

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 **2022 Annual Capital Expenditure (ACE) Plan**

2022 ACE Plan

Date Filed: November 26, 2021

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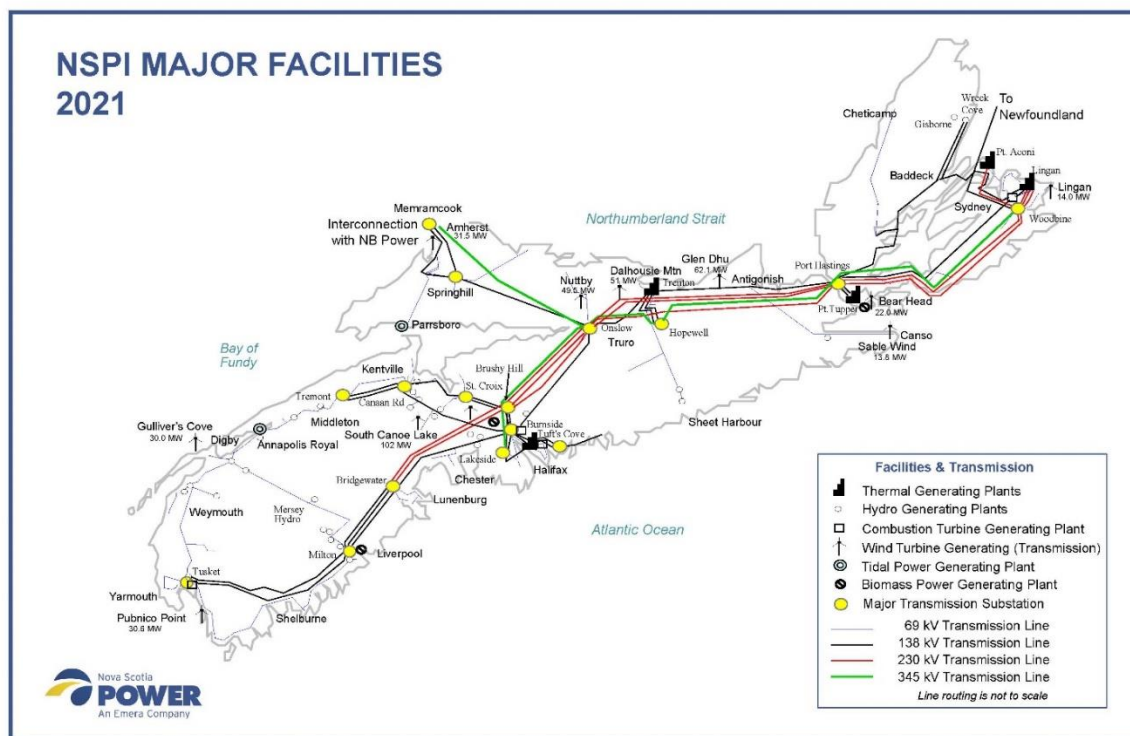
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Nova Scotia Power

2022 Annual Capital Expenditure Plan



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11		

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1 **1.0 EXECUTIVE SUMMARY**

2
3 The Nova Scotia Power Incorporated (NS Power, Company) Annual Capital Expenditure (ACE)
4 Plan Application provides customers, the Nova Scotia Utility and Review Board (NSUARB,
5 Board), and other stakeholders with a comprehensive and transparent overview of the Company's
6 intended capital investments for the year ahead.

7
8 NS Power is focused on its customers and providing them with safe and reliable electric service in
9 a cost-effective manner. The capital investments proposed under the 2022 ACE Plan are aligned
10 with these key objectives and continue to be vetted and planned in compliance with the NSUARB-
11 approved Capital Expenditure Justification Criteria (CEJC), while balancing affordability.

12
13 NS Power's total capital budget for 2022 (inclusive of capital projects under \$1,000,000 and Point
14 Aconi projects, as well as previously approved multi-year project profiles) is \$531.6 million. In
15 this Application, within the overall 2022 capital budget, NS Power is requesting NSUARB
16 approval of 24 capital work orders with total project investment of \$70.6 million and the 2022
17 capital routine program of \$110.5 million for an aggregate total of \$181.1 million.

18
19 In the 2020 Integrated Resource Plan (IRP), NS Power put forward a long-term strategy for
20 delivering safe, reliable, affordable and clean electricity to customers across Nova Scotia. Through
21 the IRP process, NS Power undertook a long-term system planning exercise to understand how the
22 electricity system will continue to meet the needs of customers and respond to changes in the
23 electricity planning landscape. This process informs ongoing investment, retirement, and operating
24 decisions that are in the best interests of customers over a 25-year planning horizon. NS Power
25 plans the system to be safe, reliable, affordable, clean, and robust under many potential future
26 outcomes. In the near-term, NS Power is undertaking "no-regrets" actions that further these
27 planning objectives and that were shown to be robust, or common, under many potential futures.
28 The IRP Action Plan was a key output of the 2020 IRP. The Action Plan identifies the critical
29 undertakings required over the near term to implement the long-term electricity strategy. NS Power
30 has identified near-term investment and operational strategies that satisfy its planning objectives

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1 while not closing off opportunities that may later prove to be advantageous. The investments in
2 the 2022 ACE Plan are aligned with the long-term strategy Action Plan that was confirmed through
3 the IRP and the Company's focus on reducing carbon emissions from its electricity generation
4 while maintaining affordability. The Company continues to assess changes in the planning
5 landscape and has engaged with both the federal and provincial governments respecting
6 decarbonizing with a goal of transitioning to clean energy in a way that is affordable for customers.

7
8 Since the IRP, on November 5, 2021, the Government of Nova Scotia enacted the Environmental
9 Goals and Climate Change Reduction Act. The legislation establishes the Province's goal of
10 having 80 percent of electricity in the Province supplied by renewable energy and the phasing out
11 of coal-fired electricity generation by 2030. As such, as part of the transition to renewable energy,
12 NS Power's 2022 capital budget includes subsequent submittal capital projects to assist the
13 Company in its plan to transition away from coal and achieve 80 percent renewables by 2030.

14
15 NS Power is reviewing impacts of the new Renewable Energy Standards (RES) on forecast
16 requirements for its thermal generating fleet to provide firm capacity and energy. NS Power
17 operates and maintains its generation fleet utilizing a well-established asset management program
18 that informs when appropriate capital investment is required. That philosophy will continue to be
19 applied to coal-fired generation units going forward, balancing the need for firm generating
20 capacity for the power system, reliable supply of electricity, and anticipated unit retirement
21 timeframes. The investments contained in the 2022 ACE Plan for the thermal generating fleet are
22 required in the near-term to support the continued safe, reliable operation of the assets.

23
24 The investments in the 2022 ACE Plan:

- 25
- 26 • Support NS Power's business priority of safe delivery of electricity service to customers.
27 Safety compliance projects contained in the 2022 ACE Plan include projects such as
28 upgrades to fire suppression systems and guard rail systems.
- 29
-

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- 1 • Continue to support ongoing environmental compliance, such as the maintenance of hydro
2 and wind renewable energy resources, and the continued remediation of PCBs and asbestos
3 through corresponding recurring capital programs aligned with regulation timelines.
4
- 5 • Align with coal-unit retirement planning and achievement of the 80 percent renewable
6 electricity standard by 2030, as recently mandated under the *Renewable Electricity*
7 *Regulations*.
8
- 9 • Provide benefits in communities throughout the province, including reliability focused
10 improvements on the T&D system and response to reliability challenges arising from
11 increasingly more severe weather. NS Power's transmission and distribution rights-of-way
12 widening program and T&D line and substation equipment replacements, and incremental
13 integration of new technologies and asset programs reduce the frequency and duration of
14 unplanned outages for customers, and result in improved customer reliability.
15
- 16 • Incorporate innovative approaches and solutions that enable the transition to 2030, enhance
17 the overall customer experience and strive to improve reliability of service at a cost that is
18 affordable for customers.
19

20 Traditional capital investments will continue to be augmented by projects focused on adapting to
21 Nova Scotians' evolving expectations for more innovative energy solutions, with easier access,
22 and increased digital control. Although these projects may not be primarily justified under the
23 "Innovation" criteria as defined in the CEJC, continuing to invest in innovation and projects that
24 improve customers' experience will be a fundamental component of NS Power's future capital
25 expenditures. This includes initiatives such as the Smart Grid Nova Scotia project, approved by
26 the Board on May 7, 2020, which is studying the benefits related to the adoption of Distributed
27 Energy Resources (DERs) and their centralized control through an Energy Systems Platform
28 (ESP). Investment in innovation and customer experience also includes initiatives to provide new
29 digital experiences for customers, such as the Customer Energy Management (CEM) project,
30 approved by the Board on October 21, 2021, involving the implementation of a web-based online

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1 system. This system will allow customers to access their Advanced Metering Infrastructure (AMI)
2 electricity use data and acquire insights to help them manage their electricity consumption. Also
3 through the CEM, NS Power is implementing the Time Varying Pricing (TVP) tariffs approved
4 by the NSUARB under matter M09777. Projects such as these allow easier access to NS Power's
5 products and services, thereby providing more choice and control for customers.

6
7 As noted above, the 2022 ACE Plan also includes subsequent submittal estimates for investments
8 related to the Company's plan to transition away from coal, known as the Eastern Clean Energy
9 Initiative (ECEI), which will employ innovative solutions to enable the transition and realize 80
10 percent renewable electricity in Nova Scotia by 2030. As policy development continues to evolve
11 in the coming year, the level of investment in ECEI in 2022 and beyond will be subject to change.

12
13 In addition to these transformative projects, the 2022 ACE Plan also includes projects that include
14 innovative elements, such as increasing investment in electric vehicles (EV) and associated
15 charging infrastructure,¹ which provides the opportunity to examine reliability/grid modernization
16 considerations with strategic evaluation of charging station placement.

17
18 NS Power continues to adapt to the changing landscape and evaluate workplans to balance capital
19 investments in the context of the COVID-19 pandemic, utilizing operational restrictions and other
20 short-term risk mitigation measures, such as project deferrals where necessary, without a material
21 adverse impact on the general reliability of the system. Changes continue to be implemented in
22 the business as the pandemic continues to evolve to allow operational and project work to progress
23 safely. NS Power's processes have been enhanced to include pandemic-specific safety
24 considerations, logistical risk for labour and materials, and provincial and federal restrictions and
25 protocols.

26
27 In keeping with NS Power's commitment to transparency in the ACE Plan process, the Company
28 intends to host a technical conference following submission to address any questions following

¹ Please refer to Section 10.4.

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- 1 initial review by intervenors. The 2022 ACE Plan also addresses the Directives arising from the
- 2 2021 ACE Plan Decision.²

² Please refer to Section 4.0.

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2.0 2022 ACE PLAN STRUCTURE

The following provides an overview of how the 2022 ACE Plan is organized.

- **Section 3.0 – Introduction** – This section provides a high-level summary of the overall expenditures in the 2022 ACE Plan, including a breakdown of expenditures into various categories such as sustaining and strategic capital, as well as a forecast of expenditures in those categories for the next five years.
- **Section 4.0 – 2021 ACE Plan Follow-Up** – This section addresses the status of items from the 2021 ACE Plan, including a list of capital items pending submission in 2021 from the 2021 ACE Plan, and the 2021 ACE Plan deferred and cancelled items.
- **Section 5.0 – 2022 ACE Plan** – This section provides a summary of all 2022 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 *Public Utilities Act*; however, the Company includes them in its ACE Plan for information 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.

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-
- 1 • **Section 7.0 - Transmission** - This section lists all transmission capital projects submitted
2 for approval, as well as related carry-over spending. Transmission assets transmit
3 electricity from the generation plants to the distribution system throughout the province.
4 Transmission includes assets and equipment operating at 69 kV level or higher, and also
5 includes substation assets.
6
 - 7 • **Section 8.0 - Distribution** - This section lists all distribution capital projects submitted for
8 approval, as well as related carry-over spending. Distribution assets include equipment for
9 delivering electric energy from substations to customers served at voltages below 69 kV.
10
 - 11 • **Section 9.0 - General Plant** - This section lists all general plant capital projects submitted
12 for approval, as well as related carry-over spending. General plant assets include computer
13 infrastructure and communication equipment, which comprise the majority of capital
14 expenditures in this category. Other items such as office equipment, vehicles, telecom,
15 construction equipment and buildings (except generating and substation facilities) are also
16 included within this category.
17
 - 18 • **Section 10.0 - Routine Capital Program** - This section lists all routine capital items
19 submitted for approval, by generation, transmission, distribution, and general plant.
20 Routine capital items are recurring annual expenditures for replacement of equipment (like-
21 for-like replacement), additions to existing equipment base resulting from system growth,
22 and addition of customers to the system.
23
 - 24 • **Section 11.0 - Directives and Miscellaneous** – This section provides information in
25 response to the various directives issued by the Board in respect to the Company's ACE
26 Plan over the years as well as other miscellaneous information previously included in the
27 Company's Application. The Board's directives include requests for information on
28 revenue requirement impacts, transmission and distribution investment reliability impacts,
29 and the ranking of projects submitted in the ACE Plan for approval.
30
-

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The 2022 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 2022 ACE Plan projects in Excel format (Appendix B)** – This provides the Board and interested parties a convenient reference of all expenditures in 2022, 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 Q3 Capital Reports (Appendix C)** – NS Power’s Q3 capital reports, submitted to the NSUARB on November 1, 2021, have been updated with 2022 ACE Plan projects submitted for approval and subsequent submittal, and provided in Excel format. The updated Q3 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).
- **The Excel version of NS Power’s Long-Term Capital Planning & Revenue Requirement table found in Section 11.1.1 (Appendix D)** – The table provides the Board and interested parties with the data required to examine the calculation and assumptions used to calculate the revenue requirement associated with NS Power’s ACE Plan expenditures.
- **2017-2021 Contingency Report (Appendix E)** – In accordance with the Board’s 2019, 2020 and 2021 ACE Plan directives, a complete listing of projects submitted for approval in 2017-2021 (either through or outside of the ACE Plan proceedings, including projects submitted for subsequent approval, but excluding U&U projects), that has been completed,

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1 including information as directed by the Board is provided in Excel format. Further detail
2 relating to this directive can be found in Section 11.1.7.

- 3
- 4 • **Cost Minimization Project Details (Appendix F)** – In accordance with the Board’s 2021
5 ACE Plan directive, supplemental specific project details are provided.

- 6
- 7 • **Management Plan for the Autotransformer Fleet (Appendix G)** – In accordance with
8 the Board’s 2021 ACE Plan directive, NS Power’s management plan for the
9 autotransformer fleet is provided.

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3.0 INTRODUCTION

3.1 2022 ACE Plan Summary

The Company's overall 2022 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 \$531.6 million. Within the overall 2022 ACE Plan budget, NS Power is requesting NSUARB approval of 24 capital work orders and the 2022 capital routine program, for a total approval amount of \$181.1 million.

Figure 1 and **Figure 2** below illustrate NS Power's overall capital budget for 2022 and total forecast capital spending for 2023 through to 2026, as well as NS Power's total annual capital expenditures by function.

Figure 1: NS Power Total Capital Spend: Historical, Budget and Forecast
(Millions of Dollars)



F = Forecast, B=Budget in above figure

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Figure 2: Total Annual Capital Expenditures by Function

(Millions of Dollars)

Year	Actuals						ACE Plan 2022	Forecast			
	2017	2018	2019	2020	2021 Q3 F*	2021 ACE Budget		2023	2024	2025	2026
Generation	\$129.6	\$100.2	\$129.7	\$88.0	\$178.2	\$149.6	\$202.2	\$242.3	\$153.3	\$127.6	\$145.2
Transmission	88.6	81.3	51.6	43.9	58.0	56.6	149.9	168.7	114.3	220.4	195.1
Distribution	79.1	114.6	166.8	143.6	116.1	97.5	107.6	90.6	91.1	92.5	94.0
General Plant	94.5	51.8	48.4	40.9	63.6	58.0	71.9	70.0	58.4	69.5	45.3
Total	\$391.7	\$347.9	\$396.5	\$316.4	\$415.9	\$361.8	\$531.6	\$571.6	\$417.1	\$510.0	\$479.6

*The 2021 Q3 Forecast includes actuals up to July and forecast amounts for the remainder of the year.

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

NS Power's capital investments in the 2022 ACE Plan focus on maintaining and improving existing system performance as well as enabling Nova Scotia to achieve a lower carbon future with 80 percent of the electricity in Nova Scotia coming from renewable sources by 2030. NS Power continues to make timely investments based on equipment condition and criticality in order to maintain the performance of assets for customers while in parallel continuing to develop and implement the investments that are necessary to transform the power system by the end of this decade.

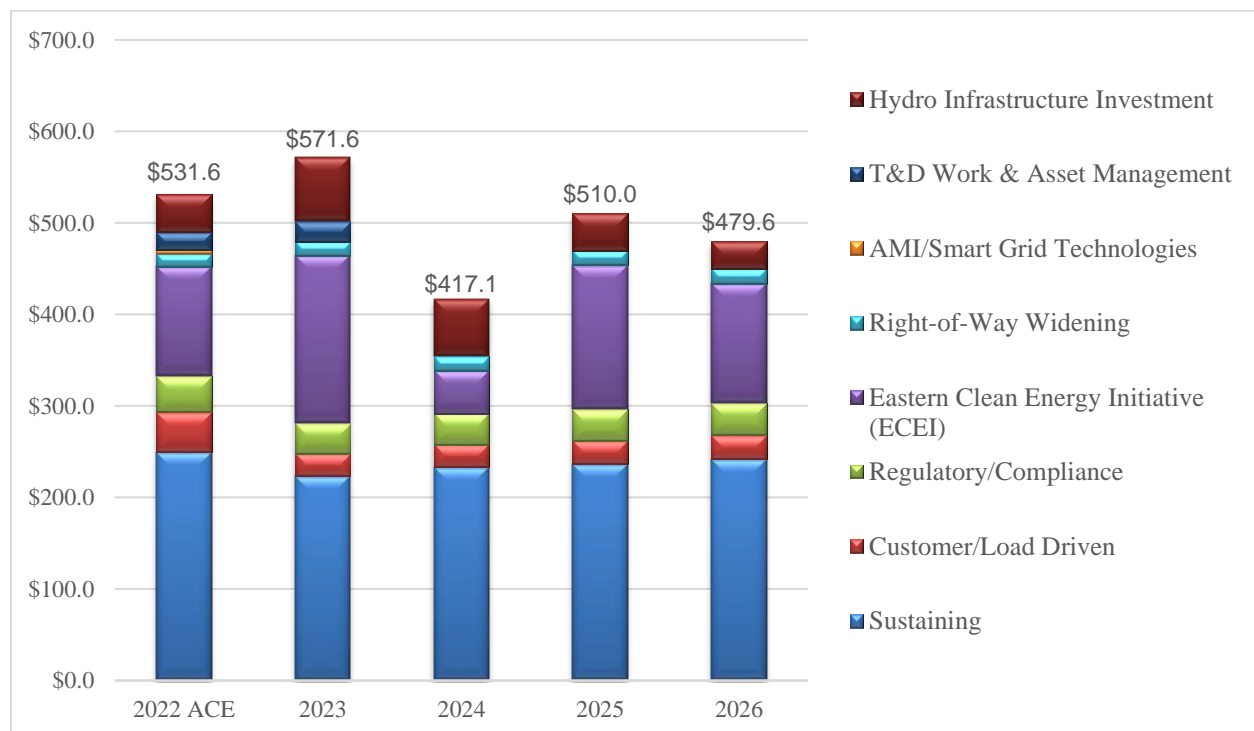
NS Power has a plan to achieve this through ECEI. It includes the Atlantic Loop which is a new Regional Transmission line to increase supply of renewable energy to the Atlantic region. It also includes a portfolio of innovative clean energy solutions. NS Power has approximately \$120M forecast in 2022 for subsequent submittal projects in relation to ECEI, the details and scope of which are under refinement and will be fully justified when filed by the Company. As policy development continues to evolve in the coming year, the level of investment in 2022 and beyond will be subject to change.

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Generation, transmission, distribution and general plant projects in the 2022 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.

As shown in **Figure 3** and **Figure 4** below, projected costs associated with ECEI and Sustaining Capital comprise the largest investment type for 2022. NS Power's investments toward sustaining the Company's assets, customer driven investments required for load growth, and investments required by regulatory or environmental standards are forecast to be relatively stable over the next five years. Capital investment as part of ECEI is also required to assist the Company in its plan to transition to cleaner energy and achieve 80 percent renewables by 2030.

Figure 3: Breakdown of Capital Forecast by Investment Type
(Millions of dollars)



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Figure 4: Breakdown of Capital Forecast by Investment Type
(Millions of Dollars)

Investment Type	2022	2023	2024	2025	2026
Sustaining	\$249.6	\$223.6	\$233.3	\$236.8	\$242.2
Customer/Load Driven	43.9	24.3	24.8	25.3	25.8
Regulatory/Compliance	39.3	32.9	33.6	34.2	34.9
Right-of-Way Widening	13.9	15.4	15.7	16.0	16.3
Eastern Clean Energy Initiative (ECEI)	119.7	183.4	47.2	157.5	131.0
AMI/Smart Grid Technologies	3.6	0.0	0.0	0.0	0.0
T&D Work & Asset Management	20.2	22.0	0.0	0.0	0.0
Hydro Infrastructure Investment	41.3	70.0	62.5	40.1	29.4
	\$531.6	\$571.6	\$417.1	\$510.0	\$479.6

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

Note: These figures are the Company's current forecast. The accuracy of these estimates will improve over time as new information informs the potential investments.

Section 11.1.1 of this Application (Impact of 2022 ACE Plan on Revenue Requirement and Affordability) shows that NS Power's capital expenditures for 2022-2026 reduce upward pressure on rates and revenue requirement cumulatively over the next five years. This takes into account the additional fixed cost recovery as a result of customer growth achieved through these capital investments made to serve new customers.

3.2 Relief Sought from the Board

NS Power respectfully requests Board approval of the following, in accordance with Section 35A of the *Public Utilities Act*:

- 24 Capital Items with 2022 budget investment of \$33.3 million and total project investment of \$70.6 million (please refer to Section 5.2); and
- Capital routine programs with 2022 budget investment of \$110.5 million (please refer to Section 10.1).

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4.0 2021 ANNUAL CAPITAL EXPENDITURE PLAN FOLLOW-UP

This section addresses items arising from the 2021 ACE Plan. These items include a summary of the outcome of stakeholder engagement discussions, a list of subsequent submittal capital items from the 2021 ACE Plan that are planned to be submitted before year-end, as well as items from the 2021 ACE Plan that have been deferred or cancelled.

In addition to the items noted for stakeholder consultation, the Board provided the following additional directives in its 2021 ACE Plan Order, all of which NS Power has complied with in the 2022 ACE Plan:

- *To report back to the Board as to the status of the management plan for the autotransformer fleet, as part of the 2022 ACE Plan filing.*³ Please refer to **Appendix G**.
- *To continue to provide more detailed information in its quarterly reports on the timing and anticipated costs of any projects deferred as a result of the COVID-19 pandemic.*⁴ NS Power has complied with the Board's Directive; updates have been provided in the Company's quarterly capital reports, and, although no direct deferrals have been reported to date in 2021, will continue to provide this detail, as applicable, going forward.
- *To continue to track the information related to contingency spending noted in Paragraph 92 of the Board's 2020 ACE Plan Decision, with certain modifications.*⁵ Please refer to **Appendix E**.
- *In subsequent ACE Plan applications, to continue to provide examples of cost minimization practices used during execution and construction of the prior year's projects, with specific project cost minimization efforts being fully described.*⁶ Please refer to Section 11.1.5 for further details on NS Power's cost minimization efforts, and **Appendix F** for supplemental project details.

³ M09920, NS Power 2021 Annual Capital Expenditure Plan, NSUARB Decision, June 10, 2021, page 47.

⁴ M09920, NS Power 2021 Annual Capital Expenditure Plan, NSUARB Decision, June 10, 2021, page 47.

⁵ M09920, NS Power 2021 Annual Capital Expenditure Plan, NSUARB Decision, June 10, 2021, pages 47-48.

⁶ M09920, NS Power 2021 Annual Capital Expenditure Plan, NSUARB Decision, June 10, 2021, page 48.

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4.1 Stakeholder Engagement

The NSUARB provided the following directive in its Order approving the 2021 ACE Plan:

Undertake stakeholder engagement to address the following issues:

- A better understanding of NS Power's cost minimization and project management practices;
- Development of criteria for the selection of projects to be included as specific examples of NS Power's cost minimization efforts;
- The capital cost threshold for which NS Power will conduct internal post project reviews;
- A framework and reporting protocols for a capital cost "lessons learned" business practice;
- Matters raised by the SBA in relation to the Non-Binding Contingency Guidelines, and the commitments made by NS Power, as set out in paragraph [105] of the Decision;
- Whether NS Power should be directed to improve its Non-Binding Contingency Guidelines to identify specific budget and planning practices that improve accuracy and support cost minimization in capital projects by:
 - i) fully implementing the AACE Recommended Practices, including creation of a checklist to classify project maturities; ii) documenting use of expert judgement when setting contingencies by applying predetermined guidelines using a matrix, or some other approach that demonstrates the basis for the budget contingency; and iii) applying contingencies to specific parts of the project budget, rather than routinely applying contingencies to the total project budget;
- Whether the Board's Contingency Directive should be expanded to require data on all projects with budgets or spending over \$250,000, and whether the scope of the data request should be wider;
- Whether NS Power should leverage the project contingency to help drive cost minimization, using a continuous process to increase the cost estimate accuracy throughout the planning process;
- Whether NS Power should make a greater use of scope variation allowances and report total contingency amounts, including scope variations, when furnishing information on capital projects;
- Whether the Board should direct NS Power to update the EAM to align with new practices and more recent data that affect the replacement cost of energy and the design of sensitivities;
- Whether NS Power should be directed to provide a full explanation of the current accounting treatment for all decommissioning-related costs;

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- Whether AMI implementation IT projects should not only support the time-varying pricing, but also ensure all customers are able to access details of their energy consumption. Further, whether NS Power should coordinate with E1 so that customers have immediate access to relevant information about saving energy and money when they access that information;
- Whether NS Power should provide to the Board a total cost of ownership estimate for the PAM IT project (CI 49094), and whether NS Power should be directed to routinely provide such information for IT projects with capital budgets over \$1 million; and
- Whether any learnings were derived from the COVID-19 project deferral experience and how these might be leveraged for future capital expenditure planning.⁷

In relation to the stakeholder engagement process and report, the Board provided the following in Directive 6:

Prepare a draft schedule, complete with milestone dates and a description of associated deliverables, for this stakeholder consultation process by July 9, 2021. The draft schedule is to be submitted to the Board and stakeholders for review and comments. The stakeholder consultation process is to conclude with a report to the Board describing the outcomes of the consultations. The Board directs that a report or reports be filed by September 30, 2021, in relation to all the matters referred to the stakeholder engagement process.⁸

In accordance with the NSUARB's directives, and as outlined in the Board-approved stakeholder engagement schedule, NS Power engaged with stakeholders and a report was submitted to the NSUARB on October 1, 2021. In its letter dated November 2, 2021, the Board, while acknowledging that agreement had not been reached on several issues, advised that it is satisfied that NS Power has complied with Directives 5 and 6 from the Board's 2021 ACE Plan Decision and accepts the Report as filed with respect to the engagement with stakeholders.

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

⁷ M09920, NS Power 2021 Annual Capital Expenditure Plan, NSUARB Order, June 10, 2021, Directive 5.

⁸ M09920, NS Power 2021 Annual Capital Expenditure Plan, NSUARB Order, June 10, 2021, Directive 6.

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4.2 2021 Capital Items Pending Submission

The NSUARB provided the following directive in its 2017 ACE Plan Order:

9. The Board directs NSPI to include, as part of their annual ACE Plan submissions, a list of projects which appear as items for subsequent submission in a prior years' ACE Plan filing, which have not been submitted for approval at the time of an ACE Plan filing, but which NSPI intends to submit by the end of the calendar year.⁹

Figure 5 sets out projects included in the 2021 ACE Plan as items for subsequent approval, but not yet submitted to the Board. NS Power has identified two subsequent submittal items that it anticipates will be filed with the NSUARB for approval by the end of 2021. These projects will carry over into 2022 and total \$21.0 million of 2022 forecast spending. These budget numbers were estimated at the time the 2022 ACE Plan was prepared and are subject to change as the scope and details of the projects are refined.

Figure 5: Pending 2021 Subsequent Submittal Items

CI#	Project Title	2022 Budget (\$)	Project Total (\$)
General Plant			
46075	IT - T&D WAM Phase 2 – Work Management and Scheduling & Dispatch <i>This project will upgrade and replace NS Power's T&D Work & Asset Management (WAM) and Scheduling & Dispatch systems, respectively.</i>	20,175,198	57,487,877
C0030987	IT - NERC CIP Environment Refresh* <i>This project is to refresh required NERC CIP infrastructure in the Control Centre and substations.</i>	856,233	1,446,131
Total Capital Items for Subsequent Approval		21,031,431	58,934,008

*Capital Item Related to NERC and/or NPCC Standards

⁹ M07745, NS Power 2017 Annual Capital Expenditure Plan, NSUARB Order, April 4, 2017.

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4.3 2021 ACE Plan Subsequent Submittal List Status Update

Figure 6 below provides an update to the list of projects that were identified by NS Power in the 2021 ACE Plan for later submission for NSUARB approval.

Figure 6: Subsequent Submittal Project Status Update

CI#	Project Title	ACE 2021		Updated		Status
		2021 Budget (\$)	Project Total (\$)	2021 Budget (\$)	Project Total (\$)	
Generation						
39472	HYD - Mersey Redevelopment Phase 1	9,441,871	159,822,112	4,577,527	189,447,076	2022 ACE Plan Subsequent Submission
48913	HYD - Tusket Facility Refurbishment	1,061,936	2,544,240	524,897	3,227,213	Deferred to 2023
49634	HYD - Trout River Diversion Screen Replacements	600,149	1,013,722	142,691	1,822,300	2022 ACE Plan Subsequent Submission
C0026285	TRE Heavy Fuel Oil Tank Refurbishment	1,644,255	1,732,921	2,969,981	2,979,546	Approved
Distribution						
C0008638	Cogswell HRM Redevelopment Program	300,967	2,904,326	170,204	6,982,854	2022 ACE Plan Subsequent Submission
47794	Heckman Island Underwater Cable Replacement	1,129,537	1,296,112	1,023,118	1,338,364	Approved
General Plant						
46075	IT – T&D WAM Phase 2 – Work Management and Scheduling & Dispatch	2,403,362	55,899,483	7,026,993	57,487,877	2021 ACE Plan Pending Submission
C0021839	IT - Customer Energy Insights Management	2,351,875	2,560,958	5,345,424	6,672,521	Approved
C0030987	IT - NERC CIP Environment Refresh*	1,318,786	1,318,786	1,128,683	1,446,131	2021 ACE Plan Pending Submission
C0011167	IT - Backup Infrastructure Upgrade	652,768	1,015,253	569,713	1,004,879	2022 ACE Plan Subsequent Submission

*Capital Item Related to NERC and/or NPCC Standards

4.4 2021 ACE Plan Capital Items Deferred / Cancelled

NS Power's list of deferred and cancelled capital work orders relative to the 2021 ACE Plan is contained in **Figure 7**. Given the timing of the filing of this Application, **Figure 7** does not include 2021 ACE Plan Subsequent Submittal items that are planned to be submitted after this Application has been filed and prior to 2021 year-end and does not include additional 2022 expenditures.

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These 51 projects were originally included in the 2021 ACE Plan with a forecast investment of \$25.0 million in 2021. Ten of these projects have been cancelled, while 41 have been deferred to future years. NS Power's asset management processes guide the Company's decisions related to project deferrals to assure risks are being appropriately managed and capital investments appropriately prioritized.

Of the 51 projects listed, no projects were included in the 2021 ACE Plan for approval. Five of these projects were listed in the 2021 ACE Plan subsequent submittal list, to be filed separately as individual capital items, 37 projects were listed in the 2021 ACE Plan as projects under \$1,000,000, and 9 projects were at Point Aconi.

Figure 7: 2021 ACE Items – Deferred or Cancelled

CI	Project Title	2021 ACE Project Total	Cancelled/ Deferred	Deferred To	Prior Approval	Prior ACE Plan Reference	2022 ACE Plan Reference
Generation							
C0009299	POA Bag House Filter Replacement <i>Updated condition assessments indicate that the bag filters are acceptable and can remain in-use for an additional year.</i>	1,621,274	Deferred	2022		Pt. Aconi	Pt. Aconi
C0009320	POA CW Screen Refurbishment <i>This project has been deferred due to unplanned outage related carry-over work identified late in 2020 work using available resources in 2021.</i>	254,590	Deferred	2022		Pt. Aconi	Pt. Aconi
C0020023	POA LS Vacuum System <i>This project has been deferred due to unplanned outage related carry-over work identified late in 2020 work using available resources in 2021.</i>	130,395	Deferred	2023		Pt. Aconi	
C0020142	POA Turbine Controls Evergreen <i>This scope of this project will now be included in CI C0020123.</i>	271,937	Cancelled			Pt. Aconi	
C0030489	TUC6 - HP Boiler Tube Replacement <i>The scope of this project will now be included in C0041986 - TUC6 HRSG Refurbishments.</i>	45,199	Cancelled			Less than \$1M	

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Figure 7: 2021 ACE Items – Deferred or Cancelled

CI	Project Title	2021 ACE Project Total	Cancelled/ Deferred	Deferred To	Prior Approval	Prior ACE Plan Reference	2022 ACE Plan Reference
C0030493	TUC3 Lube Oil Coolers Refurbishment <i>This project has been deferred due to higher priority carry-over work using available resources in 2021.</i>	40,485	Deferred	2022		Less than \$1M	Less than \$1M
C0030529	TUC3 Generator Refurbishment <i>This project has been deferred to 2022 to align with other work planned for Tuft's Cove Unit 3 and avoid potential delays due to material delivery.</i>	706,226	Deferred	2022		Less than \$1M	Request Approval
C0031227	POA 1B Primary Fan Motor Lifting Device <i>This project has been deferred due to unplanned outage related carry-over work identified late in 2020 work using available resources in 2021.</i>	99,756	Deferred	2022		Pt. Aconi	Pt. Aconi
48913	HYD - Tusket Facility Refurbishment <i>Deferred in order to complete additional scoping and preliminary engineering.</i>	1,061,936	Deferred	2023		Subsequent Submittal	
49634	HYD - Trout River Diversion Screen Replacements <i>Deferred in order to complete additional scoping and preliminary engineering.</i>	600,149	Deferred	2022		Subsequent Submittal	Subsequent Submittal
C0020364	TRE5 Stack Access <i>Stack inspections will utilize a person basket in order to avoid the replacement of the stack access stairs.</i>	201,292	Cancelled			Less than \$1M	
C0030783	POA Generator Refurbishment <i>This project has been deferred based on updated condition assessments and forecasted unit utilization.</i>	952,116	Deferred	2023		Pt. Aconi	
C0030786	POA Ash Cell Capping <i>This project has been deferred due to higher priority carry-over work using available resources in 2021.</i>	1,408,299	Deferred	2022		Pt. Aconi	Pt. Aconi
C0030886	POT - Polisher Valves & Solenoid Panel <i>NS Power has utilized other alternative technical solutions to mitigate risk and avoid replacement at this time.</i>	94,075	Cancelled			Less than \$1M	
C0031115	POT - Lube Oil Piping Replacement 2021 <i>This project has been deferred due to higher priority carry-over work using available resources in 2021.</i>	49,425	Deferred	2023		Less than \$1M	

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Figure 7: 2021 ACE Items – Deferred or Cancelled

CI	Project Title	2021 ACE Project Total	Cancelled/Deferred	Deferred To	Prior Approval	Prior ACE Plan Reference	2022 ACE Plan Reference
C0030564	POA MCC Upgrades <i>This project has been deferred due to higher priority carry-over work using available resources in 2021.</i>	100,995	Deferred	2023		Pt. Aconi	
C0011518	POA Kelly Rock Primary Crusher Refurbishment <i>This scope of this project will now be included in CI C0041032.</i>	23,760	Cancelled			Pt. Aconi	
C0031209	PHB - Air Heater Refurbishment 2021 <i>NS Power has utilized other alternative technical solutions to mitigate risk and avoid replacement at this time.</i>	250,142	Cancelled			Less than \$1M	
C0023682	TRE6 Mill Bullgear and Pinions <i>This project has been deferred due to higher priority unit 6 trunnion and gearbox work using available resources in 2021.</i>	663,253	Deferred	2022		Less than \$1M	Less than \$1M
C0031243	PHB - Turbine Block Valve #30 <i>This project has been deferred due to higher priority block valve work using available resources in 2021.</i>	200,581	Deferred	2022		Less than \$1M	Less than \$1M
C0029684	TUS - Fuel Piping Coating Refurbishment <i>This project has been deferred due to higher priority work using available resources in 2021.</i>	31,994	Deferred	2022		Less than \$1M	Less than \$1M
C0030549	CT - VJ2 - General Control and Protection Upgrade <i>Deferred in order to complete additional scoping and preliminary engineering.</i>	147,789	Deferred	2023		Less than \$1M	
C0021470	TUC1 Natural Gas Valves Refurbishment <i>This project has been deferred due to delays in material availability from suppliers.</i>	46,676	Deferred	2022		Less than \$1M	Less than \$1M
C0030487	TUC3 Lube Oil Refurbishment <i>This project has been deferred due to delays in material availability from suppliers.</i>	44,248	Deferred	2022		Less than \$1M	Less than \$1M
C0030524	TUC2 Turbine Controls PLC Upgrade <i>This project has been deferred to 2022 to align with other work planned for Tuft's Cove Unit 2.</i>	53,769	Deferred	2022		Less than \$1M	Less than \$1M
C0030492	TUC6 Vacuum Pump Replacement <i>Updated condition assessments indicated that the vacuum pump is acceptable for service at this time.</i>	31,448	Cancelled			Less than \$1M	

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Figure 7: 2021 ACE Items – Deferred or Cancelled

CI	Project Title	2021 ACE Project Total	Cancelled/Deferred	Deferred To	Prior Approval	Prior ACE Plan Reference	2022 ACE Plan Reference
C0021402	TUC Oil Tanks Levels and Pump House Controls Upgrade <i>This project has been deferred due to higher priority carry-over work using available resources in 2021.</i>	72,861	Deferred	2022		Less than \$1M	Less than \$1M
C0030905	POT - GSCW Pump & Motor Replacement <i>This project has been deferred due to higher U&U work using available resources in 2021.</i>	199,284	Deferred	2022		Less than \$1M	Less than \$1M
C0031278	PTMT - Idler Assemblies for inhaul & Dock Conveyors <i>This project has been deferred due to higher U&U work using available resources in 2021.</i>	37,418	Deferred	2023		Less than \$1M	
C0031277	PTMT - Rebuild Hopper Walls 2021 <i>This project has been deferred due to higher U&U work using available resources in 2021.</i>	37,005	Deferred	2023		Less than \$1M	
39472	HYD - Mersey Redevelopment Phase 1 <i>Deferred to better define project scope and consultation and engagement requirements.</i>	9,441,871	Deferred	2022		Subsequent Submittal	Subsequent Submittal
Distribution							
C0031121	104S-313 - Reconductor Big Hill <i>This project has been deferred due to higher priority carry-over work using available resources in 2021.</i>	690,254	Deferred	2022		Less than \$1M	Less than \$1M
C0031304	37N-413G-South Athol Rebuild <i>This project has been deferred due to delays in acquiring required easements.</i>	633,974	Deferred	2022		Less than \$1M	Less than \$1M
C0008638	Cogswell HRM Redevelopment Program <i>Deferred due to ongoing discussions with HRM.</i>	300,967	Deferred	2022		Subsequent Submittal	Subsequent Submittal
General Plant							
C0032502	IT - Time Varying Pricing Solution <i>This scope of this project will now be included in CI C0021839 - IT - Customer Energy Insights Management.</i>	625,539	Cancelled			Less than \$1M	
C0031099	IT - Computer Telephony Integration <i>This project has been deferred due to higher priority carry-over work using available resources in 2021.</i>	257,562	Deferred	2023		Less than \$1M	

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Figure 7: 2021 ACE Items – Deferred or Cancelled

CI	Project Title	2021 ACE Project Total	Cancelled/Deferred	Deferred To	Prior Approval	Prior ACE Plan Reference	2022 ACE Plan Reference
C0031028	IT - Network Access Control <i>This project has been deferred due to higher priority carry-over work using available resources in 2021.</i>	225,243	Deferred	2022		Less than \$1M	Less than \$1M
C0031100	IT - HVCA Upgrade <i>This project has been deferred due to higher priority carry-over work using available resources in 2021.</i>	200,009	Deferred	2023		Less than \$1M	
C0011302	IT - PeopleSoft Upgrade <i>This project has been deferred due to higher priority carry-over work using available resources in 2021.</i>	175,551	Deferred	2023		Less than \$1M	
C0021829	IT - Domain Password Management <i>This project has been deferred due to higher priority carry-over work using available resources in 2021.</i>	81,411	Deferred	2023		Less than \$1M	
C0031102	AMO Outage Management System <i>NS Power is looking at opportunities to optimize current tools and processes prior to additional investment.</i>	36,516	Cancelled			Less than \$1M	
C0021822	IT - Data Catalogue & Quality Tool <i>This project has been deferred due to higher priority carry-over work using available resources in 2021.</i>	104,740	Deferred	2023		Less than \$1M	
C0031027	IT - Multi-Factor Authentication <i>This project has been deferred due to higher priority carry-over work using available resources in 2021.</i>	586,159	Deferred	2022		Less than \$1M	Less than \$1M
C0021133	SCADA Mobile Application <i>This project has been deferred due to higher priority carry-over work using available resources in 2021.</i>	114,766	Deferred	2022		Less than \$1M	Less than \$1M
49832	Victoria Junction Substations Fiber Links <i>This project has been deferred due to higher priority carry-over work using available resources in 2021.</i>	60,299	Deferred	2022		Less than \$1M	Less than \$1M
C0032144	IT - Control Centre Applications Replacement <i>The scope of this project will now be included in CI C0023622 - AMO Substation and Transmission APM Program.</i>	340,147	Cancelled			Less than \$1M	

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Figure 7: 2021 ACE Items – Deferred or Cancelled

CI	Project Title	2021 ACE Project Total	Cancelled/ Deferred	Deferred To	Prior Approval	Prior ACE Plan Reference	2022 ACE Plan Reference
C0031002	IT - Customer Billing & Payment Solution <i>This project has been deferred due to higher priority carry-over work using available resources in 2021.</i>	357,205	Deferred	2022		Less than \$1M	Less than \$1M
C0022002	IT - Outage Map Upgrade <i>This project has been deferred due to higher priority carry-over work using available resources in 2021.</i>	453,441	Deferred	2023		Less than \$1M	
C0031094	IT - Cloud Integration Platform <i>This project has been deferred due to higher priority carry-over work using available resources in 2021.</i>	70,882	Deferred	2023		Less than \$1M	
C0021843	IT - Upgrade Oracle OBIA <i>This project has been deferred due to higher priority carry-over work using available resources in 2021.</i>	160,749	Deferred	2022		Less than \$1M	Less than \$1M
C0011167	IT - Backup Infrastructure Upgrade <i>Deferred in order to complete additional scoping and preliminary engineering.</i>	652,768	Deferred	2022		Subsequent Submittal	Subsequent Submittal

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5.0 2022 ANNUAL CAPITAL EXPENDITURE PLAN

5.1 Summary of Expenditures

Figure 8 below provides the proposed capital investment by category for NS Power's 2022 ACE Plan. This Application seeks NSUARB approval of the 2022 routine capital and 24 2022 projects, which total approximately \$143.9 million of forecast investment in 2022. Certain items do not require NSUARB approval but are included in NS Power's annual capital plan for transparency and informational purposes. The 2022 ACE Plan budget also includes investment on multi-year projects that were previously approved by the NSUARB (Carryover Projects).

Figure 8: 2022 Capital Investments by Category
(Millions of dollars)

2022 ACE Spend	2022 NSUARB Approval Request	NSUARB Approval Not Required	Capital Items Forecast for Later Filing & Approval in 2021/2022	Previously Approved Capital Projects with 2022 Carryover	2022 ACE Plan
Capital Item Approval Sought through the 2022 ACE Process (Including Routine Capital Projects)	143.9				143.9
2021 ACE Plan Items Pending Submission in 2021			21.0		21.0
Capital Items Submitted for Later Approval in 2022			167.9		167.9
2022 Carryover Projects				121.9	121.9
Capital Items Less Than \$1M		67.7			67.7
Point Aconi Capital Spend		9.2			9.2
2022 ACE Plan	\$143.9	\$76.9	\$188.9	\$121.9	\$531.6

Note: NS Power is seeking approval of \$110.5 million of routine investment in 2022.

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

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5.2 2022 ACE Plan Capital Items Submitted for Approval

Figure 9 below provides the list of 24 new Capital Items for which NS Power seeks NSUARB approval in the 2022 ACE Plan, totaling approximately \$33.3 million of spending in 2022, with a total forecast investment of approximately \$70.6 million.

Figure 9: 2022 Capital Items Submitted for Approval

Tab #	CI#	Project Title	2022 Budget (\$)	Project Total (\$)
Generation				
Hydro				
G01	C0036368	HYD - Lower Great Brook Switchgear Replacement	1,126,746	1,362,281
G02	C0024484	HYD - Fourth Lake Switchgear Replacement	930,499	1,145,245
Total New Hydro Spending			\$2,057,245	\$2,507,527
Steam Turbine				
G03	C0038747	LIN1 L-0 Blade Replacement	1,289,669	6,066,800
G04	C0041906	PHB – 2022 Turbine Refurbishment	3,276,746	3,729,597
Generator				
G05	C0030529	TUC3 Generator Refurbishment	1,629,446	1,629,926
Total New Steam Spending			\$6,195,861	\$11,426,322
Gas Turbine				
G06	C0029693	CT - VJ1 Generator Replacement	5,532,037	5,942,640
G07	C0029691	CT - VJ1 Control System Upgrade	751,417	1,016,225
Total New Gas Turbine Spending			\$6,283,454	\$6,958,865
Total New Generation Spending			\$14,536,560	\$20,892,714
Transmission				
T01	C0041893	2022/2023 Transmission Right-of-Way Widening 69kV	2,536,790	5,312,315
T02	C0041837	2022/2023 Substation Polychlorinated Biphenyl (PCB) Equipment Removal	2,299,568	3,805,434
T03	C0041793	L7002 Replacements and Upgrades Phase 2	564,090	3,640,960
T04	C0041805	L7005 Replacements and Upgrades Phase 2	1,399,971	3,182,518
T05	C0041989	2022/2023 Sacrificial Anode Installation Program	646,705	3,015,107

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Figure 9: 2022 Capital Items Submitted for Approval

Tab #	CI#	Project Title	2022 Budget (\$)	Project Total (\$)
T06	C0041794	L5031 Replacements and Upgrades Phase 2	644,038	2,905,019
T07	C0041789	L5550 Replacements and Upgrades Phase 2	702,915	2,698,515
T08	C0041796	L6020 Replacements and Upgrades Phase 2	1,225,755	2,518,243
T09	C0041810	L5022 Replacements and Upgrades	920,607	2,172,200
T10	C0041791	L6551 Replacements and Upgrades	765,590	1,988,246
T11	C0043571	2022/2023 Transmission Switch & Breaker Replacement	511,414	1,612,638
T12	C0041790	L8001 Replacements and Upgrades Phase 2	696,045	1,395,537
T13	C0043010	2022/2023 Wood Pole Retreatment Program	525,751	1,300,037
T14	C0041800	L5537 Replacements and Upgrades	563,202	1,270,698
T15	C0041804	2022 Line Retirement Program	454,663	1,242,178
Total New Transmission Spending			\$14,457,106	\$38,059,646
Distribution				
D01	C0041892	New Distribution Rights-of-Way Phase 7	2,940,175	9,854,291
D02	C0043130	2022 Padmount Replacement Program	1,386,611	1,807,359
Total New Distribution Spending			\$4,326,786	\$11,661,650
Total New Capital Spending			\$33,320,452	\$70,614,010
Total Routine Capital Spending			\$110,533,578	\$110,533,578
Total Capital Items for which Approval is Sought			\$143,854,030	\$181,147,588

5.3 2022 ACE Plan Capital Items Forecast for Subsequent Approval

Figure 10 below identifies 2022 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 2022. NS Power estimates approximately \$167.9 million of investment in 2022 on these projects, which are currently estimated for total investment of approximately \$942.9 million. Approximately \$120M is forecast in 2022 for subsequent submittal projects in relation to ECEI. As noted in Section 3.1, as policy development continues to evolve in the coming year, the level of investment in ECEI in 2022 and beyond will be subject to change. The budget numbers

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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 2022 projects.

Figure 10: 2022 Capital Items Forecast for Subsequent Submittal

CI#	Project Title	2022 Budget (\$)	Project Total (\$)
Generation			
Hydro			
39472	HYD - Mersey Redevelopment Phase 1 <i>This project is the first phase of the re-development of the Mersey Hydro System and includes the replacement of the Big Falls Powerhouse, the Big Falls Control Structure and the redevelopment of the Big Falls Substation</i>	6,268,288	189,447,076
C0015798	WRC Tunnel T-2 Remediation <i>This project is for the remediation of rockfall in the T-2 tunnel connecting the Wreck Cove Reservoir and Surge Lake.</i>	15,889,111	43,775,454
C0034486	HYD - WRC LEM Penstock intake <i>This project will modernize the Penstock Intake structure at the Wreck Cove Generating Station.</i>	150,655	11,239,851
C0012838	HYD - Lequille Canal Dyke, Gates and Tailrace Refurbishment <i>This project is for the refurbishment of the Lequille power canal embankments, replacement of the powerhouse intake gate and tailrace gate, and replacement of the tailrace retaining structure.</i>	489,872	6,123,004
C0000979	HYD - Governor Dam Refurbishment <i>This project is for the refurbishment of the Governor Lake Dam on the Sheet Harbour Hydro System, and includes the left embankment dam, sluice structure and free overflow concrete spillway.</i>	280,606	2,696,630
49634	HYD - Trout River Diversion Structure Replacement <i>This project is for the replacement of the fish diversion structures that house the fish screen structure and the inlet structure that directs fish into the bypass channel to Trout River Pond on the Black River Hydro System.</i>	1,365,833	1,822,300
Total New Hydro Spending for Subsequent Approval		\$24,444,364	\$255,104,313
Gas Turbine			
C0041507	CT TUS1 Exhaust Stack Replacement <i>This project is for the replacement of the Tusket Combustion Turbine stack due to condition assessment.</i>	2,031,020	2,031,020
Total New Gas Turbine Spending for Subsequent Approval		\$2,031,020	\$2,031,020

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Figure 10: 2022 Capital Items Forecast for Subsequent Submittal

CI#	Project Title	2022 Budget (\$)	Project Total (\$)
Steam			
C0044392	Eastern Clean Energy Initiative (ECEI) - Coal Conversion <i>This project is for work on generation assets as part of the ECEI and the transition to 80% renewable electricity in Nova Scotia by 2030.</i>	9,390,264	32,341,325
C0041651	TUC HFO Tank 4 Refurbishment <i>This project is for the refurbishment of Heavy Fuel Oil Tank 4 at the Tufts Cove Generating Station.</i>	1,110,293	1,110,293
Total New Steam Spending for Subsequent Approval		\$10,500,557	\$33,451,617
Wind			
C0044771	Eastern Clean Energy Initiative (ECEI) - Wind <i>This project is for work on wind assets as part of the ECEI and the transition to 80% renewable electricity in Nova Scotia by 2030.</i>	29,563,744	83,280,972
Total New Wind Spending for Subsequent Approval		\$29,563,744	\$83,280,972
Total New Generation Spending for Subsequent Approval		\$66,539,686	\$373,867,922
Transmission			
C0044391	Eastern Clean Energy Initiative (ECEI) - Transmission <i>This project is for upgrades to transmission assets as part of the ECEI and the transition to 80% renewable electricity in Nova Scotia by 2030.</i>	20,378,370	351,898,909
C0045132	Eastern Clean Energy Initiative (ECEI) - Energy Storage <i>This project is for storage assets as part of the ECEI and the transition to 80% renewable electricity in Nova Scotia by 2030.</i>	60,413,412	171,207,920
C0032382	Susie Lake Substation Addition <i>This project is for the construction of a new substation in the Susie Lake area of Bayer's Lake Business Park in Halifax. This new substation would provide capacity to serve the 13.5 MVA of large customer load growth that is planned in the area in the next several years, including the new QEII Community Outpatient Centre and various other planned commercial and residential developments.</i>	3,605,202	6,225,600
C0022247	1N-Onslow 138 kV Add Second 42 MVA Power Transformer <i>This project will install a new 138/25 kV power transformer and three additional distribution feeders at the 1N-Onslow 138 kV substation.</i>	293,817	4,500,000
C0021140	New 138KV-25KV Substation - Stellarton <i>This project will construct a new 138kV-25kV substation in Stellarton to support load growth in the area and improve system contingency capacity.</i>	3,990,799	4,047,925

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Figure 10: 2022 Capital Items Forecast for Subsequent Submittal

CI#	Project Title	2022 Budget (\$)	Project Total (\$)
C0036826	L8004 Parallel Canso Strait Crossing <i>This project is to parallel the L8004 crossing of the Canso Strait crossing in order to increase the max operating temperature of L8004.</i>	970,337	2,139,081
Total New Transmission Spending for Subsequent Approval		\$89,651,937	\$540,019,436

Distribution

C0008638	Cogswell HRM Redevelopment Program <i>This project includes the costs associated with the redevelopment of the Cogswell District by Halifax Regional Municipality (HRM). This project will require undergrounding of overhead infrastructure and relocation of existing underground infrastructure and the addition of electrical feeds for new residential and commercial environments</i>	1,252,201	6,982,854
C0022662	22C-404GA Lennox Passage Rebuild <i>This project will replace the three-phase submarine cables at the Lennox Passage crossing of 22C-404GA between Cape Breton Island and Isle Madame.</i>	1,710,569	2,352,191
Total New Distribution Spending for Subsequent Approval		\$2,962,770	\$9,335,045

General Plant

47751	ECC Dynamic Line Rating Implementation <i>This project will implement devices and technology to expand the transfer capability of the Cape Breton Export (CBX) corridor.</i>	502,306	5,144,525
C0032202	Sydney T&D Depot Consolidation <i>This project will consolidate Sydney T&D Operations staff from two current locations into one new location. The new location will allow for the consolidation of personnel and equipment from existing locations on Townsend Street, which is on a floodplain, and Keltic Drive, where yard and office space is shared with Bell.</i>	200,000	2,815,000
C0043910	IT - Customer Energy Management Phase 2 <i>This project will implement CPP Advanced and Multiple Unit Residential Building tariffs, tariff change functionality and performance testing at scale for the new TVP tariffs.</i>	2,154,815	2,154,815
C0011168	IT - Firewall Refresh <i>This project will replace legacy perimeter and core firewalls to maintain vendor support, enable advanced security functions and improve equipment management efficiency.</i>	1,020,625	2,112,237
C0031024	IT - Security Patch Management <i>This project will implement new management tools to facilitate scanning for new vulnerabilities and improve the system patching process.</i>	1,400,000	1,700,000

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Figure 10: 2022 Capital Items Forecast for Subsequent Submittal

CI#	Project Title	2022 Budget (\$)	Project Total (\$)
C0041994	NERC CIP 2022* <i>This project will implement changes to processes, procedures, and implement new/enhance existing technologies to remain compliant with NERC CIP Standards.</i>	371,967	1,379,474
50292	Kempt Road and Dartmouth East Depot Truck Bays <i>This project will construct truck shelters for each of the Kempt Road and Dartmouth East Depots to be used as both shelter and storage facilities for NS Power utility and bucket trucks.</i>	608,390	1,333,049
C0005498	IT - Endpoint Security <i>This project will overhaul NS Power's anti-malware platform.</i>	815,749	1,064,684
C0011167	IT - Backup Infrastructure Upgrade <i>This project will upgrade NS Power's backup infrastructure</i>	892,633	1,004,879
C0042166	IT - Data Loss Prevention Platform <i>This project will and implement a new Data Loss Prevention (DLP) technological platform to mitigate data loss risks.</i>	783,551	1,003,551
Total New General Plant Spending for Subsequent Approval		\$8,750,035	\$19,712,213
Total Capital Items for Subsequent Approval		\$167,904,427	\$942,934,616

*Capital Item Related to NERC and/or NPCC Standards

5.4 2022 ACE Plan Capital Items with Estimated Total Project Cost of Less Than \$1,000,000

Figure 13 below sets out capital items with a total project cost of less than \$1,000,000. These projects do not require NSUARB approval but are provided for transparency and informational purposes.

Similar to 2021, the information in this section has been expanded in the 2022 ACE Plan in accordance with the agreement reached with stakeholders pursuant to NS Power's report provided to the NSUARB on September 5, 2017. Historical dollar values and numbers of projects are provided in **Figure 11** and **Figure 12** below, respectively. The table of projects under \$1,000,000 includes 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.

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Figure 11: Historical Value of Projects Less Than \$1M

(Millions of dollars)

Value of Projects Less than \$1M (\$)				
Function	2019	2020	2021	2022
Gas Turbine	2.4	2.4	2.2	2.2
Steam	33.3	34.4	28.5	34.2
Hydro	2.6	2.9	1.9	5.1
Wind	0.3	0.0	0.9	0.5
Transmission	1.6	2.8	2.7	5.6
Distribution	4.7	3.7	8.1	11.7
General Plant	3.3	5.1	7.5	8.3
Total	\$48.2	\$51.2	\$51.8	\$67.7

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

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Figure 12: Historical Number of Projects Less Than \$1M

# of Projects Less than \$1M				
Function	2019	2020	2021	2022
Gas Turbine	13	26	12	26
Steam	136	162	137	182
Hydro	8	12	6	20
Wind	2	0	3	3
Transmission	5	12	8	23
Distribution	16	12	23	49
General Plant	17	18	29	34
Total	197	242	218	337

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Figure 13: 2022 Capital Items with Estimated Total Project Cost of Less than \$1M

CI#	Project Title	2022 Budget (\$)	Project Total (\$)	Criticality	Condition	Rating
Generation						
Hydro						
C0008002	HYD - Nictaux Canal Crest Rebuild	937,259	937,259	4	4	16
<i>This project is for the rebuild of the Nictaux Canal crest, due to its deteriorated condition.</i>						
C0038187	HYD - MER Breaker Upgrades Phase 2	574,765	574,765	3	5	15
<i>This project is the second phase of breaker refurbishments on the Mersey Hydro System. This project includes the overhaul of two Generator Switchgear and Arc Flash Upgrades to increase safety and reliability</i>						
C0038629	HYD - Ridge Surge Tank Refurbishment	398,458	468,930	4	4	16
<i>This project is for the refurbishment of the existing surge tank at the Ridge Generating Station due to its deteriorated condition.</i>						

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Figure 13: 2022 Capital Items with Estimated Total Project Cost of Less than \$1M

CI#	Project Title	2022 Budget (\$)	Project Total (\$)	Criticality	Condition	Rating
C0038167	HYD - LEQ Thrust Bearing Redesign	342,521	375,417	4	4	16
<i>This project is for the replacement of the existing Lequille thrust bearing with a modern spring bed tilt pad design bearing to maintain reliability.</i>						
C0038873	HYD - Tractor Acquisitions	309,790	370,906	3	5	15
<i>This project is for the purchase of three tractors to allow for internal resources to complete snow clearing and vegetation management on the Sheet Harbour, Mersey River, and Fundy Hydro Systems.</i>						
C0038827	HYD - GIS HPU Replacement	338,085	338,085	3	5	15
<i>This project is for the replacement of the HPU that powers the bypass valve and the turbine isolation valve at the Gisborne Generating plant. The components are obsolete and cannot be repaired.</i>						
C0038129	HYD - AVO1 Crane Replacement	292,299	295,214	4	4	16
<i>This project is for the replacement of the existing crane at Avon Unit 1 due to age and condition assessment.</i>						
C0028444	HYD - SHH Crane Refurbishment	263,411	263,411	4	4	16
<i>This project is for the refurbishment of cranes at the Ruth Falls and Malay Falls Plants on the Sheet Harbour Hydro System to increase safety through replacement of the existing crane conductors with a festoon system.</i>						
C0040086	HYD - HMS Window Replacement	199,225	214,310	3	5	15
<i>This project is for the replacement of twelve 10'x6' windows at the Hydro Maintenance shop. The current windows are not properly sealed and are contributing to unnecessary energy loss and could lead to water damage.</i>						
C0039446	HYD - Hydro Door Replacements	206,918	206,918	3	5	15
<i>This project includes replacement of existing doors at Avon 1, Hell's Gate, Tusket and Mill Lake that are original to the plant, have exceeded their service life and are now causing security concerns.</i>						
C0042466	HYD - STM Garage Refurbishment	182,702	182,702	3	5	15
<i>This project is for the refurbishment of the St. Margaret's Bay storage garage including roof, windows and concrete work. The garage is now 80 years old and in deteriorated condition with asbestos and lead paint present.</i>						
C0039467	HYD - AVO1 Headgate Refurbishment	181,696	181,696	4	4	16
<i>This project is for the refurbishment of the Avon Unit 1 headgate and replacement of the trash racks. The existing seals do not seal properly and cause the headgate to leak when it is closed, causing safety concerns for employees working behind the gate.</i>						
C0031464	HYD - WRC Garage Auxiliary Storage	168,634	168,634	3	5	15
<i>This project is for the supply and installation of an equipment storage building for Wreck Cove Hydro. Having interior storage for equipment will prolong the life of this equipment by protecting it from the weather extremes onsite, as well as making it more easily accessible in the winter.</i>						
C0038346	HYD - PAR Window Replacement	118,776	139,883	3	5	15
<i>This project is for the replacement of twenty 6'x5' windows at Paradise that have reached the end of their useful life and are inoperable. The replacement windows will be more energy efficient than the existing windows, which were installed in 1950.</i>						
C0039566	HYD - GIS Water Filtration Upgrade	127,333	127,333	3	5	15
<i>This project will upgrade the existing Gisborne water filtration system to provide cooling water to the gearbox and lubricating/cooling water to the turbine bearing.</i>						
C0019199	HYD - TUS Crane Refurbishment	105,107	105,107	4	5	20
<i>This project is for the replacement of the existing crane conductors with a festoon system on the overhead powerhouse crane at the Tusket Hydro facility to increase safety.</i>						
C0029284	HYD - Fourth Lake Diesel Generator	104,496	104,496	4	4	16
<i>This project is for the purchase of a Diesel Emergency Generator for the Fourth Lake Hydro Site to ensure sump pumps and plant equipment have backup power during outages.</i>						
C0039386	HYD - Bloody Creek Safety Improvements	98,779	98,779	5	3	15
<i>This project will remove the valve pit at the Bloody Creek pumphouse to improve safety by removing the confined space.</i>						

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Figure 13: 2022 Capital Items with Estimated Total Project Cost of Less than \$1M

CI#	Project Title	2022 Budget (\$)	Project Total (\$)	Criticality	Condition	Rating
C0029462	HYD - WRC Forklift Purchase	84,020	84,020	3	5	15
This project is for the purchase of a forklift for loading/unloading on site at Wreck Cove which is currently not possible in the powerhouse.						
C0038874	HYD - FAR Spillway Culvert Replacement	66,457	78,028	3	5	15
This project is for replacement of the culvert on the Fall River Spillway due to deteriorated condition.						
Total Hydro Items Less Than \$1M		\$5,100,728	\$5,315,891			
Steam						
C0041348	TRE6 Bottom Ash Refurbishment	746,689	746,689	4	4	16
This project includes the refurbishment of the bottom ash removal system on Trenton Unit 6 (the chain, the flight bars, idlers and take up pulleys, and head sprockets) based on condition assessment. Efficient removal of ash from coal units is imperative for safe reliable operation, without ash removal the unit would be required to come offline.						
C0041310	TRE Asbestos Abatement (2022)	745,913	745,913	4	4	16
This project is for asbestos abatement in multiple areas of the Trenton Generating Station, in accordance with the Occupational Health and Safety Act (OHSa) and the Department of Labour's "Asbestos in the Workplace" guide.						
C0019339	TRE6 Main Steam Piping Refurbishment	535,174	744,302	5	4	20
This project is to refurbish sections of piping on the Main Steam Line at Trenton Unit 6 due to asset condition. Mitigation of this risk is required to sustain safe reliable operation.						
C0041727	POT - Extraction CEMS Upgrade 2022	730,231	730,231	5	4	20
This project will upgrade the continuous emission monitoring system (CEMS) equipment for the Point Tupper Generating Station Unit 2 stack, to maintain continuous reliability of monitoring the level of SO2 and NOx in the flue gas emissions. This is a component of the Environmental Management System and required in the facility operating permit.						
C0036068	LIN Mill Refurbishment 2022	695,339	695,339	4	4	16
This project is for the replacement of deteriorated welded steel rollers and tables with ceramic wear components, worm gear and shaft, vertical shaft and other non-repairable mill components. Sustaining reliability of the mills reduces derations or forced outages on the Lingan Units.						
C0036286	LIN3 Boiler Refurbishment 2022	690,639	690,639	5	3	15
This project is to refurbish and replace deteriorated boiler tubes, tube bends and shields on the Lingan Unit 3 boiler as part of the planned unit outage in 2022. Boiler tube refurbishment and replacements are required to ensure integrity of the boiler allowing for continued safe reliable operation. This practice is reviewed by NS Department of Labour.						
C0036346	LIN1 Boiler Refurbishment 2022	622,659	622,659	5	3	15
This project is to refurbish and replace deteriorated boiler tubes, tube bends and shields on the Lingan Unit 1 boiler as part of the planned unit outage in 2022. Boiler tube refurbishment and replacements are required to ensure integrity of the boiler allowing for continued safe reliable operation. This practice is reviewed by NS Department of Labour.						
C0042031	PHB - Precipitator Refurbishment 2022	615,206	615,206	4	4	16
This project is for the refurbishment of the Port Hawkesbury Biomass precipitator through replacements of the precipitator's gas distribution screens and collecting panels and electrodes. Based on condition assessment of components these components need refurbishment to sustain environmental compliance.						
C0041706	POT - Boiler Refurbishment 2022	597,993	597,993	5	3	15
This project is to refurbish and replace deteriorated boiler tubes, tube bends and shields on the Point Tupper boiler as part of the planned unit outage in 2022. Boiler tube refurbishment and replacements are required to ensure integrity of the boiler allowing for continued safe reliable operation. This practice is reviewed by NS Department of Labour.						
C0036287	LIN4 Boiler Refurbishment 2022	596,889	596,889	5	3	15
This project is to refurbish and replace deteriorated boiler tubes, tube bends and shields on the Lingan Unit 4 boiler as part of the planned unit outage in 2022. Boiler tube refurbishment and replacements are required to ensure integrity of the boiler allowing for continued safe reliable operation. This practice is reviewed by NS Department of Labour.						

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Figure 13: 2022 Capital Items with Estimated Total Project Cost of Less than \$1M

CI#	Project Title	2022 Budget (\$)	Project Total (\$)	Criticality	Condition	Rating
C0023682	TRE6 6A Mill Bullgear and Pinion Refurbishment	548,231	548,231	4	5	20
<i>This project includes replacement of the bullgear and pinion on the Trenton Unit 6 6A Mill based on condition assessment. Reliable operation of the mills is required for safe operation and to reduce unit derations or outages.</i>						
C0041324	TRE6 6B Mill Bullgear and Pinion Refurbishment	545,453	545,453	4	5	20
<i>This project includes replacement of the bullgear and pinion on the Trenton Unit 6 6B Mill based on condition assessment. Reliable operation of the mills is required for safe operation and to reduce unit derations or outages.</i>						
C0040906	LIN3 Turbine Valve Refurbishment 2022	540,106	540,106	5	3	15
<i>This project will refurbish the Turbine Main Steam Control Valves (upper and lower), Combined Reheat Valves (left and right) and Turbine Main Stop Valve at Ligan Unit 3 steam turbine. Based on the asset strategy these valves have reached a refurbishment interval in 2022. These valves control the flow of steam to turbine and if they are not reliable can damage the turbine and increase safety risk.</i>						
C0042026	PHB - Boiler Refurbishment 2022	534,985	534,985	5	3	15
<i>This project is to refurbish and replace deteriorated boiler tubes, tube bends and shields on the Port Hawkesbury Biomass boiler as part of the planned unit outage in 2022. Boiler tube refurbishment and replacements are required to ensure integrity of the boiler allowing for continued safe reliable operation. This practice is reviewed by NS Department of Labour.</i>						
C0042028	PHB - Air Heater Refurbishment 2022	519,316	519,316	3	5	15
<i>This project is for the refurbishment of the air heater at the Port Hawkesbury Biomass Plant through select tube replacements based on condition assessment. The air heater refurbishment is required to sustain environmental compliance and reliable operation of the unit.</i>						
C0042127	TRE6 Boiler Upper Waterwall Panel Replacement	507,965	507,965	5	3	15
<i>This project is for the replacement of deteriorated upper waterwall panels in the Trenton Unit 6 Boiler based on condition assessment. Boiler tube refurbishment and replacements are required to ensure integrity of the boiler allowing for continued safe reliable operation. This practice is reviewed by NS Department of Labour.</i>						
C0041369	TRE6 Turbine Reheat Valves	486,071	486,071	5	3	15
<i>This project includes replacement or refurbishment of valve stems and bushings, hydraulic valves and control oil pressure regulators as well as the replacement of the bolts and studs on the reheat valves. Based on the asset strategy these valves have reached a refurbishment interval in 2022. These valves control the flow of steam to turbine and if they are not reliable can damage the turbine and increase safety risk</i>						
C0030643	LIN4 BFP Refurbishment 2022	483,771	483,771	5	3	15
<i>This project is for the refurbishment of a boiler feed pump (BFP) including cartridge overhaul at Ligan Unit 4. Based on operational history, condition assessment and last overall date this pump is required to be refurbished to sustain unit reliability.</i>						
C0041746	POT - Coal Mill Refurbishment 2022	480,204	480,204	5	3	15
<i>This project is for the replacement of welded steel rollers and tables with ceramic wear components, worm gear and shaft, vertical shaft and other non-repairable mill components. Based on condition assessments these components require refurbishment to sustain reliability of the mills reduces unit derations and forced outages</i>						
C0036866	TRE Surface Water Discharge Pipe Replacement	419,567	460,795	3	5	15
<i>This project will replace a deteriorated culvert that directs surface water from two adjoining properties, into the cooling water canal, and then into the east river. Effective water management onsite is required to ensure environmental compliance.</i>						
C0037986	TUC3 LP Turbine Refurbishment	434,775	434,775	5	4	20
<i>This project is for the refurbishment of the blading components in the LP turbine at Tufts Cove Unit 3. The LP turbine has reached a required refurbishment interval based on unit utilization and condition assessments.</i>						
C0031222	TRE6 Partition Valve and Waterbox Refurbishment	412,316	412,316	3	5	15
<i>This project will refurbish the front waterbox and the three partition valves based on asset condition. Integrity of the water box and associated valves is required for safe reliable operation of the unit.</i>						
C0041845	POT - DAS Upgrades 2022	296,784	396,806	4	4	16
<i>This project will upgrade the data acquisition system (DAS) at Point Tupper Generating Station. This project is being driven by asset obsolesce to ensure critical data is managed to sustain safe, environmental compliant, and reliable generation.</i>						

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Figure 13: 2022 Capital Items with Estimated Total Project Cost of Less than \$1M

CI#	Project Title	2022 Budget (\$)	Project Total (\$)	Criticality	Condition	Rating
C0028283	TUC2 Vacuum Pump Replacement	383,909	383,909	3	5	15
<i>This project will replace the existing south vacuum pump at Tufts Cove Unit 2 that is no longer functional to reintroduce redundancy to the vacuum system and reduce operational risk. Vacuum pumps remove air from the steam cycle to ensure efficient reliable operation of the unit.</i>						
C0036006	LIN - CW Screen Refurbishment 2022	373,503	373,503	4	4	16
<i>This project is for the refurbishment of two circulating water (CW) screens through replacement of corroded and worn components based on condition assessments. These screens remove debris from the cooling water that would otherwise result in unit derates or forced outages.</i>						
C0041816	POT - Bear Head Ash Site 2022	290,641	362,852	5	3	15
<i>This project includes the development of an additional cell to accommodate ash from Point Tupper Generating station and the Port Hawkesbury biomass plant at the Bear Head facility.</i>						
C0041661	TUC2 Boiler Refurbishment 2022	359,735	359,735	5	3	15
<i>This project is to refurbish and replace deteriorated boiler tubes, tube bends and shields on the Tufts Cove Unit 2 boiler as part of the planned unit outage in 2022. Boiler tube refurbishment and replacements are required to ensure integrity of the boiler allowing for continued safe reliable operation. This practice is reviewed by NS Department of Labour.</i>						
C0041659	TUC1 Boiler Refurbishment 2022	358,824	358,824	5	3	15
<i>This project is to refurbish and replace deteriorated boiler tubes, tube bends and shields on the Tufts Cove Unit 1 boiler as part of the planned unit outage in 2022. Boiler tube refurbishment and replacements are required to ensure integrity of the boiler allowing for continued safe reliable operation. This practice is reviewed by NS Department of Labour.</i>						
C0012138	TRE6 CW Line Refurbishment	81,527	357,130	4	4	16
<i>This project is to install cathodic protection on the dresser couplings of the Trenton Unit 6 CW intake piping to reduce the risk of corrosion. A portion of the pipe is exposed to the exterior elements and is in direct contact with the cooling water from Unit 5. Without this cathodic protection the intake piping will be required to be replaced in advance of useful life.</i>						
C0036349	LIN1 RH Tube Replacement 2022	305,309	305,309	5	3	15
<i>This project is to replace deteriorated reheat tube bends that pass through the waterwall and connect to the reheat header. Boiler tube replacements and refurbishments are required to ensure integrity of the boiler allowing for continued safe reliable operation. This practice is reviewed by NS Department of Labour.</i>						
C0041887	POT - CW Pump Refurbishment 2022	295,939	295,939	4	4	16
<i>This project will refurbish one cooling water (CW) pump at the Point Tupper generating Station. Based on condition assessments this pump requires refurbishment to sustain reliable operation of the unit.</i>						
C0042027	PHB - Generator Shaft Seal Refurbishment	284,396	284,396	5	3	15
<i>This project is for the refurbishment of the generator shaft seal at the Port Hawkesbury Biomass plant. Based on condition assessment, particularly leaks around number four bearing, this refurbishment is required for safe reliable operation.</i>						
C0030531	TUC3 Air Pre-Heaters Refurbishment	283,015	283,015	3	5	15
<i>This project will refurbish the air pre-heater on Tufts Cove Unit 3 through replacement of air sealing devices based on condition assessment.</i>						
C0030782	ICP #1 Belt Take-up Replacement	240,473	273,973	4	4	16
<i>This project will replace the belt tensioning take-up. The current belt take-up relies on a mechanical tightening device which is corroded and at the end of its service life.</i>						
C0039646	LIN Condenser Valve and Actuator Refurbishment 2022	261,979	261,979	4	4	16
<i>This project is for the refurbishment of select condenser valves and actuators based on condition assessment.</i>						
C0021723	TUC Parking Lot Refurbishment	249,262	249,262	3	5	15
<i>This project will re-grade and pave the main parking lot to allow proper drainage to level surfaces and prevent dangerous ice build-up which can lead to slips, trips and falls.</i>						
C0036328	LIN3 ID Fan VIV Refurbishment 2022	247,860	247,860	3	5	15
<i>This project is for the refurbishment of the variable inlet vanes (VIV) on the induced draft (ID) fan at Lingan Unit 3. These vanes control air flow for environmental compliance and reliable operations.</i>						

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Figure 13: 2022 Capital Items with Estimated Total Project Cost of Less than \$1M

CI#	Project Title	2022 Budget (\$)	Project Total (\$)	Criticality	Condition	Rating
C0039028	LIN1 Ash Incline Refurbishment 2022	247,363	247,363	5	3	15
<i>This project is for the refurbishment of the Lingan Unit 1 bottom ash incline conveyor belt structure based on condition assessment. Efficient removal of ash from coal units is imperative for safe reliable operation, without ash removal the unit would be required to come offline.</i>						
C0030702	LIN4 Bottom Ash Incline Belt Refurbishment	247,344	247,344	4	4	16
<i>This project is for the refurbishment of the Lingan 4 bottom ash incline conveyor belt structure due to condition assessment. Efficient removal of ash from coal units is imperative for safe reliable operation, without ash removal the unit would be required to come offline.</i>						
C0041899	POT - Water Pre-Treatment Plant Upgrade	243,412	243,412	4	4	16
<i>This project is for the addition of a pre-treatment system in the water treatment plant facility at Point Tupper Generating Station. The existing system reactivator and sand filters have reached end of life and are no longer reliable. This system treats water required for the generating unit and auxiliary systems.</i>						
C0039686	LIN WTP Caustic Pump Skid Replacement 2022	240,678	240,678	3	5	15
<i>This project is for the replacement of the water treatment plant chemical pump skids and associated piping and valves due to asset condition. Reliable operation of these pumps is required to ensure water quality for the operating units.</i>						
C0039106	LIN1 SCC Refurbishment 2022	234,979	234,979	4	5	20
<i>This project is for the refurbishment of the Lingan Unit 1 bottom ash system's submerged chain conveyor (SCC) drive, steel structure and the conveyor idlers which have corroded over normal operation. Efficient removal of ash from coal units is imperative for safe reliable operation, without ash removal the unit would be required to come offline.</i>						
C0039167	LIN4 SCC Refurbishment 2022	234,979	234,979	4	4	16
<i>This project is for the refurbishment of the Lingan Unit 4 bottom ash system's submerged chain conveyor (SCC) drive, steel structure and the conveyor idlers which have corroded over normal operation. Efficient removal of ash from coal units is imperative for safe reliable operation, without ash removal the unit would be required to come offline.</i>						
C0031243	PHB - Turbine Block Valve #30	225,001	225,001	4	4	16
<i>This project is for the refurbishment of the Turbine Block valve #30 at the Port Hawkesbury Biomass Plant. Based on condition assessments this valve is passing and must be refurbishment to provide system isolations for safe reliable operation of the unit.</i>						
C0021469	TUC Facilities Upgrade Phase 3	220,268	220,268	3	5	15
<i>This project is for renovation of facilities original to the plant. This project will include the upgrade of the electrical and instrumentation shops, the addition of a private wheelchair accessible washroom on the main floor of the annex building along with reconfiguring areas on both levels of the office block to increase the useable space for meeting rooms and offices.</i>						
C0039066	LIN Ash Conditioner Refurbishment 2022	217,705	217,705	3	5	15
<i>This project is for the refurbishment of two of the four ash conditioners which includes replacement of the mixing paddles, refurbishment of each of the two shafts in both conditioners, refurbishment of the large drive gear, and replacement of the shaft labyrinth seals. This project is driven by asset condition and a requirement sustain environmental compliance and reliable operations.</i>						
C0041798	POT - New Washroom 2022	216,952	216,952	3	5	15
<i>This project is for the construction of a new washroom at the Point Tupper Generating Station as part of diversity and inclusion requirements onsite</i>						
C0029924	LIN4 BFP Check Valve Replacement	214,753	214,753	4	4	16
<i>This project is for the replacement of the passing Boiler Feed Pump (BFP) Check Valves at Lingan Unit 4. Based on condition assessments this valve is passing resulting in increased reliability risk on the unit.</i>						
C0028643	LIN4 - Boiler Erosion Reduction System Refurbishment	209,276	209,276	4	4	16
<i>The scope of work for this project is to refurbish and replace deteriorated sections of the Boiler Erosion Reduction System made up of boiler erosion screens, envelope shields and flow baffles.</i>						
C0035847	LIN Plant Lighting Upgrade 2022	209,075	209,075	3	5	15
<i>This project will continue to upgrade the plant lighting to more energy efficient LED technology removing the safety hazards associated with low light conditions.</i>						
C0041664	TUC2 CW Pump Building Replacement	208,568	208,568	3	5	15
<i>This project is for the replacement of the existing building for the CW pumps at Tufts Cove Unit 2. The building is deteriorated and needs to be replaced to protect the pump motors and electrical equipment.</i>						

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Figure 13: 2022 Capital Items with Estimated Total Project Cost of Less than \$1M

CI#	Project Title	2022 Budget (\$)	Project Total (\$)	Criticality	Condition	Rating
C0044150	PTMT - Cathodic Protection 2022	207,132	207,132	3	5	15
<i>This project is for the replacement of the cathodic protection system for the Point Tupper Marine Terminal. The terminal has several marine structures in the Strait of Canso which are subject to the corrosive effects of salt water. The existing system must be replaced in order to preserve the marine structures.</i>						
C0028806	LIN4 RH Tube Replacement 2022	205,816	205,816	5	3	15
<i>This project is to replace reheat tube bends that pass through the waterwall and connect to the reheat header. Boiler tube refurbishment and replacements are required to ensure integrity of the boiler allowing for continued safe reliable operation. This practice is reviewed by NS Department of Labour.</i>						
C0036306	LIN Coal Crusher Refurbishment 2022	204,492	204,492	4	4	16
<i>This project is for the replacement of one coal crusher at the Langan Generating Station which has reached the end of its useful life. The coal crusher is used to break up frozen or large pieces of coal on route to the coal silos.</i>						
C0036288	LIN Facilities Upgrades 2022	199,740	199,740	3	5	15
<i>This project is for the renovation of facilities original to the plant. Scope includes work on the washrooms and control rooms. This work needs to be completed to align with diversity and inclusion requirements and correct identified safety hazards.</i>						
C0036391	LIN Coal Stacker Refurbishment 2022	198,983	198,983	3	5	15
<i>This project is for the refurbishment of the coal stacker structure which has deteriorated due to corrosion posing safety and reliability risk. The coal stacker is required to position coal on the live coal pile as it is delivered by rail to the Langan Generating Station and is an essential part of the coal delivery system.</i>						
C0036406	LIN Precipitator Refurbishment 2022	197,671	197,671	4	4	16
<i>This project is for the refurbishment of the precipitator system which removes particulate from the flue gas flow at the Langan Generating Station that have reached the end of their expected useful life.</i>						
C0036067	LIN Siding Refurbishment 2022	194,631	194,631	4	4	16
<i>This project is for the refurbishment of plant siding. The siding is original to the plant and is galbestos, which contains asbestos in the coating. This project will focus on replacing the siding in the lower section of the plant where the coating is beginning to degrade.</i>						
C0039166	LIN CW Valve Refurbishment 2022	193,600	193,600	4	4	16
<i>This project is for the refurbishment of the cooling water (CW) valves to sustain reliability. These valves control the flow of cooling water going to the boilers and the turbine condensers throughout the Langan Generating Station and require refurbishment based on asset condition.</i>						
C0039527	TUC Platform and Ladder Upgrades	191,570	191,570	5	3	15
<i>This project will upgrade platforms and ladders at Tufts Cove to improve safe access to equipment.</i>						
C0036146	LIN3 Misc. Valve Refurbishment 2022	190,065	190,065	3	5	15
<i>This project includes select valve refurbishments for Langan Unit 3 based on condition assessment.</i>						
C0036329	LIN1 Misc. Valve Refurbishment 2022	190,007	190,007	3	5	15
<i>This project includes select valve refurbishments for Langan Unit 1 based on condition assessment.</i>						
C0036128	LIN4 Misc. Valve Refurbishment 2022	189,767	189,767	3	5	15
<i>This project includes select valve refurbishments for Langan Unit 4 based on condition assessment.</i>						
C0042933	TRE6 Stack Refurbishment	151,517	189,760	4	4	16
<i>This project is to replace the liner bumper assembly at the 490 foot elevation of the Trenton Unit 6 Stack liner due to condition assessment. This is required to ensure overall stack integrity to support safe reliable operation.</i>						
C0041726	POT - Asbestos Abatement 2022	188,825	188,825	5	3	15
<i>This project is for asbestos abatement in multiple areas of the Point Tupper Generating Station in accordance with the Occupational Health and Safety Act (OHSA) and the department of labor's "Asbestos in the Workplace" guide.</i>						

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Figure 13: 2022 Capital Items with Estimated Total Project Cost of Less than \$1M

CI#	Project Title	2022 Budget (\$)	Project Total (\$)	Criticality	Condition	Rating
C0042726	TRE6 ID Fan Expansion Joint Structural Refurbishment	179,114	179,114	3	5	15
<i>This project will refurbish the ID fan through replacement of the steel frame on the expansion joint based on condition assessment.</i>						
C0041650	TUC Handrail Program 2022	173,384	173,384	5	3	15
<i>This project is for upgrades to handrails at Tufts Cove which are presently not the proper dimensions required by code.</i>						
C0041993	TUC2 CW Inlet Concrete Refurbishment	173,119	173,119	3	5	15
<i>This project will refurbish the CW inlet on Tufts Cove Unit 2 based on condition assessment.</i>						
C0030524	TUC2 Turbine Controls PLC Upgrade	170,531	170,531	5	4	20
<i>This project will replace obsolete electro-mechanical relays for the motor controls on the Tufts Cove Unit 2 turbine auxiliaries which are required for safe, reliable operation.</i>						
C0036929	LIN D2 Conveyor Belt Replacement 2022	169,637	169,637	4	4	16
<i>This project is for the replacement of the D2 coal conveyor belt running under the coal yard. The D2 conveyor belt is worn, curling and at the end of its expected life and can no longer move the designed coal load due to damage to the belt edging reducing its volume capacity.</i>						
C0041228	TRE Ash Site Management 2022	167,838	167,838	5	3	15
<i>This project includes the intermediate cover of exposed ash, pending final capping, which is required to meet environmental compliance.</i>						
C0030522	TUC2 TWIP PLC Upgrade	158,843	167,727	4	4	16
<i>This project will replace the obsolete Allen Bradley PLC that controls the Tufts Cove Unit 2 water induction prevention with the current Control Logics type of PLC.</i>						
C0010331	TRE6 Precipitator Controls Upgrade	165,881	165,881	3	5	15
<i>This project will upgrade the controls for the static precipitators used to remove particulates from stack emissions to be compliant with the environmental operating permit. The existing precipitator controls on Trenton Unit 6 are obsolete and are no longer supported by the OEM.</i>						
C0042030	PHB -Trancel Screw Refurbishment 2022	160,109	160,109	4	4	16
<i>This project is for the refurbishment of the PB3 feedings system comprising of screw conveyors that feeds biomass fuel to the boiler. These screws wear overtime under normal operation and must be refurbished to sustain reliable operation.</i>						
C0041657	TUC Rotating Equipment Shaft Guards Upgrade	160,039	160,039	5	3	15
<i>This project will install guards on exposed rotating equipment in the plant to improve safety of personnel.</i>						
C0030905	POT - GSCW Pump & Motor Replacement	159,385	159,385	4	4	16
<i>This project is for the replacement and additions to the general service cooling water (GSCW) system at the Point Tupper Generating Station.</i>						
C0041653	TUC Lighting Program 2022	157,356	157,356	4	4	16
<i>This project is to replace out of service lighting with efficient LED fixtures. The main driver of this project is to improve lighting in high risk areas, improving Plant safety.</i>						
C0036407	LIN HFO/LFO Line Refurbishment 2022	152,950	152,950	5	3	15
<i>This project is for the refurbishment of the heavy and light fuel oil lines based on condition assessment reducing environmental and asset integrity risks</i>						
C0041051	LIN Roof Hatch Redesign 2022	151,267	151,267	5	3	15
<i>This project will redesign the current roof hatch system to allow for safer operation by plant personnel and to prevent birds from entering the building while the hatches are open.</i>						

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Figure 13: 2022 Capital Items with Estimated Total Project Cost of Less than \$1M

CI#	Project Title	2022 Budget (\$)	Project Total (\$)	Criticality	Condition	Rating
C0041690	POT - 2022 Miscellaneous Valve/Component Replacement	150,919	150,919	3	5	15
<i>This project includes select valve refurbishments for Point Tupper based on condition assessment.</i>						
C0036007	LIN Grating Refurbishment 2022	150,582	150,582	5	3	15
<i>This project will refurbish grating and stairways on the bottom floor of the boiler house, CW and crusher buildings that are degrading from corrosion and wear which is affecting the structural integrity and safety of the structures.</i>						
C0041207	LIN WTP PLC/Controls Upgrade 2022	150,477	150,477	3	5	15
<i>This project will upgrade the existing Programmable Logic Controller (PLC) system in the Water Treatment Plant from the old PLC 5 system to the newer and more reliable PLC Control Logics. The current PLC is no longer supported and the control cabinets are showing signs of corrosion and need to be replaced to sustain reliable operation.</i>						
C0041312	TRE LED Lighting 2022	150,170	150,170	3	5	15
<i>This project is to replace light fixtures at the Trenton Generating Station with LED fixtures and bulbs. Many of the fixtures no longer operate causing low light areas around the plant which is creating safety hazards. This project will upgrade the plant lighting to more energy efficient LED technology removing the safety hazards associated with low light conditions.</i>						
C0030527	TUC2 Air Pre-Heater Refurbishment	148,595	148,595	3	5	15
<i>This project will refurbish the air heater on Tufts Cove Unit 2 through replacement of air sealing devices based on condition assessment.</i>						
C0041323	TRE6 Valve Refurbishment 2022	147,843	147,843	3	5	15
<i>This project includes select valve refurbishments for Trenton Unit 6 based on condition assessment.</i>						
C0030062	LIN3 HIP Insulation Replacement	146,253	146,253	4	4	16
<i>This project will replace the insulation covering the outer upper and lower shell of the high and intermediate pressure (HIP) sections of the Lingan Unit 3 steam turbine based on asset condition. Effective insulation of the turbine is required for safe, reliable operation</i>						
C0042029	PHB - Conveyors & Handling Systems 2022	144,458	144,458	4	4	16
<i>This project is for the replacement of components on the secondary biomass fuel handling system including the drag chain conveyor, belt conveyor, screw and other fuel handling equipment. This project is required for the reliable feed of fuel to the boiler.</i>						
C0041648	TUC Electric Valve Actuator Replacements	143,036	143,036	4	4	16
<i>This project will replace obsolete valves and actuators for which parts and service are no longer available. These valves regulate steam and water flow around the boilers and turbines.</i>						
C0030487	TUC3 Lube Oil Replacement	142,272	142,272	4	4	16
<i>This project will replace the Tufts Cove Unit 3 Turbine Lubrication Oil. The chemical properties of the oil have deteriorated to a point where replacement is required to sustain reliable operation.</i>						
C0041647	TUC Dehumidifier Access Improvements	141,864	141,864	3	5	15
<i>This project will install dedicated platforms for housing the turbine de-humidifiers on Tufts Cove Units 1 and 2. The de-humidifiers are currently located on the turbine deck and are an obstruction to personnel accessing equipment. Dehumidifiers are required to preserve the assets from corrosion during offline periods, extending component life.</i>						
C0010944	AMO LIN4 Enhanced Monitoring	137,196	140,034	4	4	16
<i>This project is for the deployment of devices to enhance NS Power's ability to monitor its generating assets and expand the ability to identify problem areas early and implement appropriate mitigating measures. This technology will allow NS Power to better manage current asset risks and extend refurbishment interval for some equipment, optimizing capital requirements.</i>						
C0020310	TRE Roofing Anchor Points	136,204	136,204	4	4	16
<i>This project will install roofing anchor points (for fall arrest purposes) to improve worker safety on several areas around the Trenton Generating Station.</i>						
C0030526	TUC2 Demineralized Water Cooler Refurbishment	135,537	135,537	3	5	15
<i>This project is required to refurbish the Tufts Cove Unit 2 demineralized water coolers based on condition assessment.</i>						

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Figure 13: 2022 Capital Items with Estimated Total Project Cost of Less than \$1M

CI#	Project Title	2022 Budget (\$)	Project Total (\$)	Criticality	Condition	Rating
C0021402	TUC Oil Tanks Levels and Pump House Controls Upgrade	132,487	132,487	3	5	15
<i>This project will upgrade the obsolete HFO pumphouse control system that uses electro-mechanical relay to a Programmable Logic Controller (PLC) system. This will allow operation from the control room with improved reliability and monitoring of the system.</i>						
C0021764	TRE5 CW Intake Canal Refurbishment	119,515	131,400	4	4	16
<i>This project is to refurbish the Trenton Generating Station's Unit 5 Cooling Water intake canal. The aged canal infrastructure has deteriorated, and condition assessment has identified early signs of failure.</i>						
C0036390	LIN Ash Site Winter Cover 2022	127,884	127,884	5	3	15
<i>This project is for the addition of a winter cover on completed ash laydown areas preventing loose ash from becoming airborne and travelling to neighboring properties.</i>						
C0036348	LIN4 Steam Drum Level Controls Upgrade	121,412	121,412	4	4	16
<i>This project is for the upgrade of the steam drum level controls on Lingan Unit 4 as the current level controls are obsolete and no longer supported.</i>						
C0042712	POT - Stack Refurbishment Phase 1	119,079	119,079	4	4	16
<i>This project is the first of two phases required to refurbish the Point Tupper Unit 2 stack. This will include filling external cracks with epoxy injection, replacing the south breech weather skirting and one section of the block wall.</i>						
C0020305	TRE Common Water Replacement	114,105	114,105	3	5	15
<i>This project is for the replacement of deteriorated piping in the Trenton Common Water System including water lines on the Town water system, Fire water system, and the Auxiliary Cooling water system.</i>						
C0036266	LIN Coal Plant Structural Refurbishment 2022	113,665	113,665	4	4	16
<i>This project is for the refurbishment of the structural system in the Lingan coal reclaim. This project is required to address damage caused by corrosion of the conveyer system over time. The structural refurbishment will address both the operational and concerns associated with the degraded support structures while ensuring the coal handling demands are met in a safe and reliable manner.</i>						
C0030483	TUC2 Online Generator Monitoring	113,548	113,548	5	4	20
<i>This project will install equipment to allow on-line monitoring of the generator. This equipment will detect evidence of partial discharge, which is more accurate than annual off-line testing, providing valuable real-time intelligence regarding the health of the stator winding.</i>						
C0041053	LIN Ladder Swing Gates 2022	113,341	113,341	5	3	15
<i>This project is for the installation of ladder swing gates on the permanent ladders that are used around the plant to access isolated areas and equipment to improve safety.</i>						
C0041314	TRE Fish Barrier Screen Replacement	112,820	112,820	5	3	15
<i>This project will replace the existing fish barrier screens with ones made from stainless steel and composite materials. This will reduce annual maintenance requirements due to the brackish nature of the water used in the cooling system.</i>						
C0041308	TRE 4160 and 600V Breaker Refurbishment 2022	112,815	112,815	5	3	15
<i>This project includes select refurbishment or replacement of defective or obsolete electrical breakers based on condition assessments.</i>						
C0020664	TUC3 Online Generator Monitoring	112,622	112,622	4	4	16
<i>This project will install equipment to allow on-line monitoring of the generator. This equipment will detect evidence of partial discharge, which is more accurate than annual off-line testing, providing valuable real-time intelligence regarding the health of the stator winding.</i>						
49659	TUC PLC Replacement	107,386	112,057	4	4	16
<i>This project will replace obsolete PLCs as part of the fleet wide PLC replacement program. This PLC controls the water induction prevention of the Tufts Cove Unit 1 Turbine.</i>						
C0041668	TUC3 4160 and 600V Breaker Refurbishment 2022	111,707	111,707	5	3	15
<i>This project includes select refurbishment or replacement of defective or obsolete electrical breakers based on condition assessments.</i>						

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Figure 13: 2022 Capital Items with Estimated Total Project Cost of Less than \$1M

CI#	Project Title	2022 Budget (\$)	Project Total (\$)	Criticality	Condition	Rating
C0041663	TUC2 Condenser Inlet CW Expansion Joints Replacement	111,475	111,475	4	4	16
<i>This project will replace the cooling water (CW) expansion joints on the inlet to the Tufts Cove Unit 2 condenser based on asset condition.</i>						
C0041787	POT 4160 and 600V Breaker Refurbishment 2022	111,392	111,392	5	3	15
<i>This project includes select refurbishment or replacement of defective or obsolete electrical breakers based on condition assessments.</i>						
C0041665	TUC2 DCS HMI Upgrade Phase 2	108,232	108,232	5	4	20
<i>The second phase of this project will replace the obsolete Distributed Control System (DCS) Human Machine Interface (HMI) graphics for the NERC system.</i>						
C0041799	TUC Plant Security Upgrades 2022	107,056	107,056	4	4	16
<i>This project will continue to upgrade plant security with upgrades to cameras and wharf lighting to comply with Marine Transportation Security Regulations requirements.</i>						
C0042106	PTMT - MCC Siding & Roof Replacement	106,520	106,520	3	5	15
<i>This project includes the replacement of the siding and roof of the motor control center (MCC) at the Point Tupper Marine Terminal based on condition assessment.</i>						
C0041662	TUC2 4160 and 600V Breaker Refurbishment 2022	103,610	103,610	5	3	15
<i>This project includes select refurbishment or replacement of defective or obsolete electrical breakers based on condition assessments.</i>						
C0039526	TUC Sensors and Alarms Refurbishment	69,340	103,003	4	4	16
<i>This project will refurbish sensors and alarms to address issues related to faulty field instrument devices, DCS graphics and logic deficiencies.</i>						
C0036347	LIN Fan Positioner Upgrade 2022	102,906	102,906	3	5	15
<i>This project is for the upgrade from pneumatic fan positioners that have reached the end of their expected useful life to electrical actuated fan positioners. The fan positioners are used to control air flow via dampers on coal mill exhausters and combustion air duct.</i>						
C0041311	TRE HVAC Upgrades 2022	101,028	101,028	4	4	16
<i>This project is for the replacement of heating, ventilating and air conditioning (HVAC) equipment for the Trenton Generating Station. The focus of this HVAC replacement project will be to replace the existing HVAC equipment with heat pumps to maintain the year-round cooling that is required for the plant staff, while also improving efficiency and equipment access.</i>						
C0041786	POT - LFO & HFO System Upgrades 2022	100,816	100,816	5	4	20
<i>This project includes upgrades to the light and heavy fuel oil systems at the Point Tupper Generating Station based on condition assessment driven by the Risk Based Inspection (RBI) program.</i>						
C0021522	TUC1 4160 and 600V Breaker Replacement 2022	100,433	100,433	5	3	15
<i>This project includes select refurbishment or replacement of defective or obsolete electrical breakers based on condition assessments.</i>						
C0041349	TRE6 Burner Impeller Replacement	99,340	99,340	4	4	16
<i>This project is for the replacement of burner impellers on Trenton Unit 6. This will help maintain efficiency and minimize NOx emissions.</i>						
C0041366	TRE6 Conveyors Refurbishment 2022	98,880	98,880	5	3	15
<i>This project includes the refurbishment of conveyor components, including belts, pulleys, scrapers and structural/electrical components to maintain and improve safety of the Trenton Unit 6 coal delivery system.</i>						
C0039147	LIN Coal Feeder Drive Replacement 2022	98,854	98,854	4	4	16
<i>This project will upgrade the coal feeder controls (human machine interface, variable speed drive control, and weightometer control) that are used to meter the amount of coal into the coal pulverizers and into the boiler. The controls are obsolete, and parts are no longer available to ensure feeder availability.</i>						

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Figure 13: 2022 Capital Items with Estimated Total Project Cost of Less than \$1M

CI#	Project Title	2022 Budget (\$)	Project Total (\$)	Criticality	Condition	Rating
C0041707	POT - Ladder Swing Gates & Guarding 2022	98,641	98,641	5	3	15
<i>This project is for the installation of ladder swing gates on the permanent ladders that are used around the plant to access isolated areas and equipment to improve safety.</i>						
C0036148	LIN 4160 and 600V Breaker Refurbishment 2022	98,621	98,621	4	4	16
<i>This project includes select refurbishment or replacement of defective or obsolete electrical breakers based on condition assessments.</i>						
C0021502	TUC1 FD Fan VIV Actuator Replacement	98,253	98,253	4	4	16
<i>This project will replace the obsolete Variable Inlet Vane (VIV) actuators for the Tufts Cove Unit 1 Forced Draft (FD) fan. This will allow more precise control using electronic positioners and electric motors rather than pneumatics for the FD fan.</i>						
C0020602	ICP Silo Liner Replacement	97,540	97,540	3	5	15
<i>This project is for the replacement of the railcar loading silo liners which prevents wear on the shell of the silo. The current liner is worn and requires replacement to mitigate risk of a shell failure.</i>						
C0039068	LIN Guarding and Railing Upgrade 2022	97,337	97,337	5	3	15
<i>This project will upgrade guarding and railing around high priority areas around ladders and gates to address safety concerns.</i>						
C0036388	LIN3 Auxiliary Air Upgrades 2022	95,955	95,955	3	5	15
<i>This project will upgrade the auxiliary air damper positioners from air actuated to electrically actuated. The auxiliary air dampers control the air supply to the boiler therefore helping to control the combustion process. The existing positioners have been experiencing reliability issues, which may impact boiler efficiency as well as emissions control.</i>						
C0042706	TUC2 Obsolete Valve Replacements	94,795	94,795	4	4	16
<i>This project will replace obsolete valves and actuators at Tufts Cove Unit 2 for which parts and service are no longer available. These valves regulate steam and water flow around the boilers and turbines.</i>						
C0041674	TUC3 Obsolete Valve Replacements	94,565	94,565	4	4	16
<i>This project will replace obsolete valves and actuators at Tufts Cove Unit 3 for which parts and service are no longer available. These valves regulate steam and water flow around the boilers and turbines.</i>						
C0030943	ICP Pumphouse Refurbishment	89,955	89,955	3	5	15
<i>This project is for the refurbishment of the International Coal Pier water supply pumphouse which supplies process water to the pier. The pumphouse is essential to this water supply which is required to allow the plant to operate essential systems like the dust control system.</i>						
C0041672	TUC3 FD Fan Ducting Expansion Joints Refurbishments	89,933	89,933	4	5	20
<i>This project will refurbish the expansion joints in the discharge ducting of the forced draft (FD) fans based on asset condition.</i>						
C0039667	LIN WTP Resin Replacement 2022	89,278	89,278	3	5	15
<i>This project is for the replacement of the ion exchange resin at the water treatment plant (WTP). Ion exchange resin is used to remove contaminants from the feedwater; the existing resin has reached the end of its useful life.</i>						
C0041370	TRE6 Replace Vacuum Pump Coolers	88,884	88,884	3	5	15
<i>This project is for the replacement of the Trenton Unit 6 Vacuum Pump coolers based on asset condition.</i>						
C0021463	TUC Turbine Bay Louvers Refurbishment	88,351	88,351	3	5	15
<i>This project will upgrade the controls and mechanical components of the turbine bay louvers to allow proper operation to mitigate risk of freezing of the plant equipment and risk of smoke and fire ingress into the plant in the event of a fire in the transformer yard.</i>						
C0041666	TUC2 Generator Synchronizer Replacement	87,814	87,814	5	5	25
<i>This project will replace the Tufts Cove Unit 2 synchronizer as the existing synchronizer is now obsolete and reached the end of its expected service life.</i>						
C0041655	TUC Steam Drum Level Detection Upgrades	86,103	86,103	4	4	16
<i>This project will upgrade Tufts Cove Units 1, 2 and 3 steam drum level detection with Aquarian Columns which utilize high and low level conductivity probes. The existing detection equipment has reached the end of its service life and is unreliable.</i>						

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CI#	Project Title	2022 Budget (\$)	Project Total (\$)	Criticality	Condition	Rating
C0041990	TUC3 East Condensate Extraction Pump Refurbishment	85,412	85,412	3	5	15
<i>This project will refurbish the East condensate extraction pump (CEP) on Tufts Cove Unit 3 due to age and condition of the asset.</i>						
C0041658	TUC Water Treatment Plant #3 Refurbishment	83,998	83,998	4	4	16
<i>This project will refurbish the #3 Water Treatment Plant train at Tufts Cove including valve replacements, recirculation pump replacement and controls upgrades. These valves and pump are obsolete and the pneumatic controls are to be moved to the PLC to increase reliable operation.</i>						
C0036387	LIN GSCW Small Bore Piping Refurbishment 2022	83,103	83,103	3	5	15
<i>This project is for the refurbishment of the general service cooling water (GSCW) small bore piping which has deteriorated, creating challenges in ensuring a proper flow of cooling water to equipment requiring cooling.</i>						
C0041728	POT - Facility Upgrades 2022	82,343	82,343	3	5	15
<i>This project is for the renovations and upgrades of facilities original to the over thirty year old plant. This project will include work on the utility room to address deteriorated infrastructure and safety hazards.</i>						
C0041986	TUC6 HRSG Refurbishments	81,541	81,541	4	4	16
<i>This project will refurbish the Heat Recovery Steam Generator (HRSG) boilers to reduce casing gas leaks causing vestibule corrosion, and pressure tubing replacement where reduced wall thickness has occurred due to internal contact and wear.</i>						
47605	TRE Carbon Analyzer Replacement	80,433	80,433	3	5	15
<i>This project will replace the existing carbon analytical equipment at the Trenton Generating Station that is obsolete. The equipment is used on a regular basis to measure the carbon content of the ash generated at the station.</i>						
C0041368	TRE6 Sootblowers 2022	80,140	80,140	3	5	15
<i>This project is to refurbish the Trenton Unit 6 sootblowers through replacement of critical sootblower components that have reached end of life to maintain heat rate and reliability of the boiler.</i>						
C0041691	POT - Lighting Upgrades 2022	79,943	79,943	3	5	15
<i>This project will continue to upgrade the plant lighting to more energy efficient LED technology removing the safety hazards associated with low light conditions.</i>						
C0021466	TUC Underground Water Lines Replacement	78,879	78,879	4	4	16
<i>This project will replace two underground water lines which are deteriorated due to corrosion.</i>						
C0041649	TUC Fire Protection and Cable Wraps	78,790	78,790	4	4	16
<i>This project will install fire protection for cable trays near the Tufts Cove Turbine-Generators and protection of steel columns for lubrication tanks as per insurers recommendations.</i>						
C0021462	TUC Plant Siding Refurbishment	77,195	77,195	5	3	15
<i>This project is for removal and replacement of siding that contains asbestos from the Tufts Cove plant as this siding is becoming friable due to deterioration.</i>						
C0041687	LIN34 CW MCC Decommissioning 2022	75,788	75,788	3	5	15
<i>This project will include relocation of all control wiring to the new motor control centre (MCC) and the removal of the original MCC units. The original MCC units no longer provide appropriate weather protection.</i>						
C0042034	PHB - Battery Bank Replacement	74,386	74,386	4	4	16
<i>This project is for the replacement of battery bank A at the Port Hawkesbury Biomass plant that has reached the end of its expected useful life.</i>						

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C0041656	TUC Portable Furnace Viewing Camera	74,320	74,320	3	5	15
<i>This project is for a portable furnace viewing camera to allow monitoring of the heating pattern of the boiler tubes against the expected operating design to help prevent failures due to heat flux in this area. An irregular pattern may be an indication of overheating in some areas which may lead to a tube leak. This wide angled IR viewing device can provide a continuous display of the heat pattern and accurate temperature measurement.</i>						
C0041652	TUC Lagoon Pump System Upgrade	72,558	72,558	3	5	15
<i>This project will upgrade the lagoon pumphouse and equipment to allow better access for maintenance and more reliable operation.</i>						
C0020603	ICP Locomotive Traction Motor Refurbishment	70,621	70,621	4	4	16
<i>This project is for refurbishment of one set of traction motors based on condition assessment. The locomotive truck sets supply the traction to move the rail cars via an electric traction motor.</i>						
C0041897	POT - Coal System Structural Refurbishment	70,375	70,375	4	4	16
<i>This project is for the refurbishment of the structural steel coal system at the Point Tupper Generating Station including the refurbishment and replacement of various components in the coal gallery system to provide for the safety of the employees working in the area.</i>						
C0020570	ICP Conveyor Hydraulics Refurbishment	34,681	69,908	4	4	16
<i>This project is to refurbish the hydraulics that lift and control the #6 and #7 stacker conveyors based on condition assessments.</i>						
C0041313	TRE Demineralization Plant Upgrades	69,668	69,668	3	5	15
<i>This project will upgrade the Trenton Unit 6 demineralization plant to address the inability to heat caustic for regeneration/resin cleaning while no units are running, allowing more efficient boiler feedwater supply, and replace select valves in the water treatment plant (WTP) based on condition assessment.</i>						
C0041676	TUC6 Battery Bank U6B Replacement	69,296	69,296	4	4	16
<i>This project is for replacement of battery bank B at Tufts Cove Unit 6 which has reached the end of its expected useful life.</i>						
C0041675	TUC3 Natural Gas Valves Refurbishment 2022	68,410	68,410	4	4	16
<i>This project is for the refurbishment of natural gas burner valves that control the flow of natural gas to the Tufts Cove Unit 3 boiler based on condition assessment.</i>						
C0041891	POT - Ash Site Collection Stair Structure	64,440	64,440	3	5	15
<i>This project is for a new structural steel stair and catwalk extended to cantilever off the excising outfall to safely capture a water sample.</i>						
C0041889	POT - Induced Draft Fan Upgrades	64,277	64,277	4	4	16
<i>The project is for refurbishment of the Point Tupper Generating Station induced draft (ID) fan based on condition assessment, including replacement of deteriorated ductwork surrounding the ID fan.</i>						
C0042710	POT - Battery Bank Refurbishment 2022	63,886	63,886	4	4	16
<i>This project is for the replacement of the 129V battery bank at the Point Tupper generating station based on age and recent results of the battery bank test.</i>						
C0041846	POT - Waste Water Treatment Plant Upgrades 2022	61,832	61,832	3	5	15
<i>This project is for the replacement of one waste water transfer pump at the Point Tupper Generating Station based on condition assessment to ensure adequate and reliable operation.</i>						
C0041316	TRE Floor Plates and Grating 2022	58,787	58,787	5	3	15
<i>This project is for the select replacement of pedestrian grating based on condition assessment.</i>						
C0041677	TUC6 Breaker Refurbishments 2022	57,148	57,148	4	4	16
<i>This project includes select refurbishment or replacement of defective or obsolete electrical breakers based on condition assessments.</i>						

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Figure 13: 2022 Capital Items with Estimated Total Project Cost of Less than \$1M

CI#	Project Title	2022 Budget (\$)	Project Total (\$)	Criticality	Condition	Rating
C0042708	POT - Waste Water Transfer Pump Replacement 2022	53,654	53,654	3	5	15
<i>This project is for the replacement of one deteriorated waste water transfer pump at the Point Tupper Generating Station.</i>						
C0041654	TUC Electrical Panel Replacements	53,356	53,356	3	5	15
<i>This project is for the replacement of deteriorated electrical panels and junction boxes throughout Tufts Cove Generating Station.</i>						
C0042707	TUC1 Hydrogen Panel Refurbishments	50,202	50,202	4	4	16
<i>This project will refurbish the hydrogen panel on Tufts Cove Unit 1 through replacements of flow control and measurement devices including obsolete valves.</i>						
C0042033	PHB - Silo Screw Refurbishment 2022	49,276	49,276	4	4	16
<i>This project is for refurbishment of the silo screw, including reservicing of the flights. A condition assessment identified several components of the silo screw that require replacement.</i>						
C0041319	TRE PAC System Upgrades 2022	49,212	49,212	4	4	16
<i>This project will upgrade the powdered activated carbon (PAC) system by component replacements (including blowers, motors, piping and distribution "spider") that have worn due to the abrasive nature of the PAC.</i>						
C0041188	LIN Coating Feeder Floor and Walls 2022	48,014	48,014	3	5	15
<i>This project will install a coating on the walls and floor around the feeders to improve cleaning of the area and prevent coal dust from accumulating. This area can be difficult to clean in its current state, causing risk of dust transfer to the turbine hall where it can negatively impact operation of the turbine and generator.</i>						
C0021470	TUC1 Natural Gas Valves Refurbishment	45,744	48,007	4	4	16
<i>This project is for refurbishment of the natural gas burner valves at Tufts Cove Unit 1. These valves are 20 years old and they are starting to allow gas to pass.</i>						
C0041988	TUC1 Condenser Sump Structural Steel Refurbishment	45,895	45,895	3	5	15
<i>This project will replace corroded structural steel in the Tufts Cove Unit 1 condenser sump which supports floor plates and equipment.</i>						
C0041667	TUC2 Natural Gas Valves Refurbishment 2022	44,780	44,780	4	4	16
<i>This project is for the refurbishment of natural gas burner valves that control the flow of natural gas to the Tufts Cove Unit 2 boiler. These valves are 20 years old and they are starting to allow gas to pass.</i>						
C0042088	PTMT - E-Crane Travel Pump Replacement	44,659	44,659	5	3	15
<i>This project is for the replacement of the travel pump on the Point Tupper Marine Terminal E-Crane based on condition assessment. The E-Crane is a key component for the self-unloading vessels, and travels on a track to perform this task.</i>						
C0041548	AMO TUC Relay Information Management	43,507	43,507	0	0	0
<i>This project is to enable remote connectivity to relay data, currently only available on the plant site. This will enable trending of data, as well as remote trouble-shooting and health monitoring for critical assets which enhances efficient operation.</i>						
C0030493	TUC3 Lube Oil Coolers Refurbishment	41,956	41,956	4	4	16
<i>This project will refurbish the Tufts Cove Unit 3 lube oil coolers, including corrosion protection and component refurbishment. The coolers have experienced heavy corrosion due to service in salt water environment and the foundation concrete is deteriorating.</i>						
C0042711	POT - Swing Gates 2022	37,879	37,879			
<i>This project is for the installation of ladder swing gates on the permanent ladders that are used around the plant to access isolated areas and equipment to improve safety.</i>						
C0031086	TRE TAMS Toe Buttress Habitat Restoration	35,203	35,203	5	3	15
<i>This project includes habitat restoration efforts to offset new instream footprint associated with the Trenton Ash Management Site (TAMS) toe buttress installation. This project is required to maintain compliance with the Fisheries Act.</i>						
C0042086	PTMT - MCC Computer Upgrades	34,750	34,750	4	4	16
<i>This project is for the replacement of the obsolete motor control center (MCC) programable logic controller (PLC) at Point Tupper Marine Terminal as part of the fleet wide PLC replacement program.</i>						

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Figure 13: 2022 Capital Items with Estimated Total Project Cost of Less than \$1M

CI#	Project Title	2022 Budget (\$)	Project Total (\$)	Criticality	Condition	Rating
C0041307	TRE Ladder Swing Gates and Guarding	30,667	30,667	5	3	15
This project is for the installation of ladder swing gates on the permanent ladders that are used around the plant to access isolated areas and equipment to improve safety.						
C0042046	PTMT - Roadway Refurbishment 2022	28,057	28,057	3	5	15
This project is for the restoration of the roadway at Point Tupper Maine Terminal. The current roadway is corroding away and requires refurbishment to provide for the safety of the employees driving on the road.						
C0041894	POT - Boiler Phosphate Meter	26,991	26,991	4	4	16
This project will replace the boiler phosphate meter for the Point Tupper Generating Station as the existing meter is no longer reliable. Phosphate level management is important to ensure the performance and reliability of the boiler.						
C0041206	LIN JD Gator Replacement 2022	26,270	26,270	3	5	15
This project will replace the current JD Gator that has reached its end of service life.						
Total Steam Items Less Than \$1M		\$34,182,290	\$35,051,656			
Gas Turbine						
C0030550	CT - VJ1 Gen Control and Protect	302,657	352,629	5	3	15
This project will replace the existing electro-mechanical generator protection at Victoria Junction Unit 1 with a new digital generator protection relay and replace the AVR with a newer AVR with more functionality and protection. The new design addresses obsolescence issues, and is consistent with installations across the fleet.						
C0041525	CT VJ1 MCC Upgrades	330,532	330,532	5	3	15
This project is for the refurbishment of the Victoria Junction Unit 1 motor control center (MCC) that has reached the end of its service life.						
C0041512	CT TUS1 Air Compressor & Dryer Replacement	288,894	288,894	4	4	16
This project is for the replacement of the existing air compressor and dryer with a modern, modular system. The existing system experiences regular failures, and the air tank no longer has the required thickness to ensure safe, reliable operation.						
C0041537	CT BGT Package Coating	174,663	174,663	3	5	15
This project is for the recoating of the engine and generator enclosure and stacks at the Burnside Combustion Turbine to extend the useful life of the enclosure and stacks, and ensure clean supply of air at the intake.						
C0041509	TUS 1 Fuel System Upgrade	156,464	156,464	4	5	20
This project will upgrade the fuel delivery system at the Tuskett Combustion Turbine to increase the reliability of the overall unit through improved performance and reduction in failures.						
C0041514	CT BGT Fuel Piping/Cable Bridges	145,589	145,589	4	4	16
This project will replace the existing underground piping systems at the Burnside Generation station based on condition assessment.						
C0041513	CT BGT Bleed Valve Upgrade	107,376	107,376	4	4	16
This project is in response to an OEM service bulletin for known issues with the existing bleed valve and will provide a new compressor air bleed valve system incorporating a new bleed valve actuating cylinder, air supply hoses, control box assembly, wiring harnesses and related supporting hardware.						
C0041522	CT - Harden Control System Grounding	86,801	86,801	4	4	16
This project will upgrade the control system grounding and install surge protection systems to mitigate the risk to the operation of the programmable logic controllers (PLC) of the units caused by lightning. The PLC is used to control the CT and is vital to the reliable operation of the unit.						
C0041519	TUS1 Station Services Battery Bank Replacement	50,005	50,005	4	4	16
This project involves the replacement of the Tuskett Combustion Turbine station service battery bank as the batteries have reached the end of their expected service life. The batteries are needed to provide emergency backup DC power.						
C0041515	CT VJ1 Air Hood Upgrades	48,312	48,312	4	4	16
This project is for upgrades to the Victoria Junction Unit 1 air intake based on condition assessment.						

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CI#	Project Title	2022 Budget (\$)	Project Total (\$)	Criticality	Condition	Rating
C0041534	CT - VJ2 VLRA Battery Bank Replacement	47,823	47,823	5	4	20
<i>This project involves the replacement of the Victoria Junction Unit 2 battery bank as the batteries have reached the end of their expected service life. The batteries are needed to provide emergency backup DC power.</i>						
C0041533	CT VJ1 VLRA Battery Bank Replacement	47,637	47,637	5	4	20
<i>This project involves the replacement of the Victoria Junction Unit 1 battery bank as the batteries have reached the end of their expected service life. The batteries are needed to provide emergency backup DC power.</i>						
C0043552	CT - Camera Replacement	47,604	47,604	3	5	15
<i>This project is for the upgrade and replacement of camera systems across the combustion turbine fleet that are currently subject to cyber security risks based on location of manufacturing.</i>						
C0041516	CT TUC 4 Replace Package Hoses	45,044	45,044	4	4	16
<i>This project will replace select critical external hoses based on condition assessment.</i>						
C0041529	CT TUC4 Add SOV in Demineralized Water Return	44,941	44,941	3	5	15
<i>This project is for the addition of Solenoid operated valves (SOV) to the demineralized water return as a protective measure to prevent backflow of natural gas into the LM6000 control building. This will reduce the risk of fire or exposure to high levels of natural gas.</i>						
C0041531	CT TUC5 Add SOV in Demineralized Water Return	44,941	44,941	3	5	15
<i>This project is for the addition of Solenoid operated valves (SOV) to the demineralized water return as a protective measure to prevent backflow of natural gas into the LM6000 control building. This will reduce the risk of fire or exposure to high levels of natural gas.</i>						
C0041517	CT TUC 5 Replace Package Hoses	44,409	44,409	4	4	16
<i>This project will replace select critical external hoses based on condition assessment.</i>						
C0041526	CT VJ1 Battery Charger Replacement	38,339	38,339	3	5	15
<i>This project will replace the battery chargers at Victoria Junction Unit 1 based on condition assessment.</i>						
C0041510	CT VJ2 AC/DC Fuel Pump Replacement	32,856	32,856	4	5	20
<i>This project is for the replacement of the AC and DC fuel pumps at Victoria Junction Unit 2 that are at the end of their service life and are a critical part of the unit's fuel system.</i>						
C0029684	TUS - Fuel Piping Coating Refurbishment	30,203	32,796	4	4	16
<i>This project is for the refurbishment of the fuel system piping coating to correct rust/coating deformities at Tusket.</i>						
C0041518	CT BGT2 Air System Replacement	26,052	26,052	4	4	16
<i>This project is for the replacement of the Burnside Combustion Turbine Unit 2 air lines and compressor based on condition assessment.</i>						
C0041532	TUS1 Generator Enclosure Oil Containment Seal Refurbishment	23,602	23,602	3	5	15
<i>This project will refurbish the generator enclosure slab to provide for proper oil containment in the event of an oil leak.</i>						
C0041521	CT BGT1 Inverter Replacement	22,997	22,997	4	4	16
<i>This project is for the replacement of the existing inverter at Burnside Unit 1 that has reached the end of its expected service life with a newer model that will provide a manufacturer's warranty and support for replacement parts.</i>						
C0041523	CT TUS1 Fuel Flow Meter Replacement	17,658	17,658	4	4	16
<i>This project will replace the fuel flow meter to allow for regular calibration and accurate reporting.</i>						

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Figure 13: 2022 Capital Items with Estimated Total Project Cost of Less than \$1M

CI#	Project Title	2022 Budget (\$)	Project Total (\$)	Criticality	Condition	Rating
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C0041528	CT TUC4/5 Confined Space Attachment Points	17,500	17,500	5	3	15
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This project is for the installation of attachment points in four locations where there is regular confined space work but there are not permanent rescue anchor points. Installing certified anchor points will allow for a swing arm to be installed to lower someone to ground in case of an emergency.

C0041520	CT BGT Spare Inverter	16,298	16,298	4	4	16
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This project is for the purchase of a spare inverter to be stored at the Burnside Combustion Turbine. The inverter is used to power critical control systems and parts and service are difficult to source. This inverter will be a critical spare for the fleet.

Total Gas Turbine Items Less Than \$1M		\$2,239,197	\$2,291,761			
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Wind

C0041535	AMO Nuttby Enhanced Monitoring	197,197	197,197			
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This project is for the installation of instrumentation to monitor the health of wind turbines at Nuttby in real-time and augment predictive analytic models for the equipment. This information will help ensure actions are taken at the right time to address performance and reliability concerns in advance of failures.

C0037747	WIN - South Canoe Continuous Monitoring System Upgrade	152,672	180,673			
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This project is for the addition of a continuous monitoring system for the South Canoe Wind Farm to aid in early fault detection, and detection and management of major component failure.

C0041847	WIN - Nuttby Smoke Detection System	163,114	163,114			
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This project is for the addition of smoke detection in all 22 wind turbines at Nuttby Wind Farm in accordance with insurer's recommendation.

Total Wind Items Less Than \$1M		\$512,983	\$540,984			
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Total Generation Items Less Than \$1M		\$42,035,198	\$43,200,292			
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Transmission

C0041830	Spare Power Production Unit Transformer	883,700	883,700	5	3	15
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This project is for the purchase of a spare transformer to cover several unit transformers across the power production fleet that are showing signs of deterioration. This spare will provide backup against a number of contingency scenarios.

C0041833	2022/2023 Bulk Oil Breaker Replacement Program	383,882	795,186	4	5	20
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This project is for the replacement of four bulk oil breakers - 1 x 69 kV circuit breaker and 3 x 138 kV circuit breakers.

C0021132	24C-T54G Grounding Bank Replacement	723,299	784,561	3	5	15
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This project is for the replacement of the existing Dickie Brook grounding transformer 24C-T54G with an NS Power standard sized 3-Phase 69kV zig-zag grounding bank. This unit has reached end of life and a replacement is required for continued reliable operation.

C0041812	L6040 Replacements and Upgrades	336,712	673,424	4	4	16
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L6040 is a 17.2 kilometre (64 Structures) 69kV transmission line, built in 1959, that connects 91H Tufts Cove to 132H Spider Lake substations. This project is required to replace deteriorated assets that have been identified through NS Power's inspection program. This project includes the replacement of deteriorated overhead ground wire on 20 spans.

C0041822	Wreck Cove Cable Storage System	357,100	590,610	5	5	25
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This project is for the purchase of a modernized storage system for a spare HV cable at the Wreck Cove Generating Facility to replace the old storage infrastructure currently on site. This will bring the existing storage solution up to industry best practice for long term storage of an oil filled cable and ensure that the cable will be available and in good operating condition when required.

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C0031051	Pennsylvania Breaker Replacements	211,510	430,791	3	5	15
<i>This project is for the replacement of 16 circuit breakers manufactured by Pennsylvania Breaker. The existing breakers have several known failure mechanisms that result in unreliable operation which poses a customer reliability risk.</i>						
C0031267	2022 Oil Containment Program	400,965	400,965	5	3	15
<i>This project is for the installation of oil containment systems for substation main power transformers. These oil containment systems mitigate the risk of transformer oil releases causing environmental damage.</i>						
C0037907	5V-501 Switch and Structure Replacement	403,856	403,856	3	5	15
<i>This project is for the replacement of deteriorated substation transmission line switch 5V-501 at 5V-Lumsden Hydro. This includes the replacement of one 69kV transmission line switch and associated wooden structure.</i>						
C0031047	85S Generator Breaker Replacements	153,831	305,201	4	4	16
<i>This project will replace 85S-601 and 85S-602 that have been identified for replacement based on age, number of operations, maintenance history and criticality to the transmission system.</i>						
C0044431	2022/2023 Capacitor Bank Breaker Replacements	136,367	293,110	4	4	16
<i>This project will retire and replace two capacitor bank breakers, 139H-419 and 1H-417 that have been identified for replacement based on age, number of operations, maintenance test data, service history and criticality to the systems they serve.</i>						
C0011117	17V-T1 Power Transformer Replacement	75,704	278,093	3	5	15
<i>This project is for the replacement of the existing St Croix 17V-T1, 7.5 MVA, 66/22 kV power transformer with an NS Power standard sized 7.5/10/12.5 MVA unit, including the purchase of new 69 kV and 25 kV lightning arresters.</i>						
C0031044	67N-713 230 kV Breaker Replacement	272,277	277,963	5	4	20
<i>This project will replace circuit breaker 67N-713 at 67N-Onslow EHV and repurpose salvageable parts to maintain the remaining operational inventory of ten similar 230 kV Toshiba type GSL-200PIA units across the system.</i>						
C0041840	Legacy Oil Containment Refurbishments	169,887	253,114	5	3	15
<i>This project is for the refurbishment of two older oil containment systems that are at end of life, including concrete refurbishment, valve replacements, and controls replacements.</i>						
C0041844	Upgrade Mobile Protection Relays	126,782	252,883	4	4	16
<i>This project will upgrade existing electromechanical mobile substation relays and events recorders to more modern microprocessor-based relays which will result in improved event recording during outages.</i>						
C0041838	Animal Deterrents/Pest Mitigation for Cable Trenches	101,426	252,747	4	4	16
<i>This project will install animal deterrents and/or pest mitigation in cable trenches at one substation to prevent hazards from animal waste and animals chewing on cable insulation or infesting substation control buildings.</i>						
C0031043	10W Radiator Replacements	179,690	179,690	3	5	15
<i>This project is for the replacement of seven radiators associated for 10W-GT4. The existing radiators are corroded to a point where they are becoming an operational concern.</i>						
C0041841	Onslow Spares Yard Grade/Storage Pads	152,138	152,138	3	5	15
<i>This project is for upgrades to the spare storage yard at 67N Onslow to install oil level monitoring and alarming. This investment will mitigate the risk of environmental impacts associated with oil releases from spare assets.</i>						
C0041831	Lingan Spare Potential Transformers	138,805	138,805	5	5	25
<i>This project is to procure spare electrical potential transformers for 87S SF6 230kV bus based on age of the existing transformers. These transformers are custom made and not available off-the-shelf.</i>						
C0041828	Auto-Regenerating Breather Retrofit Program	123,029	123,029	3	5	15
<i>This project is part of a multi-year program to deploy auto-regenerating silica gel breathers on substation transformers. The breathers will improve moisture management inside transformer oil systems, thus reducing maintenance investments.</i>						

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CI#	Project Title	2022 Budget (\$)	Project Total (\$)	Criticality	Condition	Rating
C0041842	Bird Deterrents for 2S and 50N	101,426	101,426	4	4	16
This project is for the installation of bird deterrents at 2S and 50N to reduce the risk of bird contacts that result in customer outages.						
C0041835	50W Radiator Replacements	81,141	81,141	3	5	15
This project is for the replacement of three radiators associated for 50W-T53. The existing radiators are corroded to a point where they are becoming an operational concern.						
C0041836	Oil Treatment Equipment	76,070	76,070	4	4	16
This project is for oil processing pumps required for oil handling to be performed as part of the polychlorinated biphenyl (PCB) replacement program. This is necessary to allow the re-use of 2-49ppm PCB oil in future projects reducing processing and new oil costs.						
C0031294	16V Low Side Switch Addition	47,878	47,878	4	4	16
This project is for the addition of a low-side switch to enable single transformer isolation at 16V Weymouth which will allow hydro generation to continue in the event of a single transformer (planned or unplanned) outage.						
Total Transmission Items Less Than \$1M		\$5,637,473	\$7,776,378			
Distribution						
C0031117	2H-411-Prospect Rd Phase Extension	681,277	840,281	4	5	20
This project will build a 2.7 kilometre, 3-phase 336 ASC line extension of primary distribution for feeder 2H-411 along the Prospect Rd to accommodate the increased load in the area.						
C0031121	104S-313 - Re-Conductor Big Hill	51,733	743,778	4	5	20
This project involves reconductoring along Highway 105 near Big Hill in Glen Tosh from D372-066 to D372-065 065 to address load restriction on two phases resulting in load imbalances.						
C0042687	15N-202 Arthur St Conversion	669,772	718,195	4	4	16
This project will rebuild and convert the deteriorated primary distribution feeder on Arthur Street in Truro.						
C0031304	37N-413G-South Athol Rebuild	68,421	643,312	5	3	15
This project will rebuild to roadside approximately 3 kilometres of targeted off-road sections of distribution feeder 37N-413G from South Hampton to South Athol.						
C0043490	2022 Downline Asset PCB Replacements	633,031	633,031	5	4	20
This project provides for the systematic removal of downline assets containing or identified as potentially containing polychlorinated biphenyl (PCB) materials, in accordance with federal guidelines. These assets include downline metering tanks, step-down transformers, and voltage regulators.						
C0042586	59C-402 St. Peters Rebuild	281,087	607,966	5	4	20
This project will relocate approximately 0.9 kilometers of three-phase distribution feeder 59C-402 to roadside and rebuild the Crossing at the same location along Highway 4, near St. Peters.						
C0043930	1H-419 Targeted Underground Device Replacements	584,333	584,333	5	4	20
This project is for the replacement of targeted underground distribution devices on 1H-419 based on underground inspection results to improve reliability.						
C0043230	65V-301 Nictaux West Reconductor	502,569	540,937	5	4	20
This project will reconductor approximately 2.5 kilometers of three phase primary along Highway 201 in Nictaux. This section of line is at end of life and requires replacement.						
C0031402	559W-331-Molega Lake Rd Rebuild	190,573	516,448	4	4	16
This project will rebuild approximately 2.2 kilometers of single phase primary along Molega Lake road. This section of line is at end of life and requires replacement.						

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C0042426	11S-411 Coxheath Rebuild Phase 2	506,916	506,916	4	4	16
<i>This project is to rebuild the double circuit distribution feeder from L6539 to Mountain Road along Coxheath Road in Sydney. This section of line is at end of life and requires replacement.</i>						
C0004138	50W-412GA Port Medway Line Extension	266,001	503,061	4	5	20
<i>This project will extend distribution feeder 50W-412GA along Port Medway Road and across Highway 103 towards Medway. This project is to manage load on the stepdown transformer 531W-T1.</i>						
C0042186	100C-421 - Harvre Boucher Rebuild	449,187	486,768	4	5	20
<i>This project will relocate approximately 1.4 km kilometres of primary distribution feeder 100C-421 to roadside to improve reliability and outage response.</i>						
C0042969	59C-401 - Greenville Street Rebuild	248,969	471,478	4	4	16
<i>This project will relocate approximately 1.2 kilometres of primary distribution feeder 59C-401 to roadside along Greenville Street, near St. Peters to improve reliability and outage response.</i>						
C0043330	88W-314-Vancouver St Rebuild	103,881	415,764	5	4	20
<i>This project will replace 940 metres of primary distribution feeder 88W-314 from Water St to Main Shore Rd along Vancouver St. This section of line is at end of life and requires replacement.</i>						
C0031296	67C-411GBA Little Mabou Rebuild	224,403	387,382	4	5	20
<i>This project will relocate approximately 1.0 kilometre of primary distribution feeder 67C-411GBA to roadside along Little Mabou Road to improve reliability and outage response.</i>						
C0041955	2022 Hydraulic Recloser Replacements	356,662	386,109	4	5	20
<i>This project is for the replacement of 10 downline reclosers with electronic reclosers on targeted distribution feeder sections to support improved reliability.</i>						
C0031403	101W Port Mersey Feeder Exits	364,636	368,305	4	5	20
<i>This project is for the installation of new feeder exits at the 101W substation in accordance with recommendation 6.1.3 & 6.1.4 in planning study 383-0718-W74 50W-Milton and Liverpool Area.</i>						
C0033429	1H-403 Targeted Underground Replacements	106,167	360,752	5	4	20
<i>This project is for the replacement of targeted underground distribution devices on distribution feeder 1H-403 based on underground inspection results to improve reliability.</i>						
C0044090	2022 Vault Replacement	341,602	341,602	5	4	20
<i>This project involves upgrading and replacing equipment in underground vaults to meet current utility standards and requirements. This project will reduce safety and environmental risks in the targeted vaults.</i>						
C0043110	11S-305 - Kenwood Drive Roundabout	290,582	326,181	5	5	25
<i>This project will relocate 3-phase poles on distribution feeder 11S-305 on Kings Road in Sydney to support NSTIR's Phase 3 of the Kings Road roundabout projects.</i>						
C0031107	55V-314G-Aylesford East Reconductor	189,899	324,355	4	5	20
<i>This project is for the replacement of 1.3 kilometres of distribution feeder 55V-314G along Highway 1 between Aylesford Rd and Long Point Rd to accommodate load growth.</i>						
C0041948	87W-312 Targeted Device Replacements	291,289	314,692	4	4	16
<i>This project is for replacement of targeted distribution devices on distribution feeders 87W-312 and 87W-312G from Hubbards to Blanford based on feeder inspection results.</i>						
C0042847	61N-204 High Street Conversion	168,309	317,616	4	5	20
<i>This project will convert existing 4kV primary service that is being supplied from 61N North Provost Street substation by extending the 25kV distribution feeder 50N-412 along High Street. This is in accordance with recommendation 6.4.1 in planning study 362-0615-E30 Stellarton 4kV Conversion.</i>						

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Figure 13: 2022 Capital Items with Estimated Total Project Cost of Less than \$1M

CI#	Project Title	2022 Budget (\$)	Project Total (\$)	Criticality	Condition	Rating
C0042846	15C-211 - Deepdale Conversion	120,240	312,286	4	5	20
<i>This project will reconfigure and convert a section of distribution feeder 15C-211 along Deepdale road near Inverness from 4kV to 25kV. This project will address power quality challenges on this section of line.</i>						
C0033507	Underground Switch Replacements	234,975	310,811	5	4	20
<i>This project is for the targeted replacement of underground switches in underground structure MH133 on feeder 1H-405 in Halifax to improve reliability and outage response.</i>						
C0043950	509V-301 Freeport Rebuild	308,136	308,136	4	5	20
<i>This project involves rebuilding the deteriorated 1,468 metres of three phase feeder along Route 217 from Overcove Rd to the ferry terminal in Freeport, Long Island.</i>						
C0042608	2C-402 - Troy BTR	170,101	287,966	4	4	16
<i>This project will relocate approximately 1 kilometre of distribution feeder 2C-402 to roadside along Route 19 near Troy to improve reliability and outage response.</i>						
C0043651	4C-441G - Rear Monastery Road Reconductor	260,793	282,005	3	5	15
<i>This project will replace approximately 1.3 kilometres of single-phase distribution feeder 4C-441G. This section of line is at end of life and requires replacement.</i>						
C0043510	2C-402 - Little Judique Reinsulate	276,979	276,979	4	5	20
<i>This project will replace the existing porcelain pin insulators on approximately 6.5 kilometres of distribution feeder 2C-402 with silicone line post insulators to provide increased protection from salt contamination.</i>						
C0039986	2022 113H Feeder Exit Cable Replacements	206,282	260,907	5	4	20
<i>This project is for the replacement of substation exit cables for distribution feeders 113H-433 and 113H-443 at the 113H Dartmouth East substation.</i>						
C0042606	67C-411GBA West Mabou Harbour Rebuild	111,996	243,260	5	4	20
<i>This project will relocate approximately 0.7 kilometres of distribution feeder 67C-411GBA to roadside along Little Mabou Road, near West Mabou Harbour to improve reliability and outage response.</i>						
C0041957	2022 Substation Animal Guards	227,930	245,483	5	3	15
<i>This project will install animal guards on switch insulators, bus support insulators, bushings, cutouts, leads and jumpers to mitigate the risk of animal related outages.</i>						
C0041947	2022 Cutout Replacements	201,706	214,202	5	4	20
<i>This project is for the replacement of cutouts on targeted feeder sections based on inspection results. Porcelain arrestors will also be replaced in conjunction with transformer cutouts.</i>						
C0041946	2022 Automatic Sleeve Replacements	200,751	212,544	5	5	25
<i>This project is for the replacement of approximately 350 automatic sleeves on 3-phase primary and neutral conductors to help improve reliability.</i>						
C0041950	67C-411 Targeted Device Replacements	205,861	205,861	4	5	20
<i>This project is for replacement of targeted distribution devices on feeder 67C-411 based on feeder inspection results to improve reliability performance.</i>						
C0042910	101H-413 Aspen Ct Rebuild	83,740	180,691	5	4	20
<i>This project will rebuild approximately 0.6 kilometres of backlot deteriorated distribution feeder 101H-413 to roadside along Aspen Cres to improve area reliability.</i>						
C0041951	92H-331 and 332 Targeted Device Replacements	184,735	184,735	4	4	16
<i>This project is for replacement of targeted distribution devices on feeders 92H-331 and 92H-332 based on feeder inspection results to improve reliability.</i>						

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Figure 13: 2022 Capital Items with Estimated Total Project Cost of Less than \$1M

CI#	Project Title	2022 Budget (\$)	Project Total (\$)	Criticality	Condition	Rating
C0041949	59C-402 Targeted Device Replacements	184,735	184,735	4	4	16
This project is for replacement of targeted distribution devices on feeder 59C-402 based on feeder inspection results to improve reliability.						
C0042326	101H-413 Balsam Circle Rebuild	148,327	160,846	5	4	20
This project will rebuild approximately 0.4 kilometres of backlot deteriorated single-phase distribution feeder 101H-413 to roadside along Balsam Circle to improve reliability and outage response.						
C0041953	2022 Recloser Remote Connectivity	153,616	162,655	5	3	15
This project is for the deployment of remote connectivity to 10 downline reclosers on targeted distribution feeder sections. Enabling connectivity will help improve outage response. Installations include cellular modems and antennas where necessary and integration into the DSCADA system.						
C0041954	2022 New Branchline Reclosers	143,935	155,289	5	4	20
This project is for the installation of 15 new branch-line reclosers on targeted distribution feeder section branch-lines to improve feeder reliability.						
C0043390	664N-211 - Claremont Avenue Conversion	139,168	148,918	4	4	16
This project will convert the existing 4kV primary service that is being supplied from 664N by extending the existing 25kV feeder 62N-416 along Claremont Avenue. This is in accordance with recommendation 6.3.3 in planning study 362-0615-E30 Stellarton 4kV Conversion.						
C0033445	Targeted Pin Insulator Replacements	93,577	145,414	4	4	16
This project is for the targeted replacement of pin insulators on distribution feeders to help improve reliability.						
C0042946	113H-441G Ashgrove Ave Rebuild	111,357	133,086	4	5	20
This project is for the replacement of approximately 10 deteriorated poles and crossarms in the back lot of Ashgrove Ave on distribution feeder 113H-441G which are at end of life.						
C0041952	48H-302 Targeted Device Replacements	127,071	127,071	4	4	16
This project is for replacement of targeted distribution devices on feeder 48H-302 based on feeder inspection results to improve reliability.						
C0033426	Underground Manhole Water Pumps	3,191	122,367	5	4	20
This project will install water pumps in targeted underground manholes to mitigate the risk of water damaged equipment.						
C0042287	82V-403 Elmsdale River Crossing Rebuild	115,837	115,837	4	4	16
This project will rebuild the deteriorated section of distribution feeder 82V-402 across the Elmsdale River along Highway 277 near the 82V Elmsdale substation.						
C0042927	103C-314 – Grand Etang Water Crossing	12,456	99,755	4	4	16
This project will relocate approximately 1 kilometre of distribution feeder 103C-314 to roadside along the Cabot Trail at the Grand Etang River Crossing to improve reliability and outage response.						
C0043650	57C-426 - Eight Island Lake Rebuild	77,066	83,233	3	5	15
This project will replace approximately 330 metres of deteriorated distribution feeder 57C-426J crossing Eight Island Lake.						
Total Distribution Items Less Than \$1M		\$11,675,862	\$16,504,337			
General Plant						
C0031022	IT - Identity & Access Management	739,385	907,938	5	4	20
This project will implement enhanced security functionality and governance for employees and contractors in accessing NS Power's systems.						
C0030984	IT - Cisco UCS Lifecycle	891,243	891,243	5	5	25
This project is part of a multi-year investment to replace end of life server infrastructure used to operate many applications						

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Figure 13: 2022 Capital Items with Estimated Total Project Cost of Less than \$1M

CI#	Project Title	2022 Budget (\$)	Project Total (\$)	Criticality	Condition	Rating
C0031002	IT - Customer Billing & Payment Solution	286,083	687,972	4	4	16
<i>This project will implement customer billing and payment enhancements to improve the accuracy and clarity for customer bills and automate manual processes.</i>						
C0043550	IT - Itron Collection Manager	671,162	671,162	5	5	25
<i>This project will upgrade the Itron OpenWay Head-End system to a newer, vendor supported version.</i>						
C0031027	IT - Multi-Factor Authentication	514,820	564,820	5	4	20
<i>This project will implement multi-factor authentication (MFA) products that will enhance access security to applicable NS Power systems by adding an additional layer of security to mitigate unauthorized access to systems.</i>						
C0031028	IT - Network Access Control	337,998	531,848	3	5	15
<i>This project will install replacement switches and upgrade operating systems to controls to mitigate the risk of unauthorized devices connecting to our corporate network.</i>						
C0021849	IT - WI-FI Refresh	194,023	506,950	3	5	15
<i>This project will replace Wi-Fi infrastructure, including the upgrade of aging Wireless LAN Controllers (WLC), and replace end of life access points.</i>						
C0021834	IT - CIS - OS Upgrade	212,915	359,475	5	5	25
<i>This is a life cycle management activity that will upgrade the CIS AS400 OS from V7R1 that is end of support in April 2022.</i>						
C0041546	AMO Lequille Telecom Upgrade	358,951	358,951			
<i>This project is for the design and installation of an improved telecommunication connection to the Lequille hydro station.</i>						
C0011159	IT - PI System Upgrade	353,996	353,996	4	5	20
<i>This project will upgrade PI application software used to collect, store and visualize power plant operational data to maintain vendor support</i>						
C0031169	IT - GIS Upgrade 2022	351,814	351,814	5	4	20
<i>This project will apply the most recent updates to GIS software including enhanced functionality for modeling the distribution power grid and will provide continued vendor support of mobile applications used by field personnel for real-time situational awareness.</i>						
C0032142	GIS - Telecom Asset Modelling Project	348,905	348,905			
<i>This project is to enhance the GIS Solution and capture, update and model the full inventory of telecom assets into the GIS Solution.</i>						
C0030983	IT - User File Services Upgrade	346,858	346,858	4	5	20
<i>This project will replace end of life server infrastructure that provides network file services for users and departments</i>						
51963	IT - Adept Upgrade	291,870	319,298	4	5	20
<i>This project will upgrade the Adept application to the latest supported version, including interfaces and technical environment.</i>						
C0042168	IT - Web Application Firewall Uplift	304,484	304,484	3	5	15
<i>This project will implement Web application firewall to reduce risk of cyber attacks for internet facing web servers.</i>						
C0042151	IT - Expand Network Core	246,815	246,815	5	5	25
<i>This project will replace end of life access switches within the data center core network.</i>						
C0042686	IT - ADMS Maintenance Release 2022	234,039	234,039	5	3	15
<i>This project will configure and implement enhancements to the ADMS application while facilitating better supportability from the vendor. Enhancements include improved management of outages on the distribution power grid and providing more accurate real-time outage information to customer.</i>						
C0021833	IT - CIS - Data Archive	200,263	200,263	5	5	25
<i>This project will implement a solution for the management of CIS data to ensure adequate space in the technical environment.</i>						

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Figure 13: 2022 Capital Items with Estimated Total Project Cost of Less than \$1M

CI#	Project Title	2022 Budget (\$)	Project Total (\$)	Criticality	Condition	Rating
C0043310	AMO Technology Environment Upgrade	105,647	182,365			
<i>This project will upgrade the Asset Management technology environments to provide alignment with Cybersecurity policies and technology standardization initiatives. This work would include database server upgrades, as well as other configuration changes and associated work.</i>						
C0021843	IT - Upgrade Oracle OBIA	166,006	170,483	3	5	15
<i>This project is for the upgrade of Oracle Business Intelligence Application (OBIA) to the most recent version.</i>						
C0041928	AMO Distribution Configuration Management	131,392	147,342			
<i>This project will deploy a solution to manage configuration of down-line, automated protection devices.</i>						
C0041966	2022 - Electric Vehicle Transition	120,000	120,000			
<i>This project will install charging infrastructure to support electric vehicles within the NS Power fleet of vehicles.</i>						
C0041926	AMO T&D Risk Evaluation Automation	114,435	114,435			
<i>This project will automate risk evaluation and communication processes for long-term sustainability of the processes, as well as ensuring that the resultant information is consumable and usable for Reliability Teams and subject matter experts.</i>						
C0043551	IT - Oracle MDMS Maintenance Release	103,590	103,590	5	4	20
<i>This project will install vendor-supplied defect fixes and enhancements to the Meter Data Management System.</i>						
C0030989	IT - Server Configuration Management	77,427	102,427	4	5	20
<i>This project will implement revised server hardening configuration standards to reduce cyber and operational risks</i>						
C0021133	SCADA Mobile Application	101,090	101,090			
<i>This project is for an application to the business for accessing SCADA screens and readings via mobile devices.</i>						
C0042162	IT - Oracle Linux 6	100,921	100,921	5	4	20
<i>This project will upgrade Linux server operating systems and migrate applications to newer servers to maintain vendor support and reduce cyber risks.</i>						
C0011170	IT - JSCAPE MFT Upgrade	100,814	100,814	3	5	15
<i>This project will upgrade or replace the managed file transfer (MFT) tool.</i>						
C0043911	IT - Courtesy Callback/Virtual Hold	77,663	77,663	4	4	16
<i>This project will implement an IVR courtesy callback feature for NS Power customers to reduce estimated wait times and improve customer experience.</i>						
49832	Victoria Junction Substations Fiber Links	61,755	61,755			
<i>This project will install new fiber links, from 415S Victoria Junction Radio to the 2S VJ substations to improve the reliability and capability of communications to these sites.</i>						
C0041907	AMO CT Component Life Management System	52,866	52,866			
<i>This project will ensure the long-term sustainment of component tracking and lifecycle management of components for the LM6000 combustion turbines. With many interchangeable components, this work will eliminate much of the administrative load and manual work currently required to track component life.</i>						
C0029925	AMO CMS Expansion	51,796	51,796			
<i>This project is for the development of an additional module within the Competency Management System (CMS) to support training and competency requirements, as well as apprenticeship progression, for transmission and distribution resources.</i>						
C0041566	AMO Application Modernization	30,162	30,162			
<i>This project is for the modernization of multiple applications, which were built on a programming language which is not being supported into the future.</i>						

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Figure 13: 2022 Capital Items with Estimated Total Project Cost of Less than \$1M

CI#	Project Title	2022 Budget (\$)	Project Total (\$)	Criticality	Condition	Rating
C0020339	AMO Risk Repository Tool	24,653	24,653			
<i>This project is to provide a user-friendly solution to capture risks evaluated through Reliability Team asset management processes. The interface will allow consumable and efficient alignment of risks across NS Power's core assets and enable consistent assessment across asset classes.</i>						
Total General Plant Items Less Than \$1M		\$8,305,844	\$9,729,197			
Total Capital Items Less Than \$1M		\$67,654,377	\$77,210,203			

5.5 2022 ACE Plan Capital Items – Point Aconi Generating Station

Figure 14 below provides the Point Aconi capital projects for 2022. These projects do not require NSUARB approval but are provided for transparency purposes.

Figure 14: 2022 Capital Items – Point Aconi Generating Station

CI#	Project Title	2022 Budget (\$)	Project Total (\$)
C0009299	POA Bag House Filter Replacement	407,548	1,622,797
C0030786	POA Cell Capping	1,389,191	1,389,191
C0040869	POA Boiler Refurbishment 2022	1,082,524	1,082,524
C0040846	POA Boiler Refractory Replacement 2022	940,602	940,602
C0040929	POA LS Quarry Reclamation 2022	497,000	497,000
C0042626	POA LFO Tank Inspection and Refurbishment	494,050	494,050
C0040888	POA LS System Refurbishment 2022	305,964	305,964
C0040868	POA Valve Component Replacement 2022	303,730	303,730
C0009320	POA CW Screen Refurbishment	277,438	277,438
C0040889	POA Coal System Refurbishment 2022	270,173	270,173
C0040847	POA Boiler Arrowhead Replacements 2022	256,045	256,045
C0040930	POA LS Crusher System Optimization	246,028	246,028
C0040867	POA Ash System Refurbishment 2022	243,476	243,476
C0040866	POA Expansion Joint Replacement 2022	165,379	165,379
C0040892	POA Fire System Upgrade 2022	157,125	157,125
C0040871	POA Access Improvement 2022	119,296	119,296
C0030822	POA Steam Drum Refurbishment	105,292	105,292
C0040948	POA Washroom Upgrades	100,300	100,300

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Figure 14: 2022 Capital Items – Point Aconi Generating Station

CI#	Project Title	2022 Budget (\$)	Project Total (\$)
C0041032	POA LS Quarry Refurbishments	100,085	100,085
C0041066	POA Machinery Guarding Upgrades	99,593	99,593
C0041049	POA Outfall Channel Erosion Protection	97,762	97,762
C0041067	POA Laboratory Equipment Upgrade	82,534	82,534
C0041069	POA Draft Plant Damper Upgrades	79,882	79,882
C0041046	POA Hi-Vol Upgrades	70,701	70,701
C0040876	POA 4160 and 600V Breaker Refurbishment 2022	69,664	69,664
C0040890	POA Facilities Upgrades 2022	61,662	61,662
C0041052	POA BA Center Drain Valve Replacement	60,455	60,455
C0040891	POA Plant Lighting Upgrade 2022	59,381	59,381
C0040949	POA Swing Gate & Ladder Upgrades	49,797	49,797
C0041071	POA - Analytical Panels Upgrade	31,774	31,774
Total Point Aconi New Spending		\$8,224,449	\$9,439,698
Point Aconi Carryover Spending		\$250,334	\$2,621,942
Point Aconi Routine Spending			
10718	POA - Routine Equipment Replacement	222,441	222,441
27858	POA Roofing Routine	394,087	394,087
33865	POA Heat Rate Routine	57,631	57,631
21484	POA Plant Tools & Equipment	55,000	55,000
25647	POA DCMS Equipment Replacement	35,000	35,000
Point Aconi Routine Spending		\$764,158	\$764,158
Total Point Aconi Capital Spending		\$9,238,942	\$12,825,799

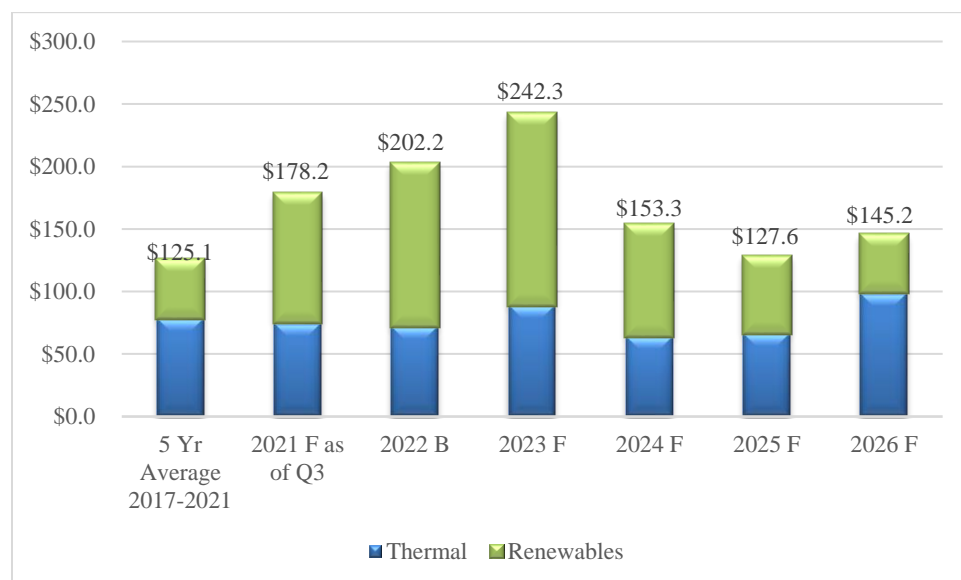
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6.0 GENERATION

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

Figure 15 below illustrates NS Power's capital investment on generation, including historical, forecast and budget. The increase in investment in 2022 and future years is largely attributable to the forecast investment in the Mersey Hydro System Re-Development, the Wreck Cove Hydro System Life Extension & Modernization (LEM) project, and ECEI. NS Power has approximately \$39M in forecast 2022 spending for subsequent submittal projects in relation to generation assets for ECEI, which includes new wind and coal conversion, to assist the Company in its plan to transition away from coal and achieve 80 percent renewables by 2030. As noted in Section 3.1, as policy development continues to evolve in the coming year, the level of investment in ECEI in 2022 and beyond will be subject to change.

Figure 15: Generation Investment – Historical, Forecast and Budget
(Millions of dollars)

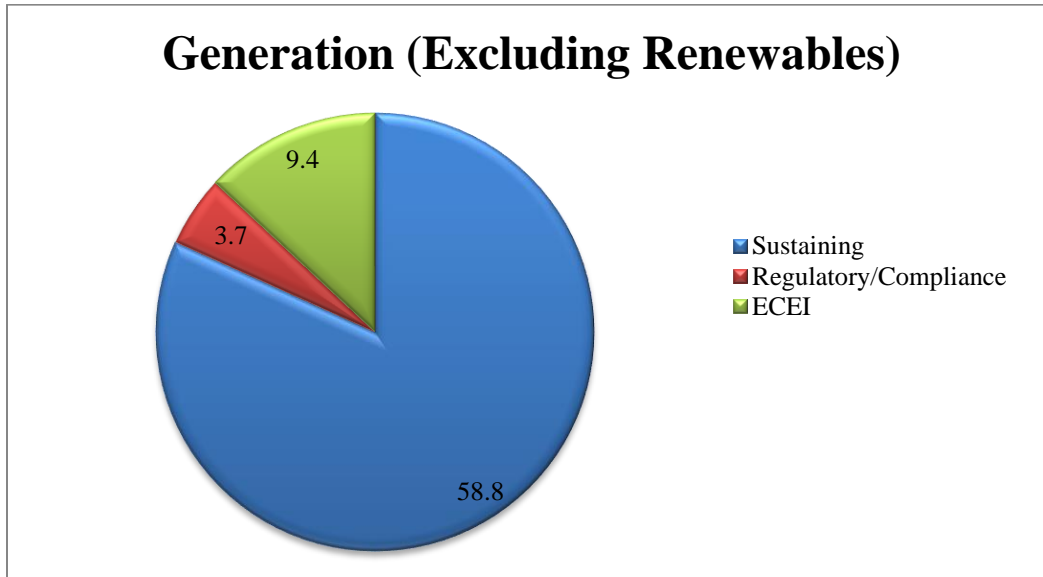


F = Forecast, B=Budget in above figure

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Figure 16 and **Figure 17** provide a breakdown of the 2022 generation investment by investment type.

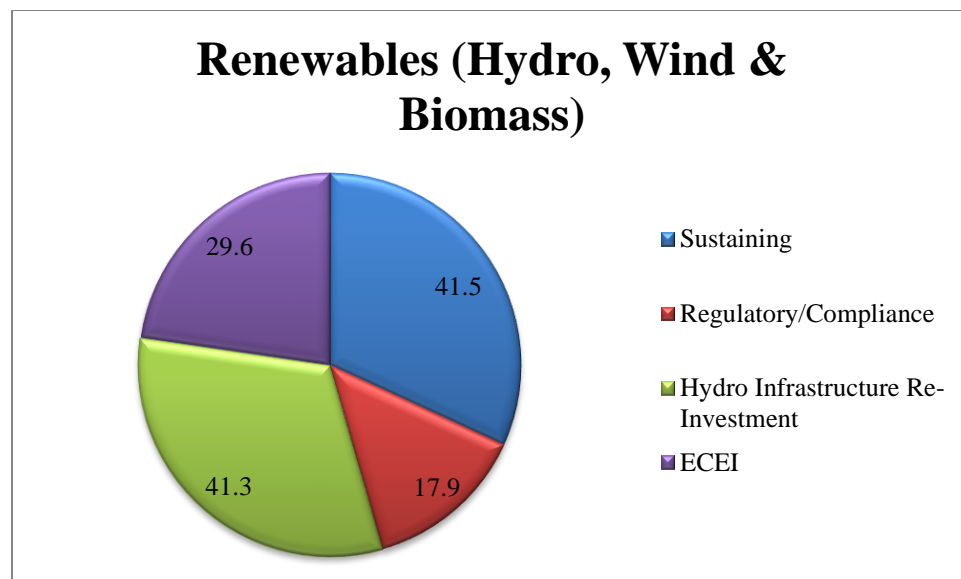
Figure 16: 2022 Thermal Investment by Investment Type
(Millions of dollars)



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Figure 17: 2022 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 2022 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, including the decommissioning of generating units in alignment with the company's plans to continue its transition away from coal-fired generation by 2030.

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

- 2
- 3 • fleet-wide asset class programs;
 - 4 • application of the latest technologies to enhance understanding of asset health;
 - 5 • effective operational support tools and infrastructure; and
 - 6 • risk-based inspection programs.
- 7

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

10

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

16

17 The focus for generation capital investments in 2022 is on current requirements to provide for the
18 safe, environmentally compliant and reliable operation of the thermal assets based on utilization
19 outlooks as well as investment in hydro infrastructure renewal, combined with investment to
20 facilitate the Company's transition to achieve 80 percent renewables by 2030.. The approximately
21 \$202 million generation capital investment plan for 2022 is summarized in **Figure 18** below.

22

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Figure 18: Summary of 2022 Generation Capital Investments

(Millions of dollars)

i	New 2022 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)	14.5
ii	2022 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 2022 ACE Plan. (As provided in Section 5.3)	66.5
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)	42.0
v	Point Aconi Generating Station capital spending. (As provided in Section 5.5)	9.1
vi	Carry-over capital spending. (As provided in Section 6.1)	64.8
vii	Routine capital spending. (As provided in Section 10)	5.1
	Total 2022 Generation Capital Investment Plan	202.2
	Request for ACE Approval (Items i and vii)	19.6

Note 1: Totals may be off due to rounding.

6.1 Generation – Carry-over Capital Spending Summary

Figure 19: Generation Carry-over Capital Spending Summary

CI#	Project Title	Start Date	Final Date	Previous Expenditure (\$)	2022 Budget (\$)	Subsequent Spending (\$)	Total Estimate (\$)
Hydro Generation Plant							
C0013838	HYD WRC LEM Unit Rehabilitation and Replacement	2019/11	2025/12	23,694,931	28,159,089	31,288,108	83,142,128
29807	HYD - Tuskett Falls Main Dam	2008/01	2023/12	20,299,554	11,452,688	5,135,463	36,887,705
C0014218	Wreck Cove Life Extension and Modernization (LEM) Project - Balance of Plant	2019/11	2025/12	17,080,077	6,730,606	2,799,214	26,609,897
16374	HYD - Gaspereau Dam Safety Remedial Works	2007/05	2024/07	11,847,879	301,388	6,791,065	18,940,332
50518	HYD - Ruth Falls Main Dam Refurbishment	2017/02	2023/12	2,233,815	4,993,455	526,650	7,753,920
C0002539	HYD - Bridge Remediation 2019	2017/12	2022/12	4,872,710	316,801	-	5,189,512
49756	HYD - Marshall Falls Main Dam Refurbishment	2016/12	2025/06	543,416	332,273	4,040,936	4,916,625
44978	HYD - Wreck Cove Controls Upgrade	2014/01	2022/12	2,541,918	1,512,979	-	4,054,897
51235	HYD - Wreck Cove Main Access Road Refurbishment	2017/06	2023/12	1,353,313	1,576,100	-	2,929,413
47551	HYD - SHH Controls Upgrade	2015/07	2023/06	1,559,537	458,607	-	2,018,144
48791	HYD - WRC Safety Standards Upgrades	2016/01	2022/10	1,731,394	136,788	-	1,868,182
51234	HYD - Wreck Cove HVAC Upgrade	2017/04	2022/12	1,278,819	578,649	-	1,857,468
51775	HYD - Fixed Ladder & Machine Guard Upgrades	2017/06	2023/06	1,411,404	418,042	-	1,829,446

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Figure 19: Generation Carry-over Capital Spending Summary

CI#	Project Title	Start Date	Final Date	Previous Expenditure (\$)	2022 Budget (\$)	Subsequent Spending (\$)	Total Estimate (\$)
48914	HYD - Malay Falls Facility Refurbishment	2016/02	2024/11	91,227	140,892	704,457	936,577
C0019021	HYD - Malay Falls Unit 4 Overhaul	2020/01	2023/01	106,179	646,635	-	752,814
C0019023	HYD - Malay Falls Unit 4 Generator Refurbishment	2020/09	2023/08	231,780	533,365	-	765,144
49945	HYD - Malay Falls Switchgear Replacement	2017/12	2023/04	76,178	711,692	-	787,870
48712	HYD - Dam Instrumentation Upgrade	2016/06	2023/05	177,887	268,329	-	446,216
C0032083	HYD - Mersey System Headcover Refurbishment	2020/12	2023/06	20,261	467,226	-	487,486
C0015760	HYD - D4 Riparian Flow Measurement	2020/06	2023/12	282,747	175,423	-	458,170
C0039506	HYD - Mersey Log Hoist Partial Refurbishment	2021/05	2024/12	164,971	81,604	-	246,574
C0031093	HYD - SHH Interconnection Protection Panels	2020/10	2023/05	143,425	136,841	-	280,266
C0019025	HYD - Sloane Dam Refurbishment	2019/05	2023/12	63,049	209,515	-	272,564
C0010758	WIN - South Lake Turbine Decommission	2020/07	2022/09	24,712	87,244	-	111,956
Total Hydro Generation Plant				91,831,184	60,426,229	51,285,892	203,543,306

Steam Generation Plant

C0020385	LIN Heavy Oil Tank Refurbishment	2019/09	2023/12	160,043	1,971,917	662,409	2,794,370
48638	TRE - Rail Car Fuel Delivery Upgrade	2015/12	2022/12	1,062,522	82,433	-	1,144,955
C0021982	ICP U&U Unloading Hopper Replacement	2019/09	2022/12	306,873	222,176	-	529,049
C0018941	LIN - CW Pump Refurbishment 2020	2020/01	2022/12	454,252	94,794	-	549,046
49546	TRE6 FW Heater Level Control	2020/03	2022/10	240,489	55,663	-	296,152
C0020842	POT Turbine Generator Fire Protection	2021/08	2022/12	1,839	283,313	-	285,152
C0021423	TUC Aux Boiler PLC/DCS Upgrades	2021/01	2023/02	101,009	180,740	-	281,749
48850	AMO Fleet Mobile Technology Advancement	2018/10	2022/01	242,059	8,000	-	250,059
49555	TRE6 Water Treatment Plant PLC Upgrades	2020/03	2022/12	13,460	217,983	-	231,443
51394	LIN34 Operator Control Panel Button Upgrade	2017/04	2022/12	7,961	218,727	-	226,688
C0020263	LIN Coal Stacker MCC Upgrade	2020/03	2022/12	68,455	142,849	-	211,305

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Figure 19: Generation Carry-over Capital Spending Summary

CI#	Project Title	Start Date	Final Date	Previous Expenditure (\$)	2022 Budget (\$)	Subsequent Spending (\$)	Total Estimate (\$)
C0030622	LIN Wastewater Piping Replacement	2021/01	2022/12	4,546	206,177	-	210,723
C0020644	AMO TUC3 Turbine Supervisory System Upgrade	2020/01	2022/12	2,538	119,781	-	122,319
C0010335	TRE Waste Water Treatment Plant Chemical Feed System Upgrade	2019/03	2022/08	51,370	56,839	-	108,209
C0030962	POT - Bunker C Pump Replacement	2021/01	2022/04	63,153	35,197	-	98,350
49657	TUC Sequence of Events Recorder Upgrade	2018/11	2022/12	25,272	54,217	-	79,489
Total Steam Generation Plant				2,805,840	3,950,807	662,409	7,419,056
Gas Turbine Generation Plant							
46483	CT - TUS - Control System Upgrade	2021/01	2023/06	920,158	107,698	-	1,027,856
C0030082	CT - Generator Bearings Replacement	2020/01	2023/12	203,303	341,527	14,598	559,429
Total Gas Turbine Generation Plant				1,123,461	449,226	14,598	1,587,285
Wind Generation							
C0035506	WIN - Nuttby Collector Circuit Replacement	2021/01	2022/12	148,812	(65,767)	-	83,045
Total Gas Turbine Generation Plant				148,812	(65,767)	-	83,045
Total Generation Carry Over Spending				95,909,297	64,760,495	51,962,900	212,632,692

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6.2 Generation – New 2022 Capital Items for ACE Plan Approval

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Figure 20: Generation - New 2022 Capital Items for ACE Plan Approval

Tab #	CI#	Project Title	2022 Budget	Project Total
Hydro Generation Plant				
G01	C0036368	HYD - Lower Great Brook Switchgear Replacement	1,126,746	1,362,281
G02	C0024484	HYD - Fourth Lake Switchgear Replacement	930,499	1,145,245
Total Hydro Generation Plant			\$2,057,245	\$2,507,527

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Figure 20: Generation - New 2022 Capital Items for ACE Plan Approval

Tab #	CI#	Project Title	2022 Budget	Project Total
Steam Generation Plant				
Turbine				
G03	C0038747	LIN1 L-0 Blade Replacement	1,289,669	6,066,800
G04	C0041906	PHB – 2022 Turbine Refurbishment	3,276,746	3,729,597
Generator				
G05	C0030529	TUC3 Generator Refurbishment	1,629,446	1,629,926
Total Steam Generation Plant			\$6,195,861	\$11,426,322
Gas Turbine Generation Plant				
G06	C0029693	CT - VJ1 Generator Replacement	5,532,037	5,942,640
G07	C0029691	CT - VJ1 Control System Upgrade	751,417	1,016,225
Total Gas Turbine Generation Plant			\$6,283,454	\$6,958,865
Total Generation New Spending			\$14,536,560	\$20,892,714

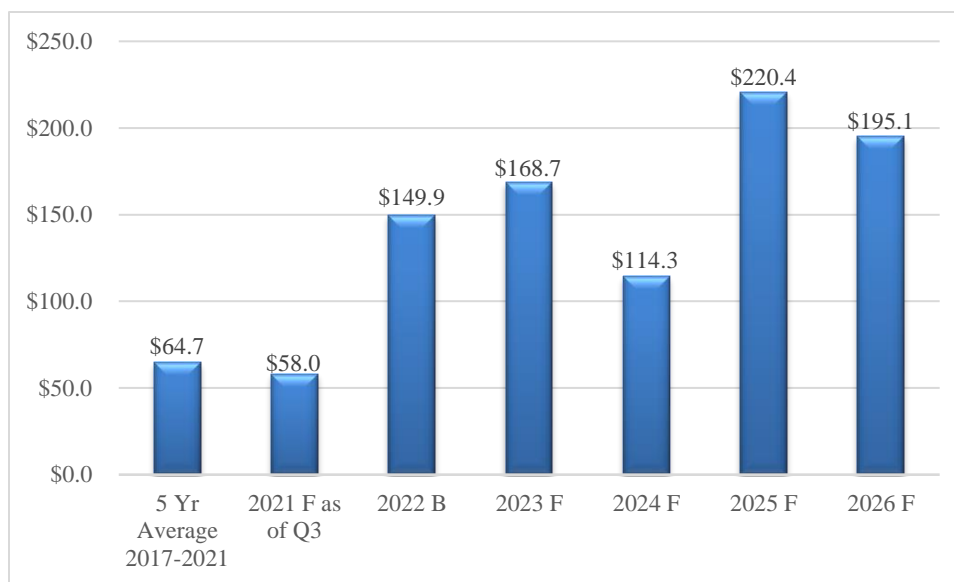
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7.0 TRANSMISSION

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 21** below illustrates NS Power's capital investment in transmission, including historical, forecast and budget.

Figure 21: Transmission Investment– Historical, Forecast and Budget
(Millions of dollars)



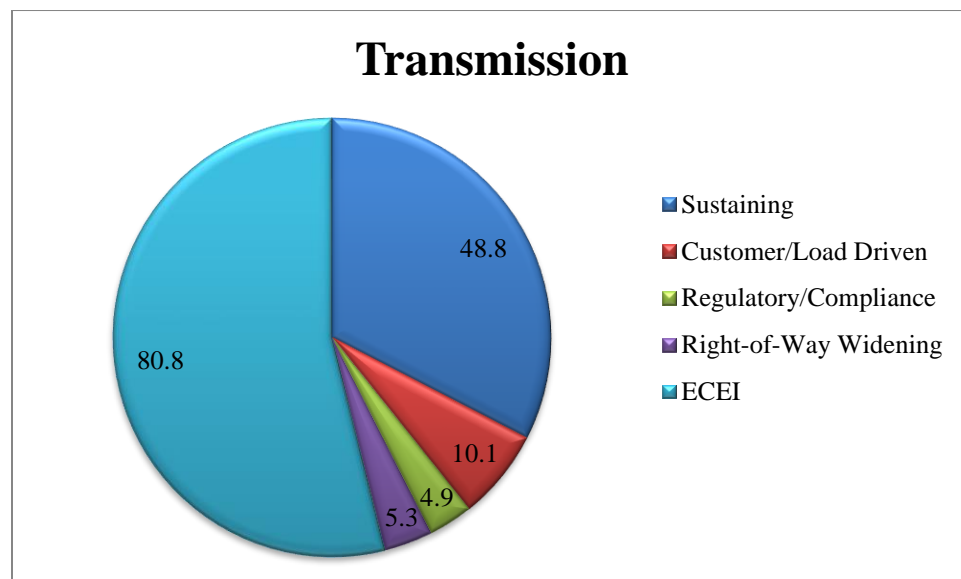
F = Forecast, B=Budget in above figure

Figure 22 provides a breakdown of the 2022 transmission investment by investment type.

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Figure 22: 2022 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 Section 11.1.6 for additional detail on NS Power's strategy related to reliability.

The focus for transmission capital investments in 2022 is on sustaining system reliability, and ECEI. NS Power has approximately \$81M in forecast 2022 spending for subsequent submittal projects in relation to transmission assets for ECEI, which includes a new Regional Transmission line and energy storage, to assist the Company in its plan to transition away from coal and achieve 80 percent renewables by 2030. As noted in Section 3.1, as policy development continues to evolve in the coming year, the level of investment in ECEI in 2022 and beyond will be subject to change. The approximately \$150 million transmission capital investment plan for 2022 is summarized in **Figure 23** below.

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Figure 23: Summary of 2022 Transmission Capital Investments

(Millions of dollars)

i	New 2022 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)	14.5
ii	2022 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 2022 ACE Plan. (As provided in Section 5.3)	89.7
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)	5.6
iv	Carry-over capital spending. (As provided in Section 7.1)	26.7
v	Routine capital spending. (As provided in Section 10)	13.5
vi	Total 2022 Transmission Capital Investment Plan	149.9
	Request for ACE Approval (Items i and v)	28.0

Note 1: Totals may be off due to rounding.

7.1 Transmission – Carry-over Capital Spending Summary

Figure 24: Transmission Carry-Over Capital Spending Summary

CI#	Project Title	Start Date	Final Date	Previous Expenditure	2022 Budget	Subsequent Spending	Total Estimate
Transmission Plant							
C0021102	L5029 Replacements and Upgrades	2020/06	2023/12	110,177	1,936,146	3,943,541	5,989,864
C0031089	2021/2022 Transmission Right-of-Way Widening 69kV	2021/04	2022/12	2,577,291	2,799,525	-	5,376,817
49793	L7011 Replacements and Upgrades	2017/04	2022/05	4,593,152	216,727	-	4,809,879
47954	L7012 Replacements and Upgrades	2017/04	2022/05	3,803,878	625,251	-	4,429,129
C0011261	101W Port Mersey Substation Expansion	2019/11	2022/12	1,695,187	2,166,027	-	3,861,214
C0031263	2021/2022 Substation Polychlorinated Biphenyl (PCB) Equipment Removal	2021/02	2023/12	1,822,890	1,976,483	-	3,799,372
C0021106	L7005 Replacements and Upgrades Phase 1	2020/07	2022/12	2,863,974	788,562	-	3,652,536
C0021105	L7002 Replacements and Upgrades Phase 1	2019/11	2023/03	1,623,281	1,639,870	-	3,263,151
C0011321	L5031 Replacements and Upgrades Phase 1	2020/10	2022/12	125,358	2,001,074	-	2,126,432
C0031085	L6516 Line Replacement and Upgrades	2021/10	2023/06	33,847	1,393,631	1,352,752	2,780,231
51975	5P Mobile Substation Replacement	2018/01	2023/11	1,381,297	76,997	1,202,607	2,660,902

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Figure 24: Transmission Carry-Over Capital Spending Summary

CI#	Project Title	Start Date	Final Date	Previous Expenditure	2022 Budget	Subsequent Spending	Total Estimate
C0033644	2021/2022 Steel Tower Life Extension	2021/02	2022/12	1,224,836	1,207,114	-	2,431,950
49779	L6537 Replacements and Upgrades Phase 2	2018/01	2022/07	1,939,270	455,354	-	2,394,624
C0021104	L5550 Replacements and Upgrades Phase 1	2020/03	2022/12	1,813,755	537,853	-	2,351,608
C0021107	L8001 Replacements and Upgrades Phase 1	2020/06	2022/12	1,960,038	314,019	-	2,274,057
C0011339	L6549 Replacements and Upgrades Phase 2	2019/01	2022/06	1,620,119	484,831	-	2,104,950
C0031050	New Spare Large Autotransformer	2021/01	2023/08	20,818	457,674	1,869,996	2,348,489
C0031122	L6539 Replacements and Upgrades	2021/01	2023/06	284,070	1,563,394	-	1,847,464
C0033645	2021/2022 Steel Tower Refurbishment	2021/01	2022/12	959,521	744,164	-	1,703,685
C0011241	L5026 Replacements and Upgrades	2019/01	2022/04	1,374,856	233,513	-	1,608,369
C0021122	2020/2021 Transmission Switch & Breaker Replacement	2020/01	2022/03	1,445,593	55,097	-	1,500,689
52320	L6549 Replacements & Upgrades	2018/09	2022/06	1,454,552	25,831	-	1,480,383
C0031262	2020/2021 Transmission Switch and Breaker Replacement	2021/03	2022/12	267,524	876,922	-	1,144,445
C0011243	L5551 - Replacements and Upgrades	2018/12	2022/04	944,570	130,389	-	1,074,959
C0010978	2019/2020 Transmission Switch & Breaker Replacement	2018/12	2022/12	899,172	155,588	-	1,054,760
C0010955	2020/2021 Wood Pole Retreatment Program	2020/05	2022/12	753,748	228,039	-	981,787
C0031052	Replenish Spare used at 58C	2021/03	2023/08	20,818	174,720	777,985	973,524
C0031042	5P-MS Rewind	2021/01	2023/03	71,293	627,159	-	698,452
C0031053	L5506 Line Replacements and Upgrades	2021/01	2022/12	32,852	654,235	-	687,087
47915	L5053 Replacements and Upgrades	2017/03	2022/04	412,689	314,122	-	726,811
52059	L5039 Replacements and Upgrades	2018/03	2022/04	635,829	88,754	-	724,584
C0031283	2021 Substation Theft Prevention	2021/03	2022/12	311,371	390,481	-	701,852
C0031274	2021 Cap Bank Breaker Replacements	2021/04	2022/12	215,128	166,589	-	381,717
C0031268	AMO Critical Equipment Online Monitoring	2021/03	2022/10	161,007	213,864	-	374,871
43268	9W-B53 Tusket Support Structure Replacement	2018/01	2023/03	14,550	339,002	-	353,552
C0022783	2021 Generation Related Power Transformer Refurbishments	2020/10	2022/12	18,149	277,850	-	296,000
52261	83V-503 & 83V-504 - Bring Switches to Roadside	2018/08	2022/08	166,329	88,157	-	254,486
C0011039	Lumsden 5V Generating Transformer Replacement	2019/03	2023/03	86,090	164,375	-	250,465

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Figure 24: Transmission Carry-Over Capital Spending Summary

CI#	Project Title	Start Date	Final Date	Previous Expenditure	2022 Budget	Subsequent Spending	Total Estimate
C0021145	Mobile Substation Low Voltage Cable Trailer	2020/03	2022/12	122,767	72,045	-	194,812
C0026342	AMO Substation Test Equipment	2020/02	2022/04	207,910	10,355	-	218,264
Total Transmission Carry Over Spending				\$40,069,556	\$26,671,782	\$9,146,882	\$75,888,220

7.2 Transmission – New 2022 Capital items for ACE Plan Approval

Figure 25: Transmission - New 2022 Capital Items for ACE Plan Approval

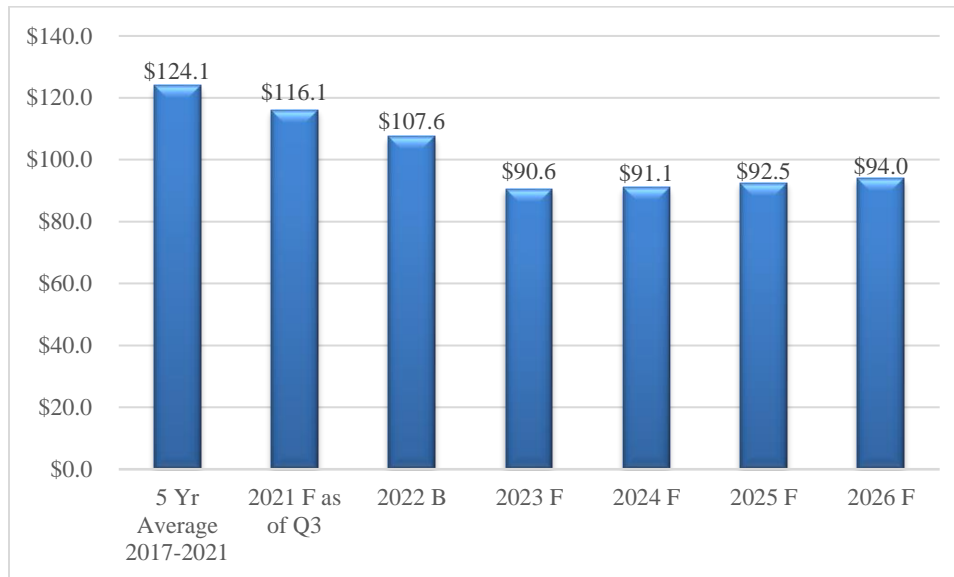
Tab #	CI#	Project Title	2022 Budget	Project Total
Transmission Plant				
T01	C0041893	2022/2023 Transmission Right-of-Way Widening 69kV	2,536,790	5,312,315
T02	C0041837	2022/2023 Substation Polychlorinated Biphenyl (PCB) Equipment Removal	2,299,568	3,805,434
T03	C0041793	L7002 Replacements and Upgrades Phase 2	564,090	3,640,960
T04	C0041805	L7005 Replacements and Upgrades Phase 2	1,399,971	3,182,518
T05	C0041989	2022/2023 Sacrificial Anode Installation Program	646,705	3,015,107
T06	C0041794	L5031 Replacements and Upgrades Phase 2	644,038	2,905,019
T07	C0041789	L5550 Replacements and Upgrades Phase 2	702,915	2,698,515
T08	C0041796	L6020 Replacements and Upgrades Phase 2	1,225,755	2,518,243
T09	C0041810	L5022 Replacements and Upgrades	920,607	2,172,200
T10	C0041791	L6551 Replacements and Upgrades	765,590	1,988,246
T11	C0043571	2022/2023 Transmission Switch & Breaker Replacement	511,414	1,612,638
T12	C0041790	L8001 Replacements and Upgrades Phase 2	696,045	1,395,537
T13	C0043010	2022/2023 Wood Pole Retreatment Program	525,751	1,300,037
T14	C0041800	L5537 Replacements and Upgrades	563,202	1,270,698
T15	C0041804	2022 Line Retirement Program	454,663	1,242,178
Total Transmission New Spending			\$14,457,106	\$38,059,646

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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 26** below illustrates NS Power's capital spending on distribution, including historical, forecast and budget.

Figure 26: Distribution Investment – Historical, Forecast and Budget
(Millions of dollars)



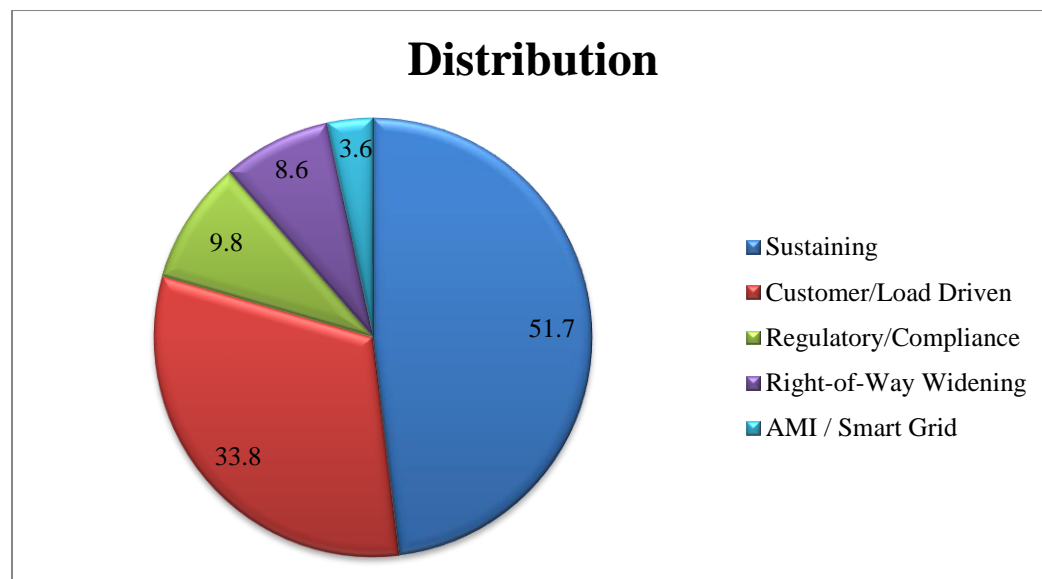
F = Forecast, B=Budget in above figure

Figure 27 provides a breakdown of the 2022 distribution investment by investment type.

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Figure 27: 2022 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 Section 11.1.6 for additional detail on NS Power's strategy related to reliability.

The focus for Distribution capital investments in 2022 continues to reflect localized customer load growth and customer reliability. The approximately \$108 million Distribution capital investment plan for 2022 is summarized in **Figure 28** below.

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Figure 28: Summary of 2022 Distribution Capital Investments

(Millions of dollars)

i	New 2022 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)	4.3
ii	2022 capital spending for projects with total estimated project spend greater than \$1,000,000 for which approval will be sought subsequent to the filing of the 2022 ACE Plan. (As provided in Section 5.3)	3.0
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)	11.7
iv	Carry-over capital spending. (As provided in Section 8.1)	18.1
v	Routine capital spending. (As provided in Section 10)	70.6
	Total 2022 Distribution Capital Investment Plan	107.6
	Request for ACE Approval (Items i and v)	74.9

Note 1: Totals may be off due to rounding.

8.1 Distribution – Carry-over Capital Spending Summary

Figure 29: Distribution Carry-Over Capital Spending Summary

CI#	Project Title	Start Date	Final Date	Previous Expenditure	2022 Budget	Subsequent Spending	Total Estimate
Distribution Plant							
47124	Advanced Metering Infrastructure	2015/01	2022/07	141,656,406	3,080,960	-	144,737,366
C0031083	New Distribution Rights-of-Way Phase 6	2021/05	2022/11	4,550,156	5,651,016	-	10,201,172
C0010778	Smart Grid Nova Scotia Project	2018/10	2022/12	3,890,814	550,835	-	4,441,649
C0020834	2020/2021 Inaccessible PCB Transformer Replacements	2020/06	2024/11	718,989	566,887	1,701,202	2,987,077
C0031145	2021 Padmount Replacement Program	2021/02	2022/12	911,697	459,191	-	1,370,888
C0006319	2019 PCB Pole Top Transformer Replacements	2018/03	2023/12	364,959	430,578	430,578	1,226,116
C0020830	85S-401 Cape Smokey Build to Roadside	2020/10	2023/12	721,659	84,372	338,765	1,144,796
41350	16W-301 Hebron Rebuild Phase 2	2017/05	2023/12	553,908	285,638	75,497	915,042
C0011187	5N-301 - Masstown Road Rebuild Phase 2	2019/10	2022/12	202,517	337,809	-	540,326
C0011206	102W-311 Jedediah Rd Rebuild	2019/07	2022/12	278,036	108,334	-	386,371
52184	37N-412 Glooscap Trail Rebuild Phase 2	2017/09	2022/12	535,717	315,120	-	850,837
C0031150	36W-301-Add Third Phase - Allendale	2021/03	2023/06	269,892	462,306	101,715	833,914
C0031119	96H-412-Dufferin Mines Rd Rebuild	2021/03	2023/12	27,348	146,067	621,951	795,366

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Figure 29: Distribution Carry-Over Capital Spending Summary

CI#	Project Title	Start Date	Final Date	Previous Expenditure	2022 Budget	Subsequent Spending	Total Estimate
C0031164	515W-211-New Germany Conversion	2021/04	2022/12	77,766	577,791	-	655,557
C0027611	67C-411 - Highway 252 BTR	2020/05	2023/12	370,741	341,432	39,781	751,954
49841	23H-Rockingham Voltage Conversion-Phase 2	2017/01	2022/04	690,032	42,644	-	732,676
C0033444	63V-312 Stronach Mountain Phase Extension	2021/06	2023/06	144,189	293,144	277,416	714,748
C0016183	2020 Downline Asset PCB Replacements	2019/06	2022/12	601,109	97,303	-	698,412
C0031166	2021 Downline Asset PCB Replacements	2021/01	2022/12	282,932	402,642	-	685,574
C0015198	50V Kentville Aluminum Light Pole Replacement	2019/05	2023/12	246,660	186,581	183,178	616,419
C0031112	6S-225 - Townsend Street Conversion	2021/02	2023/11	396,396	79,324	134,112	609,832
C0014019	2019 Substation Recloser Replacements	2019/05	2022/07	275,085	311,372	-	586,457
52229	16V-314H-New Edinburgh Phase Extension	2019/08	2023/05	126,529	253,763	48,904	429,195
52205	30N-412 Hwy 242 Fundy Shore Rebuild	2018/02	2022/04	479,173	72,329	-	551,502
C0037858	2021 Hydraulic Recloser Replacements	2021/04	2022/12	287,224	232,262	-	519,486
C0008740	Canso Distribution System Asset Replacement	2019/12	2023/12	239,087	71,654	174,893	485,634
C0026043	9H-221 Conversion - Jubilee Road Area	2020/02	2022/12	200,448	283,910	-	484,358
C0031299	88H-402 Trafalgar Line Extension and Offload	2021/01	2022/12	127,810	186,114	-	313,924
C0031148	Metro-Stack insulator replacements	2020/10	2022/08	256,912	130,115	-	387,028
C0033304	Downline Recloser Additions - Part 1	2020/11	2022/12	104,076	21,754	-	125,831
C0031297	709H-221 Bedford 4kV Conversion	2021/03	2023/02	76,124	288,769	-	364,893
C0011189	2H-411 - Cowie Hill UG System Replacements Part 3	2019/05	2023/12	138,641	123,365	91,222	353,228
C0033305	Branch-Line Recloser Additions - Part 1	2020/11	2022/06	326,736	10,846	-	337,582
C0031149	Targeted Automatic Sleeve Replacements	2021/01	2022/12	105,207	29,044	-	134,251
C0038727	22C-402 - Feeder Exit Replacement	2021/04	2022/12	43,992	139,802	-	183,794
C0020839	101H-411-Sackville rear lot Rebuild	2020/03	2022/04	223,773	99,258	-	323,031
C0031120	76V-301-Maitland Bridge Build to Roadside	2021/08	2022/12	135,415	174,122	-	309,537
49877	23H-302 Clayton Park Rebuild Phase II	2017/04	2023/03	1,777	234,676	-	236,454
47775	58C 67C Inverness Automatic Transfer Scheme	2019/04	2022/02	223,596	10,507	-	234,102
C0031300	9H-223 North St Conversion	2021/05	2023/10	56,630	132,921	38,420	227,971

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Figure 29: Distribution Carry-Over Capital Spending Summary

CI#	Project Title	Start Date	Final Date	Previous Expenditure	2022 Budget	Subsequent Spending	Total Estimate
C0006178	84W-302 Subsea Cable Removal and UG Cable Replacement	2018/02	2022/12	19,188	150,534	-	169,723
C0019579	7N-301 ICP	2019/08	2022/04	164,931	60,129	-	225,060
C0031110	89W-303-Oakland Rd Water Crossing	2021/02	2023/05	89,762	24,546	50,280	164,587
C0031113	61N-204 Townsend Avenue Conversion	2021/02	2022/12	196,016	2,037	-	198,052
C0031289	10H-231-South Park St and Wright Ave 4kV Conversion	2021/11	2023/05	1,038	151,751	40,546	193,334
C0031305	37N-413-HWY 2 Rebuild - Newville Lake	2021/01	2022/12	31,021	129,235	-	160,256
C0033427	Underground Fault Indicators	2020/11	2022/06	97,848	55,111	-	152,959
C0011180	23W Feeder Exit Cable Replacement	2019/10	2023/11	22,036	111,259	-	133,295
C0030944	1N-402 1N-405 Targeted Asset Replacements	2020/07	2022/02	81,630	13,210	-	94,841
C0028804	20H-301 Targeted Asset Replacements	2020/05	2022/02	73,896	7,294	-	81,191
C0033449	Substation Animal Contact Prevention	2020/11	2022/12	41,575	5,036	-	46,611
C0030486	3S - Targeted Asset Replacements	2020/06	2022/07	29,785	22,798	-	52,582
C0028564	92H-331 Targeted Asset Replacements	2020/05	2022/02	44,741	5,052	-	49,793
C0028982	104H-411 412 422 423 Targeted Asset Replacements	2020/05	2022/02	28,647	5,563	-	34,211
C0028803	139H-414 Targeted Asset Replacements	2020/05	2022/02	30,062	1,680	-	31,742
Total Distribution Carry Over Spending				161,872,334	18,051,791	4,348,459	184,272,584

8.2 Distribution – New 2022 Capital Items for ACE Plan Approval

Figure 30: Distribution - New 2022 Capital Items for ACE Plan Approval

Tab #	CI#	Project Title	2022 Budget	Project Total
Distribution Plant				
D01	C0041892	New Distribution Rights-of-Way Phase 7	2,940,175	9,854,291
D02	C0043130	2022 Padmount Replacement Program	1,386,611	1,807,359
Total Distribution New Spending			\$4,326,786	\$11,661,650

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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, cost effective energy to customers. **Figure 31** below illustrates NS Power's capital investment in general plant, including historical, forecast and budget.

Figure 31: General Plant Investment – Historical, Forecast and Budget
(Millions of dollars)



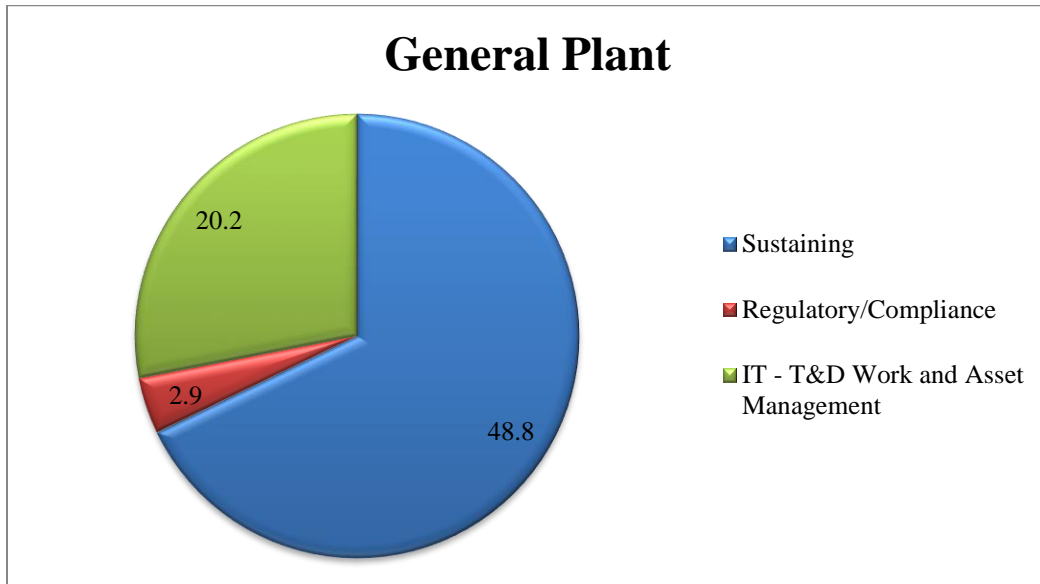
F = Forecast, B=Budget

Figure 32 provides a breakdown of the 2022 general plant spend by investment type.

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Figure 32: 2022 General Plant Spend by Investment Type

(Millions of dollars)



General plant capital investment in 2022 is primarily in Information Technology and Operational Technology. The approximately \$72 million general plant capital investment plan for 2022 is summarized in **Figure 33** below.

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Figure 33: Summary of 2022 General Plant Capital Investments

(Millions of dollars)

i	New 2022 capital spending for projects with total estimated project spending greater than \$1,000,000 and for which approval is sought.	-
ii	2022 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 2022 ACE Plan. (As provided in Section 5.3)	8.8
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)	8.3
iv	2022 capital spending for projects included in the 2021 ACE Plan for which approval will be sought in late 2021. (As provided in Section 4.2)	21.0
v	Point Aconi Generating Station capital spending. (As provided in Section 5.5)	0.1
vi	Carry-over capital spending. (As provided in Section 9.1)	12.4
vii	Routine capital spending. (As provided in Section 10)	21.3
	Total 2022 General Plant Capital Investment Plan	71.9
	Request for ACE Approval (Items i and vii)	21.3

Note 1: Totals may be off due to rounding.

9.1 General Plant – Carry-Over Capital Spending Summary

Figure 34: General Plant - Carry-Over Spending Summary

CI#	Project Title	Start Date	Final Date	Previous Expenditure	2022 Budget	Subsequent Spending	Total Estimate
C0011378	Route Network Upgrade	2019/07	2023/12	2,509,667	1,703,655	507,835	4,721,157
C0021109	New RTU Deployment Project	2020/10	2024/12	1,014,919	1,553,416	1,015,639	3,583,974
C0002137	ECC Map Board and Technology Modernization	2019/02	2022/09	1,437,526	447,842	-	1,885,368
C0011819	2020 SCADA Upgrade*	2018/11	2022/09	507,489	7,337	-	514,826
C0029928	AMO Weymouth Telecom Upgrade	2021/01	2022/12	17,466	476,790	-	494,255
C0002130	ADMS Distribution Fault Location	2018/01	2022/12	337,215	48,321	-	385,536
Total Telecommunications				5,824,281	\$4,237,360	\$1,523,474	\$11,585,115
49480	IT - Data Centre Disaster Recovery	2016/05	2022/12	5,522,157	391,686	-	5,913,843
C0021839	IT - Customer Energy Management (CEM)	2020/01	2022/12	5,452,296	667,694	-	6,119,991
49093	IT - Security Operations Center (SOC) and Security Information Event Monitoring (SIEM)	2016/03	2022/05	4,121,516	112,227	-	4,233,742

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Figure 34: General Plant - Carry-Over Spending Summary

CI#	Project Title	Start Date	Final Date	Previous Expenditure	2022 Budget	Subsequent Spending	Total Estimate
49094	IT - Privilege Access Management (PAM)	2016/06	2023/12	1,124,634	1,349,610	100,000	2,574,244
C0011087	IT - Customer Identity & Access Management	2019/01	2022/03	846,068	147,227	-	993,294
51483	IT - Public Key Infrastructure Certificate Authority	2017/05	2022/05	371,780	438,196	-	809,976
C0011111	IT - ADMS Maintenance Release 2021	2021/06	2022/10	151,486	201,121	-	352,607
C0031178	IT - Arc FM DXI Hot Fix	2021/03	2022/11	76,894	162,201	-	239,096
C0043011	IT - Website Map Integration	2021/01	2022/03	140,316	53,957	-	194,273
Total Computers				\$17,807,147	\$3,523,919	\$100,000	\$21,431,066

C0023622	AMO Substation and Transmission Asset Performance Management Program	2019/11	2022/12	1,923,091	729,181	-	2,652,273
C0017098	RAL Generator Replacement	2019/05	2022/05	299,035	1,438,835	-	1,737,870
C0010838	MCC - HVAC Replacement	2019/04	2022/12	1,183,888	495,874	-	1,679,762
C0023623	AMO Distribution Asset Performance Management Program	2020/01	2022/12	642,859	896,300	-	1,539,159
48837	AMO Fleet Environmental Data Management	2016/01	2022/04	897,658	9,007	-	906,665
C0037787	Fish Detection System Pilot	2021/03	2023/12	289,447	345,208	127,451	762,106
C0020341	Static Equipment Program Management System	2020/01	2022/12	410,773	47,754	-	458,527
C0018485	AMO Wind Asset Management Implementation	2019/05	2022/06	390,561	30,147	-	420,708
C0019038	AMO Hydro Water Management	2019/05	2022/10	218,722	119,843	-	338,565
C0031203	2021 Telecom Building Replacement	2021/03	2022/12	25,615	271,717	-	297,332
C0011820	Damage Assessment Mobile Data Collection Device Replacement	2019/07	2022/02	170,857	47,362	-	218,219
C0026682	EOC Facility Upgrades	2021/01	2022/08	194,219	2,988	-	197,207
C0031462	AMO Environmental Event Response Interface	2020/07	2022/06	135,860	61,164	-	197,024
C0021283	AMO T&D Telecom Upgrades	2019/07	2022/12	96,416	94,893	-	191,309
51095	AMO Corporate Dashboard Development	2017/04	2022/08	171,777	4,800	-	176,577
C0019883	AMO HYD Dam Safety Mobility	2019/06	2022/12	81,489	4,865	-	86,354
48035	AMO PP NERC Management System*	2019/01	2022/07	42,779	42,000	-	84,779

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Figure 34: General Plant - Carry-Over Spending Summary

CI#	Project Title	Start Date	Final Date	Previous Expenditure	2022 Budget	Subsequent Spending	Total Estimate
C0035666	EV Charging Station Installations 2021	2021/09	2022/12	34,858	43,437	-	78,294
Total Other General Plant				\$7,209,904	\$4,685,376	\$127,451	\$12,022,731
Total General Plant Carry Over Spending				\$30,841,333	\$12,446,655	\$1,750,925	\$45,038,912

*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 2022 routine capital program in the amount of approximately \$110.5 million.

10.1 Routine Capital Spending by Function Yr/Yr

Figure 36: Routine Capital Spending by Function Yr/Yr

	2020 Actual	2021 Budget	2021 Forecast*	2022 ACE Plan
Generation				
Generation Equipment Replacements	3,585,625	3,792,872	3,548,824	4,016,295
Generation Other Hydro	449,783	768,954	780,621	788,225
Generation Other Thermal	219,172	331,935	297,188	343,057
	\$4,254,581	\$4,893,761	\$4,626,633	\$5,147,576
Transmission				
Transmission Substation Replacement, Add'ns/Mod'ns	4,153,052	3,239,301	3,854,896	4,005,269
Primary Equipment Spares	358,171	255,000	308,033	300,000
Protection Modification & Replacement	625,033	851,287	973,198	978,162
Transmission Line Replacement, Add'ns/Mod'ns	7,639,621	7,176,396	7,427,891	7,623,023
Transmission Right-of-Way Widening	505,508	584,280	584,634	588,035
	\$13,281,385	\$12,106,265	\$13,148,652	\$13,494,488
Distribution				
Meters	1,729,092	1,997,121	2,490,704	2,440,694
Distribution Upgrades and Replacement	33,903,851	27,825,268	33,690,123	31,944,113
New Customers	29,193,530	24,510,850	33,182,891	31,245,970
Joint Use	3,860,882	1,383,607	4,649,970	4,387,955
Distribution Right-of-Way Widening	-42,003	584,280	584,130	588,035
	\$68,645,351	\$56,301,126	\$74,597,817	\$70,606,767

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Figure 36: Routine Capital Spending by Function Yr/Yr

	2020 Actual	2021 Budget	2021 Forecast*	2022 ACE Plan
General Plant				
Work Vehicles	6,134,669	10,402,577	10,048,778	10,711,180
Tools and Test Equipment	1,417,181	1,747,352	1,859,366	1,690,449
Telecommunications	1,127,485	1,268,679	1,256,524	1,300,675
Computing Asset Management	1,707,480	2,069,702	1,912,836	1,958,756
Property Improvements and Furniture	1,807,632	4,023,237	3,607,270	4,345,000
Other	973,849	1,277,444	1,395,418	1,278,686
	\$13,168,295	\$20,788,991	\$20,080,192	\$21,284,746
Total Routine Capital Spending	\$99,349,611	\$94,090,144	\$112,453,294	\$110,533,578

Note: The entire routine program totals \$111.3 million including Point Aconi routines. The totals presented above and in the following information do not include Point Aconi routines.

*The 2021 Forecast includes actuals up to July and forecast amounts for the remainder of the year.

10.2 Routine Capital Spending Project Breakdown Yr/Yr

Figure 37: Routine Capital Spending Project Breakdown Yr/Yr

Project #	CI #	Project Title	2020 Actual	2021 Budget	2021 Forecast*	2022 ACE Plan
G001	10634	CT - Routine Equipment Replacements	516,815	362,031	363,459	360,687
H001	11622	HYD - Routine Equipment Replacement	1,002,712	702,768	808,076	795,845
H004	27867	HYD-Roofing Routine	121,038	98,898	79,394	100,878
S001	10645	POT - Routine Equipment Replacement	138,420	215,988	220,163	169,465
	10673	TRE - Routine Equipment Replacement	378,213	385,291	389,652	427,974
	43646	PHB - Routine Equipment Replacement	41,974	195,808	81,587	98,365
	10621	TUC - Routine Equipment Replacement	262,573	252,329	250,122	250,860
	10626	LIN - Routine Equipment Replacement	414,120	393,545	394,946	389,087
S004	27856	TRE - Roofing Routine	54,280	82,017	68,868	99,622
	27855	POT - Roofing Routine	8,613	110,223	92,286	98,719
	27854	TUC - Roofing Routine	10,289	61,295	796	51,495
	27857	LIN - Roofing Routine	41,973	162,100	162,140	157,959
W001	41830	Wind - Routine Equipment Replacement	594,605	770,581	637,336	1,015,339
Generation Equipment Replacements Total			\$3,585,625	\$3,792,872	\$3,548,824	\$4,016,295

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Figure 37: Routine Capital Spending Project Breakdown Yr/Yr

Project #	CI #	Project Title	2020 Actual	2021 Budget	2021 Forecast*	2022 ACE Plan
H005	35583	HYD - Oil Release Risk Assessment	484,427	583,710	557,647	599,285
H006	35584	HYD - Gate Refurbishment	(34,644)	185,244	222,973	188,940
		Generation Hydro Total	\$449,783	\$768,954	\$780,621	\$788,225
S005	33871	TUC - Heat Rate Routine	61,132	50,104	65,060	88,920
	33867	POT - Heat Rate Routine	51,459	102,452	91,075	88,622
	33869	TRE - Heat Rate Routine	82,344	85,173	65,577	79,732
	33863	LIN - Heat Rate Routine	24,237	94,206	75,477	85,782
		Generation Thermal Total	\$219,172	\$331,935	\$297,188	\$343,057
T003	23120	Provincial - Trans Substation Primary	3,577,620	2,411,583	3,034,757	3,150,711
T004	23121	Provincial - Substation Additions & Replacements	575,432	827,718	820,139	854,557
		Transmission Subs Replace, Adds/Mods Total	\$4,153,052	\$3,239,301	\$3,854,896	\$4,005,269
T018	14973	Primary Equipment Spares	358,171	255,000	308,033	300,000
		Primary Equipment Spares Total	\$358,171	\$255,000	\$308,033	\$300,000
T016	14841	Protection Modification & Replacement	625,033	851,287	973,198	978,162
		Protection Modification & Replacement Total	\$625,033	\$851,287	\$973,198	\$978,162
T001	23115	Provincial Transmission Line Replace	1,997,692	1,773,646	2,000,588	2,178,529
T011	23118	Provincial Planned Trans Line Replacement	5,641,929	5,402,750	5,427,303	5,444,494
		Transmission Line Replacements Total	\$7,639,621	\$7,176,396	\$7,427,891	\$7,623,023
T010	43827	Transmission Right of Way Widening	505,508	584,280	584,634	588,035
		Transmission Right-of-Way Widening Total	\$505,508	\$584,280	\$584,634	\$588,035
D009	26496	Meter Routine	1,729,092	1,997,121	2,490,704	2,440,694
		Meters Total	\$1,729,092	\$1,997,121	\$2,490,704	\$2,440,694

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Figure 37: Routine Capital Spending Project Breakdown Yr/Yr

Project #	CI #	Project Title	2020 Actual	2021 Budget	2021 Forecast*	2022 ACE Plan
D005	23158	Unplanned Replace Deteriorated	17,293,412	14,603,935	19,943,637	17,058,077
D006	23135	Regulatory Replacements - Province	2,857,385	1,965,202	2,251,551	2,066,763
D008	23361	Provincial Storm	5,239,095	3,314,661	3,459,733	3,901,717
D051	29038	System Performance Improvement Routine	497,292	529,948	623,007	601,492
D055	23137	Planned Replacement Of Distribution	8,016,667	7,411,523	7,412,194	8,316,064
Distribution Upgrades and Replacement Total			\$33,903,851	\$27,825,268	\$33,690,123	\$31,944,113
D004	26716	New Customer Upgrades	7,346,941	7,267,545	8,431,339	7,700,269
D018	23511	Primary Equipment Spares - Distribution	109,368	150,000	168,654	156,337
D061	39766	New Customers - Residential	14,657,919	10,591,919	17,046,089	16,353,992
D062	39770	New Customers - Commercial	7,079,301	6,501,387	7,536,809	7,035,373
New Customers Total			\$29,193,530	\$24,510,850	\$33,182,891	\$31,245,970
D007	23136	Contractual Replacements (Joint Use)	3,860,882	1,383,607	4,649,970	4,387,955
Joint Use Total			\$3,860,882	\$1,383,607	\$4,649,970	\$4,387,955
D010	23127	Provincial Widening	(42,003)	584,280	584,130	588,035
Right of Way Widening Total			(\$42,003)	\$584,280	\$584,130	\$588,035
P006	20945	Replacement and Additional Work Vehicles	398,933	150,000	395,376	300,000
P063	39304	Class 3 Work Vehicle Replacements	149,607	300,000	304,679	300,000
P062	39305	Work Vehicle Replacements	3,302,312	7,602,577	7,229,477	7,831,180
P061	40236	Transportation Vehicle Replacements	2,282,776	2,350,000	2,119,246	2,280,000
Work Vehicles Total			\$6,134,669	\$10,402,577	\$10,048,778	\$10,711,180
P002/P016		Meter Shop - Tools and Equipment	1,315,962	1,658,996	1,763,933	1,577,054
P015	11611	Hydro Production Tools, Test Equipment	101,218	88,356	95,433	113,395
Tools and Test Equipment Total			\$1,417,181	\$1,747,352	\$1,859,366	\$1,690,449

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Figure 37: Routine Capital Spending Project Breakdown Yr/Yr

Project #	CI #	Project Title	2020 Actual	2021 Budget	2021 Forecast*	2022 ACE Plan
P025	16365	Mobile Radio Routine	153,973	238,528	220,555	243,772
P027	16551	Telecommunication Radio and Fibre Optics	202,207	191,103	192,319	197,971
P028	16550	Telecommunication Systems Replace & Modifications	606,617	654,048	657,841	673,933
P814	38243	Telecommunications Spares	164,689	185,000	185,808	185,000
Telecommunications Total			\$1,127,485	\$1,268,679	\$1,256,524	\$1,300,675
P010	16073	SCADA Improvements Routine	87,699	90,500	109,215	112,268
P031	29114	NS Power IT Infrastructure	1,469,854	1,761,103	1,606,120	1,633,218
P040	28522	CT's DCMS Routine	27,698	21,951	22,487	21,951
	25667	POT - DCMS Equipment Replacement Routine	-	51,148	41,782	50,000
	25626	TRE - DCMS Equipment Replacement Routine	11,287	50,000	50,000	45,000
	25646	TUC - DCMS Equipment Replacement Routine	73,532	60,000	52,800	61,320
	25668	LIN - DCMS Equipment Replacement Routine	37,410	35,000	30,431	35,000
Computing Asset Management Total			\$1,707,480	\$2,069,702	\$1,912,836	\$1,958,756
P001/P030		Property Improvement and Furniture	1,807,632	4,023,237	3,607,270	4,345,000
Property Improvement and Furniture Total			\$1,807,632	\$4,023,237	\$3,607,270	\$4,345,000
P012/P041		Other (HYD - Security Improvement & FAC - Land Acquisition)	305,861	539,444	847,799	549,286
P018	48158	Environment Equipment Replacement Routine	61,786	100,000	69,945	100,000
P816	38897	FAC Enviro Property Remed Routine	180,122	214,000	135,420	215,400
P815	38896	FAC Environment Site Assess Routine	215,801	214,000	139,109	214,000
P032	38848	Purchasing Equip & Warehouse Routine	210,279	210,000	203,145	200,000
Other Total			\$973,849	\$1,277,444	\$1,395,418	\$1,278,686
Routine Capital Spending			\$99,349,611	\$94,090,144	\$112,453,294	\$110,533,578

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

*The 2021 Forecast includes actuals up to July and forecast amounts for the remainder of the year.

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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.¹⁰

A summary of NS Power's total routine and like-for-like routine spending is provided in **Figure 38** below.

Figure 38: Annual Cost of Like for Like Routine Replacements

NOVA SCOTIA POWER (\$M)	2018 Actuals	2019 Actuals	2020 Actuals	2021 Forecast	2022 ACE
Total Routine Spending	106.6	116.3	99.3	112.5	110.5
Less:					
New Customers	25.7	23.9	29.2	33.2	31.2
System Growth and Performance	3.1	2.8	1.8	2.9	3.0
Other	1.1	1.3	1.2	1.7	1.7
Like-for-Like	76.8	88.4	67.2	74.6	74.6
Work Vehicles (Like-for-like)	9.1	9.7	6.1	10.0	10.7
Net (Like-for-like)	67.6	78.6	61.0	64.6	63.9

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

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10.4 2022 Routine Capital Spending Project Details

Transmission

Figure 39: Transmission Substation Replacements, Additions and Modifications

T003 Provincial: Transmission Substation Primary Equipment	2022 ACE Plan Forecast
Unplanned Replacements	2,165,919
Transformer Gasket Replacement	120,000
2022 Substation Insulator Replacement	71,436
Breaker Gas Seal Replacements	40,000
Insulating Fluids Replacement	80,000
Structure and Footing Remediation	293,506
Substation Ground Grid Replacements	199,850
Battery Bank and Charger Replacements	180,000
Total T003 Provincial: Transmission Substation Primary Equipment	\$3,150,711
T004 Provincial: Substation Additions & Replacements	
Unknown Additions	394,557
Backup Station Services	220,000
Lightning Arrestors	150,000
Add Low Side Switches at 85S	90,000
Total T004 Provincial: Substation Additions & Replacements	\$854,557
Total Transmission Substation Replacements, Additions and Modifications	\$4,005,269

Figure 40: Primary Equipment Spares

T018 Primary Equipment Spares	2022 ACE Plan Forecast
Spare Current Transformer (CT) Replenishment	80,000
Spare Pressure Release Devices	40,000
Spare Switches	50,000
Spare Capacitor Bank Breaker	130,000
Total Primary Equipment Spares	\$300,000

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Figure 41: Protection Modification and Replacement

T016 Protection Modification & Replacement	2022 ACE Plan Forecast
Replace L6539 Line protection at 3S	28,150
Replace L6545 Line protection at 85S	28,150
Replace L6549 Line protection at 85S	28,150
Replace L8001 Protection at 67N	58,000
Replace 79N-T81 B87 protection	28,150
Replace 9W-T2 Differential protection	62,000
Replace LCBII relays at 50W, 104W, 101W	70,000
Replace LCBII relays on L6507 at 50N and 79N	60,000
Replace LCBII relays on L6508 at 50N and 79N	60,000
L5512 Protection Replacement at 95H	70,000
50W L6020 Replace Protection Panel	120,000
1C Replace L6521 Primary Protection	20,000
101S Replace SER/RTU	35,000
9W Replace SER	40,000
50N Replace SER	80,000
85S Replace Pilot Wire Relay for GT2	44,732
103H-T81 Replace "A" Protection	80,000
67N 345 kV Replace Terminal Server 67N2-TS1	2,000
20H-Spryfield & 23H-Rockingham UFLS Corrections	6,000
67N 230 kV Replace Terminal Server 67N1-TS1	2,000
9W Reclosing Modifications (L5027)	2,000
Add L5500 Secondary protection	16,000
Unplanned Relay Failure	37,830
Total Protection Modification & Replacement	\$978,162

1

Figure 42: Transmission Line Replacement, Additions, Modifications

	2022 ACE Plan Forecast
T001 Provincial Transmission Line Replacement (Unplanned)	
This routine is budgeted based on historical T001 investment	\$2,178,529
T011 Provincial- Planned Transmission Line Replacement	
LINE # Description	
L5042 Farrell St. 99H to Albro Lake 62H	83,510
L5049 Tufts Cove 91H to Farrell St. 99H	57,210
L5019 Canaan Rd. 43V to Hollow Bridge Hydro 6V	178,662
L6007 Tufts Cove 91H to Burnside 108H	129,958

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Figure 42: Transmission Line Replacement, Additions, Modifications

		2022 ACE Plan Forecast
L5022	Canaan Rd. 43V to Michelin 92V	186,272
L5023	Waterville Tap 56V to Waterville 55V	182,122
L5024	Tremont 51V to Kingston 63V	214,788
L5030	Aberdeen St. 10N to Black River Rd. 6N	189,704
L5549	Maccan 30N to Hickman St. Sw. Sta. 19N	222,059
L5540	Milton 50W to 5540A, L-5540B Junction L	57,552
L5565	Seaboard 1S to Albert Bridge 57S	205,176
L5573	Victoria Jct. 2S to Ligan Mine 80S	139,132
L6552	Antigonish 4C to Glen Dhu 93N	312,589
L6051	Brushy Hill 120H to St. Croix 17V	21,419
L6537	Port Hastings 2C to Glen Tosh 5S	97,629
L7008	Brushy Hill 120H to Bridgewater 99W	174,835
L6024	Milton 50W to Tuskett 9W	244,072
L5054	Weymouth Hydro 16V to Saulnierville 93V	98,625
L6503	Onslow 1N to Trenton 50N	434,847
L7011	Port Hastings 3C to Woodbine 101S	130,006
L7009	Brushy Hill 120H to Bridgewater 99W	283,422
Various	1-6 Month Inspection Driven Work	1,800,905
T011 Provincial- Planned Transmission Line Replacement		\$5,444,494
Transmission Line Replacement Total		\$7,623,023

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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.¹¹

NS Power confirms that the cost estimates for vegetation management and right-of-way widening projects in the 2022 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 43** below:

Figure 43: T010 Forecast by Line

> 69 kV	
L7003	151,296
L6537	95,447
L6012	98,330
L6538	108,398
L6535	134,564
Total T010	
	\$588,035

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.¹²

CI C0041893 – 2022/2023 Transmission Right-of-Way Widening 69kV is submitted in the 2022 ACE Plan in compliance with the Board's directive. With the addition of a separate capital work

¹¹ M07745, NS Power 2017 Annual Capital Expenditure Plan, NSUARB Order, April 4, 2017.

¹² 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 2022 ACE Plan Reliability Directive in section 11.1.6.

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1 order for transmission Right-of-Way widening, the transmission vegetation management program
2 is now carried-out under three broad initiatives:

- 3
- 4 1. Operating activities for transmission vegetation management;
 - 5 2. Capital routine T010 - Transmission Right-of-Way Widening (for 138kV, 230kV and
6 345kV RoWs); and
 - 7 3. New transmission rights-of-way widening individual capital projects (i.e. CI C0041893 for
8 69kV RoWs and subsequent phases).
- 9

10 Capital routine T010 remains for the widening of 138kV, 230kV and 345kV rights-of-way. This
11 is the traditional scope of T010, but it has also previously included 69kV rights-of-way which are
12 now assumed under CI C0041893 and subsequent phases. This was the scope of work included in
13 the \$43.2 million eight-year program (\$5.4 million per year), which the NSUARB approved in
14 principle and directed NS Power to include in ACE Plan filings for final approval.¹³ The 69kV
15 work was removed from T010 but the budget for T010 remains approximately the same due to
16 increased North America Electric Reliability Corporation (NERC) requirements at the other
17 voltage levels (specifically 138kV).

18

19 **Distribution**

¹³ 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.

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Figure 44: Meters - D009 Meter Routine

Item#	Prg#	Meter Type	Meter Style	Description	2022 Forecast	Current Unit Cost	Capital for meters (\$)
1.0 Element, 120-240 volt							
	101	Form 1s (4 jaw)	3450514	C2SRD (HW 4.1) 1S CL200 OPENWAY RIVA CENTRON W/ DISCONNECT.	96	126.35	12,130
	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	96	159.60	15,322
1.5 Element, 120-240 volt							
	102	C2SRD TOU/BID	3450512	C2SRD (HW 4.1) 2S CL200 OPENWAY RIVA CENTRON W/ DISCONNECT (TOU)BID	1500	111.72	167,580
	102	C2SR	3450569	C2SR (HW4.1) 2S CL200 OPENWAY RIVA CENTRON "NO DISCONNECT"	1000	111.72	111,720
2.0 Element, 120-480 volt							
	101		3450511	CN2SRD (HW 4.1) 12S CL200 OPENWAY RIVA CENTRON W/ DISCONNECT	2400	126.35	303,240
			3450559	CP3SRA (HW4.1), 12S CL200 OPENWAY RIVA CENTRON POLYPHASE METER. 120V-277V	150	196.84	29,526
	103	45s	3450565	CP3SRA (HW4.1) 45S CL20 OPENWAY RIVA CENTRON POLYPHASE METER. 120V-277V	4	196.84	787
	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							
	104	9s	3450516	CP2SRA (HW4.0) 9S/36S CL20 OPENWAY RIVA CENTRON POLYPHASE METER. 120V-277V (TOU)	4	196.84	787
	103	9s	3450561	CP3SRA (HW4.1) 9S/36S CL20 OPENWAY RIVA CENTRON POLYPHASE METER. 120V-277V	480	196.84	94,483

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	104	9s	345056 7	CP3SRA (HW4.1) 9S/36S CL20 OPENWAY RIVA CENTRON POLYPHASE METER. 120V-277V (TOU)	4	196.84	787
	104	16s	345051 9	CP2SRA (HW4.0) 16S CL200 OPENWAY RIVA CENTRON POLYPHASE METER. 120V-277V (TOU)	4	196.84	787
	103	16s	345056 2	CP3SRA (HW4.1) 16S CL200 OPENWAY RIVA CENTRON POLYPHASE METER. 120V-277V	384	196.84	75,587
	103	16s	345056 3	CP3SRA (HW4.1) 16S CL200 OPENWAY RIVA CENTRON POLYPHASE METER. 240V-480V	288	196.84	56,690

Total Meters	6894		946,822
Misc Meters "ION"	5	8,000	40,000
Cellular Meters	20	900	18,000
CT and PT requirements			200,000
Wire, Adapters and switches			160,000
Total Materials			1,364,822
Freight			41,168
Applied Overhead			548,164
Labour			486,540
D009 Meters Total			2,440,694

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1

Distribution Upgrades and Replacement

Figure 45: Distribution Upgrades and Replacement

**2022 ACE Plan
Forecast**

D005 Unplanned Replacement Deteriorated Equipment

The forecast was developed based on an estimated 8,907 persondays of work at a unit cost of \$1,915/personday

\$17,058,077

D006 Regulatory Replacements

The 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.

\$2,066,763

D008 Provincial Storm

This forecast is developed based on past experience. There can be significant variation in this amount based on yearly storm activity.

\$3,901,717

D051 System Performance Improvement

Recloser Control Upgrades	92,000
85S-401-Protection upgrade	90,000
11S-411GA-Eskasoni Protection Upgrade	50,000
4C-430-Lochaber Road Upgrades	165,000
24C-442-Install Recloser Dover Road	49,492
11S-412-Sydney River Crossing Contingency Upgrade	50,000
104S-313-Protection Upgrade	45,000
67C-412-Protection Upgrade	60,000

Total D051 System Performance Improvement

\$601,492

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.)	2,425,651
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.)	1,210,382
Field Driven Work	1,847,174
539W-311 Hemlock Dr Build to Roadside	134,749
83V-303G Black River Lake Build to Roadside	207,210
48W-204 Liverpool 4kV Load Transfer	250,288
126H-312G Murphy Rd Rebuild	87,273
66V-201 Commercial Street Rebuild	141,621
20N-203 Conversion on Church St	148,242

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Distribution Upgrades and Replacement

Figure 45: Distribution Upgrades and Replacement

	2022 ACE Plan Forecast
2022 Manhole Equipment Replacement	45,000
13N-311 Outram and HaveLock Rebuild	288,255
82V-402H Kelly Rd Pole Replacements	68,500
62N-415 Trafalgar Road ICP	105,000
50N-410 Piedmont Build to Roadside	110,000
82V-403 Carroll's Corner Bridge crossing	145,891
665H-311 Malay Falls Rd Rebuild	67,828
67C-411 Collindale Build to Roadside	85,000
22C-404 High Road Build to Roadside	200,000
16W-301H Pembroke Rd Repole	225,000
104S-312 Old Margaree Rd Rebuild	60,000
568C-311 Egypt Road rebuild	115,000
584N-301 Irwin Lake Rd Upgrades	127,000
85S-401 Ingonish Centre Rebuild	146,000
48H-301 Sinclair St Pole Replacements	75,000
Total D055 Planned Replacement of Distribution Equipment	\$8,316,064
Distribution Upgrades and Replacement Total	\$31,944,113

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.¹⁴

¹⁴ M09656, NS Power 2019 Distribution Routines ATO, NSUARB Decision, October 21, 2020.

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The forecast for D005 for 2022 was developed based on the previous 5-year average for spend from 2017-2021 plus an annual inflation of 2%. This forecast resulted in an estimated 8,907 person days of work at a unit cost of \$1,915/person day. The following breakdown of annual regular labour and overtime spend are inputs into the 5-year average forecast.

Figure 46: 2017-2021 Spend in D005

Year	Regular Labour (PH)	Regular Labour \$/PH	Overtime Labour (PH)	Overtime Labour \$/PH
2017	43,050	\$ 45.84	16,440	\$ 91.69
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

This results in a forecast 2022 spend in D005 of the following:

Figure 47: Forecast 2022 Spend in D005

Year	Regular Labour (PH)	Regular Labour \$/PH	Overtime Labour (PH)	Overtime Labour \$/PH
2022	45,304	\$ 49.19	23,547	\$ 98.39

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 2017-2021. 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.

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New Customers

Figure 48: New Customers

	2022 ACE Plan Forecast
D004 New Customer Upgrades	
This forecast is developed based on prior spending levels for New Customer Upgrades	\$7,700,269
D018 Primary Equipment Spares Distribution	
This forecast is developed based on the probable amount of distribution spare equipment required during the year.	\$156,337
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.	\$16,353,992
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.	\$7,035,373
Total New Customers	\$31,245,970

1

Joint Use

Figure 49: Joint Use

	2022 ACE Plan Forecast
D007 Joint Use	
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.	\$4,387,955

2

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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.¹⁵

NS Power confirms that the cost estimates for vegetation management and right-of-way widening projects in the 2022 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 50**.

Figure 50: 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
73W-411	Cornwall	7.00	7.00	21,600	151,200	26,622	177,822
24C-422	Guysborough	10.00	10.00	21,600	216,000	38,031	254,031
22C-402	Marble Mountain/West Bay	4.00	4.00	21,600	86,400	15,212	101,612
Provincial	Clear Cut Buffers (Other Forestry Operations)	2.15	2.15	21,600	46,400	8,170	54,570
Total Distribution Right of Way Widening							\$588,035

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

¹⁵ M07745, NS Power 2017 Annual Capital Expenditure Plan, NSUARB Order, April 4, 2017.

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1 ROW corridors”.¹⁶ In its Supplemental Decision on September 21, 2015, the Board directed NS
2 Power as follows:

3
4 [36] A circumstance where it will take 32 years for the distribution vegetation
5 management program to become sustainable causes the Board significant
6 concern.

7 //

8 [38] The Board is intrigued by the stakeholder discussion concerning innovative
9 financing options and directs NSPI to pursue that issue and report back to
10 the Board the results of those discussions.¹⁷
11

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

15
16 NS Power is seeking approval as part of the 2016 ACE Plan of \$3 million for the
17 distribution widening routine, D010, in 2016. The \$3 million comes from the
18 portion of the annual \$10.4 million that is spent on managing the vegetation in
19 distribution ROWs to a sustainable state.¹⁸
20

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

22
23 ...the Board assumes that NSPI has increased the distribution Routine budget by
24 an amount of \$2.4 million from the operating budget over the \$600,000 in the 2015
25 ACE Plan. This means that NSPI is reducing its operating expenses by \$2.4 million
26 in 2016, thus increasing profits, with a corresponding increase in its rate base. This
27 action will only increase rates which the Board does not approve. Accordingly, the
28 Board reduces the routine budget for D010 to \$600,000, to be in line with the 2015
29 ACE Plan amount.¹⁹
30

¹⁶ 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.

¹⁷ 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.

¹⁸ M07176, NS Power 2016 Annual Capital Expenditure Plan, November 12, 2015, page 72.

¹⁹ M07176, NS Power 2016 Annual Capital Expenditure Plan, NSUARB Decision, June 8, 2016, page 18.

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1 Consistent with prior ACE Plans, for the 2022 ACE Plan, NS Power has not increased the budget
2 for D010 in response to the PTSA findings; rather, additional investment has been broken out into
3 a separate capital work order, CI C0041892 - New Distribution Rights-of-Way Phase 7. The
4 distribution vegetation management program is now carried-out under three broad initiatives:
5

- 6 1. Operating activities for distribution vegetation management;
- 7 2. Capital Routine D010 - Distribution Right-of-Way Widening; and
- 8 3. New distribution rights-of-way individual capital projects (i.e. C0041892 and subsequent
9 phases).

10
11 The scope of work completed under operating activities will continue to focus on existing right-
12 of-way asset reclamation, urban cycle trimming in municipalities, reactive maintenance, hazard
13 tree mitigation, vegetation removal during storm events, customer requested tree trimming, and
14 maintaining sustainability of existing rights-of-way.
15

16 The scope of work completed under the D010 routine will continue to focus on widening of
17 existing rights-of-way to the current standard beyond the Department of Nova Scotia
18 Transportation and Infrastructure Renewal (NSTIR) right-of-way.
19

20 CI C0041892 and subsequent phases will establish new rights-of-way where none have previously
21 existed.
22

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General Plant

Figure 51: Work Vehicles

P006 Replacement and Additional Work Vehicles	Quantity	Avg Unit Price	2022 ACE Plan Forecast
Reel and Pole Trailers	9	25,000	225,000
ATV / RTV	6	15,000	90,000
		Salvage	-15,000
Total P006 Replacement and Additional Work Vehicles			\$300,000
P061 Transportation Vehicle Replacements	49	49,031	2,402,500
		Salvage	-122,500
			\$2,280,000
P062 Work Vehicle Replacements	22	370,963	8,161,180
		Salvage	-330,000
			\$7,831,180
P063 Class 3 Work Vehicle Replacements	3	105,000	315,000
		Salvage	-15,000
			\$300,000
		Total Work Vehicles	\$10,711,180

Replacement of Fleet Vehicles with Electric Vehicles

While NS Power continues to encourage the adoption of electric vehicles (EV), in order for an EV to be considered a viable replacement, it must be able to perform all operational requirements of the vehicle being replaced and be of comparable cost. Prior to 2022 vehicle replacements, the battery electric vehicles (BEVs) and plug-in hybrid electric vehicles (PHEVs) that were available had not satisfied both these requirements for all vehicles that have been replaced. However, as costs for EVs continue to decline and new models become available that are more fit for purpose, they are now considered viable alternatives to traditional internal combustion vehicles.

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1 The operational hurdles that are required to be overcome are two-fold: (1) Operational Fit for
2 Purpose: Is there an EV that can perform all the same operational tasks that the current vehicle
3 does?; and (2) Charging Infrastructure: Continued expansion of level 2 and 3 EV Charging stations
4 across the province needs to continue to mitigate the current EV range restrictions. NS Power
5 continues to explore all opportunities to increase this coverage, including an expansion of level 2
6 charging stations and consideration for level 3 charging stations at a number of the Company's
7 regional depots and offices.

8
9 *Operational Fit for Purpose*

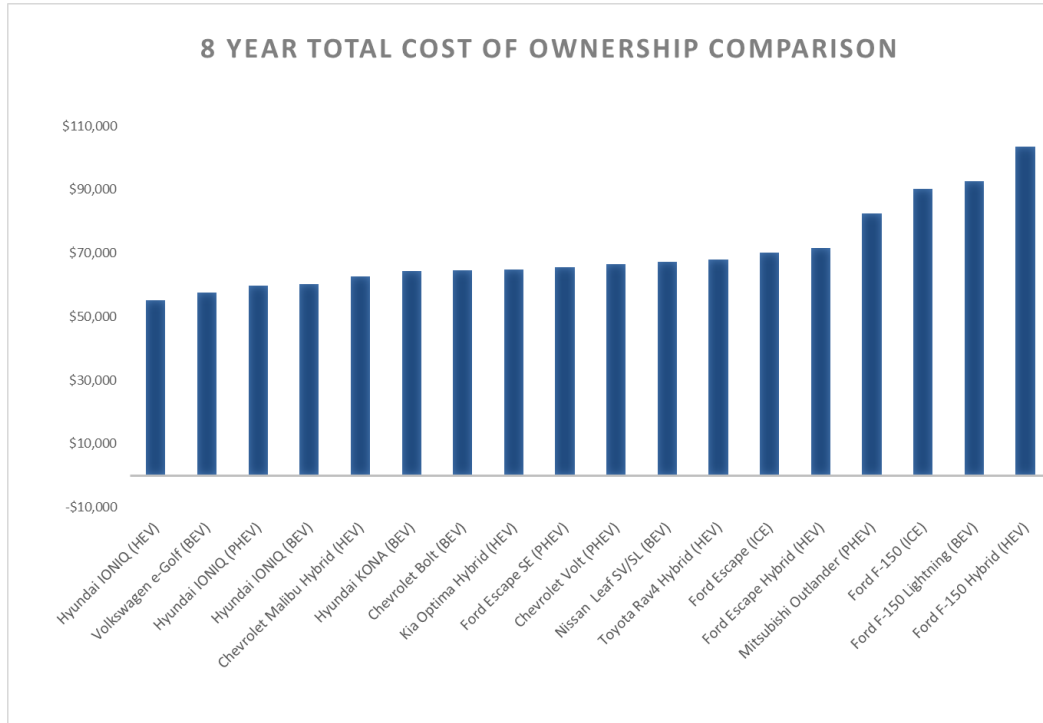
10
11 While the number of electric vehicles that fit both the operational and cost requirements continues
12 to increase, the majority of transportation vehicles utilized by NS Power are pickup trucks, which
13 to date have not had feasible replacements available as BEV or PHEVs. The 2022 Ford F-150
14 Lightning BEV is the first EV pickup truck that is expected to meet NS Power's operational
15 requirements.

16
17 The 2022 ACE Plan budget for P061 – Transportation Vehicle Replacements includes 10 BEVs
18 (Ford F-150 Lightnings) that are replacing current pickup trucks used in operations. These 10
19 BEVs total \$680,000.

20
21 Please refer to **Figure 52** and **Figure 53** below for NS Power's latest analysis of various electric
22 vehicles from a Total Cost of Ownership (TCO) and an emissions perspective.

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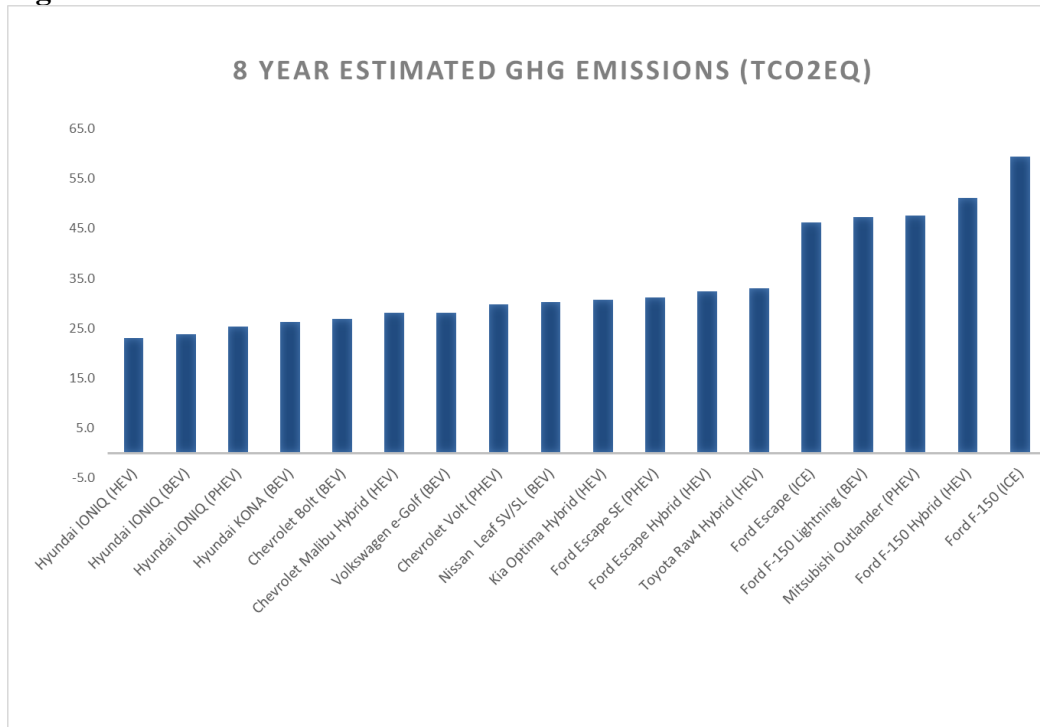
1 **Figure 52: Electric Vehicles Total Cost of Ownership**



2
3

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Figure 53: Electric Vehicles Estimated Emissions



In addition to pursuing the conversion of passenger vehicles to electric, NS Power is also examining opportunities to electrify the heavy duty work vehicle (such as line/bucket trucks) portion of the fleet. To date, fully electric heavy duty vehicles are not widely available and the few that are do not meet NS Power's operational requirements. Electrification of heavy duty vehicles is not limited to the engine, and can include electrifying other components of the vehicle. For example, as part of the 2022 P062 – Work Vehicle Replacement Routine, two work vehicles being purchased (as a pilot initiative), include a hybrid Power Take-off (PTO), which is the mechanism that powers the boom on the aerial device. Currently, in order to operate the boom, the main truck engine must be running. Idling these engines is harmful to the engine's reliability, creates significant job site noise and produces local tailpipe emissions. The electric PTO option can operate for up to 4 hours, which will reduce emissions, noise and increase engine reliability.

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Charging Infrastructure

To support the electrification of NS Power's fleet and the successful operationalization of the new vehicles, an investment in charging infrastructure is required. The scope of CI C0041966 – 2022 Electric Vehicle Transition (please refer to Section 5.4) is to install level 2 chargers to support NS Power EV fleet. The installed cost of a level 2 charging station (8-12 hours of required charging) is included in the total cost of ownership analysis of each new 2022 Ford F-150 Lightning BEV as noted in **Figure 52** above. In addition to dedicated level 2 charging stations, level 3 charging stations (30-60 minutes of required charging) will also be required beyond 2022 to support the operational needs of the vehicles. A determination of how many level 3 charging stations are required to support the initial order of BEV trucks will be assessed as part of CI C0041966 – 2022 Electric Vehicle Transition. NS Power will monitor the use of all existing and any new level 3 charging stations and, as more electric vehicles are introduced into the fleet, will determine the total number of level 3 charging stations that will be required going forward. Deployment of an electrified vehicle fleet and charging stations will be undertaken with a strategic view of any potential positive impacts such infrastructure may contribute to grid reliability and modernization initiatives. In cases where added value is identified for customers through NS Power's use of BEVs and charging stations at a given location, such installations would be included for evaluation as part of an overall distribution innovation and reliability strategy for that area.

Figure 54: Tools and Test Equipment

2022 ACE
Plan
Forecast

Meter Shop Tools and Equipment	\$45,000
Provincial Line Tools & Equipment	
Western Territory	125,000
North Eastern Territory	135,000
Cape Breton Territory	140,000
Central Territory	150,000
T&D Asset	500,000
System Maintenance	150,000
P002 Tools and Equipment Total	\$1,245,000

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Figure 54: Tools and Test Equipment

	2022 ACE Plan Forecast
P015 Hydro Production Tools & Test Equipment	\$113,395
P016 Thermal Production Tools & Test Equipment	
POT Tools & Equipment	75,000
TUC Tools & Equipment	60,000
TRE Tools & Equipment	80,000
LIN Tools & Equipment	59,054
CT Tools & Equipment	28,000
PHB Tools & Equipment	30,000
P016 Thermal Production Tools & Test Equipment Total	\$332,054
Tools and Test Equipment Total	\$1,690,449

1

Figure 55: Telecommunication

	2022 ACE Plan Forecast
P025 Mobile Radio	
Replacement radio equipment hardware and upgrades	85,000
Equipment repairs, antenna replacements and repairs	75,000
Mobile radio servers repairs and upgrades	43,000
Miscellaneous support for system	40,772
	\$243,772
P027 Telecommunication Radio & Fibre Ops	
HVAC & Generator Upgrades	110,000
Radio Site repairs - Miscellaneous	50,971
Add Generator Alarms and Controls	17,000
Miscellaneous Upgrades and Replacements	20,000
	\$197,971
P028 Telecommunication Systems Replace & Modifications	
Miscellaneous teleprotection equipment upgrades (as required)	27,000
Upgrade miscellaneous radio links (as required)	31,000
Misc. Telecom Equipment (as required)	38,500
Nokia Equipment Repairs and Support	21,000

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Figure 55: Telecommunication

	2022 ACE Plan Forecast
Telecom engineering services	54,080
Telecom engineering support services	26,100
Battery Replacements	76,500
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	116,503
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
	\$673,933

P814 Telecommunications Spares

Alcatel-Lucent MPR9500 Microwave Radio	50,500
Net Guardian Alarm Monitoring Equipment	15,000
7705 MPLS Router Spares	25,000
Ethernet Spares	4,500
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	50,000
	\$185,000

Telecommunications Total

\$1,300,676

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Figure 56: Computing Asset Management

2022 ACE Plan
Forecast

P010 SCADA Improvements

This forecast is developed based on
SCADA equipment/operator interfaces
failures or modifications

P010 SCADA Improvements Total **\$112,268**

P031 NS Power IT Infrastructure

Infrastructure Component	Asset Management Plan	Volume to be Refreshed	
Voice and Data Network	Network Infrastructure & Equipment		190,000
Servers	Servers Refresh, Licenses, & Storage		212,893
Laptop and Desktop Computers, Personal Devices	Computers that have or will reach four (4) years old	500	750,000
	Mobile Devices	250	250,000
	Software & software licenses		110,325
	Application enhancements/development		50,000
Power Supplies	Replaced after 10 years		40,000
Accessories	Accessories		30,000
P031 NS Power IT Infrastructure Total			1,633,218

P040 DCMS Equipment Replacement

CT's DCMS Equipment Replacement	21,951
POT DCMS Equipment Replacement	50,000
TRE DCMS Equipment Replacement	45,000
TUC DCMS Equipment Replacement	61,320
LIN DCMS Equipment Replacement	35,000
	\$213,271

Computing and Asset Management Total **\$1,958,756**

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Figure 57: Property Improvement and Furniture

Property Improvement and Furniture		2022 ACE Plan Forecast
P001	Building Protective Coatings	25,000
	Roofing & Emergency Refurbishment	25,000
	Grading / Drainage	81,000
	Fencing	56,000
	Pole Brow	120,000
	General Refurbishment Work	556,500
	Asphalt / Paving	605,000
	Consulting	104,500
	HVAC Improvements	192,000
	Substations	29,000
	Generator	20,000
	Protective Signage Replacement	5,000
	Security Improvements	50,000
	Depot Generator Replacements	405,000
	1H General Refurbishments	371,000
	Substation / Depot Improvements	1,700,000
Property Improvement and Furniture Total		\$4,345,000

1

Figure 58: Other

Other		2022 ACE Plan Forecast
P012	HYD - Security Improvements	499,236
P018	Environmental Equipment Replacement	100,000
P041	FAC - Land Acquisition Routine	50,050
P816	FAC - Environment Property Remediation	215,400
P815	FAC - Environment Site Assessment	214,000
P032	FAC - Equipment & Warehouse	200,000
Other Total		\$1,278,686

2

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1 **11.0 DIRECTIVES AND MISCELLANEOUS**

3 **11.1 NSUARB ACE Plan Directives and Stakeholder Commitments**

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

9 **11.1.1 Impact of 2022 ACE Plan on Revenue Requirement and Affordability**

11 **Introduction**

13 The NSUARB has directed NS Power to provide information regarding the ACE Plan's revenue
14 requirement impact. Directive 7 of the 2011 ACE Plan Decision²⁰ and Directive 12 of the 2012
15 ACE Plan Decision²¹ require NS Power to provide the estimated effect the ACE Plan may have
16 on revenue requirement over the next five years. This information is provided in **Figure 59** below.
17 Through discussion and agreement with stakeholders as well as further direction from the
18 NSUARB, a version of NS Power's "Long-Term Capital Planning & Revenue Requirement" table
19 incorporating stakeholder assumptions is provided in **Figure 60** below.

21 Considered as a whole, NS Power's assumptions and corresponding information provide the
22 NSUARB and customers an impression of the impact NS Power's capital program is expected to
23 have on revenue requirement. The 2022 ACE Plan is focused on the provision of safe and reliable
24 electric service, investing where required to best maintain the performance and reliability of the
25 Company's assets, while minimizing upward pressure on rates.

²⁰ NSUARB-P-128.11, NSPI 2011 Annual Capital Expenditure Plan, NSUARB Decision, June 23, 2011.

²¹ NSUARB-P-128.12, NSPI 2012 Annual Capital Expenditure Plan, NSUARB Decision, May 4, 2012.

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The overall revenue requirement table, “Long-Term Capital Planning & Revenue Requirement” contained in **Figure 59** shows that NS Power’s capital expenditures have a cumulative decreasing effect on NS Power’s revenue requirement for customers over the next five years, taking into account the contribution to fixed costs provided by new customer additions.

Overall Revenue Requirement

The overall revenue requirement calculation shows the effect on rate base and the effect on revenue requirement. The underlying assumption of this calculation is that, to the extent capital expenditures equal depreciation expense in a given year, there is no incremental effect on rate base or associated revenue requirement and therefore it is not included in the calculation.

The revenue requirement assessment incorporates the following inputs:

- Capital expenditures compared to forecast depreciation expense annually.
 - Administrative overhead credit based on the proration 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.

This method does not address the revenue requirement effect should capital projects not be completed. Costs resulting from not completing certain projects include items such as increased operating costs, increased fuel costs, increased repair costs, and other risks or implications. Avoided cost benefits are not included in this revenue requirement calculation.

Figure 59: Long-Term Capital Planning & Revenue Requirement

LONG-TERM CAPITAL PLANNING & REVENUE REQUIREMENT

NOVA SCOTIA POWER (\$M)	2022	2023	2024	2025	2026
<u>Estimated Investment Related to five-year Capital Plan</u>					
Capital Expenditures (Investment)	\$531.6	\$571.6	\$417.1	\$510.0	\$479.6
Less: Depreciation of all assets	245.4	253.5	268.2	282.2	294.4
Incremental Investment over Depreciation (Growth)	\$286.2	\$318.1	\$148.8	\$227.9	\$185.2
Incremental Investment as a portion of Total Investment	53.8%	55.7%	35.7%	44.7%	38.6%
<u>New Incremental Regulated Capital Assets</u>					
Beginning Balance	-	286.2	604.3	753.2	981.0
Capital Investment	531.6	571.6	417.1	510.0	479.6
Depreciation	245.4	253.5	268.2	282.2	294.4
Ending Balance	286.2	604.3	753.2	981.0	1,166.2
Average Incremental Net Book Value of projects in five-year plan	143.1	445.2	678.7	867.1	1,073.6
<u>Capital Cost Allowance</u>					
Depreciation of Assets added 2022-2026	20.0	35.4	94.0	58.7	60.1
<u>Impact on Net Earnings</u>					
Expenses					
OM&G	(3.8)	(7.6)	(11.4)	(15.2)	(19.0)
Administrative Overhead	(28.2)	(26.2)	(16.7)	(20.4)	(14.0)
Depreciation	2.1	6.6	9.5	18.1	20.4
Interest	4.4	13.8	21.0	26.9	33.3
AFUDC	(7.2)	(13.4)	(7.4)	(7.5)	(9.4)

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Figure 59: Long-Term Capital Planning & Revenue Requirement

LONG-TERM CAPITAL PLANNING & REVENUE REQUIREMENT

NOVA SCOTIA POWER (\$M)	2022	2023	2024	2025	2026
Earnings before tax	(11.5)	(3.6)	(10.0)	15.8	27.0
Income Tax less Impact of Administrative Overhead	(10.6)	(13.3)	(29.6)	(9.4)	(6.4)
Income Tax Impact of Administrative Overhead	(5.7)	(5.3)	(3.4)	(4.1)	(2.8)
Net Earnings	\$4.8	\$15.0	\$22.9	\$29.3	\$36.2
<u>Incremental Revenue Requirement of five-year capital plan</u>					
Including Fixed Cost Recovery:					
Incremental Revenue Requirement of five-year capital plan	(44.2)	(30.4)	(15.0)	17.7	38.3
Change in Incremental Revenue Requirement from Previous Year	(44.2)	13.8	15.4	32.6	20.6
Rate Impact of five-year capital Plan	-3.5%	-2.4%	-1.2%	1.4%	3.0%
Excluding Fixed Cost Recovery:					
Incremental Revenue Requirement of five-year capital plan	(40.4)	(22.8)	(3.6)	32.9	57.3
Change in Incremental Revenue Requirement from Previous Year	(40.4)	17.6	19.2	36.4	24.4
Rate Impact of five-year capital Plan	-3.2%	-1.8%	-0.3%	2.6%	4.5%

The overall revenue requirement shown in **Figure 59**, in the line item “Incremental Revenue Requirement of five-year capital plan” including Fixed Cost Recovery, shows a cumulative decreasing revenue requirement for years 2022 to 2026 of \$ 33.5 million as a result of the new capital investment. This is due to additional fixed cost recovery received from customer growth achieved through capital investments to serve these customers, Administrative Overhead and AFUDC credits related to construction of capital assets, and the income tax impact of new capital investment. In addition, decreasing revenue requirement for this period can also be partially attributed to the planned investments in ECEI which have a higher CCA rate and qualify for accelerated CCA deductions.

Stakeholder Revenue Requirement Table

In compliance with the 2016 ACE Plan Terms of Consensus and the subsequent stakeholder engagement process, NS Power has included an additional revenue requirement table using assumptions requested by stakeholders. The table shown in **Figure 60** below, first included in the 2017 ACE Plan, evolved through the 2017 ACE Plan Stakeholder Engagement process. It now

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1 includes the following significant differences from NS Power's "Long-Term Capital Planning &
2 Revenue Requirement" table above:

- 3
- 4 • Elimination of the impact of additional fixed cost recovery as well as the administrative
5 overhead and AFUDC credits from the revenue requirement calculation.
6
- 7 • Elimination of the application of the incremental spend as a portion of total spend
8 percentage to the calculated depreciation expense and capital cost allowance in the revenue
9 requirement calculation.
10
- 11 • Elimination of the reduction of depreciation of all assets in the calculation of New
12 Incremental Regulated Capital Assets.
13

14 NS Power believes the assumptions reflected in the table shown in **Figure 60** do not accurately
15 reflect the impact of the Company's capital program because:

- 16
- 17 • Including the reduction in fixed costs in the model demonstrates the decrease in revenue
18 requirement for current customers related to having more customers connected and sharing
19 the fixed costs.
20
- 21 • Including the AO and AFUDC credits in the calculation of revenue requirement is
22 consistent with how rates are calculated and that the inclusion of these credits in the
23 revenue requirement directive is appropriate.
24

25 Since NS Power does not have the option to cease investment in its capital infrastructure at a
26 sustaining level, a five year capital plan should be viewed in the context of costs that the capital
27 program is driving in comparison to maintaining the asset base.
28

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Figure 60: Long-Term Capital Planning & Revenue Requirement (Stakeholder Table)

LONG-TERM CAPITAL PLANNING & REVENUE REQUIREMENT (STAKEHOLDER TABLE)

NOVA SCOTIA POWER (\$M)	2022	2023	2024	2025	2026
Capital Expenditures (Investment)	\$531.6	\$571.6	\$417.1	\$510.0	\$479.6
Less: Depreciation of all assets	245.4	253.5	268.2	282.2	294.4
Incremental Investment over Depreciation (Growth)	286.2	318.1	148.8	227.9	185.2
Incremental Investment as a portion of Total Investment	53.8%	55.7%	35.7%	44.7%	38.6%
Revenue Requirement Calculation					
OM&G	-	-	-	-	-
Depreciation	3.8	11.9	26.6	40.6	52.8
Interest	8.2	25.3	40.7	55.1	70.4
AFUDC	-	-	-	-	-
Return on Equity	9.0	27.6	44.3	59.9	76.6
Income Tax less Impact of Administrative Overhead	(9.6)	(9.7)	(78.5)	(12.5)	(10.7)
Administrative Overhead	-	-	-	-	-
Income Tax Impact of Administrative Overhead	-	-	-	-	-
Incremental Revenue Requirement of five-year capital plan	11.4	55.2	33.1	143.1	189.1
Change in Incremental Revenue Requirement from Previous Year	11.4	43.7	(22.1)	110.0	46.1
Rate Impact of five-year capital Plan	0.9%	4.3%	2.6%	11.3%	14.9%
RECAP					
Expenses					
OM&G	-	-	-	-	-
Administrative Overhead	-	-	-	-	-
Depreciation	3.8	11.9	26.6	40.6	52.8
Interest	8.2	25.3	40.7	55.1	70.4
AFUDC	-	-	-	-	-
Earnings before tax	(0.6)	17.9	(34.2)	47.4	66.0
Income Tax less Impact of Administrative Overhead	(9.6)	(9.7)	(78.5)	(12.5)	(10.7)
Income Tax Impact of Administrative Overhead	-	-	-	-	-
Net Earnings	\$9.0	\$27.6	\$44.3	\$59.9	\$76.6

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Figure 60: Long-Term Capital Planning & Revenue Requirement (Stakeholder Table)

LONG-TERM CAPITAL PLANNING & REVENUE REQUIREMENT (STAKEHOLDER TABLE)

NOVA SCOTIA POWER (\$M)	2022	2023	2024	2025	2026
<u>New Incremental Regulated Capital Assets</u>					
Beginning Balance	-	531.6	1,103.3	1,520.3	2,030.4
Capital Investment	531.6	571.6	417.1	510.0	479.6
Ending Balance	531.6	1,103.3	1,520.3	2,030.4	2,510.0
Average Balance	265.8	817.4	1,311.8	1,775.4	2,270.2
<u>Capital Cost Allowance</u>					
Depreciation of Assets added 2022-2026	36.3	63.2	263.0	131.0	155.5

Conclusion

As illustrated in **Figure 59** above, NS Power's capital program for 2022 reduces upward pressure on rates and revenue requirement for the period of 2022 to 2026.

NS Power recognizes that this describes the influence of its capital program only. NS Power also recognizes that all aspects of its business contribute to the complete picture of our revenue requirement in any given year. Those other aspects include, broadly, fuel costs, operating, maintenance, and general (OM&G) costs, and past investments.

Capital investments in the 2022 ACE Plan focus on sustaining capital assets to maintain and improve existing system performance, as well as on the addition of capital assets that will enable Nova Scotia to achieve a lower carbon future with 80 percent of the electricity in Nova Scotia coming from renewable sources by 2030 in a way that is affordable for customers. As noted in Section 3.1, as policy development continues to evolve in the coming year, the level of investment in ECEI in 2022 and beyond will be subject to change.

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11.1.2 Sustaining Capital – 2022 ACE Plan Alignment with the 2020 Integrated Resource Plan (IRP)

The 2015 ACE Plan Terms of Consensus provided the following:

NS Power will also engage with interested stakeholders on the issue of NS Power including information in future ACE Plans to show how its long-term planning assumptions regarding projections of sustaining capital investment in existing thermal plants presented in the IRP and future ACE Plans are consistent. This stakeholder consultation process will begin within 30 days of the Board issuing its decision in this matter.²²

During the stakeholder consultation process in early 2015, NS Power discussed the issue of including information in future ACE Plans to show how its long-term planning assumptions regarding projections of sustaining capital investment in existing thermal plants presented in the IRP and future ACE Plans are consistent. A mock-up of this commitment was provided to and agreed upon by stakeholders pursuant to NS Power's report submitted to the Board on June 30, 2015.²³

Starting with the 2021 ACE Plan, NS Power has provided comparisons to capital assumptions used in the 2020 IRP. This approach continues for the 2022 ACE Plan.

The 2022 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. Two capital investment trajectories were developed for the 2020 IRP, reflecting the two mandatory coal retirement dates that were studied (2030 and 2040). In the 2030 coal retirement scenario, sustaining capital investment begins to be reduced after 2025 as major refurbishments are removed from the plan. The plan from 2021 through 2025 was essentially unchanged in either retirement scenario. Many of the lowest-cost IRP plans, including the Reference Plan, are based on a 2040

²² M06514, NS Power 2015 Annual Capital Expenditure Plan, Terms of Consensus Agreement, February 18, 2015, page 2.

²³ M06963, NS Power 2015 Annual Capital Expenditure Plan, Stakeholder Engagement Report, June 30, 2015.

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coal retirement. The IRP Action Plan and Roadmap are informed by a broad range of plans, including plans with 2030 coal retirement dates. Importantly, NS Power confirms that the 2022 investment plan would not change with a 2030 or 2040 retirement scenario for the coal units, due to the short interval of many refurbishment intervals and the requirement to sustain safe reliable operation of assets until their planned retirement date.

The table below in **Figure 61** presents coal unit retirement dates from three IRP scenarios, which, together with other key scenarios and modeling results, informed the IRP Key Findings and Action Plan developed during the 2020 IRP proceeding. This table confirms that under IRP Scenario 3.1C, coal unit retirements under a 2030 retirement trajectory are delayed until late in the decade (please refer to IRP Finding 2c²⁴ for additional background on this analysis completed during the IRP).

Figure 61: Coal Unit Retirement Dates from 2020 IRP Scenarios

	2.0C (Reference Plan) 2040 Coal / Low Electrification	2.1C 2040 Coal / Mid Electrification	3.1C 2030 Coal / Mid Electrification
Lingan 1	2036	2036	2029
Lingan 2	2021	2021	2021
Lingan 3	2040	2040	2029
Lingan 4	2040	2040	2029
Point Tupper 2	2040	2039	2030
Trenton 5	2023	2023	2023
Trenton 6	2039	2039	2030
Point Aconi 1	2030	2040	2030

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.

²⁴ M08929, Exhibit N-9 Powering a Green Nova Scotia, Together, 2020 Integrated Resource Plan, Nova Scotia Power, November 27, 2020 (2020 IRP Report), pages 107-108.

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1 As shown in **Figure 62**, NS Power thermal generation investment is below the IRP capital forecast
2 for 2022. This variance is expected as the IRP used a top down approach with unit-specific high
3 utilization factors for all the units (to ensure higher capital thresholds were tested in the IRP), while
4 the ACE Plan is built bottom up from current risk assessments with projected utilization factors.
5 While the snapshot in 2022 shows a lower investment level than the IRP sustaining capital profile,
6 this investment level is appropriately aligned with current projected utilization factors and
7 reliability/risk tolerances. There will be differences in unit investment profiles in future years
8 based on actual utilization and present conditions, which drives the timing of major refurbishment
9 intervals, causing the investment to be lower or higher than the long term IRP projection in a given
10 year. For example, the Major Unit Outage on Lingan Unit 1 was moved to 2023 instead of 2021
11 as forecast in the IRP sustaining capital profile; the main component of the Lingan Unit 1 major
12 outage is the required turbine refurbishment, including last stage blade replacements to sustain
13 safe, reliable generation.

14
15 The total thermal investment over the 25 year period will look different than the base case IRP
16 sustaining capital. Declining investment in coal assets will be replaced with other firm capacity
17 sources which could include batteries, gas units, fast acting combustion turbines, or capacity
18 imports over existing and new transmission infrastructure. NS Power will continue to work with
19 stakeholders to align sustaining capital projections and will update annually in NS Power's 10
20 Year System Outlook.

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Figure 62: 2020 IRP vs. 2022 ACE Forecast Comparison by Unit

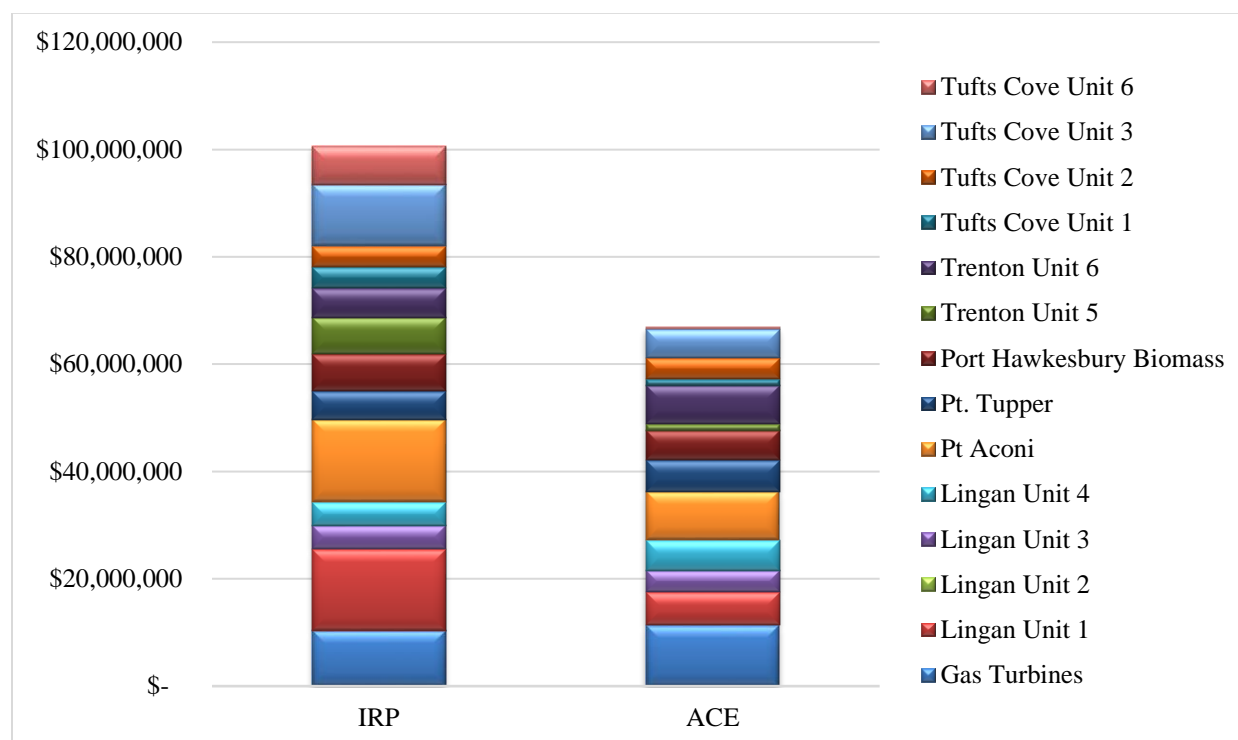


Figure 63 outlines the sustaining capital assumptions used in the 2020 IRP under a 2040 coal retirement trajectory. As noted above, in the 2030 coal retirement scenario, sustaining capital investment begins to be reduced after 2025 as major refurbishments are deferred from the plan, and the plan from 2021 through 2025 is the same in either retirement scenario. These investments are required prior to 2030 to achieve safe operation, environmental compliance and reliable operation to support firm peak requirements. **Figure 64** outlines the thermal sustaining capital assumptions for the 2030 coal retirement scenario used in the 2020 IRP. This demonstrates a decline in forecast coal unit investment after 2025 compared to the forecast in **Figure 63**.

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Figure 63: 2020 IRP Sustaining Capital Forecast

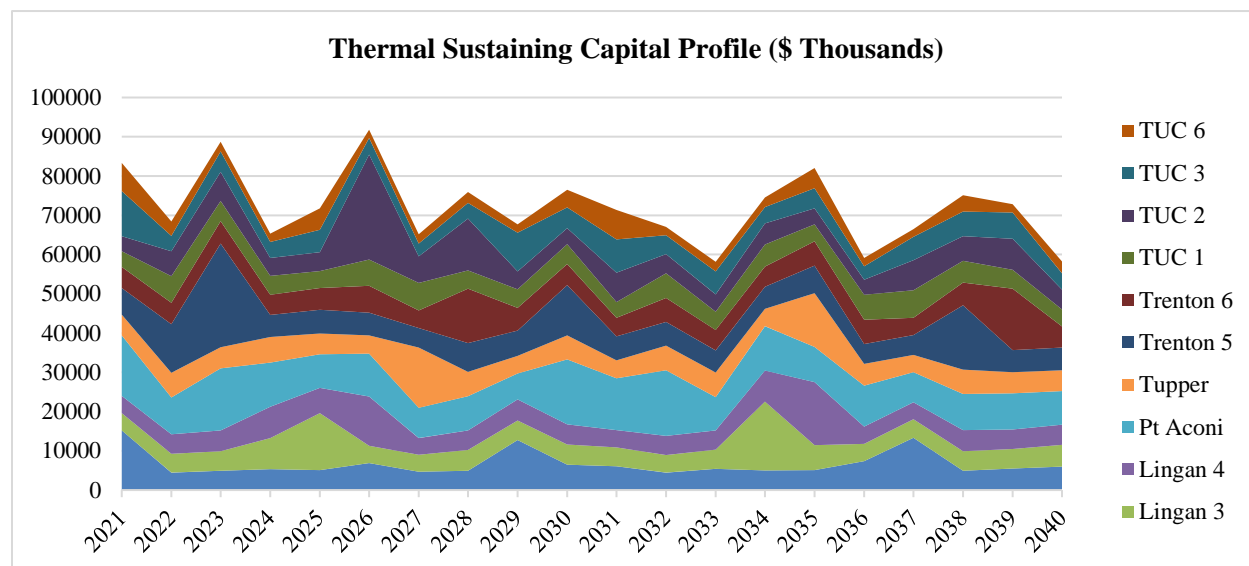
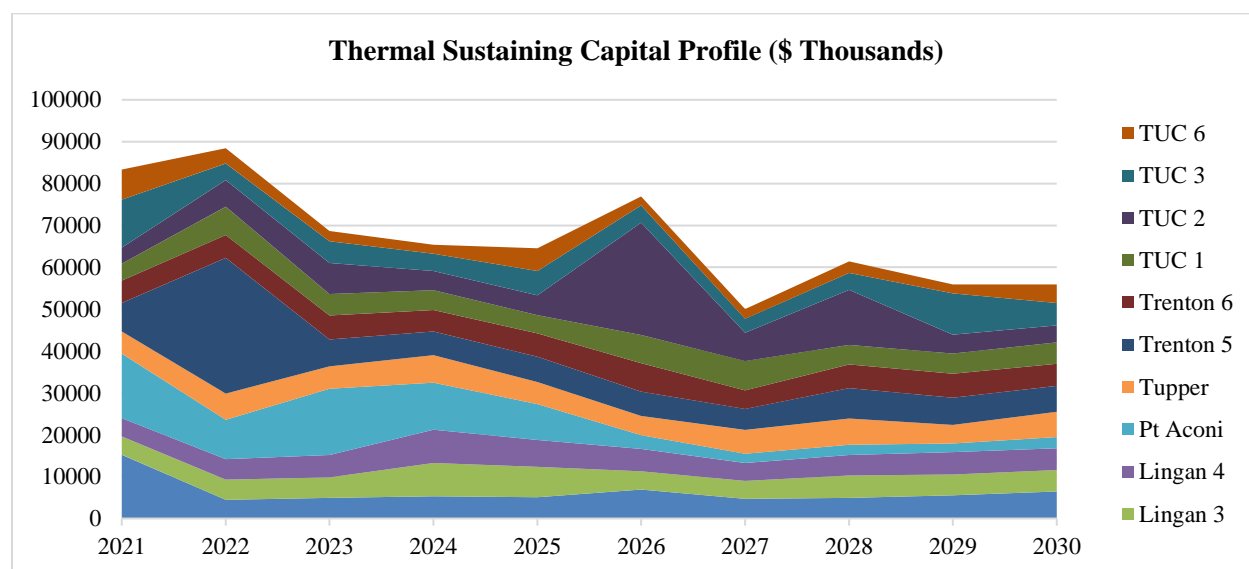


Figure 64: 2020 IRP Sustaining Capital Forecast – 3.1C 2030 Coal / Mid Electrification



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11.1.3 Annual Rating/Prioritization of Capital Projects

Pursuant to 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.
-

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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 ranking 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.

Figure 65 to Figure 69 below identify the projects included in the 2022 ACE Plan, their rating categories and rating values, where applicable.

Figure 65: Hydro – 2022 ACE Plan Capital Item Ratings

CI	Project Title	2022 ACE Budget	Rating Category	Criticality	Condition	Rating
C0036368	HYD - Lower Great Brook Switchgear Replacement	1,126,746	Business Sustainability	3	5	15
C0024484	HYD - Fourth Lake Switchgear Replacement	930,499	Business Sustainability	3	5	15
C0008002	HYD - Nictaux Canal Crest Rebuild	937,259	Business Sustainability	4	4	16
C0038187	HYD - MER Breaker Upgrades Phase 2	574,765	Business Sustainability	3	5	15
C0038629	HYD - Ridge Surge Tank Refurbishment	398,458	Business Sustainability	4	4	16
C0038167	HYD - LEQ Thrust Bearing Redesign	342,521	Business Sustainability	4	4	16
C0038873	HYD - Tractor Acquisitions	309,790	Business Sustainability	3	5	15
C0038827	HYD - GIS HPU Replacement	338,085	Business Sustainability	3	5	15

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Figure 65: Hydro – 2022 ACE Plan Capital Item Ratings

CI	Project Title	2022 ACE Budget	Rating Category	Criticality	Condition	Rating
C0038129	HYD - AVO1 Crane Replacement	292,299	Business Sustainability	4	4	16
C0028444	HYD - SHH Crane Refurbishment	263,411	Business Sustainability	4	4	16
C0040086	HYD - HMS Window Replacement	199,225	Business Sustainability	3	5	15
C0039446	HYD - Hydro Door Replacements	206,918	Business Sustainability	3	5	15
C0042466	HYD - STM Garage Refurbishment	182,702	Business Sustainability	3	5	15
C0039467	HYD - AVO1 Headgate Refurbishment	181,696	Business Sustainability	4	4	16
C0031464	HYD - WRC Garage Auxiliary Storage	168,634	Business Sustainability	3	5	15
C0038346	HYD - PAR Window Replacement	118,776	Business Sustainability	3	5	15
C0039566	HYD - GIS Water Filtration Upgrade	127,333	Business Sustainability	3	5	15
C0019199	HYD - TUS Crane Refurbishment	105,107	Business Sustainability	4	5	20
C0029284	HYD - Fourth Lake Diesel Generator	104,496	Business Sustainability	4	4	16
C0039386	HYD - Bloody Creek Safety Improvements	98,779	Health & Safety	5	3	15
C0029462	HYD - WRC Forklift Purchase	84,020	Business Sustainability	3	5	15
C0038874	HYD - FAR Spillway Culvert Replacement	66,457	Business Sustainability	3	5	15

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Figure 66: Steam – 2022 ACE Plan Capital Item Ratings

CI	Project Title	2022 ACE Budget	Rating Category	Criticality	Condition	Rating
C0038747	LIN1 L-0 Blade Replacement	1,289,669	Business Sustainability	5	4	20
C0041906	PHB – 2022 Turbine Refurbishment	3,276,746	Business Sustainability	5	3	15
C0030529	TUC3 Generator Refurbishment	1,629,446	Business Sustainability	5	4	20
C0041348	TRE6 Bottom Ash Refurbishment	746,689	Business Sustainability	4	4	16
C0041310	TRE Asbestos Abatement (2022)	745,913	Health & Safety	4	4	16
C0019339	TRE6 Main Steam Piping Refurbishment	535,174	Business Sustainability	5	4	20
C0041727	POT - Extraction CEMS Upgrade 2022	730,231	Business Sustainability	5	4	20
C0036068	LIN Mill Refurbishment 2022	695,339	Business Sustainability	4	4	16
C0036286	LIN3 Boiler Refurbishment 2022	690,639	Business Sustainability	5	3	15
C0036346	LIN1 Boiler Refurbishment 2022	622,659	Business Sustainability	5	3	15
C0042031	PHB - Precipitator Refurbishment 2022	615,206	Business Sustainability	4	4	16

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Figure 66: Steam – 2022 ACE Plan Capital Item Ratings

CI	Project Title	2022 ACE Budget	Rating Category	Criticality	Condition	Rating
C0041706	POT - Boiler Refurbishment 2022	597,993	Business Sustainability	5	3	15
C0036287	LIN4 Boiler Refurbishment 2022	596,889	Business Sustainability	5	3	15
C0023682	TRE6 6A Mill Bullgear and Pinion Refurbishment	548,231	Business Sustainability	4	5	20
C0041324	TRE6 6B Mill Bullgear and Pinion Refurbishment	545,453	Business Sustainability	4	5	20
C0040906	LIN3 Turbine Valve Refurbishment 2022	540,106	Business Sustainability	5	3	15
C0042026	PHB - Boiler Refurbishment 2022	534,985	Business Sustainability	5	3	15
C0042028	PHB - Air Heater Refurbishment 2022	519,316	Business Sustainability	3	5	15
C0042127	TRE6 Boiler Upper Waterwall Panel Replacement	507,965	Business Sustainability	5	3	15
C0041369	TRE6 Turbine Reheat Valves	486,071	Business Sustainability	5	3	15
C0030643	LIN4 BFP Refurbishment 2022	483,771	Business Sustainability	5	3	15
C0041746	POT - Coal Mill Refurbishment 2022	480,204	Business Sustainability	5	3	15
C0036866	TRE Surface Water Discharge Pipe Replacement	419,567	Environment	3	5	15
C0037986	TUC3 LP Turbine Refurbishment	434,775	Business Sustainability	5	4	20
C0031222	TRE6 Partition Valve and Waterbox Refurbishment	412,316	Business Sustainability	3	5	15
C0041845	POT - DAS Upgrades 2022	296,784	Business Sustainability	4	4	16
C0028283	TUC2 Vacuum Pump Replacement	383,909	Business Sustainability	3	5	15
C0036006	LIN - CW Screen Refurbishment 2022	373,503	Business Sustainability	4	4	16
C0041816	POT - Bear Head Ash Site 2022	290,641	Environment	5	3	15
C0041661	TUC2 Boiler Refurbishment 2022	359,735	Business Sustainability	5	3	15
C0041659	TUC1 Boiler Refurbishment 2022	358,824	Business Sustainability	5	3	15
C0012138	TRE6 CW Line Refurbishment	81,527	Business Sustainability	4	4	16
C0036349	LIN1 RH Tube Replacement 2022	305,309	Business Sustainability	5	3	15
C0041887	POT - CW Pump Refurbishment 2022	295,939	Business Sustainability	4	4	16
C0042027	PHB - Generator Shaft Seal Refurbishment	284,396	Business Sustainability	5	3	15
C0030531	TUC3 Air Pre-Heaters Refurbishment	283,015	Business Sustainability	3	5	15
C0030782	ICP #1 Belt Take-up Replacement	240,473	Business Sustainability	4	4	16
C0039646	LIN Condenser Valve and Actuator Refurbishment 2022	261,979	Business Sustainability	4	4	16

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Figure 66: Steam – 2022 ACE Plan Capital Item Ratings

CI	Project Title	2022 ACE Budget	Rating Category	Criticality	Condition	Rating
C0021723	TUC Parking Lot Refurbishment	249,262	Business Sustainability	3	5	15
C0036328	LIN3 ID Fan VIV Refurbishment 2022	247,860	Business Sustainability	3	5	15
C0039028	LIN1 Ash Incline Refurbishment 2022	247,363	Business Sustainability	5	3	15
C0030702	LIN4 Bottom Ash Incline Belt Refurbishment	247,344	Business Sustainability	4	4	16
C0041899	POT - Water Pre-Treatment Plant Upgrade	243,412	Business Sustainability	4	4	16
C0039686	LIN WTP Caustic Pump Skid Replacement 2022	240,678	Business Sustainability	3	5	15
C0039106	LIN1 SCC Refurbishment 2022	234,979	Business Sustainability	4	5	20
C0039167	LIN4 SCC Refurbishment 2022	234,979	Business Sustainability	4	4	16
C0031243	PHB - Turbine Block Valve #30	225,001	Business Sustainability	4	4	16
C0021469	TUC Facilities Upgrade Phase 3	220,268	Business Sustainability	3	5	15
C0039066	LIN Ash Conditioner Refurbishment 2022	217,705	Business Sustainability	3	5	15
C0041798	POT - New Washroom 2022	216,952	Business Sustainability	3	5	15
C0029924	LIN4 BFP Check Valve Replacement	214,753	Business Sustainability	4	4	16
C0028643	LIN4 - Boiler Erosion Reduction System Refurbishment	209,276	Business Sustainability	4	4	16
C0035847	LIN Plant Lighting Upgrade 2022	209,075	Business Sustainability	3	5	15
C0041664	TUC2 CW Pump Building Replacement	208,568	Business Sustainability	3	5	15
C0044150	PTMT - Cathodic Protection 2022	207,132	Business Sustainability	3	5	15
C0028806	LIN4 RH Tube Replacement 2022	205,816	Business Sustainability	5	3	15
C0036306	LIN Coal Crusher Refurbishment 2022	204,492	Business Sustainability	4	4	16
C0036288	LIN Facilities Upgrades 2022	199,740	Business Sustainability	3	5	15
C0036391	LIN Coal Stacker Refurbishment 2022	198,983	Business Sustainability	3	5	15
C0036406	LIN Precipitator Refurbishment 2022	197,671	Business Sustainability	4	4	16
C0036067	LIN Siding Refurbishment 2022	194,631	Business Sustainability	4	4	16
C0039166	LIN CW Valve Refurbishment 2022	193,600	Business Sustainability	4	4	16
C0039527	TUC Platform and Ladder Upgrades	191,570	Business Sustainability	5	3	15
C0036146	LIN3 Misc. Valve Refurbishment 2022	190,065	Business Sustainability	3	5	15
C0036329	LIN1 Misc. Valve Refurbishment 2022	190,007	Business Sustainability	3	5	15

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Figure 66: Steam – 2022 ACE Plan Capital Item Ratings

CI	Project Title	2022 ACE Budget	Rating Category	Criticality	Condition	Rating
C0036128	LIN4 Misc. Valve Refurbishment 2022	189,767	Business Sustainability	3	5	15
C0042933	TRE6 Stack Refurbishment	151,517	Business Sustainability	4	4	16
C0041726	POT - Asbestos Abatement 2022	188,825	Health & Safety	5	3	15
C0042726	TRE6 ID Fan Expansion Joint Structural Refurbishment	179,114	Business Sustainability	3	5	15
C0041650	TUC Handrail Program 2022	173,384	Business Sustainability	5	3	15
C0041993	TUC2 CW Inlet Concrete Refurbishment	173,119	Business Sustainability	3	5	15
C0030524	TUC2 Turbine Controls PLC Upgrade	170,531	Business Sustainability	5	4	20
C0036929	LIN D2 Conveyor Belt Replacement 2022	169,637	Business Sustainability	4	4	16
C0041228	TRE Ash Site Management 2022	167,838	Environment	5	3	15
C0030522	TUC2 TWIP PLC Upgrade	158,843	Business Sustainability	4	4	16
C0010331	TRE6 Precipitator Controls Upgrade	165,881	Business Sustainability	3	5	15
C0042030	PHB -Trancel Screw Refurbishment 2022	160,109	Business Sustainability	4	4	16
C0041657	TUC Rotating Equipment Shaft Guards Upgrade	160,039	Business Sustainability	5	3	15
C0030905	POT - GSCW Pump & Motor Replacement	159,385	Business Sustainability	4	4	16
C0041653	TUC Lighting Program 2022	157,356	Business Sustainability	4	4	16
C0036407	LIN HFO/LFO Line Refurbishment 2022	152,950	Business Sustainability	5	3	15
C0041051	LIN Roof Hatch Redesign 2022	151,267	Business Sustainability	5	3	15
C0041690	POT - 2022 Miscellaneous Valve/Component Replacement	150,919	Business Sustainability	3	5	15
C0036007	LIN Grating Refurbishment 2022	150,582	Business Sustainability	5	3	15
C0041207	LIN WTP PLC/Controls Upgrade 2022	150,477	Business Sustainability	3	5	15
C0041312	TRE LED Lighting 2022	150,170	Business Sustainability	3	5	15
C0030527	TUC2 Air Pre-Heater Refurbishment	148,595	Business Sustainability	3	5	15
C0041323	TRE6 Valve Refurbishment 2022	147,843	Business Sustainability	3	5	15
C0030062	LIN3 HIP Insulation Replacement	146,253	Business Sustainability	4	4	16
C0042029	PHB - Conveyors & Handling Systems 2022	144,458	Business Sustainability	4	4	16
C0041648	TUC Electric Valve Actuator Replacements	143,036	Business Sustainability	4	4	16
C0030487	TUC3 Lube Oil Replacement	142,272	Business Sustainability	4	4	16

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Figure 66: Steam – 2022 ACE Plan Capital Item Ratings

CI	Project Title	2022 ACE Budget	Rating Category	Criticality	Condition	Rating
C0041647	TUC Dehumidifier Access Improvements	141,864	Business Sustainability	3	5	15
C0010944	AMO LIN4 Enhanced Monitoring	137,196	Business Sustainability	4	4	16
C0020310	TRE Roofing Anchor Points	136,204	Business Sustainability	4	4	16
C0030526	TUC2 Demineralized Water Cooler Refurbishment	135,537	Business Sustainability	3	5	15
C0021402	TUC Oil Tanks Levels and Pump House Controls Upgrade	132,487	Business Sustainability	3	5	15
C0021764	TRE5 CW Intake Canal Refurbishment	119,515	Business Sustainability	4	4	16
C0036390	LIN Ash Site Winter Cover 2022	127,884	Business Sustainability	5	3	15
C0036348	LIN4 Steam Drum Level Controls Upgrade	121,412	Business Sustainability	4	4	16
C0042712	POT - Stack Refurbishment Phase 1	119,079	Business Sustainability	4	4	16
C0020305	TRE Common Water Replacement	114,105	Business Sustainability	3	5	15
C0036266	LIN Coal Plant Structural Refurbishment 2022	113,665	Business Sustainability	4	4	16
C0030483	TUC2 Online Generator Monitoring	113,548	Business Sustainability	5	4	20
C0041053	LIN Ladder Swing Gates 2022	113,341	Business Sustainability	5	3	15
C0041314	TRE Fish Barrier Screen Replacement	112,820	Environment	5	3	15
C0041308	TRE 4160 and 600V Breaker Refurbishment 2022	112,815	Business Sustainability	5	3	15
C0020664	TUC3 Online Generator Monitoring	112,622	Business Sustainability	4	4	16
49659	TUC PLC Replacement	107,386	Business Sustainability	4	4	16
C0041668	TUC3 4160 and 600V Breaker Refurbishment 2022	111,707	Business Sustainability	5	3	15
C0041663	TUC2 Condenser Inlet CW Expansion Joints Replacement	111,475	Business Sustainability	4	4	16
C0041787	POT 4160 and 600V Breaker Refurbishment 2022	111,392	Business Sustainability	5	3	15
C0041665	TUC2 DCS HMI Upgrade Phase 2	108,232	Business Sustainability	5	4	20
C0041799	TUC Plant Security Upgrades 2022	107,056	Business Sustainability	4	4	16
C0042106	PTMT - MCC Siding & Roof Replacement	106,520	Business Sustainability	3	5	15
C0041662	TUC2 4160 and 600V Breaker Refurbishment 2022	103,610	Business Sustainability	5	3	15
C0039526	TUC Sensors and Alarms Refurbishment	69,340	Business Sustainability	4	4	16
C0036347	LIN Fan Positioner Upgrade 2022	102,906	Business Sustainability	3	5	15

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Figure 66: Steam – 2022 ACE Plan Capital Item Ratings

CI	Project Title	2022 ACE Budget	Rating Category	Criticality	Condition	Rating
C0041311	TRE HVAC Upgrades 2022	101,028	Business Sustainability	4	4	16
C0041786	POT - LFO & HFO System Upgrades 2022	100,816	Business Sustainability	5	4	20
C0021522	TUC1 4160 and 600V Breaker Replacement 2022	100,433	Business Sustainability	5	3	15
C0041349	TRE6 Burner Impeller Replacement	99,340	Business Sustainability	4	4	16
C0041366	TRE6 Conveyors Refurbishment 2022	98,880	Business Sustainability	5	3	15
C0039147	LIN Coal Feeder Drive Replacement 2022	98,854	Business Sustainability	4	4	16
C0041707	POT - Ladder Swing Gates & Guarding 2022	98,641	Business Sustainability	5	3	15
C0036148	LIN 4160 and 600V Breaker Refurbishment 2022	98,621	Business Sustainability	4	4	16
C0021502	TUC1 FD Fan VIV Actuator Replacement	98,253	Business Sustainability	4	4	16
C0020602	ICP Silo Liner Replacement	97,540	Business Sustainability	3	5	15
C0039068	LIN Guarding and Railing Upgrade 2022	97,337	Business Sustainability	5	3	15
C0036388	LIN3 Auxiliary Air Upgrades 2022	95,955	Business Sustainability	3	5	15
C0042706	TUC2 Obsolete Valve Replacements	94,795	Business Sustainability	4	4	16
C0041674	TUC3 Obsolete Valve Replacements	94,565	Business Sustainability	4	4	16
C0030943	ICP Pumphouse Refurbishment	89,955	Business Sustainability	3	5	15
C0041672	TUC3 FD Fan Ducting Expansion Joints Refurbishments	89,933	Business Sustainability	4	5	20
C0039667	LIN WTP Resin Replacement 2022	89,278	Business Sustainability	3	5	15
C0041370	TRE6 Replace Vacuum Pump Coolers	88,884	Business Sustainability	3	5	15
C0021463	TUC Turbine Bay Louvers Refurbishment	88,351	Business Sustainability	3	5	15
C0041666	TUC2 Generator Synchronizer Replacement	87,814	Business Sustainability	5	5	25
C0041655	TUC Steam Drum Level Detection Upgrades	86,103	Business Sustainability	4	4	16
C0041990	TUC3 East Condensate Extraction Pump Refurbishment	85,412	Business Sustainability	3	5	15
C0041658	TUC Water Treatment Plant #3 Refurbishment	83,998	Business Sustainability	4	4	16
C0036387	LIN GSCW Small Bore Piping Refurbishment 2022	83,103	Business Sustainability	3	5	15
C0041728	POT - Facility Upgrades 2022	82,343	Business Sustainability	3	5	15

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Figure 66: Steam – 2022 ACE Plan Capital Item Ratings

CI	Project Title	2022 ACE Budget	Rating Category	Criticality	Condition	Rating
C0041986	TUC6 HRSG Refurbishments	81,541	Business Sustainability	4	4	16
47605	TRE Carbon Analyzer Replacement	80,433	Business Sustainability	3	5	15
C0041368	TRE6 Sootblowers 2022	80,140	Business Sustainability	3	5	15
C0041691	POT - Lighting Upgrades 2022	79,943	Business Sustainability	3	5	15
C0021466	TUC Underground Water Lines Replacement	78,879	Business Sustainability	4	4	16
C0041649	TUC Fire Protection and Cable Wraps	78,790	Health & Safety	4	4	16
C0021462	TUC Plant Siding Refurbishment	77,195	Business Sustainability	5	3	15
C0041687	LIN34 CW MCC Decommissioning 2022	75,788	Business Sustainability	3	5	15
C0042034	PHB - Battery Bank Replacement	74,386	Business Sustainability	4	4	16
C0041656	TUC Portable Furnace Viewing Camera	74,320	Business Sustainability	3	5	15
C0041652	TUC Lagoon Pump System Upgrade	72,558	Business Sustainability	3	5	15
C0020603	ICP Locomotive Traction Motor Refurbishment	70,621	Business Sustainability	4	4	16
C0041897	POT - Coal System Structural Refurbishment	70,375	Business Sustainability	4	4	16
C0020570	ICP Conveyor Hydraulics Refurbishment	34,681	Business Sustainability	4	4	16
C0041313	TRE Demineralization Plant Upgrades	69,668	Business Sustainability	3	5	15
C0041676	TUC6 Battery Bank U6B Replacement	69,296	Business Sustainability	4	4	16
C0041675	TUC3 Natural Gas Valves Refurbishment 2022	68,410	Business Sustainability	4	4	16
C0041891	POT - Ash Site Collection Stair Structure	64,440	Business Sustainability	3	5	15
C0041889	POT - Induced Draft Fan Upgrades	64,277	Business Sustainability	4	4	16
C0042710	POT - Battery Bank Refurbishment 2022	63,886	Business Sustainability	4	4	16
C0041846	POT - Waste Water Treatment Plant Upgrades 2022	61,832	Business Sustainability	3	5	15
C0041316	TRE Floor Plates and Grating 2022	58,787	Business Sustainability	5	3	15
C0041677	TUC6 Breaker Refurbishments 2022	57,148	Business Sustainability	4	4	16
C0042708	POT - Waste Water Transfer Pump Replacement 2022	53,654	Business Sustainability	3	5	15
C0041654	TUC Electrical Panel Replacements	53,356	Business Sustainability	3	5	15
C0042707	TUC1 Hydrogen Panel Refurbishments	50,202	Business Sustainability	4	4	16
C0042033	PHB - Silo Screw Refurbishment 2022	49,276	Business Sustainability	4	4	16

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Figure 66: Steam – 2022 ACE Plan Capital Item Ratings

CI	Project Title	2022 ACE Budget	Rating Category	Criticality	Condition	Rating
C0041319	TRE PAC System Upgrades 2022	49,212	Business Sustainability	4	4	16
C0041188	LIN Coating Feeder Floor and Walls 2022	48,014	Business Sustainability	3	5	15
C0021470	TUC1 Natural Gas Valves Refurbishment	45,744	Business Sustainability	4	4	16
C0041988	TUC1 Condenser Sump Structural Steel Refurbishment	45,895	Business Sustainability	3	5	15
C0041667	TUC2 Natural Gas Valves Refurbishment 2022	44,780	Business Sustainability	4	4	16
C0042088	PTMT - E-Crane Travel Pump Replacement	44,659	Business Sustainability	5	3	15
C0030493	TUC3 Lube Oil Coolers Refurbishment	41,956	Business Sustainability	4	4	16
C0042711	POT - Swing Gates 2022	37,879	Business Sustainability	5	3	15
C0031086	TRE TAMS Toe Buttress Habitat Restoration	35,203	Business Sustainability	5	3	15
C0042086	PTMT - MCC Computer Upgrades	34,750	Business Sustainability	4	4	16
C0041307	TRE Ladder Swing Gates and Guarding	30,667	Health & Safety	5	3	15
C0042046	PTMT - Roadway Refurbishment 2022	28,057	Business Sustainability	3	5	15
C0041894	POT - Boiler Phosphate Meter	26,991	Business Sustainability	4	4	16
C0041206	LIN JD Gator Replacement 2022	26,270	Business Sustainability	3	5	15

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Figure 67: Combustion Turbine – 2022 ACE Plan Capital Item Ratings

CI	Project Title	2022 ACE Budget	Rating Category	Criticality	Condition	Rating
C0029693	CT - VJ1 Generator Replacement	5,532,037	Business Sustainability	5	3	15
C0029691	CT - VJ1 Control System Upgrade	751,417	Business Sustainability	5	3	15
C0030550	CT - VJ1 Gen Control and Protect	302,657	Business Sustainability	5	3	15
C0041525	CT VJ1 MCC Upgrades	330,532	Business Sustainability	5	3	15
C0041512	CT TUS1 Air Compressor & Dryer Replacement	288,894	Business Sustainability	4	4	16
C0041537	CT BGT Package Coating	174,663	Business Sustainability	3	5	15
C0041509	TUS 1 Fuel System Upgrade	156,464	Business Sustainability	4	5	20
C0041514	CT BGT Fuel Piping/Cable Bridges	145,589	Business Sustainability	4	4	16
C0041513	CT BGT Bleed Valve Upgrade	107,376	Business Sustainability	4	4	16
C0041522	CT - Harden Control System Grounding	86,801	Business Sustainability	4	4	16

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Figure 67: Combustion Turbine – 2022 ACE Plan Capital Item Ratings

CI	Project Title	2022 ACE Budget	Rating Category	Criticality	Condition	Rating
C0041519	TUS1 Station Services Battery Bank Replacement	50,005	Business Sustainability	4	4	16
C0041515	CT VJ1 Air Hood Upgrades	48,312	Business Sustainability	4	4	16
C0041534	CT - VJ2 VLRA Battery Bank Replacement	47,823	Business Sustainability	5	4	20
C0041533	CT VJ1 VLRA Battery Bank Replacement	47,637	Business Sustainability	5	4	20
C0043552	CT - Camera Replacement	47,604	Health & Safety	3	5	15
C0041516	CT TUC 4 Replace Package Hoses	45,044	Business Sustainability	4	4	16
C0041529	CT TUC4 Add SOV in Demineralized Water Return	44,941	Business Sustainability	3	5	15
C0041531	CT TUC5 Add SOV in Demineralized Water Return	44,941	Business Sustainability	3	5	15
C0041517	CT TUC 5 Replace Package Hoses	44,409	Business Sustainability	4	4	16
C0041526	CT VJ1 Battery Charger Replacement	38,339	Business Sustainability	3	5	15
C0041510	CT VJ2 AC/DC Fuel Pump Replacement	32,856	Business Sustainability	4	5	20
C0029684	TUS - Fuel Piping Coating Refurbishment	30,203	Business Sustainability	4	4	16
C0041518	CT BGT2 Air System Replacement	26,052	Business Sustainability	4	4	16
C0041532	TUS1 Generator Enclosure Oil Containment Seal Refurbishment	23,602	Business Sustainability	3	5	15
C0041521	CT BGT1 Inverter Replacement	22,997	Business Sustainability	4	4	16
C0041523	CT TUS1 Fuel Flow Meter Replacement	17,658	Business Sustainability	4	4	16
C0041528	CT TUC4/5 Confined Space Attachment Points	17,500	Business Sustainability	5	3	15
C0041520	CT BGT Spare Inverter	16,298	Business Sustainability	4	4	16

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Transmission & Distribution

Figure 68: Transmission and Distribution – 2022 ACE Plan Capital Item Ratings

CI	Project Title	2022 ACE Budget	Rating Category	Criticality	Condition	Rating
Transmission Capital Items Included in 2022 ACE Plan						
C0041893	2022/2023 Transmission Right-of-Way Widening 69kV	2,536,790	Business Sustainability	3	5	15
C0041837	2022/2023 Substation Polychlorinated Biphenyl (PCB) Equipment Removal	2,299,568	Environment	5	5	25
C0041793	L7002 Replacements and Upgrades Phase 2	564,090	Business Sustainability	5	4	20

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Transmission & Distribution

Figure 68: Transmission and Distribution – 2022 ACE Plan Capital Item Ratings

CI	Project Title	2022 ACE Budget	Rating Category	Criticality	Condition	Rating
C0041805	L7005 Replacements and Upgrades Phase 2	1,399,971	Business Sustainability	5	3	15
C0041989	2022/2023 Sacrificial Anode Installation Program	646,705	Business Sustainability	5	3	15
C0041794	L5031 Replacements and Upgrades Phase 2	644,038	Business Sustainability	4	5	20
C0041789	L5550 Replacements and Upgrades Phase 2	702,915	Business Sustainability	5	5	25
C0041796	L6020 Replacements and Upgrades Phase 2	1,225,755	Business Sustainability	4	4	16
C0041810	L5022 Replacements and Upgrades	920,607	Business Sustainability	3	5	15
C0041791	L6551 Replacements and Upgrades	765,590	Business Sustainability	4	5	20
C0043571	2022/2023 Transmission Switch & Breaker Replacement	511,414	Business Sustainability	4	5	20
C0041790	L8001 Replacements and Upgrades Phase 2	696,045	Business Sustainability	5	4	20
C0043010	2022/2023 Wood Pole Retreatment Program	525,751	Business Sustainability	3	5	15
C0041800	L5537 Replacements and Upgrades	563,202	Business Sustainability	3	5	15
C0041804	2022 Line Retirement Program	454,663	Business Sustainability	5	3	15
C0041830	Spare Power Production Unit Transformer	883,700	Business Sustainability	5	3	15
C0041833	2022/2023 Bulk Oil Breaker Replacement Program	383,882	Business Sustainability	4	5	20
C0021132	24C-T54G Grounding Bank Replacement	723,299	Business Sustainability	3	5	15
C0041812	L6040 Replacements and Upgrades	336,712	Business Sustainability	4	4	16
C0041822	Wreck Cove Cable Storage System	357,100	Business Sustainability	5	5	25
C0031051	Pennsylvania Breaker Replacements	211,510	Business Sustainability	3	5	15
C0037907	5V-501 Switch and Structure Replacement	403,856	Business Sustainability	3	5	15
C0031267	2022 Oil Containment Program	400,965	Environment	5	3	15
C0031047	85S Generator Breaker Replacements	153,831	Business Sustainability	4	4	16
C0044431	2022/2023 Capacitor Bank Breaker Replacements	136,367	Business Sustainability	4	4	16
C0011117	17V-T1 Power Transformer Replacement	75,704	Business Sustainability	3	5	15
C0031044	67N-713 230 kV Breaker Replacement	272,277	Business Sustainability	5	4	20
C0041840	Legacy Oil Containment Refurbishments	169,887	Environment	5	3	15

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Transmission & Distribution

Figure 68: Transmission and Distribution – 2022 ACE Plan Capital Item Ratings

CI	Project Title	2022 ACE Budget	Rating Category	Criticality	Condition	Rating
C0041844	Upgrade Mobile Protection Relays	126,782	Business Sustainability	4	4	16
C0041838	Animal Deterrents/Pest Mitigation for Cable Trenches	101,426	Business Sustainability	4	4	16
C0031043	10W Radiator Replacements	179,690	Business Sustainability	3	5	15
C0041841	Onslow Spares Yard Grade/Storage Pads	152,138	Business Sustainability	3	5	15
C0041831	Lingan Spare Potential Transformers	138,805	Business Sustainability	5	5	25
C0041828	Auto-Regenerating Breather Retrofit Program	123,029	Business Sustainability	3	5	15
C0041842	Bird Deterrents for 2S and 50N	101,426	Business Sustainability	4	4	16
C0041835	50W Radiator Replacements	81,141	Business Sustainability	3	5	15
C0041836	Oil Treatment Equipment	76,070	Environment	4	4	16
C0031294	16V Low Side Switch Addition	47,878	Business Sustainability	4	4	16
Distribution Capital Items Included in 2022 ACE Plan						
C0041892	New Distribution Rights-of-Way Phase 7	2,940,175	Business Sustainability	3	5	15
C0043130	2022 Padmount Replacement Program	1,386,611	Business Sustainability	5	4	20
C0031117	2H-411-Prospect Rd Phase Extension	681,277	Business Sustainability	4	5	20
C0031121	104S-313 - Re-Conductor Big Hill	51,733	Business Sustainability	4	5	20
C0042687	15N-202 Arthur St Conversion	669,772	Business Sustainability	4	4	16
C0031304	37N-413G-South Athol Rebuild	68,421	Business Sustainability	5	3	15
C0043490	2022 Downline Asset PCB Replacements	633,031	Environment	5	4	20
C0042586	59C-402 St. Peters Rebuild	281,087	Business Sustainability	5	4	20
C0043930	1H-419 Targeted Underground Device Replacements	584,333	Business Sustainability	5	4	20
C0043230	65V-301 Nictaux West Reconductor	502,569	Business Sustainability	5	4	20
C0031402	559W-331-Molega Lake Rd Rebuild	190,573	Business Sustainability	4	4	16
C0042426	11S-411 Coxheath Rebuild Phase 2	506,916	Business Sustainability	4	4	16
C0004138	50W-412GA Port Medway Line Extension	266,001	Business Sustainability	4	5	20
C0042186	100C-421 - Harvre Boucher Rebuild	449,187	Business Sustainability	4	5	20
C0042969	59C-401 - Greenville Street Rebuild	248,969	Business Sustainability	4	4	16
C0043330	88W-314-Vancouver St Rebuild	103,881	Business Sustainability	5	4	20
C0031296	67C-411GBA Little Mabou Rebuild	224,403	Business Sustainability	4	5	20
C0041955	2022 Hydraulic Recloser Replacements	356,662	Business Sustainability	4	5	20

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Transmission & Distribution

Figure 68: Transmission and Distribution – 2022 ACE Plan Capital Item Ratings

CI	Project Title	2022 ACE Budget	Rating Category	Criticality	Condition	Rating
C0031403	101W Port Mersey Feeder Exits	364,636	Business Sustainability	4	5	20
C0033429	1H-403 Targeted Underground Replacements	106,167	Business Sustainability	5	4	20
C0044090	2022 Vault Replacement	341,602	Business Sustainability	5	4	20
C0043110	11S-305 - Kenwood Drive Roundabout	290,582	Business Sustainability	5	5	25
C0031107	55V-314G-Aylesford East Reconductor	189,899	Business Sustainability	4	5	20
C0042847	61N-204 High Street Conversion	168,309	Business Sustainability	4	5	20
C0041948	87W-312 Targeted Device Replacements	291,289	Business Sustainability	4	4	16
C0042846	15C-211 - Deepdale Conversion	120,240	Business Sustainability	4	5	20
C0033507	Underground Switch Replacements	234,975	Business Sustainability	5	4	20
C0043950	509V-301 Freeport Rebuild	308,136	Business Sustainability	4	5	20
C0042608	2C-402 - Troy BTR	170,101	Business Sustainability	4	4	16
C0043651	4C-441G - Rear Monastery Road Reconductor	260,793	Business Sustainability	3	5	15
C0043510	2C-402 - Little Judique Reinsulate	276,979	Business Sustainability	4	5	20
C0039986	2022 113H Feeder Exit Cable Replacements	206,282	Business Sustainability	5	4	20
C0041957	2022 Substation Animal Guards	227,930	Business Sustainability	5	3	15
C0042606	67C-411GBA West Mabou Harbour Rebuild	111,996	Business Sustainability	5	4	20
C0041947	2022 Cutout Replacements	201,706	Business Sustainability	5	4	20
C0041946	2022 Automatic Sleeve Replacements	200,751	Business Sustainability	5	5	25
C0041950	67C-411 Targeted Device Replacements	205,861	Business Sustainability	4	5	20
C0041951	92H-331 and 332 Targeted Device Replacements	184,735	Business Sustainability	4	4	16
C0041949	59C-402 Targeted Device Replacements	184,735	Business Sustainability	4	4	16
C0042910	101H-413 Aspen Ct Rebuild	83,740	Business Sustainability	5	4	20
C0041953	2022 Recloser Remote Connectivity	153,616	Business Sustainability	5	3	15
C0042326	101H-413 Balsam Circle Rebuild	148,327	Business Sustainability	5	4	20
C0041954	2022 New Branchline Reclosers	143,935	Business Sustainability	5	4	20
C0043390	664N-211 - Claremont Avenue Conversion	139,168	Business Sustainability	4	4	16
C0033445	Targeted Pin Insulator Replacements	93,577	Business Sustainability	4	4	16
C0042946	113H-441G Ashgrove Ave Rebuild	111,357	Business Sustainability	4	5	20

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Transmission & Distribution

Figure 68: Transmission and Distribution – 2022 ACE Plan Capital Item Ratings

CI	Project Title	2022 ACE Budget	Rating Category	Criticality	Condition	Rating
C0041952	48H-302 Targeted Device Replacements	127,071	Business Sustainability	4	4	16
C0033426	Underground Manhole Water Pumps	3,191	Business Sustainability	5	4	20
C0042287	82V-403 Elmsdale River Crossing Rebuild	115,837	Business Sustainability	4	4	16
C0042927	103C-314 – Grand Etang Water Crossing	12,456	Business Sustainability	4	4	16
C0043650	57C-426 - Eight Island Lake Rebuild	77,066	Business Sustainability	3	5	15

1

Information Technology

Figure 69: IT - 2022 ACE Plan Capital Item Ratings

CI	Project Title	2022 ACE Budget	Rating Category	Criticality	Condition	Ranking
C0031022	IT - Identity & Access Management	739,385	Business Sustainability	5	4	20
C0030984	IT - Cisco UCS Lifecycle	891,243	Business Sustainability	5	5	25
C0031002	IT - Customer Billing & Payment Solution	286,083	Business Sustainability	4	4	16
C0043550	IT - Itron Collection Manager	671,162	Business Sustainability	5	5	25
C0031027	IT - Multi-Factor Authentication	514,820	Business Sustainability	5	4	20
C0031028	IT - Network Access Control	337,998	Business Sustainability	3	5	15
C0021849	IT - WI-FI Refresh	194,023	Business Sustainability	3	5	15
C0021834	IT - CIS - OS Upgrade	212,915	Business Sustainability	5	5	25
C0011159	IT - PI System Upgrade	353,996	Business Sustainability	4	5	20
C0031169	IT - GIS Upgrade 2022	351,814	Business Sustainability	5	4	20
C0030983	IT - User File Services Upgrade	346,858	Business Sustainability	4	5	20
51963	IT - Adept Upgrade	291,870	Business Sustainability	4	5	20
C0042168	IT - Web Application Firewall Uplift	304,484	Business Sustainability	3	5	15
C0042151	IT - Expand Network Core	246,815	Business Sustainability	5	5	25
C0042686	IT - ADMS Maintenance Release 2022	234,039	Business Sustainability	5	3	15
C0021833	IT - CIS - Data Archive	200,263	Business Sustainability	5	5	25
C0021843	IT - Upgrade Oracle OBIA	166,006	Business Sustainability	3	5	15
C0043551	IT - Oracle MDMS Maintenance Release	103,590	Business Sustainability	5	4	20
C0030989	IT - Server Configuration Management	77,427	Business Sustainability	4	5	20
C0042162	IT - Oracle Linux 6	100,921	Business Sustainability	5	4	20
C0011170	IT - JSCAPE MFT Upgrade	100,814	Business Sustainability	3	5	15

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Information Technology

Figure 69: IT - 2022 ACE Plan Capital Item Ratings

CI	Project Title	2022 ACE Budget	Rating Category	Criticality	Condition	Ranking
C0043911	IT - Courtesy Callback/Virtual Hold	77,663	Business Sustainability	4	4	16

11.1.4 2022 to 2026 Forecast ACE Plan Expenditures by Functional Class and Spending Program

Pursuant to 2011 ACE Plan Directive 12, NS Power provides its forecast investments by functional class and spending program. Justifications for projects determined as capital investments are scoped on an annual basis. Capital investment on the basis of health and safety, environmental compliance and requirement to serve remains non-discretionary. **Figure 70** below identifies anticipated sustaining capital by function and specific notable investments included in this ACE Plan. Investment levels from 2022 to 2026 are subject to change based on operating conditions, updated asset assessments, regulatory directives, or legislation/regulations.

Sustaining capital funding levels represent typical annual investment by function in a given year to sustain the integrity of existing assets. Notable capital projections reflect specific projects. Included in these specific projects are transformative multi-year program investments and asset growth.

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Figure 70: Forecast ACE Plan Expenditures by Functional Class and Spending Program
(Millions of dollars)

	2022 ACE	2023	2024	2025	2026
Base Capital Investment					
Thermal Generation	56.7	65.7	63.0	69.0	89.0
Combustion Turbines	11.4	7.0	4.0	0.7	12.9
Hydro Generation	52.4	20.2	18.9	13.9	10.0
Wind Generation	1.5	3.7	3.8	3.9	3.9
Transmission	63.8	54.7	61.7	56.4	57.5
Distribution	96.0	81.4	81.8	83.0	84.3
General Plant	51.7	45.0	38.4	44.5	45.3
Total Base Capital Expenditure	333.4	277.8	271.6	271.3	302.9
General Plant:					
IT - CIS Replacement	0.0	3.0	20.0	25.0	0.0
IT - T&D Work and Asset Management	20.2	22.0	0.0	0.0	0.0
Distribution:					
Advanced Metering Infrastructure	3.1	0.0	0.0	0.0	0.0
Distribution R.O.W Widening	8.6	9.2	9.3	9.5	9.7
Transmission:					
Transmission R.O.W Widening	5.3	6.2	6.4	6.5	6.6
ECEI - Intertie	20.4	22.1	21.0	157.5	131.0
ECEI - Grid Scale Battery	60.4	85.6	25.2	0.0	0.0
Generation:					
ECEI - Thermal	9.4	23.0	0.0	0.0	0.0
ECEI - Wind	29.6	52.7	1.0	0.0	0.0
Hydro Infrastructure Renewal					
Wreck Cove LEM	35.0	36.2	26.2	4.2	0.0
Mersey Re-Development	6.3	33.8	36.3	35.9	29.4
Total Notable Capital	198.2	293.9	145.5	238.7	176.7
Total Annual Capital Investment	531.6	571.6	417.1	510.0	479.6

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1 **11.1.5 Cost Minimization**

2
3 The NSUARB's 2019 ACE Plan Order Directive 5 provided as follows:

4
5 NS Power is directed, in subsequent ACE Plan applications, to provide specific
6 examples of project execution cost minimization efforts for the prior year, complete
7 with a description of the cost savings accrued by these efforts.
8

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

10
11 NS Power is directed in subsequent ACE Plan applications, to provide examples of
12 cost minimization efforts during execution and construction from the prior year's
13 projects, with project specific cost minimization examples being fully described.
14

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

16
17 In subsequent ACE Plan applications, NS Power is to continue to provide specific
18 examples of cost minimization practices used during execution and construction of
19 the prior year's projects, with specific cost minimization efforts being fully
20 described. In particular, the Board directs that this information continues to be
21 presented in the format used in Section 11.1.5 of the 2021 ACE Plan application.
22 This material is to be supplemented with additional specific project details in the
23 format used in Attachment 1 of NS Power's response to the CA's IR-1 in the 2021
24 ACE Plan proceeding.
25

26 Cost minimization is at the forefront of all stages of capital project development and execution.

27 The following are examples of processes that NS Power follows in order to obtain best value for
28 customers at the lowest cost:

- 29
- 30 • Preliminary engineering efforts examine technically feasible options for a capital project.
31 Generally, the alternative with the least cost is chosen. However, there are infrequent
32 occasions where more costly options provide greater value for customers. The options
33 examined and their relative costs are noted under "Why do this project this way?" in each
34 capital work order, where applicable.
-

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- 1 • The most cost effective option is generally determined in early project development;
2 however, NS Power continues to evaluate each project throughout the course of its
3 development, to confirm that the chosen alternative remains the most cost effective and
4 feasible option.
5
 - 6 • As projects are being executed, project managers track actual costs compared to approved
7 budgets. In this way project teams are kept apprised of spending trends in real-time in
8 order to mitigate potential cost overruns.
9
 - 10 • Material and contract costs are subject to competitive bidding processes where applicable.
11 Competitive bidding processes are designed to encourage cost competitiveness among
12 multiple vendors thereby aiding in the procurement of low cost materials and services.
13
 - 14 • For larger scale capital projects, NS Power looks for opportunities to participate in
15 procurement consortiums with other utilities to leverage the negotiating strength of a larger
16 collective of organizations.
17
 - 18 • After vendor selection, NS Power continues to negotiate best value and lowest cost and
19 establishes contractual assurances and protections. In extenuating circumstances, the
20 Company has also negotiated services and materials at discount or no cost from its vendors
21 and applies those savings directly to capital projects.
22
 - 23 • Where possible, NS Power enters into multi-year contracts or master service agreements
24 with vendors for services and materials. Multi-year contracts and master service
25 agreements allow NS Power to secure costs and rates that would otherwise be higher if
26 they were procured on a shorter term basis.
27
 - 28 • Projects are scheduled during planned outages where possible. Conducting as much capital
29 work during planned outages allows for the continued economic dispatch of NS Power's
-

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generation fleet and results in deployment of labour resources at one time thereby avoiding possible multiple deployments which can lead to increased costs.

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 71** below:

Figure 71: Cost Minimization Savings²⁵

Savings Category	Savings (\$M)
Design & Detailed Engineering	0.7
Project Execution Efficiencies	3.2
Procurement Process/Negotiated Savings	9.5
Total	13.4

In accordance with the Board's direction in the 2021 ACE Plan Order, please refer to **Appendix F** for specific examples of cost minimization efforts with savings categories identified as summarized in **Figure 71**.

²⁵ In addition to the savings summarized in **Figure 71**, NS Power's cost minimization efforts related to the Wreck Cove Life Extension Modernization (LEM) project resulted in substantive savings for customers as provided in NS Power's Contingency and Cost Minimization Report dated March 31, 2021 (M009596).

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1 **11.1.6 Impact of Reliability Projects**

2
3 The NSUARB's 2013 ACE Plan Decision provided the following directive:

4
5 ...the Board expects NSPI to monitor the impact of the deferral of reliability
6 projects in the original 2013 ACE Plan closely and to provide a report on the results
7 in the next ACE Plan.²⁶
8

9 Pursuant to NS Power's commitment noted in the 2015 ACE Plan Terms of Consensus, this
10 directive is expanded to include additional information regarding continued sustaining capital
11 investments and maintaining reliability performance.
12

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

14
15 The Board directs NSPI to identify and list any proposed capital investments related
16 to performance standards established by the Board in future ACE Plan
17 applications.²⁷
18

19 T&D projects in the 2022 ACE Plan will contribute to having a net positive impact on the metrics
20 tracked under performance standards. They are selected based on the asset management
21 methodology pursuant to section 6.2 of the CEJC, guiding investments to where they are needed
22 most.
23

24 The NSUARB directed NS Power to continue providing the same information with respect to
25 reliability and severe weather events notwithstanding the NSUARB's approval of the performance
26 standards in 2017 and the Company's obligations to report on those standards:
27

28 ...[T]o what extent, if any, certain aspects of the information set out in Section 8.1.7
29 of the 2017 ACE Plan will be reproduced in the report required by the Performance
30 Standards Decision remains to be seen.
31

²⁶ M05339, NS Power 2013 Annual Capital Expenditure Plan, NSUARB Decision, May 27, 2013, page 44, line 174.

²⁷ M07745, NS Power 2017 Annual Capital Expenditure Plan, NSUARB Order, April 4, 2017.

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1 It is not clear such items as, for example, plans for replacement of aging
2 transmission and distribution equipment, and storm performance information,
3 beyond the 48-hour restoration metric, will be fully explored in the context of
4 performance standard metrics reporting.

5
6 As there is some uncertainty, and a part of the information provided in Section 8.1.7
7 is derived from an agreement between stakeholders, as part of the 2015 ACE Plan
8 process, the Board will not direct any changes to the current ACE Plan reporting
9 related to reliability at this time. The Board will monitor the ongoing relevancy of
10 this part of the ACE Plan.

11
12 The first report arising from the Performance Standards Decision is due March 31,
13 2018. Once that report has been filed and analyzed, the matter should be revisited
14 in the context of a future ACE Plan.²⁸
15

16 Finally, the Board's 2020 Performance Standards Decision provided the following directive:
17

18 A comprehensive and effective approach to align the reliability
19 performance of those circuits with the service level provided to customers
20 in other regions of the province needs to be developed. It is unclear whether
21 NS Power has undertaken any reliability analysis to determine if
22 performance would be improved with additional or reconfigured
23 infrastructure (circuits or substation) that could minimize circuit exposure.
24 It is also unclear whether integrating innovative technological advances
25 associated with microgrids, battery storage, or other distributed energy
26 resources was studied to determine the effectiveness of such measures in
27 improving service restoration or minimizing outage durations. The Board
28 directs NS Power to undertake a comprehensive analysis which results in
29 clearly identified measures, as well as the associated timing and costs, to
30 bring these problem and chronic circuits into alignment with the reliability
31 performance in the rest of the province. This study and the action plan are
32 to be reviewed during an upcoming ACE Plan proceeding.²⁹
33

34 In accordance with the Board's direction, NS Power undertook a comprehensive analysis
35 to bring problem and chronic circuits into alignment with reliability performance in the rest
36 of the province. The resulting study and action plans are in progress and will be filed with
37 the Board separately.

²⁸ M07745, NS Power 2017 Annual Capital Expenditure Plan, NSUARB Decision, April 4, 2017, paragraphs 98 to 101.

²⁹ M10055, NS Power 2020 Annual Performance Standards, Decision, June 23, 2021, page 13.

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1 **Reliability Strategy**

2
3 To meet reliability challenges from severe weather and climate change and achieve reliability
4 improvements on the T&D system, improved reliability performance analysis, technological
5 innovation, targeted mitigating measures, and new approaches to the way we work are necessary.
6 NS Power's Customer Reliability Strategy (CRS) is an overarching program to identify and
7 implement improvements in power system reliability for the benefit of NS Power customers. This
8 strategy is intertwined with existing T&D projects and routines focused on reliability already
9 underway. In concert with effective asset management practices in place for the T&D system, this
10 focused strategy helps to supplement efforts to improve the customer experience to date.

11
12 The Company's approach to customer reliability is focused on balancing optimized investments
13 with affordability and is built on four elements:

- 14
- 15 • Technology & Data: Utilize data and analytic tools to gain new insights into system
16 performance and identify opportunities to improve performance. Continue the integration
17 of operational/health data into risk profiles to better align with mitigation strategies.
18
 - 19 • Innovation: Explore innovative technologies such as battery storage and micro grids, and
20 systems such as enhanced vegetation condition assessments, and advanced asset-health
21 indicators.
22
 - 23 • New ways of Working: Implement enhanced risk-based decision making through the
24 creation of focused reliability teams which identify and prioritize work with a customer
25 first lens.
26
 - 27 • Communication: Engage in proactive, meaningful and continual communication with
28 customers and key stakeholders.
29
-

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1 Cross-functional reliability teams utilize outage data, device performance data, and asset
2 condition information to realize a comprehensive view of each feeder. This information is used to
3 identify both risks and options for mitigating them as appropriate. Reliability teams leverage not
4 only traditional investment tools, but also understand and incorporate potential opportunities
5 available through emerging technologies. The results of this approach are notably illustrated in
6 the Problem Feeder Reliability plan where potential risk mitigation approaches are considered and
7 evaluated for the specific circumstances. Under investigation for Problem Feeders are new and
8 innovative approaches to distribution reliability such as wider adoption of residential battery
9 storage, Microgrids (including distributed energy resources), and distribution automation.

10
11 Building from these four key elements of Technology & Data, Innovation, New Ways of Working,
12 and Communication, the analysis and corresponding programs for the distribution system were
13 developed with opportunities identified in the following key areas:

- 14
15 • Smart Grid and Intelligent Devices Deployment
16 • Targeted Priority Device Replacement
17 • Storm Hardening and Reliability Upgrades
18 • Enhanced Vegetation Management

19
20 Further integration of asset management processes, tools, and data contribute to enhanced
21 understanding of asset condition, criticality, and risk across the T&D system. Detailed analysis of
22 this intelligence allows for targeting areas of concern and identification of appropriate corrective
23 actions. The CRS incorporates new technologies and asset programs such as additional protection
24 equipment, use of intelligent devices, targeted asset replacements and upgrades, and enhanced
25 vegetation management increases the number of options available to NS Power to reduce both the
26 frequency and duration of unplanned outages for customers. Finally, a strong focus on risk-based
27 decision making, enhanced work prioritization, and further reliability team initiatives will help to
28 realize improved customer experience.

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Proposed investment options associated with achieving these improvements 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 mitigation of the highest risks on the system for the greatest number of customers.

Proposed CRS investments in each of the four tracks for 2022 and the projected overall 5-year track are broken out below:

Reliability Track	2022 Capital Investment (\$million)	5-Year Spend Estimate in CRS (\$million)
Enhanced Vegetation Management	8.6	34
Smart Grid/Intelligent Devices	1.9	22
Storm Hardening & Reliability Upgrades (Including Underground Upgrades)	6.6	52
Targeted Device Replacements	2.8	5
Total	19.9	113

Lessons learned from problem feeder investments will be used to improve CRS projects and vice versa, as applicable.

Reliability Statistics

As shown in **Figure 72** and **Figure 73** below, with the exception of 2011, 2016, 2018, and 2019 largely due to challenging weather conditions, NS Power's annual outage frequency and duration continues to be below the average of Atlantic Canada utilities. 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.

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Figure 72: Annual Atlantic Canada Outage Frequency

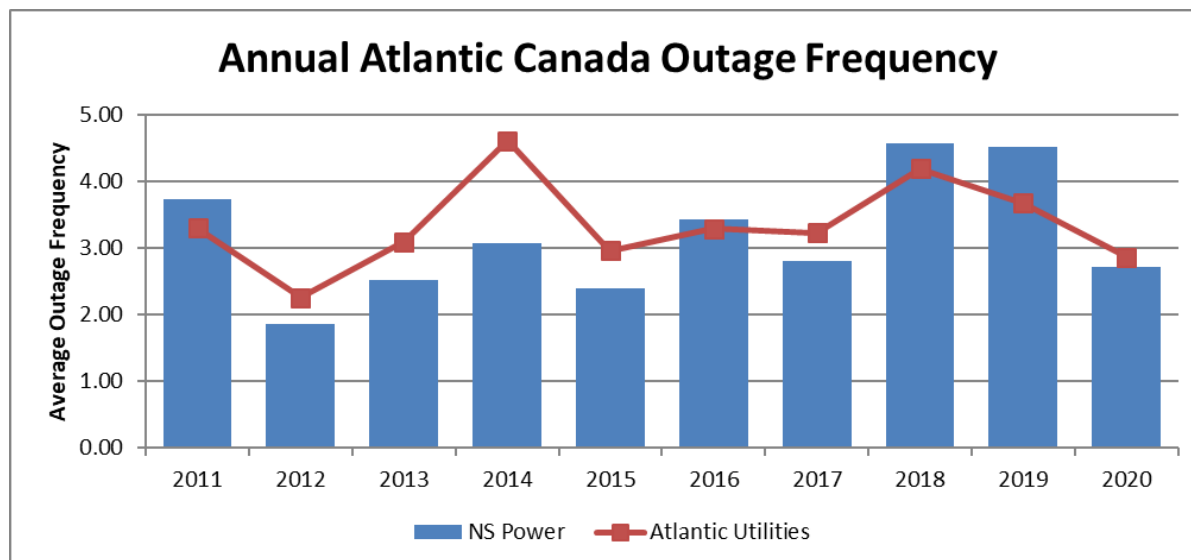


Figure 73: Annual Atlantic Canada Outage Duration

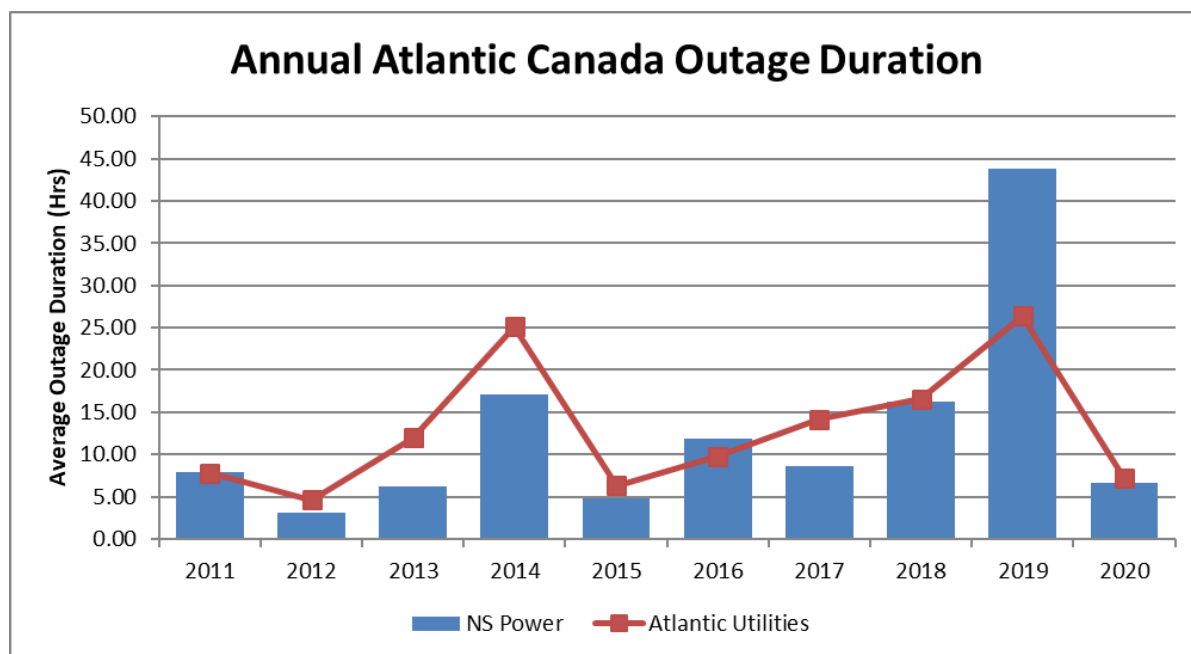
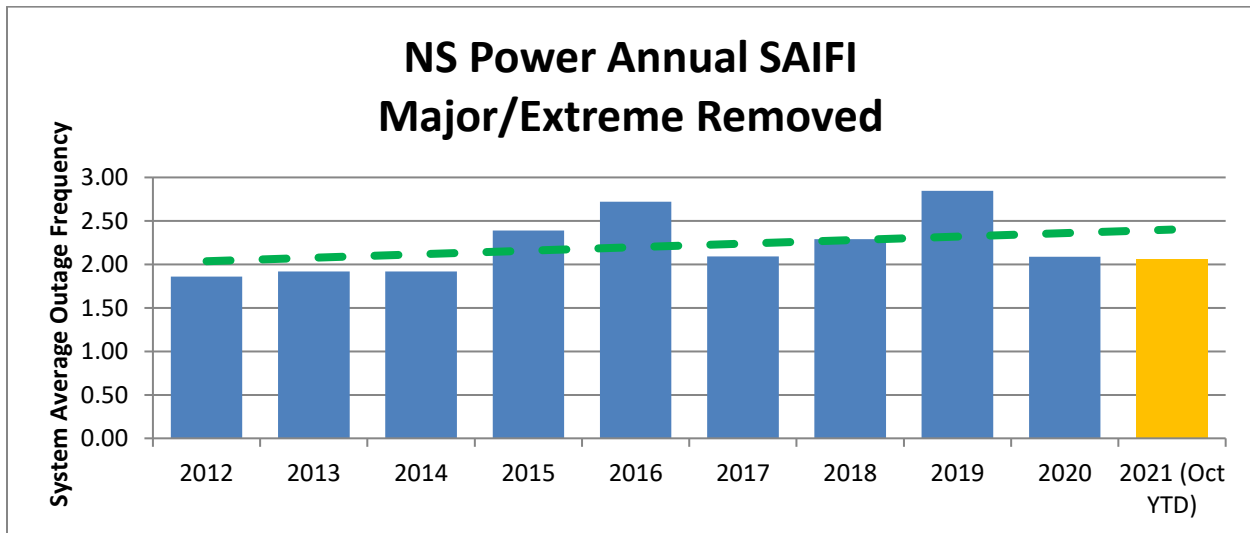


Figure 74 and Figure 75 below represent NS Power's reliability statistics with Major and Extreme Events (such as Hurricane Dorian and as defined by IEEE-1366) removed from the data. This shows a normalized comparison between yearly reliability performance. Performance observed

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in 2014, 2016, 2018, and 2019 were largely the result of a significant number of 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. 2021 performance to date has been similarly influenced by six Significant Event Days (SEDs) leading to above normal outage impacts not excluded by IEEE-1366. The 10 year trend shows overall sustainment or only small deterioration of reliability for customers despite challenging weather conditions in recent years.

Figure 74: NS Power Annual SAIFI (Major/Extreme Events Excluded)



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Figure 75: NS Power Annual SAIDI (Major/Extreme Events Excluded)

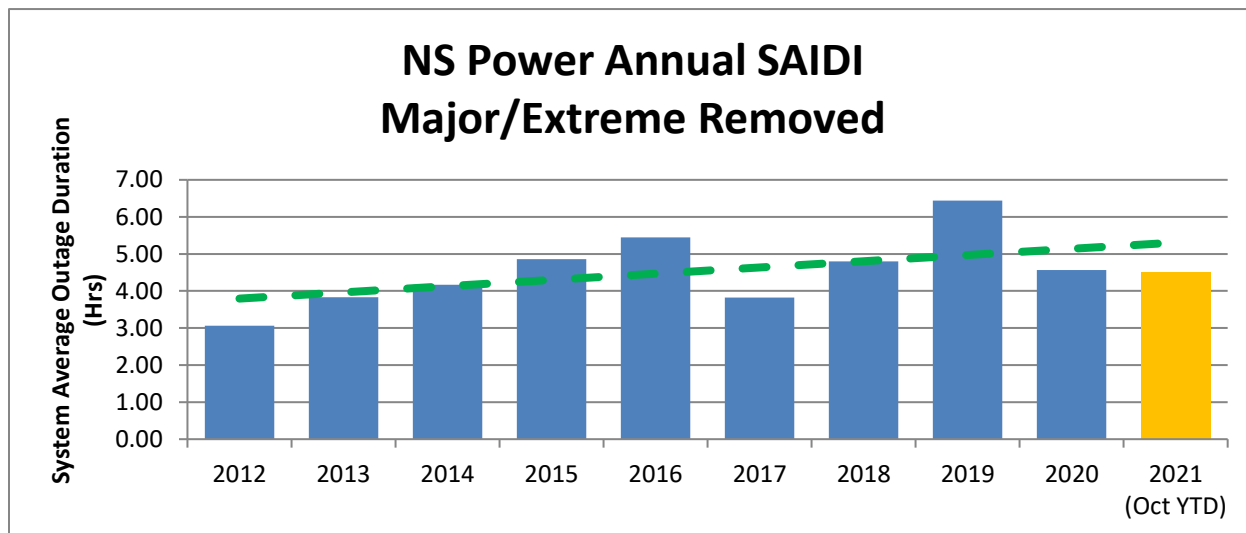
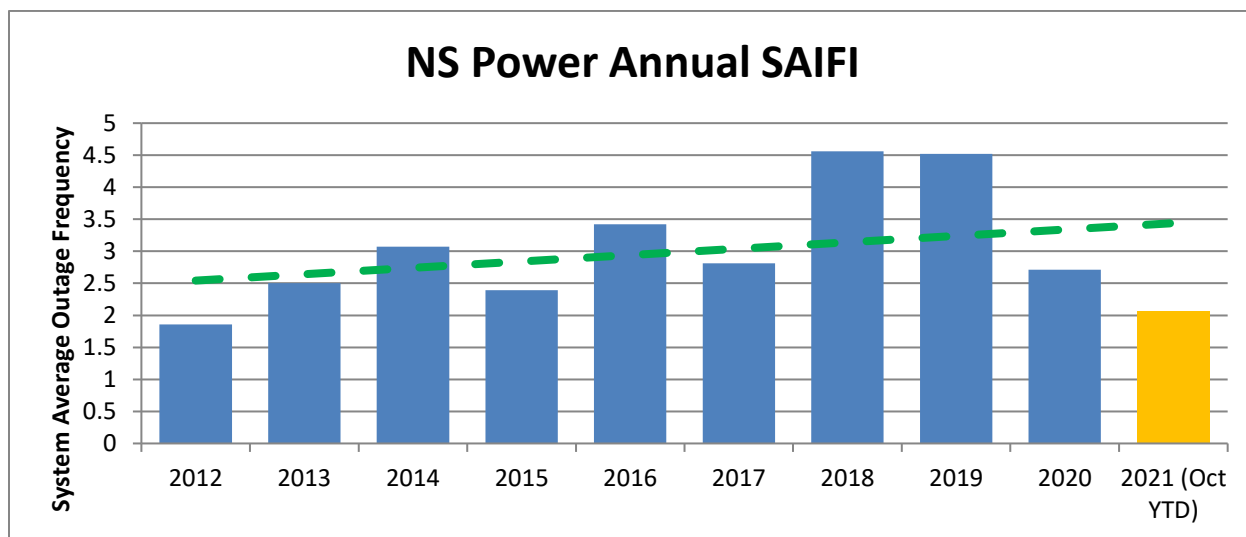


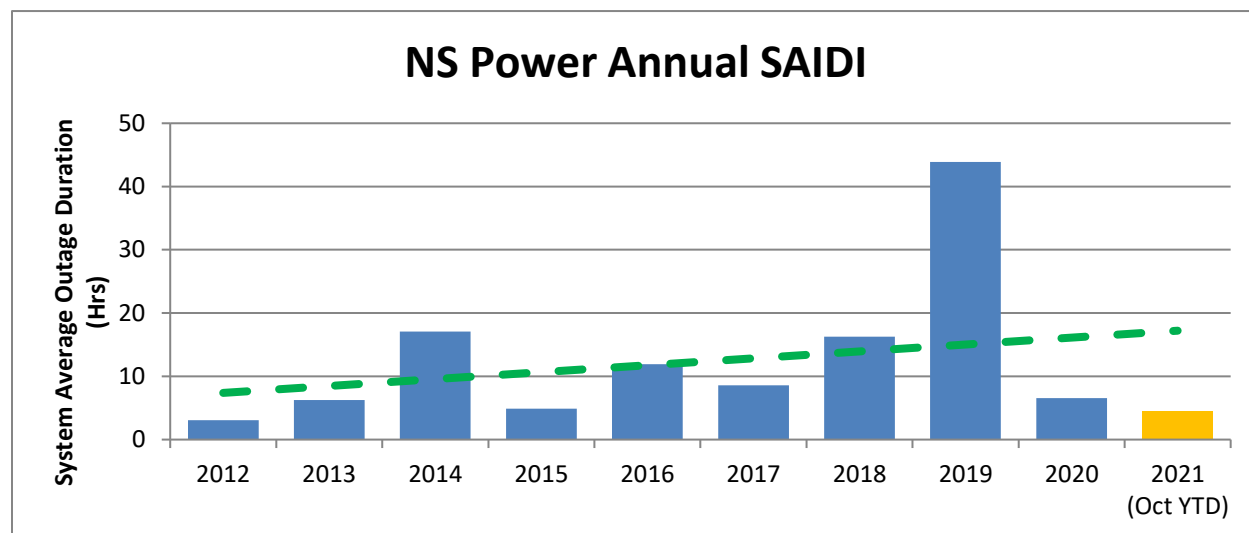
Figure 76 and Figure 77 below represent NS Power's reliability statistics with Major and Extreme Events included.

Figure 76: NS Power Annual SAIFI (Major and Extreme Events Included)



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Figure 77: 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 weather events (Arthur 2014, Matthew 2016, Dorian 2019) 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 consistent (sustaining) trends 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 reliability over the long term.

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.

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Tree Contacts

Since 2012, tree contacts continue to be one of the largest sources of outage hours for NS Power's customers. **Figure 78** and **Figure 79** below show both customer interruptions and customer hours of interruption due to tree contacts under normal and severe weather conditions.

Figure 78: Annual Tree Contact – Customer Interruptions

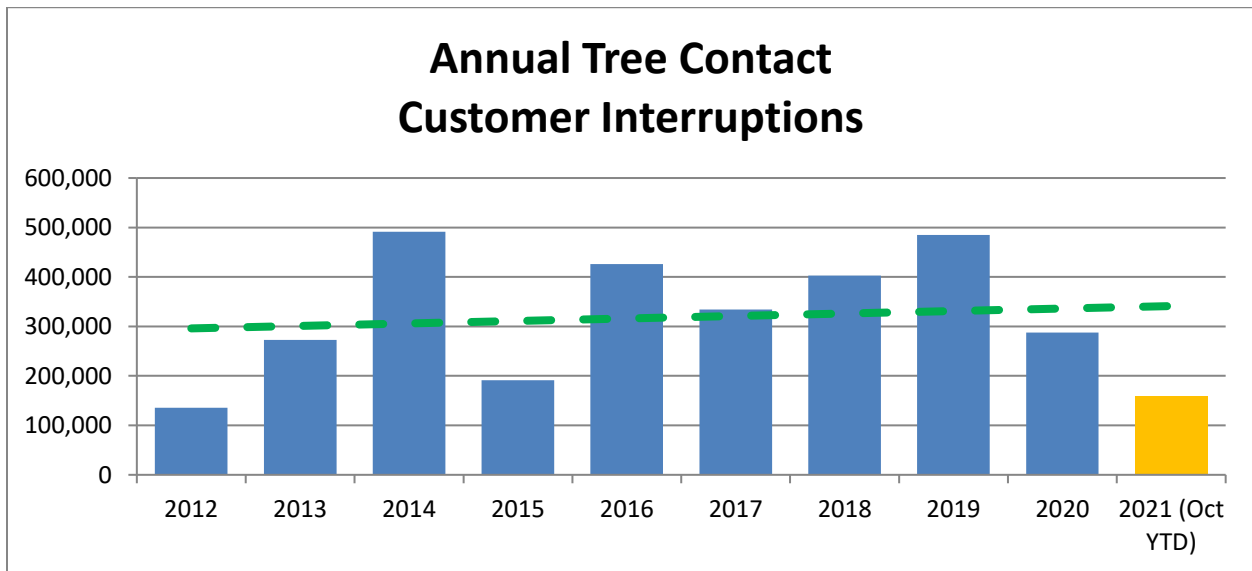
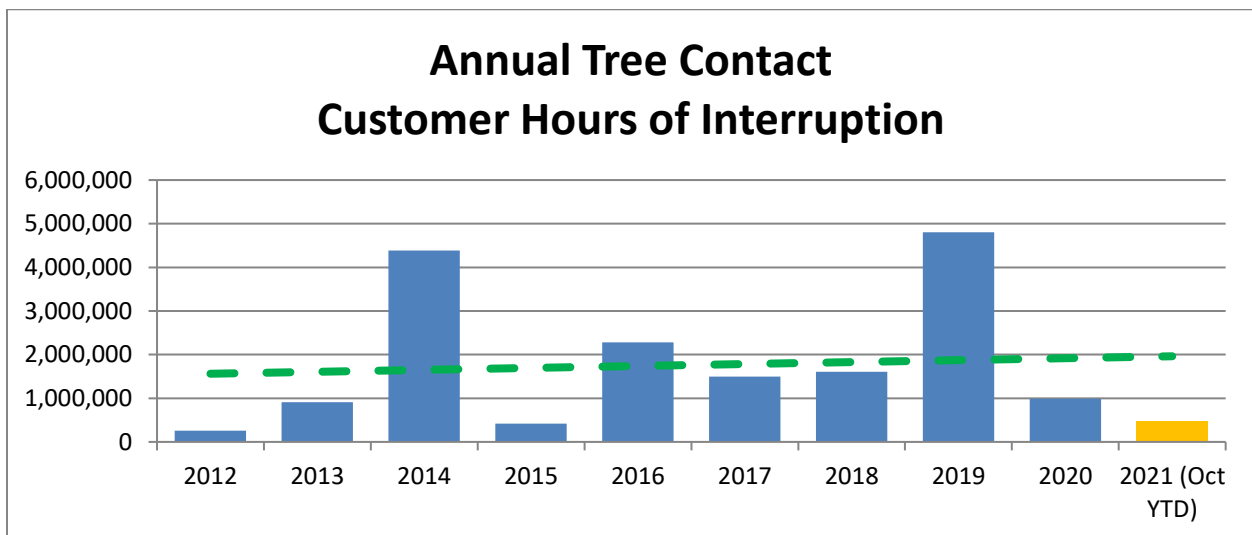


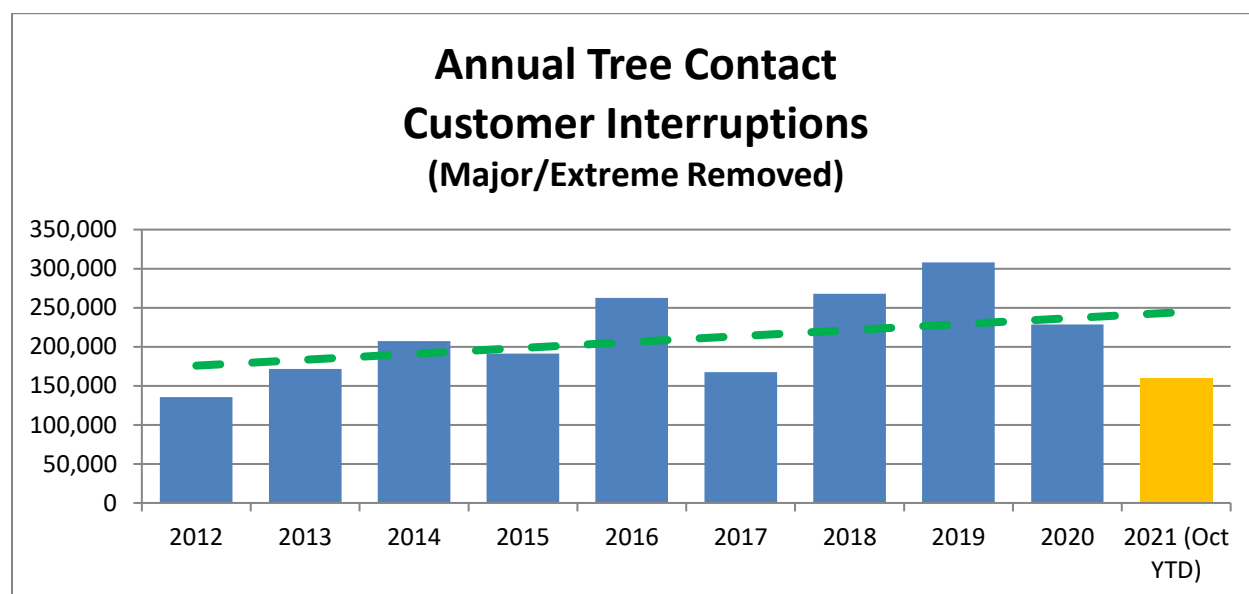
Figure 79: Annual Tree Contact – Customer Hours of Interruption



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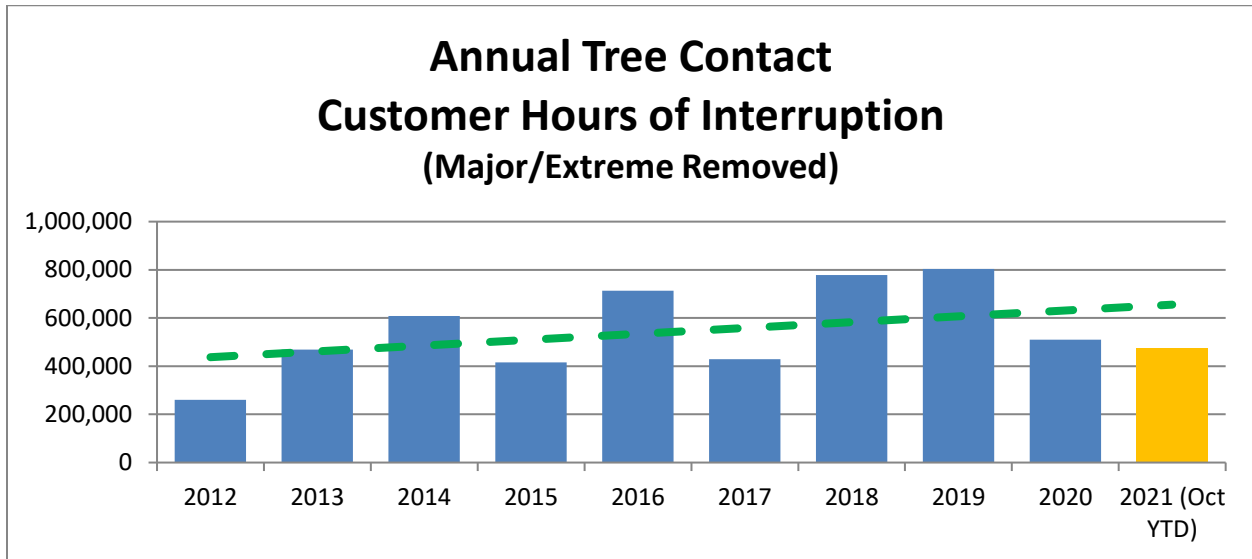
Figure 80 and **Figure 81** below show the tree contact data normalized with Major and Extreme Events removed. With these events removed, the data demonstrates the vegetative effects of major storms and their impact for months following the extreme event.

Figure 80: Annual Tree Contact – Customer Interruptions (Major/Extreme Events Removed)



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Figure 81: 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 2022 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.

- C0041892– New Distribution Rights-of-Way Phase 7
- C0041893 – 2022/2023 Transmission Right-of-Way Widening 69kV
- D010 Distribution Right-of-Way Routine
- T010 Transmission Right-of-Way Routine

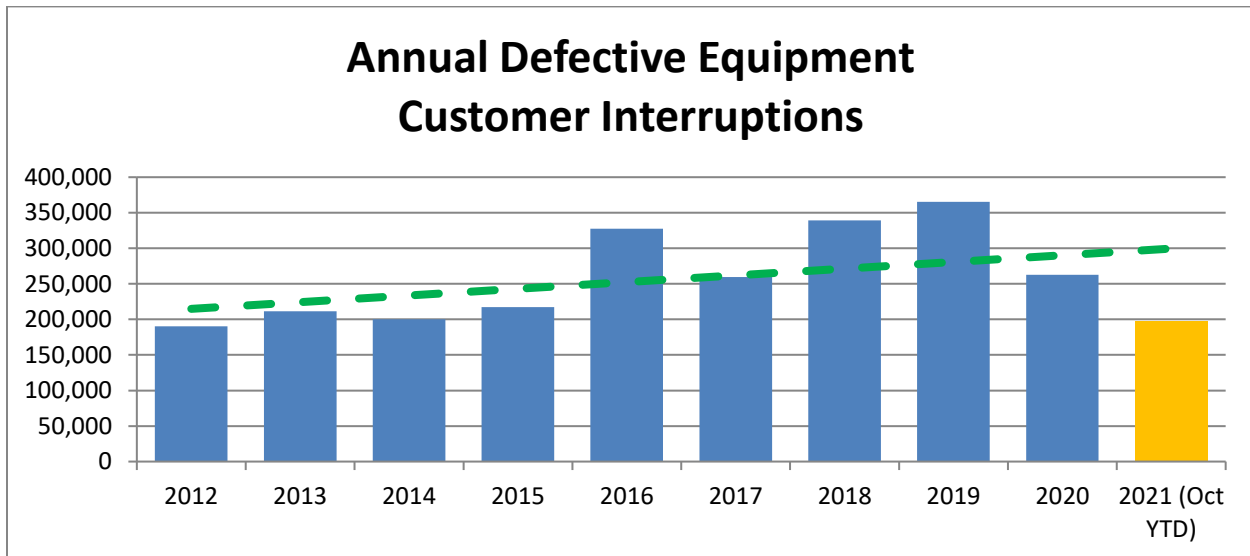
Defective Equipment

Figure 82 and **Figure 83** below show the reliability results realized through upgrades and replacements of targeted distribution equipment resulting from the Reliability Investment Strategy. 2021 results year to date are showing the potential for improved performance over recent years.

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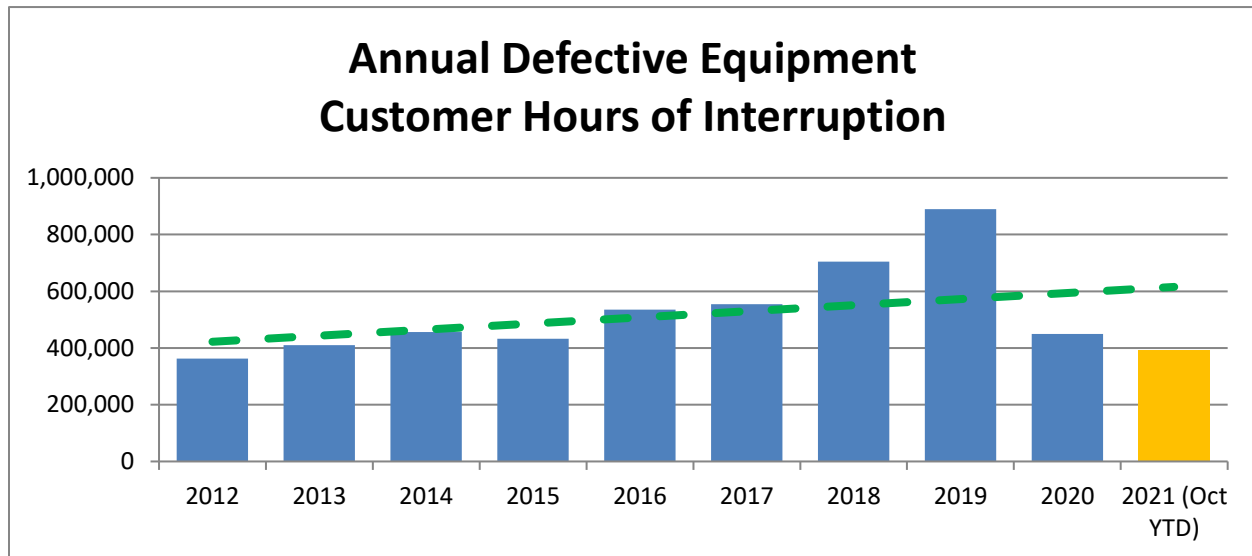
Reliability teams are continuing to investigate improvements in maintenance strategies to identify failure modes for asset classes with the highest contributions to customer impacts. In 2018 and 2019, NS Power experienced an increase of primary aerial conductor failures leading to a higher than typical 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. Fortunately, the combination of targeted asset investments and more favourable weather conditions to date has contributed to overall improved equipment reliability performance. In particular, customer hours of interruption year to date are on track to be below the 5-year average for defective equipment.

Figure 82: Annual Defective Equipment – Customer Interruptions



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Figure 83: Annual Defective Equipment – Customer Hours of Interruption



Taking a further look into the 2020 reliability data, defective equipment outages can be classified by device type. This is shown in **Figure 84** below.

Figure 84: Customer Hours of Interruption

Customer Hours of Interruption		
Device Type	2020	% of Hours
Pin Insulator	100,296	22.30%
Primary Aerial Conductor	71,319	15.85%
Wood Pole	45,545	10.12%
Tie Wire	37,834	8.41%
Automatic Splice	33,507	7.45%
Cutout	26,204	5.83%
Recloser	19,560	4.35%
Lead	16,719	3.72%
Fuse Link	13,195	2.93%
U/G Switch Device	12,191	2.71%

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

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

- 4 • C0042608 – 2C-402 - Troy Build to Roadside
- 5 • C0043230 – 65V-301 Nictaux West Reconductor
- 6 • C0042326 – 101H-413 Balsam Circle Rebuild

7
8 **Update on storm performance and related capital investments**

9
10 The effect of storms and storm response varies storm-to-storm and year-to-year. The wind speeds,
11 rainfalls, time of year, time of day and weather forecast accuracy all contribute to a storm's impact.
12 NS Power anticipates that the impacts of a changing climate over the medium and long term will
13 result in increasing weather risks for the system that must be mitigated. The number of wind gusts
14 greater than 80 km/h in 2020, while lower than 2019, is consistent with the elevated levels
15 experienced over the past five years. The average hours of wind gusts greater than 80 km/h during
16 the five-year period from 2016-2020 reflected a 64 percent increase over the previous five-year
17 period from 2011-2015. Targeted investments in traditional reliability-focused projects as well as
18 innovative technologies, contribute to positioning NS Power to meet the challenges of a changing
19 climate.

20
21 NS Power uses the 2.5 Beta Method (IEEE-3366 Standard) to classify Major Event Days. The
22 same methodology is applied to further classify Significant Event Days (2.0 Beta) and Extreme
23 Event Days (3.5 Beta).

24
25 As of October 31, 2021, NS Power experienced 6 significant event days, and no major event days
26 or extreme event days.

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1 NS Power has the following capital programs for storm response and reactive work for 2022:

- 2
- 3 • D008 – Provincial Storm Distribution
- 4 • T001 – Transmission Line Unplanned
- 5

6 As noted above, NS Power continues to invest on vegetation management. These investments aim
7 to minimize tree contact and maximize access to our transmission and distribution systems as
8 provided for in routines T010 and D010, as well as capital work orders CI C0041892 and CI
9 C0041893.

10

11 2021 Storm Performance vs. Previous Years

12

13 **Figure 85** to **Figure 90** below show the count of the previously identified event day³⁰
14 classifications, and their SAIFI and SAIDI contributions annually. They outline the frequency and
15 impact of significant event days³¹ to customers. While 2021 has had no MEDs or EEDs to date,
16 there have been an above average six SEDs year to date. However, provincial all-in reliability
17 results for 2021 still compare favorably to past years without MEDs and EEDs such as 2012 (0
18 SEDs) and 2015 (4 SEDs), indicating overall positive reliability performance.

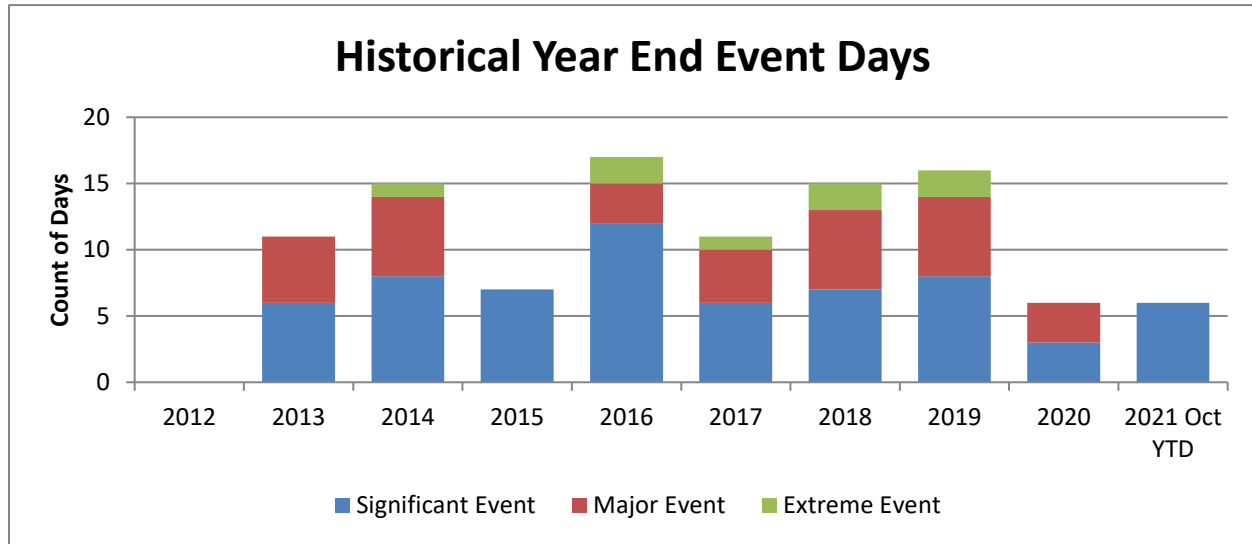
19

³⁰ 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.

³¹ 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 2 β threshold, are not exclusively due to storms or other inclement weather.

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1 **Figure 85: Historical Year End Event Days**



2
3

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Figure 86: Count of Annual Event Days – Oct YTD

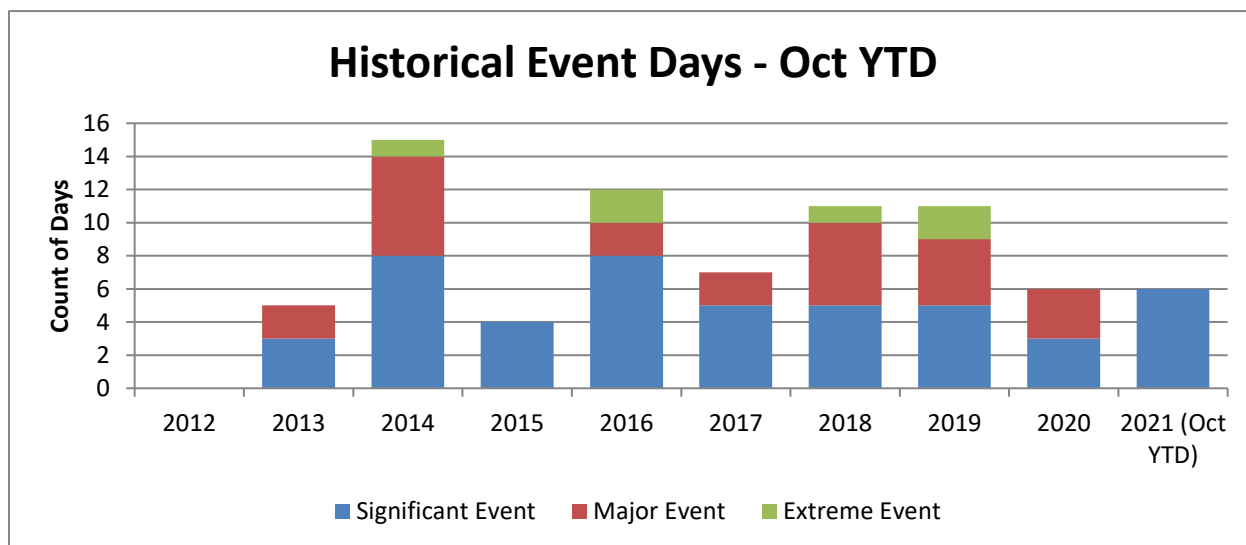
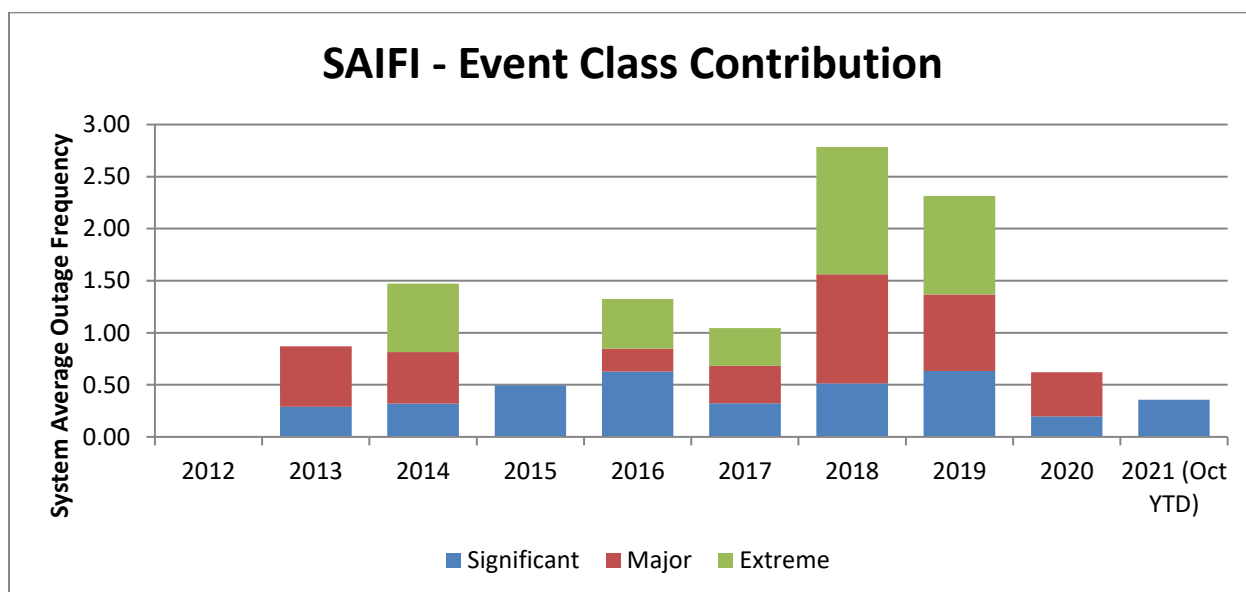


Figure 87: SAIFI- Event Class Contribution



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Figure 88: SAIFI Event Class Contribution – Oct YTD

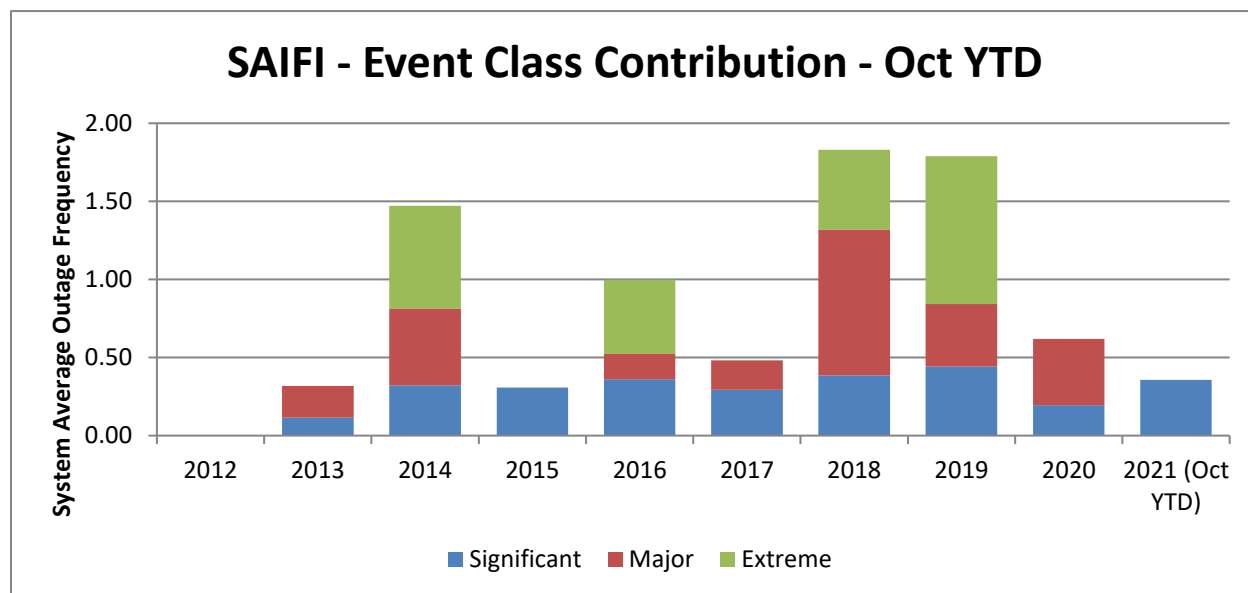
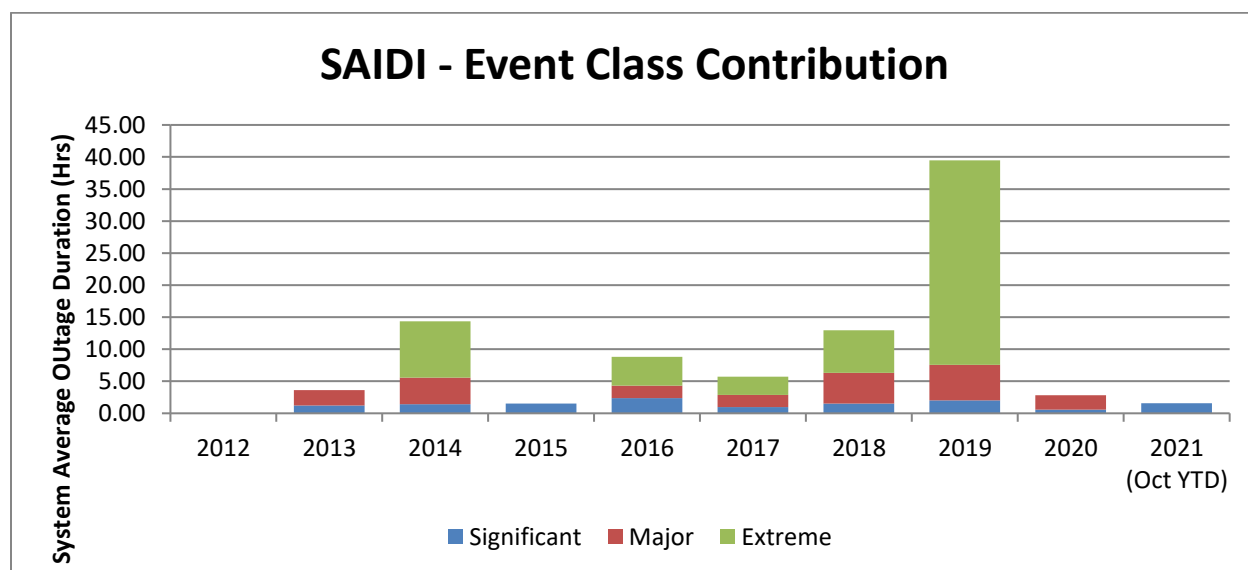
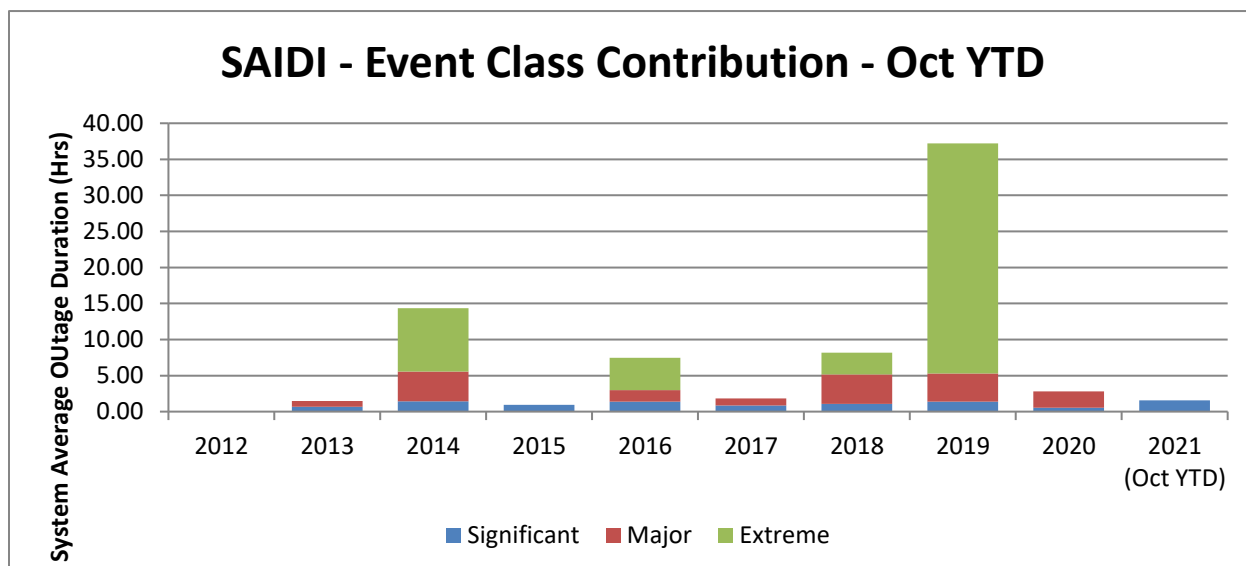


Figure 89: SAIDI – Event Class Contribution



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Figure 90: SAIDI Event Class Contribution – Oct YTD



Note: 2012 experienced no severe weather days.

Figure 91 below provides detail on outage causes for the 6 event days experienced so far in 2021.

Figure 91: Detail on Outage Causes for identified Event Days

CEA Cause Code	Description	Significant	Major	Extreme	% of Hours
		Hours of Interruption	Hours of Interruption	Hours of Interruption	
0	Unknown/Other	46,773	0	0	6%
1	Scheduled Outage	15,899	0	0	2%
2	Loss of Supply	6,958	0	0	1%
3	Tree Contacts	217,495	0	0	27%
4	Lightning	12	0	0	0%
5	Damaged Equipment	59,261	0	0	7%
6	Adverse Weather	433,249	0	0	53%
7	Adverse Environment	110	0	0	0%
8	Human Element	550	0	0	0%
9	Foreign Interference	37,142	0	0	5%
	Total	817,449	0	0	

Twenty-seven percent of all identified event day outage hours year to date in 2021 have been caused by tree contacts. While NS Power always strives to minimize tree caused outages, the

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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 2022:

- C0041892 – New Distribution Rights-of-Way Phase 7
- C0041893 – 2022/2023 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.³²

In accordance with the Board's directive, NS Power provides its progress report on D010 and T010 below as of October 31, 2020.

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.³³

³² M07176, NS Power 2016 Annual Capital Expenditure Plan, NSUARB Order, June 8, 2016.

³³ M07745, NS Power 2017 Annual Capital Expenditure Plan, NSUARB Order, April 4, 2017.

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1 NS Power confirms that the cost estimates for vegetation management and right-of-way widening
2 projects in the 2022 ACE Plan are based on actual historical costs incurred.

3
4 *Expenditures, Works Undertaken, and Results*

5
6 The following progress was made on 69kV transmission widening under C0031089:
7

- 8 • 78 percent of planned work has been completed as of October 31, 2021
- 9 • 100 percent completion is forecast for year end 2021
- 10 • Forecast year end spend is approximately \$2,527,000
- 11 • Substitutions have been made from the original plan, due to revised priorities:
 - 12 • L-5536 has been substituted by L-5027

13
14 The following progress was made on >69kV transmission widening under T010:
15

- 16 • 90 percent of planned work has been completed as of October 31, 2021
- 17 • 100 percent completion is forecast for year end 2021
- 18 • Forecast year end spend is approximately \$600,000

19
20 The following progress was made on distribution widening under D010:
21

- 22 • No planned work has been completed as of October 31, 2021
- 23 • 100 percent completion forecast for year end 2021
- 24 • Forecast year end spend is approximately \$500,000

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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.³⁴

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

³⁴ M06514, NS Power 2015 Annual Capital Expenditure Plan, Terms of Consensus, February 18, 2015, page 2 of 5.

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Plans for Replacement of Aging Transmission and Distribution Equipment

The multi-year Reliability Investment Strategy has resulted in sustained reliability for NS Power customers. NS Power continually monitors outages and performance of transmission, substation and distribution assets, and future investments will continue at an appropriate level to provide affordable and reliable service. To sustain these 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 in concert with asset condition, performance, and legislated requirements; it is never the single determining

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element in an investment decision. Capital project justifications outline the 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 92** below.

Figure 92: Age Based Replacement Ranges for T&D Assets

Asset Classification	Quantity on Grid	High Range Replacements		Low Range Replacements	
		Estimated Useful Life (Years)	Annual Replacements	Estimated Useful Life (Years)	Annual Replacements
Distribution Conductor (km)	43,742	45	972	55	795
Distribution Structure	414,527	50	8,290	60	6,909
Pole Top Transformer	131,070	35	3,745	45	2,913
Underground Conductor (km)	415	45	9	55	8
Padmount Transformers	4,587	35	131	45	102
Transmission Conductor (km)	5,429	55	99	65	83
Transmission Structure	31,310	55	569	65	482
Substation Breakers	587	45	13	55	11
Substation Transformer	425	50	8	60	7

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1 Age demographics information is presently not available for all transmission and distribution asset
2 classes. Substation transformers, substation breakers, transmission conductor, downline reclosers
3 and padmount transformers are asset classes for which this information is available at this time.
4 As asset information improves for individual asset classes, their age profiles provide a more
5 complete picture of the current state across the T&D system.

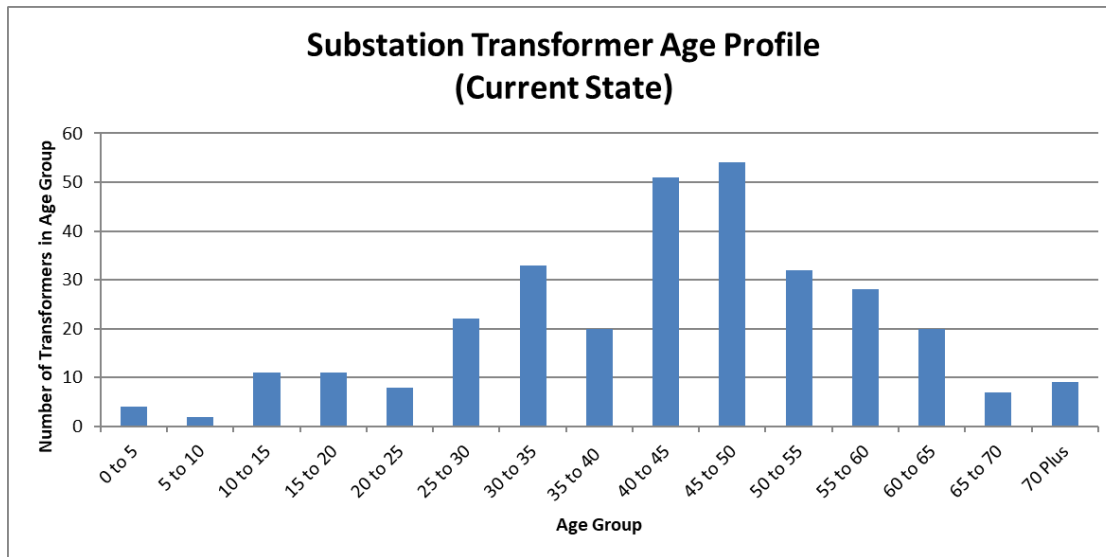
6
7 As T&D equipment reaches end-of-life, capital investments are used to mitigate impacts related
8 to aging infrastructure. This being said, it is important to note here, and for context with the
9 following sections (**Figure 93-Figure 102**), that age is not the only determinant of useful life and
10 therefore reliability or risk; older equipment can have lower risk ratings than newer equipment due
11 to design or utilization or other operating conditions and there continues to be advancements in
12 technologies to enable re-validation of useful life. Therefore, in addition to age-driven
13 identification and justification for capital replacements or upgrades, observed or calculated
14 condition, risk, reliability impact, and other factors are considered in determining a given asset
15 class' capital program in any given year. The noted expected ranges of replacement per asset class
16 per year serve as a guide or calibration range and are based on the age arithmetic; actual
17 replacement plans will vary depending on the assessment of the assets' conditions and priorities
18 in the context of each year's overall plan.

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Substation Transformers

Figure 93 below shows the substation transformer age profile (current state).

Figure 93: Substation Transformers Age Profile (Current State)

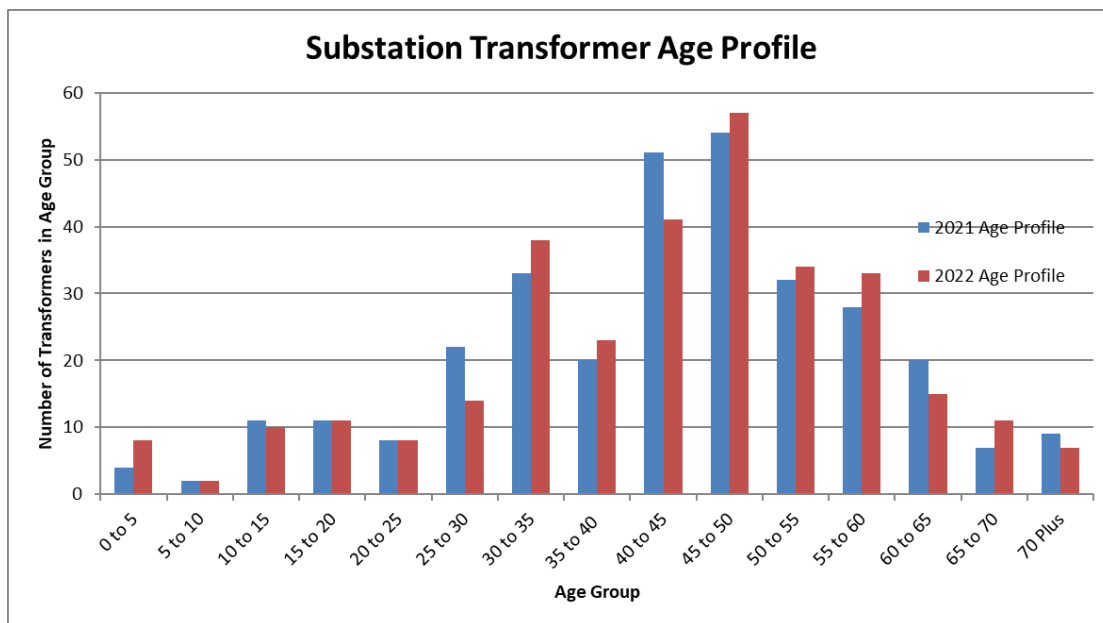


- Expected useful life of 50-60 years depending on the transformer type, utilization, and environmental conditions.
- Age Demographics – 30.8 percent of Transformers are beyond 50 years of service and 11.5 percent are beyond 60 years of service.
- Calculated range of annual replacement using the expected useful life only – 7-8 units per year.
- Changes to age demographics – As a result of the proposed 2022 capital investments in substation transformers, the age profile for this asset class will experience an increase of 0.25 percent in assets beyond 50 years of age and a decrease of 0.9 percent above 60 years of age. Age is only one of multiple factors in determining targeted assets in a given year.

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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 94** illustrates the overall change in asset age profile for Substation Transformers between 2021 and 2022.

Figure 94: Substation Transformer Age Profile

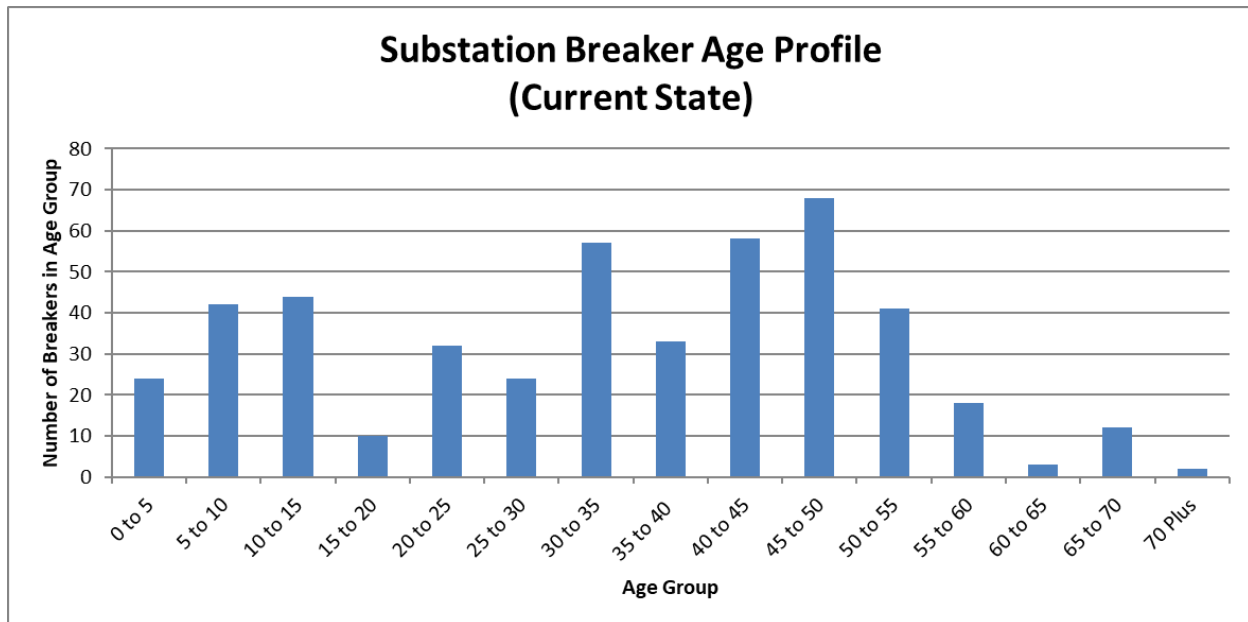


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Substation Breakers

Figure 95 below shows the substation breaker age profile (current state).

Figure 95: Substation Breakers Age Profile (Current State)

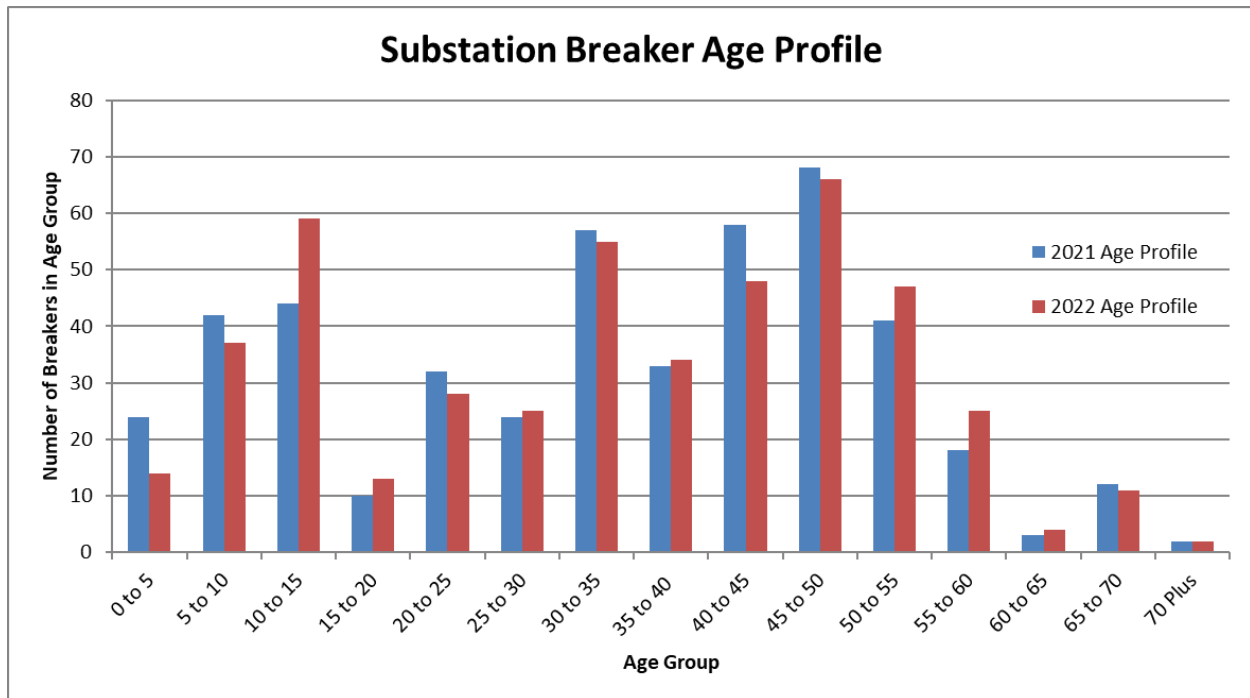


- Expected useful life of 45-55 years depending on the breaker type, operations count, and environmental conditions.
- Age Demographics – 30.8 percent of breakers are beyond 45 years of service and 7.5 percent are beyond 55 years of service.
- Calculated range of annual replacement using the expected useful life only – 11-13 units per year.
- Changes to age demographics – As a result of the proposed capital investments in Substation Breakers during 2022, the age profile for this asset class will experience a 2.25 percent increase of assets beyond 45 years of age and 1.5 percent increase beyond 55 years of age. Age is only one of multiple factors in determining targeted assets in a given year. To support mitigation

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of risk associated with this asset class, continuation of the strategic breaker spares program is planned. **Figure 96** illustrates the overall change in asset age profile for Substation Breakers between 2021 and 2022.

Figure 96: Substation Breaker Age Profile

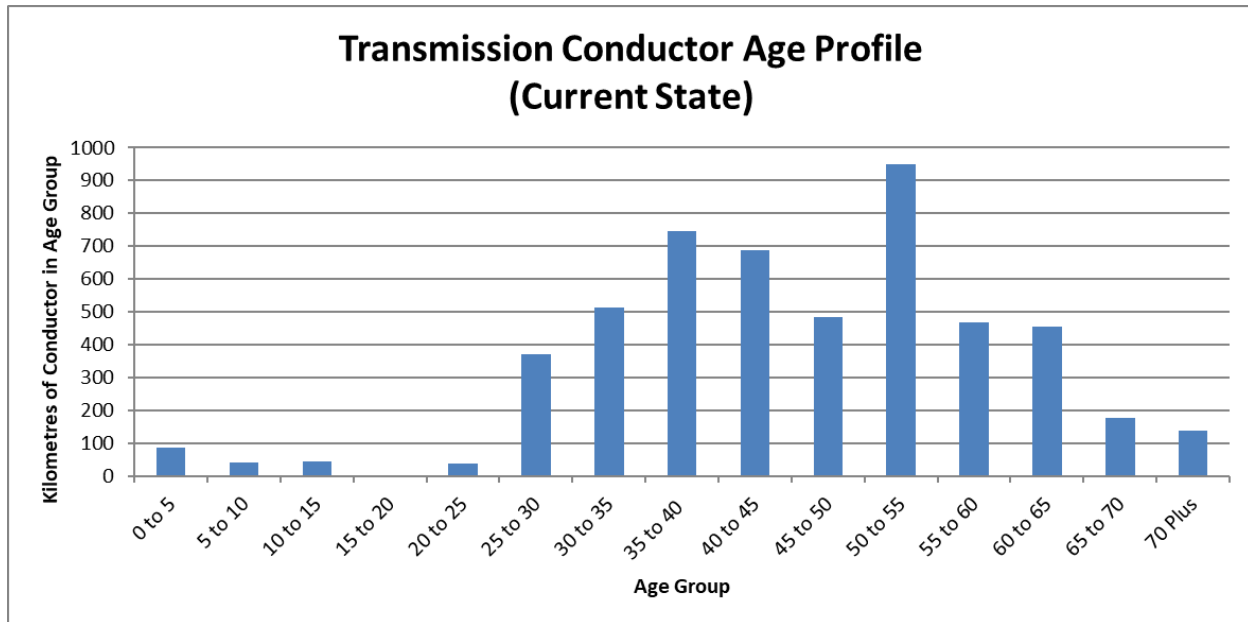


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Transmission Conductor

Figure 97 below shows the transmission conductor age profile (current state).

Figure 97: Transmission Conductor Age Profile (Current State)



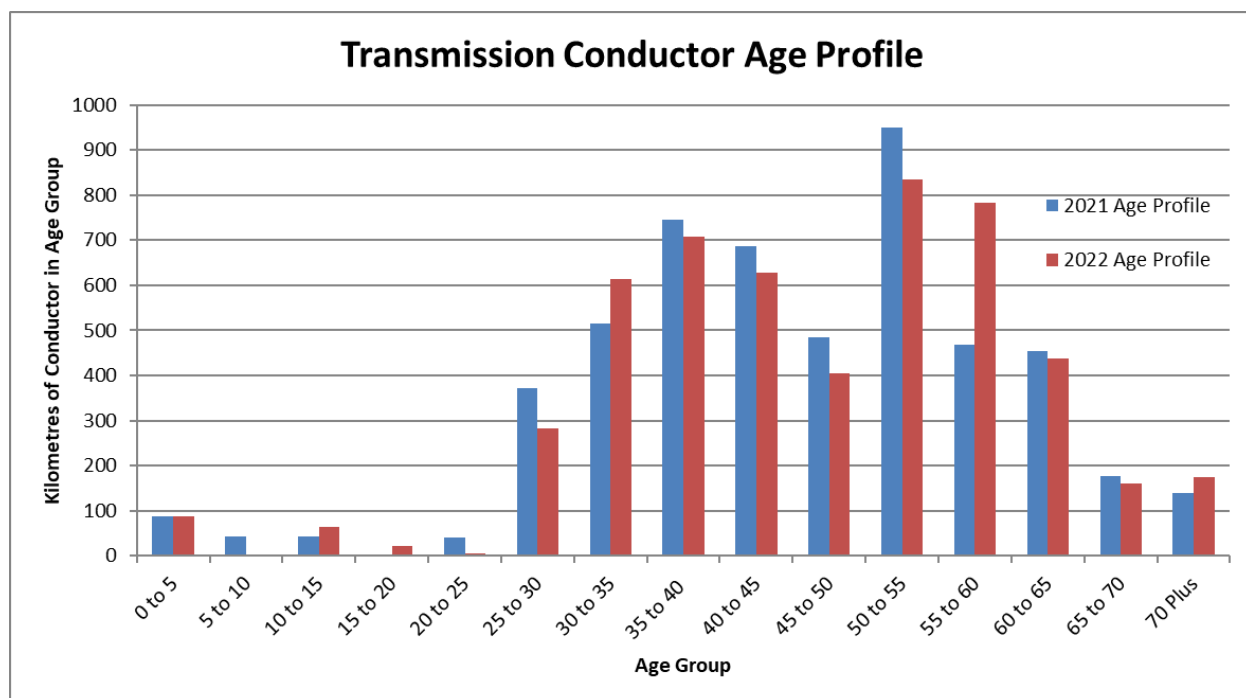
- Expected useful life of 55-65 years depending on the conductor design and environmental conditions.
- Age Demographics – 23.8 percent of conductor is beyond 55 years of service and 6.1 percent beyond 65 years of service.
- Calculated range of annual replacement using the expected useful life only – 83 to 99 km per year.
- Changes to age demographics – As a result of proposed capital investments in transmission conductor in 2022, the age profile for this asset class will experience an approximately 1

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percent increase in assets beyond 55 years of age and 0.3 percent increase beyond 65 years of age. Age is only one of multiple factors in determining targeted assets in a given year.

Figure 98 illustrates the overall change in asset age profile for transmission conductor between 2021 and 2022.

Figure 98: Transmission Conductor Age Profile

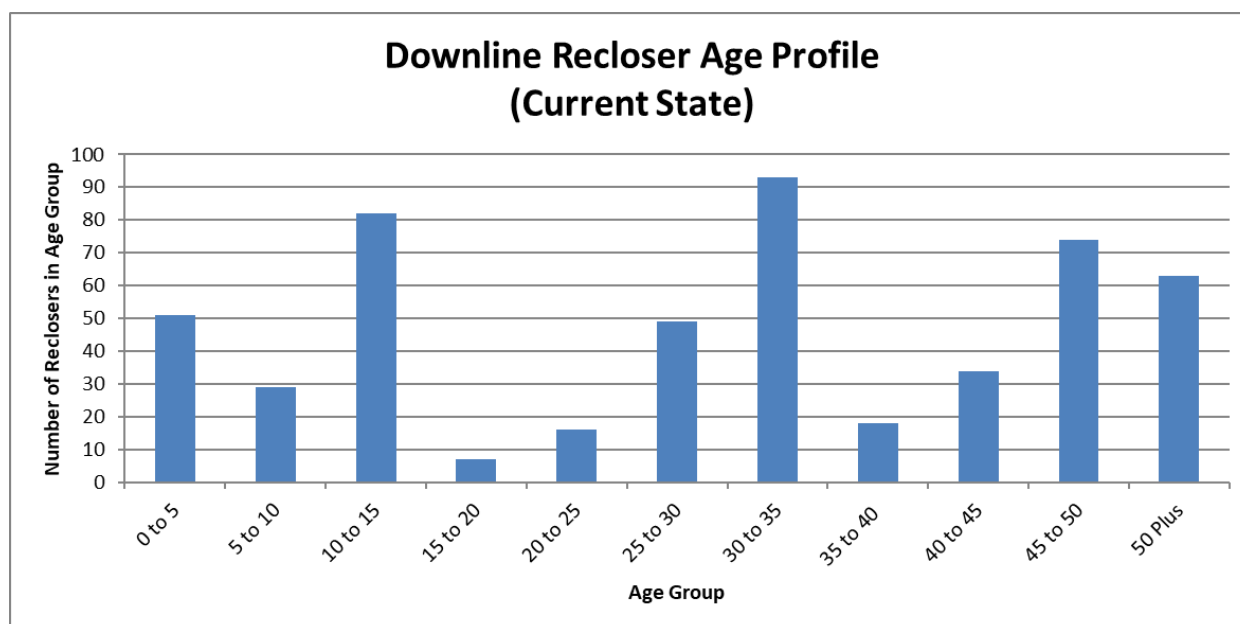


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Downline Reclosers

Figure 99 below shows the downline reclosers age profile (current state).

Figure 99: Downline Reclosers Age Profile (Current State)

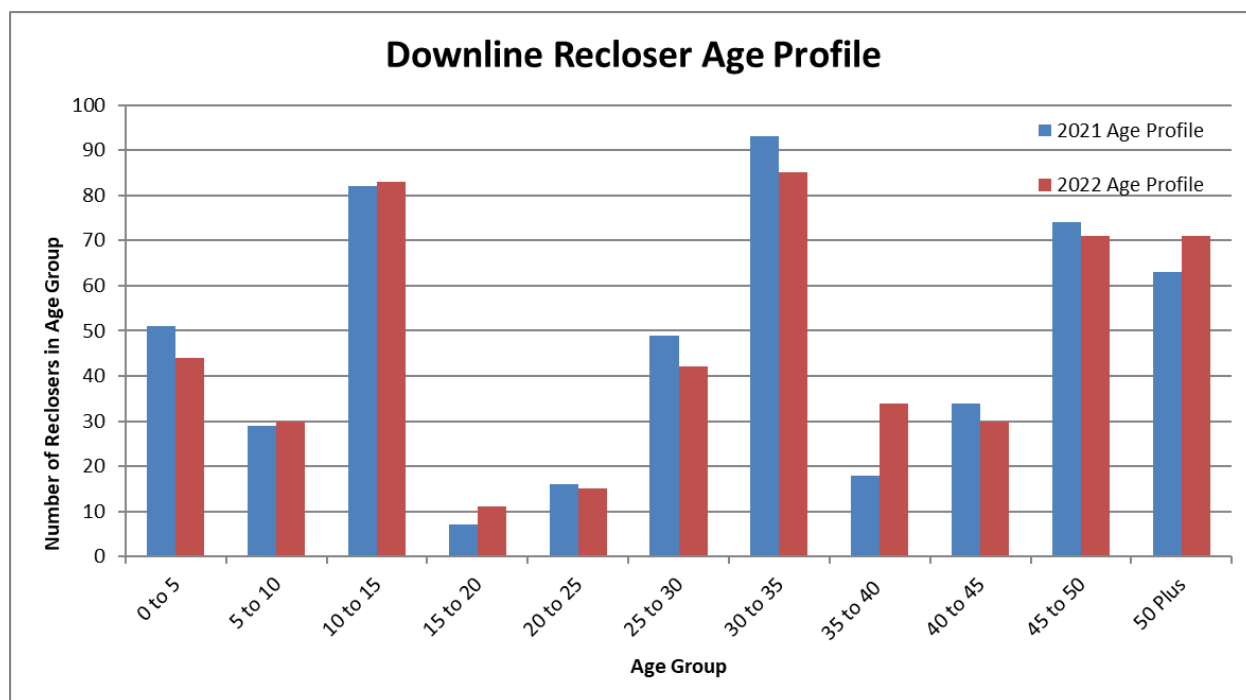


- Expected useful life of 30-40 years depending on the downline recloser design, loading, and environmental conditions.
- Age Demographics – 54.6 percent of Downline Reclosers are beyond 30 years of service and 33.1 percent are beyond 40 years of service.
- Calculated range of annual replacement using 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 2022, the age profile for this asset class will experience an approximately 1.8 percent increase in assets beyond 30 years of age and 0.2 percent

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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 100** below illustrates the overall change in asset age profile for Downline Reclosers between 2021 and 2022.

Figure 100: Downline Recloser Age Profile

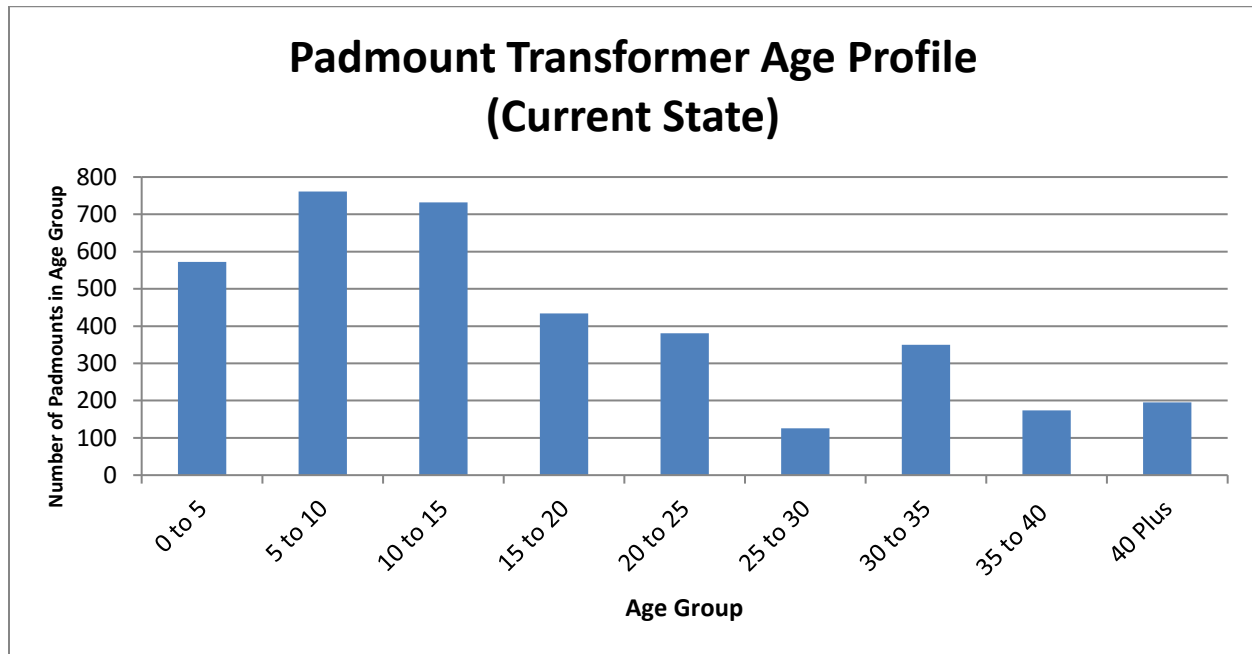


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Padmount Transformers

Figure 101 below shows the Padmount Transformer age profile (current state).

Figure 101: Padmount Transformers Age Profile (Current State)



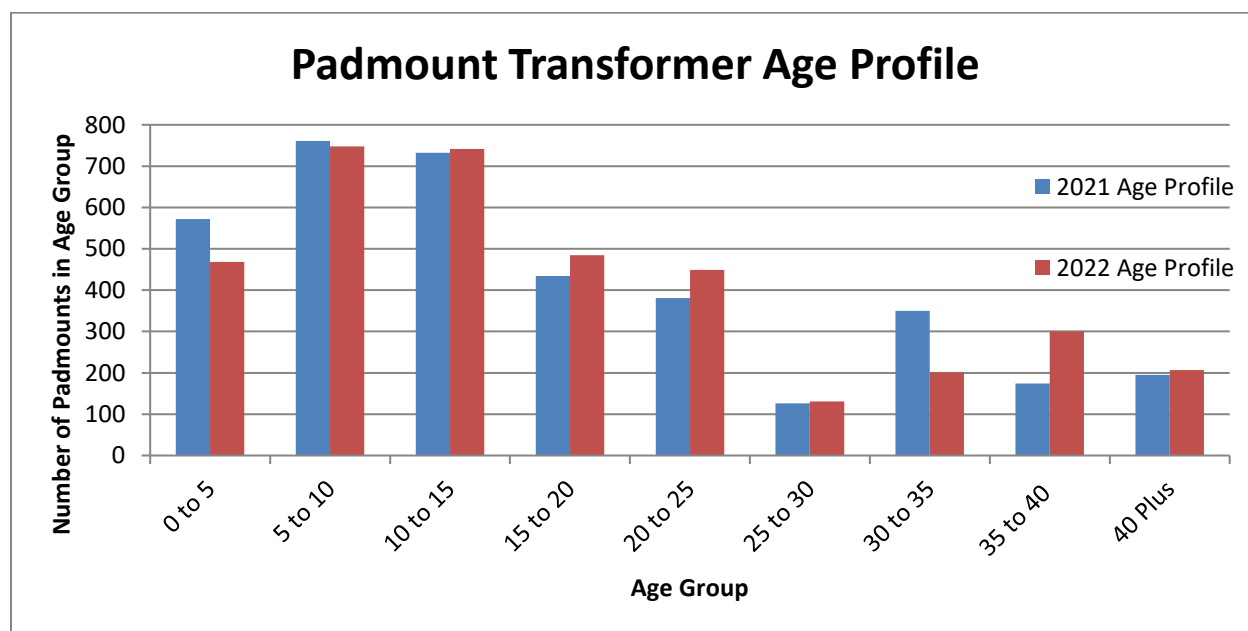
- Expected useful life of 35-45 years depending on the padmount design, loading, and environmental conditions.
- Age Demographics – 9.9 percent of padmounts are beyond 35 years of service and 1.9 percent beyond 45 years of service.
- Calculated range of annual replacement using the expected useful life only – 102 to 131 units per year.
- Changes to age demographics – As a result of the proposed capital investments in Padmount Transformers during 2022, the age profile for this asset class will experience an

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approximately 3.7 percent increase in assets beyond 35 years of age and a 0.4 percent increase beyond 45 years of age.

Figure 102 below illustrates the overall change in asset age profile for Padmount Transformers between 2021 and 2022.

Figure 102: Padmount Transformer Age Profile



11.1.7 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);

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-
- 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).

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

2
3 Continue to track the information noted in Paragraph 92 of the Board's 2020 ACE
4 Plan decision for each completed capital project that was submitted for Board
5 approval in 2017, 2018, 2019, 2020 and 2021 (either through or outside of the ACE
6 Plan proceedings, including projects submitted for subsequent approval, but
7 excluding U&U projects). Further the Board directs that the following additional
8 information be included in the related 2022 ACE Plan reporting:

- 9
10 • NS Power is to identify all new projects that have been added to the report;
11 and
12 • For any capital projects that have a negative variance greater than or equal
13 to 25% of the Board approved capital cost estimate, NS Power shall provide
14 an explanation detailing the reasons for the variance.
15

16 The Board directs NS Power to continue to track this information, including
17 information related to projects approved by the Board after 2021, and report it in
18 subsequent ACE Plan applications. The Board finds the format of Appendix E of
19 the 2021 ACE Plan application a useful means of presenting this data. The Board,
20 therefore, directs that the data continue to be presented in this format in subsequent
21 ACE Plan applications (subject to the modifications noted in the preceding
22 paragraph). This reporting shall also categorize projects by function (i.e.,
23 generation, transmission, distribution, and general plant), with "generation"
24 projects further categorized by type of project (i.e., hydro, steam, gas, other
25 renewables).
26

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

28
29 NS Power continues to apply its non-binding contingency guidelines as developed in consultation
30 with Stakeholders in the execution of its capital program. As demonstrated in **Appendix E**, the
31 contingency applied to all projects is within the ranges set out in the non-binding contingency
32 guidelines. On average, the amount of contingency that NS Power has applied to the projects for
33 approval in the 2022 ACE Plan is 14 percent. This is near the mid-point of the range for projects
34 with a Class 3 estimate as detailed in the non-binding contingency guidelines.
35

36 The application of NS Power's non-binding contingency guidelines was discussed as part of
37 stakeholder engagement sessions in August 2021. NS Power has committed to continued

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implementation of the non-binding contingency guidelines with additional efforts to make the process consistent across the capital program. As a result of discussions with stakeholders, the non-binding contingency guidelines have been updated to improve guidance to users, and now include an estimate maturity checklist, charts to better explain how AACE guidelines consider contingency, and practice around rationalized contingency evaluation and application to specific parts of the budget versus contingency applied against an overall project budget.

11.2 2022 Capital Spending by Justification Criteria

Items in the 2022 ACE Plan have been developed in accordance with the CEJC. Definitions of the various criteria referenced in **Figure 103** below are included in the CEJC.

Figure 103: Capital Expenditures by Justification

(Millions of dollars)

Justification Criteria	2022 Budget	Projects included for Approval	Routine Spend	Less than \$1M	2021 ACE Items for Filing in late 2021	Items for Subsequent Submission	Carryover	Pt. Aconi
Innovation	\$ 61.0	-	-	-	-	\$ 60.4	\$ 0.6	-
Health & Safety	21.9	-	-	1.2	-	0.8	19.8	0.2
Environment	10.4	2.3	0.5	2.3	-	-	3.9	1.4
Land and Right-of-Way	0.1	-	0.1	-	-	-	-	-
Hydro, Wind and Biomass	105.2	2.1	3.2	5.5	-	53.2	41.2	-
Thermal	74.4	12.5	2.7	35.2	-	12.5	3.8	7.6
Transmission Plant	83.7	11.6	13.5	4.1	-	29.2	25.2	-

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Figure 103: Capital Expenditures by Justification

(Millions of dollars)

Justification Criteria	2022 Budget	Projects included for Approval	Routine Spend	Less than \$1M	2021 ACE Items for Filing in late 2021	Items for Subsequent Submission	Carryover	Pt. Aconi
Distribution System	100.3	4.3	68.2	11.0	-	3.0	13.8	-
Pole Retreatment	0.8	0.5	-	-	-	-	0.2	-
Metering Equipment	5.5	-	2.4	-	-	-	3.1	-
Work Support Facilities	17.4	-	7.5	1.4	-	1.7	6.8	-
Information Technology Application and Hardware System	40.2	-	1.7	6.8	21.0	7.1	3.5	-
Vehicles	10.9	-	10.7	0.1	-	-	0.0	-
Total	\$531.6	\$33.3	\$110.5	\$67.7	\$21.0	\$167.9	\$121.9	\$9.2

*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 2022 Capital Spending by Justification Sub-Criteria

Figure 104 below provides 2022 capital spending by justification sub-criteria.

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Figure 104: 2022 Capital Spending by Justification Sub-Criteria

(Millions of dollars)

Justification Sub-Criteria	2022 Budget	Projects included for Approval	Routine Spend	Less than \$1M	2021 ACE Items for Filing in late 2021	Items for Subsequent Submission	Carryover
Distribution System							
Requirement to Serve	\$64.7	\$0.0	\$63.2	\$0.3	\$0.0	\$1.3	\$0.0
Pole Strength	1.7	-	-	0.9	-	-	0.7
Service Voltage	2.5	-	-	1.1	-	-	1.4
Deteriorated Conductor	2.6	-	-	0.5	-	-	2.1
Outage Performance	10.4	2.9	0.6	0.9	-	-	6.0
Joint Use Agreement	4.4	-	4.4	-	-	-	-
Other Distribution System	14.0	1.4	-	7.3	-	1.7	3.6
Total	\$100.3	\$4.3	\$68.2	\$11.0	\$0.0	\$3.0	\$13.8
Work Support Facilities							
Building Facilities/Furniture	\$4.5	\$0.0	\$4.5	\$0.0	\$0.0	\$0.0	\$0.0
Building Replacement/Modifications	1.9	-	-	-	-	0.2	1.7
Telecontrol & Telecommunications	6.8	-	1.3	0.9	-	0.4	4.2
Other Work Support Facilities	4.2	-	1.7	0.5	-	1.1	0.9
Total	\$17.4	\$0.0	\$7.5	\$1.4	\$0.0	\$1.7	\$6.8

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

**2022 ACE Plan
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11.4 Quick Reference Sheet

2022 AFUDC Rate for Capital 6.47%

In the Board's Weighted Average Cost of Capital (WACC) and Allowance for Funds Used During Construction (AFUDC) Order dated December 15, 2020, the NSUARB directed NS Power as follows:

1. The WACC and AFUDC rates are established at 6.47%, effective January 1, 2021;
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 M07215.³⁵

Consistent with the Board's Order, the 2022 ACE Plan projects use the Board's approved AFUDC rate of 6.47 percent.

An application for the calculation of the updated WACC/AFUDC rate was filed by the Company on November 23, 2021.

2022 O/H Rates

Generation			Customer Operations		Shared Services	
PP Regular	21.63%		Regular	72.58%	IT	54.45%
Hydro	46.15%		Contract	17.61%		
Contract	8.38	%	Vehicle	40.09%		

³⁵ M09919, NS Power WACC/AFUDC Application, NSUARB Order, December 15, 2020.

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11.5 2022 Depreciation Rates

Figure 105: 2022 Depreciation Rates

	2022
Steam Production Plant	
<i>Lingan</i>	
Lingan 1-2	4.12%
Lingan 3-4	2.28%
Lingan – Common	4.48%
Total Lingan	3.35%
Point Aconi 1	2.27%
<i>Point Tupper</i>	
Point Tupper 1 (Common)	3.97%
Point Tupper 2	2.82%
Total Point Tupper	2.89%
<i>Trenton</i>	
Trenton 5	3.10%
Trenton 6	2.34%
Trenton – Common	0.47%
Total Trenton	2.47%
<i>Tufts Cove</i>	
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%
Total Steam Production Plant	2.82%

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Figure 105: 2022 Depreciation Rates

	2022
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%

	2022
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%

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Figure 105: 2022 Depreciation Rates

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%

	2022
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%

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Figure 105: 2022 Depreciation Rates

	2022
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%
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%
Smart Grid Project	
Solar Generation	4.00%
Batteries	10.00%
EV Chargers	6.67%

CI Number: C0036368

Title: HYD - Lower Great Brook Switchgear Replacement

Start Date: 2021/05
In-Service Date: 2022/12
Final Cost Date: 2023/06
Function: Hydro
Forecast Amount: \$1,362,281

DESCRIPTION:

This project will replace the existing switchgear with modern arc-flash rated switchgear, integrating with modern controls and interfaces.

The Lower Great Brook Generation Station is a single powerhouse with two 2MW units located on the Mersey Hydro System. On average, these units generate 19 GWh of renewable electricity annually.

Summary of Related CIs +/- 2 years:

Pursuant to Section 11.2 of the CEJC, related CIs for Hydro projects include “work completed on the same generating unit and dam structures, but not necessarily the same asset.”

- No other projects in 2020, 2021, 2022, 2023, or 2024

Depreciation Class: Hydraulic Production Plant – Mersey

Estimated Life of the Asset: 35 Years

Retirement Information:

- Categorization of Retirement: Accounting Policy 6420 - Retirement and Disposal of Capital Assets
- Percentage of Asset Pool: 0.4%

JUSTIFICATION:

Justification Criteria: Health & Safety

Why do this project?

The current switchgear requires manual racking of the breakers every time the unit requires safe work permit isolation (multiple times a year) which includes a significant arc-flash hazard for the hydro operator and risk of damage to the equipment. The project is being undertaken to eliminate the arc-flash hazard for personnel safety and improved reliability of the unit breakers.

This project is primarily justified on health and safety, and secondarily on unit reliability.

Why do this project now?

The switchgear in the Lower Great Brook plant is 67 years old and has surpassed its design life. The design of the breakers presents an arc-flash risk with every manual racking operation. The switchgear breakers, and other components of the switchgear, are in poor condition and require replacement. As discussed in the 2020 Integrated Resource Plan (IRP), Nova Scotia Power continues to evaluate the Mersey Refurbishment project which will determine the optimal long-term strategy for the Mersey hydro system. Based on this strategy, the earliest this plant could be replaced is anticipated to be 2042. In the near term, the Lower Great Brook generating station is expected to continue to operate and so this work is required to address a current safety issue and needs to be completed at this time.

Why do this project this way?

Replacing the switchgear is required to bring the equipment up to modern safety standards. Replacing the switchgear will improve the safety and reliability of the plant and is the only option as refurbishment is not feasible due to equipment obsolescence.

CI Number : C0036368

- HYD - Lower Great Brook Switchgear Replacement

Project Number C0036368

Parent CI Number :

-

Asset Location : 1357

- 1357 Lower Great Brook Common Property

Budget Version 2022 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	2500 - HGP - Generator	1,261,916
Retirements	2500 - HGP - Generator	100,365
Total Cost:		1,362,281
Original Cost:		125,397

Capital Project Detailed Estimate

Location: Hydro CI #: C0036368 Title: HYD - Lower Great Brook Switchgear Replacement Execution Year: 2022										
Description					Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#'s)
Regular Labour										
Hydro River Staff - Construction	PD	217	\$	372	\$	80,916				
Engineering Staff	PD	130	\$	413	\$	53,744				
Project Support Staff	PD	80	\$	339	\$	27,099				
Sub-Total					\$	161,758				
Travel Expenses										
Travel Expense	Month	8	\$	700	\$	5,600				
Sub-Total					\$	5,600				
Materials										
Switchgear/Transformer	Lot	1	\$	422,579	\$	422,579				
R/C Panel	Lot	1	\$	8,538	\$	8,538				CI 49945
Spare Breaker	Lot	1	\$	12,274	\$	12,274				
Cable to Substation	Lot	1	\$	20,000	\$	20,000				CI C0019024
Misc. Materials	Lot	1	\$	15,000	\$	15,000				
Sub-Total					\$	478,392				
Contracts										
Install switchgear	Lot	1	\$	150,000	\$	150,000				CI C0019024
Misc. Contracts	Lot	1	\$	15,000	\$	15,000				
Commissioning & Testing	Lot	1	\$	18,975	\$	18,975				
Site Construction Supervision	Lot	1	\$	28,000	\$	28,000				
Sub-Total					\$	211,975				
Consulting										
Interconnection Design/Drawings	Lot	1	\$	15,500	\$	15,500				
Specifications	Lot	1	\$	23,000	\$	23,000				
Arc Flash Study	Lot	1	\$	70,333	\$	70,333				
Breakers and HV BUSS PM (AMO)	Lot	1	\$	24,375	\$	24,375				
Building Modifications	Lot	1	\$	20,000	\$	20,000				
Sub-Total					\$	153,208				
Meals										
Site Visits	Month	8	\$	500	\$	4,000				
Sub-Total					\$	4,000				
Rental/Maintenance of Equipment										
Generator Rental	Month	5	\$	1,500	\$	7,500				
Sub-Total					\$	7,500				
Other Goods and Services										
Contingency	%	20%	\$	1,022,432	\$	204,486				
Sub-Total					\$	204,486				
Interest Capitalized										
AFUDC					\$	43,961				
Sub-Total					\$	43,961				
Administrative Overhead										
Labour AO					\$	73,641				
Contractor AO					\$	17,759				
Sub-Total					\$	91,400				
Sub-Total (no AO, AFUDC)					\$	1,226,919				
TOTAL (AO, AFUDC included)					\$	1,362,281				
Original Cost					\$	125,397				
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.										

CI Number: C0024484

Title: HYD - Fourth Lake Switchgear Replacement

Start Date: 2021/04
In-Service Date: 2022/12
Final Cost Date: 2023/06
Function: Hydro
Forecast Amount: \$1,145,245

DESCRIPTION:

This project will replace the existing obsolete switchgear with modern safety improved arc-flash rated switchgear, integrating with modern controls and interfaces.

The Fourth Lake Generation Station is a single powerhouse with one 3MW unit located on the Sissiboo Hydro System. On average, the unit generates 9.3 GWh of renewable electricity annually.

Summary of Related CIs +/- 2 years:

Pursuant to Section 11.2 of the CEJC, related CIs for Hydro projects include “work completed on the same generating unit and dam structures, but not necessarily the same asset.”

- No other projects in 2020, 2021, 2022, 2023, or 2024

Depreciation Class: Hydraulic Production Plant - Bear River

Estimated Life of the Asset: 35 Years

Retirement Information:

- Categorization of Retirement: Accounting Policy 6420 - Retirement and Disposal of Capital Assets
- Percentage of Asset Pool: 0.7%

JUSTIFICATION:

Justification Criteria: Health & Safety

Why do this project?

The current switchgear requires manual racking of the breakers every time the unit requires safe work permit isolation (multiple times a year) which includes a significant arc-flash hazard for the hydro operator and risk of damage to the equipment. The project is being undertaken to eliminate the arc-flash hazard for personnel safety and improved reliability of the unit breakers.

This project is primarily justified on health and safety, and secondarily on unit reliability.

Why do this project now?

The switchgear in the Fourth Lake plant is 38 years old and has reached the end of its expected design life of 30 years. The design of the breakers presents an arc-flash risk with every manual racking operation. The switchgear breakers, and other components of the switchgear, are in poor condition and require replacement.

Why do this project this way?

Replacing the switchgear is required to bring the equipment up to modern safety standards. Replacing the switchgear, will improve the safety and reliability of the plant and is the only option as refurbishment is not feasible due to equipment obsolescence.

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CI Number : C0024484

- HYD - Fourth Lake Switchgear Replacement

Project Number C0024484

Parent CI Number :

-

Asset Location : 1364

- 1364 Fourth Lake, 3 Mwh; 1983 on Sissiboo River

Budget Version 2022 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	2300 - HGP - Power Equip.-Station S	1,018,500
Retirements	2300 - HGP - Power Equip.-Station S	126,745
Total Cost:		1,145,245
Original Cost:		418,376

Capital Project Detailed Estimate

Location: Hydro CI#: C0024484 Title: HYD - Fourth Lake Switchgear Replacement Execution Year: 2022						
Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#s)
Regular Labour						
Hydro River Staff - Construction	PD	123	\$ 372	\$ 45,819		
Engineering Staff	PD	115	\$ 413	\$ 47,542		
Project Support Staff	PD	60	\$ 339	\$ 20,324		
			Sub-Total	\$ 113,685		
Term Labour						
Hydro River Staff - Construction	PD	20	\$ 372	\$ 7,518		
			Sub-Total	\$ 7,518		
Travel Expenses						
Travel Expense	Lot	1	\$ 5,600	\$ 5,600		
			Sub-Total	\$ 5,600		
Materials						
Switchgear and Breakers	Lot	1			Attachment 1, Page 4	
Misc. Materials	Lot	1				
Cable to Substation	Lot	1	\$ 20,000	\$ 20,000		C0019024
Motor Control Centre Replacement Equipment	Lot	1	\$ 83,802	\$ 83,802		C0025683
Spare Breaker	Lot	1	\$ 10,000	\$ 10,000		
			Sub-Total	\$ 297,552		
Contracts						
Installation - Switchgear	Lot	1	\$ 122,467	\$ 122,467		C0019024
Installation - MCC	Lot	1	\$ 90,000	\$ 90,000		C0025683
Commissioning & Testing	Lot	1	\$ 18,975	\$ 18,975		
Site Construction Supervision	Lot	1	\$ 28,000	\$ 28,000		
Building Moisture Infiltration	Lot	1	\$ 30,000	\$ 30,000		
			Sub-Total	\$ 289,442		
Consulting						
Interconnection Design/Drawings	Lot	1	\$ 15,500	\$ 15,500		
Specifications (Switchgear + MCC)	Lot	1	\$ 45,260	\$ 45,260		
Arc Flash Study	Lot	1	\$ 55,707	\$ 55,707		
HMI & PLC Programming	Lot	1	\$ 8,880	\$ 8,880		
Building Modifications	Lot	1	\$ 10,000	\$ 10,000		
			Sub-Total	\$ 135,347		
Meals						
Site Visits	Lot	1	\$ 4,000	\$ 4,000		
			Sub-Total	\$ 4,000		
Rental/Maintenance of Equipment						
Generator Rental	Lot	1	\$ 7,500	\$ 7,500		
			Sub-Total	\$ 7,500		
Other Goods and Services						
Contingency	%	20%	\$ 860,644	\$ 172,129		
			Sub-Total	\$ 172,129		
Interest Capitalized						
AFUDC				\$ 33,183		
			Sub-Total	\$ 33,183		
Administrative Overhead						
Labour AO				\$ 55,040		
Contractor AO				\$ 24,249		
			Sub-Total	\$ 79,289		
			Sub-Total (no AO, AFUDC)	\$ 1,032,773		
			TOTAL (AO, AFUDC included)	\$ 1,145,245		
Original Cost				\$ 418,376		

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.

Powell Industries

Powered By Safety



Prepared by: Kelley Leyte

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Budget Bill of Material and Pricing Proposal

Company: Nova Scotia Power
Project: 4th Lake Hydro Station
Powell MSD: 242040

COMPANY OVERVIEW

Powell was founded in 1947 and has over 70 years of experience with 3500 employees worldwide. As the largest manufacturer of Medium Voltage Switchgear (Arc-Resistant and Metal-Clad) in North America and one of the largest in the world, Powell specializes in the engineering, manufacturing and servicing of complex electrical solutions where critical power applications demand a safe and reliable supply. With Powell's equipment sold, serviced, and utilized world-wide, Powell's customers hail from a wide variety of industries, including: electrical utilities, transportation, environmental, mining & metals, renewables, commercial, institutional and the oil & gas sector. Powell attributes its continued success to the production of high quality, safety-oriented equipment which satisfies and exceeds our clients' needs. Given the high levels of customer satisfaction, 80% of our business is repeat business.

Powell Canada Inc. is a subsidiary of Powell Industries Inc. Powell Canada was incorporated in 2009 and is headquartered in Acheson (Edmonton), Alberta. As one of Canada's most reputable electrical equipment manufacturing companies, Powell Canada proudly employs more than 400 people across the country. The Acheson Head Office is home to Powell's 400,000 ft² manufacturing facility - Canada's largest switchgear and E-House manufacturing plant.



In addition to our manufacturing facility, Powell Canada has service centers located in Edmonton, AB, Fort McMurray, AB, and Lloydminster, AB. Powell Canada has sales offices located in Calgary, AB, and Montreal, QC. Powell Canada also has a Research & Development center in Vancouver, BC.

Powell Industries

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Powell has several other manufacturing facilities globally. Most notably, Powell owns & operates North America's largest switchgear and E-House factory in Houston, TX (500,000 ft² – see picture below).



Powell Canada is an ISO 9001:2015 certified facility.

Powell Industries Inc. is a publicly traded company on NASDAQ: POWL. The chart below outlines Powell's Annual Revenues for the last 6 years. You can also find this information in our Annual Reports available at powellind.com.

Annual Revenues (in USD):

2019	\$517,180,000.00
2018	\$448,716,000.00
2017	\$395,911,000.00
2016	\$565,243,000.00
2015	\$661,858,000.00
2014	\$647,814,000.00

Source: Powell – 2019 Annual Report

Powell Canada – Head Office:

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(780) 948 – 3300
infocanada@powellind.com

Powell Industries – Head Office:

8550 Mosley Road
Houston, Texas 77075
(713) 944 – 6900
info@powellind.com

Powell Industries

Powered By Safety

One (1) line-up of PowlVac-AR® arc resistant metal clad switchgear with vacuum circuit breakers in accordance with ANSI standards C37.09, C37.20.2, C37.20.7, and rated as follows:

Maximum Voltage Class:	5	kV
Basic Impulse Level:	60	kV
Power Frequency Withstand:	19	kV
Voltage Range (K factor):	1	
Short-circuit Current Rating:	36	kA rms
Close and Latch Capacity:	94	kA Peak
Close Voltage:	125	VDC
Trip Voltage:	125	VDC
Frequency:	60	Hz

3 Vertical section(s) of metal clad switchgear each with the following features:

- Indoor enclosure, 11 gauge steel
- Basic one or two high construction
- Arc resistant rear access door and top mounted arc plenum
- 1200A main bus, tin plated copper, 3 phase, 3 wire
- Flame retardant and track resistant Bonded Epoxy bus insulation system
- Epoxy main bus pass through insulators in a glass polyester mounting
- Carbon steel Grade 5 mounting hardware, plated for corrosion protection
- Phase polarity 1 2 3 or A B C, front to back, top to bottom, left to right
- 1/4" X 3" copper ground bus with plating to match main bus
- Control terminal blocks, 600 volt, 30 ampere
- Control wiring, 14 gauge, 41 strand, type SIS with VW-1 flame retardant rating
- Control wire termination, insulated, spade tongue, crimp type
- Current transformer shorting type terminal blocks
- CT control wiring, 12 gauge, 65 strand, type SIS with VW-1 flame retardant rating
- CT terminations, insulated, ring tongue, crimp type
- Common DC bus #8 AWG SIS wire with seamless ring tongue terminations
- Laminated plastic device nameplates, stainless steel mounting screws
- Wire markers, sleeve type
- Enclosure space heaters with expanded metal cages, 240VAC, energized @ 120VAC
- CSA Label
- Texture powder coat paint finish
- ANSI-61, light gray exterior with white instrument panels

1 Set of voltage monitoring equipment, each to include:

- 1 Closed door racking type roll-out assembly complete with primary and secondary fuses
- 3 Voltage transformer(s), 14400:120 volt

3 Sets of voltage monitoring equipment, each to include:

- 1 Closed door racking type roll-out assembly complete with primary and secondary fuses
- 2 Voltage transformer(s), 14400:120 volt

1 Set of voltage monitoring equipment, each to include:

- 1 Closed door racking type roll-out assembly complete with primary and secondary fuses

Powell Industries

Powered By Safety

1 Voltage transformer(s), 14400:120 volt

1 Circuit breaker equipment set, each to include:

- 1 Circuit breaker cell with a single action (latch - unlatch) door with, closed door racking provision, viewing window, integral light and remote switch, riser bus, cell studs, insulated primary spouts, automatic isolating shutters, manual closed door trip unit, and cell interlocks as required by ANSI.
- 1 Silver plated copper runback bus assembly with boots
 - Epoxy bus stand off assembly
- 1 PowlVac drawout vacuum circuit breaker with closed door racking provision, with 2a/2b contacts
- 1 Circuit breaker open/close control switch
- 2 Circuit breaker status indicating lights, LED type
- 1 Circuit breaker switch, MOC 9 circuit (5a/4b)
- 1 Circuit breaker switch, TOC 9 circuit (5a/4b)
- 1 Closed door racking to include viewing window, light 120 VAC LED type with switch
- 1 Emergency push to trip switch with protective cover
- 1 Mechanical rear door safety interlock (interlocks the rear cell door to the breaker cell)
- 1 DC bus isolation disconnect, knife blade type, 250VDC, 2 pole
- 1 Set close circuit disconnect fuse block with fuses
- 1 Set trip circuit disconnect fuse block with solid link
- 6 Current transformers, single ratio, standard burden
- 1 Zero sequence current transformer
- 1 Feeder Protection Relay, SEL 751A#01
- 1 Set A-B chance ball stud with covers
- 1 Lot nameplates

1 Set of switchgear accessories to include:

- 1 Manual charging handle
- 1 Circuit breaker racking handle
- 1 Interlock override
- 1 VT rollout assembly racking handle

Metal Clad Switchgear Budget Price

[REDACTED]

Additional Options:

Circuit Breaker Monitor™ (CBM)..... Breaker

Real-Time Circuit Breaker Data Acquisition and Diagnostics

[REDACTED]

BriteSpot G3™ Thermal Monitoring..... Breaker

Instant. Accurate. 24/7 Fiber-Optic Temperature Monitoring

[REDACTED]

Circuit Breaker Monitor™ (CBM)..... Breaker

[REDACTED]

**Total Budget Estimate
(plus or minus 15%)**

[REDACTED]

Note: Bill of Material and Pricing is budgetary only and will vary plus or minus 15% pending receipt and review of final project specifications, data sheets, and one-line drawings.

Powell Industries

Powered By Safety

Submitted by:



Kelley Leyte

Sales & Marketing Coordinator

Powell Canada Inc.

Phone: 780.884.6177

Email: kelly.leyte@powellind.com

IMPORTANT NOTICE

This Powell budgetary quotation is preliminary and not final and as such non-binding. It is tendered for discussion only, does not constitute a term to contract and Powell can, without notice, make any change in Powell's own discretion. Any contract to sell the subject matter of the proposal shall be subject to mutual agreement as to price (which may be different than that shown herein), schedule, scope of work and terms.

CI Number: C0038747

Title: LIN1 L-0 Blade Replacement

Start Date: 2022/12
In-Service Date: 2023/06
Final Cost Date: 2023/12
Function: Steam
Forecast Amount: \$6,066,800

DESCRIPTION:

This project includes the replacement of the Lingan Unit 1 Last Pass (L-0) turbine blades. The L-0 blades are original to the turbine (1979) and are susceptible to wear due to their location in the turbine (the L-0 blades are the last blades before the steam is condensed in the condenser).

This project will be completed as part of the planned major outage on Lingan Unit 1 in 2023 and includes investment on multiple assets in order to safely and reliably operate this unit up until its anticipated planned retirement which would approximately coincide with the next planned major maintenance outage interval (8-10 years). These investments also enhance NS Power's capability to two-shift (the process of cycling the unit off and on versus continuous operation) this unit in the future which provides much needed flexibility to the generating fleet. The blades have a long delivery time and need to be ordered in 2022 to allow for them to be on site and ready for the major outage in 2023.

Summary of Related CIs +/- 2 years:

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

- 2021 CI C0028842 – LIN1 Turbine Valve Refurbishment \$353,733

Depreciation Class: Steam Production Plant - Lingan 1-2

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: 0.7%

JUSTIFICATION:

Justification Criteria: Thermal

Sub Criteria: Equipment Refurbishment/Replacement

Why do this project?

Evaluation of Lingan Unit 1 L-0 turbine blade life consumption calculations and inspection by the NS Power Turbine Generator Asset Management Team in corroboration with third party experts indicates that the L-0 blades are now at the end of their service life. The tips of the blades have started to erode, and erosion patterns caused stress risers which allowed a cyclic fatigue fracture to occur with increasing risk of blade separation. Completing this replacement will mitigate the risk of blade separation, and the resulting damage to both the interior and possibly the exterior of the machine.

Why do this project now?

Life consumption calculations and inspection indicate that the Lingan Unit 1 L-0 turbine blades are at the end of life and due to the reasons mentioned above are at risk of blade separation. It is necessary for safety and unit reliability to re-establish the life cycle integrity of the Lingan Unit 1 L-0 blades. The Lingan Unit 1 outage has been deferred for two years to 2023 with increased monitoring and asset life consumption modeling. NS Power can not extend this refurbishment interval beyond 2023 due to the unacceptable risk to safe reliable operation from vibration excursions and blade separations that can cause significant collateral damage to the turbine. For example, blade liberations can

cause rotor instability potentially damaging hydrogen seals that could result in a fire or explosion. This scenario is outside NS Power's Risk Tolerance due to the potential consequences to people's safety. This major planned outage provides sufficient time for the L-0 blades to be replaced.

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. Cropping of the existing blades was also evaluated but due to the estimated 40 percent load reduction in an already firm capacity deficient outlook this option was not feasible. If the blades are not purchased in advance of the outage, Langan Unit 1 could be unavailable for an extended period (up to 18 months) through the 2023/2024 winter putting firm customers at an unacceptable risk of interruption

REDACTED (CONFIDENTIAL INFORMATION REMOVED)

REDACTED 2022 ACE Plan CI C0038747 Page 3 of 4

CI Number : C0038747

- LIN1 L-0 Blade Replacement

Project Number C0038747

Parent CI Number : 459715

-

Asset Location : 1131

- 1131 Lingan Unit 1; Commissioned 1979, 164Mwh

Budget Version 2022 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	1000 - SGP - Turbo Gen.Instal.	5,263,472
Retirements	1000 - SGP - Turbo Gen.Instal.	803,328
Total Cost:		6,066,800
Original Cost:		1,499,114

Capital Project Detailed Estimate

Location: Lingan Generating Station CI# : C0038747 Title: LIN1 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	20	\$ 365	\$ 7,309		
Engineering	PD	20	\$ 413	\$ 8,268		
Maintenance Trades	PD	328	\$ 372	\$ 122,016		
Utility worker	PD	20	\$ 245	\$ 4,900		
			Sub-Total	\$ 142,493		CI 47658
OT Labour						
Maintenance Trades	PD	276	\$ 744	\$ 205,344		
			Sub-Total	\$ 205,344		
Term Labour						
Maintenance Trades	PD	525	\$ 372	\$ 195,300		
Utility worker	PD	224	\$ 245	\$ 54,876		
			Sub-Total	\$ 250,176		
Travel Expense						
Factory Blade Inspection	Lot	1	\$ 10,000	\$ 10,000		
			Sub-Total	\$ 10,000		
Materials						
L-0 Replacement Blades	Lot	1			Attachment 1, Page 4, Item 5.1.1	
Blade Hardware	Lot	1			Attachment 1, Page 4, Item 5.1.2	
USD to CDN Exchange	%	30%				
Misc Consumables	lot	1				
			Sub-Total	\$ 2,782,750		
Contracts						
Rotor Inspection Services	Lot	1				
L-0 Blade Replacement	Lot	1			Attachment 1, Page 4, Item 5.2	
Turbine Vibration Technical Advisor	Lot	1	\$ 30,000	\$ 30,000		
Turbine Technical Advisor	Lot	1	\$ 300,000	\$ 300,000		
USD to CDN Exchange	%	30%	\$ 1,117,100	\$ 335,130		
Grit Blasting	Lot	1	\$ 50,000	\$ 50,000		
Onsite machining	Lot	1	\$ 100,000	\$ 100,000		
Fastener Heaters	Lot	1	\$ 35,000	\$ 35,000		
			Sub-Total	\$ 1,637,230		
Consulting						
Project Management	Lot	1	\$ 40,000	\$ 40,000		
			Sub-Total	\$ 40,000		
Other Goods & Services						
Contingency	%	15%	\$ 4,419,980	\$ 662,997		
			Sub-Total	\$ 662,997		
Interest Capitalized						
AFUDC				\$ 91,517		
			Sub-Total	\$ 91,517		
Administrative Overhead						
Labour AO				\$ 107,126		
Contractor AO				\$ 137,167		
			Sub-Total	\$ 244,293		
SUB-TOTAL (no AO, AFUDC)				\$ 5,730,990		
TOTAL (AO, AFUDC included)				\$ 6,066,800		
Original Cost				\$ 1,499,114		
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.						



TOSHIBA

TOSHIBA AMERICA ENERGY SYSTEMS CORPORATION

6623 W. WASHINGTON STREET, WEST ALLIS, WI 53214
PHONE: (414) 475-2800
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July 7, 2021

Jason March
Nova Scotia Power, Incorporated
1894 Barrington Street, Post Office Box 910
Halifax, Nova Scotia, Canada, B3J 2W5

RE: Proposal to Nova Scotia Power, Incorporated
Lingan Unit 1 – Supply and Installation of LP Turbine Last-Stage (L0) Blades
TAES Proposal Q5614, Revision 1

Dear Mr. March:

Toshiba America Energy Systems Corporation (TAES) is pleased to offer this proposal for the supply and installation of LP turbine L0 blades for Lingan Unit 1. Attached, please find the TAES proposal, which consists of the following sections:

- Section 1 — Scope of Supply
- Section 2 — Scope of Service: LP Rotor L0 Blade Replacement, Turbine End and Generator End
- Section 3 — Technical Clarifications
- Section 4 — Schedule
- Section 5 — Prices
- Section 6 — Commercial Clarifications
- Section 7 — Attachments
- Section 8 — Confidentiality

This Revision 1 updates the prices of the parts and services. We hope this proposal is of interest to you and look forward to discussing it with you in detail in the near future. Please contact me if you have questions. Thank you.

Regards,

Ben Secora

Ben Secora
Account Manager
TOSHIBA AMERICA ENERGY SYSTEMS CORPORATION
Telephone Number: 414-217-4175
Email: ben.secora@toshiba.com

Cc: Lee Hietpas, Vice President, Power Generation Services
Brian Albin, Director of OEM Services
Jeff Wenzel, Manager, Project Management
Tom Kaboski, Manager, Maintenance Services
John Kovacic, Manager of Proposals and Contracts



Section 1 — Scope of Supply

1.1 Supply of LP Turbine 30" L0 Blades:

Part	Quantity
Turbine End	
L0 Blade with Erosion Shield	88
Cover Segment	91
Sleeve	88
Pins	317
Reamers and other installation hardware	
Generator End	
L0 Blade with Erosion Shield	88
Cover Segment	91
Sleeve	88
Pins	317
Reamers and other installation hardware	

Section 2 — Scope of Service: LP Rotor L0 Blade Replacement, Turbine End and Generator End

- 2.1 Transport to site tooling and materials.
- 2.2 Mobilize to site blading specialists.
- 2.3 Establish plant contact interface.
- 2.4 Complete safety training as required.
- 2.5 Set-up one (1) powered roller set (Plant scope).
- 2.6 Receive and inventory blades and assembly hardware (e.g., covers, pins, etc.).
- 2.7 Receive the rotor, already set up on a powered roller by the Plant or Others.
- 2.8 Remove blades on Turbine End (TE) and Generator End (GE).
- 2.9 Blast clean the rotor (Plant scope).
- 2.10 Glass-bead blast the last-stage-blade attachment areas (Plant scope).
- 2.11 Clean the installation area.
- 2.12 Perform Non Destructive Examination (NDE) of the last-stage-blade attachment areas (Plant scope).
- 2.13 Install blade rows, TE and GE, including:
 - 2.13.1 Ream pin holes.
 - 2.13.2 Install pins and stake to secure.
 - 2.13.3 Secure bucket covers.
- 2.14 Mobilize to site one (1) Dynamics Engineer.
- 2.15 Set up the portable balance machine supplied by TAES (Plant scope).
- 2.16 Perform low-speed balance of the assembled LP rotor.
- 2.17 Release the rotor to the Plant.
- 2.18 Demobilize from site.

Section 3 — Technical Clarifications

- 3.1 Scope of Supply:
 - 3.1.1 The parts described herein carry the standard TAES parts warranty.
 - 3.1.2 This proposal does not represent a guaranty of performance.
- 3.2 Spill Strips:
 - 3.2.1 This proposal does not include the supply or installation of replacement L0 diaphragm spills strips.
- 3.3 Scope of Service:
 - 3.3.1 For all TAES on-site staff, this proposal includes one (1) hour of contractor safety orientation training performed near or at site and immediately preceding work start.

- 3.3.2 To address COVID-19 concerns, for all on-site TAES staff and contractor employees, this proposal includes the use of face masks and sanitizing wipes; TAES and the plant must discuss additional COVID-19 requirements, which, if they apply, TAES will regard as Extra Work (for example, this proposal does not include the cost of quarantine before or after travel to site).
- 3.3.3 TAES is not responsible for any costs associated with the presence on site of hazardous material, including asbestos or lead carbonate.
 - 3.3.3.1 If required and approved by the Plant, TAES would perform the services required for the abatement of hazardous material as Extra Work.
- 3.3.4 Crane:
 - 3.3.4.1 This proposal assumes that the Plant will supply a crane with the capacity required for the proposed work and a crane operator.
 - 3.3.4.2 Proposal assumes that the overhead crane can reach all components for disassembly/reassembly.
 - 3.3.4.3 This proposal assumes TAES will have priority on overhead crane usage.
 - 3.3.4.4 TAES will regard as Extra Work any delay caused by crane mechanical issues.
 - 3.3.4.5 If required, TAES will supply of additional cranes, hoists and rigging as Extra Work.
- 3.3.5 This proposal assumes that TAES can manually remove pins.
 - 3.3.5.1 TAES would perform machining or drilling-out of pins as Extra Work.
- 3.3.6 Replacement Parts:
 - 3.3.6.1 Unless explicitly specified herein, this proposal does not include replacement parts and assumes that the Plant will supply replacement parts.
 - 3.3.6.2 If the Plant does not supply replacement parts, TAES will re-use existing parts.
- 3.3.7 Low speed balance:
 - 3.3.7.1 This proposal assumes that the Plant or Others will perform rotor moves in support of the blade change out and the low-speed balance.
 - 3.3.7.2 TAES will balance the rotor in accordance with ISO 1940/1 to G2.5 criteria.
 - 3.3.7.3 If TAES cannot remove the balance weights by normal hand methods, TAES will destructively remove the weights by machining methods (drilling, grinding, etc.) as Extra Work.
- 3.3.8 This proposal assumes the Plant or Others will off-load and load tools and provide other craft labor support for re-blading activities.
- 3.3.9 Repairs and Extra Work:
 - 3.3.9.1 Unless explicitly specified herein, this proposal does not include repairs.
 - 3.3.9.2 Upon discovery, TAES will submit recommendations for repairs.
 - 3.3.9.3 TAES will perform repairs as Extra Work.
 - 3.3.9.4 In addition to repairs, TAES will treat as Extra Work any service beyond what is specified in Section 2, Scope of Work.
 - 3.3.9.4.1 This includes additional time or delays (including standby time) outside the direct control of TAES or its subcontractors, excess time required for stuck or damaged parts, or added scope.
 - 3.3.9.5 TAES will provide a cost and schedule estimated - in the form of an Extra Work Authorization (EWA) - for Extra Work.
 - 3.3.9.6 TAES will not begin Extra Work without the Plant's authorization.
 - 3.3.9.7 TAES will calculate the price for Extra Work in accordance with the *Toshiba America Energy Systems Corporation Thermal Business Unit Fleet Rate Sheet, April 1, 2022 – March 31, 2023* (Attachment 1).



Section 4 — Schedule

- 4.1 TAES estimates delivery to site approximately eight (8) months after acknowledgement of a purchase order.
 - 4.1.1 Note that Toshiba has raw material available in stock now to manufacture these blades and that the price and delivery are contingent upon that material remaining available at the time we receive a purchase order.
 - 4.1.2 TAES reserves the right to recalculate pricing if we receive a purchase order after the proposal validity period.
- 4.2 This proposal assumes that TAES will perform the scope of service during an outage during the fall of 2022.
 - 4.2.1 This proposal assumes that TAES Technical Advisors will be present during re-blading services while supporting the larger scope of outage work.
- 4.3 TAES estimates that we can perform blade replacement services in approximately 20 calendar days, including set up and low-speed balance, working two (2) 12-hour shifts per day.
 - 4.3.1 This schedule estimate assumes the Plant or Others will perform blast and NDE services in three (3) 12-hour shifts.

Section 5 — Prices

- 5.1 Scope of Supply:
 - 5.1.1 Blades, Cover Segments, and Sleeves: [REDACTED] USD Fixed Price.
 - 5.1.2 Pins, Reamers and other Installation Hardware: [REDACTED] Fixed Price.
- 5.2 Scope of Service: [REDACTED] USD Fixed Price.

Section 6 — Commercial Clarifications

- 6.1 TAES will provided the quoted services in accordance with *Master Goods & Services Agreement between Nova Scotia Power and Toshiba American Energy Systems Corporation Effective Date August 5, 2015* (Attachment 2), plus Amendments 1 and 2 to the agreement (Attachments 3 and 4).
- 6.2 This offer shall remain valid for 90 days after the date of the proposal.
- 6.3 Payment terms are net 35 days.
 - 6.3.1 A late payment service charge of 1½% per month shall apply.
- 6.4 Pricing assumes that no site work will occur during a holiday or holiday weekend.
- 6.5 Prices do not include sales and use taxes, VAT, gross receipts, excise taxes and other local and state taxes, fees and any security instrument cost.
- 6.6 Freight terms are DDP in accordance with Incoterms 2010.
 - 6.6.1 This proposal covers the supply of parts under a standard, non-expedited lead time.
- 6.7 The above price and delivery is subject to prior sale.
- 6.8 Invoicing shall be as follows:
 - 6.8.1 Blades, Cover Segments, and Sleeves:
 - 6.8.1.1 Twenty-five percent (25%) by upon acknowledgement of a purchase order.
 - 6.8.1.2 Sixty-five percent (65%) upon FOB Japan.
 - 6.8.1.3 Ten percent (10%) upon arrival at site.
 - 6.8.2 Pins, Reamers and other Installation Hardware:
 - 6.8.2.1 Twenty-five percent (25%) by upon acknowledgement of a purchase order.
 - 6.8.2.2 Sixty-five percent (65%) upon shipment.
 - 6.8.2.3 Ten percent (10%) upon arrival at site.
 - 6.8.3 Site services:
 - 6.8.3.1 Twenty percent (20%) upon acknowledgement of a purchase order.



- 6.8.3.2 Fifty percent (50%) upon mobilization to site.
- 6.8.3.3 Thirty percent (30%) upon demobilization.
- 6.9 All prices are in US dollars.
- 6.10 TAES will require the Plant's assistance in obtaining permissions for TAES site service staff to enter and work in Canada.
 - 6.10.1 TAES will require the letter of invitation eight (8) weeks in advance of the start date.
- 6.11 Note that this proposal includes both services and parts offerings. TAES requests that NSPI provide separate purchase order line items for the parts defined in Section 1 and the services defined in Section 2. Alternatively, TAES can accept separate purchase orders for the services and parts.

Section 7 — Attachments

- 7.1 **Attachment 1:** Toshiba America Energy Systems Corporation Thermal Business Unit Fleet Rate Sheet, April 1, 2022 – March 31, 2023.
- 7.2 **Attachment 2:** Master Goods & Services Agreement between Nova Scotia Power and Toshiba American Energy Systems Corporation Effective Date August 5, 2015.
- 7.3 **Attachment 3:** Amendment 1 to the Master Goods & Services Agreement.
- 7.4 **Attachment 4:** Amendment 2 to the Master Goods & Services Agreement.

Section 8 — Confidentiality

- 8.1 This offer contains information proprietary to TAES; it is submitted in confidence and is to be used solely for the purpose for which it is furnished and returned upon request.
- 8.2 This document and information are not to be reproduced, transmitted, disclosed, or used otherwise in whole or in part without the written authorization of TAES.



TOSHIBA AMERICA ENERGY SYSTEMS CORPORATION

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Toshiba America Energy Systems Corporation
Thermal Business Unit Fleet Rate Sheet, April 1, 2022 – March 31, 2023

LABOR CATEGORY ⁴	STRAIGHT TIME	OVERTIME	DOUBLE TIME
Field Services			
Site Manager			
Technical Advisor (TA)			
Specialty Services			
Generator Specialist			
Lead Field Technician			
Field Technician			
Measurement Inspection Services (MIS) Engineer			
Manual Measurement Technician and Equipment ⁶			
3-D Measurement Technician and Equipment ^{5, 6}			
Shop Services			
Heavy Machining			
Medium Machining			
Specialized Technician			
Technician / Light Machining			
Office Engineering Services			
Engineer (Milwaukee- or Japan-based)			
EQUIPMENT RENTAL ⁶			
Vibration Equipment			
Dynamic Signal Analyzer			
Vibration Probe (Proximity, Velocity, Accelerometer)			
Impulse Hammer			
Field Machining Equipment			
Portable Lathe			
Turbine Tool Trailer			
Lamina Drill			
Welding Machine			
Other			
Stator Test Skid			
OTHER EXPENSES			
Subcontractor Services and Materials			
Shipping and Freight			
Travel and Expenses			
Round-trip Airfare			
Personal Vehicle Use: Mileage when a TAES employee uses a personal vehicle to travel from home to a work site and return home from a work site.			
Per Diem: Includes hotel/motel, meals, local transportation (including car rental), and miscellaneous living expenses (for example, laundry).			
TAES Company Van			
TAES Company Stake Truck			

¹ Rates are unit price per piece of equipment and are valid for each use or 1 w

² Rates are per week, or any portion thereof, with one week minimum.

³ Equipment shipping is not included in the above rates and will be charged at cost plus 10%.

⁴ A 15% adder to all labor rates will apply to International Work.

⁵ Includes one FARA Arm/Laser scanner.

⁶ If equipment is quarantined at a nuclear facility, the regular rental fee will apply until the equipment is available for use.

FIELD SERVICES LABOR CATEGORIES

Site Manager: TAES field service representative that provides on-site project management and lead field service engineering services, including the planning and organization of resources required to complete the TAES work scope, supervision of TAES personnel and TAES contractors, and providing progress reports on project schedule and cost.

Technical Advisor: TAES field service representative that provides technical advice on the methods and standards for the disassembly, inspection, repair, and reassembly of the turbine and generator, and may include pre- and post-outage services. Technical Advisor service does not include the supervision or management of customer's employees or contractors.

Specialty Services are defined as the inspection, tuning, programming, troubleshooting and upgrade of the control & supervisory instrumentation systems, D-EHC system, and excitation/AVR systems; as well as vibration analysis, balancing, start up and commissioning support, and condition assessment services. Specialty Services does not include the supervision or management of Customer's employees or contractors.

Field Technician: TAES technicians performing work at a customer location.

Lead Field Technician: Senior TAES technicians overseeing the work performed by Field Technicians at a customer location.

Generator Specialist: TAES field service representative that provides on-site project management for generator inspection, testing, and repairs.

Measurement Inspection Services (MIS) Engineer: A TAES office-based engineer specializing in MIS activities.

Manual Measurement Technician and Equipment: A TAES specialist technician performing MIS services using mechanical equipment. The hourly rate does not include the transport of equipment to and from site.

3-D Measurement Technician and Equipment: A specialized field services technician performing MIS services through the use of FARO Arm/Laser Scanner technology. The hourly rate does not include the transport of equipment to and from site.

SHOP SERVICES LABOR CATEGORIES

Technician / Light Machining: TAES welding or NDE technicians performing work at TAES facilities.

Medium Machinist: TAES CNC machinists performing work at TAES facilities.

Large Machinist: TAES machinists performing work at TAES facilities utilizing the Sellers 16' VTL, 5" Horizontal Boring Bar, Indicating Stand, or 84" Wagner Lathe.

Engineer: TAES engineers performing engineering services other than those identified above or project management services and primarily stationed at TAES facilities.

DEFINITIONS

Straight Time: The first eight (8) hours work on Monday through Friday (not including TAES company holidays). A minimum of eight (8) Straight Time hours will be invoiced for any day TAES personnel is working at the site.

Overtime: Hours worked in excess of eight but less than twelve Monday through Friday, and the first twelve hours worked on Saturday (not including TAES company holidays).

Double Time: All hours worked in excess of twelve in any one day, worked on Sundays, or worked on designated TAES company holidays.

Holiday Time: A minimum of eight (8) hours at double time rates will be billed per person anytime TAES personnel are required to work on-site, be on stand-by, be locally on-call, or on carry-over during a holiday.

Holiday Carry-over Time: A minimum charge of 8 hours at the double time rate will be invoiced when a project spans over a holiday, whether the TAES personnel is requested to work or not.

Standby Time: Eight (8) hours at the straight time rate per man day is billed for each non-working week day and/or for each weekend day in which a field service representative is required to be available for work.

Travel Time will be charged per the following:

- **Scheduled Outage Services:** Eight (8) hours ST Fee listed above for each one way trip for North America based Engineers / Specialists / Site Managers; or Twelve (12) hours ST Fee for each one way trip of internationally based personnel.
- **Unscheduled / Emergency Outage Services:** Actual travel time at the applicable rate above.

Per Diem will be invoiced for each travel day, on-site day, standby day, and all carry-over days during the week or weekend unless the purchaser agrees to pay the travel-home and return-to-job costs.

Field Services: TAES personnel providing services while stationed primarily at a customer location.

Shop Services: TAES personnel providing services while stationed primarily at TAES facilities.

CI Number: C0041906

Title: PHB – 2022 Turbine Refurbishment

Start Date: 2022/08
In-Service Date: 2022/11
Final Cost Date: 2023/05
Function: Steam
Forecast Amount: \$3,729,597

DESCRIPTION:

This project is for the inspection and refurbishment of all turbine blades and other components of the Port Hawkesbury Biomass turbine as is recommended by the original equipment manufacturer (OEM) for this steam turbine with the running hours that are currently forecast in the near term. A complete evaluation of the steam turbine involves opening the upper casings and removing the rotor and lower nozzle diaphragms, nozzle box and inner casings.

This project is required to identify and correct issues such as pitting, cracking, thinning and fretting in components such as blades, rotors, seals, casing and fasteners that if left undetected could impact reliability of the turbine.

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).”

- No other projects in 2020, 2021, 2022, 2023, or 2024

Depreciation Class: Steam Production Plant – Port Hawkesbury Biomass

Estimated Life of the Asset: 10 Years

Retirement Information:

- Categorization of Retirement: Accounting Policy 6420 - Retirement and Disposal of Capital Assets
- Percentage of Asset Pool: 1.4%

JUSTIFICATION:

Justification Criteria: Thermal

Sub Criteria: Equipment Refurbishment/Replacement

Why do this project?

Legislation:

NS Power is required to maintain the PHB unit as a base load cogeneration facility and operate the plant on an economic dispatch basis or as required for system reliability. PHB capital projects and routines are designed to maintain PHB unit in that capacity. Section 5(2A) of the Renewable Electricity Regulations provide as follows:

5(2A) NSPI must maintain the Port Hawkesbury biomass power generation plant available as a base load cogeneration facility and NSPI must operate the plant on an economic dispatch basis or as required for system reliability.

Renewable Energy Standards:

The PHB generation station was designed to meet requirements under the Renewable Energy Standards (RES), providing ready and reliable renewable energy, while contributing to system stability. The Port Hawkesbury Biomass Cogeneration Facility is the only NS Power-owned renewable resource whose output can be increased to meet RES

obligations in the event of a low wind/hydro output year. Continued investment in the biomass facility diversifies NS Power's energy portfolio in renewables and will contribute to meeting RES requirements.

Contractual Obligations:

The PHB arrangement was designed and approved as a cogeneration operation. The boiler's steam output is for the purpose of producing renewable electrical energy and supplying Port Hawkesbury Paper's (PHP) mill steam requirements.

As a cogeneration facility, the biomass unit is highly integrated into the operation of the paper mill. NS Power and PHP entered into a Shared Services and Steam Supply Agreement dated September 28, 2012 (the Agreement). Within the Agreement, NS Power agreed to provide steam and related services to PHP over the term of the contract.

Asset Condition:

Ongoing asset management activities identified the requirement for a turbine refurbishment to maintain the near term and long-term safe reliability operation of the PHB turbine and mitigate the risk of unplanned outages.

Why do this project now?

Safe reliable operation of the turbine is critical to achieving the obligations noted above. Since its installation in 2012, the turbine has accumulated over 53,000 operating hours as of August 2021. Based on recommendations from the OEM and to maintain the near term and long-term reliability of the turbine and mitigate the risk of unplanned outages it is necessary to execute a rotor out inspection in 2022, which will be of sufficient duration to complete the inspection and associated remediation work.

Why do this project this way?

Completing the work recommended by the OEM is the only feasible way to allow for safe, reliable and efficient operation of the turbine. Refurbishment of the turbine through replacement of components at the appropriate time and in accordance with OEM and industry recommendations versus complete replacement of the turbine is the most cost effective approach. The cost to replace the turbine generator would be in excess of \$12 million in comparison to \$2.2 million for this project scope. The part list for the outage was recommended by the OEM with optimization by internal subject experts to ensure only the essential parts are procured. This will result in approximately \$300,000 of savings for customers. The parts are required to be procured prior to turbine disassembly due to long lead times, in order to minimize the unit downtime. This approach also ensures the continued safe and reliable operation of the Steam Turbine. In addition to maintaining the safe and reliable operation of the turbine, completing refurbishment during the 2022 planned outage will allow for efficient operation of the unit in alignment with NS Power's asset management strategy.

CI Number : C0041906

- PHB - 2022 Turbine Refurbishment

Project Number C0041906

Parent CI Number :

-

Asset Location : 1401

- 1401 Port Hawkesbury Biomass

Budget Version 2022 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	1000 - SGP - Turbo Gen.Instal.	3,523,227
Retirements	1000 - SGP - Turbo Gen.Instal.	206,370
Total Cost:		3,729,597
Original Cost:		3,007,934

Capital Project Detailed Estimate

Location: Port Hawkesbury Biomass CI# : C0041906 Title: PHB – 2022 Turbine Refurbishment Execution Year: 2022						
Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (CI#s)
Regular Labour						
Electrician	PD	55	\$ 365	\$ 20,100		
Engineering	PD	25	\$ 413	\$ 10,335		
Maintenance Trades	PD	50	\$ 372	\$ 18,600		
Power Plant Technician	PD	75	\$ 390	\$ 29,231		
Utilityworker	PD	250	\$ 245	\$ 61,245		
Sub-Total				\$ 139,511		39529
OT Labour						
Electrician	PD	50	\$ 365	\$ 18,272		
Maintenance Trades	PD	35	\$ 372	\$ 13,020		
Power Plant Technician	PD	45	\$ 390	\$ 17,539		
Utilityworker	PD	115	\$ 245	\$ 28,173		
Sub-Total				\$ 77,004		39529
Term Labour						
Electrician	PD	50	\$ 233	\$ 11,666		
Maintenance Trades	PD	35	\$ 223	\$ 7,811		
Power Plant Technician	PD	40	\$ 270	\$ 10,811		
Utilityworker	PD	55	\$ 168	\$ 9,228		
Sub-Total				\$ 39,515		39529
Travel Expense						
Travel Expense	Lot	1	\$ 5,000	\$ 5,000		
Sub-Total				\$ 5,000		39529
Materials						
Turbine Materials	Lot	1	\$ 385,000	\$ 385,000		
USD Conversion	%	30%	\$ 385,000	\$ 115,500		
Sub-Total				\$ 500,500		39529
Contracts						
OEM Technical Field Advisor	Lot	1	\$ 694,758	\$ 694,758		
Millwright Labour	Lot	1	\$ 1,092,037	\$ 1,092,037		
Offsite Machining	Lot	1	\$ 55,000	\$ 55,000		
Descaling of Rotors and Diaphragms	Lot	1	\$ 47,500	\$ 47,500		
Inspection NDE Services	Lot	1	\$ 35,000	\$ 35,000		
Vibration Analysis	Lot	1	\$ 10,500	\$ 10,500		
Borescope / FME Services	Lot	1	\$ 25,000	\$ 25,000		
Phased Array & Boresonics	Lot	1	\$ 188,481	\$ 188,481		
Scaffolding Installation and Removal	Lot	1	\$ 37,500	\$ 37,500		
Onsite Welding	Lot	1	\$ 35,000	\$ 35,000		
Sub-Total				\$ 2,220,776		
Consulting						
Technical Advising Consultant	Lot	1	\$ 35,000	\$ 35,000		
Sub-Total				\$ 35,000		
Meals						
Meals	Lot	1	\$ 1,700	\$ 1,700		
Sub-Total				\$ 1,700		
Other Goods & Services						
Contingency	%	15%	\$ 3,019,006	\$ 452,851		
Sub-Total				\$ 452,851		
Interest Capitalized						
AFUDC				\$ 24,639		
Sub-Total				\$ 24,639		
Administrative Overhead						
Labour AO				\$ 47,044		
Contractor AO				\$ 186,057		
Sub-Total				\$ 233,101		
SUB-TOTAL (no AO, AFUDC)				\$ 3,471,857		
TOTAL (AO, AFUDC included)				\$ 3,729,597		
Original Cost				\$ 3,007,934		
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.						

CI Number: C0030529

Title: TUC3 Generator Refurbishment

Start Date: 2021/06
In-Service Date: 2022/05
Final Cost Date: 2022/11
Function: Steam
Forecast Amount: \$1,629,926

DESCRIPTION:

This project is for the refurbishment of the Tufts Cove Unit 3 generator through replacement of the hydrogen seal housings and the refurbishment of the stator end winding insulation and blocking to address and mitigate the risk of unplanned failure around these two areas.

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).”

- No other projects in 2020, 2021, 2022, 2023, or 2024

Depreciation Class: Steam Production Plant – Tufts Cove – Tufts Cove 3

Estimated Life of the Asset: 30 Years

Retirement Information:

- Categorization of Retirement: Accounting Policy 6420 - Retirement and Disposal of Capital Assets
- Percentage of Asset Pool: 0.4%

JUSTIFICATION:

Justification Criteria: Thermal

Sub Criteria: Equipment Refurbishment/Replacement

Why do this project?

The hydrogen seal housings in the Tufts Cove Unit 3 generator have historically experienced erosion at the cup packing ring sealing areas, resulting in oil ingress to the generator which causes increased moisture in the generator that could lead to damage to the generator electrical insulation. In 2014, one of the two hydrogen seals were refurbished with spray welding and machining as a short term mitigation strategy; however, inspection of the seal most recently in 2017 shows the seal has deteriorated. Since 2017, NS Power has implemented an enhanced monitoring plan to manage this risk until the planned major inspection interval required in 2022. Replacement of the seals is required to mitigate the issues related to the failure of the seal.

The stator end winding insulation in the Tufts Cove Unit 3 generator has deteriorated over time from thermal cycling. The bitumen in the insulation separates and leaks out which can lead to voids, insulation cracking, and eventually stator ground faults which cause electrical imbalance causing vibration and further break down of insulation. Severe ground faults can lead to damage which could require re-winding of the generator or replacement of the generator stator core. Refurbishment to localized insulation, packing blocks, and coatings will be required in the end winding locations to extend the life of the asset.

Why do this project now?

The Tufts Cove 3 generator has accumulated more than 275,000 hours of operation and has over 1,800 Start/Stop cycles. The generator requires a major inspection interval (40,000 hours) in 2022 where the rotor is required to be disassembled for inspection which is appropriate time to complete this scope of work. The condition of the hydrogen seal housings has deteriorated to the point where replacement is required, and the stator end winding insulation will require refurbishment to address known issues. The planned 2022 outage provides an optimal time frame to plan and

execute this work to minimize risk of failure of the generator while in service. The mitigation of these two known issues during the 2022 planned outage will ensure reliable operation of the unit.

Why do this project this way?

Replacement of the hydrogen seal housings is the only technically feasible option and will ensure safe and reliable operation of the Generator. Refurbishment of the hydrogen seal housings is not feasible as the previous refurbishment option was a short term solution, was found to have deteriorated in 2017 and the service is no longer offered by or warranted by the Original Equipment Manufacturers (OEM). Using this method, it would not be possible to return the seals to an acceptable state for long term operation. Refurbishment of the end winding insulation is the only technically feasible way to mitigate the risk and maintain safe and reliable operation of the generator. Coordinating these refurbishments with the major generator inspection interval is the most cost effective approach minimizing unit downtime.

REDACTED (CONFIDENTIAL INFORMATION REMOVED)

REDACTED 2022 ACE Plan CI C0030529 Page 3 of 4

CI Number : C0030529

- TUC3 Generator Refurbishment

Project Number C0030529

Parent CI Number :

-

Asset Location : 1173

- 1173 Tufts Cove Unit 3; Commissioned 1976, 152 Mwh

Budget Version 2022 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	1000 - SGP - Turbo Gen.Instal.	1,385,829
Retirements	1000 - SGP - Turbo Gen.Instal.	244,097
Total Cost:		1,629,926
Original Cost:		305,484

Capital Project Detailed Estimate

<div>Location: Tufts Cove Generating Station</div> <div>CI# : C0030529</div> <div>Title: TUC3 Generator Refurbishment</div> <div>Execution Year: 2022</div>						
DescriptionUnitQuantityUnit EstimateTotal Estimate					Cost Support Reference	Completed Similar Projects (FP#s)
Regular Labour						
Electrician	PD	20	\$365	\$7,309		
Engineering	PD	60	\$413	\$24,805		
Maintenance Trades	PD	60	\$372	\$22,325		
Power Plant Technician	PD	10	\$390	\$3,897		
Utilityworker	PD	25	\$245	\$6,125		
			Sub-Total	\$64,461		
OT Labour						
Maintenance Trades	PD	25	\$744	\$18,604		
Electrician	PD	10	\$731	\$7,309		
Power Plant Technician	PD	10	\$779	\$7,795		
Utilityworker	PD	25	\$490	\$12,249		
			Sub-Total	\$45,957		
Term Labour						
Maintenance Trades	PD	10	\$372	\$3,721		
Utilityworker	PD	25	\$245	\$6,125		
			Sub-Total	\$9,845		
Materials						
H2 Seals and Parts	EA	2			Attachment 1	
Misc. Materials & Consumables	Lot	1				
			Sub-Total	\$398,871		
Contracts						
Day Shift and Night Shift TFA	EA	1			Attachment 2, Item 8A	
Generator Rotor & Stator Inspections	EA	1			Attachment 2, Item 8B	
Tooling & Shipping	EA	1			Attachment 2, Item 8C	
Retaining Ring Non Drive End	EA	1			Attachment 2, Item 9	
Day Shift Craft Labour	EA	1			Attachment 2, Item 10	
Scaffold (Wall / Rotor Enclosure)	EA	1	\$25,000	\$25,000		
			Sub-Total	\$817,864		
Consulting						
TG Advisors	EA	1				
Siemens Preplanning	EA	1			Attachment 2, Item 7	
			Sub-Total	\$99,432		
Other Goods & Services						
Contingency	%	10%	\$938,127	\$93,813		
			Sub-Total	\$93,813		
Interest Capitalized						
AFUDC				\$10,107		
			Sub-Total	\$10,107		
Administrative Overhead						
Labour AO				\$21,055		
Contractor AO				\$68,521		
			Sub-Total	\$89,576		
SUB-TOTAL (no AO, AFUDC)					\$1,530,243	
TOTAL (AO, AFUDC included)					\$1,629,926	
Original Cost					\$305,484	
<div>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.</div> <div>Note 2: Small differences in totals are attributable to rounding.</div> <div>Note 3: Contingency determined using a combination of internal subject matter expert judgment and predetermined guidelines which have been gained over many years, including some uncertainty for actual site conditions. Risks are well understood based on past experience.</div>						



SCL Ref: SF201690816
Cust Ref: RFQ 123456
Date: 1/8/2021

To: TIM GILLIS / CLETUS MACISAAC
CC: KARL NOWLAN
NSPI

Subject: PROPOSAL FOR H2 Seal Housing

With reference to your RFQ 123456 dated 05-Aug-20, we are pleased to provide the following proposal for your consideration.

RFQ ITEM	DESCRIPTION	QTY	UNIT PRICE	TOTAL PRICE	EST DELIVERY (ARO)
1001	H2 SEAL HOUSING - 1 off EE and 1 off TE Hydrogen Seal Housings CUSTOMER CAT ID: TBD ASSY DWG NO.: SL30119.027 DETAIL DWG NO.: 493L1507	2 EA			43 Weeks
			PRICE		
			TOTAL PRICE:		

Note: LOOSE OIL FEED PIPES & FLANGES INCLUDED - TO BE WELDED AT SITE

MK.45- 493U1514 - Oil Feed Pipe 4-OFF
MK.46-60AU11-04 - Flange for Oil Feed & Press Gauge Pipes 4-OFF

Prices: Price shown is in Canadian funds, include any import duties that may be applicable, DDP Pt. Tupper, 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' 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.

Location of Supply: Siemens Energy Limited UK, Newcastle Upon Tyne UK

Validity: This proposal is valid for a period of 60 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 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 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' ability to supply or deliver is impacted.

Siemens 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
Imran Ijaz
Sales Manager
imran.ijaz@siemens.com

Digitally signed by
Imran Ijaz
Date: 2021.01.08
15:11:28 -05'00'

KOTWAL ASHTAD
Senior Management

Digitally signed by KOTWAL ASHTAD
DN: cn=KOTWAL ASHTAD, o=Siemens, email=ashtad.kotwal@siemens.com
Date: 2021.01.08 15:29:05 -05'00'



SIEMENS
energy



Proposal

Siemens Energy Reference Number SF191396547

Customer	Nova Scotia Power
Proposal Description	NSPI 2021 TC3 - HP, LP Gen Major Resources rev5
Submission Date	June 7, 2021
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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Nova Scotia Power
NSPI 2021 TC3 - HP, LP Gen Major Resources rev5

June 7, 2021

Cletus MacIsaac
Maintenance Superintendent
Nova Scotia Power Inc.
315 Windmill Road
Dartmouth, NS B3A 1H3
Cletus.MacIsaac@nspower.ca

Subject: **NSPI 2021 TC3 - HP, LP Gen Major Resources rev5**
Siemens Energy Reference Number SF191396547

Dear Mr. MacIsaac,

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.

This Proposal is valid 120 days from submission date unless otherwise extended, modified, or withdrawn in writing by Siemens Energy 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 Energy during such validity period will be sufficient to form an agreement on the terms and conditions of this Proposal.

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

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Power Generation Services
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Proposal SF191396547

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Nova Scotia Power
NSPI 2021 TC3 - HP, LP Gen Major Resources rev5

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.

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.com

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Revision History

Date	Rev	Summary	Issued By
April 30, 2021	4	Updated scope and pricing to reflect 2021 and 2022 outages.	C. Holloway
June 7, 2021	5	-1.0 Scope of Work: Removed craft labour for HP scope. Removed PM for HP outage. Added EIT for HP outage. Removed general tooling for HP outage. Updated HP outage Org chart. - 2.0 Pricing: Updated pricing table based on scope changes	C. Holloway

1.0 Scope of Work

Siemens Energy is pleased to present the work scopes outlined below. The following work scopes have been developed based on discussions and TMS planning between NSPI and Siemens Energy. This proposal captures both the Fall 2021 outage and the Spring 2022 outage. **Red text denotes the scope deferred to Spring 2022 unless otherwise stated.**

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 (COVID Permitting)
- Outage schedule creation and publication
- Coordination and administration of 3rd party and internal support

1.2 Steam Turbine Major Inspection with Nozzle Replacement

HP Turbine Base Scope:

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Proposal SF191396547

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Nova Scotia Power
NSPI 2021 TC3 - HP, LP Gen Major Resources rev5

Disassembly

- Unbolt and unbox HP Turbine
- Remove HP spindle, set in stands
- Hone HP bore
- Cut bottom HP steam inlets (NSPI scope to define and complete)
- Remove bottom HP cylinder
- Remove Nozzle chest to cylinder retaining nut and separate nozzle chest from cylinder
- Install / fit new HP Nozzles (at local shop)
- Refurb, clean, assess and re-establish radial and axial spring back labyrinth gland seals
- Remove, inspect/dress and reinstall all spring back seals

Inspection

- Perform complete center-line clearance and component evaluations
- Full blade path assessment of stationary and rotating blading by blade fitter (after grit blasting by others)
- Visual inspect spindle and blade path
- MPI blade path and glands (NSPI or 3rd party to conduct NDE, Siemens Energy to review results)
- Take hardness checks, replicate HP spindle (NSPI or 3rd party to conduct NDE, Siemens Energy to review results)
- Carry out Boresonic/NDE inspection of HP Spindle bore as defined by Siemens Energy Engineering & customer technical support
- Phased array inspection of rows 1-13 spindle root radial grooves (per PB2-10-9001-ST-EN-01)
- Laser distortion check of the HP turbine
 - Perform laser tracker survey of the catenary curve
 - Perform Tops-Off HP Cylinder Distortion Check
 - Prepare report based on evaluations of laser tracker data

Assembly

- Re-install HP nozzle chests
- Re-install HP bottom cylinder
- Restore & weld bottom HP steam inlets (NSPI scope to define and complete)
- Re-install HP turbine and check spindle TIR in half shell
- Re-install HP Turbine cylinder and close joint steam tight
- Check and adjust shaft alignment

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Power Generation Services
1577 North Service Road
Oakville, Ontario L6H 0H6

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Pedestals & Bearings

- Remove, clean, measure, visually inspect, and assemble all HP and Generator Bearings (1, 2, 7, 8, 9 & cross-shaft bearings)
- Inspect, clean, and lubricate pedestal grease slide plates/surfaces (as scaffold permits under the IP/LP, scaffold expected under the HP for nozzle job)
- All NDE to be conducted by NSPI or 3rd party and will be reviewed by Siemens Energy

HP Turbine Optional Scope:

- HP Spring back seal install
- Balance Engineer upon startup

LP Turbine Optional Scope:

- Day Shift Craft Labour:
 - Unbolt and Unbox LP Turbine
 - Full set of clearance checks
 - TIR in half shell check
 - Remove LP turbine, set in stands
 - Full blade path assessment of stationary and rotating blading by blader (after grit blasting by NSPI or 3rd party)
 - MPI blade path and glands (NSPI or 3rd party to conduct NDE, Siemens to review results)
 - Repair/Remedy minor blade path findings (anything greater than 1 day of effort will be EWA)
 - Refurb, clean, assess and re-establish radial and axial spring back labyrinth gland seals
 - Check final clearances
 - Rebuild Spindle into cylinder
 - Final torque all flanges and support vacuum leak testing
 - Final alignment and necessary adjustments

LP Disc Bore NDE Inspection Base Scope:

- Disc Bore Inspection on all disc
- Provide inspection results to Engineering
- Provide a final NDE report
- Support for the Rotor Disc Bore Inspection:
 - The rotor is to be placed in a Lathe or on variable speed power rolls provided by the customer. Power rolls should have an anti-thrust mechanism to prevent the rotor from moving axially. (Lathe is the preferred method)

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- The rotor needs to be dust blasted. Clean disc web from the hub face to approximately twenty (20) inches, so as to provide smooth particle-free surface for plexiglass transducer wedges prior to initiation of the inspection. Dust blasting or cleaning services are not part of this offer.

LP Rotor Bore NDE Exam Base Scope:

- Bore diameter measurements are taken before and after surface preparation (for high temperature rotors). This data is analyzed for high temperature rotors to determine if creep deformation has occurred. Accurate bore measurements help to assure accurate calculations of bore stresses and flaw locations.
- A visual examination is conducted to verify surface finish and to detect any visual discontinuities.
- A Magnetic Particle (MT) examination is performed to detect flaws on one of the most highly stressed areas of the rotor, the bore surface.
- The final examination is performed with a computerized Ultrasonic Flaw Detection System that uses longitudinal and shear waves to cover a radial depth range from the bore surface out to eight inches.

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 Generator Open/Close and Rotor Inspection

Generator Open/Close & Rotor Inspection Base Scope:

Disassembly

- Mechanically disassemble generator and remove rotor
 - Includes disassembly of bearings (as noted in HP section), hydrogen seals.

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Hydrogen Seal Inspection

- As the seal is being disassembled, check for any distortion and abnormalities to the cup packing washers and 'O'-ring and general seal alignment.
- Inspect white metal running face for scoring, over-heating, and freedom of oil passages.
- Check that the running face is square and true.
- UT check white metal for bonding to seal ring. (NDE to be performed by NSPI or 3rd party and reviewed by Siemens Energy).
- Mount seal housing and seal ring on stand and check for ovality, dimensional clearances, mating surfaces of half joint and check brass sliding pads (replace if worn).
- Inspect 'O'-ring and 'cup packing washer' running face and 'O'-ring grooves for score marks or uneven surface.
- Install new 'O'-rings and cup packing washers, insulating flanges and diaphragms.
- Inspect the spring assemblies for damage and freedom of movement. Replace any suspect springs, guides, or plungers.

Generator rotor inspection, assessment, and refurbishment

- As found electrical testing (IR,PI, RSO, winding resistance)
- Balance weight and gas blockage survey
- Remove Up-shaft Lead (U.S.L) and radial pins (Assessment, U.S.L. to be conducted by NSPI or 3rd party)
- Inspect End Windings by intrascope where possible
- Perform slot wedge vent hole blockage survey
- Inspect Winding leads where accessible
- Prepare shaft and slots for NDE
- NDE Shaft (NSPI or 3rd party to conduct NDE, Siemens Energy to review results)
- Perform Boresonic Inspection
- Refit stripped components after cleaning
- Install U.S.L. and radial pins
- Air Test U.S.L.
- Complete electrical testing post rebuild (IR,PI, RSO, winding resistance)
- Carry out runout checks
- Inspect slibrings for damage, grooving wear etc.
- Polish slibrings (any corrective machining will be extra work)
- Polish journals and seal collars
- Check coupling runouts

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- Final electrical testing prior to release (IR,PI, RSO, winding resistance)

Generator Retaining Ring Inspection (installed on rotor)

- Visual Inspection with remote video equipment in accessible areas under the ring
- Visual inspection of the retaining ring exterior and exposed surfaces
- NDE inspection of the ID surface from the OD of the ring
- NDE inspection of the OD surface

Assembly

- Mechanically assemble generator including installation of the rotor

Generator Open/Close & Rotor Inspection Optional Scope:

- Straighten Turbine End Coupling by removing and reinstalling
- Day shift craft labour

1.5 Generator Stator Major Inspection

Generator Stator Major Inspection Base Scope:

- Prior to any work commencing, NSP shall make provisions to erect a clean condition enclosure around both ends of the generator, which will be put in place as soon as the rotor is removed.
- Before degassing the machine, casing leak checks will be carried out and all leak areas noted.

General Inspection

- Inspect the condition of the inside of the casing for cleanliness and adhesion of paint.
- Check the fan guide assembly and air gap gas baffle for wear
- Check condition of inner and outer door mating surfaces and inspect condition of sealing gasket grooves, ensure sealing compound injection holes are free, prior to re-assembly
- Inspect and report any oil leakage into stator casing and bushing compartments.
- NDE all external welded bosses to the generator casing (NSPI or 3rd party to conduct
- NDE, Siemens Energy to review results)
- Inspect and clean bearing pedestal insulation

Core Inspection

- Inspect and record the general cleanliness of the core
- Check the core bore and the back of the core for core tightness, fretting, damaged core plate and signs of overheating or core burning
- Inspect for signs of arcing between the core and frame, (i.e. back of core burning)

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- Inspect that the core support fingers are tight
- Check for signs of red oxide deposits in the core bore or the back of the core. Record the position, if this is localized or if it is distributed throughout the machine, and give an indication of the amount observed
- Inspect the radial and axial ventilation holes are not blocked and are free from debris.
- Stator core integrity testing using the Siemens Energy Multifrequency Core Analysis System (SMCAS) method.
- Inspect for fatigue cracks in the stator casing and core frame welds and hydrogen cooler support angles
- Check inner core retaining plates (where applicable) for integrity of insulation and ensure bolts are tight and locked
- Check core grounding strap for tightness and signs of overheating

Winding Inspection

- Carry out insulation resistance and polarization index tests on the windings, measured between phases and ground at the start of the overhaul and at completion.
- Partial discharge (PD) testing of each phase. (see note 1)
- Capacitance (C) and dissipation factor (DF) testing of each phase. (see note 1)
- High voltage DC ramp testing on each phase (NSP to advise maximum voltage setting to be used in testing)
- Phase resistance measurements
- Inspect for general cleanliness and check for signs of electrical discharge or deterioration of the end windings and conductor bars, where these exit the core.
- Inspect for movement, fretting, overheating or damage to end winding's insulation and end winding supports. Ensure that all end winding support brackets are tight
- Carry out a stator winding wedge tightness survey and record.
- Ensure the thermocouple and RTD cables and support conduits are secure. Carry out OHMIC, Continuity Check and IR tests (500 volts) on all thermocouples and RTDs.

Notes:

(1) Siemens Energy is offering this scope of work under the assumption that the testing is to be performed to the maximum voltage capability of the Doble® test equipment being utilized to perform this test. Maximum test equipment current output and the specific capacitance of the generator stator phase(s) under test may limit the maximum test voltage capability, in accordance with Doble® standard practice related to this testing. The parties involved, by executing this contract, acknowledge the limitations and are in agreement that the testing will be performed to the maximum Doble® equipment capability only.

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Hydrogen Coolers

- While the coolers are still in the machine and ensuring all water is removed, a proving air pressure test on the tube bundles shall be carried out.
- Inspect for cleanliness, security of tubes and rubber bushings between compartments, and clean as necessary.
- Inspect internal bore of hydrogen cooling tubes and clean as necessary.
- Inspect the joint face on the hydrogen coolers and generator casing hydrogen cooler facing. Ensure all bolt holes and studs are in good condition.
- Prior to re-inserting coolers, clean and inspect the stator casing support structure for the coolers.

Seal Oil and Hydrogen Gas System Inspection

- Remove and inspect hydrogen seal oil rings. Measure diameters to determine proper clearance to the shaft
- Visually inspect stator end windings and bushing box for presence of oil

1.6 Tooling

Tooling has been included for the Spring 2022 outage. General hand tools and non-specialized tooling is not included for the Fall 2021 outage and can be provided via EWA upon request.

2.0 Proposed High Level Implementation Schedule

Fall 2021 outage starts September 27 2021 and ends November 30th 2021 for a 9 week duration.

Spring 2021 outage starts March 28 2022 and ends May 3 2022 for a 5.5 week duration.

A detailed project schedule will be jointly developed through the TMS process.

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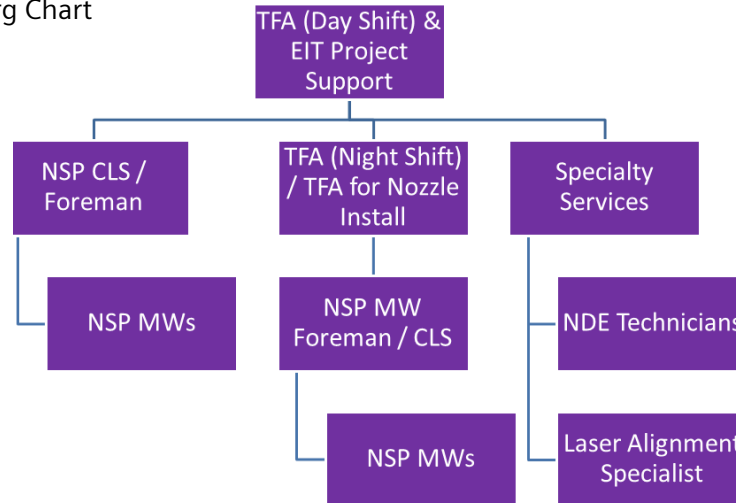
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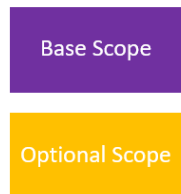
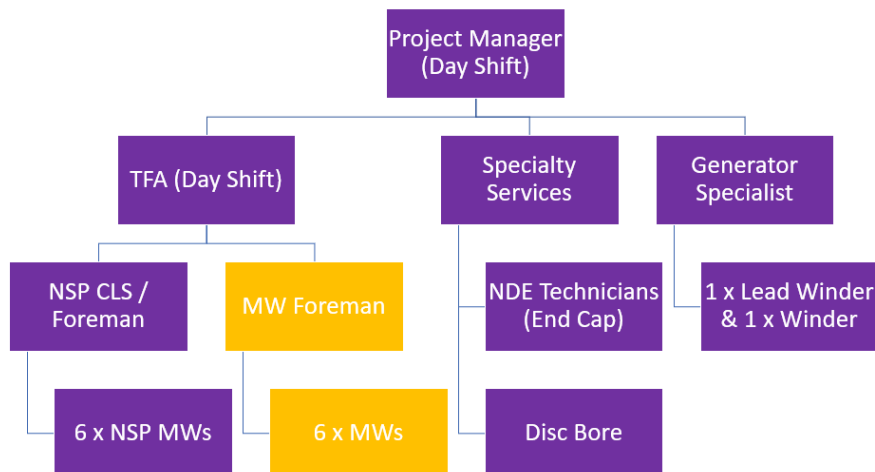
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2.1 Proposed Organizational Chart

HP Outage Org Chart



GEN and LP Outage Org Chart



3.0 Commercial Considerations / Pricing

3.1 Pricing

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

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Item	Work Scope Description	Price Basis	Price ⁽¹⁻⁷⁾
1	Pre-Planning	Fixed	
HP Base Scope			
2	A. Day Shift (DS) TFA & EIT B. Night Shift (NS) TFA Support & HP Nozzle Scope	T&M	
3	A. HP Spindle Bore NDE, Blade Root Phased Array NDE Inspection B. Laser Distortion Check, Catenary Curve	Fixed	
HP Optional Scope			
4	Spring Back Seal Replacement	T&M	
5	Balance Engineer	T&M	
Valves Base Scope			
6	DS TFA	T&M	
Generator Base Scope			
7	Pre-Planning	Fixed	
8	A. DS & NS TFA Support B. Generator Rotor & Stator Inspections C. Tooling & Shipping	T&M T&M Fixed	
9	A. Retaining Ring NDE	Fixed	
Generator Optional Scope			
10	DS Craft Labour	T&M	
11	Straighten Coupling		
LP Base Scope			
12	A. PM, Day Shift (DS) TFA B. Disc Bore NDE Inspection	T&M Fixed	
LP Optional Scope			
13	DS Craft Labour	T&M	
COVID Self Isolation			
14	Pre 14 Day Isolation per US Specialist	Estimate ⁽⁵⁾	

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Item	Work Scope Description	Price Basis	Price ⁽¹⁻⁷⁾
15	Post 14 Day Isolation per US Specialist		
16	Pre 14 Day Isolation per US Tech		
17	Post 14 Day Isolation per US Tech		
18	Pre 14 Day Isolation per UK Specialist		
19	Post 14 Day Isolation per UK Specialist		
20	Pre 14 Day Isolation per Canadian TFA		
21	Pre 14 Day Isolation per Canadian Tech		
22	Pre 14 Day Isolation per Canadian PM		
<p>(1) All prices are quoted in Canadian dollars and do not include any sales tax. Applicable taxes will be added at time of invoice.</p> <p>(2) Pricing assumes inspection scope only, any remedial/discovery work will be addressed via SDIR/EWA process.</p> <p>(3) 2021 MSA rates, with 2% escalation, have been used in this T&M estimate. MSA rates in effect at time of execution shall apply to the work scope.</p> <p>(4) Fixed price scopes invoices to be issued upon completion of the workscope. T&M scopes will be invoiced monthly. Payment terms as stated in the MSA shall apply.</p> <p>(5) All craft labour will be charged at prices listed in Attachment 1 plus escalation for 2021 and 2022.</p> <p>(6) All parts required to execute workscope shall be free issued by NSPI.</p> <p>(7) Self-isolation cost related to COVID-19 has been estimated according to known requirements at this time.</p>			

3.2 Quality Program

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

3.3 Environmental, Health & Safety

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

3.4 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.

3.5 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 continuously changing, their impacts on the Contract are unknown at this time. To avoid

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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.

4.0 Table of Attachments

No.	Description	No. of Pages
1	Craft Labour Rates	1
2	TFA Role-Responsibility	3

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Attachment 1 – Craft Labour Rates

Note: the below Craft Labour Rates are 2020 rates and subject to escalation for 2021 and 2022.

	Regular	Second Shift	OT	Second Shift OT	Board/Day
Millwright Foreman					
Millwright Journeyman					
Machinist Supervisor (Onsite)					
Machinist (Onsite)					

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ATTACHMENT 2

ROLE AND RESPONSIBILITIES OF TECHNICAL FIELD ADVISORS

ROLE:

The role of the Technical Field Advisor (TFA) includes:

- Adherence to all site safety requirements and safety related instructions.
- Provide sound technical advice to achieve a high build quality, thus ensuring a safe and reliable return to service and operation.
- Provide input as may be required concerning build procedures that are relevant to overhaul and/or retrofit installation, ensuring build the quality.
- Work with the outage team (installation/execution/planning) to achieve practicable outage programme without compromising build integrity.
- Provide advice and guidance at the point of work with consideration to:
 - The correct application of techniques required to be adopted during the build
 - “Techniques” are meant to mean, but not be limited to, the following examples:
 - bolting sequences for removal / torquing
 - order of operations for disassembly / assembly
 - method to determine a measurement
 - use of Siemens supplied specialty tooling, special processes (e.g. use of supports, jacks, etc.)
 - The correct use of equipment.
 - “Equipment” is meant to mean, but not be limited to, the following examples:
 - specialty tooling supplied with the equipment
 - bolting heating equipment (right size for application, etc.)
 - measurement tooling (using the right tool for the job, use of jigs, etc.)
 - The taking of measurements correctly, at the correct locations and accuracy.
 - The following examples illustrate this expectation:
 - Definition of the tolerance for measurement (e.g. tape measurer vs. specialty instrument)
 - using the correct equipment
 - using the correct jig
 - taking consideration for influencing factors (e.g. state of assembly, gas vs. un-gassed, temperature)
- To monitor the build process with regard to foreign material exclusion (FME) to uphold quality of build.
 - “Monitor” is intended to mean providing a professional opinion on the FME practices and to raise concern observed in policy or practice. Siemens Energy will be responsible for own personnel’s adherence to the FME program.

- To provide the link, where necessary, between the Original Equipment (OE) Engineering and other technical support and the point of installation contact/installation contractor.
- Provide feedback of installation issues to the OE Engineer and make suggestions/observations commensurate with their knowledge and understanding.
- Review inspection reports, measurement data, operational data, and the like to provide recommendations for correction(s) and improvement(s) in accordance with established standards

RESPONSIBILITY

The Technical Field Advisor is primarily responsible for:

- Ensuring that the unit has been built to approved build procedures and standards.
 - This seems to imply that Siemens Energy have quality control responsibility. Suggest rewording as follows:
 - *Providing the necessary information and recommendations such that the unit is built to appropriate procedures and standards*
- All known defects have been reported, and all appropriate actions have been taken to remedy such (as may be dictated by the customer).
 - This implies that Siemens Energy are responsible for finding defects, which is typically performed by NDE technicians. Suggest rewording as follows:
 - *Providing technical assessment of all reported defects, abnormalities and recommendations on appropriate actions that can be taken to ensure the safe and reliable operation of the unit upon return to service*
- FME regime and back out inspections have been upheld and completed as appropriate throughout.
 - 1. Follow the protocol in place
 - 2. Identify any risks to the FME and provide guidance on when inspections should be done and type of inspection
- That all observed conditions, assessments, and recommendations are communicated to NSP such that the unit is considered to be safe to operate.
 - For example,
 - During a valve outage, ensure that all valves open/close according to specification; components condition is assessed and is acceptable to operate for the intended duration
 - SDIRs are issued for any findings and closed prior to return to service.
 - All out of specification conditions (e.g. clearance measurements) are brought to the attention of NSP for their acceptance
 - Give information to help make the decision, don't make the decision on behalf of NSP
 - As above for point 1, Siemens Energy cannot be responsible for QC. Also, Siemens Energy cannot make that determination since there are so many

factors outside of their control (e.g. are switches in the correct position, are regulators set to the correct setting, all personnel are clear of the area and off "LOTO", etc.)

- Ensure that the approved Inspection and Test Plan is completed as work progresses and any deviations for the plan are promptly communicated to NSP
- Provide a final outage report that details the work performed, as found / as left condition of components, records of measurements / inspections, and recommendations for future consideration

Whilst the Technical Field Advisor will endeavour to provide as much support and outage experience as practicable, across the many facets of site work, the following are participated in by the TFA as requested but may not typically be the direct responsibility of the Technical Field Advisor, and any specific requirements for such shall be detailed in the appropriate Statement of Work (SOW):

- Commercial control.
- Ownership of the programme.
- Management of, or responsibility for, site safety other than the expected duty of care and of individual safety requirements.
- Management of the installation Workforce.
- Direct Supervision of the Workforce.
- Productivity of Workforce.
- Scheduling of work activities (e.g. preparation of the work list for the day, reporting on the work completed)
- Make technical decisions for out of specification conditions

CI Number: C0029693

Title: CT – VJ1 Generator Replacement

Start Date: 2021/04
In-Service Date: 2022/06
Final Cost Date: 2022/12
Function: Gas Turbine
Forecast Amount: \$5,942,640

DESCRIPTION:

This project is for the replacement of the generator assembly at the Victoria Junction Unit 1 Combustion Turbine. 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 45 years of operation.

In the 2020 Integrated Resource Plan, 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 in the strategy to achieve 80 percent renewable energy in the province by 2030 by providing firm capacity for intermittent energy sources. 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 requirement² 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 the Victoria Junction CT1 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. Amongst these is the provision of 230MW of firm generating capacity and operating reserves. These units are capacity assets and critical to system reliability when called upon.

Summary of Related CIs +/- 2 years:

Pursuant to Section 11.2 of the Detailed CEJC, related CIs for Gas Turbines include “[work completed on the same asset (turbine, boiler, etc.) and on the same unit (Lingan Unit #3, for example).”

- No other projects in 2020, 2021, 2022, 2023, or 2024

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: 9.6%

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 unit with new equipment that is consistent with the generator design installed at the other Burnside Units and Tusket locations. Not completing this project would increase the risk of generator condition driven forced outage, which exposes the Nova Scotia Power system to the potential of a lengthy loss of ancillary services and peak generation supply provided by Victoria Junction Unit 1. NS Power does not consider a “run to failure” strategy 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 1 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’s asset management team 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 Nova Scotia Power’s strategic investment in the combustion turbine fleet. TGA provides a third-party global experience to turbine generator condition assessment. In the latest review from TGA in 2020, TGA continued to recommend the Victoria Junction Unit 1 generator assembly be replaced in 2022.

This project reliably extends the life of the unit with new equipment that is consistent with the generator design installed at the Burnside and Tusket locations.

Why do this project this way?

Based on the potential known failure modes in VJ1 generator design, refurbishing the generator is not recommended since this activity will not adequately mitigate these risks. Victoria Junction Unit 1 generator assembly, which was installed in 1976, is expected to be in similar condition to that of the Burnside Unit 3 prior to the completion of CI 45733 CTs Burnside Unit #3 Generator Refurbishment U&U. Replacement of the generator at this time is the only technical feasible alternative. NS Power also evaluated using contract labour versus internal resources with internal resources being significantly less expensive.

REDACTED (CONFIDENTIAL INFORMATION REMOVED)

REDACTED 2022 ACE Plan CI C0029693 Page 3 of 4

CI Number : C0029693

- CT - VJ1 Generator Replacement

Project Number C0029693

Parent CI Number :

-

Asset Location : 1201

- 1201 Victoria Junction Unit 1, 30 Mwh unit

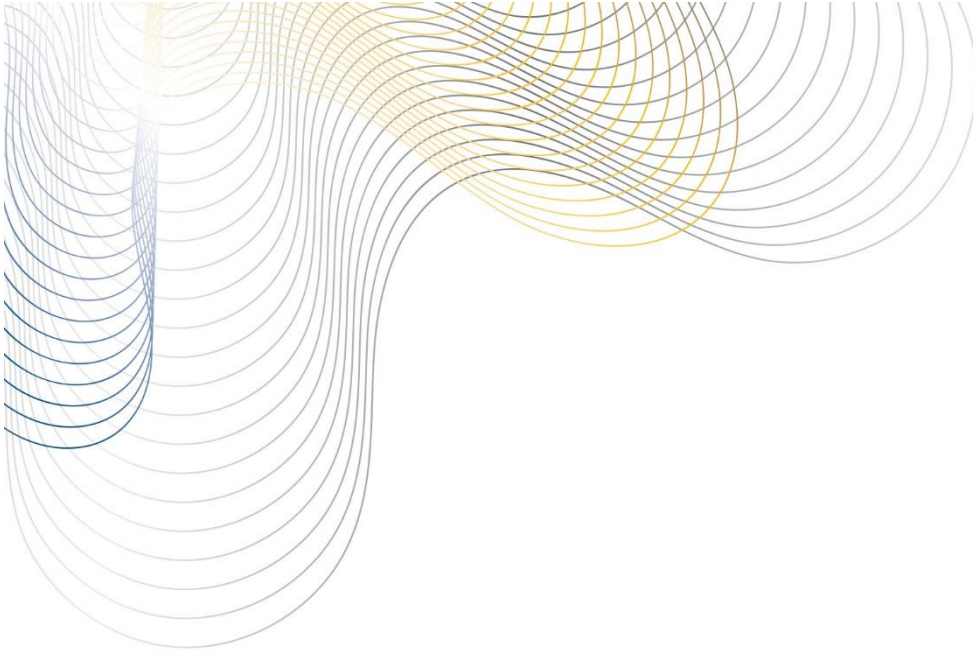
Budget Version 2022 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	3000 - GTG - Gas Turbine Engines	5,805,280
Retirements	3000 - GTG - Gas Turbine Engines	137,360
Total Cost:		5,942,640
Original Cost:		1,278,856

Capital Project Detailed Estimate

Location: Gas Turbine CI# : C0029693 Title: CT - VU1 Generator Replacement Execution Year: 2022						
Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (CI#s)
Regular Labour						
Engineering	PD	100	\$ 413	\$ 41,341		
Gas Turbine Operators	PD	275	\$ 365	\$ 100,498		
CADD Operators	PD	30	\$ 300	\$ 8,999		
Project Manager	PD	200	\$ 413	\$ 82,682		
Project Financial Support	PD	27	\$ 365	\$ 9,951		
			Sub-Total	\$ 243,471		CI# 51711, CI# 33142
OT Labour						
Gas Turbine Operators	PD	130	\$ 731	\$ 95,016		
			Sub-Total	\$ 95,016		CI# 51711, CI# 33142
Term Labour						
Electrician	PD	150	\$ 365	\$ 54,817		
			Sub-Total	\$ 54,817		CI# 51711, CI# 33142
Travel Expense						
Travel and Accommodations	Lot	1	\$ 69,666	\$ 69,666		
			Sub-Total	\$ 69,666		CI# 51711, CI# 33142
Materials						
New Generator Rotor, Stator & Exciter	Lot	1			Attachment 1	
Installation and Commissioning Parts Kit	Lot	1			Attachment 2	
USD Conversion	%	30%				
Partial Discharge Kit	Kit	1				CI# 51711
Rotor Earth Fault Monitor Kit and Vibration Sensor Kit	Kit	1				CI# 51711
Clutch refurbishment	Lot	1				CI# 51711
Clutch input shaft refurbishment	Lot	1				
Full shim set	Kit	1	\$ 12,000	\$ 12,000		
New drivetrain hardware	Kit	1	\$ 15,000	\$ 15,000		
New generator oil	Lot	1	\$ 20,000	\$ 20,000		
Bus duct and conductors	Lot	1	\$ 40,000	\$ 40,000		
DAS interface cards and hardware	Lot	1	\$ 15,000	\$ 15,000		
			Sub-Total	\$ 2,662,723		
Contracts						
OEM Site support	Lot	1			Attachment 3	
USD Conversion	%	30%				
Rotor Removal Tooling - Rail Type System	Lot	1				
OEM Field Service Travel	Lot	1	\$ 25,000	\$ 25,000		
Replace bus duct and conductors	Lot	1	\$ 30,000	\$ 30,000		
Depot baseline	Lot	1	\$ 20,000	\$ 20,000		
Enclosure baseline	Lot	1	\$ 8,000	\$ 8,000		
Enclosure roof modifications (clutch hatch/removable roof)	Lot	1	\$ 40,000	\$ 40,000		
Specialized welding services	Lot	1	\$ 30,000	\$ 30,000		
Alignment services	Lot	1	\$ 32,927	\$ 32,927		
Crane support	Lot	1	\$ 125,000	\$ 125,000		
Generator oil system clean	Lot	1	\$ 35,000	\$ 35,000		
Generator enclosure oil containment coating refurbishment	Lot	1	\$ 6,000	\$ 6,000		
Roadway upgrade/modifications	Lot	1	\$ 250,000	\$ 250,000		
Remove/modify fencing for access to unit	Lot	1	\$ 20,000	\$ 20,000		
Fire system modifications	Lot	1	\$ 12,000	\$ 12,000		
Customs/Commercial invoicing/support	Lot	1	\$ 5,000	\$ 5,000		
Scaffolding/enclosure	Lot	1	\$ 33,000	\$ 33,000		
Site Washrooms and Office Trailers	Lot	1	\$ 62,600	\$ 62,600		
Waste bin/multiple trips	Lot	1	\$ 2,500	\$ 2,500		
Generator Assembly Disposal	Lot	1	\$ 40,000	\$ 40,000		
			Sub-Total	\$ 1,255,537		
Consulting						
TGA CT Fleet Health Assessment	Lot	1	\$ 3,951	\$ 3,951		
Electrical Engineering Support	Lot	1	\$ 24,000	\$ 24,000		
DAS engineering support	Lot	1	\$ 45,000	\$ 45,000		
			Sub-Total	\$ 72,951		CI# 51711, CI# 33142
Legal						
Immigration	Lot	1	\$ 12,000	\$ 12,000		
Terms and Conditions review/approval	Lot	1	\$ 3,000	\$ 3,000		
			Sub-Total	\$ 15,000		CI# 51711, CI# 33142
Meals						
Meals	Lot	1	\$ 39,810	\$ 39,810		
			Sub-Total	\$ 39,810		CI# 51711, CI# 33142
Freight						
Generator shipment to VJ	Lot	1	\$ 180,000	\$ 180,000		
Parts shipment to VJ	Lot	1	\$ 5,000	\$ 5,000		
Tooling shipment to VJ	Lot	1	\$ 12,000	\$ 12,000		
USD Conversion	%	30%	\$ 197,000	\$ 59,100		
Clutch round trip shipment to SSS	Lot	1	\$ 2,000	\$ 2,000		
Clutch input shaft shipment to BRUSH	Lot	1	\$ 2,000	\$ 2,000		
			Sub-Total	\$ 260,100		CI# 51711, CI# 33142
Equipment Rental						
Forklift	Lot	1	\$ 12,000	\$ 12,000		
Space Heaters	Lot	1	\$ 5,000	\$ 5,000		
			Sub-Total	\$ 17,000		
Other Goods & Services						
Contingency		20%	\$ 4,311,565	\$ 862,313		
			Sub-Total	\$ 862,313		
Interest Capitalized						
AFUDC				\$ 113,051		
			Sub-Total	\$ 113,051		
Administrative Overhead						
Labour AO				\$ 75,919		
Contractor AO				\$ 105,274		
			Sub-Total	\$ 181,184		
SUB-TOTAL (no AO, AFUDC)					\$ 5,648,405	
TOTAL (AO, AFUDC included)					\$ 5,942,640	
Original Cost					\$ 1,278,856	
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.						



QUOTATION

TITLE NSPI - Victoria Junction 1 swapout

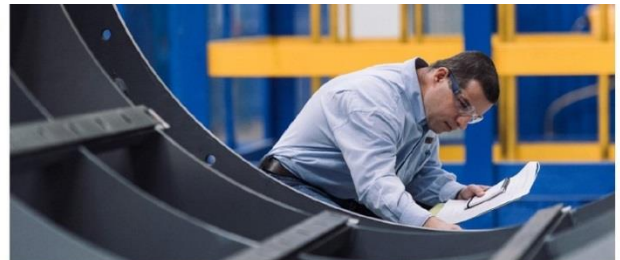
CUSTOMER Nova Scotia Power Corporation

CUSTOMER REFERENCE Dean Webb

BRUSH REFERENCE Q-07155
OPP-113376

REVISION 3

DATE 29/Mar/2021



www.brush.eu



EXECUTIVE SUMMARY

TITLE	NSPI - Victoria Junction 1 swap out
CUSTOMER & REFERENCE	Nova Scotia Power Corporation
	Dean Webb
VENDOR	<div>BRUSH SEM s.r.o.</div> <div>Edvarda Beneše 564/39</div> <div>Doudlevce</div> <div>Plzeň</div> <div>301 00</div> <div>Czech Republic</div> <div>Tel: +420 378 210717</div> <div>www.brush.eu</div> <div>ISO 9001:2015</div> <div>ISO 45001:2018</div> <div>ISO 14001:2015</div>
REGIONAL SALES	Julius Daxner jdaxner@brushgms.com
<p>After your generator has reached certain milestones in its operating life-cycle an investment must be made to continue optimised operation, and to minimise risk of unplanned outages. In some cases this means following the OEM recommended service for a major overhaul, in other cases a “drop-in-replacement” is more economically suitable.</p> <p>A drop-in-replacement allows for a defined outage length that is shorter than a major overhaul, with no surprises. The new generator is dropped into place fitting the foundation, fittings, and electrical connections of the site. Additionally, often there can be production and life-cycle performance increases in the same space as the old generator.</p> <p>However, it may be the case that a major overhaul is more appropriate for your operation than a drop-in-replacement. To help you make this important decision, BRUSH will support your cost benefit analysis and planning well before the service is required.</p>	
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	QUANTITY	UNIT	UNIT PRICE	EXTENDED PRICE
1	FP10308	Supply new Generator Stator	1.00	Each		
		Supply new Rotor Assembly BDAX 7-193PR	1.00	Each		
		Supply new Generator Exciter Stator	1.00	Each		
		Witness Testing	1.00	Each		

TOTAL CONTRACT PRICE	
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DELIVERY SCHEDULE

ITEM	REFERENCE	DESCRIPTION	LEAD TIME	INCOTERMS 2010
1	FP10308	Supply new Generator Stator, Rotor & Exciter Assembly	34 Weeks	EXW BRUSH - Plzen

FINANCIAL TERMS

INVOICE COMPANY & ADDRESS	Nova Scotia Power Corporation 1223 Lower Water St Halifax NS B3J 3S8 Canada
CURRENCY	United States Dollar (USD)
INVOICE TERMS	20% Deposit. Payment required before commencement of manufacture. 80% On Notification Of Readiness, EXW terms. Payment required within 30 days of invoice date.
PAYMENT TERMS	100% net, 30 days after invoice date
BASIS OF PRICE	All prices are exclusive of Value Added Tax (VAT), which, where applicable, will be charged extra at the rate ruling at the date of invoice.
BANK GUARANTEES	Not included within our scope of supply.



CONTRACT TERMS & CONDITIONS

VALIDITY	This offer is valid for 60 days
TERMS & CONDITIONS	Terms and conditions stipulated in Asset Purchase Agreement - NSPI and Brush - VICTORIA - (proposed by Brush; 2-9-21)
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.
CANCELLATION CURVE	Refer to appendices
PURCHASE ORDER TO BE ISSUED TO	BRUSH SEM s.r.o.
PURCHASE ORDER DETAIL	<p>Please be aware that, to be valid and processed, a purchase order needs to clearly identify the following information (as a minimum):</p> <ul style="list-style-type: none"> • Reference to our quote number and revision • Works scope • Quantity and units required • Price and rates • Payment terms including currency • Acceptance of BRUSH 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.
CORONAVIRUS	<p>As a result of the outbreak of the Coronavirus, we reserve the following rights:</p> <ol style="list-style-type: none"> 1. To withhold the mobilization of our Field Service Engineer(s) or other members of our personnel to a region which we deem to be at risk. 2. In the event that our Field Service Engineer(s) or other members of our personnel have to be placed in quarantine as a result of the deployment to be undertaken on your behalf, BRUSH reserves the right to charge for the duration of the quarantine period at the prevailing time. <p>We will continue to monitor the evolving situation and will act in accordance with the circumstances which prevail at any given time.</p>



TECHNICAL PROPOSAL

The proposed Wound stator Assembly will match the electrical and mechanical interfaces of the replacement generator with the following serial number and frame size:- Serial Number: 75325-1G Frame Size BDAX 70-76P

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, unless otherwise purchased from BRUSH.

- BRUSH to manufacture, test and supply a new wound stator assembly, comprising of stator housing, stator core insulated copper coils and stator slot RTD's (Resistance Temperature Detectors)
- All interfaces to match customer requirements
- Design of the stator will be as per customer requirements

Our replacement rotors are designed and manufactured to the latest modern specifications and as such will incorporate technical improvements whilst offering total compatibility with the rotor it replaces and will include:

- Balanced wound rotor
- Rectifier assembly
- Exciter Armature
- Exciter Field
- PMX Rotor and Stator Assembly

The proposed Wound Rotor Assembly will match the electrical and mechanical interfaces of the replacement generators with the following serial number and frame size:-
Serial Number: 75325-1G Frame Size BDAX 70-76P

Manufacture, Test and Delivery: -

The equipment will be manufactured and tested at BRUSH facilities and delivered according to the INCOTERMS and timescale quoted within this offer.

Warranty :-

BRUSH rotors come fully warrantied and various options in terms of life cycle management solutions could be offered dependent on individual project requirements.



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

Major components for DAX type cylindrical rotor generator with shaft mounted brushless exciter.

OPERATING CONDITIONS AND ENVIRONMENT

ENVIRONMENT	Safe area, outdoors	DESIGN AMBIENT TEMPERATURE RANGE	-25°C to +40°C
ALTITUDE	Up to 1000m above sea level	SEISMIC ZONE	None specified
H2S REQUIREMENTS	Nonapplicable	LOCATION	Onshore Canada
SITE AMBIENT TEMPERATURE RANGE	Customer to confirm	MINIMUM DESIGN TRANSPORT TEMPERATURE	Above -25°C

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, $X_d(i)$	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, $X_{2(i)}$	16.4 %
	Unsaturated zero sequence reactance, $X_{0(i)}$	8.6 %
	Quadrature axis synchronous reactance, $X_q(i)$	193 %
	Quadrature axis saturated transient reactance, $X'_q(v)$	22.0 %
	Quadrature 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, $T'd_0$	10.30 seconds
	Transient S.C. time constant, $T'd$	0.72 seconds
	Sub transient O.C. time constant, $T''d_0$	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

BEARING SYSTEM

DRIVE END
Bearings and bearing pedestals not included in BRUSH supply
NON DRIVE END
Bearings and bearing pedestals not included in BRUSH supply

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.
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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
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'	Right hand side looking on drive end	NEUTRAL TERMINAL 'HANDING'	Left hand side looking on drive end
LINE TERMINAL IDENTIFICATION	60Hz - T1 T2 T3 to IEC C50.13	NEUTRAL TERMINAL IDENTIFICATION	As per Generator 75325-1G
LINE CONNECTIONS	As per Generator 75325-1G	NEUTRAL CONNECTIONS	As per Generator 75325-1G
ELECTRICAL PHASE SEQUENCE	T1 T2 T3		

AUXILIARY TERMINATION BOXES

LOCATION	As per Generator 75325-1G
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AUXILIARY SUPPLIES

AC VOLTAGE - THREE PHASE	As per Generator 75325-1G
AC VOLTAGE - SINGLE PHASE	As per Generator 75325-1G
DC VOLTAGE	As per Generator 75325-1G

PAINT SPECIFICATION

SPECIFICATION	PS 2828 - BRUSH standard paint system for non-corrosive environment
COLOUR	As per Generator 75325-1G

WORKSHOP TESTS

SPECIFICATION	DI 0000210 - BRUSH design information for Generator DAX Routine check tests
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INSPECTION

INSPECTION & TEST PLAN	Routine Check Tests		
WITNESS TESTS & INSPECTION	Customer to observe testing of the generator according to Brush ITP		
PROVISIONAL NOTICE	14 Days	FINAL NOTICE	4 Days

PACKING AND PRESERVATION

SPECIFICATION	DI 0000206 BRUSH design information - Generators & Motors
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QUALITY, STANDARDS AND CERTIFICATION

DESIGN STANDARDS	IEEE C50.13		
WELD PROCEDURES	EN 15614		
THIRD PARTY CERTIFICATION	None included		
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	<p>When installed in accordance with instructions defined within the manual, generator(s) will comply with the following EU directives:</p> <p>The appropriate standards of protection required by the European Community Machinery Directive 2006/42/EC.</p> <p>Low Voltage Directive 2006/95/EC.</p> <p>EMC Directive 2004/108/EC.</p>		
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.		



DOCUMENTATION

APPROVALS	<p>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</p> <p>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.</p>
MANUFACTURING INFORMATION	<p>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.</p> <p>We require any documentation provided in electronic format to be in two dimensional, dwg (AutoCAD version 2015 or earlier) or .dxf format.</p> <p>For documentation other than drawings, BRUSH utilise "Microsoft Office" standard software package.</p>
SCOPE DOCUMENTS AND DRAWINGS	<p>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.</p> <p>All dates given are subject to BRUSH having enough detailed data to proceed with the engineering phase without any delays.</p> <p>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.</p> <p>Third party equipment and documentation will only be provided in languages other than English where available.</p>

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



EQUIPMENT & LOCATION

SERIAL NUMBER	FRAME DESIGNATION OR MODEL	CUSTOMER REFERENCE	LOCATION NAME & ADDRESS
753253-1G	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

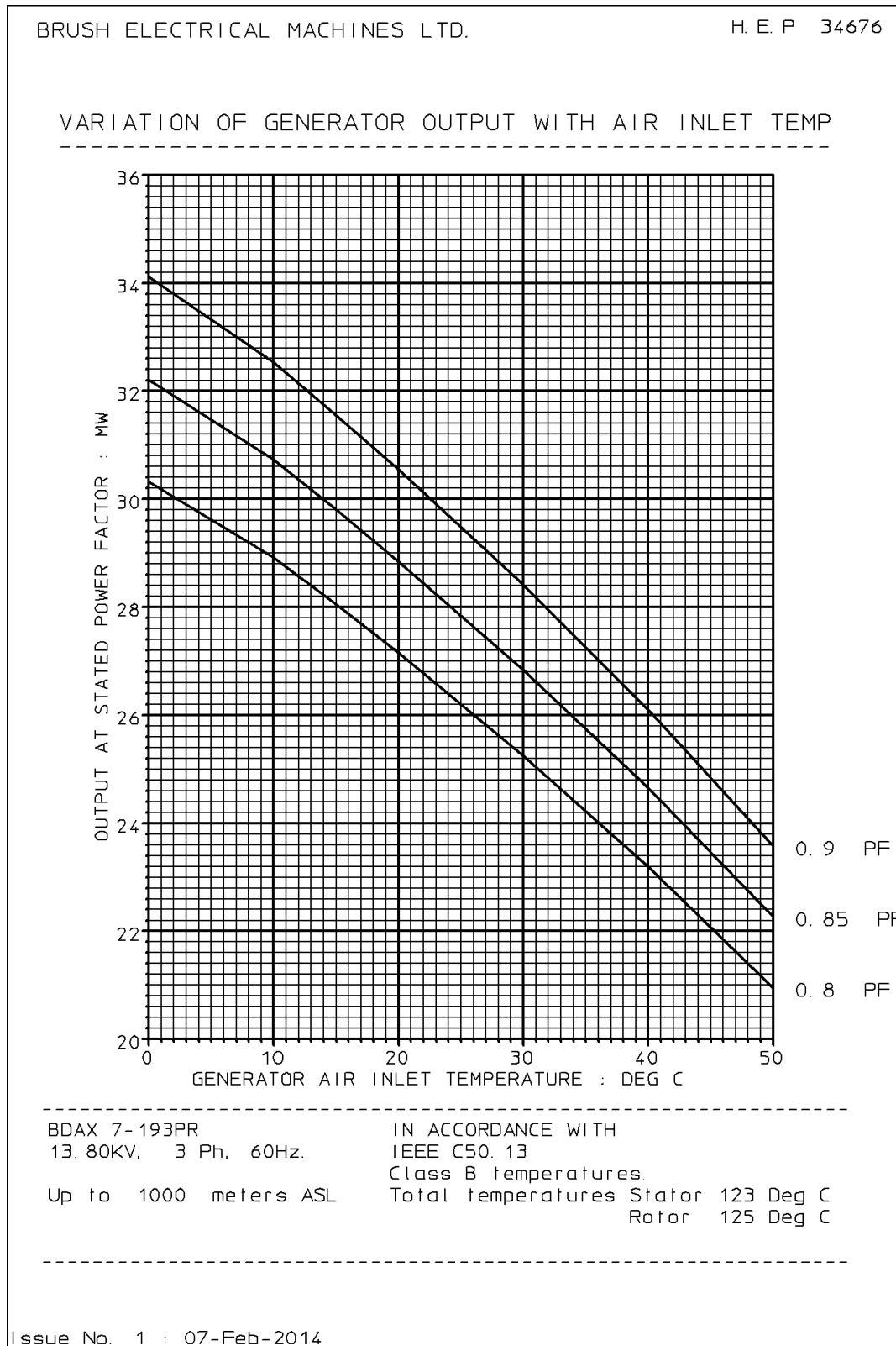


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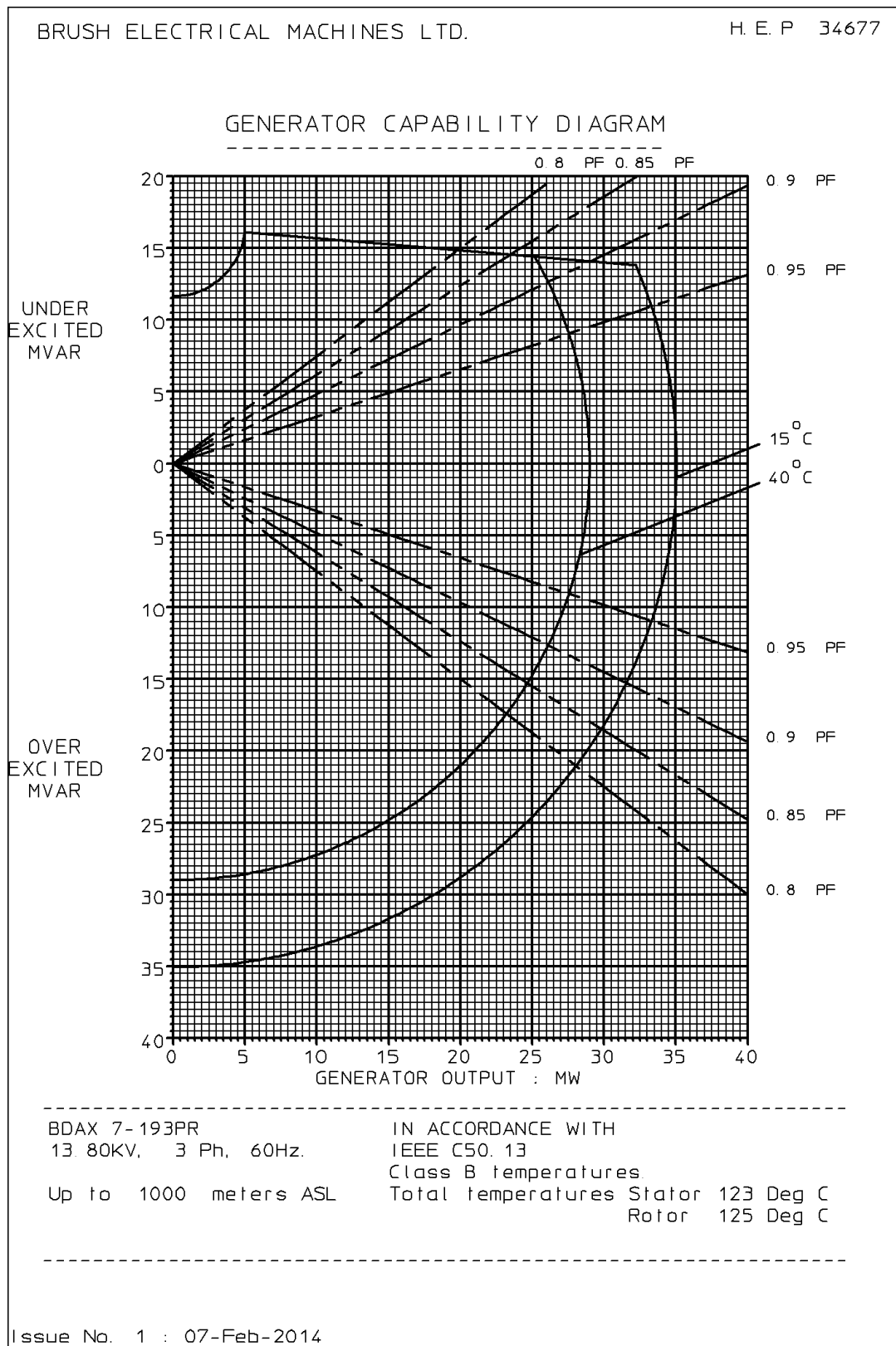


OUTPUT VERSUS COOLANT INLET TEMPERATURE



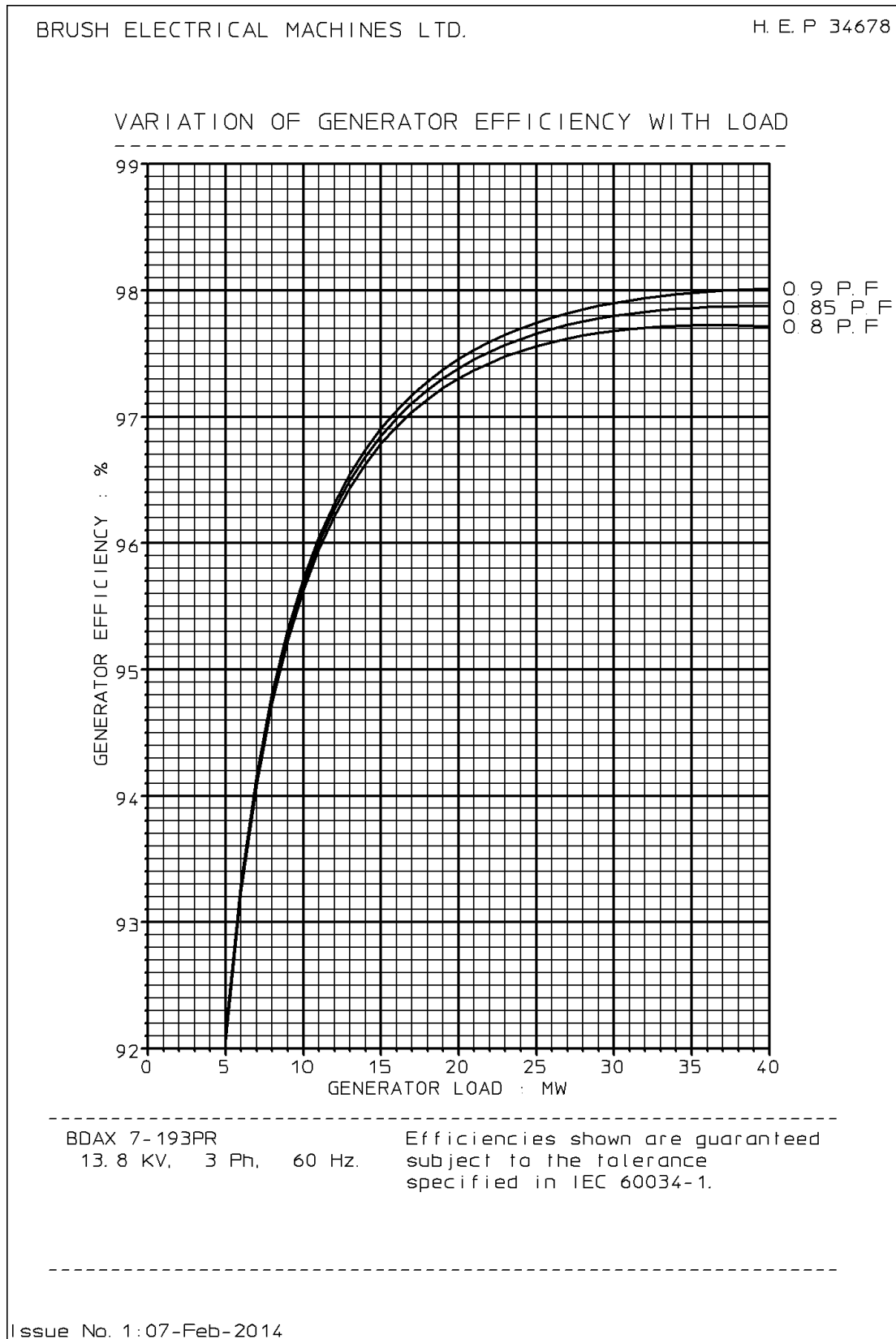


GENERATOR CAPABILITY DIAGRAM



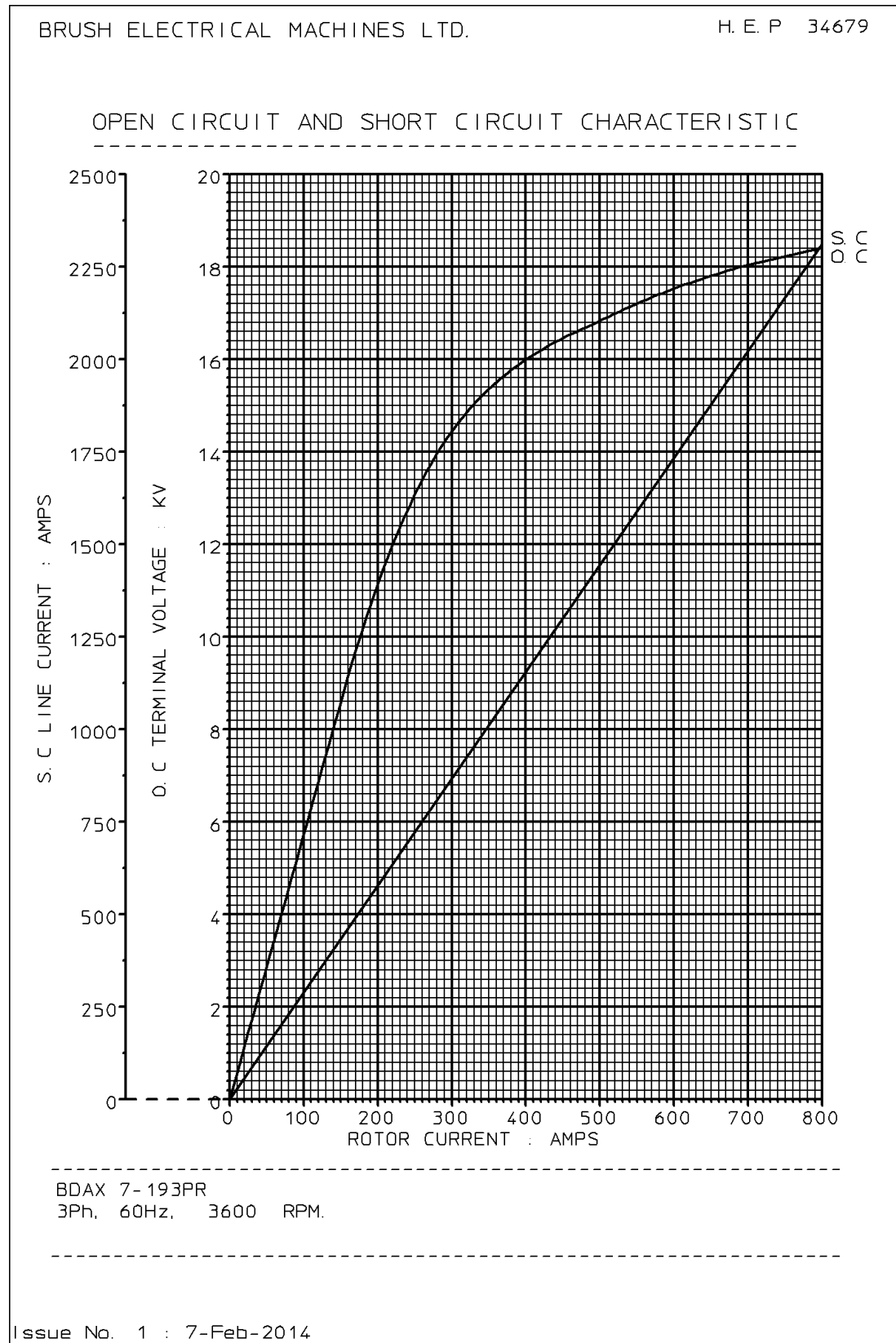


EFFICIENCY VERSUS OUTPUT



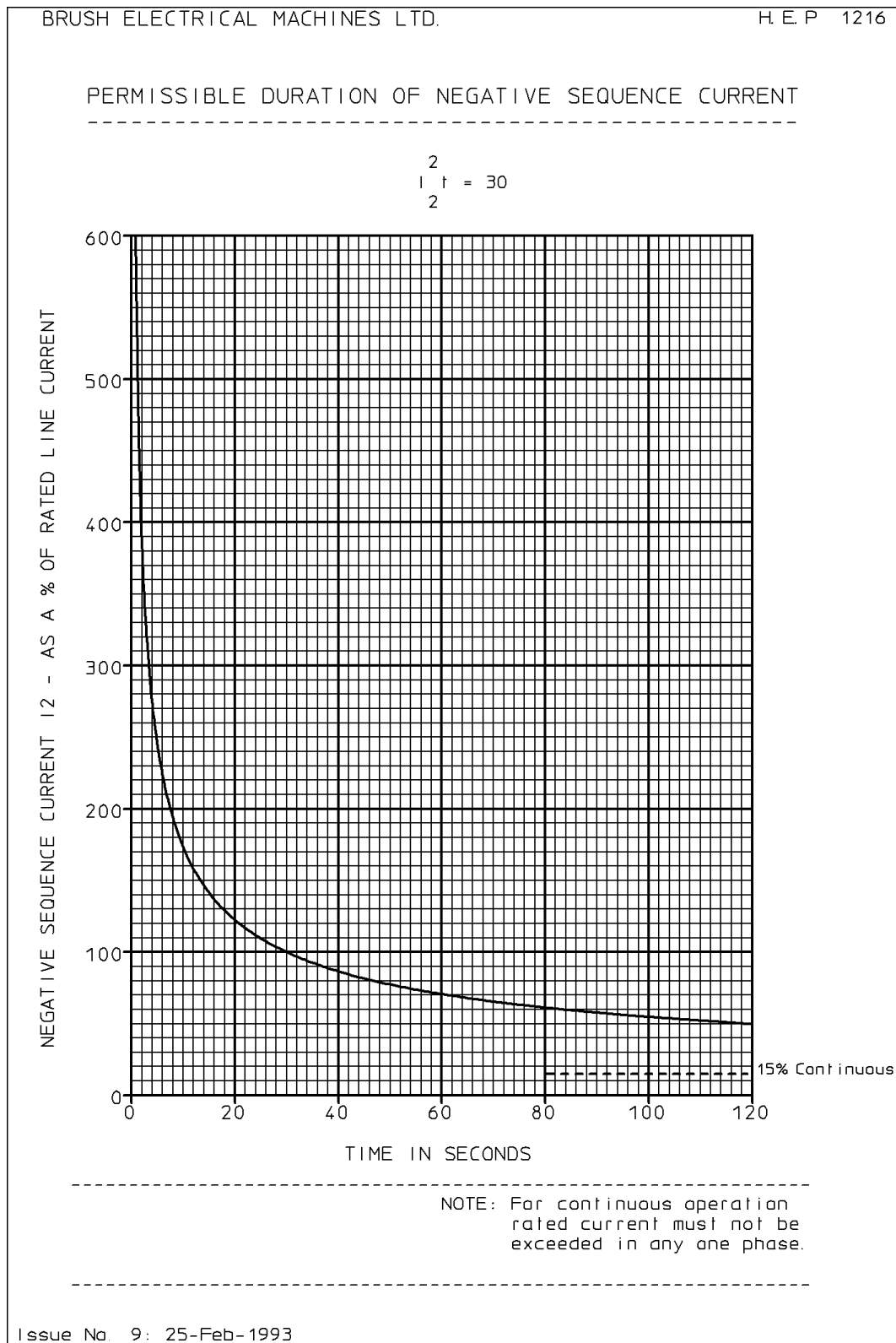


OPEN AND SHORT CIRCUIT CURVES



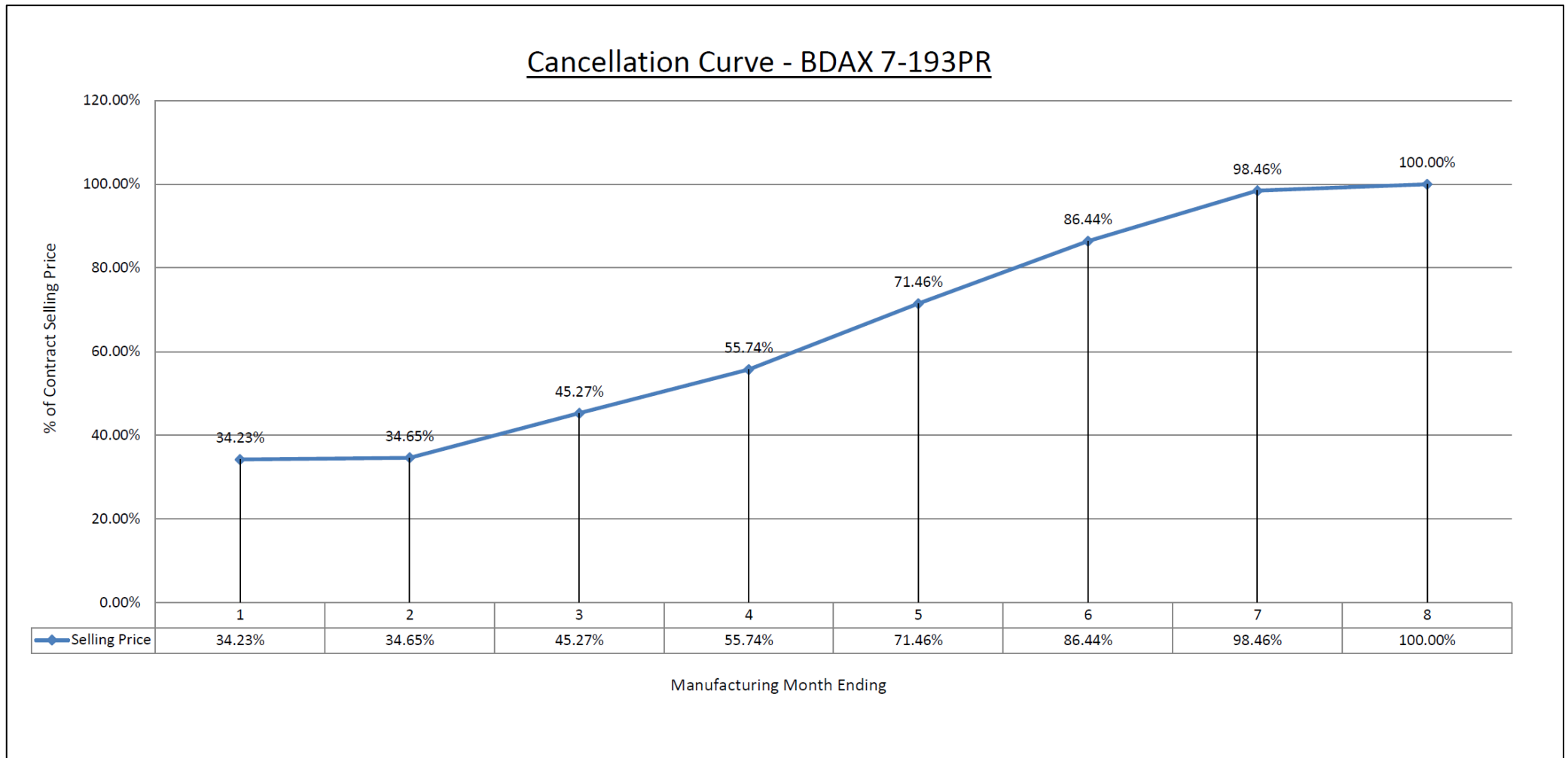


PERMITTED DURATION OF NEGATIVE SEQUENCE CURRENT





CANCELLATION CURVE

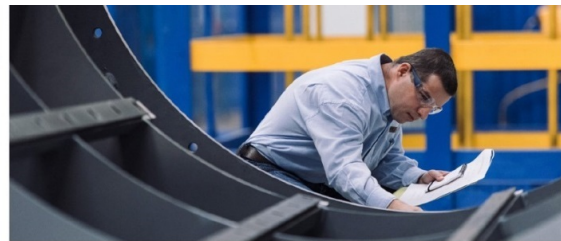




TRUST. WELL EARNED.

QUOTATION FOR PARTS

TITLE	NSPI - Victoria Junction Unit 1 - I & C Parts		
CUSTOMER	Nova Scotia Power Corporation		
CUSTOMER REFERENCE	NSPI - Victoria Junction Unit 1 - I & C Parts		
BRUSH REFERENCE	Q-07451-P3M6K9	REVISION	0
	DATE	23/07/2020	



www.brush.eu



EXECUTIVE SUMMARY

TITLE	NSPI - Victoria Junction Unit 1 - I & C Parts
CUSTOMER & REFERENCE	Nova Scotia Power Corporation Dean Webb (902) 428-7649 dean.webb@nspower.ca
	NSPI - Victoria Junction Unit 1 - I & C Parts
VENDOR	BRUSH Americas Tel: +1 412 829 7500 601 Braddock Avenue www.brush.eu Turtle Creek ISO 9001:2015 Pittsburgh Pennsylvania 15145 United States of America
REGIONAL SALES	Julius Daxner jdaxner@brushgms.com +1-514-794-5242
CUSTOMER SUPPORT	Jithesh Louis JLouis@brushgms.com +1-412-829-7500 x 232
PRICE	\$318,620.87
<p>BRUSH Americas has great pleasure in submitting a proposal to in response to the tender referenced Dean Webb.</p> <p>Why buy BRUSH parts?</p> <p>As the Original Equipment Manufacturer, only BRUSH has the ability to supply parts made to the same exacting standards as the original. Our unrivalled knowledge of the machines we build ensures that the part you receive has been perfectly engineered to match the original. All items are available in the shortest possible lead-times and are the only parts that offer a full original manufacturer's guarantee.</p>	
CONFIDENTIALITY	The information contained within this Quote 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 Americas.



COMMERCIAL PROPOSAL

PRICE SCHEDULE

ITEM	REFERENCE**	DESCRIPTION	QUANTITY**	UNIT	UNIT PRICE	EXTENDED PRICE	STANDARD LEAD TIME	
1	S312225601	BEARING SLEEVE	1.00	Each			16 Week(s)	
	*End user discount of 20% applied and valid through to end of 2020.							
2	S312225701	BEARING SLEEVE	1.00	Each			16 Week(s)	
	*End user discount of 20% applied and valid through to end of 2020.							
3	S311774701	BEARING BUSH	1.00	Each			16 Week(s)	
4	S311623801	BEARING BUSH	1.00	Each			19 Week(s)	
5	S312225801	WASHER - THRUST	1.00	Each			19 Week(s)	
6	S703430601	CLUTCH GLAND KIT	1.00	Each			9 Week(s)	
7	S312070201	GLAND ASSEMBLY - PEDESTAL RTDS	1.00	Each			9 Week(s)	
8	S312232301	GLAND ASSEMBLY - CLUTCH RTDS	1.00	Each			9 Week(s)	
8	S311875001	INSULATION PACKER	1.00	Each			9 Week(s)	
9	S311713304	DOWEL PINS - SET OF 4	1.00	Each			9 Week(s)	
10	S703360401	BEARING KEY AND BUTTON KIT	1.00	Each			11 Week(s)	
11	S703356501	FASTERNER KIT - THRUST WASHER	1.00	Each			9 Week(s)	
12	S311745605	PIPE GASKET - SET OF 2	1.00	Each			9 Week(s)	
13	S311745701	PIPE GASKET - SET OF 2	3.00	Each			9 Week(s)	
14	S311745704	PIPE GASKET - SET OF 2	5.00	Each			9 Week(s)	
15	S311745709	PIPE GASKET - SET OF 2	1.00	Each		9 Week(s)		
16	S311745713	GASKET PIPE SET OF 2	2.00	Each		9 Week(s)		
17	S311745714	GASKET - PIPE - SET OF 2	1.00	Each		9 Week(s)		



18	S311745716	GASKET - PIPE - SET OF 2	2.00	Each	9 Week(s)
19	S311745608	PIPE GASKET - SET OF 2	1.00	Each	9 Week(s)
20	S311745609	PIPE GASKET - SET OF 2	1.00	Each	9 Week(s)
21	S311745616	GASKET - PIPE - SET OF 2	1.00	Each	9 Week(s)
22	S311745626	GASKET PIPE SET OF 2	2.00	Each	9 Week(s)
23	S318348101	SHIM SET - PEDESTAL BEARING	1.00	Each	9 Week(s)
24	S840012001	BRUSH - CARBON	1.00	Each	11 Week(s)
*End user discount of 20% applied and valid through to end of 2020					
25	S840012101	BRUSH HOLDER AND CLAMP	1.00	Each	11 Week(s)
26	S703430401	CONDUIT AND WIRING KIT	1.00	Each	9 Week(s)
27	S703430501	TERMINAL RAIL KIT	1.00	Each	9 Week(s)
28	S318029858	SPRING - SET OF 3	1.00	Each	10 Week(s)
29	S311636901	GASKET	1.00	Each	9 Week(s)
30	S311790508	GASKET - EXCITER AIR OUTLET	1.00	Each	9 Week(s)
31	S315921901	EXCITER SIDE COVER GASKET KIT	1.00	Each	9 Week(s)
32	S318081001	WASHERS - DOWTY - VARIOUS	10.00	Each	9 Week(s)
33	S311745621	GASKET - BEARING	1.00	Each	9 Week(s)
34	S311779801	GASKET - SET OF 4	1.00	Each	9 Week(s)
35	S311779701	GASKET - CLUTCH HOUSING	1.00	Each	9 Week(s)
36	S318029837	HOSE ASSEMBLY	1.00	Each	10 Week(s)
*End user discount of 20% applied and valid through to end of 2020					
37	S318029838	HOSE ASSEMBLY	1.00	Each	10 Week(s)
*End user discount of 20% applied and valid through to end of 2020					
38	S312208701	THERMOCOUPLE - DUPLEX	4.00	Each	9 Week(s)
39	S311983106	TEMPERATURE DETECTOR	1.00	Each	9 Week(s)



	*End user discount of 20% applied and valid through to end of 2020.					
40	S310808301	LOCKING PLATE - SET OF 10	1.00	Each		9 Week(s)
41	S318053101	FIXING KIT - UNC	1.00	Each		9 Week(s)
42	S321375901	COMPOUND AND TAPE KIT	1.00	Each		10 Week(s)
This parts has a shelf life of 6 months from date of Manufacture. All items to be kept sealed to retain solvents (i.e. in polythene bags/tins etc) Tapes to be kept in the refrigerator between temperatures of 3 Degrees Celsius and 5 Degrees Celsius.						
	*End user discount of 20% applied and valid through to end of 2020.					
43	S319978301	BEARING SEAL FASTENER KIT	2.00	Each		11 Week(s)
44	S311797501	GASKET - AIR INLET FILTER	2.00	Each		9 Week(s)
45	S318657401	GASKET AND INSUL KIT OIL INLET	1.00	Each		9 Week(s)
46	S318657801	GASKET N INSUL KIT-OIL OUTLET	1.00	Each		9 Week(s)
47	S319973701	BEARING PEDESTAL-FASTENER KIT	1.00	Each		10 Week(s)
49	S312225900	SOLENOID VALVE	1.00	Each		10 Week(s)
50	S311956802	ORIFICE PLUG KIT - SET OF 6	1.00	Each		11 Week(s)
51	S703334701	OIL DEFLECTOR	1.00	Each		15 Week(s)
52	S703334702	LOCKNUT - SET OF 3	1.00	Each		9 Week(s)
53	S703354901	FASTENER KIT - OIL GUIDE	1.00	Each		9 Week(s)
54	S703366901	FASTENER KIT - STATOR AIR INLETS	1.00	Each		9 Week(s)
55	S311775705	FITTED BOLT - OIL CATCH	1.00	Each		11 Week(s)

**** Note: Part numbers and quantity listed above needs to be verified with BRUSH Engineering at the time of order.**

TOTAL	
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DELIVERY DETAILS

INCOTERMS (2010)	DDP
DELIVERY ADDRESS	Victoria Junction Peaking Station, Canada

FINANCIAL TERMS

INVOICE COMPANY & ADDRESS (if available)	Nova Scotia Power Corporation - Customer to provide invoice address
CURRENCY	United States Dollar
INVOICE TERMS	Invoiced issued upon Purchase Order acceptance
PAYMENT DETAILS	Payable upon Receipt, prior to shipment
MINIMUM ORDER VALUE	Please note that BRUSH Americas operates a minimum order value of \$750. Orders below this value will be charged at the Minimum Order Value.

CONTRACT TERMS & CONDITIONS

VALIDITY	This offer is valid until 22/08/2020
TERMS & CONDITIONS	BRUSH AMERICAS - General Terms & Conditions of Sales 2019.
PURCHASE ORDER TO BE ISSUED TO	Generator & Motor Services of PA, LLC (dba BRUSH Americas). Please forward purchase order to purchaseorder@brushgms.com



EQUIPMENT & LOCATION

SERIAL NUMBER	FRAME DESIGNATION OR MODEL	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



TERMS & CONDITIONS

BRUSH AMERICAS - General Terms & Conditions of Sales 2019

<p>1. Definitions</p> <p>1.1 In construing these Conditions the following words and expressions shall have the meanings hereby assigned to them:</p> <p>"ABC Policy" shall mean the Anti-Bribery and Corruption Policy of the Company Group, which is available upon request.</p> <p>"Applicable Law" shall mean all laws, statutes, proclamations, by-laws, regulations, statutory instruments, rules, orders, delegated or subordinate legislation, from time to time in force at the location where the Services are to be performed.</p> <p>"Affiliate" shall mean, in relation to any company, any subsidiary of that company or any holding company of that company or any other subsidiary of that holding company, and holding company and subsidiary shall have the meanings given to them in section 1159 of the Companies Act 2006 (as amended).</p> <p>"Company" shall mean the member of the Company Group identified in the Contract.</p> <p>"Company Group" shall mean BRUSH Electrical Machines Ltd in England, BRUSH HMA B.V. in the Netherlands, GENERATOR AND MOTOR SERVICES OF PENNSYLVANIA, LLC DBA BRUSH AFTERMARKET in the USA, BRUSH SEM s.r.o. in the Czech Republic and BRUSH Transformers Limited in England, together with any of their co-ventures, sub-contractors of any tier or Affiliates and employees (including agency personnel), directors, officers and agents of any of the foregoing.</p> <p>"Contract" shall mean the agreement between the Company and the Purchaser which constitutes the Tender/Quotation, these Conditions, the Purchase Order, the Order Acknowledgement, the ABC Policy and any other document referred to and incorporated by reference in any of the aforementioned documents, and any BRUSH Supplementary Terms and Conditions.</p> <p>"Company Personnel" shall mean the person or persons involved in the performance of the Services on behalf of the Company, whether employees, agency personnel or sub-contractors of any tier.</p> <p>"Commencement Date" shall mean the commencement date for the Contract as set out in the Order Acknowledgement.</p> <p>"Conditions" shall mean these BRUSH Americas General Terms and Conditions of Sale, Version dated 2019.</p> <p>"Charges" shall mean the fees and expenses for the supply of Goods and Services.</p> <p>"Confidential Information" shall mean all information and material (whether oral, electronically recorded, in writing or otherwise) relating to either Party, the fact of and the terms of the Contract, and including software, samples, trade secrets, business records, concepts, ideas and any other information that may be derived from them, and any other materials of whatever description, whether such information comes into the possession of the other Party before, on or after the Commencement Date.</p> <p>"Event of Default" shall mean any of: (a) a breach of these Conditions; (b) a tortious act or omission (including negligence); (c) breach of statutory duty; or misrepresentation (each an Event of Default) (d) any other claim or claims made by Purchaser pursuant to any Contracts governed by these Conditions.</p> <p>"Goods" shall mean (but not limited to) items of plant, equipment, materials and/or parts supplied by the Company and in relation to the Services, if any.</p> <p>"Intellectual Property Rights" shall mean all intellectual property rights, trademarks, trade and business names, service marks, get-ups, patents, copyright (including copyright in computer programs), database rights, design rights, registered designs, utility models, semiconductor topographical rights, inventions, know-how, Confidential Information and all other intellectual property and rights of a similar or corresponding nature in any part of the world, whether or not registered or capable of registration, in respect of such rights which are registerable the right to apply for registration and all applications for registration of any of the foregoing rights.</p> <p>"Purchaser" shall mean the Party to whom the Goods and Services are to be provided by the Company, as identified in the Contract.</p> <p>"Site" shall mean the place or places at which the Services are to be rendered as set out in the Contract.</p> <p>"Services" shall mean the services to be carried out under the Contract as specified in the Scope of Supply.</p> <p>"Specification" shall mean the specification for the Goods or Services (as applicable) set out in the Contract.</p> <p>"Scope of Supply" shall mean the agreed scope of supply, including the applicable Charges and schedule for the supply of the Goods and Services as detailed in the Contract.</p> <p>"Supplementary Terms" shall mean any additional terms and conditions applicable to the Services, which shall form part of the Contract.</p> <p>1.2 The Company and the Purchaser shall be referred to individually as a "Party" and together as "Parties".</p> <p>1.3 Any reference in these Conditions to a statute or a provision of a statute shall be construed as a reference to that statute or provision as amended, re-enacted or extended at the relevant time.</p> <p>1.4 "Indemnify" means on demand to indemnify and keep indemnified, and hold harmless, the Party to be indemnified on an after-tax basis.</p> <p>2. General</p> <p>2.1 The supply of Goods and Services shall be subject to these Conditions, in addition to any BRUSH Supplementary Terms and Conditions, to the exclusion of any other terms and conditions the Purchaser purports to apply, whether in a Purchase Order or otherwise, which are hereby rejected or (as appropriate) shall be excluded from the Contract.</p> <p>2.2 Unless otherwise stated within the Tender/Quotation, the Contract is conditional upon the machine or parts of the machine in relation to which the Services are provided being free from asbestos or other hazardous materials. It is the responsibility of the Purchaser to inform the Company if asbestos or other hazardous materials may be present. The Company may cancel the Contract immediately without liability to the Purchaser on receipt of a notice referring to this Condition 2.2 or if, prior to or on inspection of the machine or</p>
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parts of the machine, the Company knows or suspects asbestos or other hazardous materials to be present. Purchaser shall dispose of, or keep on Purchaser's site, all used and/or unused DOT Regulated Substance including, but not limited to, Contact Adhesive, Positron, Astro 6271, and Denatured Alcohol.

3. Contract Formation

3.1 The Company's employees, agents or sub-contractors of any tier are not authorised to make any representations concerning the Goods and Services unless confirmed by an authorised representative of the Company in writing. In entering into the Contract the Purchaser acknowledges that it does not rely on, and waives any claim in relation to, any such representations which are not so confirmed.

3.2 Sales literature, price lists and other documents issued by the Company in relation to the Goods and Services are subject to alteration without notice and do not constitute offers to sell the Goods or supply the Services. Any typographical, clerical or other accidental errors or omissions in any sales literature, tender, quotation, price list, acceptance of offer, invoice or other document or information issued by the Company shall be subject to correction without any liability on the part of the Company.

3.3 The Tender/Quotation does not constitute an offer by the Company to sell or supply the Goods or Services. The Purchase Order constitutes an offer by the Purchaser to purchase the Goods and Services.

3.4 No contract for the supply of Goods and Services shall be binding on the Company until the Purchaser issues a Purchase Order and either the Company issues an Order Acknowledgement, or if earlier, the Company commences the Services or delivers the Goods.

3.5 Notwithstanding Condition 3.4, the Company may at its sole discretion agree to supply the Goods or perform the Services before a Purchase Order has been submitted by the Purchaser and accepted by the Company, if the Purchaser so requests. If the Company elects to do so, the Purchaser shall, until a Purchase Order is received by the Company and accepted in accordance with these Conditions, fully indemnify the Company for any and all cost and losses incurred by the Company as a result of supplying the Goods or performing the Services at the Purchaser's request in advance of receiving the Purchaser Order. Any Services or Goods provided by Company prior to a Purchase Order being provided shall be governed exclusively by the Conditions.

4. The Goods

4.1 Subject to the payment of the Charges when due, the Company shall supply the Goods.

4.2 The Company reserves the right to make any changes to the Specification which are required, in order to conform to any applicable safety or other statutory or regulatory requirements, or which do not materially affect the quality or performance of the Goods.

4.3 Dates for delivery are estimates only. The Company shall use reasonable endeavours to complete its obligations in accordance with estimated delivery dates set out in the Contract, but time will not be of the essence in the performance of these obligations.

4.4 Unless otherwise agreed, the Goods may be delivered by the Company in advance of the delivery due date.

5. The Services

5.1 Subject to the payment of the Charges when due under the Contract, the Company shall supply the Services.

5.2 Times for performance of the Services are estimates only. The Company will use reasonable endeavours to perform the Services in accordance with the estimated timescales set out in the Contract, but time will not be of the essence in the performance of these obligations.

5.3 The Purchaser shall:

5.3.1 co-operate with the Company and provide all reasonable assistance required to achieve the objectives set out in the Contract, including providing all necessary information, descriptions, Specifications, access to premises and adequate access to equipment to enable the Company to satisfy its obligations under the Contract; and

5.3.2 obtain and maintain all necessary licences, consents and other rights necessary to comply with all Applicable Law.

5.4 If the Company's performance of its obligations under the Contract is prevented or delayed by any act or omission (including any breach of Condition 5.3) of the Purchaser, its agents, subcontractors, consultants or employees, then the Company shall not be liable for any costs, damages, expenses or losses sustained or incurred by the Purchaser that arise directly or indirectly from such prevention or delay, and the time period for Company's performance of its obligations under the Contract shall be extended accordingly. All standby costs, demobilization costs, and remobilization costs, which are applicable, will be charged to Purchaser and Purchaser will be liable for such charges.

5.5 The Company may (but shall not be obliged to) carry out a Site survey or make enquiries to the Purchaser in relation to the condition of the Site and the relevant equipment to which the Services relate, and the environment conditions in which such equipment is located. If any circumstances change or the information provided by the Purchaser proves to be inaccurate (in the reasonable opinion of the Company), the Company shall be permitted to decline to provide the Services (and the Purchaser shall be obliged to pay the Company's reasonable costs and expenses incurred up to that point) or the Company may alter the Charges and performance dates.

5.6 On completion of performance of the Services, the Company shall issue the Purchaser with a certificate of completion. On receipt of such certificate, the Purchaser shall review the Services performed and test the relevant equipment to ensure the Services conform to the Contract. The Purchaser shall promptly sign the certificate of completion if the Services conform to the Contract. The Purchaser shall not unreasonably refuse to sign or delay signing the certificate of completion.

5.7 All information and advice set out in any documents and any information or advice given verbally by or on behalf of the Company is for the benefit of the Purchaser only. The Company shall have no liability whatsoever to any third party which relies on such information or advice.

5.8 The Purchaser shall indemnify the Company Group on demand against any damages, costs, losses, expenses, incurred by, and any claims (including claims from third parties), proceedings, demands or actions brought against, the Company Group arising in connection with the reliance by any third party on any information or advice which is provided by the Company to the Purchaser in relation to the Services.



6. Terms of Payment

6.1 The Purchaser shall pay the Charges.

6.2 The Company reserves the right, by giving notice to the Purchaser at any time before delivery, to increase the Charges to reflect any increase in the cost to the Company which is due to any factor beyond the control of the Company including any foreign exchange fluctuations, currency regulation, alteration of duties, increase in the costs of labour, materials or other costs of manufacture, any change in delivery dates, quantities or Specifications for the Goods and Services which are requested by the Purchaser, changes in Applicable Law or any delay caused by any instructions of the Purchaser or failure or delay of the Purchaser to give the Company adequate information or instructions.

6.3 The Charges are exclusive of any applicable value added tax, excise, sales or taxes or levies of a similar nature which are imposed or charged by any competent fiscal authority in respect of the Goods and Services, which the Purchaser shall be additionally liable to pay to the Company.

6.4 All payments required to be made pursuant to a Contract by the Purchaser, shall be made within thirty (30) days after the date of the relevant invoice, without any set-off, withholding or deduction except such amount (if any) of tax as the Purchaser is required to deduct or withhold by law.

6.5 The time of payment shall be of the essence of the Contract.

6.6 If the Purchaser fails to make any payment on the due date in respect of the Charges or any other sum due under the Contract then the Company shall, without prejudice to any rights which the Company may have pursuant to any statutory provision in force from time to time, have the right to charge the Purchaser interest on a daily basis at an annual rate equal to the aggregate of three (3%) percent above the base rate on any sum due and not paid on the due date. Such interest shall be calculated cumulatively on a daily basis and shall run from day to day and accrue after as well as before any judgement.

6.7 The Company may raise an invoice in respect of the Services on or after completion. Where the Services continue for more than one (1) month after the Commencement Date, the Company may raise an invoice at the end of each month in which the Services are performed in respect of any Services performed in that month.

6.8 If the supply of Services is suspended or terminated for any reason, the Company may raise an invoice immediately in respect of Services performed but not yet paid for.

6.9 Goods supplied under the Contract shall be invoiced on Notification of Readiness to despatch or after despatch from the Company's works.

6.10 All expenses of the Company incurred in performance of the Services will be payable by the Purchaser together with a finance and administration charge of twenty (20%) percent. The cost of currency conversion and all bank charges will be borne by the Purchaser.

6.11 Any local taxation or other impost payable by or in respect of the Company or the Company Personnel whilst engaged by the Purchaser in respect of the Services and Goods, including all sales, use and excise taxes, will be the responsibility of the Purchaser excepting taxes that are compelled to be legally payable by Company.

6.12 If the Purchaser fails to make any payment on the due date then, without prejudice to any other right or remedy available to the Company, the Company shall be entitled to cancel the order or suspend any further deliveries of Goods and Services to the Purchaser until payment is made in full.

7. Suspension and Termination

7.1 The Purchaser may at any time instruct the Company or the Company's Personnel in writing to suspend the performance of the Services or any part thereof. All costs of the Company arising out of or in connection with any suspension will be paid by the Purchaser to the Company on demand.

7.2 If during the term of any suspension the Company Personnel are retained on Site, they will be deemed to be on standby and the Company shall be entitled to charge the Purchaser for the Company Personnel being on standby at the Company's standard daily rate for the relevant person(s).

7.3 If the Company Personnel(s) are required to be withdrawn from the Site, such withdrawal will be affected as expeditiously as is reasonably possible commensurate with the Company Personnel taking such measures as are necessary for the safety and security of the Site Equipment(s). The Purchaser will be responsible for the safe storage of any Company equipment left at the Site pending recommencement of the Services.

7.4 The Purchaser will be charged for all work completed and committed to, including the Company Personnel's time up to the time of termination or suspension, making the Equipment safe and returning to base where suspension is at the Purchaser's request.

7.5 If a purchase order for parts is cancelled after items are shipped, there will be a 25% restocking charge to cover the costs of shipping and returning the item to inventory. If a cancelled part is a special order for The Purchaser, there may be a cancellation charge up to the price of the part.

7.6 No Contract may be terminated or cancelled for convenience by the Purchaser except with the prior written agreement of the Company on the terms that the Purchaser shall indemnify the Company in full against all losses, costs (including the cost of all labour and materials used), damages, charges and expenses incurred by the Company as a result of such termination or cancellation.

7.7 Either Party may terminate a Contract at any time on written notice if:

(a) any action (corporate or otherwise), legal proceedings or other procedure or step is taken by any person in any jurisdiction in relation to or with a view to:

(i) the winding up, dissolution, administration or reorganisation (by way of voluntary arrangement, scheme of arrangement or otherwise) of a Party (except that no right to terminate will arise in respect of any procedure commenced for the purpose of a solvent amalgamation or reconstruction);

(ii) the appointment of a liquidator, trustee in bankruptcy, receiver, administrative receiver, administrator, nominee, supervisor or similar office in respect of a Party or any of its assets;



(iii) the enforcement of any security over any assets of a Party; or
 (iv) the attachment, sequestration, distraining upon or execution over or affecting any material asset of a Party; in each case which is not withdrawn or dismissed as soon as practicable;
 (b) the other Party perceives (acting reasonably) that the Party is unable to pay its debts as they fall due or is insolvent;
 (c) the Party enters into a composition or arrangement with its creditors or any class of them;
 (d) the Party ceases to carry on its business or substantially all of its business, or is struck off; or
 (e) the commencement of any analogous procedure or step in relation to such Party in any jurisdiction other than England and Wales.
 (f) the other Party commits a material breach of the Contract and (if such breach is remediable) fails to take reasonable steps to remedy such breach within thirty (30) days after receipt of written notice containing details of the relevant breach.

8. Delivery

8.1 Delivery of the Goods shall be made by the Company in accordance with the INCOTERM (2010) as specified in the Contract.

9. Liability for Delay and Non-Delivery

9.1 Subject to Condition 16, if a fixed time is quoted by the Company for the completion, despatch or delivery of the Goods or performance of the Services and the Company fails to deliver such Goods or any part of them or perform the Services (as applicable) on or before the due delivery date or performance date or within any extension thereof that is agreed by the Parties, the Company shall pay the Purchaser for each full week of delay, liquidated damages at the rate of zero point five (0.5%) percent, up to a maximum of five (5%) percent, of the Contract price in respect of the portion of the Goods or Services that are delayed and where the Purchaser can demonstrate they have suffered loss. Such payment shall be in full satisfaction of the Company's liability for delay and shall be the Purchaser's sole remedy for late delivery or performance (as applicable). A two (2) week grace period after the fixed delivery date or performance date shall apply before the application of any liquidated damages under this Condition 9.1.

9.2 Any time quoted by Company for delivery of equipment to be serviced or repaired at the Company's premises shall not begin until the Company has received the equipment to be repaired at its premises and a Contract is in place with all necessary information to enable the Company to commence the relevant Services.

10. Title and Risk

10.1 Title and risk in the Goods will pass to the Purchaser on notification by the Company of Goods ready for despatch. Following such notification, and whilst the Goods are in the Company's possession, in the event of any loss or damage to the Goods, the Company will transfer to the Purchaser, in full and final satisfaction of the Company's liability, insurance proceeds actually paid out by the insurance company up to the total value of the Goods.

11. Storage

11.1 If the Purchaser requires storage from the Company, or if the Purchaser does not take possession of the Goods on the agreed date for delivery and/or if the Company is unable by reason of the Purchaser's instructions or lack of instructions to deliver the Goods when ready then (i) the Goods will be placed into storage by the Company and the Purchaser shall be liable for the Company's storage charges in accordance with the Company's standard storage rates; (ii) the Company shall be entitled to invoice for such completed Goods and (iii) following a period of storage of three months or more then, where applicable, VAT at the prevailing rate will be payable on the full value of the Goods and the costs of storage. Should VAT become payable, an invoice covering the VAT payment will be raised by the Company and will be due for payment by the Purchaser on reaching the end of a storage period of three months. Once the Goods are taken out of storage the VAT payment will be refunded by the Company to the Purchaser within 60 days of the Company's receipt of shipping certification.

12. Defective Goods and Services

12.1 The Company shall make good, by repair or the supply of a replacement, any defects which, under proper use, appear in the Goods within a period of twelve (12) calendar months after the Goods have been delivered or eighteen (18) calendar months from notification of readiness to despatch, whichever period expires earlier (the "Warranty Period"), provided that the Purchaser notifies the Company of the defect within three (3) business days from the Purchaser becoming aware of the defect and such notice is provided to Company within the Warranty Period.

12.2 Defective Goods shall be returned to the Company, for repair, by the Purchaser if requested by the Company. The Company shall refund the cost of carriage on such returned Goods and the repaired or new parts will be delivered by the Company free of charge to the delivery point stated in the Contract.

12.3 The Company shall re-perform any Services where such Services are found to be non-compliant with the Specifications within a period of twelve (12) calendar months after completion of the Services, provided that the Purchaser notifies the Company of the defect within three (3) business days from the Purchaser becoming aware of the defect and such notice is provided to Company within the Warranty Period.

12.4 The liability of the Company under Conditions 12.1 and 12.3 shall only relate to Services and Goods supplied or performed as part of the Scope of Supply within the Contract, and does not extend to parts, materials, equipment or services not supplied by the Company.

12.5 Goods repaired or replaced or Services which are re-performed shall have a further warranty of twelve (12) calendar months from the date of repair, replacement or re-performance (as applicable), being limited to and not exceeding a total defect warranty period of twenty-four (24) calendar months.

12.6 If on delivery, any of the Goods do not conform with the Specification in any material respect, the Purchaser shall give written notice of such defect to the Company within three (3) business days of such delivery and, the Company shall at its sole option:

12.6.1 replace or repair the defective Goods within ninety (90) days, or lesser time as agreed by the Company, of receiving the Purchaser's



notice (and Condition 12.2 shall apply); or

12.6.2 refund to the Purchaser the price for the Goods which are defective.

12.7 If the Purchaser fails to give notice of defects in accordance with Condition 12.6, the Goods shall be deemed accepted by the Purchaser.

12.8 The Company shall have no liability in respect of any defect arising from fair wear and tear, wilful damage, negligence of the Purchaser, failure to follow the Company's instructions and recommendations (whether oral or in writing), misuse, alteration or repair of the Goods without the Company's approval, or any other act or omission on the part of the Purchaser, its employees or agents or any third party.

12.9 Upon expiry of the warranty period set out in this Condition 12, the Company shall have no liability to the Purchaser either under the Contract or in tort (including negligence).

12.10 The remedies of the Purchaser set out in this Condition 12 shall be the sole and exclusive remedy of the Purchaser in respect of defective Goods or Services; no other warranties, whether at law, or otherwise, shall be applicable.

13. Limits of Liability

13.1 Notwithstanding any other clause, whether these Conditions, or otherwise, neither the Company nor the Purchaser shall have any liability to the other whatsoever, whether by way of indemnity, for breach of contract, or tort (including negligence), or by reason of any representation, implied warranty, condition or other term, or by any duty at common law or under express terms of these Conditions or the Contract, or by any other way imaginable, for any loss of contracts, loss of business, loss of use, loss of profits, loss of revenue, fines or similar impositions levied by any regulatory body or competent authority, loss of goodwill or reputation or for any indirect, special, consequential, financial or economic loss, damages, costs, expenses or other claims (whether caused by the Company's or Purchaser's servants or agents or otherwise) which arise out of or in connection with the supply of the Goods and Services.

13.2 The Purchaser shall indemnify the Company against all damages, costs, claims and expenses related to loss of or damage to any equipment (including that of third parties) caused by the Company, or its agents or employees in performing the Services, except to the extent caused by any negligent acts or omissions of the Company or its agent or employees.

13.3 Nothing in these Conditions or the Contract shall operate to exclude or limit the liability of either Party for death and/or personal injury caused by the negligent acts and omissions of that Party, or fraud.

13.4 Notwithstanding any other provision in these Conditions, Contract, or otherwise, Company's total liability, whatsoever, for any claim or claims made against Company by Purchaser, or by any other entity or person, whether a party hereto or otherwise, relating to any transactions between Company and Purchaser governed by these Conditions, whether such claim or claims are based on tort, warranty or any other theories of law, or otherwise, shall in no event, in the aggregate, exceed the Purchase Order price, including any amendments thereto, from which the claim or claims arose.

14. Intellectual Property Rights

14.1 The Company shall indemnify the Purchaser against any claim by a third party that the use or sale of any article or material supplied by the Company to Purchaser infringes the Intellectual Property Rights of that third party; provided always that this indemnity shall not apply to any infringement which is due to the Company having followed a design or instruction furnished or given by Purchaser or to the use of such article or material in a manner or for a purpose or in a foreign country not specified by or disclosed to the Company, or any infringement which is due to the use of such article or material in association or combination with any other article or material not supplied by the Company.

14.2 The indemnity at Condition 14.1 is conditional on Purchaser giving to the Company the earliest possible notice in writing of any claim being made or action threatened or brought against Purchaser and on Purchaser permitting the Company at the Company's own expense to conduct any litigation that may ensue and all negotiations for a settlement of the claim and the Purchaser taking all reasonable steps to mitigate its losses.

14.3 Purchaser warrants that any design or instruction furnished or given by Purchaser shall not infringe the Intellectual Property Rights of any third party.

15. Force Majeure

15.1 Force Majeure means any circumstances occurring after the date of the Contract which prevent, hinder or delay the affected Party from performing its obligations and which are beyond the reasonable control of the affected Party.

15.2 Force Majeure shall include (but is not limited to) acts of God, war (whether declared or not), national emergency, civil commotion and unrest, riots, natural disasters, floods, earthquakes, strikes, lockouts or other labour disturbances, unavailability of transport, shortages of raw materials or utilities, breakdown or failure or malfunctioning of machinery or any other cause beyond the reasonable control of a Party.

15.3 If either Party is prevented, hindered or delayed from performing any of its obligations under the Contract by a Force Majeure event then it shall notify the other Party of the circumstances constituting the Force Majeure event and of the obligations which it is thereby delayed, hindered or prevented from performing. The Party giving the notice shall not be in breach of the Contract and shall be excused from the performance of such obligations for so long as the Force Majeure Event may continue but shall take reasonable steps to mitigate the impact of any Force Majeure event.

15.4 If the Force Majeure event prevents, hinders or delays the performance of the affected obligations by more than sixty (60) days, either Party may terminate the Contract by written notice to the other. In the event of termination, the Purchaser shall pay the Company for Services performed up to the date of the Force Majeure event only.

16. Confidentiality

16.1 Each Party (the "Recipient") undertakes to the other Party (the "Discloser") to:



16.1.1 hold all Confidential Information of the Discloser which it obtains in relation to a Contract, in strict confidence;
 16.1.2 not disclose, or authorise the disclosure of, the Discloser's Confidential Information to any third party other than pursuant to Condition 16.2, 16.3 and 16.4;
 16.1.3 not use, or authorise anyone to use, the Discloser's Confidential Information for any purpose other than the purposes of the Contract; and
 16.1.4 promptly notify the Discloser of any suspected or actual unauthorised use or disclosure of the Discloser's Confidential Information of which the Recipient becomes aware and promptly take all reasonable steps that the Discloser may require in order to prevent, stop or remedy the unauthorised use or disclosure.

16.2 Each Party may disclose the other Party's Confidential Information to its Affiliates and their respective officers, directors, employees, contractors, advisors and auditors, but only to the extent, and provided, that such persons:

16.2.1 need to know the Confidential Information disclosed to them;
 16.2.2 have been informed in writing of the confidential nature of the Confidential Information and the purpose for which it may be lawfully used; and
 16.2.3 have agreed (whether pursuant to their contracts of employment or otherwise) to comply with terms which are substantially the same as the terms of Conditions in respect of the Confidential Information disclosed to them.

16.3 Condition 16.1 will not apply to Confidential Information to the extent that:

16.3.1 such Confidential Information has been placed in the public domain other than through the fault of the Recipient;
 16.3.2 such Confidential Information has been independently developed by the Recipient without reference to the Confidential Information of the Discloser;
 16.3.3 the Discloser has approved in writing the particular use or disclosure of the Confidential Information;
 16.3.4 such Confidential Information was already known by the Recipient prior to the disclosure without an obligation of confidentiality; or
 16.3.5 such Confidential Information is independently received from a third party without any obligation of confidence and the Recipient has made reasonable enquiries that the third party owed no obligation of confidence to the Discloser.

16.4 Each Party may disclose the other Party's Confidential Information if, and to the extent that, it is required to do so by a regulator, a relevant stock exchange or otherwise by Applicable Law.

16.5 Each Party acknowledges that Confidential Information is valuable and that damages might not be an adequate remedy for any breach of this Condition 16 and accordingly a Party or its Affiliates will be entitled, without proof of special damage, to an injunction and other equitable relief for any actual or threatened breach of Condition 16.

17. Assignment
 17.1 The Company may at its sole discretion at any time assign the Contract or any part of it to any person, firm or company.
 17.2 The Purchaser shall not be entitled to assign the Contract or any part of it without the prior written consent of the Company, which shall not be unreasonable withheld.

18. Waiver
 18.1 Any failure or neglect by either Party to enforce its rights under the Contract shall not be construed as a waiver of those rights. No waiver by a Party of any breach of the Contract by the other Party shall be considered as a waiver of any subsequent breach of the same or any other provision.

19. Severability
 19.1 If any provision of these Conditions is held by any competent authority to be invalid or unenforceable in whole or in part, that provision shall be deemed not to form part of the Contract and the validity of the other provisions of these Conditions and the remainder of the provision in question shall not be affected thereby.

20. Third Party Rights
 20.1 A person who is not a party to the Contract shall have no rights under the Contract pursuant to the Contracts (Rights of Third Parties) Act 1999.

21. Governing Law
 21.1 The Contract shall be governed by and construed in accordance to the governing law of the Commonwealth of Pennsylvania.

22. Arbitration
 22.1 If at any time any question, dispute or difference whatsoever shall arise between the Parties upon, in relation to, or in connection with the Contract, either Party may give to the other notice in writing of the existence of such question, dispute, claim or difference and, if the Parties are unable to amicably agree to a resolution, the same shall be referred to the arbitration of a person to be mutually agreed upon within thirty (30) days of receipt of such notice, of some person appointed by the American Arbitration Association.
 22.2 Any controversy or claim arising out of or relating to this Contract, or the breach thereof, shall be settled by arbitration administered by the American Arbitration Association in accordance with its Commercial [or other] Arbitration Rules. The place of arbitration shall be Pittsburgh, PA.

23. United Nations Convention
 23.1 The provisions of the United Nations Convention on Contracts for the International Sale of Goods ("The Vienna Convention") are hereby excluded from the Contract.



24. Trading Sanctions and Export Control

24.1 If Purchaser transfers to any third party any Goods (i.e. hardware and/ or software and/ or technology as well as corresponding documentation, regardless of the mode of provision) delivered by Company or any other equipment in relation to which Services (including all kinds of technical support) have been performed by the Company (the "Transfer"), Purchaser shall comply with all applicable national and international (re-) export control and trading sanction regulations.

24.2 If any Transfer occurs the Purchaser shall in guarantee and warrant that:

24.2.1 there will be no infringement of an embargo imposed by the United Kingdom, European Union, United States of America and/ or by the United Nations;

24.2.2 such items being transferred are not intended for use in connection with armaments, nuclear, biological or chemical weapons technology (WMD) or any type of missile technology and/ or any form of terrorism, financing of terrorism or money laundering; and

24.2.3 the regulations of all applicable Sanctioned Party Lists of the United Kingdom, European Union and the United States of America concerning the trading with entities, persons and organizations listed therein are considered and the appropriate due diligence conducted.

24.3 If the Company opts to conduct an export control and trading sanctions audits, the Purchaser upon request by the Company, shall promptly provide the Company with all information pertaining to any particular end customer, destination and intended use of the Goods, and equipment in relation to which the Services are provided by Company.

24.4 Purchaser shall indemnify the Company and any member of the Company Group from and against any claim, proceeding, action, fine, loss, cost and damages arising out of or relating to any non-compliance with export control and trading sanction rules and regulations by Purchaser.

25. Anti-Bribery Corruption (ABC) and Anti-Money Laundering Provisions

25.1 Each Party shall fully comply with all Applicable Laws of the countries in which the obligations set forth in this Contract shall be performed, as well as the applicable anti-corruption, anti-money laundering and anti-terrorism laws of the United Kingdom, including, the United States Foreign Corrupt Practices Act and the UK Bribery Act 2010.

25.2 In performing its obligations under this Contract, the Parties and its officers, directors, employees, agents and representatives agree that they have not, and shall not:

25.2.1 directly or indirectly, offer, give, make, promise, pay or authorize the payment of any money, gift, or anything of value to any person that is an officer or employee of any government, or an officer or employee of any department, agency or instrumentality thereof, or of any public international organization, or any person acting in an official capacity on behalf of such government, department, agency or instrumentality thereof, or any candidate for or appointee to a political or government office, or to any political party; or

25.2.2 receive, transfer, retain, use or hide the proceeds of any criminal activity whatsoever, or employ or otherwise conduct business with a "designated person", namely a person or entity that appears on any list issued by the United Kingdom or United States of America or international organizations such as the United Nations or European Union as being involved in money laundering, terrorism, or drug trafficking, or as having violated economic or arms embargoes.

25.3 The Purchase shall fully comply with the ABC Policy.

25.4 In the event that either Party becomes aware or obtains knowledge of any violations of this Condition, the aware Party shall promptly report to the other Party any such violation.

25.5 Any violation of the provisions of this Condition shall be sufficient cause for either Party to terminate the Contract.

25.6 Purchaser shall indemnify the Company and any member of the Company Group from and against any claim, proceeding, action, fine, loss, cost and damages arising out of or relating to any non-compliance with any anti-bribery and corruption and anti-money laundering provisions by Purchaser.

26. Entire Agreement

26.1 This Contract constitutes the entire agreement between the Parties relating to its subject matter and supersedes all prior representations, including negligence misrepresentations, agreements, negotiations or understandings between the Parties.

26.2 No variation to the Contract shall be binding unless agreed in writing between the authorised representatives of the Parties.

27. Supplementary Terms and Conditions

27.1 The Company's Supplementary Terms shall also form part of the Contract if referred to in the Tender/Quotation or provided to the Purchaser

SUPPLEMENTARY TERMS APPLICABLE TO SITE WORK

1. Definitions and Interpretation

1.1 All terms capitalised in these Supplementary Terms shall have the meaning set out in the Company's BRUSH Americas General Terms and Conditions of Sale 2019 (the "Conditions").

1.2 In these Supplementary Terms, "Equipment" means any equipment in relation to which the Purchaser has requested Services and "Base" means the usual place of residence of the relevant Company Personnel.

1.3 All Conditions apply, in addition to these Supplementary Terms. In the event of a conflict between these Supplementary Terms and the Conditions, these Supplementary Terms shall prevail to the extent of the conflict.

2. Health, Safety and Environment

2.1 The Purchaser shall be responsible for providing safe systems of work for the Company Personnel and ensuring that the health and



safety of the Company Personnel is adequately safeguarded while performing the Services.

2.2 Scaffolding, work platforms, equipment, services and facilities provided by the Purchaser for use by the Company Personnel shall be suitable for their intended purpose and shall conform to all Applicable Laws including in relation to health and safety and any applicable codes of practice.

2.3 Lifting equipment provided by the Purchaser for use by the Company Personnel shall be suitable for its intended purpose and shall have current and valid test certification sufficient to satisfy local legal requirements as a minimum.

2.4 The Company Personnel shall be entitled at any time, at his/her absolute discretion, to refuse to perform the Services or suspend performance of the Services, if the conditions at the Site are or have the potential to be unsafe or pose an unacceptable risk to health and/or safety.

2.5 The Purchaser shall ensure that the Company Personnel is permitted to take adequate rest and meal breaks during the course of the provision of the Services and immediately before and after long distance travel, including a minimum rest break of eight (8) continuous hours in any twenty-four (24) hour period.

2.6 The Company Personnel shall not under any circumstances be required to perform any Services if in the reasonable opinion of the Company Personnel, such performance may result in equipment being rendered incapable of being returned to service or in a condition that in the reasonable opinion of the Company Personnel poses an abnormal and unacceptable risk to the safety of persons or the property of third parties.

2.7 The Company Personnel shall not be required to perform the Services in a designated confined space (as defined in the Confined Spaces Regulations 1997) without prior consultation with the Company in every instance and until all additional safety requirements of the Company have been implemented by the Purchaser in every instance.

2.8 If the Services are being performed by Company Personnel outside of the Company Personnel's normal country of residence, the Purchaser shall, at its own expense, provide the Company Personnel during the period of performance of the Services with medical treatment and emergency dental treatment of a standard not less than that normally expected by the Purchaser's own senior staff. If any of the Company Personnel are absent from duty due to sickness, the Purchaser's responsibilities under the Contract to provide medical treatment shall be limited to fourteen (14) consecutive days of medical treatment for the relevant Company Personnel.

2.9 Unless otherwise stated within the Tender/Quotation, this Contract is conditional upon the machine or parts of the machine in relation to which the Services are provided and the Site being free from asbestos or other hazardous materials. It is the responsibility of the Purchaser to inform the Company if asbestos or other hazardous materials may be present. The Company may cancel the Contract immediately without liability to the Purchaser on receipt of a notice referring to this Condition 2.9 or if, prior to or on inspection of the machine or parts of the machine or the Site, the Company knows or suspects asbestos or other hazardous materials to be present.

2.10 If the Company agrees to perform the Services notwithstanding the presence of asbestos or hazardous materials in the machines or parts of the machines in relation to which the Services are provided or the Site, the Company will provide a written risk assessment and method statement identifying the control measures required from the Purchaser for the protection of all personnel involved, prior to the commencement of performance of the Services and the Purchaser shall comply with such risk assessment and method statement.

2.11 The Purchaser shall be responsible for disposing of any waste generated during the performance of the Services. This may include the disposal of waste collected using specialist asbestos arrestment equipment such as type "H" vacuums.

2.12 The mobilisation of Company Personnel will be subject to the Company receiving assurances from the Purchaser (to the Company's satisfaction in its sole discretion) concerning the safety of the Company Personnel from point of arrival in the country to point of departure. The Company reserves the right to decline to mobilise any Company Personnel without incurring any liability to the Purchaser if, in the Company's sole discretion, it deems that the safety of the Company Personnel is or could be at risk.

2.13 The Company shall have no liability to the Purchaser for any failure to perform the Services or delay in performance of the Services where such delay or failure is permitted under clauses 2.4, 2.6, 2.7, 2.9 or 2.12.

3. Working Facilities

3.1 The Purchaser shall ensure that the Equipment is ready and accessible and available for the performance of the Services and that all necessary facilities are provided as and when required, including proper foundations or mounting points ready to receive the Equipment as and when delivered, adequate lifting facilities and scaffolding, all skilled and unskilled labour, masons, joiners and builders' work, suitable protection for the Equipment from time of delivery, any special instrumentation, all tools other than hand tools, all lighting, heating, water, gas and electricity necessary on the Site during the performance of the Services, secure storage facilities on the Site for the Company Personnel's tools and equipment and any other facilities reasonably requested by the Company from time to time.

3.2 All of the above are to be provided by the Purchaser at its own expense to enable the Services to be performed expeditiously and continuously carried out. The Purchaser shall protect the Company and the Company Personnel and hold them harmless from any claim or liability whatsoever arising from the use of the facilities referred to in Condition 3.1.

3.3 The Company shall have no liability to the Purchaser for any delay or failure in performing the Services which is caused by or contributed to by the failure or delay in the Purchaser providing access to the facilities referred to in Condition 3.1.

4. Mobilisation Date

4.1 The Company's ability to meet the required mobilisation date will depend upon suitable Company Personnel availability and will be subject to confirmation upon receipt of the Purchase Order.

5. Tour of Duty

5.1 Unless otherwise agreed, no Company Personnel shall in performance of the Services be required to be out of their normal country of residence for more than three (3) months. At the end of this period the Company will have the option (at its sole discretion) of replacing the Company Personnel or sending his/her family to the vicinity of the Site.

5.2 All costs arising in connection with Condition 5.1, including provision of suitable family accommodation for the duration of the stay,



will be to the Purchaser's account and will be the Purchaser's responsibility.

6. Leave of Absence

6.1 The Purchaser shall grant the Company Personnel(s) leave of absence on National and Local Holidays on full pay (charged to the Purchaser), provided always that this arrangement can be varied by mutual written agreement between the Parties.

6.2 During assignments lasting in excess of one (1) calendar month, the Company Personnel shall be entitled to take a leave of absence accrued at the rate of two (2) days per calendar month. Leave of absence is taken by agreement between the Parties and is not chargeable to the Purchaser.

7. Replacement of Company Personnel

7.1 The Company shall, if necessary, or if so required by the Purchaser, withdraw and replace the Company Personnel by another person capable of performing the same duties in any of the following circumstances:

7.1.1 on compassionate grounds;

7.1.2 where the Company Personnel has been certified by a Medical Officer as having become medically unfit to perform the Services;

7.1.3 in the reasonable opinion of the Purchaser the Company Personnel is technically incompetent or negligent in the performance of the Services;

7.1.4 where the Company Personnel has, in the reasonable opinion of the Purchaser, impaired his/her ability to perform the Services through abuse of alcohol or drugs, or has been found, on reasonable grounds, to be dishonest or otherwise untrustworthy; and

7.1.5 where the Company Personnel has become the subject of a demand or order by any properly authorised officials of the police, armed forces or government for his/her removal from the Site.

7.2 In the event that the Company agrees to replace the Company Personnel at the request of the Purchaser for any other reason, the cost of replacement will be borne by the Purchaser.

7.3 The Company may (without any liability to the Purchaser) recall the Company Personnel from the Site immediately for any reason which is beyond the Company's control if, in the Company's sole discretion, it deems that the safety of the Company Personnel is or may be at risk. The cost of withdrawal of the Company Personnel in such circumstances shall be borne by the Purchaser and the Company shall have no liability to the Purchaser in respect of any losses suffered by the Purchaser as a result of such recall. The Purchaser shall provide the Company with such support and assistance as the Company requires in order to affect a recall of the Company Personnel. The Company shall not be obliged to recommence the performance of the Services at the Site until the Company determines (in its absolute discretion) that it is safe for the Company Personnel to do so.

8. Standby and Callout

8.1 The Purchaser will be charged for any time during which the Company Personnel is held on standby at the Purchaser's request or is unable to proceed with the Services for reasons not attributable to the Company Personnel or the Company. The rate to be charged will be the standard rate or the overtime rate stated in the Tender/Quotation, as appropriate.

8.2 If the Company Personnel is called out between shifts, the Purchaser will be charged at the overtime rate stated in the Tender/Quotation from the end of the previous shift to the end of the callout period. The Company Personnel shall be entitled to a minimum of eight (8) hours between the end of a callout period and being required to next report for duty, though this condition may be relaxed by the specific agreement of the Company Personnel in each such case.

9. Travel

9.1 Subject to Condition 10, the Company shall in all circumstances be responsible for making and arranging all travel, accommodation, medical and visa arrangements for the Company Personnel travelling from Base to and from the Site(s).

9.2 The Purchaser, at its own expense, shall provide in a timely manner, for all necessary entry, work and other permits as may be required.

9.3 The Purchaser shall supply on request and in a timely manner, any necessary "Letter of Invitation" or "No Objection Certificate" at no cost to the Company.

9.4 For all air travel lasting less than six (6) hours in flight duration including any stop-over, the air travel shall be of a standard not less than full open return economy class.

9.5. For all air travel exceeding six (6) hours flight duration including any stop-overs, the air travel shall be of a standard not less than full open return premium economy class.

9.6. All air travel shall be in an aircraft conforming to the standards of the International Air Transport Association.

10. Travel Cost

10.1 All of the Company Personnel's travel time from Base to and from the Site will be charged to the Purchaser as detailed in the Tender/Quotation.

10.2 All expense costs of travel together with the finance and administration charge shall be charged to the Purchaser as detailed in the Tender/Quotation.

10.3 Travel costs include, where appropriate, air travel or ferry excess baggage, visa charges and taxi to travel from Base to the airport and associated costs.

10.4 The Company Personnel will normally hire a car for all local transport from accommodation to and from the Site and for recreational purposes. The car hire costs including insurance and petrol will be invoiced to and paid by the Purchaser.

11. Meals and Accommodations

11.1 Unless otherwise agreed in writing by the Company, the Purchaser shall reimburse the Company for or at its own expense shall



provide and arrange, meals and accommodation for the Company Personnel of a standard similar, so far as possible, to that normally expected by the Purchaser's senior staff.

11.2 For ease of accounting, standard daily meal allowances have been established for use in some countries. Where a daily meal allowance is stated in the Tender/Quotation, this will be the applicable charge for reimbursement to the Company for the Company Personnel's midday and evening meals in the country concerned.

11.3 If Purchaser is providing room and board, or 'man-camps, on Purchaser's site, Purchaser shall provide hygienic conditions (including, but not limited to, clean rooms, hot – running water, a private space for lodging, etc.). Purchaser shall also provide three nutritious, balanced meals and drinking water.

12. Training and Induction

12.1 Training and induction time will be charged at the standard rate or the overtime rate as stated in the Tender/Quotation as appropriate.

13. Interpreters

13.1 The Purchaser shall make competent interpreters available to the Company Personnel free of charge if so required by the Company.

14. Timesheets

14.1 To minimise disputes as to the validity of timesheets, the Purchaser will, prior to mobilisation of the Company Personnel, nominate a Site representative(s) who is/are authorised to sign the Company Personnel's timesheets.

14.2 In the event that the Purchaser does not have a representative at Site who is its own employee it must nominate some other person(s) and identify those person(s).

14.3 If on arrival at Site the Company Personnel is not able to establish the presence of the Purchaser's nominated authorised representative on Site, he/she will report this situation to the Company who will seek clarification from the Purchaser before the Services are commenced. Any delay or additional charges attributable to such action by the Company will be to the account of the Purchaser.

15. Dependencies

15.1 The Company shall be discharged from its obligations under the Contract where the Purchaser is in breach of these Supplementary Terms or where the responsibilities of the Purchaser and the actions and events in relation to the Services which need to be performed or (as the case may be) to occur, or not to occur, in order for the Company to perform its obligations are not met other than due to a breach by the Company of the Contract.

SUPPLEMENTARY TERMS APPLICABLE TO ROGIS SERVICES

1. Definitions and Interpretation

1.1 All Conditions apply in addition to these Supplementary Terms. In the event of a conflict between these Supplementary Terms and the Conditions, these Supplementary Terms shall prevail to the extent of the conflict. All terms capitalised in these Supplementary Terms shall have the meaning set out in the Company's BRUSH Americas General Terms and Conditions of Sale 2019 (the "Conditions"), except as set out below:

1.1.1 "Environmental Conditions" means the condition of the Equipment (including the levels of grease and other materials present in the Equipment) and the conditions impacting upon the Equipment (including the operating temperature and humidity levels);

1.1.2 "Equipment" means any equipment in relation to which the Purchaser has requested a ROGIS Inspection;

1.1.3 Intentionally omitted.

1.1.4 "Pre-Inspection Questionnaire" means the information request provided by the Company which is to be completed by the Purchaser and returned to the Company, detailing (amongst other things) the Environmental Conditions;

1.1.5 "ROGIS" means Robotic Generator Inspection Service;

1.1.6 "ROGIS Device" means the remotely controlled tool known as ROGIS which is used by the Company for internal inspections of Equipment;

1.1.7 "ROGIS Inspection" means the inspection of the Equipment using the ROGIS Device (and for the purpose of these Supplementary Terms, the ROGIS Inspection constitutes the Services, as defined in the Conditions).

1.1.8 "Standard Inspection" means a manual inspection of the Equipment not using the ROGIS Device and carried out in accordance with the Supplementary terms for Site Work and the Conditions.

1.2 The Conditions apply to any ROGIS Inspection in addition to these Supplementary Terms.

1.3 Where the Services involve the performance of a ROGIS Inspection at the Site, the Supplementary Terms for Site Work shall apply in addition to these Supplementary Terms for ROGIS.

1.4 In the event of any conflict between these Supplementary Terms for ROGIS, these Supplementary Terms for Site Work and the Conditions shall prevail to the extent of the conflict.

2. Pre-Inspection Questionnaire and Site Survey

2.1 The Company shall require the Purchaser to complete the Pre-Inspection Questionnaire prior to the Company providing a Tender/Quotation in respect of the Services.

2.2 The Purchaser agrees to promptly complete and return to the Company the Pre-Inspection Questionnaire, and the Purchaser warrants that all information provided by it to the Company shall be complete, accurate and up to date.

2.3 In addition to the provision of a completed Pre-Inspection Questionnaire, the Company may (at its absolute discretion) visit the Site to undertake a site survey and an initial inspection of the Equipment to establish the Environmental Conditions and verify the information



provided by the Purchaser in the Pre-Inspection Questionnaire.

2.4 The Purchaser warrants that for the duration of the ROGIS Inspection the Environmental Conditions shall be identical to those disclosed to the Company by the Purchaser in response to the Pre-Inspection Questionnaire and to those established by the Company as a result of the Site visit undertaken by the Company (if any).

2.5 Following the completion of the Pre-Inspection Questionnaire by the Purchaser, if the Company discovers that the information provided by the Purchaser is inaccurate or the Site conditions are unsuitable for a ROGIS Inspection, either as a result of the Site survey and initial inspection carried out in accordance with Condition 2.3, or attending the Site to undertake the ROGIS Inspection or otherwise, the Company may opt to apply either or both options below:

2.5.1 apply Condition 2.6 and 3.2 below; and

2.5.2 reissue the Tender/ Quotation to take the accurate information into account.

2.6 If the Environmental Conditions vary from the position described in Condition 2.4:

2.6.1 Conditions 3.2 and 7.1 shall apply; and

2.6.2 If the Company cannot undertake the ROGIS Inspection at all or as planned, the Purchaser shall pay all costs and expenses incurred by the Company.

3. Ability to Perform the Services

3.1 The Contract is conditional upon:

3.1.1 the Equipment having an air gap surrounding the rotor which is sufficiently large for the ROGIS Device to perform the ROGIS Inspection;

3.1.2 the Environmental Conditions being compatible with the performance of the Services; and

3.1.3 the absence of any circumstances which lead the Company to consider that the performance of a ROGIS Inspection could lead to damage to the Equipment or the ROGIS Device; in each case to be determined at the Company's absolute discretion.

3.2 If either,

3.2.1 the requirements of Condition 3.1 above are not met; or

3.2.2 the Company determines that the Pre -Inspection Questionnaire information is inaccurate (and the provisions of Condition 2.5 apply), without prejudice to Condition 2.6.2, the Company may (in its absolute discretion and without liability to the Purchaser), offer to perform a Standard Inspection, which may require the Equipment to be dismantled. If the Purchaser requests that the Company proceeds with a Standard Inspection, the Parties shall discuss the alternative scope of work and the Purchaser shall place a new Purchase Order accordingly.

4. Nature of ROGIS Device

4.1 The Purchaser acknowledges that the ROGIS Device is an advanced inspection technology and accordingly:

4.1.1 there is a minimal risk that the Company may need to dismantle the Equipment to retrieve the ROGIS Device; and

4.1.2 there is a minimal risk that the ROGIS Inspection could cause damage to the Equipment.

4.2 The Purchaser agrees that it has instructed the Company to undertake the ROGIS Inspection notwithstanding (and accepting) the risks outlined in Condition 4.1, in particular due to the potential benefits that the ROGIS Inspection can achieve if successful, including reduced downtime to the Equipment in comparison to that where a Standard Inspection is carried out.

4.3 If either:

4.3.1 the ROGIS Inspection is not performed successfully; or

4.3.2 a ROGIS Inspection has been planned and the Quotation / Tender refers to a ROGIS Inspection being performed, but it is not performed, other than due to a breach of the Contract or negligence by or on behalf of the Purchaser, the Company's sole liability shall be (at its option) to either re-perform the ROGIS Inspection within a reasonable period; refund the Charges; or perform a Standard Non-ROGIS Inspection.

4.4 The ROGIS Device is fitted with a retrieval cable so the risks of the Company needing to dismantle the Equipment to recover the ROGIS Device (should there be any technical issues) are low. However, in the event that the Equipment must be dismantled to recover the ROGIS Device, the Company acknowledges that this may result in Equipment downtime and the Purchaser agrees to promptly do all such acts and things as the Company requires in order to dismantle the Equipment and retrieve the ROGIS Device as quickly as possible. The Company's total liability, in the aggregate, to the Purchaser, in such circumstances shall be limited to as described in Condition 16 of the Conditions.

5. ROGIS Device

5.1 The Purchaser acknowledges that the ROGIS Device is a very high value equipment and that the Company could incur substantial losses if the ROGIS Device is damaged or destroyed while on the Site or in the Equipment.

5.2 The Purchaser agrees that:

5.2.1 it shall not do or permit its employees, agents or contractors to do or omit to do anything which could cause, contribute to or result in damage to the ROGIS Device;

5.2.2 it shall comply with all instructions of the Company which relate to the ROGIS Inspection and the use and storage of the ROGIS Device; and

5.2.3 it shall indemnify the Company from and against all losses, liabilities, costs, expenses and damages arising out of or in connection with any breach by the Purchaser of this Contract, including Conditions 5.2.1 or 5.2.2.

5.3 The Purchaser agrees that any information in relation to the ROGIS Device, the use of the ROGIS Device by the Company and the process of the ROGIS Inspection is Confidential Information as defined in the Conditions.

6. Results of ROGIS Inspection



6.1 Following a ROGIS Inspection, the Company shall provide a service report to the Purchaser containing a diagnosis and recommendations.
 6.2 The service report only identifies the conditions of the Equipment at the time the ROGIS inspection occurs and the company gives no warranty that the ROGIS Inspection will identify future defects which may arise.
 6.3 Unless otherwise agreed in the Contract, the Services are limited to the performance of the ROGIS Inspection and do not include the implementation of the Company's recommendations, such work being subject to a separate agreement between the Parties.

7. Dependencies and Liability

7.1 The Company shall be discharged from its obligations under the Contract where the Purchaser is in breach of these Supplementary Terms or where the responsibilities of the Purchaser are not met other than due to a breach by the Company of the Contract.
 7.2 The remedies specified in these Supplementary Terms shall constitute the exclusive remedies of the Purchaser in respect of the defaults to which they relate.

SUPPLEMENTARY TERMS APPLICABLE TO FACTORY REPAIRS

1. Definitions and Interpretation

1.1 All terms capitalised in these Supplementary Terms shall have the meaning set out in the Company's BRUSH Americas General Terms and Conditions of Sale 2019 (the "Conditions").
 1.2 In these Supplementary Terms "Equipment" means any equipment in relation to which the Purchaser has requested Services.
 1.3 The Conditions are applicable in addition to these Supplementary Terms. In the event of any conflict between these Supplementary Terms and the Conditions, these Supplementary Terms shall prevail to the extent of the conflict.

2. Packing

2.1 Unless otherwise specified in the Tender/Quotation, packing shall be in accordance with the Company's standard export practice details of which are available on request.

3. Shipping

3.1 Unless otherwise specified in the Tender/Quotation, all descriptive and shipping specifications, drawings and particulars of weights and dimensions submitted with the Tender/Quotation are approximate only and will be subject to confirmation in writing by the Company following receipt of a Purchase Order.
 3.2 The shipping terms for the Equipment shall be as set out in the Tender/Quotation.
 3.3 Unless otherwise set out in the Tender/Quotation, the Purchaser shall be responsible for insuring the Equipment whilst the Equipment is in transit to the Company's premises and whilst the Equipment is in transit from the Company's premises. Unless otherwise agreed, the Equipment shall be at the Purchaser's risk during transit to and from the Company's premises. The Company shall insure the Equipment while the Equipment is at the Company's premises.

4. Performance of Repaired Equipment

4.1 Any performance figures for the Equipment given by the Company (the "Performance Figures") are based upon the Company's experience in relation to equipment similar to the Equipment and are such as the Company expects (but does not guarantee) to obtain on tests conducted at the Company's premises.
 4.2 The Company shall have no liability to the Purchaser for any losses, costs, expenses, liabilities or damages suffered by the Purchaser as a result of failure of the Equipment to perform in accordance with the Performance Figures unless the Company has expressly guaranteed the Performance Figures in writing, such guaranteed Performance Figures always to be subject to any tolerances specified in the Contract.
 4.3 If the actual performance figures for the Equipment obtained on tests in the Company's premises are outside any acceptance limits specified in the Contract, the Purchaser shall notify the Company. The Company shall endeavour to rectify the Equipment's performance within a reasonable time period after the date of the notice referred to in this Condition 4.3.
 4.4 The Company gives no warranty as to the fitness for purpose of the Equipment following completion of the Services and the Purchaser shall be solely responsible for ensuring the Equipment is fit for its intended purposes and if Company is not hired by Purchaser to reinstall the Equipment following the repair Services, no warranty, whether at law, or otherwise, shall be applicable to Purchase for the Services performed governed by these Conditions.

5. Limitation of Liability for Repaired Equipment

5.1 The Tender/Quotation is subject to the completion of a physical inspection of the Equipment by the Company. If, on inspection, the Company in its absolute discretion is of the view that the repairs cannot be undertaken, the Company shall advise the Purchaser as soon as is reasonably practicable. The Company shall have no liability to the Purchaser in such circumstances for any losses, costs, expenses, liabilities or damages suffered by the Purchaser as a result of the repairs not being carried out. The Purchaser shall be liable to the Company for the cost of any physical inspection which shall be invoiced by the Company and paid by the Purchaser in accordance with the Conditions.
 5.2 Equipment sent to the Company for repair shall be delivered to the premises specified by the Company in the Tender/Quotation at the Purchaser's cost.
 5.3 Unless otherwise stated within the Tender/Quotation, this Contract is conditional upon the Equipment being free from asbestos or other hazardous materials. It is the responsibility of the Purchaser to inform the Company if asbestos or other hazardous materials may be present prior to delivering the Equipment to the Company's premises. The Company may cancel the Contract immediately without



liability to the Purchaser on receipt of a notice referring to this Condition 5.3 or if, prior to or on inspection of the machine or parts of the machine, the Company knows or suspects asbestos or other hazardous materials to be present.

5.4 If the Company agrees to perform Services in relation to Equipment which includes asbestos or other hazardous materials it is the Purchaser's responsibility to ensure that the Equipment containing asbestos or other hazardous material being sent to the Company's premises are packed and labelled in accordance with all Applicable Laws and all lawful instructions of the Company.

6. Inspection and Tests of Repaired Equipment

6.1 If the Purchaser requires tests to be carried out on the Equipment prior to return of the Equipment to the Purchaser which are different to the Company's standard tests (being those specified in the Tender/Quotation) or that tests be carried out in the presence of the Purchaser or the Purchaser's representative, the costs of these tests will be charged to the Purchaser and paid by the Purchaser in accordance with the Conditions.

6.2 In the event of any delay on the part of the Purchaser in attending tests referred to at Condition 6.1 (where the Purchaser has requested such attendance) or in carrying out any inspection set out in the Tender/Quotation, after seven (7) days' notice that the Equipment is ready to be so tested, the tests will proceed in the absence of the Purchaser and shall be deemed to have been made in the presence of the Purchaser and the inspection will be deemed to have been made by the Purchaser.

7. Storage

7.1 If the Company does not receive forwarding instructions sufficient to enable the Company to despatch the Equipment within fourteen (14) days after the notification referred to in Condition 7.1, or the Purchaser does not take delivery of the Equipment, the Purchaser shall arrange for storage either at the Company's own premises or elsewhere on behalf of the Purchaser and the Purchaser shall be liable for all costs and expenses incurred by the Company as a result of such storage (including the cost of insurance, storage and demurrage).



TRUST. WELL EARNED.

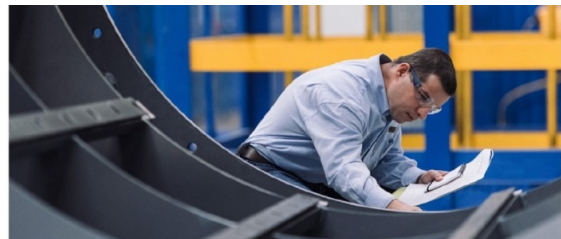
QUOTATION (TIME & MATERIALS)

TITLE NSPI (Victoria Junction) – Unit 1 Generator I&C

CUSTOMER Nova Scotia Power Corporation

CUSTOMER REFERENCE NSPI (Victoria Junction) - Unit 1 Generator I&C

BRUSH REFERENCE Q-07450 **REVISION** 0 **DATE** 23/Jul/2020



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EXECUTIVE SUMMARY

TITLE	NSPI (Victoria Junction) - Unit 1 Generator I&C
CUSTOMER & REFERENCE	<p>Nova Scotia Power Corporation Dean Webb Reliability Specialist, Combustion Turbines Generation Services Nova Scotia Power Inc Office: (902) 428-7649 Mobile: 902-476-0522 dean.webb@nspower.ca</p> <p>NSPI (Victoria Junction) - Unit 1 Generator I&C</p>
VENDOR	<p>BRUSH Americas 601 Braddock Avenue Turtle Creek Pittsburgh Pennsylvania 15145 United States of America</p> <p>Tel: +1 412 829 7500 www.brush.eu ISO 9001:2015</p>
REGIONAL SALES	Julius Daxner jdaxner@brushgms.com +1-514-794-5242
CUSTOMER SUPPORT	Jithesh Louis JLouis@brushgms.com +1-412-829-7500 x 232
<p>BRUSH has a team of highly qualified and experienced field service engineers operating around the globe. This provides our clients with a global aftermarket support network for all our core Original Equipment Manufacturer products and third party equipment.</p> <p>Being the largest independent turbo-generator manufacturer in the world enables us to tap into 125 years of experience, innovation and exacting quality standards. We constantly strive to outperform the most challenging demands from diverse industry sectors.</p> <p>Our trained and skilled engineers have extensive experience working on-site, in vastly diverse environments both onshore and offshore. Our highly skilled engineers can provide a range of services from proactive maintenance inspections to full on-site repairs/overhauls.</p>	
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 Americas.



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COMMERCIAL PROPOSAL

PRICE SCHEDULE

ITEM	REFERENCE	DESCRIPTION	QUANTITY	UNIT	UNIT PRICE	EXTENDED PRICE
1	FS10144	Site Survey: Replacement Generator	1.00	Service(s)		
2	FP10011	Engineering/Technical Support	1.00	Each		
3	FP10011	Project Planning Support	1.00	Each		
4	FS10035	Removal/Installation of Generator DAX 70	1.00	Service(s)		
5	FS10053	Bearing Pedestal Modification	1.00	Service(s)		
6	FS10010	Commissioning of Generator DAX 70	1.00	Service(s)		
<p>^/*>/** Price(s) are ESTIMATES only and relate to the work scope detailed. Any additional work required will be charged using the Field Service Engineer Rates listed in Page 5.</p> <p>^/* Estimated airfare costs for the engineer(s) to travel to & from the site have been included in the prices listed above. Actual airfare costs will be invoiced at Costs +10%.</p> <p>*/** A weekly rental fee will be invoiced from dispatch until receipt of tooling and test equipment back at the BRUSH facility. Any delays caused by the Customer in receipt of tooling and test equipment back at the BRUSH facility will be subject to further weekly rental fees.</p> <p>*/** Tooling and test equipment shipping costs to & from the site are excluded from this offer and will be invoiced at Costs + 10%.</p> <p>*/** Tooling and test equipment rentals from third party vendors, if required, will be invoiced at Costs +10%.</p> <p>*/** Replacement Parts are not included in the pricing listed above.</p> <p>** Note: Price(s) listed above assumes that Bearing pedestal modification will be performed in series with Removal/Installation of Generator DAX 70 and during the same mobilization. If more than one mobilization/demobilization is required, additional charges will be incurred using the Field Service Engineer Rates listed in Page 5.</p> <p>This offer excludes any taxes, fees, or any other regional specific costs.</p> <p>BRUSH will not be responsible for any delays caused by Customs clearance.</p>						



FIELD SERVICE ENGINEER RATES

DISCIPLINE	STANDARD RATE	OVERTIME	EXPENSES	
	PER HOUR	PER HOUR	PER DIEM	OTHER
Mechanical Engineer x 1 Site Survey: Replacement Generator Bearing Pedestal Modification				Cost plus 10%
BRUSH Engineering Technical specialist x 1 Engineering/Technical Support				Cost plus 10%
Project Manager x 1 Project Planning Support				Cost plus 10%
Mechanical Engineers x 2 Removal/Installation of Generator DAX 70				Cost plus 10%
Electrical/Commissioning Engineer x 1 Commissioning of Generator DAX 70				Cost plus 10%
PRICING	<u>Currency is in United States Dollars</u> <ul style="list-style-type: none"> Prices in this quotation are ESTIMATES only. The service(s) will be invoiced using the above rates. The price(s) listed in the Price Schedule section relates to the work scope(s) detailed. Any additional work required will be charged using the Field Service Engineer Rates listed above. This offer excludes any taxes, fees, or any other regional specific costs. 			
TOOLING	<ul style="list-style-type: none"> A weekly hire fee will be invoiced from dispatch until receipt of tooling back at the BRUSH facility. See equipment rental rates table. Transportation is excluded from the price(s) listed in the Price Schedule section. All transportation will be charged at costs + 10%. The duration of use is an estimated value only. 			
STANDARD RATE	<ul style="list-style-type: none"> Standard rate is applicable for works carried out in 2020 on an Onshore site. Standard rate is charged for work performed Monday through Friday at 8 hours per day. A standard Onshore day is 8 hours. Days partially worked are charged as a full day. A standard Offshore day is 12 hours. Days partially worked are charged as a full day. All induction and training time are billed per the above rates. 			
OVERTIME	<ul style="list-style-type: none"> Overtime rate applies to all hours worked in excess of 8 hours per day Monday through Friday and all hours worked on Saturday, Sunday and holidays for Onshore work. Overtime rate applies to all hours worked in excess of 12 hours per day Monday through Friday and all hours worked on Saturday, Sunday and holidays for Offshore work. It is charged at standard rate +50%. 			
TRAVEL TIME	<ul style="list-style-type: none"> Mobilization/Demobilization travel time is charged for all time, door to door using the standard rate (no overtime). Local travel from hotel to site and site to hotel is charged using the standard rate. 			
STANDBY TIME	<ul style="list-style-type: none"> Standby time (at site) is charged for all hours not worked using the standard rate or the overtime rate depending on the total number of hours not worked. Standby time (offsite) is charged using the standard rate with a maximum of 10 hours per day. 			
EXPENSES	<u>Expenses per diem rate, when charged, includes:</u> <ul style="list-style-type: none"> Accommodations, food, local transport and all minor expenses. All induction and training, working and waiting days & standby time. <u>Expenses per diem rate does NOT include:</u> <ul style="list-style-type: none"> All air travel charges and visas which will be charged at the cost plus stated margin. Travel days (unless our engineers have to stay over in a hotel on their way to site) or offshore working. 			



EQUIPMENT RENTAL RATES (AS NEEDED ONLY)

Equipment	Rate per Week (US \$)
Insulation Resistance Tester – 5kV (Megger)	
10 Amp DLRO and Long Cables	
HI-POT – 75kV DC	
RSO	
Variac	
EL CID	
Bore Scope – 6mm diameter	
RoGIS (Including the EL CID)	
Injection Set for AVR Calibration	
Gang Box (with tools) Rental	
Bearing Tooling and theodolite	
PMG Remag kit	
Rotor Removal Tooling- Crane Type System	
Rotor Removal Tooling- Rail Type System	
Tool Module Rental	
Rotor Stands	

Currency is in United States dollars

- Customer will be invoiced the weekly rate for any full or partial weeks.
- Weekly hire fee will be charged from the dispatch date until receipt of the tooling/test equipment back at the BRUSH facility.
- Customer is responsible for paying BRUSH the transportation charges, duties and fees related to tooling shipping.
- Transportation charges, duties and fees will be billed at Cost + 10%.
- BRUSH will arrange delivery, pickup and return of equipment as required.

ENGINEER'S SCHEDULE

DISCIPLINE	DESCRIPTION	ESTIMATED START ON SITE	ESTIMATED DURATION ON SITE (10 Hours PER SHIFT)
Mechanical Engineer x 1	Site Survey: Replacement Generator	Fall 2020 - Pending Engineer availability	1 Day (single shift)
Mechanical Engineers x 2	Removal/Installation of Generator DAX 70	Spring 2021 - Pending Engineer, and Tooling availability	44 Days (single shift)
Mechanical Engineer x 1	Bearing Pedestal Modification	Spring 2021 - Pending Engineer, and Tooling availability	6 Days (single shift)
Electrical/Commissioning Engineer x 1	Commissioning of Generator DAX 70	Spring 2021 - Pending Engineer, and Tooling availability	14 Days (single shift)



NOTES FOR ENGINEER'S SCHEDULE

ENGINEER'S ESTIMATED DURATION ON SITE	Estimated duration on site is dependent on the package being standard with no modifications, alterations and no site obstructions. Any repair work may result in additional time on site. In case the works take longer to complete than estimated, the BRUSH Project manager will advise the customer before reaching the scheduled demobilisation date and confirm the additional estimated duration required to complete the works. The associated purchase order must be amended to reflect the additional costs and received by BRUSH prior to the scheduled demobilisation date for the BRUSH Engineers to remain on site.
ADDITIONAL NOTES	Customer to provide site technicians and contractors (as needed) to assist BRUSH Engineers for the duration of the work scope.

FINANCIAL TERMS

INVOICE COMPANY & ADDRESS	Nova Scotia Power Corporation - Customer to provide invoice address				
CURRENCY	United States Dollar				
INVOICE TERMS	Invoice issued upon completion of services. Assignments lasting less than a month will be invoiced on completion. Greater than a month will be subject to monthly payment claims.				
PAYMENT TERMS	100% net, 30 days after invoice date				
BASIS OF PRICE	All prices are exclusive of Value Added Tax (VAT), which, where applicable, will be charged extra at the rate ruling at the date of invoice.				
CANCELLATION / POSTPONEMENT	In the event that an agreed mobilisation date is to be postponed or cancelled by the Purchaser, other than for reasons beyond the Purchaser's reasonable control, BRUSH reserves the right to charge a fee as detailed below and in accordance with the relevant notice period provided.				
	Notice Period (working days)	Variable Fee		Fixed Fee	Total
		Postponement	Cancellation		
	Less than 7 days	Cost+10%	Cost+10%	\$575	Variable + Fixed Fee
	Within 7-21 days	Cost+10%			Variable Fee Only
	Greater than 21 days	No Charge Applicable			

CONTRACT TERMS & CONDITIONS

VALIDITY	This offer is valid until 23/Aug/2020.
TERMS & CONDITIONS	NSPI and Brush mutually agreed Service Terms and Conditions August 25, 2016. See attached.
PURCHASE ORDER TO BE ISSUED TO	Generator & Motor Services of PA, LLC (dba BRUSH Americas). Please forward purchase order to purchaseorder@brushgms.com



PURCHASE ORDER DETAIL	<p>Please be aware that, to be valid and processed, a purchase order needs to clearly identify the following information (as a minimum):</p> <ul style="list-style-type: none"> • Reference to our quote number and revision • Works scope • Quantity and units required • Price and rates • Payment terms including currency • Acceptance of BRUSH terms and conditions • Delivery date and duration • Delivery method • Invoicing address and method • Any special requirements • Field Service: Site contact details; Project contact details; Service engineer reporting location
FORCE MAJEURE	<p>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 Americas. If BRUSH Americas 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.</p>
CORONAVIRUS	<p>As a result of the outbreak of the Coronavirus, we reserve the following rights:</p> <ol style="list-style-type: none"> 1. To withhold the mobilization of our Field Service Engineer(s) or other members of our personnel to a region which we deem to be at risk. 2. In the event that our Field Service Engineer(s) or other members of our personnel have to be placed in quarantine as a result of the deployment to be undertaken on your behalf, BRUSH reserves the right to charge for the duration of the quarantine period at the prevailing time. <p>We will continue to monitor the evolving situation and will act in accordance with the circumstances which prevail at any given time.</p>
SPLIT ORDERS	<p>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. In the event that the full purchase order is received after this period then BRUSH may put on hold engineering and production activities.</p>



TECHNICAL PROPOSAL

ITEM 1) SITE SURVEY: REPLACEMENT GENERATOR

WORK SCOPE	<ul style="list-style-type: none"> - Record details of site environment - Record details of site accessibility - Record details of current generator access and mountings - Record details of current cabling and wiring - Record details of coolant temperature and type (i.e. CACW, CACA, filter vent), and maximum / minimum rise in temperature ° C - Record details of existing lube oil system, including flow rates, pressures and temperatures - Detail information of current logistics on site - Detailed pictures to understand current arrangement of existing equipment to ensure the design and specification of proposed new equipment - Visually inspect the line and neutral terminal cubicles - Record details of all rating plates - Dimension checks of the equipment being replaced, including space for rotor withdrawal - Availability of space for the new equipment panels - Availability of space for the new equipment with existing panels - Details of generator excitation - Copy and record details as to how new equipment can be connected within the existing panels - Copy and record details of electrical schematic diagrams showing overall scheme of the existing excitation system - Record details of the availability of all interfaces - Record details of the current holding down bolt method of existing generator - Record details of all component types on the shaft line (gearboxes, GT, ST, flexi-coupling, etc.) - Record information of hotels and welfare facilities in the area - Record details of any noise restrictions on site if any - Record details of space available for the removal and fitting of new generator - Record details of general / shift working patterns on site - Record details of work shop availability and machining capabilities
DIVISION OF RESPONSIBILITIES	<p>THE CUSTOMER WILL BE RESPONSIBLE FOR THE FOLLOWING:</p> <ul style="list-style-type: none"> - Interpreters if needed. - Isolation of the generator (electrically and mechanically). Prepare generator for test (i.e. hydrogen safe and de- energized). Isolate generator stator winding from isophase bus, ground securely and separate phases for testing (to be witnessed by BRUSH Field Service Engineer) - Site safety induction. Lock-out and tag-out (permit system) of all generator equipment - Disassembly / reassembly of gearbox, prime mover, starter pack, canopy and split couplings (and all what's required to make the generator readily accessible) - Alignment Specs - Machine service history (Including oil samples taken every 6 months when available) - Office / toilets / parking / potable water - Utility / phone / internet / lighting - Crane with operators, lifting gear, and riggers & forklift with drivers. - Scaffolding (dismantling / reassembly incl.) - Secured, clean storage & lay down space near turbine-generator work area. - Necessary water, compressed air and power supplies(120/240V single phase and 240/480V three phases) - Fire protection equipment & HSE management (including CO2 fire extinguishers) - Disposal container and disposal of hazardous and non-hazardous waste including materials containing asbestos, if encountered in stator - On-site first aid facilities - All permits, site entries, licenses and letter of invitations (where applicable) including associated costs - BRUSH Engineer site security and safety - One (1) site technician to assist BRUSH engineer.



	<p>BRUSH WILL BE RESPONSIBLE FOR THE FOLLOWING:</p> <ul style="list-style-type: none"> - Skilled manpower - Final report - Arrangement of flights, food, hotel, visa and car
TOOLING	N/A
DOCUMENTATION	<p>Field Engineer Report</p> <ul style="list-style-type: none"> - An initial results-based field service report will be left by the engineer including an acceptance certificate to be signed by the customer's representative. - A full report with recommendations will be issued with appropriate invoice documentation on completion of all activities.
ENGINEER REQUIREMENTS	Mechanical: 1
ADDITIONAL WORK	<p>All additional work which is required in order to complete the work and/or any waiting or standby time required for reasons outside of our reasonable control or called for by the CUSTOMER or its site representative shall be paid for by the CUSTOMER in accordance with the rates shown in the commercial proposal. Additional materials will be subject to a further quotation as and when requirements are known.</p>



ITEM 2) ENGINEERING/TECHNICAL SUPPORT

WORK SCOPE	Enhanced technical support will be provided on an as needed basis for only the most difficult and unusual problem-solving tasks unresolved by Field Service Engineers. Enhanced technical support team members (OEM Engineers/Subject Matter Experts) will be identified and assigned responsibility to support this project to ensure prompt response to all issues.
DOCUMENTATION	Weekly Activity Report (if required)
ENGINEER REQUIREMENTS	BRUSH Engineering
ADDITIONAL WORK	All additional work which is required in order to complete the work and/or any waiting or standby time required for reasons outside of our reasonable control or called for by the CUSTOMER or its site representative shall be paid for by the CUSTOMER in accordance with the rates shown in the commercial proposal. Additional materials will be subject to a further quotation as and when requirements are known.



ITEM 3) PROJECT PLANNING SUPPORT

WORK SCOPE	<p>BRUSH to provide office-based (BRUSH US & BRUSH UK) Project Management Support to:</p> <ul style="list-style-type: none"> - Develop project plan based on experience at NSPI Burnside and Tusket projects - Create a GANTT chart of planned project activities - Develop Job Book/Project Plan <p>Project Plan objective:</p> <ul style="list-style-type: none"> - Optimize allocation of labor and equipment resources and control and assess work schedule, quality, safety and cost performance.
DIVISION OF RESPONSIBILITIES	<p>Customer Responsibilities:</p> <ul style="list-style-type: none"> - Ensure regular communication with both BRUSH US site and office support <p>Brush Responsibilities:</p> <ul style="list-style-type: none"> - Review all past documentation for the NSPI Burnside and Tusket projects, to reduce or eliminate any bottlenecks or delays during the project. - Maintain communication with customer project manager to make any required schedule adjustments to minimize impact to project timeline
DOCUMENTATION	GANTT Chart/ Project Plan
ENGINEER REQUIREMENTS	Project Manager: 1 (Field Service Engineer/BRUSH Engineering to consult as needed)
ADDITIONAL WORK	All additional work which is required in order to complete the work and/or any waiting or standby time required for reasons outside of our reasonable control or called for by the CUSTOMER or its site representative shall be paid for by the CUSTOMER in accordance with the rates shown in the commercial proposal. Additional materials will be subject to a further quotation as and when requirements are known.



ITEM 4) REMOVAL/INSTALLATION OF GENERATOR DAX 70

<p>WORK SCOPE</p>	<p>Generator Removal:</p> <ul style="list-style-type: none"> - Remove all components required to extract rotor - Remove rotor from unit - Removal of foundation mounting hardware - Verification that all wiring, plumbing and any other assemblies are disconnected - Assistance to crane operator with properly rigging rotor and stator for removal <p>Generator Installation:</p> <ul style="list-style-type: none"> - Check foundations are ready to receive the generator (foundations are clean and elevation and centre lines are correct) * - Check for any transit damage and record - Remove packing case (If generator is to stand for any length of time establish temporary heating supply) - Remove rotor transit clamp - Clean and inspect rotor coupling face - Remove transit beams - Clean generator feet - Remove shaft end protection tape - Lift generator onto foundation matching generator centre lines with foundation centre lines - Align generator to prime mover ensuring that the rotor is in correct axial position (temporary heaters will have to be de-energized) Customer responsible for generator alignment. - Tighten down foundation bolts - If applicable fit cooler / air ducting to generator - If applicable fit lineside and neutral cubicles - Re-check generator alignment to prime mover (adjust if required, finalise any outstanding grout and final torque of generator bolts). Customer responsible for generator alignment. - Make all electrical connections both HV and LV including earth - Establish heater supplies - Fit oil lube systems / pipework to generator (system to be flushed prior to start up—Customer to fill the oil and perform system flushing). - If applicable fit acoustic canopy and walkways
<p>DIVISION OF RESPONSIBILITIES</p>	<p>THE CUSTOMER WILL BE RESPONSIBLE FOR THE FOLLOWING:</p> <ul style="list-style-type: none"> - Interpreters, if needed. - Isolation of the generator (electrically and mechanically). Prepare generator for test (i.e. hydrogen safe and de- energized). Isolate generator stator winding from isophase bus, ground securely and separate phases for testing (to be witnessed by BRUSH Field Service Engineer) - Site safety induction. Lock-out and tag-out (permit system) of all generator equipment - Disassembly / reassembly of gearbox, prime mover, starter pack, canopy and split couplings (and all what's required to make the generator readily accessible) - Alignment Specs - Machine service history (Including oil samples taken every 6 months when available) - Office / toilets / parking / potable water - Utility / phone / internet / lighting - Crane with operators, rigging, and riggers & forklift with drivers - Scaffolding (dismantling / reassembly incl.) - Secured, clean storage & lay down space near turbine-generator work area. - Necessary water, compressed air and power supplies (120/240V single phase and 240/480V three phases) - Fire protection equipment & HSE management (including CO2 fire extinguishers) - Disposal container and disposal of hazardous and non-hazardous waste including materials containing asbestos, if encountered in stator. - On-site first aid facilities - All permits, site entries, licenses and letter of invitations (where applicable) including associated costs - BRUSH Engineer site security and safety - Generator storage off-site and/or disposal and associated transportation. - Provide new BRUSH generator. - (2-4) Site technicians (as needed) to assist BRUSH Engineers for the duration of the work scope.



	<ul style="list-style-type: none"> - Any and all generator foundation repairs, if needed. - Provide BRUSH parts for new generator installation/assembly. - Provide rotor removal tooling - Any electrical, conduit or piping work - Any work on fire suppression system (if fitted) - Generator/turbine Alignment. - Providing fabrication company to install lifting beam & lifting lug inside generator enclosure for rotor removal (if needed) - Disassembly/reassembly of any and all portions of the generator enclosure that is required to complete generator extraction/reinstallation (if needed) - Providing and set-up of Cribbing and I-Beams for mounting of rotor removal rails on top of the cribbing (as needed) - Provide welder to spot weld rail removal system to I-beams that are positioned on top of the cribbing and removal of welds when rail system/I beams are finished being used (if needed) - Disassembly/reassembly of generator enclosure end-wall exciter end which is required to complete rotor extraction/reinstallation (if needed). - Providing & installation of scaffolding/tent structure to protect the generator/workers from environment. <p>BRUSH WILL BE RESPONSIBLE FOR THE FOLLOWING:</p> <ul style="list-style-type: none"> - Skilled manpower - Final report - Arrangement of flights, food, hotel, visa and car - Tooling/test equipment (see below) - Generator disassembly/reassembly (as needed)
TOOLING	<p>BRUSH to provide:</p> <ul style="list-style-type: none"> -Bearing Tooling and theodolite -Major Tooling Box -Megger <p>Customer to provide:</p> <ul style="list-style-type: none"> -Rotor removal tooling
DOCUMENTATION	<p>Field Engineer Report</p> <ul style="list-style-type: none"> - An initial results-based field service report will be left by the engineer including an acceptance certificate to be signed by the customer's representative. - A full report with recommendations will be issued with appropriate invoice documentation on completion of all activities.
ENGINEER REQUIREMENTS	<p>Mechanical: 2</p> <p>Customer supplied Site technicians: (2-4) As needed</p>
ADDITIONAL WORK	<p>All additional work which is required in order to complete the work and/or any waiting or standby time required for reasons outside of our reasonable control or called for by the CUSTOMER or its site representative shall be paid for by the CUSTOMER in accordance with the rates shown in the commercial proposal. Additional materials will be subject to a further quotation as and when requirements are known.</p>
NOTES	<p>* Any foundation issues found will be presented to NSPI who will be responsible for any and all Repairs</p> <p>Note: Bedplate removal/installation is not included.</p>



ITEM 5) BEARING PEDESTAL MODIFICATION

WORK SCOPE	<p>Bearing Pedestal Modifications:</p> <ul style="list-style-type: none"> - Machine pedestal to accept RTD - Mount RTD boxes to pedestals - Run conduit to protect RTD wiring back to designated terminal box - Install RTD and connect to terminal block for monitoring <p>(Customer to provide RTDs and terminal boxes)</p> <p>Note: Bearing modification (adding RTD port) is not included in this offer. Bearings modification to install RTD is the responsibility of the customer.</p>
DIVISION OF RESPONSIBILITIES	<p>THE CUSTOMER WILL BE RESPONSIBLE FOR THE FOLLOWING:</p> <ul style="list-style-type: none"> - Interpreters, if needed. - Isolation of the generator (electrically and mechanically). Prepare generator for test (i.e. hydrogen safe and de- energized). Isolate generator stator winding from isophase bus, ground securely and separate phases for testing (to be witnessed by BRUSH Field Service Engineer) - Site safety induction. Lock-out and tag-out (permit system) of all generator equipment - Disassembly / reassembly of gearbox, prime mover, starter pack, canopy and split couplings (and all what's required to make the generator readily accessible) - Alignment Specs - Machine service history (Including oil samples taken every 6 months when available) - Office / toilets / parking / potable water - Utility / phone / internet / lighting - Crane & forklift with operators & drivers - Scaffolding (dismantling / reassembly incl.) - Secured, clean storage & lay down space near turbine-generator work area. - Necessary water, compressed air and power supplies (120/240V single phase and 240/480V three phases) - Fire protection equipment & HSE management (including CO2 fire extinguishers) - Disposal container and disposal of hazardous and non-hazardous waste including materials containing asbestos, if encountered in stator. - On-site first aid facilities - All permits, site entries, licenses and letter of invitations (where applicable) including associated costs - BRUSH Engineer site security and safety - New RTDs and terminal box. - Any electrical, conduit or piping work - Site technicians (as needed) to assist BRUSH Engineers for the duration of the work scope. <p>BRUSH WILL BE RESPONSIBLE FOR THE FOLLOWING:</p> <ul style="list-style-type: none"> - Skilled manpower - Final report - Arrangement of flights, food, hotel, visa and car - Tooling/test equipment (see below)
TOOLING	<p>BRUSH to provide:</p> <ul style="list-style-type: none"> - Power drill tools - Hand tools
DOCUMENTATION	<p>Field Engineer Report</p> <ul style="list-style-type: none"> - An initial results-based field service report will be left by the engineer including an acceptance certificate to be signed by the customer's representative. - A full report with recommendations will be issued with appropriate invoice documentation on completion of all activities.
ENGINEER REQUIREMENTS	<p>Mechanical: 1</p>



ADDITIONAL WORK	All additional work which is required in order to complete the work and/or any waiting or standby time required for reasons outside of our reasonable control or called for by the CUSTOMER or its site representative shall be paid for by the CUSTOMER in accordance with the rates shown in the commercial proposal. Additional materials will be subject to a further quotation as and when requirements are known.
NOTES	Bearings modification (adding RTD port in bearings) is not included in this offer. Bearings modification to install RTD is the responsibility of the customer.



ITEM 6) COMMISSIONING OF GENERATOR DAX 70

<p>WORK SCOPE</p>	<p>On-site works:</p> <ul style="list-style-type: none"> - Mobilise to the site. - Marshal tools and equipment adjacent to the panels. - Confirm that all safety regulation are in place prior to commissioning activities and that all stake holders are informed. - Ensure surrounding area is clean and free. - Access panels. - Collect tools and equipment from area adjacent to the Generator. - Confirm with Owner's operators that the generator is available for electrical power connection and permit is returned. - An immediate verbal report will be given to client personnel should any significant problems be apparent on the unit during Inspection. - After leaving site a full report of the units condition will be submitted along with any recommendations for future works. <p>On-site works summary:</p> <ul style="list-style-type: none"> - Pre-commissioning. - Short circuit test. - No load test. - Synchronisation test. - Load test. - Final acceptance test (endurance run). <p>Pre-run:</p> <ul style="list-style-type: none"> - Check main machine earthing. - Check cabling loop (interconnection from and to generator, excitation panel and protection panel). - Check electrical cables to be properly routed and stress-relieved (all cables and bus bar connections properly connected as per applicable documentation). - Check all generator fuses and miniature circuit breakers. - Check that all current transformers which are not used are short-circuited. - Check that all current transformer jumpers are in the correct position. - Check that all voltage transformers are open or correctly loaded. - Check the power supplies for generator auxiliaries. - Check all HV primary connections. - Check all HV secondary connections. - Check bearings insulation resistance (if possible).- Check terminal connections for correct phase sequence. - Check shaft earthing brush configuration is clean and secured (if applicable).- Check exciter/ PMG for contamination. - Inspect rotating rectifier bridge. - Check REFM transmitter is secure and clean (if applicable).- Check all auxiliary terminal boxes and their earthing. - Check operation of leak detectors in the cooling system. - Check the electrically driven fans in the cooling system for correct operation. - Confirm Polarization Index test done. - Confirm Insulation Resistance test (rotor, PMG, exciter field) done. - Check all RTD functioning. - Check the synchronization system (e.g. by using live HV) if applicable. - Check all insulation resistances are in accordance with BRUSH-HMA standards. <p>Pre-run, safety equipment checks</p> <ul style="list-style-type: none"> - General Safety Equipment. - Confirm that the AVR is ready for no load run. - Confirm that generator protection system is ready for no load run (starting, control, protection and alarm relays). - Confirm that generator breaker is in 'test' position and HV lines commissioned and ready for no load run.
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	<ul style="list-style-type: none"> - Confirm that turbine is ready for no load run. - Confirm that all parts of systems are safe to start. - Communications set up between machinery and control points. - Check for clear access and escape routes. - Check all machine covers are fitted. - Check all terminal box covers secured or adequate safety barriers in place. - All control and monitoring systems commissioned and ready to be operative (oil, water, etc.). - Fire detection system on line (pay attention to CO2 systems). - Check state of all system isolating valves. - Record the results on Commissioning Data Sheet. <p>Machine running, no load:</p> <ul style="list-style-type: none"> - Check PMG voltage and frequency. - Confirm the residual generator voltage inside the GCP (between 1 and 10% of generator voltage). - Apply excitation and make sure that the following data have been measured and registered: - Date. - Time. - Excitation current/ voltage. - Load current/ voltage. - Output power / frequency. - Bearing-shaft vibration. - Bearing temperatures. - Oil pressure and temperature. - Stator winding temperatures. - Generator cooling air. - Heat exchanger cooling air/ water temperature. - Commission the rotor earth fault. - Check phase sequence. - Record the results on commissioning data sheet. <p>Machine running synchronising</p> <p>Before the machine is synchronized to the grid, check:</p> <ul style="list-style-type: none"> - Phase sequence of the generator equal to that of the running unit and/or grid. - Same voltage. - Same frequency. - Same phase angle. <p>Machine running, load run</p> <ul style="list-style-type: none"> - Apply excitation and make sure that the following data have been measured and registered: - Date. - Time. - Excitation current/ voltage. - Load current/ voltage. - Output power / frequency. - Bearing-shaft vibration. - Bearing temperatures. - Oil pressure and temperature. - Stator winding temperatures. - Generator cooling air. - Heat exchanger cooling air/ water temperature. - Confirm that all values are within the maximum allowable limits. - Confirm all checks have been carried out and all settings recorded in the Commissioning Data Sheet. - Record the results on Commissioning Data Sheet.
DIVISION OF RESPONSIBILITIES	<p>THE CUSTOMER WILL BE RESPONSIBLE FOR THE FOLLOWING:</p> <ul style="list-style-type: none"> - Interpreters, if needed.



	<ul style="list-style-type: none"> - Isolation of the generator (electrically and mechanically). Prepare generator for test (i.e. hydrogen safe and de- energized). Isolate generator stator winding from isophase bus, ground securely and separate phases for testing (to be witnessed by BRUSH Field Service Engineer) - Site safety induction. Lock-out and tag-out (permit system) of all generator equipment - Disassembly / reassembly of gearbox, prime mover, starter pack, canopy and split couplings (and all what's required to make the generator readily accessible) - Alignment Specs - Machine service history (Including oil samples taken every 6 months when available) - Office / toilets / parking / potable water - Utility / phone / internet / lighting - Crane & forklift with operators & drivers - Scaffolding (dismantling / reassembly incl.) - Secured, clean storage & lay down space near turbine-generator work area. - Necessary water, compressed air and power supplies (120/240V single phase and 240/480V three phases) - Fire protection equipment & HSE management (including CO2 fire extinguishers) - Disposal container and disposal of hazardous and non-hazardous waste including materials containing asbestos, if encountered in stator. - On-site first aid facilities - All permits, site entries, licenses and letter of invitations (where applicable) including associated costs - BRUSH Engineer site security and safety - Site technicians (as needed) to assist BRUSH Engineers for the duration of the work scope. <p>BRUSH WILL BE RESPONSIBLE FOR THE FOLLOWING:</p> <ul style="list-style-type: none"> - Skilled manpower - Final report - Arrangement of flights, food, hotel, visa and car - Tooling/test equipment (see below)
TOOLING	<p>BRUSH to provide:</p> <ul style="list-style-type: none"> - Hand tools - Laptop - 3 Phase Sec Injection Test Set
DOCUMENTATION	<p>Field Engineer Report</p> <ul style="list-style-type: none"> - An initial results-based field service report will be left by the engineer including an acceptance certificate to be signed by the customer's representative. - A full report with recommendations will be issued with appropriate invoice documentation on completion of all activities.
ENGINEER REQUIREMENTS	<p>Electrical/Commissioning: 1</p>
ADDITIONAL WORK	<p>All additional work which is required in order to complete the work and/or any waiting or standby time required for reasons outside of our reasonable control or called for by the CUSTOMER or its site representative shall be paid for by the CUSTOMER in accordance with the rates shown in the commercial proposal. Additional materials will be subject to a further quotation as and when requirements are known.</p>



EQUIPMENT & LOCATION

SERIAL NUMBER	FRAME DESIGNATION OR MODEL	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



TERMS & CONDITIONS

NSPI AND BRUSH MUTUALLY AGREED SERVICE TERMS AND CONDITIONS AUGUST 25, 2016. SEE ATTACHED



TABLE OF APPENDICES

QUOTATION ACCEPTANCE

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QUOTATION ACCEPTANCE

Q-07450 Revision 0 Dated 23/07/2020

NSPI (Victoria Junction) – Unit 1 Generator I&C

We, Nova Scotia Power Corporation accept the Quotation referenced Q-07450 Revision 0 Dated 23/07/2020 containing the details stated, without any deviations.

Customer is requested to complete the following details for BRUSH to accept and execute the project.

PURCHASE ORDER NUMBER		DATE	
INVOICING ADDRESS			
SITE ACTIVITY	Dates to align with project execution duration as stated in the quotation. Please advise below if there is any change with respect to the quotation and actual requirements.		
SITE START DATE		SITE FINISH DATE	
SITE ADDRESS			
SITE CONTACT PERSON	NAME		
	DESIGNATION		
	TELEPHONE		
	EMAIL		

COMMENTS AND DEVIATIONS

If any specific detail(s) has been omitted above, the same shall be as per the original Quotation reference Q-07450 Revision 0 Dated 23/07/2020. The project shall be executed only if, this document is issued providing enough time to supply any mandatory parts required and based on availability of engineers for the above-mentioned outage. This document is in mutual agreement between the Parties and shall supersede any other prior agreements.

SIGNATORIES

ACCEPTED AND AGREED TO FOR AND BEHALF OF		ACCEPTED AND AGREED TO FOR AND BEHALF OF	
BY		BY	
NAME		NAME	
POSITION		POSITION	
DATE		DATE	

NOVA SCOTIA POWER INCORPORATED - PURCHASE ORDER TERMS & CONDITIONS

1.0 Definitions:

In this PO, the following terms have the following meanings where the context permits or requires:

- (a) "Goods" includes machinery, equipment, goods, materials, supplies, drawings and other property specified by NSPI in this PO.
- (b) "NSPI" means Nova Scotia Power Incorporated, its successors and assigns.
- (c) "PO" means this agreement/purchase order and any additional terms or conditions attached hereto.
- (d) "Seller" means the persons, and/or corporations to which this PO is addressed and each of their respective heirs, personal representatives, successors and permitted assigns.
- (e) "Services" means any and all services provided by the Seller to NSPI under this PO.

2.0 Entire Agreement:

This PO and any confidentiality agreement(s) entered into between NSPI and the Seller represents the entire agreement between the parties with reference to its subject matter. No modification or amendment shall be binding on either party unless consented to in writing by both parties. Each party agrees that it has not relied on any representations of the other party not contained in this PO. The terms and conditions of this PO shall supersede and abrogate all previous communications, commitments or agreements between the parties, unless a formal written agreement has been entered into between the parties.

3.0 Packaging:

NSPI will not pay any additional charges for boxing, crating, or packing, except by special agreement with the Seller.

4.0 Shipment:

Delivery must be made on the date(s) specified herein. If the Seller fails to make deliveries in accordance with this PO, NSPI may at its option terminate this PO in whole or in part and return (at the Seller's expense) or refuse to accept the Goods. Quantities received by NSPI in excess of quantities specified may, at the option of NSPI, be returned at Seller's expense.

Services must be performed by the date(s) specified herein. If the Seller fails to perform the Services in accordance with this Purchase Order, NSPI may at its option terminate this Purchase Order in whole or in part.

5.0 Inspections:

Goods are subject to inspection by NSPI. If NSPI determines that the Goods are not in accordance with specifications accompanying the PO, they may be rejected by NSPI and returned at NSPI's discretion. If inspection discloses defective Goods, or Goods of an inferior quality or workmanship, NSPI at its option, may cancel any unshipped Goods and return the Goods at the Seller's expense.

NSPI reserves the right to appoint its own inspector, at NSPI's cost, to inspect, examine and witness all tests on Goods. At all times, the Seller shall co-operate with NSPI's inspector.

Inspection or lack of inspection does not relieve the Seller of the Seller's obligations (including warranties) under this PO.

6.0 Title:

Title to the Goods and risk of loss shall pass from the Seller to NSPI upon delivery to and acceptance by NSPI.

7.0 Intellectual Property:

The Seller acknowledges and agrees that all contributions made in the course of provision of the Services, and namely the works, work product, drawings, innovations, discoveries, inventions or realizations, as well as their adaptation or modification, whether they be protected or not under any applicable law, entirely and solely belong to NSPI when made, conceived, created, realized or implemented by the Seller. The Seller, in advance, assigns and transfers to NSPI all right, title and interest to said contributions and work product and agrees, at NSPI's request, to execute any documentation required to effect such transfer.

Nothing contained herein shall be construed as limiting or depriving the Seller of its right to use the general knowledge, know-how and skills

developed during the provision of the Services, provided that the Seller shall remain subject to any continuing confidentiality obligations to NSPI.

8.0 Price & Payment:

Unless otherwise stated, all prices stated are in Canadian dollars. Payment shall be made net thirty (30) days from receipt of invoice by NSPI.

NSPI is not responsible for any interest or carrying charges unless consented to in writing by NSPI. The Seller will not permit any lien or charge to attach to the Goods or to any of NSPI's property or premises. If a lien or charge is attached, the Seller will promptly procure its release, and hold NSPI harmless from all loss, cost, damage or expense incidental thereto. All payments by NSPI to the Seller hereunder will be in accordance with, and subject to, all applicable laws, including holdback requirements under *Builders' Lien Act* (Nova Scotia).

9.0 Taxes and Duties:

Unless otherwise stated in this PO, the Seller will pay, and indemnify NSPI for all taxes that Seller is responsible for, except for any and all sales and use taxes.

10.0 Indemnities:

The Seller shall at all times indemnify and save harmless NSPI all loss, costs, charges, damages, expenses (including legal fees), damages, claims and demands whatsoever that NSPI may incur by reason of:

- (i) Personal injury, death, loss or damage to property arising out of Seller's negligent acts or negligent omissions or willful misconduct during the performance of this PO but excluding any such injury, death, loss, or damage to the extent that same is caused by the negligence or willful act or omission of NSPI; or
- (ii) any claim by a third party(s) that possession or use by NSPI of any intellectual property delivered as a part of or in connection with the Goods or Services infringes any patent, copyright, trade secret or other intellectual property right.

The Seller, at his own cost, risk, and expense, will defend any and all actions, suits, or other legal proceedings that may be brought against NSPI for any such claim or demand and satisfy any judgment that may be rendered against NSPI in any such action, suit, or other legal proceedings.

Except for the Seller's obligations to indemnify NSPI neither NSPI nor the Seller shall be liable to the other for any consequential, special, incidental, multiple, exemplary or punitive damages for performance or non-performance under this PO.

11.0 Warranty:

For the duration of the Warranty Period, defined below, Seller warrants that all Goods are of good, sufficient and merchantable quality, fit for the purpose or purposes specified and are free from any defect in design, material, workmanship or title. The Seller, at NSPI's request, will either promptly replace or repair at the Seller's expense any defective or damaged Goods which fail to comply with specifications or requirements under this PO or NSPI may, at its option and on reasonable notice to the Seller, correct such default, failure or damage and the Seller is liable to NSPI for all costs incurred in doing so. Neither payment for nor inspection, testing or acceptance of any Goods by NSPI excludes or limits any warranties hereunder or implied by law. The Seller will assign to NSPI or enforce for NSPI's benefit, any warranties obtained from manufacturers or subcontractors. All warranties continue in full force and effect notwithstanding any termination of this PO. Unless set out otherwise herein, warranties with respect to the supply and/or installation of Goods will expire twelve (12) months from receipt by NSPI of such Goods, or, with regard to Services, twelve (12) months from completion of Services (the "Warranty Period"). Should any Goods, or part thereof, be repaired, or replaced the warranty obligations of Seller will be twelve (12) months from NSPI's receipt of the repaired or replaced good.

For a period of twelve (12) months from the date of completion of Services, the Seller warrants that all Services performed shall be performed in a professional and workmanlike manner using personnel with the skills and training appropriate for the assigned tasks and using equipment that is appropriate for the purpose for which it is supplied and functioning properly. Seller further warrants that it shall re-perform Services which are found to have been in breach of the foregoing warranties for a period of twelve (12) months following completion of the Service.

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Except as otherwise provided herein, the foregoing warranties are exclusive and are in lieu of all other warranties and guarantees whether written, oral, implied or statutory. NO IMPLIED STATUTORY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE SHALL APPLY.

12.0 Default:

NSPI may immediately terminate this PO if: (i) the Seller breaches a material term of this PO; or (ii) the Seller is insolvent, declared bankrupt, seeks the benefit of any insolvency legislation, or if a receiver is appointed in respect of the Seller or over a portion of the Seller's assets. Upon such termination, NSPI is relieved of all further obligation hereunder. The Seller is liable to NSPI for all costs, expenses and/or damages (including legal fees) incurred by NSPI in completing or procuring the completion of this PO in excess of the purchase price.

13.0 Termination:

This PO may be terminated by NSPI, in whole or in part, by thirty (30) days prior written notice to the Seller for any reason. Charges for work or materials supplied up to the date of termination, including demobilization from site, if applicable, will be computed on the basis of Seller's most recent Time & Material Rate Sheet. Such adjustment does not apply to Goods which are Seller's standard stock. The Seller is not entitled to any compensation or damages for any direct or indirect damage, loss, prospective profits, economic loss or incidental or consequential damages as a result of such termination. Immediately upon receipt of such termination notice, the Seller will discontinue all work under this PO and make every effort to cancel orders or contracts that have been made. Any claim for adjustment by the Seller must be asserted within 30 days from the date of termination.

14.0 Insurance:

The Seller shall maintain the following insurance coverage for the duration of the PO: (i) Comprehensive General Liability insurance with limits of not less than \$2,000,000 per occurrence for bodily injury or death, and \$2,000,000 per occurrence property damage plus contractual liability coverage, (ii) automobile liability insurance, \$2,000,000 per occurrence; and, if applicable, (iii) environmental impairment liability: \$2,000,000 per occurrence. NSPI shall be named as an additional insured on the Seller's insurance policy(s). Upon request, the Seller shall provide NSPI with certificates of insurance satisfactory to NSPI evidencing that the foregoing insurance has been obtained.

15.0 Dispute Resolution:

In the event of a dispute in connection with this PO, a senior officer of the Seller and a senior officer of NSPI shall meet to discuss and resolve the dispute and the parties shall have ten (10) days to resolve the dispute (or five (5) days if either party notifies the other party that the matter requires urgent resolution). In the event resolution cannot be achieved then such dispute or difference shall be referred to arbitration under the provisions of the *Commercial Arbitration Act* of Nova Scotia. Unless otherwise requested by NSPI there shall be no stoppage in the provision of Goods or Services during any dispute resolution process.

16.0 Compliance with Laws:

The Seller shall comply with all statutory and legal requirements within the Province of Nova Scotia necessary for the performance of this PO by the Seller as well as all NSPI safety policies.

17.0 Force Majeure:

Neither the Seller nor NSPI shall be liable for any failure to comply with this Agreement to the extent that and for as long as such failure is caused by a Force Majeure Event. "Force Majeure Event" means any event or circumstance not reasonably within the control of, or not caused in whole or part by the negligence of, the party affected which wholly or partly prevents the performance by that party of its obligations under this PO, provided that such party is in good faith unable to perform such obligations by any commercially reasonable substitute means. Force Majeure Events include acts of God, war, riot, fire, explosion, flood, hurricane, acts of governmental authorities or acts of terrorism. Dates of delivery and/or performance may be extended by a period equal to the time actually lost by reason of a Force Majeure Event; provided, however that any deliveries and/or performance delayed or not made for reasons of Force Majeure Event may be suspended, reduced or cancelled by NSPI without any cost or obligation to NSPI. The party claiming a Force Majeure Event must give written notice to the other party within two (2)

days of becoming aware of the Force Majeure Event and must also use commercially reasonable efforts to remedy the condition that prevents performance and to mitigate the effect of the same in order to continue to perform its obligations under hereunder.

18.0 Confidentiality

The Seller and NSPI (as to information disclosed, the "Disclosing Party") may each provide the other party (as to information received, the "Receiving Party") with "Confidential Information." "Confidential Information" shall mean all the terms of this PO, all information about the Goods or Services and all information related to the business or products of the Disclosing Party that is not generally known to the public. The obligations of this Article shall not apply to any portion of the Confidential Information which (i) is or becomes generally available to the public other than as a result of disclosure by the Receiving Party, or (ii) is or becomes available to the Receiving Party or on a non-confidential basis from a source other than the Disclosing Party, or (iii) has been or is subsequently independently developed by the Receiving Party without reference to the Confidential Information, or (iv) which the Receiving Party is required to disclose by law or a regulatory body with regulatory responsibility over the Receiving Party.

The Receiving Party agrees to: (i) use the Confidential Information only in connection with this transaction and permitted uses of the Goods and Services, (ii) not use, reveal, release, disclose or divulge the Confidential Information in any form whatsoever to any person or publish in any manner whatsoever, other than as permitted hereby, unless it has the prior written consent of the Disclosing Party; and (iii) to safeguard the Confidential Information from unauthorized disclosure.

19.0 General:

(a) This PO shall be construed in accordance with the laws in force in the Province of Nova Scotia, Canada and the federal laws of Canada applicable therein. The parties agree to atorn to the jurisdiction of the Courts of Nova Scotia.

(b) This PO shall enure to the benefit of and be binding upon the parties and their respective successors and permitted assigns. The Seller will not assign or otherwise transfer this PO or any part hereof without NSPI's prior written consent, which may be unreasonably withheld by NSPI.

(c) Any failure by NSPI at any time or from time to time to enforce or require the strict keeping and performance of any of the terms or conditions of the PO shall not constitute a waiver of such terms or conditions. NSPI may at any time avail itself of such remedies as it may have for any breach of such terms or conditions.

(d) If any section or part or parts of sections in this PO are determined to be illegal or unenforceable, it or they shall be considered separate and severed from this PO and the remaining provisions of this PO shall remain in full force and effect and shall be binding upon the parties hereto as if such section or sections or part or parts of the sections had never been included.

(e) Section headings used herein are for the convenience only and shall not be construed so as to affect the interpretation or construction of this Agreement.

(f) In this PO, words importing the singular include the plural and vice versa and words importing a specific gender include all genders.

(g) The words "includes" or "including" shall mean "includes without limitation" or "including without limitation", respectively.

(g) In the event there is more than one Seller, all obligations of Seller hereunder are joint and several.

(h) All provisions of this PO which by their express terms or nature are continuing shall survive the expiration or termination of this PO, including this provision, and any provisions relating to notice, confidentiality, indemnification, termination, intellectual property, dispute resolution, as well as any provisions which are required to determine, or which exclude or limit, any liability or which are otherwise required to give effect to or interpret any such provisions which are continuing

ARM

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20.0 Limits of Liability

Save for death or personal injury, gross negligence or willful misconduct, and intellectual property infringement, Seller's total liability, in the aggregate, whatsoever for any claim of NPSI or any other person shall not exceed two million dollars (\$2,000,000.00).

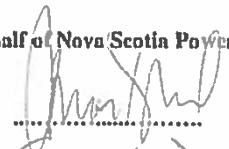
Notwithstanding any other clause in this agreement, neither NPSI nor Seller shall be liable to the other or any other person, whether by way of indemnity, or for breach of contract, or tort (including but not limited to negligence) for loss of contracts, loss of use, loss of profits, fines or similar impositions levied by any regulatory body or competent authority, or for any other indirect, consequential, financial or economic loss.

If a purchase order for parts is cancelled by NPSI after items are shipped, there will be a 25% restocking charge to cover the costs of shipping and returning the item to inventory. If a cancelled part is a special order for NPSI, there may be a cancellation charge up to the price of the part.

For and on behalf of Generator and Motor Services of Pennsylvania, LLC

Signed by:  Date: 8/25/2016
Name: Aaron S. Marra Position: Legal Counsel

For and on behalf of Nova Scotia Power Incorporated

Signed by:  Date: Aug 25 2016
Name: Jamie MacDonald Position: Sr. Director
Power Production

CI Number: C0029691

Title: CT – VJ1 Control System Upgrade

Start Date: 2021/08
In-Service Date: 2022/06
Final Cost Date: 2022/12
Function: Gas Turbine
Forecast Amount: \$1,016,225

DESCRIPTION:

This project is for the upgrade of the Victoria Junction Unit 1 Combustion Turbine (CT) control system, including the sequencer programmable logic controllers, fuel controls system, data acquisition system, cameras, field devices and human machine interface graphics package to modernize Victoria Junction Unit 1 CT Controls.

Victoria Junction Unit 1 is a 33MW combustion turbine located in Sydney that provides black start capability, 10-minute reserve, Volt-Ampere Reactive support, and firm generating capacity to the NS Power electrical system. Unit 1 was originally commissioned in 1976.

The Victoria Junction CT is fully automated, enabling remote operation with minimal site intervention, and is a hybrid of original equipment and other upgrades from the 1980s that are now beyond their expected useful life. The control systems required to enable this mode of operation are fully integrated and distributed throughout the unit. The control system manages all engine processes, all generator processes, and specific auxiliary processes. The control system upgrade will also enable remote monitoring and diagnostic functionality, improving condition-based maintenance and long-term investment planning.

In the 2020 Integrated Resource Plan, NS Power identified that firm capacity resources will be a key requirement of the developing NS Power system in both the near and long term¹. 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 requirement² 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 the Victoria Junction CT is consistent with the results of the 2020 IRP.

Summary of Related CIs +/- 2 years:

Pursuant to Section 11.2 of the 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 2020, 2021, 2022, 2023, or 2024

Depreciation Class: Other Production - Gas Turbines - Victoria Junction

Estimated Life of the Asset: 20 Years

Retirement Information:

- Categorization of Retirement: Accounting Policy 6420 - Retirement and Disposal of Capital Assets
- Percentage of Asset Pool: 1.7%

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.

JUSTIFICATION:

Justification Criteria: Thermal

Sub Criteria: Equipment Replacement/Refurbishment

Why do this project?

Portions of the existing control system are obsolete and becoming difficult to source replacement parts for, troubleshoot and diagnose. The new control system integrates improved user interface software, and improved troubleshooting aids. New unit process management equipment, new software, and improved control system process management will also reduce false indication, resultant nuisance trips and related forced outages. The new controls will ensure the safe and reliable operation of the combustion turbine. The new control system is of a modular design that will reduce the impact of component obsolescence as well as overall project cost, as only the individual components will require replacement rather than the entire system.

Why do this project now?

Portions of the existing control system that were installed in the 1980s are obsolete and becoming difficult to source replacement parts for, troubleshoot and diagnose. As time progresses, spare parts availability will decrease and lead times will increase. Replacement lead times for many of the current control system components are lengthy and replacement components will eventually become unavailable.

The control system will be replaced during the regularly scheduled annual outage, providing the most cost effective, low impact approach to replacing the existing control system.

Why do this project this way?

Replacement of the entire system at this time is the only option due to the obsolescence of the system and scarcity of replacement component parts. The new control system is designed with an improvement on obsolescence management in mind, as the new system is of a modular design. This is expected to improve service life and reduce costs going forward by enabling the replacement of obsolete modules rather than the entire system.

REDACTED (CONFIDENTIAL INFORMATION REMOVED)

REDACTED 2022 ACE Plan CI C0029691 Page 3 of 4

CI Number : C0029691

- CT - VJ1 Control System Upgrade

Project Number C0029691

Parent CI Number :

-

Asset Location : 1201

- 1201 Victoria Junction Unit 1, 30 Mwh unit

Budget Version 2022 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	3000 - GTG - Gas Turbine Engines	1,006,215
Retirements	3000 - GTG - Gas Turbine Engines	10,010
Total Cost:		1,016,225
Original Cost:		221,804

Capital Project Detailed Estimate

Location: Gas Turbine CI# : C0029691 Title: CT – VJ1 Control System Upgrade Execution Year: 2022						
Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#s)
Regular Labour						
Engineering	PD	145	\$ 413	\$ 60,051		
Gas Turbine Operators	PD	55	\$ 365	\$ 20,100		
CADD Operators	PD	20	\$ 300	\$ 5,999		
			Sub-Total	\$ 86,150		
OT Labour						
Internal Commissioning Site Time	PD	10	\$ 730	\$ 7,309		
			Sub-Total	\$ 7,309		
Travel Expense						
Travel and Accommodations	Lot	1	\$ 11,250	\$ 11,250		
			Sub-Total	\$ 11,250		
Materials						
Fossil - Controls Materials	Lot	1			Attachment 1, Item 2.1, 2.2, 2.3, 2.4	
Misc. Materials (wiring, fuses, cable)	Lot	1				
Engineering Workstation/Licenses	Lot	1	\$ 15,000	\$ 15,000		
Cameras	Lot	1	\$ 5,000	\$ 5,000		
			Sub-Total	\$ 485,940		
Contracts						
Fossil - Assessment and Commissioning	Lot	1			Attachment 1, Item 2.5, 2.6	
Electrical Contractor	Lot	1				
Camera Installation	Lot	1	\$ 15,000	\$ 15,000		
			Sub-Total	\$ 184,630		
Consulting						
Electrical Site Design	Lot	1	\$ 20,000	\$ 20,000		
			Sub-Total	\$ 20,000		
Meals						
Meals	Lot	1	\$ 7,500	\$ 7,500		
			Sub-Total	\$ 7,500		
Other Goods & Services						
Contingency	%	20%	\$ 802,779	\$ 160,556		
			Sub-Total	\$ 160,556		
Interest Capitalized						
AFUDC				\$ 17,165		
			Sub-Total	\$ 17,165		
Administrative Overhead						
Labour AO				\$ 20,257		
Contractor AO				\$ 15,468		
			Sub-Total	\$ 35,725		
				SUB-TOTAL (no AO, AFUDC)	\$ 963,335	
				TOTAL (AO, AFUDC included)	\$ 1,016,225	
				Original Cost	\$ 221,804	
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
PROPOSAL FOR
VJ COMBUSTION TURBINE, UNITS 1 & 2
CONTROLS SYSTEM UPGRADE
VICTORIA JUNCTION, NOVA SCOTIA**



FPS PROPOSAL 20x092 (REV3)
MAY 25, 2021

FOSSIL POWER SYSTEMS INC.
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Nova Scotia Power – Victoria Junction Combustion Turbine Controls Upgrade
Rev3 – May 25, 2021

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Nova Scotia Power – Victoria Junction Combustion Turbine Controls Upgrade
Rev3 – May 25, 2021

1 OVERVIEW

1.1 INTRODUCTION

The following proposal is for the design, fabrication, and commissioning of a complete controls system upgrade for Units 1 and 2 at Nova Scotia Power's Combustion Turbine site in Victoria Junction. The scope of supply is based on details communicated by NSP.

This proposal provides pricing to completely upgrade each Unit's control system, including enough I/O based on the assumptions listed in section 1.2. Allen-Bradley ControlLogix I/O will be used. Graphics for the new system will be built on new VTScada HMI workstations, with upgraded touchscreens. Existing VTScada licenses will be reused or upgraded by NSP. The system will also be remotely accessible from the NSPI network.

Also included will be all the required I/O cables, terminal blocks, drawings, and manuals. The existing control room cabinets will be re-used.

1.2 DESIGN PHILOSOPHY & PROJECT ASSUMPTIONS

The primary goals of this project are:

- a) Upgrade sequencer PLC from Rockwell PLC5 hardware to ControlLogix and ensure all changes will continue to meet the needs of plant operations and maintenance.
- b) Upgrade the fuel control system from Modicon PLC hardware to ControlLogix, encompassing valve control based on the new Woodward card.
- c) Integrate the sequencer, fuel control and DAS system logic, into a single ControlLogix based upgraded control system.
- d) Provide new terminal blocks, power supplies, racks, and interconnecting cables to interface with field IO.
- e) Provide a new VTScada HMI graphics package and touchscreen hardware, designed for the upgraded software.
- f) Upgrade engine and generator field instrumentation from digital switches to analog transmitters.
- g) Provide commissioning services for all equipment outlined in this proposal.
- h) Provide all wiring and layout drawings and documentation required to properly document and troubleshoot the system.

This proposal is based on the following assumptions, for each unit:

- a) The maximum I/O count required is 16 TC, 16 TC/RTD, 12 RTD, 32 AI, 4 AO, 112 DI, 128 DO.
- b) The PLC system will be non-redundant (processor and IO), with similar IO count to BGT4.
- c) Field instrumentation replacement is assumed to be similar to BGT4. If scope of instrumentation replacement changes after the site assessment, a change order will be required.
- d) The replacement of hardwired switches, meters and indicators on the control system panel door is assumed to be the same scope as was supplied for BGT4.
- e) All installation is the responsibility of NSP.
- f) VTScada software licenses or license upgrades are the responsibility of NSP.

Nova Scotia Power – Victoria Junction Combustion Turbine Controls Upgrade
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1.2.1 PLC SYSTEM DESIGN

New back panels complete with new PLC hardware, will be provided, which will be installed in the existing control cabinets. The logic will be programmed based on both the existing design, and the design of the new system installed at Burnside Unit 4.

The PLC system will be completely tested such that the entire system operation is verified prior to the functional acceptance test, and prior to the equipment being shipped to site.

The PLC system shall be designed and fabricated to meet the requirements of the Canadian Electrical Code (CEC) as well as any other international or local codes, as required.

The PLC system shall be designed to ensure the execution of a safe, orderly operating sequence in the start-up and shutdown of plant systems by providing clear alarm monitoring and trending capabilities for important process systems and data monitoring points.

1.2.2 OPERATOR INTERFACE DESIGN

New graphics will be supplied based on the Burnside Unit 4 graphical interface, using VTScada software. Modifications will be made as necessary to account for any additional display information or improvements required. The workstation hardware will be upgraded, with a new HMI touchscreen. A new workstation and touchscreen will be provided for each unit and will be mounted in the cabinet with a new keyboard tray similar to Burnside Unit 4.

Nova Scotia Power – Victoria Junction Combustion Turbine Controls Upgrade
Rev3 – May 25, 2021

2 STANDARD HARDWARE & ENGINEERING DESIGN

Fossil Power proposes to supply the following standard items as part of the controls system upgrade.

1. Allen-Bradley control hardware, back panels, power distribution equipment, interconnecting cabling and terminal blocks.
2. New instrumentation, including an upgrade from digital switches to analog transmitters where ever possible.
3. Vibration instrumentation for the Engine (Generator is included in another project)
4. A new Woodward Servo Position Controller for fuel control.
5. New junction boxes to marshal the IO in the field, for connection to the new PLC panel.
6. System Engineering including wiring drawings, alarm set-point sheets and programming.
7. Complete system documentation.

2.1 PLC UPGRADE

FPS proposes to supply all required hardware for the new ControlLogix based PLC control system mounted on custom built panels. The new system consists of a single non-redundant processor for each Unit and all IO hardware and communication interface hardware to replace the current sequencer, fuel controller and DAS systems. The new Rockwell based vibration monitoring system will already be installed, but will be reconfigured to communicate on the new control network. For each Unit, two 13-slot racks will be mounted on the new panels, which will be manufactured at FPS in Burnside, NS and will ship fully wired, programmed and tested. The panels will be installed in the existing cabinets in the control room.

The PLC hardware selected is based on the system IO assumptions noted in section 1.2 of this proposal. A list of the PLC hardware required per Unit is shown in the table below. A Prosoft card is included, which will be the Modbus interface to the Bitronics meter. Please note all communication is via ethernet and requires no special cards to be mounted in the HMI computers. A new 24" HMI touchscreen will be provided per Unit and mounted in the panel door, as an upgrade to the HMI hardware currently in service.

Also included is supply of the Woodward Servo Position Controller to replace the PEPCO fuel modulation valve driver. The module will be mounted on a steel panel for installation in the control cabinet.

Nova Scotia Power – Victoria Junction Combustion Turbine Controls Upgrade
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Control System Hardware (per Unit)

Qty	Description	Part Number
1	Processor	1756-L71
4	Redundant Power Supply	1756-PB75R
2	Redundant Power Supply Adapter	1756-PSCA2
4	Redundant Power Supply Cable	1756-CPR2U
2	13 slot chassis	1756-A13
1	Ethernet Comms	1756-EN2T
2	Ethernet IO	1756-EN2TR
3	32pt DC Input Card	1756-IB32
1	16pt DC Input Card	1756-IB16
1	16pt DC Isolated Output Card	1756-OB16I
7	16pt Contact Output Card	1756-OW16I
2	16pt Analog Input Card, HART, isolated	1756-IF16IH
1	4pt Analog Output Card	1756-IF4XOF2F
2	8pt RTD/TC Input Card	1756-IRT8I
1	16pt TC Input Card	1756-IT16
1	RTD Input Card	1756-IR12
3	CJC THERMISTORS (QTY 2)	1756-CJC
1	20pt PLC Terminal Block	1756-TBNH
17	36pt PLC Terminal Block	1756-TBCH
18	Ext. Term. Block Housing	1756-TBE
1	Prosoft Card	MV156E-MNET

2.2 ENGINEERING DESIGN & TESTING

Complete engineering design, drafting and related documentation is included in the scope of this project. All documentation will be provided in English only and will be provided in electronic formats, including Adobe Acrobat, Microsoft Word, Microsoft Excel, and/or Microsoft Project, as required.

1. Project Schedule
2. Equipment list
3. Equipment architecture and layout drawings (including Bill of Materials)
4. Terminal block wiring and equipment interface drawings
5. Program Logic drawings
6. FAT checklist
7. Recommended spare parts list
8. Operation and maintenance (O&M) manuals
9. Onsite Commissioning Checklist

A factory acceptance test (FAT) will be conducted at the FPS factory in Dartmouth, NS. This FAT will include personnel from NSP and FPS. The FAT will be comprised of a hardware simulation of the system I/O which will thoroughly test and verify all panel wiring, system logic and operator interface.

To ensure a smooth and productive FAT, the system wiring and logic will be 100% tested by FPS engineers prior to the arrival of NSP personnel.

Nova Scotia Power – Victoria Junction Combustion Turbine Controls Upgrade
Rev3 – May 25, 2021

2.3 INSTRUMENTATION & PANEL HARDWARE

Engine and generator instrumentation is to be upgraded from digital switches to HART enabled analog transmitters where ever possible. Diagnostic program logic will be implemented to detect a HART configuration mismatch between the field instrument and the PLC analog channel. Installation of the new transmitters is the responsibility of NSP.

This proposal assumes that the following signals will be converted to analog transmitters on each unit.

- Fuel pressure
- Engine, turbine, generator lube oil pressures
- AC lube oil pump pressure
- Engine, turbine breather pressures
- Starter signal pressure, starter duct pressure, air receiver pressure
- Engine, turbine, generator lube oil levels
- Fuel oil filter DP

Temperature signals measured by type T thermocouple devices that are in good working order should be re-used in the new control system. If awarded this project FPS will conduct a detailed assessment of site instrumentation to determine if additional instrumentation requires replacement. New thermocouple probes and transmitters will be supplied for those signals which are currently not in good working order.

This proposal assumes a total of 7 temperature probes, including HART enabled temperature transmitters will be replaced.

The pricing in section 3 is based on the assumption that only the items listed above will be supplied/upgraded. If further instrumentation requires replacement, a change order will be requested.

The hardwired switches, meters and indicators on the control system panel door will also be upgraded for each Unit. Custom metal plates complete with SBM style local control switches, indicator lamps, and instrument meters will be provided. The new plates will bolt on to the existing cabinets after the old fronts have been cut out and removed. Another set of plates will be provided to accommodate the new cut-out for the upgraded HMI touchscreen.

New junction boxes will be assembled and shipped, to marshal the IO in the field prior to connection to the PLC panel.

2.4 TRAINING COURSE

Pricing has been included for a customer training course with the applicable NSP staff. Training course will consist of a single day on-site presentation, hard copies of training material and question & answer session.

2.5 SITE ASSESSMENT – SITE TIME

To complete the site assessment, which entails gathering all information required for the engineering design, it is assumed one engineer will be required to travel to Sydney and spend five 8-hour days at the plant.

2.6 COMMISSIONING - SITE TIME (ESTIMATE)

All panel, instrument installation and wiring terminations will be performed by a 3rd party electrical contractor hired by Nova Scotia Power. The contractor will run new cables between the control room, engine and generator buildings through existing conduit as required by the new control system. The new junction boxes provided by FPS will be installed by the contractor as needed to marshal the IO in the field before being wired to the new PLC panel.

The time required for an engineer to commission the system is estimated to be approximately 20 days per unit. For the purpose of this proposal, it is assumed that one engineer will be required, working 8-hour days.

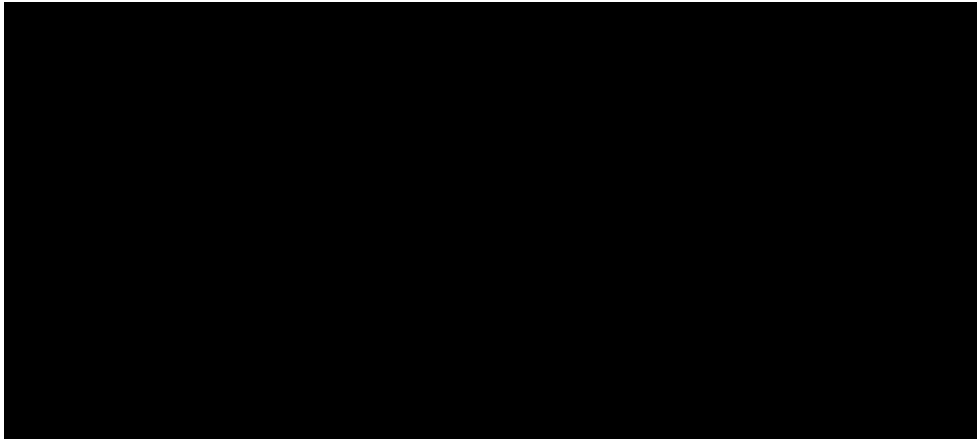
Commissioning Site Time (Estimate) 20 days @ 8 hours/day

Time will be billed at the standard FPS rate as required. Only actual hours spent at site will be billed.

Nova Scotia Power – Victoria Junction Combustion Turbine Controls Upgrade
Rev3 – May 25, 2021

PRICING SUMMARY

Pricing is based on receiving the order for both units at the same time. FPS will purchase materials and manufacture for both units at the same time. We will provide a full set of drawings for both units. The first unit will be fully tested (FAT) on a hardwired simulator (with some loops being soft simulated) and the second unit will be tested with a point to point check. Both units will be shipped at the same time. The final 10% hold back on the first unit to be installed will be invoiced when complete or no more than 90 days after shipment. The final 10% hold back on the second unit to be installed will be invoiced when complete or no more than 365 days after shipment. All pricing is in CAD funds.



3 COMMERCIAL TERMS

Delivery:	26 weeks after receipt of order	
Shipping:	Included	
FOB:	Victoria Junction	
Taxes and Duties:	Extra	
Country of Origin:	Canada	
Bid Validity:	June 25, 2021	
Terms of Payment (Items 2.1-2.4):	ARO	20%
	Submission of drawings	20%
	Material Ordered	30%
	Ready for shipment	20%
	Satisfactory operation	10%
Terms of Payment (Items 2.5, 2.6):	Upon completion	100%
Terms of payment based on full contract amount.		
Payment required within 30 days of invoicing.		

CI Number: C0041893

Title: 2022/2023 Transmission Right-of-Way Widening 69kV

Start Date: 2022/06
In-Service Date: 2022/06
Final Cost Date: 2024/02
Function Class: Transmission
Forecast Amount: \$5,312,315

DESCRIPTION:

This project will widen rights-of-way to reduce the occurrence of edge and off right-of-way tree contacts by increasing the separation between trees and transmission lines. The vegetation management practices performed under NS Power's maintenance program target vegetation within the rights-of-way and maintain existing, sustainable rights-of-way. These activities prevent tree growth from causing outages, but do not address edge or off rights-of-way trees.

2022 is year seven of the eight-year 69kV Transmission Rights-of-Way Widening Plan accepted by the NSUARB through the Post Tropical Storm Arthur review process. Increasing the width of rights-of-way for 69kV transmission lines to 30-40 meters where possible will significantly reduce the risk of trees contacting power lines during storms. Currently, 242 km of transmission rights-of-way are targeted for widening in 2022.

The 69kV transmission lines and the length of rights-of-way currently planned for widening in 2022 are shown in the table below. The transmission lines completed can be expected to vary as further inspections, and changes in prioritization occur throughout 2022.

Line #	Region	Length of Right-of way to be Widened (km)
L-5511	Halifax	12.0
L-5535	Yarmouth	82.0
L-5050	Digby	14.6
L-5053	Kings	41.4
L-5500	Pictou	16.7
L-5501	Pictou	3.6
L-5564	Cape Breton	22.4
L-5035	Kings	1.2
L-5029	Cumberland	32.4
L-5047	Annapolis	0.4
L-5537	Yarmouth	6.4
L-5506	Pictou	8.8
TOTAL		241.9

Summary of Related CIs +/- 2 years:

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

- 2020 CI C0020627 2020 Transmission Right-of-Way Widening 69kV \$5,489,820
- 2021 CI C0031089 2021 Transmission Right of Way Widening 69kV \$5,288,520
- 2023 CI TBD 2023 Transmission Right of Way Widening 69kV \$TBD

Depreciation Class: Transmission Plant - Land Rights - Easements

JUSTIFICATION:

Justification Criteria: Transmission Plant

Why do this project?

NS Power's standard right-of-way width for a 69kV transmission line was previously 20 metres. Given the power line structure is usually in the center of the right-of-way, this resulted in a cleared area of 10 metres on each side of the centerline. The distance between the forest edge and conductor varies, depending on structure type. While this distance provides ample clearance for the safe maintenance and operation of all types of structures, it is not wide enough to prevent many tree species that are tall enough to span the entire right-of-way width from making contact with the power lines when they fall. Increasing the right-of-way width for 69kV transmission lines to 30-40 meters will significantly reduce the risk of trees contacting the power lines during storms. Additionally, expanding the right-of-way for existing 69kV transmission allows for future replacement/conversion of these lines to 138kV, if necessary, which requires a 30 metre right-of-way, if ever needed.

Why do this project now?

This is year seven of the eight-year 69kV Transmission Rights-of-Way Widening Plan. The transmission rights-of-way currently targeted for widening in 2022 are noted above and are consistent with the prioritization outlined in the Widening Plan. The transmission rights-of-way completed can be expected to vary as prioritization can change throughout the program due to inspections and/or reliability data.

This project is deemed in-service when the first transmission right-of-way is widened (June 2022), therefore the Final Cost date (February 2024) is six months after the last right-of-way is expected to be completed on this project (August 2023).

Why do this project this way?

Prioritizing the widening of the 69kV transmission rights-of-way based on customer count and transmission system redundancy will provide the largest reliability benefit. This method of widening the 69kV transmission rights-of-way was accepted as part of the Post Tropical Storm Arthur stakeholder engagement.

REDACTED (CONFIDENTIAL INFORMATION REMOVED)

2022 ACE Plan CI C0041893 Page 3 of 4

CI Number : C0041893

- 2022/2023 Transmission Right-of-Way Widening 69kV

Project Number C0041893

Parent CI Number :

-

Asset Location : 1455

- 1455 Transmission Plant General

Budget Version 2022 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	0200 - TP - Land Rights	5,312,315
Total Cost:		5,312,315
Original Cost:		

Capital Project Detailed Estimate

Location: Transmission CI#: C0041893 Title: 2022/2023 Transmission Right-of-Way Widening 69kV Execution Year: 2022-2023												
Description						Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#'s)	
Royalties & Easements												
Easement Costs						Lot	1	\$ 20,000	\$ 20,000			
						Sub-Total		\$ 20,000				
Contracts												
Tree Trimming						Lot	1	\$ 4,500,000	\$ 4,500,000	This estimate is based on historical costs for similar work completed on the 69kV system		
						Sub-Total		\$ 4,500,000				
Administrative Overhead												
Contract AO									\$ 792,315			
						Sub-Total		\$ 792,315				
SUB-TOTAL (no AO, AFUDC)										\$ 4,520,000		
TOTAL (AO, AFUDC included)										\$ 5,312,315		
Original Cost												
Note 1: Small differences in totals are attributable to rounding.												

CI Number: C0041837

Title: 2022/2023 Substation Polychlorinated Biphenyl (PCB) Equipment Removal

Start Date: 2022/03
In-Service Date: 2022/03
Final Cost Date: 2023/09
Function Class: Transmission
Amount: \$3,805,434

DESCRIPTION:

This project will replace substation devices that have polychlorinated biphenyl (PCB) levels of 50 mg/kg or more to comply with 2008 Federal Environmental PCB Regulations. PCB sampling of all accessible substation equipment was completed in projects from previous years and the focus of this project will be the removal and replacement of equipment containing PCBs.

A portion of the capital costs associated with this capital item will contribute toward settling the Company's Asset Retirement Obligation for PCB contaminated oil.

Summary of Related CIs +/- 2 years:

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

- 2020 CI C0021123 2020/2021 Substation PCB Equipment Removal \$5,197,372
- 2021 CI C0031263 2021/2022 Substation PCB Equipment Removal \$7,512,226
- 2023 CI TBD 2023/2024 Substation PCB Equipment Removal \$TBD
- 2024 CI TBD 2024/2025 Substation PCB Equipment Removal \$TBD

Depreciation Class: Transmission Plant – Station Equipment

Estimated Useful Life: 40 Years

Retirement Information:

- Categorization of Retirement: Accounting Policy 6420 - Retirement and Disposal of Capital Assets
- Percentage of Asset Pool: 0.2%

JUSTIFICATION:

Justification Criteria: Environment

Why do this project?

This project is required to enable NS Power to comply with the revised 2008 Federal PCB Regulations as set by the Federal Government, which includes a deadline of year end 2025 for the elimination of all equipment containing PCBs in concentrations at or above 50 mg/kg.

Why do this project now?

This project needs to be completed now to support the orderly replacement of all applicable PCB contaminated substation equipment before the 2025 deadline.

This project is deemed in-service when the first device is removed (March 2022), therefore the Final Cost Date (September 2023) is listed as six months after the last device is removed under this project (March 2023).

Why do this project this way?

The replacement of equipment containing greater than 50 mg/kg concentration of PCBs must be planned over a period of several years to manage outages effectively and comply with the 2008 Federal PCB Regulations.

CI Number : C0041837

- 2022/2023 Substation Polychlorinated Biphenyl (PCB) Equipment Removal **Project Number** C0041837

Parent CI Number :

-

Asset Location : 1455

- 1455 Transmission General

Budget Version 2022 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	2200 - TP - Elec Contr.Equip.	478,248
Additions	2300 - TP - Power Equip.-Station S	121,004
Additions	4300 - TP - Substn Dev.	1,255,582
Additions	4400 - TP - Substn.Transf.	1,522,275
Retirements	2300 - TP - Power Equip.-Station S	12,056
Retirements	4300 - TP - Substn Dev.	177,733
Retirements	4400 - TP - Substn.Transf.	238,536
Total Cost:		3,805,434
Original Cost:		1,063,470

Capital Project Detailed Estimate

Location: Transmission CI#: C0041837 Title: 2022/2023 Substation Polychlorinated Biphenyl (PCB) Equipment Removal Execution Year: 2022/2023						
Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#s)
Regular Labour						
T&D Labour - Electrician/Technician	PD	1287	\$ 359	\$ 461,705		
T&D Labour - Design	PD	352	\$ 426	\$ 150,115		
T&D Labour - Commissioning	PD	189	\$ 359	\$ 67,960		
Procurement Labour	Lot	1	\$ 24,945	\$ 24,945		
			Sub-Total	\$ 704,725		
Travel Expense						
Travel Expenses	Lot	1	\$ 3,001	\$ 3,001		
			Sub-Total	\$ 3,001		
Materials						
Buildings, Structures, and Grounds	Lot	1	\$ 51,160	\$ 51,160		
Electrical Control Equipment	Lot	1	\$ 73,425	\$ 73,425		
Power Substation Equipment	Lot	1	\$ 19,200	\$ 19,200		
Substation Device	Lot	1	\$ 728,450	\$ 728,450		
Substation Transformer	Lot	1	\$ 367,500	\$ 367,500		
Design	Lot	1	\$ 7,500	\$ 7,500		
			Sub-Total	\$ 1,247,235		
Contracts						
Buildings, Structures, and Grounds	Lot	1	\$ 151,215	\$ 151,215		
Electrical Control Equipment	Lot	1	\$ 41,670	\$ 41,670		
Substation Devices	Lot	1	\$ 166,550	\$ 166,550		
Substation Transformer	Lot	1	\$ 312,700	\$ 312,700		
			Sub-Total	\$ 672,135		
Consulting						
Inspection & Witnessing of Tests	Lot	1	\$ 3,000	\$ 3,000		
			Sub-Total	\$ 3,000		
Other Goods & Services						
Contingency	%	10%	\$ 2,630,096	\$ 263,010		
			Sub-Total	\$ 263,010		
Vehicle Overhead						
Vehicle AO				\$ 282,531		
			Sub-Total	\$ 282,531		
Administrative Overhead						
Labour AO				\$ 511,454		
Contract AO				\$ 118,343		
			Sub-Total	\$ 629,797		
SUB-TOTAL (no AO, AFUDC)				\$ 2,893,106		
TOTAL (AO, AFUDC included)				\$ 3,805,434		
Original Cost				\$ 1,063,470		
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.						

CI Number: C0041793

Title: L7002 Replacements and Upgrades Phase 2

Start Date: 2022/04
In-Service Date: 2022/04
Final Cost Date: 2024/04
Function Class: Transmission
Forecast Amount: \$3,640,960

DESCRIPTION:

L7002 is a 75 kilometre (338 Structures) 230kV transmission line, built in 1970, that connects 67N Onslow and 120H Brushy Hill 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 approximately 72 structures. This project will be completed over 2 years.

The project scope includes:

- Structure Replacements: 58 Structures
- Timber Replacements: 13 Structures
- Other Deteriorated Assets: 1 Structure

Summary of Related CIs +/- 2 years:

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

- No other projects in 2020, 2021, 2022, 2023, or 2024

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: 0.2%

JUSTIFICATION:

Justification Criteria: Transmission Plant

Why do this project?

The transmission line inspection program identified deteriorated assets that require replacement to avoid transmission interruptions. Failure to complete this project would compromise the reliable operation of this line. 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 (April 2022), therefore the Final Cost Date (April 2024) is listed as six months after the final work is completed (October 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 : C0041793

- L7002 Replacements and Upgrades Phase 2

Project Number C0041793

Parent CI Number :

-

Asset Location : 1455

- 1455 Transmission General

Budget Version 2022 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	3500 - TP - Wood Poles	2,461,446
Additions	3800 - TP - Insulators	1,164
Additions	3900 - TP - O/H Cond.	556,209
Retirements	3500 - TP - Wood Poles	621,405
Retirements	4000 - TP - O/H Cond.Devices	736
		<hr/>
Total Cost:		3,640,960
Original Cost:		430,958

Capital Project Detailed Estimate

Location: Transmission CI#: C0041793 Title: L7002 Replacements and Upgrades Phase 2 Execution Year: 2022/2023						
Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#'s)
Regular Labour						
T&D Labour - Planning	PD	32	\$ 354	\$ 11,462		
T&D Labour - Site Supervision	PD	97	\$ 429	\$ 41,685		
T&D Labour - Electrician/Technician	PD	59	\$ 380			
Sub-Total				\$ 53,147		
Materials						
Wood Poles	Lot	1	\$ 572,930	\$ 572,930		
O/H Conductor	Lot	1	\$ 182	\$ 182		
Sub-Total				\$ 573,112		
Contracts						
Land Rights	Lot	1	\$ 20,000	\$ 20,000		
Wood Poles	Lot	1	\$ 1,717,882	\$ 1,717,882		
Insulators	Lot	1	\$ 834	\$ 834		
O/H Conductor	Lot	1	\$ 398,074	\$ 398,074		
O/H Conductor Devices	Lot	1	\$ 625	\$ 625		
Survey and Mapping	Lot	1	\$ 20,000	\$ 20,000		
Sub-Total				\$ 2,157,415		
Other Goods & Services						
Contingency	%	15%	\$ 2,783,674	\$ 417,551		
Sub-Total				\$ 417,551		
Vehicle Overhead						
Vehicle AO				\$ 21,307		
Sub-Total				\$ 21,307		
Administrative Overhead						
Labour AO				\$ 38,572		
Contract AO				\$ 379,856		
Sub-Total				\$ 418,428		
SUB-TOTAL (no AO, AFUDC)				\$ 3,201,225		
TOTAL (AO, AFUDC included)				\$ 3,640,960		
Original Cost				\$ 430,958		
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.						

CI Number: C0041805

Title: L7005 Replacements and Upgrades Phase 2

Start Date: 2022/05
In-Service Date: 2022/05
Final Cost Date: 2023/12
Function Class: Transmission
Forecast Amount: \$3,182,518

DESCRIPTION:

L7005 is a 159.3 kilometre (740 Structures) 230kV transmission line, built in 1983, that connects 67N Onslow to 3C Port Hastings substations. This project is required to replace deteriorated assets that have been identified through NS Power's transmission line inspection program. The second and final phase of this project includes the replacement of deteriorated assets on approximately 71 structures.

The project scope includes:

- Structure Replacements: 44 Structures
- Insulator Replacements: 7 Structures
- Timber and Insulator Replacements: 15 Structures
- Bond or Guy Wire Replacements: 2 structures
- Other Deteriorated Assets: 3 Structures

Summary of Related CIs +/- 2 years:

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

- 2020 CI C0021106 L7005 Replacements and Upgrades Phase 1 \$3,576,991

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: 0.5 %

JUSTIFICATION:

Justification Criteria: Transmission Plant

Why do this project?

The transmission line inspection program identified deteriorated assets that require replacement to avoid transmission interruptions. Failure to complete this project would compromise the reliable operation of this line. Asset failures on this line would decrease system redundancy resulting in a reduction of corridor transfer capacity.

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 (May 2022), therefore the Final Cost Date (December 2023) is listed as six months after the final work is completed (June 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 : C0041805 - L7005 Replacements and Upgrades Phase 2

Project Number C0041805

Parent CI Number : -

Asset Location : 1455 - 1455 Transmission General

Budget Version 2022 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	3500 - TP - Wood Poles	1,753,839
Additions	3800 - TP - Insulators	133,281
Additions	3900 - TP - O/H Cond.	765,444
Retirements	3500 - TP - Wood Poles	449,690
Retirements	3800 - TP - Insulators	27,282
Retirements	3900 - TP - O/H Cond.	52,982
Total Cost:		3,182,518
Original Cost:		1,089,612

Capital Project Detailed Estimate

Location: Transmission CI#: C0041805 Title: L7005 Replacements and Upgrades Phase 2 Execution Year: 2022/2023						
Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#'s)
Regular Labour						
T&D Labour - Planning	PD	23	\$ 354	\$ 8,081		
T&D Labour - Site Supervision	PD	81	\$ 429	\$ 34,539		
			Sub-Total	\$ 42,620		
Materials						
Wood Poles	Lot	1	\$ 382,311	\$ 382,311		
Insulators	Lot	1	\$ 14,697	\$ 14,697		
O/H Conductors	Lot	1	\$ 21,238	\$ 21,238		
			Sub-Total	\$ 418,246		
Contracts						
Wood Poles	Lot	1	\$ 1,264,051	\$ 1,264,051		
Insulators	Lot	1	\$ 104,557	\$ 104,557		
O/H Cond.	Lot	1	\$ 575,469	\$ 575,469		
Survey and Mapping	Lot	1	\$ 20,000	\$ 20,000		
			Sub-Total	\$ 1,964,077		
Other Goods & Services						
Contingency	%	15%	\$ 2,424,943	\$ 363,741		
			Sub-Total	\$ 363,741		
Vehicle Overhead						
Vehicle AO				\$ 17,087		
			Sub-Total	\$ 17,087		
Administrative Overhead						
Labour AO				\$ 30,931		
Contract AO				\$ 345,815		
			Sub-Total	\$ 376,747		
SUB-TOTAL (no AO, AFUDC)					\$ 2,788,684	
TOTAL (AO, AFUDC included)					\$ 3,182,518	
Original Cost					\$ 1,089,612	
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.						

CI Number: C0041989

Title: 2022/2023 Sacrificial Anode Installation Program

Start Date: 2022/07
In-Service Date: 2022/07
Final Cost Date: 2024/06
Function Class: Transmission
Amount: \$3,015,107

DESCRIPTION:

This project will systematically install sacrificial anodes, highly active metals used for cathodic protection, on steel transmission structures and key tower anchors identified as corroding or at a high risk for corrosion. This program, along with the inspection of transmission steel towers and the steel tower refurbishment project, will identify and address corrosion issues on steel assets throughout the province.

Summary of Related CIs +/- 2 years:

Pursuant to Section 11.2 of the CEJC, related CIs for Transmission/Distribution include “Work completed on the same asset class (Padmount transformers, Breakers, etc.) or in the same location (feeder, Transmission Line).”

- 2019 CI C0010948 2019/2020 Sacrificial Anode Installation Program \$3,099,862
- 2024 CI TBD 2024/2025 Sacrificial Anode Installation Program \$TBD

Depreciation Class: Transmission Equipment – Towers and Fixtures

Estimated Useful Life: 15-20 years

JUSTIFICATION:

Justification Criteria: Transmission Plant

Why do this project?

Based on transmission line inspections, the age of NS Power infrastructure, and the corrosion rate of steel once galvanization is breached, a need for mitigation action on steel transmissions structures has been indicated. Sacrificial anodes, previously proven effective in other jurisdictions to protect steel transmission structure assets and slow the rate of corrosion, have been recommended as a corrosion solution by NS Power’s Transmission & Distribution engineering group.

Why do this project now?

Based on the age of NS Power’s steel transmission structure assets, the original galvanization is at, or near, the end of its anticipated life. Cathodic protection provided by the installation of sacrificial anodes will effectively extend the life of the steel structures where they are installed. Installation of sacrificial anodes is determined based on the assessment of the service environment and soil corrosivity. Prioritization of sacrificial anode installation on NS Power’s transmission lines is based primarily on age, line criticality, acid rock drainage risk, and soil conditions.

This project is deemed in-service when the first anode is installed (July 2022), therefore the Final Cost Date (June 2024) is listed as six months after the last anode is installed (December 2023).

Why do this project this way?

The installation of sacrificial anodes protects the existing assets once the original galvanization is ineffective, extending life and deferring costly replacement. Installing sacrificial anodes is the only technically feasible option to accomplish the intended scope of this project.

REDACTED (CONFIDENTIAL INFORMATION REMOVED)

2022 ACE Plan CI C0041989 Page 2 of 3

CI Number : C0041989

- 2022/2023 Sacrificial Anode Installation Program

Project Number C0041989

Parent CI Number :

-

Asset Location : 1455

- 1455 Transmission Plant General

Budget Version 2022 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	3700 - TP - Steel Towers	3,015,107
Total Cost:		3,015,107
Original Cost:		

Capital Project Detailed Estimate

Location: Transmission CI#: C0041989 Title: 2022/2023 Sacrificial Anode Installation Program Execution Year: 2022/2023						
Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#s)
Regular Labour						
T&D Labour - Site Supervision	PD	115	\$ 429	\$ 49,460		
Procurement/Financial Support	Lot	1	\$ 3,040	\$ 3,040		
			Sub-Total	\$ 52,500		
Materials						
Anodes & Test Stations	EA	929	\$ 155	\$ 144,000		
			Sub-Total	\$ 144,000		
Contracts						
Contract Line Work	Lot	1	\$ 2,000,000	\$ 2,000,000		
Contract Supervision	Lot	1	\$ 100,000	\$ 100,000		
			Sub-Total	\$ 2,100,000		
Consulting						
External Program Consulting	Lot	1	\$ 51,000	\$ 51,000		
			Sub-Total	\$ 51,000		
Meals & Entertainment						
Meals	Lot	1	\$ 3,600	\$ 3,600		
			Sub-Total	\$ 3,600		
Other Goods & Services						
Contingency	%	10%	\$ 2,351,100	\$ 235,110		
			Sub-Total	\$ 235,110		
Vehicle Overhead						
Vehicle AO				\$ 21,048		
			Sub-Total	\$ 21,048		
Administrative Overhead						
Labour AO				\$ 38,102		
Contract AO				\$ 369,747		
			Sub-Total	\$ 407,849		
SUB-TOTAL (no AO, AFUDC)				\$ 2,586,210		
TOTAL (AO, AFUDC included)				\$ 3,015,107		
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 guidelines which have been gained over many years. Risks are well understood based on past annual program experience.						

CI Number: C0041794

Title: L5031 Replacements and Upgrades Phase 2

Start Date: 2022/07
In-Service Date: 2022/07
Final Cost Date: 2024/03
Function Class: Transmission
Forecast Amount: \$2,905,019

DESCRIPTION:

L5031 is a 19.8 kilometre (146 Structures) 69kV transmission line, built in 1966, that connects 87W Hubbards and 84W Robinsons Corner substations. This project is required to replace deteriorated assets that have been identified through NS Power's transmission line inspection program. The second and final phase of this project includes the replacement of deteriorated assets on approximately 67 structures.

The project scope includes:

- Structure Replacements: 60 Structures
- X-Bracing Replacements: 5 Structures
- Insulator Replacements: 1 Structures
- Bond or Guy Wire Replacements: 1 Structures

Summary of Related CIs +/- 2 years:

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

- 2020 CI C0011321 L5031 Replacements and Upgrades Phase 1 \$2,147,212

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: 0.1%

JUSTIFICATION:

Justification Criteria: Transmission Plant

Why do this project?

The transmission line inspection program identified deteriorated assets that require replacement to avoid transmission interruptions. Not completing this project would compromise the reliable operation of this line. Asset failures on this line, a radial transmission feed to the 84W Robinsons Corner substation serving approximately 1,800 customers, could result in extended power outages.

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 (July 2022), therefore the Final Cost Date (March 2024) is listed as six months after the final work is completed (September 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 : C0041794

- L5031 Replacements and Upgrades Phase 2

Project Number

C0041794

Parent CI Number :

-

Asset Location : 1455

- 1455 Transmission General

Budget Version

2022 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	3500 - TP - Wood Poles	1,770,518
Additions	3800 - TP - Insulators	19,018
Additions	3900 - TP - O/H Cond.	903,145
Retirements	3500 - TP - Wood Poles	208,519
Retirements	3800 - TP - Insulators	3,821
Total Cost:		2,905,019
Original Cost:		331,639

Capital Project Detailed Estimate

Location: Transmission CI#: C0041794 Title: L5031 Replacements and Upgrades Phase 2 Execution Year: 2022/2023						
Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#'s)
Regular Labour						
T&D Labour - Planning	PD	12	\$ 354	\$ 4,235		
T&D Labour - Site Supervision	PD	76	\$ 429	\$ 32,554		
			Sub-Total	\$ 36,789		
Materials						
Wood Poles	Lot	1	\$ 210,798	\$ 210,798		
Insulators	Lot	1	\$ 959	\$ 959		
			Sub-Total	\$ 211,756		
Contracts						
Wood Poles	Lot	1	\$ 1,265,194	\$ 1,265,194		
Insulators	Lot	1	\$ 16,239	\$ 16,239		
O/H Conductor	Lot	1	\$ 662,464	\$ 662,464		
			Sub-Total	\$ 1,943,897		
Other Goods & Services						
Contingency	%	15%	\$ 2,192,442	\$ 328,866		
			Sub-Total	\$ 328,866		
Vehicle Overhead						
Vehicle AO				\$ 14,749		
			Sub-Total	\$ 14,749		
Administrative Overhead						
Labour AO				\$ 26,700		
Contract AO				\$ 342,262		
			Sub-Total	\$ 368,962		
SUB-TOTAL (no AO, AFUDC)				\$ 2,521,309		
TOTAL (AO, AFUDC included)				\$ 2,905,019		
Original Cost				\$ 331,639		
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.						

CI Number: C0041789

Title: L5550 Replacements and Upgrades Phase 2

Start Date: 2022/01
In-Service Date: 2022/01
Final Cost Date: 2024/01
Function Class: Transmission
Forecast Amount: \$2,698,515

DESCRIPTION:

L5550 is a 33.3 kilometre (157 structures) 69kV transmission line, built in 1976, that connects 30N Maccan and 37N Parrsboro substations. This project is required to replace deteriorated assets that have been identified through NS Power’s transmission line inspection program. This second and final phase of the project includes the replacement of deteriorated assets on approximately 76 structures.

The project scope includes:

- Structure Replacements: 29 Structures
- Timber and Insulator Replacements: 41 Structures
- Insulator Replacements: 6 Structures

Summary of Related CIs +/- 2 years:

Pursuant to Section 11.2 of the CEJC, related CIs for Transmission/Distribution include “Work completed on the same asset class (Padmount transformers, Breakers, etc.) or in the same location (feeder, Transmission Line).”

- 2020 CI C0021104 L5550 Replacements and Upgrades Phase 1 \$2,234,816

Depreciation Class: Transmission Plant – Poles 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 transmission line inspection program identified deteriorated assets that require replacement to avoid transmission interruptions. Not completing this project would compromise the reliable operation of this line. Unplanned asset failures on this line, a radial feed to 37N Parrsboro substation serving approximately 3,200 customers, would result in extended power outages.

Why do this project now?

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

This project is deemed in-service when the first portion of the work is complete (January 2022), therefore the Final Cost Date (January 2024) is listed as six months after the final work is completed (July 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 : C0041789 - L5550 Replacements and Upgrades Phase 2

Project Number C0041789

Parent CI Number : -

Asset Location : 1455 - 1455 Transmission General

Budget Version 2022 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	3500 - TP - Wood Poles	2,279,367
Additions	3800 - TP - Insulators	190,785
Retirements	3500 - TP - Wood Poles	179,992
Retirements	3800 - TP - Insulators	48,371
Total Cost:		2,698,515
Original Cost:		544,505

Capital Project Detailed Estimate

Location: Transmission CI#: C0041789 Title: L5550 Replacements and Upgrades Phase 2 Execution Year: 2022/2023						
Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#'s)
Regular Labour						
T&D Labour - Planning	PD	14	\$ 354	\$ 4,969		
T&D Labour - Site Supervision	PD	89	\$ 429	\$ 38,112		
			Sub-Total	\$ 43,081		
Materials						
Wood Poles	Lot	1	\$ 263,686	\$ 263,686		
Insulators	Lot	1	\$ 21,613	\$ 21,613		
			Sub-Total	\$ 285,299		
Contracts						
Wood Poles	Lot	1	\$ 1,531,616	\$ 1,531,616		
Insulators	Lot	1	\$ 156,974	\$ 156,974		
Survey and Mapping	Lot	1	\$ 25,000	\$ 25,000		
			Sub-Total	\$ 1,713,590		
Other Goods & Services						
Contingency	%	15%	\$ 2,041,970	\$ 306,296		
			Sub-Total	\$ 306,296		
Vehicle Overhead						
Vehicle T&D Labour Regular AO				\$ 17,271		
			Sub-Total	\$ 17,271		
Administrative Overhead						
Labour AO				\$ 31,266		
Contract AO				\$ 301,712		
			Sub-Total	\$ 332,978		
SUB-TOTAL (no AO, AFUDC)					\$ 2,348,266	
TOTAL (AO, AFUDC included)					\$ 2,698,515	
Original Cost					\$ 544,505	
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.						

CI Number: C0041796

Title: L6020 Replacements and Upgrades Phase 2

Start Date: 2022/05
In-Service Date: 2022/05
Final Cost Date: 2024/04
Function Class: Transmission
Forecast Amount: \$2,518,243

DESCRIPTION:

L6020 is a 58 kilometre (283 Structures) 138kV transmission line, built in 1963, that connects 50W Milton and 30W Souriquois substations. This project is required to replace deteriorated assets that have been identified through NS Power's transmission line inspection program. The second and final phase of this project includes the replacement of deteriorated assets on approximately 109 structures. This project will be completed over two years.

The project scope includes:

- Structure Replacements: 22 Structures
- Timber and Insulator Replacements: 77 Structures
- Insulator Replacements: 9 Structures
- Other Deteriorated Assets: 1 Structure

Summary of Related CIs +/- 2 years:

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

- 2021 CI C0031069 – L6020 Replacements and Upgrades \$1,825,300

Depreciation Class: Transmission Plant – Overhead Conductors and Devices
Transmission Plant – Poles 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: 0.1%

JUSTIFICATION:

Justification Criteria: Transmission Plant

Why do this project?

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

Why do this project now?

This work has been prioritized based 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 (May 2022), therefore the Final Cost Date (April 2024) is listed as six months after the last portion of work is completed (October 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 : C0041796

- L6020 Replacements and Upgrades Phase 2

Project Number C0041796

Parent CI Number :

-

Asset Location : 1455

- 1455 Transmission General

Budget Version 2022 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	3500 - TP - Wood Poles	1,105,258
Additions	3800 - TP - Insulators	379,983
Additions	3900 - TP - O/H Cond.	744,620
Retirements	3500 - TP - Wood Poles	182,353
Retirements	3800 - TP - Insulators	106,029
Total Cost:		2,518,243
Original Cost:		252,790

Capital Project Detailed Estimate

Location: Transmission CI#: C0041796 Title: L6020 Replacements and Upgrades Phase 2 Execution Year: 2022/2023						
Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#s)
Regular Labour						
T&D Labour - Planning	PD	13	\$ 354	\$ 4,443		
T&D Labour - Site Supervision	PD	66	\$ 429	\$ 28,187		
			Sub-Total	\$ 32,630		
Materials						
Wood Poles	Lot	1	\$ 187,323	\$ 187,323		
Insulators	Lot	1	\$ 34,823	\$ 34,823		
O/H Conductor	Lot	1	\$ 17	\$ 17		
			Sub-Total	\$ 222,162		
Contracts						
Wood Poles	Lot	1	\$ 770,354	\$ 770,354		
Insulators	Lot	1	\$ 331,271	\$ 331,271		
O/H Conductor	Lot	1	\$ 540,717	\$ 540,717		
Survey and Mapping	Lot	1	\$ 8,000	\$ 8,000		
			Sub-Total	\$ 1,650,342		
Other Goods & Services						
Contingency	%	15%	\$ 1,905,134	\$ 285,770		
			Sub-Total	\$ 285,770		
Vehicle Overhead						
Vehicle AO				\$ 13,082		
			Sub-Total	\$ 13,082		
Administrative Overhead						
Labour AO				\$ 23,681		
Contract AO				\$ 290,576		
			Sub-Total	\$ 314,257		
SUB-TOTAL (no AO, AFUDC) \$ 2,190,904						
TOTAL (AO, AFUDC included) \$ 2,518,243						
Original Cost				\$ 252,790		
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.						

CI Number: C0041810

Title: L5022 Replacements and Upgrades

Start Date: 2022/01
In-Service Date: 2022/01
Final Cost Date: 2023/12
Function Class: Transmission
Forecast Amount: \$2,172,200

DESCRIPTION:

L5022 is a 19.3 kilometre (122 Structures) 69kV transmission line, built in 1981, that connects 43V Canaan Road and 92V Michelin 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 approximately 101 structures. This project will be completed over two years.

The project scope includes:

- Structure Replacements: 7 Structures
- Timber and Insulator Replacements: 55 Structures
- Insulator Replacements: 38 Structures
- Other Deteriorated Assets: 1 Structures

Summary of Related CIs +/- 2 years:

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

- No other projects in 2020, 2021, 2022, 2023, or 2024

Depreciation Class: Transmission Plant – Poles 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: 0.3%

JUSTIFICATION:

Justification Criteria: Transmission Plant

Why do this project?

The transmission line inspection program identified deteriorated assets that require replacement to avoid transmission interruptions. Failure to complete this project would compromise the reliable operation of this line.

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 (January 2022), therefore the Final Cost Date (December 2023) is listed as six months after the final work is completed (June 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 : C0041810 - L5022 Replacements and Upgrades

Project Number C0041810

Parent CI Number : -

Asset Location : 1455 - 1455 Transmission General

Budget Version 2022 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	3500 - TP - Wood Poles	1,683,220
Additions	3800 - TP - Insulators	351,868
Retirements	3500 - TP - Wood Poles	73,336
Retirements	3800 - TP - Insulators	63,776
Total Cost:		2,172,200
Original Cost:		722,036

Capital Project Detailed Estimate

Location: Transmission											
CI#: C0041810											
Title: L5022 Replacements and Upgrades											
Execution Year: 2022/2023											
Description					Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#s)	
Regular Labour											
T&D Labour - Planning					PD	7	\$ 354	\$ 2,330			
T&D Labour - Site Supervision					PD	71	\$ 429	\$ 30,569			
							Sub-Total	\$ 32,899			
Materials											
Wood Poles					Lot	1	\$ 87,542	\$ 87,542			
Insulators					Lot	1	\$ 28,952	\$ 28,952			
							Sub-Total	\$ 116,494			
Contracts											
Wood Poles					Lot	1	\$ 1,191,043	\$ 1,191,043			
Insulators					Lot	1	\$ 279,522	\$ 279,522			
Survey and Mapping					Lot	1	\$ 10,000	\$ 10,000			
							Sub-Total	\$ 1,480,565			
Other Goods & Services											
Contingency					%	15%	\$ 1,629,958	\$ 244,494			
							Sub-Total	\$ 244,494			
Vehicle Overhead											
Vehicle AO								\$ 13,190			
							Sub-Total	\$ 13,190			
Administrative Overhead											
Labour AO								\$ 23,876			
Contract AO								\$ 260,683			
							Sub-Total	\$ 284,559			
SUB-TOTAL (no AO, AFUDC)								\$ 1,874,451			
TOTAL (AO, AFUDC included)								\$ 2,172,200			
Original Cost									\$ 722,036		
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.											

CI Number: C0041791

Title: L6551 Replacements and Upgrades

Start Date: 2022/06
In-Service Date: 2022/06
Final Cost Date: 2023/12
Function Class: Transmission
Forecast Amount: \$1,988,246

DESCRIPTION:

L6551 is a 12 kilometre (44 Structures) 138kV transmission line, built in 1960, that connects 30N Maccan to 92N Amherst Wind Farm 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 approximately 44 structures.

The project scope includes:

- Overhead Guy Wire Replacements: 44 structures

Summary of Related CIs +/- 2 years:

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

- No other projects in 2020, 2021, 2022, 2023, or 2024

Depreciation Class: Transmission Plant – Towers 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: 0.1%

JUSTIFICATION:

Justification Criteria: Transmission Plant

Why do this project?

The transmission line inspection program identified deteriorated assets that require replacement to avoid transmission interruptions. Failure to complete this project would compromise the reliable operation of this line.

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 (June 2022), therefore the Final Cost Date (December 2023) is listed as six months after the final work is completed (June 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.

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Project Number C0041791

-

Budget Version 2022 ACE Plan

Exp. Type	Utility Account	Forecast Amount
Additions	3700 - TP - Steel Towers	360,779
Additions	3900 - TP - O/H Cond.	1,130,404
Retirements	3900 - TP - O/H Cond.	497,063
Total Cost:		1,988,246
Original Cost:		161,745

Capital Project Detailed Estimate

Location: Transmission Cl#: C0041791 Title: L6551 Replacements and Upgrades Execution Year: 2022/2023						
Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#'s)
Regular Labour						
T&D Labour - Planning	PD	6	\$ 354	\$ 1,984		
T&D Labour - Site Supervision	PD	37	\$ 429	\$ 15,948		
			Sub-Total	\$ 17,932		
Materials						
O/H Conductors	Lot	1	\$ 99,191	\$ 99,191		
			Sub-Total	\$ 99,191		
Contracts						
Steel Towers	Lot	1	\$ 254,798	\$ 254,798		
O/H Conductors	Lot	1	\$ 1,121,796	\$ 1,121,796		
Survey and Mapping	Lot	1	\$ 5,951	\$ 5,951		
			Sub-Total	\$ 1,382,545		
Other Goods & Services						
Contingency	%	15%	\$ 1,499,668	\$ 224,950		
			Sub-Total	\$ 224,950		
Vehicle Overhead						
Vehicle AO				\$ 7,189		
			Sub-Total	\$ 7,189		
Administrative Overhead						
Labour AO				\$ 13,014		
Contract AO				\$ 243,425		
			Sub-Total	\$ 256,439		
				SUB-TOTAL (no AO, AFUDC)	\$ 1,724,618	
				TOTAL (AO, AFUDC included)	\$ 1,988,246	
				Original Cost	\$ 161,745	
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.						

CI Number: C0043571

Title: 2022/2023 Transmission Switch & Breaker Replacement

Start Date: 2022/01
In-Service Date: 2022/01
Final Cost Date: 2024/06
Function Class: Transmission
Forecast Amount: \$1,612,638

DESCRIPTION:

This project provides for the replacement of deteriorated substation circuit breakers and transmission disconnect switches on the NS Power transmission system. The project estimate includes the retirement and replacement of one 69 kV circuit breaker, three 138 kV circuit breakers, four 69 kV disconnect switches, and four 138 kV disconnect switches. The circuit breakers and switches being replaced have been prioritized based on the maintenance history, age, number of operations, electrical test results, design or manufacturing issues, inspection results, customers supplied, system redundancy, and safety and environmental issues.

NS Power anticipates that a portion of the capital costs associated with this capital item will contribute toward settling the Company's Asset Retirement Obligation for PCB contaminated oil.

Summary of Related CIs +/- 2 years:

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

- 2020 CI C0021122 2020/2021 Transmission Switch & Breaker Replacement \$1,312,643
- 2021 CI C0031262 2021/2022 Transmission Switch & Breaker Replacement \$1,483,048
- 2023 CI TBD 2023/2024 Transmission Switch & Breaker Replacement \$TBD
- 2024 CI TBD 2024/2025 Transmission Switch & Breaker Replacement \$TBD

Depreciation Class: Transmission Plant – Station Equipment

Estimated Useful Life: 40 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?

This project will replace deteriorated substation circuit breakers and transmission switches. Completing this project will mitigate the risk of transmission supply interruptions and enable the continued reliable operation of the transmission system for customers.

This project is being undertaken primarily to replace assets at the end of their expected useful life, and secondarily to reduce environmental risks by removing oil filled equipment.

Why do this project now?

The circuit breakers being replaced are, on average, 50 years old. The expected useful life of a circuit breaker is 40 years. Switches have an expected useful life of 40 years as well and the switches being evaluated for replacement are approaching or past this expected useful life.

This project is deemed in-service when the first disconnect switch or circuit breaker is replaced (January 2022), therefore the Final Cost Date (June 2024) is listed as six months after the last item is completed (December 2023).

Why do this project this way?

Replacement of the transmission breakers and switches is the only option. Due to the age of the devices, replacement parts are no longer available for the majority of the circuit breakers that are being replaced.

CI Number : C0043571 - 2022/2023 Transmission Switch & Breaker Replacement

Project Number C0043571

Parent CI Number : -

Asset Location : 1455 - 1455 Transmission General

Budget Version 2022 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	0300 - TP - Bldg.,Struct.Grnd.	260,958
Additions	2200 - TP - Elec Contr.Equip.	36,715
Additions	4300 - TP - Substn Dev.	1,253,496
Retirements	4300 - TP - Substn Dev.	61,469
Total Cost:		1,612,638
Original Cost:		228,525

Capital Project Detailed Estimate

Location: Transmission CI#: C0043571 Title: 2022/2023 Transmission Switch & Breaker Replacement Execution Year: 2022/2023						
Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#'s)
Regular Labour						
T&D Labour - Electrician/Technician	PD	429	\$ 359	\$ 153,858		
T&D Labour - Design	PD	197	\$ 426	\$ 83,966		
T&D Labour - Field Super. & Ops	PD	30	\$ 429	\$ 13,070		
T&D Labour - Commissioning	PD	117	\$ 359	\$ 41,958		
			Sub-Total	\$ 292,852		
Travel Expense						
Travel Expenses	Lot	1	\$ 777	\$ 777		
			Sub-Total	\$ 777		
Materials						
Buildings, Structures and Grounds	Lot	1	\$ 52,500	\$ 52,500		
Substation Devices	Lot	1	\$ 580,020	\$ 580,020		
Electrical Control Equip	Lot	1	\$ 18,900	\$ 18,900		
Design	Lot	1	\$ 2,100	\$ 2,100		
			Sub-Total	\$ 653,520		
Contracts						
Buildings, Structures and Grounds	Lot	1	105,000	\$ 105,000		
Substation Devices	Lot	1	70,287	\$ 70,287		
Field Super. & Ops	Lot	1	\$ 13,440	\$ 13,440		
			Sub-Total	\$ 188,727		
Other Goods & Services						
Contingency	%	10%	\$ 1,135,876	\$ 113,588		
			Sub-Total	\$ 113,588		
Vehicle Overhead						
Vehicle AO				\$ 117,407		
			Sub-Total	\$ 117,407		
Administrative Overhead						
Labour AO				\$ 212,537		
Contracts AO				\$ 33,229		
			Sub-Total	\$ 245,767		
				SUB-TOTAL (no AO, AFUDC)	\$ 1,249,464	
				TOTAL (AO, AFUDC included)	\$ 1,612,638	
				Original Cost	\$ 228,525	
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.						

CI Number: C0041790

Title: L8001 Replacements and Upgrades Phase 2

Start Date: 2022/05
In-Service Date: 2022/05
Final Cost Date: 2023/12
Function Class: Transmission
Forecast Amount: \$1,395,537

DESCRIPTION:

L8001 is a 95.7 kilometre (276 Structures) 345kV transmission line, built in 1976, that connects 67N Onslow EHV and 410N New Brunswick Power Memramcook Station 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 approximately 93 structures.

The project scope includes:

- Sign Replacements: 12 Structures
- Insulator Replacements: 81 Structures

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)."

- 2020 – CI C0021107 L8001 Replacement and Upgrades Phase 1 - \$2,292,093
- 2023 – CI TBD L8001 Replacement and Upgrades Phase 3 - \$TBD

Depreciation Class: Transmission Plant – Poles and Fixtures
Transmission Plant – Overhead Conductors and Devices
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 transmission line inspection program identified deteriorated assets that require replacement to avoid transmission interruptions. Failure to complete this project would compromise the reliable operation of this line. Asset failures on this line would decrease system redundancy.

Why do this project now?

This work has been prioritized based on 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 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 (May 2022), therefore the Final Cost Date (December 2023) is listed as six months after the final work is completed (June 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 : C0041790

- L8001 Replacements and Upgrades Phase 2

Project Number C0041790

Parent CI Number :

-

Asset Location : 1455

- 1455 Transmission General

Budget Version 2022 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	3500 - TP - Wood Poles	614,569
Additions	3700 - TP - Steel Towers	53,173
Additions	3800 - TP - Insulators	501,685
Additions	3900 - TP - O/H Cond.	108,452
Retirements	3700 - TP - Steel Towers	3,017
Retirements	3800 - TP - Insulators	114,640
Total Cost:		1,395,537
Original Cost:		281,688

Capital Project Detailed Estimate

Location: Transmission CI#: C0041790 Title: L8001 Replacements and Upgrades Phase 2 Execution Year: 2022/2023						
Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#'s)
Regular Labour						
T&D Labour - Planning	PD	5	\$ 354	\$ 1,642		
T&D Labour - Site Supervision	PD	49	\$ 429	\$ 21,041		
			Sub-Total	\$ 22,684		
Materials						
Wood Poles	Lot	1	\$ 1,536	\$ 1,536		
Steel Towers	Lot	1	\$ 1,673	\$ 1,673		
Insulators	Lot	1	\$ 69,692	\$ 69,692		
O/H Conductor	Lot	1	\$ 147	\$ 147		
			Sub-Total	\$ 73,048		
Contracts						
Wood Poles	Lot	1	\$ 442,407	\$ 442,407		
Insulators	Lot	1	\$ 390,187	\$ 390,187		
O/H Conductor	Lot	1	\$ 78,195	\$ 78,195		
Steel Towers	Lot	1	\$ 39,303	\$ 39,303		
			Sub-Total	\$ 950,093		
Other Goods & Services						
Contingency	%	15%	\$ 1,045,824	\$ 156,873		
			Sub-Total	\$ 156,873		
Vehicle Overhead						
Vehicle AO				\$ 9,094		
			Sub-Total	\$ 9,094		
Administrative Overhead						
Labour AO				\$ 16,463		
Contract AO				\$ 167,283		
			Sub-Total	\$ 183,745		
SUB-TOTAL (no AO, AFUDC)				\$ 1,202,697		
TOTAL (AO, AFUDC included)				\$ 1,395,537		
Original Cost				\$ 281,688		
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.						

CI Number: C0043010

Title: 2022/2023 Wood Pole Retreatment Program

Start Date: 2022/06
In-Service Date: 2022/06
Final Cost Date: 2024/06
Function Class: Transmission
Amount: \$1,300,037

DESCRIPTION:

This project provides for the retreatment of approximately 10,200 transmission poles in 2022 and 2023. This project is the fourth CI of a multi-year program that will continue beyond 2023.

NS Power carries out a pole retreatment program on transmission class poles. Wood poles originally treated with pentachlorophenol and creosote preservatives are retreated with wood preservatives to reinforce the preservative retention levels in the ground line area maintaining protection against fungal and insect damage.

Summary of Related CIs +/- 2 years:

Pursuant to Section 11.2 of the CEJC, related CIs for Transmission/Distribution include “Work completed on the same asset class (Padmount transformers, Breakers, etc.) or in the same location (feeder, Transmission Line).”

- 2020 – CI C0010955 2020/2021 Wood Pole Retreatment Program - \$1,410,561
- 2024 – CI TBD 2024/2025 Wood Pole Retreatment Program - \$TBD

Depreciation Class: Transmission Plant - Poles and Fixtures

Estimated Useful Life: 55 years

JUSTIFICATION:

Justification Criteria: Pole Retreatment

Why do this project?

This project is being completed in order to extend the expected life of 10,200 transmission poles from 35 years to 55 years, delaying the replacement of these poles by approximately 20 years.

Why do this project now?

This project should be completed now to contribute to the reliable operation of the transmission system.

This project is forecast to be in-service when the first pole is forecast to be completed (June 2022), therefore the Final Cost Date (June 2024) is listed as six months after the last pole is forecast to be completed (December 2023).

Why do this project this way?

Pole retreatment is a proven and accepted cost effective approach to extend the life of transmission poles. The average cost of a transmission pole installation is \$4,500 and a retreatment costs approximately \$109 per pole. Four retreatments (at 15, 25, 35 and 45 years of service) extend the expected life of the pole from 35 years to 55 years at a total cost of \$436 per pole (4 treatments at \$109 each). The average cost per year of service for a pole without retreatment is \$129 (\$4,500 / 35 years); with a retreatment program the average cost per year for the 20 additional years of service is \$22 (\$436 / 20 years). Ultimately this yields a combined annual cost per year of service of \$90 (\$4,936 / 55 years) for a pole subject to a retreatment program. Completing pole retreatment in this manner is a cost effective way to extend the life of treated wood poles and to defer the replacement of the pole by approximately 20 years.

CI Number : C0043010

- 2022/2023 Wood Pole Retreatment Program

Project Number C0043010

Parent CI Number :

-

Asset Location : 1455

- 1455 Transmission Plant General

Budget Version 2022 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	3500 - TP - Wood Poles	1,300,037
Total Cost:		1,300,037
Original Cost:		

Capital Project Detailed Estimate

Location: Transmission CI#: C0043010 Title: 2022/2023 Wood Pole Retreatment Program Execution Year: 2022/2023						
Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#s)
Regular Labour						
T&D Labour - Site Supervision	PD	113	\$ 385	\$ 43,505		
Procurement/Financial Support	Lot	1	\$ 5,000	\$ 5,000		
Sub-Total				\$ 48,505		
Travel Expense						
Travel - Site Supervision	Lot	1	p	#VALUE!		
Sub-Total				#VALUE!		
Contracts						
Pole Retreatment	EA	8164	\$ 109	\$ 889,876		
Pole Retreatment	EA	2041	\$ 20	\$ 40,820		
Sub-Total				\$ 930,696		
Meals & Entertainment						
Meals - Site Supervisor	Lot	1	\$ 2,000	\$ 2,000		
Sub-Total				\$ 2,000		
Other Goods & Services						
Contingency	%	10%	#VALUE!	#VALUE!		
Sub-Total				#VALUE!		
Vehicle Overhead						
Vehicle AO				\$ 19,446		
Sub-Total				\$ 19,446		
Administrative Overhead						
Labour AO				\$ 35,202		
Contracts AO				\$ 163,868		
Sub-Total				\$ 199,070		
SUB-TOTAL (no AO, AFUDC)				#VALUE!		
TOTAL (AO, AFUDC included)				#VALUE!		
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 guidelines which have been gained over many years. Risks are well understood based on past annual program experience.						

CI Number: C0041800

Title: L5537 Replacements and Upgrades

Start Date: 2022/01
In-Service Date: 2022/01
Final Cost Date: 2024/02
Function Class: Transmission
Forecast Amount: \$1,270,698

DESCRIPTION:

L5537 is a 3.4 kilometre (19 Structures) 69kV transmission line, built in 1971, that connects 9W Tusket, 10W Tusket Gas Turbine, and 102W Tusket Distribution 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 approximately 16 structures.

The project scope includes:

- Structure Replacements: 16 Structures

Summary of Related CIs +/- 2 years:

Pursuant to Section 11.2 of the CEJC, related CIs for Transmission/Distribution include “Work completed on the same asset class (Padmount transformers, Breakers, etc.) or in the same location (feeder, Transmission Line).”

- No other projects in 2020, 2021, 2022, 2023, or 2024

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: 0.1%

JUSTIFICATION:

Justification Criteria: Transmission Plant

Why do this project?

The transmission line inspection program identified deteriorated assets that require replacement to avoid transmission interruptions. Failure to complete this project would compromise the reliable operation of this transmission line. Unplanned asset failures on this line, a radial transmission feed to the 10W Tusket Gas Turbine site and 102W Tusket Distribution substation serving approximately 2,500 customers, would result in extended power outages.

Why do this project now?

This work has been prioritized based on 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 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 (January 2022), therefore the Final Cost Date (February 2024) is listed as six months after the final work is completed (August 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.

REDACTED (CONFIDENTIAL INFORMATION REMOVED)

2022 ACE Plan CI C0041800 Page 2 of 3

CI Number : C0041800

- L5537 Replacements and Upgrades

Project Number C0041800

Parent CI Number :

-

Asset Location : 1455

- 1455 Transmission General

Budget Version 2022 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	3500 - TP - Wood Poles	1,052,299
Additions	3900 - TP - O/H Cond.	116,407
Retirements	3500 - TP - Wood Poles	101,992
Total Cost:		1,270,698
Original Cost:		172,556

Capital Project Detailed Estimate

Location: Transmission CI#: C0041800 Title: L5537 Replacements and Upgrades Execution Year: 2022/2023						
Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#'s)
Regular Labour						
T&D Labour - Planning	PD	4	\$ 354	\$ 1,541		
T&D Labour - Site Supervision	PD	24	\$ 429	\$ 10,322		
			Sub-Total	\$ 11,863		
Materials						
Wood Poles	Lot	1	\$ 75,780	\$ 75,780		
O/H Conductor	Lot	1	\$ 1,270	\$ 1,270		
			Sub-Total	\$ 77,050		
Contracts						
Wood Poles	Lot	1	\$ 770,316	\$ 770,316		
O/H Conductor	Lot	1	\$ 82,733	\$ 82,733		
Survey and Mapping	Lot	1	\$ 5,000	\$ 5,000		
			Sub-Total	\$ 858,049		
Easements						
Permits	Lot	1	\$ 15,000	\$ 15,000		
			Sub-Total	\$ 15,000		
Other Goods & Services						
Contingency	%	15%	\$ 961,962	\$ 144,294		
			Sub-Total	\$ 144,294		
Vehicle Overhead						
Vehicle AO				\$ 4,756		
			Sub-Total	\$ 4,756		
Administrative Overhead						
Labour AO				\$ 8,610		
Contract AO				\$ 151,077		
			Sub-Total	\$ 159,686		
SUB-TOTAL (no AO, AFUDC)					\$ 1,106,256	
TOTAL (AO, AFUDC included)					\$ 1,270,698	
Original Cost					\$ 172,566	
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.						

CI Number: C0041804

Title: 2022 Line Retirement Program

Start Date: 2022/01
In-Service Date: 2022/01
Final Cost Date: 2023/12
Function Class: Transmission
Forecast Amount: \$1,242,178

DESCRIPTION:

This project includes the removal of poles, conductor and anchors from the following decommissioned transmission lines:

- L5504 is a former 3.5 km 69 kV transmission line from Port Hawkesbury to the retired Louisiana Pacific substation. This line has 32 structures that will be removed. Both the transmission line and substation were retired in 1993.
- The 4.2 km section of 69 kV transmission line L5513 to the retired Pleasant Harbour substation. This section of line has 140 structures that will be removed. Both the transmission line and substation were retired in 1993.
- A retired 4.7 km 69 kV transmission line that is located in the Pockwock watershed area. This section of line has 42 structures that will be removed.

These lines have been decommissioned for some time and now require removal to mitigate the risk of safety concerns from deteriorating assets.

Summary of Related CIs +/- 2 years:

Pursuant to Section 11.2 of the CEJC, related CIs for Transmission/Distribution include “Work completed on the same asset class (Padmount transformers, Breakers, etc.) or in the same location (feeder, Transmission Line).”

- 2020 CI 52317 2020 Line Retirement Program \$746,044

Retirement Information:

- Categorization of Retirement: Accounting Policy 6420 - Retirement and Disposal of Capital Assets
- Percentage of Asset Pool: 0.2%

JUSTIFICATION:

Justification Criteria: Health & Safety

Why do this project?

These assets are no longer maintained as they are no longer in service, and therefore they must be removed before they become a safety hazard.

Why do this project now?

These 69kV transmission lines are no longer required, and there have been no preventative maintenance investments in these assets since their retirements which means the assets are in a deteriorated state and must be removed before they become a safety hazard.

This project is deemed in-service when the first line is removed from service (January 2022), therefore the Final Cost Date (December 2023) is listed as six months after the last line is removed (June 2023).

Why do this project this way?

Removal of the lines detailed above mitigates the liability risk associated with de-energized and abandoned lines. There are no alternative methods for mitigating these risks.

CI Number : C0041804 - 2022 Line Retirement Program

Project Number C0041804

Parent CI Number : -

Asset Location : 1455 - 1455 Transmission General

Budget Version 2022 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Retirements	3500 - TP - Wood Poles	508,747
Retirements	3900 - TP - O/H Cond.	717,823
Retirements	4000 - TP - O/H Cond.Devices	15,608
Total Cost:		1,242,178
Original Cost:		314,869

Capital Project Detailed Estimate

Location: Transmission CI#: C0041804 Title: 2022 Line Retirement Program Execution Year: 2022/2023						
Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#'s)
Regular Labour						
T&D Labour - Site Supervision	PD	27	\$ 429	\$ 11,513		
			Sub-Total	\$ 11,513		
Contracts						
Wood Poles	Lot	1	\$ 375,555	\$ 375,555		
O/H Conductor	Lot	1	\$ 529,894	\$ 529,894		
O/H Conductor Devices	Lot	1	\$ 11,522	\$ 11,522		
			Sub-Total	\$ 916,971		
Other Goods & Services						
Contingency	%	15%	\$ 928,484	\$ 139,273		
			Sub-Total	\$ 139,273		
Vehicle Overhead						
Vehicle AO				\$ 4,616		
			Sub-Total	\$ 4,616		
Administrative Overhead						
Labour AO				\$ 8,356		
Contract AO				\$ 161,451		
			Sub-Total	\$ 169,807		
SUB-TOTAL (no AO, AFUDC)				\$ 1,067,756		
TOTAL (AO, AFUDC included)				\$ 1,242,178		
Original Cost				\$ 314,869		
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.						

CI Number: C0041892

Title: New Distribution Rights-of-Way Phase 7

Start Date: 2022/08
In-Service Date: 2022/08
Final Cost Date: 2024/03
Function Class: Distribution
Amount: \$9,854,291

DESCRIPTION

This project is to establish new rights-of-way for distribution feeders (where rights of way have not previously existed) on targeted circuits and where current vegetation management maintenance practices have limited impact on preventing off right-of-way tree contacts and their negative influence on reliable operation of NS Power's system. The new rights-of-way will primarily be established adjacent to the road right-of-way edge, where the majority of distribution feeders are currently located and bordered by vegetation.

The targeted circuits expected to be included in this project, subject to change based on feeder risk factors such as performance, criticality, and permissions are:

Feeder	Geographic Location	Kilometres of Treatment
1N-405	Truro	5
18V-412	Windsor	15
18V-413	Burlington	10
37N-411	Parrsboro	5
50W-412	Milton	20
57C-422	Guysborough	20
73W-411	Bridgewater	20
83V-303	New Minas	10
84W-301	Chester	10
88H-402	Upper Musquodoboit	10
1V-443	Vaughan	5
100C-421	Mulgrave	25
2C-402	Judique,	15
85S-401	Red River	15
67C-411	Smithville	10
22C-402	Marble Mountain	20
57S-401	Albert Bridge	10
24C-442	Guysborough	30
57C-426	Sherbrooke	20
62N-413	Thorburn	30
62N-416	Lansdowne Station	20
22N-403	Beckwith	5
4N-313	Tatamagouche	12

Summary of Related CIs +/- 2 years:

Pursuant to Section 11.2 of the CEJC, related CIs for Transmission/Distribution include “Work completed on the same asset class (Padmount transformers, Breakers, etc.) or in the same location (feeder, Transmission Line).”

- 2020 CI C0020623 New Distribution Rights-of-Way Phase 5 \$10,015,266
- 2021 CI C0031083 New Distribution Rights-of-Way Phase 6 \$9,762,735
- 2023 CI TBD New Distribution Rights-of-Way Phase 8 \$TBD
- 2024 CI TBD New Distribution Rights-of-Way Phase 9 \$TBD

Depreciation Class: Distribution Plant - Land Rights - Easements, Surveys and Clearing

JUSTIFICATION:

Justification Criteria: Distribution System

Sub Criteria: Outage Performance

Why do this project?

Tree contacts are the leading cause of outage impacts to customers, both during non-storm and storm events. Over the last five years (2016-2020), tree contacts have caused over 16,500 outage events, 1.9 million customer interruptions and 11.1 million customer hours of interruption, which represents 23 percent, 21 percent and 25 percent of these totals, respectively. Approximately 80 percent of these tree contacts are caused by fallen trees from outside of the right-of-way. The vegetation management practices performed under NS Power’s asset management program targets vegetation within the rights-of-way, maintaining existing rights-of-way. These activities prevent tree growth from causing outages from within the right-of-way, but do not address edge or off right-of-way trees. Establishing new rights-of-way will reduce the occurrence of edge of right-of-way tree contacts by increasing the separation between trees and distribution feeders.

Why do this project now?

During the Post-Tropical Storm Arthur Review (M06321), the Board’s consultant, The Liberty Consulting Group (Liberty) recommended NS Power accelerate the Distribution Right-of-Way sustainability efforts in order to achieve additional reliability benefits during major storm events. As set out in NS Power’s February 13, 2015 Stakeholder Consultation Report, there was general stakeholder support for accelerating the sustainability program.

A focus on removing trees within and along the edge of the NSTIR rights-of-way will result in more immediate improvements in reliability and require less reactive maintenance going forward. Proactive establishment of new distribution rights-of-way will further improve customer reliability during major and extreme weather events with respect to tree contacts.

This project is forecast to be in-service when the first right of way is created/widened (August 2022), therefore the Final Cost date (March 2024) is six months after the last new right of way is forecast to be established (September 2023).

Why do this project this way?

Liberty’s report on its review of NS Power’s response to Post-Tropical Storm Arthur included the recommendation that, for distribution rights-of-way, NS Power should “develop a comprehensive plan for reclaiming and/or widening the overgrown ROW corridors”.¹

The distribution vegetation management program will be carried-out under three broad initiatives:

- (1) Operating activities for distribution vegetation management
- (2) Capital Routine D010 - Distribution Right-of-Way Widening

¹ Review of Nova Scotia Power Inc.'s (NSPI) state of preparedness and response to Post-Tropical Storm Arthur, M06321, The Liberty Consulting Group, Comments on Review of NS Power's Storm Response, Exhibit A-4, September 9, 2014, page 7.

- (3) New Distribution Right-of-Ways individual capital projects (i.e. CI 49611, CI 50796, CI C0001950, CI C0010040, CI C0020623, CI C0031083 and CI C0041892)

Taken together, these initiatives will address the findings of the Post-Tropical Storm Arthur proceeding. The scope of work to be completed under this CI and subsequent phases is to establish new rights-of-way where none have previously existed. The new rights-of-way will primarily be established adjacent to the road right-of-way edge, where the majority of distribution feeders are currently located and bordered by vegetation.

REDACTED (CONFIDENTIAL INFORMATION REMOVED)

2022 ACE Plan CI C0041892 Page 4 of 5

CI Number : C0041892

- New Distribution Rights-of-Way Phase 7

Project Number C0041892

Parent CI Number :

-

Asset Location : 1456

- 1456 Distribution Plant General

Budget Version 2022 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	0200 - DP - Land Rights	9,854,291
Total Cost:		9,854,291
Original Cost:		

Capital Project Detailed Estimate

Location: Distribution CI#: C0041892 Title: New Distribution Rights-of-Way Phase 7 Execution Year: 2022-2023						
Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#'s)
Contracts						
1N-405	km	5	\$ 24,500	\$ 122,500		
18V-412	km	15	\$ 24,500	\$ 367,500		
18V-413	km	10	\$ 24,500	\$ 245,000		
37N-411	km	5	\$ 24,500	\$ 122,500		
50W-412	km	20	\$ 24,500	\$ 490,000		
57C-422	km	20	\$ 24,500	\$ 490,000		
73W-411	km	20	\$ 24,500	\$ 490,000		
83V-303	km	10	\$ 24,500	\$ 245,000		
84W-301	km	10	\$ 24,500	\$ 245,000		
88H-402	km	10	\$ 24,500	\$ 245,000		
1V-443	km	5	\$ 24,500	\$ 122,500		
100C-421	km	25	\$ 24,500	\$ 612,500		
2C-402	km	15	\$ 24,500	\$ 367,500		
85S-401	km	15	\$ 24,500	\$ 367,500		
67C-411	km	10	\$ 24,500	\$ 245,000		
22C-402	km	20	\$ 24,500	\$ 490,000		
57S-401	km	10	\$ 24,500	\$ 245,000		
24C-442	km	30	\$ 24,500	\$ 735,000		
57C-426	km	20	\$ 24,500	\$ 490,000		
62N-413	km	30	\$ 24,500	\$ 735,000		
62N-416	km	20	\$ 24,500	\$ 490,000		
22N-403	km	5	\$ 24,500	\$ 122,500		
4N-313	km	12	\$ 24,500	\$ 294,000		
			Sub-Total	\$ 8,379,000		
Administrative Overhead						
Contract AO				\$ 1,475,291		
			Sub-Total	\$ 1,475,291		
				SUB-TOTAL (no AO, AFUDC)	\$ 8,379,000	
				TOTAL (AO, AFUDC included)	\$ 9,854,291	
Original Cost				\$ -		
Note 1: Small differences in totals are attributable to rounding.						

CI Number: C0043130

Title: 2022 Padmount Replacement Program

Start Date: 2022/03
In-Service Date: 2022/03
Final Cost Date: 2023/08
Function Class: Distribution
Forecast Amount: \$1,807,359

DESCRIPTION:

This project will replace 70 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 Transmission/Distribution include "Work completed on the same asset class (Padmount transformers, Breakers, etc.) or in the same location (feeder, Transmission Line)."

- 2020 CI C0020835 2020 Padmount Replacement Program \$1,612,389
- 2021 CI C0031145 2021 Padmount Replacement Program \$1,636,153
- 2023 CI TBD 2023 Padmount Replacement Program \$TBD
- 2024 CI TBD 2024 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: 1.4%

JUSTIFICATION:

Justification Criteria: Distribution System

Why do this project?

Padmount transformer inspections have identified transformers that need to be replaced in 2022 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 aid in the prevention of environmental incidents, as padmount transformer failures can result in an oil release, which is prohibited by environmental regulations and results 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 (March 2022), therefore the Final Cost Date (August 2023) is listed as six months after the last transformer is completed (February 2023).

Why do this project this way?

Padmount transformers are typically associated with commercial customers. Planned replacement of end of expected useful life padmount transformers is conducted during an outage coordinated with the customer. The planned replacement of these transformers under this project will minimize unplanned customer outages and mitigate potential environmental impact.

REDACTED (CONFIDENTIAL INFORMATION REMOVED)

2022 ACE Plan CI C0043130 Page 3 of 4

CI Number : C0043130

- 2022 Padmount Replacement Program

Project Number C0043130

Parent CI Number :

-

Asset Location : 1456

- 1456 Distribution Plant General

Budget Version 2022 ACE Plan

Capital Item Accounts

Exp. Type	Utility Account	Forecast Amount
Additions	4600 - DP - U/G Conductor	102,869
Additions	4800 - DP - U/G Line Transf.	1,598,548
Retirements	4800 - DP - U/G Line Transf.	105,942
Total Cost:		1,807,359
Original Cost:		698,903

Capital Project Detailed Estimate

Location: Distribution CI#: C0043130 Title: 2022 Padmount Replacement Program Execution Year: 2022/2023						
Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#'s)
Regular Labour						
T&D Labour - Design	PD	173	\$ 426	\$ 73,824		
T&D Labour - PLT	PD	143	\$ 395	\$ 56,622		
			Sub-Total	\$ 130,445		
OT Labour						
T&D Labour - PLT	PD	154	\$ 734	\$ 113,243		
			Sub-Total	\$ 113,243		
Materials						
U/G Conductor	Lot	1	\$ 78,062	\$ 78,062		
U/G Line Transformer	Lot	1	\$ 1,005,104	\$ 1,005,104		
			Sub-Total	\$ 1,083,166		
Contracts						
U/G Line Transformer	Lot	1	\$ 107,408	\$ 107,408		
			Sub-Total	\$ 107,408		
Other Goods & Services						
Contingency	%	10%	\$ 1,434,262	\$ 143,426		
			Sub-Total	\$ 143,426		
Vehicle Overhead						
Vehicle AO				\$ 74,996		
			Sub-Total	\$ 74,996		
Administrative Overhead						
Labour AO				\$ 135,763		
Contract AO				\$ 18,911		
			Sub-Total	\$ 154,674		
				SUB-TOTAL (no AO, AFUDC)	\$ 1,577,689	
				TOTAL (AO, AFUDC included)	\$ 1,807,359	
				Original Cost	\$698,903	
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.						

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	
(3) = System Security	*Includes Description, PowerPlant (PP), Detailed Cost Estimate (DCE), and Economic Analysis Model (EAM).

Function/Tab	Capital Work Order	Work Order Main Body*	Attachment 1	Attachment 2	Attachment 3
Generation					
	Hydro Projects				
G01	C0036368 - HYD Lower Great Brook Switchgear Replacement				
G02	C0024484 - HYD Fourth Lake Switchgear Replacement	DCE (1)	CS: Vendor Proposal (1)		
	Steam Projects				
	Turbine				
G03	C0038747 - LIN1 L-0 Blade Replacement	DCE (1)	CS: Vendor Proposal (1)		
G04	C0041906 - PHB – 2022 Turbine Refurbishment				
	Generator				
G05	C0030529 - TUC3 Generator Refurbishment	DCE (1)	CS: Vendor Proposal (1)	CS: Vendor Proposal (1)	
	Gas Turbine				
G06	C0029693 - CT – VJ1 Generator Replacement	DCE (1)	CS: Vendor Quote (1)	CS: Vendor Quote (1)	CS: Vendor Quote (1)
G07	C0029691 - CT – VJ1 Control System Upgrade	DCE (1)	CS: Vendor Proposal (1)		
Transmission					
T01	C0041893 - 2022/2023 Transmission Right-of-Way Widening 69kV				
T02	C0041837 - 2022/2023 Substation Polychlorinated Biphenyl (PCB) Equipment Removal				
T03	C0041793 - L7002 Replacements and Upgrades Phase 2				
T04	C0041805 - L7005 Replacements and Upgrades Phase 2				
T05	C0041989 - 2022/2023 Sacrificial Anode Installation Program				
T06	C0041794 - L5031 Replacements and Upgrades Phase 2				
T07	C0041789 - L5550 Replacements and Upgrades Phase 2				
T08	C0041796 - L6020 Replacements and Upgrades Phase 2				
T09	C0041810 - L5022 Replacements and Upgrades				
T10	C0041791 - L6551 Replacements and Upgrades				
T11	C0043571 - 2022/2023 Transmission Switch & Breaker Replacement				
T12	C0041790 - L8001 Replacements and Upgrades Phase 2				
T13	C0043010 - 2022/2023 Wood Pole Retreatment Program				
T14	C0041800 - L5537 Replacements and Upgrades				
T15	C0041804 - 2022 Line Retirement Program				
Distribution					
D01	C0041892 - New Distribution Rights-of-Way Phase 7				
D02	C0043130 - 2022 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.

2022 ACE Plan Appendix B has been filed electronically.

NS Power 2021 Capital Spend

3rd Quarter Overview - as of September 30, 2021

	Generation	Distribution	Transmission	General Property	Total NS Power
2021 Submitted ACE Total	\$ 149,595,316	\$ 97,471,300	\$ 56,640,397	\$ 58,046,319	\$ 361,753,333
Total YTD Spend	104,800,983	86,205,671	37,250,786	33,158,511	261,415,951
Variance YTD/ACE Spend	(44,794,333)	(11,265,629)	(19,389,611)	(24,887,808)	(100,337,381)
Percentage of ACE Spent as of September 30, 2021	70%	88%	66%	57%	72%
Add:					
ATOs	1,670,781	-	-	(282,744)	1,388,037
U&Us/P&As	3,699	-	-	-	3,699
Changes to ACE Items for Subsequent Approval	(305,651)	(106,419)	-	2,993,549	2,581,479
Total Increase	1,368,829	(106,419)	-	2,710,805	3,973,216
Less:					
Projects cancelled	(917,854)	-	-	(1,002,202)	(1,920,056)
Projects deferred	(18,002,393)	(1,625,195)	-	(3,500,786)	(23,128,373)
Total Decrease	(18,920,247)	(1,625,195)	-	(4,502,987)	(25,048,429)
2021 Potential Capital Spend*	\$ 132,043,899	\$ 95,739,687	\$ 56,640,397	\$ 56,254,137	\$ 340,678,119

* Amounts do not reflect the reforecast of capital projects since the 2021 ACE Plan submission, or reforecasting of subsequent items filed.

NS Power Capital Item Status Update

2021 3rd Quarter Overview - Updated for 2022 ACE Plan

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
Pending Submission	Hydro	39472	HYD - Mersey Redevelopment Phase 1	2022 ACE Plan (for Subsequent Approval)		\$ 189,447,076		\$ 15,220,076			
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	\$ 264,764			
Pending Submission	Hydro	49634	HYD - Trout River Diversion Structure Replacement	2022 ACE Plan (for Subsequent Approval)		\$ 1,822,300		\$ 103,634			
Pending Submission	Distribution	C0008638	Cogswell HRM Redevelopment Program	2022 ACE Plan (for Subsequent Approval)		\$ 6,982,854		\$ 221,411			
Pending Submission	General Plant	C0011167	IT - Backup Infrastructure Upgrade	2022 ACE Plan (for Subsequent Approval)		\$ 1,004,879		\$ 3,467			
Pending Submission	Transmission	C0021140	New 138KV-25KV Substation - Stellarton	2022 ACE Plan (for Subsequent Approval)		\$ 4,047,925		\$ -			
Pending Submission	Transmission	C0022247	1N-Onslow 138 kV Add Second 42 MVA Power Transformer	2022 ACE Plan (for Subsequent Approval)		\$ 4,500,000		\$ 83,709			
Approved	Transmission	43267	13V Gulch Hydro Replace 13V-GT1 and 13V-VR1	2015 ACE Plan	2015 ACE Plan	\$ 1,061,902	\$ 1,061,902	\$ 1,011,936			
Approved	Transmission	52314	1C-GT1/UT1 Replacement	2018 ACE Plan	2018 ACE Plan	\$ 2,032,393	\$ 2,032,393	\$ 1,600,142			
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	\$ 2,197,905			
Approved	Transmission	49948	2017/2018 Isolated Structure Replacements	2017 ACE Plan	2017 ACE Plan	\$ 3,822,487	\$ 3,822,487	\$ 4,716,437			
Approved	Transmission	49838	2017/2018 Substation Polychlorinated Biphenyl (PCB) Equipment Removal Program	2017 ACE Plan	2017 ACE Plan	\$ 4,127,023	\$ 4,127,023	\$ 4,334,411			
Approved	Transmission	49818	2017/2018 Transmission Switch & Breaker Replacement	2017 ACE Plan	2017 ACE Plan	\$ 1,074,472	\$ 1,074,472	\$ 1,096,946			
Approved	Distribution	51493	2018 PCB Pole Top Transformer Replacement	2018 ACE Plan	2018 ACE Plan	\$ 1,360,354	\$ 1,360,354	\$ 1,383,203			
Approved	Transmission	51403	2018 PCB Removal Program	2018 ACE Plan	2018 ACE Plan	\$ 4,402,342	\$ 4,402,342	\$ 3,474,665			
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	\$ 2,033,829			
Approved	Transmission	51406	2018/2019 Transmission Switch & Breaker Replacement	2018 ACE Plan	2018 ACE Plan	\$ 1,405,891	\$ 1,405,891	\$ 1,098,194			
Approved	Distribution	47787	2H Armdale New Feeders	2017 ACE Plan (for Subsequent Approval)	OTQ - April 6, 2020	\$ 1,285,679	\$ 1,734,221	\$ 1,723,722			
Approved	Transmission	46811	2H Armdale Transformer Addition	2016 ACE Plan (For Subsequent Approval)	OTQ - June 30, 2016	\$ 2,545,596	\$ 2,566,861	\$ 2,816,043			
Approved	Transmission	48131	48H-T1 Replacement	2018 ACE Plan	2018 ACE Plan	\$ 1,281,449	\$ 1,281,449	\$ 1,520,559			
Approved	Transmission	52328	56N-T1 Transformer Upgrades	2018 ACE Plan	2018 ACE Plan	\$ 1,279,271	\$ 1,279,271	\$ 1,228,589			
Approved	Transmission	51975	5P Mobile Substation Replacement	2018 ACE Plan	2018 ACE Plan	\$ 4,829,458	\$ 4,829,458	\$ 1,378,199			
Deferred	Transmission	45053	69Kv Structure Replacements West	2017 ACE Plan (for Subsequent Approval)		\$ 4,818,017		\$ 225,494			
Approved	Transmission	51956	6P Mobile Substation Rewind U&U	U&U	Q3 2017 - October 30, 2017		\$ 1,516,121	\$ 1,004,858			
Approved	Distribution	47124	Advanced Metering Infrastructure	2017 ACE Plan (for Subsequent Approval)	OTQ - October 19, 2017	\$ 8,274,738	\$ 132,395,247	\$ 140,779,366			
Approved	Generation	51711	CT Burnside #2 Generator Replacement	P&A	OTQ - July 17, 2018		\$ 3,306,710	\$ 3,282,191			
Approved	Generation	51526	CT Tusket Generator Replacement	P&A	OTQ - July 17, 2018		\$ 3,810,417	\$ 3,888,637			
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	\$ 1,384,188			
Deferred	Generation	49942	HYD - Tidewater Facility Refurbishment	2018 ACE Plan	2018 ACE Plan	\$ 1,234,178	\$ 1,234,178	\$ 77,460			
Awaiting Approval	Generation	29807	HYD - Tusket Falls Main Dam	2017 ACE Plan (for Subsequent Approval)	OTQ - July 23, 2021	\$ 9,940,664	\$ 36,826,119	\$ 16,398,641			
Approved	Generation	51234	HYD - WRC HVAC Upgrade	2018 ACE Plan	2018 ACE Plan	\$ 1,876,537	\$ 1,876,537	\$ 1,059,229			
Approved	Generation	51235	HYD - WRC Main Access Rd Refurbishment	2018 ACE Plan	2018 ACE Plan	\$ 2,686,075	\$ 2,686,075	\$ 1,316,876			
Approved	Generation	48791	HYD - WRC Safety Standards Upgrades	2018 ACE Plan (for Subsequent Approval)	OTQ - June 4, 2018	\$ 1,019,928	\$ 1,760,570	\$ 1,738,086			
Approved	Generation	51236	HYD - WRC Tailrace Rock Bolting	2018 ACE Plan	2018 ACE Plan	\$ 8,861,996	\$ 8,861,996	\$ 8,015,525			
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	\$ 1,209,685			
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			
Approved	Distribution	49787	Intelligent Feeder Project	2017 ACE Plan (for Subsequent Approval)	OTQ - March 31, 2017	\$ 2,399,368	\$ 2,782,384	\$ 3,031,513			
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	General Plant	44671	IT - Enterprise Resource Plan (ERP)	2016 ACE Plan (for Subsequent Approval)	OTQ - November 10, 2016	\$ 9,891,170	\$ 89,664,000	\$ 88,156,596			
Approved	Transmission	47950	L5017 Replacements & Upgrades	2016 ACE Plan	Q1 2018 - May 7, 2018	\$ 2,182,142	\$ 3,062,664	\$ 2,962,591			
Approved	Transmission	47949	L-5028 Replacements and Upgrades	2016 ACE Plan	2016 ACE Plan	\$ 1,144,355	\$ 1,144,355	\$ 906,756			
Approved	Transmission	49790	L5505 Replacements and Upgrades	2017 ACE Plan	2017 ACE Plan	\$ 1,223,571	\$ 1,223,571	\$ 761,792			
Approved	Transmission	49778	L5535 Replacements and Upgrades	2017 ACE Plan	OTQ - April 16, 2018	\$ 1,261,920	\$ 2,590,269	\$ 2,333,136			
Approved	Transmission	49779	L6537 Replacements and Upgrades	2018 ACE Plan	OTQ - March 4, 2019	\$ 1,255,220	\$ 2,331,474	\$ 1,943,081			
Approved	Transmission	47914	L6537 Replacements and Upgrades	2016 ACE Plan	2016 ACE Plan	\$ 1,382,705	\$ 1,382,705	\$ 1,551,355			
Approved	Transmission	52320	L6549 2018 Replacements & Upgrades	2018 ACE Plan	2018 ACE Plan	\$ 1,406,535	\$ 1,406,535	\$ 1,454,552			
Approved	Transmission	44987	L7003 Lidar Upgrades	2015 ACE Plan (for Subsequent Approval)	OTQ - August 31, 2015	\$ 6,885,817	\$ 11,032,275	\$ 10,759,981			
Approved	Transmission	49793	L7011 Replacements and Upgrades	2017 ACE Plan	OTQ - April 1, 2019	\$ 3,343,484	\$ 4,810,276	\$ 4,593,152			
Approved	Transmission	47954	L7012 Replacements and Upgrades	2017 ACE Plan	2017 ACE Plan	\$ 4,428,520	\$ 4,428,520	\$ 4,396,365			
Approved	Generation	49940	LM6000 TUC5 Control System Upgrade	2017 ACE Plan (for Subsequent Approval)	OTQ - July 3, 2018	\$ 1,018,769	\$ 1,275,559	\$ 961,265			
Approved	Transmission	C0001900	Mount Hope 69-25kV Substation	2018 ACE Plan	2018 ACE Plan	\$ 2,982,338	\$ 2,982,338	\$ 1,467,610			
Approved	Transmission	48061	New Mobile Substation 7.5MVA	2016 ACE Plan (for Subsequent Approval)	OTQ - June 30, 2016	\$ 1,728,234	\$ 2,390,744	\$ 2,533,634			
Approved	Transmission	52323	Port Hastings 2C BPS Upgrade	P&A	Q2 - August 7, 2018		\$ 4,201,449	\$ 3,987,719			
Internally FIN'd	Generation	47611	POT - Demolish Unit 1 Stack	2016 ACE Plan	2016 ACE Plan	\$ 1,732,346	\$ 1,732,346	\$ -			
Approved	General Plant	43202	Replace Mobile Radio System	2017 ACE Plan (for Subsequent Approval)	Q4 2016 - January 31, 2017	\$ 6,537,700	\$ 6,296,878	\$ 6,499,458			
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	\$ 1,314,844			
Pending Submission	Transmission	43678	Separate L8004/L7005 on Canso Crossing Double Circuit Tower(DCT)	2017 ACE Plan (for Subsequent Approval)		\$ 16,183,691		\$ 20,385,511			
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			
Approved	Distribution	44749	Tiverton Tower Refurbishment	2017 ACE Plan (for Subsequent Approval)	Q1 2019 - May 6, 2019	\$ 1,058,200	\$ 1,954,524	\$ 2,181,673			
Partial Approval	Generation	44267	TRE Ash Lagoon Site Closure	2015 ACE Plan	OTQ - July 7, 2017 (partially approved)	\$ 7,994,849	\$ 8,993,879	\$ 7,747,093			
Approved	Generation	49534	TRE6 EHG/Turbine Controls Upgrade	2018 ACE Plan	2018 ACE Plan	\$ 2,725,344	\$ 2,725,344	\$ 1,229,506			
Approved	Generation	50518	HYD - Ruth Falls Main Dam Refurbishment	2019 ACE Plan	2019 ACE Plan	\$ 7,244,422	\$ 7,244,422	\$ 2,287,758			
Approved	Generation	C0002539	HYD - Bridge Remediation 2019	2019 ACE Plan	2019 ACE Plan	\$ 6,843,686	\$ 6,843,686	\$ 4,548,293			
Approved	Generation	46254	HYD - Mill Lake Surge Tank Replacement	2019 ACE Plan	2019 ACE Plan	\$ 3,598,193	\$ 3,598,193	\$ 3,413,057			
Internally FIN'd	Generation	C0004058	HYD - Tidewater 2 Overhaul	2019 ACE Plan	2019 ACE Plan	\$ 1,916,321	\$ 1,916,321	\$ 1,959,940			
Internally FIN'd	Generation	C0010957	HYD - Malay Falls Unit 6 Overhaul	2019 ACE Plan	2019 ACE Plan	\$ 1,273,280	\$ 1,273,280	\$ 1,117,203			
Approved	Generation	48638	TRE - Rail Car Fuel Delivery Upgrade	2019 ACE Plan	2019 ACE Plan	\$ 1,236,623	\$ 1,236,623	\$ 1,062,522			
Approved	Transmission	C0010042	2019 Transmission Right-of-Way Widening 69kV	2019 ACE Plan	2019 ACE Plan	\$ 5,650,794	\$ 5,650,794	\$ 5,626,852			
Approved	Transmission	C0010948	2019/2020 Sacrificial Anode Installation Program	2019 ACE Plan	2019 ACE Plan	\$ 3,099,862	\$ 3,099,862	\$ 1,356,377			

NS Power Capital Item Status Update

2021 3rd Quarter Overview - Updated for 2022 ACE Plan

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	C0010952	2019/2020 Substation Polychlorinated Biphenyl (PCB) Equipment Removal	2019 ACE Plan	2019 ACE Plan	\$ 2,786,245	\$ 2,786,245	\$ 2,576,925			
Approved	Transmission	C0010949	2019/2020 Steel Tower Life Extension	2019 ACE Plan	2019 ACE Plan	\$ 2,414,140	\$ 2,414,140	\$ 2,023,150			
Approved	Transmission	C0011339	L6549 - Replacements and Upgrades Phase 2	2019 ACE Plan	2019 ACE Plan	\$ 2,209,907	\$ 2,209,907	\$ 1,620,119			
Approved	Transmission	C0010950	2019/2020 Steel Tower Refurbishment	2019 ACE Plan	2019 ACE Plan	\$ 2,009,268	\$ 2,009,268	\$ 2,046,281			
Approved	Transmission	C0011338	L5548 - Replacements and Upgrades	2019 ACE Plan	2019 ACE Plan	\$ 1,699,381	\$ 1,699,381	\$ 1,803,110			
Approved	Transmission	C0011242	L5541 - Replacements and Upgrades	2019 ACE Plan	2019 ACE Plan	\$ 1,624,850	\$ 1,624,850	\$ 1,826,161			
Approved	Transmission	C0011241	L5026 - Replacements and Upgrades	2019 ACE Plan	2019 ACE Plan	\$ 1,498,789	\$ 1,498,789	\$ 1,374,856			
Approved	Transmission	C0011300	L7005 - Replacements and Upgrades	2019 ACE Plan	2019 ACE Plan	\$ 1,346,026	\$ 1,346,026	\$ 1,591,255			
Approved	Transmission	C0011240	L5511 - Replacements and Upgrades	2019 ACE Plan	2019 ACE Plan	\$ 1,255,087	\$ 1,255,087	\$ 1,485,116			
Approved	Transmission	C0010978	2019/2020 Transmission Switch & Breaker Replacement	2019 ACE Plan	2019 ACE Plan	\$ 1,044,148	\$ 1,044,148	\$ 942,313			
Approved	Transmission	C0011243	L5551 - Replacements and Upgrades	2019 ACE Plan	2019 ACE Plan	\$ 1,014,077	\$ 1,014,077	\$ 944,568			
Approved	Distribution	C0011208	2019 Padmount Replacement Program	2019 ACE Plan	2019 ACE Plan	\$ 1,413,544	\$ 1,413,544	\$ 1,450,201			
Approved	Distribution	C0011209	855-401 - Cabot Trail Rebuild	2019 ACE Plan	2019 ACE Plan	\$ 1,305,919	\$ 1,305,919	\$ 1,537,845			
Approved	Distribution	C0006319	2019 PCB Pole Top Transformer Replacements	2019 ACE Plan	2019 ACE Plan	\$ 1,177,592	\$ 1,177,592	\$ 303,195			
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	\$ 8,097,908			
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	\$ 17,294,591			
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	\$ 225,529			
Approved	General Plant	C0011378	Route Network Upgrades	2020 ACE Plan (2019 Pending Submission)	OTQ - December 2, 2019	\$ 5,724,240	\$ 5,717,752	\$ 1,911,503			
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	\$ 4,046,129			
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	\$ 4,668,167			
Approved	General Plant	C0010838	MCC - HVAC Replacement	2019 ACE Plan (for Subsequent Approval)	OTQ - October 4, 2021	\$ 1,071,364	\$ 1,606,254	\$ 54,594			
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	\$ 297,159			
Approved	Distribution	C0018059	58C-403 Rebuild Hwy 19 South West Margaree	P&A	Q1 2019 - May 6, 2019		\$ 1,127,220	\$ 1,245,874			
Internally FIN'd	Steam	C0013578	TRE Circulating Water Fish Barrier	U&U	OTQ - June 3, 2019		\$ 1,454,175	\$ 1,350,339			
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	\$ 1,064,896			
Approved	General Plant	C0020338	AMO Meridium Upgrade for Power Production	P&A	Q3 - November 4, 2019	\$ -	\$ 1,571,516	\$ 1,611,249			
Approved	Transmission	C0021105	L7002 Replacements and Upgrades Phase 2	P&A	Q3 - November 4, 2019	\$ -	\$ 3,121,442	\$ 749,135			
Approved	Hydro	C0006358	HYD - Lake Mulgrave Dam Refurbishments	2020 ACE Plan	2020 ACE Plan	\$ 5,853,650	\$ 5,853,650	\$ 5,755,542			
Approved	Distribution	C0020623	New Distribution Rights-of-Way Phase 5	2020 ACE Plan	2020 ACE Plan	\$ 10,015,266	\$ 10,015,266	\$ 9,931,134			
Approved	Transmission	C0020627	2020 Transmission Right-of-Way Widening 69kV	2020 ACE Plan	2020 ACE Plan	\$ 5,489,820	\$ 5,489,820	\$ 5,584,036			
Approved	Transmission	52285	L5524 Replacements and Upgrades	2020 ACE Plan	2020 ACE Plan	\$ 2,161,314	\$ 2,161,314	\$ 2,178,914			
Approved	Hydro	C0012878	HYD - Weymouth Falls Unit 1 Generator Refurbishment	2020 ACE Plan	2020 ACE Plan	\$ 2,264,326	\$ 2,264,326	\$ 2,150,660			
Approved	Transmission	C0011261	101W Port Mersey Substation Expansion	2020 ACE Plan	2020 ACE Plan	\$ 4,651,384	\$ 4,651,384	\$ 463,697			
Approved	Transmission	C0021123	2020/2021 Substation Polychlorinated Biphenyl (PCB) Equipment Removal	2020 ACE Plan	2020 ACE Plan	\$ 5,197,372	\$ 5,197,372	\$ 5,169,424			
Approved	Transmission	C0021106	L7005 Replacements and Upgrades Phase 1	2020 ACE Plan	2020 ACE Plan	\$ 3,576,991	\$ 3,576,991	\$ 2,526,366			
Approved	Transmission	C0021102	L5029 Replacements and Upgrades	2020 ACE Plan	2020 ACE Plan	\$ 6,206,677	\$ 6,206,677	\$ -			
Approved	Gas Turbine	49949	LM6000 TUC4 Control System Replacement	2020 ACE Plan	2020 ACE Plan	\$ 1,149,996	\$ 1,149,996	\$ 839,038			
Approved	Transmission	C0021130	48H Metalclad Switchgear Replacement	2020 ACE Plan	2020 ACE Plan	\$ 1,210,706	\$ 1,210,706	\$ 1,307,407			
Approved	Transmission	C0011321	L5031 Replacements and Upgrades Phase 1	2020 ACE Plan	2020 ACE Plan	\$ 2,147,212	\$ 2,147,212	\$ 111,589			
Approved	Transmission	C0021104	L5550 Replacements and Upgrades Phase 1	2020 ACE Plan	2020 ACE Plan	\$ 2,234,816	\$ 2,234,816	\$ 1,753,540			
Approved	Transmission	C0021107	L8001 Replacements and Upgrades Phase 1	2020 ACE Plan	2020 ACE Plan	\$ 2,292,093	\$ 2,292,093	\$ 473,019			
Approved	Distribution	C0020835	2020 Padmount Replacement Program	2020 ACE Plan	2020 ACE Plan	\$ 1,612,389	\$ 1,612,389	\$ 1,523,050			
Approved	Transmission	C0021122	2020/2021 Transmission Switch & Breaker Replacement	2020 ACE Plan	2020 ACE Plan	\$ 1,312,643	\$ 1,312,643	\$ 1,227,627			
Approved	Transmission	C0010955	2020/2021 Wood Pole Retirement Program	2020 ACE Plan	2020 ACE Plan	\$ 1,410,561	\$ 1,410,561	\$ 495,840			
Approved	Distribution	C0020834	2020/2021 Inaccessible PCB Transformer Replacements	2020 ACE Plan	2020 ACE Plan	\$ 2,950,294	\$ 2,950,294	\$ 552,584			
Approved	General Plant	C0021109	New RTU Deployment Project	2020 ACE Plan	2020 ACE Plan	\$ 8,028,097	\$ 8,028,097	\$ 442,617			
Approved	Transmission	52303	L7019 Replacements and Upgrades	2020 ACE Plan	2020 ACE Plan	\$ 1,374,092	\$ 1,374,092	\$ 1,009,410			
Approved	Transmission	C0021323	Trenton 50N-T13 Replacement	2020 ACE Plan	2020 ACE Plan	\$ 1,516,880	\$ 1,516,880	\$ 1,092,435			
Approved	Transmission	C0021026	Willow Lane 15N-T3 Replacement	2020 ACE Plan	2020 ACE Plan	\$ 1,326,647	\$ 1,326,647	\$ 279,935			
Approved	Steam	C0021584	TUC3 Turbine Valves Refurbishments	2020 ACE Plan	2020 ACE Plan	\$ 1,041,020	\$ 1,041,020	\$ 200,853			
Approved	Hydro	49756	HYD - Marshall Falls Main Dam Refurbishment	2020 ACE Plan	2020 ACE Plan	\$ 5,452,794	\$ 5,452,794	\$ 449,678			
Approved	Transmission	C0021142	19W-T51 Transformer Replacement	2020 ACE Plan	2020 ACE Plan	\$ 1,512,336	\$ 1,512,336	\$ 351,705			
Approved	Distribution	C0021182	93V-313-Meteghan Rebuild	2020 ACE Plan	2020 ACE Plan	\$ 1,075,625	\$ 1,075,625	\$ 912,949			
Pending Submission	General Plant	46075	IT - T&D WAM Phase 2 – Work Management and Scheduling & Dispatch	2022 ACE Plan (2021 Pending Submission)		\$ 55,899,483		\$ 10,160,019			
Approved	Distribution	C0010778	Smart Grid Nova Scotia Project	2020 ACE Plan (for Subsequent Approval)	OTQ - December 5, 2019	\$ 6,740,589	\$ 7,053,622	\$ 4,892,220			
Approved	General Plant	C0010019	IT - ADMS Upgrade	2020 ACE Plan (for Subsequent Approval)	OTQ - March 2, 2020	\$ 8,962,442	\$ 9,626,891	\$ 9,859,132			
Approved	General Plant	C0021826	IT - Enterprise Data Lake	2021 ACE Plan (2020 Pending Submission)	OTQ - December 7, 2020	\$ 1,260,147	\$ 1,260,147	\$ 1,556,900			
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	\$ 758,800			
Approved	Steam	C0020385	LIN Heavy Oil Tank Refurbishment	2020 ACE Plan (for Subsequent Approval)	OTQ - January 28, 2021	\$ 1,162,325	\$ 3,396,731	\$ 158,547			
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	\$ 1,239,717			
Deferred	Transmission	C0010956	78W Substation Relocation and New Power Transformer	2020 ACE Plan (for Subsequent Approval)		\$ 2,542,645		\$ 59,674			
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	\$ 14,202,564			
Approved	General Plant	C0023623	AMO Distribution APM Program	2020 ACE Plan (for Subsequent Approval)	OTQ - April 6, 2020	\$ 1,708,240	\$ 1,721,484	\$ 668,984			
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	\$ 1,200,112			
Approved	Gas Turbine	C0018880	VJ2 Engine Refurbishment	P&A	OTQ - May 25, 2021		\$ 2,146,629	\$ 2,146,677			
Approved	Transmission	C0024486	2S-T1 Transformer Replacement	U&U	Q1 2020 - May 4, 2020		\$ 2,648,403	\$ 2,694,638			
Approved	Hydro	16374	HYD Gaspereau Dam Safety	2008 ACE Plan	OTQ - February 23, 2020	\$ 4,354,889	\$ 22,703,451	\$ 11,096,631			
Approved	General Plant	C0017098	Ragged Lake Generator Replacement	P&A	Q2 2020 - August 4, 2020		\$ 2,229,267	\$ 250,515			
Approved	Distribution	C0031083	New Distribution Rights-of-Way Phase 6	2021 ACE Plan	2021 ACE Plan	\$ 9,762,735	\$ 9,762,735	\$ 3,894,464			
Approved	Transmission	C0031263	2021/2022 Substation Polychlorinated Biphenyl (PCB) Equipment Removal	2021 ACE Plan	2021 ACE Plan	\$ 7,512,226	\$ 7,512,226	\$ 940,924			
Approved	Gas Turbine	C0020944	LM6000 - 191-443 Hot Section Engine Refurbishment	2021 ACE Plan	2021 ACE Plan	\$ 5,749,282	\$ 5,749,282	\$ 1,882,148			
Approved	Transmission	C0031089	2021/2022 Transmission Right-of-Way Widening 69kV	2021 ACE Plan	2021 ACE Plan	\$ 5,288,520	\$ 5,288,520	\$ 842,016			
Approved	General Plant	49094	IT - Privilege Access Management (PAM)	2021 ACE Plan	2021 ACE Plan	\$ 3,211,166	\$ 3,211,166	\$ 426,655			
Approved	Transmission	C0031122	L6539 Replacements and Upgrades	2021 ACE Plan	2021 ACE Plan	\$ 2,821,842	\$ 2,821,842	\$ 1,130			

NS Power Capital Item Status Update

2021 3rd Quarter Overview - Updated for 2022 ACE Plan

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	C0031085	L6516 Line Replacement and Upgrades	2021 ACE Plan	2021 ACE Plan	\$ 2,730,592	\$ 2,730,592	\$ -			
Approved	Steam	C0030528	TUC3 HP Turbine Refurbishment	2021 ACE Plan	2021 ACE Plan	\$ 2,085,094	\$ 2,085,094	\$ 436,073			
Approved	Transmission	C0031050	New Spare Large Autotransformer	2021 ACE Plan	2021 ACE Plan	\$ 2,398,564	\$ 2,398,564	\$ -			
Approved	Transmission	C0033644	2021/2022 Steel Tower Life Extension	2021 ACE Plan	2021 ACE Plan	\$ 2,332,746	\$ 2,332,746	\$ 16,728			
Approved	Transmission	C0033645	2021/2022 Steel Tower Refurbishment	2021 ACE Plan	2021 ACE Plan	\$ 1,944,005	\$ 1,944,005	\$ 430,267			
Approved	Transmission	C0031069	L6020 Replacements and Upgrades	2021 ACE Plan	2021 ACE Plan	\$ 1,825,300	\$ 1,825,300	\$ 1,410,023			
Approved	Distribution	C0031145	2021 Padmount Replacement Program	2021 ACE Plan	2021 ACE Plan	\$ 1,636,153	\$ 1,636,153	\$ 523,211			
Approved	Transmission	C0031262	2020/2021 Transmission Switch and Breaker Replacement	2021 ACE Plan	2021 ACE Plan	\$ 1,483,048	\$ 1,483,048	\$ 277,845			
Approved	Transmission	C0031064	L5054 Replacements and Upgrades	2021 ACE Plan	2021 ACE Plan	\$ 1,134,737	\$ 1,134,737	\$ -			
Approved	Gas Turbine	46483	CT - TUS Control System Upgrade	2021 ACE Plan	2021 ACE Plan	\$ 1,046,322	\$ 1,046,322	\$ 345,257			
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	\$ 4,349,901			
Deferred	Hydro	48913	HYD - Tuskett Facility Refurbishment	2021 ACE Plan (for Subsequent Approval)		\$ 2,544,240		\$ 100,336			
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	\$ 1,131,278			
Pending Submission	General Plant	C0030987	IT - NERC CIP Environment Refresh	2022 ACE Plan (2021 Pending Submission)		\$ 1,318,786		\$ 84,404			
Awaiting Approval	Hydro	49944	HYD Dickie Brook Penstock Repair	2018 ACE Plan	Q3 - November 1, 2021	\$ 478,820	\$ 1,286,390	\$ 808,164			
Awaiting Approval	Distribution	C0041892	New Distribution Rights-of-Way Phase 7	2022 ACE Plan	2022 ACE Plan	\$ 9,854,291	\$ 9,854,291	\$ -			
Awaiting Approval	Steam	C0038747	LIN1 L-O Blade Replacement	2022 ACE Plan	2022 ACE Plan	\$ 6,066,800	\$ 6,066,800	\$ -			
Awaiting Approval	Gas Turbine	C0029693	CT - VJ1 Generator Replacement	2022 ACE Plan	2022 ACE Plan	\$ 5,942,640	\$ 5,942,640	\$ 367,464			
Awaiting Approval	Transmission	C0041893	2022/2023 Transmission Right-of-Way Widening 69kV	2022 ACE Plan	2022 ACE Plan	\$ 5,312,315	\$ 5,312,315	\$ -			
Awaiting Approval	Transmission	C0041837	2022/2023 Substation Polychlorinated Biphenyl (PCB) Equipment Removal	2022 ACE Plan	2022 ACE Plan	\$ 3,805,434	\$ 3,805,434	\$ -			
Awaiting Approval	Steam	C0041906	PHB – 2022 Turbine Refurbishment	2022 ACE Plan	2022 ACE Plan	\$ 3,729,597	\$ 3,729,597	\$ -			
Awaiting Approval	Transmission	C0041793	L7002 Replacements and Upgrades Phase 2	2022 ACE Plan	2022 ACE Plan	\$ 3,640,960	\$ 3,640,960	\$ -			
Awaiting Approval	Transmission	C0041805	L7005 Replacements and Upgrades Phase 2	2022 ACE Plan	2022 ACE Plan	\$ 3,182,518	\$ 3,182,518	\$ -			
Awaiting Approval	Transmission	C0041989	2022/2023 Sacrificial Anode Installation Program	2022 ACE Plan	2022 ACE Plan	\$ 3,015,107	\$ 3,015,107	\$ -			
Awaiting Approval	Transmission	C0041794	L5031 Replacements and Upgrades Phase 2	2022 ACE Plan	2022 ACE Plan	\$ 2,905,019	\$ 2,905,019	\$ -			
Awaiting Approval	Transmission	C0041789	L5550 Replacements and Upgrades Phase 2	2022 ACE Plan	2022 ACE Plan	\$ 2,698,515	\$ 2,698,515	\$ -			
Awaiting Approval	Transmission	C0041796	L6020 Replacements and Upgrades Phase 2	2022 ACE Plan	2022 ACE Plan	\$ 2,518,243	\$ 2,518,243	\$ -			
Awaiting Approval	Transmission	C0041810	L5022 Replacements and Upgrades	2022 ACE Plan	2022 ACE Plan	\$ 2,172,200	\$ 2,172,200	\$ -			
Awaiting Approval	Transmission	C0041791	L6551 Replacements and Upgrades	2022 ACE Plan	2022 ACE Plan	\$ 1,988,246	\$ 1,988,246	\$ -			
Awaiting Approval	Distribution	C0043130	2022 Padmount Replacement Program	2022 ACE Plan	2022 ACE Plan	\$ 1,807,359	\$ 1,807,359	\$ -			
Awaiting Approval	Steam	C0030529	TUC3 Generator Refurbishment	2022 ACE Plan	2022 ACE Plan	\$ 1,629,926	\$ 1,629,926	\$ 472			
Awaiting Approval	Transmission	C0043571	2022/2023 Transmission Switch & Breaker Replacement	2022 ACE Plan	2022 ACE Plan	\$ 1,612,638	\$ 1,612,638	\$ -			
Awaiting Approval	Transmission	C0041790	L8001 Replacements and Upgrades Phase 2	2022 ACE Plan	2022 ACE Plan	\$ 1,395,537	\$ 1,395,537	\$ -			
Awaiting Approval	Hydro	C0036368	HYD - Lower Great Brook Switchgear Replacement	2022 ACE Plan	2022 ACE Plan	\$ 1,362,281	\$ 1,362,281	\$ 111,302			
Awaiting Approval	Transmission	C0043010	2022/2023 Wood Pole Retirement Program	2022 ACE Plan	2022 ACE Plan	\$ 1,300,037	\$ 1,300,037	\$ -			
Awaiting Approval	Transmission	C0041800	L5537 Replacements and Upgrades	2022 ACE Plan	2022 ACE Plan	\$ 1,270,698	\$ 1,270,698	\$ -			
Awaiting Approval	Transmission	C0041804	2022 Line Retirement Program	2022 ACE Plan	2022 ACE Plan	\$ 1,242,178	\$ 1,242,178	\$ -			
Awaiting Approval	Hydro	C0024484	HYD - Fourth Lake Switchgear Replacement	2022 ACE Plan	2022 ACE Plan	\$ 1,145,245	\$ 1,145,245	\$ 93,801			
Awaiting Approval	Gas Turbine	C0029691	CT - VJ1 Control System Upgrade	2022 ACE Plan	2022 ACE Plan	\$ 1,016,225	\$ 1,016,225	\$ 105,934			
Pending Submission	Transmission	C0044391	Eastern Clean Energy Initiative (ECEI) - Transmission	2022 ACE Plan (for Subsequent Approval)		\$ 351,898,909		\$ -			
Pending Submission	Transmission	C0045132	Eastern Clean Energy Initiative (ECEI) - Energy Storage	2022 ACE Plan (for Subsequent Approval)		\$ 171,207,920		\$ -			
Pending Submission	Wind	C0044771	Eastern Clean Energy Initiative (ECEI) - Wind	2022 ACE Plan (for Subsequent Approval)		\$ 83,280,972		\$ -			
Pending Submission	Hydro	C0015798	WRC Tunnel T-2 Remediation	2022 ACE Plan (for Subsequent Approval)		\$ 43,775,454		\$ 1,632,646			
Pending Submission	Steam	C0044392	Eastern Clean Energy Initiative (ECEI) - Coal Conversion	2022 ACE Plan (for Subsequent Approval)		\$ 32,341,325		\$ -			
Pending Submission	Hydro	C0034486	HYD - WRC LEM Penstock intake	2022 ACE Plan (for Subsequent Approval)		\$ 11,239,851		\$ 1,012,155			
Pending Submission	Transmission	C0032382	Susie Lake Substation Addition	2022 ACE Plan (for Subsequent Approval)		\$ 6,225,600		\$ 41,230			
Pending Submission	Hydro	C0012838	HYD - Lequille Canal Dyke, Gates and Tailrace Refurbishment	2022 ACE Plan (for Subsequent Approval)		\$ 6,123,004		\$ 444,545			
Pending Submission	General Plant	C0032202	Sydney T&D Depot Consolidation	2022 ACE Plan (for Subsequent Approval)		\$ 2,815,000		\$ -			
Pending Submission	Hydro	C0000979	HYD - Governor Dam Refurbishment	2022 ACE Plan (for Subsequent Approval)		\$ 2,696,630		\$ 325,693			
Pending Submission	Distribution	C0022662	22C-404GA Lennox Passage Rebuild	2022 ACE Plan (for Subsequent Approval)		\$ 2,352,191		\$ 191,976			
Pending Submission	General Plant	C0043910	IT - Customer Energy Management Phase 2	2022 ACE Plan (for Subsequent Approval)		\$ 2,154,815		\$ -			
Pending Submission	Transmission	C0036826	L8004 Parallel Canso Strait Crossing	2022 ACE Plan (for Subsequent Approval)		\$ 2,139,081		\$ -			
Pending Submission	General Plant	C0011168	IT - Firewall Refresh	2022 ACE Plan (for Subsequent Approval)		\$ 2,112,237		\$ 3,696			
Pending Submission	Gas Turbine	C0041507	CT TUS1 Exhaust Stack Replacement	2022 ACE Plan (for Subsequent Approval)		\$ 2,031,020		\$ -			
Pending Submission	General Plant	C0031024	IT - Security Patch Management	2022 ACE Plan (for Subsequent Approval)		\$ 1,700,000		\$ -			
Pending Submission	General Plant	C0041994	NERC CIP 2022	2022 ACE Plan (for Subsequent Approval)		\$ 1,379,474		\$ -			
Not Approved at this time	General Plant	50292	Kempt Road and Dartmouth East Depot Truck Bays	2022 ACE Plan (for Subsequent Approval)	Q3 2017 - October 30, 2017	\$ 1,333,049	\$ 1,095,720	\$ -			
Pending Submission	Steam	C0041651	TUC HFO Tank 4 Refurbishment	2022 ACE Plan (for Subsequent Approval)		\$ 1,110,293		\$ -			
Pending Submission	General Plant	C0005498	IT - Endpoint Security	2022 ACE Plan (for Subsequent Approval)		\$ 1,064,684		\$ 215,359			
Pending Submission	General Plant	C0042166	IT - Data Loss Prevention Platform	2022 ACE Plan (for Subsequent Approval)		\$ 1,003,551		\$ -			

NS Power 2021 ACE Plan Items – Deferred or Cancelled

This report includes any deferred or cancelled projects that were included in the 2021 ACE Plan.

CI	Project Title	2021 ACE Amount	2021 ACE Project Total	Cancelled / Deferred	Deferred To	Prior Approval	2021 ACE Plan Reference	Commentary
Generation								
C0009299	POA Bag House Filter Replacement	1,621,274	1,621,274	Deferred	2022		Pt. Aconi	Updated condition assessments indicates that the bag filters are acceptable and can remain in-use for an additional year.
C0009320	POA CW Screen Refurbishment	254,590	254,590	Deferred	2022		Pt. Aconi	This project has been deferred due to unplanned outage related carry-over work identified late in 2020 work using available resources in 2021.
C0020023	POA LS Vacuum System	130,395	130,395	Deferred	2023		Pt. Aconi	This project has been deferred due to unplanned outage related carry-over work identified late in 2020 work using available resources in 2021.
C0020142	POA Turbine Controls Evergreen	271,937	271,937	Cancelled			Pt. Aconi	The scope of this project will now be included in CI C0020123.
C0030489	TUC6 - HP Boiler Tube Replacement	45,199	45,199	Cancelled			Less than \$1M	The scope of this project will now be included in C0041986 - TUC6 HRSG Refurbishments.
C0030493	TUC3 Lube Oil Coolers Refurbishment	40,485	40,485	Deferred	2022		Less than \$1M	This project has been deferred due to higher priority carry-over work using available resources in 2021.
C0030529	TUC3 Generator Refurbishment	706,226	706,226	Deferred	2022		Less than \$1M	This project has been deferred to 2022 to align with other work planned for Tuft's Cove Unit 3 and avoid potential delays due to material delivery.
C0031227	POA 18 Primary Fan Motor Lifting Device	99,756	99,756	Deferred	2022		Pt. Aconi	This project has been deferred due to unplanned outage related carry-over work identified late in 2020 work using available resources in 2021.
48913	HYD - Tusket Facility Refurbishment	1,061,936	2,544,240	Deferred	2023		Subsequent Submittal	Deferred in order to complete additional scoping and preliminary engineering.
49634	HYD - Trout River Diversion Screen Replacements	600,149	1,013,722	Deferred	2022		Subsequent Submittal	Deferred in order to complete additional scoping and preliminary engineering.
C0020364	TRES Stack Access	201,292	201,292	Cancelled			Less than \$1M	Stack inspections will utilize a person basket in order to avoid the replacement of the stack access stairs.
C0030783	POA Generator Refurbishment	952,116	952,116	Deferred	2023		Pt. Aconi	This project has been deferred based on updated condition assessments and forecasted unit utilization.
C0030786	POA Ash Cell Capping	1,408,299	1,408,299	Deferred	2022		Pt. Aconi	This project has been deferred due to higher priority carry-over work using available resources in 2021.
C0030886	POT - Polisher Valves & Solenoid Panel	94,075	94,075	Cancelled			Less than \$1M	NS Power has utilized other alternative technical solutions to mitigate risk and avoid replacement at this time.
C0031115	POT - Lube Oil Piping Replacement 2021	49,425	49,425	Deferred	2022		Less than \$1M	This project has been deferred due to higher priority carry-over work using available resources in 2021.
C0030564	POA MCC Upgrades	100,995	100,995	Deferred	2023		Pt. Aconi	This project has been deferred due to higher priority carry-over work using available resources in 2021.
C0011518	POA Kelly Rock Primary Crusher Refurbishment	23,760	23,760	Cancelled			Pt. Aconi	This scope of this project will now be included in CI C0041032.
C0031209	PHB - Air Heater Refurbishment 2021	250,142	250,142	Cancelled			Less than \$1M	NS Power has utilized other alternative technical solutions to mitigate risk and avoid replacement at this time.
C0023682	TREG Mill Bullgear and Pinions	663,253	663,253	Deferred	2022		Less than \$1M	This project has been deferred due to higher priority unit 6 trunnion and gearbox work using available resources in 2021.
C0031243	PHB - Turbine Block Valve #30	200,581	200,581	Deferred	2022		Less than \$1M	This project has been deferred due to higher priority block valve work using available resources in 2021.
C0029684	TUC5 - Fuel Piping Coating Refurbishment	31,994	31,994	Deferred	2022		Less than \$1M	This project has been deferred due to higher priority work using available resources in 2021.
C0030549	CT - VJ1 - General Control and Protection Upgrade	147,789	285,643	Deferred	2022		Less than \$1M	Deferred in order to complete additional scoping and preliminary engineering.
C0021470	TUC1 Natural Gas Valves Refurbishment	46,676	46,676	Deferred	2022		Less than \$1M	This project has been deferred due to delays in material availability from suppliers.
C0030487	TUC3 Lube Oil Refurbishment	44,248	44,248	Deferred	2022		Less than \$1M	This project has been deferred due to delays in material availability from suppliers.
C0030524	TUC2 Turbine Controls PLC Upgrade	53,769	156,628	Deferred	2022		Less than \$1M	This project has been deferred to 2022 to align with other work planned for Tuft's Cove Unit 2.
C0030492	TUC6 Vacuum Pump Replacement	31,448	31,448	Cancelled			Less than \$1M	Updated condition assessments indicated that the vacuum pump is acceptable for service at this time.
C0021402	TUC Oil Tanks Levels and Pump House Controls Upgrade	72,861	72,861	Deferred	2022		Less than \$1M	This project has been deferred due to higher priority carry-over work using available resources in 2021.
C0030905	POT - GSCW Pump & Motor Replacement	199,284	199,284	Deferred	2022		Less than \$1M	This project has been deferred due to higher U&U work using available resources in 2021.
C0031278	PTMT - Idler Assemblies for Inhaul & Dock Conveyors	37,418	37,418	Deferred	2023		Less than \$1M	This project has been deferred due to higher U&U work using available resources in 2021.
C0031277	PTMT - Rebuild Hopper Walls 2021	37,005	37,005	Deferred	2023		Less than \$1M	This project has been deferred due to higher U&U work using available resources in 2021.
39472	HYD - Mersey Redevelopment Phase 1	9,441,871	159,822,112	Deferred	2022		Subsequent Submittal	Deferred to better define project scope and consultation and engagement requirements.
Distribution								
C0031121	104S-313 - Re-conductor Big Hill	690,254	746,009	Deferred	2022		Less than \$1M	This project has been deferred due to higher priority carry-over work using available resources in 2021.
C0031304	37N-413G-South Athol Rebuild	633,974	633,974	Deferred	2022		Less than \$1M	This project has been deferred due to delays in acquiring required easements.
C0008638	Cogswell HRM Redevelopment Program	300,967	2,904,326	Deferred	2022		Subsequent Submittal	Deferred due to ongoing discussions with HRM.
Transmission								
General Plant								
C0032502	IT - Time Varying Pricing Solution	625,539	625,539	Cancelled			Less than \$1M	This scope of this project will now be included in CI C0021839.
C0031099	IT - Computer Telephony Integration	257,562	507,562	Deferred	2022		Less than \$1M	This project has been deferred due to higher priority carry-over work using available resources in 2021.
C0031028	IT - Network Access Control	225,243	553,009	Deferred	2022		Less than \$1M	This project has been deferred due to higher priority carry-over work using available resources in 2021.
C0031100	IT - HVCA Upgrade	200,009	200,009	Deferred	2022		Less than \$1M	This project has been deferred due to higher priority carry-over work using available resources in 2021.
C0011302	IT - PeopleSoft Upgrade	175,551	400,551	Deferred	2022		Less than \$1M	This project has been deferred due to higher priority carry-over work using available resources in 2021.
C0021829	IT - Domain Password Management	81,411	81,411	Deferred	2022		Less than \$1M	This project has been deferred due to higher priority carry-over work using available resources in 2021.
C0031102	AMIO Outage Management System	36,516	36,516	Cancelled			Less than \$1M	NS Power is looking at opportunities to optimize current tools and processes prior to additional investment.
C0021822	IT - Data Catalogue & Quality Tool	104,740	104,740	Deferred	2022		Less than \$1M	This project has been deferred due to higher priority carry-over work using available resources in 2021.
C0031027	IT - Multi-Factor Authentication	586,159	586,159	Deferred	2022		Less than \$1M	This project has been deferred due to higher priority carry-over work using available resources in 2021.
C0021133	SCADA Mobile Application	114,766	114,766	Deferred	2022		Less than \$1M	This project has been deferred due to higher priority carry-over work using available resources in 2021.
49832	Victoria Junction Substations Fiber Links	60,299	60,299	Deferred	2022		Less than \$1M	This project has been deferred due to higher priority carry-over work using available resources in 2021.
C0032144	IT - Control Centre Applications Replacement	340,147	340,147	Cancelled			Less than \$1M	The scope of this project will now be included in CI C0023622.
C0031002	IT - Customer Billing & Payment Solution	357,205	978,193	Deferred	2022		Less than \$1M	This project has been deferred due to higher priority carry-over work using available resources in 2021.
C0022002	IT - Outage Map Upgrade	453,441	991,147	Deferred	2023		Less than \$1M	This project has been deferred due to higher priority carry-over work using available resources in 2021.
C0031094	IT - Cloud Integration Platform	70,882	508,515	Deferred	2023		Less than \$1M	This project has been deferred due to higher priority carry-over work using available resources in 2021.
C0021843	IT - Upgrade Oracle OBIA	160,749	160,749	Deferred	2022		Less than \$1M	This project has been deferred due to higher priority carry-over work using available resources in 2021.
C0011167	IT - Backup Infrastructure Upgrade	652,768	1,015,253	Deferred	2022		Subsequent Submittal	Deferred in order to complete additional scoping and preliminary engineering.
Previously listed as deferred, now active in 2021.								
C0030525	TUC3 GSCW Coolers Refurbishment	57,136	57,136	Deferred	2022		Less than \$1M	This project is no longer deferred and will be completed in 2021.
C0022783	2021 Generation Related Power Transformer Refurbishments	402,385	402,385	Deferred	2022		Less than \$1M	This project is no longer deferred and will begin in Q4 2021.

Final Cost Report

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 September 30, 2021	Comment
40648	IT - Field Mobility System	9/30/2015	3,332,515	2,024,988	The remaining work on this project will now be included in the WAM Phase 2 project (CI 46075) of the overall T&D Work & Asset Management initiative. The WAM Phase 2 project is expected to be filed with the NSUARB before year-end 2021. Accordingly, a Final Cost Application for CI 40648 is planned for submission shortly thereafter.
49534	TRE6 EHG/Turbine Controls Upgrade	8/15/2019	2,725,344	1,229,506	The controls upgrade has been completed and NERC testing is required in order to finalize this project and submit for Final Cost application. NERC testing is expected to be completed in late 2021 and a Final Cost Application submitted in 2022.

2022 ACE Plan Appendix D has been filed electronically.

Filing Type	CI Number	Project Title	Function Class	Status	Original Submission Amounts			Actual Amounts			Comments/Notes
					Estimated In-Service Date	Approved Estimate	Contingency on Approved Estimate	Actual In-Service Date	Actual Spend (as of 09/30/2021)	Variance to Approved Estimate	
2015 ACE Plan	44716	TUC2 North Boiler Feedwater Pump Refurbishment	Steam Generation Plant - S	Complete - Final Costed	3/15/2017	191,007	-	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.
2016 ACE Plan	48111	East Switch Upgrade 155	Transmission Plant - T	Complete - Final Costed	8/31/2017	122,220	8,400	7/31/2019	290,265	168,045	Subsequently approved >\$250 in 2017 for \$304,379.
2016 ACE Plan	47874	LIN Ash Scales Replacement	Steam Generation Plant - S	Complete - Final Costed	12/31/2017	237,241	-	6/30/2019	237,241	293,303	Subsequently approved >\$250 in 2017 for \$481,251.
2016 ACE Plan	47933	LIN3 Turbine Vibration Monitoring Upgrade	Steam Generation Plant - S	Complete - Final Costed	6/19/2016	238,216	-	6/30/2016	291,238	53,022	Subsequently approved >\$250 in 2017 for \$280,095.
2016 ACE Plan	47947	TUC2 Condenser Waterbox Coating Replacement	Steam Generation Plant - S	Complete - Final Costed	10/26/2016	225,210	-	10/28/2016	368,637	143,427	Subsequently approved >\$250 in 2017 for \$366,978.
2016 ACE Plan	47600	TRE Ashes Abatement (2016)	Steam Generation Plant - S	Complete - Final Costed	12/15/2016	154,303	-	11/29/2016	2,088,071	1,934,368	Subsequently approved >\$250 in 2017 for \$2,096,391.
2016 ACE Plan	47606	TRE3 Southport Controls Upgrade	Steam Generation Plant - S	Complete - Final Costed	12/15/2016	158,399	-	12/11/2016	386,649	128,251	Subsequently approved >\$250 in 2017 for \$385,301.
2016 ACE Plan	47756	36V-303 Reconnector Middle Dyke Rd	Distribution Plant - D	Complete - Final Costed	1/31/2017	226,303	9,878	1/30/2017	287,678	61,375	Subsequently approved >\$250 in 2017 for \$287,779.
2017	49039	HYD Lequille Controls Upgrades	Hydro Generation Plant - H	In-service Complete	9/30/2017	762,912	117,200	3/30/2018	722,822	(40,090)	
2017	48296	HYD Bridge Remediation	Hydro Generation Plant - H	Complete - Final Costed	12/1/2017	40,513	-	12/1/2017	27,743	(12,770)	
2017	43202	Replace Mobile Radio System	General Plant - P	In-service Complete	7/31/2017	6,286,878	407,840	8/31/2018	6,499,458	202,580	
2017	48893	TUC3 IP Turbine Refurbishment	Steam Generation Plant - S	Complete - Final Costed	12/1/2017	4,871,454	-	1/31/2018	5,466,520	595,066	ATO approved October 9, 2018.
2017	48779	VOPF Expansion	General Plant - P	Complete - Final Costed	1/3/2018	1,708,923	153,459	1/1/2018	1,837,566	128,643	
2017	38931	HYD Harmony Stabilization	Hydro Generation Plant - H	Complete - Final Costed	1/20/2018	931,942	112,492	10/1/2017	717,750	(154,192)	
2017	50295	Electric Vehicle Infrastructure Deployment	General Plant - P	Complete - Final Costed	3/31/2018	415,908	-	6/15/2018	509,795	89,387	2017 submission was not approved by NSUARB.
2017	46499	Stator Rewind Kit Capital Spare	Steam Generation Plant - S	Complete - Final Costed	3/4/2018	2,871,003	-	8/17/2018	2,917,466	46,462	
2017	47786	129H Kearney Lake Load Transfer	Distribution Plant - D	Complete - Final Costed	10/30/2017	286,280	-	2/28/2018	415,886	129,606	
2017	49517	IT - Storage Infrastructure Upgrade	General Plant - P	Complete - Final Costed	7/28/2018	1,901,189	-	5/1/2018	1,564,220	(33,969)	
2017	49593	IT - CIS High Availability	General Plant - P	Complete - Final Costed	12/31/2017	519,023	64,771	6/18/2018	560,760	41,737	
2017	47682	HYD Lequille Switchgear Replacement	Hydro Generation Plant - H	Complete - Final Costed	10/11/2017	776,391	91,199	3/22/2018	739,474	(36,916)	
2017	47876	HYD - Lequille Overhaul	Hydro Generation Plant - H	Complete - Final Costed	11/30/2017	8,395,229	-	6/23/2018	2,378,233	(983,004)	ATO approved April 10, 2018.
2017	47648	HYD - Lequille Pipeline Replacement	Hydro Generation Plant - H	Complete - Final Costed	9/30/2017	1,121,253	194,400	12/15/2017	925,167	(196,087)	
2017	47553	TRE6 Turbine Valve Refurbishment	Steam Generation Plant - S	Complete - Final Costed	10/15/2017	570,600	-	11/14/2017	601,996	31,396	
2017	44776	TUC4S LM6000 Generator Stator Re-wedge	Gas Turbine Generation Plant - G	Complete - Final Costed	8/31/2017	1,361,301	106,055	8/31/2017	1,113,120	(147,781)	
2017	47654	HYD - Gulch Penstock & Surge Tank Replacement	Hydro Generation Plant - H	Complete - Final Costed	11/15/2017	4,970,540	597,463	4/28/2018	5,087,474	116,934	
2017	49538	TRE5 Generator Rotor Flux Probe Installation	Steam Generation Plant - S	Complete - Final Costed	10/15/2017	784,610	-	11/15/2017	852,045	67,435	
2017	49596	HYD - Hells Gate 2 Overhaul	Hydro Generation Plant - H	Complete - Final Costed	11/30/2017	1,204,263	150,476	2/20/2018	1,144,529	(59,734)	FIN approved October 26, 2018.
2017	49674	TUC2 Boiler Selective Waterwall Tube Replacements	Steam Generation Plant - S	Complete - Final Costed	5/30/2017	421,518	-	6/30/2017	656,906	235,388	
2017	51053	TRE4 HP Turbine Diaphragm Piston Refurbishment	Steam Generation Plant - S	Complete - Final Costed	11/30/2017	1,185,045	-	11/30/2017	1,114,746	(70,299)	
2017	49273	BG12 Engine Refurbishment	Gas Turbine Generation Plant - G	Complete - Final Costed	11/30/2017	2,170,157	98,006	11/30/2017	1,981,224	(188,933)	
2017	49860	IT - Sharepoint Upgrade	General Plant - P	Complete - Final Costed	7/1/2018	3,903,594	333,223	2/28/2019	4,141,669	237,465	
2017	51052	TRE5 Generator High Voltage Bushings Critical Spare	Steam Generation Plant - S	Complete - Final Costed	8/15/2017	261,250	-	1/1/2018	265,793	4,543	
2017	49499	PWB - Boiler Refurbishment 2017	Steam Generation Plant - S	Complete - Final Costed	8/31/2017	593,740	50,552	8/24/2017	401,915	(191,825)	
2017	49922	Western Switching Upgrades	Transmission Plant - T	Complete - Final Costed	8/30/2017	378,843	29,475	8/30/2017	650,674	271,831	ATO approved June 11, 2019.
2017	49438	LIN A Gallery Floor Replacement	Steam Generation Plant - S	Complete - Final Costed	11/15/2017	591,761	44,548	8/31/2017	404,299	(187,462)	
2017	49787	Intelligent Feeder Project	General Plant - P	In-service Complete	2/1/2018	2,181,324	-	1/21/2018	2,031,513	(149,811)	
2017	47751	TRE5 LP Turbine Diaphragm Tip Seal Replacement	Steam Generation Plant - S	Complete - Final Costed	10/15/2017	1,704,784	-	11/15/2017	1,784,504	80,120	FIN approved June 12, 2018.
2017	47760	855-402 Re-Insulate	Distribution Plant - D	Complete - Final Costed	8/31/2018	1,551,859	101,256	3/31/2017	1,700,504	149,066	
2017	49511	POI Air Meter Refurbishment	Steam Generation Plant - S	Complete - Final Costed	5/30/2017	272,538	23,538	6/1/2017	363,699	91,161	
2017	49598	HYD - Gibsons Switchgear Replacement	Hydro Generation Plant - H	Complete - Final Costed	6/30/2017	747,450	90,255	2/16/2018	164,413	(583,037)	
2017 ACE Plan	50020	LIN CEMS Replacement	Steam Generation Plant - S	Complete - Final Costed	9/30/2017	170,281	-	10/31/2018	689,032	518,750	Subsequently approved >\$250 in 2017 for \$633,355.
2017 ACE Plan	49553	TRE Ashes Abatement 2017	Steam Generation Plant - S	Complete - Final Costed	7/15/2017	226,451	-	8/2/2017	684,184	457,733	Subsequently approved >\$250 in 2017 for \$728,886.
2017 ACE Plan	49551	TRE5 CEMS Replacement	Steam Generation Plant - S	Complete - Final Costed	5/21/2017	162,647	-	5/21/2017	379,657	216,990	Subsequently approved >\$250 in 2017 for \$679,922.
2017 ACE Plan	49862	50N-410 Rebuild Trenton	Distribution Plant - D	Complete - Final Costed	6/30/2017	247,773	15,996	7/31/2017	486,542	238,769	Subsequently approved >\$250 in 2017 for \$440,325.
2017 ACE Plan	49693	TUC HFO Tank Dyke Pipeline Refurbishments	Steam Generation Plant - S	Complete - Final Costed	12/30/2017	219,022	-	12/15/2017	884,473	665,451	Subsequently approved >\$250 in 2017 for \$664,753.
2017 ACE Plan	49806	2017 Padmount Replacement Program	Distribution Plant - D	Complete - Final Costed	1/20/2017	1,703,774	129,960	4/30/2017	1,715,177	15,403	
2017 ACE Plan	49902	2017 Telecom Building Replacement - Wittenburg	General Plant - P	Complete - Final Costed	5/1/2018	294,000	18,748	5/1/2018	294,000	0	
2017 ACE Plan	49992	2017 Transmission Right of Way Widening	Transmission Plant - T	Complete - Final Costed	12/30/2017	5,400,855	-	1/4/2017	5,494,423	93,568	
2017 ACE Plan	49867	55V-313 Berwick North Replacements	Distribution Plant - D	Complete - Final Costed	10/30/2017	345,565	16,882	3/2/2018	417,926	72,361	
2017 ACE Plan	47769	50N-301 Overhaul Re-Replacements	Distribution Plant - D	Complete - Final Costed	5/2/2017	401,493	-	5/2/2017	400,006	(1,487)	
2017 ACE Plan	50073	45-332 Bernad Land Drive Conversion	Distribution Plant - D	Complete - Final Costed	7/1/2017	302,893	15,284	11/30/2017	345,727	42,834	
2017 ACE Plan	49799	532N Elm Street Conversion Phase 1	Distribution Plant - D	Complete - Final Costed	6/30/2017	548,688	28,106	1/31/2018	525,501	(23,187)	
2017 ACE Plan	49880	Meister Shop Test Console Replacement	General Plant - P	Complete - Final Costed	2/15/2017	410,457	-	11/24/2017	400,133	(10,324)	
2017 ACE Plan	49861	IT - S System Upgrade	General Plant - P	Complete - Final Costed	7/1/2018	801,253	64,155	7/1/2018	814,726	13,473	
2017 ACE Plan	48774	HYD - Milton Shop HVAC Upgrade	Hydro Generation Plant - H	Complete - Final Costed	10/31/2017	564,347	98,240	8/20/2018	571,463	7,116	
2017 ACE Plan	49707	TUC2 Generator Bushing Replacement	Steam Generation Plant - S	Complete - Final Costed	7/25/2017	440,082	-	6/15/2018	726,401	286,319	ATO approved July 26, 2018.
2017 ACE Plan	47953	LIN Ballast Positioner Refurbishment	Steam Generation Plant - S	Complete - Final Costed	9/20/2017	566,619	-	10/31/2017	607,545	40,926	
2017 ACE Plan	49821	Monsey River Hydro Spare Transformer	Transmission Plant - T	Complete - Final Costed	3/1/2018	1,535,094	44,006	3/1/2018	1,535,094	0	
2017 ACE Plan	49818	2017/2018 Transmission Switch & Breaker Replacement	Transmission Plant - T	In-service Complete	4/30/2017	1,074,472	81,794	1/31/2018	1,096,946	22,474	
2017 ACE Plan	49792	2017 Transmission Line Retirement Program	Transmission Plant - T	Complete - Final Costed	3/1/2017	526,064	37,660	6/1/2017	544,382	18,318	
2017 ACE Plan	49466	PTMT - Dock and Inland Conveyor Replacement	Steam Generation Plant - S	In-service Complete	4/23/2017	467,607	-	12/23/2017	469,683	2,076	ATO approved January 26, 2018.
2017 ACE Plan	49815	2017/2018 Steel Tower Refurbishment	Transmission Plant - T	In-service Complete	2/28/2017	2,003,917	143,733	2/28/2017	1,937,433	(66,484)	
2017 ACE Plan	49533	TRE6 Boiler Refurbishment	Steam Generation Plant - S	Complete - Final Costed	10/15/2017	1,259,454	-	11/14/2017	1,490,498	231,045	
2017 ACE Plan	49537	TRE5 Analytical Panel Upgrade	Steam Generation Plant - S	In-service Complete	10/15/2017	438,216	37,764	8/15/2019	534,927	96,711	
2017 ACE Plan	49432	LIN Mill Refurbishment 2017	Steam Generation Plant - S	Complete - Final Costed	12/31/2017	429,839	-	6/23/2018	439,839	9,000	
2017 ACE Plan	49918	54N-303 Underground Device Replacements Phase I	Distribution Plant - D	Complete - Final Costed	12/30/2017	469,604	-	7/31/2017	521,501	51,897	
2017 ACE Plan	49057	TRE6 Excitation System Replacement	Steam Generation Plant - S	Complete - Final Costed	10/15/2017	904,011	84,695	11/30/2017	893,489	(10,522)	
2017 ACE Plan	49419	POI Boiler Refurbishment 2017	Steam Generation Plant - S	Complete - Final Costed	6/30/2017	969,292	82,805	6/1/2017	1,180,397	211,105	
2017 ACE Plan	47647	RO1 Boiler Chemical Backwashing	Steam Generation Plant - S	Complete - Final Costed	8/30/2017	974,008	-	8/30/2017	974,008	0	ATO approved November 2, 2017.
2017 ACE Plan	49430	LIN CW Pump Refurbishment 2017	Steam Generation Plant - S	Complete - Final Costed	6/16/2017	516,270	-	6/22/2017	560,231	43,962	
2017 ACE Plan	49532	TRE4 Air Heater Refurbishment	Steam Generation Plant - S	Complete - Final Costed	10/15/2017	1,428,236	60,066	11/14/2017	1,548,759	120,523	
2017 ACE Plan	49536	TRE5 Boiler Refurbishments 2017	Steam Generation Plant - S	Complete - Final Costed	5/15/2017	571,589	-	5/15/2017	602,969	31,380	
2017 ACE Plan	49836	115-302 115-401 Rebuild Conduith Phase 2	Distribution Plant - D	Complete - Final Costed	4/1/2017	807,456	53,550	12/29/2017	774,528	(32,928)	
2017 ACE Plan	49434	LIN CW Screen Refurbishment 2017	Steam Generation Plant - S	Complete - Final Costed	10/16/2017	347,062	-	8/31/2017	334,390	(12,672)	
2017 ACE Plan	49774	LS522 Replacements and Upgrades	Transmission Plant - T	Complete - Final Costed	6/30/2017	1,537,652	96,401	9/3/2018	1,784,759	246,907	
2017 ACE Plan	47125	TRE3 MBR Refurbishment 2017	Steam Generation Plant - S	Complete - Final Costed	11/21/2017	821,141	47,051	11/21/2017	860,180	38,039	
2017 ACE Plan	49675	TUC2 Cooling Water Piping Refurbishment	Steam Generation Plant - S	Complete - Final Costed	6/30/2017	568,673	-	6/30/2017	812,353	243,680	
2017 ACE Plan	49866	512N Toney River Replacements	Distribution Plant - D	Complete - Final Costed	11/1/2017	285,219	-	12/29/2017	453,402	168,182	
2017 ACE Plan	49463	POI Coal Mill Overhaul 2017	Steam Generation Plant - S	Complete - Final Costed	7/30/2017	328,410	40,291	12/14/2017	301,240	(27,170)	
2017 ACE Plan	49782	LS078 Replacements and Upgrades	Transmission Plant - T	Complete - Final Costed	12/31/2017	1,293,342	79,727	12/31/2017	1,293,342	0	ATO approved July 19, 2018.
2017 ACE Plan	41511	TRE5 - Condenser Waterbox and Cooling Water Piping Refurbishment	Steam Generation Plant - S	Complete - Final Costed	9/15/2017	700,809	-	12/1/2017	949,194	248,385	
2017 ACE Plan	49878	2017 Substation Insulator Replacement Program	Transmission Plant - T	Complete - Final Costed	2/15/2017	508,893	34,971	3/1/2017	553,578	(44,685)	
2017 ACE Plan	49813	2017 CW Containment Program	Transmission Plant - T	Complete - Final Costed	12/1/2017	424,518	-	12/1/2017	429,520	5,002	
2017 ACE Plan	49776	L7008 Replacements and Upgrades	Transmission Plant - T	In-service Complete	9/13/2017	876,277	-	8/31/2017	733,884	(142,393)	
2017 ACE Plan	47956	L7004 Replacements and Upgrades	Transmission Plant - T	Complete - Final Costed	9/28/2017	672,131	42,872	7/31/2017	481,723	(190,408)	
2017 ACE Plan	49591	35 Feeder Exit Cable Replacement(s)	Distribution Plant - D	Complete - Final Costed	9/30/2017						

Filing Type	CI Number	Project Title	Function Class	Status	Estimated In-Service Date	Original Submission Amounts			Actual In-Service Date	Actual Amounts			Comments/Notes
						Approved Estimate	Contingency on Approved Estimate			Actual Spend (as of 09/30/2021)	Variance to Approved Estimate		
2018 ACE Plan	51802	TRES Boiler Refurbishment 2018	Steam Generation Plant - S	Complete - Final Costed	6/15/2018	1,212,228	46,694		9/14/2018	1,384,485		172,257	
2018 ACE Plan	49947	TRES S-1 BFP Refurbishment	Steam Generation Plant - S	Complete - Final Costed	6/15/2018	345,623	23,628		9/14/2018	190,208		(155,414)	
2018 ACE Plan	51816	TRES Asbestos Abatement 2018	Steam Generation Plant - S	Complete - Final Costed	10/2/2018	509,035	20,747		9/7/2019	729,996		220,962	
2018 ACE Plan	52208	35 Feeder Exit Cable Replacement Phase 2	Distribution Plant - D	Complete - Final Costed	12/31/2018	293,228	19,861		8/31/2018	540,984		247,755	
2018 ACE Plan	52119	L5054 2018 Replacements and Upgrades	Transmission Plant - T	Complete - Final Costed	11/30/2018	560,143	37,063		7/31/2018	784,720		224,578	
2018 ACE Plan	51850	LINA RH Tube Replacement	Steam Generation Plant - S	Complete - Final Costed	4/21/2018	399,546			7/9/2018	522,749		123,203	
2018 ACE Plan	51405	2018 Wood Pole Retreatment Program	Transmission Plant - T	Complete - Final Costed	1/31/2018	1,361,076	97,480		6/30/2018	924,521		(436,555)	
2018 ACE Plan	52102	L5014-2018 Replacements and Upgrades	Transmission Plant - T	Complete - Final Costed	10/31/2018	848,700	56,264		5/31/2018	1,038,850		189,150	
2018 ACE Plan	C0001950	New Distribution Rights-of-Way Ph 3	Distribution Plant - D	Complete - Final Costed	3/30/2018	9,822,493	-		2/1/2018	10,388,858		466,365	
2018 ACE Plan	51852	POT - Coal Mill Overhaul 2018	Steam Generation Plant - S	Complete - Final Costed	11/1/2018	822,267	38,497		8/21/2018	392,517		(429,750)	
2018 ACE Plan	51818	PHB Boiler Refurbishment 2018	Steam Generation Plant - S	Complete - Final Costed	9/30/2018	440,315	38,681		7/31/2018	76,887		(363,428)	
2018 ACE Plan	51806	LIN Mill Refurbishment 2018	Steam Generation Plant - S	Complete - Final Costed	10/21/2018	673,153	-		10/31/2018	791,432		118,279	
2018 ACE Plan	50577	TRES CEMS Replacement	Steam Generation Plant - S	Complete - Final Costed	8/15/2018	715,562	60,558		10/13/2018	736,211		20,649	
2018 ACE Plan	51857	TRES Burner Refurbishments 2018	Steam Generation Plant - S	Complete - Final Costed	6/26/2018	332,497	27,571		9/14/2018	214,410		(118,088)	
2018 ACE Plan	49676	TUC2 CEMS Replacement	Steam Generation Plant - S	Complete - Final Costed	7/30/2018	380,140	-		2/26/2019	411,019		30,878	
2018 ACE Plan	51807	TUC2 Boiler Lower Vestibule Refurbishment	Steam Generation Plant - S	Complete - Final Costed	6/6/2018	412,872	25,114		6/29/2018	193,683		(219,189)	
2018 ACE Plan	47684	LIN3 - Boiler Refurbishment 2018	Steam Generation Plant - S	Complete - Final Costed	4/4/2018	739,657			4/14/2018	791,058		51,401	
2018 ACE Plan	51862	TRES Luke Oil Cooler Refurbishment	Steam Generation Plant - S	Complete - Final Costed	9/15/2018	341,769	29,721		9/1/2020	307,870		(33,899)	
2018 ACE Plan	49898	15N-202 Victoria St Replace Deteriorated Assets	Distribution Plant - D	Complete - Final Costed	8/31/2018	242,253	11,843		8/31/2018	388,998		146,745	Subsequently approved >\$250 in 2019 for \$394,528.
2019	52292	TUC Heavy Fuel Oil Tank Dyke Refurbishment	Steam Generation Plant - S	Complete - Final Costed	11/28/2019	495,317	18,981		11/28/2019	482,963		(12,354)	
2019 ACE Plan	50832	TRE - (Boiler C) HVO Refurbishment Project Phase 2	Steam Generation Plant - S	Complete - Final Costed	9/15/2019	2,573,137	187,155		12/15/2019	2,113,228		(459,909)	FW approved June 28, 2021.
2019 ACE Plan	51238	TRE - Asbestos Abatement 2019	Steam Generation Plant - S	Complete - Final Costed	11/15/2019	1,038,841	81,795		12/15/2019	1,113,337		84,496	
2019 ACE Plan	C0011088	POT - Coal Mill Refurbishment 2019	Steam Generation Plant - S	Complete - Final Costed	11/30/2019	472,973	56,006		11/30/2019	579,947		106,974	
2019 ACE Plan	C0011064	PHB - Boiler Refurbishment 2019	Steam Generation Plant - S	Complete - Final Costed	8/31/2019	565,707	48,681		11/30/2019	545,270		(20,437)	
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		11/28/2019	366,139		60,288	
2019 ACE Plan	C0011458	ICP - Rail System Refurbishment Program 2019	Steam Generation Plant - S	In-service Complete	8/15/2019	626,192	50,144		11/22/2019	593,193		(26,998)	
2019 ACE Plan	C0010369	TRES - Baghouse Filter Replacement Phase 2	Steam Generation Plant - S	Complete - Final Costed	11/15/2019	542,340	24,491		11/1/2019	485,730		(56,610)	
2019 ACE Plan	C0009059	LIN - Coal Plant Structural Refurbishment Phase 5	Steam Generation Plant - S	Complete - Final Costed	9/1/2019	375,902	-		5/31/2019	470,748		94,846	
2019 ACE Plan	C0009080	LIN - CW Screen Refurbishment 2019	Steam Generation Plant - S	Complete - Final Costed	7/1/2019	354,651	-		5/31/2019	395,892		41,240	
2019 ACE Plan	C0009092	LIN3 - Reheat Tube Replacement 2019	Steam Generation Plant - S	Complete - Final Costed	4/1/2019	412,548	-		5/31/2019	482,716		70,168	
2019 ACE Plan	C0009099	LIN3 - Boiler Refurbishment 2019	Steam Generation Plant - S	Complete - Final Costed	6/10/2019	788,176	-		5/31/2019	865,166		76,990	
2019 ACE Plan	C0009079	LIN - CW Pumps Refurbishment 2019	Steam Generation Plant - S	Complete - Final Costed	7/1/2019	522,011	-		4/24/2019	548,598		26,586	
2019 ACE Plan	C0010141	POT - 18-1/2 Turbine Refurbishment	Steam Generation Plant - S	Complete - Final Costed	7/31/2019	2,938,990	245,840		6/28/2019	2,956,688		17,708	
2019 ACE Plan	C0010498	POT - Turbine Valve Refurbishment	Steam Generation Plant - S	Complete - Final Costed	7/5/2019	698,497	59,090		6/28/2019	724,495		25,998	
2019 ACE Plan	C0011076	POT - Boiler Refurbishment 2019	Steam Generation Plant - S	Complete - Final Costed	5/30/2019	1,388,434	115,014		6/21/2019	1,442,731		54,297	
2019 ACE Plan	47591	TRES - Bottom Ash Sulfur Replacement	Steam Generation Plant - S	Complete - Final Costed	10/31/2019	356,562	39,272		10/31/2019	344,136		(12,426)	
2019 ACE Plan	C0010372	TRES - Post Cooler Conveyor Refurbishment	Steam Generation Plant - S	Complete - Final Costed	10/15/2019	319,596	18,128		10/31/2019	264,402		(55,195)	
2019 ACE Plan	C0009088	LIN - 18-2 CEMS Replacement	Steam Generation Plant - S	Complete - Final Costed	9/1/2019	757,499	65,359		10/17/2019	760,179		2,680	
2019 ACE Plan	C0009062	LIN - Reclaim Feeder Refurbishment Phase 3	Steam Generation Plant - S	Complete - Final Costed	8/1/2019	542,948	11,500		10/17/2019	586,460		43,512	
2019 ACE Plan	C0010718	TRES - Turbine Main Valve Refurbishment	Steam Generation Plant - S	Complete - Final Costed	10/30/2019	730,005	54,500		9/30/2019	675,642		(54,363)	
2019 ACE Plan	C0010319	TRES - Boiler Refurbishment 2019	Steam Generation Plant - S	Complete - Final Costed	11/15/2019	518,302	22,347		9/26/2019	613,921		95,619	
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		8/22/2019	618,980		21,283	
2019 ACE Plan	C0010323	TRES - Mills Refurbishment 2019	Steam Generation Plant - S	Complete - Final Costed	8/15/2019	796,370	43,504		8/15/2019	884,077		87,707	
2019 ACE Plan	C0010318	TRES - Boiler Refurbishment 2019	Steam Generation Plant - S	Complete - Final Costed	8/15/2019	1,016,388	43,291		8/15/2019	1,114,668		98,279	
2019 ACE Plan	C0010326	TRE6 - Parallel Slide Valve Replacement	Steam Generation Plant - S	Complete - Final Costed	8/15/2019	256,080	20,261		8/15/2019	227,590		(28,491)	
2019 ACE Plan	51790	TRE6 - Generator High Voltage Bushings Replacement	Steam Generation Plant - S	Complete - Final Costed	8/15/2019	694,934	46,883		8/15/2019	392,917		(301,416)	
2019 ACE Plan	C0009093	LINA - Reheat Tube Replacement 2019	Steam Generation Plant - S	Complete - Final Costed	4/30/2019	412,548	-		7/23/2019	497,095		84,546	
2019 ACE Plan	C0009100	LINA - Boiler Refurbishment 2019	Steam Generation Plant - S	Complete - Final Costed	4/30/2019	754,772	-		7/23/2019	811,487		56,716	
2019 ACE Plan	C0009108	LINA - Economizer Header Refurbishment	Steam Generation Plant - S	Complete - Final Costed	4/30/2019	509,373	38,000		7/23/2019	415,461		(93,913)	
2019 ACE Plan	C0009113	LINA - Burner Front Refurbishment	Steam Generation Plant - S	Complete - Final Costed	4/30/2019	378,290	-		7/23/2019	268,075		(109,814)	
2019 ACE Plan	C0007638	POT - Generator Auxiliary Equipment Refurbishment	Steam Generation Plant - S	Complete - Final Costed	7/31/2019	3,473,920	288,627		6/28/2019	3,601,411		127,491	
2019 ACE Plan	C0010142	POT - HP Turbine refurbishment	Steam Generation Plant - S	Complete - Final Costed	7/31/2019	1,813,421	152,665		6/28/2019	1,942,027		128,607	
2019 ACE Plan	C0011085	POT - Hydrogen Panel Replacement	Steam Generation Plant - S	Complete - Final Costed	7/31/2019	464,252	39,933		6/23/2019	698,908		234,656	
2019 ACE Plan	C0007398	POT - Air Heater Refurbishment	Steam Generation Plant - S	Complete - Final Costed	5/28/2019	669,205	55,206		5/23/2019	817,883		147,878	
2019 ACE Plan	C0009096	LIN - Mill Refurbishment 2019	Steam Generation Plant - S	Complete - Final Costed	7/1/2019	677,819	-		4/24/2019	873,091		195,272	
2019 ACE Plan	C0010040	New Distribution Rights-of-Way Widening Phase 4	Distribution Plant - D	Complete - Final Costed	1/1/2019	10,275,861	-		11/30/2018	10,856,561		80,700	
2019 ACE Plan	C0004058	HYD - Tidewater 2 Overhaul	Hydro Generation Plant - H	Complete - Final Costed	8/31/2019	1,516,321	217,535		2/28/2020	1,959,940		443,619	
2019 ACE Plan	49874	CT - BCT Replace Balcon Fire Protection	Gas Turbine Generation Plant - G	Complete - Final Costed	10/31/2019	1,149,153	96,944		5/29/2020	1,116,544		(32,609)	
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		2/24/2020	557,834		(278,020)	
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		2/24/2020	1,117,203		(156,077)	
2019 ACE Plan	C0011320	22W-311 GA - Hawk Point Road Reconstructor Replacement	Distribution Plant - D	Complete - Final Costed	8/31/2019	465,758	35,473		9/24/2020	542,223		76,465	
2019 ACE Plan	C0011091	POT - Asbestos Abatement 2019	Steam Generation Plant - S	In-service Complete	5/31/2019	270,498	32,734		1/3/2020	227,075		(43,423)	
2019 ACE Plan	C0010325	TRES - CW Screen Refurbishment	Steam Generation Plant - S	Complete - Final Costed	10/31/2019	382,776	25,548		10/9/2020	236,964		(145,812)	
2020	C0021805	IT - Microsoft Enterprise Agreement 2020	General Plant - P	Complete - Final Costed	7/31/2020	3,139,727	-		10/31/2020	3,307,541		167,814	
						212,637,621	11,791,484			232,775,316		10,137,705	

Business Area	Total Project Savings	CI Number	Project Title	Attributed To	Reason for Savings	Details of Cost Savings
Gas Turbine	\$ 1,257,375	C0020944	LM6000 - 191-443 Hot Section Engine Refurbishment	Materials	Efficiencies - Process	Detailed inspection of the engine once it was opened resulted in a reduction of scope.
Gas Turbine	\$ 142,456	C0029692	LM6000 - TUC4 Generator Rotor Ring Refurbishment	Materials	Procurement Negotiations	Procurement process resulted in lower pricing.
General Plant	\$ 461,414	11744	Depot Renovations	Materials	Procurement Negotiations	Procurement process resulted in lower pricing.
General Plant	\$ 108,000	C0010019	IT - ADMS Upgrade	Materials	Design Engineering Adjustment	Used a new technology approach - Remote Desktop Service (RDS) - instead of buying 50 desktop computers for dedicated ADMS access.
General Plant	\$ 87,422	C0017098	RAL Generator Replacement	Materials	Procurement Negotiations	Procurement process resulted in lower pricing.
General Plant	\$ 80,000	49480	IT - Data Centre Disaster Recovery	Materials	Design Engineering Adjustment	Firewall purchase reduced due to design approach change. An existing Firewall was found that can be used and change to use partial virtual Firewall.
General Plant	\$ 17,392	C0020313	IT - Customer Care Telephony Platform Upgrade	Consulting	Design Engineering Adjustment	Consultant effort was less than expected due to changes in approach.
General Plant	\$ 6,174	49480	IT - Data Centre Disaster Recovery	Materials	Procurement Negotiations	Procurement process resulted in lower pricing.
General Plant	\$ 6,029	49480	IT - Data Centre Disaster Recovery	Materials	Procurement Negotiations	Procurement process resulted in lower pricing.
Hydro	\$ 6,000,000	C0014218	HYD - WRC LEM Balance of Plant	Contracts	Procurement Negotiations	Procurement process resulted in lower contractor pricing.
Hydro	\$ 344,990	C0012878	HYD - Weymouth Falls Unit 1 Generator Refurbishment	Contracts	Procurement Negotiations	Procurement process resulted in lower contractor pricing.
Hydro	\$ 79,500	51236	HYD - WRC Tailrace Tunnel Rock Bolting Phase 1	Contracts	Efficiencies - Process	Worked with contractor to coordinate pre-site visit testing and avoid standby/isolation costs originally planned.
Hydro	\$ 66,684	48712	HYD - Dam Instrumentation Upgrade	Contracts	Procurement Negotiations	Procurement process resulted in lower pricing.
Hydro	\$ 60,000	C0015760	HYD - D4 Riparian Flow Measurement	Contracts	Efficiencies - Person Hours	Installation of the D4 valve was completed using internal labour rather than contractors resulting in project savings.
Hydro	\$ 41,450	C0028323	HYD - GIS Bypass Valve Refurbishment	Materials	Efficiencies - Material	Use of a drone to further examine difficult to access and obsolete Gisborne Bypass valve bushings reduced the original material requirements as quantities and types were confirmed ahead of time.
Hydro	\$ 37,000	C0003998	HYD - Wreck Cove Station Service Cable Replacement	Materials	Design Engineering Adjustment	Original estimate included copper cable but after further design and engineering, it was determined that aluminum cable would be acceptable as it was used for the original cable and would result in lower project costs.
Hydro	\$ 25,000	C0032082	HYD - Mersey River Breaker Refurbishments	Contracts	Efficiencies - Person Hours	Installation of the Mersey breaker pendant was completed using internal labour rather than contractors resulting in project savings.
Hydro	\$ 17,000	C0019024	HYD - RUF Switchgear Replacement	Materials	Repurposing of Remaining Materials	Instead of buying new high voltage cable for all units, reused existing cable for one unit and bought new terminations.
Hydro	\$ 6,000	C0013658	HYD - WRC U1 Turbine Bearing Replacement	Travel/Accommodations	Efficiencies - Person Hours	Work planned to align with the outage on WRC Unit 1 resulted in savings for travel/accommodations.
Steam	\$ 800,000	44267	TRE Ash Lagoon Site Closure	Contracts	Procurement Negotiations	Procurement process resulted in lower contractor pricing after a new RFP was issued.
Steam	\$ 545,000	C0026285	TRE Heavy Fuel Oil Tank Refurbishment	Contracts	Efficiencies - Process	Detailed inspection of the tank after the oil was removed resulted in a reduction of scope.
Steam	\$ 377,657	C0020024	POA CW Pump Refurbishment	Materials	Procurement Negotiations	Procurement process resulted in lower pricing.
Steam	\$ 600,000	C0029783	POA - Boiler Refurbishment 2021	Contracts	Efficiencies - Process	Boiler Tube Repair Thermal Maintenance Practice (TMP-004) was reviewed and updated which allowed boiler tubes to safely reach 50% of the original wall thickness and reducing the frequency of replacement in accordance with the original maintenance practice. Cost savings in future years will be realized as a result of the change to the maintenance practice as well.
Steam	\$ 201,292	C0020364	TRE5 Stack Access	Other	Design Engineering Adjustment	Future stack inspections will utilize a person basket in order to avoid the replacement of the stack access stairs.
Steam	\$ 199,555	C0026285	TRE Heavy Fuel Oil Tank Refurbishment	Contracts	Procurement Negotiations	Procurement process resulted in lower contractor pricing.
Steam	\$ 160,000	C0010321	TRE5 Parallel Slide Valve Replacement	Labour	Efficiencies - Person Hours	Reduction in scope of work realised as disassembly of the valves using internal labour was not required.
Steam	\$ 125,000	44267	TRE Ash Lagoon Site Closure	Materials	Design Engineering Adjustment	Use of alternative screened soil for growth medium instead of topsoil.
Steam	\$ 102,298	C0030566	POA Ash Transport Piping	Contracts	Procurement Negotiations	Procurement process resulted in lower contractor pricing.
Steam	\$ 70,133	C0020263	LIN Coal Stacker MCC Upgrade	Materials	Procurement Negotiations	Procurement process resulted in lower pricing.
Steam	\$ 50,000	44267	TRE Ash Lagoon Site Closure	Materials	Design Engineering Adjustment	Reduced the scope of the road to only go halfway around the site
Steam	\$ 48,706	C0021602	TUC Telehandler Forklift	Materials	Design Engineering Adjustment	Trialed a few units and realized that a smaller less expensive machine would meet the requirements.
Steam	\$ 48,000	49714	TUC - UT3 and ST34 Cable Replacement	Materials	Salvage	Cable sent to salvage contractor after removal.
Steam	\$ 35,000	C0030922	POT - Coal Chute Refurbishment	Contracts	Efficiencies - Process	The scaffolding requirements were executed in a more efficient manner, resulting in cost savings.

Business Area	Total Project Savings	CI Number	Project Title	Attributed To	Reason for Savings	Details of Cost Savings
Steam	\$ 30,000	C0010335	TRE - Waste Water Treatment Plant Chemical Feed System Upgrade	Contracts	Design Engineering Adjustment	Use of wireless technology instead of fibre as originally planned.
Steam	\$ 29,850	C0030802	POA Diesel Generator Control Panel Upgrade	Materials	Procurement Negotiations	Procurement process resulted in lower pricing.
Steam	\$ 23,000	C0026285	TRE Heavy Fuel Oil Tank Refurbishment	Contracts	Procurement Negotiations	Procurement process resulted in lower contractor pricing.
Steam	\$ 22,220	C0033728	TUC No.1 Elevator Refurbishment	Other	Design Engineering Adjustment	Elevator was originally expected to require a travelling cable but inspection revealed this was not required resulting in savings in materials, labour and contracts.
Steam	\$ 20,105	C0029842	POA LS System Refurbishment 2021	Contracts	Procurement Negotiations	Procurement process resulted in lower contractor pricing.
Steam	\$ 18,500	C0035067	TRE5 U&U Baghouse Module 5&6 Refurb	Materials	Procurement Negotiations	Procurement process led to a lower cost option as an alternative bag that was less expensive than the OEM supplied bag was found.
Steam	\$ 15,000	C0031111	POT - Boiler Fill Pump Replacement 2021	Labour	Efficiencies - Person Hours	Planning and scoping with the subcontractors prior to the start of the project resulted in costs savings for each individual trade involved in the project
Transmission	\$ 505,000	C0001900	Mount Hope 69-25kV Substation	Materials	Procurement Negotiations	Procurement process resulted in savings on the padmount substation cost compared to the budgeted amount.
Transmission	\$ 214,168	C0021107	L8001 Replacements and Upgrades Phase 1	Contracts	Efficiencies - Process	Use of a helicopter to deliver materials to remote towers that were being climbed to avoid access matting costs.
Transmission	\$ 201,910	C0011261	101W Port Mersey Substation Expansion	Materials	Procurement Negotiations	Procurement process resulted in lower pricing.
Transmission	\$ 56,105	C0021104	L5550 Replacements and Upgrades Phase 1	Contracts	Efficiencies - Process	Matting contractor hired directly which eliminated markup costs related to subcontracting.
Transmission	\$ 23,485	52285	L5524 Replacements and Upgrades	Contracts	Efficiencies - Process	Matting contractor hired directly which eliminated markup costs related to subcontracting.
Transmission	\$ 20,998	C0011338	L5548 - Replacements and Upgrades	Contracts	Efficiencies - Process	Matting contractor hired directly which eliminated markup costs related to subcontracting.
Transmission	\$ 18,419	C0021106	L7005 Replacements and Upgrades Phase 1	Contracts	Efficiencies - Process	Matting contractor hired directly which eliminated markup costs related to subcontracting.
Transmission	\$ 10,795	23118	Provincial - Planned Trans Line Replacements	Contracts	Efficiencies - Process	Matting contractor hired directly which eliminated markup costs related to subcontracting.
Transmission	\$ 6,343	44987	L7003 Lidar Upgrades	Contracts	Efficiencies - Process	Matting contractor hired directly which eliminated markup costs related to subcontracting.

Auto Transformer Management Plan

In its decision approving the 2021 ACE Plan, the NSUARB directed as follows:

Report back to the Board as to the status of the management plan for the autotransformer fleet, as part of the 2022 ACE Plan filing.

In accordance with the NSUARB's direction, the following is a report on NS Power's Auto Transformer Management Plan.

Transformers are critical assets required to deliver energy from the generating units over transmission assets to customers. Transmission substation transformers are typically installed in pairs, where one transformer provides contingency for the failure of the other, and where each unit is rated to supply the total expected load at the station. This provides a suitable contingency supply during the period required to order a replacement unit or install a system spare for longer term coverage.

NS Power has ten similar-sized 138-69 kV autotransformers in service throughout the province. While NS Power's grid is robust enough to withstand many single contingency scenarios brought about by a failure of one of these units, it comes at a cost to the flexibility of the transmission system and reduced ability to withstand additional contingencies.

NS Power's risk mitigation strategy for the autotransformer fleet includes the purchase of a system spare, to be deployed (and replaced) in the case of an unplanned failure, combined with planned replacement of the aging assets over the next several years. Typical response to a power transformer failure within a distribution substation has consisted of the temporary installation of a mobile substation transformer followed by the semi-permanent installation of a system spare transformer. Long term installation of a mobile is not desirable as it makes the unit unavailable for rapid deployment to other system failures and leaves it exposed to possible damage due to system faults. The most desirable state is to have sufficient out-of-service spare transformer inventory to perform long-term backup of transformer failures in order to keep the mobile fleet free to promptly respond to unexpected transformer failures. **Figure 1** outlines NS Power's risk profile for the autotransformer fleet with projected replacement years. NS Power utilizes a standardized method of evaluating asset risk and bases replacements, refurbishments, repairs, spares procurement, or other measures requiring capital investment upon the risk profile of the entire asset base. Replacement decisions are made when the risk of a given asset determines that mitigation is required, and that refurbishment or repair is not technically or economically justified. Actual replacement dates will be directed by updated condition assessment and forecast utilization in alignment with generation unit decommissioning. These plans are updated at minimum once per year to align with the Company's long term planning assumptions, to minimize investment for customers.

Figure 1

138kV Substation	Unit	Manufactured	Criticality	Condition	Risk	Tentative Replacement Year	Current Mitigation
99W - Bridgewater	99W-T61	1982	4	3	12	>2030	
90H - Sackville	90H-T1	1965	3	4	12	2024	
91H – Tufts Cove	91H-T11	1959	4	4	16	2023	Tap changer controls no longer functioning remotely. Manual control still functional and adequate.
	91H-T62	1981	4	2	8	>2030	
1N - Onslow	1N-T1	1978	3	3	9	2028	
	1N-T4	1975	3	3	9	2026	
50N - Trenton	50N-T8	1969	4	4	16	2025	Gasket/sealing systems deteriorated, environmental mitigation in place.
	50N-T12	1975	4	4	16	2030	
2S – Victoria Junction	2S-T1	2016	4	2	8	>2060	
	2S-T2	1972	4	4	16	2024	Gasket/sealing systems deteriorated, environmental mitigation in place.