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**INFORMATION RELEASE – BCUC responds to BC Hydro's comments on the Site C Inquiry Final Report**
November 28, 2017

Vancouver – The British Columbia Utilities Commission (BCUC) has responded to the letter from the 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 BCUC's response is attached to this information release.

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 Commission has also received further submissions from BC Hydro, the PVLA and others. The Commission responds to BC Hydro's letter below, but otherwise considers the Inquiry to be closed. We do not intend to post or respond to any further submissions.

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 28, 2017

Sent via eFile

Mr. Fred James
Chief Regulatory Officer
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**Re: British Columbia Hydro and Power Authority - British Columbia Utilities Commission Inquiry Respecting Site C – Project No. 1598922**

Dear Mr. James:

British Columbia Hydro and Power Authority's (BC Hydro) letter of November 16, 2017, Site C Inquiry – Comments on Commission Models, provides a number of comments on the models used by the Commission in producing an Illustrative Alternative Portfolio as part of its Final Report to Government of British Columbia regarding the Site C Inquiry (Final Report). The Commission thanks BC Hydro for its letter and sets out its response below.

Sincerely,

*Original signed by:*

David Morton
Chair and Chief Executive Officer

DM/yl
Enclosure

## Introduction

The Inquiry initiated by Order in Council (OIC) 244 requested that the British Columbia Utilities Commission (Commission) evaluate the cost to BC Hydro ratepayers of continuing, suspending or terminating construction of the Site C dam. As part of the termination scenario, the OIC asks what other portfolio of commercially feasible generating projects and demand-side management initiatives could provide similar benefits to the Site C project. To address this question, the BC Utilities Commission (Commission) provided an Illustrative Alternative Portfolio in its Final Report. The assumptions and calculations underpinning the Illustrative Alternative Portfolio were published on November 3, 2017,[1] with an Errata subsequently issued on November 16, 2017.[2]

After the close of the Inquiry, the Commission received a letter from the Deputy Ministers of Energy, Mines and Petroleum Resources and Finance requesting further information. We also received a submission from BC Hydro dated November 16, 2017, Site C Inquiry – Comments on Commission Models (Letter), providing additional comments on the two models used by the Commission (the Illustrative Alternative Portfolio Spreadsheet and the Site C UEC Calculator) to support the analysis for the Final Report.[3]

The Commission has also received further submissions from BC Hydro, the PVLA and others. The Commission responds below to BC Hydro's Letter, but otherwise considers the Inquiry to be closed. We do not intend to post or respond to any further submissions.

The Commission thanks BC Hydro for its letter, which highlights six main issues where BC Hydro submits there have been calculation and input errors:

- Application of discount rate to Site C surplus
- Application of inflation factors and discount rates
- Treatment of sunk costs
- Transmission loss savings
- Cost of capital for IPP financing
- Application of technology assumptions to geothermal resources.

The Commission's response addresses each of these areas in turn to provide further clarity regarding its assumptions and conclusions, and, where appropriate, explains modifications to the models that have taken place.

## 1.0 Commission response to BC Hydro comments

### 1.1 Application of discount rate to Site C surplus

As noted in the Letter, the Commission has updated the discount rate for valuing the trade value of surplus in Exhibit A-26, resulting in a reduction in the net cost of Site C by $336 million.

[1] Exhibits A-24-2, A-24-2-1.
[2] Exhibit A-26-1.
[3] http://www.bcuc.com/Documents/NewsRelease/2017/11-24-2017_InformationRelease_BCH-Letter-Site-C-Final-Report.pdf.

### 1.2 Application of inflation factors and discount rates

The Commission agrees with BC Hydro's assertion that there has been inconsistent application of inflation factors and discount rates in the Illustrative Alternative Portfolio Spreadsheet and that this results in an overstatement of the cost to ratepayers of the illustrative alternative portfolio of $60 million. However, the Commission does not consider this amount to be material in the context of the uncertainty inherent in the magnitude and timing of the termination costs, and in light of other uncertainties surrounding cost assumptions. Therefore we will not be making further updates to the Final Report.

The Commission has noted this issue of cost uncertainty in both the Final Report and in its response to the letter of the Deputy Minister of Energy, Mines and Petroleum Resources and Deputy Minister of Finance, dated November 23, 2017.[4]

In reaching its conclusions, the Commission was required to estimate the costs of each of the three options, and in the case of termination, the cost of the alternative energy that might be required. It is important to recognize that each estimate comes with a degree of uncertainty. For example, when considering the cost of terminating the Site C project, the Commission found, based on information from BC Hydro and Deloitte, that costs to terminate construction and remediate the site could range from $750 million to $2.3 billion.[5] In order to make a comparison between the options of terminating and continuing the project, the Commission chose a reasonable "point estimate" of $1.8 billion based on BC Hydro's P90 estimate, to which we added the costs of acquiring the Illustrative Alternative Portfolio.[6]

But it would be quite possible, based on the information available, to conclude that the cost to terminate construction and remediate the site could be up to a billion dollars less, or half a billion dollars more. Nonetheless, in spite of this uncertainty, the Commission considered it reasonable to conclude that the option of suspending the project, estimated to be $3.6 billion more than either continuing or terminating construction, would be significantly more expensive for ratepayers. By comparison, the comparative estimated costs to ratepayers of continuing or terminating the project, at $2.852 billion and $3.147 billion respectively,[7] were so close that it would be unreasonable for the Commission to draw a meaningful distinction between them.

Given the range of estimates to terminate construction and remediate the site ($750 million to $2.3 billion) an even larger difference between the estimated costs to continue or to terminate the project would have resulted in the Commission drawing the same conclusion they were similar.

To further illustrate how using point estimates for input assumptions masks the potential variability of assumptions, consider the original Site C completion costs. The original estimate of $8.35 billion was based on a Class 3 estimate, which means that the expected accuracy range is from 20% under the budgeted amount to 30% over the budgeted amount – in this case a variance of $4.2 billion.[8]

Accordingly, in order to rely on a numeric analysis of the costs of various options, the differences in results should be greater than the amount of uncertainty in the input assumptions. In the Inquiry, BC Hydro calculated the incremental cost to ratepayers of terminating the Site C project – including the cost of an alternative portfolio – compared to the cost of completing, to be in the range of $6.2 billion to $11.1 billion. If these

[4] http://www.bcuc.com/Documents/NewsRelease/2017/11-23-2017_InformationRelease_BCUC-responds-to-Site-C-Additional-Questions.pdf.
[5] Final Report p. 128.
[6] This is BC Hydro's P90 estimate, which should only have a 10% chance of being exceeded.
[7] Final Report, Errata, p. 10 of 11.
[8] American Association of Cost Engineers, Cost Estimate Classification System – As Applied in Engineering, Procurement and Construction for the Process Industries.

amounts could be substantiated, it would provide a compelling case to continue. However, based on the evidence available to the Inquiry we were unable to verify these amounts.[9]

### 1.3 Treatment of sunk costs

BC Hydro states in its letter that 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. BC Hydro asserts that this approach prevents analysis of absolute impacts to ratepayers, and implies sunk costs are amortized over 70 years.

While we agree that sunk costs were excluded from the analysis, we do not agree that the Report implied sunk costs are amortized over 70 years. The report explicitly stated:

> **The Panel takes no position on the recoverability from ratepayers for sunk and termination costs. Further, we take no position on the recovery period for sunk and termination costs.**

However, for the analysis of ratepayer impacts of the termination scenario, we have assumed that termination costs will be recovered from ratepayers over a 10, 30 or 70-year recovery period.

Sunk costs have appropriately been excluded from the analysis. Further, we note that there has been no determination that Site C costs, in the continue scenario, will be recovered over 70 years.

When considering the recoverability of any costs, there are a number of regulatory principles considered, including:

- Price signals that encourage efficient use and discourage inefficient use (economic efficiency);
- Fair apportionment of costs among customers (fairness);
- Avoid undue discrimination (fairness);
- Customer understanding and acceptance, practical and cost effective to implement (practicality);
- Freedom of controversies as to proper interpretation (practicality);
- Recovery of the revenue requirement (stability);
- Revenue stability (stability); and
- Rate stability (stability).[10]

The above considerations would apply to the recovery period of both termination costs and sunk costs.

We generally agree with the Deputy Ministers' statement "Fair and appropriate rate-setting principles for rate-regulated utilities typically aim to avoid causing future generations to pay for investments from which they will derive no benefit." Intergenerational equity is an important consideration when considering the deferral of cost recovery. However, in the termination case, both the sunk and termination costs relate to a stranded asset, and it is important to note that no-one benefits from a stranded asset. Therefore, there is no more – or less – justification that any particular generation should be more liable than another for the costs related to that stranded asset.

[9] Exhibit F1-1, pp. 66–67 and 96–97.
[10] Bonbright principles, BC Hydro 2015 Rate Design Application, Decision dated January 20, 2017, pp. 11, 12.

In our letter to the Deputy Ministers dated November 23, 2017, we provided additional sensitivity analysis that estimates the total ratepayer impact and unit energy costs of including sunk and/or termination costs for both Site C and the Illustrative Alternative Portfolio, across a range of amortization periods.

### 1.4 Transmission loss savings

The Commission accepts BC Hydro's position that DSM volumes were updated for average distribution and transmission losses. However, the 11% adjustment is still reasonable as the Panel determined in the Report that the losses adjustment should be for *incremental* losses at the Site C plant gate (as opposed to average losses) to be consistent with BC Hydro's methodology used to calculate the wind unit energy cost in the Site C proceeding.[11]

BC Hydro states in the Site C Inquiry:

> Resources that BC Hydro acquires incur losses to deliver energy to the load centre, largely the Lower Mainland. To calculate UECs, BC Hydro uses the methods described below to estimate losses for a particular resource. … The line losses adjustment was estimated based on the peak load incremental losses for bulk transmission paths converted to energy losses using system loss load factors for year 2014-2015. [emphasis added]
>
> For a project located in the Peace River region, the total incremental losses to the Lower Mainland are 14 per cent (the sum of 5.08 per cent from Peace River to Central Interior, 3.98 per cent from Central Interior to Kelly Nicola, and 4.94 per cent from Kelly Nicola to Lower Mainland). The average load factor and loss load factor are 0.65715 and 0.47575 for year 2014/2015, respectively. … Using Wind_PC18 as an example, the line loss adjuster = 77.84 * (1/(1-0.14 * 0.47575/0.65715) - 1) = $8.78/MWh.[12] [Note: $8.78/$77.84 = 11.3%]

The difference between incremental and average losses can be significant. A 2011 Report by the Regulatory Assistance Project titled "Valuing the Contribution of Energy Efficiency to Avoided Marginal Line Losses and Reserve Requirements" states:

> Thus, resistive losses increase with the square of the current, meaning losses increase as load increases. … Depending on the load shape of the utility (how sharp the "needle peak" is), the percentage of generation that is "lost" before it reaches loads are typically at least twice as high as the average annual losses on the system. During the highest critical peak hours (perhaps 5-25 hours per year) when the system is under stress, the losses may be four to six times as high as the average.[13]

BC Hydro has previously stated that average network losses are estimated to be 4.1% for distribution and 6.28% for transmission, for a total of 10.38%.[14] Incremental transmission losses from the Peace Region were estimated by BC Hydro in the Site C Inquiry to be 11.3%,[15] and incremental distribution losses are assumed to be double

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[11] Final Report, Appendix C, p. 3 states: "11% incremental transmission losses to Site C plant gate location" and p. 4 states: "Energy volumes have been grossed up by 11% for avoided transmission real power losses to be comparable to wind plant gate supply side options."

[12] Submission F1-8, BC Hydro, IR 2.36.0, pp. 92, 93.

[13] Regulatory Assistance Project, "Valuing the Contribution of Energy Efficiency to Avoided Marginal Line Losses and Reserve Requirements," 2011, p. 4, http://www.raponline.org/wp-content/uploads/2016/05/rap-lazar-eeandlinelosses-2011-08-17.pdf.

[14] BC Hydro Application to Amend Rate Schedule 1289 Net Metering Service and Cancel Tariff Supplement No. 63, Exhibit B-7, preamble to BCUC IR 2.1.

[15] Submission F1-8, BC Hydro, BCUC IR 36 ($8.78/$77.84 = 11.3%).

average losses (i.e., 8.2%), for a total of 19.5%. As a result, the 11% adjustment is a reasonable adjustment to reflect incremental rather than average line losses.

The Commission recognises that the use of incremental vs. average line losses for DSM cost effectiveness tests is an issue in other proceedings and here we take no position on this issue. The approach taken in the Site C analysis is merely to ensure consistent treatment between BC Hydro assumptions used for supply side options and those used for demand side options.

### 1.5 Cost of capital for IPP financing

BC Hydro states in the letter that its estimate of IPP cost of capital of 6.4% is in real terms, and that in nominal terms the cost of capital would be 8.5%. As noted in the response to the Deputies' letter, this affects the sensitivity analysis only. To the extent that readers want to analyze BC Hydro's IPP financing cost estimate they can use the spreadsheet provided by the Commission to do so.

The Final Report modelled a sensitivity analysis for IPP financing costs using 3.4%, 6.4% and 8.4%. The table below (from the response to the Deputy Ministers' letter) summarises the results of sensitivity analysis. Please note that the sensitivity analysis below only reflects the increase in financing costs of IPP financed projects, and does not reflect the corresponding decrease in ratepayer risk of IPP financed projects:

**Table 5: Sensitivity analysis regarding wind/geothermal financing cost assumption**[25]

| | Illustrative Alternative Portfolio PV Cost | | |
|---|---|---|---|
| **Load forecast scenario** | **Commission Assumptions** [26] **(BC Hydro financing rate of 3.43%)** | **Alternative financing cost assumption (BC Hydro IPP financing rate of 8.5%)** | **Increase/(Decrease) in Alternative Portfolio PV cost** |
| • High load forecast | $5,121 million | $5,831 million | $710 million |
| • Med load forecast | $4,618 million | $5,130 million | $512 million |
| • Low load forecast | $3,147 million | $3,359 million | $212 million |

### 1.6 Application of technology assumptions to geothermal resources

BC Hydro states that lower cost and higher capacity factor assumptions are used for the geothermal projects in the Commission's Illustrative Alternative Portfolio than are appropriate, due to the technology that is expected to be used for the projects in question. The Commission appreciates BC Hydro's comments. However, as this information wasn't made available in the Inquiry, we were not able to include it in the report.

The Commission's decision to only include the Canoe Reach and Lakelse Lake projects, for a total capacity of 81 MW, in the year F2025, in the illustrative portfolio is based on information obtained prior to issuing the Final Report. The selection of these projects is meant to illustrate the potential costs of pursuing geothermal in BC. The items which BC Hydro notes in its letter are assumptions which, if verified, may increase costs.

To demonstrate the potential impact to ratepayers of different project costs the Commission provided a sensitivity analysis of geothermal costs in its Final Report. For that sensitivity analysis, the Commission explained: "The medium value reflects the NREL capital and O&M costs for hydrothermal flash technology, whereas the high value reflects the NREL capital and O&M costs for hydrothermal binary technology. The low

value reflects the project-specific costs that CanGEA submitted in F66-4."[16] In addition, the Commission stated "The assumptions used in the Illustrative Alternative Portfolio are not without risk… The cost of wind may be higher than estimated. There may actually be no geothermal potential."[17]

The Commission considers that uncertainty exists with regards to the future cost of geothermal; there are factors which could increase or decrease costs from the Commission's medium value. Therefore, the Commission continues to believe that the size and costs of geothermal resources used in the Illustrative Alternative Portfolio are within the range of reasonableness.

[16] Site C Final Report, Appendix C, p. 6.
[17] Site C Final Report, Appendix C, p. 186.