Q. **Reference: Application Rev. 1, Volume 2, Upgrades for Future Retirement of Stephenville Gas Turbine**

a. Is this project being coordinated with Newfoundland Power?

b. How many times, and for what duration, has the Stephenville Gas Turbine been operated to meet Stephenville and the surrounding area load over the past five years?

c. What is driving the forecast load increase in the Stephenville area?

d. Did Hydro consider extending the life of the Stephenville Gas Turbine in its assessment of alternatives? How would the costs of this alternative compare to the costs of other alternatives considered in the analysis? Might extending the life of the Stephenville Gas Turbine also help with potential capacity issues identified in the Reliability and Resource Adequacy Study?

e. Please provide the economic analysis and all assumptions that support the recommended alternative (page 4).

A.

a. Newfoundland and Labrador Hydro ("Hydro") has been in consultation with Newfoundland Power on this project. The project has been discussed at joint system planning meetings and the analysis has involved consideration of Newfoundland Power's 66 kV network in the area.

b. Please refer to Table 1 for a summary of operation of the Stephenville Gas Turbine to meet Stephenville and the surrounding area load over the past five years.

Table 1: Summary of Stephenville Gas Turbine Operation for Stephenville Supply

Event	Date	Duration
Planned TL 209 Outage	31-Jan-2015	9.5 hours
Planned TL 209 Outage	17-Nov-2015	9 hours
Planned SVL T3 Outage	19-Nov-2015	10.5 hours
Planned SVL T3 Outage	20-Nov-2015	10.5 hours
Planned SVL T3 Outage	1-Dec-2015	4.5 hours
Planned TL 209 Outage	26-Sep-2016	9 hours
Planned TL 209 Outage	23-Jun-2017	4 hours
Planned TL 209 Outage	12-Jun-2018	4 hours
Planned TL 209 Outage	21Sep-2018	5 hours
Unplanned T3 Outage	5-Nov-2018	10.5 hours
Unplanned TL 209 Outage	5-Mar-2019	5.5 hours
Planned SVL T3 Outage	19-Jun-2019	1 hour
Planned TL 209/T3 Outage	25-Jun-2019	2 hours
Planned TL 209 Outage	24-Oct-2019	5 hours

c. The infeed load forecast for Stephenville is presented in Table 1 of the Transmission System Impact - Stephenville Gas Turbine Retirement (Attachment 1 of the Upgrades for Future Retirement of Stephenville Gas Turbine project report),[1] does not show any material change in load for the area in the medium term. The variation in load is limited to approximately 0.5% (from 51.4MW to 51.7MW) over the period ranging from 2020–2025.

d. In Hydro assessment of the long-term viability of the Hardwoods and Stephenville Gas Turbines it was determined that the gas generators and power turbines at these plants are obsolete and pose an operational risk to the reliability of the plant. These components are either no longer supported by their OEM[2] or there are no new replacement components available. To address these obsolescence issues, Hydro considered the following alternatives:

i. Repowering: This option includes installing new gas generators and power turbines at the facility. However, Hydro determined that replacement of the majority of the plants components (air intakes, gas generators, power turbines, exhaust stacks, and engine

[1] "2021 Capital Budget Application," Newfoundland and Labrador Hydro, rev 1 , August 7, 2020 (originally filed August 4, 2020), vol II, tab 14.
[2] Original Equipment Manufacturer ("OEM").

auxiliaries) would also be required if Hydro were to pursue this option. As such, the cost of repowering would be approximately $120–$140 million, comparable to that of building a new facility.

ii. Status Quo: This option included the continued operation of the Stephenville Gas Turbine until 2028. Hydro determined that a capital investment of approximately $17 million would be required to ensure the continued reliable operation of the facility based on the operating regime of the plant in 2018.

iii. Construction of New Plants: This option is currently under review as part of the ongoing *Reliability and Resource Adequacy Study Review* proceeding. A new facility of a similar size as Stephenville is estimated to cost approximately $166 million. This assumes the continued use of existing fuel storage facilities.

iv. Retirement of Stephenville Gas Turbine: This option includes the early retirement of the Stephenville Gas Turbine. To facilitate this, upgrades are required to the Bottom Brook Terminal Station for an approximate cost of $9 million.

The Stephenville Gas Turbine is required to remain in operation until the Muskrat Falls Project has been reliably released for service for capacity on the Island Interconnected System. Additionally, the Stephenville Gas Turbine is required for backup generation to the Port Aux Port Peninsula until the upgrades at the Bottom Brook Terminal Station are completed. Further extension of the Stephenville Gas Turbine would keep an additional 50 MW of capacity available for use on the Island Interconnected System; however, the risk of reliability issues due to the obsolescence of the plants prime movers would remain for the life of the plant.

e. As per the report referenced in the question, four alternatives were considered for the reliable long-term supply for Stephenville and surrounding area:

- Alternative 1: Uprate Bottom Brook Terminal Station Transformer T2;
- Alternative 2: Install new 230/66 kV transformer at Bottom Brook Terminal Station;
- Alternative 3: Deferral; and

- Alternative 4: Perform upgrades for the future retirement of the Stephenville Gas Turbine at the Bottom Brook Terminal Station and the Stephenville Terminal Station.

As discussed in Hydro's response to part d of this question, the continued long-term operation of the Stephenville Gas turbine is not a viable alternative. The project can therefore not be deferred and Alternative 3 is not a viable option.

As presented in Attachment 1 of the referenced report, the retirement of the gas turbine would result in an unacceptable risk to customer supply without making certain terminal station upgrades. The lowest cost, reliable solution (from Alternative 1, 2, or 4) must therefore be executed.

The three remaining alternatives do not have appreciable differences in scope other than the required number of power transformers replacements. As described in the referenced report, load flow analysis was performed and it was confirmed that Alternative 1 would require the replacement of three power transformers. Alternative 2 and Alternative 4 would require the replacement of a single power transformer. By inspection, Alternative 1 would not serve as the lowest cost alternative.

Alternative 2 and Alternative 4 both involve the installation of a 230/66 kV power transformer at Bottom Brook Terminal Station. Alternative 2 involves the purchase of a new power transformer while Alternative 4 involves the relocation of a power transformer from Hydro's existing inventory. If a new power transformer were to be purchased (Alternative 2), the project cost estimate would be approximately $13.5 million. A project involving transformer relocation (Alternative 4) has a cost estimate of approximately $9.9 million.

With a project cost differential of $3.6 million, Alternative 4 would be the lowest cost solution as long as the existing power transformer does not fail and require a replacement before 2027.

ABB performed a condition assessment on the existing power transformer and confirmed that the loss of insulation life is estimated to be less than 15% and that it should have

significant insulation life remaining. The risk of a transformer failure in the near term is therefore deemed to be very low.

On the basis of the above points, Hydro recommended that Alternative 4 be selected to provide lowest cost, reliable service for customers in Stephenville and surrounding areas.