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June 21, 2019

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. 1598969
British Columbia Utilities Commission (BCUC or Commission)
British Columbia Hydro and Power Authority (BC Hydro)
Electricity Purchase Agreement (EPA) Renewals – Sechelt Creek Hydro, Brown Lake Hydro, and Walden North Hydro

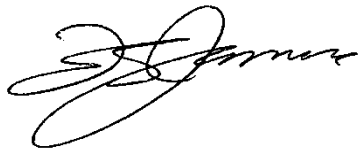
BC Hydro writes in accordance with Commission Order No. G-91-19 to provide its responses to Round 2 information requests as follows:

Exhibit B-12	Responses to Commission IRs (Public Version)
Exhibit B-12-1	Responses to Commission IRs (Confidential Version)
Exhibit B-13	Responses to Commission Confidential IRs (Confidential)
Exhibit B-14	Responses to Interveners IRs (Public Version)
Exhibit B-14-1	Responses to Interveners IRs (Confidential Version)
Exhibit B-15	Responses to Interveners Confidential IRs (Confidential)

BC Hydro is filing a number of IR responses and/or attachments to responses confidentially with the BCUC. BC Hydro confirms that in each instance, an explanation for the request for confidential treatment is provided in the public version of the IR response or in Exhibit B-3. BC Hydro seeks this confidential treatment pursuant to section 42 of the *Administrative Tribunals Act* and Part 4 of the Commission's Rules of Practice and Procedure.

For further information, please contact Geoff Higgins at 604-623-4121 or by email at bchydroregulatorygroup@bchydro.com.

Yours sincerely,



Fred James
Chief Regulatory Officer

st/tl

Enclosure

1.0 Reference: Exhibit B-7, CEC 1.2.1
Exhibit B-1, page 2, lines 13-14

2.1.1 Are the "more robust terms and conditions" referred to on page 2 the "more favourable terms" discussed in the response to CEC 1.2.1 and documented in Appendix F?

RESPONSE:

Generally yes. However, BC Hydro notes that the comparison table included in Appendix F does not show all of the terms which may be more favourable to BC Hydro.

1.0 Reference: Exhibit B-7, CEC 1.2.1
Exhibit B-1, page 2, lines 13-14

2.1.2 If not, please outline what the new terms and conditions are that are considered to be "more robust".

RESPONSE:

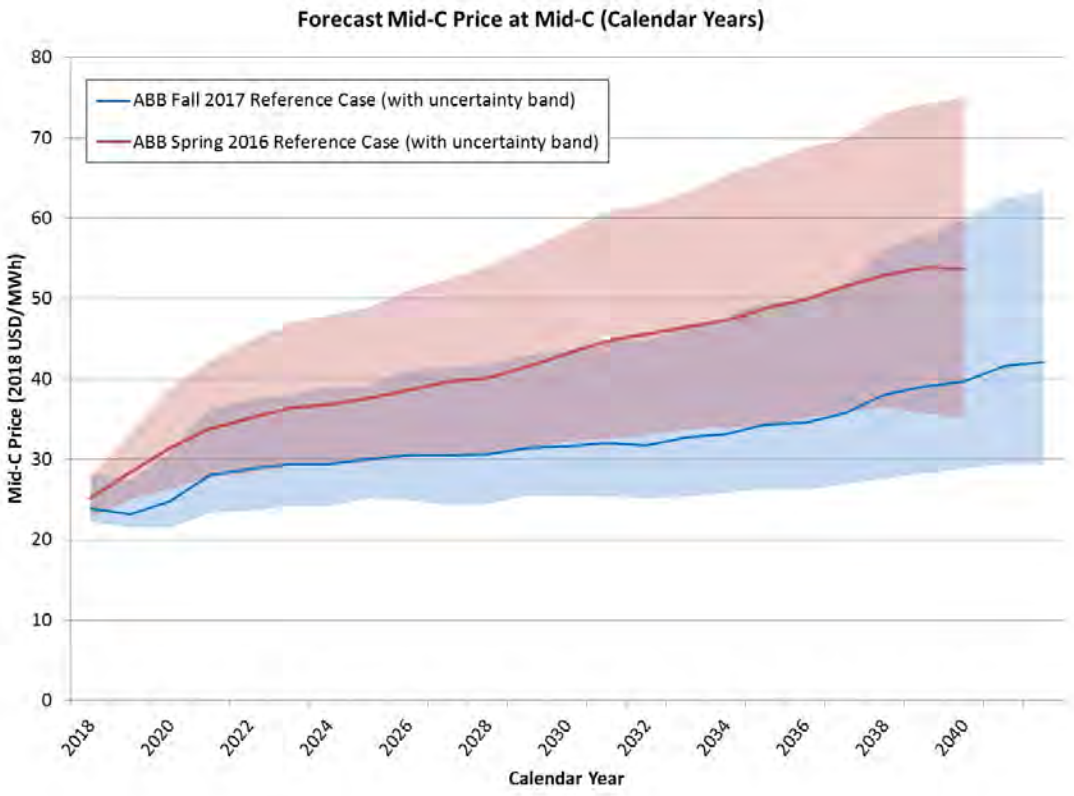
Please refer to BC Hydro's response to BCOAPO IR 2.1.1.

2.0 Reference: Exhibit B-5, BCUC 1.8.1; BCUC 1.21.1 and BCUC 1.29.1
Exhibit B-7, CEC 1.4.3

2.2.1 Figure 1 in CEC 1.4.3 provides the forecast Mid-C Price based on ABB's 2017 Fall Reference Forecast. Please provide a revised version of Figure 1 that also includes ABB's Spring 2016 Mid-C Price forecast as used in the Application.

RESPONSE:

Please see the the graphic below that shows the requested information.



2.0 Reference: Exhibit B-5, BCUC 1.8.1; BCUC 1.21.1 and BCUC 1.29.1
Exhibit B-7, CEC 1.4.3

2.2.2 Are the levelized energy prices for each of the Renewed EPA's (per Tables 3, 5 and 7) greater or less than the "Market Price" for the EPA's as set out in Table 1 of BCUC 1.8.1?

RESPONSE:

The public version of this response has been redacted to maintain in confidence commercially sensitive information as public disclosure could impact the commercial interests of our suppliers and ongoing negotiations related to EPA renewals.

The table below demonstrates that in comparison to the "Market" scenario set out in Table 1 of BC Hydro's response to BCUC IR 1.8.1:

- **The levelized EPA price for Sechelt Creek and Brown Lake is higher ; and**
- **The levelized EPA price for Walden North is lower.**

Table 1 Levelized EPA Price and BC Hydro's Opportunity Cost based on Market Price (2017$/MWh)

EPA (Application Reference)	Levelized EPA Price (Application)	BC Hydro's Opportunity Cost based on Market Price (BCUC IR 1.8.1)
Sechelt Creek Hydro (Page 12, Table 3)	[redacted]	[redacted]
Brown Lake Hydro (Page 20, Table 5)	[redacted]	[redacted]
Walden North Hydro (Page 31, Table 7)	[redacted]	[redacted]

2.0 Reference: Exhibit B-5, BCUC 1.8.1; BCUC 1.21.1 and BCUC 1.29.1
Exhibit B-7, CEC 1.4.3

2.2.3 Are the levelized energy prices for each of the Renewed EPA's (per Tables 3, 5, and 7) greater or less than the revised BC Hydro Opportunity Cost set out in Table 1 of BCUC 1.8.1?

RESPONSE:

The public version of the response has been redacted to maintain in confidence commercially sensitive information in order to protect IPPs' commercial interests. The public disclosure of the redacted information could also impact BC Hydro's commercial interests and ongoing negotiations related to EPAs.

The table below demonstrates that the levelized EPA price for the three EPA Renewals in the Application is lower than BC Hydro's revised opportunity cost set out in Table 1 of BC Hydro's response to BCUC IR 1.8.1.

Table 1 Levelized EPA Price and BC Hydro's Opportunity Cost based on Market Price (2017$/MWh)

EPA (Application Reference)	Levelized EPA Price (Application)	BC Hydro's Revised Opportunity Cost (BCUC IR 1.8.1)
Sechelt Creek Hydro (Page 12, Table 3)	[redacted]	[redacted]
Brown Lake Hydro (Page 20, Table 5)	[redacted]	[redacted][1]
Walden North Hydro (Page 31, Table 7)	[redacted]	[redacted]

[1] The Brown Lake hydro facility is estimated to provide 6 MW of dependable capacity. Reflecting the long-term value of this capacity would increase BC Hydro's opportunity costs by approximately $[redacted]-$[redacted]/MWh.

2.0 Reference: Exhibit B-5, BCUC 1.8.1; BCUC 1.21.1 and BCUC 1.29.1
Exhibit B-7, CEC 1.4.3

2.2.4 With respect to the response to BCUC 1.8.1, please provide a revised version of Table 1 where: i) the "Market Values" and ii) the "Revised BC Hydro Opportunity Costs" (for the surplus period) are based on ABB's 2017 Fall Reference Forecast.

RESPONSE:

Please refer to BC Hydro's response to BCOAPO IR 2.6.2 for a revised version of Table 1 (from BC Hydro's response to BCUC IR 1.8.1) that includes updates to a number of inputs, including the LRB, the market price forecast and a preliminary assessment of the cost of wind energy.

2.0 Reference: Exhibit B-5, BCUC 1.8.1; BCUC 1.21.1 and BCUC 1.29.1
Exhibit B-7, CEC 1.4.3

2.2.5 Are the levelized energy prices for each of the Renewed EPA's (per Tables 3, 5 and 7) greater or less than the "Market Price" for the EPA's as set out in the revised version of Table 1 per part (4) above?

RESPONSE:

Please refer to BC Hydro's response to BCOAPO IR 2.6.2 for a revised version of Table 1 (from BC Hydro's response to BCUC IR 1.8.1) that includes updates to a number of inputs, including the LRB, the market price forecast and a preliminary assessment of the cost of wind energy.

2.0 Reference: Exhibit B-5, BCUC 1.8.1; BCUC 1.21.1 and BCUC 1.29.1
Exhibit B-7, CEC 1.4.3

2.2.6 Are the levelized energy prices for each of the Renewed EPA's (per Tables 3, 5 and 7) greater or less than the "BC Hydro Opportunity Cost" for the EPA's as set out in the revised version of Table 1 per part (4) above?

RESPONSE:

Please refer to BC Hydro's response to BCOAPO IR 2.6.2 for a revised version of Table 1 (from BC Hydro's response to BCUC IR 1.8.1) that includes updates to a number of inputs, including the LRB, the market price forecast and a preliminary assessment of the cost of wind energy.

3.0 Reference: Exhibit B-5, BCUC 1.8.1, 1.8.2.1 and 1.8.4
Exhibit B-1, page 8 (Table 1)

The response to BCUC 1.8.4 states: "BC Hydro recently adopted the use of market price as a conservative interim assumption for evaluating energy during surplus and deficit periods". (emphasis added)

2.3.1 Precisely when did BC Hydro adopt the use of market price as a conservative interim assumption for evaluating energy during surplus and deficit periods?

RESPONSE:

BC Hydro began considering using market price as a conservative interim assumption in late fall 2018. BC Hydro adopted the conservative interim assumption after consideration of several factors noted below around the time of the release of Phase 1 Report of the Comprehensive Review of BC Hydro; this report was released on February 14, 2019. These factors include:

- **BC Hydro's updated LRB shows it will not need to acquire new energy resources for many years to come;**
- **Potential policy changes that may affect BC Hydro arising from ongoing government review and other energy related policies; and**
- **Electricity generation technology cost uncertainty over the long term.**

3.0 Reference: Exhibit B-5, BCUC 1.8.1, 1.8.2.1 and 1.8.4
Exhibit B-1, page 8 (Table 1)

The response to BCUC 1.8.4 states: "BC Hydro recently adopted the use of market price as a conservative interim assumption for evaluating energy during surplus and deficit periods". (emphasis added)

2.3.2 What is meant by "interim assumption"?

RESPONSE:

Please refer to BC Hydro's response to BCUC IR 2.2.2.

3.0 Reference: Exhibit B-5, BCUC 1.8.1, 1.8.2.1 and 1.8.4
Exhibit B-1, page 8 (Table 1)

The response to BCUC 1.8.4 states: "BC Hydro recently adopted the use of market price as a conservative interim assumption for evaluating energy during surplus and deficit periods". (emphasis added)

2.3.3 Based on this approach, would the market price be used to evaluate any future EPA renewals for the entire term of the renewal? If not, please provide a revised version of Table 1 (Exhibit B-1) that indicates when "market prices" would be used and what other values would also be used.

RESPONSE:

For the duration that the interim assumption is in effect, BC Hydro plans to evaluate all energy received under future EPA renewals for generation on the integrated system at market prices.

4.0 Reference: Exhibit B-5, BCUC 1.8.3.2, 1.8.4 and 1.11.2.2.1
Exhibit B-1, Appendix B, Tables 3-6 and 3-8
Exhibit B-1, pages 8 (Table 1)

The response to BCUC 1.8.3.2 states: "BC Hydro's current DSM Plan does not acquire all DSM up to $89/MWh".

2.4.1 Please confirm that the reference to "BC Hydro's current DSM Plan" is referring to the DSM Plan is set out in the F20-F21 RRA Application.

RESPONSE:

Confirmed.

4.0 Reference: Exhibit B-5, BCUC 1.8.3.2, 1.8.4 and 1.11.2.2.1
Exhibit B-1, Appendix B, Tables 3-6 and 3-8
Exhibit B-1, pages 8 (Table 1)

The response to BCUC 1.8.3.2 states: "BC Hydro's current DSM Plan does not acquire all DSM up to $89/MWh".

2.4.2 What DSM Plan was the basis for the DSM savings included in Tables 3-6 and 3-8 of Appendix B?

RESPONSE:

The DSM savings included in Tables 3-6 and 3-8 of Appendix B are based on the DSM Plan in the F17-F19 RRA.

4.0 Reference: Exhibit B-5, BCUC 1.8.3.2, 1.8.4 and 1.11.2.2.1
Exhibit B-1, Appendix B, Tables 3-6 and 3-8
Exhibit B-1, pages 8 (Table 1)

The response to BCUC 1.8.3.2 states: "BC Hydro's current DSM Plan does not acquire all DSM up to $89/MWh".

2.4.3 With respect to Table 3-8, what is the average levelized Total Resource cost (TRC) and Utility Cost for DSM measures forecast to be implemented over the F2022 to F2033 period?

RESPONSE:

The average net levelized Total Resource Cost and Utility Cost for the DSM Plan shown in Table 3-8 (F17-F19 RRA DSM Plan) for activities covering the period from fiscal 2022 to fiscal 2033 are $39/MWh (F2017$) and $21/MWh (F2017$), respectively.

BC Hydro notes that Table 3-8 of Appendix B in the Application along with the DSM Plan shown in that Table have been updated as per BC Hydro's response to BCUC IR 1.11.2.2.1. Please also refer to BC Hydro's response to BCOAPO IR 2.5.3 where we provide net levelized Total Resource Costs and Utility Costs for the updated DSM Plan.

BC Hydro also notes that these values represent the average levelized costs of the DSM Plan included in Table 3-8, and do not represent the marginal cost of incremental DSM. BC Hydro does not have an analysis on the marginal cost of incremental DSM.

4.0 Reference: Exhibit B-5, BCUC 1.8.3.2, 1.8.4 and 1.11.2.2.1
Exhibit B-1, Appendix B, Tables 3-6 and 3-8
Exhibit B-1, pages 8 (Table 1)

The response to BCUC 1.8.3.2 states: "BC Hydro's current DSM Plan does not acquire all DSM up to $89/MWh".

2.4.4 With respect to Table 3-8, what is the DSM initiative forecast to be implemented over the F2022-F2033 period that has the highest levelized TRC and what is the associated levelized value (in 2017$)?

RESPONSE:

The DSM program with the highest average levelized Total Resource Cost is the Residential Low Income Program at $151/MWh (F2017$), based on F17-F19 RRA DSM Plan activities from fiscal 2022 to fiscal 2033.

BC Hydro notes that Table 3-8 in this Application along with the DSM Plan shown in that Table have been updated as per BC Hydro's response to BCUC IR 1.11.2.2.1. Please refer to BC Hydro's response to BCOAPO IR 2.5.4 where we provide details on the DSM program with the highest average levelized Total Resource Cost, based on the updated DSM Plan.

4.0 Reference: Exhibit B-5, BCUC 1.8.3.2, 1.8.4 and 1.11.2.2.1
Exhibit B-1, Appendix B, Tables 3-6 and 3-8
Exhibit B-1, pages 8 (Table 1)

The response to BCUC 1.8.3.2 states: "BC Hydro's current DSM Plan does not acquire all DSM up to $89/MWh".

2.4.5 With respect to Table 3-8, which DSM initiative forecast to be implemented over the F2022-F2033 period that has the highest levelized Utility Cost and what is its associated levelized value (in 2017$)?

RESPONSE:

The DSM program with the highest average levelized Utility Cost is the Residential Low Income Program at $210/MWh (F2017$), based on F17-F19 RRA DSM Plan activities from fiscal 2022 to fiscal 2033.

BC Hydro notes that Table 3-8 in this Application along with the DSM Plan shown in that Table have been updated as per BC Hydro's response to BCUC IR 1.11.2.2.1. Please refer to BC Hydro's response to BCOAPO IR 2.5.5 where we provide details on the DSM program with the highest average levelized Utility Cost, based on the updated DSM Plan.

5.0 Reference: Exhibit B-5, BCUC 1.8.3.2, 1.8.4 and 1.11.2.2.1
Exhibit B-1, Appendix B, Tables 3-6 and 3-8
Exhibit B-1, pages 8 (Table 1)

2.5.1 Based on the utility's information found in BCUC 1.11.2.2.1's Tables 1 and 3, has the period during which DSM and EPA Renewals are the marginal resource now changed to F2027 to F2031?

RESPONSE:

Confirmed.

5.0 Reference: Exhibit B-5, BCUC 1.8.3.2, 1.8.4 and 1.11.2.2.1
Exhibit B-1, Appendix B, Tables 3-6 and 3-8
Exhibit B-1, pages 8 (Table 1)

2.5.1 Based on the utility's information found in BCUC 1.11.2.2.1's Tables 1 and 3, has the period during which DSM and EPA Renewals are the marginal resource now changed to F2027 to F2031?

2.5.1.1 If not, based on BCUC 1.11.2.2.1 what is the period for which DSM and EPA Renewals are the marginal resource and how was it determined?

RESPONSE:

Please refer to BC Hydro's response to BCOAPO IR 2.5.1.

5.0 Reference: Exhibit B-5, BCUC 1.8.3.2, 1.8.4 and 1.11.2.2.1
Exhibit B-1, Appendix B, Tables 3-6 and 3-8
Exhibit B-1, pages 8 (Table 1)

2.5.2 Please provide an updated version of Table 1 (Exhibit B-1) based on the LRB presented in BCUC 1.11.2.2.1.

RESPONSE:

Please refer to BC Hydro response to BCOAPO IR 2.6.1 for an updated Table 1 from Exhibit B-1.

5.0 Reference: Exhibit B-5, BCUC 1.8.3.2, 1.8.4 and 1.11.2.2.1
Exhibit B-1, Appendix B, Tables 3-6 and 3-8
Exhibit B-1, pages 8 (Table 1)

2.5.3 With respect to Table 3 in BCUC 1.11.2.2.1, what is the average levelized Total Resource Cost (TRC) and Utility Cost for DSM measures forecast to be implemented over the F2027 to F2031 period (or, if different, the period identified in the previous response)?

RESPONSE:

The average net levelized Total Resource Cost and Utility Cost for the DSM Plan shown in Table 3 of BC Hydro's response to BCUC IR 1.11.2.2.1 for activities covering the period from fiscal 2027 to fiscal 2031 are $16/MWh (F2017$) and $31/MWh (F2017$), respectively.

BC Hydro notes that these values represent the average levelized costs of the DSM Plan included in Table 3 of BC Hydro's response to BCUC IR 1.11.2.2.1, and do not represent the marginal cost of incremental DSM. BC Hydro does not have an analysis on the marginal cost of incremental DSM.

5.0 Reference: Exhibit B-5, BCUC 1.8.3.2, 1.8.4 and 1.11.2.2.1
Exhibit B-1, Appendix B, Tables 3-6 and 3-8
Exhibit B-1, pages 8 (Table 1)

2.5.4 With respect to Table 3 in BCUC 1.11.2.2.1, what is the DSM initiative forecast to be implemented over the F2027-F2031 period (or, if different, the period identified in the previous response) with the highest levelized TRC and what is the associated levelized value (in 2017$)?

RESPONSE:

The DSM program with the highest average levelized TRC cost is the Non-Integrated Areas Program at $148/MWh (F2017$), based on F20-F21 DSM Plan activities from fiscal 2027 to fiscal 2031.

5.0 Reference: Exhibit B-5, BCUC 1.8.3.2, 1.8.4 and 1.11.2.2.1
Exhibit B-1, Appendix B, Tables 3-6 and 3-8
Exhibit B-1, pages 8 (Table 1)

2.5.5 With respect to Table 3, in BCUC 1.11.2.2.1, what is the DSM initiative forecast to be implemented over the F2027-F2031 period (or, if different, the period identified in the previous response) with the highest levelized Utility Cost and what is the associated levelized value (in 2017$)?

RESPONSE:

The DSM program with the highest average levelized Utility Cost is the Non-Integrated Areas Program at $153/MWh (F2017$), based on F20-F21 DSM Plan activities from fiscal 2027 to fiscal 2031.

6.0 Reference: Exhibit B-5, BCUC 1.8.1, 1.11.2.2.1 and 1.21.1
Exhibit B-7, CEC 1.4.3
Exhibit B-1, pages 9 (Table 1) 12 (Table 3). 19 (Table 5) and 31 (Table 7)

In response to the first round of interrogatories, BC Hydro has provided a more recent Market Price Forecast (BCUC 1.21.1 and CEC 1.4.3) and a new Load/Resource Balance (BCUC 1.11.2.2.1). Also, BC Hydro has revised its opportunity cost calculations with respect to specific EPAs and indicated that the value for Brown Lake did not include any value for the dependable capacity provided (BCUC 1.8.1)

2.6.1 Based on these updates, please provide a revised version of Table 1.

RESPONSE:

A revised Table 1, which also includes information requested from other IRs[1], is presented below.

[1] Specifically: BCOAPO IR 2.5.2, BCOAPO IR 2.7.3.2 and BCOAPO IR 2.8.2.

Marginal Resources	Period of Applicability	Scenarios for Unit Energy Cost (Adjusted to the Lower Mainland)			
		LRMC (Fiscal 2017$) (outdated and to be updated in the IRP)	BC Hydro Interim Assumption[2]	Preliminary Assessment of B.C. Wind Energy (Fiscal 2018$)	BCUC Assumption of $60/MWh Wind in Waneta at POI (Fiscal 2018$)
DSM and EPA Renewals	**Fiscal 2027 to Fiscal 2031**	**89/MWh**	**Market Price**	**54 - 80/MWh**	**73/MWh**
Greenfield IPPs	**Fiscal 2032 and beyond**	**104/MWh**	**Market Price**	**54 - 80/MWh**	**73/MWh**

BC Hydro notes the following with regard to valuing energy during the above periods of applicability:

- **In the absence of an updated LRMC, BC Hydro has adopted an interim assumption to evaluate cost effectiveness based on market prices during surplus and deficit. BC Hydro believes this is an appropriate conservative approach on a go-forward basis until new LRMCs are adopted;**

[2] Please refer to BC Hydro response to BCOAPO IR 2.2.2 for definition of interim assumption.

- **A preliminary analysis of the cost of wind energy in B.C. suggests the relevant future cost of wind energy delivered to the lower mainland could be available from $54-80/MWh ($2018). Please refer to BC Hydro's response to BCUC IR 2.7.1. BC Hydro notes that this preliminary assessment suggests that the future cost of wind energy is less than the out dated LRMC for DSM and EPA Renewals of $89/MWh;**

- **BC Hydro notes that in BC Hydro's Waneta 2017 Application, an estimate of the current cost of wind in B.C. at $60/MWh at the point of interconnection was considered reasonable. As stated in the BCUC decision for the BC Hydro 2017 Waneta Transaction Application (page 46 of the Decision):**

  > **"The Panel also notes that CEABC, BCSEA-SCBC and CEC all believe the use of wind energy at $60/MWh is appropriate …The Panel is also satisfied that using $60/MWh for wind resources is appropriate."**

Based on $60/MWh at the point of interconnection in 2018, the future cost of wind delivered to the lower mainland would be $73/MWh.

6.0 Reference: Exhibit B-5, BCUC 1.8.1, 1.11.2.2.1 and 1.21.1
Exhibit B-7, CEC 1.4.3
Exhibit B-1, pages 9 (Table 1) 12 (Table 3). 19 (Table 5) and 31 (Table 7)

In response to the first round of interrogatories, BC Hydro has provided a more recent Market Price Forecast (BCUC 1.21.1 and CEC 1.4.3) and a new Load/Resource Balance (BCUC 1.11.2.2.1). Also, BC Hydro has revised its opportunity cost calculations with respect to specific EPAs and indicated that the value for Brown Lake did not include any value for the dependable capacity provided (BCUC 1.8.1)

2.6.2 Based on these updates please provide revised versions of Tables 3, 5 and 9 using the approach in the Application (per pages 8-9) for evaluating energy but using the updated values for Market Prices (during surplus periods), the revised dates for the applicability of DSM & EPAs versus Greenfield IPPs as the basis for LRMC (per BCUC 1.11.2.2.1) plus the revisions noted in BCUC 1.8.1.

RESPONSE:

The public version of this response has been redacted to maintain in confidence commercially sensitive information.as public disclosure could impact BC Hydro's and the IPP's commercial interests related to EPAs.

This answer also responds to the following IRs:

- **BCOAPO IR 2.2.4 (update BC Hydro's opportunity cost and market scenario to 2017 market price);**
- **BCOAPO IR 2.2.5 (compare market scenario to levelized prices for each of the three EPA renewals);**
- **BCOAPO IR 2.2.6 (compare BC Hydro's opportunity cost to levelized prices for each of the three EPA renewals);**
- **BCOAPO IR 2.6.2.1 (compare BC Hydro's opportunity cost to levelized prices for each of the three EPA renewals);**
- **BCOAPO IR 2.7.3.3 (updated DSM cost);**
- **BCOAPO IR 2.8.3 (updated wind cost);**
- **BCOAPO IR 2.8.3.1 (compare BC Hydro's opportunity cost to levelized prices for each of the three EPA renewals);**

- **BCOAPO IR 2.8.5 (use BCUC wind price of $60/MWh at POI as updated wind cost);**
- **BCOAPO IR 2.8.5.1 (compare BC Hydro's opportunity cost to levelized prices for each of the three EPA renewals);**
- **BCOAPO IR 2.11.1 (do IPP opportunity cost need to be updated?); and**
- **BCOAPO IR 2.11.1.1 (provide tables in relation to BCOAPO IR 2.11.1).**

BC Hydro provides the requested updated versions of Table 1 (from BC Hydro's response to BCUC IR 1.8.1) and Tables 3, 5 and 7[1] (from the Application) below which include the revisions to BC Hydro's opportunity cost discussed in BC Hydro's response to BCUC IR 1.8.1 and the revisions to the IPP's opportunity cost discussed in BCUC CONF IR 1.2.1. In addition, similar to Table 1 provided in BC Hydro's response to BCUC IR 1.8.1, the updated tables include two versions of BC Hydro's opportunity cost using (1) BC Hydro's current interim market approach and (2) BC Hydro's approach used in the Application which valued the EPA renewal energy at BC Hydro's LRMC in periods of LRB shortfall.

BC Hydro notes that rather than provide the requested tables for each updated assumption building up one at a time, as requested in the IRs referenced above, BC Hydro has provided one updated version for each of Tables 1, 3, 5 and 7 that includes all of the following updates noted below. This information is provided as one consolidated update because if only one element is updated at a time the analysis does not accurately capture all of the updates to the multiple variables at play. For example, updating the analysis for a new LRB without updates to the market price would only provide a partial view of the effect of the updated inputs.

- **LRB: based on the LRBs provided in BC Hydro's response to BCUC IR 1.11.2.2.1 the period of applicability for the LRMC values was updated as set out in Table 1 of BC Hydro's response to BCUC IR 2.6.1;**
- **Market price: based on the ABB Fall 2017 Reference Case provided in BC Hydro's response to CEC IR 1.4.3;**
- **Cost of Wind: for the values that rely on the approach from the Application, the cost of wind is based on the preliminary assessment of B.C. wind energy ($54 - $80/MWh, 2018$) discussed in BC Hydro's response to BCUC IR 2.7.1. BC Hydro notes that, as set out in Table 1 of BC Hydro's response to BCUC IR 2.6.1, BC Hydro assumes that DSM and EPA renewals can be achieved at the same price. This means that the preliminary assessment for the cost of wind is assumed to represent BC Hydro's opportunity cost for energy in fiscal 2027 and beyond;**

[1] BC Hydro notes that the request was for an update to Table 9 from the Application; however, there is no Table 9 in the Application, so we have provided an update to Table 7.

- **Losses: based on the updated values provided in BC Hydro's response to BCUC IR 2.8.1; and**
- **Time of Delivery Adjustment: based on the updated values provided in BC Hydro's response to BCUC IR 2.9.1.1.**

As shown in updated Tables 3 and 5 below, for the Seaton Creek and Brown Lake EPA renewals the levelized EPA prices are:

- **Higher than BC Hydro's opportunity cost using the current interim market approach and the LRMC approach with the low end of the preliminary wind cost assessment range; and**
- **Lower than BC Hydro's opportunity cost using the LRMC approach with the high end of the preliminary wind cost assessment range.**

BC Hydro notes that the calculated capacity credit would be enough to make the Brown Lake EPA renewal cost-effective when (i) using the low capacity value ([redacted]) for the LRMC approach with the low end of the preliminary wind cost assessment range; and (ii) using the high capacity value ([redacted]) for the interim market approach.

As shown in updated Table 7 below, for the Walden North EPA renewal the negotiated energy prices (levelized) are:

- **Higher than BC Hydro's opportunity cost using the current market interim approach and the LRMC approach with the low end of the preliminary wind cost assessment range; and**
- **Lower than BC Hydro's opportunity cost using the LRMC approach with the high end of the preliminary wind cost assessment range.**

BC Hydro notes that the supporting calculations and assumptions are provided in the attachment to BC Hydro's response to BCUC CONF IR 2.9.1.

Updated Table 1 BC Hydro's Opportunity Cost (2017$/MWh)

EPA (Application Reference)	Application	Revised and Updated	Market
Sechelt Creek Hydro (Page 12, Table 3)	[redacted]	[redacted]	[redacted]
Brown Lake Hydro[2] (Page 20, Table 5)	[redacted]	[redacted]	[redacted]
Walden North Hydro (Page 31, Table 7)	[redacted]	[redacted]	[redacted]

Updated Table 2 Sechelt Creek EPA Renewal Cost-Effectiveness Benchmarks

	Levelized Energy Price ($2017/MWh)
Original EPA (if original EPA price is applied to entire renewal term)	[redacted]
IPP's Opportunity Cost (based on BC Border Sell Price)	[redacted]
BC Hydro's Opportunity Cost	
Using BC Hydro Interim Market Assumption in all years	[redacted]
Using Preliminary Assessment of BC Wind Energy in 2027 and beyond	[redacted]
Renewed EPA	[redacted]

[2] The Brown Lake hydro facility is estimated to provide 6 MW of dependable capacity. Reflecting the long-term value of this capacity would increase BC Hydro's opportunity costs by approximately $[redacted]-$[redacted]/MWh.

Updated Table 3 Brown Lake EPA Renewal Cost-Effectiveness Benchmarks

	Levelized Energy Price ($2017/MWh)
Original EPA (if original EPA price is applied to entire renewal term)	[redacted]
IPP's Opportunity Cost (based on BC Border Sell Price)	[redacted]
BC Hydro's Opportunity Cost[3]	
Using BC Hydro Interim Market Assumption in all years	[redacted]
Using Preliminary Assessment of BC Wind Energy in 2027 and beyond	[redacted]
Renewed EPA	[redacted]

Updated Table 4 Walden North EPA Renewal Cost-Effectiveness Benchmarks

	Levelized Energy Price ($2017/MWh)
Original EPA applied to the renewal term	[redacted]
Original EPA offset by the Forbearance fee applied for the renewal term	[redacted]
IPP's Opportunity Cost (based on BC Border Sell Price)	[redacted]
BC Hydro's Opportunity Cost	
Using BC Hydro Interim Market Assumption in all years	[redacted]
Using Preliminary Assessment of BC Wind Energy in 2027 and beyond	[redacted]
Renewed EPA	[redacted]

[3] The Brown Lake hydro facility is estimated to provide 6 MW of dependable capacity. Reflecting the long-term value of this capacity would increase BC Hydro's opportunity costs by approximately $[redacted]-$[redacted]/MWh.

6.0 Reference: Exhibit B-5, BCUC 1.8.1, 1.11.2.2.1 and 1.21.1
Exhibit B-7, CEC 1.4.3
Exhibit B-1, pages 9 (Table 1) 12 (Table 3). 19 (Table 5) and 31 (Table 7)

In response to the first round of interrogatories, BC Hydro has provided a more recent Market Price Forecast (BCUC 1.21.1 and CEC 1.4.3) and a new Load/Resource Balance (BCUC 1.11.2.2.1). Also, BC Hydro has revised its opportunity cost calculations with respect to specific EPAs and indicated that the value for Brown Lake did not include any value for the dependable capacity provided (BCUC 1.8.1)

2.6.2 Based on these updates please provide revised versions of Tables 3, 5 and 9 using the approach in the Application (per pages 8-9) for evaluating energy but using the updated values for Market Prices (during surplus periods), the revised dates for the applicability of DSM & EPAs versus Greenfield IPPs as the basis for LRMC (per BCUC 1.11.2.2.1) plus the revisions noted in BCUC 1.8.1.

2.6.2.1 Similar to the text provided in Exhibit B-1 at pages 12 (lines 6-8), 19 (lines 12-14) and 31 (lines 3-5), please comment as to whether the levelized energy price for each EPA is above or below BC Hydro Opportunity Cost values set out in response to part (2) above.

RESPONSE:

Please refer to BC Hydro's response to BCOAPO IR 2.6.2 for the requested comparison based on revised analysis of BC Hydro's opportunity cost and the IPP's opportunity cost that includes updates to a number of inputs, including the LRB, the market price forecast and a preliminary assessment of the cost of wind energy.

6.0 Reference: Exhibit B-5, BCUC 1.8.1, 1.11.2.2.1 and 1.21.1
Exhibit B-7, CEC 1.4.3
Exhibit B-1, pages 9 (Table 1) 12 (Table 3). 19 (Table 5) and 31 (Table 7)

In response to the first round of interrogatories, BC Hydro has provided a more recent Market Price Forecast (BCUC 1.21.1 and CEC 1.4.3) and a new Load/Resource Balance (BCUC 1.11.2.2.1). Also, BC Hydro has revised its opportunity cost calculations with respect to specific EPAs and indicated that the value for Brown Lake did not include any value for the dependable capacity provided (BCUC 1.8.1)

2.6.3 What are the levelized prices for each of the three EPA renewals for the period up to (and including) 2026?

RESPONSE:

This response includes commercially sensitive information which has been redacted in the public version of the response as public disclosure could impact BC Hydro's and the IPP's commercial interests related to EPAs.

BC Hydro notes that the requested comparison is not appropriate for determining the cost effectiveness of the EPA renewals in the Application because:

- **It does not reflect the price or value of the energy from each facility over the entire term of the EPAs; and**
- **The levelized market price does not reflect the monthly shape of the energy associated with each EPA renewal.**

However, to be responsive BC Hydro provides the levelized EPA prices and market prices (based on the BC Border Sell price) over the period 2018 to 2026 in the table below. The values show that over this period the levelized market price is less than the levelized EPA prices of the three EPA renewals in this Application.

Table 1 Levelized Price Comparison over 2018-2026 (2017$/MWh)

EPA	Levelized EPA Price (over 2018-2026)	Levelized Market Price (over 2018-2026)
Sechelt Creek Hydro	[redacted]	[redacted]
Brown Lake Hydro	[redacted]	
Walden North Hydro	[redacted]	

6.0 Reference: Exhibit B-5, BCUC 1.8.1, 1.11.2.2.1 and 1.21.1
Exhibit B-7, CEC 1.4.3
Exhibit B-1, pages 9 (Table 1) 12 (Table 3). 19 (Table 5) and 31 (Table 7)

In response to the first round of interrogatories, BC Hydro has provided a more recent Market Price Forecast (BCUC 1.21.1 and CEC 1.4.3) and a new Load/Resource Balance (BCUC 1.11.2.2.1). Also, BC Hydro has revised its opportunity cost calculations with respect to specific EPAs and indicated that the value for Brown Lake did not include any value for the dependable capacity provided (BCUC 1.8.1)

2.6.3 What are the levelized prices for each of the three EPA renewals for the period up to (and including) 2026?

2.6.3.1 In each case, please comment on how this value compares (i.e., is it higher or lower than) with BC Hydro's levelized cost for Market Purchases (based on the updated Market Price forecast) for the period up to (and including) 2026?

RESPONSE:

Please refer to BC Hydro's response to BCOAPO IR 2.6.3 for the requested comments.

7.0 Reference: Exhibit B-5, BCUC 1.8.4
Exhibit B-1, page 9 (Table 1) and Appendix B

The response to BCUC 1.8.4 states: "The $89/MWh estimate was a price signal to set the upper limit on DSM and EPA renewal acquisitions". It also states: "These LRMCs are now considered out of date."

2.7.1 Please confirm that the $89/MWh estimate for EPA renewals was developed at the time of the F2017-F2019 Revenue Requirements Application. If not, when was it developed?

RESPONSE:

The $89/MWh benchmark for EPA renewals was developed initially in the 2013 IRP, and was described as a range of $85-100/MWh (fiscal 2013$).The estimate was revised to the low end of the range ($85/MWh fiscal 2015$) in an evidentiary update provided in the 2015 Rate Design Application based upon updated information on both the reduced need for new resources and the anticipated costs of IPP EPA renewals. The $89/MWh estimate used in this Application is consistent with previous estimates listed above after consideration of inflation.

7.0 Reference: Exhibit B-5, BCUC 1.8.4
Exhibit B-1, page 9 (Table 1) and Appendix B

The response to BCUC 1.8.4 states: "The $89/MWh estimate was a price signal to set the upper limit on DSM and EPA renewal acquisitions". It also states: "These LRMCs are now considered out of date."

2.7.2 Based on its experience to date in renegotiating EPA renewals, does BC Hydro consider is $89 / MWh (2017$) to still be an appropriate cost effectiveness benchmark for EPA renewals?

RESPONSE:

The $89/MWh is outdated. However, BC Hydro notes that we do not expect to acquire all available resources up to this benchmark, nor do we expect this price to be the clearing price.

BC Hydro does not have an updated benchmark price at this time. BC Hydro has adopted the use of market price as a conservative interim assumption for evaluating energy during surplus and deficit periods.

Please refer to BC Hydro response to BCOAPO IRs 2.2.2 and 2.3.3 for a description of the BC Hydro interim use of market price for evaluation. Please also refer to BC Hydro response to BCOAPO IR 2.6.1 for an updated Table 1 in the Application.

7.0 Reference: Exhibit B-5, BCUC 1.8.4
Exhibit B-1, page 9 (Table 1) and Appendix B

The response to BCUC 1.8.4 states: "The $89/MWh estimate was a price signal to set the upper limit on DSM and EPA renewal acquisitions". It also states: "These LRMCs are now considered out of date."

2.7.2 Based on its experience to date in renegotiating EPA renewals, does BC Hydro consider is $89 / MWh (2017$) to still be an appropriate cost effectiveness benchmark for EPA renewals?

2.7.2.1 If yes, why?

RESPONSE:

Please refer to BC Hydro's response to BCOAPO IR 2.7.2.

7.0 Reference: Exhibit B-5, BCUC 1.8.4
Exhibit B-1, page 9 (Table 1) and Appendix B

The response to BCUC 1.8.4 states: "The $89/MWh estimate was a price signal to set the upper limit on DSM and EPA renewal acquisitions". It also states: "These LRMCs are now considered out of date."

2.7.2 Based on its experience to date in renegotiating EPA renewals, does BC Hydro consider is $89 / MWh (2017$) to still be an appropriate cost effectiveness benchmark for EPA renewals?

2.7.2.2 If not, what would be a more appropriate benchmark?

RESPONSE:

Please refer to BC Hydro's response to BCOAPO IR 2.7.2.

7.0 Reference: Exhibit B-5, BCUC 1.8.4
Exhibit B-1, page 9 (Table 1) and Appendix B

The response to BCUC 1.8.4 states: "The $89/MWh estimate was a price signal to set the upper limit on DSM and EPA renewal acquisitions". It also states: "These LRMCs are now considered out of date."

2.7.3 For purposes of this Application, is $89/MWh still the best "price signal to set an upper limit on DSM and EPA renewal acquisitions" (per BCUC 1.8.4)?

RESPONSE:

At the time this Application was submitted, the LRMCs listed in Table 1 of the Application were seen as the appropriate benchmark for evaluating cost effectiveness during the relevant periods of applicability as determined by BC Hydro's net surplus or deficit position.

However, BC Hydro confirms that the $89/MWh benchmark price for EPA renewals is out of date and is not the appropriate price signal for an EPA negotiated today.

BC Hydro's LRB shows it will not need to acquire new energy resources for many years to come. Given potential policy changes that may affect BC Hydro arising from ongoing government review and other energy related policies, on top of technology cost uncertainty in the long term, BC Hydro is of the view that a conservative market-based valuation during periods of energy deficit is appropriate until new LRMCs are adopted. This conservative assumption will be used to evaluate cost effectiveness on a go-forward basis until new LRMCs are adopted. In addition, BC Hydro presents perspectives on benchmark prices relevant to this Application in our response to BCOAPO IR 2.6.1.

7.0 Reference: Exhibit B-5, BCUC 1.8.4
Exhibit B-1, page 9 (Table 1) and Appendix B

The response to BCUC 1.8.4 states: "The $89/MWh estimate was a price signal to set the upper limit on DSM and EPA renewal acquisitions". It also states: "These LRMCs are now considered out of date."

2.7.3 For purposes of this Application, is $89/MWh still the best "price signal to set an upper limit on DSM and EPA renewal acquisitions" (per BCUC 1.8.4)?

2.7.3.1 If yes, why?

RESPONSE:

Please refer to BC Hydro response to BCOAPO IR 2.7.3.

7.0 Reference: Exhibit B-5, BCUC 1.8.4
Exhibit B-1, page 9 (Table 1) and Appendix B

The response to BCUC 1.8.4 states: "The $89/MWh estimate was a price signal to set the upper limit on DSM and EPA renewal acquisitions". It also states: "These LRMCs are now considered out of date."

2.7.3 For purposes of this Application, is $89/MWh still the best "price signal to set an upper limit on DSM and EPA renewal acquisitions" (per BCUC 1.8.4)?

2.7.3.2 If no, what is the best value and please provide a revised version of Table 1 (Exhibit B-1).

RESPONSE:

Please refer to BC Hydro response to BCOAPO IR 2.7.3 and to BC Hydro response to BCOAPO IR 2.6.1 for an updated Table 1.

7.0 Reference: Exhibit B-5, BCUC 1.8.4
Exhibit B-1, page 9 (Table 1) and Appendix B

The response to BCUC 1.8.4 states: "The $89/MWh estimate was a price signal to set the upper limit on DSM and EPA renewal acquisitions". It also states: "These LRMCs are now considered out of date."

2.7.3 For purposes of this Application, is $89/MWh still the best "price signal to set an upper limit on DSM and EPA renewal acquisitions" (per BCUC 1.8.4)?

2.7.3.3 If no, please provide revised responses to BCOAPO 6.2 and 6.2.1 (above) using this revised value for the LRMC related to DSM and EPA Renewals.

RESPONSE:

Please refer to BC Hydro's response to BCOAPO IR 2.6.2 for revised analysis of BC Hydro's opportunity cost and the IPP's opportunity cost with updates to a number of inputs, including the LRB, the market price forecast and the cost of wind energy.

8.0 Reference: Exhibit B-5, BCUC 1.13, 1.14, 1.15 and 1.16
BCUC 1.8.1, 1.11.2.2.1 and 1.21.1
Exhibit B-7, CEC 1.4.3
Exhibit B-1, pages 9 (Table 1), 12 (Table 3), 19 (Table 5) and 31 (Table 7)

The response to BCUC 1.14.1 (footnote #4) indicates that the LRMC value of $104/MWh based on the cost of new wind resources is "now outdated".

2.8.1 Taking into account the information in the references provided for BCUC 1.13 through BCUC 1.16 as well as the BC Hydro's responses, what is BC Hydro's current view as to the cost of wind energy ($ 2017) at the point of interconnection and the resulting LRMC value ($ 2017)?

RESPONSE:

For BC Hydro's comments on the cost of wind energy, please refer to BC Hydro's response to BCUC IR 2.7.1.

BC Hydro does not have an updated LRMC corresponding to the cost of energy delivered to the Lower Mainland from B.C.-based greenfield IPPs. BC Hydro plans to update the LRMC in our next IRP.

8.0 Reference: Exhibit B-5, BCUC 1.13, 1.14, 1.15 and 1.16
BCUC 1.8.1, 1.11.2.2.1 and 1.21.1
Exhibit B-7, CEC 1.4.3
Exhibit B-1, pages 9 (Table 1), 12 (Table 3), 19 (Table 5) and 31 (Table 7)

The response to BCUC 1.14.1 (footnote #4) indicates that the LRMC value of $104/MWh based on the cost of new wind resources is "now outdated".

2.8.2 If BC Hydro has an updated value for the cost of wind energy (per BCOAPO 8.1 that differs from that used in the Application), then based on the responses to BCOAPO 7.3 through 7.3.2 and BCOAPO 8.1; the new Load/Resource Balance (BCUC 1.11.2.2.1) and the response to part (1), please provide an updated version of Table 1 from Exhibit B-1.

RESPONSE:

Please refer to BC Hydro's response to BCOAPO IR 2.6.1 for an updated Table 1 from Exhibit B-1.

8.0 Reference: Exhibit B-5, BCUC 1.13, 1.14, 1.15 and 1.16
BCUC 1.8.1, 1.11.2.2.1 and 1.21.1
Exhibit B-7, CEC 1.4.3
Exhibit B-1, pages 9 (Table 1), 12 (Table 3), 19 (Table 5) and 31 (Table 7)

The response to BCUC 1.14.1 (footnote #4) indicates that the LRMC value of $104/MWh based on the cost of new wind resources is "now outdated".

2.8.3 If BC Hydro has an updated value for the cost of wind energy (per BCOAPO 8.1), then based the responses to BCOAPO 8.2, the more recent Market Price Forecast (BCUC 1.21.1 and CEC 1.4.3) and the revised assumptions in BCUC 1.8.1, please provide revised versions of Tables 3, 5 and 9 from Exhibit B-1.

RESPONSE:

Please refer to BC Hydro's response to BCOAPO IR 2.6.2 for revised analysis of BC Hydro's opportunity cost and the IPP's opportunity cost with updates to a number of inputs, including the LRB, the market price forecast and a preliminary assessment of the cost of wind energy.

8.0 Reference: Exhibit B-5, BCUC 1.13, 1.14, 1.15 and 1.16
BCUC 1.8.1, 1.11.2.2.1 and 1.21.1
Exhibit B-7, CEC 1.4.3
Exhibit B-1, pages 9 (Table 1), 12 (Table 3), 19 (Table 5) and 31 (Table 7)

The response to BCUC 1.14.1 (footnote #4) indicates that the LRMC value of $104/MWh based on the cost of new wind resources is "now outdated".

2.8.3 If BC Hydro has an updated value for the cost of wind energy (per BCOAPO 8.1), then based the responses to BCOAPO 8.2, the more recent Market Price Forecast (BCUC 1.21.1 and CEC 1.4.3) and the revised assumptions in BCUC 1.8.1, please provide revised versions of Tables 3, 5 and 9 from Exhibit B-1.

2.8.3.1 Similar to the text provided in Exhibit B-1 at pages 12 (lines 6-8); 19 (lines 12-14) and 31 (lines 3-5), please comment as to whether the levelized energy price for each EPA is above or below the BC Hydro Opportunity Cost values set out in response to BCOAPO 8.3.

RESPONSE:

Please refer to BC Hydro's response to BCOAPO IR 2.6.2 for the requested comments based on revised analysis of BC Hydro's opportunity cost and the IPP's opportunity cost with updates to a number of inputs, including the LRB, the market price forecast and a preliminary assessment of the cost of wind energy.

8.0 Reference: Exhibit B-5, BCUC 1.13, 1.14, 1.15 and 1.16
BCUC 1.8.1, 1.11.2.2.1 and 1.21.1
Exhibit B-7, CEC 1.4.3
Exhibit B-1, pages 9 (Table 1), 12 (Table 3), 19 (Table 5) and 31 (Table 7)

The response to BCUC 1.14.1 (footnote #4) indicates that the LRMC value of $104/MWh based on the cost of new wind resources is "now outdated".

2.8.4 If BC Hydro does not have an updated view as to the cost of wind energy (per BCOAPO 8.1), then please provide the LRMC value ($ 2017) consistent with a wind energy cost of $60/MWh per the BCUC Waneta Decision (page 46).

RESPONSE:

Please see BC Hydro's response to BCOAPO IR 2.6.1.

8.0 Reference: Exhibit B-5, BCUC 1.13, 1.14, 1.15 and 1.16
BCUC 1.8.1, 1.11.2.2.1 and 1.21.1
Exhibit B-7, CEC 1.4.3
Exhibit B-1, pages 9 (Table 1), 12 (Table 3), 19 (Table 5) and 31 (Table 7)

The response to BCUC 1.14.1 (footnote #4) indicates that the LRMC value of $104/MWh based on the cost of new wind resources is "now outdated".

2.8.5 If BC Hydro does not have an updated view as to the cost of wind energy (per BCOAPO 8.1), then please provide revised versions of Tables 1, 3, 5 and 9 from Exhibit B-1 based on the more recent Market Price Forecast (BCUC 1.21.1 and CEC 1.4.3); the new Load/Resource Balance (BCUC 1.11.2.2.1), the revised assumptions in BCUC 1.8.1, the response to BCOAPO 7.3 and a wind energy cost of $60/MWh (per the Waneta Decision).

RESPONSE:

Please refer to BC Hydro's responses to BCOAPO IRs 2.6.1 and 2.6.2 for the requested tables including revised analysis of BC Hydro's opportunity cost and the IPP's opportunity cost with updates to a number of inputs, including the LRB, the market price forecast and a preliminary assessment of the cost of wind energy.

8.0 Reference: Exhibit B-5, BCUC 1.13, 1.14, 1.15 and 1.16
BCUC 1.8.1, 1.11.2.2.1 and 1.21.1
Exhibit B-7, CEC 1.4.3
Exhibit B-1, pages 9 (Table 1), 12 (Table 3), 19 (Table 5) and 31 (Table 7)

The response to BCUC 1.14.1 (footnote #4) indicates that the LRMC value of $104/MWh based on the cost of new wind resources is "now outdated".

2.8.5 If BC Hydro does not have an updated view as to the cost of wind energy (per BCOAPO 8.1), then please provide revised versions of Tables 1, 3, 5 and 9 from Exhibit B-1 based on the more recent Market Price Forecast (BCUC 1.21.1 and CEC 1.4.3); the new Load/Resource Balance (BCUC 1.11.2.2.1), the revised assumptions in BCUC 1.8.1, the response to BCOAPO 7.3 and a wind energy cost of $60/MWh (per the Waneta Decision).

2.8.5.1 Similar to the text provided in Exhibit B-1 at pages 12 (lines 6-8); 19 (lines 12-14) and 31 (lines 3-5), please comment as to whether the levelized energy price for each EPA is above or below BC Hydro Opportunity Cost values set out in response to BCOAPO 8.5.

RESPONSE:

Please refer to BC Hydro's response to BCOAPO IR 2.6.2 for the requested comparison based on revised analysis of BC Hydro's opportunity cost and the IPP's opportunity cost with updates to a number of inputs, including the LRB, the market price forecast and a preliminary assessment of the cost of wind energy.

9.0 Reference: Exhibit B-5, BCUC 1.20.1

2.9.1 Please explain more fully the basis on which wind energy is viewed as providing capacity benefits when considered on a portfolio basis but not when considered on its own.

RESPONSE:

BC Hydro's system capabilities for energy and for capacity have been assessed within the framework set by the Clean Energy Act and BC Hydro's reliability planning criteria.

Intermittent resources, such as wind energy, may not be available whenever required, and therefore, they cannot provide capacity benefit on their own. However, when aggregated with BC Hydro's large and reliable hydroelectric system, they contribute to meeting the generation capacity reliability planning criterion and therefore, their capacity contribution is considered on a portfolio basis.

10.0 Reference: Exhibit B-7, CEC 1.8.2 and 1.8.4

2.10.1 Is the levelized EPA price for the Sechelt Creek EPA for period up to F2033 greater or less than BC Hydro's DSM cost?

RESPONSE:

BC Hydro notes that the requested comparison is not appropriate for determining the cost effectiveness of the EPA renewals in the Application because:

- **It does not reflect the price or value of the energy from each facility over the entire term of the EPAs; and**
- **It does not compare two prices that apply for an equivalent duration.**

However, to be responsive BC Hydro confirms that the levelized EPA prices (over fiscal 2018 to fiscal 2033 and over fiscal 2018 to fiscal 2031) for the three EPA renewals in the Application are higher than the net levelized cost of the DSM portfolio (excluding codes & standards savings) over the next three years as set out in the F20-F21 RRA.

10.0 Reference: Exhibit B-7, CEC 1.8.2 and 1.8.4

2.10.2 Similarly, for each of the Brown Lake and Walden North EPAs, is the levelized EPA price for the period up to F2033 greater or less than BC Hydro's DSM cost?

RESPONSE:

Please refer to BC Hydro's response to BCOAPO IR 2.10.1.

10.0 Reference: Exhibit B-7, CEC 1.8.2 and 1.8.4

2.10.3 For each of the three EPAs, is the levelized EPA price for the period up to F2031 greater or less than BC Hydro's DSM cost? (Note: This question assumes that the new load resource balance provided in BCUC 1.11.2.2.1 indicates that DSM and EPA renewals are the marginal resource up to 2031 per BCOAPO 5.1. If a different date is appropriate please substitute)

RESPONSE:

Please refer to BC Hydro's response to BCOAPO IR 2.10.1.

11.0 Reference: Exhibit B-7, CEC 1.8.3
Exhibit B-1, pages 12 (Table 3), 19 (Table 5) and 31 (Table 7)

2.11.1 Based on the response to CEC 1.8.3, do the IPP Opportunity Cost values in Tables 3, 5 and 7 need to be updated?

RESPONSE:

The public version of this response has been redacted to maintain in confidence commercially sensitive information as public disclosure could impact the commercial interests of our suppliers and ongoing negotiations related to EPA renewals.

The requested updated information was provided in BC Hydro's response to BCUC CONF IR 1.2.1. For convenience, we have reproduced this table below. The supporting calculations are provided in the 'Summary' tab of the attached Excel spreadsheet to BC Hydro's response to BCUC IR 1.8.1.

Please also refer to BC Hydro's response to BCOAPO IR 2.6.2 for revised analysis of BC Hydro's opportunity cost and the IPP's opportunity cost with updates to a number of inputs, including the load resource balance, the market price forecast and the cost of wind energy.

Table 1 IPP Opportunity Cost (2017$/MWh)

	Application	Revised
Sechelt Creek	[redacted]	[redacted]
Brown Lake	[redacted]	[redacted]
Walden North	[redacted]	[redacted]

11.0 Reference: Exhibit B-7, CEC 1.8.3
Exhibit B-1, pages 12 (Table 3), 19 (Table 5) and 31 (Table 7)

2.11.1 Based on the response to CEC 1.8.3, do the IPP Opportunity Cost values in Tables 3, 5 and 7 need to be updated?

2.11.1.1 If yes, please provide revised tables.

RESPONSE:

Please refer to BC Hydro's response to BCOAPO IR 2.11.1 for the revised values of IPP opportunity cost.

Please also refer to BC Hydro's response to BCOAPO IR 2.6.2 for revised analysis of BC Hydro's opportunity cost and the IPP's opportunity cost with updates to a number of inputs, including the LRB, the market price forecast and a preliminary assessment of the cost of wind energy.

12.0 Reference: Exhibit B-5, BCUC 1.5.1 and 1.8.1

2.12.1 Please confirm that BC Hydro's Opportunity Cost with respect to Walden North does not include any allowance for the cost of an alternative diversion structure.

RESPONSE:

Confirmed. As discussed in BC Hydro's response to BCUC IR 1.5.1, BC Hydro has not carried out an assessment of available options for building an alternative diversion structure at this time.

13.0 Reference: Exhibit B-5, BCUC 1.21.1 and 1.21.2

2.13.1 For purposes of determining BC Hydro's Opportunity Costs for each EPA, please clarify whether firm and non-firm energy were valued differently during: i) the period of surplus when Market Prices applied; ii) during the period when the LRMC is based on DSM and EPA renewals and iii) during the period when the LRMC is based on Greenfield IPPs.

RESPONSE:

With respect to the market price and time of delivery adjustment assumptions discussed in BC Hydro's responses to BCUC IRs 1.21.1 and 1.21.2, BC Hydro provides the following:

(i) During the period of LRB surplus, firm and non-firm energy were both valued at market prices (ABB Spring 2016 reference case);

(ii) During the period when the LRMC was based on DSM and EPA renewals, firm energy was valued at the $89/MWh (as set out in Table 1 of the Application), and non-firm energy was valued at market; and

(iii) During the period when the LRMC was based on Greenfield IPPs, firm energy was valued at the $104/MWh (as set out in Table 1 of the Application) and non-firm energy was valued at market.

For all periods, the values were adjusted for time of delivery based on the Delivery Price Adjustment Table from the 2013 IRP.

13.0 Reference: Exhibit B-5, BCUC 1.21.1 and 1.21.2

2.13.1 For purposes of determining BC Hydro's Opportunity Costs for each EPA, please clarify whether firm and non-firm energy were valued differently during: i) the period of surplus when Market Prices applied; ii) during the period when the LRMC is based on DSM and EPA renewals and iii) during the period when the LRMC is based on Greenfield IPPs.

2.13.1.1 If yes, please explain the differences.

RESPONSE:

Please refer to BC Hydro's response to BCOAPO IR 2.13.1 for an explanation of the differences in how firm and non-firm energy were valued for the purposes of determining BC Hydro's opportunity costs in the Application.

14.0 Reference: Exhibit B-7, CEC 1.12.1

2.14.1 In the response reference is made to an "adjusted energy price". The same terminology is used in Footnotes 14, 20 and 29 of Exhibit B-1. Furthermore, footnote 29 makes reference to footnote 27 which is linked to BC Hydro's Opportunity Cost. In these footnotes, is the "adjusted energy price" referring to the BC Hydro Opportunity Cost as set out in Tables 3, 5 and 7 respectively?

RESPONSE:

The reference to footnote 27 in footnote 29 should be to footnote 28. Footnotes 14, 20, 28 and 29 refer to adjustments to the levelized EPA price rather than BC Hydro's opportunity cost. These adjustments account for additional costs to BC Hydro, such as network upgrade costs, that are not accounted for in the levelized EPA price.

These additional costs (shown as total costs and levelized adjustments to the levelized EPA price) were provided in footnotes 14, 20 and 28 rather than included in Tables 3, 5 and 7 because they were small and did not impact the conclusions in the Application regarding cost-effectiveness of the EPA renewals.

14.0 Reference: Exhibit B-7, CEC 1.12.1

2.14.1 In the response reference is made to an "adjusted energy price". The same terminology is used in Footnotes 14, 20 and 29 of Exhibit B-1. Furthermore, footnote 29 makes reference to footnote 27 which is linked to BC Hydro's Opportunity Cost. In these footnotes, is the "adjusted energy price" referring to the BC Hydro Opportunity Cost as set out in Tables 3, 5 and 7 respectively?

2.14.1.1 If not, how and where are the cost of the network upgrades reflected in Tables 3, 5 and 7?

RESPONSE:

Please refer to BC Hydro's response to BCOAPO IR 2.14.1 for an explanation of BC Hydro's treatment of the cost of network upgrades in the Application.

14.0 Reference: Exhibit B-7, CEC 1.12.1

2.14.1 In the response reference is made to an "adjusted energy price". The same terminology is used in Footnotes 14, 20 and 29 of Exhibit B-1. Furthermore, footnote 29 makes reference to footnote 27 which is linked to BC Hydro's Opportunity Cost. In these footnotes, is the "adjusted energy price" referring to the BC Hydro Opportunity Cost as set out in Tables 3, 5 and 7 respectively?

2.14.1.2 If Tables 3, 5 and 7 do not capture the cost of network upgrades, please indicate what the impact would be.

RESPONSE:

Please refer to BC Hydro's response to BCOAPO IR 2.14.1 for an explanation of BC Hydro's treatment of the cost of network upgrades in the Application.

24.0 Reference: **https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/electricity-alternative-energy/electricity/bc-hydro-review/bch19-158-ipp_report_february_11_2019.pdf**

2.24.1 Please confirm that the Zapped Report is included in the Evidentiary Record.

RESPONSE:

Not confirmed.

25.0 Reference: Zapped Report page 72

The only available solution to the financial impacts described comes when the EPAs associated with IPP projects generating Intermittent energy mature and BC Hydro has an opportunity to renew them. Energy has only one value and that is the market rate it can be traded at, the Mid-C rate. The financial issues described in this report will continue if Zapped: A Review of BC Hydro's Purchase of Power from Independent Power Producers | 73 BC Hydro adopts an EPA renewal strategy for IPP projects generating Intermittent energy at any price other than the existing Mid-C market rate.

2.25.1 Please comment on the above excerpt.

RESPONSE:

BC Hydro does not believe it is appropriate to comment on the conclusions or the methodology of the report. The Zapped Report was commissioned by the Minister of Energy, Mines & Petroleum Resources to review BC Hydro's power acquisitions and provides an independent assessment of government policy. While BC Hydro provided background data and information to the consultant, the consultant developed his own independent analysis, conclusions and recommendations.

Please refer to BC Hydro's response to BCUC IR 1.8.4, where we discuss BC Hydro's conservative interim assumption for evaluating energy during surplus and deficit periods.

25.0 Reference: Zapped Report page 72

The only available solution to the financial impacts described comes when the EPAs associated with IPP projects generating Intermittent energy mature and BC Hydro has an opportunity to renew them. Energy has only one value and that is the market rate it can be traded at, the Mid-C rate. The financial issues described in this report will continue if Zapped: A Review of BC Hydro's Purchase of Power from Independent Power Producers | 73 BC Hydro adopts an EPA renewal strategy for IPP projects generating Intermittent energy at any price other than the existing Mid-C market rate.

2.25.2 Please provide the Powerex (BC Hydro sales revenue) net average market sale price for sale of surplus power, excluding any freshet driven sales, and provide the top of range price and the bottom of range price for the same. Please provide confidentially if necessary.

RESPONSE:

BC Hydro is providing the requested information based fiscal 2018 actuals, as this is the most recent information available. BC Hydro understands the question to be asking for the minimum, average and maximum surplus sales price in the non-freshet period. For the purposes of this calculation, BC Hydro has assumed that the freshet period was from May 1 to July 31. However, BC Hydro notes that the freshet and freshet driven sales can occur outside of this period depending on system constraints and conditions, weather and market conditions.

Based on BC Hydro's monthly surplus sales volumes and costs in fiscal 2018, the weighted average market price of surplus sales, excluding sales during the freshet period was $34/MWh. The maximum average monthly price during this period was $42/MWh (in February 2018). The minimum average monthly price during this period was $22/MWh (in April 2017).

26.0 Reference: Zapped Report pages 69 and pages 72 and 73

BC Hydro has no obligation to this investor and certainly no obligation to pay more than the power is worth to ensure the future viability of the investment. The current renewal strategy (that has been used on the first set of renewals) considers an IPP's cost of service, including rate of return. This approach will not deliver energy to ratepayers at its real market value. BC Hydro is a Commercial Crown corporation and should do nothing more or less than act in a commercial manner. Any offer of a renewal rate that is negotiated based on the IPPs cost of service and a rate of return, rather than the market value of the energy produced, is a non-commercial act; it is somewhat equivalent to a guarantee of future profit for the out of province investor who now owns the project. BC Hydro should establish one reasonable commercial proposition, define that proposition in appropriate detail and present it as the only commercial offer BC Hydro will make to investors holding a maturing IPP generating Intermittent energy. The reasonable commercial proposal should acknowledge that if any Intermittent generation facility cannot make a profit being paid the full market value of the energy it produces, it is by definition not viable and should cease operations. The commercial proposal (Commercial Proposal) for the renewal of IPPs generating Intermittent energy should be along the following lines: The IPP energy is in the BC Hydro system, so transmission costs within BC are moot. BC Hydro should offer to buy the Firm energy at the appropriate Mid-C price for Firm energy (can consider a term price providing the term is no longer than the term of the EPA), and the Intermittent and non-Firm energy at the Mid-C spot price. Term of the EPA should be in the range of 5-10 years. All of this would need to consider how the resources would fit into BC Hydro long-term Resource Plan.

42) Recommendations

A. EPA Renewals

BC Hydro should offer the Commercial Proposal (or some variation thereto), as the only offer it will make to IPP investors. The Commercial Proposal should feature an offer to either: a. buy all energy at the appropriate Mid-C market rate, or b. have the investor trade its energy directly in the market, which is currently an option. Cost of shaping, firming and line losses are to the account of the investor. If the investor believes the project is not commercially viable, BC Hydro should offer to buy the assets for a small fraction of their original cost. If the project is not commercially viable and the asset sale offer is not acceptable to the investor, BC Hydro should allow the project to fail and the province should enforce remediation obligations

2.26.1 Please comment on the above recommendation and why BC Hydro is not following this line of reasoning.

RESPONSE:

BC Hydro does not believe it is appropriate to comment on the conclusions or the methodology of the report. The Zapped Report was commissioned by the Minister of Energy, Mines & Petroleum Resources to review BC Hydro's power acquisitions and provides an independent assessment of government policy. While BC Hydro provided background data and information to the consultant, the consultant developed his own independent analysis, conclusions and recommendations.

Please refer to BC Hydro's response to BCUC IR 1.8.4, where we discuss BC Hydro's conservative interim assumption for evaluating energy during surplus and deficit periods.

26.0 Reference: Zapped Report pages 69 and pages 72 and 73

BC Hydro has no obligation to this investor and certainly no obligation to pay more than the power is worth to ensure the future viability of the investment. The current renewal strategy (that has been used on the first set of renewals) considers an IPP's cost of service, including rate of return. This approach will not deliver energy to ratepayers at its real market value. BC Hydro is a Commercial Crown corporation and should do nothing more or less than act in a commercial manner. Any offer of a renewal rate that is negotiated based on the IPPs cost of service and a rate of return, rather than the market value of the energy produced, is a non-commercial act; it is somewhat equivalent to a guarantee of future profit for the out of province investor who now owns the project. BC Hydro should establish one reasonable commercial proposition, define that proposition in appropriate detail and present it as the only commercial offer BC Hydro will make to investors holding a maturing IPP generating Intermittent energy. The reasonable commercial proposal should acknowledge that if any Intermittent generation facility cannot make a profit being paid the full market value of the energy it produces, it is by definition not viable and should cease operations. The commercial proposal (Commercial Proposal) for the renewal of IPPs generating Intermittent energy should be along the following lines: The IPP energy is in the BC Hydro system, so transmission costs within BC are moot. BC Hydro should offer to buy the Firm energy at the appropriate Mid-C price for Firm energy (can consider a term price providing the term is no longer than the term of the EPA), and the Intermittent and non-Firm energy at the Mid-C spot price. Term of the EPA should be in the range of 5-10 years. All of this would need to consider how the resources would fit into BC Hydro long-term Resource Plan.

42) Recommendations

A. EPA Renewals

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2.26.2 If BC Hydro is taking into account the value of energy from these IPPs as a future resource in BC Hydro's long term resource

planning, please provide BC Hydro's quantitative evaluation of the value of acquiring energy under renewal before it is needed for domestic customers.

RESPONSE:

BC Hydro's quantitative evaluation of the value of acquiring energy under each EPA renewal, prior to such energy being needed to serve our load on the integrated system, is as reflected in our cost-effectiveness analysis and our assessment of BC Hydro's opportunity costs. Please refer to BC Hydro's response to BCUC IR 1.8.1 for further information concerning the assessment of BC Hydro's opportunity costs in the Application.

27.0 Reference: Exhibit B-7, CEC 1.1.2

1.0 Reference: Exhibit B-1, page 5

- The levelized prices of $[redacted], $[redacted] and $[redacted] (all in 2017$) over the term of the Sechelt Creek, Brown Lake, and Walden North EPA renewals, respectively, compare favourably to BC Hydro's opportunity cost of $[redacted], $[redacted] and $[redacted] (all in 2017$), for each facility respectively;

1.1.2 Please explain whether the comparison to BC Hydro's opportunity costs is the only test that is appropriate.

RESPONSE:

BC Hydro's opportunity cost is not the only cost-effectiveness benchmark considered by BC Hydro. As provided in our Application, BC Hydro's opportunity cost was viewed as the upper benchmark of cost-effectiveness and was, at the time, considered to be our avoided cost. In evaluating the EPA price, BC Hydro also took into consideration the IPP's opportunity cost (i.e., based on the BC Border Sell Price) as a cost-effectiveness benchmark. In addition, BC Hydro considered EPA renewal prices against an estimate of the IPP's cost of service (including a rate of return).

This approach is consistent with the Commission's determination, as provided in the Alcan decision, where the Commission in its evaluation of whether the 2007 Alcan EPA was in the public interest agreed that the value of the 2007 Alcan EPA lies somewhere between BC Hydro's avoided cost and Alcan's opportunity cost (see page 107 of the Commission's decision accompanying Order E-3-08).

2.27.1 Please confirm, or otherwise explain, that the Planning View of the Load Resource Balance drives the need for resource acquisitions such as IPP contract renewals.

RESPONSE:

Confirmed. Please also refer to BC Hydro's response to BCUC IR 1.11.1.

27.0 Reference: Exhibit B-7, CEC 1.1.2

1.0 Reference: Exhibit B-1, page 5

- The levelized prices of $[redacted], $[redacted] and $[redacted] (all in 2017$) over the term of the Sechelt Creek, Brown Lake, and Walden North EPA renewals, respectively, compare favourably to BC Hydro's opportunity cost of $[redacted], $[redacted] and $[redacted] (all in 2017$), for each facility respectively;

1.1.2 Please explain whether the comparison to BC Hydro's opportunity costs is the only test that is appropriate.

RESPONSE:

BC Hydro's opportunity cost is not the only cost-effectiveness benchmark considered by BC Hydro. As provided in our Application, BC Hydro's opportunity cost was viewed as the upper benchmark of cost-effectiveness and was, at the time, considered to be our avoided cost. In evaluating the EPA price, BC Hydro also took into consideration the IPP's opportunity cost (i.e., based on the BC Border Sell Price) as a cost-effectiveness benchmark. In addition, BC Hydro considered EPA renewal prices against an estimate of the IPP's cost of service (including a rate of return).

This approach is consistent with the Commission's determination, as provided in the Alcan decision, where the Commission in its evaluation of whether the 2007 Alcan EPA was in the public interest agreed that the value of the 2007 Alcan EPA lies somewhere between BC Hydro's avoided cost and Alcan's opportunity cost (see page 107 of the Commission's decision accompanying Order E-3-08).

2.27.2 Please confirm that for BC Hydro a deficit in the middle gap scenario of the Load Resource Balance creates the requirement to add energy and/or capacity depending on the circumstance.

RESPONSE:

Confirmed. Pursuant to subsection 6(2) of the CEA, BC Hydro is required to achieve electricity self-sufficiency by holding the rights to an amount of electricity that meets its electricity supply obligations under average water conditions from its Heritage Assets that are hydroelectric facilities, taking into account DSM and electricity solely from electricity generating facilities within the Province.

27.0 Reference: Exhibit B-7, CEC 1.1.2

1.0 Reference: Exhibit B-1, page 5

- The levelized prices of $[redacted], $[redacted] and $[redacted] (all in 2017$) over the term of the Sechelt Creek, Brown Lake, and Walden North EPA renewals, respectively, compare favourably to BC Hydro's opportunity cost of $[redacted], $[redacted] and $[redacted] (all in 2017$), for each facility respectively;

1.1.2 Please explain whether the comparison to BC Hydro's opportunity costs is the only test that is appropriate.

RESPONSE:

BC Hydro's opportunity cost is not the only cost-effectiveness benchmark considered by BC Hydro. As provided in our Application, BC Hydro's opportunity cost was viewed as the upper benchmark of cost-effectiveness and was, at the time, considered to be our avoided cost. In evaluating the EPA price, BC Hydro also took into consideration the IPP's opportunity cost (i.e., based on the BC Border Sell Price) as a cost-effectiveness benchmark. In addition, BC Hydro considered EPA renewal prices against an estimate of the IPP's cost of service (including a rate of return).

This approach is consistent with the Commission's determination, as provided in the Alcan decision, where the Commission in its evaluation of whether the 2007 Alcan EPA was in the public interest agreed that the value of the 2007 Alcan EPA lies somewhere between BC Hydro's avoided cost and Alcan's opportunity cost (see page 107 of the Commission's decision accompanying Order E-3-08).

2.27.3 Please confirm, or otherwise explain, that BC Hydro interprets the self-sufficiency requirement in the Clean Energy Act to mean that it must acquire clean energy from within BC, at any point at which the Planning Load Resource Balance – middle - registers a deficit.

RESPONSE:

Please refer to BC Hydro's response to CEC IR 2.27.2.

27.0 Reference: Exhibit B-7, CEC 1.1.2

1.0 Reference: Exhibit B-1, page 5

- The levelized prices of $[redacted], $[redacted] and $[redacted] (all in 2017$) over the term of the Sechelt Creek, Brown Lake, and Walden North EPA renewals, respectively, compare favourably to BC Hydro's opportunity cost of $[redacted], $[redacted] and $[redacted] (all in 2017$), for each facility respectively;

1.1.2 Please explain whether the comparison to BC Hydro's opportunity costs is the only test that is appropriate.

RESPONSE:

BC Hydro's opportunity cost is not the only cost-effectiveness benchmark considered by BC Hydro. As provided in our Application, BC Hydro's opportunity cost was viewed as the upper benchmark of cost-effectiveness and was, at the time, considered to be our avoided cost. In evaluating the EPA price, BC Hydro also took into consideration the IPP's opportunity cost (i.e., based on the BC Border Sell Price) as a cost-effectiveness benchmark. In addition, BC Hydro considered EPA renewal prices against an estimate of the IPP's cost of service (including a rate of return).

This approach is consistent with the Commission's determination, as provided in the Alcan decision, where the Commission in its evaluation of whether the 2007 Alcan EPA was in the public interest agreed that the value of the 2007 Alcan EPA lies somewhere between BC Hydro's avoided cost and Alcan's opportunity cost (see page 107 of the Commission's decision accompanying Order E-3-08).

2.27.4 Please confirm, or otherwise explain, that a modification to the self-sufficiency requirement (such as the use of self-sufficiency averaging over a period of time or a reduction in the % of self-sufficiency) could significantly diminish the economic value of the IPP energy to BC Hydro as a consequence of changes in timing of the need for energy supply.

RESPONSE:

BC Hydro has not undertaken an analysis to project the effect on the economic value of IPP energy to BC Hydro that may result from a modification to the self-sufficiency requirement.

Conceptually, a modification to the self-sufficiency requirement could result in market energy import becoming a resource option/alternative. This may affect BC Hydro's approach with regard to IPP energy acquisitions and renewals such that their competitiveness with alternative sources of energy may be different.

28.0 Reference: Exhibit B-7, CEC 1.1.1 and page 1.3.1 and Exhibit B-1, page 7

1.1.1 Please explain how the levelized prices over the term of each facility compares to their alternative opportunities.

RESPONSE:

Each IPP's alternative opportunity is reflected in its opportunity cost. For each of the facilities, the IPP's opportunity cost is lower than the levelized price over the term of its respective EPA.

Please also refer to BC Hydro's response to BCUC CONF IR 1.2.1.

1.3.1 Please explain what opportunity any of these EPA renewals would have in the alternative to renewing with BC Hydro that would enable them to receive $85/MWh.

RESPONSE:

Estimates for each of the IPP's opportunity costs is as provided on pages 12, 20 and 31 the Application. BC Hydro is not aware of an alternative that would allow the IPPs to receive $85/MWh. The Application does not suggest that there is such an alternative.

- IPP's Opportunity Cost – will generally reflect market prices; BC Hydro is using, as a proxy, the Mid-C electricity spot market value less costs for losses and wheeling to Mid-C (referred to as the BC Border sell price[6]);

2.28.1 Please comment on whether or not BC Hydro considers the potential for the self-sufficiency requirement in the Clean Energy Act to be reversed and/or modified to some extent as a possible scenario when it is renewing its IPP agreements.

RESPONSE:

At the time of negotiating the three EPAs in this Application, BC Hydro did not consider the potential for the self-sufficiency requirement to be changed in the future. BC Hydro notes that the uncertainties impacting long-term resource needs

are considered in the 2013 IRP, and these encompass uncertainties that could have a similar effect to a policy change related to the self-sufficiency requirement and the chance that resource requirements exceed or fall below expectations as a result of such changes.

The 2013 IRP considered the uncertainties and related risks for addressing resource needs over the longer term, including twelve key uncertainties identified in section 4.3.3 of the 2013 IRP. Three of the uncertainties considered were:

- **Load growth and the chance that load growth exceeds or falls below expectations;**
- **DSM and the chance that DSM savings exceed or fall below expectations; and**
- **Current and future regulatory and public policy developments such as: climate action and renewable portfolio standard targets.**

28.0 Reference: Exhibit B-7, CEC 1.1.1 and page 1.3.1 and Exhibit B-1, page 7

1.1.1 Please explain how the levelized prices over the term of each facility compares to their alternative opportunities.

RESPONSE:

Each IPP's alternative opportunity is reflected in its opportunity cost. For each of the facilities, the IPP's opportunity cost is lower than the levelized price over the term of its respective EPA.

Please also refer to BC Hydro's response to BCUC CONF IR 1.2.1.

1.3.1 Please explain what opportunity any of these EPA renewals would have in the alternative to renewing with BC Hydro that would enable them to receive $85/MWh.

RESPONSE:

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2.28.1 Please comment on whether or not BC Hydro considers the potential for the self-sufficiency requirement in the Clean Energy Act to be reversed and/or modified to some extent as a possible scenario when it is renewing its IPP agreements.

2.28.1.1 If yes, please explain how BC Hydro factors this consideration into its planning.

RESPONSE:

Please refer to BC Hydro's response to CEC IR 2.28.1.

28.0 Reference: Exhibit B-7, CEC 1.1.1 and page 1.3.1 and Exhibit B-1, page 7

1.1.1 Please explain how the levelized prices over the term of each facility compares to their alternative opportunities.

RESPONSE:

Each IPP's alternative opportunity is reflected in its opportunity cost. For each of the facilities, the IPP's opportunity cost is lower than the levelized price over the term of its respective EPA.

Please also refer to BC Hydro's response to BCUC CONF IR 1.2.1.

1.3.1 Please explain what opportunity any of these EPA renewals would have in the alternative to renewing with BC Hydro that would enable them to receive $85/MWh.

RESPONSE:

Estimates for each of the IPP's opportunity costs is as provided on pages 12, 20 and 31 the Application. BC Hydro is not aware of an alternative that would allow the IPPs to receive $85/MWh. The Application does not suggest that there is such an alternative.

- IPP's Opportunity Cost – will generally reflect market prices; BC Hydro is using, as a proxy, the Mid-C electricity spot market value less costs for losses and wheeling to Mid-C (referred to as the BC Border sell price[6]);

2.28.1 Please comment on whether or not BC Hydro considers the potential for the self-sufficiency requirement in the Clean Energy Act to be reversed and/or modified to some extent as a possible scenario when it is renewing its IPP agreements.

2.28.1.2 If not, please explain why not.

RESPONSE:

Please refer to BC Hydro's response to CEC IR 2.28.1.

28.0 Reference: Exhibit B-7, CEC 1.1.1 and page 1.3.1 and Exhibit B-1, page 7

1.1.1 Please explain how the levelized prices over the term of each facility compares to their alternative opportunities.

RESPONSE:

Each IPP's alternative opportunity is reflected in its opportunity cost. For each of the facilities, the IPP's opportunity cost is lower than the levelized price over the term of its respective EPA.

Please also refer to BC Hydro's response to BCUC CONF IR 1.2.1.

1.3.1 Please explain what opportunity any of these EPA renewals would have in the alternative to renewing with BC Hydro that would enable them to receive $85/MWh.

RESPONSE:

Estimates for each of the IPP's opportunity costs is as provided on pages 12, 20 and 31 the Application. BC Hydro is not aware of an alternative that would allow the IPPs to receive $85/MWh. The Application does not suggest that there is such an alternative.

- IPP's Opportunity Cost – will generally reflect market prices; BC Hydro is using, as a proxy, the Mid-C electricity spot market value less costs for losses and wheeling to Mid-C (referred to as the BC Border sell price[6]);

2.28.2 Do all the IPPs have a reasonable opportunity to sell their energy into the market?

RESPONSE:

Yes. Please refer to BC Hydro's response to BCUC IR 2.21.2 for a discussion regarding why BC Hydro does not believe there are barriers to accessing wholesale electricity markets.

28.0 Reference: Exhibit B-7, CEC 1.1.1 and page 1.3.1 and Exhibit B-1, page 7

1.1.1 Please explain how the levelized prices over the term of each facility compares to their alternative opportunities.

RESPONSE:

Each IPP's alternative opportunity is reflected in its opportunity cost. For each of the facilities, the IPP's opportunity cost is lower than the levelized price over the term of its respective EPA.

Please also refer to BC Hydro's response to BCUC CONF IR 1.2.1.

1.3.1 Please explain what opportunity any of these EPA renewals would have in the alternative to renewing with BC Hydro that would enable them to receive $85/MWh.

RESPONSE:

Estimates for each of the IPP's opportunity costs is as provided on pages 12, 20 and 31 the Application. BC Hydro is not aware of an alternative that would allow the IPPs to receive $85/MWh. The Application does not suggest that there is such an alternative.

- IPP's Opportunity Cost – will generally reflect market prices; BC Hydro is using, as a proxy, the Mid-C electricity spot market value less costs for losses and wheeling to Mid-C (referred to as the BC Border sell price[6]);

2.28.2 Do all the IPPs have a reasonable opportunity to sell their energy into the market?

2.28.2.1 If no, please elaborate on the restrictions or other factors that reduce or eliminate the individual IPP's opportunities to sell into the market.

RESPONSE:

Please refer to BC Hydro's response to BCUC IR 2.21.2.

28.0 Reference: Exhibit B-7, CEC 1.1.1 and page 1.3.1 and Exhibit B-1, page 7

1.1.1 Please explain how the levelized prices over the term of each facility compares to their alternative opportunities.

RESPONSE:

Each IPP's alternative opportunity is reflected in its opportunity cost. For each of the facilities, the IPP's opportunity cost is lower than the levelized price over the term of its respective EPA.

Please also refer to BC Hydro's response to BCUC CONF IR 1.2.1.

1.3.1 Please explain what opportunity any of these EPA renewals would have in the alternative to renewing with BC Hydro that would enable them to receive $85/MWh.

RESPONSE:

Estimates for each of the IPP's opportunity costs is as provided on pages 12, 20 and 31 the Application. BC Hydro is not aware of an alternative that would allow the IPPs to receive $85/MWh. The Application does not suggest that there is such an alternative.

- IPP's Opportunity Cost – will generally reflect market prices; BC Hydro is using, as a proxy, the Mid-C electricity spot market value less costs for losses and wheeling to Mid-C (referred to as the BC Border sell price[6]);

2.28.3 In addition to the higher price, what if any benefits do the IPPs receive by selling to BC Hydro vis-a-vis an alternative?

RESPONSE:

Some of the benefits that BC Hydro believes that IPPs may receive by selling to BC Hydro under the terms of the renewal EPAs as compared to selling to a third party are:

- **No need for the IPP to schedule and pay for transmission wheeling on the BC Hydro system or other transmission systems;**
- **Reduced risk of delivery of energy to the point of delivery because no additional transmission wheeling rights need to be obtained on other party's transmission systems;**
- **Certainty of energy sales under a long-term contract, and**
- **Low counter-party risk.**

28.0 Reference: Exhibit B-7, CEC 1.1.1 and page 1.3.1 and Exhibit B-1, page 7

1.1.1 Please explain how the levelized prices over the term of each facility compares to their alternative opportunities.

RESPONSE:

Each IPP's alternative opportunity is reflected in its opportunity cost. For each of the facilities, the IPP's opportunity cost is lower than the levelized price over the term of its respective EPA.

Please also refer to BC Hydro's response to BCUC CONF IR 1.2.1.

1.3.1 Please explain what opportunity any of these EPA renewals would have in the alternative to renewing with BC Hydro that would enable them to receive $85/MWh.

RESPONSE:

Estimates for each of the IPP's opportunity costs is as provided on pages 12, 20 and 31 the Application. BC Hydro is not aware of an alternative that would allow the IPPs to receive $85/MWh. The Application does not suggest that there is such an alternative.

- IPP's Opportunity Cost – will generally reflect market prices; BC Hydro is using, as a proxy, the Mid-C electricity spot market value less costs for losses and wheeling to Mid-C (referred to as the BC Border sell price[6]);

2.28.4 What, if any, risks do the IPPs experience by selling to BC Hydro vis-a-vis an alternative? Please elaborate and quantify any risks where possible.

RESPONSE:

BC Hydro has not conducted a detailed analysis of the risks that IPPs may experience if they sell to BC Hydro instead of to a third party, nor has BC Hydro quantified such risks. However, one of the key potential risks that IPPs may experience as a result of selling to BC Hydro under the terms of the renewal EPAs is lack of flexibility to sell to other third parties and to respond to high market prices (if available).

28.0 Reference: Exhibit B-7, CEC 1.1.1 and page 1.3.1 and Exhibit B-1, page 7

1.1.1 Please explain how the levelized prices over the term of each facility compares to their alternative opportunities.

RESPONSE:

Each IPP's alternative opportunity is reflected in its opportunity cost. For each of the facilities, the IPP's opportunity cost is lower than the levelized price over the term of its respective EPA.

Please also refer to BC Hydro's response to BCUC CONF IR 1.2.1.

1.3.1 Please explain what opportunity any of these EPA renewals would have in the alternative to renewing with BC Hydro that would enable them to receive $85/MWh.

RESPONSE:

Estimates for each of the IPP's opportunity costs is as provided on pages 12, 20 and 31 the Application. BC Hydro is not aware of an alternative that would allow the IPPs to receive $85/MWh. The Application does not suggest that there is such an alternative.

- IPP's Opportunity Cost – will generally reflect market prices; BC Hydro is using, as a proxy, the Mid-C electricity spot market value less costs for losses and wheeling to Mid-C (referred to as the BC Border sell price[6]);

2.28.5 What, if any risk, do the IPPs experience if terminated and not renewed vs. selling to BC Hydro under the renewal. Please elaborate and quantify any risk where possible

RESPONSE:

BC Hydro cannot speculate, with a reasonable degree of certainty, what each of the IPP's will experience and pursue if the EPA renewal is not accepted by the BCUC. Please refer to BC Hydro's response to CEC IR 2.28.4 in relation to what IPPs may experience if they sell to BC Hydro.

BC Hydro notes, however, that if the Walden North EPA renewal is not accepted, the existing original EPA and Forbearance Agreement will remain in effect.

29.0 Reference: Exhibit B-7, CEC 1.2.5

1.2.5 Does BC Hydro consider that it is in a favourable negotiating position with each of the IPPs? Please explain why or why not for each. Please provide the information confidentially if necessary.

RESPONSE:

Yes. With respect to IPPs on the integrated system, including the IPPs whose EPA renewals are the subject of this Application, in the current market environment (including the energy surplus) BC Hydro considers it has generally been in a favourable negotiating position. This has been the case particularly if an IPP is seeking a long-term agreement and does not wish to undertake the risks associated with selling electricity to someone else. However, BC Hydro notes that each bilateral negotiation is unique and that there can be additional factors which may influence the dynamics of the negotiations, such as relationships with First Nations and potential First Nations impacts, BC Hydro system considerations, and coordination of operations and water management issues.

2.29.1 Please identify the alternative customers that BC Hydro believes would be available to the IPPs.

RESPONSE:

Other than BC Hydro, IPPs could sell their energy to:

- **A marketer (such as Powerex) directly at the point of interconnection;**
- **Energy markets outside of B.C., such as Mid-C spot market and the Alberta market; and**
- **Wholesale customer loads within or outside of B.C. (such as FortisBC).**

29.0 Reference: Exhibit B-7, CEC 1.2.5

1.2.5 Does BC Hydro consider that it is in a favourable negotiating position with each of the IPPs? Please explain why or why not for each. Please provide the information confidentially if necessary.

RESPONSE:

Yes. With respect to IPPs on the integrated system, including the IPPs whose EPA renewals are the subject of this Application, in the current market environment (including the energy surplus) BC Hydro considers it has generally been in a favourable negotiating position. This has been the case particularly if an IPP is seeking a long-term agreement and does not wish to undertake the risks associated with selling electricity to someone else. However, BC Hydro notes that each bilateral negotiation is unique and that there can be additional factors which may influence the dynamics of the negotiations, such as relationships with First Nations and potential First Nations impacts, BC Hydro system considerations, and coordination of operations and water management issues.

2.29.2 Please elaborate on the risks that an IPP would face selling electricity to someone else.

RESPONSE:

BC Hydro cannot speculate, with a reasonable degree of certainty, what an IPP will experience if they wish to sell to a third party other than BC Hydro. However, please refer to BC Hydro's response to CEC IR 2.28.3 which outlines some of the benefits that an IPP may receive by selling to BC Hydro as compared to selling to another third party.

30.0 Reference: Exhibit B-7, CEC 1.3.2 and CEC 1.10.3

a) Lowest cost

In the 2013 IRP, all of the EPAs that had expiry dates in fiscal 2014 through to fiscal 2033 were assumed to be agreements eligible for renewal. As existing contracts have been expiring, each IPP project has been individually assessed. If BC Hydro and the IPP could reach agreement on a contract that was cost-effective in consideration of our long term system needs, BC Energy Objectives in the *Clean Energy Act*, as well as other project attributes (described further below), then the EPA may have been renewed provided that the renewal costs could be managed within the applicable financial framework.

BC Hydro expectations have been that the EPA renewal portfolio as a whole would likely have the lowest cost relative to other potential clean or renewable greenfield supply options. The EPAs within the EPA renewal portfolio did not expire/terminate at the same time and it was not possible to identify, prior to each of the negotiations being completed, which EPAs would have had the lowest cost. For example, an existing EPA contract price was not expected to factor into an IPP's cost of service going forward. BC Hydro has not developed a process to identify the lowest cost contracts within the EPA renewal portfolio prior to entering into negotiations with specific IPP projects;

1.10.3 Please provide the range of industry practice for capital and O&M costs.

RESPONSE:

BC Hydro does not have a specific 'range of overall industry practice' for O&M costs and capital costs for IPP facilities. In conducting our reviews, we reference historical cost data received from the IPP, data received from other IPPs, benchmark studies on utilities' operations, reports from utilities' management consultants as well as any other publicly available information.

BC Hydro then reviews the forecasted capital and O&M costs submitted by the IPP for its facility and assesses the overall reasonableness of these assumptions given the above and the project-related risks, such as the age, condition, location, access, and other risks associated with the facility. Based on the information available to us, an assessment is ultimately made on whether the IPP's forecasted capital and O&M costs fall within acceptable industry practice.

2.30.1 Does BC Hydro have a maximum supply that it is willing to renew from its IPP renewal portfolio?

RESPONSE:

No, BC Hydro does not have a maximum supply for EPA renewals. As discussed in BC Hydro's response to BCUC IR 1.42.1.1, BC Hydro seeks to renew expiring EPAs where it is cost-effective to do so. BC Hydro's 2013 IRP includes renewal assumptions (which are reflected in our most recent LRB) but these assumptions do not set targets or threshold amounts for the energy and capacity volumes for EPA renewals. These renewal assumptions have been estimates of what BC Hydro assumed at that time would be available for renewal at cost-effective prices.

30.0 Reference: Exhibit B-7, CEC 1.3.2 and CEC 1.10.3

a) Lowest cost

In the 2013 IRP, all of the EPAs that had expiry dates in fiscal 2014 through to fiscal 2033 were assumed to be agreements eligible for renewal. As existing contracts have been expiring, each IPP project has been individually assessed. If BC Hydro and the IPP could reach agreement on a contract that was cost-effective in consideration of our long term system needs, BC Energy Objectives in the *Clean Energy Act*, as well as other project attributes (described further below), then the EPA may have been renewed provided that the renewal costs could be managed within the applicable financial framework.

BC Hydro expectations have been that the EPA renewal portfolio as a whole would likely have the lowest cost relative to other potential clean or renewable greenfield supply options. The EPAs within the EPA renewal portfolio did not expire/terminate at the same time and it was not possible to identify, prior to each of the negotiations being completed, which EPAs would have had the lowest cost. For example, an existing EPA contract price was not expected to factor into an IPP's cost of service going forward. BC Hydro has not developed a process to identify the lowest cost contracts within the EPA renewal portfolio prior to entering into negotiations with specific IPP projects;

1.10.3 Please provide the range of industry practice for capital and O&M costs.

RESPONSE:

BC Hydro does not have a specific 'range of overall industry practice' for O&M costs and capital costs for IPP facilities. In conducting our reviews, we reference historical cost data received from the IPP, data received from other IPPs, benchmark studies on utilities' operations, reports from utilities' management consultants as well as any other publicly available information.

BC Hydro then reviews the forecasted capital and O&M costs submitted by the IPP for its facility and assesses the overall reasonableness of these assumptions given the above and the project-related risks, such as the age, condition, location, access, and other risks associated with the facility. Based on the information available to us, an assessment is ultimately made on whether the IPP's forecasted capital and O&M costs fall within acceptable industry practice.

2.30.1 Does BC Hydro have a maximum supply that it is willing to renew from its IPP renewal portfolio?

2.30.1.1 If yes, please provide.

RESPONSE:

Please refer to BC Hydro's response to CEC IR 2.30.1.

30.0 Reference: Exhibit B-7, CEC 1.3.2 and CEC 1.10.3

a) Lowest cost

In the 2013 IRP, all of the EPAs that had expiry dates in fiscal 2014 through to fiscal 2033 were assumed to be agreements eligible for renewal. As existing contracts have been expiring, each IPP project has been individually assessed. If BC Hydro and the IPP could reach agreement on a contract that was cost-effective in consideration of our long term system needs, BC Energy Objectives in the *Clean Energy Act*, as well as other project attributes (described further below), then the EPA may have been renewed provided that the renewal costs could be managed within the applicable financial framework.

BC Hydro expectations have been that the EPA renewal portfolio as a whole would likely have the lowest cost relative to other potential clean or renewable greenfield supply options. The EPAs within the EPA renewal portfolio did not expire/terminate at the same time and it was not possible to identify, prior to each of the negotiations being completed, which EPAs would have had the lowest cost. For example, an existing EPA contract price was not expected to factor into an IPP's cost of service going forward. BC Hydro has not developed a process to identify the lowest cost contracts within the EPA renewal portfolio prior to entering into negotiations with specific IPP projects;

1.10.3 Please provide the range of industry practice for capital and O&M costs.

RESPONSE:

BC Hydro does not have a specific 'range of overall industry practice' for O&M costs and capital costs for IPP facilities. In conducting our reviews, we reference historical cost data received from the IPP, data received from other IPPs, benchmark studies on utilities' operations, reports from utilities' management consultants as well as any other publicly available information.

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2.30.1 Does BC Hydro have a maximum supply that it is willing to renew from its IPP renewal portfolio?

2.30.1.2 If no, please explain why not.

RESPONSE:

Please refer to BC Hydro's response to CEC IR 2.30.1.

30.0 Reference: Exhibit B-7, CEC 1.3.2 and CEC 1.10.3

a) Lowest cost

In the 2013 IRP, all of the EPAs that had expiry dates in fiscal 2014 through to fiscal 2033 were assumed to be agreements eligible for renewal. As existing contracts have been expiring, each IPP project has been individually assessed. If BC Hydro and the IPP could reach agreement on a contract that was cost-effective in consideration of our long term system needs, BC Energy Objectives in the *Clean Energy Act*, as well as other project attributes (described further below), then the EPA may have been renewed provided that the renewal costs could be managed within the applicable financial framework.

BC Hydro expectations have been that the EPA renewal portfolio as a whole would likely have the lowest cost relative to other potential clean or renewable greenfield supply options. The EPAs within the EPA renewal portfolio did not expire/terminate at the same time and it was not possible to identify, prior to each of the negotiations being completed, which EPAs would have had the lowest cost. For example, an existing EPA contract price was not expected to factor into an IPP's cost of service going forward. BC Hydro has not developed a process to identify the lowest cost contracts within the EPA renewal portfolio prior to entering into negotiations with specific IPP projects;

1.10.3 Please provide the range of industry practice for capital and O&M costs.

RESPONSE:

BC Hydro does not have a specific 'range of overall industry practice' for O&M costs and capital costs for IPP facilities. In conducting our reviews, we reference historical cost data received from the IPP, data received from other IPPs, benchmark studies on utilities' operations, reports from utilities' management consultants as well as any other publicly available information.

BC Hydro then reviews the forecasted capital and O&M costs submitted by the IPP for its facility and assesses the overall reasonableness of these assumptions given the above and the project-related risks, such as the age, condition, location, access, and other risks associated with the facility. Based on the information available to us, an assessment is ultimately made on whether the IPP's forecasted capital and O&M costs fall within acceptable industry practice.

2.30.2 Is the implication in the above two paragraphs that BC Hydro has not evaluated individual IPPs in the renewable portfolio against each other in order to maximize cost effectiveness?

RESPONSE:

Yes. As stated in BC Hydro's response to BCUC IR 1.42.1.1:

> **"BC Hydro generally has assessed each individual IPP project as its EPA approached the end of its contract term; however, for those EPAs that have "evergreen" provisions, BC Hydro has been deferring renewal of EPAs for the smaller hydroelectric projects and focusing on negotiation of EPA renewals with larger hydroelectric projects such as the Akolkolex, Soo River, Boston Bar and Doran Taylor projects which have already been executed and accepted by the Commission.**
>
> **Given the above, as an EPA for a larger hydroelectric project approached the end of its original contract term, our negotiations with the individual IPP focused on assessing the individual facility and its cost structure and risks, and achieving a cost effective renewal contract in the context of the key principle of reducing near term costs while maintaining cost effective options for long term need (Recommended Action 4 from the 2013 IRP). BC Hydro has been renewing individual EPAs where it has been cost effective to do so and has been guided by the 2013 IRP EPA renewal assumptions."**

30.0 Reference: Exhibit B-7, CEC 1.3.2 and CEC 1.10.3

a) Lowest cost

In the 2013 IRP, all of the EPAs that had expiry dates in fiscal 2014 through to fiscal 2033 were assumed to be agreements eligible for renewal. As existing contracts have been expiring, each IPP project has been individually assessed. If BC Hydro and the IPP could reach agreement on a contract that was cost-effective in consideration of our long term system needs, BC Energy Objectives in the *Clean Energy Act*, as well as other project attributes (described further below), then the EPA may have been renewed provided that the renewal costs could be managed within the applicable financial framework.

BC Hydro expectations have been that the EPA renewal portfolio as a whole would likely have the lowest cost relative to other potential clean or renewable greenfield supply options. The EPAs within the EPA renewal portfolio did not expire/terminate at the same time and it was not possible to identify, prior to each of the negotiations being completed, which EPAs would have had the lowest cost. For example, an existing EPA contract price was not expected to factor into an IPP's cost of service going forward. BC Hydro has not developed a process to identify the lowest cost contracts within the EPA renewal portfolio prior to entering into negotiations with specific IPP projects;

1.10.3 Please provide the range of industry practice for capital and O&M costs.

RESPONSE:

BC Hydro does not have a specific 'range of overall industry practice' for O&M costs and capital costs for IPP facilities. In conducting our reviews, we reference historical cost data received from the IPP, data received from other IPPs, benchmark studies on utilities' operations, reports from utilities' management consultants as well as any other publicly available information.

BC Hydro then reviews the forecasted capital and O&M costs submitted by the IPP for its facility and assesses the overall reasonableness of these assumptions given the above and the project-related risks, such as the age, condition, location, access, and other risks associated with the facility. Based on the information available to us, an assessment is ultimately made on whether the IPP's forecasted capital and O&M costs fall within acceptable industry practice.

2.30.2 Is the implication in the above two paragraphs that BC Hydro has not evaluated individual IPPs in the renewable portfolio against each other in order to maximize cost effectiveness?

2.30.2.1 If yes, when BC Hydro is renewing EPA's with a later renewal date does it incorporate the supply provided from earlier

renewals so that it does not overcommit to supply? Please explain

RESPONSE:

Generally yes. BC Hydro incorporates supply from earlier approved renewals into the "before planned resources" LRB. The LRB will be updated if the volume of energy materially changes the "before planned resources" LRB, otherwise this will be done at a later date with other updates.

30.0 Reference: Exhibit B-7, CEC 1.3.2 and CEC 1.10.3

a) Lowest cost

In the 2013 IRP, all of the EPAs that had expiry dates in fiscal 2014 through to fiscal 2033 were assumed to be agreements eligible for renewal. As existing contracts have been expiring, each IPP project has been individually assessed. If BC Hydro and the IPP could reach agreement on a contract that was cost-effective in consideration of our long term system needs, BC Energy Objectives in the *Clean Energy Act*, as well as other project attributes (described further below), then the EPA may have been renewed provided that the renewal costs could be managed within the applicable financial framework.

BC Hydro expectations have been that the EPA renewal portfolio as a whole would likely have the lowest cost relative to other potential clean or renewable greenfield supply options. The EPAs within the EPA renewal portfolio did not expire/terminate at the same time and it was not possible to identify, prior to each of the negotiations being completed, which EPAs would have had the lowest cost. For example, an existing EPA contract price was not expected to factor into an IPP's cost of service going forward. BC Hydro has not developed a process to identify the lowest cost contracts within the EPA renewal portfolio prior to entering into negotiations with specific IPP projects;

1.10.3 Please provide the range of industry practice for capital and O&M costs.

RESPONSE:

BC Hydro does not have a specific 'range of overall industry practice' for O&M costs and capital costs for IPP facilities. In conducting our reviews, we reference historical cost data received from the IPP, data received from other IPPs, benchmark studies on utilities' operations, reports from utilities' management consultants as well as any other publicly available information.

BC Hydro then reviews the forecasted capital and O&M costs submitted by the IPP for its facility and assesses the overall reasonableness of these assumptions given the above and the project-related risks, such as the age, condition, location, access, and other risks associated with the facility. Based on the information available to us, an assessment is ultimately made on whether the IPP's forecasted capital and O&M costs fall within acceptable industry practice.

2.30.3 Please confirm, or otherwise explain, that BC Hydro has the expectation that the EPA renewal portfolio as a whole would be cost effective relative to other potential clean or renewable greenfield supply options based on its understanding of and ability to estimate the costs of greenfield operations and the renewable portfolio supply operations. And please supply the quantitative evidence to support the conclusion.

RESPONSE:

The 2013 IRP recommended action to pursue cost-effective EPA renewals was established, taking into account the assumed costs and expected benefits (e.g., financial, social, environmental and system impacts) of EPA renewals in comparison with other potential resource options, which included DSM, investment in existing BC Hydro generation assets and renewable greenfield IPPs. Based on the benchmark LRMC prices for DSM and EPA renewals and greenfield IPP supply established in the 2013 IRP, the EPA renewal portfolio in general represented cost-effective potential resources compared to greenfield IPP resources.

In implementing the 2013 IRP recommended action for EPA renewals, IPP projects have been individually assessed for need and for cost-effectiveness as they come up for renewal. In general, the assessment of cost-effectiveness has been relative to BC Hydro's opportunity cost which considered market prices during periods of LRB surplus and the benchmark LRMC prices in periods of LRB deficit.

As discussed in BC Hydro's response to BCUC IR 1.8.4, BC Hydro's last estimate of the cost of greenfield IPPs (i.e., LRMC) is out of date. A preliminary analysis of wind costs in B.C. suggest costs have decreased. BC Hydro has adopted an interim assumption to use market price to value energy during surplus and deficit periods.

Please refer to BC Hydro's response to BCUC confidential IR 2.9.1 for the quantitative analysis of the cost-effectiveness of the three EPA renewals in this Application relative to BC Hydro's opportunity cost reflecting the interim market approach discussed above and the approach used in the Application with a number of different scenarios for the potential cost of greenfield IPPs.

30.0 Reference: Exhibit B-7, CEC 1.3.2 and CEC 1.10.3

a) Lowest cost

In the 2013 IRP, all of the EPAs that had expiry dates in fiscal 2014 through to fiscal 2033 were assumed to be agreements eligible for renewal. As existing contracts have been expiring, each IPP project has been individually assessed. If BC Hydro and the IPP could reach agreement on a contract that was cost-effective in consideration of our long term system needs, BC Energy Objectives in the *Clean Energy Act*, as well as other project attributes (described further below), then the EPA may have been renewed provided that the renewal costs could be managed within the applicable financial framework.

BC Hydro expectations have been that the EPA renewal portfolio as a whole would likely have the lowest cost relative to other potential clean or renewable greenfield supply options. The EPAs within the EPA renewal portfolio did not expire/terminate at the same time and it was not possible to identify, prior to each of the negotiations being completed, which EPAs would have had the lowest cost. For example, an existing EPA contract price was not expected to factor into an IPP's cost of service going forward. BC Hydro has not developed a process to identify the lowest cost contracts within the EPA renewal portfolio prior to entering into negotiations with specific IPP projects;

1.10.3 Please provide the range of industry practice for capital and O&M costs.

RESPONSE:

BC Hydro does not have a specific 'range of overall industry practice' for O&M costs and capital costs for IPP facilities. In conducting our reviews, we reference historical cost data received from the IPP, data received from other IPPs, benchmark studies on utilities' operations, reports from utilities' management consultants as well as any other publicly available information.

BC Hydro then reviews the forecasted capital and O&M costs submitted by the IPP for its facility and assesses the overall reasonableness of these assumptions given the above and the project-related risks, such as the age, condition, location, access, and other risks associated with the facility. Based on the information available to us, an assessment is ultimately made on whether the IPP's forecasted capital and O&M costs fall within acceptable industry practice.

2.30.4 Why is BC Hydro unable to make educated estimates as to the likely renewal prices of an individual IPP based on the cost and terms of the Utility's past agreements with the IPP, BC Hydro's understanding of interest rates, estimated fixed and variable costs, and other considerations. Please provide specifics as to the types of information that BC Hydro would be unable to make an estimate of and explain why an estimate is not possible.

RESPONSE:

While it is possible for BC Hydro to "guess" the cost of service of an individual IPP, the accuracy of such an estimate would be limited in value for decision-making purposes with respect to BC Hydro's portfolio of EPAs.

BC Hydro would require further details from the IPP regarding facility condition, historical capital and operating costs to develop an estimate of the IPP's cost of service within a reasonable level of accuracy. Both capital and operating costs are difficult to predict without information provided by the IPP. For example, the level of capital investment required in a given facility will be dependent upon the condition of the facility, which can only be determined through an examination of the existing facility combined with a review of maintenance records. In addition, operating costs for hydro facilities will vary widely, depending on the condition and location of the facility, access to labour, accessibility of the site, local property taxes, etc.

31.0 Reference: Exhibit B-7, CEC 1.3.2

> **b) Greatest certainty of continued operation**
>
> **As part of the EPA renewal process, BC Hydro requested that IPPs have a third-party engineering consultant prepare a condition assessment for the facility. BC Hydro reviewed the condition assessment and in some cases asked a second third-party consultant to review the condition assessment. In general, BC Hydro sought to confirm that the IPP facility was in good condition and had a good likelihood of continued operation based on the current condition, proposed facility plans, and term of the renewed EPA. BC Hydro did not compare each facility's assessment to other potential EPA renewals.**
>
> **Sechelt Creek, Brown Lake and Walden North submitted condition assessments for their respective facilities. As stated in the Filing (sections 4.7(d), 5.7(d) and 6.7(d), respectively), all facilities were assessed to be in "satisfactory" or "good" condition with a good likelihood of continued operation over the term of each project's renewed EPA; and**

2.31.1 'Greatest certainty of continued operation' implies to the CEC that the IPPs are evaluated against each other. Please comment.

RESPONSE:

The section heading entitled "Greatest certainty of continued operation" is not intended to imply that the IPPs are evaluated against each other.

Please refer to BC Hydro's response to BCUC IR 1.42.1.1 which provides a discussion regarding BC Hydro's approach to EPA renewals since the 2013 IRP.

31.0 Reference: Exhibit B-7, CEC 1.3.2

> **b) Greatest certainty of continued operation**
>
> **As part of the EPA renewal process, BC Hydro requested that IPPs have a third-party engineering consultant prepare a condition assessment for the facility. BC Hydro reviewed the condition assessment and in some cases asked a second third-party consultant to review the condition assessment. In general, BC Hydro sought to confirm that the IPP facility was in good condition and had a good likelihood of continued operation based on the current condition, proposed facility plans, and term of the renewed EPA. BC Hydro did not compare each facility's assessment to other potential EPA renewals.**
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> **Sechelt Creek, Brown Lake and Walden North submitted condition assessments for their respective facilities. As stated in the Filing (sections 4.7(d), 5.7(d) and 6.7(d), respectively), all facilities were assessed to be in "satisfactory" or "good" condition with a good likelihood of continued operation over the term of each project's renewed EPA; and**

2.31.2 Please provide any and all thresholds that the utility utilizes in accepting condition as adequate for renewal.

RESPONSE:

BC Hydro does not utilize any specific thresholds when assessing condition assessment reports prepared for IPP facilities. Generally, if an engineering consultant (qualified as a professional engineer) is retained to perform a condition assessment report, BC Hydro reviews the report and relies on the professional opinion of the engineering consultant who has prepared the assessment.
BC Hydro considers the condition of the plant to be adequate for renewals where the assessment concludes that a plant is in good condition and has a good likelihood of continued operation based on the current conditions, proposed facility maintenance plans, and the term of the renewed EPA.

Please also refer to BC Hydro's response to CEC IR 1.10.5.

32.0 Reference: Exhibit B-7, CEC 1.16.4

1.16.4 Please provide quantitative context for size of risks faced by the IPP including:

a) Water rental and property tax increases
b) Equipment failure
c) Diversion restrictions
d) Reduced water flows

RESPONSE:

BC Hydro does not complete a risk assessment for all of the risks, and a quantification of those risks, that may arise for an IPP during the term of its EPA with BC Hydro. As discussed in the Application, risks associated with the IPP facility are borne by the IPP. If a risk materializes, then this risk is managed and assumed by the IPP.

Realization of a risk borne by the IPP does not affect the energy price included in the EPA. For these EPA renewals, if an IPP is unable to deliver energy as specified in the EPA, due to a risk materializing, BC Hydro is not obligated to pay the IPP.

2.32.1 Are there any penalties in favour of BC Hydro if the IPP is not able to deliver energy as specified? Please explain.

RESPONSE:

No; for the Walden North and Sechelt Creek EPAs. Yes; for the Brown Lake EPA as it includes a payment adjustment if the IPP does not deliver all of the energy that BC Hydro has the right to require in certain circumstances.

32.0 Reference: Exhibit B-7, CEC 1.16.4

1.16.4 Please provide quantitative context for size of risks faced by the IPP including:

a) Water rental and property tax increases
b) Equipment failure
c) Diversion restrictions
d) Reduced water flows

RESPONSE:

BC Hydro does not complete a risk assessment for all of the risks, and a quantification of those risks, that may arise for an IPP during the term of its EPA with BC Hydro. As discussed in the Application, risks associated with the IPP facility are borne by the IPP. If a risk materializes, then this risk is managed and assumed by the IPP.

Realization of a risk borne by the IPP does not affect the energy price included in the EPA. For these EPA renewals, if an IPP is unable to deliver energy as specified in the EPA, due to a risk materializing, BC Hydro is not obligated to pay the IPP.

2.32.2 Are there any penalties in favour of the IPPs if BC Hydro is unable to accept the energy as specified in the EPA? Please explain.

RESPONSE:

In general terms, if there is a "BC Hydro System Constraint", as defined in each of the EPAs, and the IPPs are able to generate and deliver energy to the point of interconnection, then BC Hydro has an obligation to pay for certain energy. This description is a simplification of the EPA terms and the details of this obligation are laid out in each of the EPAs, which can be found in section 5.8 of the Walden North EPA and section 5.7 of the Brown Lake and Sechelt Creek EPAs.

33.0 Reference: Exhibit B-7, CEC 1.17.5

(d) Technical

A consulting firm retained by the Brown Lake IPP conducted a condition assessment of the Brown Lake facility and concluded that "all mechanical equipment that have been inspected and necessary for the operation of the power plant are in very good condition and all civil equipment that have been inspected and necessary for the operation of the power plant are in apparent good condition." The consultant's report further states that "proper operation of power plant can be assured for [redacted]". The Brown Lake IPP also provided a Long Term Operating Reliability Report that concluded "the Brown Lake Generating Station has a proven historical record of reliable operation which can be maintained through adherence to the preventive maintenance program, proactive repair to damaged mechanical equipment, replacement and refurbishment of aging electrical components, and modernization of the control and protection systems. If these conditions are maintained, similar levels of reliability can be achievable for an additional 40 years."

1.17.5 What party conducted the Long Term Operating Reliability Report?

RESPONSE:

The Brown Lake IPP owner, Innergex Renewable Energy Inc., prepared the Long Term Reliability Report. As this report was prepared by the IPP, it is not considered an independent third-party assessment. A copy of this report is attached on a confidential basis as it contains commercially sensitive material to the IPP.

2.33.1 The Brown Lake Long Term Reliability Report is not an independent third party assessment. How does BC Hydro factor this report into its decision-making? Does it weight it differently than an independent third party report? Please explain.

RESPONSE:

The Brown Lake Long Term Reliability Report was prepared by a professional engineer. As professional engineers are bound by the *Engineers and Geoscientists Act*, as well as the Bylaws and Code of Ethics of the Association of Professional Engineers and Geoscientists of the Province of B.C., the regulating

and governing body, BC Hydro is of the view it can generally rely on the work of the professional engineer.

BC Hydro took into consideration the fact that the Brown Lake Long Term Reliability Report was not prepared by a third-party. However, BC Hydro's own internal review did not identify significant questions or concerns with the report.

33.0 Reference: Exhibit B-7, CEC 1.17.5

(d) Technical

A consulting firm retained by the Brown Lake IPP conducted a condition assessment of the Brown Lake facility and concluded that "all mechanical equipment that have been inspected and necessary for the operation of the power plant are in very good condition and all civil equipment that have been inspected and necessary for the operation of the power plant are in apparent good condition." The consultant's report further states that "proper operation of power plant can be assured for [redacted]". The Brown Lake IPP also provided a Long Term Operating Reliability Report that concluded "the Brown Lake Generating Station has a proven historical record of reliable operation which can be maintained through adherence to the preventive maintenance program, proactive repair to damaged mechanical equipment, replacement and refurbishment of aging electrical components, and modernization of the control and protection systems. If these conditions are maintained, similar levels of reliability can be achievable for an additional 40 years."

1.17.5 What party conducted the Long Term Operating Reliability Report?

RESPONSE:

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2.33.2 Please highlight any differences in what the Condition Assessment provided by the independent third party consultant determined and the Long Term Operating Reliability Report provided by Innergex. Please include significant differences in what they examined and differences in what they concluded, if any.

RESPONSE:

The public version of this response has been redacted to maintain in confidence commercially sensitive information. The redacted information is commercially

sensitive to the IPP, and public disclosure of this information would be harmful to the commercial interests of the IPP.

The independent third-party consultant was engaged to provide a condition assessment of the Brown Lake Generating Station's mechanical equipment and dam structure. The consultant concluded that the mechanical equipment was in very good condition and the civil equipment was in apparent good condition. The conclusions relate to the current physical condition of the mechanical and civil equipment although the consultant commented that they believe that the execution of Innergex's maintenance program will ensure the facility continues to operate for [redacted]

Innergex's Long Term Operating Reliability Report provides a discussion on how their operations and maintenance program and capital improvement program will enable the facility to operate reliably for an additional 40 years. Their conclusions are based on a history of reliable operations and an expectation that the continuation of the existing operations, maintenance and capital programs will maintain the reliability of the facility going forward.

33.0 Reference: Exhibit B-7, CEC 1.17.5

(d) Technical

A consulting firm retained by the Brown Lake IPP conducted a condition assessment of the Brown Lake facility and concluded that "all mechanical equipment that have been inspected and necessary for the operation of the power plant are in very good condition and all civil equipment that have been inspected and necessary for the operation of the power plant are in apparent good condition." The consultant's report further states that "proper operation of power plant can be assured for [redacted]". The Brown Lake IPP also provided a Long Term Operating Reliability Report that concluded "the Brown Lake Generating Station has a proven historical record of reliable operation which can be maintained through adherence to the preventive maintenance program, proactive repair to damaged mechanical equipment, replacement and refurbishment of aging electrical components, and modernization of the control and protection systems. If these conditions are maintained, similar levels of reliability can be achievable for an additional 40 years."

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RESPONSE:

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2.33.2 Please highlight any differences in what the Condition Assessment provided by the independent third party consultant determined and the Long Term Operating Reliability Report provided by Innergex. Please include significant differences in what they examined and differences in what they concluded, if any.

2.33.2.1 If there are any differences between the reports, did BC Hydro consider purchasing or requiring the IPP to provide an Independent Third Party Long Term Operating Reliability Report? Please explain.

RESPONSE:

The two reports were generally consistent in their assessment, and BC Hydro's review did not identify significant questions or concerns. As a result, after consideration BC Hydro concluded that there was no need for an independent third-party long-term operating reliability report.

34.0 Reference: Exhibit B-5, BCUC 1.3.4.1 and BCUC 1.5.1

RESPONSE:

BC Hydro has no records in relation to the original construction of the Sechelt Creek facility. The Sechelt Creek IPP has advised BC Hydro of the following:

- **The Sechelt Creek facility was specifically designed, with input from shíshálh Nation, to minimize any negative environmental impacts and has received international recognition for sustainable development;**
- **If the facility were to be decommissioned, it is not expected to improve any potential historical negative environmental impacts and given that decommissioning would have a negative impact on the spawning channel, decommissioning is expected to have a negative environmental impact; and**
- **Any negative environmental impacts that resulted from the original construction of the facility were minimal and there are no environmental impacts from the original construction of the facility that have the potential to worsen with continued operation of the facility.**

1.5.1 Does BC Hydro consider that salmon migration could be negatively affected if the Walden North EPA is not renewed, or that there could be other negative environmental impacts? Please explain.

RESPONSE:

As provided at the end of section 6.2 of the Application, if the Walden North EPA renewal is not accepted, the original EPA and the Forbearance Agreement will remain in effect in accordance with their respective terms. If there is no EPA with BC Hydro, the Diversion Agreement terminates. Without an EPA and Diversion Agreement, there are uncertainties regarding how the parties will manage water flows in relation to the diversion tunnel.

Water needs to be fed from Cayoosh Creek through the IPP's plant (which includes its diversion structure) to reach BC Hydro's Cayoosh Diversion Tunnel. The diversion structure is essentially the Walden North IPP's tailrace structure as shown on page 1 of Appendix G of the Application. This tailrace structure feeds into and connects to BC Hydro's Cayoosh Diversion Tunnel. Pursuant to the Diversion Agreement, the IPP built and maintains its diversion structure connecting to the tunnel. The Cayoosh Diversion Tunnel is owned and operated by BC Hydro and allows for the diversion of water from the Walden North IPP's tailrace to Seton Lake which is part of BC Hydro's Bridge River system.

If the diversion of water from Cayoosh Creek to Seton Lake is discontinued, salmon migration will be negatively affected. BC Hydro has conducted an analysis that showed the tunnel being opened (which allows water from the Cayoosh Creek to flow into Seton Lake) is critical in maintaining the dilution ratios that support salmon migration. Recent BC Hydro studies have shown that not maintaining the dilution ratio during the salmon migration period leads to a change in salmon migratory behaviour and a failure of salmon to successfully migrate to the Seton River and spawning areas.

The continuation of the Diversion Agreement enables BC Hydro to avoid the cost of an alternative diversion structure (in order to feed water into BC Hydro's diversion tunnel) if such a structure is required sometime in the future. Given the existing diversion structure is already in place and owned by the IPP, BC Hydro has not carried out an assessment of available options for building an alternative diversion structure at this time. We have also not considered the alternative of negotiating a new diversion agreement in the absence of an EPA and we do not have an estimate of what such an agreement might cost.

2.34.1 Is it fair to say that the First Nations IPP owners have their own significant interest in retaining the environmental benefits arising from the various IPP projects which have environmental considerations? Please explain why or why not.

RESPONSE:

Please refer to BC Hydro's response to BCUC IR 2.1.2 which discusses the natural and/or financial resources for the Cayoose Creek Indian Band and the shíshálh Nation, respectively. Please note that such environmental benefits may not necessarily be related to the environmental attributes, as defined in the EPAs with these IPPs.

34.0 Reference: Exhibit B-5, BCUC 1.3.4.1 and BCUC 1.5.1

RESPONSE:

BC Hydro has no records in relation to the original construction of the Sechelt Creek facility. The Sechelt Creek IPP has advised BC Hydro of the following:

- **The Sechelt Creek facility was specifically designed, with input from shíshálh Nation, to minimize any negative environmental impacts and has received international recognition for sustainable development;**
- **If the facility were to be decommissioned, it is not expected to improve any potential historical negative environmental impacts and given that decommissioning would have a negative impact on the spawning channel, decommissioning is expected to have a negative environmental impact; and**
- **Any negative environmental impacts that resulted from the original construction of the facility were minimal and there are no environmental impacts from the original construction of the facility that have the potential to worsen with continued operation of the facility.**

1.5.1 Does BC Hydro consider that salmon migration could be negatively affected if the Walden North EPA is not renewed, or that there could be other negative environmental impacts? Please explain.

RESPONSE:

As provided at the end of section 6.2 of the Application, if the Walden North EPA renewal is not accepted, the original EPA and the Forbearance Agreement will remain in effect in accordance with their respective terms. If there is no EPA with BC Hydro, the Diversion Agreement terminates. Without an EPA and Diversion Agreement, there are uncertainties regarding how the parties will manage water flows in relation to the diversion tunnel.

Water needs to be fed from Cayoosh Creek through the IPP's plant (which includes its diversion structure) to reach BC Hydro's Cayoosh Diversion Tunnel. The diversion structure is essentially the Walden North IPP's tailrace structure as shown on page 1 of Appendix G of the Application. This tailrace structure feeds into and connects to BC Hydro's Cayoosh Diversion Tunnel. Pursuant to the Diversion Agreement, the IPP built and maintains its diversion structure connecting to the tunnel. The Cayoosh Diversion Tunnel is owned and operated by BC Hydro and allows for the diversion of water from the Walden North IPP's tailrace to Seton Lake which is part of BC Hydro's Bridge River system.

If the diversion of water from Cayoosh Creek to Seton Lake is discontinued, salmon migration will be negatively affected. BC Hydro has conducted an analysis that showed the tunnel being opened (which allows water from the Cayoosh Creek to flow into Seton Lake) is critical in maintaining the dilution ratios that support salmon migration. Recent BC Hydro studies have shown that not maintaining the dilution ratio during the salmon migration period leads to a change in salmon migratory behaviour and a failure of salmon to successfully migrate to the Seton River and spawning areas.

The continuation of the Diversion Agreement enables BC Hydro to avoid the cost of an alternative diversion structure (in order to feed water into BC Hydro's diversion tunnel) if such a structure is required sometime in the future. Given the existing diversion structure is already in place and owned by the IPP, BC Hydro has not carried out an assessment of available options for building an alternative diversion structure at this time. We have also not considered the alternative of negotiating a new diversion agreement in the absence of an EPA and we do not have an estimate of what such an agreement might cost.

2.34.1 Is it fair to say that the First Nations IPP owners have their own significant interest in retaining the environmental benefits arising from the various IPP projects which have environmental considerations? Please explain why or why not.

2.34.1.1 If yes, would BC Hydro agree that the environmental benefits of continuing the various facilities can be expected to be of value to the First Nations IPP owners? Please explain why or why not.

RESPONSE:

Yes. For an example, please refer to BC Hydro's response to BCUC IR 2.1.2 which discusses the salmon migration and spawning channel as natural and/or financial resources for the Cayoose Creek Indian Band and the Shíshálh Nation, respectively. Please note that such environmental benefits may not necessarily be related to the environmental attributes, as defined in the EPAs with these IPPs.