Q. **Reference: Schedule 1 - 2023 Capital Budget Overview**

In its 2023 capital budget application Newfoundland Power stated that it does not currently have the software or data necessary to calculate the risk mitigation or reliability improvement values of capital expenditures. Hydro is able to provide the prioritization of the programs and projects proposed in its 2023 capital budget application by risk mitigated per $1 million (Table 8).

a) Please describe the process Hydro used to develop the list of prioritized projects by risk mitigated per $1 million.

b) Please identify and discuss any challenges Hydro experienced in providing the list of prioritized projects.

c) Please identify and discuss any limitations to the prioritization of projects by risk mitigated per $1 million.

A. **a)** To determine the risk mitigated for each project, Newfoundland and Labrador Hydro ("Hydro") calculated the associated risk before execution of the proposed scope (pre-implementation), and the expected risk after the scope is executed (post-implementation). Risk scores were developed utilizing the Capital Risk Assessment Matrix, provided in Hydro's Capital Budget Overview.[1] Risk scores were calculated by multiplying the risk impact index value with the risk likelihood index value. The risk mitigation value was calculated as the difference between the pre-implementation risk score and the post-implementation risk score. Hydro then divided each risk mitigation value by the project cost (in $ millions), to determine the risk mitigated per $1 million.

b) With the exception of the challenges associated with prioritization of projects by risk mitigated per $1 million as discussed in part c) of this response, the primary challenge Hydro encountered in developing its list of prioritized projects was in assessing the risk associated

[1] "2023 Capital Budget Application," Newfoundland and Labrador Hydro, July 13, 2022, vol. I, sch. 1, app. F.

with General Plant projects or programs, such as those associated with buildings or information systems. For example, by nature, General Plant assets do not have a direct impact on reliability, and therefore cannot be evaluated based on their potential customer impact or the impact to generating reserves. While these assets do not have a direct impact on reliability, they are critical for supporting Hydro's day-to-day operations, and failure to adequately maintain these assets through prudent capital investment would eventually result in limitations in Hydro's ability to safely and reliably maintain its core assets. To address this challenge, Hydro has included criteria within its Capital Risk Evaluation Matrix, and has aimed to create proportionality between these criteria and the criteria used to assess risk associated with its core assets.

Additionally, while Hydro has aimed to "quantify" risk by obtaining numerical risk values, Hydro recognizes that the inputs used in calculating risk values are subjective and/or qualitative in many cases. For example, Hydro is not able to determine the precise likelihood of failure of a given asset in a given period of time; however, Hydro has utilized the professional judgement of subject matter experts to categorize likelihood values appropriately, and has developed its Capital Risk Assessment Matrix to facilitate consistent risk scoring across a wide variety of asset types. Through improvement of Hydro's asset management system, Hydro aims to improve the objectivity and quantitative nature of its inputs; however, Hydro recognizes that this is a significant undertaking that will be developed over several years.

Hydro also experienced challenges in assessing the risk of projects without defined scopes, such as Hydro's in-service failure programs. While the likelihood value of such projects is known given that the asset has already failed or is nearing the point of failure, the impact of such a failure is dependent on the specific asset, which is not known at the time of risk evaluation.

c) The primary challenge encountered by Hydro in the prioritization of projects by risk mitigated per $1 million is the tendency for this method to favour projects with low materiality. Hydro owns and operates assets with highly divergent asset values. Project cost is the denominator of the equation to determine risk mitigated per $1 million, resulting in lower risk mitigated per $1 million for projects with higher materiality, regardless of the risk

mitigated. As a result, prioritization in this manner favors projects or programs with low materiality, while assigning relatively low priority to projects with very high materiality, regardless of the risk mitigated. For example, a project to replace a component of a generator control system may have lower materiality and therefore a higher risk mitigated per dollar spent then a project to overhaul the same generator. The impact of failure of the generator itself due to a decision to defer a unit overhaul, or the impact of the failure of the generator control system, would both cause a forced outage of the unit, and would therefore be assigned the same risk impact score. Both of these projects would be considered critical to ensuring reliable operation of the unit in question, and therefore it is Hydro's opinion that prioritization based on the criticality of the unit and the likelihood of unit failure irrespective of project cost would provide more value in comparing these projects to other planned investments. Similar examples can be seen throughout Table 8 of Hydro's Capital Budget Overview.[2]

It is Hydro's opinion that risk mitigated per $1 million provides more value when comparing mutually exclusive projects which address a common risk. Assessing alternatives in this manner would allow for comparison of alternatives with different risk mitigation values and different project costs, as an input to cost-benefit analysis.

The concept of evaluating risk mitigated per unit cost is known as Risk Spend Efficiency ("RSE"). Hydro has observed that other utilities have noted similar limitations with the use of RSE for work planning. A report made available by San Diego Gas & Electric titled "Risk Quantification Framework and Risk Spend Efficiency" provides an overview of the quantification methods used by Southern California Gas Company and San Diego Gas & Electric Company, including a discussion of shortcomings associated with the implementation of RSE.[3] In this report, the author notes that "conceptually, RSEs could be a useful tool to assist in decision making." However, it is noted in the report that "RSEs remain a data point to consider, but (are) not the deciding factor for mitigation selection." The shortcomings of RSE noted in the report are:

[2] "2023 Capital Budget Application," Newfoundland and Labrador Hydro, July 13, 2022, vol. I, sch. 1, p. 34, Table 8.
[3] "Risk Quantification Framework and Risk Spend Efficiency," Southern California Gas Company and San Diego Gas & Electric Company, May 17, 2021 <https://www.sdge.com/sites/default/files/regulatory/SCG_SDGE_RAMP-C_Risk_Quantification_Framework_and_Risk_Spend_Efficiency_5-17-21.pdf>.

- Lack of data and challenges with data collection;
- Frequency of Incidents;
- Reliance on Subject Matter Experts;
- Occurrence of Changes;
- Changing Methodologies and Tools;
- Non-RSE Factors (i.e. factors not accounted for in RSE);
- Inability to Compare RSEs Across Utilities;
- Lack of Common View of Risk Tolerance;
- Lack of Recognition of Mitigation Synergy;
- Treatment of Non-Asset Mitigations/Controls; and
- Misalignment with Utility or Commission (Regulator) Priorities.

Hydro remains open to exploring the role of RSE in investment prioritization; however, it is Hydro's opinion that prioritization by risk mitigated remains a more accurate way of determining investment priority in the current regulatory context.