Q. (Reference Application Schedule B, pages 55 and 56 of 98) For the Distribution Reliability Initiative project, why is this project not captured under other distribution projects such as the Rebuild Distribution Lines project? Should reliability be incorporated in the prioritization process in the Rebuild Distribution Lines project?

A. **A. GENERAL**

2015 Distribution Reliability Review

In 2014, as part of its *Investigation and Hearing into Supply Issues and Power Outages on the Island Interconnected System*, a comprehensive review of Newfoundland Power's electrical system reliability management practices was undertaken by the Board. The *2015 Distribution Reliability Review* filed with the Company's 2016 Capital Budget Application outlined Newfoundland Power's current distribution reliability management practices and provided an assessment of current distribution system reliability as being adequate.[1]

Newfoundland Power's distribution reliability will, in significant measure, reflect the general condition of its plant in the field. If the plant is deteriorated or defective, it will be more prone to failure. Maintaining deteriorated plant, particularly in areas subject to severe weather conditions, can result in reduced levels of service reliability for customers.

Current Reliability Management Practices

Newfoundland Power's existing reliability management practices include a combination of (i) a structured, inspection-based preventative maintenance program for the Company's distribution system, (ii) ongoing data-based assessment of individual distribution feeder reliability performance, and (iii) effective response to outages caused by system failure throughout the Company's service territory. For the purpose of the 2021 Capital Budget Application, items (i) and (ii) will be the subject of this response.[2]

Newfoundland Power performs condition assessments on all of its distribution feeders on a 7 year cycle. Where conditions are encountered which give rise to a risk of imminent failure of feeder sections or components, repairs are performed as soon as practicable. High-priority repairs typically form part of the Company's annual *Reconstruction* capital project.[3] Where conditions encountered on inspection indicate replacement of deteriorated distribution structures or electrical equipment is warranted, but not immediately required to ensure continuity of service to customers, repairs are scheduled

[1] Current reliability management practices have yielded distribution system reliability for Newfoundland Power's customers, which is better than the current Canadian average.

[2] This response will focus on the Company's preventative maintenance and data-based reliability programs. It will not include a review of the structure of the Company's outage management and emergency response capabilities.

[3] The annual *Reconstruction* capital project is part of the Company's annual capital budget application. It is meant to ensure that high priority projects which are required to ensure continuity of service to customers are undertaken in a prompt manner.

for the ensuing year as part of the Company's annual *Rebuild Distribution Lines* capital project.[4]

Each year, Newfoundland Power assesses and ranks the reliability performance of its distribution feeders based upon industry standard reliability indices. Where reliability data, together with engineering condition assessment, indicate that material improvement in reliability performance of worst performing feeders is warranted, work will be undertaken as part of the Company's *Distribution Reliability Initiative* capital project.[5]

Reconstruction and Rebuild Distribution Lines Capital Projects

Newfoundland Power's *Reconstruction* and *Rebuild Distribution Lines* capital projects are the cornerstone of its overall reliability management practices. They have existed for almost 2 decades.

The *Reconstruction* and *Rebuild Distribution Lines* capital projects work together as part of Newfoundland Power's preventative maintenance program that addresses deterioration and deficiencies on the distribution system. These capital projects are based on inspections with capital expenditures related to the level of deterioration identified.[6] Based on priorities established in the Company's inspection standards work is performed under either the *Reconstruction* or *Rebuild Distribution Lines* capital projects.

Currently, inspections are performed by Distribution Planners who assess plant condition according to the inspection standards. Inspection standards include both (i) specifications for distribution equipment such as poles, guys, crossarms, insulators, conductor, transformers, cut outs and switches, and (ii) condition assessment standards for that equipment. All overhead primary distribution lines are required to have a minimum of one detailed ground inspection every 7 years.[7]

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[4] The annual *Rebuild Distribution Lines* capital project is typically part of the Company's annual capital budget application. By scheduling refurbishment of distribution lines, the Company is able to achieve improved economies in overall distribution maintenance.

[5] The *Distribution Reliability Initiative* capital project is part of the Company's annual capital budget applications. Work will only occur under the *Distribution Reliability Initiative* capital project where data analysis and engineering condition assessment indicate material improvement in reliability performance can be achieved. Regardless of whether work is proposed to be performed under the *Distribution Reliability Initiative* capital project, Newfoundland Power reports its assessment of its worst performing feeders as part of every annual capital budget application.

[6] The level of deterioration identified is prioritized into 1 of 4 classifications according to the *Distribution Line Inspection and Maintenance Practices*. These practices were last before the Board in the Rate Mitigation Options and Impacts Reference as Attachment C to the response to Request for Information PUB-NP-056.

[7] A survey of 23 utilities conducted in 2014 for the Canadian Electricity Association on distribution line inspection practices found that all utility's responding inspected their distribution feeders. The average inspection cycle was 5 years in a range of 1 year to 12 years. The report titled *CEATI Report No. T134700-50/119 Distribution Inspection & Maintenance Cycle Comparison of Utility Practices* can be purchased from CEATI International Inc.

Where problems with specific types or brands of distribution equipment become known, the *Rebuild Distribution Lines* capital project can be used to address an orderly replacement of the equipment. One example of this was the defective grout used in the manufacture of the CP 8080 two piece distribution insulator. These insulators were specifically identified for replacement early in the *Rebuild Distribution Lines* capital project.[8]

Newfoundland Power's *Reconstruction* and *Rebuild Distribution Lines* capital projects provide a structured basis to ensure distribution plant and equipment are maintained in good condition. It also provides effective means of addressing specific defective equipment types or other plant conditions which reduce reliability as those defects or conditions emerge.

Distribution Reliability Initiative Capital Project

The *Distribution Reliability Initiative* capital project targets the replacement of deteriorated poles, conductor, and hardware to improve reliability for customers served by specific distribution feeders.[9]

The selection of the specific distribution feeders for consideration under the *Distribution Reliability Initiative* capital project involves a 2 stage assessment.

First, the reliability performance of all of the Company's distribution feeders is assessed against 6 industry standard reliability metrics. These include (i) the system average interruption frequency index, or SAIFI[10], (ii) the system average interruption duration index, or SAIDI[11], (iii) the customers interrupted per kilometer of distribution line, or CIKM[12], (iv) the customers hours of interruption per kilometer of distribution line, or CHIKM[13], (v) the total number of customer interruptions, or CI, and (vi) total number of customer minutes of interruption. Each of these metrics provides a different perspective on the reliability that customers' experience.

Second, once screening identifies the Company's worst performing distribution feeders, an engineering assessment is performed on these feeders. This assessment includes an analysis of past service problems, consultation with local field staff, and consideration of possible design and construction alternatives. Where this assessment indicates that

[8] See the 2004 Capital Budget Application, Volume III, Distribution, Appendix 2 for further details.

[9] Worst-performing feeder programs are standard in the electric utility industry and are considered to be best practice. In a study completed for the Canadian Electricity Association, 81% of utilities responding had a worst performing feeders program. The study results were included in the report titled *Worst Performing Feeders, Service Continuity Committee: A New Measures Working Group Whitepaper* which was included as Attachment A to response to Request for Information PUB-NP-005 in Newfoundland Power's 2016 Capital Budget Application.

[10] SAIFI is the total number of customers interrupted divided by the total number of customers served by the distribution line.

[11] SAIDI is the total number of hours of customer interruption divided by the total number of customers served by the distribution line.

[12] CIKM is the total number of customers interrupted divided by the length in kilometers of the distribution line.

[13] CHIKM is the total number of hours of customer interruption divided by the length in kilometers of the distribution line.

reliability improvement can be achieved in a reasonably cost effective manner, then work is proposed for inclusion in the *Distribution Reliability Initiative* capital project.

B. RESPONSE

The *Distribution Reliability Initiative* and *Rebuild Distribution Lines* projects are distinct pieces to the Company's distribution reliability management practices. The *Distribution Reliability Initiative* project is in response to reliability issues already experienced in specific areas of the Company's service territory. The *Rebuild Distribution Lines* project is part of the Company's preventative maintenance program focused on components that are a risk to public or employee safety or that are likely to result in imminent failure.[14]

The *Rebuild Distribution Lines* and *Distribution Reliability Initiative* capital projects were part of the comprehensive review by the Liberty Consulting Group ("Liberty") in 2014. With respect to the *Distribution Reliability Initiative* project, Liberty recommended that Newfoundland Power "perform a structured evaluation of the costs and benefits of reinstituting a regular annual program for addressing worst performing feeders."[15] With respect to the *Rebuild Distribution Lines* project, Liberty recommended that Newfoundland Power "increase the emphasis on the *Rebuild Distribution Lines* initiative in annual capital budgets, with the goal of reducing distribution equipment failures."[16]

Newfoundland Power's management of its Distribution system assets is highly dependent upon the completion of these annual projects. The Company's *Distribution Reliability Initiative* and *Rebuild Distribution Lines* projects are consistent with good utility practice.[17]

Newfoundland Power intends to continue to include the *Rebuild Distribution Lines* and *Distribution Reliability Initiative* as separate capital projects as part of its ongoing management of distribution system reliability. The work included as part of the *Rebuild Distribution Lines* project is prioritized through the Company's *Distribution Line Inspection and Maintenance Practices*. These practices prioritize work based on the reliability and safety risks associated with the level of component deterioration and failure of specific defective equipment.

[14] For an explanation of how reliability is incorporated in the prioritization process in the *Rebuild Distribution Lines* project see the response to Request for Information NLH-NP-028.

[15] Report on *Island Interconnected System to Interconnection with Muskrat Falls addressing Newfoundland Power,* December 17, 2014, Recommendation 2.2.

[16] Report on *Island Interconnected System to Interconnection with Muskrat Falls addressing Newfoundland Power,* December 17, 2014, Recommendation 2.1.

[17] For information on Liberty's and the Board's assessment that Newfoundland Power's distribution management practices are consistent with good utility practice see response to Request for Information CA-NP-043.