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April 30, 2024

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

Attention: Jo-Anne Galarneau
Executive Director and Board Secretary

Re: Quarterly Report on Asset Performance in Support of Resource Adequacy for the Twelve Months Ended March 31, 2024

Please find enclosed Newfoundland and Labrador Hydro's ("Hydro") Quarterly Report on Asset Performance in Support of Resource Adequacy for the Twelve Months Ended March 31, 2024, formerly titled "Quarterly Report of Generating Units for the Twelve Months Ended []".Hydro has renamed this report to more accurately reflect the expansion of reporting beyond generating units, with the addition of the Equivalent Forced Outage Rate ("EqFOR") for the Labrador-Island Link (Section 8.0) and inclusion of operating hours for the Soldier's Pond Synchronous Condensers (Appendix A).

Should you have any questions, please contact the undersigned.

Yours truly,

NEWFOUNDLAND AND LABRADOR HYDRO

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

Encl.

ecc:

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Regulatory Email

Quarterly Report on Asset Performance in Support of Resource Adequacy

For the Twelve Months Ended March 31, 2024

April 30, 2024

A report to the Board of Commissioners of Public Utilities

newfoundland labrador hydro

Contents

List of Appendices

1.0 Introduction

In this report, Newfoundland and Labrador Hydro ("Hydro") provides data on forced outage rates of its generating facilities and the Labrador-Island Link ("LIL"). The data provided pertains to historical forced outage rates and assumptions Hydro uses in its assessments of resource adequacy. This report covers the performance for the current 12-month reporting period of April 1, 2023 to March 31, 2024 ("current period").

This report contains forced outage rates for the current period for individual generating units at regulated hydraulic facilities,[1] the Holyrood Thermal Generating Station ("Holyrood TGS"), Hydro's gas turbines, and the non-regulated Muskrat Falls Hydroelectric Generating Facility ("Muskrat Falls Facility"). In addition, forced outage rates are provided for the 900 MW[2] LIL. This report also provides, for comparison purposes, the individual asset forced outage rates for the 12-month reporting period of April 1, 2022 to March 31, 2023 ("previous period"). Further, total asset class data is presented based on the calendar year for the ten most recent years—2014 to 2023—with the exception of the Muskrat Falls Facility[3] and the LIL.[4,5]

The forced outage rates of Hydro's generating units are calculated using two measures:

1) DAFOR for the continuous (base-loaded) units; and

2) Derated adjusted utilization forced outage probability ("DAUFOP") for the standby units.

DAFOR is a metric that measures the percentage of time that a unit or group of units is unable to generate at its maximum continuous rating due to forced outages or unit deratings. The DAFOR for each

[1] Regulated hydraulic facilities include the Bay d'Espoir Hydroelectric Generating Facility ("Bay d'Espoir Facility" or "BDE"), the Cat Arm Hydroelectric Generating Station ("Cat Arm Station" or "CAT"), the Hinds Lake Hydroelectric Generating Station ("Hinds Lake Station" or "HLK"), the Upper Salmon Hydroelectric Generating Station ("Upper Salmon Station" or "USL"), the Granite Canal Hydroelectric Generating Station ("Granite Canal Station" or "GCL"), and the Paradise River Hydroelectric Generating Station ("Paradise River Station" or "PRV").

[2] The LIL has not yet been commissioned to 900 MW; it is currently rated at 700 MW. Hydro is now planning to execute the 900 MW pole overload test late in the fall of 2024 when higher system load conditions will next be present.

[3] The final generating unit at the Muskrat Falls Facility was released for commercial operation on November 25, 2021. Annual derated adjusted forced outage rate ("DAFOR") performance data is available beginning in 2022.

[4] The LIL was officially commissioned on April 13, 2023. Annual equivalent forced outage rate ("EqFOR") data will not be available until 2024 year end.

[5] In the "*Reliability and Resource Adequacy Study Review* – Labrador-Island Link Update for the Quarter Ended March 31, 2024," Newfoundland and Labrador Hydro, April 4, 2024,("Q1 2024 LIL Quarterly Update"), Hydro used the acronym "EFOR" as shorthand for the equivalent forced outage rate. In previous filings, Hydro has used "EFOR" to refer to equivalent forced outage rate *demand*, with "EqFOR" used for the equivalent forced outage rate. Hydro wishes to clarify that each instance of "EFOR" used in the Q1 2024 LIL Quarterly Update should have read as "EqFOR".

unit is weighted to reflect differences in generating unit sizes to provide a company total and reflect the relative impact a unit's performance has on overall generating performance. This measure is applied to hydraulic units and, historically, was used for the thermal units; however, it does not apply to gas turbines because of their operation as standby units and their relatively low operating hours.

DAUFOP is a metric that measures the percentage of time that a unit or group of units will encounter a forced outage and not be available when required. DAUFOP is a measure primarily used for gas turbines; however, this measure will be applicable to the thermal units as their operation moves towards standby operation in the future. This metric includes the impact of unit deratings.

The forced outage rates include outages that remove a unit from service completely as well as instances when units are derated. If a unit's output is reduced by more than 2%, the unit is considered derated under Electricity Canada guidelines. These guidelines require that the derated levels of a generating unit be calculated by converting the operating time at the derated level into an equivalent outage time.

As the LIL is not a generating unit, the above noted forced outage rate measures do not apply to this asset. Instead, Hydro has determined an appropriate metric to be an EqFOR to measure the performance of this asset as it relates to the supply of electricity to the Island. This EqFOR measures the percentage of time that the LIL bipole in unable to deliver its maximum continuous rating[6] to the Island due to forced outages, derates, or unplanned monopole outages. The effect of deratings and unplanned monopole outages is converted to equivalent bipole outage time using the same methodology as outlined above for generating units.

In addition to forced outage rates, this report provides details for those outages which occurred in the current period that contributed materially to forced outage rates exceeding those used in Hydro's resource adequacy planning analysis for both the near and long term.

[6] The LIL maximum continuous rating is 700 MW at present.

2.0 Assumptions Used in Hydro's Assessment of System Reliability and Resource Adequacy

Hydro continually assesses the reliability of its system and its ability to meet customer requirements, filing both near- and long-term assessments with the Board of Commissioners of Public Utilities.[7]

As part of the ongoing *Reliability and Resource Adequacy Study Review* proceeding, Hydro detailed the process undertaken for determining the forced outage rates most appropriate for use in its near-term reliability assessments and long-term resource adequacy analysis. Table 1 and Table 2 summarize the most recent forced outage rate assumptions, as determined using the forced outage rate methodology.[8] The forced outage rate methodology for the LIL is included in Section 8.0 of this report and will also be included in the upcoming filing of the Resource Adequacy Plan in the second quarter of 2024. Forced outage rate assumptions will be re-evaluated on an annual basis to incorporate the most recent data available.

Table 1: Hydro's Reliability and Resource Adequacy Study Analysis Values – Generating Units (%)

Asset Type	Measure	Near-Term Analysis Value	Resource Planning Analysis Value
Hydraulic: Regulated and Muskrat Falls	DAFOR	3.90	2.30
Thermal	DAUFOP	20.00[9]	20.00
Gas Turbines			
Happy Valley	DAUFOP	4.70	7.60
Hardwoods and Stephenville	DAUFOP	30.00	N/A
Holyrood	DAUFOP	4.90	4.90

[7] Hydro currently files an assessment of near-term system reliability and resource adequacy annually in November, the Near-Term Reliability Report. Hydro also files an assessment of longer-term system reliability and resource adequacy. The most recent filing was the "Reliability and Resource Adequacy Study – 2022 Update," Newfoundland and Labrador Hydro, October 3, 2022 ("RRA Study 2022 Update").
<http://www.pub.nl.ca/applications/NLH2018ReliabilityAdequacy/correspondence/From%20NLH%20-%20Reliability%20and%20Resource%20Adequacy%20Study%20-%202022%20Update%20-2022-10-03.PDF>

[8] Values indicated for Hydro's near-term analysis reflect those used in the RRA Study 2022 Update and the "Reliability and Resource Adequacy Study Review – 2023 Near-Term Reliability Report – November Report," Newfoundland and Labrador Hydro, June 2, 2023 ("November 2023 Near-Term Report"),
<http://www.pub.nl.ca/applications/NLH2018ReliabilityAdequacy/reports/From%20NLH%20-%20Near-Term%20Reliability%20Report%20-%20November%20%202023%20-%202023-11-15.PDF>.

[9] The Holyrood TGS base assumption is 20.00%. The sensitivity assumption is 34.00%. A sensitivity value of 34.00% was chosen to reflect actual performance at the Holyrood TGS for the 2021–2022 winter operating period.

A three-year, capacity-weighted average was applied to the regulated hydraulic units (Bay d'Espoir Facility, Cat Arm Station, Hinds Lake Station, Granite Canal Station, Upper Salmon Station, and Paradise River Station) for a near-term analysis, resulting in a DAFOR of 3.90%, while a ten-year, capacity-weighted average was applied for use in the resource planning model, resulting in a DAFOR of 2.30%. The DAFOR value was based on historical data reflective of Hydro's maintenance program over the long term.

For the Muskrat Falls Facility, the same analysis values for near-term and resource planning were used, as it is assumed that these assets will be maintained to the same standards as the remainder of the hydraulic fleet. Once historical operational data from the Muskrat Falls Facility is available, the DAFOR applied will be re-evaluated.

Historically, forced outage rates for the three units at the Holyrood TGS have been reported using the DAFOR metric, which is predominately used for units that operate in a continuous (base-loaded) capacity. As presented in Hydro's RRA Study 2022 Update, there are reliability concerns associated with the operation of the units at the Holyrood TGS in a standby capacity. When considering standby or peaking operations of units at the Holyrood TGS, DAFOR is no longer the most appropriate measure of forced outage rates; instead, UFOP[10] and DAUFOP should be considered. Given the frequency of deratings historically experienced by these units, DAUFOP is a more appropriate measure.

Analyses performed for a range of Holyrood TGS DAUFOP assumptions indicate the sensitivity of supply adequacy to changes in the availability of the Holyrood TGS. From this analysis, a DAUFOP of 20.00% was recommended in the near term, with a sensitivity value of 34.00%. Hydro will continue to analyze the operational data to ensure that forced outage rate assumptions for the Holyrood TGS are appropriate.

At present time, the operation of the units at the Holyrood TGS remains base-loaded to ensure the availability of capacity for the power system, as the LIL is recently commissioned and in the early operational stages. This will remain the case as Hydro continues to monitor LIL performance and reliability. If the LIL is found to perform well for an extended period, and system conditions permit, Hydro will have the opportunity to incrementally remove the Holyrood TGS units from service. To

[10] Utilization forced outage probability ("UFOP").

ensure alignment with the assumptions used in the resource planning model (PLEXOS)[11] while appropriately reporting on current period versus historical performance, Hydro will continue to use the DAFOR performance measure and the 20.00% forced outage rate for the units at the Holyrood TGS.

As the gas turbines in the existing fleet are in varied conditions, each was considered on an individual basis rather than applying a weighted average across all units. For the Happy Valley Gas Turbine, a three-year, capacity-weighted average was applied to the unit for the near-term analysis, resulting in a DAUFOP of 4.70%, while a ten-year, capacity-weighted average was applied for use in the resource planning model resulting in a DAUFOP of 7.60%. The DAUFOP values were based on historical data founded upon the unit's past performance. For the Holyrood Gas Turbine, a scenario-based approach was used to estimate an appropriate value for the near-term analysis, resulting in a DAUFOP of 4.90%. For the Hardwoods and Stephenville Gas Turbines, a DAUFOP of 30.00% was used for the near-term analysis, consistent with the metrics that were considered in the November 2023 Near-Term Report. As the Hardwoods and Stephenville Gas Turbines are approaching end-of-life, there is no resource planning analysis value listed for these facilities and the near-term assumption will remain for the remaining life of each facility. As of the most recent update, the Hardwoods Gas Turbine is proposed for retirement in 2030. Due to reliability concerns in the near term, the Stephenville Gas Turbine, originally proposed for retirement in 2024, is now being considered for operation potentially beyond 2024 should the Resource Adequacy Plan analysis determine it is necessary.

Table 2: Hydro's Reliability and Resource Adequacy Study Analysis Values – LIL (%)

Asset Type	Measure	Base Planning Analysis Value	Range of Planning Analysis Values
LIL	EqFOR	5.00	1.00–10.00

Now that the LIL is commissioned, multiple years of operational experience are required to better inform the long-term selection of a bipole forced outage rate. In the interim, the bipole forced outage rate will be addressed with a range of upper and lower limits as additional scenarios in the analysis,

[11] The resource planning model does not differentiate between DAFOR and DAUFOP metrics; rather, it applies a forced outage rate only.

currently 10.00% and 1.00%, respectively. However, the current base-case assumption is a 5.00% LIL forced outage rate.

3.0 Current Period Overview

Table 3: DAFOR and DAUFOP Overview (%)

Asset Type	Measure	1-Apr-2022 to 31-Mar-2023	1-Apr-2023 to 31-Mar-2024	Near-Term Planning Analysis Value	Resource Planning Analysis Value
Hydraulic: Regulated	DAFOR	2.60	6.15	3.90	2.30
Hydraulic: Muskrat Falls Facility	DAFOR	5.20	0.79	3.90	2.30
Thermal	DAFOR/DAUFOP[12]	12.67	43.07	20.00	20.00
Gas Turbines					
Hardwoods/Stephenville	DAUFOP	6.12	43.32	30.00	N/A
Happy Valley	DAUFOP	0.00	23.38	4.70	7.60
Holyrood	DAUFOP	0.00	5.71	4.90	4.90

As shown in Table 3, regulated hydraulic DAFOR and thermal DAFOR performance declined for the current period, while the Muskrat Falls Facility DAFOR performance improved for the current period when compared to the previous period. The DAUFOP[13] performance for the Hardwoods and Stephenville Gas Turbines, the Happy Valley Gas Turbine, and the Holyrood Gas Turbine have all declined in the current period compared to the previous period.

Table 4: EqFOR Overview (%)

Asset Type	Measure	1-Apr-2022 to 31-Mar-2023	1-Apr-2023 to 31-Mar-2024	Base Planning Analysis Value	Range of Planning Analysis Values
LIL	EqFOR	N/A[14]	2.70[15]	5	1–10

Table 4 presents LIL data for the current period only; data is not available for the previous period as it was operating in a pre-commissioned state.

[12] The resource planning model does not differentiate between DAFOR and DAUFOP; rather, it requires the selection of a forced outage rate percentage.
[13] Hydro began reporting DAUFOP performance in January 2018 for its gas turbines.
[14] The LIL was not commissioned until April 14, 2023.
[15] This EqFOR is calculated on a base LIL capacity of 700 MW. On a base capacity of 900 MW, the EqFOR is calculated to be approximately 3.30%. Following the completion of the 900 MW test, all calculations will be adjusted to reflect the change in assumptions.

4.0 Hydraulic Unit DAFOR Performance – Regulated Hydro

Detailed results for the current period and the previous period are presented in Table 5 and Chart 1. These results are compared to Hydro's near-term and resource planning analysis values for forced outage rates, as used in the RRA Study 2022 Update and the November 2023 Near-Term Report. Any individual unit with forced outage rates which exceed the established near-term and/or resource planning analysis values is discussed herein.

Table 5: Hydraulic Weighted DAFOR – Regulated Hydro

Generating Unit	Maximum Continuous Unit Rating (MW)	12 Months Ended Mar 2023 (%)	12 Months Ended Mar 2024 (%)	Near-Term Analysis Value (%)	Resource Planning Analysis Value (%)
All Hydraulic Units – Weighted	**954.4**	**2.6**	**6.15**	**3.90**	**2.30**
Hydraulic Units					
BDE Unit 1	76.5	0.00	0.00	3.90	2.30
BDE Unit 2	76.5	0.00	0.16	3.90	2.30
BDE Unit 3	76.5	0.06	0.00	3.90	2.30
BDE Unit 4	76.5	0.20	0.24	3.90	2.30
BDE Unit 5	76.5	26.04	0.00	3.90	2.30
BDE Unit 6	76.5	0.59	34.56	3.90	2.30
BDE Unit 7	154.4	0.00	0.00	3.90	2.30
CAT Unit 1	67	0.00	0.24	3.90	2.30
CAT Unit 2	67	0.24	0.00	3.90	2.30
HLK Unit	75	0.37	0.88	3.90	2.30
USL Unit	84	7.05	53.90	3.90	2.30
GCL Unit	40	3.10	2.54	3.90	2.30
PRV Unit	8	0.00	0.33	3.90	2.30

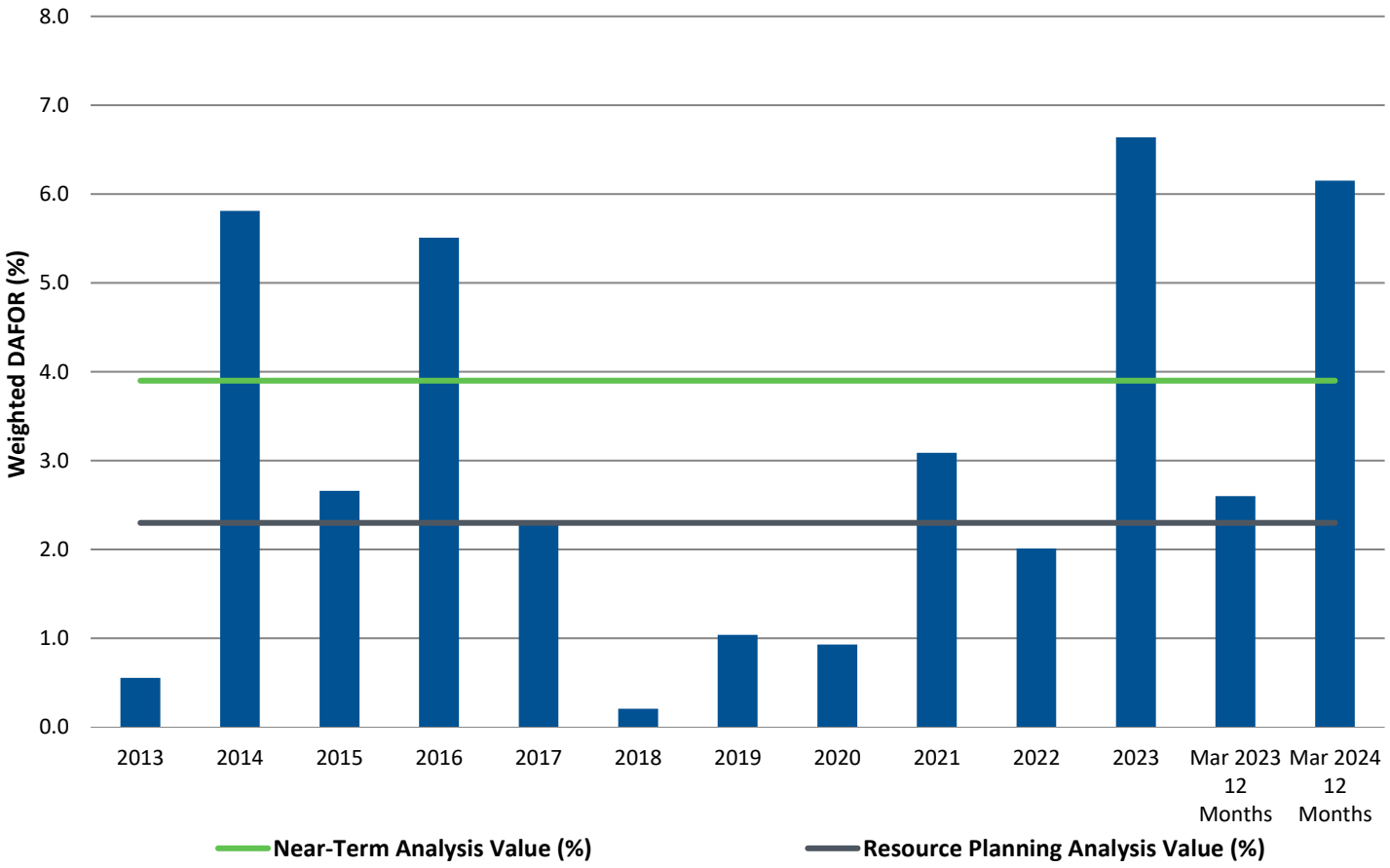

Chart 1: Hydraulic Weighted DAFOR – Regulated Hydro

4.1 Bay d'Espoir Facility

Considering individual hydraulic unit performance, the Bay d'Espoir Unit 6 DAFOR of 34.56% is above the resource planning analysis value of 2.30% and is above the near-term planning analysis value of 3.90% for an individual hydraulic unit. This increase in DAFOR was the result of a forced outage on July 25, 2023, as a result of the failure of a bushing on Transformer T6 ("T6"). This transformer was removed and a suitable spare transformer was installed in its place. The unit was successfully synchronized to the system for testing and released for normal service on October 7, 2023. An investigation into the cause of this transformer failure, as well as the previous failure of Transformer T5 ("T5")[16] in Bay d'Espoir has been ongoing, with the final report currently undergoing the necessary

[16] Bay d'Espoir T5 had previously experienced a similar failure, resulting in a forced outage to Bay d'Espoir Unit 5 from July 3, 2022 to September 4, 2022. The required investigations into the failures of both T5 and T6 are being completed in parallel.

reviews. While completing the required technical investigation, Hydro has leveraged the support of industry experts and has proactively began implementing identified corrective actions to mitigate the risk of additional failures.

4.2 Upper Salmon Station

The Upper Salmon Station unit DAFOR of 53.90% is above the resource planning analysis value of 2.30% and is above the near-term planning analysis value of 3.90% for an individual hydraulic unit. This increase in DAFOR was the result of a forced extension of a planned outage that occurred on March 10, 2023. Hydro has previously reported, in the November 2023 Near-Term Report, that this unit has experienced ongoing issues with the rotor rim keys and guidance block assemblies and that life extension activities were required to be completed prior to the unit returning to service.

An application was approved to undertake additional work to address the required life extension activities;[17] this work commenced in May 2023 with all work completed and the unit successfully returned to service on December 12, 2023.

A required inspection to assess the ongoing effectiveness of work completed in 2023 was completed on April 23, 2024, and yielded no findings of concern. Hydro is required to complete one additional inspection during the scheduled annual maintenance outage in late 2024.

4.3 Granite Canal Station

The Granite Canal unit DAFOR of 2.54% is above the resource planning analysis value of 2.30%; however, it is below the near-term planning analysis value of 3.90% for an individual hydraulic unit, and is showing improvement in performance over the previous period. In the current period, the DAFOR was primarily impacted by three forced outages.[18]

There have been no forced outages to report in the first quarter of 2024.

[17] The "Application for Approval for Rotor Rim Shrinking and Stator Recentering at the Upper Salmon Hydroelectric Generating Station," Newfoundland and Labrador Hydro, April 26, 2022 was approved as per *Public Utilities Act,* RSNL 1990, c P-47, Board Order No. P.U. 18(2022), Board of Commissioners of Public Utilities, May 20, 2022.
[18] Further details on these outages can be found in "Quarterly Report on Performance of Generating Units for the Twelve Months Ended December 31, 2023," Newfoundland and Labrador Hydro, January 31, 2024 ("Q4 2023 Rolling 12 Report").

5.0 Hydraulic Unit DAFOR Performance – Muskrat Falls

Detailed results for the current period and the previous period are presented in Table 6 and Chart 2. These results are compared to Hydro's near-term and resource planning analysis values for forced outage rates, as used in the RRA Study 2022 Update and the November 2023 Near-Term Report. Any individual unit with performance that does not meet the established near-term and/or resource planning analysis values is discussed herein. Overall, the plant performance for Muskrat Falls Facility shows improvement over the previous period.

Table 6: Hydraulic Weighted DAFOR – Muskrat Falls

Generating Unit	Maximum Continuous Unit Rating (MW)	12 Months Ended Mar 2023 (%)	12 Months Ended Mar 2024 (%)	Near-Term Analysis Value (%)	Resource Planning Analysis Value (%)
Muskrat Falls Units - weighted	**824**	**5.20**	**0.79**	**3.90**	**2.30**
Muskrat Falls Units					
Muskrat Falls 1	206	7.55	2.38	3.90	2.30
Muskrat Falls 2	206	7.48	0.94	3.90	2.30
Muskrat Falls 3	206	4.27	0.11	3.90	2.30
Muskrat Falls 4	206	2.38	0.01	3.90	2.30

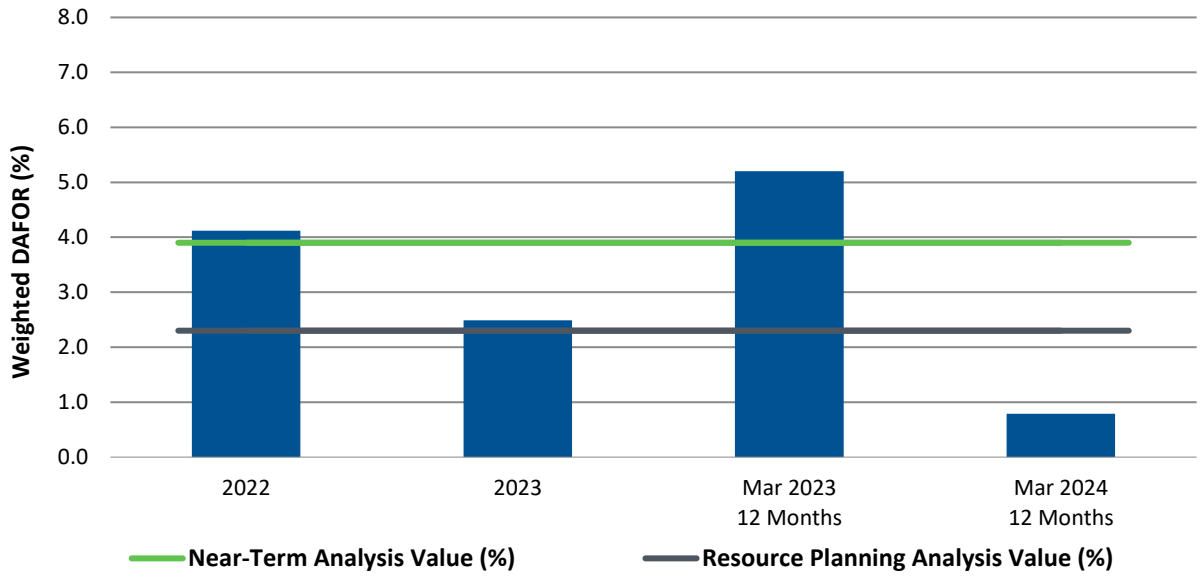

Chart 2: Hydraulic Weighted DAFOR – Muskrat Falls

5.1 Muskrat Falls Unit 1

The Muskrat Falls Unit 1 DAFOR of 2.38% is above the resource planning analysis value of 2.30%, but is below the near-term planning analysis value of 3.90% for an individual hydraulic unit, and shows an improvement in performance over the previous period. The DAFOR performance was materially impacted as a result of a forced derating to 140 MW resulting from a crack discovered in the discharge ring, as previously reported in the Q4 2023 Rolling 12 Report. This forced derating began when the unit was returned to service on March 31, 2023, following the implementation of temporary repairs. This derate remained until permanent repairs were completed during a planned outage in April 2023. The unit was returned to service, rated for full output, on May 12, 2023.

In addition, before its return to service after completing scheduled maintenance, the unit experienced a forced outage on October 24, 2023, during final energization tests. This outage, which lasted just over 24 hours, was the result of an excitation system cooling fan failure. The unit was returned to service on October 25, 2023, and has been operating without issue since that time.

6.0 Thermal Unit DAFOR Performance

Detailed results for the current and previous periods are presented in Table 7 and Chart 3. These results are compared to Hydro's near-term and resource planning analysis values for forced outage rates, as used in the RRA Study 2022 Update and the November 2023 Near-Term Report.

For the current period, the weighted DAFOR for all thermal units of 43.07% is above the 20.00% near-term and resource planning analysis values. The individual unit DAFOR outcome for the current period of 9.05% for Unit 1 at the Holyrood TGS is below the 20.00% analysis value. The performance of Unit 2 and Unit 3 at the Holyrood TGS is further discussed in Section 6.1 and Section 6.2, respectively.

Table 7: Thermal DAFOR

Generating Unit	Maximum Continuous Unit Rating (MW)	12 months Ended Mar 2023 (%)	12 months Ended Mar 2024 (%)	Near-Term Analysis Value (%)	Resource Planning Analysis Value (%)
All Thermal Units – Weighted	**490**	**12.67**	**43.07**	**20.00**	**20.00**
Thermal Units					
Holyrood TGS Unit 1	170	23.78	9.05	20.00	20.00
Holyrood TGS Unit 2	170	0.67	84.22	20.00	20.00
Holyrood TGS Unit 3	150	17.35	23.22	20.00	20.00

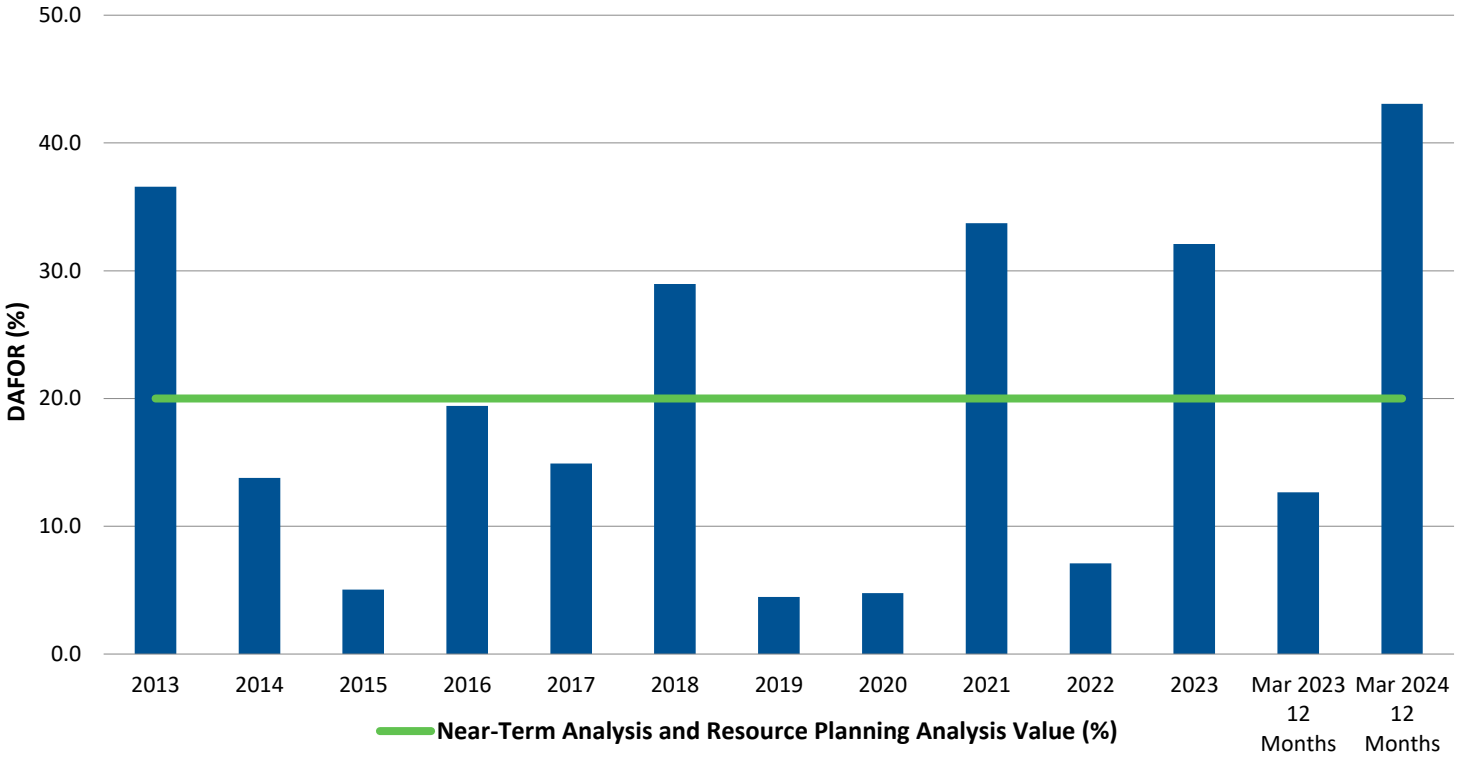

Chart 3: Thermal DAFOR

6.1 Holyrood TGS Unit 2

Considering individual thermal unit performance, the DAFOR of 84.22% for Unit 2 at the Holyrood TGS is above the near-term and resource planning analysis value of 20.00% for a unit at the Holyrood TGS; and shows a decline in performance over the previous period. This elevated DAFOR is a result of a forced extension to the planned unit outage to overhaul the Unit 2 turbine and replace the L-0 blades at the

GE[19] shop in the United States.[20] Subsequent turbine rotor inspection at the GE shop identified additional and unexpected cracking on the L-1 blades, resulting in the required replacement of that set of blades.[21] The blades have been installed, and the turbine rotor was returned to site in December 2023. Upon evaluation, it was determined the journal bearings sustained damage during shipping and would require additional repair. Re-assembly work has been completed and the unit is currently undergoing commissioning activities.

6.2 Holyrood TGS Unit 3

Considering individual thermal unit performance, the DAFOR of 23.22% for Unit 3 at the Holyrood TGS is above the near-term and resource planning analysis value of 20.00% for a unit at the Holyrood TGS; and shows a decline in performance over the previous period. This elevated DAFOR was primarily the result of two forced deratings and one forced outage experienced in the current period.

On October 24, 2023, during start-up activities, following the changeover from synchronous condenser to generation mode, the east-forced draft fan motor failed. The motor was sent to be refurbished and the unit was returned to service, but operated with a forced derating to 50 MW until November 25, 2023, when the refurbished motor was returned to service.

On December 16, 2023, a small boiler tube leak was identified on Unit 3. The leak was assessed by site personnel and, given the location and nature of the leak, it was agreed that the unit could remain online, with a precautionary forced derating to 70 MW with close monitoring by Operations. This derating remained in effect until Unit 3 was removed from service on January 9, 2024, to facilitate the planned investigation and repair of this leak. Repairs were made and the unit was returned to service on January 17, 2024, with full capacity.

On March 27, 2024, the unit was removed from service following the discovery of excessive steam leakage from an attemperator spray block valve. The unit was isolated, the faulty valve replaced, and the unit was made available for service at full load on March 29, 2024.

[19] General Electric ("GE").
[20] Approved in Public Utilities Act, RSNL 1990, c P47, Board Order No. P.U. 17(2022), Board of Commissioners of Public Utilities, May 20, 2022.
[21] These are the low pressure next-to-last stage ("L-1") blades, a separate stage of blades from the last stage ("L-0") blades.

7.0 Gas Turbine DAUFOP Performance

The combined DAUFOP for the Hardwoods and Stephenville Gas Turbines was 43.32% for the current period, as shown in Table 8 and Chart 4. This is above the near-term planning analysis value of 30.00%. The Stephenville Gas Turbine DAUFOP for the current period is 73.11%, which is above the near-term planning assumption of 30.00%. The Hardwoods Gas Turbine DAUFOP for the current period is 12.31%, which is below the near-term planning assumption of 30.00%. On a per-unit basis, both the Stephenville and Hardwoods Gas Turbines have declined in performance when compared to the previous period. The performance of the Stephenville Gas Turbine is discussed in Section 7.1.

Table 8: Hardwoods/Stephenville Gas Turbine DAUFOP

Gas Turbine Units	Maximum Continuous Unit Rating (MW)	12 months Ended Mar 2023 (%)	12 months Ended Mar 2024 (%)	Near-Term Planning Analysis Value (%)
Gas Turbines	**100**	**6.12**	**43.32**	**30.00**
SVL	50	10.40	73.11	30.00
HWD	50	1.99	12.31	30.00

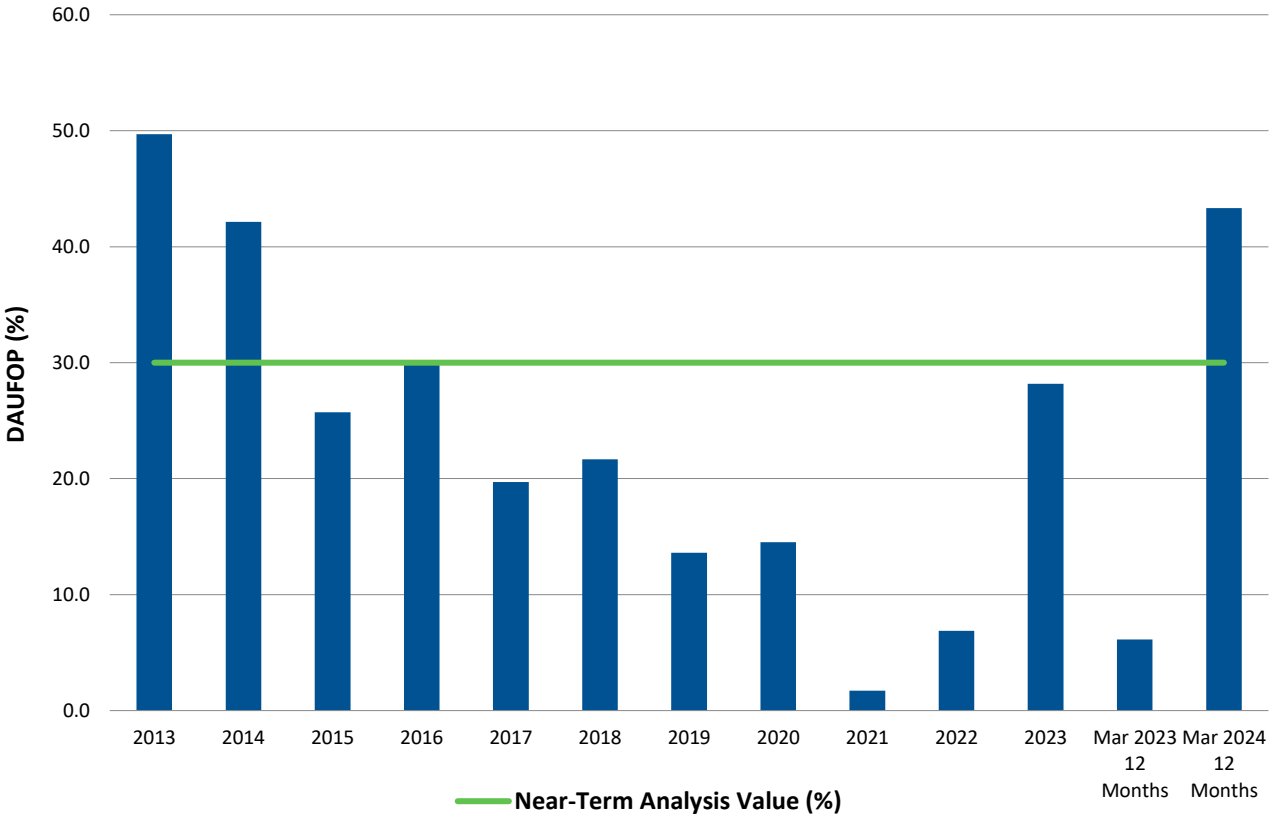

Chart 4: Gas Turbine DAUFOP: Hardwoods/Stephenville Units

The DAUFOP for the Happy Valley Gas Turbine was 23.38% for the current period, as shown in Table 9 and Chart 5. This is above both the near-term analysis value of 4.70% and the resource planning analysis value of 7.60% and indicates a decline in performance over the previous period. The performance of the Happy Valley Gas Turbine is discussed in Section 7.2.

Table 9: Happy Valley Gas Turbine DAUFOP

Gas Turbine Unit	Maximum Continuous Unit Rating (MW)	12 months Ended Mar 2023 (%)	12 months Ended Mar 2024 (%)	Near-Term Analysis Value (%)	Resource Planning Analysis Value (%)
Happy Valley	25	0.00	23.38	4.70	7.60

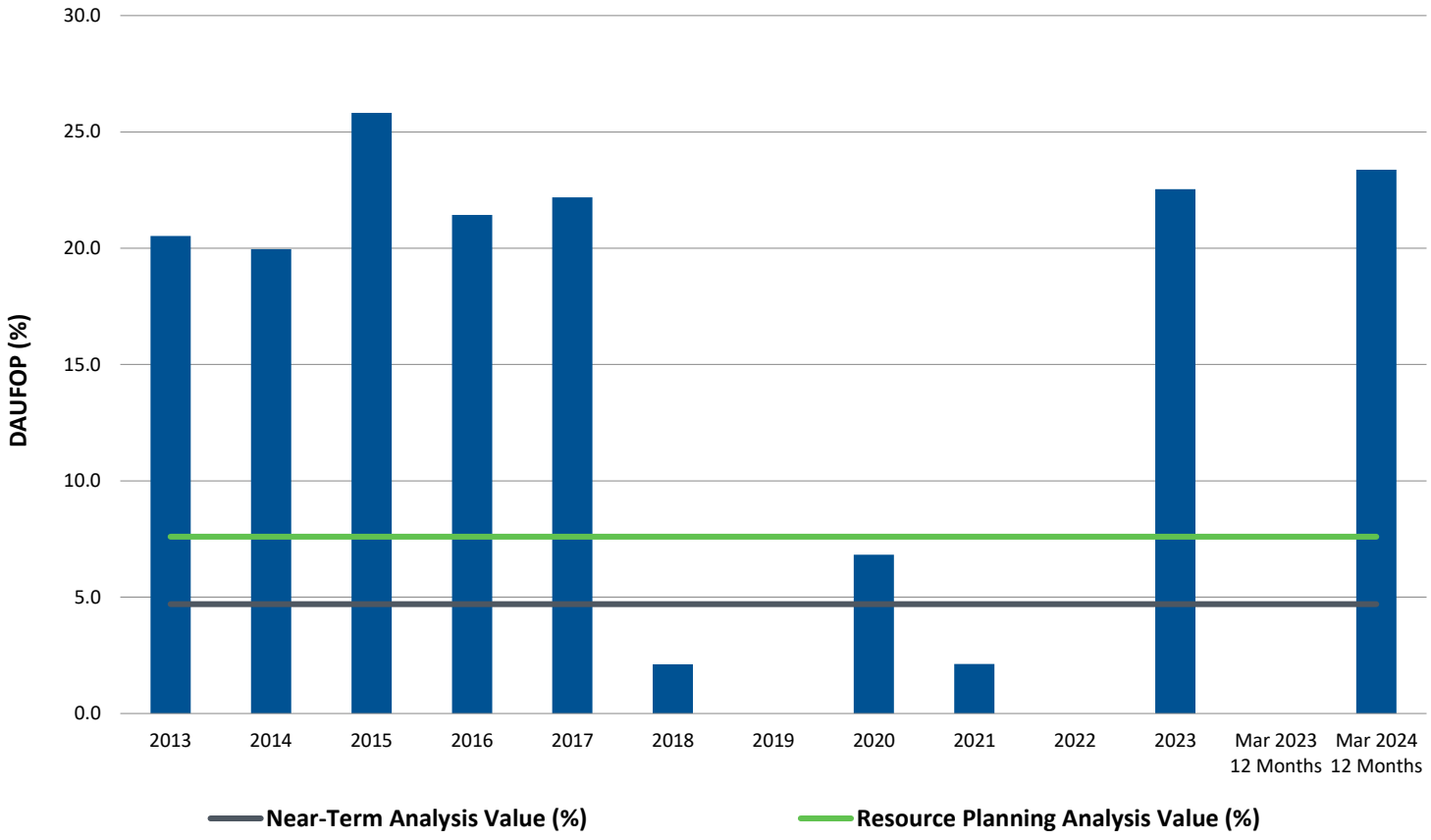

Chart 5: Gas Turbine DAUFOP: Happy Valley Unit

The Holyrood Gas Turbine DAUFOP of 5.71% for the current period is above the near-term and resource planning analysis value of 4.90%, as shown in Table 10 and Chart 6, and indicated a decline in performance when compared to the previous period. The performance of the Holyrood Gas Turbine is discussed in Section 7.3.

Table 10: Holyrood Gas Turbine DAUFOP

Gas Turbine Unit	Maximum Continuous Unit Rating (MW)	12 Months Ended Mar 2023 (%)	12 Months Ended Mar 2024 (%)	Near-Term Analysis Value (%)	Resource Planning Analysis Value (%)
HRD	123.5	0.00	5.71	4.90	4.90

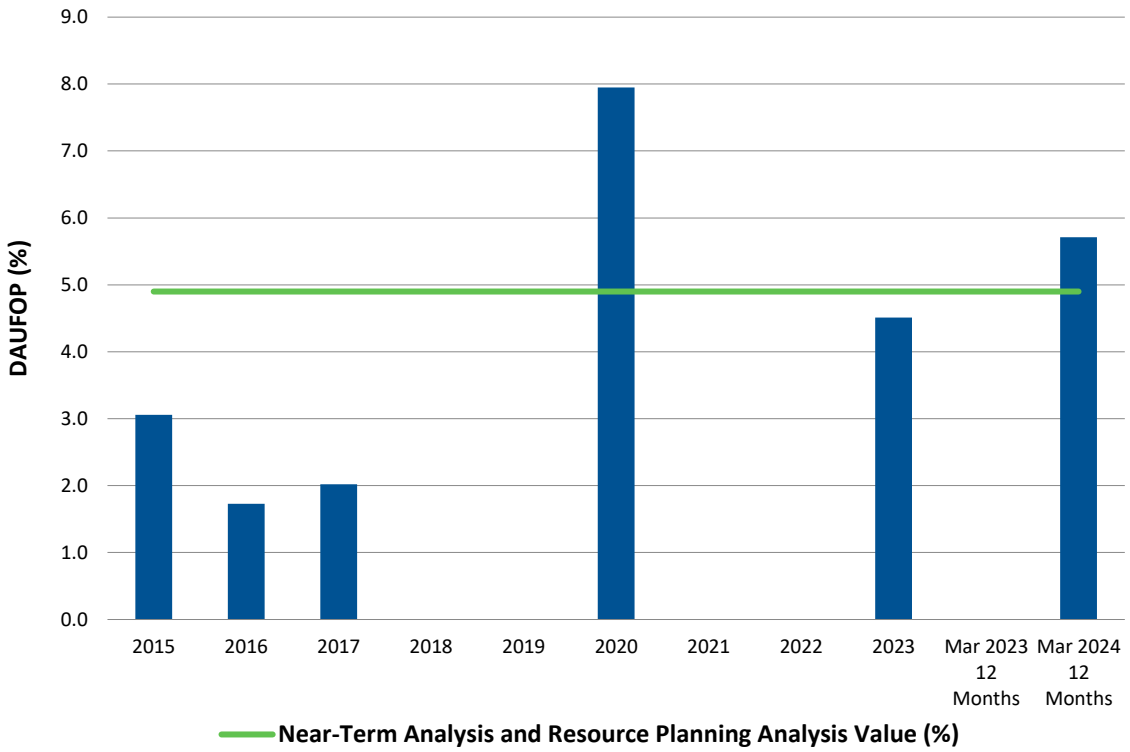

Chart 6: Gas Turbine DAUFOP– Holyrood Unit

7.1 Stephenville Gas Turbine

The Stephenville Gas Turbine DAUFOP was 73.11% for the current period, which is above the near-term analysis value of 30.00%. This decline in performance is a result of the failure of the alternator cooling fan, which occurred on July 14, 2023.[22]

[22] Additional information was provided in the "2023–2024 Winter Readiness Planning Report," Newfoundland and Labrador Hydro, December 11, 2023, sec. 2.2, p. 8 and sec. 7.4.1, p. 38. <http://www.pub.nl.ca/indexreports/winterreadiness/From%20NLH%20-%202023%E2%80%932024%20Winter%20Readiness%20Planning%20Report%20-%20Final%20Report%20-%202023-12-11.PDF>

An inspection was completed by the original equipment manufacturer ("OEM") who recommended that the alternator be removed from the unit. The rotor was removed from the alternator and sent to the OEM's facility in the United States where it underwent inspection and testing throughout December 2023. The rotor was returned to site in late February 2024 and was reinstalled in the unit on March 5, 2024. The exciter was also returned to site in mid-February 2024; however, it sustained damage during shipping and required additional repairs. It is expected that the exciter will be returned to site in May 2024, with anticipated return to service mid-June 2024.

7.2 Happy Valley Gas Turbine

The Happy Valley Gas Turbine DAUFOP was 23.38% for the current period, which is above the near-term analysis value of 4.70% and the resource planning analysis value of 7.60%. This decline in performance is a result of five forced outages, four of which occurred in the second and third quarters of 2023 and were previously reported,[23] and one which occurred since the previous filing.

On February 29, 2024, following the completion of planned testing, the Happy Valley unit experienced issues with the lubrication system which resulted in a forced outage until the unit was returned to service on March 2, 2024.

7.3 Holyrood Gas Turbine

The Holyrood Gas Turbine DAUFOP was 5.71% for the current period, which is above the near-term and resource planning analysis values of 4.90%. This decline in performance is a result of two forced outages experienced during the current period. On June 16, 2023, the unit was made unavailable as a result of loose bearing thermocouple wiring. The issue was resolved and the unit returned to service at full capacity on June 17, 2023.

On December 6, 2023, the unit experienced an unplanned outage due to two failed communication cards in the control system for the unit. These cards were replaced and the unit was returned to service on December 7, 2023.

[23] "Quarterly Report on Performance of Generating Units for the Twelve Months Ended September 30, 2023," Newfoundland and Labrador Hydro, October 30, 2023, sec. 6.2, pp. 14–15. <http://www.pub.nl.ca/indexreports/12month/From%20NLH%20-%20Q3%202023%20Report%20on%20the%20Rolling%2012%20Month%20Performance%20of%20Hydros%20Generating%20Units%20-%202023-10-30.PDF>

8.0 Labrador-Island Link EqFOR Performance

The LIL was commissioned on April 14, 2023 and, as such, EqFOR data is only available for the current period at this time. Data between April 1, 2023, and April 14, 2023, has been included for completeness despite being from the pre-commissioning period; the LIL did not experience any forced unavailability during that time.

The EqFOR for the LIL was 2.70% for the current period, as shown in Table 11. This is well within the range of values used by Hydro in the resource planning analysis scenarios. Additionally, it is below the base planning analysis value of 5.00%.

Table 11: LIL EqFOR (%)

Asset Type	Measure	1-Apr-2022 to 31-Mar-2023	1-Apr-2023 to 31-Mar-2024	Base Planning Analysis Value	Range of Planning Analysis Values
LIL	EqFOR	N/A	2.70[24]	5.00	1.00 – 10.00

The availability of the three Soldiers Pond synchronous condensers ("SC") is critical to the reliable delivery of electricity to the Island Interconnected System via the LIL. No operational issues concerning the Soldiers Pond SCs resulted in outages or derating to the LIL in the current period; going forward, any issues of this nature will be discussed in this report.

A fulsome update on the total number of hours of operation for the Soldiers Pond SCs for the rolling 12-month period is provided in in Appendix A of this report.

[24] This includes the forced outage hours accumulated from April 1, 2024, to April 7, 2024, as the outage began in the current reporting period on March 30, 2024, as reported in the Q1 2024 LIL Quarterly Update, and was resolved prior to filing.

Appendix A

Soldiers Pond Synchronous Condensers

Table A-1: Quarterly Rolling 12-Month Operating Hours for Soldiers Pond Synchronous Condensers

Unit	Operating Hours[25]
SC1	7,875.1
SC2	7,287.8
SC3	7,792.5

Hydro has historically provided Information on the operation of the Soldiers Pond SCs within the quarterly *Reliability and Resource Adequacy Study Review* – Labrador-Island Link Update.[26]

[25] Hydro has provided its best estimate of operating hours for each unit for the 12 months ending March 31, 2024 based on an assumption of 24/7 operation of all three SCs, and known outages (both planned and unplanned) recorded in its database.
[26] Please refer to Q1 2024 LIL Quarterly Update for Hydro's most recent update.