Q. Paragraph 8 of the revised application states that: "Alternatives involving the interconnection of multiple isolated systems are expected to further facilitate the integration of renewable energy in the future, as such systems are better suited to absorb fluctuations in supply that are commonly experienced from renewable generation, allowing for a greater penetration of renewable energy on the system."

In addition, Hydro's revised application appears to rely on the finding in the Integrated Response Plan provided by Midgard Consulting Inc. (the "Midgard Report") that the fully interconnected system configuration facilitates greater penetration of incremental renewable energy sources sooner (see, for example, pages 5 and 8 of Schedule 2).

a) Please provide the existing renewable energy penetration maximums per each of the eight isolated diesel power plants in NCC territory (in terms of percentage and in units of energy – recent three-year average), and the value of increased renewable energy penetration in the proposed regional diesel plant, displacing the existing four power plants (again in percentage and units of energy – three-year average).

b) Please provide details regarding how the revised application (including the revised project schedule) will affect when renewable energy projects are expected to be researched, developed, and executed in the area.

A. **a)** It is not possible to determine the exact technical or economic renewable energy penetration limits for any isolated diesel powered community without understanding the scale of the project being considered and the amount of federal funding available for the specific project. Independent power producers interested in selling power to Newfoundland and Labrador Hydro ("Hydro") would need to complete their own Hybrid Power Dispatch and Economic Study. This study would investigate a number of different renewable energy generation and energy storage technologies to determine which is the most economic to develop based on technical constraints and the amount of outside funding available for the project.

From a technical perspective, the maximum amount of renewable energy that can be installed in any isolated diesel powered community depends on the scale of the renewable energy generation facility and technology used. From an economic perspective, the amount of energy penetration that can be achieved depends on the technical limits, project costs, diesel fuel costs, and amount of outside funding available.

The technical maximum renewable energy penetration of a small scale renewable energy project with no control system will be limited based on the renewable energy facilities capacity. In turn, the capacity of the facility will be limited based on the difference between the system's minimum load and the minimum generation limit of the smallest diesel genset. The amount of energy generated would be dependent on the renewable energy resource (i.e., sunlight for a solar installation, or wind for a wind turbine installation). For example, in the theoretical system depicted in Figure 1, the maximum capacity for a small scale renewable energy project without a control system would be 47 kW which is the minimum community load (147 kW) minus the minimum diesel unit generation limit (100 kW). The amount of energy that could be generated would equal the area under the solar generation curve.

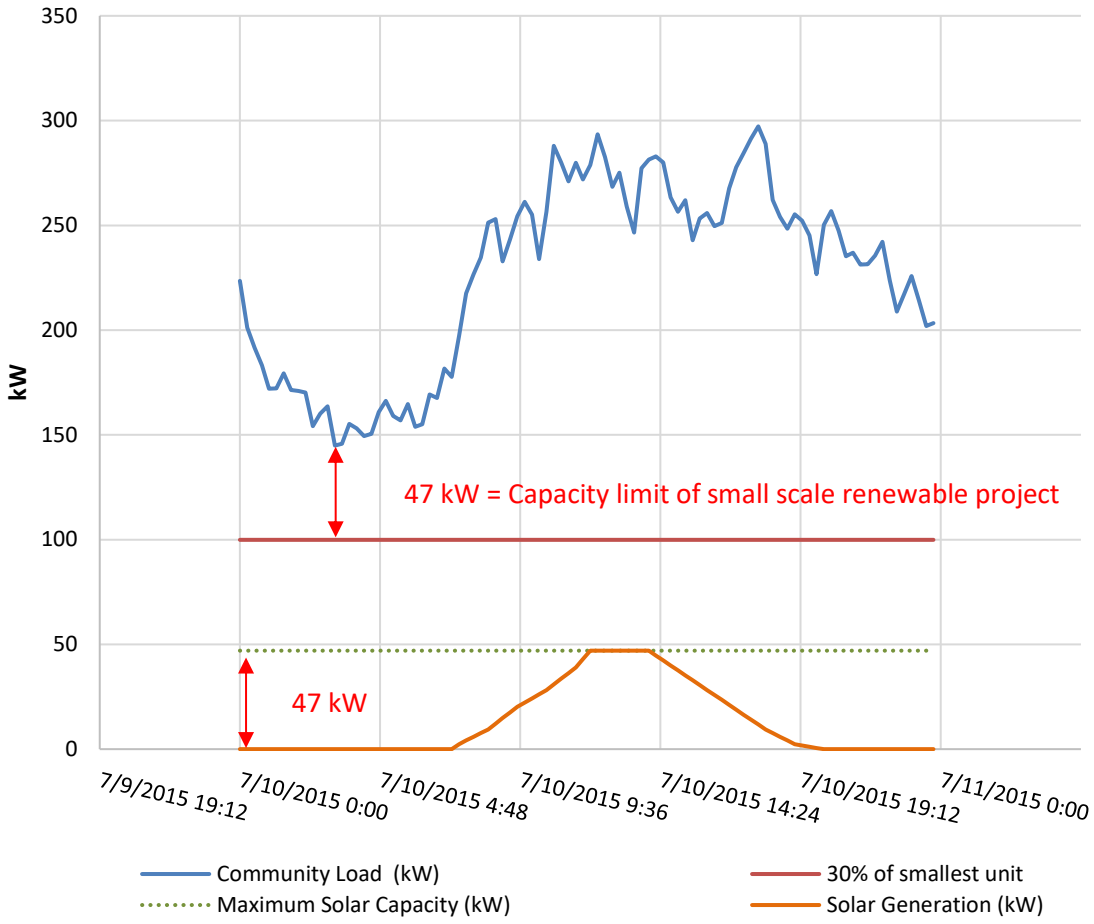

Figure 1: Daily Load Profile

The technical maximum renewable energy penetration of a medium scale renewable energy project that has a battery energy storage system sized to manage fluctuations in renewable generation, and a dedicated communication link to Hydro's diesel plant, would be limited based on the difference between the diesel units minimum load levels and the community load at all points in time, not just the minimum value. The system would not have a capacity limit imposed, and in theory could be designed to provide all the remaining energy beyond the energy provided by Hydro's smallest diesel unit when it is operating at the minimum diesel generation limit.

The maximum renewable energy potential for medium scale renewable energy projects in the isolated system considered as part of the southern Labrador interconnection project is included in Hydro's application.[1]

Considering the theoretical system depicted in Figure 1, the maximum amount of renewable energy penetration would be the area between the community load and minimum diesel generation curve.

The technical maximum renewable energy penetration limit of a large-scale renewable energy project that has a battery energy storage system and control system designed to allow for a diesel-off operation would be the full energy requirements of the system. For example, considering the theoretical system depicted in Figure 1, this would be represented by the area under the community load curve.

b) Renewable energy projects are already being researched, developed, and executed all over the province, including within southern Labrador. Hydro expects these activities to continue with or without the proposed interconnection; however, if the proposed interconnection is constructed, there will be increased potential for renewable energy projects in terms of the number and size of such projects, as well as the area in which they may be feasible. If the interconnection is constructed as per the revised application, this would increase the potential for renewable energy projects even further than the initially proposed phased interconnection. The immediate interconnection of the communities as proposed within Hydro's revised application will allow for greater renewable penetration sooner than Hydro's initial proposal.

Regardless of the alternative, penetration of renewable energy is limited to that which is feasible on each individual system, until such time that the individual systems are interconnected, which Hydro expects to be completed in 2027.

[1] "Long-Term Supply for Southern Labrador – Revision 1," Newfoundland and Labrador Hydro, rev. May 31, 2023 (originally filed July 16, 2021), sch. 1, att. 1, app. B, p. 3, table 1.