more closely examined and discussed with stakeholders.

9.1.2 Financial Parameters

Certain financial parameters are required to undertake an economic evaluation of capital expenditures. They are:

AFUDC: The cost-of-capital invested in construction work in progress is included in an allowance for funds used during

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	construction ("AFUDC") as an addition to the cost of property constructed using a weighted average cost-of-capital.
Book Depreciation:	The difference between the amount of book value for an asset and how much depreciation is assessed on the asset.
Cost of Capital:	The weighted average cost of all capital employed by NS Power.
Taxes:	The taxes payable by NS Power on its earnings and the capital it employs to finance projects.
Capital Cost Allowance:	Depreciation expense for tax purposes (also known as the CCA).
Inflation Rates:	The rates to be used to establish the future prices of goods and services.
Discount Rate:	The cost of capital rate adjusted by other factors such as risk premiums.

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9.1.3 Cost Components for Analysis

The cost components of the economic analysis are as follows:

1. Relevant costs
2. Cost estimates
3. Receipts from the sale of by-products
4. Unequal lives

9.1.3.1 Relevant Costs

The estimate of the costs and benefits of a capital project should show the difference in revenue requirement as a result of undertaking the project.

9.1.3.2 Cost Estimates

Reliable estimates and forecasts are vital to the capital investment decision. A sophisticated process of analyzing financial information and managing the decision related to a project is of little value if a casual approach is taken to development of these estimates. Effective management of capital expenditure decisions, therefore, requires that controls be designed and operated to ensure that projections are realistic at the time decisions are made.

When estimating costs for capital expenditures, the following guidelines should be applied:

1. Only future revenues and costs after the payment of tax on income are relevant. Historical costs may be useful in terms of providing a basis for prediction, but they do not represent what future costs will be. A cost that occurs before the decision is implemented, that is, a past or “sunk" cost, cannot be influenced and must therefore be ignored.

2. Only differential revenues and costs are relevant. This means that only the difference in revenue requirement between implementing or not implementing a proposal need be considered.

3. Opportunity costs are relevant. If a resource can be used more than one way, it has an opportunity cost. In general terms, an opportunity cost is the benefit lost by taking one action as opposed to another.

It is the revenue requirement generated by an investment project that is of primary importance in an economic analysis. As used in the context of this guide, payment means a cash flow from NS Power to an outside entity, and non-cash

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payments including items such as AO and depreciation. The date of payment, as well as the magnitude of these payments, must be estimated.

Cost allocations, charges and transfers between different parts of NS Power are not payments to an outside entity, and must not be used for economic cost comparisons unless they can be shown to accurately reflect such payments (e.g. internal labour used in achieving the required result is included in the estimated costs of alternatives). Items withdrawn from stores or spares do create payments to an outside entity when they are replaced and must be included in the estimate.

9.1.3.3 Receipts from the sale of by-products

A by-product is any physical result of an alternative which is not a part of the required result. Some examples of by-products are: assets which become surplus to requirements, electricity sold outside Nova Scotia, and flyash used for making concrete. Receipts from the sale of by-products are included in the determination of the minimum revenue requirement by including them as credits to operating & maintenance costs.

9.1.3.4 Unequal Lives

Alternative capital investments can have different useful lives. To make a valid comparison when the future payments are not equal it is necessary to equalize the lives of the projects. One method is to assume a chain of replacements where the analysis covers the same number of years.

Alternatively, terminal values can be used to shorten the period in an economic cost comparison to avoid some of the effort required to include all the significant cash flows under the chain replacement method. Terminal values must not be used to shorten the period to less than the expected life of any major asset required by the alternatives. The terminal values of capital expenditures can be determined using the following techniques:

1. When an active market exists for a capital asset, such as an automobile, the potential net receipts from sale of the asset must be used as the terminal value.

2. When no active market exists for a retained asset, such as a distribution line, the replacement value to NS Power must be considered. Unless in the judgement of the estimators a better criterion of this value is available, the terminal value should be a straight line proration of the replacement cost based on remaining service life.

   For example, if a distribution line is expected to have a third of its service

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life remaining at the end of the comparison period, and to have a replacement cost of $450,000 at that time, it should be assigned a terminal value of $150,000.

Terminal values, also called retention or residual values, are included in economic cost comparisons as receipts.

9.1.4 Analysis Period

Depending on the nature of the capital investment, the analysis timelines will vary.

9.1.4.1 The Planning Horizon - Economic Life

The criterion to estimate the life of a project is the continued ability to generate satisfactory cash flows or other intangible benefits. The economic life of a project is the least of its physical life, technological life, or product market life, or the point where cost differences between discounted alternatives are so small they are insignificant.

9.1.4.2 Physical Life

Physical life represents the time taken for an asset to become physically worn, or consumed so that it can no longer be efficiently maintained and must be replaced. However, equipment will often be disposed of before its physical life has expired.

9.1.4.3 Technological Life

Technological life is the period of time that elapses before an even newer machine or process becomes available which would make the proposed machine or process obsolete. Improvements will almost certainly be made sometime in all machines or processes now in existence, but questions of which machines or processes will be improved, and how soon they will be on the market, are most difficult to answer. To ignore a product or machine's technological life is to imply that the technological life is the same as the physical life.

9.1.4.4 Product Market Life

Although a machine may be in excellent physical condition, and there may be no better machine on the market, its economic life has ended for the organization as soon as the manufacturer ceases to produce the product, market the product, or provide spares and services.

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9.1.5 Calculating the Net Present Value (Worth)

The estimates prepared for economic cost evaluations must include, as a relevant cost, the time value of money. Capital investment decisions require investing money now to bring more money in the future. The time value of money is an opportunity cost; by making a particular investment now, we give up the opportunity to make other investments.

The common time is called the present and the process of converting future costs to the present is called discounting. Discounting changes the magnitude of an estimate according to a compound interest formula. The degree of change depends on the time interval involved and on the compound interest rate, that is, the discount rate.

Interest, principal repayments, and dividend amounts are not included in the cash flows for discounting purposes. The investment decision is based on the revenue requirement of the project, regardless of how it is financed. Using the cost of capital as the discount rate automatically provides for not only the recovery of the investment, but also a return on the investment at least equal to the cost of capital.

After the estimates have been converted to their present worth equivalents, they are totalled and cash receipts and terminal values are subtracted from costs.

In the Economic Analysis Model the net present value (worth) differences between alternatives are then calculated, the alternatives ranked according to their net present value (worth), and the alternative with the lowest present cost (or highest present value, in the case of economic projects) is identified.

9.1.6 Sensitivity Analysis

An economic cost comparison cannot be given its proper weight in a decision without some indication of its sensitivity to input assumptions; that is, of the confidence that can be placed in its results. The potential sources and likelihood of error in the ranking of alternatives can be determined by a sensitivity analysis.

Sensitivity analysis gives NS Power an idea about how unfavourable variance occurrences like lower volumes, shorter useful lives or higher costs affect the economics of a project. It is a technique which is used to identify those estimates which are the principal contributors (key factors) to the risk that an inferior alternative will be chosen. In this technique, the estimates which have the greatest impact on the comparison are identified, usually by changing each one in turn by a given proportion, e.g. 10%. Then, the effect of varying these estimates through a range of values (e.g. from a minimum to a maximum) based on possible inaccuracies in forecasts and assumptions is evaluated. Those estimates that significantly change the comparison, when varied through this range

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of possible values, are candidates for additional estimating effort directed toward reducing the range.

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Nova Scotia Power Inc. Capital Planning & Capital Expenditure Justification Criteria
Detailed Document

10.0 NS Power Capital: Types of Capital Applications Submitted for UARB Approval

- Capital projects submitted to the Board in the Annual Capital Expenditure Plan (ACE).
- Capital projects identified in the ACE Plan requiring subsequent submission to the Board.
- Capital projects included in the ACE Plan, but for which the Board has withheld approval in the ACE Decision (typically requires a filing by NS Power of additional supporting information, in a separate, or revised capital application).
- Unforeseen and Unbudgeted (U&U) capital projects. These projects are not included in the ACE Plan and are filed separately for Board approval.
- Planned and Advanced (P&A) capital projects. These projects are not included in the ACE Plan and are filed separately for Board approval.
- Authority to Overspend (ATO) applications. These applications represent request for UARB approval of over-expenditure on a capital project or routine.
- Scope Change applications. These applications represent request for UARB approval of scope changes within a previously UARB approved capital project. This is independent of any variances in costs.
- Final Cost (FIN) applications. These applications are required for UARB approval if final costs of the project are over or under the specified spend thresholds. They consist of final cost details and variance analysis.

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11.0 Requirements for UARB Approval

11.1 General Requirements

NS Power is a public utility, subject to the provisions of the Public Utilities Act (the Act). NS Power is subject to general supervisory oversight of the UARB. Section 35 and Section 35AA (October 30, 2019) of the Act provide the following:

> 35 No public utility shall proceed with any new construction, improvements or betterments in or extensions or additions to its property used or useful in furnishing, rendering or supplying any service which requires the expenditure of more than two hundred and fifty thousand dollars without first securing the approval thereof by the Board.
>
> 35AA (1) In this Section, "large-scale public utility" means a public utility with an annual revenue of one hundred million dollars or more.
>
> (2) A large-scale public utility is not required to secure the approval of the Board under Section 35 for new construction, improvements or betterments in or extensions or additions to its property used or useful in furnishing, rendering or supplying any service that requires the expenditure of one million dollars or less.

The Board may approve, or disallow capital projects requested by NS Power. The Board's approval may be in the amount applied for by NS Power or another amount the Board considers appropriate. The form of Board review is determined by the Board and may involve direct review by the Board, its staff and consultants and/or a public hearing, either oral or written.

NS Power retains the discretion to defer or cancel capital projects submitted and/or approved by the Board based on condition reassessment and reprioritization in accordance with engineering, business judgment and resource availability. Any projects cancelled or deferred are reported in the Quarterly Capital Reports.

11.2 Capital Application Requirements

Supporting documentation is provided with each capital work order application. The following information will be filed with each capital application in the project description, as relevant:

- Project Start Date
- Project In Service Date
- Project Final Cost Date
- Utility Function
- Forecast Amount
- Projects Estimated Useful Life

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- Depreciation Class

Related Projects approved or having taken place in the past 2 years, current year or anticipated for the next 2 years including the projects' estimated costs. When multiple projects relate to the same asset, or initiative they should be grouped as a package.

Project Description

Justification Criteria Including:
- Sub Criteria (when applicable)
- Description of why the project is being undertaken (i.e. Why do this project?)
- Description of why the project is necessary at the time proposed (i.e. Why do this project now?)
- Description of why the project will be carried out in the manner proposed (i.e. Why do this project this way?)
- Whether the work will be undertaken by an affiliate and reason for affiliate involvement

Summary of Related Capital Items

A list of related capital projects that have been or are scheduled to be completed within +/- 2 years of the submitted project will be included in capital applications.

A project can be considered related if it meets the following parameters:

Steam/Gas Turbine – Work completed on the same asset (turbine, boiler, etc.) and on the same unit (Lingan Unit #3, for example).

Hydro – Work completed on the same generating unit and dam structures, but not necessarily the same asset.

Wind – Work completed on the same Wind Farm site.

Transmission & Distribution – Work completed on the same asset class (Padmount transformers, Breakers, etc.) or in the same location (feeder, Transmission Line).

General Plant – Work completed on the same asset (application, building, etc.).

Cost Support - This may include but is not limited to:

- Supplier quotes, or estimates
- Significant contract terms & conditions
- Management's best estimate based on previous experience or related projects

Additional Information required to justify the project - This may include but is not limited to:

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- Engineering/condition assessment reports
- Independent consultant reports
- Planning studies
- Business cases

Cost Benefit Analysis - This may include but is not limited to:

- The Economic Analysis Model; including inputs, assumptions, and results for all alternatives
- The Levelized Cost Model; including inputs, assumptions, and results for all alternatives
- Production Costing Modelling Results
- NS Power procurement documentation and recommendations; (i.e. Requests for Expressions of Interest and Requests for Proposals)

Project Due Diligence Summaries

Industry Information

Real Estate Information - This may include but is not limited to:

- Lease agreements
- Property evaluations and assessments

NS Power Performance Data - This may include but is not limited to:

- Load statistics
- Outage performance data
- Annual maintenance schedules
- Historical results for multi-year projects
- Internal NS Power reviews
- Operating performance indicators

Technical Details - This may include but is not limited to:

- Substation drawings
- Line drawings
- System Impact Studies
- Generation Interconnection Agreement

Stakeholder Information - This may include but is not limited to:

- Government legislation

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- Letters of project support
- Stakeholder engagement communication

11.3 Capital Costs Incurred Prior to Application

NS Power strives to submit all capital applications to the UARB for review and approval on a timely basis. Capital costs incurred prior to application submission will be subject to the criteria noted below with respect to their inclusion into rate base.

Preliminary Engineering Projects

Each quarter, any spend above $1,000,000 associated with a preliminary engineering project that has been inactive (i.e. no internal or external engineering or scoping work, exceeding $10,000, being carried out within the last 12 month period) will be removed from rate base until such time as the preliminary engineering becomes active again or these costs are submitted for approval to the UARB.

Under $1,000,000 Projects Subsequently Exceeding $1,000,000

Projects originally budgeted at less than $1,000,000, but subsequently exceeding that threshold during project execution, must be filed with the UARB for approval no later than within six months of the project exceeding $1,000,000. Any projects that do not get filed within this timeframe will have all costs in excess of $1,000,000 removed from rate base in the quarter after the six month timeframe until these costs are submitted for approval to the UARB.

Capital Projects in ATO Position

If a previously approved capital project exceeds the allowable variance of the greater of 5% or $250,000 and is not filed within six months of exceeding the approved amount, then the costs in excess of Board approval will be removed from rate base each quarter until these costs are approved by the UARB.

Unapproved Plant in Service Spending

Any capital item with unapproved plant in service above $1,000,000 that does not fall under any of the above categories, and where a capital work order has not been filed with the Board within 6 months of the project's completion, the spend to date on that project in excess of $1,000,000 will be excluded from rate base each quarter until such time as the work order is filed.

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12.0 Authorization to Overspend (ATO) Requirements

12.1 Individual Capital Item ATO

Approval to Overspend (ATO) applications are intended to request Board approval prior to incurring additional expenditures above the approved amount. Individual capital items (non-routine) that are tracking final costs with a variance of more than the greater of 5% or $250,000 must be submitted as ATO applications, within 6 months, if NS Power intends to include costs in excess of Board approval in its regulated rate base.

The reporting included with the Quarterly submission of capital project applications will provide the budget, forecast and actual financial details in a one line format for all projects. Those projects that are tracking final costs with a variance of more than the greater of 5% or $250,000 will be specifically identified.

The following documentation shall be filed with the Board in an individual capital item ATO application:

- Updated UARB approval sheet reflecting the revised project amount;
- Revised Capital Item Description Page reflecting the revised project amount;
- Cost support for the ATO request; and
- Updated economic analysis and / or production costing modelling results (if applicable).

12.2 Individual Capital Item Scope Change

Scope Change applications are intended to request Board approval prior to proceeding with a change in scope as compared to the previously Board approved scope. Scope Change applications may experience cost variances from the original application, but are submitted regardless of whether the thresholds for ATO and FIN applications have been exceeded. In the event a project has exceeding the ATO and FIN cost thresholds and has also experienced a scope change, the project will be submitted as a combined ATO or FIN and Scope Change application.

The following documentation shall be filed with the Board in an individual capital item Scope Change application:

- Updated UARB approval sheet reflecting the revised project amount if applicable;
- Revised Capital Item Description Page reflecting the revised scope change;
- Cost support for the ATO request (if applicable); and

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- Updated economic analysis and / or production costing modelling results (if applicable).

12.3 Routine Capital ATO

Routine capital ATOs are based on the annual budget of individual sub-routines noted in the preceding ACE Plan.

Those sub-routines with variances compared to the annual budget of more than the greater of 5% or $250,000 will require submission to the UARB for review and approval in the first half of the following year.

The following documentation shall be filed with the Board in a sub-routine capital ATO application:

- UARB approval sheet including the sub-routines subject to overspend, the revised sub-routine amount, variance amounts, and detailed variance explanations for each in the comments section.

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13.0 Final Cost Application (FIN) Requirements

Individual capital item projects that have realized a scope change or have final costs with a variance of more than the greater of +/-5% or +/-$250,000 will require that a final cost application be submitted to the Board for approval.

Projects not falling within this threshold may require final cost applications as requested by the UARB.

The information provided in these submissions includes:

- Updated UARB approval sheet reflecting the Final Cost amount;
- Revised Capital Item Description Page reflecting the Final Cost of the project;
- Line by line project account variance explanations will be provided for those accounts with material variances; and
- Project scope variances.

All projects should be final costed within six months of their in-service date. Exceptions to this requirement will be required on occasion. A final cost submission may be delayed due to certain circumstances or unique projects. Circumstances may include not receiving final vendor invoicing in a timely fashion. Unique projects may include projects for which in-service dates are well in advance of project completion. In all cases where final costing capital work orders are submitted past six months after their in-service, justifications for the delay will be provided.

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14.0 Retirement of Capital Assets

NS Power retires capital assets for various reasons, including:

Normal Wear and Tear

This is referred to as normal deterioration of physical plant caused by use over time and usually occurs because of the physical deterioration of the asset. This type of retirement usually causes an asset to be scrapped.

Inadequacy

This usually occurs because of such items as customer safety, employee safety, public safety, increased customer demand.

The asset can no longer be used safely or cannot supply the customers adequately. The asset is retired but could be reused in another location.

Technical and Economic Obsolescence

The asset is technically obsolete or becomes redundant and no longer economically supplies customers' needs. The asset is retired but could be reused in another location.

Public Authority Requirements

The asset is required to be removed and or replaced for some of the following reasons:

- Environmental regulations (e.g. PCBs)
- Regulatory requirements (e.g. meter replacement)
- Highway relocations

The asset is retired but could be reused in another location.

Customer Requirements

The asset currently serving the customer does not meet customer requirements in a manner other than adequacy and efficiency of supply (e.g. customer requests underground service).

The customer usually pays for any of these requests but the assets must be retired. However they could be reused elsewhere.

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Procedures

When capital assets reach the end of their useful life and are no longer able to contribute to the service of customers, they must be retired from the Plant in Service records at their original cost. In doing so, they are removed from rate base.

For retirements of property, plant and equipment other than land and entire production plants, the original cost plus any costs of removal less salvage proceeds is charged to accumulated depreciation, with no immediate gain or loss recognized.

Gains or losses on capital assets, with the exception of land, are deferred and depreciated over the remaining life of the assets, in accordance with depreciation rate filings with the Nova Scotia Utility and Review Board.

The only exception to this policy concerns the sale of land, in which the resulting gain or loss is recognized immediately.

In those cases where the disposal of land requires expenditures to address environmental issues, then this transaction will be viewed on its own merit, as per approved financial policies.

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15.0 Routine Expenditures

15.1 Foreword

NS Power's Routine Program (the Program) is organized and managed through a subset of capital items (Routines) which are provided below. The Program provides for recurring annual allocations of funds for high volume, repetitive, like-for-like capital replacements, enhancements, or additions that are expected to continue into the foreseeable future.

The Program is held to the same standards as individual ACE Plan projects with regards to compliance with Capital Expenditure Justification Criteria and NS Power's Financial Policies and Procedures.

On an annual basis NS Power requests UARB approval for the Program and its component Routines through NS Power's ACE Plan. Within the approval request further context and justification is provided to support the annual funding levels of the Routines. This information includes specific project budget details, historical trending and year over year variances.

15.2 Definition

Routines include recurring annual capital expenditures for:

- Replacement of worn out or technologically deficient stand-alone equipment.
- Additions/improvements to existing capital assets to raise or improve productivity levels and asset value.
- Additions to existing equipment base resulting from system growth.
- Addition of customers to the system.

15.3 Unit Cost Materiality Limits

The threshold for capitalizing smaller asset purchases is to be consistent with the materiality limits contained in the financial policies. Expenditures for amounts less than the stated capitalization limits should be charged to operations as they are incurred, regardless of the volume purchased.

Exceptions:

Where smaller components are implicit within the scope of a capital project they will be capitalized as part of the overall project.

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IT Infrastructure:

NS Power's computer platforms are made up of the following components:

- Keyboards
- Monitors
- Docking stations
- Peripheral communication devices
- Desktop and laptop computers
- Software
- Licenses
- Servers
- Networks
- Data Storage

Each of these assets is integral to the operation of the computer systems which allow employees to perform their daily work functions. NS Power's annual IT capital investment allows for the periodic refresh of certain components to ensure that each platform is functioning at its intended potential. As these purchases are included in and required to ensure the adequate performance of each employee's computer system, the investments will be capitalized.

15.4 Routine Classification

Routines are classified into four functional categories:

- Generation
- Transmission
- Distribution
- General Plant

The Routines included in the Program are as follows:

Generation Routines

Generation Equipment Replacements
Generation Other Hydro
Generation Other Thermal

Transmission Routines

Transmission Substation Replacements, Additions, Modifications
Primary Equipment Spares
Protection Modification & Replacement
Transmission Line Replacements, Additions, Modifications

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Distributions Routines

Meters
Distribution Upgrades and Replacement
New Customers
Joint Use
Right-of-Way Widening

General Plant Routines

Work Vehicles
Tools and Test Equipment
Telecommunications
Computing Asset Management
Property Improvements and Furniture
Other

15.5 Approval

Routines are provided for Board approval on an annual basis through the ACE Plan. As part of the ACE Plan proceeding, stakeholders are provided the opportunity to evaluate each Routine. If a new Routine is required, NS Power will file for Board approval of the Routine prior to or by including it in the ACE Plan. If there are new projects added to an existing Routine, NS Power will identify the projects within the ACE Plan documentation.

Over-expenditure

Please refer to section 12.2.

Limits

All individual expenditures are tracked separately within the routine.

Routine Expenditure Reporting

The Board is kept apprised of the actuals incurred during a given year through the ACE Plan process and in the Q4 capital reports provided to the Board.

Projects within Routines

Descriptions of the individual routine projects included in NS Power Routine Program are provided in **Appendix A**.

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16.0 Confidentiality

Where the above documentation packages provide confidential information (e.g. commercially sensitive information such as vendor quotes, cost estimates, and internal procurement recommendations; proprietary third party information such as consultant reports and standards documentation; and security sensitive information such as transmission one-line diagrams), NS Power will justify and request the Board, in accordance with Rule 12 of the Board's Rules, maintain portions of the capital filings as confidential. NS Power will minimize such requests for increased transparency and to support the Board's objective in issuing transparent, non-confidential, public decisions.

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Nova Scotia Power Inc. Capital Planning & Capital Expenditure Justification Criteria
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17.0 Capital Expenditure Justification Criteria

17.1 Introduction – General Considerations

The following considerations are used to evaluate the economic justification for procurement and replacement of equipment, materials and services on the NS Power system.

- Examination of basic needs and alternatives (e.g. why is this required, why now, what other options are available, what are the consequences of doing nothing?).
- Examination of suitable technologies to provide an appropriate solution(s).
- Evaluation of alternative means of acquiring technologies including: design and build NS Power owned facilities and provide services using NS Power staff; rent or lease facilities and provide services using NS Power staff; rent or lease facilities and contract to others for services; and variants of the above as appropriate.
- The alternatives will be ranked using the most appropriate measure (e.g. Revenue Requirement or Net Present Value (NPV)), and the best alternative will be chosen (i.e. lowest Revenue Requirement or highest NPV or lowest Net Present Cost, etc.)
- Capability to meet industry norms for performance, such that NS Power's ability to provide its customers with the required levels of service are not compromised.
- Obsolescence and/or lack of support from facility, spare parts and service suppliers, such that NS Power incurs unacceptable risk of financial loss and/or liability.
- Ability to provide the lowest overall operating costs to NS Power.
- Required to ensure compliance with NPCC and, or NERC Reliability Standards.

The least cost option meeting the requirements and constraints specified above shall be selected.

17.1.1 Integrated Resource Plan

An Integrated Resource Plan (IRP) assesses various supply and demand scenarios to determine the best ways for NS Power to meet future requirements (including emission standards) in a cost-effective and reliable manner, while maintaining a minimum 20% capacity reserve margin above firm loads. The IRP is an important resource document used in the development of the capital plan.

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NS Power's IRP is:

- A strategic document;
- A planning document that helps NS Power and governing bodies create long-term sustainable plans based on in-depth analysis;
- A result of broad consultation with stakeholders;
- A roadmap that outlines the primary demand and supply options to be used by NS Power to meet future electricity and emission requirements;
- An analysis framework that integrates demand and supply options to meet future electricity requirements reliably and cost effectively in compliance with current and emerging operational and environmental constraints;
- A reference against which to assess demand and supply-side applications;
- A living document that will be updated as conditions change materially; and
- Developed using models that incorporate the best information available at the time of planning, as well as predictions about potential decisions that are subject to change as societal and technology priorities evolve.

NS Power's IRP:

- Is based on current information about basic assumptions;
- Sources include:
  - Recognized experts and consultants
  - UARB staff and UARB consultants
  - Proprietary information sources
  - Publicly available trends
  - Stakeholders / suppliers
  - NS Power's professional experience and judgment;
- Has a 25-year planning horizon;
- Provides ranges of realistic values based on current information.

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NS Power's IRP is not:

- An application for UARB approval of specific NS Power initiatives;
- A commitment by NS Power to undertake specific initiatives;
- A prohibition against specific third-party initiatives; or
- A review of regulatory or accounting treatment for NS Power assets or costs.

17.2 Innovation

General

The electricity industry, along with customers' needs and expectations, is changing. It is subject to governments mandating increasingly stringent environmental legislation and regulation; increased adoption of distributed energy resources; and increased participation in feed-in-tariff programs, also implemented through government policy. All of these impact the delivery and affordability of electricity to customers. This is changing the way in which electric utilities generate and deliver electricity.

These developments require proactive and timely adaptation by electric utilities, so that they can continue to provide safe, reliable and affordable electricity to customers in a way that adapts to the changing electricity landscape and the evolving expectations of customers. This means doing things in new ways, so adaptation, by definition, requires utilities to invest in, test, and deploy non-traditional, innovative technologies.

In some cases, the efficacy of these innovative technologies is subject to many variables including region-specific application, and therefore can only be determined through their practical application locally via corresponding capital investments and demonstration projects. These must be pursued to develop core knowledge of the technology, and determine whether they will lead to feasible long-term solutions.

These innovation projects assist with the determination of whether certain innovative capital investments will achieve customer value in the future. The value of these demonstration projects goes beyond the deployment and use of the capital assets by providing data and learnings, allowing for testing before deploying at scale, or aiding in the development of business cases, where applicable.

For greater certainty, this category applies to capital projects that are responsive to the above evolution of the electric system. Innovation projects justified under this criterion will propose to use innovative technologies or use established technologies in innovative ways. Innovation projects are not projects that propose incremental upgrades or improvements to established

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technologies, except to the extent that such upgrade or improvement involves innovative technologies or use of established technologies in innovative ways.

Justification Criteria

Innovation capital projects are justified on the basis that there is a reasonable expectation that they will provide customer value in some or all of the areas of reducing upward pressure on revenue requirement, reliability and grid stability, government policy compliance, and customer experience, through the deployment of proven technologies in innovative ways. In addition, innovation capital investments may be justified on the basis that they are reasonably expected to allow for testing before deploying at scale, provide valuable data and learnings, or aid in the development of business cases where applicable.

Sub-Justification Criteria

Innovation capital projects may be justified under one or more of the following sub-criteria:

- reduce upward pressure on revenue requirement
- reliability and grid stability
- environmental and other compliance
- customer experience improvements

Reduce Upward Pressure on Revenue Requirement

Capital investments under this sub-criterion may contribute to understanding how emerging impacts to NS Power's system may affect revenue requirement, or reduce upward pressure on NS Power's revenue requirement. This reduction can be achieved a number of different ways, including by increasing fixed costs contributions, decreasing operational costs, decreasing capital investment, decreasing fuel cost, or increasing the output of cost effective forms of renewable generation.

Innovation capital projects justified under reducing upward pressure on revenue requirement must (1) be reasonably expected to reduce upward pressure on revenue requirement, based on known issues increasing pressure on revenue requirement, through the deployment of proven technologies in innovative ways; or (2) be reasonably expected to allow for testing before deploying at scale, provide valuable data and learning, or aid in the development of business cases where applicable, regarding the efficacy of innovation technology in reducing upward pressure on revenue requirement.

Reliability and Grid Stability

Intensifying weather events, customer reliance on electricity and service expectation, and decreasing power quality caused by increasing wind and solar generation, are all creating reliability and grid stability challenges that are difficult to address with traditional grid

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technologies and practices. Capital investments under this sub-criterion may mitigate these issues by allowing NS Power to test new technologies and techniques which may allow further integration of solar, wind and other impactful technologies without compromising system stability and potential growth, as well as ways to reduce outage frequency or duration through the incorporation and optimization of technologies such as grid automation, electricity storage, distributed generation and energy management technologies.

Innovation capital projects justified under reliability and grid stability must (1) be reasonably expected to improve reliability and grid stability, based known issues affecting the same, through the deployment of proven technologies in innovative ways; or (2) be reasonably expected to allow for testing before deploying at scale, provide valuable data and learnings, or aid in the development of business cases where applicable, regarding the efficacy of innovation technology in improving the reliability of the system.

Environmental and Other Compliance

The Nova Scotia Renewable Energy Standards provide that 40 percent of NS Power's generation must come from renewable resources starting in 2020. Moreover, NS Power must comply with four air emission hard caps for CO2, NOx, Hg, and SO2, and potential future federal cap and trade requirements. Capital investments under this sub-criterion may contribute to achieving these renewable generation and emissions requirements through the testing or deployment of innovation technologies such as battery storage, which can store excess variable renewable energy to be utilized when the renewable resource is not producing energy.

Innovation capital projects justified under environmental and other compliance must (1) be reasonably expected to support environmental or other compliance, based on environmental compliance or other legislation and regulation, through the deployment of proven technologies in innovative ways; or (2) be reasonably expected to allow for testing before deploying at scale, provide valuable data and learnings, or aid in the development of business cases where applicable, regarding the efficacy of innovation technology in complying with environmental or other policy.

Customer Experience

Rapid advances in technology, the offerings customers receive from other service providers, and the availability and control of information 24 hours a day are driving changing customer expectations. As customer expectations continue to evolve, using innovative technologies in new ways may contribute to meeting them. Customer experience projects are driven by the reasonable expectation they may lead to improvements to customer experience exclusive of other justifications, but may also provide benefits under the other sub-criterion noted above.

Innovation capital projects justified under customer experience must (1) be reasonably expected to improve the customer experience, based on either stated or predicted needs of customers, through the deployment of proven technologies in innovative ways; or (2) be reasonably

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expected to allow for testing before deploying at scale, provide valuable data and learnings, or aid in the development of business cases where applicable, regarding the efficacy of innovation technology in improving the customer experience.

17.3 Health & Safety

NS Power conducts all of its business in a manner which is both health and safety conscious. Health and/or safety are one of the many reasons why a capital expenditure might be required. In cases where health and safety is not the principal justification for the project and other criteria (e.g. pole retreatment, transmission plant replacement etc.) are used to justify the project, health and safety is not used as sub-justification criteria even if health and safety is a secondary driver for the project.

This criterion applies to capital projects undertaken to comply with applicable laws and accepted industrial practices, including but not restricted to:

- Nova Scotia Occupational Health and Safety Act and Regulations
- NS Power standards and work practices
- Orders issued by the N.S. Department of Labour, or Environment
- Accepted industrial practice or codes
- Exercise of due diligence

As well as applying to active NS Power sites, the Health and Safety criterion is applicable to temporarily or permanently decommissioned NS Power sites. Examples of such expenditures include the following:

- Demolition of physical plant to eliminate all liability
- Alterations to a site or physical plant to render it secure against public intrusion in order to limit liability (e.g. Signage, fencing, boarding of windows and doors, electrical isolation, etc.)
- Security devices to alarm intruders
- Alterations to a site or physical plant in preparation for sale or disposal

Projects where compliance with such requirements is the primary driver for the investment will utilize the Health and Safety justification criteria. There are often projects where other (discretionary) asset management criteria may be major drivers in addition to Safety improvements that will be accomplished through a capital upgrade. The intent is to code the project to its primary driver but judgment is often required to ensure consistency.

17.4 Environment

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As an industrial enterprise, NS Power is obligated to act in a manner which is respectful and protective of the environment in accordance with Company policy, environmental legislation and regulations and agreements with governments. Subsequent to appropriate analysis of its existing and proposed operations, NS Power may need to make capital expenditures to achieve the required environmental performance. NS Power is committed to an environmental ethic which supports environmental and economic sustainability.

The environmental justification criteria include the following:

Environmental Permit, License, Regulation Criteria

These criteria refer to the specific law(s) and the enabling legislation which is enacted to provide for processes, project approvals, environmental monitoring, and standards of performance.

Resulting from regulations, laws and legislation are instruments which require a certain level of environmental performance. They can significantly impact capital expenditures.

These instruments are:

- permits
- licenses
- regulations

NS Power's capital expenditure criteria will include justification based on the type of instrument placing the requirements.

Environmental Agreement, Guidelines, International Standards and Voluntary Action Criteria

These criteria respond to agreements between governments, government guidelines, international standards developed for various industrial sectors and voluntary action that bind the owner/operator to carry out its business in a certain way so as to meet agreed environmental performance.

These instruments may be more flexible than those described in section 1.0 above. However, there is usually little choice given the expectations of performance under international trade agreements. These agreements have provisions which can be used to punish and/or reward industries, economic sectors and countries based on environmental performance.

NS Power's capital expenditure criteria will include justification to make such an expenditure by reference to the specific instrument in question.

17.5 Land and Right-Of-Way

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NS Power needs to occupy and access land to enable the Company's operations. Land can be held as a fee simple title or through some other interest or type of right over land. Fee simple ownership is normally taken for facilities where permanent exclusive occupation is required, for example a thermal generating plant. Where these requirements are lessened in some way, NS Power can acquire interests which are less than the fee simple interest in land, including rights-of-way or easements for power lines, or utility corridors and leases or licences for the occupation of land.

Land and Rights owned by NS Power are managed according to their use, with the main distinction being between those in current use for company operations and those where there is no operational use. Sites without an operational use can be held to mitigate or protect adjoining operational uses, allow management of the remnants of past use, or to allow for future activities or to generate revenue.

The criteria governing NS Power land transactions are as follows:

Land Acquisition

Land is normally acquired as part of a capital project associated with the five year capital budget. Occasionally land that will satisfy the requirements of a future capital project that is beyond the five year capital budget will become available on the open market. In such instances the property may be acquired if no economically practical alternative property is available to satisfy the requirements of the future project in question.

Land Disposal

NS Power can dispose of, lease or grant rights over surplus land. Land associated with hydro projects is generally retained to protect the safety and usability of the whole system. Land to be disposed of will be investigated to ensure compliance with NS Power environmental criteria and provincial regulations.

Land and Building Disposal

A building, land or rights surplus to NS Power requirements and which can be sold will be sold with its associated lands assuming all environmental criteria have been met. If the land and building cannot be sold as one entity, then the building or facility will be removed or retired under NS Power retirement of capital asset criteria and, depending upon requirements, the land will be retained or sold.

Abandoned Rights-of-Way

NS Power normally retains rights-of-way which are not in current use to allow for future use. If a right-of-way is determined to be surplus to NS Power requirements, then the right-of-way may be released, usually to the owner of the property over which the right-of-way exists.

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17.6 Hydro, Wind and Biomass

The principles set out hereunder shall be used by NS Power in determining the methods used and timing of purchase and replacement of its hydro, wind and biomass production assets.

These production assets shall be purchased, replaced, or modified for any of the following conditions:

- To eliminate conditions which, in the opinion of NS Power, constitute hazards to operating personnel or the general public.
- To meet NS Power's obligations to third parties or to conform to applicable laws and regulations - including Nova Scotia's Renewable Electricity Standards and Canadian Dam Safety Guidelines.
- To produce an economic benefit by reducing or minimizing operating costs, or improving generating equipment efficiency.
- To maintain reliability and quality of supply to the bulk power system.
- When the probability of failure is high enough that:
    - Making the proposed capital investment reduces the costs compared to continuing to repair the existing asset;
    - The estimated cost reduction is of significant magnitude to meet NS Power's financial criteria; and
    - The timing of investment is optimized to maximize customer net benefits.

Hydro - Economic Justification Procedure

The following procedure is used to evaluate replacement, refurbishment or upgrades to NS Power's hydro production assets.

The least cost option meeting all the requirements and constraints specified shall be selected.

- Wood stave pipelines shall be replaced when an engineering assessment indicates a high risk of failure exists. The engineering assessment takes into consideration near end of life annual inspection reports, stave sampling (where appropriate), performance reports (leakage and stave failure) and risk assessment.

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- Turbine runners shall be replaced on the basis of runner degradation or potential efficiency improvements. Turbine runners under consideration for replacement due to runner degradation will be based on a qualitative and quantitative assessment following annual inspections. An engineering analysis will examine potential improvement for efficiency improvement.

- Capital improvements and replacement of dams and hydraulic structures will be initiated where formal engineering investigation and risk assessment find that the structures do not comply with accepted national standards of stability and flood management capability for existing structures, or where accepted criteria of "due diligence" for public and environmental safety cannot be met.

- Generator stators will be rewound when there is a high probability of insulation failure or when failure has occurred. All generation station windings are tested under a regular inspection program. Units having older type insulating materials or those whose windings are exhibiting insulation deterioration are tested annually. The tests provide insulation resistance values, dissipation indices and polarization indices. Station winding replacement is justified taking into consideration measured test values, age, type of insulating material and trends in insulation performance suggested by test results.

- In all instances, it must be demonstrated that the value of energy to the system is greater than the cost of the capital project in question or the next most cost effective renewable energy option to replace the hydro generation. The latter is required to ensure NS Power remains compliant with Nova Scotia's Renewable Electricity Standards.

17.7 Thermal

The principles set out hereunder shall be used by NS Power in determining the methods used and timing of purchase and replacement of its thermal production assets.

Equipment Replacement/Refurbishment

Capital expenditures to purchase, replace, or refurbish equipment must be justified by an engineering and economic evaluation which incorporates information from planned inspection/performance programs and industry standards. An economic analysis is carried out such that the least cost option meeting all the requirements and constraints specified shall be selected.

Thermal production assets shall be purchased, replaced, or modified when the probability of failure is high enough that:

- Making the proposed capital investment reduces the costs compared to continuing to repair the existing asset;

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- The estimated cost reduction is of significant magnitude to meet NS Power's financial criteria; and

- The timing of investment is optimized to maximize customer net benefits.

Heat Rate

For capital expenditures resulting in Unit heat rate improvements, an annual cost saving is calculated using the system dispatch production models (i.e. production costing model) (for major improvements) or calculated on a BTU/kWh basis using current production forecasts and current cost of fuel forecast (for minor improvements < 1% improvement in heat rate).

Capacity

For capital expenditures that result in an increase in net Unit capacity, the value of a kW is calculated using system planning models.

Labour

Impacts on present or future labour requirements are calculated on an annual savings/cost basis taking overtime and fringe benefits into account.

Forced Outage Rate

Unplanned outages result in replacement generation, often at a higher cost than the existing generation. These costs are estimated using the probabilistic production model and incorporated into the Economic Analysis Model.

17.8 System Design

Nova Scotia Power's interconnected system is divided into several classifications, each of which is governed by different design criteria.

These classifications are as follows:

- Primary Transmission
- Secondary Transmission
- Electrically Remote Transmission
- Subtransmission
- Transformation

NS Power is a member of the Northeast Power Coordinating Council (NPCC). Those portions of the NS Power Bulk Power System, wherein single contingencies can potentially adversely affect

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the interconnected NPCC system, are designed and operated in accordance with NPCC Directory #1, Design and Operation of the Bulk Power System.

NS Power is required to follow the standards of the North American Electric Reliability Corporation (NERC). NERC is a non-government organization which regulates Bulk Power System users, owners, and operators through the adoption and enforcement of standards for fair, ethical, and efficient practices. NERC standards are filed with the UARB through a regulatory approval process where they become mandatory and enforceable in the province of Nova Scotia. NS Power designs its Bulk Electric System to meet the requirements of the in-force NERC standards. NS Power utilizes a set of deterministic criteria for its interconnected transmission system that combines protection performance specifications with system dynamics and steady state performance requirements. The NS Power Bulk Electric System is planned, designed, and operated in accordance with single contingency criteria.

NS Power System Design Criteria are applied for all other portions of the interconnected system.

NERC standards and NPCC criteria are continually evolving. NS Power system design practices are constantly updated to meet the requirements of new and evolving standards.

The System Design criteria are provided and maintained in report #NS Power-TPR-003-4. The current version of this report is provided in Appendix C.

Definitions

Primary Transmission is defined as the 345 kV transmission system interconnecting Lakeside-Onslow-Hopewell-Woodbine and Salisbury, New Brunswick, the 230 kV transmission system interconnecting Brushy Hill-Onslow-Lingan-and Pt. Aconi, Nova Scotia and the interconnecting 345/230 kV transformation between them.

Prime clearance times are defined to be 4.5 cycles first zone and 6 cycles second zone with permissive signal for both three-phase and line-to-ground faults.

Back-up clearance times are defined to be 15 to 18 cycles for both three-phase and line-to-ground faults.

Secondary Transmission System is defined to be that part of the system which serves mainly to interconnect miscellaneous generation and Primary Transmission with Subtransmission at major load centres.

The lesser importance of secondary transmission relative to the Primary Transmission permits a relaxation of the design criteria from that required for the primary transmission system. This definition then governs most of the 138 kV development plus certain 69 kV and 230 kV, other than on the Primary Transmission system.

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Local back-up clearance is defined to be less than 30 cycles (a figure of 20 cycles is desirable but where coordination so dictates, a 30 cycle figure is acceptable).

Remote back-up clearance is defined to be less than 30 cycles which in certain instances implies reduced margins of coordination.

Electrically Remote Transmission is defined by those buses at which ultimate fault levels are projected to not exceed 1500 MVA three phase.

Prime time clearance is defined to be 9 cycles for both three-phase and line-to-ground faults.

Subtransmission System is defined to be that part of the system which primarily serves as a source for transformation to the distribution level. This type of system is primarily characterized by radial feeds although looped subtransmission exists.

Interconnected Transmission System is defined as the combined Primary, Secondary, and Electrically Remote Transmission systems including connected generation.

Normal system conditions are defined to include all of the following:

- Any load condition (this includes the full range of annually forecasted loads).
- All transmission facilities in service (no line or transformer maintenance).
- Economically scheduled and dispatched generation allowing for planned generator maintenance outages (non-firm generation is not included as economically dispatched generation).
- Stable steady-state operation of the Interconnected Transmission System.
- All system voltages within 95% to 105% of nominal, unless otherwise noted.
- All system elements operating within their continuous thermal ratings, unless otherwise noted.

A system element is defined to be any one generator, transmission line, transformer or bus section.

Local back-up clearance is defined to be the time to clear an in-zone fault.

Remote back-up clearance is defined to be the time to clear an out-of-zone fault.

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Breaker back-up is defined to be protection against local breaker failure to trip for any reason. Breaker back-up will be applied to all Primary Transmission and most of the Secondary Transmission systems.

17.9 Transmission Plant

The principles and criteria set hereunder shall be used by NS Power in determining the methods used and timing of purchase and replacement of its transmission plant.

Conditions for Purchase

Transmission plant shall be upgraded, rerouted, or otherwise modified for any of the following conditions:

- To eliminate conditions which, in NS Power's opinion, constitute hazards to operating personnel or to the general public.
- To meet NS Power's obligation to third parties or to conform to the provisions of applicable laws and regulations.
- To reduce or minimize operating costs of the transmission system.
- To maintain reliability and quality of supply to the distribution bus.

Conditions for Replacement

Transmission plant shall be replaced, if still required to meet system design requirements, as follows:

- Transmission poles which fail the test for resistance to overturning moment in accordance with Transmission Maintenance Practice TMP 475C.1.
- Certain insulators with cemented joints are failing due to the composition of the cement used in the manufacture of the insulators. The manufacturers of the insulators are no longer in existence. These insulators include:
    - Suspension insulators in strain positions.
    - Pin type insulators manufactured with two or more parts of porcelain cemented together.
    - Cap and pin insulators manufactured with two or more parts of porcelain cemented together.

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- Multicone insulators.
- Suspension insulators in tangent positions when a history of failure has been established by outage statistics.

- Substation apparatus which fails or is predicted to fail due to; insulation degradation, out of calibration or capacity limitation. Apparatus is inspected and tested at regular intervals to ensure reliability of purpose, security of the electrical system, and safety of operating personnel and general public. Programs for determining the current and predicted performance are as follows:
  - Substations are visually inspected every month.
  - Insulating oils are tested every year.
  - Other insulations are tested every four to six years.
  - SF6 interrupters are tested every eight years and oil interrupters are tested every six years.
  - NPCC protection is tested every two years.
  - Batteries are visually inspected every year.
  - Insulation degradation as confirmed by internal testing; intervals varying by equipment and performance and asset age.

Transmission Plant Replacement - Economic Justification Procedure

The following procedure will be used to evaluate the replacement, modification or upgrade of Transmission Plant at NS Power:

- Any transmission plant which fails or is predicted to fail will be evaluated firstly as to NS Power's current and future requirements.
- An economic evaluation will then be completed such that the least cost option meeting all the requirements and constraints specified shall be selected. Included in these alternatives will be the costs to:
  - Repair the transmission plant to such a state as to meet NS Power's requirements.
  - Upgrade or modify other transmission plant so as to eliminate NS Power's requirement for the plant in question.

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- Replace the transmission plant as to maintain NS Power's transmission system.

- Any repairs, upgrades or modifications will be costed as per the manufacturer's and NS Power's specifications and standards. The costs for completing this work will include and compare NS Power's costs and/or manufacturer's operating and maintenance labour, material, expenses, shipping and all other relevant costs or factors which may affect these costs (i.e. availability of labour, material, revenue, etc.).

17.10 Distribution System

Nova Scotia Power's Distribution System connects the majority of NS Power's customers to the Transmission System. (Some of the larger customers are supplied directly from the transmission network.) As such the Distribution System criteria bridge the gap between the Transmission System and the customer's service entrance. The need for distribution projects is driven by the criteria provided below.

Requirement to Serve

The provision of electrical service to customers, as well as street lighting and other unmetered services is a requirement of NS Power. The least cost option to extend the system will be undertaken unless the customer requests to contribute the incremental cost difference. Extension of service will conform to the latest version of the NS Power Rates, Regulations and Procedures Manual.

Pole Strength Compliance with Standard CAN/CSA-C22.3 No. 1-10 - Overhead Systems

Principles and Criteria for Replacement of Distribution Pole Lines

- The principles and criteria set out hereunder shall be used by NS Power in determining the methods used and timing of replacements of its distribution poles lines.

- Conditions for change or replacement:

  Pole lines shall be replaced, upgraded, rerouted and otherwise modified for any of the following purposes:

  - To eliminate conditions which, in NS Power's opinion, constitute hazards to operating personnel or to the general public.

  - To meet NS Power's distribution planning criteria.

  - To meet NS Power's obligation to third parties or to conform to the provisions of applicable laws and regulations thereunder.

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- To minimize distribution cost in the absence of any requirement to alter the distribution system under the provisions noted above.

- Criterion for select pole replacement:

  - Poles found to fail the test for resistance to overturning moment, as set out in the NS Power report entitled, "Distribution Line Inspection Procedures and Pole Replacement Criteria", 1993-09-28, shall be replaced. It is noted that the specified criterion is based on existing CSA standards.

  - Where a pole is found to fail the stated strength test, it shall be replaced immediately if, in the opinion of NS Power, it constitutes a hazard to operating personnel or the general public. Otherwise, it shall be replaced in a least cost manner.

  - Under least cost planning, an option involving timing of replacements which differs from that obtained by application of a distribution planning study may be found to provide the minimum cost. In this case, if hazards are not incurred, the global minimum shall be selected.

Service Voltage Outside CSA Standard CAN3-C235-83 (C2010)

CSA sets national voltage level standards at customer's service entrance, utilization points, and the point of sale to a municipal utility.

When it is determined from measurement or computer models that the voltage will be over or under these standards then various alternative solutions to these problems will be identified and the least cost option meeting all the requirements and constraints specified shall be selected.

- Service Voltage Outside Standards - Economic Justification Procedure

  The following procedure is used to evaluate alternative solutions to correcting voltage conditions to CSA Standards on the Nova Scotia Power Inc. distribution system.

- Local Voltage

  For local voltage issues the costs are identified to determine a least cost solution. These costs include: relocating the single phase transformer tap to another phase, replacing a transformer with a larger size, relocating the transformer closer to the load, reconductoring secondary on service conductors, other similar options. All costs are included for labour, material, expenses, interest, removal and salvage.

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These costs are totalled in current year dollars and represent the costs to resolve local voltage problems.

- Feeder/Substation

For feeder or substation issues relating to low voltage the costs are identified to determine the least cost solution. These costs include: adjusting regulator settings, addition of line regulators, addition of shunt capacitors, reconductoring, conversion of the system in question to a higher voltage, addition of another feeder, addition of a substation or other unforeseen options. All costs are included for labour, material, expenses, interest, removal, salvage, losses, maintenance, and any other related costs. These costs are totalled in current year or present worth dollars, and represent the costs to resolve feeder/substation voltage problems.

Overloaded Equipment

- Transformers

Transformers used as step-downs from one primary voltage to another are considered to be overloaded when they have reached a peak load in excess of 133% of their top nameplate rating. If the transformer load peaks in the summer and has a high daily load factor, a criteria of 110% top nameplate rating is used. Padmount and vault installed transformers should be loaded according to DEP 3.03 "Loading Guide - Padmount Transformers".

"Single Phase Transformer Capacity Selection Chart for 120/240V Domestic Services" T-1, from "Overhead Distribution Standards Manual" should be used for pole mounted transformer loading.

- Cables and Overhead Substation Exits

Cables or overhead distribution feeder circuits emanating from a supply substation will be considered to be overloaded when the peak load exceeds 325 amps or thermal capacity whichever is less and transfer capability with adjacent feeders has been fully utilized.

In addition, cable ratings for normal and emergency conditions should be determined by reference to the "Underground Standards Manual".

- Conductors

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Overhead conductors are considered to be overloaded when they have reached the loadings as per the report "Conductor Current Carrying Capabilities" and the "Overhead Distribution Standards Manual".

Variables considered were: conductor resistance, dissipation, wind velocity, atmospheric pressure, emissivity, etc. In addition, a conductor carrying a current of 325 amps is considered to be at its load limit.

- Equipment

Equipment, such as reclosers, regulators and switches are considered to be overloaded when they exceed their continuous current rating as provided by the manufacturers.

- Overloaded Equipment - Economic Justification Procedure

The following procedure is to be used to evaluate alternative solutions to correct overloading equipment problems on the Nova Scotia Power Inc. distribution system.

For overloading equipment problems the costs are identified such that the least cost option meeting all the requirements and constraints shall be selected. These costs include: replacing the equipment in question with higher rated equipment, reduction in load by reconfiguring the power system, converting to a higher voltage for equipment other than transformers and other unforeseen options. All costs are included for labour, material, expenses, removal, salvage and any other related costs. These costs are totalled in current year or present worth dollars, as appropriate, and represent the cost of resolving the overloaded equipment problem.

Deteriorated Conductor

Overhead conductor shall be replaced on the basis of:

- deterioration sufficient to constitute a safety risk to powerline technicians or the public at large;
- deterioration sufficient to result in an unacceptable level of outages to customers;
- least cost economics.

It is sufficient justification for replacement that the conductor fail to meet any one of the criteria outlined below.

The criteria that establish the basis for conductor replacement are as follows:

- Powerline Technician Safety - Live Line Procedures

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When safety considerations for live line procedures as per the NS Power Safety Manual are evaluated, they shall be based on evidence of conductor deterioration as established by 5.2, or 5.3 but may include other factors permitted by the NS Power Safety Manual when assessed by a fully qualified powerline technician assigned to the job. If the conductor is deteriorated to the extent that it is not deemed safe to work live then conductor replacement would be considered in conjunction with the earliest pole replacement program on that line.

- CSA Safety Standard

  When tests indicate that the conductor tensile strength for conductors size #2 and larger has deteriorated to less than 60%, or for conductors sized #4 and smaller has deteriorated to less than 80% of the ultimate tensile strength specified for design loading conditions as stipulated in CSA Standard C22.3 NO. 1-10 "Overhead Systems". (Note 1) Testing to support this recommendation will be conducted on representative samples of conductor.

- Lineworker Safety - General Linework

  When tests indicate that the torsional ductility of individual supporting strands of the conductor is reduced below 4 turns when tested according to ASTM Standard E558-83 "Standard test method for torsion testing of wire" for a test conductor length of 120 wire diameters. (Note 1) Testing to support this recommendation will be conducted on representative samples of conductor.

- Economics

  At times it is economical under least cost planning to establish an earlier replacement date. The economic analysis will include the value of energy losses in combination with other significant operating cost considerations (e.g. maintenance and customer costs due to outages) for the existing conductor as compared with the capital and operating costs of the replacement conductor. The economics will be calculated over the remaining life of the conductor which will, in the absence of more specific information, be established by evaluating the point in time when it will fail to meet technical requirements such as electrical load, voltage, protection or conductor strength.

- When direct measurement shows loss of the galvanizing coating on the reinforcing strands over a significant portion of the circuit. Conductor replacement will be planned on the basis of predicted remaining life as established from experienced deterioration rates.

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Note 1 - A database of conductor test results will be established. This database will be analysed to support the longer term objective of developing additional, cost-effective conductor replacement criteria founded on direct observation of specific characteristics of the conductor that pertain to its life expectancy. These will include, besides the test results, the conductor type, age, aggressiveness of environmental conditions at installation site (or distance from coast) failure history and splices per conductor per km.

Outage Performance

In evaluating methods of achieving reliability targets, analysis of the interruption data will be undertaken annually to direct the spending in the areas which will have the greatest impact on provincial reliability without sacrificing the regional reliability to a level below that warranted by the customer density. Transmission as well as distribution alternatives will be coordinated.

Distribution System Protection

The protection of the distribution plant and public and employee safety is provided in Distribution Engineering Practice "6.02 Overcurrent Protection Guidelines". The specific objectives of the criteria are to:

- Protect electrical plant from thermal and electromagnetic damage which can be caused by excessive current flow.
- Limit hazards to public and operating personnel.
- Maintain service continuity to customers through the selective coordination of overcurrent devices.

Distribution System Protection - Economic Justification Procedure

The following procedure is to be used to evaluate alternative solutions to protection problems on the Nova Scotia Power Inc. distribution system.

For protection problems the costs are identified such that the least cost option meeting all the requirements and constraints shall be selected. These costs include: addition of protective devices, uprating protective devices, reconductoring, addition of phases, converting to a higher voltage, reconfiguring the power system, addition of a feeder, addition of a substation, increase a substation transformer or other possible unforeseen options. All costs are included for labour, material, expenses, interest, removal, salvage, maintenance, losses and any other related costs. These costs are totalled in current year or

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present worth dollars and represent the costs to resolve distribution system protection problems.

Prevention of Catastrophic Failure of Distribution Transformers/Capacitors

Maximum symmetrical fault levels of 8000 amps at 24.94 kV and 9000 amps at 12.47 kV govern the Distribution System design. In addition to these levels, so as to prevent catastrophic failure, distribution equipment subject to symmetrical fault levels exceeding 4000 amps at 12.47 kV and 3000 amps at 25 kV should be protected by current limiting fuses as outlined in Distribution Engineering Practice 5.30.

Grounding Criteria

Grounding of the distribution system should ensure that the system neutral to ground (earth potential)[2] shall not exceed 10 volts. Methodology is contained in the "Overhead Distribution Standards Manual", Section G - Relocation.

- Grounding - Economic Justification Procedure

  To reduce the earth potential the costs are identified such that the least cost option meeting all the requirements and constraints shall be selected. These costs include: insuring the neutral integrity, addition of grounding, reducing current flow, increasing size of neutral conductor, adding phases or other unforeseen options. All costs are included for labour, material, expenses, interest, removal, salvage, outage costs and customer outage costs as well as any other related costs. The costs are totalled in current year dollars and represent the cost of fixing a grounding problem.

Joint Use Agreement

Expenditures required in accordance with our Joint Use Agreement with Bell Aliant. This agreement is established to reduce costs to both NS Power and Bell Aliant customers, by sharing poles.

Highway Relocation

Poles located on highway, city street, town and municipal rights of way are installed based on pole permits and must normally be relocated at NS Power's cost when requested by the right-of-way owner.

[2] Ground or earth refers to the reference point in an electrical circuit from which other voltages are measured, or a common return path for electric current, or a direct physical connection to the Earth.

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Radio Interference Voltage

The Radio Interference Regulations under the Radio Communication Act Chapter 1374 regulate the radio noise limits being emitted from our distribution lines. Alternative methods of reducing noise involve tightening hardware or replacing insulators or other similar methods.

Voltage Unbalance

Expenditures may be required due to violation of the criteria outlined in DEP 5.50 "Distribution Feeder Balancing" on NS Power's system.

Alternative methods of solving this problem would include phase current balancing, addition of phases, replacing conductor.

Voltage Flicker Due to Motor Starting

Allowable flicker is governed by DEP 3.04 "Voltage Flicker Due to Motor Starting".

Flicker caused by customer equipment should be mitigated by the customer with NS Power solutions requiring contribution from the customer such as reconductoring, voltage conversion, new feeders, new substation, etc.

CATV Agreement

CATV contracts with various Cable Television companies throughout Nova Scotia govern our expenditures.

17.11 Pole Retreatment

The principles and criteria set out hereunder shall be used by NS Power in determining the methods used and the timing of retreatment of its transmission and distribution wood poles.

Conditions for Retreatment

Wood poles originally treated with pentachlorophenol and creosote preservatives shall be retreated with approved wood preservatives to reinforce the preservative retention levels in the ground line area thereby maintaining acceptable toximetric thresholds necessary for protection against fungal and insect attack.

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Criteria for Wood Pole Retreatment

Wood pole species found on the transmission and distribution systems include various kinds of Pine, Douglas Fir, and Western Red Cedar. NS Power undertakes on a line basis, retreatment of those poles that have been in service for 15 years or more in the following manner:

- Transmission class poles are tested for resistance to overturning moment in accordance with Distribution Engineering Practice (DEP) 7.51.Poles found to have an effective circumference equal to or greater than the minimum required circumference and a shell thickness of 3 inches or more are scheduled for retreatment.
- Specified failure criterion is based largely on existing CSA standards for required pole strength and to some extent on utility industry practice.
- Some poles though meeting strength and treatment criteria may not be retreated due to various reasons. These include landowner requests, poles in proximity to agricultural lands or domestic gardens and poles inside water buffer zones established by the Nova Scotia Department of the Environment and included in the yearly ministerial permit.
- Appropriate personnel are informed of poles that fail criteria.
- All pole tests and retreatment data will be maintained on a computerized database for future reference.

Pole Retreatment - Economic Justification Procedure

The management plan for retreatment of transmission class poles is based on studies which consider the age, species, original treatment and structural integrity of the lines comprising the transmission system. NS Power carries out a pole retreatment program on transmission class poles. The least cost option meeting all the requirements and constraints shall be selected.

17.12 Metering Equipment

The principles and criteria set hereunder shall be used by NS Power in determining what types of metering equipment to purchase and timing of replacements.

Conditions for Purchase and Service

Metering equipment shall be purchased and placed into service under the following conditions:

- For revenue metering, NS Power purchases only those meters having Measurement Canada (MC) TYPE APPROVAL. These are the only approved apparatus for measuring AC energy and power in Canada, and upon whose readings a legal bill may be rendered by the supplier to the customer.

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- Meters are sealed by NS Power, or accredited verifier, to the Standard proclaimed in document S-E-02, "Specifications for Verification and Re-verification of Electricity Meters", before being placed in service. Meters are also brought in from active service on a periodic basis for re-verification according to this standard.

- Meters being purchased at the present time for kWh measurement will be of the standard type because these have been determined to be the most economic choice when all factors related to metering cost have been considered. The determining factor in this economic choice is the costs associated with meter re-verification.

MC allows selective sampling of standard induction type meters both in verification and re-verification. MC requires each register to be tested fully, as must any load control device, and the meter once sealed, cannot be updated electronically, unless the seal is broken at the meter shop and the whole calibration process repeated. The multitude of readouts causes delays in re-verification, and the special features required for Industry Canada TYPE APPROVAL makes these meters much more expensive on a unit for unit basis.

Conditions for Replacement

Metering equipment shall be replaced, upgraded or otherwise modified for any of the following reasons:

- When meters fail the criteria specified in the Standard, depending upon the economics (i.e. labour/material charges, availability of spare parts) of overhauling, and whether or not a directive to discard is received from MC, they are either repaired and returned to service or retired and replaced by new meters.

- When a rate class for a given customer changes, requiring a meter with greater or lesser capability.

Metering Equipment - Economic Justification Procedure

The following procedure is used to evaluate the replacement of meters on the Nova Scotia Power Inc. system.

- Any meter(s) which has been ordered to be discarded as a result of an order from Measurement Canada (MC) shall be replaced with a type approved by the MC.

- Any meters of a particular lot which are known to have a defect will require action. This may require a meter replacement or repair.

- An economic evaluation will be completed to determine the least cost alternative. Included in these alternatives are the costs to replace the meter, the costs to

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repair the meter at a NS Power facility, the costs to repair the meter at a manufacturer's facility. Included in these costs are labour, material, expenses, overhead, shipping and any other relevant costs.

- Meters which fail re-verification according to the document S-E-02, "Specifications for Verification and Re-Verification of Electricity Meters", shall be repaired or replaced. Appropriate action is taken based on the least cost alternative. In determining the cost to repair or replace the meter the expected life is calculated from standard electric utility depreciation practices.

17.13 Work Support Facilities

Building Facilities/Furniture

NS Power owns and operates buildings and associated systems, equipment and furniture to support the delivery of service to customers (i.e. other than that associated with generation facilities, the costs of which are included in the related function costs). These facilities are operated in a manner which provides the most suitable environment for employees to carry out their work in a safe and efficient manner and protects the asset and extends its original useful life.

Facilities may be constructed, replaced, upgraded, renovated, leased, retired or otherwise modified for any of the following purposes;

- To eliminate conditions which, in NS Power's opinion, constitute hazards to NS Power's personnel or to the general public;
- To meet NS Power's obligations to third parties or to conform with the provision of applicable laws and regulations there under;
- To protect facility assets by maintaining them in a reasonable operating condition;
- To comply with regulations and legislation.

Building Facilities/Furniture - Economic Justification Procedure

The following procedure will be used to evaluate the construction, replacement, renovation, modification or retirement of NS Power facilities. In all cases financial analysis will be conducted on the basis of least cost over the facility life cycle.

Facility Audits

- Periodic audits will be carried out on all facilities. These audits will identify any operating issues, deficiencies, inefficiencies, potential hazards, code compliance, or any

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opportunities for improvements to the facilities. Aspects examined will include the building structure, the electrical, lighting, mechanical (including heating ventilating and air conditioning), communications and safety systems, as well as interior appointments including finishes, furniture and signage. Examination of the grounds will encompass all aspects of the compound, any out-buildings and all environmental considerations.

- Capital work identified from these audits will be examined for its positive impact on the productivity and working conditions of employees, elimination of hazards, code and regulations compliance, or its ability to extend the life of the building asset. Applicable projects will be cost justified over the life of the building and all costs taken into account (labour, material, expenses, administrative overhead, interest and all other relevant costs).

- Furniture and equipment will be replaced on an equivalent and suitable basis when existing items are no longer serviceable or when safety or ergonomic issues dictate. Additions to inventory will be made on the basis of new human resource requirements or the support of a valid business case.

Building Replacement/Modifications

Capital projects which involve building replacements, new buildings, or the renovation or modification of a major portion of the building space will consider the following factors in the economic analysis when pertinent:

- Operating costs of the building (heat, lights, rentals, general maintenance, etc.)
- Relevant operating costs of the functions carried out by employees (e.g. travel time)
- Capital costs necessary to continue to operate the existing facility (e.g. roof replacement, code compliance)
- Effect on staffing levels (e.g. reduced staff due to reorganization or relocation)
- Construction costs (land purchase and preparation, building design, project supervision and management, temporary relocations, contractor costs, retirement of old facilities)
- Cost of preliminary investigation, study and engineering
- Relevant safety and environmental issues
- Long range needs (business requirements of the investment for the useful life of the asset)

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The least cost option meeting all the requirements and constraints specified above shall be selected.

Telecontrol & Telecommunications

The principles and criteria set hereunder shall be used by NS Power in determining the methods used and timing of procurement and replacement of its Telecontrol and Telecommunications facilities and services.

Definitions

- *Telecontrol Facilities* includes equipment which is used to provide supervisory control and data acquisition (SCADA), remote control, special protection systems and teleprotection.

- *Telecommunication Facilities* includes broadband transport mediums such as: fibre optics, microwave radio, UHF and VHF radio, metallic-pair cable, power line carrier, and systems which employ these mediums to transfer voice and data communications from one location to another such as: telephone, mobile radio, telecontrol equipment, computer networks, video, etc.

General

Telecontrol and telecommunications are essential for the protection and control of the Bulk Power System. They allow for remote monitoring and control of the power system through SCADA and provide for high speed protection of generation and transmission facilities through teleprotection and special protection systems (SPS). Telecontrol and telecommunications are also required to ensure compliance with Northeast Power Coordinating Council (NPCC) and the North American Electric Reliability Corporation (NERC) Reliability Standards. Telecontrol and telecommunication facilities are not used directly for the supply of electricity to NS Power customers. They are enabling technologies which help to satisfy NS Power's business requirements to serve its customers in the most economical, effective and safe manner possible. The need for the application of this technology is driven by the above requirements.

Telecontrol & Telecommunications - Economic Justification Procedure

The following considerations are used to evaluate the economic justification for procurement and replacement of telecontrol and telecommunication facilities and services on the Nova Scotia Power Inc. system.

Procurement of Facilities and Services
The procurement of telecontrol/telecommunication facilities and services shall be made according to the following process:

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- Examination of basic needs and alternatives (e.g. why is this required, why now, what other options are available, what are the consequences of doing nothing?).

- Examination of suitable technologies to provide an appropriate solution(s).

- Evaluation of alternative means of acquiring the above technologies including: design and build NS Power owned facilities and provide services using NS Power staff; rent or lease facilities and provide services using NS Power staff; rent or lease facilities and contract to others for services; and variants of the above as appropriate.

  Each alternative will be subject to full life cycle economic analysis which will include: capital costs, lease/rental costs, NS Power operating costs, contract costs and taxation.

- The alternatives will be ranked using the most appropriate measure (e.g. Net Present Value (NPV)), and the best alternative will be chosen (i.e. highest NPV or lowest Net Present Cost, etc.).

- Replacement of Facilities and Services.

- Capability to meet industry norms for performance, such that NS Power's ability to provide its customers with the required levels of service are not compromised.

- Obsolescence and/or lack of support from facility, spare parts and service suppliers, such that NS Power incurs unacceptable risk of financial loss and/or liability.

- Ability to provide the lowest overall operating costs to NS Power.

- Required to ensure compliance with NPCC and, or NERC Reliability Standards.

17.14 Information Technology Application and Hardware System

Information Technology (IT) is subject to rapid evolution, obsolescence, and evolving customer expectations. Accordingly, categories and justifications for IT capital investments vary, from mitigating risks associated with obsolescence to meeting customer needs and expectations. IT projects can be broadly justified under the following sub-criteria:

- Technical
- Economic
- Customer Experience

IT capital projects may be justified primarily under one of these sub-criteria or under a combination of them all. These categories and their justifications are expanded upon below.

Technical

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Technical projects are driven by criticality and condition based risk assessments of in-service assets. They are most frequently associated with mitigating risks associated with obsolescence, security, and system performance to meet requirements of the utility to serve customers. Technical projects are ranked according to the ranking matrix and methodology outlined in Section 6.2.

Economic

Economic projects are driven by opportunities to operate in a more cost effective manner. Economics may also be associated with Technical, and Customer Experience projects.

Customer Experience

Customer experience projects are driven by either stated or predicted needs of customers, and are reasonably expected to provide improvements to their experience and interactions with NS Power.

Information Application and Hardware Systems - Economic Justification Procedure:

The following procedures will be used to evaluate the purchase, replacement or upgrade of Information Application and Hardware Systems at NS Power:

- Any Information Application and Hardware System which fails or is predicted to fail NS Power's requirements for capacity, security or service levels will first be evaluated as to NS Power's current and future requirements.
- An economic evaluation will then be completed to determine the most cost effective alternative. Included in these alternatives will be the cost to:
    - Repair the Information Application and Hardware System to such a state as to meet NS Power's requirements.
    - Upgrade or modify other Information Application and Hardware Systems so as to eliminate NS Power's requirement for the plant in question.
    - Replace the Information Application and Hardware System as to maintain current business requirements.
- Any repairs, upgrades or modifications will be costed as per the manufacturer's and NS Power's specifications and standards. The costs for completing this work will include and compare NS Power's total cost of ownership (TCO) and/or manufacturer's costs. Included in these costs will be all capital, operating and maintenance labour, material, overheads, expenses, shipping and all other relevant costs or factors over the asset's expected useful

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life, which may affect these costs (i.e. availability of labour, material, revenue, etc.). Please refer to Section 6.7.5 for more information on TCO.

- New Information Application and Hardware System will be evaluated on a least cost basis considering the total cost of ownership (TCO) which satisfied NS Power's current and future requirements. Alternatives to purchasing new systems will include: modifications to existing systems, technological availability, capital, operating and maintenance costs such as labour, material, overheads, expenses, shipping and all other relevant costs or factors over the asset's expected useful life.

- The least cost technically acceptable option meeting all the requirements and constraints specified above shall be selected. The Total Cost of Ownership, as defined in Section 6.7.5, should be considered in the analysis.

17.15 Vehicles

Nova Scotia Power requires vehicles for the effective delivery of its services. There are two broad classifications used for vehicle identification; transportation and work vehicles.

Transportation vehicles are primarily used for transportation of personnel. Vans, cars, sport utility vehicles and trucks are considered transportation vehicles.

Work vehicles provide Nova Scotia Power personnel with the means to conduct their day-to-day work. Bucket aerial trucks, digger trucks, cranes, off road equipment, pole and wire trailers make up the majority of vehicles in this classification.

Vehicle Replacement Process

The first step in the review of any vehicle for potential replacement is that it meet the life cycle costing methodology initial screening criteria.

Vehicles proposed for replacement based on the screening criteria of vehicle age, kilometres and maintenance history are then subject to a mechanical inspection and analysis.

As part of this exercise, a Vehicle Standardization Committee made up of user group members establishes that the type of vehicle is still the most appropriate for the work use. As job functions change and new technologies evolve, a different vehicle may be specified.

Vehicle expenditures and decisions on vehicle maintenance and replacement are the responsibility of Fleet Services.

The Fleet Services group provides predictive maintenance information on each class of vehicle, along with individual vehicle records. This group also provides technical support and guidance for the selection of the appropriate vehicle for each class. The premise of vehicle replacement is

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to achieve the most economical decision based on life cycle costing, which includes predictive maintenance, age and kilometres.

NS Power follows the life cycle costing methodology to establish units that are a potential for replacement. Vehicle replacements are ranked and scheduled based on the overall benefits to all operating units.

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Appendix A: Capital Projects within the NS Power Routine Program

Generation Routines

Generation Equipment Replacements

Each generating unit forecasts projects relating to capital replacements for repair and/or refurbishment of equipment that are not large enough in scope and magnitude to be justified as individual capital projects. The value of the equipment replacement routines will vary from year to year.

Upon identification of failure or deterioration in performance, a like for like replacement is completed immediately in the case of failure or at the next scheduled maintenance outage for the affected unit.

Generation Other Hydro

This routine provides for the costs associated with managing/reducing the risk of environmental events and security requirements for the hydro facilities. It also includes the acquisition of new land properties for business support activities and/or retiring land properties that are no longer business viable or required.

Annual condition-based analysis will dictate the scope of work required for each hydro facility.

Generation Other Thermal

This routine provides for the costs associated with efficiency-driven projects. These projects must directly impact and improve the Unit heat rate.

Transmission Routines

Transmission Substation Replacements, Additions, Modifications

This routine provides for the replacement of deteriorated or failed circuit breakers, bushings, instrument transformers, arrestors, batteries, chargers, switches, etc; modification or upgrade of existing equipment to prevent damage, extend serviceable life or reduce customer outages; replace primary equipment spares; and the retirement of failed or deteriorated transmission substation plant.

The replacement of deteriorated or failed equipment is immediate. Modifications are initiated as a result of identified system problems following a review of options. These are minor in nature. The least cost option meeting the requirements and constraints specified shall be selected.

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Primary Equipment Spares

This routine provides for the costs associated with ensuring an adequate level of spare substation equipment is maintained for high voltage system components.

Protection Modification & Replacement

This routine provides for transmission substation protective relays, under frequency load shedding, automatic line reclosing, metering, fault and sequence of event recorders along with spare relays and components that fail or are damaged during the year. It also covers minor modifications to inadequate protection and control logic schemes.

Minor modifications result from a change in system protection design criteria and can be traced back to the inadequacy from standard. This work is carried out in a planned manner with other work being carried out in the substation.

Damaged and failed equipment are replaced as soon as possible to maintain the operation of the substation.

Transmission Line Replacements, Additions, Modifications

This routine provides for the reactive and planned replacement of transmission line components.

Poles, structures and insulators which have been damaged or broken are replaced to maintain the transmission lines. Visual inspection or accident reports are used to identify the required replacement.

To maintain the service level, such failures are replaced immediately. The transmission line inspection program prioritizes circuits for component replacements on an annual basis.

Distribution Routines

Meters

This routine provides for the costs of purchasing and installing all classes of meters for customers.

Please refer to Capital Expenditure Justification Criteria: Metering Equipment for the justification criteria relating to metering.

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Distribution Upgrades and Replacement

This routine covers the costs associated with reactive distribution plant replacement, planned distribution plant replacement, upgrades to the distribution system to achieve system performance improvements, the replacement of distribution assets as a result of damage caused by storms, and the replacement or addition of distribution assets that are required to accommodate government regulations.

Reactive distribution plant replacement is a result of equipment failing due to age, deterioration or destruction by outside forces (vehicles, vandalism, etc.). Planned distribution plant replacement is undertaken as a result of inspection programs.

The routine is estimated based on a combination of units to be replaced at an average unit cost and project costs as a result of inspection programs.

New Customers

This routine covers the utility's cost of adding new customers to the electrical system. Capital contributions required in aid of construction are governed by the Regulations approved by the Nova Scotia Utility and Review Board.

This routine is submitted on a Province wide basis based on an estimated number of new customers and on average per customer cost.

The vast majority of new customer connections result in a request for service. This initial contact established the timing, cost and complexity of the addition. Primary customers served at higher voltages require NS Power discussions regarding transformation, location, timing and detailed plans including costs.

Joint Use

There are three components which provide the funding level of the Joint Use Routine. Local field district work, Provincial sale of distribution poles under the Joint Use agreement to Bell Aliant and all other Joint use work contribute to the annual budget.

During the preparation of NS Power's ACE Plan, Bell Aliant may not have not prepared their province wide priorities for work to be carried out. As a result, NS Power identifies the total value of work it is prepared to do and sub-divides this work into field district level upon priority setting. This exercise combined with NS Power priorities for Joint Use work provides the basis for the annual budget development.

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Right-of-Way Widening

This routine provides for costs associated with right-of-way widening for both the distribution and transmission systems. Provincial Right of Way Widening often requires acquiring additional easements and is equivalent to newly purchased land. NS Power proactively widens right-of-ways where it is deemed that vegetation issues could result in a degraded reliability performance on the power system.

General Plant Routines

Work Vehicles

This routine covers the replacement and any additions to the transportation vehicle fleet. The item is prepared Province wide and managed by the Fleet Services group.

Please refer to Capital Expenditure Justification Criteria: Vehicles for the justification criteria relating to vehicle purchases.

Tools and Test Equipment

This routine covers tools and test equipment for field and plant operations. Customer Service, Hydro and Thermal each submit a province wide budget for tools and equipment which meet materiality and criteria requirements.

Telecommunications

This routine covers replacements and modifications in six areas, when the equipment has failed or is unserviceable.

- Mobile Radio Network & Systems Routine

  This includes mobile radios, portable radios, or remote control units, repeaters, gap filler repeaters, or base stations, cards and components, antennas, waveguides and power supplies.

- Voice Network & Systems

  This includes PBX Cards, disk drives, power supplies, software & component upgrades, telephone sets, fax machines, and wiring due to office moves.

- Telecom Systems Broadband Network & Systems

  - Broadband Network and Systems: Includes multiplexor, radio, and related system cards, power supplies, antennas, waveguides, fibre optic splice components, patch panels, and connectors.

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- Cable System and Circuits: Includes NS Power metallic and fibre cables and related termination equipment, positron cable protection installations as jointly identified by NS Power & Bell, individual communication channels and related materials.

- Voice Networks and Systems: Includes system operations voice system (SOPS), SOPS telephone sets, telecom site phones and order wire.

- Network Management Systems: Includes network management servers and software, telecom alarm monitoring devices and site monitoring equipment.

- Telecommunications Spares

  Includes: Maintenance Spares for telecommunication equipment and facilities, broadband networks and systems, cable systems and circuits, voice networks and systems and network management systems.

- Telecommunications Sites

  Includes: Upgrades and improvements to NS Power radio sites and telecommunication sites (i.e. backup generators), HVAC replacements, fences, buildings, etc.

- SCADA/Telecontrol Network & Systems

  Includes: Teleprotection, telemetry, and SCADA system, cards, components and power supplies, etc. (includes Ragged Lake Facility)

Computing Asset Management

This routine provides for the acquisition of hardware and software products to maintain the cost effective, secure and efficient operation of NS Power's computer and network facilities. The computer and network facilities are used for the development and operation of the financial, customer, human resources and engineering information processing applications for NS Power.

This routine includes the purchase of hardware and software products required for the continuing operation of the file servers distributed across the province, the midframe and mainframe platforms located at the main computer facility at Ragged Lake, and the computer data network which links these.

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Property Improvements and Furniture

This routine provides for improvements to NS Power property. These improvements can include environmental compliance work, or infrastructure replacement such as door, window and roof replacement. The routine work is based on on-going review of the state of NS Power land and buildings as identified by field and facilities staff evaluation.

This Routine also provides for the replacement of office and warehouse furniture and equipment. Furniture and equipment purchased as part of a new facility are not included in this item.

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Appendix B: Capital Item Documentation Policy & Review Requirements

Objective

To specify the documentation required to provide reasonable assurance that capital expenditures at Nova Scotia Power Inc. are incurred for the maximum benefit of the customer while ensuring compliance with applicable laws, regulations, and internal policies and processes.

Purpose

Documentation is prepared and retained for every capital project for the following reasons:

- To provide assurance that the capital expenditure(s) were necessary, that alternatives (including the status quo) were evaluated, that cost data was analyzed, and that an economic analysis was performed (if applicable);
- To demonstrate compliance with applicable laws, code of conduct, regulations and internal policies and processes;
- To communicate employee responsibility and accountability for the planning, management and control of spending activities relating to capital;
- To provide a source of historical information which can be referenced for future budgeting and spending; and
- To facilitate the transfer of project responsibilities and to assist in training.

Scope

This policy applies to all capital spending including routine and non-routine spending.

Accountability

Each capital project owner (person responsible for the project) is accountable for maintaining the appropriate level of documentation to support capital decisions, including development, justification, cost analysis and spending.

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Analysis of Alternatives

All alternatives must be reviewed prior to initiating a capital project. Generally, alternatives are developed through self-generated ideas, discussions with suppliers and consultants, technical articles, general utility trends, or a combination of the above. Some of these alternatives may not be feasible for various reasons and, in the end, usually several alternatives are examined using the Economic Justification Criteria. However, proper documentation shall be provided outlining the reasons why certain alternatives were not considered feasible (see Exhibit 'A').

Review and Approval Process

There will be two levels of review:

Level 1 Review (*See Table 1*)

This review is performed by:

- Person(s) responsible for planning, budgeting, controlling and managing the project (person responsible for the project),
- Person(s) responsible, within the Division/Department, for initial approval of the project. Approval is subject to the item meeting the Capital Expenditure Justification Criteria in place at the time the project is approved.

Documentation Requirements:

Sufficient documentation will be maintained to support the financial and technical content of the item from the ACE Plan, including the project in rate base and continues until the project is complete and received final cost approval. All documentation which provides assurance that the capital program is executed for the maximum benefit of the customer, while ensuring compliance with applicable laws, regulations, and internal policies and processes, will be accessible by or directed to those person(s) who have the authority to act on it, including NS Power Management and Internal Audit, Revenue Canada, and the Nova Scotia Utility and Review Board (see Exhibit 'A' for guidance).

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Level 2 Review (*See Table 1*)

This review is performed by:

- Person(s) responsible for final corporate approval of the capital item and confirming that the item meets the technical and financial criteria contained in the Capital Expenditure Justification Criteria at the time the project is approved.

Documentation Requirements:

Sufficient documentation will be maintained to provide reasonable assurance that the item meets NS Power's financial and technical justification criteria as contained in the Capital Expenditure Justification Criteria Document. All documentation which provides reasonable assurance that the criteria have been met will be accessible by or directed to those person(s) who have the authority to act on it, including NS Power Management and Internal Audit, Revenue Canada, and the Nova Scotia Utility and Review Board (see Exhibit 'A' for guidance).

Table 1

Process	Level of Review
ACE Plan Initiation & Approval	Level 1 & 2
Capital Spending Approval (Activation)	Level 1 & 2
Capital Monitoring (Cost Control)	Level 1
Capital Forecasting	Level 1
Capital Item Authority to Overspend (ATO)	Level 1 & 2
Rate Base Inclusion	Level 1 & 2
Final Costing	Level 1 & 2

File Content Guidelines

Exhibit 'A' provides a guideline for the documentation to be maintained in the capital file(s).

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Records Retention Period

All capital files should be maintained for a minimum of six years from the in-service date of the asset to meet the Taxation Authorities requirements. Prior to six years a letter of permission must be obtained from the Taxation Authorities before the capital file(s) is (are) destroyed. The Corporate Tax Services Department and the Secretary and General Counsel Division should be contacted for assistance if required. Retention beyond the minimal requirement of six years should be based on other requirements. For example, due to the long term nature of capital expenditures, certain support documentation contained in the capital file(s) may provide a source of information for future capital expenditures or may be required to support several expenditures over a specified planning period. In addition, certain legal, safety or environmental issues associated with particular capital projects may warrant a longer retention period than six years. In these and other instances, the retention period will be based on the particular situation.

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Exhibit A

Note: The descriptions provided are intended to be used as guidelines. The actual file contents will vary depending on the capital item.

Description	Contents	Level	
		1	2
A) Authorization Details	Authorization - Divisional approval If >$1M or U&U: Executive committee approval UARB approval - Corporate approval (approval detail can be found on Capital Item Detail Report)		x
B) Analysis of Alternatives	Includes : - Description of the possible alternatives associated with the capital project - Reasons why certain alternatives required no further analysis - Reasons for choosing the accepted alternative	x	
C) Capital Item Detail Information	Includes: Annual spending requirements - ACE Plan - Approved spending - Additional spending - Forecast - Final cost Online recommendations/approvals - Item recommendation - Item approval - Item activation Description - Scope - Project components/costs	x	x

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Description	Contents	Level	
		1	2
	Account listing - Account numbers - Responsibility codes - Amounts		

	Justification
	- Criteria & sub-criteria
	- Document(s) name & location
	- Person responsible
	- Memo
	  - Why do the project?
	  - Why now?
	  - Why this way?
	- References - legislation, regulations		

	Reason for over or under expenditure, final costing - Description		
D) Economic Analysis	Analysis output including: - Supporting documentation for revenue, capital & operating costs - All calculations & major assumptions - Recommendation - Qualitative factors - All other relevant support documentation	x	x
E) Correspondence	- UARB - Other	x	x

F) Technical & Financial Criteria (*See Capital Expenditure Justification Criteria*)	Working papers supporting
	- Derivatives & calculations
	- Explanation of changes in scope or amount
	- Source of costs
	  - Historical, standard
	  - Manufacturer quotes
		x	

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Description	Contents	Level 1	Level 2
	Budget estimates	x	
	Other relevant information - (*content will vary*) Examples include: - Regulations, acts, codes - Permits, licences, guidelines, agreements - Engineering studies & assessments - Pole test results - Planning reports - Outage reports - Retreatment data - Insulating oil, insulations, circuit interrupter, electrical protection, battery tests - Annual inspection reports, stave sampling, performance reports - Production models - Joint use information	x	
G) Cost Control, Final Costing	Cost monitoring, forecasting & final costing - Reports (eg. work scheduling) - Supporting worksheets and analysis	x	
	Retirement Information	x	
	Tenders and bid evaluations	x	
	Financial reports, including - Power Plant Information- General ledger - Purchasing & Accounts Payable - Labour Distribution - Documentation to support assumptions, decisions, or other factors which change the expected cost and/or scope of the project.	x	

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Appendix C: System Design Criteria

NOVA SCOTIA POWER
An Emera Company

NS Power
System Design Criteria

Report number NS Power-TPR-003-4

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REVISION RECORD

Date	Version Number	Approver , Date Signature		Comments
1995/01/12	0			Initial document
2010/10/07	1	T. Leopold		Updated to align with changes to System Design Criteria and better align with NERC/NPCC standards
2013/05/10	2	P. Zinck		Revised fault clearing time requirements for Primary and Secondary Transmission, contingency loading for Remote Transmission, and system transformer loading.
2016/03/24	3	D. Stanford	24-Mar-16	Updated to include Looping Policy
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PURPOSE

The purpose of this document is to state the Nova Scotia Power Inc. (NS Power) planning and development criteria to be applied to new additions to NS Power transmission system planned or constructed after the effective date of this document. NS Power's transmission system is divided into four classifications, each of which is governed by different design criteria. Where and when applicable, NS Power criteria will be superseded by the Northeast Power Coordinating Council (NPCC) criteria.

The NS Power classifications are as follows:

1. Primary Transmission
2. Secondary Transmission
3. Electrically Remote Transmission
4. Transformation

The NS Power System Design Criteria combine protection performance specifications with system dynamics and steady state performance requirements. When system expansions are undertaken, facilities are to be constructed such that the criteria are met. The specified speed of protection systems must be achieved unless faster speeds are specified or slower speeds are accepted based on system studies. System studies to determine adequacy and investment requirements must be conducted using the actual characteristics (setting and operating time) of existing protection systems.

DEFINITIONS

1. **Normal system conditions** are defined to include all of the following:

    a. Expected load conditions.
    b. All transmission facilities in service (no line or transformer maintenance).
    c. Economically scheduled and dispatched generation allowing for planned generator maintenance outages (non-firm generation is not included as economically dispatched generation). Economic dispatch may be influenced by environmental or regulatory restrictions.
    d. Stable steady-state operation of the Interconnected Transmission System.
    e. All system voltages within 95% to 105% of nominal, unless otherwise noted.
    f. All system elements operating within their continuous thermal ratings, unless otherwise noted.
2. A **system element** is defined to be any one generator, transmission line, transformer or bus section.

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3. **Breaker back-up** is defined to be protection against a local breaker's failure (mechanical or electrical) to trip when initiated by an associated protection operation. The term "**Breaker failure protection**" is used interchangeably in this document.
4. **Single contingency** is defined as loss of one **system element** with or without a fault.

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1. PRIMARY TRANSMISSION SYSTEM

Primary Transmission is defined as 230kV and above.

The protection system must be designed with redundancy to cater to any single element failure, in keeping with good utility practice and conform to industry standards.

Unless otherwise specified, and determined appropriate by transient stability studies, the following fault clearing times will be applied to the Primary Transmission system. Any deviations from these criteria must be submitted to the system planning group for approval.

a. For a three phase or phase to ground fault on the local bus or on any element directly connected to the local bus such that it is within the instantaneous protection zone for that element (e.g. 21Z1, 87, 50) the fault contribution clearing time will be 4 cycles.
b. Where breaker failure protection is required to trip local breakers to isolate the fault described in item (a), the fault clearing time will be 12 cycles.
c. Where breaker failure protection is required to trip remote breakers to isolate the fault described in item (a), the fault contribution clearing time will be 14 cycles.
d. For a three phase or phase to ground fault on any element directly connected to the local bus such that it is outside the instantaneous protection zone for that element (e.g. 21Z2, 51) the fault contribution clearing time will be 6 cycles.
e. Where breaker failure protection is required to trip local breakers to isolate the fault described in item (d), the fault contribution clearing time will be 14 cycles.
f. Where breaker failure protection is required to trip remote breakers to isolate the fault described in item (d), the fault contribution clearing time will be 16 cycles.

Breaker failure protection will be applied to all Primary Transmission.

The design criteria are:

1. From normal system conditions, the Interconnected Transmission System dynamic response shall be stable and positively-damped following a permanent three-phase fault on any one system element cleared in prime time. No cascade tripping shall occur.
2. From normal system conditions, the Interconnected Transmission System dynamic response shall be stable and positively-damped following a permanent line-to-ground fault on any one system element cleared in prime time. No cascade tripping shall occur.
3. From normal system conditions, the Interconnected Transmission System dynamic response shall be stable and positively-damped following a permanent line-to ground fault on any one system element cleared in breaker back-up time. No cascade tripping beyond elements cleared by the operative back-up protection shall occur.

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4. From normal system conditions, following loss of any one system element with or without fault, all system elements shall be within 110% of their thermally limited ratings under the condition that the System Operator can take action within a 10 minute period to reduce load on the element.
5. From normal system conditions, for the loss of any one system element with or without fault, steady-state post-contingency Interconnected Transmission System bus voltages shall be not less than 90% or greater than 110% of nominal following correction by automatic tap-changers. In addition no bus shall experience a voltage change from pre-fault to post-fault condition greater than 10% before movement of tap-changers.
6. As far as possible, provision should be made to ensure that no fault is left permanently on the system.

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2. SECONDARY TRANSMISSION SYSTEM

This category includes all other loop transmission facilities, operating higher than 100 kV, which are not included in the Primary Transmission nor the Electrically Remote Transmission categories.

The protection system must be designed with sufficient redundancy to cater to any single element failure, in keeping with good utility practice and conform to industry standards. The following fault clearing times will be applied to the Secondary Transmission system. Any deviations from these criteria must be submitted to the system planning group for approval.

a. For a three phase or phase to ground fault on the local bus or on any element directly connected to the local bus such that it is within the instantaneous protection zone for that element (e.g. 21Z1, 87, 50) the fault contribution clearing time will be 6 cycles.

b. Where breaker failure protection is required to trip local breakers to isolate the fault described in item a), the fault contribution clearing time will be 14 cycles.

c. Where breaker failure protection is required to trip remote breakers to isolate the fault described in item a), the fault clearing time will be 16 cycles.

d. For a three phase or phase to ground fault on any element directly connected to the local bus such that it is outside the instantaneous protection zone for that element (e.g. 21Z2, 51) the fault contribution clearing time will be 8 cycles.

e. Where breaker failure protection is required to trip local breakers to isolate the fault described in item d), the fault contribution clearing time will be 16 cycles.

f. Where breaker failure protection is required to trip remote breakers to isolate the fault described in item d), the fault contribution clearing time will be 18 cycles.

Breaker failure protection will be applied to Secondary Transmission if system studies determine the requirement.

The design criteria are:

1. From **normal system conditions**, the Interconnected Transmission System dynamic response shall be stable and positively-damped following a permanent three-phase fault on any one **system element** cleared in prime time. No cascade tripping shall occur.

2. From **normal system conditions**, the Interconnected Transmission System dynamic response shall be stable and positively-damped following a permanent

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line-to-ground fault on any one **system element** cleared in prime time. No cascade tripping shall occur.

3. From **normal system conditions**, the Interconnected Transmission System dynamic response shall be stable and positively-damped following a permanent line-to ground fault on any one **system element** cleared in **breaker back-up** time. No cascade tripping beyond elements cleared by the operative back-up protection shall occur.

4. From **normal system conditions**, following loss of any one system element with or without fault, all system elements shall be within 110% of their thermally limited ratings in steady state, under the condition that the System Operator can take action within a 10 minute period to reduce load on the element.

5. From normal system conditions, for the loss of any one system element with or without fault, steady-state post-contingency Interconnected Transmission System bus voltages shall be not less than 90% or greater than 110% of nominal following correction by automatic tap-changers. In addition no bus shall experience a voltage change from pre-fault to post-fault condition greater than 10% before movement of tap-changers.

6. As far as possible, provision should be made to ensure that no fault is left permanently on the system.

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3. ELECTRICALLY REMOTE TRANSMISSION SYSTEM

This category is defined by the buses at which the ultimate fault levels will not exceed 1,500 MVA three-phase.

1. The Interconnected Transmission System dynamic response shall be stable and positively-damped following a fault on any one **system element.**

2. From normal system conditions, following a **single contingency**, all system elements shall be within 110% of their thermally limited ratings under the condition that the System Operator can take action within a 10 minute period to reduce load on the element.

3. From **normal system conditions**, for any **single contingency**, steady-state post-contingency system bus voltages shall not be less than 90% and not be greater than 110% of nominal following correction by automatic tap-changers. In addition, no bus shall experience a voltage change from pre-fault to post-fault condition greater than 10% before movement of tap changers.

4. As far as possible, provision should be made to ensure that no fault is left permanently on the system.

5. **Breaker back-up** will be applied to Electrically Remote Transmission if system studies determine the requirement.

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4. TRANSFORMATION

Capacity for any individual transformation point shall, under **normal system conditions**, be sufficient to meet the daily load requirements after due consideration is given to the following:

a. Economic dispatch or outage of generation.

b. Loading of transformer(s) to their (or their associated equipment) thermally limited ratings.

Reinforcement is required in all cases when, for a single contingency, there will result either, thermal damage to equipment in attempting to continue to supply the load, or, inability to meet the daily load requirements in whole or in part after due consideration is given to the following:

a. The capacity of the underlying interconnection(s) with another supply point(s) when applicable.

b. Out-of-merit running of generation when applicable.

c. Loading of remaining station(s) transformer(s) to their (or their associated equipment) thermally-limited ratings as per the Notes below. (This in conjunction with (a) and (b) above as applicable.)

d. Largest available **suitable** mobile transformer loaded to its nameplate rating. (This in conjunction with (a) and (b) above as applicable.)

Notes:

1. Reinforcement may be the economic choice even if (a), (b) and (c) or (d) result in satisfaction of the load supply criterion because estimated out-of-merit costs may significantly exceed the costs of capital advancement.

2. In accordance with methods accepted within North America, and particularly with reference to "C57.91-1995 IEEE Guide for Loading Mineral-Oil-Immersed Transformers", it is NS Power practice to permit the loading of transformers to exceed the nominal or nameplate value.

3. For distribution load serving transformers to exceed the nominal or nameplate value, where calculations are not specifically conducted, overload capability assumptions based on normal cyclic daily loading may be made, but shall not exceed 133% of top nameplate rating. In any case the maximum overload capability is not to exceed the current NS Power SCADA Alarm limits. In special circumstances, such as **single contingency** situations where some means of reducing the overload exists, a thermal rating based on a loss of life of 2 1/2% may be applied to distribution load serving transformers, in

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accordance with the above and engineering judgment. The loss of life permitted is measured over the time required to reduce the loading on the transformers. This may be done by switching low voltage circuits or relieving load by use of a mobile transformer.

4. For system power transformers, where calculations are not specifically conducted:

   a. Under system normal, loading is limited to 100% of the 65°C manufacturer nameplate MVA for summer and 110% for winter;

   b. Under contingency, the 15 minute short time rating is limited to 110% of the 65°C manufacturer nameplate MVA for summer and 120% for winter, provided that the system operator has the means to reduce the overload to system normal rating within 15 minutes;

   c. Consideration should be given to the ratings of the auxiliary equipment such as CTs, PTs, bushings and tap changers.

   When no means of reducing the overload exists, a 0% loss of life is used.

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Nova Scotia Power Inc. Capital Planning & Capital Expenditure Justification Criteria
Detailed Document

Attachments

A. NOVA SCOTIA POWER INC. RADIAL TRANSMISSION POLICY

A radial load is a load center, such as a substation, that provides power to a large population, connected to the power grid via a single transmission line. Loss of a radial transmission line results in loss of supply with no other way to connect the radial load to the grid. A single transmission line may have more than one radial load connected to it.

A lone substation, which is dedicated to a single customer, is not considered a radial load in this context. Any load, which is tapped from a transmission line connected between two supply points, is not considered a radial load since this load can be fed from either supply location.

Where the load on a radial transmission line exceeds 40 MW, a planning study will be undertaken. The planning study will examine options of reducing the size of the load by load transfer to other substations, by considering local generation in the vicinity, and by other practical load reduction methods.

The planning study will also examine options to improve the line performance such as: vegetation control, lightning mitigation, line upgrade, and other practical technological methods.

In the case of multiple radial loads, which are connected to one radial transmission line, the planning study will examine the option of installing remote switching at the upstream substations to provide fast restoration to the radial loads upstream from the faulted line section.

Implementation of the above "stepped" approach will be the first mitigation measure for any radial load above 40 MW. After implementation of these measures, should the vulnerable radial load remain above 40 MW and should the existing transmission supply exhibit deterioration in reliability, NS Power will evaluate options to improve reliability of service and limitation of load at risk, including looping two radials in close proximity, reducing load subject to a radial feed using DSM techniques (demand shifting, conservation, energy storage, distributed generation), and/or constructing a second transmission line to provide loop feed.

When load on a radial transmission line grows past 60 MW, a second transmission feed will be evaluated regardless of performance or stepped restoration.

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