



October 18, 2017

Mr. Patrick Wruck  
Commission Secretary  
British Columbia Utilities Commission  
Suite 410, 900 Howe Street  
Vancouver, BC  
V6Z 2N3

Re: British Columbia Hydro and Power Authority ("BC Hydro") –  
British Columbia Utilities Commission ("Commission")  
Inquiry Respecting Site C  
Alternative Portfolios Comments of Naikun Wind Energy Ltd. ("Naikun")

Dear Mr. Wruck:

Please accept the attached submission in respect of the Site C Inquiry and, in particular, the Alternative Portfolios (and related assumptions and calculations) set out in Commission Letter No. A-22 and the spreadsheet marked as A-22-1.

Sincerely,

A large, stylized handwritten signature in black ink, which appears to be "Mike O'Connor". The signature is written over the typed name and extends across several lines of the letter.

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**British Columbia Hydro and Power Authority (“BC Hydro”) –  
British Columbia Utilities Commission (“Commission”)  
Inquiry Respecting Site C  
Alternative Portfolios Comments of Naikun Wind Energy Ltd. (“Naikun”)**

**Background**

On August 2, 2017, the Lieutenant Governor of British Columbia issued Order in Council No. 244 (the “OIC”). This OIC asked the British Columbia Utilities Commission (the “Commission”) to inquire into the Site C project (“Site C”) pursuant to Terms of Reference specified in section 3 of the OIC. This request was made under the provisions of section 5(1) of the *Utilities Commission Act* (the “UCA”).

On October 11, 2017, the Commission issued Alternative Portfolios (and related assumptions and calculations), which were prepared by Commission staff and set out in Commission Letter No. A-22 and the spreadsheet marked as A-22-1. The Commission has sought comments on the Alternative Portfolios and, in particular:

1. The assumptions underlying the Alternative Portfolios; and
2. The calculations, inputs, and assumptions used in the Alternative Portfolio Spreadsheet.

Naikun has not had the time, nor does it have the resources, to “proof” the Alternative Portfolio Spreadsheet for this submission. As such, we have confined our comments to the assumptions underlying the Alternative Portfolios as set out in the “Key Assumptions” table in Commission Letter No. A-22.

**Alternative Portfolio Assumptions**

Assumption Number and Description (from Letter No. A-22)	Naikun Comments
1. Discount Rate	<p>BC Hydro has used a weighted average cost of capital methodology (“WACC”) to arrive at the 6 per cent (nominal) discount rate adopted by the Commission.</p> <p>This approach is generally appropriate for <i>private sector</i> firms where capital is unconstrained. Where capital is constrained, or where there is a risk profile to the proposed project that is demonstrably different from the remainder of the firm’s activities, the WACC is not appropriate. The Commission</p>

	<p>properly alludes to (at least the latter of) these concern in its Preliminary Report<sup>1</sup>.</p> <p>However, there is an even more fundamental problem with using the WACC methodology in the public sector and for Crown Corporations. The WACC approach is appropriate in the private sector because the objective is to maximize shareholder wealth – that is why the discount rate for these investments should equal the cost of financing them (again, when capital is unconstrained).</p> <p>It is not possible in this submission to canvass all of the many and complex reasons why this analysis falls short when considering public sector or Crown corporation investments. Doing so would involve reviewing vast literature on the social time-value of money, and even examining the fundamental question of whether discounting multi-generational public assets is correct in principle.</p> <p>What we can say with certainty is that the Crown’s discount rate cannot be directly measured by its cost of borrowing, because this borrowing cost is plainly a function of the implicit taxpayer guarantee that underpins that debt – or put another way, the Crown’s cost of debt does not reflect project risk because the Crown can always tax to repay its obligations.</p> <p>Given the entirety of these concerns, Naikun cautions the Commission to be careful in putting too much weight on the various Alternative Portfolios’ net present value (“NPV”) when considering their relative merits, particularly where the portfolios have vastly different capital spending profiles over time.</p> <p>Specifically, if the Commission finds that discounting <i>is</i> deemed to be a useful analytical tool for a public sector investment, then the correct discount rate for evaluating the projects is almost certainly higher than results from the WACC-based approach favoured by BC Hydro. In that case, portfolios with delayed spending will be shown to be even more beneficial relative to Site C.</p>
<p>2. Financing Costs and Taxes</p>	<p>Concerns with the financing costs assumed by Commission staff follow from the arguments made in respect of the discount rate. The implicit inflation rate contained in BC Hydro’s chosen</p>

<sup>1</sup> Preliminary Report Executive Summary, Page vii of viii

	<p>discount rate is 2.1 per cent. Applying the same inflation rate to a debt rate of 3.43 per cent means that the project is borrowing at a 1.33 per cent real interest rate.</p> <p>This is a historically low number (the average since 2000 is 1.99 per cent, for example), and it seems remarkably optimistic to assume that such low-cost borrowing will be possible over the financing life of these portfolios.</p> <p>Of greater concern is that this rate, as discussed above, takes no account of the debt insurance that taxpayers are providing.</p> <p>At an absolute level, this would tend to quite sharply understate the cost of any project (or portfolio of projects) analyzed using this debt assumption. If the low debt-cost is used only for comparing portfolios, then there is relatively less concern, although it must be remembered that the total cost of any resulting investment will be artificially low, and inclusive of a considerable subsidy from taxpayers to ratepayers.</p>
<p>3. Alternative Portfolio Options</p>	<p>This proceeding has illuminated significant disagreements between Deloitte and BC Hydro concerning load forecasting methodologies. In addition, the evidence in this proceeding has shown a wide disparity between BC Hydro's historical load forecasts and what has ultimately transpired.</p> <p>These two conditions should leave the Commission reluctant to make a long-term and inflexible bet on any particular outcome, including any portfolio that is: (a) rigidly designed around a specific load outcome, and (b) performs inadequately should life unfold differently. Site C is just such an asset.</p> <p>This highlights the importance of flexibility in the chosen portfolio – that is, the ability to scale-up if load is showing signs of being greater than expected, or slowing down if the reverse trend is revealing itself.</p> <p>This flexibility is inherent in the Commission staff's portfolios, and it is profoundly absent with Site C. Unfortunately, by concentrating on NPV as the core comparator between the portfolios and Site C, and among the portfolios, this important consideration can be lost (although the Commission staff appears to try to compensate for this in the way it handles excess energy from its Site C alternatives (see assumption 8)).</p> <p>This argues, ultimately, for a more dynamic analysis of portfolio</p>

	<p>development, based on a more nuanced look at how load might evolve over time. That analysis is necessary to assign a value to having “optionality” over time, which is largely missing in the static analysis.</p>
<p>4. Size of the Alternative Portfolio</p>	<p>As with the load forecast, the approach expressed by this assumption seems overly static and, given the “lumpiness” of new assets, potentially misleading.</p> <p>Naikun does not have the resources, nor has it had the time in this compressed reply period, to evaluate exactly how Commission staff has added new resources in respect of each load forecast.</p> <p>However, in general Naikun cautions the Commission to observe that, as noted above, a key benefit of building a portfolio with multiple generation and demand-side resources is that the portfolio can be flexible and reactive. Comparing three static portfolios against a pre-determined load curve (even with the approach to surplus used by Commission staff) obscures this benefit.</p>
<p>5. Location of Alternative Portfolio</p>	<p>Naikun is not persuaded by the Commission staff’s decision to focus on plant-gate prices and, by extension, to populate its portfolios only with wind assets from the Peace River.</p> <p>Commission staff has explained this choice as being to “minimize the risk of additional network reinforcements relative to Site C”.</p> <p>But with respect, this implies that these reinforcements exist, and would be stranded if Site C were abandoned. It also assumes that, even if the transmission upgrades have already been done, that they should not be treated as sunk, with alternatives evaluated at the margin.</p> <p>It also assumes that BC Hydro has correctly identified where in the province new load will locate, even though that assumption is simply not consistent with the evidence.</p> <p>Finally, it assumes that, even if the load were exactly where BC Hydro is thinking it would be, and even if the existing transmission system were perfectly suited to meeting that load from the Peace, that this transmission cost savings would more than offset the benefits of higher quality off-shore wind.</p> <p>There is simply no evidentiary basis for these assumptions, and</p>

	<p>significant reason to be sceptical about them. LNG load, for example, is largely planned to be on the north coast, should it materialise. BC Hydro’s grid has almost no surplus capacity to transmit energy to meet that load from Prince George to the coast.</p> <p>In addition, Naikun’s wind project, for example, has a capacity factor and winter load profile that is far superior to on-shore projects in the Peace. Naikun believes that this higher quality output more than offsets the incremental transmission costs associated with the project, particularly if (as seems likely) much of the new load is located outside the Lower Mainland.</p>
<p>6. Energy Surplus to BC Hydro Need</p>	<p>This is a critical question, since the by-product of Site C’s “lumpiness” relative to a more flexible portfolio is likely to be surplus energy.</p> <p>However, for such a critical piece of analysis, the Commission staff has chosen a somewhat shaky foundation. In fact, the evidence that Commission staff cite as a starting point for its analysis is simply the prepared text of a commenter at one of the Commission’s public information sessions.</p> <p>Unfortunately, Mr. McCullough is simply not correct in his assertion that Mid-C prices need not be forecast because forward prices can simply be looked up.</p> <p>Depending on the market and the time, forward prices may or may not be a very good predictor of actual prices that will exist at some future point. But what they never are is an assured price at which one can sell in the future, at least without first having purchased and paid for the right to do so.</p> <p>Put another way, today’s forward price is just a collective forecast of future prices, based on the bets that traders are making now. This collective forecast may be good or it may not be. Relying on that price to be determinative of future outcomes is akin to expecting that odds arising from pari-mutuel betting will always pick exactly the horses that will win, place, and show.</p> <p>Forecasting future commodity prices – particularly for non-storable products in markets that are experiencing disruption – is hard, and must be approached with great caution. While the Commission staff’s assumption of \$25 mid-C prices may seem reasonable now, it is simply not reasonable to assume with</p>

	<p>absolute confidence that realising those prices will be possible in 2025, let alone any number of years after that.</p> <p>This uncertainty highlights the enormous value of flexibility, and gives rise to one of the greatest risks of Site C. Assuming away market risks with unfounded price certainty, as proffered by Mr. McCullough (albeit in making the argument against Site C) and adopted by Commission staff is, itself, simply too risky.</p> <p>Planning so as to avoid surplus is a far safer strategy, and certainly far more appropriate for a utility that is relying on taxpayers to provide the buffer that would normally be taken up through having equity within a project's capital structure.</p>
7. Capacity Surplus to BC Hydro Need	Naikun agrees that it is generally sensible to assume that there is no market value to surplus capacity.
8. Energy Exceeding Site C	<p>As noted above, Naikun assumes that the Commission staff's approach to this issue is intended to act as a proxy for investment flexibility.</p> <p>As a proxy, this approach seems reasonable, particularly since wind resources are highly amenable to phasing.</p>
9. Capacity Exceeding Site C	Naikun agrees with this assumption.
10. Energy and Capacity Options	Naikun understands that Commission staff was compromised by the compressed time frame of this proceeding as it sought to construct its illustrative portfolios. As such, Naikun welcomes both the Commission staff's acknowledgement of other possible portfolios, and the Commission's assurance that the portfolios are being used only as a tool to solicit feedback (Naikun further agrees that they are a very useful tool for that purpose).
11. Energy Efficiency DSM	<p>BC Hydro has a record of over-estimating its DSM penetration, and the effectiveness of its DSM investments<sup>2</sup>. As such, Naikun cautions the Commission in relying too heavily on BC Hydro's evidence for both the cost and effectiveness of its DSM programs.</p> <p>It should also be remembered that DSM tends to be a diminishing resource, which becomes exhausted as it penetrates the market. That is, BC Hydro's long history with</p>

<sup>2</sup> See, for example, <https://beta.theglobeandmail.com/news/british-columbia/bc-hydro-wont-meet-energy-conservation-targets/article24094714/?ref=http://www.theglobeandmail.com&>

	<p>DSM means that the easy targets will already have been taken up, and on-going growth in DSM can become much more difficult to achieve.</p> <p>Naikun also notes that Commission staff has assigned an 11 per cent loss factor to wind, and repeats that in its treatment of DSM. This loss factor assumes the Peace River location for wind and a Lower Mainland location for load. As discussed under Assumption 5, it is quite likely that some reasonable portion of future load will be in the north, and so generation located there will not impose these losses on the system. Indeed, it is possible that projects like Naikun, located close to north coast load, could improve system losses relative to Peace wind or Site C.</p>
12. Wind – Project Characteristics	Naikun is not in a position to comment on the performance of wind projects besides its own. Naikun does wish to emphasise, however, that it believes off-shore wind provides generally superior performance to Peace River wind on a cost-adjusted basis, and so the Commission staff’s portfolios tend to understate the extent to which alternatives to Site C can outperform large hydro.
13. Wind – Capital and O&M Cost	See comments on Assumption 12.
14. Wind – Wind Integration	<p>Naikun is pleased to see that the Commission staff is taking account of concerns about BC Hydro’s dated wind-integration study.</p> <p>Naikun cannot know until BC Hydro properly updates its work whether or not the drop from \$5 per MWh to \$2.50 per MWh takes full account of the necessary adjustments, but directionally the change seems appropriate.</p>
15. Capacity DSM	See comments on Assumption 11. However, Naikun recognizes that BC Hydro has not undertaken significant capacity-focused DSM to date, so market saturation concerns applicable to energy DSM likely do not apply to capacity DSM investments.
16. Batteries	Naikun is not qualified to comment on this assumption.
17. Exchange Rate	Naikun believes that the Commission staff has chosen a sensible figure for the purposes here. This forecast is generally consistent with, for example, the Pacific Exchange Rate service as of the date of this submission, and extending out five years <sup>3</sup> .
18. Firming	Naikun agrees with this assumption, with due caution about the known reliability of capacity DSM.

<sup>3</sup> <http://fx.sauder.ubc.ca/CAD/forward.html>

19. Shaping and Storage	Naikun agrees with this assumption.
20. Grid Reliability	Naikun agrees with this assumption, with the observation that there should be no inherent expectation that grid reliability will suffer from wind resources being located on the north coast rather than in the Peace region.
21. Greenhouse Gas Emissions	<p>This assumption seems adequate for the purposes of this analysis, but would warrant further analysis.</p> <p>Recent studies have raised serious questions about the methane production from dams, and about methane's contribution as a greenhouse gas<sup>4</sup>. That is an important concern that highlights a reason to be sceptical about the long-term acceptability of large hydro.</p>

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<sup>4</sup> See for example: <http://www.sciencemag.org/news/2016/09/hundreds-new-dams-could-mean-trouble-our-climate>