Dear [Name]:

Re: Your request for access to information under Part II of the Access to Information and Protection of Privacy Act (File # NR-164-2018)

On September 24, 2018, the Department of Natural Resources received your request for access to the following records/information:

For the last twelve months please provide a copy of all records in the possession of the Department of Natural Resources relating to the NL Hydro Stephenville Gas Turbine operation including but not limited to any reference to UFOP or DAUFOP and any reference to the Combined Gas Turbines or CGT or CT

On October 16, 2018, the department has received approval from the Information and Privacy Commissioner to extend the timeline for your request by 20 business days.

I am pleased to inform you that a decision has been made by the Department of Natural Resources, confirmed by the Deputy Minister, to provide access to the requested records. The records are attached.

We are providing access to the most information possible but have made redactions in accordance with Sections

As set out in section 42 of the Act you may ask the Information and Privacy Commissioner to review the department’s decision to provide access to the requested information. A request to the Commissioner must be made in writing within 15 business days of the date of this letter or within a longer period that may be allowed by the Commissioner. Your request should identify your concerns with the department’s response and why you are requesting a review.

The request for review may be addressed to the Information and Privacy Commissioner
is as follows:

Office of the Information and Privacy Commissioner
2 Canada Drive
P.O. Box 13004, Stn. A
St. John’s, NL A1B 3V8

Telephone: (709) 729-6309
Toll-Free: 1-877-729-6309
Facsimile: (709) 729-6500

Pursuant to section 52 of the Act, you may also appeal directly to the Supreme Court Trial Division within 15 business days after receiving the department’s decision.

Please be advised that responsive records will be published following a 72 hour period after the response is sent electronically to you or five business days in the case where records are mailed to you. It is the goal to have the responsive records posted to the Completed Access to Information Requests website within one business day following the applicable period of time. Please note that requests for personal information will not be posted online.

For further details about how an access to information request is processed, please refer to the Access to Information Policy and Procedures Manual at http://www.atipp.gov.nl.ca/info/index.html.

If you have any questions, please feel free to contact me at 709-729-0463 or rhynes@gov.nl.ca.

Sincerely,

Rod Hynes

Rod Hynes
ATIPP Coordinator
Agenda

- Purpose
- Electrical System in NL
- Capacity and Energy
- Transmission
- Glossary
The purpose of this presentation is to:

- Provide a brief overview of common electricity concepts and the electrical system in NL
Electrical System in NL
NL Electrical System

• NL has a winter peaking electrical system
  - Highest or peak load on the system is in the winter
  - High usage of electric heat across the province

• In order to ensure that all industrial and residential customers in the province have access to electricity, Hydro needs to ensure that it has enough installed firm capacity to meet this peak load
  - The system is therefore sized to meet the winter peak
  - The province has enough capacity to meet its needs but there is no excess

• The load in the summer is much lower then in the winter
  - In the summer not all generators in the fleet are producing electricity as it is not required.
  - Annual maintenance is performed on units during this down time.
  - For significant portions of the year, the NL load is served by hydro generation only

• Once the province is connected to the North American Grid through the Maritime Link (ML) and the Labrador Island Link (LIL), the generators that are not being used to meet domestic demand could be used to produce energy for the export market
Annual Energy Use in Newfoundland

Island Interconnected System - Energy Supply

- Hydro Generation 2015
- Thermal Generation 2015
- Power Purchases 2015
- Hydro Generation 2016
- Thermal Generation 2016
- Power Purchases 2016

GWh

Month: January, February, March, April, May, June, July, August, September, October, November, December
NLH Generation Sources

- **Hydroelectric**
  - There are hydroelectric generating stations located across Newfoundland and Labrador
  - This is the province’s main source of electricity

- **Thermal**
  - Holyrood Thermal Generating Station
  - Holyrood Combustion Turbine
  - Hardwoods, Stephenville, HV-GB Gas Turbines

- **Diesel**
  - 25 Diesel Plants

- **Wind**
  - 3 Wind Farms (Hydro has PPAs with these wind producers)

- **Additional power is also purchased from Newfoundland Power and CBPPL**
Balance on the Grid

- An electrical grid must be in balance. The supply of electricity must equal the load at all times.
- If there is an imbalance, then the Grid will react to ensure that balance is restored.
- The load on the Grid fluctuates constantly based on customer demand.
- To ensure balance, the electrical Grid signals dispatchable generators across the province to increase or decrease generation to meet the new load.
  - In normal operations, this happens instantaneously and customers are not impacted by these changes.
- If a generator experiences a problem and shuts down unexpectedly, the Grid reacts by shedding load (dropping customers) so that the system regains balance.
  - The instantaneous shedding of load results in an unplanned outage to customers.
  - This is called under frequency load shedding and is explained here.
- A outage can also occur if the load gets too high and goes beyond the capacity of the electrical system.
Meeting Capacity Requirements

• To ensure that the load never gets as high as the firm capacity of the system, NL Hydro’s System Planning Group forecasts what the load will be both in the short term and long term.

• Long term predictions of future load growth are used to help ensure that there is enough installed capacity to meet customer demand. If the load is expected to increase, additional firm capacity may have to be built.
  – Capacity takes time to build/install. Approximately 2 years for a Combustion Turbine and 5 years for Hydro Plants. Approval is also required by the PUB

• The installed capacity on the island is based on the maximum load that is expected on the Grid plus a safety factor
  – Simply put, the safety factor is an additional amount of capacity that is kept in reserve. The amount of reserve is determined by System Planning and is based on reliability standards and best industry practices

• Generation sources like Wind Turbines and Solar Panels are non-firm generation sources and cannot be relied on to supply power when required and therefore can not be considered firm capacity
Capacity and Energy
Capacity and Energy

- It is often said that NL is long on energy but short on capacity. What does this actually mean?
  - As discussed previously, the NL interconnected system is designed to meet the peak load. This peak load only happens a few hours a year
    - If the load on the system was expected to increase through normal load growth or through the addition of a large industrial customer, NL Hydro would have to build or secure a new source of firm capacity to meet the new peak load
    - NL Hydro operates the system with only the amount of firm capacity that is necessary to meet peak load.
      - Any additional firm capacity beyond what is required to meet peak load would not be economically prudent as the costs of adding capacity would be paid for by ratepayers
    - Therefore during the peak winter periods, the interconnected system is “short” on capacity as there is no excess beyond what is needed to serve customers
  - During the remainder of the year, the installed capacity of all the generators on the island is larger then what is required to meet the needs of the province
    - These generators are capable of producing additional energy that is not required to meet domestic load. In fact, the generators are capable of producing significant quantities of energy that can be exported to external markets
    - This is why the province is “long” on energy
Capacity & Energy Analogy

• It can be helpful to explain capacity and energy by looking at the case of a Restaurant
  • Capacity - The total number of seats in a restaurant is the Capacity.
    o As an example, a restaurant that can seat 100 people will have a Capacity of 100 people
    o If 50 people are currently seating in the restaurant than it will be operating at half its capacity
    o If 101 people wanted to sit in the restaurant at the same time it would be over capacity and one person would have to wait in line.
    o Unlike restaurants, the electricity system does not have lines. The system must be sized to accommodate all customers at the same time and must be built large enough to serve everyone
Capacity & Energy Analogy

- **Energy** - The specific number of meals that can be served in an hour, a week, or a year would be equal to Energy
  - Looking at our 100 seat restaurant, the number of meals that will be consumed in a day, week or year will depend on the demand by customers
    - If the restaurant is busy and all tables are full (Full Capacity) than the restaurant will produce 100 meals an hour but no more due to the lack of additional seats
    - If the restaurant is open 24 hours a day and all tables are full for every hour of the day the restaurant will produce 2400 meals a day (24 x 100)
    - If the restaurant is open 24 hours a days, 365 days a year and every table is full every hour of the day, the restaurant will produce 876,000 meals a year (8760 hours in a year x 100)
  - In this example the capacity of the restaurant is 100 people and the annual energy produced is 876,000 meals
  - This is equivalent to a 100 MW generator producing 876,000 MWh of energy over the course of a year
Capacity & Energy Analogy

• Determining the optimal restaurant size
  – A restaurant is designed to seat an optimal number of people
    • They want to have enough tables to serve all the customers that they expect to walk through their doors
    • If the restaurant is too big, the owners will have to pay additional costs
      – They will be paying rent on a building that is oversized, they will have to pay extra wait staff to serve the tables even if they are not being used, etc.
    • If the restaurant is too small, they will have a long line and will be turning customers away
    • When designing the restaurant capacity, the owners must decide how many customers they are comfortable turning away
    • Most restaurants are not full every hour of every day and an optimal number of seats must be determined to ensure customers are satisfied and that the restaurant is operating in the most economical way
Valentines day and Mother’s Day are very popular days for people to eat out at restaurants. On these days most restaurants are usually at full capacity at all hours.

- On these days, if the restaurant had 10 or 20 more seats, they would have no problem filling these seats
- On these days the restaurant is capacity constrained
- During almost all other times of the year, the restaurant is not at full capacity and it would not be cost effective to build seating for 10 or 20 more people for two days of the year
- A smart restaurant owner will design the size of their restaurant to make sure that it is full most of the time but that is not oversized

Like Valentines Day and Mother’s Day in restaurants, the electrical system has peak days. These are the coldest days in the winter

- Unlike restaurants, the electrical system can not make people wait in line. The system needs to be designed to meet everyone’s demands. This means that the system must have the capacity to meet the expected load
- As building extra capacity is expensive and is paid for by ratepayers, it is important to build enough to serve the needs of the province but no more
Capacity & Energy Analogy

• To Summarize:
  – The NL electrical system is designed to serve the peak load
  • That means that there is enough installed capacity or MWs to serve all customers on the coldest day of the year but not a significant amount of excess
  • During the rest of the year, the installed capacity is larger than required to meet the load and the province can produce significantly more energy than it requires
  • Newfoundland can be said to be long on energy and short on capacity
  • Post Muskrat Falls, the excess capacity can also be used to produce energy for export
  – If a new industrial customer came forward with a requirement for firm power during the peak periods, new capacity would have to be built to serve this load
Capacity & Energy Analogy

- Looking at our restaurant example, this would be equivalent to a new office building that is planning to open next to the restaurant.
  - If the new building is built, it would bring new customers to the restaurant.
  - It may make economic sense for the restaurant to expand the number of seats to meet the new customers demand.
  - Before the restaurant spends money to expand its capacity, it will need to:
    - Determine if there are any other things it can do to generate more revenue from its existing infrastructure.
    - Gain assurances that the new building is going to be built and that new customers will need to be served regularly.
Transmission
Transmission

• The Maritime Link (ML) and the Labrador Island Link (LIL) are being completed as part of the Lower Churchill Project
  – The ML has a capacity of 500 MW and the LIL has a capacity of 900 MW
• For the first time ever, the island of Newfoundland will be connected to the North American electrical Grid
• Excess energy from NL will now be able to be sold to external markets in Canada and the United States.
  – Alternatively, it will be possible to import energy if required
• The amount of energy that can be sold will depend on the excess energy in the province that is available for sale and the space available on the transmission links
• The LIL will be used mostly to bring energy from Muskrat Falls to NL
• The ML will be used to export energy to NS and beyond
  – A portion of the capacity of the line will be dedicated to existing commitments to Emera and NSPI
  – The remainder of the line will be used to export electricity to external markers or import electricity if required
Transmission Rights

- There are two types of transmission rights:
  - Firm - The guaranteed right to delivery electricity across a transmission line during a period of time
    - This could be 24 hours a day, 365 days a year or it could only be during peak hours
    - Firm transmission is contracted and the generator of electricity is able to schedule its energy deliveries
  - Non-firm - Allows for the flow of energy when there is space on the line.
    - Holders of firm transmission rights have the first right to use the line.
    - Holders of non-firm transmission rights are allowed to flow if firm energy is not being delivered
    - Ability to flow will fluctuate and it is not possible to guarantee delivery during any specific hour of the day

- Nalcor has the firm transmission rights for both the ML and the LIL
  - Nalcor will look to use these firm rights to export/import as much electricity as economically and technically possible
  - There will be times when Nalcor will not be flowing electricity across the links and non-firm transmission rights will be available for purchase.
Excess Energy Available For Export

Surplus Provincial Energy by Month - Post Muskrat Falls

GWh

January 2021: 200 GWh
February 2021: 150 GWh
March 2021: 100 GWh
April 2021: 150 GWh
May 2021: 200 GWh
June 2021: 350 GWh
July 2021: 250 GWh
August 2021: 300 GWh
September 2021: 250 GWh
October 2021: 300 GWh
November 2021: 250 GWh
December 2021: 200 GWh

January 2022: 150 GWh
February 2022: 100 GWh
March 2022: 150 GWh
April 2022: 200 GWh
May 2022: 350 GWh
June 2022: 250 GWh
July 2022: 300 GWh
August 2022: 250 GWh
September 2022: 300 GWh
October 2022: 250 GWh
November 2022: 300 GWh
December 2022: 200 GWh

January 2023: 100 GWh
February 2023: 50 GWh
March 2023: 100 GWh
April 2023: 150 GWh
May 2023: 200 GWh
June 2023: 350 GWh
July 2023: 250 GWh
August 2023: 300 GWh
September 2023: 250 GWh
October 2023: 300 GWh
November 2023: 250 GWh
December 2023: 200 GWh

January 2024: 50 GWh
February 2024: 0 GWh
March 2024: 50 GWh
April 2024: 100 GWh
May 2024: 150 GWh
June 2024: 200 GWh
July 2024: 350 GWh
August 2024: 250 GWh
September 2024: 300 GWh
October 2024: 250 GWh
November 2024: 300 GWh
December 2024: 200 GWh

January 2025: 0 GWh
February 2025: 0 GWh
March 2025: 0 GWh
April 2025: 0 GWh
May 2025: 0 GWh
June 2025: 0 GWh
July 2025: 0 GWh
August 2025: 0 GWh
September 2025: 0 GWh
October 2025: 0 GWh
November 2025: 0 GWh
December 2025: 0 GWh
Glossary

- Capacity - Is related to power and is the maximum power output of a generator, i.e. it is the highest amount of electricity that a generating unit is capable of producing at any moment
  - As an example, a 100 MW generator can produce electricity at any power level between 0 to 100 MW. The maximum it can produce is 100 MW and thus has a capacity of 100 MW
  - When we talk about the capacity of the Newfoundland electrical system, we mean the maximum power output of all the generators added together
  - Firm capacity is the total power available from dispatchable generation sources on the island
  - Another term related to capacity is Capacity Factor (CF). The CF is the average energy generated divided by the rated peak energy
    - A 100 MW generator operating at 100 MW for half the hours in a year would have a CF of 50%
Glossary

- Energy - Is the amount of electricity a generator actually produces over a specific period of time
  - For example, a generator with 100 megawatt (MW) capacity that operates at that power level consistently for one hour will produce 100 megawatt hours (MWh) of electricity
  - If the generator operates at only half its capacity for one hour, it will produce 50 MWh of electricity
  - Many generators do not operate at their full capacity all the time and the generators output will vary based on conditions at the power plant and load on the Grid
  - As energy numbers can be quite large, there are sometimes expressed in GWh (1 GWh = 1000 MWh) or TWh (1 TWh = 1000 GWh)
Glossary

• Generation Types
  • Dispatchable - Generating plants that can adjust their power output up or down based on changes in the load or based on a command from a system operator are said to be dispatchable generation
    o These generators can be counted on to supply the exact amount of power required when it is required. This type of generation can be considered firm capacity
    o Hydro Plants, Diesel Plants and the Holyrood Thermal Generating Station are all examples of dispatchable generators. These plants all have a way to store the fuel (water, diesel, etc.) required to spin their turbines
  • Non-Dispatchable – Generation that cannot be controlled by a system operator or respond to changes in the load is non-dispatchable
    o Intermittent sources of power like wind turbines and solar panels are examples of non-dispatchable generation. These generation types are considered non-firm and do not have a capacity value
    o Wind turbines and solar panels can not be counted on to provide power at all times due to the constantly changing weather conditions
    o There amount of power produced from a wind turbine fluctuates from second to second based on constantly changing wind speeds
    o Non-dispatchable generators due not have a means to store their fuel source (air, sun, etc.) for use at later date
Glossary

• **Generator** - A device that turns the rotation of a magnetic core into electricity
  o A turbine is connected to a generator and is used to rotate the core
  o Generators can be large or small and the size is measured in Watts, Kilowatts or Megawatts. 1 megawatt = 1 million watts

• **Grid** - The Grid is an interconnected network of equipment used to deliver electricity from producers to consumers
  o It consists of generating stations, high voltage transmission lines that carries electricity over long distances, distribution lines that connect individual customers, etc.
  o The Grid allows generating stations to be connected to customers across the province and also allows the generators to instantaneously respond to changes in the load

• **Load** - The demand for electricity at any moment in time
  o The Provincial load is measured in MW or GW.
  o The load on the Grid fluctuates every second of every day
  o The supply of electricity must equal the load at all times
  o Generators connected to the Grid ramp their production up or down to maintain balance
Glossary

• Power - Is the amount of electricity produced by a generator at a given moment in time. A generator can have a range of power outputs up to its maximum rating (capacity of unit). Power is measured usually measured in kilowatts, megawatts or gigawatts.

• Turbine - A mechanical device used to turn a generator.
  o Turbines are essential large fans that are turned (rotated) by using air, water, or steam.
  o Holyrood uses steam turbines, hydro plants use water turbines and wind turbines use air.
Title: Newfoundland & Labrador Hydro’s Near-Term Generation Adequacy Report

Issue: To provide an overview of Newfoundland & Labrador Hydro’s (NLH) semi-annual generation adequacy report on Island Interconnected System to the Board of Commissioner of Public Utilities.

Background and Current Status:
- Following power outages and supply issues on the Island Interconnected system (IIS) in late December 2013 and early January 2014 the Board of Commissioner of Public Utilities (PUB) began an investigation and hearing into causes of the outages.
- The PUB has the authority to conduct an investigation into the service provided by a utility, of its own motion, where it determines that it is appropriate, or where a duly constituted complaint has been filed. Sections 82, 84 and 87-89 of the Electrical Power Control Act specifically address investigations and complaints. This investigation has been conducted in accordance with the Board’s authority under these provisions.
- In its February 19, 2014 order (P.U. 3(2014)) the PUB identified the intervenors and set out the two phased investigation process to be followed in the matter. Phase one dealt with the immediate reliability issues for the IIS prior to interconnection with Muskrat Falls. Reliability issues post Muskrat Falls interconnection would be addressed in Phase Two.
- NLH’s generation planning and supply were key issues throughout the investigation and the PUB has expressed concerns on its generation capacity to meet customers demand and adequate reserve capacity in the next few years. The PUB will continue to evaluate NLH’s generation planning and supply as part of Phase Two of the investigation. The PUB has directed NLH to immediately commence its supply review recommended by a third party consultant, and advised NLH to file its generation adequacy report semi-annually.
- To comply with the PUB’s directives, NLH files its Near-term Generation Adequacy Report on May 15 and November 15 each year. This (May 15) report addresses NLH’s capacity to provide adequate supply to its IIS customers by meeting peak demand and energy requirements.
- The report is structured with an introductory “IIS Overview” section. A second section called “System Planning Criteria” discusses the planning criteria. The next section called “Asset Reliability” details the factors affecting asset reliability and current state of assets. For discussion, the assets are grouped by facility types of Hydraulic, Thermal and Gas Turbine. There is a fourth section called “Load Forecast” followed by another section on “System Constraints and Future Supply Risk”. The last section concludes the report.
- In the “Overview” section NLH reports on its statutory mandate given by section (5)1 of the Hydro Corporation Act to generate electricity in the province. It informs of its transmission, distribution, operation and maintenance activities comprising of 3,500 KM of transmission and 3,400 KM distribution lines and serving utility customer Newfoundland
Power (NP), five regulated industrial customers and 38,000 direct residential customers
on the island.

- The next section, lays out NLH’s System Planning criteria which includes load forecasting,
criteria for generation and transmission planning. The Generation planning criteria is as
follows:
  - Capacity: The IIS should have sufficient generating capacity to satisfy a Loss of
    Load Hours (LOLH) expectation target of not more than 2.8 hours per year, and
    The IIS should have sufficient generating capacity to maintain a minimum reserve
    of 240 MW at the P90 system peak (See Annex 1 for details on LOLH and P90)
  - Energy: The Island Interconnected System should have sufficient generating
capacity to supply all of its firm energy requirements with firm system capability.

NLH’s Transmission Planning criteria addresses power flow for normal operations,
transmission element failures and emergency situations.

- In the “Asset Reliability” section of the report, NLH states that it reports to the PUB on the
rolling 12 month performance of its assets, detailing any reliability issues in the previous
12 months period.

- Following is a summary of the issues with the assets identified in the report.
  - NLH undertook significant work in 2016 and 2017 to address deteriorated welds in
    Penstocks 1 and 2 at Bay d’Espoir. In May 2018, cracks were confirmed in
    Penstock 3 and works is underway with funding from the “Allowance for
    Unforeseen Item Account” to address the issue. Penstock 4 was inspected in 2014
    and found healthy. NLH plans to inspect penstocks at Upper Salmon, Paradise
    River, Snook’s Arm and Granite hill in the coming years.
  - Cracked rotor key welds observed on the generation unit at Upper Salmon plant. The
    2018 capital plan includes upgrades to address these issues.
  - One existing cooler has been repaired and additional one was purchased for Hinds
    Lake plant.
  - NLH plans to replace the spherical valve controls in 2018 at Cat Arm.
  - Boiler tubes at the Holyrood Station (HTGS) were replaced in 2016.
  - Variable Frequency Drives at Holyrood were modified throughout 2016-17, but
    continue to have issues. NLH is closely monitoring the status.
  - Supplemental Capital Budget Application is being prepared to replace air heating
    equipment at Holyrood.
  - The turbine control system at Holyrood had issues and has been addressed.
  - Two exciter control systems at HTGS were installed in 1999, 2000 and another
    one was replaced in 2013 to ensure reliable operation.
  - Flanges on Unit 1 and 2 at HTGS experienced issues. One is replaced while the
    replacement of the other is planned for 2018.
  - A stop Valve in Unit 1 boiler at HTGS failed in January 2018. Originally supplied in
    1969, the valve was replaced.
  - NLH plans to provide current assets condition and long term plans for the
    Stephenville and Hardwood gas turbine in its 2019 Capital Budget application to
    the PUB, after identifying issues. Some work has been completed on the turbines.
  - NLH has evaluated the health of generating units across all classes. Annex 2 –
table 1 summarizes the projected availability of its generating assets from a
reliability perspective. Estimated value of the five year Capital expenditure on generation assets is presented in table 2.

- In its load forecast, NLH and NP both do not expect load growth in the next five years consistent with poor provincial economic outlook, however NLH’s peak demand forecast due to severe weather indicates an additional 60MW load requirement.
- NLH notes that capacity may be available on a short-term basis to prevent a shortfall in generation, or to displace more costly sources of generation.
- Availability and capacity of the LIL has the largest impact on the supply adequacy of IIS.

**Analysis**

- The report noted that there was sufficient generation to meet peak demand.
- Some of the supply scenarios that NLH analyzed, result in violation of planning criteria. NLH continues to increase its operational awareness to proactively respond to any issue that may arise in future.
- NLH has conducted a thorough assessment of its assets to identify potential risks to the reliable operation of its key generation assets. NLH is confident in its ability to meet IIS energy requirements.
- In addition to the base forecast, NLH has constructed three sensitivity demand forecasts to examine the effects of different load growth projections. NLH has also performed analysis on seven cases to determine the effects of different system conditions on its capability to supply customers.
- The 2018 in-service of the Maritime Link and the Labrador-Island Link, combined with recapture energy and contracted supply from external markets, ensure NLH is well positioned to reliably supply customers through Winter 2021-2022 in absence of generation from the Muskrat Falls Generation Station.

**Action Being Taken:**

- The note is provided for information purposes only.

**Prepared/Approved by:** Y. Khan/ M. Janes

**Ministerial Approval:**

May 30, 2018
Annex 1

Table 1: Summarized Asset Reliability Metrics

<table>
<thead>
<tr>
<th>Asset Type</th>
<th>Reliability Metric</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bay D’Espoir Hydraulic Units</td>
<td>DAFOR(^1) = 3.85%</td>
</tr>
<tr>
<td>Remaining Hydraulic Units</td>
<td>DAFOR = 0.73%</td>
</tr>
<tr>
<td>Holyrood Thermal Units</td>
<td>DAFOR(^1) = 15%, 18%, 20%</td>
</tr>
<tr>
<td>Holyrood GT</td>
<td>DAUFOP(^2) = 5%</td>
</tr>
<tr>
<td>Stephenville GT</td>
<td>Base DAUFOP = 30%</td>
</tr>
<tr>
<td></td>
<td>Sensitivity DAUFOP = 50%</td>
</tr>
<tr>
<td>Hardwoods GT</td>
<td>Base DAUFOP = 30%</td>
</tr>
<tr>
<td></td>
<td>Sensitivity DAUFOP = 50%</td>
</tr>
</tbody>
</table>

Table 2: NLH Five year Capital Plan (Generation)

<table>
<thead>
<tr>
<th>Expended to 2017</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2,017.00</td>
<td>58,397.70</td>
<td>44,627.80</td>
<td>39,873.20</td>
<td>33,126.40</td>
<td>32,287.30</td>
<td>225,229.40</td>
</tr>
</tbody>
</table>

Source: NLH 2018 Capital Budget Application p-83

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\(^1\) Derating Adjusted Force Outage Rate (DAFOR) is a reliability KPI for generation assets that includes NLH’s thermal and hydroelectric generation assets on the interconnected systems. DAFOR measures the percentage of the time that a unit or group of units is unable to generate at its Maximum Continuous Rating (MCR) due to forced outages. The KPI is weighted to reflect differences in generating unit sizes.

\(^2\) DAUFOP is the probability that a generating unit will not be available due to forced outages or forced deratings when there is demand on the unit to generate. Given DAUFOP as an indication of GT reliability would reflect all periods where GT unit deratings impact available system generation, Hydro has decided to use DAUFOP as the basis for all of the analysis in this report.
Title: Newfoundland and Labrador Hydro September 2018 Monthly Energy Supply Report

Issue: To provide an overview of Newfoundland and Labrador Hydro’s (NLH) September 2018 Monthly Energy Supply Report for Island Interconnected System (IIS).

Background and Current Status:
- In February 2016, the Board of Commissioners of Public Utilities (PUB) directed NLH to file a bi-weekly report containing: (1) System Hydrology Report, (2) the thermal plant operated in support of hydrology, (3) production by plant/unit, and (4) details of current or anticipated long-term de-rating. In July 2016, the PUB indicated a monthly report would be sufficient. The Report, filed with the PUB on October 10, 2018 covers data for September 2018.

- The Report notes that inflows into NLH’s reservoirs were approximately 57 per cent below average in September. In turn, aggregate reservoir storage levels as of September 30 were 1299 GWh, which is 47 per cent below the seasonal maximum operating level and 38 per cent above the minimum storage level.

- The Report advises that based on observed low water reservoir levels, NLH made a decision on September 26, 2018, to import energy (1.7 GWh via the Maritime Link) and increase thermal generation mitigate low system storage, and reduce overall system cost throughout winter 2018-2019 by displacing future Holyrood generation. The Report states total Holyrood generation was 19.7 GWh in September.

- On unit de-ratings for September, the Report states that Holyrood Unit 1 was on planned outage for the entire month, while Unit 2 was returned to service on September 15, following its planned annual outage. The unit was limited to 70 MW and experienced forced outages until September 20. On September 20, the load was increased to 100 MW and problems were experienced with the unit. Testing is underway to determine full operational capacity of the unit. Holyrood Unit 3 was placed on planned outage on September 24 and a second outage on September 28.

- The Report notes the Stephenville gas turbine remains de-rated to 25 MW (from 50 MW) due maintenance issues. NLH expects the unit to operational on October 12 after a planned testing on October 9. NLH advises the Hardwoods gas turbine is available at full capacity of 50 MW.

Analysis:
- In its 2018-2019 Winter Readiness planning report filed with the PUB in October, NLH noted that, while a plan is in place to address required winter readiness-related maintenance for Hardwoods gas turbine, that maintenance remains outstanding. It is not clear how NLH’s characterization of the winter readiness of the Hardwoods gas turbine reconciles how the unit’s readiness is characterized in the supply report.

- It is not known whether or if the conditions described in the Report, specifically increased thermal production as a result of low hydrology, will ultimately impact rates.
Action Being Taken:
• NR will continue to monitor and advise on all NLH supply-related matters.

Prepared/Approved by: Y. Khan / M. Janes
Ministerial Approval: NOT APPROVED

October 17, 2018