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April 6, 2022

Board of Commissioners of Public Utilities  
Prince Charles Building  
120 Torbay Road, P.O. Box 21040  
St. John's, NL A1A 5B2

Attention: Ms. Cheryl Blundon  
Director of Corporate Services and Board Secretary

Dear Ms. Blundon:

**Re: Application for Approval to Purchase and Install a Diesel Engine at the Mary's Harbour Diesel Generating Station**

Please find enclosed Newfoundland and Labrador Hydro's application for approval to purchase and install a new diesel engine to replace the failed engine at the Mary's Harbour Generating Station. This project is required to ensure the provision of reliable service in Mary's Harbour. The cost of this project is \$137,700.

Should you have any questions, please contact the undersigned.

Yours truly,

**NEWFOUNDLAND AND LABRADOR HYDRO**

---

Shirley A. Walsh  
Senior Legal Counsel, Regulatory  
SAW/sk

Encl.

ecc:

**Board of Commissioners of Public Utilities**

Jacqui H. Glynn  
PUB Official Email

**Consumer Advocate**

Dennis M. Browne, QC, Browne Fitzgerald Morgan & Avis  
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Sarah G. Fitzgerald, Browne Fitzgerald Morgan & Avis  
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# **Application for Approval to Purchase and Install a Diesel Engine for the Mary's Harbour Diesel Generating Station**

**April 6, 2022**



**An application to the Board of Commissioners of Public Utilities**

**IN THE MATTER OF** the *Electrical Power Control Act, 1994*, SNL 1994, Chapter E-5.1 ("*EPCA*") and the *Public Utilities Act, RSNL 1990*, Chapter P-47 ("*Act*"), and regulations thereunder; and

**IN THE MATTER OF** an application by Newfoundland and Labrador Hydro ("*Hydro*") for approval of the purchase and installation of a new diesel engine for the Mary's Harbour Diesel Generating Station pursuant to s 41(3) of the *Act*.

**To: The Board of Commissioners of Public Utilities ("*Board*")**

**THE APPLICATION OF NEWFOUNDLAND AND LABRADOR HYDRO STATES THAT:**

**A. Background**

1. Hydro is a corporation continued and existing under the *Hydro Corporation Act, 2007*, is a public utility within the meaning of the *Act*, and is subject to the provisions of the *EPCA*.

**B. Application**

2. Hydro has 23 diesel generating stations, 18 of which are prime power stations. These prime power stations are not interconnected to the grid and serve as the primary source of capacity and energy for isolated systems. The 18 prime power stations serve approximately 4,400 customers.
3. The Mary's Harbour holds two 545 kW units (Unit 2093 and Unit 2103) and a 725 kW unit (Unit 2104), all of which are used to provide electrical service to the community. In addition to fixed generation, the Mary's Harbour Diesel Generating Station has a 725 kW mobile unit (Unit 2090), which is operated during the summer months to serve additional load associated with fish processing.

4. Unit 2093, installed in 2016, was the most utilized unit in Mary's Harbour, running for an average of 4,900 hours annually. It had reached the level of operating hours requiring a unit overhaul in 2019 when the engine was replaced rather than overhauled, as replacement was the least-cost option at that time. The next planned overhaul for the unit was scheduled for 2024, once it reached 40,000 hours. The unit had historically operated reliably and its planned maintenance was up to date. There had not been any issues with Unit 2093 until March 6, 2022, when it experienced a catastrophic engine failure.
5. At the time of Unit 2093's engine failure, detailed in the supplemental report attached as Schedule 1, the unit was online along with Unit 2104, serving the town load.
6. The damage to Unit 2093's engine included a damaged crankshaft and connecting rod that punctured the engine block in two places. The Unit's engine is not repairable; therefore, a replacement engine is required.
7. Without all three generating units during the winter, peak loads could exceed the firm capacity of the Mary's Harbour System, resulting in outages to customers. The mobile unit installed in Mary's Harbour cannot operate reliably in the winter months; therefore, it is not considered in determining firm capacity.
8. In the short term, to mitigate the reliability risks, Hydro plans to install the original engine from Unit 2093, which was retired in 2019. However, this is a short-term solution as the engine has operated for more than 22,000 hours and is overdue for an overhaul, which is more costly than procuring a replacement engine, as detailed in Schedule 1. The use of the retired engine is an emergency solution only, allowing Hydro to continue to serve Mary's Harbour customers through the winter operating season while also carrying out planned maintenance on the remaining units.
9. Schedule 1 describes the alternatives Hydro considered for the continued supply of power to Mary's Harbour. In addition to the possibility of deferral, the alternatives considered included the overhaul of the engine removed from the unit in 2019 or the replacement of the full genset. A discussion of these options is included in Schedule 1 with the conclusion being that the purchase of a new 545 kW engine at a cost of \$137,700 is the most appropriate and least-cost option.

**C. Hydro's Request**

10. Hydro requests that the Board make an order pursuant to Section 41(3) of the *Act* approving Hydro's acquisition and installation of a 545 kW diesel engine for use in the Mary's Harbour Diesel Generating Station to enable the continued supply of reliable power to Mary's Harbour.

**D. Communications**

11. Communications with respect to this application should be forwarded to Shirley A. Walsh, Senior Legal Counsel, Regulatory for Hydro.

**DATED** at St. John's in the Province of Newfoundland and Labrador this 6th day of April, 2022.

**NEWFOUNDLAND AND LABRADOR HYDRO**



---

Shirley A. Walsh  
Counsel for the Applicant  
Newfoundland and Labrador Hydro,  
500 Columbus Drive, P.O. Box 12400  
St. John's, NL A1B 4K7  
Telephone: (709) 685-4973



# **Schedule 1**

## **Mary's Harbour Diesel Engine Replacement Report**

# Mary's Harbour Diesel Engine Replacement

**April 6, 2022**



**A report to the Board of Commissioners of Public Utilities**

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## 1.0 Introduction

Newfoundland and Labrador Hydro ("Hydro") has 23 diesel generating stations, 18 of which are prime power stations.<sup>1</sup> The 18 prime power stations serve approximately 4,400 customers. The Mary's Harbour Diesel Generating Station presently has three diesel generating units ("gensets")<sup>2</sup> serving the community, Unit 2093; Unit 2103; and Unit 2104. The generating station also has a mobile unit that is used in the summer season when the fish plant is online, Unit 2090. Isolated diesel generating stations are designed to ensure that firm power can be delivered in the event of failure of the largest generation unit.

On March 6, 2022 at 6:30 p.m., Unit 2093 and Unit 2104 were online serving the town load when Unit 2093 experienced a catastrophic engine failure. To maintain supply to the town, Hydro started Unit 2103. The initial investigation showed a broken crankshaft and connecting rod that punched two holes in the engine block, as shown in photos in Appendix A. The engine is not repairable and a new engine must be purchased to return the genset to service.



Figure 1: Mary's Harbour Diesel Generating Station

<sup>1</sup> Prime power stations are not interconnected to the grid and rely on the power supplied by the diesel generation units for capacity and energy.

<sup>2</sup> A diesel genset consists of a diesel engine coupled with an alternator.

1 **2.0 Background**

2 **2.1 Existing System**

3 The Mary's Harbour Generating Station presently has three gensets serving the community: Unit 2093  
4 (545 kW); Unit 2103 (545 kW); and Unit 2104 (725 kW). The generating station also has a mobile unit  
5 that is used in the summer season when the fish plant is online, Unit 2090 (725 kW mobile). Unit 2093 is  
6 a CAT C18 genset, installed in 2016, and currently has 31,417 operating hours. In 2019, it reached  
7 20,000 operating hours and was due for its first overhaul; however, as a new engine was the least-cost  
8 option at that time, the engine was replaced rather than overhauled. Unit 2093 was forecasted to have  
9 its next overhaul in 2024, once the genset reached 40,000 operating hours.

10 **2.2 Operating Experience & Maintenance History**

11 Unit 2093 had a history of being a reliable unit and showed no signs of issues leading up to the  
12 unexpected engine failure on March 6, 2022. It was the most utilized unit in Mary's Harbour over the  
13 past five years, running for an average of 4,900 hours annually. It consistently had good oil sample  
14 results and planned maintenance was up to date. The engine, a replacement in 2019, had operated for  
15 10,466 hours without any issues up to its catastrophic failure.

16 **3.0 Justification**

17 **3.1 Operational Impact**

18 Unit 2093 is one of three units in the Mary's Harbour Diesel Generating Station that are relied upon  
19 year-round; the mobile unit is not used during the winter season, when heavy snow can impede  
20 operation and maintenance of the unit. Unit 2093 operates for approximately 4,900 hours annually on  
21 average, making it the most utilized genset in the generating station. Without this genset available,  
22 Hydro is in violation of its firm capacity and is at risk of not being able to meet peak loads during the  
23 winter, which would result in outages to customers. A replacement engine must be procured to  
24 maintain reliability to the Mary's Harbour System.

25 Until a new engine can be procured, Hydro will be using a retired C18 engine, which was removed from  
26 Unit 2093 during the 2019 overhaul after 20,951 hours and is at end-of-life. The engine now has in  
27 excess of 22,000 hours as, in 2021, it was used for approximately 1,000 hours at the Port Hope Simpsons  
28 Diesel Generating Station after Unit 2099 experienced an engine failure. This engine is considered a  
29 short-term solution as it cannot be expected to operate reliably beyond 20,000 hours and would require

1 an overhaul to operate reliably. As was the case when it was replaced instead of overhauled in 2019,  
2 this is not a cost-effective solution as it is more expensive than purchasing a new engine. This engine will  
3 serve as emergency use only and will allow operations to do planned maintenance on Units 2103 and  
4 2104 during winter without customer outages.

## 5 **4.0 Analysis**

### 6 **4.1 Identification of Alternatives**

7 Hydro has identified the following alternatives:

- 8 • Alternative 1: Replace the engine with a new 545 kW engine;
- 9 • Alternative 2: Overhaul the retired 545 kW engine; and
- 10 • Alternative 3: Replace the genset with a new 545 kW genset.

### 11 **4.2 Evaluation of Alternatives**

12 Alternative 1 involves ordering a direct replacement engine from CAT for a purchase price of \$99,500  
13 with a total project cost of \$137,800. It is the least-cost option and ensures the highest reliability going  
14 forward.

15 Alternative 2 involves ordering the required parts to overhaul the retired C18 engine and performing the  
16 overhaul using Hydro's maintenance personnel. This cost is estimated to be \$200,000.

17 Alternative 3 involves ordering a full genset, with an estimated project cost of \$400,000.

18 Alternative 1 is the most cost-effective solution and ensures a high level of reliability and confidence in  
19 the genset moving forward. The new engine has an estimated lead time of 45 weeks; however, the  
20 vendor has indicated that this may improve once the order is placed.

## 21 **5.0 Project Description**

22 This project will include the procurement, shipping, and installation of a new 545 kW CAT C18 engine to  
23 replace Unit 2093's failed engine. Modifications to any existing equipment are not required as it is a  
24 direct replacement. Completion of the installation is expected to be within five to ten days of receipt of  
25 the new engine.

**Table 1: Project Estimate (\$000)**

<b>Project Cost</b>	<b>2022</b>	<b>2023</b>	<b>Beyond</b>	<b>Total</b>
Material Supply	0.0	109.5	0.0	<b>109.5</b>
Labour	0.0	11.4	0.0	<b>11.4</b>
Consultant	0.0	0.0	0.0	<b>0.0</b>
Contract Work	0.0	0.0	0.0	<b>0.0</b>
Other Direct Costs	0.0	0.0	0.0	<b>0.0</b>
Interest and Escalation	0.0	5.8	0.0	<b>5.8</b>
Contingency	0.0	11.0	0.0	<b>11.0</b>
<b>Total</b>	<b>0.0</b>	<b>137.7</b>	<b>0.0</b>	<b>137.7</b>

**Table 2: Project Schedule**

<b>Activity</b>	<b>Start Date</b>	<b>End Date</b>
Planning:		
Open work order and plan and develop detailed schedules	April 2022	May 2022
Procurement:		
Purchase new engine from CAT	April 2022	January 2023
Construction:		
Remove spare engine and replace with new	January 2023	January 2023
Commissioning		
Run up the new engine and perform tests	January 2023	February 2023
Close-Out:		
Close work order, complete all documentation, and complete lessons learned.	February 2023	February 2023

## 1 **6.0 Conclusion**

2 On March 6, 2022, the engine of Unit 2093 at the Mary's Harbour Diesel Generating Station failed and  
 3 cannot be repaired. Returning Unit 2093 to service is necessary to meet the firm capacity requirements  
 4 for the community of Mary's Harbour. The least-cost option to return Unit 2093 to service is to replace  
 5 the failed engine with a new engine rated for 545 kW. Unit 2093 will be mated with a retired engine for  
 6 emergency use only as a short-term solution until the new engine arrives. Replacement of Unit 2093 will  
 7 help ensure reliable service for the community of Mary's Harbour until the planned interconnection of  
 8 Mary's Harbour to the proposed southern Labrador interconnection system, should Hydro's application  
 9 for the long-term supply for southern Labrador be approved by the Board.<sup>3</sup> Upon the planned

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<sup>3</sup> "Long-Term Supply for Southern Labrador – Phase 1," Newfoundland and Labrador Hydro, July 16, 2021.

- 1 retirement of the Mary's Harbour Diesel Generating Station in 2030, Hydro will assess the condition and
- 2 remaining life of Unit 2093 and, if appropriate, will seek opportunities to deploy the unit elsewhere if
- 3 deemed necessary at that time.

# Appendix A

## Photos



Figure A-1: Unit 2093 with Damaged Engine Block and Oil Spilled on Floor



Figure A-2: Hole in the Engine Block where the Connecting Rod was Ejected from the Engine





Figure A-3: Oil Spilled from Engine, due to Holes in the Engine Block, which was contained and remediated.



# Affidavit

**IN THE MATTER OF** the *Electrical Power Control Act, 1994*, SNL 1994, Chapter E-5.1 ("*EPCA*") and the *Public Utilities Act*, RSNL 1990, Chapter P-47 ("*Act*"), and regulations thereunder; and

**IN THE MATTER OF** an application by Newfoundland and Labrador Hydro ("*Hydro*") for approval of the purchase and installation of a new diesel engine for the Mary's Harbour Diesel Generating Station pursuant to s 41(3) of the *Act*.

**AFFIDAVIT**

I, Robert Collett, of St. John's in the Province of Newfoundland and Labrador, make oath and say as follows:

1. I am Vice President, Engineering and NL System Operator for Newfoundland and Labrador Hydro, the applicant named in the attached application.
2. I have read and understand the foregoing application.
3. To the best of my knowledge, information, and belief, all of the matters, facts, and things set out in this application are true.

**SWORN** at St. John's in the )  
Province of Newfoundland and )  
Labrador this 6th day of )  
April, 2022, before me: )

  
\_\_\_\_\_  
Barrister – Newfoundland and Labrador

  
\_\_\_\_\_  
Robert Collett, P. Eng.