CENTRE HELIOS

RESEARCH, ANALYSIS AND EXPERTISE IN ENERGY AND CLIMATE CHANGE

May 21, 2014

Ms. Courtney Travis
Panel Co-Manager
CEAA
22nd Floor, 160 Elgin Street
Ottawa, ON K1A 0H3

Mr. Brian Murphy
Panel Co-Manager
BCEAO
4th floor, 836 Yates Street
Victoria, BC V8W 9V1

Dear Ms. Travis and Mr. Murphy,

The Treaty 8 Tribal Association asked me to review the letter from BC Hydro dated May 9, 2014, concerning errors in Tables 16 and 18 of the Panel Report. I concur that the "Net 2" column in Table 16 appears to leave out the values in the "Low LNG" column. My review also revealed two other inconsistencies in these tables.

On page 287, the Panel writes:

> The forecast of net energy yields for the closely similar DSM options 2 and 3, which differ not in content but in expenditure devoted to them, is shown in Table 16 above.

However, while Table 16 includes a column indicating the energy savings from DSM-2, there is no mention of DSM-3.

The Final IRP (CEAR #2101) shows in Fig. 3-1 (page 3-24) that, by 2026, savings under DSM-3 would be approximately 1,100 GWh greater than under DSM-2 — 33% more than the LNG load that was inadvertently omitted from the Net 2 column. Its effect on Table 16 is shown in Table 1, below.

In this table, the first seven columns, up to the column "Net 2 (JRP)", are taken from the Table 16 of the Panel Report. The column "Net 2 (LNG)" is from BC Hydro's errata letter, taking into account the Low LNG loads. The column "DSM 3" shows the annual energy savings under DSM Option 3, derived from Fig. 3-1 in the Final IRP, mentioned above.[1] Finally, the column

[1] For 2026-33, savings were assumed to grow at the same rate as DSM-2 for those years.

326 St-Joseph E., suite 100 | Montreal, Quebec, Canada H2T 1J2 | 514/ 849-7900 206/984-9421 | philip@centrehelios.org
www.helioscentre.org

"Net 3 (LNG, DSM3)" shows the annual energy requirements resulting from considering both the Low LNG demand and energy savings flowing from DSM Option 3.

For the year 2033, the BC Hydro correction results in increasing requirements from 68.4 TWh (in the Panel's Table 16) to 69.2 TWh (the yellow cells in my Table 1). However, taking into account the energy savings from DSM Option 3, which the Panel neglected to include in its Table 16, results in decreasing the requirements to **67.9 TWh**.

Table 1. The Panel's Table 16 modified to include LNG demand and DSM-3 energy savings

| Year | Gross | Low LNG | -ΔTheft | $Opt_{zn}$ | DSM 2 | Net 2 (JRP) | Net 2 (LNG) | DSM 3 | Net 3 (LNG, DSM3) |
|---|---|---|---|---|---|---|---|---|---|
| **2012** | 56.8 | 0 | 0 | 0 | 0 | 56.8 | 56.8 | 0.0 | 56.8 |
| **2013** | 57.1 | 0 | 0 | 0 | 0 | 57.1 | 57.1 | 0.0 | 57.1 |
| **2014** | 58.7 | 0 | 0 | 0 | 1.9 | 56.8 | 56.8 | 1.9 | 56.8 |
| **2015** | 60.4 | 0 | 0 | 0.2 | 2.7 | 57.5 | 57.5 | 2.7 | 57.5 |
| **2016** | 61.9 | 0 | 0 | 0.2 | 3.6 | 58.1 | 58.1 | 3.6 | 58.1 |
| **2017** | 63.2 | 0 | 0.1 | 0.3 | 4.4 | 58.4 | 58.4 | 4.9 | 57.9 |
| **2018** | 65.8 | 0 | 0.1 | 0.3 | 4.9 | 60.5 | 60.5 | 5.7 | 59.7 |
| **2019** | 67.6 | 0 | 0.2 | 0.3 | 5.9 | 61.2 | 61.2 | 6.5 | 60.6 |
| **2020** | 69.1 | 0.8 | 0.3 | 0.3 | 6.8 | 61.7 | 62.5 | 7.5 | 61.8 |
| **2021** | 70.2 | 0.8 | 0.3 | 0.3 | 7.8 | 61.8 | 62.6 | 8.3 | 62.1 |
| **2022** | 70.8 | 0.8 | 0.4 | 0.3 | 8.2 | 61.9 | 62.7 | 9.0 | 61.9 |
| **2023** | 71.7 | 0.8 | 0.4 | 0.3 | 8.4 | 62.6 | 63.4 | 9.6 | 62.2 |
| **2024** | 72.7 | 0.8 | 0.5 | 0.3 | 8.9 | 63 | 63.8 | 10.1 | 62.6 |
| **2025** | 73.4 | 0.8 | 0.6 | 0.3 | 9.2 | 63.3 | 64.1 | 10.5 | 62.8 |
| **2026** | 73.8 | 0.8 | 0.6 | 0.3 | 9.6 | 63.3 | 64.1 | 10.7 | 63.0 |
| **2027** | 74.5 | 0.8 | 0.6 | 0.3 | 9.9 | 63.7 | 64.5 | 11.1 | 63.3 |
| **2028** | 75.5 | 0.8 | 0.6 | 0.3 | 10.2 | 64.4 | 65.2 | 11.4 | 64.0 |
| **2029** | 76.4 | 0.8 | 0.6 | 0.3 | 10.3 | 65.2 | 66 | 11.5 | 64.8 |
| **2030** | 77.4 | 0.8 | 0.6 | 0.3 | 10.5 | 66 | 66.8 | 11.8 | 65.5 |
| **2031** | 78.4 | 0.8 | 0.6 | 0.3 | 10.7 | 66.8 | 67.6 | 12.0 | 66.3 |
| **2032** | 79.5 | 0.8 | 0.6 | 0.3 | 10.9 | 67.7 | 68.5 | 12.2 | 67.2 |
| **2033** | 80.3 | 0.8 | 0.6 | 0.3 | 11 | 68.4 | 69.2 | 12.3 | 67.9 |

Thus, the increased savings from DSM Option 3, which the Panel neglected to take into account in Table 16, in fact outweigh the Low LNG energy requirements, which it had also neglected to include. The net energy demand in 2033, taking both of these factors into consideration, is lower (by 0.5 TWh) than the value of 68.4 TWh shown in the Panel's Table 16.

Furthermore, Table 16 also displays a more important error, in that it fails to take into account the Panel's own determination of future energy requirements, expressed in the finding on page 291:

**… the Panel concludes that net demand in 2033 is likely to be about 65 terawatt hours.**

This value, which presumably includes both DSM savings and the Panel's expected value of 823 GWh of LNG demand, is substantially lower than the net energy demand of 68.4 TWh shown in Tables 16 and 18.

Table 2, below, reproduces the first four columns of Table 18 of the Report. In the last two columns, it shows the Energy LRB based on the Panel's finding that net demand in 2033 is likely to be about 65 TWh. It demonstrates that, under these conditions, the LRB only turns negative in 2030, and the shortfall in 2033 is only 1.5 TWh, less than a third of the shortfall shown in the Panel Report, and less than 30% of the annual energy production from Site C.[2]

Table 2. The Panel's Table 18 modified to reflect Panel finding of 65 TWh net demand in 2033

| Year | Energy Supply | Net 2 | Energy LRB | Net (65 TWh) | Energy LRB (65 TWh) |
|---|---|---|---|---|---|
| 2012 | 60.5 | 56.8 | 3.7 | 56.8 | 3.7 |
| 2013 | 63 | 56.3 | 6.7 | 56.3 | 6.7 |
| 2014 | 57.9 | 56.9 | 1 | 56.9 | 1.0 |
| 2015 | 60 | 57.5 | 2.5 | 57.5 | 2.5 |
| 2016 | 60.5 | 58.1 | 2.4 | 58.1 | 2.4 |
| 2017 | 63.6 | 58.4 | 5.2 | 58.5 | 5.1 |
| 2018 | 64.1 | 60.6 | 3.5 | 58.9 | 5.2 |
| 2019 | 64 | 61.5 | 2.5 | 59.3 | 4.7 |
| 2020 | 64.1 | 61.7 | 2.4 | 59.7 | 4.4 |
| 2021 | 64 | 61.8 | 2.2 | 60.1 | 3.9 |
| 2022 | 63.7 | 61.9 | 1.8 | 60.5 | 3.2 |
| 2023 | 63.6 | 62.6 | 1 | 60.9 | 2.7 |
| 2024 | 63.6 | 63 | 0.7 | 61.3 | 2.3 |
| 2025 | 63.6 | 63.3 | 0.3 | 61.8 | 1.8 |
| 2026 | 63.6 | 63.3 | 0.3 | 62.2 | 1.4 |
| 2027 | 63.6 | 63.7 | -0.1 | 62.6 | 1.0 |
| 2028 | 63.5 | 64.4 | -0.9 | 63.0 | 0.5 |
| 2029 | 63.4 | 65.2 | -1.8 | 63.4 | 0.0 |
| 2030 | 63.4 | 66 | -2.6 | 63.8 | -0.4 |
| 2031 | 63.5 | 66.8 | -3.3 | 64.2 | -0.7 |
| 2032 | 63.5 | 67.7 | -4.2 | 64.6 | -1.1 |
| 2033 | 63.5 | 68.4 | -4.9 | 65.0 | -1.5 |

[2] Net demand between 2017 and 2033 has been estimated to grow linearly to reach 65 TWh in 2033.

Finally, there is some ambiguity in the Report as to whether or not the Panel's forecast net demand of 65 TWh 2033 includes LNG demand, or not. Table 3, below, adds two additional columns to the previous table, to indicate the LRB in the event that LNG load is additional to the 65 TWh mentioned above.

Table 3. The Panel's Table 18 modified to reflect Panel finding of 65 TWh net demand in 2033, plus Low LNG demand

| Year | Energy Supply | Net 2 | Energy LRB | Net (65 TWh) | Energy LRB (65 TWh) | LNG | Energy LRB (65 TWh + LNG) |
|---|---|---|---|---|---|---|---|
| 2012 | 60.5 | 56.8 | 3.7 | 56.8 | 3.7 | 0 | 3.7 |
| 2013 | 63 | 56.3 | 6.7 | 56.3 | 6.7 | 0 | 6.7 |
| 2014 | 57.9 | 56.9 | 1 | 56.9 | 1.0 | 0 | 1.0 |
| 2015 | 60 | 57.5 | 2.5 | 57.5 | 2.5 | 0 | 2.5 |
| 2016 | 60.5 | 58.1 | 2.4 | 58.1 | 2.4 | 0 | 2.4 |
| 2017 | 63.6 | 58.4 | 5.2 | 58.5 | 5.1 | 0 | 5.1 |
| 2018 | 64.1 | 60.6 | 3.5 | 58.9 | 5.2 | 0 | 5.2 |
| 2019 | 64 | 61.5 | 2.5 | 59.3 | 4.7 | 0 | 4.7 |
| 2020 | 64.1 | 61.7 | 2.4 | 59.7 | 4.4 | 0.8 | 3.6 |
| 2021 | 64 | 61.8 | 2.2 | 60.1 | 3.9 | 0.8 | 3.1 |
| 2022 | 63.7 | 61.9 | 1.8 | 60.5 | 3.2 | 0.8 | 2.4 |
| 2023 | 63.6 | 62.6 | 1 | 60.9 | 2.7 | 0.8 | 1.9 |
| 2024 | 63.6 | 63 | 0.7 | 61.3 | 2.3 | 0.8 | 1.5 |
| 2025 | 63.6 | 63.3 | 0.3 | 61.8 | 1.8 | 0.8 | 1.0 |
| 2026 | 63.6 | 63.3 | 0.3 | 62.2 | 1.4 | 0.8 | 0.6 |
| 2027 | 63.6 | 63.7 | -0.1 | 62.6 | 1.0 | 0.8 | 0.2 |
| 2028 | 63.5 | 64.4 | -0.9 | 63.0 | 0.5 | 0.8 | -0.3 |
| 2029 | 63.4 | 65.2 | -1.8 | 63.4 | 0.0 | 0.8 | -0.8 |
| 2030 | 63.4 | 66 | -2.6 | 63.8 | -0.4 | 0.8 | -1.2 |
| 2031 | 63.5 | 66.8 | -3.3 | 64.2 | -0.7 | 0.8 | -1.5 |
| 2032 | 63.5 | 67.7 | -4.2 | 64.6 | -1.1 | 0.8 | -1.9 |
| 2033 | 63.5 | 68.4 | -4.9 | 65.0 | -1.5 | 0.8 | -2.3 |

Thus, even if the Panel in fact meant that LNG demand is additional to the 65 TWh it forecast for 2033, additional energy needs would only be felt two years earlier, starting in 2028 (compared to 2027 in the Panel's Table 18, and 2024 in BC Hydro's proposed correction). The total energy shortfall in 2033 would be just 2.3 TWh, just 40% of the 5.7 TWh indicated in BC Hydro's proposed correction of Table 18.

In its letter of May 9, BC Hydro concluded that:

> When the low-LNG load scenario is included in the calculation, Table 18 would show that the need for new energy resources is in 2024, which is consistent with BC Hydro's projection as provided in Table 9 of BC Hydro's Evidentiary Update (filed September 2013).

In fact, given the Panel's finding that net demand in 2033 is likely to be only 65 terawatt hours, the Panel's conclusion (on p. 304) that "available resources could provide adequate energy and capacity until at least 2028" is in fact correct.

Please feel free to contact me should you need any additional information.

Sincerely,

<original signed by>

Philip Raphals
Executive Director
Helios Centre