Q. Paragraph 2 of the Application states that Hydro has been studying long-term supply options, in particular the possibility of interconnection, for certain communities in southern Labrador since the early 2000s. Please explain why Hydro is proposing interconnection as the long-term supply option at this time, especially in light of increasing rate pressures and rate mitigation efforts.

A. Newfoundland and Labrador Hydro ("Hydro") is proposing interconnection as the long-term supply option at this time for the following reasons:

- The existing supply configuration for customers previously served by the Charlottetown Diesel Generating Station was implemented as an interim solution and has safety and reliability issues. Immediate material capital investment is required to provide a sustainable source of supply for the community;
- Hydro's proposal is the least-cost solution in the long-term and is consistent with Hydro's legislated requirements and rate mitigation efforts. As the rate pressures resulting from the integration of the Muskrat Falls Project assets are also long-term in nature, it is appropriate and prudent that Hydro consider what is in the best interest of customers on a long-term basis; and
- The proposed approach provides the greatest opportunity for flexibility to adapt to future requirements (e.g., changes in loads, integration of renewables, etc.).

Hydro is sensitive to the current fiscal environment and understands that the timing of this major capital investment falls within a period of increasing rate pressures and rate mitigation efforts; however, a long-term solution is required and deferral of this project is not appropriate. Hydro took the materiality of this project into consideration when preparing its 2022 Capital Budget Application and deferred projects and expenditures where possible to maintain an overall 2022 capital plan which appropriately balances reliability and cost concerns.

Further detail supporting Hydro's rationale regarding the timing and justification of its proposed approach is provided in PUB-NLH-001, Attachment 1.

Material Capital Investment Required to Address Charlottetown Supply

Continued Use of Mobile Gensets in Charlottetown Without Additional Investment

As noted in Schedule 1, Attachment 1, Table 3 of Newfoundland and Labrador Hydro's ("Hydro's") Long Term Supply for Southern Labrador Application ("Application"), continued use of the mobile gensets in Charlottetown as they are presently being operated is not a viable alternative as it would present an unacceptable level of risk to safety and reliability. Additionally, there are considerations regarding increased environmental risks and operating costs associated with mobile diesel generators.

The mobile enclosures have limited space which makes it physically demanding for operators to perform maintenance and operational checks and also exposes operators to potential extreme cold or warm temperatures, potentially unsafe noise levels, and exposure to higher risks associated with arc-flash hazards. These units are also not equipped with fire suppression systems.

Operating mobile units in harsh winter conditions has proven to be unreliable. Hydro has experienced failure of mobile gensets due to snow intake during blizzard conditions, and the freeze-thaw cycle could adversely affect the integrity of the power cables running on the ground between units and on-site facilities. The intense heat and vibration associated with mobile gensets makes them more susceptible to failures. Compounding these issues, mobile gensets also have limited protection and controls, as well as inadequate monitoring functionality which does not retrieve and archive data (an essential function for troubleshooting and planning purposes).

From an environmental perspective, mobile gensets have lower fuel efficiency, higher probability of fuel spills, limited potential for renewable energy penetration, and are unable to accommodate the emission control technology expected to be required in the future.

Increased operating and maintenance costs are associated with mobile generating units due to increased outages for maintenance and, often, the requirement for a significant amount of maintenance to be completed offsite. As mobiles tend to be more customized, there is a lack of

standardization which can increase costs for equipment and parts, staff training, and vendor support. There is also a general reduction in productivity due to accessibility issues and other challenges associated with the limited physical space in the enclosures. Finally, there are increased costs associated with keeping the units and on-site facilities safe and accessible during winter.

For the previously-noted reasons, material capital investment in electrical infrastructure in Charlottetown is required at this time. As noted in Hydro's Application, capital investment of at least $10.4 million[1] is required to mitigate the risks associated with the previously-noted deficiencies and ensure reliable long-term operation.[2]

Direct Replacement of Original Charlottetown Diesel Generating Station

The direct rebuild of the Charlottetown diesel generating station to the same specifications that existed prior to the 2019 fire is not acceptable for long-term supply for Charlottetown. It is Hydro's view that it would be imprudent to rebuild the exact facility that previously existed without consideration for the current and future needs of the facility and community. For example, the previous generating station did not have adequate capacity to meet Hydro's firm capacity criteria without the support of mobile units to support peak summer loading conditions. Additionally, the previous generating station, placed in-service in 1989, did not have a fire suppression system. Hydro is currently in the process of adding fire suppression to its diesel facilities and would not construct a new diesel facility without a fire suppression system.

As noted in Hydro's Application, the diesel generating station which would be required to meet the current and future needs of the community would require a capital investment of at least $21.4 million.[3,4]

[1] Based on a Class 5 estimate.
[2] The scope of the work required to upgrade the existing mobiles in Charlottetown is described in "Long-Term Supply for Southern Labrador – Phase 1," Newfoundland and Labrador Hydro, July 16, 2021, sch.1, att. 1, sec. 4.1, pp. 22–23.
[3] Based on a Class 5 estimate.
[4] The scope of the work required to upgrade the existing mobiles in Charlottetown is described in "Long-Term Supply for Southern Labrador – Phase 1," Newfoundland and Labrador Hydro, July 16, 2021, sch. 1, att. 1, sec. 4.2, pp. 23–25.

The construction of a direct replacement plant (i.e., like for like) with the deficiencies listed above would cost approximately $10.2 million.[5] Despite it being an initial lower capital cost option, such a solution would result in an increased lifecycle cost for the supply of the region when compared to a regional interconnection due to the relatively higher operating, fuel and overhaul costs associated with the continued use of four individual, community-based isolated diesel generating systems. On this basis, a direct replacement would not be consistent with Hydro's mandate to supply electricity at the lowest possible cost, consistent with reliable service.

Phased Approach to Regional Interconnection is the Least-Cost Solution

Study Period

A long-term study period is required to ensure a complete analysis of all viable alternatives. The nature of interconnecting the four southern Labrador communities is such that it will always have a higher upfront capital investment than a singular diesel plant replacement or upgrade. Even in a phased approach, the first phase of interconnection will require the construction of a larger diesel generating station capable of eventually accommodating the integration of all four communities, as well as the cost of interconnecting the first community. Each subsequent community will then be integrated for a lesser capital investment as the pre-existence of the regional facility materially reduces the incremental costs.

As demonstrated in Hydro's analysis, there is an immediate requirement for substantial capital investment to ensure reliable supply for the community of Charlottetown. However, Hydro's analysis also demonstrates that there are significant operational and sustaining capital costs required for the reliable supply of neighbouring communities that will be directly and materially impacted by the immediate investment decision. On this basis, it is essential that all analyses, study timeframes, proposed solutions, and the ultimate investment decision be framed in consideration of long-term regional supply requirements.

[5] Please refer to Hydro's response to NP-NLH-041 for a breakdown of the estimated costs.

Determination of Least-Cost Alternative

Chart 1 presents the results of Hydro's cost benefit analysis over the 50-year planning horizon.[6] The scope associated with each alternative is as follows:

- Alternative 1 requires upgrades to the existing mobile generating units in Charlottetown in 2023 to address the previously-noted deficiencies and replacement of diesel generating stations in Mary's Harbour in 2030, Port Hope Simpson in 2035, and St. Lewis in 2045.

- Alternative 2 requires replacement of diesel generating stations in Charlottetown in 2024, Mary's Harbour in 2030, Port Hope Simpson in 2035, and St. Lewis in 2045.

- Alternative 3a is for the phased interconnection of the southern Labrador communities with Phase 1 interconnecting Charlottetown to a regional diesel generating station located in Port Hope Simpson in 2024, Phase 2 interconnecting Mary's Harbour in 2030, and Phase 3 interconnecting St. Lewis in 2045.

- Alternative 3b is for the interconnection of all four southern Labrador communities at the same time with estimated completion in 2024.

Hydro's analysis indicates that Alternative 3a is the least-cost alternative and its benefits are realized at approximately 15 years into the study period – relatively early in the study period when considering the overall study period of 50 years.

[6] Based on Class 5 analysis. For the purposes of comparing alternatives, Hydro completed Class 5 estimates for each of the viable alternatives. Once Alternative 3a was selected as the least-cost alternative, its estimate was further refined to a Class 3 estimate. Hydro did not complete Class 3 estimates for all viable alternatives due to the additional engineering and estimating costs required.

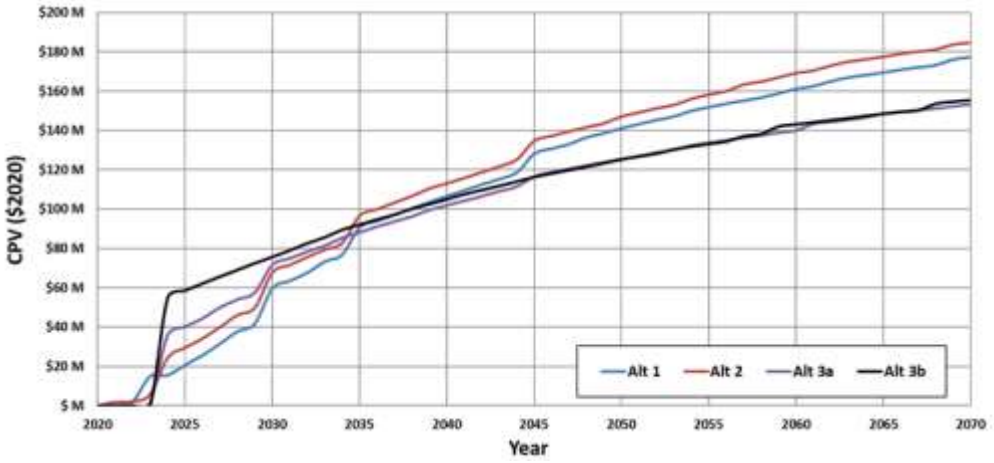

Chart 1: CPV Analysis Including O&M, Fuel and Overhaul Costs

Revenue Requirement and Rate Impacts

Chart 2 highlights the incremental revenue requirement impacts for Alternative 3a compared to that of Alternative 1. Compared to Alternative 1, the interconnection of the southern Labrador communities is expected to generate an incremental revenue requirement increase until 2035 due to higher upfront capital costs. In 2035 and beyond, Hydro forecasts a reduction in net incremental revenue requirement due to the decreased operating, maintenance, fuel and overhaul costs.

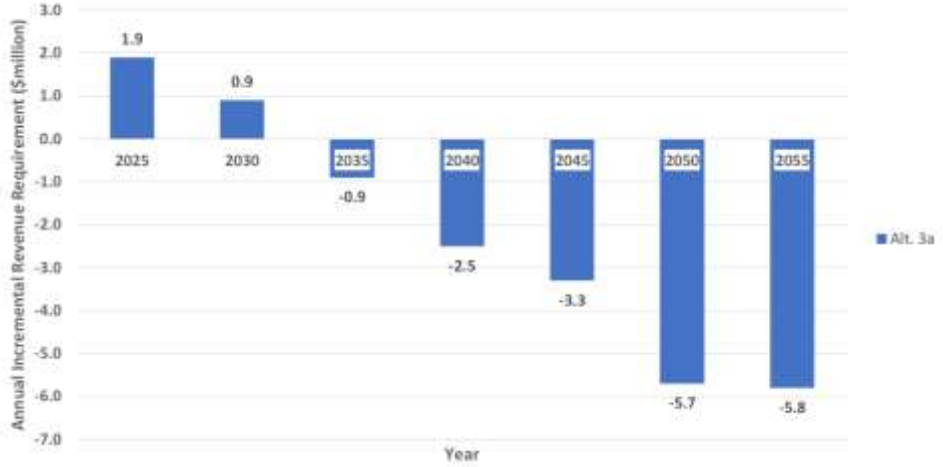

Chart 2: Incremental Revenue Requirements for Interconnection (Alt 3a) vs. Mobile Generation (Alt 1)

Similar to the incremental revenue requirements, forecast rate impacts of phased interconnection are also greater than mobile generation from the first full year in service of Phase 1 (2025) until 2035, after which they are lower. Hydro's response to PUB-NLH-002 provides an annual forecast comparing the revenue requirements and associated rate impacts of phased interconnection (Alternative 3a) and mobile generation (Alternative 1) through to 2070.

While cognizant of the current operating environment and associated rate pressures, Hydro's view to revenue requirement and rate impacts of the proposed solution is long-term. As the rate pressures resulting from the integration of the Muskrat Falls Project assets are also long-term in nature, it is appropriate and prudent that Hydro consider what is in the best interest of customers on a long-term basis.

Sensitivity Analysis

Hydro has completed analysis which determined that material changes in the cost and timing of diesel generating station replacements do not result in continued operation of individual community-based isolated diesel systems being the preferred option. For example, it would require an 80% reduction in diesel generating station replacement costs or a greater than 20-year deferral of planned diesel generating station replacements for the continued operation of individual community-based isolated diesel systems in these communities to be the preferred alternative.

Through its analysis, Hydro determined that even with material changes to the forecast benefits associated with interconnection (i.e., reduced operating and maintenance costs, avoided future capital investment, and reduced fuel costs), the continued operation of individual community-based isolated diesel systems does not become the preferred option. If Hydro were to achieve only 35% of the expected benefits associated with interconnection, the regional interconnection would still be the least-cost approach, with the time frame occurring instead at around the time of the planned replacement of the St. Lewis diesel generating station in 2045 (i.e., approximately halfway through the study period).

Impact of Deferring Interconnection

Due to the requirement for immediate capital investment to provide safe and reliable service to customers in Charlottetown, even planned short-term deferral is akin to choosing Alternative 1, which is not the least-cost alternative to provide reliable service. As previously noted, deferral is therefore counter to Hydro's legislative obligation to operate in a manner that will result in the lowest possible cost consistent with reliable service.

Flexibility to Adapt to Potential Future Changes

The nature of long-term analysis is such that variables which are unknown at the time of the analysis will inevitably materialize with time. As such, Hydro's proposed approach is designed to afford flexibility to adapt to potential future requirements such as variances from the current forecast load and integration of renewables.

Changes to Load Forecast

Over the past 20 years, load in each of the four southern Labrador Systems has either grown or remained stable. Hydro's long-term forecast indicates that the same is expected to be true through to 2070.

Substantial decreases to Hydro's load forecast are unlikely. The communities in southern Labrador are long-established communities which are connected by road, have numerous fish processing plants contributing to the local economy, and have access to many public services which Hydro has no reason to expect will diminish.

Although substantial load growth is also not expected, Hydro has historically received requests to connect relatively large customers, such as fish plants, and has been required to rely on mobile diesel generation to accommodate these new loads. The design of the regional southern Labrador interconnected system has the ability to accommodate more than 5 MW of new load which is not reflected in the current forecast with minimal additional capital investment.

Climate Policies & Technological Advances

Hydro is aware that the long-term objective of the Government of Newfoundland and Labrador is to reduce reliance on fuel consumption and that the Province is working with the federal government on its objective to attain net-zero emissions by 2050.[7] However, based on the technologies which are currently available, Hydro does not foresee a scenario whereby diesel generation equipment will not be required in some form to support firm generation during periods when renewable energy sources (i.e., run-of-river hydro, wind, and solar) are unable to generate. As the development of technologies to firm up renewable energy resources takes time and Hydro would not be able to implement such technologies in its isolated communities until they are proven to be reliable and are the most cost-effective solution for the provision of reliable power, Hydro does not expect a complete transition from diesel generation in its isolated communities in the foreseeable future.

Hydro believes the risk that the industry will transition from diesel generation in isolated communities to firm, renewable generation within the next 15 years is very low. As Hydro's analysis indicates that Alternative 3a is the least-cost alternative and its benefits are realized at approximately 15 years into the study period, it would not be beneficial to rate payers to defer interconnection on the basis that future climate policies, regulations, and/or renewable technologies may materialize as doing so requires Hydro to continue to invest in individual, community-based isolated diesel systems which are not the least-cost alternative and which would still be subject to the same policies, regulations and technological advances.

Making assumptions regarding future technologies would be speculative and not appropriate for a regulated utility. Therefore, Hydro believes the best approach for working towards

[7] Hydro has met with the Department of Crown-Indigenous Relations and Northern Affairs Canada ("CIRNAC") and Natural Resources Canada ("NRCAN") on multiple occasions in 2019 and 2020 to discuss energy priorities and a longer-term vision for the energy future of Labrador, including discussions on the Clean Energy for Rural and Remote Communities funding program and some proposed projects. Hydro has also received funding from CIRNAC through the Northern REACHE program to fund the *Labrador Interconnection Option Study* (provided in Hydro's response to PUB-NLH-015). Finally, Hydro is a participant in an advisory committee for a NRCAN and CIRNAC study that has the objectives to identify, research and analyze the policy, technical, regulatory and financial conditions faced by utilities in regard to clean energy development in remote communities. Work on this committee is currently ongoing and the study is scheduled to be complete by the end of March 2022.

compliance with climate policies and reducing reliance on diesel generation is to prepare for the incorporation of non-firm renewable sources which would reduce diesel fuel consumption.

Integration of Renewables

Hydro's Southern Labrador Renewable Energy Study[8] and Labrador Interconnection Options Study[9] demonstrate that a southern Labrador interconnection would provide greater potential for renewable energy development. The Southern Labrador Renewable Energy study demonstrates that the southern Labrador interconnection can provide up to 11.2 GWh of medium scale[10] renewable energy potential compared to up to 9.7 GWh if the region remains isolated. The Labrador Interconnection Option Study demonstrates that connecting isolated systems in groups allows development of larger scale wind turbines and battery energy storage systems that have a lower levelized cost of energy. These studies show that the single, larger regional diesel generation source supplying the four southern Labrador communities would be a more favorable and cost-effective configuration for maximizing renewable energy potential in the region.

The design of the proposed alternative includes provisions for future integration of renewable sources. For example, it has allocated space for a renewable control panel and an additional switchgear section, a grid operation station, and space in the substation for renewable infrastructure. Additionally, the proposed facility has multiple diesel genset sizes which allows Hydro to operate a lower level of diesel generation to support greater penetration of renewable energy. Hydro notes that the negotiated purchase price of renewable generation has been established at a cost which is lower than the cost of diesel fuel (normally 90% of diesel fuel cost). Under such arrangements, third parties are supported in terms of the integration of renewable facilities, but customers are protected from all risk associated with capital construction costs and operational costs. The outcome is that increased purchases of renewable energy would not only have environmental benefits but would also reduce the rural deficit.

[8] "Long-Term Supply for Southern Labrador – Phase 1," Newfoundland and Labrador Hydro, July 16, 2021, sch. 1, att. 1, app. B.
[9] "Labrador Interconnection Option Study" Hatch, November 10, 2020. Included in Hydro's response to LAB-NLH-015.
[10] Medium scale renewable energy referrers to renewable energy systems that requires some level of diesel generation to be online at all time.

Conclusions in Support of Proposed Alternative

Hydro's analysis demonstrates that material capital investment is required at this time to address the situation in Charlottetown and that interconnection of the southern Labrador communities is a lower-cost alternative than continued reliance on individual community-based isolated diesel systems on a long-term basis due to the decreased operating, maintenance, fuel and overhaul costs associated with maintaining only one, larger diesel generating station instead of four separate diesel generating stations.[11] Further, the proposed regional interconnection will offer benefits which are not reflected in the least-cost analysis. For example, the region will have: (i) improved reliability as a result of the interconnection of the four distribution systems and the larger regional diesel facility (ii) flexibility to meet potential future load growth requirements with minimal additional capital investment; and (iii) increased potential for integration of renewable energy sources.

[11] Interconnection of the distribution system is justified on the basis that it enables the fuel, operating and overhaul cost reductions associated with having one, single regional diesel generating stations instead of four separate diesel generating stations. Interconnecting the distribution systems while continuing to operate separate isolated diesel generating stations in southern Labrador would not be the least-cost option for reliable service.