

1 Q. Reference: Response to Request for Information LAB-NLH-001, Page 2 of 2, Lines 3 - 5

2 On Page 2 of 2 at Lines 3 - 5, Hydro states: "With the smallest unit sized at 1,000 kW, the
3 minimum diesel generation would be approximately 400 kW, potentially allowing for the
4 remaining load to be served by renewable energy sources."

5 What is the efficiency of a diesel generating unit typically used by Hydro when operating at 40%
6 of its rated capacity? In the response, provide an operating curve showing fuel consumption
7 versus output for the typical diesel generator set.

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10 A. Below is the fuel consumption chart of a genset¹ that was replaced in 2018.² The fuel
11 consumption rates were obtained during the Factory Acceptance Test of the new genset for the
12 Makkovik Generating Station.

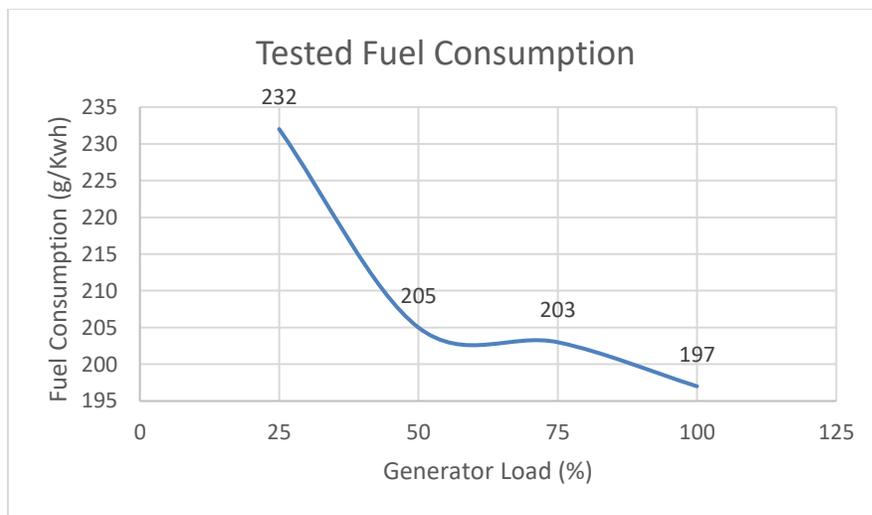


Figure 1: Fuel Consumption Chart of Genset Replaced in 2018

¹ The replaced genset was an MTU unit rated for 945 kW at 1,200 rpm.

² The Diesel Genset Replacement – Makkovik project, proposed within the "2018 Capital Budget Application," Newfoundland and Labrador Hydro, rev. October 3, 2017 (originally filed July 27, 2017), vol. III, tab 15, was approved in *Public Utilities Act*, RSNL 1990, c P-47, Board Order No. P.U. 43(2017), Board of Commissioners of Public Utilities, December 22, 2017.

1 Defining the generator's electrical efficiency as the electrical energy produced, divided by the
2 chemical energy of the fuel used, then the efficiency can be calculated by the following
3 equation:

$$4 \quad \text{Efficiency} = \frac{3.6 \times \text{output (kW)}}{\text{mass flow of the fuel (kg/h)} \times \text{lower heating value (MJ/kg)}}$$

5 The efficiency at the four tested loads are calculated as follows:

- 6 • 25% load efficiency = 37.8%;
- 7 • 50% load efficiency = 41.3%;
- 8 • 75% load efficiency = 42.4%; and
- 9 • 100% load efficiency = 42.9%.

10 Efficiency at 40% is calculated to be approximately 40.4%