

REQUESTOR NAME: Clean Energy Association of B.C. (CEBC)

INFORMATION REQUEST ROUND NO: 2

TO: BRITISH COLUMBIA HYDRO & POWER AUTHORITY

DATE: February 22, 2018

PROJECT NO: 1598933

BC HYDRO WANETA 2017 TRANSACTION

EXHIBITC6-5

APPLICATION NAME: **Waneta 2017 Transaction Application (“Transaction” or “Application”)**

16.0 **Reference: Exhibit B-1, Application, Cover Letter and Chapters 1 and 2, Summary Project and Transaction Descriptions, and Exhibit B-8, BC Hydro’s response to CEABC IR 1.1.1**

In IR 1.1.1, CEABC sought a more concise description of the Waneta facility and the key elements of the Transaction. BC Hydro’s response was that “The Waneta 2017 Transaction is accurately summarized on pages 1 to 5 of the cover letter to the Application.”

Accordingly, CEABC extracted the following pertinent points from the Cover Letter and Chapters 1 and 2 of the Application:

- The Waneta facility consists of a 64 metre dam built in 1954; an associated 490 MW generating station with 4 turbines partially upgraded in 1995, 2002, 2003, and 2007; and a 25 km 230 kV transmission line. The annual generation of the entire facility is expected to average 2,670 GWh.
- The facility includes 5 water licenses (for up to 708 cms), dating from 1930 to 1991, which have precedence to the Waneta Expansion facility, and one water license dated 2007 (for a further 224 cms), which ranks subsequent to the needs of Waneta Expansion.
- BC Hydro currently has 1/3 ownership of the dam and generation facilities, while Teck Metals Ltd. (“Teck”) owns the other 2/3 of the generation facilities and 100% of the transmission line.
- Pursuant to the Transaction, BC Hydro is offering to purchase the remaining 2/3 of the ownership of the dam and generation assets for a cash price of \$1.203 billion. It will also purchase the transmission assets at the end of a 20 to 30 year lease period, for a further \$20 million.
- Teck will lease back the 2/3 interest for an initial lease period of 20 years, with the right to extend that to 30 years, for an initial lease payment of approximately \$70 million per year, escalating at 2% compounded.
- The water licenses are now jointly owned by Teck (2/3 interest) and BC Hydro (1/3 interest), and that joint ownership will continue throughout the lease period, and then be transferred 100% to BC Hydro.
- During the Lease Period, Teck will have the rights to all of the energy and capacity associated with the 2/3 share, which it can use to serve its smelter load or sell on the wholesale market.
- After the Lease Period, and the additional purchase of the transmission assets, BC Hydro will have unencumbered ownership of 100% of the facility.

16.1 Do the above bullet points misstate any of the pertinent facts regarding the facilities or the Transaction? If so, please provide the necessary corrections.

16.2 Do the above bullet points omit any significant information about the facility or the Transaction? If so, please provide any additional information considered significant by BC Hydro.

16.3 What are the expiry dates for the water licenses?

16.4 Why won’t the water licenses be transferred to BC Hydro at the beginning of the lease period?

17.0 **Reference: Exhibit B-9-2, BC Hydro’s responses to CEABC IR 1.1.4, 1.1.5, 1.1.6, 1.2.2, 1.2.3, and Exhibit B-8-2, BC Hydro’s response to BCUC IR 1.48.1, and 1.26.1**

CEABC asked about Teck’s altered or continued liability for environmental risks.

BC Hydro responded by referring to BCUC IR 1.48.1, which discusses the Remediation Covenant, and in which BC Hydro states that, “... *BC Hydro considers that there is no change in exposure to*

environmental liability as between Teck and BC Hydro during the Lease Period.”

- 17.1 In its Final Submission to the BCUC concerning BC Hydro’s acquisition from Teck of an undivided one-third interest in its Waneta Dam and Associated Assets, dated December 17, 2009, the Independent Power Producers Association of B.C.(the predecessor to the CEABC), raised concerns about total gas pressure (pages 16-18). While CEABC appreciates BC Hydro’s response to BCUC IR 1.26.1, it would like BC Hydro to explain in more detail how these concerns have been addressed in the Application including but not limited to whether modifications to the Waneta spillway are required and what the estimated cost of any modifications may be. What is the impact of this cost on the Waneta 2017 Business Case? Please provide all values in \$2018.
- 17.2 Similarly concerns were raised about contaminated sediment in the reservoir (pages 18-23). Please explain how these concerns have been addressed in the Application including but not limited to whether Teck will be required to pay the cost of remediation for any contamination caused by anyone other than Teck. Please provide the estimated cost of remediation and the impact of this cost on the Waneta 2017 Business Case? Please provide all values in \$2018.
- 17.3 Similarly concerns were raised about the ability to pass the Probable Maximum Flood (“PMF”) (pages 24-26). Please explain how these concerns have been addressed in the Application including but not limited to the cost of modifying the Waneta spillway so that it is capable of passing the probable maximum flood. What is the impact of this cost on the Waneta 2017 Business Case? Please provide all values in \$2018.
- 17.4 Would BC Hydro as owner of the Waneta dam be liable for any damage to the Waneta Expansion plant if the Waneta dam is overtopped? Are there any agreements between Teck and the owners of the Waneta expansion plant with respect to the Waneta dam? If yes please provide copies. Do the owners of the Waneta expansion plant make any payments with respect to the continued operation and maintenance of the Waneta dam including but not limited to capital improvements, payment of annual property taxes and insurance costs? If yes please provide the details. If not please explain.
- 17.5 Similarly concerns were raised about slag possibly being entrained in the concrete in the Waneta dam (page 26). Please explain how these concerns have been addressed in the Application including but not limited whether any materials testing has been done and what the results are.
- 17.6 Similarly concerns were raised about the seismic withstand capability of the Waneta powerhouse (pages 26-27). Please explain how these concerns have been addressed in the Application including but not limited to the cost of remediation and the impact of this cost on the Waneta 2017 Business Case? Please provide all values in \$2018.

18.0 Reference: Exhibit B-9, BC Hydro’s response to CEABC IR 1.7.3 and 1.7.4

CEABC asked about the risks to the facilities in the event of a Probable Maximum Flood, and which other of BC Hydro’s existing facilities have similar overtopping risks.

BC Hydro responded, to CEABC 1.7.3, that “... *the extreme flood in question would inundate a specific downstream area, including both powerhouses. It would be speculative to assign the liabilities from such an event.*”

And in response to CEABC 1.7.4, BC Hydro stated “*Many BC Hydro dams do not have sufficient capacity to pass the entire volume of a ‘Probable Maximum Flood’ as calculated since initial construction. However, due to the very low likelihood of such an extreme event, most of these remain as very low retained risks.*”

- 18.1 Please explain how the ‘Probable Maximum Flood’ for the Waneta dam has been calculated, and also how its probability of occurrence has been estimated. .
- 18.2 In view of the recent occurrence of rare weather events, such as the two 300-year floods in Calgary within a period of 5 years, or the 1000-year drought that is currently occurring in California, what adjustments have been made to the PMF calculation and likelihood to allow for the possible effects of climate change?

18.3 Please provide a table showing all of BC Hydro’s dams that cannot pass the PMF, with their corresponding PMF levels and estimated likelihoods, and their spillway handling capacities. Also include in this table, what capital spending is currently planned to upgrade the deficient spillway capacities.

19.0 **Reference: Exhibit B-1, Application, Appendix N, page 2 of 90 (Executive Summary) and Sub-Appendix B (Review of Waneta Capital Expenditure Forecasts), and Exhibit B-9, BC Hydro’s response to CEABC IRs 1.8.1 to 1.8.7**

In Sub-Appendix B of Appendix N, there is a comparison between BC Hydro’s estimates and Teck’s estimates of future capital requirements for the three scenarios depicted. However, almost all of the substantive information is redacted, except for a few summary statements.

Nevertheless, Section 4 of Sub-Appendix B contains three charts, in which the total estimates by year, for BC Hydro and for Teck, are shown without redaction, indicating that these total values are not considered to be confidential. The only confidential values are those that reflect BC Hydro’s assumptions about how the total capital requirements will ultimately be shared between Teck and BC Hydro.

For ease of reference, the three figures containing the non-confidential total capital cost estimates are reproduced here:

Figure 1 – Life Extension Scenario with Leading Utility Practice

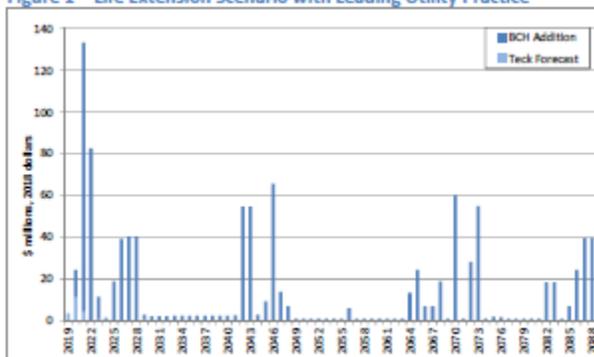


Figure 2 – Harvest Scenario with Leading Utility Practice

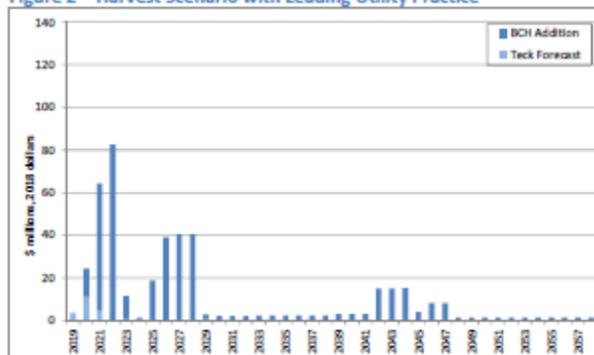
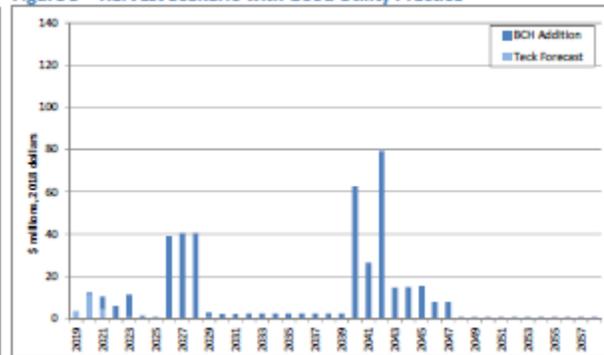


Figure 3 – Harvest Scenario with Good Utility Practice



19.1 Since the total cost information as shown in these three charts does not appear to be confidential, please provide that data in the form of a working Excel model that can produce the charts. There is no need to provide the estimates of the sharing between BC Hydro and Teck (which Hydro wishes to keep confidential), only the totals as shown in the charts. A working Excel model with pasted values, rather than calculations, will be acceptable, but the model should be able to produce the three figures shown in Section 4.

19.2 In BC Hydro’s estimation, how much capital would be required to accomplish each of the following upgrades: (Rough estimates in 2018 \$ will be acceptable.)

- a) To bring the dam and powerhouse up to current seismic standards for the category of risk associated with the Waneta facility?
- b) To bring the spillway capacity up to the level required to pass the Probable Maximum Flow?

- c) To safely remove and dispose of the toxic reservoir sediments?

Is any of the above three amounts included in the total capital estimates shown in Figures 1, 2, and 3 in the preamble to this question? If so, how much and in which years? If not, why not?

20.0 Reference: Exhibit B-1, Application, Appendix N, page 2 of 90 (Executive Summary) and Sub-Appendix B (Review of Waneta Capital Expenditure Forecasts), and Exhibit B-9, BC Hydro's response to CEABC IRs 1.8.6 and 1.8.7, Decommissioning the Assets

Figures 2 and 3 above, shown in the previous question, refer to a "Harvest Scenario", which covers only a 40 year time span. Yet, in its response to CEABC 1.8.6, BC Hydro states, "*BC Hydro expects the asset to operate in perpetuity, and has not prepared an estimate of the cost of decommissioning.*"

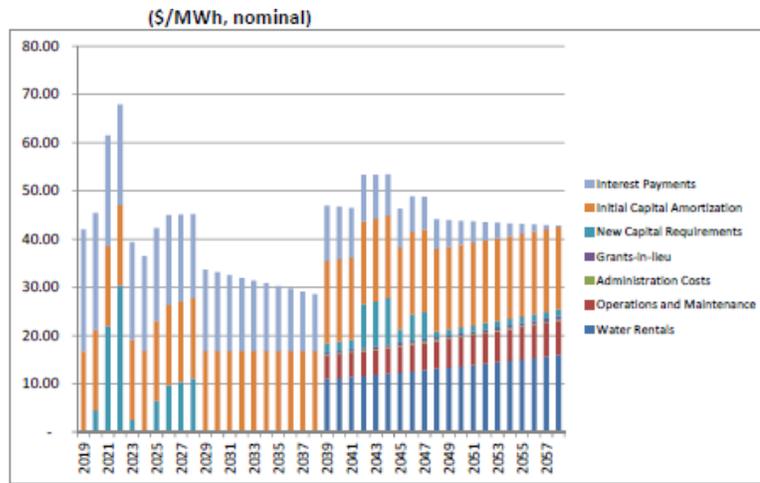
If a scenario is truly intended to "harvest" the asset over a 40 year period, then there ought to be some provision for the asset's termination and decommissioning at the end of the forecast period or shortly thereafter. In the case of the 126 megawatt John Hart generating facility there were 4 different feasible options for decommissioning (as an alternative to refurbishing the dam) and, with respect to the 106 megawatt Ruskin generating facility, 3 options.

In Exhibit B-1 from the BCUC John Hart proceedings, dated May 25, 2012, Table 3-3, page 3-25, the P90 capital cost estimate, less sunk costs, for the four decommissioning alternatives ranged from \$160 million to \$340 million. In Exhibit B-1, dated February 22, 2011, Table 3-3, pages 3-23-3-24, from the BCUC Ruskin proceedings, the "Authorized Amount (loaded)" less the definition phase and sunk costs, for the three decommissioning alternatives ranged from approximately \$200 million to \$350 million.

- 20.1 This response makes it very unclear as to what a "Harvesting Scenario" is intended to accomplish, compared to a "Life Extension Scenario". If the "Harvesting Scenarios" are expected to make the asset last in perpetuity, then doesn't that mean they are essentially the same as the "Life Extension Scenario"? Would they not, therefore, require the many of the same expenditures shown in Figure 1, rather than Figures 2 and 3?
- 20.2 Please provide a very rough estimate for the cost of decommissioning Waneta in 40 years, using if necessary scaled up estimates based on John Hart and Ruskin, over a range of alternatives similar to those for John Hart and Ruskin. Please provide the values in \$2018. The estimate should include the cost of safely disposing of the contaminated sediments. What is the impact of this cost on the Waneta 2017 Business Case also in \$2018?
- 20.3 Assuming a Waneta decommissioning cost of \$600 million in \$2018 and decommissioning occurs in 20 years, what is the impact of this cost on the Waneta 2017 Business Case also in \$2018? Similarly decommissioning in 30 years and 40 years?

21.0 Reference: Exhibit B-1, Application (page 529 of 639), Appendix N, Section 2.5 (Cost of Service) (page 14-15 of 90), and Exhibit B-9, BC Hydro's response to CEABC IR 1.10.1

CEABC asked for the data supporting the chart on page 15 of 90, which shows the components of the Cost of Service for the 40 year period:



BC Hydro’s response referenced a confidential attachment to BCUC IR 1.15.2.

- 21.1 Since the data in the chart is clearly not confidential, please provide a working Excel model that contains the data to produce this chart. CEABC is only asking for the data used for this particular chart, and pasted values will be acceptable, as long as the model can produce the chart.
- 21.2 What future regulatory oversight will the BCUC have with respect to the above expenditures shown as “Interest Payments”, “New Capital Requirements”, “Administration Costs”, or “Operations and Maintenance”?
- 21.3 Will decisions made in accordance with the Co-Possessors and Operating Agreement, Exhibit B-1, Appendix H and in particular those made by the Operating Committee, the Third Party Referee and/or an arbitrator be subject to BCUC regulatory oversight? If not, why not?
- 21.4 Assuming, in a worst case scenario, that all the New Capital Requirements will be borne by BC Hydro what will this cost be? What is the impact of this cost on the Waneta 2017 Business Case? Please provide the values in \$2018.

22.0 **Reference: Exhibit B-1, Application (page 534 of 639), Appendix N, Section 3.2.3 (Long-Run Marginal Cost) (page 19-20 of 90), and B-9, BC Hydro’s response to CEABC IR 1.11.1**

CEABC 1.11.1 asked for the calculations and assumptions used to produce the LRMC values quoted in the following table from Appendix N:

Table 3 Marginal New Resources and Related Costs

Marginal Resources	Period of Applicability	LRMC (2018 real dollars)	
		Clean + Gas	Clean Only
Energy: Greenfield IPPs	F2034 and beyond	\$106/MWh	\$106/MWh
Capacity Resources	F2029 and beyond	\$88/kW-yr (SCGT)	\$221/kW-yr (pumped storage)
Combined Cost of Energy & Capacity	Effective for F2034 and beyond	\$122/MWh	\$145/MWh

Hydro referred to its response to BCUC IR 1.7.4, which contained the algebraic formulas used for the calculations and an Excel model to implement the calculations. Unfortunately, that model sheds little light on the origin of the values in Table 3, because it starts out with pasted values for the unit capacity and unit energy costs, which are of unknown origin, namely the values in columns K and L (for energy) and R and S (for capacity).

- 22.1 To fully answer the question, please provide the model which calculates those initial unit energy and capacity costs shown in columns K, L, R, and S of the Excel attachment to BCUC 1.7.4.
- 22.2 Also please state the assumptions used in that initial unit energy cost calculation. In particular, what was assumed for the capital investments, the operating costs, the cost of financing, and the discount rates used in deriving those initial unit energy and capacity costs.

- 22.3 Please explain why those initial unit energy costs have major discontinuities over time, such as a huge increase in 2029 for the unit capital cost, and a huge increase in 2034 for the unit energy cost.

23.0 Reference: Exhibit B-1, Application (PDF page 560 of 639), Appendix N, Business Case, section 5.2 (page 46 of 90), Net Present Value of Revenue Requirements

On page 46 of the Business Case, BC Hydro states:

“In cases where BC Hydro’s financing rate is equivalent to the discount rate applied to the analysis, these two cost/benefit streams will result in approximately the same present value result. However, recent changes made to the calculation of BC Hydro’s net income result in these two methods providing divergent results. The main change was as a de-coupling of the link between BC Hydro’s return on equity and its asset base:

- Previously when BC Hydro invested capital and added to its asset base, a portion of this asset base would be “deemed” to be equity and earn a regulated rate of return. This is despite the true financing of the investment being fully debt-based through Government borrowings.

- Under the 10-year Rates Plan, BC Hydro’s return on equity is fixed and no additional return is earned upon capital investment.

- The effect of this change is that the financing of new investments is effectively done at the cost of debt from a ratepayer perspective and does not include a return on equity component.”

- 23.1 Under the 10-Year Rates Plan, is it not also true that the government has targeted to increase its equity contribution to BC Hydro to 40% over time? Is that not the reason why BC Hydro has calculated its 6% WACC based on 40% equity?
- 23.2 Why, in the calculation of the 6% WACC, is the equity included at a cost of 8.75% rather than the 11.84% authorized by the BCUC?
- 23.3 With reference to the F2017-F2019 Revenue Requirement, what is the percentage represented by the forecast distributable surplus for each of the years, as a percentage of the forecast average shareholder equity investment in each year?
- 23.4 Even though the government is targeting to bring its equity investment up to 40%, BC Hydro states that all new investments are effectively 100% debt financed. How is it necessary, or even possible, for all projects to be 100% debt financed when the government is contributing 40% of BC Hydro’s total capital through its increased equity investment?
- 23.5 Without equity how is the risk associated with the Transaction provided for?
- 23.6 Since BC Hydro is on a path to spend \$2.4 billion per year on new capital over the next decade, and the government is committed to contribute 40% in the form of equity, that equity contribution will amount to around \$10 billion, just for the new investments, plus an additional amount to increase the equity portion of all the existing assets. If none of this \$10+ billion equity investment is included in the cost of Waneta, then which projects will that equity be allocated to? Where will the government’s \$10+ billion go?
- 23.7 Please provide a breakdown by major project as to which projects will be assigned the government’s \$10+ billion equity investment that will be flowing into BC Hydro.
- 23.8 If 100% debt financing is used for all projects, then why isn’t that used as the cost of capital for all projects? Why is the cost of capital calculated using an assumption of 40% equity when equity never needs to be included in the cost of financing for any capital project?

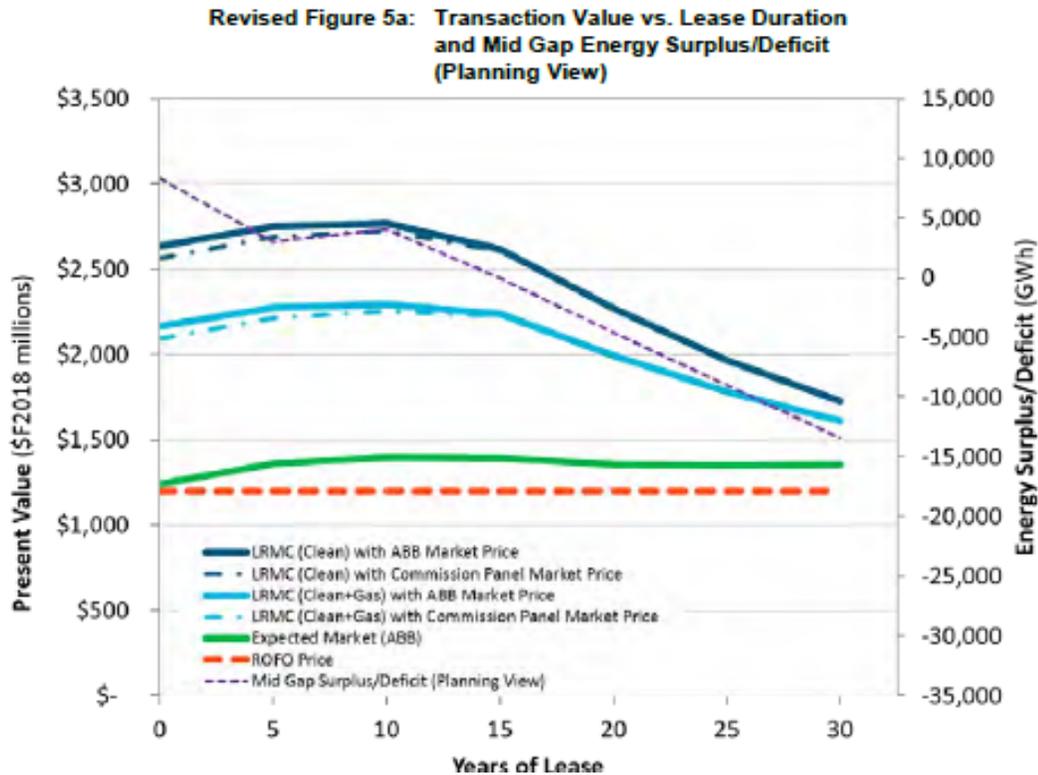
24.0 **Reference: Exhibit B-1, Application (PDF page 572 of 639), Appendix N, Business Case, Sub-Appendix B, page 3 (page 57 of 90), Capital Constraints**

On page 3 of Sub-Appendix B, BC Hydro states that, “This analysis does not consider any capital constraints at BC Hydro.”

- 24.1 Is it true that, under the 10-Year Rates Plan, BC Hydro has committed to capital spending of \$1.7 billion per year, excluding Site C, and \$2.4 billion per year including Site C? Does BC Hydro not consider this commitment to be any constraint on its capital spending?
- 24.2 If an extra \$1.2 billion is added to the capital spending in 2018, and the additional amounts needed in subsequent years to maintain and upgrade Waneta, what other capital projects will have to be deferred? How does BC Hydro justify placing a priority on the Waneta purchase over those other projects, such as the Campbell River system upgrades, or the Bridge River system upgrades?
- 24.3 In light of the fact that the cost of producing electricity from wind, solar, and batteries is on a very rapid decline, why does BC Hydro put such a high priority on the purchase of a 65 year old dam like Waneta, a project from which it will derive no energy or capacity for a period of at least 20 years, and possibly 30 years?

25.0 **Reference: Exhibit B-8, BC Hydro’s responses to BCUC IR 1.6.5.1 and 1.16.6, additional scenarios for the Business Case**

In response to BCUC 1.6.5.1, BC Hydro produced a revised Figure 5a, to include an additional line for the LRMC as per the “Commission Panel Market Price”, as follows:



And, in response to BCUC 1.16.6, BC Hydro produced a revised Table 5 to include an additional line for the Panel Mid-C energy price forecast, as follows:

**Revised Table 5 Un-risked Value of Transaction
(Present Value to 2018, \$ million)**

Basis for Post-Lease Value	Value of 20-year Lease Period	Value of Post-Lease Period	Transaction Value	Net Benefit to Ratepayers @ Price of \$1.2 billion
LRMC – Clean only	792	1,482	2,274	1,071
LRMC – Clean + Gas	792	1,206	1,997	794
BCH Industrial Tariff	792	586	1,378	175
Market Prices (ABB)	792	570	1,362	159
Panel Mid-C energy price forecast	792	477	1,269	66
Extrapolated Prices	792	440	1,232	29

25.1 CEABC requests that BC Hydro rerun its valuation modeling in order to add a further line to each of Figure 5a and Table 5, to represent the additional alternative scenario of the LRMC corresponding to the Commission Panel’s Alternative Portfolio as proposed in the Site C Inquiry. Please include a working excel model of this added case, notwithstanding the need for any redactions considered necessary to preserve confidentiality.

26.0 **Reference: Exhibit B-8-2, BC Hydro’s response to BCUC IR 1.43.3, Figure 2, Monthly Average MW for Waneta Facilities**

In its response to BCUC 1.43.3, BC Hydro includes Figure 2, which charts the monthly fluctuations in generation for the Waneta facilities from 2006 to 2016 as follows:

Figure 2 Monthly Average MW for Waneta Facilities

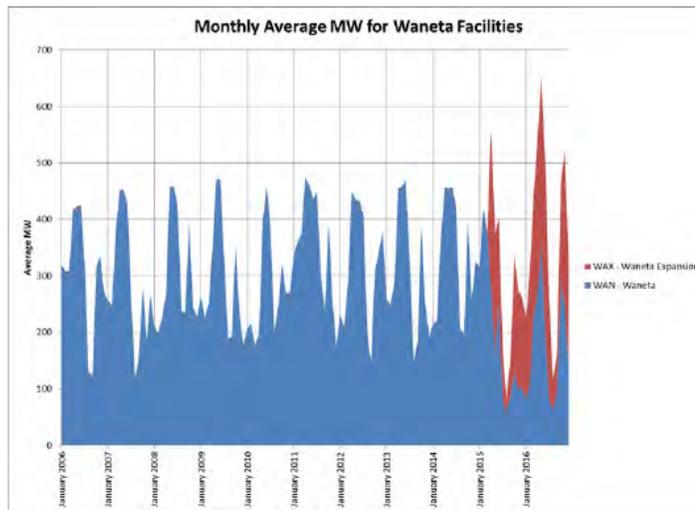


Figure 2 shows the average MW for the Waneta Facilities over each month. This chart shows the seasonality of the generation with a peak typically occurring in the spring and summer due to the spring runoff, and the lowest average generation occurring during the winter. The monthly average ranges from 119 aMW to 475 aMW. After the Waneta Expansion Project start-up the average range is lower from 59 aMW to 356 aMW.

It is clear from this chart that the output from the facilities is highly variable from month to month. The Waneta plant itself is fluctuating 3:1 when comparing wet to dry months and the highest production months are always in the freshet season.

- 26.1 How are these wide fluctuations in output dealt with in terms of supplying the Teck smelter on an even and continuous basis?
- 26.2 How are these wide fluctuations dealt with in valuing the future market sales once BC Hydro acquires the additional 2/3 of the energy after the end of the Lease Period? Does the market price forecast include month to month variations in prices and a significant discount for the large amount of freshet energy that appears to be generated?

- 26.3 For purposes of this Waneta Transaction evaluation, has BC Hydro implemented a 3x12 time-of-delivery pricing table to deal with the fluctuating value of the Waneta generation in the same way it imposes on any independent power projects? If not, why not, and please implement such a table, in order to see its impact on the economic value of the project?

27.0 **Reference: Other**

In its Final Submission to the BCUC concerning BC Hydro's acquisition from Teck of an undivided one-third interest in its Waneta Dam and Associated Assets, dated December 17, 2009, the Independent Power Producers Association of B.C. (the predecessor to the CEABC), raised concerns about incremental firm transmission (pages 12-16).

- 27.1 If through default, termination or otherwise, the electricity from Waneta is no longer being delivered to Teck as per the Waneta 2017 Business Case, what if any, transmission upgrades would be required to deliver this electricity on a firm basis to the Lower Mainland? What will the cost of any transmission upgrades be, in \$2018? What is the impact of the cost of any upgrades on the Waneta 2017 Business Case? Please provide the values in \$2018.