

1 Q. **Reference: Request for Information NP-NLH-023.**

2 In its 2021 Capital Budget Application, Additions for Load – Wabush Substation Upgrade, Section
3 4.2 Evaluation of Alternatives, Hydro identified and evaluated a three transformer alternative
4 and a two transformer alternative. Hydro stated for the two transformer alternative that “the
5 estimate for this alternative is approximately \$12.2 million and was rejected as not being the
6 least-cost alternative.” Hydro further stated “Hydro recommends the Wabush Substation
7 Upgrade – Three Transformer Configuration option (Alternative 1). This is the least-cost
8 alternative which addresses transformer capacity concerns and also addresses protection and
9 communication deficiencies within the station.”

10 Please provide the net present value analysis comparing the two transformer and three
11 transformer alternatives that demonstrates that the three transformer alternative was the least-
12 cost alternative.

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15 A. The net present value analysis demonstrating that the three-transformer alternative was the
16 least-cost alternative was performed as part of the “Labrador West 46 kV System Expansion –
17 Wabush Substation Upgrade Alternatives”¹ study. A summary of the analysis is provided herein.

18 The economic analysis involved a comparison of the cumulative present worth (“CPW”) of each
19 option for a study period of 25 years. The discount rate used in the study was 5.9%, which
20 reflected Hydro’s long-term weighted average cost of capital at that time. The economic analysis
21 for this study was based on the Long-Term Load Forecast – Spring 2018.

¹ “Labrador Interconnected System Transmission Expansion Study,” Newfoundland and Labrador Hydro, rev. April 3, 2019 (originally filed October 31, 2018), app C.

1 The CPW analysis for each option was performed using the following information:

- 2 • Estimated capital costs;
- 3 • Estimated operating costs;
- 4 • Forecasted energy costs (\$ per kWh);
- 5 • Operating load forecast (kW);
- 6 • Transformer no-load and load losses (kW);
- 7 • Estimated asset replacement costs and years; and
- 8 • Transformer remaining book values.

9 Capital and operating cost estimates were generated. The total annual costs associated with
10 transformer power losses were calculated using forecasted energy costs (\$ per kWh), no-
11 load/load losses (kW) for each transformer, and the load forecast.

12 The following assumptions and exclusions were applied to the analysis:

- 13 • Costs for supervisory control and data acquisition monitoring upgrades were excluded.
14 It was assumed that these costs would not be materially different for the four
15 alternatives under consideration.
- 16 • It was assumed that construction costs could vary.

17 A breakdown of the high-level (Class 5 for screening purposes) capital cost estimate associated
18 with each station configuration evaluated is provided in Table 1.

Table 1: Projected Budget Estimate (\$Millions)

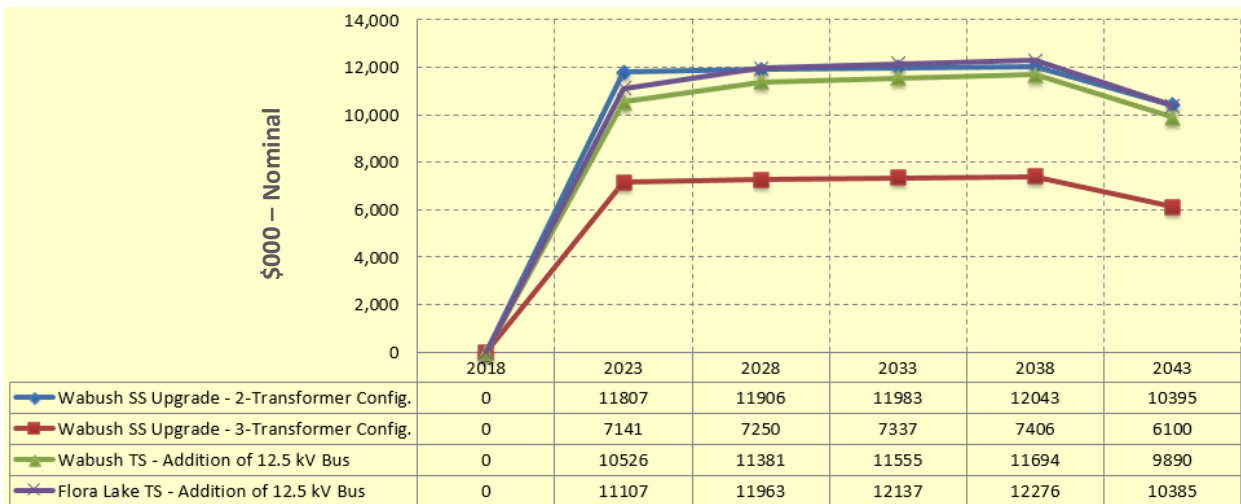
Alternatives	Cost
1 Wabush Substation Upgrade – Two Transformer Configuration	13.4
2 Wabush Substation Upgrade – Three Transformer Configuration	8.4
3 Wabush Terminal Station – Addition of 12.5 kV Bus	12.3
4 Flora Lake Terminal Station – Addition of 12.5 kV Bus	13.0

1 A summary of the results of the economic analysis is provided in Table 2.

**Table 2: Economic Analysis Summary - Alternative Comparison
Cumulative Net Present Value to the Year 2043 (\$Million)**

Alternative	CPW	Difference
2 Wabush Substation Upgrade – Three-Transformer Configuration	6.1	0
3 Wabush Terminal Station – Addition of 12.5 kV Bus	9.9	3.8
4 Flora Lake Terminal Station – Addition of 12.5 kV Bus	10.4	4.3
1 Wabush Substation Upgrade – Two-Transformer Configuration	10.4	4.3

2 A graphical representation of the cumulative net present value of each alternative from the Year
3 2018 to 2043, which demonstrates that the three-transformer alternative was the least-cost
4 alternative is provided in Chart 1.



**Chart 1: Alternative Comparison – Cumulative Net Present Value
Labrador West 46 kW Distribution Expansion – Wabush Substation Upgrades**

5 The budget estimates for the non-selected alternatives² provided in the Additions for Load –
6 Wabush Substation Upgrades project³ should not be considered, as they did not account for
7 additional costs associated with reliability improvement. The complete Class 5 estimates for
8 these three options are provided in Table 1.

² Wabush Substation Upgrade – Two-Transformer Option, Wabush Terminal Station Addition of 12.5 kV Bus, and Flora Lake Terminal Station Addition of 12.5 kV Bus.

³ “2021 Capital Budget Application,” Newfoundland and Labrador Hydro, rev October 30, 2020 (originally filed August 4, 2020), vol. II, Tab 16.

1 Hydro notes that the statement in the “2021 Capital Budget Application” regarding the two-
2 transformer alternative stating, “[T]he estimate for this alternative is approximately \$12.2
3 million . . . ”⁴ is incorrect and should have been written as “The estimate for this alternative is
4 approximately \$13.4 million . . . ”

⁴ “2021 Capital Budget Application,” Newfoundland and Labrador Hydro, rev October 30, 2020 (originally filed August 4, 2020), vol. II, Tab 16, p. 5/7–8.