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April 30, 2020

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 & Board Secretary

Dear Ms. Blundon:

Re: Rolling 12 Month Performance of Newfoundland and Labrador Hydro's Generating Units

In accordance with item 2.8 of the Liberty Report Recommendations dated December 17, 2014, please find enclosed Newfoundland and Labrador Hydro's ("Hydro") "Quarterly Report on Performance of Generating Units for the Quarter Ended March 31, 2020" ("Report").

On November 16, 2018, Hydro filed the "Reliability and Resource Adequacy Study" ("Study") with the Board of Commissioners of Public Utilities ("Board"). The Study included Hydro's proposed planning assumptions for consultation and discussion with the Board and other stakeholders. For the Report, which covers the performance of Hydro's generating units for the quarter ended March 31, 2020, the assumptions that were reported in the previous 2019 quarterly reports have been maintained for clarity prior to the transition to reporting against the new assumptions.

We trust the foregoing is satisfactory. If you have any questions or comments, please contact the undersigned.

Yours truly,

NEWFOUNDLAND AND LABRADOR HYDRO

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

Encl.

ecc: **Board of Commissioners of Public Utilities**
Jacqui Glynn
Maureen P. Green, Q.C.
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Charlie Perry, Town of Wabush
Randy Dillon, Town of Happy Valley-Goose Bay

Quarterly Report on Performance of Generating Units for the Quarter Ended March 31, 2020

April 30, 2020

A Report to the Board of Commissioners of Public Utilities

newfoundland labrador hydro
a nalcor energy company

Contents

1.0 Introduction

In this report, Newfoundland and Labrador Hydro ("Hydro") provides data on forced outage rates of its generating facilities. The data provided pertains to historical forced outage rates and assumptions Hydro uses in its assessments of resource adequacy. On November 16, 2018, Hydro filed its "Reliability and Resource Adequacy Study" ("Study") with the Board of Commissioners of Public Utilities ("Board"). The Study included Hydro's proposed planning assumptions for further discussion with the Board and the parties. An updated version of the Study was filed with the Board on November 15, 2019. This report covers the performance of Hydro's generating units for the quarter ending March 31, 2020. The assumptions used throughout are the same as reported in the 2019 quarterly reports except for the new assumptions included and identified in Table 12. While the new assumptions form the basis of Hydro's current planning processes, this report includes the historic assumptions and style to maintain similarity to previous reports.

This report contains forced outage rates for the current 12-month reporting period of April 1, 2019 to March 31, 2020, for individual generating units at hydraulic facilities, the Holyrood Thermal Generating Station ("Holyrood TGS"), and Hydro's Gas Turbines. The report also provides, for comparison purposes, the individual generating unit data on forced outage rates for the previous period of April 1, 2018 to March 31, 2019. Further, total asset class data is presented based on the calendar year for the years 2006 to 2018.

The forced outage rates of Hydro's generating units are calculated using three measures: 1) Derated Adjusted Forced Outage Rate ("DAFOR") for the hydraulic and thermal units, 2) Utilization Forced Outage Probability ("UFOP"), and 3) Derated Adjusted Utilization Forced Outage Probability ("DAUFOP") for the gas turbines.

DAFOR is a metric that measures the percentage of the 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 unit is weighted to reflect differences in generating unit sizes in order 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 and thermal units; however, it is not applicable to gas turbines because of their operation as standby units and their relatively low operating hours.

UFOP and DAUFOP are measures used for gas turbines. UFOP 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 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, including 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 Canadian Electricity Association ("CEA") guidelines. CEA guidelines require that derated levels of a generating unit are calculated by converting the operating time at the derated level into an equivalent outage time.

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

Note that the data for 2006 to 2018 in Figures 1 through 7 are annual numbers (January 1 to December 31), while the data for 2019 and 2020 are 12-month rolling numbers (April 1 to March 31 for each year).

As part of the Study, Hydro detailed the process undertaken to determine the forced outage rates most appropriate for use in its near-term reliability assessments and long-term resource adequacy analysis. The values have been updated to reflect the most current outage data and the revised forced outage rates that resulted from this process are included in sections 8.0 and 9.0 of this report. The potential impacts of these revised forced outage rates on future performance reporting are also discussed.

2.0 Overview for Period Ending March 31, 2020

Table 1: DAFOR, UFOP, and DAUFOP Overview (%)

Class of Units	Apr 1, 2019 to Mar 31, 2019	Apr 1, 2019 to Mar 31, 2020	Historic Base Planning Assumption	Historic Near-Term Planning Assumption[1]
Hydraulic (DAFOR)	0.23	1.14	0.90	2.60
Thermal (DAFOR)	14.97	4.04	9.64	14.00
Combined Gas Turbine (UFOP)	5.08	4.85	10.62	20.00
Holyrood Gas Turbine (UFOP)	0.00	0.00	5.00	5.00
Hardwoods/Stephenville Gas Turbine (DAUFOP)	23.39	13.20	-	30.00
Happy Valley Gas Turbine (DAUFOP)	0.00	1.88	-	15.00
Holyrood Gas Turbine (DAUFOP)	0.00	0.00	-	5.00

There was a decline in hydraulic DAFOR and an improvement in thermal DAFOR performance for the current 12-month period ending March 31, 2020, compared to the previous 12-month period ending March 31, 2019 (Table 1). The combined[2] gas turbine UFOP shows a slight improvement in performance for the current period compared to the previous period, while DAUFOP shows an improvement in performance for Hardwoods/Stephenville Gas Turbines, and shows a decline in performance for the Happy Valley Gas Turbine.

For the hydraulic assets, the forced outage rate of the current period ending March 31, 2020 is 1.14%, which is below the historic near-term planning assumption of 2.60%, but is above the historic base planning assumption of 0.90%. The hydraulic DAFOR for the current period is greater than the previous period; this is primarily the result of Penstock No. 1 issues experienced on Bay d'Espoir Units 1 and 2 in September 2019 and a forced derating on Bay d'Espoir Unit 3 from 76.5 MW to 70 MW related to generator thrust and guide bearing issues for the period of October 4, 2019 to November 29, 2019.

For the Holyrood TGS thermal units, the forced outage rate of the current period ending March 31, 2020 is 4.04%, which marks a significant improvement over the previous period and is below the historic base planning assumption of 9.64%, the historic sensitivity of 11.64% (section 3.0), and below the historic near-term planning assumption of 14.00%.

[1] Refer to "Near-Term Generation Adequacy Report," Newfoundland and Labrador Hydro, November 15, 2017, s 5.0 for further details.
[2] Combined gas turbines include the Hardwoods, Happy Valley, and Stephenville units. The performance of the Holyrood unit was not included in the combined base planning or sensitivity numbers as these numbers were set prior to its in service date.

Hydro began reporting DAUFOP performance in January 2018 for its gas turbines.

3.0 Generation Planning Assumptions

The Study introduced new assumptions pertaining to asset availability; however, the assumptions used throughout this report are the same as reported in previous quarterly reports. The potential impacts of these revised assumptions on reporting of generation unit performance are discussed in section 9.0 of this report. While the new assumptions form the basis of Hydro's current planning processes, this report includes the historic assumptions.

Hydro produces reports based on comprehensive reviews of energy supply for the Island Interconnected System. This is part of Hydro's analysis of energy supply up to the Muskrat Falls interconnection. The "Near-Term Generation Adequacy Report," filed on May 22, 2018, contains analysis based on the near-term DAFOR and DAUFOP and the resulting implication for meeting reliability criteria until the interconnection with the North American grid. The near-term analysis has been updated since that time to reflect changes in assumptions with respect to the in-service of the Labrador-Island Link ("LIL"). The results of this analysis were presented to the Board as part of the "Labrador-Island Link In-Service Update" submitted October 1, 2018.

Hydro's DAFOR and UFOP planning assumptions are provided in Table 2. The Holyrood Gas Turbine has a lower expected rate of unavailability than the older gas turbines (5% compared to 10.62%) due to the fact that the unit is new and can be expected to have better availability than the older units.[3]

Table 2: 2017[4] DAFOR and UFOP Historic Planning Assumptions (%)

	DAFOR		UFOP	
	Historic Base Planning Assumption	Historic Sensitivity	Historic Base Planning Assumption	Historic Sensitivity
Hydraulic Units	0.90	0.90		
Thermal Units	9.64	11.64		
Gas Turbines: Existing			10.62	20.00
Gas Turbines: New			5.0	10.0

[3] Hydro selected a 5% UFOP for the new Holyrood Gas Turbine following commentary on forced outage rates contained in the "Independent Supply Decision Review," Navigant Consulting Ltd., September 14, 2011.
[4] Refer to "Near-Term Generation Adequacy Report," Newfoundland and Labrador Hydro, November 15, 2017, s 5.0 for further details.

The DAFOR and DAUFOP assumptions used in developing the May 2018 "Near-Term Generation Adequacy Report" are noted in Table 3. Values currently used in Hydro's assessments of reliability and resource adequacy are provided in Section 9.

Table 3: DAFOR and DAUFOP Near-Term Generation Adequacy Analysis Assumptions (%)

	DAFOR Historic Near-Term Planning Assumption	DAUFOP Historic Near-Term Planning Assumption
All Hydraulic Units	2.6	
Bay d'Espoir Hydraulic Units	3.9	
Other Hydraulic Units	0.7	
Holyrood TGS	14.0	
Hardwoods and Stephenville Gas Turbines		30.0
Happy Valley Gas Turbine		15.0
Holyrood Gas Turbine		5.0

4.0 Hydraulic Unit DAFOR Performance

Detailed results for the 12-month period ending March 31, 2020 are presented in Table 4, as well as the data for the 12-month period ending March 31, 2019. These are compared to Hydro's historic near-term planning assumptions, as used in the May 2018 "Near-Term Generation Adequacy Report," and Hydro's historic base planning assumptions for the forced outage rate. Values currently used in Hydro's assessments of reliability and resource adequacy are provided in Section 9.

Table 4: Hydraulic Weighted DAFOR

Generating Unit	Maximum Continuous Unit Rating (MW)	12 months ending March 2019 (%)	12 months ending March 2020 (%)	Historic Base Planning Assumption (%)	Historic Near-Term Planning Assumption (%)
All Hydraulic Units - weighted	954.4	0.23	1.14	0.90	2.60
Hydraulic Units					
Bay D'Espoir 1	76.5	0.07	3.73	0.90	3.90
Bay D'Espoir 2	76.5	0.64	3.75	0.90	3.90
Bay D'Espoir 3	76.5	0.00	2.07	0.90	3.90
Bay D'Espoir 4	76.5	0.16	0.09	0.90	3.90
Bay D'Espoir 5	76.5	0.19	0.25	0.90	3.90
Bay D'Espoir 6	76.5	0.64	0.63	0.90	3.90
Bay D'Espoir 7	154.4	0.10	0.00	0.90	3.90
Cat Arm 1	67	0.94	0.19	0.90	0.70
Cat Arm 2	67	0.00	0.15	0.90	0.70
Hinds Lake	75	0.07	1.04	0.90	0.70
Upper Salmon	84	0.15	0.04	0.90	0.70
Granite Canal	40	0.45	0.74	0.90	0.70
Paradise River	8	1.65	7.79	0.90	0.70

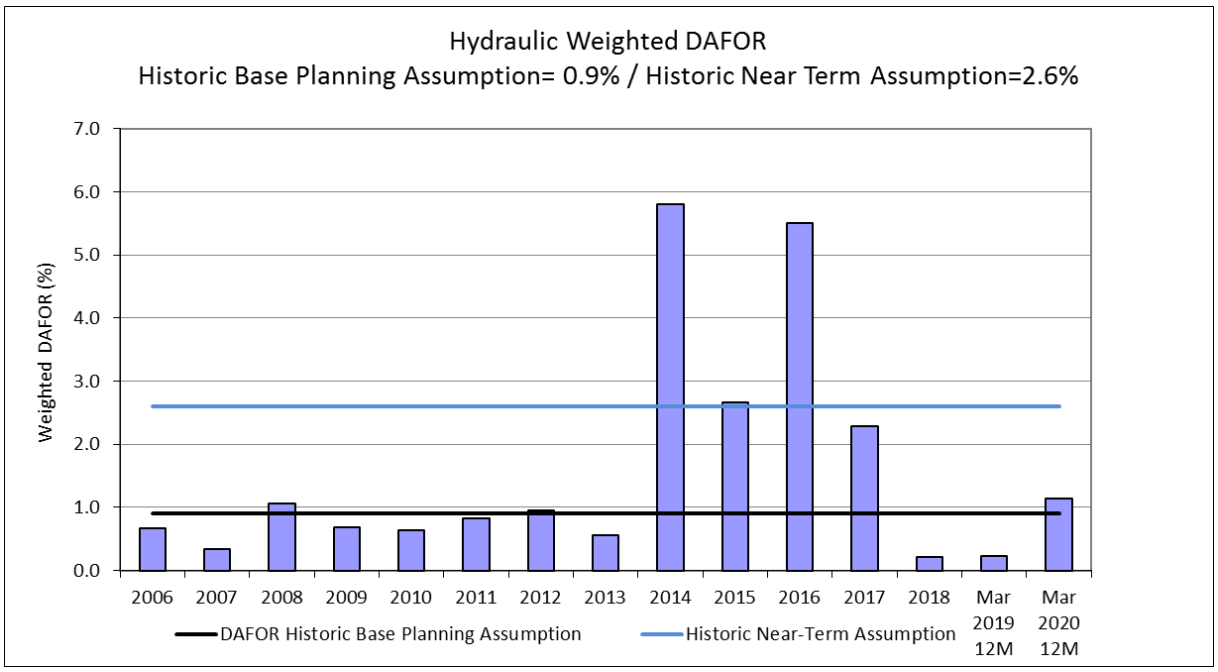

Figure 1: Hydraulic Weighted DAFOR

Considering individual hydraulic unit performance, the Bay d'Espoir Unit 1 DAFOR of 3.73%, the Bay d'Espoir Unit 2 DAFOR of 3.75% and the Bay d'Espoir Unit 3 DAFOR of 2.07% did not meet the historic base planning assumption of 0.9% but are below the historic near-term planning assumption of 3.9% for an individual Bay d'Espoir unit. As previously reported, Bay d'Espoir Units 1 and 2 experienced forced outages for the period of September 22, 2019 to October 4, 2019, as a result of a leak in Penstock 1. This leak has since been repaired and the units returned to service. Bay d'Espoir Unit 3 experienced a forced derating from 76.5 MW to 70 MW for the period of October 4, 2019 to November 29, 2019, as a result of increased vibration at higher output. The generator thrust and guide bearings have since been replaced and the unit returned to full capacity.

The Hinds Lake unit DAFOR of 1.04% did not meet the historic base planning assumption of 0.9% nor the historic near-term planning assumption of 0.7% for the unit. This was the result of two forced outages, one on January 23, 2020 to investigate arcing on the slip ring assembly and the other on March 11, 2020 to address an issue with the brake speed switch. Both issues have since been resolved.

The Granite Canal unit DAFOR of 0.74% met the historic base planning assumption of 0.9% but was above the historic near-term planning assumption of 0.7% for the unit. This was primarily the result of two forced outages. The first, a forced outage from July 26 to 29, 2019, resulted from a leak in the unit

oil head. This leak was addressed and a plan has been developed to complete necessary improvement work on the equipment during the next annual planned outage. The second outage, a starting failure, occurred on October 14, 2019 as a result of miscommunication regarding modifications made to the unit control sequence during the annual maintenance outage in 2019. These modifications were the result of a thorough engineering assessment of the control system, which was completed in response to malfunctions experiences when remotely starting and/or stopping the Granite Canal unit. The first phase of this assessment was completed in 2019, with the second phase planned for 2020.

The Paradise River unit DAFOR of 7.79% did not meet the historic base planning assumption of 0.9% nor the historic near-term assumption of 0.7% for the unit. This was primarily the result of two forced outages. The first, a forced outage from July 29, 2019 to August 9, 2019, as a result of a leak in the penstock expansion joint located in the lower level of the plant, and the second, a forced outage from November 18, 2019 to November 20, 2019, as a result of an issue with the unit breaker, as previously reported. Both issues have since been resolved.

5.0 Thermal Unit DAFOR Performance

Detailed results for the 12-month period ending March 31, 2020, are presented in Table 5, as well as the data for the 12-month period ending March 31, 2019. These results are compared to Hydro's historic short-term generation adequacy assumptions, as used in the May 2018 "Near-Term Generation Adequacy Report," and Hydro's historic long-term generation planning assumptions for the forced outage rate.

Table 5: Thermal DAFOR

Generating Unit	Maximum Continuous Unit Rating (MW)	12 months ending March 2019 (%)	12 months ending March 2020 (%)	Historic Base Planning Assumption (%)	Historic Near-Term Planning Assumption (%)
All Thermal Units - weighted	490	14.97	4.04	9.64	14.00
Thermal Units					
Holyrood 1	170	20.20	0.31	9.64	15.00
Holyrood 2	170	13.53	10.29	9.64	10.00
Holyrood 3	150	7.34	0.37	9.64	18.00

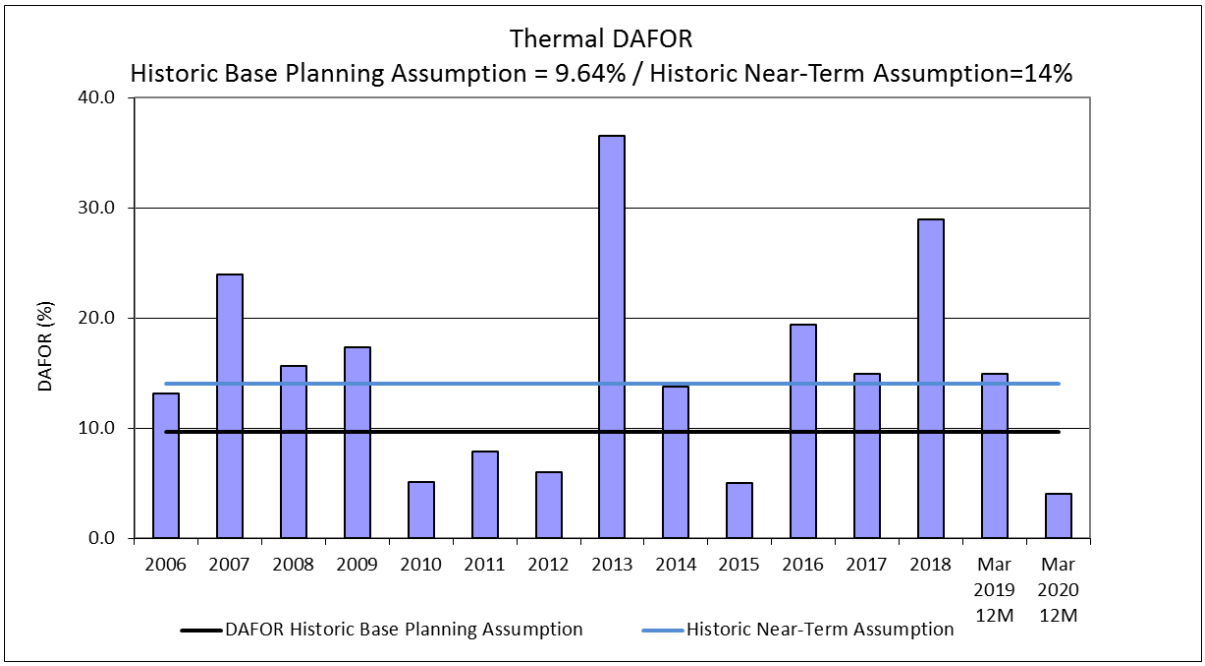

Figure 2: Thermal DAFOR

For the 12-month period ending March 31, 2020, the weighted DAFOR for all thermal units of 4.04% is below the historic base planning assumption DAFOR value of 9.64%, and below the historic near-term planning assumption of 14.00%. Unit 1 DAFOR was 0.31%, which is below the historic base planning assumption of 9.64% and below the historic near-term planning assumption of 15%. Unit 3 DAFOR was 0.37%, which is below the historic base planning assumption of 9.64% and the historic near-term planning assumption of 18%. However, Unit 2 DAFOR was 10.29%, which is above the historic base planning assumption of 9.64%, and the historic near-term assumption of 10.0%.

Unit 2 did not meet the historic base planning assumption and historic near term planning assumption primarily because of a forced outage in April 2019. From April 12 to May 4, the unit was off line due to a failure of the turbine control valve camshafts. Investigation determined that both the upper and lower camshaft assemblies were bent, which prevented proper control of the control valves and led to the unit trip. The camshafts were removed, straightened at a local machine shop, re-installed with all new bearings, and function tested to confirm proper operation before returning the unit to service. Spare upper and lower camshafts were ordered and have been added to inventory for use on either Unit #1 or #2 in the event of an additional failure.

During the remainder of 2019, there were three shorter forced outages on Holyrood Unit 2 that also contributed to the DAFOR being above the historic base planning and historic near term planning assumptions. When returning the unit to service after completion of the 2019 annual outage, on September 5, 2019, the packing in a small drain valve on the main steam line to the turbine failed causing a steam leak. The unit had to be shut down for approximately one and a half days to replace the drain valve. On October 23, 2019, the unit tripped while preparing to start up Unit 1. Unit 2 was off for approximately 30 hours while this trip was being investigated. The solenoid that controls the Unit 1 main fuel oil trip valve shorted to ground, creating a ground fault in the Stage 1 125VDC system. This caused a trip of the Unit 2 exciter and, consequently, the generator. The solenoid and two relays associated with the exciter were replaced with spares, which restored the operating capability of the units. On October 30 the east FD fan tripped, which lead to a unit trip on low airflow because of the loss of the fan. The unit was returned to service approximately six hours later. The fan trip was due to an issue within the variable frequency drive ("VFD ") cabinet. The VFD tripped and the 4160 V breaker to the drive failed to open. As a result of the breaker not opening, the control dampers did not close. This disrupted proper airflow and led to the trip of the unit. Plant forces investigated the trip and could not find any faults with the breaker or VFD and could not repeat the failure through testing. The unit was returned to service later the same day and has not had any repeat issues. Plant staff have worked with Siemens (original equipment manufacturer ("OEM") for the VFDs) and investigated the VFD sequence of events ("SOE"). Siemens will perform additional investigation and testing when they return to site for the 2020 annual outage for Unit 2.

In the first quarter of 2020 there was one additional trip of Unit 2 that contributed to the DAFOR being above the historic base planning and historic near term planning assumptions. On January 28, 2020, the west VFD fan tripped while starting a boiler feed pump, resulting in a 90 minute outage. This trip was caused by a VFD power cell failure. The failed VFD power cell was replaced during a planned outage in February.

The current period DAFOR for all units is improved over the previous period.

6.0 Gas Turbine UFOP Performance

The combined UFOP for the Hardwoods, Happy Valley, and Stephenville Gas Turbines was 4.85% for the 12-month period ending March 31, 2020 (Table 6 and Figure 3). This performance is better than the historic base planning assumption of 10.62% and the historic near-term planning assumption of 20.00%

and its performance is slightly improved over the previous period. The Hardwoods Gas Turbine UFOP for the current period is 1.35%, as compared to the historic base planning assumption of 10.62%. The Stephenville Gas Turbine UFOP for the current period is 8.16%, as compared to the historic base planning assumption of 10.62%. The Happy Valley Gas Turbine UFOP is 1.88% for the current period, as compared to the historic base planning assumption of 10.62%. On an individual unit basis, gas turbine UFOP performance for the Hardwoods Gas Turbine for the current period is improved over the previous period. The UFOP performance for Stephenville and Happy Valley units for the current period is declined over the previous period.

Table 6: Gas Turbine UFOP

Gas Turbine Units	Maximum Continuous Unit Rating (MW)	12 months ending March 2019 (%)	12 months ending March 2020 (%)	Historic Base Planning Assumption (%)	Historic Near-Term Planning Assumption (%)
Combined Gas Turbines	125	5.08	4.85	10.62	20.00
Stephenville	50	0.98	8.16	10.62	20.00
Hardwoods	50	7.77	1.35	10.62	20.00
Happy Valley	25	0.00	1.88	10.62	20.00

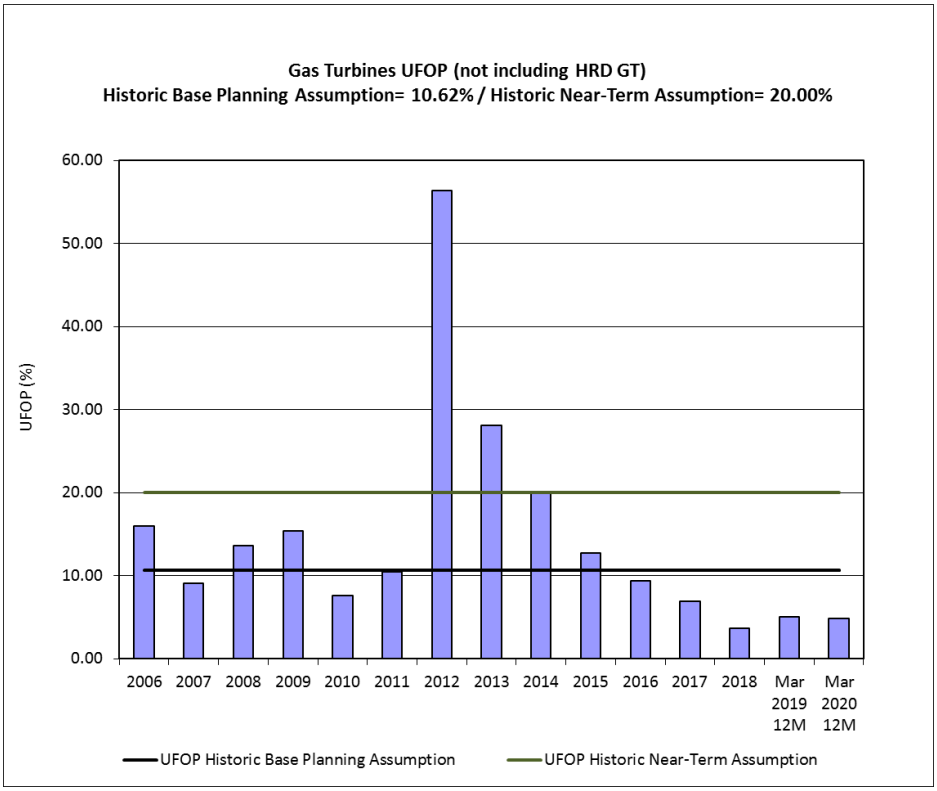

Figure 3: Gas Turbine UFOP: Hardwoods/Happy Valley/Stephenville Units

The Holyrood Gas Turbine UFOP of 0.00% for the current period is better than the historic base and historic near-term planning assumptions of 5.00% (Table 7 and Figure 4) and is equivalent to the UFOP for the previous period.

Table 7: Holyrood Gas Turbine UFOP

Gas Turbine Units	Maximum Continuous Unit Rating (MW)	12 months ending March 2019 (%)	12 months ending March 2020 (%)	Historic Base Planning Assumption (%)	Historic Near-Term Planning Assumption (%)
Holyrood GT	123.5	0.00	0.00	5.00	5.00

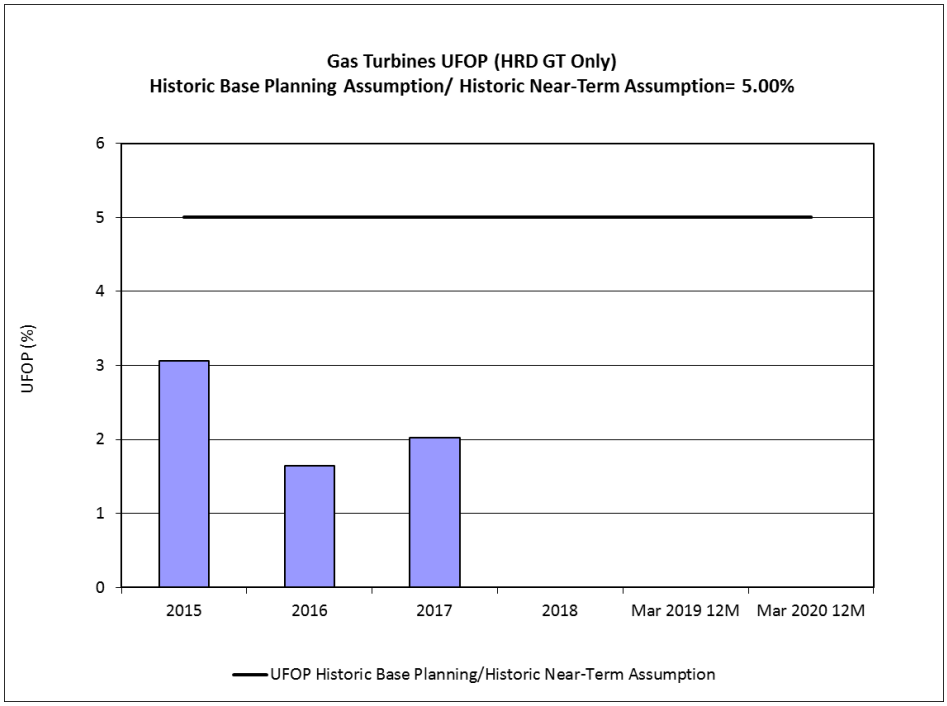

Figure 4: Gas Turbine UFOP: Holyrood Unit

7.0 Gas Turbine DAUFOP Performance

The combined DAUFOP for the Hardwoods and Stephenville Gas Turbines was 13.20% for the 12-month period ending March 31, 2020 (Table 8 and Figure 5). This is below the historic near-term planning assumption of 30.00%. The Hardwoods Gas Turbine DAUFOP for the current period is 15.44%, which is below the historic near-term planning assumption of 30.00%, and declined over the previous period. The Stephenville Gas Turbine DAUFOP for the current period is 9.19%, which is below the historic near-term planning assumption of 30.00%, and improved over the previous period.

Table 8: Hardwoods/Stephenville Gas Turbine DAUFOP

Gas Turbine Units	Maximum Continuous Unit Rating (MW)	12 months ending March 2019 (%)	12 months ending March 2020 (%)	Historic Near-Term Planning Assumption (%)
Gas Turbines (HWD/SVL)	100	23.39	13.20	30.00
Stephenville	50	34.68	9.19	30.00
Hardwoods	50	14.08	15.44	30.00

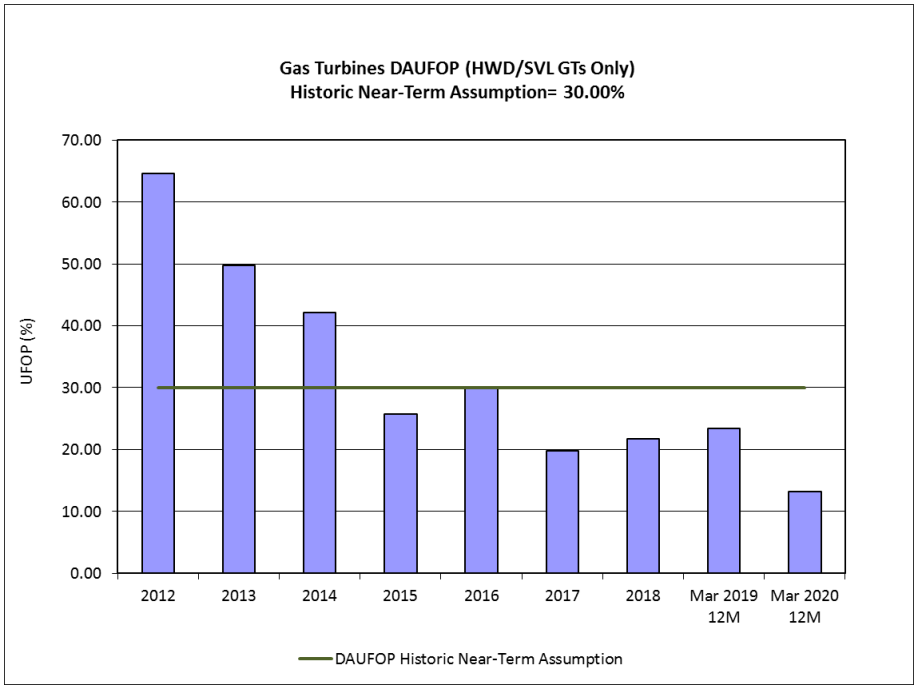

Figure 5: Gas Turbine DAUFOP: Hardwoods/Stephenville Units

The DAUFOP for the Happy Valley Gas Turbine was 1.88% for the 12-month period ending March 31, 2020 (Table 9 and Figure 6). This is below the historic near-term planning assumption of 15.00%, and declined over the previous period.

Table 9: Happy Valley Gas Turbine DAUFOP

Gas Turbine Units	Maximum Continuous Unit Rating (MW)	12 months ending March 2019 (%)	12 months ending March 2020 (%)	Historic Near-Term Planning Assumption (%)
Happy Valley	25	0.00	1.88	15.00

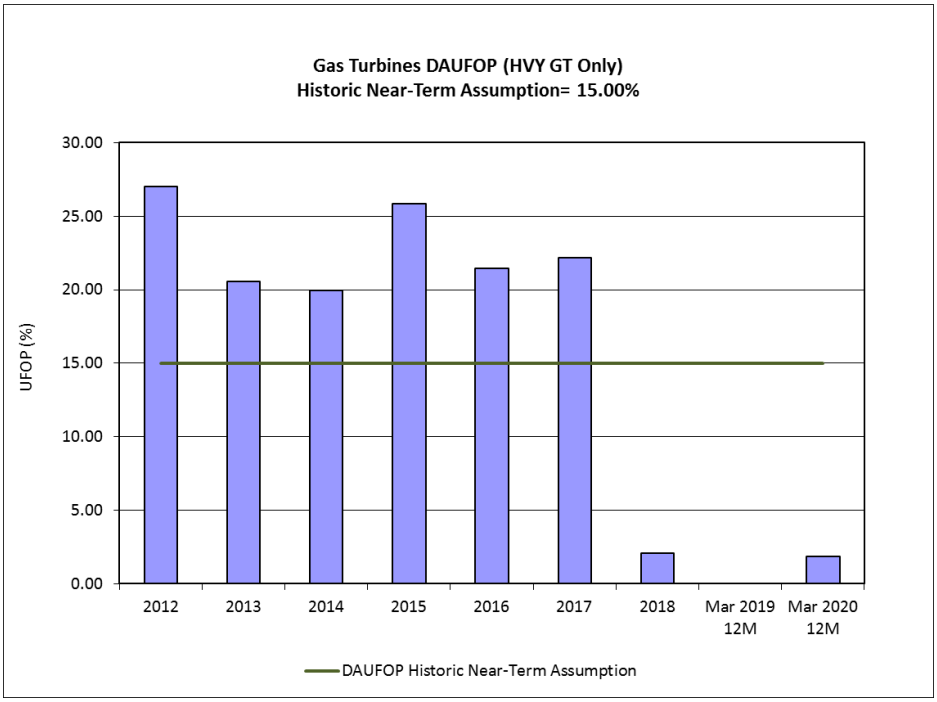

Figure 6: Gas Turbine DAUFOP: Happy Valley Unit

The Holyrood Gas Turbine DAUFOP of 0.00% for the current period is better than the historic near-term planning assumption of 5.00% (Table 10 and Figure 7) and equivalent over the previous period.

Table 10: Holyrood Gas Turbine DAUFOP

Gas Turbine Units	Maximum Continuous Unit Rating (MW)	12 months ending March 2019 (%)	12 months ending March 2020 (%)	Historic Near-Term Planning Assumption (%)
Holyrood GT	123.5	0.00	0.00	5.00

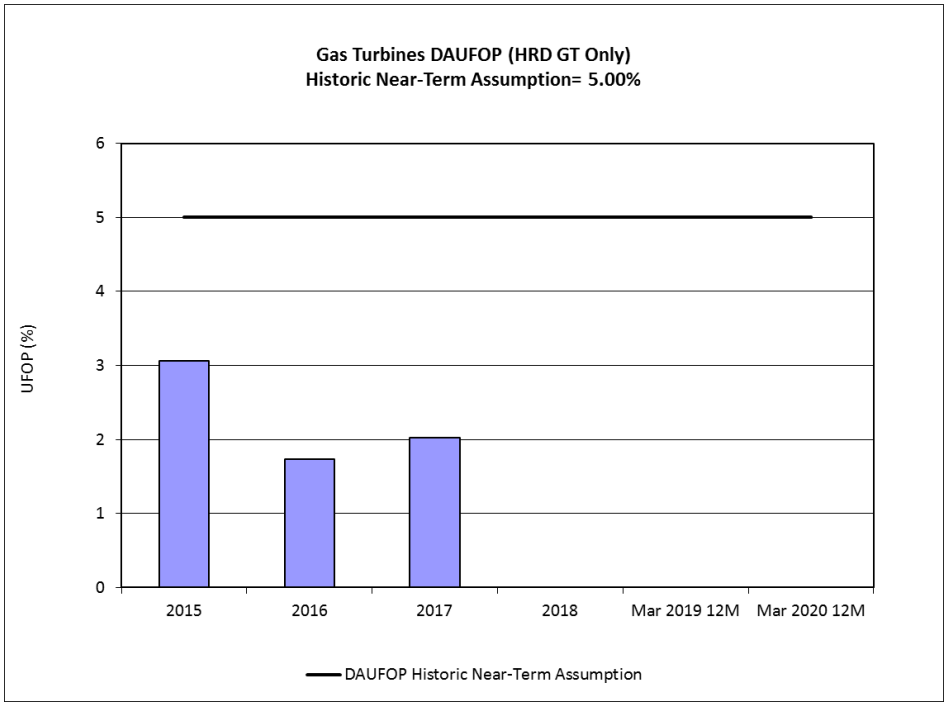

Figure 7: Gas Turbine DAUFOP: Holyrood Unit

8.0 Updated Planning Assumptions/Analysis Values

As part of the Study, 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 11 summarizes the most recent forced outage rate assumptions as calculated using the forced outage rate methodology.[5]

Table 11: Hydro's Reliability and Resource Adequacy Study Analysis Values

Unit Type	Measure	Near-Term Analysis Value (%)	Resource Planning Analysis Value (%)
Hydraulic	DAFOR	2.8	2.1
Thermal	DAFOR	15.0	N/A
Gas Turbines			
Happy Valley	DAUFOP	9.8	9.7
Hardwoods and Stephenville	DAUFOP	30.0	N/A
Holyrood	DAUFOP	1.7	1.7

[5] Values indicated for Hydro's near-term analysis reflect those used in Hydro's "Near-Term Generation Adequacy Report," filed with the Board on November 15, 2019.

For the hydroelectric units (Bay d'Espoir, Cat Arm, Hinds Lake, Granite Canal, Upper Salmon, and Paradise River) a three-year capacity-weighted average was applied to these units for the near-term analysis, resulting in a DAFOR of 2.8%, while a ten-year capacity-weighted average was applied for use in the resource planning model, resulting in a DAFOR of 2.1%. The DAFOR value was based on historical data reflective of Hydro's maintenance program over the long-term.

DAFORs of 15%, 18%, and 20% were applied to each of the units at the Holyrood TGS to determine the sensitivity of the system to Holyrood TGS availability in the near-term. This is consistent with the May 2018 "Near-Term Generation Adequacy Report." As the Holyrood TGS units are being retired once the Muskrat Falls Project assets have been reliably placed in service, the units were not included in the long-term analysis and thus there is no resource planning analysis value included for these units. For the total plant, an all units weighted value of 15% is used for the near-term.

As the gas turbines in the existing fleet are in varied condition, 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 9.8%, while a ten-year capacity-weighted average was applied for use in the resource planning model resulting in a DAUFOP of 9.7%. The DAUFOP values were based on historical data founded upon the unit's past reliable performance. For the Holyrood Gas Turbine, a three-year capacity-weighted average was applied to the unit for the near-term analysis, resulting in a DAUFOP of 1.7%. For the Hardwoods and Stephenville Gas Turbines, a DAUFOP of 30% was used for the near-term analysis, consistent with the metrics that were considered in Hydro's May 2018 "Near-Term Generation Adequacy Report." As the Hardwoods and Stephenville Gas Turbines are being considered for retirement, these units were not included in the long- term analysis and, therefore, have no resource planning analysis value included.

9.0 Comparison of Planning Assumptions and Analysis Values

As Hydro's reliability and adequacy planning assumptions have been historically used in reporting on the performance of Hydro's generating units, a comparison of the values used historically to the most recent analysis is provided in Table 12 for clarity.

Hydro notes that the Study did not utilize UFOP in its analysis. The analysis instead utilized the DAUFOP measure with changes as shown in Table 12.

Table 12: Comparison of Hydro's Planning Assumptions (%)

		Historical Planning Assumptions		Reliability and Resource Adequacy Assumptions	
Generating Unit Type	**Measure**	**Historic Base Planning Assumption**	**Historic Near-Term Planning Assumption**	**Near-Term Analysis Value**	**Resource Planning Analysis Value**
Hydraulic	DAFOR	0.9	2.6	2.8	2.1
Thermal	DAFOR	9.64	14.0	15.0	N/A
Gas Turbines					
Happy Valley	DAUFOP	-	15.0	9.8	9.7
Hardwoods and Stephenville	DAUFOP	-	30.0	30.0	N/A
Holyrood	DAUFOP	-	5.0	1.7	1.7

The generating unit performance presented earlier in this report is again presented in Tables 13 to 17 with comparison to the previous assumptions, as well as the current values. No data is provided for the UFOP performance, as Hydro does not currently use this metric in its reliability assessments. Hydro notes that on an asset class basis, the 12-month rolling performance of its generating units has no violations of Hydro's current planning assumptions pertaining to asset availability.

Table 13: Hydraulic Weighted DAFOR Performance Comparison

				May 2018		November 2019	
Generating Unit	**Maximum Continuous Unit Rating (MW)**	**12 months ending March 2019 (%)**	**12 months ending March 2020 (%)**	**Historic Base Planning Assumption (%)**	**Historic Near-Term Planning Assumption (%)**	**Near-Term Planning Analysis Value (%)**	**Resource Planning Analysis Value (%)**
All Hydraulic Units - weighted	954.4	0.23	1.14	0.90	2.60	2.80	2.10
Hydraulic Units							
Bay D'Espoir 1	76.5	0.07	3.73	0.90	3.90	2.80	2.10
Bay D'Espoir 2	76.5	0.64	3.75	0.90	3.90	2.80	2.10
Bay D'Espoir 3	76.5	0.00	2.07	0.90	3.90	2.80	2.10
Bay D'Espoir 4	76.5	0.16	0.09	0.90	3.90	2.80	2.10
Bay D'Espoir 5	76.5	0.19	0.25	0.90	3.90	2.80	2.10
Bay D'Espoir 6	76.5	0.64	0.63	0.90	3.90	2.80	2.10
Bay D'Espoir 7	154.4	0.10	0.00	0.90	3.90	2.80	2.10
Cat Arm 1	67	0.94	0.19	0.90	0.70	2.80	2.10
Cat Arm 2	67	0.00	0.15	0.90	0.70	2.80	2.10
Hinds Lake	75	0.07	1.04	0.90	0.70	2.80	2.10
Upper Salmon	84	0.15	0.04	0.90	0.70	2.80	2.10
Granite Canal	40	0.45	0.74	0.90	0.70	2.80	2.10
Paradise River	8	1.65	7.79	0.90	0.70	2.80	2.10

Table 14: Thermal DAFOR Performance Comparison

				May 2018		November 2019	
Generating Unit	**Maximum Continuous Unit Rating (MW)**	**12 months ending March 2019 (%)**	**12 months ending March 2020 (%)**	**Historic Base Planning Assumption (%)**	**Historic Near-Term Planning Assumption (%)**	**Near-Term Planning Analysis Value (%)**	**Resource Planning Analysis Value (%)**
All Thermal Units - weighted	490	14.97	4.04	9.64	14.00	15.00	N/A
Thermal Units							
Holyrood 1	170	20.20	0.31	9.64	15.00	15.00	-
Holyrood 2	170	13.53	10.29	9.64	10.00	15.00	-
Holyrood 3	150	7.34	0.37	9.64	18.00	15.00	-

Table 15: Hardwoods/Stephenville Gas Turbine DAUFOP Performance

				May 2018		November 2019	
Gas Turbine Units	**Maximum Continuous Unit Rating (MW)**	**12 months ending March 2019 (%)**	**12 months ending March 2020 (%)**	**Historic Base Planning Assumption (%)**	**Historic Near-Term Planning Assumption (%)**	**Near-Term Planning Analysis Value (%)**	**Resource Planning Analysis Value (%)**
Gas Turbines (HWD/SVL)	100	23.39	13.20	N/A	30.00	30.00	N/A
Stephenville	50	34.68	9.19	N/A	30.00	30.00	N/A
Hardwoods	50	14.08	15.44	N/A	30.00	30.00	N/A

Table 16: Happy Valley Gas Turbine DAUFOP Performance Comparison

				May 2018		November 2019	
Gas Turbine Units	**Maximum Continuous Unit Rating (MW)**	**12 months ending March 2019 (%)**	**12 months ending March 2020 (%)**	**Historic Base Planning Assumption (%)**	**Historic Near-Term Planning Assumption (%)**	**Near-Term Planning Analysis Value (%)**	**Resource Planning Analysis Value (%)**
Happy Valley	25	0.00	1.88	N/A	15.00	9.80	9.70

Table 17: Holyrood Gas Turbine DAUFOP Performance Comparison

				May 2018		November 2019	
Gas Turbine Units	**Maximum Continuous Unit Rating (MW)**	**12 months ending March 2019 (%)**	**12 months ending March 2020 (%)**	**Historic Base Planning Assumption (%)**	**Historic Near-Term Planning Assumption (%)**	**Near-Term Planning Analysis Value (%)**	**Resource Planning Analysis Value (%)**
Holyrood GT	123.5	0.00	0.00	N/A	5.00	1.70	1.70