

1 Q. **Reference: Application, Schedule 1, Chart 15 and section 6.5; Volume II, Programs and Projects**
2 **Under \$750,000, Additions for Load Growth – Upgrade Fuel Storage (2027) – Cartwright**

3 Hydro classifies \$442,700 for replacement of a 44,000 litre fuel storage tank at Cartwright with a
4 66,000 litre tank as System Growth. Hydro states that the existing tank is *“in violation of its bulk*
5 *fuel storage planning criteria.”* Hydro states that this amount is the System Growth proposed in
6 this Application.

7 a) Please file the bulk fuel storage planning criteria and the load and tank-capacity
8 calculation supporting the 66,000 litre replacement. Please state the resulting days of
9 fuel storage and any change in generating capacity (kW).

10 b) Please list each System Growth project or program for 2027 through 2031 that is not
11 included in this Application, including Jean Lake Terminal Station and Major Projects,
12 with 2027 expenditure and total project cost.

13
14
15 A. a) Newfoundland and Labrador Hydro’s bulk fuel storage planning criteria for its isolated
16 diesel generating stations is included as Attachment 1.

17 Table 1 shows the ten-day fuel requirement in Cartwright based on the 2024 Isolated Load
18 Forecast in comparison to the available and proposed usable fuel storage in both liters and
19 days. There is no change in generating capacity.

Table 1: Fuel Storage Calculations

Winter Peak Season	Forecasted 10-day Fuel Requirement (L)	Available Usable Fuel Storage (L)	Available Usable Fuel Storage (Days)	Proposed Usable Fuel Storage (L) ¹	Proposed Usable Fuel Storage (Days)
2024–2025	42,541	41,888	9.85	N/A	N/A
2025–2026	42,541	41,888	9.85	N/A	N/A
2026–2027	42,541	41,888	9.85	N/A	N/A
2027–2028	42,541	41,888	9.85	60,720	14.27
2028–2029	42,541	41,888	9.85	60,720	14.27
2029–2030	42,541	41,888	9.85	60,720	14.27

- 1 **b)** The projects referenced by the Consumer Advocate are not included in the expenditures
2 for which approval is sought in the 2027 Capital Budget Application and the information
3 requested is not relevant to the determination of the proposed 2027 capital expenditures
4 set out in this Application. Information regarding the scope, classification, costs, and
5 expenditures associated with those projects will be provided in the applications seeking
6 approval of those projects, where applicable.

¹ Usable Storage is assumed to be 92% of total volume. This is based on average usable fuel calculations for similar tanks.

RURAL PLANNING STANDARD

Rural Isolated Systems Generation Planning Criteria

Doc # RP-S-002

Date: 2020/08/21

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1 PURPOSE

The purpose of this document is to present Rural Isolated Generation Planning Criteria to be applied to the Diesel Generation Plants within the Province of Newfoundland and Labrador.

2 TERMS, ABBREVIATIONS, AND ACRONYMS

Firm Capacity means the amount of capacity that can be reasonably guaranteed from a generating unit at a particular instant when required. In the case of capacity planning, it describes the capacity that can be expected from a diesel generating plant during the system peak load.

Standby Power¹: Output available with varying load for the duration of the interruption of the normal source power. Average power output is 70% of the standby power rating. Typical operation is 200 hours per year, with maximum expected usage of 500 hours per year.

Prime Power¹: Output available with varying load for an unlimited time that is typically 90% of Standby Power Rating. Average power output is 70% of the prime power rating. Typical peak demand is 100% of prime rated ekW with 10% overload capability for emergency use for a maximum of 1 hour in 12. Overload operation cannot exceed 25 hours per year.

Continuous Power¹: Output available with non-varying load for an unlimited time that is typically 70% of Standby Power Rating. Average power output is 70-100% of the continuous power rating. Typical peak demand is 100% of continuous rated ekW for 100% of operating hours.

¹ Based on the IOS8528 Standard

3 INTRODUCTION

A Rural Isolated System is an electric power system that is isolated from either the Island or Labrador Grid, and is typically supplied by diesel based generation. Hydro has established criteria related to the appropriate reliability, at the generation level, for the System that sets the timing of generation source additions. These criteria set the minimum level of reserve capacity and energy installed in the System to ensure an adequate supply for firm demand; however, short-term deficiencies can be tolerated if the deficiencies are of minimal incremental risk. As a general rule to guide Hydro's planning activities for Rural Isolated Systems the following have been adopted.

4 RURAL PLANNING CRITERIA

4.1 Capacity

Capacity for Rural Isolated Systems is provided by Diesel Generating Plants which house a number of Diesel Generator Sets (Gensets). The minimum number of units in a diesel plant is three, and typical plant size is from three to four units, although some (typically larger) plants contain more units. The prime power rating of the gensets is used to calculate the firm capacity in the rural isolated diesel plants. Gensets are assumed to be capable of achieving their respective nameplate ratings throughout their lifecycle.

In some cases power is also supplied to the system by alternative energy sources such as wind, solar, and small hydro. To date, wind and solar are considered as non-firm energy sources even when coupled with an energy storage system. That is, the wind and/or solar generation is not considered to provide firm capacity to the system during peak load. This is due to the random nature of the energy supply (wind/solar) which will not necessarily be present when it is needed. In the case of hydro-electric plants, run-of-river plants, are treated the same as wind or solar, and provide no firm capacity to the system during peak load. A hydro-electric plant with a storage reservoir will provide some degree of firm capacity to the system. The amount of capacity is dependant on the particular site and the design of the plant.

Hydro applies firm capacity criteria, which considers all the firm power sources available to the system, when determining the amount of capacity needed to supply the system's peak load according to the five year load forecast. The criterion used to guide Hydro's planning activities in relation to system capacity is described below.

4.1.1 Firm Capacity Planning Criteria

Hydro's generation reliability criterion for the Isolated Rural Systems is stated as follows: Hydro shall maintain firm generation capacity to meet the system peak load. Firm generation capacity is defined as the total installed capacity on the system not including non-firm energy sources as noted above minus the largest single unit. Exemptions or modifications to this criterion may be considered in the following situations:

- For Isolated Rural Systems where there is no road connection or 12-month ferry access, Hydro shall meet the system peak load with 90% of its firm generation capacity.
- Additional generation may be prudent in situations where the introduction of a subtransmission system supplying multiple communities decreases existing system reliability.
- Less generation may be prudent in situations where non-firm generation has a historical record of operating at a low unavailability rate.
- Additional generation may be prudent in situations where major diesel plant modifications, such as the construction of a new diesel plant or major extension, are planned and the cost to add additional generation is of minor incremental cost.

Rationale:

The Firm Capacity Planning Criteria covers a first contingency situation. It is considered to provide a reasonable level of reliability to customers in the Rural Isolated Systems, and gives a good compromise

between cost of service and reliability. Hydro has a long standing practice of using this criterion with good success. A survey conducted by Hydro in 2007 has confirmed that this criterion is similarly practiced in other utilities. This criterion can be reasonably considered to be an industry standard practice.

4.2 Energy

Energy for Rural Isolated Systems is provided from either Type A (Arctic Grade), or Type B Diesel Fuel supplied by a local fuel vendor or stored on site by Hydro. Where cost-effective, Hydro will contract with a local fuel vendor for supply of diesel fuel to the diesel plants. In cases where this arrangement is not feasible, or not possible, Hydro will maintain long-term bulk fuel storage at the site. The amount of fuel to store is planned such that the diesel plant can supply energy requirements of the system over the winter period when fuel deliveries to the site are unavailable.

4.2.1 Vender Delivered Fuel:

In the case where Hydro relies on a contract with a fuel vendor, the following criteria are used to guide Hydro's planning criteria.

- Sufficient fuel shall be stored on site, such that the energy requirements of the system can be met for two weeks at all times of the year.
- The total available fuel storage capacity required on site shall meet the energy requirements of the system for a minimum of three weeks at all times of the year.

Assumptions:

- The local fuel vendor has enough storage to meet Hydro's winter fuel requirements.
- The local fuel vendor is scheduled to fill up Hydro's storage at least once every seven days.
- If more than twenty-one days of storage is available, then deliveries may occur less often.
- If a location has a much higher, or lower risk of delay in fuel storage than then typical, additional, or less fuel storage may be required.

Rationale:

For planning purposes a fuel delivery of once every seven days is assumed because fuel carrying ferries operate on a weekly schedule. The Fuel Storage Planning Criteria covers the contingency situation of a one week delay in fuel delivery. If the vendor fills Hydro's storage every seven days and Hydro's fuel storage is large enough for at least twenty-one days of fuel then there should always be at least two weeks of fuel in storage. If the vendor cannot supply fuel on the seventh day due to an emergency (pipe failure, pump failure, or ferry delay, etc.) there is two weeks fuel available for backup.

Exception:

If the fuel vendor contracted by Hydro resides in the same community as the diesel plant the minimum required fuel storage capacity on site is reduced to reflect the decreased risk in fuel delivery as they are not affected by highway access or ferry schedules.

- Sufficient fuel shall be stored on site, such that the energy requirements of the system can be met for seven days at all times of the year.
- The total available fuel storage capacity required on site shall meet the energy requirements of the system for a minimum of ten days at all times of the year.

4.2.2 Bulk Fuel Storage

In the case where Hydro must maintain long-term bulk fuel storage, the following criteria are used to guide Hydro's planning activities.

- Island Isolated Systems; sufficient fuel shall be stored on site, such that the energy requirements of the system can be met for four consecutive months.
- Labrador Isolated Systems; sufficient fuel shall be stored on site, such that the energy requirements of the system can be met for nine consecutive months.

Assumptions:

- Final Fuel delivery via shuttle tanker is in late November.
- Hydro's fuel requirements are communicated to the vendor in the fall before the final fuel delivery.

Rationale:

The Fuel Storage Planning Criteria covers a first contingency situation. It is considered to provide a reasonable level of reliability to customers in physically isolated communities, and gives a good compromise between cost of service and reliability. Hydro has a long standing practice of using this criterion with good success. A survey conducted by Hydro in 2007 revealed that most other utilities surveyed only maintain short-term fuel storage and rely on deliveries from fuel vendors. Only one utility surveyed maintained long-term bulk fuel storage. It appears that fuel storage practices are region specific and dependant on the local resources available (i.e. road access, local fuel vendor, etc.).

4.3 Diesel Plant Equipment

In addition to generating capacity, and energy, Hydro plans the capacity of the major diesel plant equipment that is responsible for getting the power from the individual diesel units to the power distribution system. The components covered under this criterion are the Main Breaker, Main Bus, and Service Conductors and is defined as follows:

Diesel Plant Equipment Capacity Planning Criteria

No equipment shall be loaded above 100% of its rated capacity at rated ambient temperature.

Assumptions:

- The ratings are continuous ratings.
- Ambient temperature is thirty degrees Celsius.

4.4 Diesel Plant Substations

Capacity planning of diesel plant substations (step-up transformers) is covered under Hydro's Distribution Planning Criteria. The criteria are re-iterated here since the substation forms the critical interface between the diesel plant and the distribution system.

Substation Capacity Planning Criteria

Transformers at Substations shall not be loaded above 110% of the nameplate rating.

In the case of diesel plant substations; a spare shall be retained on site such that in the event of the loss of a single unit; the spare can be installed to restore power within a reasonable time frame. The standard substation is an aerial bank of three single-phase transformers connected in a three-phase bank. The maximum size aerial bank is 1500 kVA (3x500 kVA). This transformer size was selected since it is considered to be the largest size transformer that can be handled without assistance from a bucket truck, or crane.

If transformer capacity exceeding the maximum size aerial bank is required a three-phase padmount transformers may be used. Due to the size of these units and the remote nature of these plants, the equipment and personnel required to replace a three-phase transformer may not be available when needed. To prevent a prolonged system outage, in the event of a three-phase transformer failure, a second padmount transformer may be installed and available as a spare to use when required.

Rural Planning – Standard – Rural Isolated Systems Generation Planning Criteria

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2	Scott Henderson	Accepted Pending Fuel Vender Changes	2024-04-10
3	Scott Henderson	Accepted Pending 90% Capacity Changes	2026-02-16

Document Approvers

Position	Signature	Approval Date
Team lead, Rural Planning	<i>Scott Henderson</i>	2026-02-16

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