McCullough Research

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To: McCullough Research Clients

From: Robert McCullough

Subject: Prepared Comments at the BCUC September 23, 2017 Public Session

I was the third presenter today following Vernon Ruskin and Rob Botterell to summarize our responses to three of the seventy-three questions posed by the BCUC to British Columbia Hydro. We plan to submit three expert reports to the BCUC this week.

Question 16: With regard to BC Hydro's forecast for LNG load, please provide a more detailed justification for why it considers it appropriate to continue to include each of the three LNG projects (i.e. FortisBC Tilbury LNG Phase 2, Woodfibre LNG and LNG Canada) in its load forecast.

Answer: Extensive evidence exists that British Columbia and Oregon will continue to fall behind Cheniere in the race for firm contracts. Cheniere has the largest base of existing export contracts to Asia. Their lead is expanding due to several strategic factors:

1. They are very close to the natural gas sources in Texas and Louisiana;
2. They can rely on existing infrastructure in terms of pipelines and access to the electric grid.
3. They are expanding existing brownfield facilities utilizing nearby skilled labor and engineering support.

Industry press puts the expansion cost per MTPA at between US$500/mtpa and US$600/mtpa.[1,2]

Recent west coast projects have found it difficult to meet this challenge. For example, Jordan Cove's recent FERC filing mentions a cost per mtpa of US$1,282.[3]

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[1] MTPA stands for million tonnes (of LNG) per annum.
[2] CHENIERE ENERGY, INC. BARCLAYS CEO ENERGY-POWER CONFERENCE, September 2017, page 11.
[3] Veresen submits new application for Oregon LNG terminal, BNN, September 22, 2017.

Question 22: BCUC asked a full page of questions on U.S. markets starting with "BC Hydro is requested to update this information and provide an explanation as to the impact these issues could have on export sales. This issue has been included in the questions that follow."

Answer: British Columbia Hydro has estimated that the Mid-Columbia market will cost US$35/MWh in FY2025. There is no reason to forecast prices in 2025, since the Mid-Columbia market, the largest in the world, has forward markets in both the Intercontinental Exchange and the CME. It is easy to look up the bid/ask prices for 2025 on their web sites. For example, the price for power delivered in 2025 is US$30.51.[4]

This is roughly one third the price of Site C.

Question 46: The BCUC has asked about future reductions in the price of wind projects.

Answer: The reality is today vastly different than the British Columbia Hydro estimates. British Columbia Hydro relies on a Hatch study that is several years out of date.[5] More recent data gives very different answers.

For example, I commented on the Burlington Northern freight carrying components of a new wind farm that I passed on I-5 recently. The components appear to have been destined for the new Skookumchuck Wind Energy project southeast of Olympia, Washington. Press coverage indicates that the price for the power from this project is US$51/MWh.[6] This compares rather favorably with the vintage estimates by British Columbia Hydro which range from C$101 to C$305/MWh.[7]

We would expect future wind farm prices to fall even further.

[4] September 22, 2017 ICE MDC and OMB forward market reports.
[5] Project Cost Review Final Report, Hatch, Sura L.Murphy, May 19, 2015.
[6] Wind power will fuel light-rail trains, Seattle Times, Mike Lindblom, April 19, 2017.
[7] British Columbia Hydro and Power Authority – British Columbia Utilities Commission Inquiry Respecting Site C – Project No. 1598922 – Preliminary Report, Figure 15, page 12, Appendix A.