

47751

ECCDynamic Line Rating Implementation

NON-CONFIDENTIAL

December 1, 2025



NSEB APPROVAL SHEET

Project Title: ECC Dynamic Line Rating Implementation

CI Number: 47751

Date: December 1, 2025

Expenditure Profile			Type of Filing	
Year	Budget Amount	Project Estimate	☒	Capital Project Authorization
			☐	Unforeseen and Unbudgeted (U&U)
			☐	Planned & Advanced (P&A)
			☐	Subsequent Approval Item
2015		312		
2016		753		
2017		51,159		
2018		100,800		
2019		66,798		
2020		7,098		
2021		42,060		
2022		17,299		
2023		(3,049)		
2024	133,979	18,817		
2025	716,102	1,846,317		
2026	118,141			
Total	\$968,222	\$2,148,364		

COMMENTS

This project was originally submitted in September 2024 as a P&A project for \$2,079,681, and subsequently withdrawn due to additional funding bringing the total project cost to <\$1M. The project was therefore included in the 2025 ACE Plan as a carryover project <\$1M, and is now forecasting to be >\$1M.

Submitted on behalf of NOVA SCOTIA POWER INCORPORATED



Authorized Signatory

Dave Pickles

Chief Operating Officer

DATE

November 27, 2025

Approved on behalf of NOVA SCOTIA ENERGY BOARD

DATE

CI Number: 47751**Title: ECC Dynamic Line Rating Implementation**

Start Date: 2015/11
In-Service Date: 2025/10
Final Cost Date: 2026/04
Function: General Plant
Forecast Amount: \$2,148,364

DESCRIPTION:

This project will implement a real time monitoring system to improve both situational awareness and condition monitoring of NS Power's Bulk Electric System. 129 line monitoring devices (sensors) will be installed on Transmission lines L-6515a; L-6515b; L-7003; L-7004; L-7005; L-8001, and L-8004. The sensors will communicate through a cellular network to the data collection system and analysis software to populate the NS Power SCADA System with real time dynamic line ratings (DLR) and up to 72-hour forecasting of ratings for each of these lines.

Implementation of these new Grid Enhancing Technology (GET) tools allows real time situational awareness to be leveraged by System Operators to support transmission operations under normal and adverse weather conditions. The system measures actual local environmental conditions such as wind speed, ambient temperature, and ice accretion, as well as asset conditions including galloping, excessive sag, and conductor creep as they occur on monitored transmission lines. These conditions are continuously updated in NS Power's SCADA system, analyzed, and displayed in real time to the System Operators to enable critical decision making in support of reliable transmission operations. The resulting data sets are also available to System Planning, System Security Engineering and other teams for further analysis, monitoring, and historical data that can be integrated into the overall asset management strategies for these transmission lines.

FERC has stated that "the use of DLRs generally allows for greater power flows than would otherwise be allowed and that their use can also detect situations where power flows should be reduced to maintain safe and reliable operation and avoid unnecessary wear on transmission equipment."¹ NS Power's backbone transmission system allows for power flow from in-province and out-of-province generation sources to load centres throughout Nova Scotia. As a result, these corridors are an important link for energy supply, and they contribute to overall system stability. As NS Power's generation mix continues to evolve, including new renewable energy projects and dispatchable generation sources, optimizing the use of transmission corridors plays an increasingly important role. Compared with NS Power's existing approaches using Seasonally Adjusted Ratings, this project is intended to deliver a real-time and more detailed understanding of the environmental and conductor conditions in conjunction with real-time line ratings and up to 72-hour forecasted ratings; enabling operators and engineering staff to make more informed decisions on the operation of the system. Maximizing the flexibility of the transmission system under various operational scenarios through this approach enables NS Power to access any additional and previously untapped capacity.

The situational awareness provided by this solution becomes important during major weather events where adverse conditions can occur, such as those experienced during the ice storms in November 2018 and January 2021, and the cold weather event of February 2023. The transmission rights-of-way (ROW) where these lines are located are typically remote and can be a long distance from existing monitoring devices such as Environment Canada weather stations. The lack of available real-time data limits an operator's ability to estimate or confirm environmental conditions at specific transmission line sites which may be exposed to different elevations, temperatures, precipitation, and/or wind speeds than the nearest measured reference point. Consequently, early warning of conditions negatively impacting transmission lines is not available.

NS Power previously applied for approval of this project in December 2019. On April 14, 2020, the Board issued its Decision and declined to approve the project at that time as the Board could not conclude that the benefits associated with the proposed project outweighed its costs and noted that NS Power could re-apply for the approval once it had addressed the Board's concerns noted in its Decision. NS Power then re-applied for approval of this project in September 2024 and subsequently withdrew its application in October 2024, as the Company was able to secure federal funding, resulting in the total project cost ending up at less than \$1 million. This submission incorporates

¹ <https://www.ferc.gov/media/ad22-5-000>, Section 5 page 4

additional deployment scope, as described below, and responds to the Board's concerns raised at the time of its 2020 Decision and incorporates additional information since the aforementioned September 2024 submission.

Summary of Related CIs +/- 2 years

Pursuant to Section 11.2 of the CEJC, related CIs for General Plant include "work completed on the same asset (application, building, etc.)."

- 2024 C0061525 ECC Facility Ratings \$981,603

Depreciation Class: General Plant – Remote Monitoring Equipment

Estimated Life of Asset: 15-20 Years

JUSTIFICATION:

Justification Criteria: Innovation

Sub Criteria: Reliability and Grid Stability

Why do this project?

Improving situational awareness through the implementation of real-time monitoring technology will yield tangible benefits for the NS Power system including added operating flexibility through real time capacity awareness and support achieving legislated decarbonization targets. The increase in frequency and severity of adverse weather events increases reliability risk to be offset by the enhanced monitoring capabilities that the Dynamic Line Ratings (DLR) Implementation project will provide.

Increased monitoring of field conditions along a key transmission corridor provides advanced notice of emerging environmental conditions that could pose risks to system operation. Existing weather stations operated and maintained by Environment and Climate Change Canada do not provide comprehensive coverage along the corridor length and cannot capture local impacts due to geography and topography that influence conditions directly at each transmission line site. In particular, the local adverse conditions at higher elevations during the November 28, 2018, icing event were not reflected in available data from existing stations. As climate change accelerates, NS Power is faced with the potential for more frequent and severe weather impacting the NS Power system. The improved accuracy and resolution of real-time environmental and asset condition monitoring offered by this project will contribute to strengthening overall transmission reliability and resiliency. Evaluating line conditions using an enhanced monitoring solution is reflected in emerging best practice discussions and forums for a number of Canadian Utilities. NS Power understands that implementing this technology aligns with other Canadian Utilities such as SaskPower, Hydro Quebec, BC Hydro, and Manitoba Hydro who have implemented or are in the process of implementing line monitoring technology to help mitigate these risks.

In addition to environmental conditions, the proposed project can also provide valuable insight into transmission asset condition through monitoring of conductor sag, annealing, and creep under normal conditions. Combined with other engineering datasets such as LiDAR surveys, loading information, and digital structural models, detailed assessments of conductor condition and the resulting impact on operations can be undertaken by subject matter experts. In line with asset management best practice, as existing transmission assets age over time, such analysis can be included as a valuable indicator for future risk-based decision making.

As NS Power continues to transition towards a lower-carbon electricity mix, the ability for the transmission system to accommodate the changing generation fleet is essential. Improved awareness of transmission capacity provides additional flexibility to renewable energy dispatch. The enhanced situational awareness and analysis capabilities provided by this project will enable System Operators to optimize corridor capability in real-time for generation dispatch variations as well as local weather conditions, improving utilization of these transmission lines in the short and long term. Overall, mitigating transmission congestion risks through application of monitoring technology as proposed can enable more options for generation and import configurations, supporting Nova Scotia's goals for a lower carbon future.

Why do this project now?

Climate change increases the risk of severe and frequent weather events with the potential for significant disruption to NS Power's transmission system. NS Power continues to explore and evaluate the asset risks posed by a changing climate. Based on climate projections for Nova Scotia, icing events such as those experienced in November 2018 and January 2021 continue to pose a risk to transmission reliability, and their frequency could increase during November to April periods. This coincides with the peak system load period from December to March each year. Even in cases where lines do not trip during icing events, the added line sag resulting from the added weight of ice accretion can impinge on safe clearances, increasing risks to public safety.

Implementing the project at this time will provide enhanced monitoring for future events and allow system operators to gain valuable experience in using data outputs to guide corrective actions during adverse weather conditions. Legislated renewable energy targets and coal phase-out targets to 2030 as well as projected electrification levels require NS Power to leverage additional tools and resources to meet these goals. As a result, the criticality of these specific transmission lines (corridors) is only expected to rise in the coming years.

Additionally, Natural Resources Canada's Electricity Predevelopment Program (which concludes in 2025) committed \$5.2M in funding support for this project. This conclusion date is another contributing factor to implementing now.

Finally, FERC has indicated its intent to improve overall transmission line rating methodology in North America, which is anticipated to result in additional NERC requirements in the future and will necessitate new supporting tools at NS Power to ensure compliance. Depending on the scope and timeline of FERC's adjustments and subsequent NERC compliance requirements, NS Power will likely be required to implement new technology across its bulk electric system. This project provides both a proactive step towards full implementation as well as hands-on experience that can be leveraged to improve subsequent installations, as appropriate, to comply with future NERC requirements. Based on the outcomes of this implementation, NS Power anticipates continuing to implement DLR on critical Transmission Lines.

There is currently a project in progress (C0061525 - Facility Ratings Project) to implement an Ambient Adjusted Rating (AAR) solution on all transmission lines. This combined approach to have AAR on all transmission lines with the added functionality of DLR available on the most critical transmission lines will help bolster grid efficiency, resiliency and reliability.

Why do this project this way?

Real-time, instrumented, situational awareness of critical transmission corridors is the most effective approach to realize the numerous benefits and support the future regulatory targets outlined above.

Realizing the benefits of a flexible and responsive transmission system as illustrated above and in line with the proposed project timeline, supports not only the desired end goals but also enables valuable operational experience to evaluate other opportunities for transmission monitoring across the province.

This approach provides more useable and accurate results for identifying and mitigating adverse weather risks to the transmission system compared with relying on weather sources that update less frequently and have no way to capture specific ROW conditions such as local icing. A model-only alternative Seasonally Adjusted Ratings (SAR) approach based on pre-event weather forecasts and external measures of environmental conditions away from the line itself lacks the necessary accuracy and granularity to determine timely on-site conditions. As illustrated in previous icing events, weather reports for an area are not necessarily transmission site-specific. Local conditions can have acute impacts on the effective operation of the transmission line and corridor overall. Many of NS Power's transmission corridors pass through areas with limited weather station coverage. Without an understanding of local conditions, any subsequent calculations to evaluate transmission line risk would be subject to uncertainty in both necessary inputs and final outputs. The more detailed information provided by the proposed solution also enables enhanced engineering analysis, contributing to improved understanding of asset condition. In both cases, this project contributes to improved transmission reliability and improving resiliency against resulting customer outages.

In March of 2024, NS Power conducted an RFP seeking a suitable vendor for this implementation. Eight vendors responded and all responses were reviewed in detail. The final decision and contract award was based on meeting the RFP key criteria and best suitability to NS Power operations as well as the proposed solution's ability to integrate and

function within NS Power's existing technical and physical infrastructure. The selected vendor met this criterion and also happened to be the lowest bid.

Compared with available alternatives, this project provides real-time awareness of transmission line capacity and operating limits, supporting the transition from carbon-intensive generation sources toward more renewables and imports as appropriate in each situation. Unlike a new line or thermal upgrade project, this project inherently delivers valuable situational awareness of conditions to system operators.

Finally, the implementation as outlined in the project provides a strong foundation for future development of situational awareness and real-time line rating on additional critical corridors across NS Power's transmission system. The modular design of this solution enables efficient expansion as appropriate to meet operational requirements, industry best practice, as well as potential future directives from FERC related to DLR. Considering intensifying weather events driven by climate change and the increasing dependence on transmission for delivery of clean out-of-province generation under the coal-to-clean mandate, investment in this technology will enable NS Power to mitigate these adverse effects and preserve the reliability of the backbone transmission system. Deploying DLR through this project allows NS Power to acquire valuable data and learnings, to test and gain experience with the technology before deploying at scale. This will aid in the selection of the best candidates for potential future sensor deployment in other critical areas.

Contingency Statement

This project is being filed as a Class 0 estimate. This project is well into the execution phase at the time of this project filing and the key milestones (installation and testing) have been completed. The remaining tasks are training, cut-over planning and project go live and as such 0 percent contingency is being applied.

Reason for Variance

This project was submitted in September 2024 as a Planned & Advanced (P&A) project, for \$2,079,681, and was subsequently withdrawn as the Company was able to secure additional NRCan funding which resulted in the total project cost falling below \$1 million at that time. As a result, the project was listed in the 2025 ACE Plan as a carryover project with total project estimate of less than \$1 million.

The increase of \$1,180,142 from the 2025 ACE Plan carryover estimate of \$968,222 to the total of \$2,148,364 (inclusive of Federal funding), is due to the increase of sensors to be included in the project execution.

The original project execution included sensors for only five transmission lines within the Cape Breton Export Corridor. After further review and deliberation in spring of 2025, NS Power decided to increase the sensor count to include the NB Import Transmission Line, rather than waiting for a second project to complete that next priority. Including the NB Import Line also impacted the approach to sensor installation as that area has significant geographical accessibility and terrain challenges and associated costs to overcome. This decision led to the project estimate increase and the requirement to file as over \$1 million.

Capital Project Detailed Estimate

Location: General Plant

C# : 47751

Title: ECC Dynamic Line Rating Implementation

Execution Year: 2025

Description	Unit	Quantity	Unit Estimate	Total Estimate	Cost Support Reference	Completed Similar Projects (FP#s)
Regular Labour						
Sr. Engineer Operations	PD	8	\$ 425	\$ 3,400		
SCADA Programmer	PD	45	\$ 425	\$ 19,125		
IT Security	PD	3	\$ 425	\$ 1,275		
System Operator	PD	35	\$ 670	\$ 23,450		
Misc System Operations resources	PD	20	\$ 425	\$ 8,500		
Telecom/Field resources	PD	14	\$ 375	\$ 5,250		
IT Labour (Integration - Middleware)	PD	11	\$ 425	\$ 4,675		
Field Projects Lead	PD	13	\$ 425	\$ 5,525		
Transmission Engineering Lead	PD	12	\$ 425	\$ 5,030		
Work Plan Manager Transmission	PD	16	\$ 425	\$ 6,800		
			Sub-Total	\$ 83,030		
OT Labour						
IT Labour (Integration - Middleware)	PD	3	\$ 850	\$ 2,170		
			Sub-Total	\$ 2,170		
Term Labour						
Program Manager	PD	74	\$ 490	\$ 36,197		
			Sub-Total	\$ 36,197		
OT Term Labour						
Program Manager	PD	8	\$ 490	\$ 4,086		
			Sub-Total	\$ 4,086		
Hardware						
Transmission Line Sensors	Lot	129	\$ 33,467	\$ 4,317,200		
			Sub-Total	\$ 4,317,200		
Software						
SCADA DLR Software Module	Lot	1	\$ 350,000	\$ 350,000		
SCADA Integration Module	Lot	1	\$ 158,916	\$ 158,916		
Vendor Technology Software	Lot	1	\$ 335,575	\$ 335,575		
			Sub-Total	\$ 844,491		
Consulting						
Project Manager	Lot	300	\$ 1,200	\$ 360,000		
Senior Business Analyst	Lot	210	\$ 900	\$ 189,000		
Business Analyst	Lot	225	\$ 1,200	\$ 270,000		
			Sub-Total	\$ 819,000		
Contracts						
Industry Expert Review	Lot	1	\$ 25,790	\$ 25,790		
Pilot Sensor Installation Contractor Installation	Lot	1	\$ 10,954	\$ 10,954		
Field Installation Helicopter	Lot	1	\$ 895,000	\$ 895,000		
			Sub-Total	\$ 931,744		
Travel Expenses						
Conference Attendance	Lot	1	\$ 4,113	\$ 4,113		
			Sub-Total	\$ 4,113		
Interest Capitalized						
AFUDC				\$ 134,608		
			Sub-Total	\$ 134,608		
Administrative Overhead						
Labour AO				\$ 82,909		
Contractor AO				\$ 135,862		
			Sub-Total	\$ 218,771		
SUB-TOTAL (no AO, AFUDC)					\$ 7,042,032	
Capital Contributions						
NRCan					\$ (5,247,047)	
TOTAL (AO, AFUDC included)					\$ 2,148,364	
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.



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

Document No: XXX-XX-XXXX-XXXX

Project Cost Estimate Input Checklist and Maturity Matrix						
Dynamic Line Rating	Required fields:	Estimate Classification				
Project Name: ECC Dynamic Line Rating Implementation	Started or Preliminary	Class 5	Class 4	Class 3	Class 2	Class 1
Maturity Level of Project Definition Deliverables	Defined or Complete					
General Project Data						
A. Scope						
Project Scope of Work Description	Defined (D)	P	P	D	D	D
B. Capacity						
Not Applicable						
C. Project Location						
Energy Control Centre (ECC); Distribution Control Centre (DCC); Back Up Control Centre	Defined (D)	P	P	D	D	D
D. Requirements						
Codes and/or Standards	Defined (D)	NR	P	D	D	D
Legislative Requirements	Defined (D)	NR	P	D	D	D
E. Technology Selection						
Design/Technology	Defined (D)	NR	P	D	D	D
F. Strategy						
Internal/External Resourcing	Defined (D)	NR	P	D	D	D
Solution Contracting / RFP	Defined (D)	NR	P	D	D	D
G. Planning						
Cross Team Planning (i.e., ECC/Power Generation/Corporate Security/IT Security)	Defined (D)	P	P	P	D	D
Integrated Project Plan	Defined (D)	NR	P	D	D	D
Project Code of Accounts	Defined (D)	NR	P	D	D	D
Project Schedule	Defined (D)	NR	P	D	D	D
ECC Leadership (Sponsor) approval to proceed	Defined (D)	NR	P	D	D	D
Risk Register	Defined (D)	NR	P	D	D	D
Stakeholder Consultation/Engagement/Management Plan	Defined (D)	NR	P	D	D	D
Work Breakdown Structure (WBS)	Defined (D)	NR	P	D	D	D
Start-up & Commissioning Plan	Defined (D)	NR	P	P/D	D	D
Technical Deliverables (Specifications and/or Drawings)						
Network Infrastructure	Complete (C)	P	P	C	C	C
Data Architecture	Complete (C)	P	P	C	C	C
Security Assessment	Complete (C)	NR	P	C	C	C
Solution Integration	Complete (C)	NR	P	C	C	C
Information Systems/Telecommunication Drawings	Complete (C)	NR	P	C	C	C
Total Responses	Total # Deliverables for this Project	5	21	21	21	21
Percentage	% Defined/Complete towards Class Estimate	100%	100%	100%	100%	100%

Comments:

This project is being filed as a Class 0 estimate. This project is well into the execution phase at the time of this project filing and the key milestones (installation and testing) have been completed. The remaining tasks are training, cut-over planning and project go live and as such 0% contingency is being applied.

Legend:

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

General Project Data:

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

Technical Deliverables:

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