SITE C DAM COMMENT TO BCUC

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Summary

In recent years it has become clear that the challenge facing BC's electricity market is the availability of clean capacity, not clean energy. Moreover, in recent months it has become clearer that this new capacity will be needed to address increasingly 'peaky' residential and commercial load in the Lower Mainland, not industrial load in the north.

Clean Balance Power believes that pumped hydro capacity located in the Lower Mainland would significantly reduce cost and risk to BC Hydro ratepayers relative to Site C:

- Provide clean energy peaking capacity
- Provide grid stability services similar those offered by the idled Burrard Thermal Generating Plant (spinning reserve, voltage and frequency regulation)
- Facilitate the aggregation and firming of intermittent energy resources into a new source of dispatchable energy resources, those new resources having lower levelized energy costs than those of Site C. The impact is a portfolio with significantly lower Levelized Unit Cost of Energy and Capacity than Site C
- Provide dispatchable capacity at a fraction of the environmental footprint of Site C
- Relieve congestion and defer future investment in BC Hydro's transmission grid that would most certainly be required to move energy from Site C's location in the Northeast to the Lower Mainland where it is needed
- Add capacity in smaller incremental blocks over time, more in step with annual changes in regional and provincial load profiles, thereby reducing capital cost risk to ratepayers relative to the "all the eggs in one basket" approach that Site C currently represents
- Preserve the opportunity for ratepayers to participate in ongoing and significant cost reductions attributable to technological innovation in renewable energy and battery storage
- Provide increased trading opportunities for Powerex
- Provide opportunity for First Nations partnerships and regional districts in all areas of the Province including those with limited or declining economic opportunities

For roughly ten years Clean Balance Power has been assessing the potential for low-impact pumped hydro storage located in the Lower Mainland. Kwantlen First Nation has worked closely with Clean Balance Power over this period, and has expressed an interest in moving forward with a low-impact pumped hydro project in their traditional territory that would not only respect their cultural and environmental values but also provide long term economic and employment opportunity.

Late in 2016, the company hired Knight Piesold Consultants to undertake cost assessments on a number of potential sites in the Lower Mainland varying in size from 100 MW to 1000 MW. Results of that study showed that the capital cost of a facility with 1000 MW of dependable capacity (available 10 hours per day, 6 days per week) was estimated at $1.06 billion (+/- 40%), including 38% in contingency allowances. Based on an 80 year economic life, and a 5% discount rate, and a 5-year construction period, this results in a Levelized Unit Cost of Capacity of $61 per kw-yr (fixed investment only), significantly less than any of the pumped storage costs reported in the 2013 Resource Options Report. In that report, the lowest cost option was $100/kw-yr (fixed investment only) which was a 500 MW pumped hydro project proposed for the BC Hydro Mica Dam.

The 1000 MW facility assessed in the Knight Piesold report is located just 60 km from downtown Vancouver and only 15 km from two 500 kV transmission lines (5L82 and 5L83).

Moreover, because virtually all of the plant is located in an excavated underground cavern, the environmental footprint of the 1000 MW project would be less than 50 hectares, or roughly 1% of the land area proposed to be flooded by Site C.

Pumped hydro plants need not be 1000 MW to achieve economies of scale. One unique opportunity identified in the Lower Mainland could offer 180 MW of dependable capacity (also 10 hours per day, 6 days per week but only between October and April) with a very low environmental impact resulting in a Levelized Unit Cost of Capacity at roughly $62/kw-yr (fixed investment only), similar to the 1000 MW facility.

Clean Balance Power contends that ratepayers, the environment, BC First Nations and the BC economy would be better served if a 100-500 MW pumped storage facility was located in the Lower Mainland and smaller, more measured, increments of clean energy were accumulated around the province over time, based on more certain short term energy forecasts.

Relative Risk to the Ratepayer

The economic success of any utility depends on it receiving a reasonable rate of return on its regulatory rate base (i.e., its assets). Therefore one of the major goals of any regulator overseeing is to ensure that the quantum of incremental capital investment is minimized. This leads utilities to assess new investment cases using the Levelized Unit Cost approach. This is good utility practice and an ideal method to compare the Net Present Value of the costs of different portfolios with various costs, fuel types, technologies and construction time lines. However, a major shortcoming in this approach is that *risk*s to ratepayers of the different energy portfolios assessed are not explicitly addressed by the utility other than in the choice of discount rate.

Based on public record, BC Hydro used a 5% real discount rate to assess the Site C project, reflecting a reasonable rate of return on equity relative to its peer group, and the expected cost of debt all expressed within the utility's capital structure. This is standard utility practice.

However, just because BC Hydro is a regulated utility does not mean it is immune to large project risk or that that Site C project risk is adequately reflected in the utility's allowed rate of return. Project risk is real and most likely very different than a utility's long term cost of capital. And because this is a large project, in fact the largest public project in BC's history, the risks to ratepayers of "getting it wrong" are substantial.

Capital Cost Risk

Academic and anecdotal evidence suggest that when it comes to large hydro-electric storage projects, original capital costs appear to be significantly understated. There a number of ways to account for this capital cost "over-run" risk such as increasing the discount rate or the capital cost estimate, but it would seem unreasonable not to account for it, or to assume that it has been laid off by careful planning.

Clean Balance Power contends that if Site C were replaced initially with a smaller pumped hydro facility in the Lower Mainland and then followed by annual additions to clean energy around the Province as the need arises, not only would costs to the ratepayer be lower, but portfolio diversification and private market funding would significantly reduce capital cost risk to the ratepayer.

Provincial Interest Rate Risk

There is a risk that a potential collision of unintended events such as further escalation in the capital cost of Site C and anemic GDP growth could conspire to reduce the Province's coveted "Triple-A" debt rating. The risks of this happening are not high, but the cost to the Province of it happening are significant. Smaller projects introduced over time, or undertaken and financed by private markets would serve to ameliorate this risk.

Technological Development Risk

The cost of renewables, primarily wind and solar energy, have been declining exponentially in recent years. The US Department of Energy reports that since 2008, the (unsubsidized) cost of wind installations per MW has declined by 50%, and since 2010 (unsubsidized) solar costs have fallen 60%. In addition, technological improvement has increased capacity utilization from these technologies meaningfully. A study by McKinsey and Company this year reported that lithium ion battery storage costs declined by close to 80% between 2010 and 2016. Batteries are already an economic means of addressing peaking requirements of less than one hour in duration and providing ancillary services to transmission grids. Most importantly, the time period required to permit and build out a battery farm would be in the order of 12 to 18 months, not 10 years.

In contrast, Site C represents a technological "line in the sand" whereby ratepayers would make a significant 100-year bet on a proven but dated technology and forego exploitation of declining costs on new technologies. Clean Balance Power contends that measured increases in capacity

and energy over time would preserve the opportunity for ratepayers to exploit technological innovation. This would ultimately result in lower cost and risk to BC Hydro ratepayers.

Environmental Risk

A representative 200 MW pumped storage plant in the Lower Mainland would occupy less than 1 percent of the land area required by Site C and take no agricultural land out of production. With capacity in place in the Lower Mainland, the environmental impact of smaller clean energy projects around the province could be assessed as needed, each on its own separate merit.

CONCLUSION

Site C offers both energy and capacity to the BC Hydro system, so it follows that any meaningful discussion of replacing Site C needs to consider replacement of the capacity, not just the energy. Clean Balance Power contends that ratepayer cost and ratepayer risk would decline significantly relative to Site C if a (100-500 MW) pumped hydro facility were located in the Lower Mainland, and measured, incremental additions to clean energy were added over time and across the Province.