Q. (Reference Application Schedule B, pages 11 and 12 of 98) It is stated "*This Substations project is a continuation of work started in 2007 as a result of the Substation Strategic Plan. The work included in this project is consistent with that plan*." Given that this project is now 13 years old, please quantify the benefits to customers in terms of reliability and cost savings since 2007 and the continued justification for the project. Further, please identify efficiencies and cost savings that have been developed over the years as experience has been gained with this project.

A. **A. Substation Strategic Plan**

The *Substation Strategic Plan* (the "Plan") was included in Newfoundland Power's *2007 Capital Budget Application*.[1] The Plan changed the way substation capital projects were planned and executed at Newfoundland Power.

Prior to establishing this Plan, the Company executed substation work on a component-by-component basis. For example, in the 1990s the Company had a program to replace all 2-piece insulators in substations. Following an assessment of all substations, the Company shifted its approach in 2007 to focus on the overall condition of individual substations.[2]

The Plan has been in effect for over 13 years. It continues to serve its intended purpose of realizing productivity and reliability benefits for customers.

The pace of plan execution has been extended.[3] This extension is the practical result of annual assessments completed as part of the Company's capital planning process[4] and other factors, such as requirements for *Additions Due to Load Growth* projects.

All of Newfoundland Power's long-term asset management strategies were reviewed by the Board's consultant, The Liberty Consulting Group ("Liberty"), in 2014. Liberty concluded:

> *Newfoundland Power's substation inspection, corrective maintenance, and preventive maintenance practices are consistent with good utility practices.*[5]

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1 See the *2007 Capital Budget Application*, report *2.1 Substation Strategic Plan, page 3*.

2 Typically, the requirement to refurbish or replace substation equipment is minimal during the first 40 years in service. During this period, substation equipment is replaced or refurbished if condition warrants. Beyond 40 years of age, the requirement for refurbishment or replacement increases.

3 The Plan outlined that 109 substations would be addressed over a 10-year period, with an average of 11 substations per year. To date, only 48 substations have undergone substation refurbishment and modernization.

4 In some cases, system planning studies have required adjustments to the Plan. For example, the *Central Newfoundland System Planning Study* determined the least-cost approach to replacing transmission lines 101L and 102L was to transfer the Lewisporte and Rattling Brook substations to the 138 kV transmission network. This impacted the refurbishment and modernization plan for these 2 substations.

5 See Liberty's Report on Island Interconnected System to Interconnection with Muskrat Falls addressing Newfoundland Power Inc., December 17, 2014, page 51.

Newfoundland Power uses an effective combination of periodic O&M inspection and maintenance programs and capital transmission, distribution, and annual capital substation capital rebuild and modernization projects to address condition, reliability, and operating issues with its transmission, distribution, and substation assets.[6]

B. Customer Benefits

The Plan has realized both cost and reliability benefits for customers.

From a cost perspective, execution of the Plan has coordinated *Substation Refurbishment and Modernization* projects with other major substation projects. Examples include coordination with *Additions Due to Load Growth* projects and PCB removal projects.[7] This coordination achieves efficiencies in project planning and execution. For example, it reduces costs to customers associated with the installation of portable substations.[8]

From a reliability perspective, coordinating major substation projects reduces the requirement for customer outages. Additionally, execution of the plan has increased the level of remote control and monitoring in Newfoundland Power's substations.[9] Since 2014, the Company has completed the remote control and monitoring of all distribution feeders through the *Substation Refurbishment and Modernization* project. This allows Power System Operators to prevent or respond to certain customer outages without the assistance of field crews.[10] These remote capabilities reduce both the time and cost of responding to customer outages. Liberty's review in 2014 confirmed this approach is consistent with good utility practice.[11]

Execution of the Plan has also resulted in fewer individual relay protection system components to deliver the same functionally.[12] This results in less equipment to maintain and less equipment that may fail in service. This too provides cost and reliability benefits to customers.

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6 See Liberty's *Report on Island Interconnected System to Interconnection with Muskrat Falls addressing Newfoundland Power Inc., December 17, 2014*, page 49.

7 For example, there have been 6 Additions Due to Load Growth capital projects that have been combined with Substation Refurbishment and Modernization capital projects since 2007. As well, coordinating *PCB Bushing Phase-out* projects with *Substation Refurbishment and Modernization* projects has occurred 10 times.

8 There have been 27 instances where the capital project was aligned with power transformer maintenance, which required the installation of a portable substation. The typical cost to install a portable substation is approximately $50,000. Avoiding the installation of portable substations in 27 instances reduces costs to customers by approximately $1.4 million (27 x $50,000 = $1.4 million).

9 This includes the installation of monitoring equipment on substation power transformers and circuit breakers. It also includes under-frequency control of substation breakers and reclosers.

10 This includes the ability to remotely access relay settings and fault event data from relay protection devices.

11 Liberty observed: *"SCADA control, however, exists for only about 60 percent of distribution feeders. The Company will begin SCADA replacement in 2015, under plans to include all distribution feeders in its new system. Executing these plans will bring Newfoundland Power into conformity with good utility practices."* See Liberty's *Report on Island Interconnected System to Interconnection with Muskrat Falls addressing Newfoundland Power Inc.*, December 17, 2014, page 24.

12 The replacement of electromechanical relay schemes with microprocessor-based protective relays has reduced the number of components required to provide protection of electrical equipment in substations.

These benefits are consistent with the delivery of reliable service to customers at least cost.

The request to quantify benefits to customers in terms of reliability and cost savings is not possible. Quantifying the benefits to customers in terms of reliability would involve quantifying the frequency and duration of customer outages that did not occur. Quantifying cost savings would require an estimate of the cost to complete the same work in an uncoordinated fashion.