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

INFORMATION REQUEST ROUND NO: **3**

TO: **BRITISH COLUMBIA HYDRO & POWER AUTHORITY**

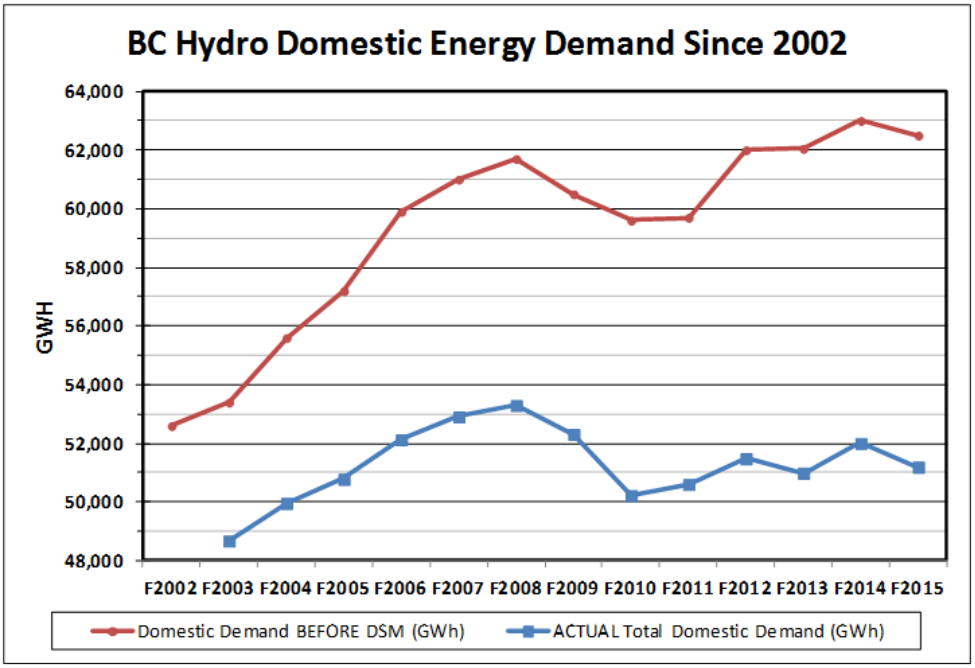
DATE: APRIL 24, 2017

PROJECT NO: 3698869 / Order G-40-16

APPLICATION NAME: **F2017-F2019 Revenue Requirements Application ("F17-19 RRA" or "RRA")**

45.0 **Reference: Exhibit B-20, BC Hydro Rebuttal Evidence, regarding CEBC IR 1.0 to BCSEA in Exhibit C4-7, re Demand-Side Management Energy Savings**

In its preamble to IR 1.0 to BCSEA, CEBC included the following chart illustrating the difference between BC Hydro's Domestic Energy demand (before DSM), as shown in a chart presented by BC Hydro at its December 16 Press Briefing entitled "Site C Project Update", and the Actual Total Domestic Energy Sales, as taken from RRA Exhibit B-1-1, App A, Schedule 14 line 10.



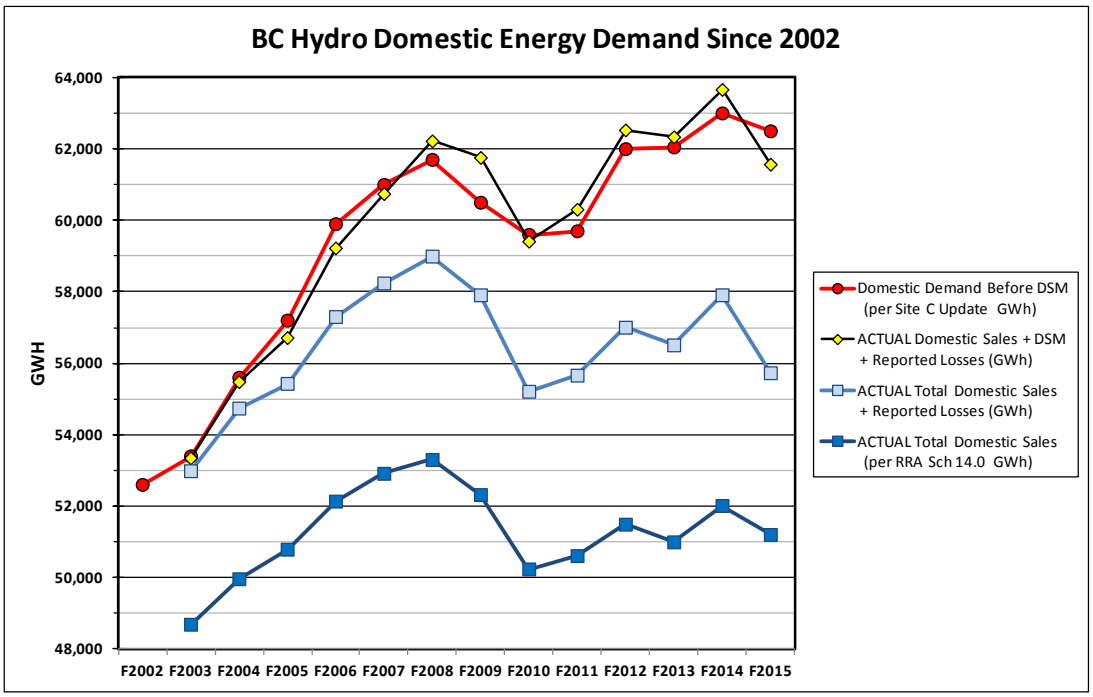
CEBC had assumed that the difference between the two lines on this chart was due entirely to the cumulative savings achieved by DSM over the period. However, in its Rebuttal Evidence, pp 14-15, BC Hydro pointed out that system losses needed also to be taken into account in determining the upper line in the chart, and not merely DSM savings. To clarify the discrepancy, BC Hydro offered the following table of cumulative energy savings from DSM:

Table 1 Cumulative Energy Savings since Fiscal 2002 (GWh/year)

Fiscal 2002	Fiscal 2003	Fiscal 2004	Fiscal 2005	Fiscal 2006	Fiscal 2007	Fiscal 2008	Fiscal 2009	Fiscal 2010	Fiscal 2011	Fiscal 2012	Fiscal 2013	Fiscal 2014	Fiscal 2015
133	358	739	1,281	1,921	2,501	3,225	3,847	4,201	4,644	5,523	5,826	5,749	5,839

Accordingly, CEBC has taken this DSM Energy Savings data and combined it with the system losses as

reported in the RRA[1] and the 2007/08 Load Forecast[2] to produce the following revised chart:



The discrepancy between the top two lines on this chart indicates that, unfortunately, CEBC is unable to quite reconcile the sum of these items with the Domestic Energy Demand as presented in BC Hydro's "Site C Update" Press Briefing.

The discrepancy is made more confusing by the fact that BC Hydro has reported three different tranches of DSM energy savings over this period, and these show some differences from the savings stated in Table 1 above. On page 79 of its F2002 Annual Report, BC Hydro stated that it had achieved 2500 GWh per year of savings from *"the success of Power Smart since its inception in 1989"* and then an additional 120 GWh of savings in F2002 from its *"re-launched...Power Smart"* initiatives. However, Table 1 shows a total of only 133 GWh of energy savings in F2002.

On page 28 of its F2008 Annual Report, BC Hydro stated that it had achieved 2518 GWh of savings in F2007 from *"Power Smart 2"*and then a further 326 GWh in F2008 from its *"Power Smart 3"* initiatives, but this doesn't agree with the savings of 3225 for F2008, as stated in Table 1 above.

Then, on page 14 of its F2016 Annual Report, BC Hydro reported savings of 4460 GWh in F2013, 4776 GWh in F2014, and 4334 GWh in F2015, but these savings do not agree with the savings presented in Table 1 above. Apparently, there may be some confusion arising between the savings attributed to Power Smart 1, Power Smart 2, and Power Smart 3, which CEBC is unable to resolve.

45.1 Can BC Hydro please provide a table and a chart which fully reconciles the Actual Domestic Sales, system losses, and savings from Power Smart 1, Power Smart 2, and Power Smart 3, over the time period from F2002 to F2016. Hopefully, this will explain how the Domestic Energy Demand in BC Hydro's "Site C Update" was derived. Please attach the table and chart as a working Excel model.

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[1] Exhibit B-1-1, Appendix A, Schedule 4, line 17

[2] 2007/08 Load Forecast is included as Appendix D to the 2008 LTAP, Table A3.5 shows system losses

45.2 What is apparently missing from this reconciliation is any savings attributed to simple customer price elasticity. In F2002, BC Hydro's total domestic electricity sales revenue was $2.4 billion. By F2016, it was $5.0 billion. That is a 108% increase in domestic electricity sales revenue, when there has only been about a 7% increase in the GWh being delivered. This means that there has been approximately a 100% increase in the average price being charged to the domestic electricity customers. Surely such a significant price increase should produce some demand reductions purely through consumer price elasticity.

How much has BC Hydro calculated as the demand reduction due to customer price elasticity? Please provide an additional line in the table for IR 45.1, which shows the savings that can be attributed to customer price elasticity. How has this savings been factored into the Energy Demand line shown in the chart from the "Site C Update" Press Briefing?

45.3 Please explain how BC Hydro is able to distinguish between the savings derived from each of the three different tranches of Power Smart programs being carried on simultaneously, some of which contain continuations of identical or closely similar programs, and also separately distinguish the impact of consumer demand reduction as a result of price elasticity, which is taking place at the same time. For instance, in F2002, how does BC Hydro know that 133 GWh was saved as a result of its new round of DSM programs and not as a carry-over result of its previous round of programs?

Similarly, from F2008 on, how does BC Hydro separate the overlapping effects of its Power Smart 2 and Power Smart 3 programs, and also distinguish these demand reductions from the naturally occurring demand reductions as a result of consumer price elasticity?

46.0 **Reference: Exhibit B-20, BC Hydro Rebuttal Evidence, Section 1.6, Extent of Demand-Side Management Savings Achieved.**

In calculating the customer demand-side energy savings achieved as a result of customer price elasticity, BC Hydro uses an elasticity coefficient of -0.05. However, a literature review included in a recent study[3] found that significantly higher coefficients may be appropriate for customer responses in the long-run time frame. The literature review provided the coefficient values shown in the following table:

Table 2: Price elasticity of electricity demand – literature values

Customer Class	Reference	Short-run	Long-run
Residential	Paul, Myers and Palmer[60]	-0.13 (-0.05 to -0.32)[61]	-0.40 (-0.14 to -1.16)
	Bernstein and Griffin[62]	-0.24	-0.32
Commercial	Paul, Myers and Palmer	-0.11 (-0.01 to -0.22)	-0.29 (-0.02 to -0.70)
	Bernstein and Griffin	-0.21	-0.97
Industrial	Paul, Myers and Palmer	-0.16 (-0.08 to -0.31)	-0.40 (-0.20 to -0.82)

46.1 Has BC Hydro reviewed the studies cited in the above table with regard to the appropriate coefficients for consumer long-run price elasticity? What comments does BC Hydro have regarding those studies vs. its own analysis used in determining the -0.05 coefficient it is currently using?

46.2 Please recalculate the response to CEBC IR 3.45.2, above, using hypothetical long-run

[3] Reassessing the Need for Site C, by R. Hendriks, P. Raphals, and K. Bakker, available at www.watergovernance.ca page 27

elasticity coefficients of -0.40 for residential and industrial loads, and -0.29 for commercial loads, and include these in an additional line in the table provided for that response.

47.0 **Reference: Exhibit B-20, BC Hydro Rebuttal Evidence, Section 1.4, Low Carbon Electrification**

In Section 1.4 of its Rebuttal Evidence, BC Hydro states that *"Since responding to Information Requests, the Lieutenant Governor in Council issued Order in Council Nos. 100 and 101 on March 1, 2017, outlining the policy parameters for low-carbon electrification."*

47.1 Now that OIC Nos. 100 and 101 are in force, please update BC Hydro's responses to the following CEBC Information Requests, including any IRs that are cross-referenced:

- IR 1.9.2
- IR 1.9.4
- IR 2.33.1
- IR 2.33.2
- IR 2.35.1
- IR 2.35.2, which also refers to BCUC IR 2.197.3