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October 30, 2023

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 Performance of Generating Units for the Twelve Months Ended  
September 30, 2023**

Please find enclosed Newfoundland and Labrador Hydro's Quarterly Report on Performance of  
Generating Units for the Twelve Months Ended September 30, 2023.

Should you have any questions, please contact the undersigned.

Yours truly,

**NEWFOUNDLAND AND LABRADOR HYDRO**

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

Encl.

ecc:

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# Quarterly Report on Performance of Generating Units

For the Twelve Months Ended September 30, 2023

October 30, 2023

A report to the Board of Commissioners of Public Utilities



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## 1 **1.0 Introduction**

2 In this report, Newfoundland and Labrador Hydro (“Hydro”) provides data on forced outage rates of its  
3 generating facilities. The data provided pertains to historical forced outage rates and assumptions Hydro  
4 uses in its assessments of resource adequacy. This report covers the performance of Hydro’s generating  
5 units for the current 12-month reporting period of October 1, 2022 to September 30, 2023 (“current  
6 period”).

7 This report contains forced outage rates for the current period for individual generating units at  
8 regulated hydraulic facilities<sup>1</sup> as well as the Holyrood Thermal Generating Station (“Holyrood TGS”) and  
9 Hydro’s gas turbines. In addition, this report contains forced outage rates for the non-regulated Muskrat  
10 Falls Hydroelectric Generating Facility (“Muskrat Falls Facility”). This report also provides, for  
11 comparison purposes, the individual generating unit data on forced outage rates for the 12-month  
12 reporting period of October 1, 2021 to September 30, 2022 (“previous period”). Further, total asset class  
13 data is presented based on the calendar year for the ten most recent years—2013 to 2022—with the  
14 exception of the Muskrat Falls Facility.<sup>2</sup>

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

- 16 **1) Derated adjusted forced outage rate (“DAFOR”) for the continuous (base-loaded) units; and**
- 17 **2) Derated adjusted utilization forced outage probability (“DAUFOP”) for the standby units.**

18 DAFOR is a metric that measures the percentage of time that a unit or group of units is unable to  
19 generate at its maximum continuous rating due to forced outages or unit deratings. The DAFOR for each  
20 unit is weighted to reflect differences in generating unit sizes to provide a company total and reflect the  
21 relative impact a unit’s performance has on overall generating performance. This measure is applied to  
22 hydraulic units and, historically, was used for the thermal units; however, it is not applicable to gas  
23 turbines because of their operation as standby units and their relatively low operating hours.

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<sup>1</sup> 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”).

<sup>2</sup> The final generating unit at the Muskrat Falls Facility was released for commercial operation on November 25, 2021. Annual DAFOR performance data is available beginning in 2022.

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

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

9 In addition to forced outage rates, this report provides details for those outages that contributed  
10 materially to forced outage rates exceeding those used in Hydro's generation planning analysis for both  
11 the near and long term.

## 12 **2.0 Assumptions Used in Hydro's Assessment of System** 13 **Reliability and Resource Adequacy**

14 Hydro continually assesses the reliability of its system and its ability to meet customer requirements,  
15 filing both near- and long-term assessments with the Board of Commissioners of Public Utilities  
16 ("Board").<sup>3</sup>

17 As part of the ongoing *Reliability and Resource Adequacy Study Review ("RRA Study Review")*  
18 proceeding, Hydro detailed the process undertaken for determining the forced outage rates most  
19 appropriate for use in its near-term reliability assessments and long-term resource adequacy analysis.  
20 Table 1 summarizes the most recent forced outage rate assumptions, as calculated using the forced

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<sup>3</sup> 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://pub.nl.ca/applications/NLH2018ReliabilityAdequacy/correspondence/From%20NLH%20-%20Reliability%20and%20Resource%20Adequacy%20Study%20-%202022%20Update%20-2022-10-03.PDF>>.

Hydro's next update, the Resource Adequacy Plan, is scheduled to be filed in the spring of 2024.

- 1 outage rate methodology.<sup>4</sup> Forced outage rate assumptions will be re-evaluated on an annual basis to
- 2 incorporate the most recent data available.

**Table 1: Hydro’s Reliability and Resource Adequacy Study Analysis Values (%)**

<b>Unit Type</b>	<b>Measure</b>	<b>Near-Term Analysis Value</b>	<b>Resource Planning Analysis Value</b>
Hydraulic: Regulated and Muskrat Falls	DAFOR	2.40	2.30
Thermal	DAUFOP	20.00 <sup>5</sup>	20.00
<b>Gas Turbines</b>			
Happy Valley	DAUFOP	6.70	7.60
Hardwoods and Stephenville	DAUFOP	30.00	N/A
Holyrood	DAUFOP	4.90	4.90

3 A five-year, capacity-weighted average was applied to the regulated hydraulic units (Bay d’Espoir  
 4 Facility, Cat Arm Station, Hinds Lake Station, Granite Canal Station, Upper Salmon Station, and Paradise  
 5 River Station) for a near-term analysis, resulting in a DAFOR of 2.40%,<sup>6</sup> while a ten-year, capacity-  
 6 weighted average was applied for use in the resource planning model, resulting in a DAFOR of 2.30%.  
 7 The DAFOR value was based on historical data reflective of Hydro’s maintenance program over the long  
 8 term.

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

13 Historically, forced outage rates for the three units at the Holyrood TGS have been reported using the  
 14 DAFOR metric, which is predominately used for units that operate in a continuous (base load) capacity.

<sup>4</sup> Values indicated for Hydro’s near-term analysis reflect those used in the “Reliability and Resource Adequacy Study – 2023 Update: Volume II: Near-Term Reliability Report – May Report,” Newfoundland and Labrador Hydro, June 2, 2023 (“May 2023 Near-Term Report”).

<<http://pub.nl.ca/applications/NLH2018ReliabilityAdequacy/reports/From%20NLH%20-%20Near-Term%20Reliability%20Report%20-%20May%202023%20-%202023-06-02.PDF>>.

<sup>5</sup> The Holyrood TGS base assumption is 20.00%. The sensitivity assumption is 34%. A sensitivity value of 34% was chosen to reflect actual performance at the Holyrood TGS for the 2021–2022 winter operating period.

<sup>6</sup> In the May 2023 Near-Term Report, Hydro deviated from the forced outage rate methodology as described when selecting forced outage rates for its hydraulic units, as the result of the prescribed methodology did not accurately represent the risk of unit outage. For the hydraulic units, Hydro used the ten-year, capacity-weighted average DAFOR, which is higher than the three-year DAFOR, increasing the forced outage rates to more appropriately represent the risk of failure in the near term.

1 As presented in Hydro’s RRA Study 2022 Update, there are reliability concerns associated with the  
2 operation of the units at the Holyrood TGS in a standby capacity. When considering standby or peaking  
3 operations of units at the Holyrood TGS, DAFOR is no longer the most appropriate measure of forced  
4 outage rates; instead, UFOP<sup>7</sup> and DAUFOP should be considered. Given the frequency of deratings  
5 historically experienced by these units, DAUFOP is a more appropriate measure.

6 Analyses performed for a range of Holyrood TGS DAUFOP assumptions indicate the sensitivity of supply  
7 adequacy to changes in the availability of the Holyrood TGS. From this analysis, a DAUFOP of 20.00%  
8 was recommended in the near term, with a sensitivity value of 34%. Hydro will continue to analyze the  
9 operational data to ensure that forced outage rate assumptions for the Holyrood TGS are appropriate.  
10 At present time, the operation of the units at the Holyrood TGS remains base-loaded to ensure the  
11 availability of capacity for the power system, as the Labrador-Island Link (“LIL”) is recently commissioned  
12 and in the early operational stages. This will remain the case as Hydro continues to monitor LIL  
13 performance and reliability. If the LIL is found to perform well for an extended period and system  
14 conditions permit, Hydro will have the opportunity to incrementally remove the Holyrood TGS units  
15 from service. To ensure alignment with the assumptions used in the resource planning model (PLEXOS)<sup>8</sup>  
16 while appropriately reporting on current period performance versus historical, Hydro will continue to  
17 use the DAFOR performance measure and the 20.00% forced outage rate for the units at the Holyrood  
18 TGS.

19 As the gas turbines in the existing fleet are in varied conditions, each was considered on an individual  
20 basis rather than applying a weighted average across all units. For the Happy Valley Gas Turbine, a  
21 three-year, capacity-weighted average was applied to the unit for the near-term analysis, resulting in a  
22 DAUFOP of 6.70%, while a ten-year, capacity-weighted average was applied for use in the resource  
23 planning model resulting in a DAUFOP of 7.60%. The DAUFOP values were based on historical data  
24 founded upon the unit’s past reliable performance. For the Holyrood Gas Turbine, a scenario-based  
25 approach was used to estimate an appropriate value for the near-term analysis, resulting in a DAUFOP  
26 of 4.90%. For the Hardwoods and Stephenville Gas Turbines, a DAUFOP of 30.00% was used for the  
27 near-term analysis, consistent with the metrics that were considered in the May 2023 Near-Term  
28 Report. As the Hardwoods and Stephenville Gas Turbines are approaching end-of-life, there is no

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<sup>7</sup> Utilization forced outage probability (“UFOP”).

<sup>8</sup> The resource planning model does not differentiate between DAFOR and DAUFOP metrics; rather, it applies a forced outage rate only.

1 resource planning analysis value listed for these facilities and the near-term assumption will remain for  
 2 the remaining life of each facility. As of the most recent update, the Hardwoods Gas Turbine is proposed  
 3 for retirement in 2030. Due to reliability concerns in the near term, the Stephenville Gas Turbine,  
 4 originally proposed for retirement in 2024, is now being considered for operation potentially beyond  
 5 2024 should the Resource Adequacy Plan<sup>9</sup> analysis determine it is necessary.

### 6 **3.0 Current Period Overview**

**Table 2: DAFOR and DAUFOP Overview (%)**

<b>Unit Type</b>	<b>Measure</b>	<b>1-Oct-2021 to 30-Sep-2022</b>	<b>1-Oct-2022 to 30-Sep-2023</b>	<b>Near-Term Planning Analysis Value</b>	<b>Resource Planning Analysis Value</b>
Hydraulic: Regulated	DAFOR	3.11	6.30	2.40	2.30
Hydraulic: Muskrat Falls Facility	DAFOR	7.27	3.83	2.40	2.30
Thermal	DAFOR/DAUFOP <sup>10</sup>	30.28	13.26	20.00	20.00
<b>Gas Turbines</b>					
Hardwoods/Stephenville	DAUFOP	3.77	19.66	30.00	N/A
Happy Valley	DAUFOP	0.00	21.58	6.70	7.60
Holyrood	DAUFOP	0.00	2.58	4.90	4.90

7 As shown in Table 2, regulated hydraulic DAFOR performance declined for the current period, while the  
 8 Muskrat Falls Facility DAFOR and thermal DAFOR performance improved for the current period when  
 9 compared to the previous period. The DAUFOP<sup>11</sup> performance for the Hardwoods and Stephenville Gas  
 10 Turbines, the Happy Valley Gas Turbine, and the Holyrood Gas Turbine have all declined in the current  
 11 period compared to the previous period.

### 12 **4.0 Hydraulic Unit DAFOR Performance – Regulated Hydro**

13 Detailed results for the current period and the previous period are presented in Table 3 and Chart 1.  
 14 These results are compared to Hydro’s near-term and resource planning analysis values for forced  
 15 outage rates, as used in the RRA Study 2022 Update and the May 2023 Near-Term Report. Any individual  
 16 unit with performance that does not meet the established near-term and/or resource planning analysis  
 17 values is discussed herein.

<sup>9</sup> To be filed in the spring of 2024 as part of the *RRA Study Review*.

<sup>10</sup> The resource planning model does not differentiate between DAFOR and DAUFOP; rather, it requires the selection of a forced outage rate percentage.

<sup>11</sup> Hydro began reporting DAUFOP performance in January 2018 for its gas turbines.



Table 3: Hydraulic Weighted DAFOR – Regulated Hydro

Generating Unit	Maximum Continuous Unit Rating (MW)	12 Months Ended Sept 2022 (%)	12 Months Ended Sept 2023 (%)	Near-Term Analysis Value (%)	Resource Planning Analysis Value (%)
<b>All Hydraulic Units – Weighted</b>	<b>954.4</b>	<b>3.11</b>	<b>6.30</b>	<b>2.40</b>	<b>2.30</b>
<b>Hydraulic Units</b>					
BDE Unit 1	76.5	0.00	0.00	2.40	2.30
BDE Unit 2	76.5	0.00	0.15	2.40	2.30
BDE Unit 3	76.5	0.06	0.00	2.40	2.30
BDE Unit 4	76.5	0.21	0.21	2.40	2.30
BDE Unit 5	76.5	33.24	0.00	2.40	2.30
BDE Unit 6	76.5	0.77	28.05	2.40	2.30
BDE Unit 7	154.4	0.00	0.00	2.40	2.30
CAT Unit 1	67	0.97	0.00	2.40	2.30
CAT Unit 2	67	0.10	0.18	2.40	2.30
HLK Unit	75	0.30	0.04	2.40	2.30
USL Unit	84	10.45	49.49	2.40	2.30
GCL Unit	40	3.67	1.05	2.40	2.30
PRV Unit	8	1.02	0.00	2.40	2.30

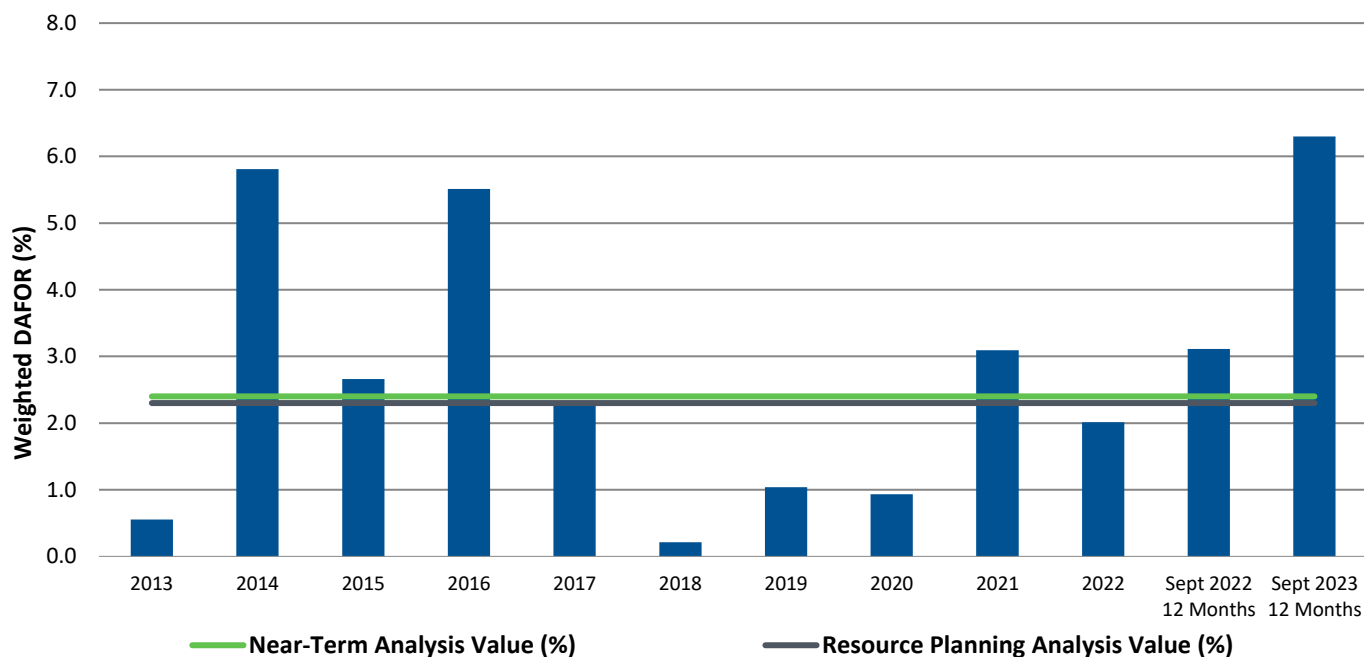


Chart 1: Hydraulic Weighted DAFOR – Regulated Hydro

1    **4.1    Bay d’Espoir Facility**

2    Considering individual hydraulic unit performance, the Bay d’Espoir Unit 6 DAFOR of 28.05% is above the  
3    resource planning analysis value of 2.30% and is above the near-term planning analysis value of 2.40%  
4    for an individual hydraulic unit. This increase in DAFOR was the result of a forced outage on  
5    July 25, 2023, as a result of the failure of a bushing on transformer T6. This transformer was removed  
6    and a suitable spare transformer was installed in its place. The unit was successfully synchronized to the  
7    system for testing and released for normal service on October 7, 2023. The investigation into the cause  
8    of the transformer failure is ongoing.

9    **4.2    Upper Salmon Station**

10   The Upper Salmon Station unit DAFOR of 49.49% is above the resource planning analysis value of 2.30%  
11   and is above the near-term planning analysis value of 2.40% for an individual hydraulic unit. This  
12   increase in DAFOR was the result of a forced extension of a planned outage that occurred on  
13   March 10, 2023. Hydro has previously reported, in the November 2022 Near-Term Report<sup>12</sup> and the May  
14   2023 Near-Term Report, that this unit has experienced ongoing issues with the rotor rim keys and  
15   guidance blocks.

16   During the most recent inspection of the rotor rim guidance blocks in March 2023, significant quantities  
17   of broken rim laminations were found in 8 of 16 guidance block assemblies. The extent of the damage  
18   varied; however, there are 2 guidance block assemblies with less than 25% of the remaining contact  
19   surface area between the key and remaining laminations. Following this discovery, the original  
20   equipment manufacturer (“OEM”) was consulted and advised that, given the known condition of the  
21   unit and the worsening results from recent inspections, continued operation of the unit in this state  
22   should not continue. Although Hydro had mitigated the risk of failure to the extent possible in the near  
23   term, there was a residual risk that a failure could occur before the execution of the required life  
24   extension work scope and this risk was realized.

25   Following the advice of the OEM, Engineering and Long-Term Asset Planning staff completed the  
26   necessary risk review and provided a formal recommendation not to return the unit at the

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<sup>12</sup> “Reliability and Resource Adequacy Study – 2022 Update: Volume II: Near-Term Reliability Report – November Report,”  
Newfoundland and Labrador Hydro, November 15, 2022 (“November 2022 Near-Term Report”).  
<<http://pub.nl.ca/applications/NLH2018ReliabilityAdequacy/reports/From%20NLH%20-%20Near-Term%20Reliability%20Report%20-%20November%202022%20-%202022-11-15.PDF>>.

1 Upper Salmon Station to service until the approved capital program can be successfully executed, later  
 2 in 2023. An application was approved to undertake additional work to address the required life  
 3 extension activities;<sup>13</sup> this work commenced in May 2023 and has progressed well with re-assembly  
 4 work ongoing. It is anticipated that the unit at the Upper Salmon Station will be returned to service prior  
 5 to December 1, 2023.

## 6 **5.0 Thermal Unit DAFOR Performance**

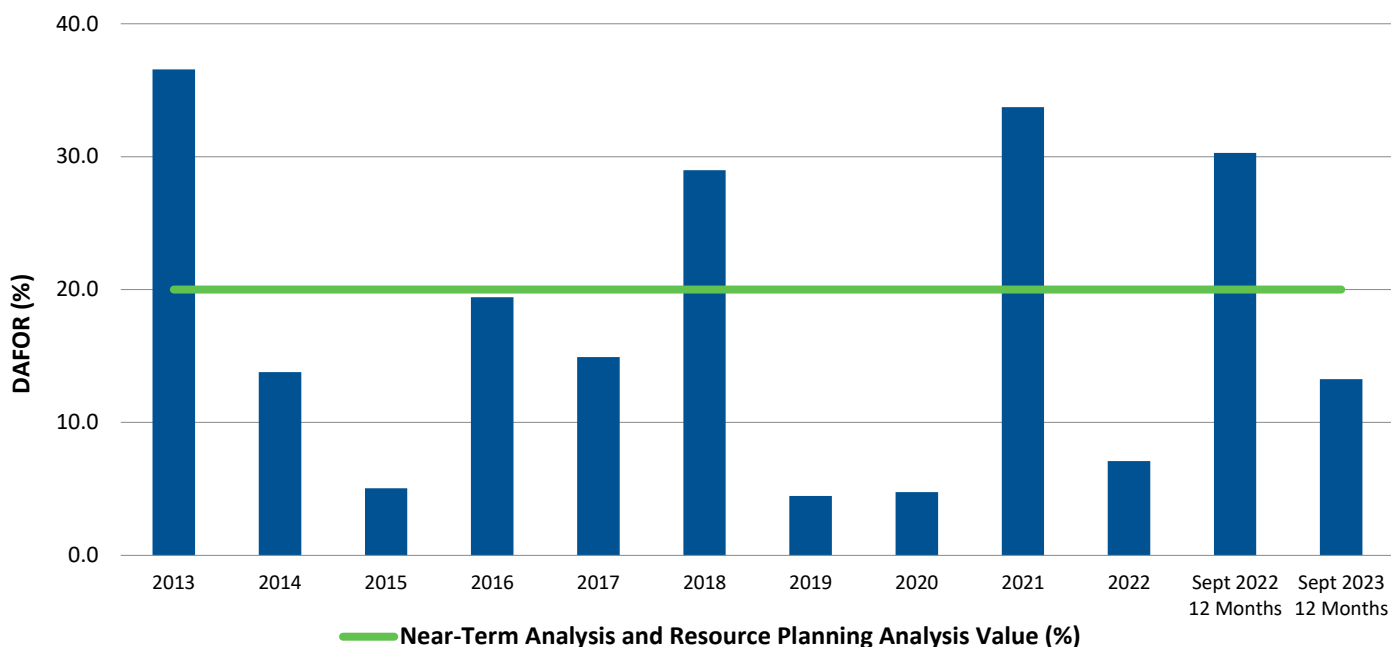
7 Detailed results for the current period and the previous period are presented in Table 4 and Chart 2.  
 8 These results are compared to Hydro’s near-term and resource planning analysis values for forced  
 9 outage rates, as used in the RRA Study 2022 Update and the May 2023 Near-Term Report.

10 For the current period, the weighted DAFOR for all thermal units of 13.26% is below the 20.00% near-  
 11 term and resource planning analysis values. The individual unit DAFOR outcome for the current period  
 12 of 5.11% for Unit 2 and 15.52 % for Unit 3 at the Holyrood TGS is below the 20.00% analysis value. The  
 13 performance of Unit 1 at the Holyrood TGS is further discussed in Section 5.1.

**Table 4: Thermal DAFOR**

<b>Generating Unit</b>	<b>Maximum Continuous Unit Rating (MW)</b>	<b>12 Months Ended Sept 2022 (%)</b>	<b>12 Months Ended Sept 2023 (%)</b>	<b>Near-Term Analysis Value (%)</b>	<b>Resource Planning Analysis Value (%)</b>
<b>All Thermal Units – Weighted</b>	<b>490</b>	<b>30.28</b>	<b>13.26</b>	<b>20.00</b>	<b>20.00</b>
<b>Thermal Units</b>					
Holyrood TGS Unit 1	170	30.42	20.90	20.00	20.00
Holyrood TGS Unit 2	170	30.50	5.11	20.00	20.00
Holyrood TGS Unit 3	150	29.79	15.52	20.00	20.00

<sup>13</sup> 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.



**Chart 2: Thermal DAFOR**

**1 5.1 Holyrood TGS Unit 1**

2 Considering individual thermal unit performance, the DAFOR of 20.90% for Unit 1 at the Holyrood TGS is  
 3 above the near-term and resource planning analysis value of 20.00% for a unit at the Holyrood TGS;  
 4 however, this is an improvement over the previous period. This elevated DAFOR was primarily the result  
 5 of electrical issues that continued from February 1 to March 12, 2023 as well as two extended periods of  
 6 derating due to pump motor failures.

7 From November 15 to December 8, 2022, the unit was derated to 80 MW due to a failure of the east  
 8 boiler feed pump motor, which experienced a ground fault during start-up. The investigation found that  
 9 the lead wire had failed. This had to be replaced and the motor windings had to be cleaned of soot and  
 10 debris buildup that resulted from the failure. The motor was reassembled, tested, and balanced. This  
 11 work was completed in the motor service contractor’s shop. The motor was returned to the site for  
 12 installation and commissioning, which was completed on December 8, 2022.

13 The primary events impacting DAFOR were the electrical issues that caused several forced outages and  
 14 deratings during February and March 2023. Unit 1 was offline for six related forced outages between  
 15 February 1, 2023, when the unit first tripped due to a potential transformer failure, and March 15, 2023,

1 when the unit was released for service by Hydro Engineering following the completion of the  
2 investigation. The unit remained online and reliable for the remainder of the operating season.

3 Through the investigation, two problems were identified, as detailed in the May 2023 Near-Term  
4 Report, these included:

5 **1)** A crack in the porcelain of the primary potential transformer in series with a 180-ohm resistor;  
6 and

7 **2)** A failed resistor in the secondary of the generator grounding transformer.

8 In addition, several corrective actions were identified.

- 9 • The replacement of the temporary resistors on the secondary of the potential transformer and  
10 the grounding transformer, which was completed in September 2023, during the planned  
11 annual outage.<sup>14</sup>
- 12 • The completion of a review of maintenance procedures, including the frequency of preventive  
13 maintenance activities on the grounding resistors and transformers. As a result, the preventive  
14 maintenance strategy is being updated to include more detail regarding required measured  
15 values. The frequency of preventive maintenance is also being increased.
- 16 • The completion of an investigation of instrument transformer testing methods to develop an in-  
17 depth testing plan for the potential transformers to better assess their condition. A review of  
18 the preventive maintenance for the potential transformers has been completed and it was  
19 found to be appropriate. The failure cause was not related to the potential transformers.
- 20 • The completion of an investigation into the cause of the failure, as well as identified spare parts  
21 issues. The cause of the failure was due to the failure of a grounding resistor in the grounding  
22 transformer cabinet. Spare part deficiencies were identified and these parts have been procured  
23 and received at the site.

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<sup>14</sup> As a preventive measure, detailed inspection and testing was completed on Unit 2 at the Holyrood TGS, which has the same configuration as Unit 1 but has not experienced any failures. This work was carried out in 2023, during the planned annual outage. Components were found to be in good shape with no deficiencies identified; however, replacement resistors have been purchased and placed in inventory as spares.

1 Unit 1 was derated to 90 MW from March 27 to April 1, 2023, due to a failure in the electrical supply  
 2 feeding the west cooling water pump. Plant electricians corrected the problem and returned the pump  
 3 to service on April 1, 2023.

## 4 **6.0 Gas Turbine DAUFOP Performance**

5 The combined DAUFOP for the Hardwoods and Stephenville Gas Turbines was 19.66% for the current  
 6 period, as shown in Table 5 and Chart 3. This is below the near-term planning analysis value of 30.00%.  
 7 The Stephenville Gas Turbine DAUFOP for the current period is 30.02%, which is marginally above the  
 8 near-term planning assumption of 30.00%. The Hardwoods Gas Turbine DAUFOP for the current period  
 9 is 8.91%, which is below the near-term planning assumption of 30.00%. On a per-unit basis, both the  
 10 Stephenville and Hardwoods Gas Turbines have declined in performance when compared to the  
 11 previous period. The performance of the Stephenville Gas Turbine is discussed herein.

**Table 5: Hardwoods/Stephenville Gas Turbine DAUFOP**

<b>Gas Turbine Units</b>	<b>Maximum Continuous Unit Rating (MW)</b>	<b>12 Months Ended Sept 2022 (%)</b>	<b>12 Months Ended Sept 2023 (%)</b>	<b>Near-Term Planning Analysis Value (%)</b>
<b>Gas Turbines</b>	<b>100</b>	<b>3.77</b>	<b>19.66</b>	<b>30.00</b>
SVL	50	6.44	30.02	30.00
HWD	50	1.92	8.91	30.00

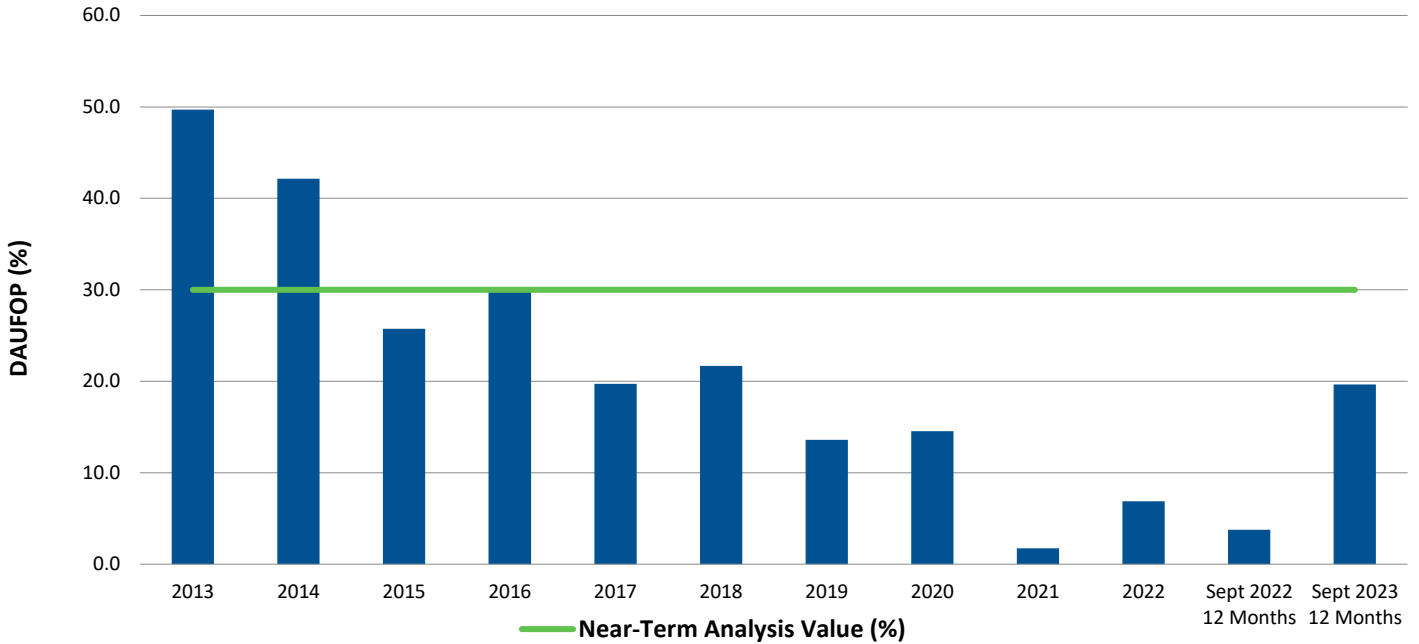
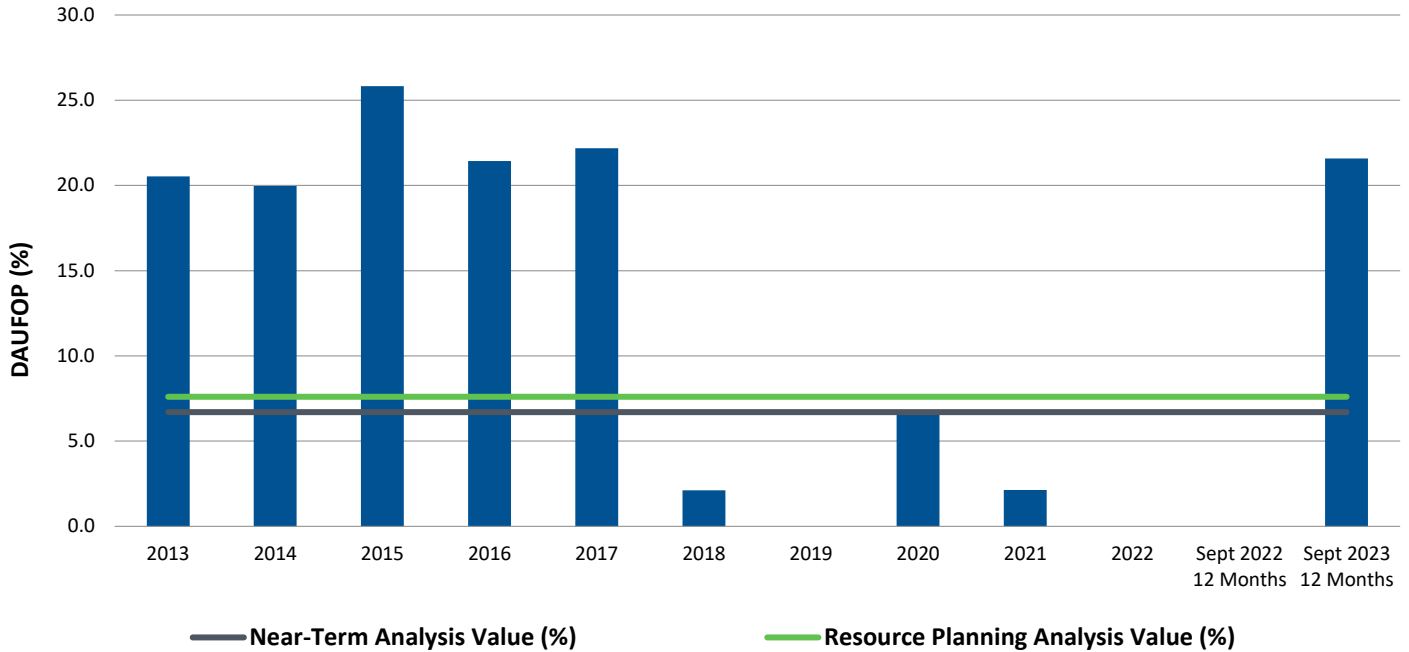


Chart 3: Gas Turbine DAUFOP: Hardwoods/Stephenville Units

- 1 The DAUFOP for the Happy Valley Gas Turbine was 21.58% for the current period, as shown in Table 6
- 2 and Chart 4. This is above both the near-term analysis value of 6.70% and the resource planning analysis
- 3 value of 7.60% and indicates a decline in performance over the previous period. The performance of the
- 4 Happy Valley Gas Turbine is discussed in Section 6.1.

Table 6: Happy Valley Gas Turbine DAUFOP

Gas Turbine Unit	Maximum Continuous Unit Rating (MW)	12 Months Ended Sept 2022 (%)	12 Months Ended Sept 2023 (%)	Near-Term Analysis Value (%)	Resource Planning Analysis Value (%)
Happy Valley	25	0.00	21.58	6.70	7.60



**Chart 4: Gas Turbine DAUFOP: Happy Valley Unit**

- 1 The Holyrood Gas Turbine DAUFOP of 2.58% for the current period is below the near-term and resource
- 2 planning analysis value of 4.90%, as shown in Table 7 and Chart 5, and indicated a decline in
- 3 performance when compared to the previous period.

**Table 7: Holyrood Gas Turbine DAUFOP**

Gas Turbine Unit	Maximum Continuous Unit Rating (MW)	12 Months Ended Sept 2022 (%)	12 Months Ended Sept 2023 (%)	Near-Term Analysis Value (%)	Resource Planning Analysis Value (%)
Holyrood	123.5	0.00	2.58	4.90	4.90



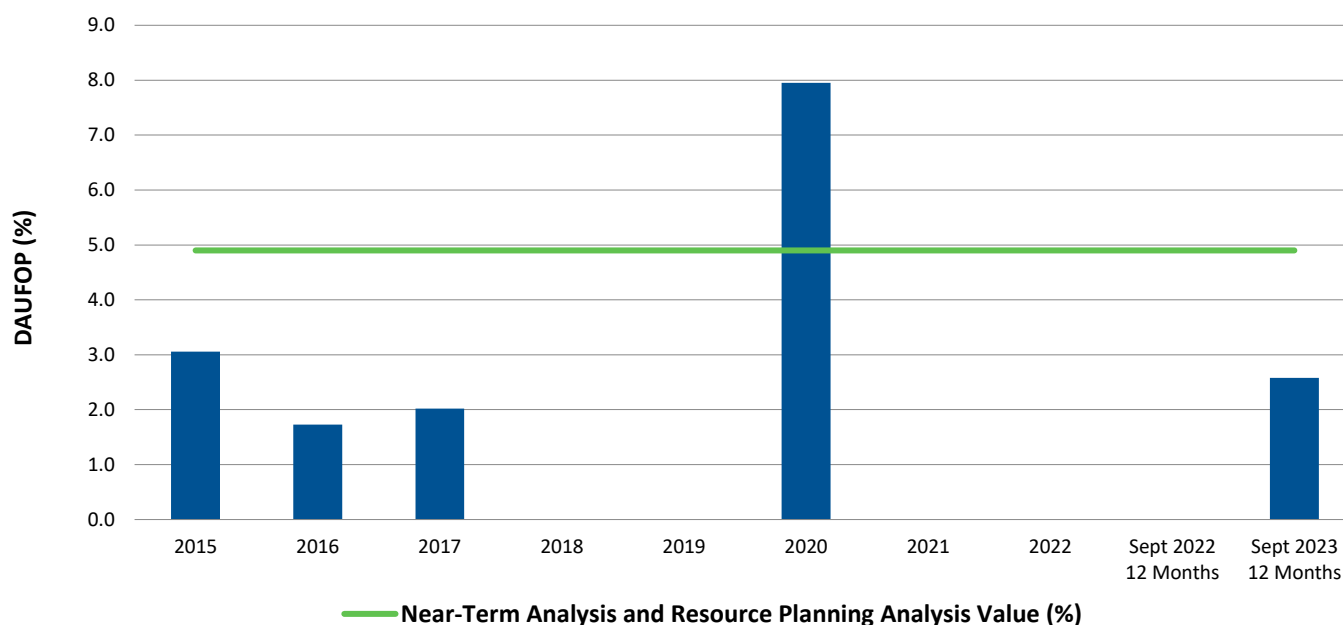


Chart 5: Gas Turbine DAUFOP: Holyrood Unit

## 1 6.1 Stephenville Gas Turbine

2 The Stephenville Gas Turbine DAUFOP was 30.02% for the current period, which is above the near-term  
 3 analysis value of 30.00%. This decline in performance is a result of the failure of the alternator cooling  
 4 fan, which occurred on July 14, 2023.<sup>15</sup>

5 An inspection was completed by the OEM who recommended that the alternator be removed from the  
 6 unit. The rotor will be removed from the alternator and sent to the OEM’s facility in the United States of  
 7 America for inspection and repair in early November 2023. The stator will be inspected, cleaned, and  
 8 repaired on site. The return-to-service date for this unit is expected to be mid- to late January 2024.

## 9 6.2 Happy Valley Gas Turbine

10 The Happy Valley Gas Turbine DAUFOP was 21.58% for the current period, which is above the near-term  
 11 analysis value of 6.70% and the resource planning analysis value of 7.60%. This decline in performance is  
 12 a result of four forced outages, three of which occurred in the second quarter of 2023 and were

<sup>15</sup> Additional information was provided in the “2023–2024 Winter Readiness Planning Report,” Newfoundland and Labrador Hydro, October 13, 2023, sec. 2.2, p. 6 and p. 8 and sec. 7.4.1, pp. 33–34.

- 1 previously reported.<sup>16</sup> Since the previous filing, the Happy Valley Gas Turbine unit was unavailable from
- 2 August 17 to 23, 2023 to complete testing and necessary adjustments on unit protective relaying devices
- 3 following a false trip, resulting from incorrect protection settings. All devices were tested and
- 4 recalibrated and the unit was successfully returned to service.

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<sup>16</sup> “Quarterly Report on Performance of Generating Units for the Twelve Months Ended June 30, 2023,” Newfoundland and Labrador Hydro, July 31, 2023, sec. 6.1, p. 13/5–13.  
<<http://pub.nl.ca/indexreports/12month/From%20NLH%20-%20Q2%202023%20Report%20on%20the%20Rolling%2012%20Month%20Performance%20of%20Hydros%20Generating%20Units%20-%202023-07-31.PDF>>.