Guy Van Uytven, [redacted]

[redacted]

14 August 2017

Mr. Patrick Wruck
Commission Secretary and Manager, Regulatory Services
British Columbia Utilities Commission
Vancouver, BC

RE: Site C Evaluation

Dear Mr. Wruck,

Thank you for allowing me to express my views on the Site C evaluation. I am a power systems engineer, semi-retired, with 50 years of Canadian and international experience. As noted by you, in your August 11th e-mail, comments are invited on the following questions to be treated by BCUC:

a. whether the project is on time and within budget;
b. the cost to ratepayers of suspending the project;
c. the cost to ratepayers of terminating the project;
d. what portfolio of generating projects and demand-side management initiatives could provide similar benefits; and
e. what are expected peak capacity demand and energy demand.

The main issue with Site C is that, at completion, forecasted demand would be insufficient to take full advantage of the hydro energy generated. This is not an unusual problem when one adds a large generating asset (1100 MW) to a relatively small demand system (2015 integrated system peak demand was 9,441 MW). Certainly, the other two hydro generating stations on the Peace river had to deal with the same problem, and they are the reason why BC Hydro rates are amongst the lowest in North America. A similar problem on the Columbia river was treated judiciously by the Columbia River treaty by exporting excess power to the US.

Since the BC Government in its Terms of Reference precluded an increase of greenhouse gases, thermal natural gas generating plants are to be excluded as a generating option. Therefore, the only commercially feasible alternatives to Site C would be wind or small hydro.

If demand is there to generate the energy, Site C hydro will be less expensive from a Life Cycle Cost of Electricity (LCOE) than wind or small hydro. We only have to refer to the following table from the US Information Administration (USIA):

U.S. Average LCOE (2016 $/MWh) for Plants Entering Service in 2022

Plant Type	Capacity Factor (%)	Levelized Capital Cost	Fixed O&M	Variable O&M (including fuel)	Transmission Investment	Total System LCOE
Dispatchable Technologies						
Coal 30% with carbon sequestration[2]	85	94.9	9.3	34.6	1.2	140.0
Coal 90% with carbon sequestration[2]	85	78.0	10.8	33.1	1.2	123.2
Natural Gas-fired						
Conventional Combined Cycle	87	13.9	1.4	40.8	1.2	57.3
Advanced Combined Cycle	87	15.8	1.3	38.1	1.2	56.5
Advanced CC with CCS	87	29.5	4.4	47.4	1.2	82.4
Conventional Combustion Turbine	30	40.7	6.6	58.6	3.5	109.4
Advanced Combustion Turbine	30	25.9	2.6	62.7	3.5	94.7
Advanced Nuclear	90	73.6	12.6	11.7	1.1	99.1
Geothermal	91	32.2	12.8	0.0	1.5	46.5
Biomass	83	44.7	15.2	41.2	1.3	102.4
Non-Dispatchable Technologies						
Wind – Onshore	39	47.2	13.7	0.0	2.8	63.7
Wind – Offshore	45	133.0	19.6	0.0	4.8	157.4
Solar PV[3]	24	70.2	10.5	0.0	4.4	85.0
Solar Thermal	20	191.9	44.0	0.0	6.1	242.0
Hydroelectric[4]	59	56.2	3.4	4.8	1.8	66.2

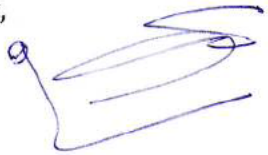
Hydroelectric life cycle cost is shown here as 66.2 US$/MWh which is about C$84/MWh. The cost for the Onshore wind is 63.7 US$/MWh. However, these costs are established based on the asset's economic life which is at most 25 years for wind and at least 100 years for hydro. Taking into account a 100-year target horizon (rebuilding wind farms after 25, 50 and 75 years) would increase the wind LCOE by about 20%, that is to 76.4 US$/MWh or 96.7 C$/MWh.

The cost advantage for hydro is thus clear. That is why Quebec has plans to add additional capacity in the coming years and is aggressively looking for markets to sell its surplus energy, including Ontario. Other added advantages for hydro are its storage capability which allows for a larger utilization factor, the possibility to provide peak demand, and to make larger integration of interruptible energy sources possible.

Then the main key question is what will demand be upon completion of Site C? If demand is there the whole exercise of Site C evaluation becomes futile. We have boxed ourselves into a corner by stating (Terms of Reference, 3c) that "the Commission should use the forecast of peak capacity demand and energy demand submitted in July 2016 as part of the Authority's Revenue Requirements Application". Looking to establish demand only in BC (the silo approach) instead of looking at a more global/regional picture (the integrated systems approach) may lead us to erroneous solutions.

Alberta has about 5,000 MW of coal-fired generation. The Alberta Government has expressed its desire to reduce GHG emissions. An HVDC transmission line between Site C and Edmonton would allow Site C's surplus baseload energy to be sent to accomplish this goal, which is also Canada's stated goal. An added advantage of this Northern link would be to increase both Alberta and BC's grid reliability by providing an alternate path for BC's Peace River energy to the existing constrained route (three 500 kV lines in a 180 m wide right-of-way, susceptible to outages from forest fires). With NDP governments in both BC and Alberta one would think that such a win-win solution would be very attractive.

Sincerely,



Guy Van Uytven, [redacted]

Second Richard Marceau Energy Symposium
October 11 & 12, 2017
Nation-Building Sustainable Energy Projects

On behalf of The Bowman Centre for Sustainable Energy, and PTAC Petroleum Technology Alliance Canada, you are invited to participate in the Second Richard Marceau Energy Symposium to move forward on nation-building sustainable energy projects.

This year's Symposium will consist of a series of presentations and workshops focused on three energy chains:
1) Putting Oil Sands Resources on a New Value-Added Trajectory
2) New Hydropower and a National Grid
3) Energy for Future Transportation

Join us October 11 & 12 to learn about the progress and accomplishments made through these national energy projects, as well as the future opportunities that exist within the Canadian energy landscape.

Confirmed Speakers Include:

- Gary Locke - Bowman Centre for Sustainable Energy
- Daniel Hoornweg - Richard Marceau Chair in Energy and Research, UOIT
- Soheil Asgarpour - Petroleum Technology Alliance Canada
- Dean Jacobs - Walpole Island First Nation
- Stephen Buffalo - Indian Resource Council
- Stewart Fast - Positive Energy Institute, University of Ottawa
- Associates of the Bowman Centre for Sustainable Energy: John Zhou, Don Wood, Ed Brost, Guy van Uytven, David Scott, Pierre Gingras, Marshall Kern

Venue: University of Calgary Downtown Campus - 906 8 Ave SW, Calgary, AB T2P 1H9

Registration: $500.00 + GST

Accommodations: Preferred rates available until September 27, 2017.
Sandman Hotel Calgary City Centre
888 7 Ave SW, Calgary, AB T2P 3J3
To reserve, please call 1-800-SANDMAN and quote group confirmation #841752.

To Register for this event, please CLICK HERE.

For more information, please contact:
Katie Cheyne, PTAC, kcheyne@ptac.org
Marshall Kern, Bowman Centre for Sustainable Energy, mkern@bowmancentre.ca