Reference: 2.1 2024 Substation Refurbishment and Modernization

Q. Appendix D page 2. It is stated that Newfoundland Power completed an analysis which showed that ISL-T1 would have to remain in service until approximately 75 years of age to offset the added costs of completing the transformer as a separate project in the future. Please provide a copy of this analysis.

A. Newfoundland Power evaluated two alternatives to address the deteriorated condition of ISL-T1 to mitigate risks to the delivery of reliable service to customers. These alternatives were: (i) complete the *Islington Substation Refurbishment and Modernization* project using the existing power transformer, including a refurbishment of the existing power transformer; or (ii) purchase and install a new transformer with the *Islington Substation Refurbishment and Modernization* project.

Alternative 1 involves installing additional equipment during the *Islington Substation Refurbishment and Modernization* project to accommodate monitoring, protecting and metering of the existing power transformer. The design of the infrastructure necessary for the existing ISL-T1 would have to factor in future requirements when the power transformer is replaced in the near future. Refurbishment of the existing power transformer would also be completed.

Alternative 2 involves purchasing and installing a new power transformer with all required equipment upgrades integrated into the transformer. The design of the infrastructure during the *Islington Substation Refurbishment and Modernization* project would accommodate the new power transformer.

A net present value ("NPV") calculation of customer revenue requirement was completed for Alternative 1 and Alternative 2. This NPV was used to determine the required remaining service life of ISL-T1 to offset the added costs of installing a new transformer as a separate project in the future. Capital costs from all years were converted to the customer revenue requirement and an NPV was calculated using the Company's weighted average incremental cost of capital.

Table 1 includes the results of the NPV analysis of the two alternatives.

Table 1
ISL-T1 Net Present Value Analysis
($000s)

Alternative	NPV
1 – Use Existing Power Transformer (70 Year Service Life)	5,601
2 – Procure and Install a New Transformer in 2025	5,459

The NPV analysis determined that Alternative 2, procuring and installing a new ISL-T1, is the least-cost alterative when compared to purchasing and installing a new power transformer in a subsequent year. In the NPV analysis, it is assumed that the new power transformer will be installed in 2028 when the existing power transformer is 70 years old. A sensitivity analysis was completed for Alternative 1, which involved analysing the impact of the service life and subsequent replacement of ISL-T1 on the NPV.

Table 2 provides the sensitivity analysis of Alternative 1 based on the NPV of customer revenue requirement.

Table 2
Sensitivity Analysis of Alternative 1
($000s)

Alternative	NPV
ISL-T1 70 Year Service Life	5,601
ISL-T1 71 Year Service Life	5,648
ISL-T1 72 Year Service Life	5,592
ISL-T1 73 Year Service Life	5,537
ISL-T1 74 Year Service Life	5,485
ISL-T1 75 Year Service Life	5,434

The NPV analysis determined that ISL-T1 would have to remain in service until 75 years of age to offset the additional cost of completing the transformer replacement project in 2025.

Power transformer ISL-T1 will be 67 years old when replaced as part of the *Islington Refurbishment and Modernization* project in 2025. Referencing industry experience, there is a high risk that the transformer could fail in the near-term.[1] Given the customer risks and costs associated with a failure of ISL-T1, replacing the power transformer in 2025 is consistent with providing reliable service to customers at least-cost.

Based on the NPV and associated sensitivity analysis, Alternative 2 is the least-cost alternative to address ISL-T1.

[1] The expected life of a power transformer is between 30 and 50 years according to the International Council on Large Electric Systems ("CIGRE") *Asset Management Decision Making Using Different Risk Assessment Methodologies* 2013 report on asset management. Also, based on 2021 information available from Electric Power Research Institute ("EPRI"), there is a sharp decline for in-service power transformers past 70 years of age.