Q. In its 2006 Capital Budget Newfoundland Power provided a 10-year plan to rebuild its aging transmission lines to ensure a safe and reliable supply of electricity to customers. Costs for Transmission Line Rebuild have continued and have increased steadily, from a low in 2016 of $4,944,000 to a high in 2019 of $10,781,000. Has Newfoundland Power revisited and reviewed the methodology and plan since project inception in 2006?

A. **A. Response**

Newfoundland Power's multi-year plan for rebuilding its aging and deteriorated transmission lines is reviewed each year as part of the Company's annual capital budget application. The primary purpose of the annual review is to prioritize rebuild projects based on the methodology outlined in the plan.

As of 2019, execution of the plan is approximately ¾ complete. All remaining work identified under the plan is included in the 5-year capital plan filed with Newfoundland Power's *2020 Capital Budget Application.*

While some changes to the plan have materialized through the Company's annual review process, the methodology fundamentally remains the same. The remainder of this response describes the plan's methodology, execution to date and continued relevance.

B. General

Methodology

Newfoundland Power filed a multi-year plan to rebuild its aging and deteriorated transmission lines as part of its *2006 Capital Budget Application* (the "Transmission Line Rebuild Strategy," or the "Strategy").[1]

The Transmission Line Rebuild Strategy was developed in response to the fact that many of the Company's 107 transmission lines were constructed over 50 years ago and were not built to any particular standard.[2] These transmission lines were not engineered to withstand local environmental conditions and were therefore more susceptible to failure. The Strategy recognized the important role that transmission lines play in providing reliable service to large numbers of customers.[3] It outlined a structured approach to

[1] See Newfoundland Power's *2006 Capital Budget Application, Volume II, Supporting Materials*, report *3.1 Transmission Line Rebuild Strategy.* An update to the Strategy was filed as part of the Company's *2008 Capital Budget Application.* The primary purpose of the update was to provide updated cost estimates to reflect inflationary increases. The methodology remained the same.

[2] The Transmission Line Rebuild Strategy, filed with the Company's *2006 Capital Budget Application*, noted: *"Prior to the amalgamation of the three largest utilities in the province in 1966 (United Towns Electric, Newfoundland Light & Power, and Union Electric) there was limited transmission design expertise in any utility. There was little consistency in the design of transmission lines and, as a result, many lines built before 1960 were not designed to any standard (and do not meet present day standards)"* (page 4).

[3] In particular, the Strategy noted: *"While feeders typically supply several hundred up to two thousand customers, transmission lines often supply a few thousand up to tens of thousands of customers"* (page 5).

rebuilding the Company's oldest and most deteriorated lines and established that required rebuild projects would be prioritized based on: (i) the physical condition of the lines; (ii) the risk of failures; and (iii) the impact a failure would have on customers.

Execution to Date

Table 1 provides an update of the transmission lines identified for rebuild in the Strategy and their current status.

Table 1
Transmission Line Rebuild Strategy - Status Update
(2006 to 2019)

Lines Identified for Rebuild	Location	Original Year of Construction	Current Status
12L	KBR - MUN	1950	Complete
13L	SJM - SLA	1962	Complete
14L	SLA - MUN	1950	Complete
15L	SLA - MOL	1958	Complete
16L	PEP - KBR	1950	Complete
18L	GOU - GDL	1952	Complete
20L	MOB - CAB	1951	Complete
21L	20L - HCP	1952	Complete
23L	MOB - PBK	1942	Complete
25L	GOU - SJM	1954	Complete
30L	RRD - KBR	1959	Complete
32L	OXP - RRD	1963	Complete
35L	OXP - KEN	1959	Planned for 2021
41L	CAR - HCT	1958	Complete
43L	HCT - NCH	1956	Complete
49L	HWD - CHA	1966	Planned for 2020
55L	BLK - CLK	1971	Planned for 2022-2023
57L	BRB - HGR	1958	Complete
68L	HGR - CAR	1958	Complete
69L	KEN - SLA	1951	Complete
94L	BLK - RVH	1969	Planned for 2023-2024
95L	RVH - TRP	1969	Planned for 2021-2022
102L	GAN - RBK	1958	*Central Planning Study*
110L	CLV - LOK	1958	Complete
111L	LOK - CAT	1956	Complete
124L	CLV - GAM	1964	Planned for 2021-2023
146L	GAN - GAM	1964	Planned for 2023-2024
302L	SPO - LAU	1959	Complete
407L	STV - STG	1956	Complete
24L	MOB - BIG	1964	Complete
53L	38L - GEA	1961	No Longer in Service
301L	SPO – GRH	1959	Complete

Table 1
Transmission Line Rebuild Strategy - Status Update
(2006 to 2019)
(continued)

Lines Identified for Rebuild	Location	Original Year of Construction	Current Status
100L	SUN - CLV	1964	Planned for 2024
101L	GFS - RBK	1957	*Central Planning Study*
105L	GFS - SBK	1963	Planned for 2021
400L	BBK - WHE	1967	Complete
403L	TAP - ROB	1960	Planned for 2020

A total of 24 transmission lines have been rebuilt under the Strategy since 2006. This represents an execution rate of approximately 71%.[4] All remaining required rebuilds are included in the 5-year plan filed with the Company's *2020 Capital Budget Application.*

Through Newfoundland Power's annual review process, 2 principal revisions have been made to the original strategy.

First, transmission line 363L was added to the strategy and prioritized for rebuilding based on the criteria outlined above.[5] Proposed expenditures for 2020 represent the final year of this multi-year project.[6]

Second, Newfoundland Power completed a *Central Newfoundland System Planning Study* in 2018. This study reflected the need to rebuild transmission lines 101L and 102L, as originally identified in the strategy. The least-cost option to rebuild these lines was identified as reconfiguration of the 138 kV transmission system in Central Newfoundland. Transmission-related capital expenditures of approximately $10.8 million in 2019 include expenditures in relation to this project.[7]

Newfoundland Power has executed its Transmission Line Rebuild Strategy in a manner responsive to changing market conditions to ensure the least-cost delivery of service to customers.

[4] Three transmission lines have been removed from the Strategy since 2006: 101L and 102L, which have been addressed as part of the *Central Newfoundland System Planning Study*, and 53L, which is no longer in service. This brings the total number of transmission lines encompassed by the Strategy to 34 (24 / 34 = 0.71, or 71%).

[5] Transmission line 363L was originally constructed in 1963 and is a radial transmission line that serves as the only source of supply for customers on the Baie Verte Peninsula. A failure of transmission line 363L could result in prolonged outages to all customers in that area. Inspections identified significant deterioration of the line due to decay, splits and checks in the poles and spar arms, cracks in insulators and other hardware deficiencies, as well as non-standard and damaged conductor. Newfoundland Power commenced a multi-year project to rebuild the line in 2018. For more information, see Newfoundland Power's *2020 Capital Budget Application, Report 3.1 2020 Transmission Line Rebuild*, page 2.

[6] The rebuilding of transmission line 363L was originally approved by the Board in Order No. P.U. 37 (2017).

[7] Initial expenditures in relation to the reconfiguration of the Central Newfoundland transmission system were originally approved by the Board in Order No. P.U. 35 (2018).

In 2014 and 2015, there was extensive transmission line construction in the province related to the Muskrat Falls Project and other significant 230 kV transmission line projects being completed by Newfoundland and Labrador Hydro. This resulted in an increase in the cost of rebuilding transmission lines.

Table 2 provides a comparison of the average cost per kilometre of rebuilding transmission lines at different periods since 2006.

Table 2
Transmission Line Rebuilds
Average Cost per Kilometre
($000s)

Period	Cost
2006-2013	$141
2014-2015	$214
2016-2019F	$170

The per-kilometre cost of rebuilding transmission lines has fluctuated since 2006 due to changing market conditions. Costs were over 50% higher in 2014 and 2015 in comparison to 2006 to 2013.

Newfoundland Power adjusted the scope of annual Transmission Line Rebuild projects in response to these cost pressures in order to ensure stability in overall capital costs.[8] These cost pressures, in addition to the revisions noted above, have contributed to a longer than anticipated execution timeline for the Strategy. The execution timeline has also been prolonged through efforts to extend the useful service lives of transmission lines, where feasible.[9]

Costs for executing the Transmission Line Rebuild Strategy are consistent with estimates previously filed with the Board.[10]

Continued Relevance

Implementation of Newfoundland Power's Transmission Line Rebuild Strategy continues to be consistent with the delivery of least-cost, reliable service to customers.

[8] During the periods of 2006 to 2013 and 2016 to 2019F, Newfoundland Power rebuilt an average of 26 km of transmission line per year. During the years 2014 and 2015, the Company rebuilt an average of 17 km per year.

[9] For more information on the life extension of transmission lines, see the response to Request for Information NLH-NP-005.

[10] For example, this Request for Information notes expenditures of a high of approximately $10.8 million in 2019. This includes forecast expenditure of approximately $2.1 million for capital maintenance on transmission lines and $8.7 million for transmission line rebuild projects. In the 2008 update of the Transmission Line Rebuild Strategy, Newfoundland Power forecasted expenditures of approximately $8.3 million for rebuild projects in 2019.

The remaining rebuild projects, including those in 2020, continue to target the oldest and most deteriorated transmission lines in Newfoundland Power's electrical system. Proposed projects continue to be inspection-based with rebuilds prioritized based on the condition of the equipment, risk of failure, and impact on customers.

The Transmission Line Rebuild Strategy was among the capital projects reviewed by the Board's consultant, The Liberty Consulting Group ("Liberty"), in January 2014 following widespread customer outages known as #darkNL.

Regarding Newfoundland Power, Liberty observed:

> *"Newfoundland Power's reliability has improved significantly since 1999 and has recently remained stable overall. Its transmission and distribution systems operate effectively in ensuring adequate service reliability. Effective maintenance and capital programs, that appropriately recognize the age of its assets, have contributed materially to improved reliability."*[11]
>
> *"Newfoundland Power annually budgets various rebuild and modernization capital projects to address transmission, distribution, and substation reliability issues and to proactively address aged equipment condition and obsolescence issues. Annual capital strategies include measures (Transmission Rebuild Strategy, Rebuild Distribution Lines Projects, Distribution Reliability Initiative, and Substation Refurbishment and Modernization Strategy) well targeted to the needs of its equipment. Asset management strategies have promoted improved system reliability since 1998, while keeping annual capital T&D expenditures under control."* [12]

Overall, these findings support that Newfoundland Power's approach to rebuilding its transmission lines continues to be consistent with the least-cost delivery of reliable service to customers.

[11] See Liberty's *Report on Island Interconnected System to Interconnection with Muskrat Falls addressing Newfoundland Power Inc.*, December 17, 2014, page ES-2.

[12] Ibid., page 51.