Transmission

Q. Reference: "2025 Capital Budget Application," Newfoundland Power Inc., June 28, 2024, Supporting Materials, Transmission: 3.1, sec. 3.0, pp. 12–20.

a) Did Newfoundland Power consider an alternative that would enable Wesleyville generation to be used or modified to provide additional voltage support to defer the voltage violations? If not, why not?

b) Can Newfoundland Power confirm that the adjustment of Newfoundland Power or Hydro transformer tap settings would not mitigate the reported voltage violations?

c) Newfoundland Power had indicated contractor prices have been higher than anticipated in relation to the proposed rebuild of 94L. Have the costs put forth in this project accounted for any potential increases? If not, how would this impact the cost-benefit analysis? Please explain.

d) Given that there is a secondary supply via 142L that could potentially facilitate a scheduled outage and that 108L appears to be a shorter length than the new route from Lewisporte to Boyd's Cove, did Newfoundland Power consider refurbishing 108L? If not, why not?

e) Has Newfoundland Power considered installing voltage regulators on the 66 kV or distribution level feeders downstream on the Gander/Twillingate System to mitigate the low voltage issue? If not, why not?

f) How many of the 515 TD4 deficiencies are outstanding? Have they been monitored to identify if progressed to TD1 or TD2?

A. a) Newfoundland Power is currently proposing to replace its thermal generation units at Wesleyville ("WES") and Greenhill ("GRH") substations as part of the Company's five-year capital plan.[1] The results of power system modeling conducted as part of the *Gander – Twillingate Transmission System Planning Study* confirms that while deploying additional generation at both WES and GRH substations would provide material voltage support to the central Newfoundland 138 kV transmission system, it would be insufficient to mitigate the observed voltage violation on Newfoundland Power's 66 kV network in the Gander-Twillingate area (the "Study Area").

See the Response to part b) for more information.

b) It is confirmed that adjusting tap settings on Newfoundland Power's or Newfoundland and Labrador Hydro's ("Hydro") transformers would not defer the voltage violation. Table 8 of the *Gander – Twillingate Transmission System Planning Study* provides 66 kV voltage levels resulting from 138 kV infeed voltages operating between 0.95 and 1.00 per-unit ("pu") at Newfoundland Power's Cobb's Pond ("COB") and Gander ("GAN") substations, which supply the 66 kV network in the Study Area.

The 138 kV network in the area is supplied by Hydro's 230/138 kV system power transformers at the Stony Brook ("STB") and Sunnyside ("SUN") terminal stations.

[1] See Newfoundland Power's *2025 Capital Budget Application, 2025-2029 Capital Plan*, page 5.

See Table 1 for additional modeling results based on STB and SUN 138 kV infeed busses boosted to 1.05 pu, as well as the GAN and COB 66 kV infeed busses boosted to 1.05 pu.[2] The results in Table 1 also include 25 MW of thermal generation dispatched at each of WES and GRH substation.

Table 1:
Evaluation of Existing Transmission Voltages (pu)
STB, SUN, COB, GAN at 1.05 pu
25 MW Generation at each of WES, GRH

BOY	SUM	TWG
0.94	0.92	0.91

As shown in Table 1, boosting the supplying transformer tap settings, in conjunction with dispatching 50 MW total generation at WES and GRH substations, is insufficient to mitigate the observed 66 kV transmission voltage violation to the Study Area.

c) Yes, transmission-related costs associated with alternatives assessed within the report *3.1 Gander – Twillingate Transmission System Planning Study* have been escalated in relation to cost increases associated with the proposed rebuild of Transmission Line 94L. In addition, Table 11 of the referenced report includes additional sensitivity analyses that considers the impact of varying transmission-related costs with respect to substation-related costs. Across each sensitivity, the proposed solution that involves constructing a new transmission line between Lewisporte ("LEW") and Boyd's Cove ("BOY") substations is least-cost.

d) Yes, Newfoundland Power did consider refurbishing Transmission Line 108L as an initial variation of Alternative 1 presented in report *3.1 Gander – Twillingate Transmission System Planning Study*. However, due to the number of deteriorated structures and other outstanding deficiencies on the line, the existing non-standard #2/0 ACSR conductor approaching end of life, and the number of remaining class 4 and 5 poles still in service on the line, a full rebuild of the line was determined to be the least cost option as an input to Alternative 1.

e) Newfoundland Power utilizes various methods to regulate voltage on both its transmission and distribution systems, including: inline autotransformer voltage regulators; power transformers equipped with either de-energized tap-changers or on-load tap changers ("OLTCs"); and capacitor banks. In addition, Newfoundland Power operates various hydroelectric and thermal generating plants that can provide material support to the Island's transmission network. The Company's utilization of

[2] Both Newfoundland Power and Hydro define normal transmission voltages to be between 0.95 and 1.05 pu.

inline autotransformer voltage regulators is limited to its distribution network due to rating constraints.[3]

The transmission-level undervoltage condition present at BOY, Summerford ("SUM"), and Twillingate ("TWG") substations is a consequence of the length of the supplying transmission lines, in conjunction with the level of load observed.[4] Regulation of 66 kV Transmission Line 142L, which is the primary supply point for BOY, SUM and TWG substations, is through the OLTC on COB substation system power transformer COB-T2. As shown in Table 1, boosting COB-T2 to its maximum normal voltage is insufficient to mitigate the voltage violation.

In addition to OLTC-based regulation of the 66 kV network supplying the Study Area, the Company employs numerous distribution-level voltage regulation methods to ensure normal distribution-level voltages on feeders supplied by SUM and TWG substations. For example, power transformers SUM-T1 and TWG-T1 both utilize OLTCs to regulate their respective 25 kV and 12.5 kV distribution busses. These feeders are further regulated by inline autotransformer voltage regulators, as well as distribution-level capacitor banks.

The extensive utilization of voltage regulation methods ensures customers supplied by Newfoundland Power's distribution network in the area observe voltages within normal planning limits; however, these strategies are insufficient to mitigate the observed voltage violation on the incoming transmission network to the area. As a result, moving the point of 66 kV regulation to BOY Substation by installing the GAN-T2 replacement at BOY Substation, in conjunction with constructing a new 138 kV transmission line between LEW and BOY substations is the preferred, least-cost solution.

f) There are currently 335 outstanding TD4 deficiencies on this transmission line. Newfoundland Power inspects its transmission lines annually in accordance to the Company's *Transmission Line Inspection and Maintenance Practices* to determine if TD4 deficiencies have progressed to TD1 or TD2.

[3] Newfoundland Power's inline autotransformer voltage regulators are distribution-level devices that follow IEEE Std. C57.15-2009, which lists 34.5 kV as the maximum nominal voltage for voltage regulators. For transmission-level voltages, the Company would utilize substation assets for regulating voltage, such as tap changers. See Newfoundland Power's *2025 Capital Budget Application,* report *3.1 Gander-Twillingate Transmission Planning Study*, page 19, for commentary regarding the feasibility of other sources of transmission-level voltage support, such as synchronous condensers or 66 kV capacitor banks.

[4] The 66 kV network supplying customers in the Study Area totals approximately 168 km in length, and serves a peak demand of approximately 32 MVA.