

Q. (Reference 2.2 – Substation Power Transformer Strategy)

It is stated (page 11) “For 2027, Newfoundland Power is proposing capital projects to replace LAU-T1, LBK-T1, HAR-T1 and RRD-T3.”

- a) For each of these transformers provide a table showing all capital and maintenance expenditures for each of the past 10 years.**
- b) For each of these transformers provide a table showing each outage event over the past 10 years including the number of customers with service interruptions and the time interrupted.**
- c) For each of these transformers please quantify the risk associated with a 3-year project delay**
- d) Is the Remove and Repair alternative still relevant? How many transformers in the past 10 years has NP pursued the Remove and Repair alternative?**
- e) Does the extended lead time for transformer replacement improve the economics of the Remove and Repair alternative?**
- f) Does purchasing an increasing number of spares and mobile substations enable extended lives of transformers; e.g., run to failure?**
- g) What is the scrap value of a transformer?**
- h) Appendix C-4 states “Newfoundland Power has three portable substations and two spare power transformer that can be used for emergency response to an in-service failure of HAR-T1.” Does this level of backup suggest the transformer can remain in service beyond 2029?**

- A. a)** Newfoundland Power does not capture operating maintenance cost data of individual assets in each of its 131 substations. These costs are captured and reported in aggregate. As a result, Newfoundland Power is unable to provide the requested maintenance expenditures for each transformer. Table 1 below shows all capital expenditures over the last 10 years for each power transformer.

Table 1 Transformer Annual Expenditures (\$000s)				
Year	LAU-T1	LBK-T1	HAR-T1	RRD-T3
2015	-	-	3	-
2016	-	-	-	-
2017	66	-	-	-
2018	-	-	-	-
2019	-	-	-	-
2020	-	-	-	112
2021	-	-	-	-

Table 1 Transformer Annual Expenditures (\$000s)				
Year	LAU-T1	LBK-T1	HAR-T1	RRD-T3
2022	-	-	-	-
2023	-	-	57	-
2024	-	-	-	-
2025	187	-	-	-

- b) Power transformer LBK-T1 is a generator step-up transformer and is therefore not associated with customer outage minutes. Transformers HAR-T1 and RRD-T3 have not experienced any unplanned outages directly attributable to transformer protection device operations. Table 2 below summarizes all unplanned customer outages associated with transformer protection on LAU-T1.

Table 2 LAU-T1 Unplanned Outages			
Date	Start Time	End Time	Customers Effected
April 30, 2018	12:10	13:32	707
June 2, 2018	10:30	11:33	707
June 15, 2020	11:47	13:11	699
January 16, 2023	22:46	23:39	688

- c) Newfoundland Power does not quantify risk increases year over year. The risk assessment completed for each of the four power transformers proposed for replacement beginning in 2027 is based on the Company's methodology for assessing risk.¹ This methodology assesses the consequence associated with not proceeding with an identified project or program as well as the probability of that consequence occurring if the identified project or program did not proceed.

The risk assessments are point-in-time assessments. Generally, the consequence of failure may change over time, with more material changes occurring over the longer term. Factors that could contribute to the consequence of failure changing over time include customer growth, the presence of new safety or environmental hazards, or changes to costs which may affect the overall economic benefit of not completing an identify project or program.

¹ See the *2027 Capital Budget Application, 2027 Capital Budget Overview*, Appendix C.

1 Generally, the probability of failure changes over time. Depending on the
2 condition of the asset, the change could be material. In the case of the four
3 power transformers proposed for replacement beginning in 2027, oil sampling
4 results provided as Attachment A of appendices A to D in report *2.2 Substation*
5 *Power Transformer Strategy* indicate progressively deteriorating condition, with
6 recommendations to re-test within one year.

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8 d) The feasibility of repair is evaluated on a case-by-case basis considering
9 offloading capabilities, availability of spare and portable units, the cost-
10 effectiveness of repair versus replacement, transformer condition and repair
11 scope, and customer or generation impact. Where conditions and risk allow,
12 remove and repair remains a viable option.

13
14 In the past ten years, Newfoundland Power has pursued the remove and repair
15 alternative for four power transformers.

- 16
17 e) No, the long lead time for power transformer procurement does not improve the
18 economics of the remove and repair option. While extended procurement lead
19 times are a consideration in evaluating alternatives, they do not materially
20 change the underlying economics of a repair where the condition of the
21 transformer or the scope of repair limits the expected benefit of continued
22 service.

- 23
24 f) No, increasing the number of spare transformers does not extend transformer
25 life or justify a run-to-failure approach. Spare units do not reduce the likelihood
26 of a transformer failure nor do they slow transformer insulation aging. Their role
27 is to provide medium-to-long-term replacement options following a transformer
28 failure, thereby relieving resource pressures on the portable substation fleet,
29 which is intended for short-term responses. A run-to-failure approach would
30 increase customer exposure to large scale outages during failures and would
31 result in higher overall costs due to the reliance on more expensive emergency
32 responses.

- 33
34 g) The scrap value of a power transformer can vary significantly depending on
35 factors such as the transformer's size, condition, location, and dismantling
36 requirements. While transformers may have recoverable value from recyclable
37 materials, the net scrap value is generally nominal when costs associated with
38 dismantling, transportation, environmental remediation of hazardous material
39 such as PCBs, and disposal efforts are considered.

- 40
41 h) No, portable substations and spare transformers are intended to mitigate the
42 consequences of an in-service failure rather than reduce the probability of failure
43 occurring. While these resources support emergency restoration, they do not
44 address the underlying condition of HAR-T1. For that reason, Newfoundland
45 Power does not consider the availability of portable substations or spare

1 transformers to be a justification for deferring the replacement of HAR-T1
2 beyond the proposed timing.

3
4 In determining the timing and priority of transformer replacements,
5 Newfoundland Power considers a combination of factors including transformer
6 condition assessments, age, probability of failures, customer and system impacts
7 associated with failure, transformer procurement lead times, and the availability
8 of portable substations and spare transformers. The availability of emergency
9 response resources is therefore considered as part of the overall assessment of
10 risk. However, emergency response capability does not displace the need to
11 replace deteriorated transformers in a planned fashion. The replacement of
12 HAR-T1 beginning in 2027 aligns with Newfoundland Power's Substation Power
13 Transformer Strategy and will allow the Company to manage reliability risks
14 while maintaining emergency response capabilities for the broader power
15 transformer fleet.