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INFORMATION RELEASE – BCUC Receives Comments from BC Hydro on Site C Inquiry Final Report
November 24, 2017

Vancouver – The British Columbia Utilities Commission (BCUC) received the attached letter from British Columbia Hydro and Power Authority (BC Hydro), providing comments on two of the models that the BCUC used to prepare its Site C Inquiry Final Report.

The comments provided by BC Hydro do not constitute a reopening of the Inquiry. The BCUC will provide a written response, which will be made publically available, as soon as possible.

The BCUC's Inquiry into Site C was initiated by Order in Council No. 244 on August 2, 2017 and was completed with the issuance of the Inquiry Panel's Final Report on November 1, 2017. The Final Report, and all information submitted during the course of the Inquiry is publically available at www.sitecinquiry.com.

The BCUC is a regulatory agency responsible for oversight of energy utilities and compulsory auto insurance in the province of British Columbia. It is the BCUC's role to balance the interests of customers with the interests of the businesses we regulate. The BCUC carries out fair and transparent reviews of matters within its jurisdiction and considers public input where public interest is impacted.

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November 16, 2017

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

Dear Mr. Wruck:

RE: Project No. 1598922
British Columbia Utilities Commission (BCUC or Commission)
British Columbia Hydro and Power Authority (BC Hydro)
Site C Inquiry – Comments on Commission Models

BC Hydro would like to recognize the Commission and all participants for their efforts in the Site C Inquiry that concluded on November 1, 2017. We appreciate the difficulty of completing the Final Report, especially given the volume of input from BC Hydro, the public, stakeholders, First Nations and other interested parties regarding the future of the Site C Project.

We write to provide comments on two of the models that the Commission used to prepare its Final Report[1] (the Illustrative Alternative Portfolio Spreadsheet[2] and the Site C UEC Calculator). We provide this information as a follow-up to a meeting with the Commission and at the Commission's request to detail our comments in writing.

BC Hydro performed a preliminary analysis of these two models and has identified what appear to be calculation and input errors. The cumulative effect of these errors is to understate the benefits of completing Site C as compared to the Commission's Illustrative Alternative Portfolio by approximately $800 million. Given the materiality of the issues identified in this letter to the Commission's Final Report, we believe that it is important to bring these issues to the Commission's attention.

We recognize and respect that the Commission has rendered its Final Report. This letter focuses exclusively on what we assess to be input and calculation errors in the modelling. In other words, these are not instances where BC Hydro simply disagrees with the Commission's methodology or input assumptions. We have had subject matter experts within BC Hydro independently confirm our assessment and present value calculations before providing our comments in writing.

1 Exhibit A-24.

2 Exhibit A-24-2-1.

Summary of Issues Identified and Impacts on the Commission's Analysis

The issues and their impact on the Commission's analysis are summarized in the following table. Each of the items is discussed in greater detail in this letter, and is grouped according to calculation methodology and treatment of input data:

	Error	Impact on PV Cost of Termination to "Low LF" Scenario ($ million)
A	Application of incorrect discount rate to Site C surplus (as acknowledged by the Commission in A-25)	+336
B	Inconsistent application of inflation factors and discount rates	-60
C	Inaccurate treatment of sunk costs	+345
D	Double-counting of transmission loss savings on demand-side management	+177
E	Use of real rather than nominal cost of capital for IPP financing	No impact except in sensitivity scenarios
F	Application of inappropriate (flash) technology assumptions to geothermal resources	No impact except in medium and high load scenarios
	Total Impact to PV Costs	**+798**

Calculation Methodology

A. Application of Discount Rate to Site C Surplus

As has been acknowledged and updated in the Commission's letter of November 15, 2017 (A-25), the Commission's model applied a nominal dollar discount rate to a real dollar cashflow in the Site C model for valuing the trade value of surplus. BC Hydro agrees with the Commission's assessment that the impact of this error results in the net cost of Site C being presented as $336 million higher than it should be.

B. Application Of Inflation Factors And Discount Rates

The Commission's model appears to have two mathematical errors due to the inconsistent application of depreciation and interest in the Illustrative Alternative Portfolio Spreadsheet. The present value (**PV**) calculation of the Site C termination cost (for all load forecast scenarios) is inconsistent with PV calculations carried out for similar cost components for other resources, such as the cost of wind projects. In the PV calculation of the Site C termination costs:

- Depreciation: The annual depreciation cost of termination (Low LF – NPV DSM tab, row 296) is calculated using the cost of termination at the end of fiscal 2020 ("end of period value", provided in the Low LF - NPV DSM tab, cell K295) which includes the cost of debt for fiscal 2019 and fiscal 2020. However, the annual depreciation cost for termination should be calculated in a similar manner to the depreciation cost for wind resources (e.g., Low LF - NPV Wind, row 28) thereby reflecting when ratepayers would start to see these costs in rates. As such, the calculation of the cost of termination of Site C should include only one year of debt cost (for fiscal 2019) because ratepayers would likely begin paying the costs of termination of Site C at the beginning of fiscal 2020.
- Interest: The annual interest cost of termination (Low LF – NPV DSM tab, row 297) is calculated using the end of period value in each year. However, the annual interest cost should be calculated in a similar manner as for wind resources (Low LF - NPV Wind tab, row 51) which uses the average of the beginning period value and the end of period value as an approximation for monthly interest costs seen by ratepayers.

In the Commission Scenario for the Low Load Case shown in Table 39 of the Final Report, the net impact of these errors results in the cost of the Illustrative Alternatives being $60 million higher. This error does not apply to the Site C model.

C. Treatment of Sunk Costs

While sunk costs are usually irrelevant for investment analysis, the manner in which sunk costs are recovered is relevant when considering the impact of Site C termination on ratepayers. This is because the manner in which sunk costs are recovered from ratepayers is expected to vary between the scenario where Site C is completed and the scenario where Site C is terminated.

- If Site C is completed, sunk costs would likely be recovered over the depreciation life of the relevant assets, which is approximately 70 years.
- If Site C is terminated, sunk costs would be recovered over a period to be determined, but likely beginning immediately after termination and recovered over substantially fewer than 70 years.

The Commission model has accounted for the recovery of sunk costs in the comparison of Site C to the Illustrative Alternative Portfolio by reducing the costs to complete Site C and not including sunk costs in the Illustrative Alternative Portfolio. This has significant implications for the Commission's calculations, specifically:

- The Commission's approach prevents analysis of absolute impacts to ratepayers, since the costs already spent would form part of the costs recovered from ratepayers should the Project be completed or be terminated. A treatment of sunk costs to allow for calculation of ratepayer impacts would have included sunk costs as part of the ratepayer cost of Site C, and added the recovery of those costs to the Illustrative Alternative Portfolio.

- By eliminating sunk costs from both portfolios, the Commission's approach to sunk costs has implicitly resulted in the sunk costs being amortized over 70 years, even in the case where Site C is terminated. The Final Report does not refer to this implicit 70 year recovery period. Rather, in the Illustrative Alternative Portfolio, the Commission has explicitly assumed that termination costs would be recovered over 30 years. This is inconsistent, since the sunk and termination costs would both be expected to be recovered from ratepayers in the same way in the event of termination.

This assumption was likely inadvertent, as it is inconsistent with the Commission's other stated assumptions regarding recovery of termination costs. The impact of this assumption is to understate the cost of the Illustrative Alternative Portfolio by $345 million as compared to the scenario where sunk costs are recovered over 30 years as the Commission has assumed for termination costs.

Treatment of Input Data

D. Transmission Loss Savings

The Commission's model has double-counted transmission loss savings associated with demand-side management (**DSM**) which has the effect of understating the cost of the Commission's alternative portfolio relative to Site C.

- In its original October 11, 2017 portfolio (Exhibit A-22), the Commission increased the amount of energy provided by demand-side management by approximately 11 per cent to reflect the avoidance of transmission losses.
- In BC Hydro's September 29, 2017 submission (F1-5) we identified DSM energy savings (response to BCUC IR 2.64.0 and attachment), stating "The information presented in Appendix L and Attachment 1 to this response reflects energy savings grossed up to the system level to reflect losses…" In our October 18, 2017 response (Exhibit F1-17), we reiterated that adding a further factor for avoided losses was incorrect as the energy volumes being used were already adjusted to reflect loss avoidance.
- The Commission stated in the Final Report that it continues to believe the adjustment is appropriate because BC Hydro's adjustment was only for distribution losses, and a further adjustment is required for transmission losses.[3]
- This is not the case. The volumes provided by BC Hydro and used by the Commission have already been adjusted to reflect transmission losses as well as distribution losses, and thus the Commission scenario double-counts transmission loss savings.
- BC Hydro's DSM programs are broad in their application and are expected to proportionately impact usage in all periods (i.e., the savings themselves are

[3] Final Report, Appendix A page 39.

believed to have the same shape as the load). As a result, average loss factors from the load forecast should be applied to energy focused DSM savings rather than peak loss factors.

Correction of this issue would advance the need for new energy resources. Assuming that wind energy projects are undertaken to meet this need (as appears to be the marginal resource in the Commission's alternative portfolio) this would increase the cost of the Illustrative Alternative portfolio by approximately $177 million.

E. Cost Of Capital For IPP Financing

The Commission's Illustrative Alternative Portfolio Spreadsheet includes the capability to apply "IPP Financing" to the alternative portfolio as a sensitivity analysis.

- The Commission has used a 6.4 per cent "nominal" cost of capital for IPPs in its sensitivity test (Input and Output sheet, cell E9), which it states is based on BC Hydro's estimate.
- However, BC Hydro's estimate of IPP cost of capital is 6.4 per cent in real terms as opposed to nominal. The nominal cost of capital would be 8.5 per cent.

This impacts only the Commission's sensitivity scenarios, but the effect of using the correct (nominal) value in those scenarios is material.

F. Application of Technology Assumptions to Geothermal Resources

The Commission includes geothermal in the Illustrative Alternative Portfolio Spreadsheet based on what it identifies as representative geothermal projects. In doing so, the Commission has used lower cost assumptions and higher capacity factor assumptions taken from a type of geothermal technology that would not be used by the representative projects. Specifically:

- The Commission utilizes Canoe Reach and Lakelse Lake as representative geothermal projects and utilizes cost and capacity factors that would apply for the use of geothermal flash technology (Sensitivity Data sheet, cells D4 and D5).
- LakeIse Lake does not have a formation temperature high enough to support flash technology. Binary technology is expected to be used[4].
- While previous studies, including BC Hydro's previous Resource Options Report, have indicated that it is possible that flash technology may be possible at Canoe

[4] Refer to GeoscienceBC report: http://www.geosciencebc.com/i/project_data/GBCReport2015-11/GBC2015-11_KWL_Geothermal%20Economics_Project_Report_27Sep16.pdf.

Reach, the current developer has indicated that binary technology is expected to be used.[5]

- Using assumptions consistent with the use of binary technology would result in:
  - Higher costs, since binary technology is more expensive than flash technology; and
  - Lower net capacity factors, since binary technology is expected to achieve an 80 per cent net capacity factor rather than the net 90 per cent of flash technology according to NREL. (We note that the Commission uses a 95 per cent capacity factor: BC Hydro assumes this is based on a CanGEA submission (F66-1) but is unaware of the basis for CanGEA's capacity factor).
- Further, the Commission does not account for reservoir degradation which is expected to result in a decrease in annual generation output by 1 per cent per year over the life of the project. This would make the redevelopment of these sites after 30 years at a 30 per cent cost reduction unlikely.

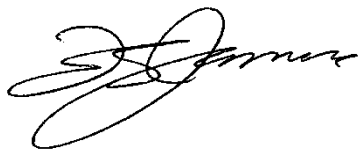
This inappropriate technology assumption does not impact the Commission's base (Low LF) scenario. However, in the higher load forecast scenarios the impact is expected to be material.

BC Hydro will continue to review the models and will bring any further material issues to the Commission's attention.

We are also currently updating our portfolio modeling to utilize the assumptions made by the Commission in its Illustrative Alternative Portfolio. We will make these results available to the Commission when complete.

For further information, please contact Fred James at 604-623-4317 or by email at bchydroregulatorygroup@bchydro.com.

Yours sincerely,



Fred James
Chief Regulatory Officer

fj/ma

[5] Refer to Borealis statements: https://www.youtube.com/watch?v=L6lBpadIkUo.