

1 **Q. The 2026 CBA Power Transformer Strategy identified 107 power transformers**
2 **for replacement over a 30-year period ending in 2052.**

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- 4 **a) Explain how Newfoundland Power expects the overall risk and impact**
5 **of transformer failures to change as the strategy is implemented. Is**
6 **total fleet risk expected to decline as replacements are completed? If**
7 **not, explain why.**
- 8 **b) Provide a fleet-level forecast showing, by year:**
9 **(i) number of transformers replaced;**
10 **(ii) remaining fleet age profile relative to the average depreciable**
11 **life; and**
12 **(iii) condition/risk score distribution.**
- 13 **c) Provide the average age for all power transformer retirements for each**
14 **year over the period 2017 to 2027F.**
- 15 **d) Explain how Newfoundland Power will avoid overbuilding portable-**
16 **substation capacity if proactive transformer replacements reduce**
17 **future transformer-failure risk.**

18

19 **A. GENERAL**

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21 Newfoundland Power's Substation Power Transformer Strategy ("the Strategy") was
22 introduced as part of the *2026 Capital Budget Application* in response to the aging
23 profile of the Company's transformer fleet and increasing power transformer
24 procurement lead times. The Strategy established a long-term, planned approach to
25 managing power transformer replacements, spare transformer inventory, and portable
26 substation resources.

27

28 The Strategy incorporated the findings of Gannett Fleming Valuation and Rate
29 Consultants, LLC ("Gannett Fleming"), in their power transformer *Service Life Study* (the
30 "Study").¹ The purpose of the Study was to estimate reasonable lives for in-service
31 power transformers and to forecast an expected retirement schedule for each of the
32 units over the next 30 years.

33

34 The Strategy has been implemented to manage safety and reliability risks associated
35 with the age of Newfoundland Power's transformer fleet. Power transformers are one of
36 the most critical assets in a substation. Failure of a substation power transformer can
37 result in extended outages to customers and can require deployment of emergency
38 response resources such as portable substations and spare power transformers. The
39 service life of the Company's power transformers has historically exceeded the expected
40 life observed in the industry with 111 of the 191 transformers currently in service being
41 50 years of age or older. As a result of extended procurement lead times in the range of
42 24 and 36 months to design, procure, deliver, install, and commission a new
43 transformer, the consequence of failure has become more difficult to manage. As power
44 transformers age, the probability of failure increases.

¹ See the *2026 Capital Budget Application*, report 2.2 *Substation Power Transformer Strategy*, Appendix C.

1 In the Study, Gannett Fleming stated:

2
3 *"The 30-year forecast of anticipated power transformer retirements is*
4 *derived from the expected average service life and the ages of the*
5 *existing assets. For this study, retirements were calculated using*
6 *statistical modeling. It is important to acknowledge that the condition of*
7 *the units was not considered in this analysis, and this statistical*
8 *approach was intended to provide a high-level outlook. Therefore, these*
9 *results can be interpreted as providing general view of likely scenarios*
10 *rather than an exact depiction of future occurrences. As with any*
11 *projection, uncertainties may exist, and the forecast should*
12 *be interpreted with the understanding that it offers a broad overview of*
13 *potential outcomes."*²

14
15 It also indicated that *"The frequent retirement of power transformers should be*
16 *expected over the next 30 years. The analysis suggests that the Company will be*
17 *replacing, on average, three transformers on an annual basis through 2052."*³

18
19 This information supported Newfoundland Power's Substation Power Transformer
20 Strategy. While the Study provided a high-level forecast of expected transformer
21 retirements based on age and service life, the Strategy expands upon this analysis by
22 incorporating transformer condition assessments, operational requirements, spare
23 transformer inventory, portable substation capability, and evolving procurement lead
24 times into long-term planning decisions. The Strategy recommends an integrated asset
25 management approach that is intended to manage the increasing risks associated with
26 an aging transformer fleet while maintaining adequate emergency response capability
27 and continuing to provide safe and reliable service to customers. The overall approach
28 coordinates and considers condition-based replacements, spare transformer inventory,
29 portable substation resources, and procurement lead times along with asset ages to
30 manage the continued safe and reliable operation of the Company's power transformer
31 fleet in a planned and reasonable manner.⁴

32 **RESPONSE**

- 33
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35 a) Newfoundland Power expects the implementation of the Strategy to reduce the
36 risk associated with deteriorated transformers. The planned replacements allow
37 the Company to address aging and deteriorated transformers before failure
38 occurs, thereby reducing the probability of in-service failures. This avoids
39 reactive procurement and reduces the potential for extended customer outages
40 and emergency restoration costs.

² See the 2026 Capital Budget Application, report 2.2 Power Transformer Replacement Strategy, Appendix C, Gannett Fleming – Service Life Study, page 6 of 45.

³ Ibid., page 40 of 45.

⁴ See the 2027 Capital Budget Application, report 2.2 Substation Power Transformer Strategy, Appendix E.

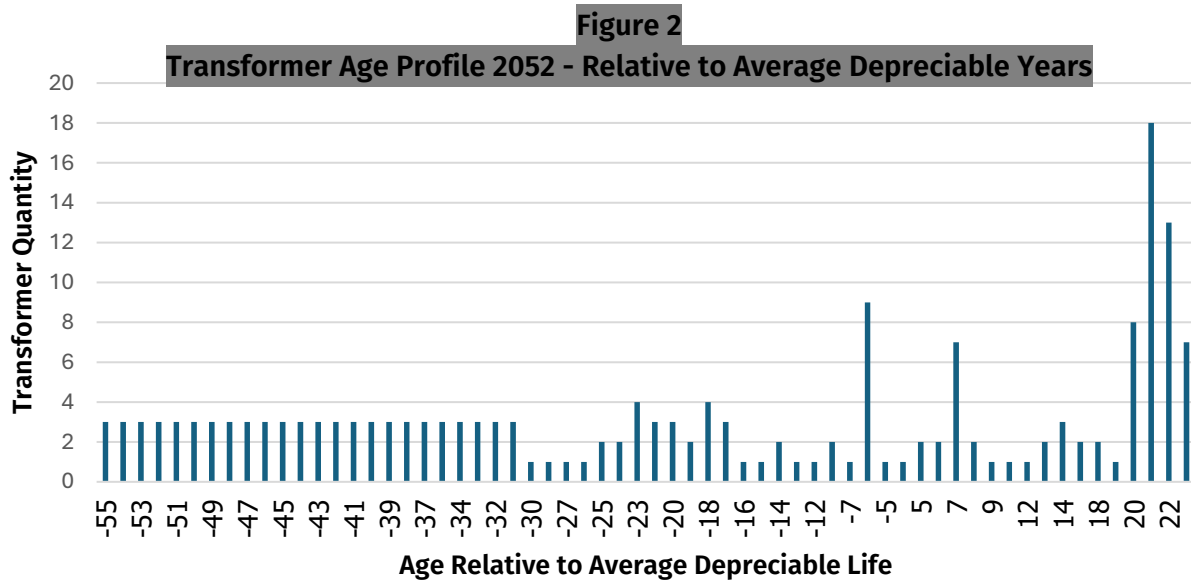
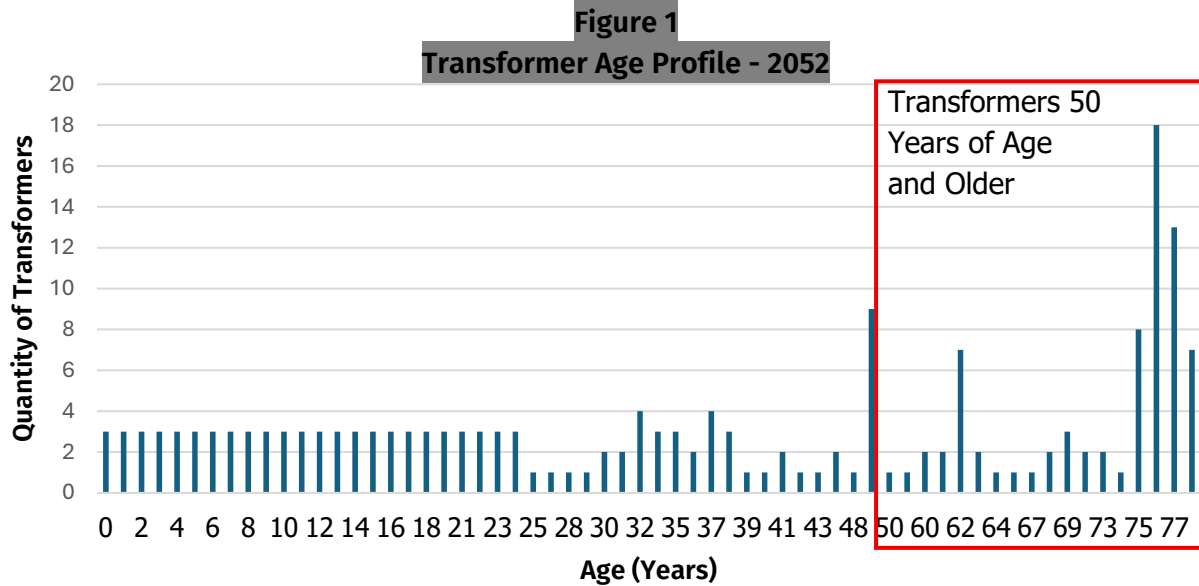
1 However, total fleet risk is not expected to decline uniformly or immediately as
2 replacements are completed. There are 111 of 191 transformers in
3 Newfoundland Power's transformer fleet that are 50 years of age or older. As a
4 result, while replacement of individual deteriorated units reduces the risk
5 associated with those units, other transformers will continue to age into higher-
6 risk categories over the same period.

7
8 The Study determined that frequent retirement of power transformers should be
9 expected over the next 30 years and that Newfoundland Power should expect to
10 replace, on average, approximately three transformers annually through 2052.
11 Accordingly, the Strategy is intended to manage and mitigate increasing fleet risk
12 over time, rather than eliminate transformer failure risk altogether.

13
14 The Strategy also recognizes that emergency response capability remains
15 necessary because not all failures can be prevented. Newfoundland Power
16 therefore combines planned transformer replacements with spare transformer
17 inventory and portable substation capability to manage both the probability and
18 consequence of transformer failures.

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20 b) i) Please refer to Figure 5 of report *2.2 Substation Power Transformer Strategy*
21 filed as part of the *2026 Capital Budget Application* for the fleet level number
22 of power transformers forecasted to be replaced each year. This forecast is
23 from the Gannett Fleming *Service Life Study*. It is important to acknowledge
24 that the condition of the units was not considered in the Study. The Study's
25 statistical approach was intended to be a high-level outlook. The results can
26 be interpreted as providing a general view of likely scenarios rather than
27 exact depiction of future occurrences. The Study's analysis suggests that the
28 Company will be replacing, on average, three transformers on an annual
29 basis through 2052. The Strategy is not designed to retire power
30 transformers based solely on age. The Company will continue to evaluate the
31 forecasted power transformer replacements as part of its annual capital
32 planning process as power transformer condition and health information are
33 updated annually.
- 34
35 ii) Figure 1 below illustrates the projected age profile of Newfoundland Power's
36 power transformer fleet in 2052 assuming an average of three transformer
37 replacements per year. For simplicity, the analysis assumes transformers are
38 replaced solely based on age, while, in practice, replacement decisions are
39 based on actual asset condition and risk. In 2052, assuming an average
40 replacement rate of three power transformers per year, 74 transformers are
41 projected to remain in service at 50 years of age or older. Figure 2 shows the
42 projected fleet age profile relative to the average depreciable life under the
43 assumption that three power transformers are replaced annually through
44 2052.

1 Based on the Study, Newfoundland Power's transformer fleet aligns with a
2 55-R3 survivor curve. Accordingly, an average depreciable life of 55 years
3 was used for this analysis. As shown in Figure 2, approximately 72 power
4 transformers are projected to remain in service beyond the average
5 depreciable life by 2052, even with an average of three power transformer
6 replacements per year.



1 iii) Newfoundland Power does not maintain a long-term forecast of fleet-wide
2 condition or risk score distributions. Transformer condition assessments are
3 based on inspections, oil sampling, electrical testing, maintenance findings,
4 operating experience, and condition assessment tools such as EPRI's Power
5 Transformer Expert System. The condition of previously stable aging
6 transformers can abruptly begin rapid deterioration. As a result, the
7 associated risk assessment can change over time as new information
8 becomes available and may not increase in a linear fashion. For this reason,
9 Newfoundland Power does not consider current condition assessments
10 sufficiently reliable to forecast fleet-wide condition or risk score distributions
11 over an extended period. The Company's long-term transformer retirement
12 forecast is therefore based on statistical modelling using asset age and
13 expected service life rather than individual transformer condition
14 assessments. As stated, the forecast alone does not serve as the basis for
15 transformer replacement, nor does transformer age, by itself, determine the
16 timing of replacements.

17
18 Newfoundland Power reviews the condition of its transformer fleet annually
19 and updates its five-year replacement forecast based on the most recent
20 condition assessments, inspections, testing results, and operating experience.

- c) The average age for all power transformer retirements for each year over the period of 2017 to 2027F is shown in Table 1. The overall average age of transformer retirement during this time frame is 54 years old.

Table 1 Transformer Retirements	
Year	Average Age of Retirement
2027F	51
2026F	67
2025	- *
2024	48
2023	73
2022	51
2021	33
2020	41
2019	53
2018	57
2017	63

Note: * denotes a year in which no transformer retirements occurred.

- d) Newfoundland Power will avoid overbuilding portable substation capacity by continuously assessing portable substation requirements as part of the Strategy. Presently, Newfoundland Power operates four portable substations to support its fleet of 191 in-service power transformers.

While the replacement of transformers under the Strategy is expected to reduce the probability of transformer failures, other transformers will continue to age and migrate into higher-risk categories over the same period. As a result, power transformer replacements do not eliminate the need for portable substations. Portable substations remain necessary to support annual maintenance activities, capital projects, emergency response to equipment failures, and periods when portable units themselves are unavailable due to maintenance, refurbishment, or repair.

1
2 The Strategy includes an annual review of the Company's five-year plan as part
3 of the capital budget process. The Strategy is updated to reflect the results of
4 ongoing inspections, condition assessments, operating experience, and system
5 requirements. This process provides a mechanism to adjust planned transformer
6 replacements, spare-transformer inventory requirements, and portable
7 substation needs as the condition of the transformer fleet and emergency
8 response requirements change over time.
9

10 While planned transformer replacements are expected to reduce transformer
11 failure risk, portable substations remain necessary for short-term emergency
12 response and planned work. Newfoundland Power avoids overbuilding portable
13 substation capacity by reassessing needs annually, considering the availability of
14 spare transformers, and coordinating portable substation requirements with the
15 evolving condition, age profile, and replacement schedule of the transformer
16 fleet.