

July 31, 2019

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: The Board of Commissioners of Public Utilities Investigation and Hearing into Supply Issues and Power Outages on the Island Interconnected System – 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 attached the original plus twelve copies of Newfoundland and Labrador Hydro's ("Hydro") "Quarterly Report on Performance of Generating Units for the Quarter Ended June 30, 2019" ("Report").

On November 16, 2018, Hydro filed the "Reliability and Resource Adequacy Study" with the Board of Commissioners of Public Utilities ("Board"). The "Reliability and Resource Adequacy 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 ending June 30, 2019, the assumptions that were reported in the previous 2018 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**



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Senior Legal Counsel, Regulatory  
SAW/las

Encl.

cc: Gerard M. Hayes, Newfoundland Power  
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Danny Dumaresque  
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# Quarterly Report on Performance of Generating Units for the Quarter Ended June 30, 2019

**July 31, 2019**

A Report to the Board of Commissioners of Public Utilities





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## 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 intervenors. This quarterly report covers the performance of Hydro’s generating units for the quarter ending June 30, 2019. The assumptions used throughout are the same as reported in the 2018 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 to provide clarity while the Board assesses the Study.

This report contains forced outage rates for the current 12-month reporting period of July 1, 2018 to June 30, 2019, 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, July 1, 2017 to June 30, 2018. Further, total asset class data is presented based on a calendar year for the years 2006 to 2018.

The forced outage rates of Hydro’s generating units are calculated using three measures: Derated Adjusted Forced Outage Rate (“DAFOR”) for the hydraulic and thermal units; and Utilization Forced Outage Probability (“UFOP”) and 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. 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.

1 UFOP and DAUFOP are measures used for gas turbines. UFOP measures the percentage of time that a  
2 unit or group of units will encounter a forced outage and not be available when required. DAUFOP is a  
3 metric that measures the percentage of time that a unit or group of units will encounter a forced outage  
4 and not be available when required; this metric includes the impact of unit deratings.

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

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

15  
16 Note that the data for 2006 to 2018 in Figures 1 through 7 are annual numbers (January 1 to December  
17 31), while the data for 2018 is also shown with 2019 as 12-month rolling numbers (July 1 to June 30 for  
18 each year).

19  
20 As part of the Study, filed with the Board on November 16, 2018, Hydro detailed the process undertaken  
21 to determine the forced outage rates most appropriate for use in its near-term reliability assessments  
22 and long-term resource adequacy analysis. The revised forced outage rates, which resulted from this  
23 process, are included in Sections 8 and 9 of this report. The potential impacts of these revised forced  
24 outage rates on future performance reporting is also discussed.



## 2.0 Overview for Period Ending June 30, 2019

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

Class of Units	July 1, 2017 to June 30, 2018	July 1, 2018 to June 30, 2019	Base Planning Assumption	Near-Term Planning Assumption <sup>1</sup>
Hydraulic (DAFOR)	2.04	0.24	0.90	2.60
Thermal (DAFOR)	26.22	9.43	9.64	14.00
Combined Gas Turbine (UFOP)	6.78	4.73	10.62	20.00
Holyrood Gas Turbine (UFOP)	0.06	0.00	5.00	5.00
Hardwoods/Stephenville Gas Turbine (DAUFOP)	24.11	18.06	-	30.00
Happy Valley Gas Turbine (DAUFOP)	19.27	0.00	-	15.00
Holyrood Gas Turbine (DAUFOP)	0.06	0.00	-	5.00

There was an improvement in hydraulic DAFOR and in thermal DAFOR performance for the current 12-month period ending June 30, 2019, compared to the previous 12-month period ending June 30, 2018 (see Table 1). The combined<sup>2</sup> gas turbine UFOP and DAFOP show an improvement in performance for the current period compared to the previous period.

For the Holyrood TGS thermal units, the forced outage rate of the current period ending June 30, 2019 is 9.43%, which is below the base planning assumption of 9.64%, the sensitivity of 11.64% (refer to Section 3), and below the near-term planning assumption of 14.00%.

The Holyrood TGS DAFOR for the current period shows a material improvement for the 2018-2019 winter season due to the work that was completed during the 2018 annual outages to improve the performance of all units with respect to air flow limitations. All three units were successfully tested to full load and have remained at that capability, with minor exceptions.

<sup>1</sup> "Near-Term Generation Adequacy Report," November 15, 2017, see section 5.0 for further details.

<sup>2</sup> 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.

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

## 2 **3.0 Generation Planning Assumptions**

3 The Study submitted to the Board in November 2018 introduced new generation planning assumptions;  
4 however, the assumptions used throughout this report are the same as reported in previous quarterly  
5 reports. The potential impacts of these revised assumptions on reporting of generation unit  
6 performance are discussed in Section 9 of this report. While the new assumptions form the basis of  
7 Hydro’s current planning processes, this report includes the historic assumptions and style to maintain  
8 similarity to previous reports to provide clarity while the Board assesses the Study.

9  
10 Hydro produces reports based on comprehensive reviews of energy supply for the Island Interconnected  
11 System. This is part of Hydro’s analysis of energy supply up to the Muskrat Falls interconnection. The  
12 “Near-Term Generation Adequacy Report”, filed on May 22, 2018, contains analysis based on the near-  
13 term DAFOR and DAUFOP and the resulting implication for meeting reliability criteria until the  
14 interconnection with the North American grid. The near-term analysis has been updated since that time  
15 to reflect changes in assumptions with respect to the in-service of the Labrador-Island Link (“LIL”). The  
16 results of this analysis were presented to the Board as part of the LIL In-Service Update submitted  
17 October 1, 2018.

18  
19 Hydro’s DAFOR and UFOP planning assumptions are provided in Table 2. The Holyrood Gas Turbine has a  
20 lower expected rate of unavailability than the older gas turbines (5% compared to 10.62%) due to the  
21 fact that the unit is new and can be expected to have better availability than the older units.<sup>3</sup>

**Table 2: 2017<sup>4</sup> DAFOR and UFOP Long-Term Planning Assumptions**

	DAFOR (%)		UFOP (%)	
	Base Planning Assumption	Sensitivity	Base Planning Assumption	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

<sup>3</sup> 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”, September 14, 2011.

<sup>4</sup> “Near-Term Generation Adequacy Report”, November 15, 2017, see section 5.0 for further details.

- 1 The DAFOR and DAUFOP assumptions used in developing Hydro’s May 2018 Near-Term Generation  
2 Adequacy report are noted in Table 3.

**Table 3: DAFOR and DAUFOP Near-Term Generation Adequacy Analysis Assumptions**

	DAFOR (%) Near-Term Generation Adequacy Assumption	DAUFOP (%) Near-Term Generation Adequacy Assumption
All Hydraulic Units	2.6	
Bay d’Espoir Hydraulic Units	3.9	
Other Hydraulic Units	0.7	
Holyrood Plant	14.0	
Hardwoods & Stephenville Gas Turbines		30.0
Happy Valley Gas Turbine		15.0
Holyrood Gas Turbine		5.0

## 3 **4.0 Hydraulic Unit DAFOR Performance**

- 4 Detailed results for the 12-month period ending June 30, 2019 are presented in Table 4, as well as the  
5 data for the 12-month period ending June 30, 2018. These are compared to Hydro’s short-term  
6 generation adequacy assumptions, as used in the May 2018 “Near-Term Generation Adequacy Report”,  
7 and Hydro’s long-term generation planning assumptions for the forced outage rate.

**Table 4: Hydraulic Weighted DAFOR**

Generating Unit	Maximum Continuous Unit Rating (MW)	12 months ending June 2018 (%)	12 months ending June 2019 (%)	Hydro Generation Base Planning Assumption (%)	Near-Term Planning Assumption (%)
<b>All Hydraulic Units - weighted</b>	954.4	2.04	0.24	0.90	2.60
<b>Hydraulic Units</b>					
Bay D’Espoir 1	76.5	8.67	0.07	0.90	3.90
Bay D’Espoir 2	76.5	12.41	0.60	0.90	3.90
Bay D’Espoir 3	76.5	0.01	0.00	0.90	3.90
Bay D’Espoir 4	76.5	0.15	0.10	0.90	3.90
Bay D’Espoir 5	76.5	0.00	0.47	0.90	3.90
Bay D’Espoir 6	76.5	0.21	0.32	0.90	3.90
Bay D’Espoir 7	154.4	1.80	0.00	0.90	3.90
Cat Arm 1	67	0.22	0.98	0.90	0.70
Cat Arm 2	67	0.09	0.16	0.90	0.70
Hinds Lake	75	0.02	0.05	0.90	0.70
Upper Salmon	84	0.16	0.05	0.90	0.70
Granite Canal	40	0.15	0.42	0.90	0.70
Paradise River	8	0.69	1.84	0.90	0.70

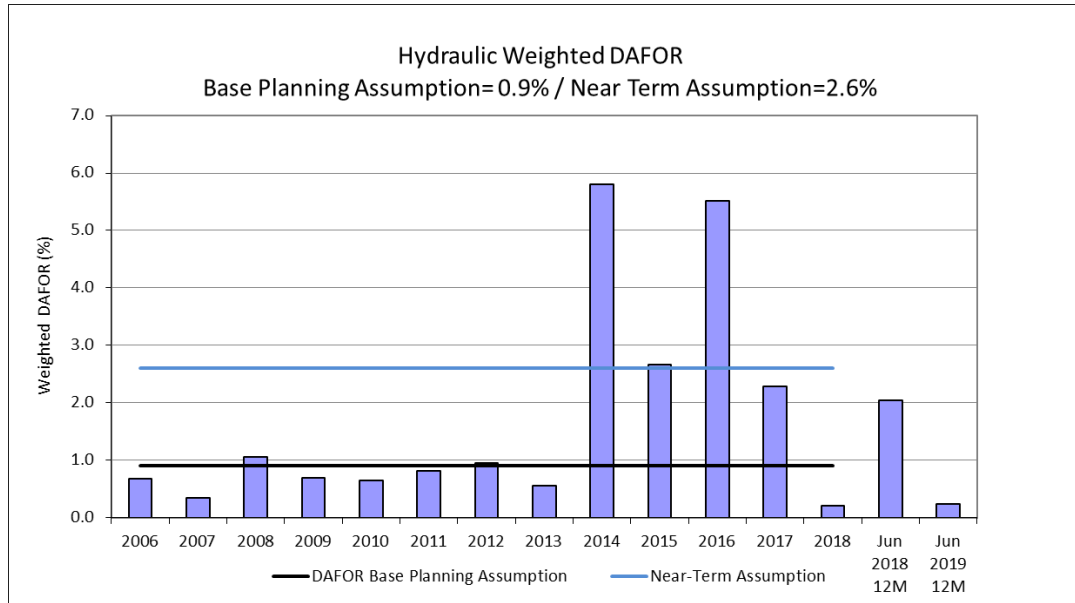


Figure 1: Hydraulic Weighted DAFOR

1 Considering individual hydraulic unit performance, the Hydro generation base planning DAFOR was  
 2 exceeded for Cat Arm Unit 1 and the Paradise River unit for the current period. The Cat Arm Unit 1  
 3 DAFOR of 0.98% exceeded the base planning assumption of 0.9% and the near-term assumption of 0.7%  
 4 for an individual Cat Arm unit. This was due to a forced derating of Cat Arm Unit 1 from 67 MW to 57  
 5 MW for the period of July 5, 2018 to August 6, 2018, as a result of an issue with Needle #1 transducer  
 6 feedback. This issue has since been resolved by replacement of the needle feedback transducer during  
 7 the annual maintenance outage for the unit.

8

9 The Paradise River unit DAFOR of 1.84% exceeded the base planning assumption of 0.9% and the near-  
 10 term assumption of 0.7% for the Paradise River unit. This was due to a starting failure that occurred on  
 11 January 13, 2019, resulting from a malfunctioning governor feedback transducer. The malfunctioning  
 12 transducer was repaired and the unit was returned to service on January 16, 2019. The issue was  
 13 resolved by replacing the transducer during a planned outage in February 2019.

## 14 5.0 Thermal Unit DAFOR Performance

15 Detailed results for the 12-month period ending June 30, 2019, are presented in Table 5, as well as the  
 16 data for the 12-month period ending June 30, 2018. These results are compared to Hydro’s short term  
 17 generation adequacy assumptions, as used in the May 2018 “Near-Term Generation Adequacy Report”,  
 18 and Hydro’s long-term generation planning assumptions for the forced outage rate.

Table 5: Thermal DAFOR

Generating Unit	Maximum Continuous Unit Rating (MW)	12 months ending June 2018 (%)	12 months ending June 2019 (%)	Hydro Generation Base Planning Assumption (%)	Near-Term Planning Assumption (%)
<b>All Thermal Units - weighted</b>	490	26.22	9.43	9.64	14.00
<b>Thermal Units</b>					
Holyrood 1	170	32.30	8.54	9.64	15.00
Holyrood 2	170	26.62	11.44	9.64	10.00
Holyrood 3	150	16.60	7.16	9.64	18.00

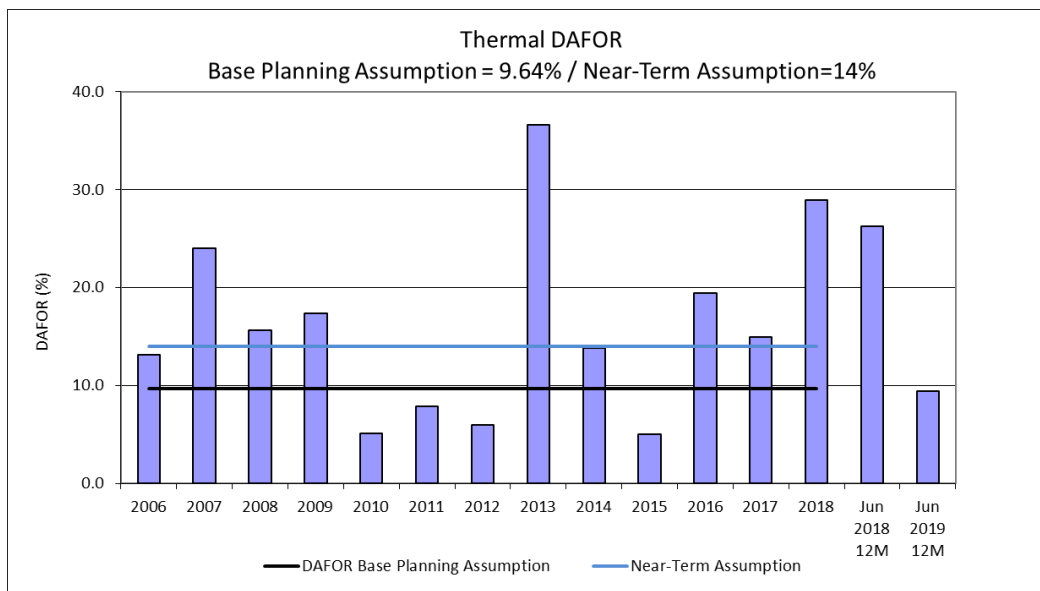


Figure 2: Thermal DAFOR

1 For the 12-month period ending June 30, 2019, the weighted DAFOR for all thermal units of 9.43% is  
2 below the assumed base planning DAFOR value of 9.64%, and below the near-term assumption of  
3 14.00%. Unit 1 DAFOR was 8.54% below the base planning assumption of 9.64% and below the near-  
4 term assumption of 15%. Unit 2 DAFOR was 11.44% which was above the base planning assumption of  
5 9.64% and above the near-term assumption of 10%. Unit 3 DAFOR was 7.34%, which is below the base  
6 planning assumption of 9.64% and the near-term assumption of 18.0%. The current period DAFOR for all  
7 units is improved over the previous period.

1 The DAFOR performance for Holyrood TGS Unit 2 (170 MW) was primarily affected by the following  
2 events:

- 3       • During the 2018 planned overhaul, work was completed to correct the air flow and furnace  
4       pressure issues in the boiler. A chemical wash of the economizer was completed and the hot  
5       end air heater baskets were replaced. The unit was returned to service on September 15, 2018  
6       with the fuel additive system in service and it was immediately noted that the furnace pressure  
7       and air flow conditions had been materially improved. Equipment issues related to start up  
8       caused a number of short forced outages and de-rates during the first few days of operation. On  
9       September 21, 2018, the unit was load tested to 140 MW, limited to this level because the  
10      online safety valve testing had not been completed. However, it was clear from the boiler  
11      performance that full load should be achievable. This was later confirmed on October 11, 2018  
12      when the unit was tested to 171 MW and was capable of more. Unit 2 remained capable of  
13      operating at full load of 175 MW throughout the winter availability period, from December 2018  
14      to the end of March 2019.
  
- 15      • On September 26, 2018, there was a boiler trip related to starting a boiler feed pump. The fan  
16      was in vane control and it was demonstrated that this trip would not occur in Variable  
17      Frequency Drive (“VFD”) air flow control. The fans were switched to VFD control mode, which  
18      ensures that the drives are more reliable, and that the savings on auxiliary power use can be  
19      realized.
  
- 20      • On October 16, 2018, there was a bypass of a power cell in one VFD drive, which caused a fan to  
21      trip resulting in a short derating to 70 MW until the fan could be restarted.
  
- 22      • On March 18, 2019, load was restricted to 50 MW for approximately 3.5 hours while Operations  
23      diagnosed and identified a problem with fouling in the west fuel oil heater. Operations switched  
24      to the east fuel oil heater and load was restored. The heaters will be cleaned during the 2019  
25      annual outage.
  
- 26      • On April 12, 2019, the unit tripped due to a turbine control valve failure. The unit remained off  
27      line on a forced outage until it was returned to service, with full load capability, on May 4, 2019.  
28      The issue was investigated and it was determined that the upper and lower control valve  
29      camshafts, which control the movement of the turbine control valves, had bowed and the  
30      camshaft bearings had seized. As a result of the increased resistive forces, the hydraulic actuator

was no longer able to control the movement of the control valves and the unit tripped. General Electric provided a technical field advisor and a crew to remove and straighten the camshafts and replace the camshaft bearings. Inspection and replacement of these components is part of the valve overhaul scope of work, which is completed every three years. It was last completed on Unit 2 in 2017. General Electric is assisting with a root cause analysis to determine why this failure occurred just two years after the overhaul and if there is additional work required to prevent future problems.

- On May 16, 2019, the unit was placed on hot-standby per Newfoundland and Labrador System Operator requirements. On June 17, 2019, the unit was taken off-line for the annual planned outage.

## 6.0 Gas Turbine UFOP Performance

The combined UFOP for the Hardwoods, Happy Valley, and Stephenville Gas Turbines was 4.73% for the 12-month period ending June 30, 2019 (see Table 6 and Figure 3). This performance is better than the base planning assumption of 10.62% and the near-term assumption of 20.00% and is improved over the previous period. The Hardwoods Gas Turbine UFOP for the current period is 7.90%, as compared to the base planning assumption of 10.62%. The Stephenville Gas Turbine UFOP for the current period is 0.61%, as compared to the base planning assumption of 10.62%. The Happy Valley Gas Turbine UFOP is 0.00% for the current period, as compared to the base planning assumption of 10.62%. On an individual unit basis, gas turbine performance for the Stephenville and Happy Valley units for the current period are improved over the previous period. The UFOP for Hardwoods Gas Turbine for the current period is increased over the previous period. Hydro’s combined gas turbines’ UFOP in the 10-year period prior to 2015 was generally consistent at approximately 10%, until 2012 when the rate exceeded 50%. Since 2012, the gas turbines combined UFOP has improved each year.

**Table 6: Gas Turbine UFOP**

Gas Turbine Units	Maximum Continuous Unit Rating (MW)	12 months		Hydro Generation	
		ending June 2018 (%)	12 months ending June 2019 (%)	Base Planning Assumption (%)	Near-Term Planning Assumption (%)
<i>Combined Gas Turbines</i>	125	6.78	4.73	10.62	20.00
Stephenville	50	4.62	0.61	10.62	20.00
Hardwoods	50	1.35	7.90	10.62	20.00
Happy Valley	25	19.27	0.00	10.62	20.00

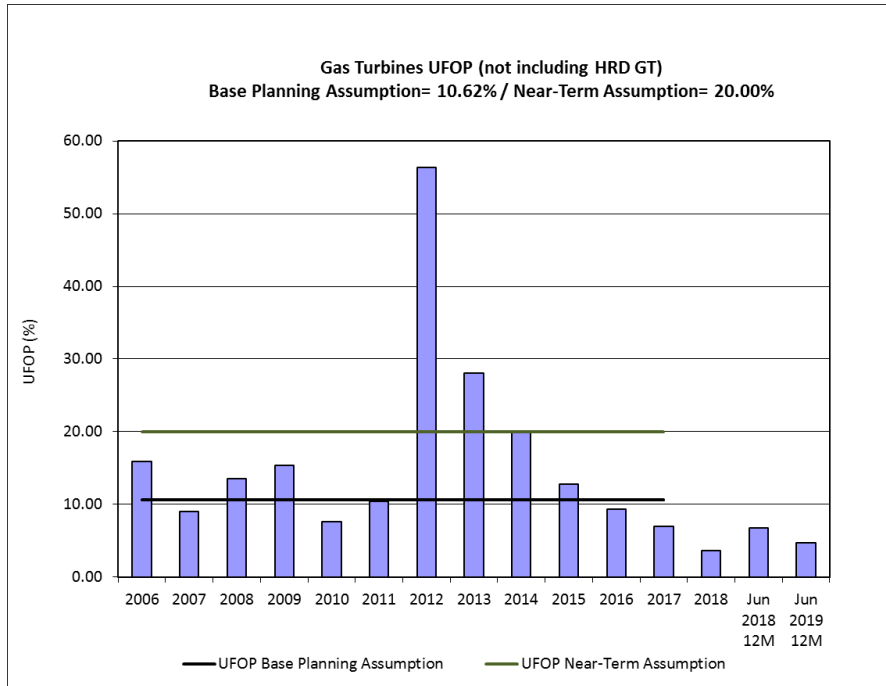


Figure 3: Gas Turbine UFOP – Hardwoods/Happy Valley/Stephenville Units

- 1 The Holyrood Gas Turbine UFOP of 0.00% for the current period is better than the base and near-term
- 2 planning assumptions of 5.00% (see Table 7 and Figure 4) and is slightly improved over the UFOP for the
- 3 previous period.

Table 7: Holyrood GT UFOP

Gas Turbine Units	Maximum Continuous Unit Rating (MW)	12 months		Hydro Generation	
		ending June 2018 (%)	12 months ending June 2019 (%)	Base Planning Assumption (%)	Near-Term Planning Assumption (%)
Holyrood GT	123.5	0.06	0.00	5.00	5.00



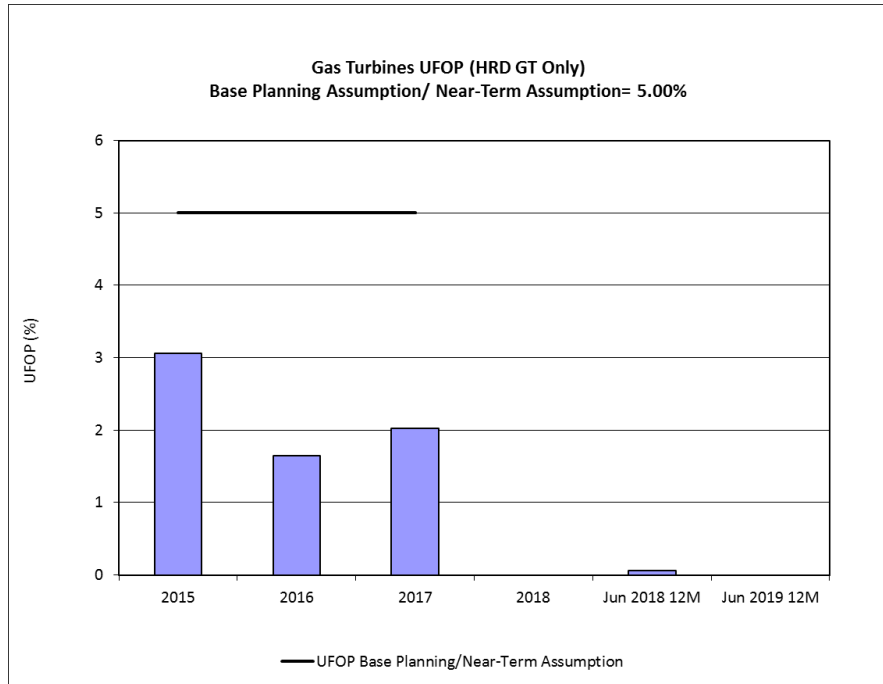


Figure 4: Gas Turbine UFOP – Holyrood Unit

## 7.0 Gas Turbine DAUFOP Performance

The combined DAUFOP for the Hardwoods and Stephenville Gas Turbines was 18.06% for the 12-month period ending June 30, 2019 (refer to Table 8 and Figure 5). This is below the near-term planning assumption of 30.00%. The Hardwoods Gas Turbine DAUFOP for the current period is 18.58%, which is below the near-term planning assumption of 30.00% and above the DAUFOP for the previous period. The Stephenville Gas Turbine DAUFOP for the current period is 16.67%, which is below the 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 June 2018 (%)	12 months ending June 2019 (%)	Near-Term Planning Assumption (%)
<b>Gas Turbines (HWD/SVL)</b>	100	24.11	18.06	30.00
Stephenville	50	51.35	16.67	30.00
Hardwoods	50	6.51	18.58	30.00

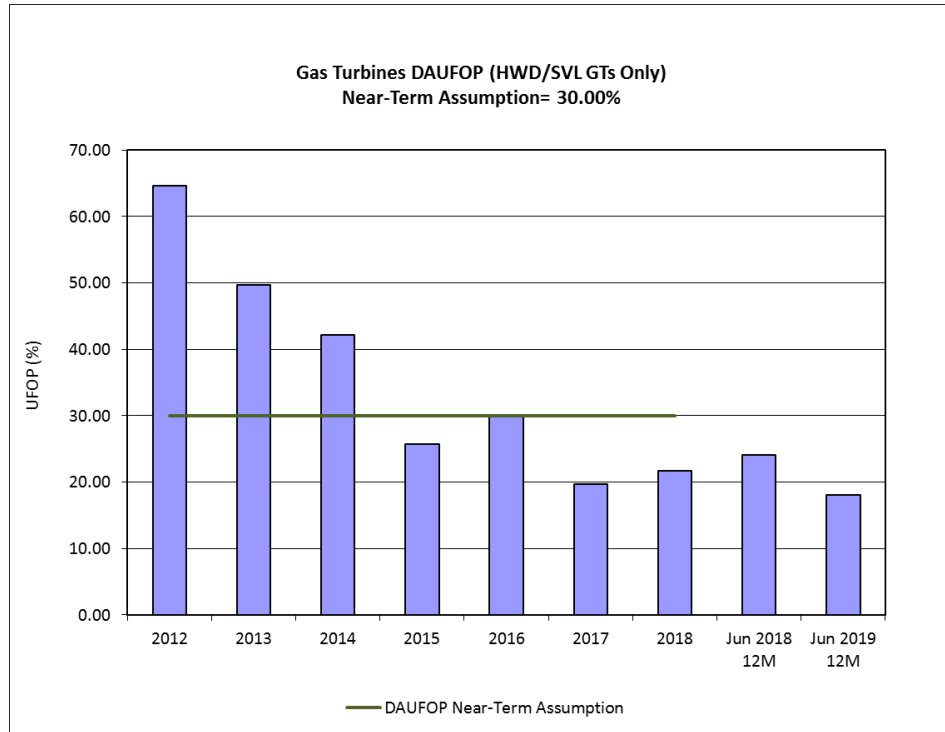


Figure 5: Gas Turbine DAUFOP – Hardwoods/Stephenville Units

- 1 The DAUFOP for the Happy Valley Gas Turbine was 0.00% for the 12-month period ending June 30, 2019
- 2 (refer to Table 9 and Figure 6). This is below the near-term planning assumption of 15.00%, and
- 3 improved over the previous period.

Table 9: Happy Valley Gas Turbine DAUFOP

Gas Turbine Units	Maximum Continuous Unit Rating (MW)	12 months ending June 2018 (%)	12 months ending June 2019 (%)	Near-Term Planning Assumption (%)
Happy Valley	25	19.27	0.00	15.00

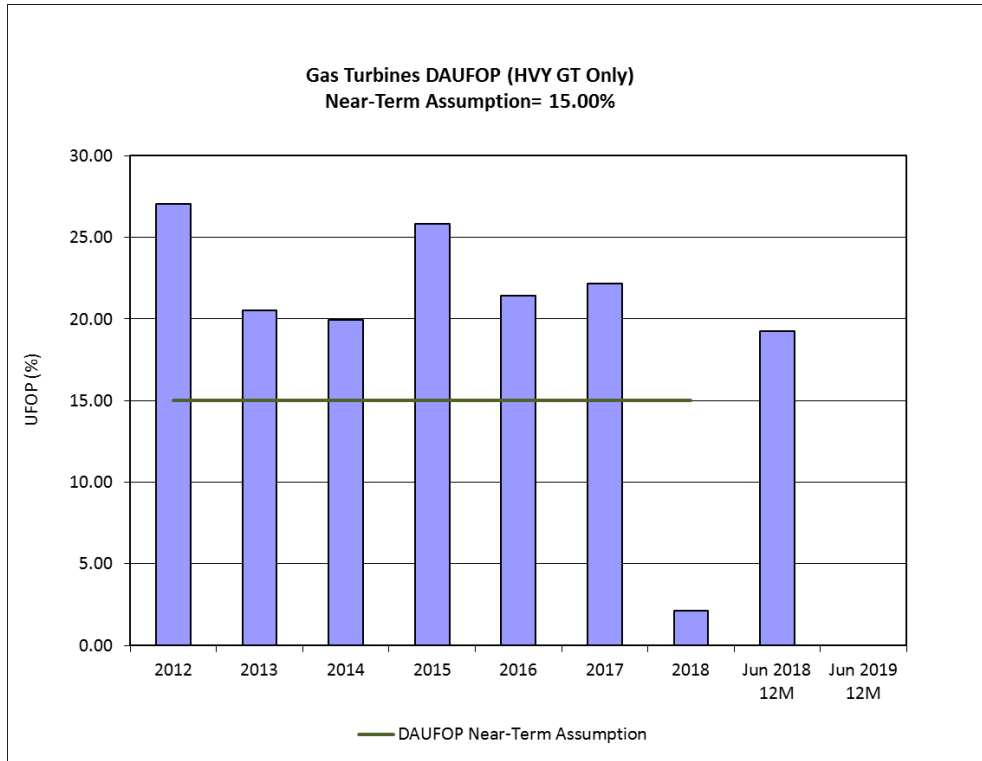


Figure 6: Gas Turbine DAUFOP – Happy Valley Unit

- 1 The Holyrood Gas Turbine DAUFOP of 0.00% for the current period is better than the near-term
- 2 planning assumption of 5.00% (see Table 10 and Figure 7) and slightly improved over the previous
- 3 period.

Table 10: Holyrood Gas Turbine DAUFOP

Gas Turbine Units	Maximum Continuous Unit Rating (MW)	12 months ending June 2018 (%)	12 months ending June 2019 (%)	Near-Term Planning Assumption (%)
Holyrood GT	123.5	0.06	0.00	5.00

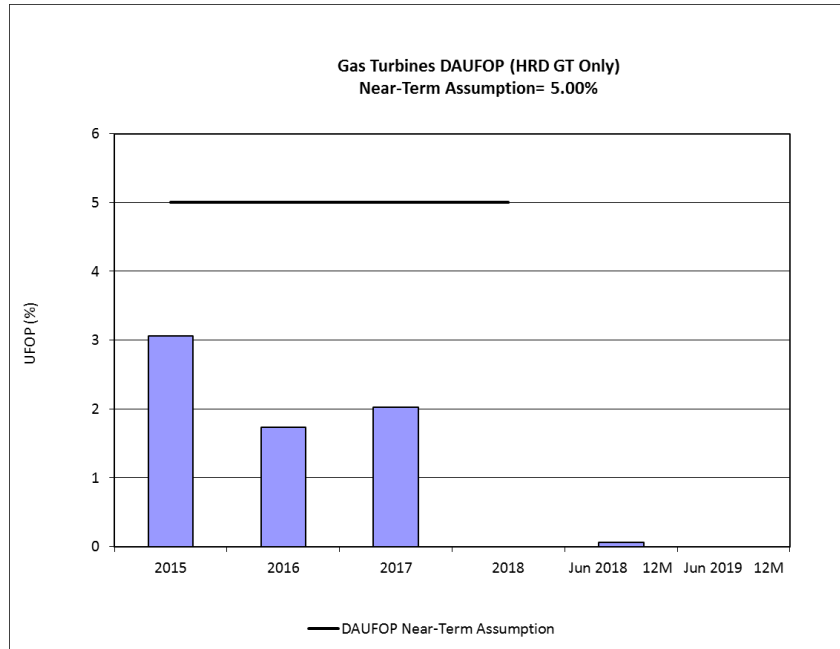


Figure 7: Gas Turbine DAUFOP – Holyrood Unit

## 8.0 Updated Planning Assumptions/Analysis Values

As part of the Study filed with the Board in November 2018, 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 analysis values that were utilized in the study.

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

Unit Type	Measure	Near-Term Analysis Value (%)	Resource Planning Analysis Value (%)
Hydraulic	DAFOR	3.50	1.93
Thermal	DAFOR	15	N/A
Gas Turbines:			
Happy Valley	DAUFOP	13.92	12.59
Hardwoods, Stephenville	DAUFOP	30	N/A
Holyrood	DAUFOP	3.06	2.24

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 3.50%, while a 10-year capacity-weighted average was applied for use

1 in the resource planning model, resulting in a DAFOR of 1.93%. The DAFOR value was based on historical  
2 data reflective of Hydro’s maintenance program over the long-term.

3  
4 DAFORs of 15%, 18%, and 20% were applied to the Holyrood TGS to determine the sensitivity of the  
5 system to Holyrood TGS availability in the near-term. This is consistent with the May 2018 “Near-Term  
6 Generation Adequacy Report”. As the Holyrood TGS units are being retired from generation mode in  
7 2021, the units were not included in the long-term analysis and thus there is no resource planning  
8 analysis value listed for these units. For the total plant, an all units weighted value of 15.00% is used for  
9 the near-term.

10  
11 As the gas turbines in the existing fleet are in varied condition, each was considered on an individual  
12 basis, rather than applying a weighted average across all units. For the Happy Valley gas turbine, a three-  
13 year capacity-weighted average was applied to the unit for the near-term analysis, resulting in a  
14 DAUFOP of 13.92%, while a ten-year capacity-weighted average was applied for use in the resource  
15 planning model resulting in a DAUFOP of 12.59%. The DAUFOP values were based on historical data  
16 founded upon the unit’s past reliable performance. As the Holyrood Gas Turbine has only been in  
17 operation for the past three years, the near-term analysis considered performance in the worst case  
18 year of its operational history.<sup>5</sup> For the long-term analysis, the average of the three years of operational  
19 data was applied for the unit, resulting in a long-term DAUFOP of 2.24%. For the Hardwoods and  
20 Stephenville Gas Turbines, a DAUFOP of 30% was used for the near-term analysis, consistent with the  
21 metrics that were considered in Hydro’s May 2018 “Near-Term Generation Adequacy Report”. As the  
22 Hardwoods and Stephenville Gas Turbines are being considered for retirement in 2021, these units were  
23 not included in the long- term analysis and, thus, there is no resource planning analysis value listed for  
24 these units.

## 25 **9.0 Comparison of Planning Assumptions/Analysis Values**

26 As Hydro’s reliability and adequacy planning assumptions have been historically used in reporting on the  
27 performance of Hydro’s generating units, a comparison of the values used most recently in the May  
28 2018 “Near-Term Generation Adequacy Report”, to these new values (“Reliability and Resource  
29 Adequacy Study”, November 16, 2018) is provided in Table 12 for clarity.

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<sup>5</sup> The Holyrood Gas Turbine had a DAUFOP of 3.06% for 2015.

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

**Table 12: Comparison of Hydro’s Planning Assumptions**

Generating Unit Type	Measure	Historical Planning Assumptions		Reliability and Resource Planning Assumptions	
		Base Planning Assumption (%)	Near-term Planning Assumption (%)	Near-term Analysis Value (%)	Resource Planning Analysis Value (%)
Hydraulic	DAFOR	0.9	2.60	3.50	1.93
Thermal	DAFOR	9.64	14.00	15.00	N/A
<b>Gas Turbines:</b>					
Happy-Valley	DAUFOP	-	15.00	13.92	12.59
Hardwoods, Stephenville	DAUFOP	-	30.00	30.00	N/A
Holyrood	DAUFOP	-	5.00	3.06	2.24

- 3 The generating unit performance presented previously in this report is again presented in Tables 13 to  
4 17 with comparison to the previous assumptions, as well as the recently revised values. No data is  
5 provided for the UFOP performance, as Hydro does not plan to use this metric in future for reliability  
6 assessments.

Table 13: Hydraulic Weighted DAFOR Performance Comparison

Generating Unit	Maximum Continuous Unit Rating (MW)	May 2018			November 2018		
		12 months ending June 2018 (%)	12 months ending June 2019 (%)	Base Planning Assumption (%)	Near-Term Planning Assumption (%)	Near-Term Planning Analysis Value (%)	Resource Planning Analysis Value (%)
<b>All Hydraulic Units - weighted</b>	954.4	2.04	0.24	0.90	2.60	3.50	1.93
<b>Hydraulic Units</b>							
Bay D'Espoir 1	76.5	8.67	0.07	0.90	3.90	3.50	1.93
Bay D'Espoir 2	76.5	12.41	0.60	0.90	3.90	3.50	1.93
Bay D'Espoir 3	76.5	0.01	0.00	0.90	3.90	3.50	1.93
Bay D'Espoir 4	76.5	0.15	0.10	0.90	3.90	3.50	1.93
Bay D'Espoir 5	76.5	0.00	0.47	0.90	3.90	3.50	1.93
Bay D'Espoir 6	76.5	0.21	0.32	0.90	3.90	3.50	1.93
Bay D'Espoir 7	154.4	1.80	0.00	0.90	3.90	3.50	1.93
Cat Arm 1	67	0.22	0.98	0.90	0.70	3.50	1.93
Cat Arm 2	67	0.09	0.16	0.90	0.70	3.50	1.93
Hinds Lake	75	0.02	0.05	0.90	0.70	3.50	1.93
Upper Salmon	84	0.16	0.05	0.90	0.70	3.50	1.93
Granite Canal	40	0.15	0.42	0.90	0.70	3.50	1.93
Paradise River	8	0.69	1.84	0.90	0.70	3.50	1.93

Table 14: Thermal Unit DAFOR Performance Comparison

Generating Unit	Maximum Continuous Unit Rating (MW)	May 2018			November 2018		
		12 months ending June 2018 (%)	12 months ending June 2019 (%)	Base Planning Assumption (%)	Near-Term Planning Assumption (%)	Near-Term Planning Analysis Value (%)	Resource Planning Analysis Value (%)
<b>All Thermal Units - weighted</b>	490	26.22	9.43	9.64	14.00	15.00	N/A
<b>Thermal Units</b>							
Holyrood 1	170	32.30	8.54	9.64	15.00	15.00	-
Holyrood 2	170	26.62	11.44	9.64	10.00	15.00	-
Holyrood 3	150	16.60	7.16	9.64	18.00	15.00	-



Table 15: Hardwoods/Stephenville Gas Turbine DAUFOP Performance

Gas Turbine Units	Maximum Continuous Unit Rating (MW)	12 months ending		12 months ending June 2019 (%)	May 2018			November 2018		
		June 2018 (%)	June 2018 (%)		Base Planning Assumption (%)	Near-Term Planning Assumption (%)	Near-Term Planning Analysis Value (%)	Near-Term Planning Analysis Value (%)	Resource Planning Analysis Value (%)	
<b>Gas Turbines (HWD/SVL)</b>	100	24.11	18.06	18.06	N/A	30.00	30.00	30.00	N/A	
Stephenville	50	51.35	16.67	16.67	N/A	30.00	30.00	30.00	N/A	
Hardwoods	50	6.51	18.58	18.58	N/A	30.00	30.00	30.00	N/A	

Table 16: Happy Valley Gas Turbine DAUFOP Performance Comparison

Gas Turbine Units	Maximum Continuous Unit Rating (MW)	May 2018			November 2018		
		12 months ending June 2018 (%)	12 months ending June 2019 (%)	Base Planning Assumption (%)	Near-Term Planning Assumption (%)	Near-Term Planning Analysis Value (%)	Resource Planning Analysis Value (%)
Happy Valley	25	19.27	0.00	N/A	15.00	13.92	12.59

Table 17: Holyrood Gas Turbine DAUFOP Performance Comparison

Gas Turbine Units	Maximum Continuous Unit Rating (MW)	May 2018			November 2018		
		12 months ending June 2018 (%)	12 months ending June 2019 (%)	Base Planning Assumption (%)	Near-Term Planning Assumption (%)	Near-Term Planning Analysis Value (%)	Resource Planning Analysis Value (%)
Holyrood GT	123.5	0.06	0.00	N/A	5.00	3.06	2.24

