BC Hydro
Power smart

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October 27, 2017

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

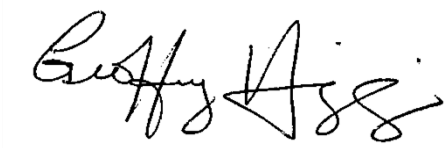
Dear Mr. Wruck:

RE: Project No. 1598922
British Columbia Utilities Commission (BCUC or Commission)
British Columbia Hydro and Power Authority (BC Hydro)
Site C Inquiry –Round 3 Information Responses
Response to BCUC IR 3.21.0

BC Hydro is writing to provide its response to an additional information request from the Commission Panel received on October 25, 2017.

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

Yours sincerely,



(for) Fred James
Chief Regulatory Officer

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Enclosure

20.0

3.21.0 Please provide all drafts of Hydro's 2016 Wind Integration Study (the project plan had it to be finished in July 2016). Please provide any BC specific data including BC Hydro's sales into the ancillary services market and any Hydro costs of integrating 15% of wind into the system.

RESPONSE:

There are no drafts of the 2016 Wind Integration Study available. The work plan for the currently underway Wind Integration Study consists of three major components: 1) determine the operating capacity reserves (within hour and hour-to-hour); 2) determine the day-ahead capacity reserves; and 3) conduct system modelling to calculate the costs associated with the operating and day-ahead capacity reserves. To date, BC Hydro is still working on the first component. The BC Hydro costs of integrating 15 per cent wind will be an outcome of the updated study which we plan to have available for the next IRP. For examples of Powerex's sales into the ancillary services market, refer to the response to BCUC IR 3.13.0.

We can, however, provide some further information on wind integration costs.

<u>Nature of Wind Integration Costs</u>

The wind integration cost consists of two components:

1) **The cost of holding incremental operating reserves; and**

2) **The opportunity cost of lost day-ahead (DA) power trading opportunities.**

Operating reserves are generating capacity resources that are reserved to manage the electric system on a daily basis (in the sub-hourly timeframe as well as hour-to-hour timeframe). These incremental operating reserves associated with wind power generation volatility, which are over and above contingency reserves held to address unplanned system outage events, are valued at ancillary services market prices. The DA power trading opportunity cost captures the impact of wind forecast uncertainty on the energy trading activities in the DA timeframe, and in the 2010 study was valued at MidC market prices.

<u>BC Hydro is Using a Base Assumption that is Half of What Was Suggested in the last Wind Integration Study</u>

The most recent Wind Integration Study (done in 2010) identified BC Hydro's wind integration cost of $10/MWh. Since this time, there have been a number of factors

that have a downward effect on the wind integration cost. However, BC Hydro is also seeing a rapid growth in the demand for capacity and flexibility in the Western Interconnect that will have an upward effect on the wind integration cost.

BC Hydro has initiated a study to update BC Hydro's wind integration costs, but this study is not yet complete. Prior to having updated results, we used professional judgement to estimate the reduced integration cost at $5/MWh and used this as the base assumption in the portfolio analysis for the Site C review.

Sensitivity Analysis Shows Site C Would Still Be More Cost Effective if Wind Integration Cost Was Zero

BC Hydro has done a sensitivity analysis in the August 30 Filing by lowering the unit energy cost for wind resource by 15 per cent. This cost reduction is greater than what is reflected in the wind integration cost of $5/MWh. As shown in this sensitivity analysis, even if the wind integration cost was removed, Site C would still be more cost effective than the alternative portfolio.

Wind Integration Costs Should Not Be Extrapolated from Other Jurisdictions

Wind integration cost is highly system specific, and should not be extrapolated from one jurisdiction to another without consideration of factors applicable to individual utilities. A recent summary of integration costs at various levels of wind penetration can be found in the 2016 Wind Technologies Market Report by the U.S Department of Energy. The wide range in estimated costs at similar wind penetration levels are in part due to differences in study methodologies, power system and market characteristics, fuel price assumptions, wind power forecasting details, and even how integration costs are defined. It is important for BC Hydro to conduct its own study and include costs that are relevant to us.

Considerations for the Update Study

The currently underway study to update the Wind Integration cost is addressing a number of factors that have changed since the 2010 study, such as lower ancillary service prices due to the introduction of sub-hourly markets, reduced gas prices, improvements in wind power forecasting accuracy, etc. These changes would have a downward effect on the wind integration cost.

However, we are also seeing rapid growth in the demand for capacity and flexibility in almost every region in the Western Interconnect as a result of intermittent renewable resource additions and retirement of flexible and baseload thermal resources. Almost every region in the West is currently identifying a future challenge of meeting this growing flexible capacity need in a way that meets their greenhouse gas reduction goals This will have an upward effect on the wind integration cost as the value of system capacity and flexibility is increased.

In general, a modeling study might not capture all the cost associated with a loss of system flexibility. For example, our 2010 study focused on lost trade opportunities in the DA market at MidC whereas Powerex has transmission to reach other markets (and can transact in other timeframes) where they can opportunistically gain more value using the flexibility of the BC Hydro system.