Doug Slater
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March 5, 2020

Via Email: mjackson@jacksonlitigation.ca

Canadian Biomass Energy Research Ltd.
c/o Matthew J. Jackson, Barrister & Solicitor
1116, 207 West Hastings Street
Vancouver, B.C.
V6B 1H7

Attention: Mr. Matthew J. Jackson, Barrister & Solicitor

Dear Mr. Jackson:

Re: FortisBC Energy Inc. (FEI)

Project No. 1599033

Revelstoke Propane Portfolio Amalgamation Application (the Application)

FEI Information Request (IR) No. 1 to Canadian Biomass Energy Research Ltd. (CBER) on Evidence

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In accordance with the Regulatory Timetable set by the British Columbia Utilities Commission Order G-13-20, attached is FEI IR No. 1 to CBER on Intervener Evidence in respect of the above noted Application.

If further information is required, please contact the undersigned.

Sincerely,

FORTISBC ENERGY INC.

Original signed:

Doug Slater

Attachments

cc (email only): Registered Parties

FortisBC Effective Cost per GJ of Heat

1.0 Exhibit C1-4: Section A, Table 1, pg. 2

FortisBC Rates

On page 2 of CBER Evidence, CBER provided the following:

Table 1: Comparison of effective heat cost per GJ of heat

	Energy source / appliance type	Price, incl. taxes & levies Min P_{min}	Max P_{max}	Unit	Calorific value (Higher Heating Value) HHV	Appliance efficiency Min η_{min}	Max η_{max}	Cost per GJ of heat Min $C_{min} = P_{min}/HHV/\eta_{max}$	Max $C_{max} = P_{max}/HHV/\eta_{min}$	Average	Current
1	Electric heat pump	$0.11 [1,2]	$0.16 [1,2]	per kWh	0.0036 GJ/kWh	208% [15]	350%	$8.5	$20.9	$14.7	$14.7
2	Subsidized propane (Fortis BC)	$12.1 [1,3]	$17.9 [1,3]	per GJ	1 GJ/GJ	75%	95% [16]	$12.7	$23.8	$18.3	$15.4
3	Cordwood	$50 [4]	$250 [5]	per cord	14.1 GJ/cord [10]	63% [17]	84% [17]	$4.2	$28.1	$16.2	$16.2
4	RCEC district heat	$16.0 [6]	$18.2 [6]	per GJ	1 GJ/GJ	95%	100%	$16.0	$19.1	$17.6	$17.6
5	Pellets	$289 [7]	$368 [7]	per tonne	17.6 GJ/tonne [11]	70% [18]	83% [18]	$19.8	$29.8	$24.8	$24.8
6	Propane (Fortis BC)	$17.0 [1,4]	$29.0 [1,4]	per GJ	1 GJ/GJ	75%	95%	$17.9	$38.6	$28.3	$26.0
7	Electric baseboard or furnace	$0.11 [1,2]	$0.16 [1,2]	per kWh	0.0036 GJ/kWh	95%	100%	$29.8	$45.8	$37.8	$37.8
8	Heating oil	$0.86 [8]	$1.55 [8]	per litre	0.0388 GJ/litre [12]	70%	85%	$26.1	$57.0	$41.5	$43.6
9	Distributed propane	$0.59 [9]	$1.32 [9]	per litre	0.0256 GJ/liter [13]	75%	95% [16]	$24.3	$68.7	$46.5	$46.5

1 Total annual cost including basic charge

2 BC Hydro residential Step 1 (min) and Step 2 (max) rate + basic charge at 10,000 kWh/year, see BC Hydro, "Residential Rates", accessed on Feb 1, 2020 at https://app.bchydro.com/accounts-billing/rates-energy-use/electricity-rates/residential-rates.html

3 Minimum and maximum total cost per GJ in the period 2009 to 2019 based on Exhibit B-1, Figure 2-2, FORTIS BC ENERGY INC, REVELSTOKE PROPANE PORTFOLIO COST AMALGAMATION APPLICATION, downloaded on Dec 20, 2019 at https://www.bcuc.com/Documents/Proceedings/2019/DOC_55159_B-1-FEI-Revelstoke-PropanePortolioCostAmal-App.pdf

4 Rough estimate: Free pick-up at cutblocks around Revelstoke, automotive and chain saw fuel cost only

5 Common price for delivered cordwood in Revelstoke

6 Estimated price based on revenue statements in financial year-end; price for residential user likely higher than for commercial users

7 Prices of local vendors; no PST on pellets

8 Minimum and maximum price of fuel oil in the period 2009 to 2010 in Vancouver; source: Natural Resources Canada, "Monthly average retail prices for gasoline and fuel oil, by geography", accessed on Feb 02, 2020 at http://www2.nrcan.gc.ca/eneene/sources/pripri/prices_bycity_e.cfm?productID=6&locationID=6&locationID=2&frequency=W&priceYear=2019&Redisplay=

9 Minimum and maximum price of auto propane, excluding motor fuel tax, in the period 2009 to 2010 in Kelowna; source: Natural Resources Canada, "Monthly average retail prices for gasoline and fuel oil, by geography", accessed on Feb 02, 2020 at

1.1 Please provide detailed calculations and all supporting assumptions for the minimum and maximum prices, including taxes and levies, of $12.1 and $17.9 per GJ, respectively for “Subsidized propane (FortisBC)” on Row 2 of Table 1. Please include breakdowns of each component that is included in the price per GJ.

1.2 Please provide detailed calculations and all supporting assumptions for the minimum and maximum prices, including taxes and levies, of $17.0 and $29.0

per GJ, respectively for "Propane (FortisBC)" on Row 6 of Table 1. Please include breakdowns of each component that is included in the price per GJ.

Annual Heating Bill

2.0 Exhibit C1-4: Section A, Table 1, pg. 2

Exhibit C1-4: Section A, Table 2, pg. 5

Table 1: Comparison of effective heat cost per GJ of heat

	Energy source / appliance type	Price, incl. taxes & levies Min P_{min}	Max P_{max}	Unit	Calorific value (Higher Heating Value) HHV		Appliance efficiency Min η_{min}	Max η_{max}	Cost per GJ of heat Min $C_{min} = P_{min}/HHV/\eta_{max}$	Max $C_{max} = P_{max}/HHV/\eta_{min}$	Average	Current
1	Electric heat pump	$0.11 [1,2]	$0.16 [1,2]	per kWh	0.0036	GJ/kWh	208% [15]	350%	$8.5	$20.9	$14.7	$14.7
2	Subsidized propane (Fortis BC)	$12.1 [1,3]	$17.9 [1,3]	per GJ	1	GJ/GJ	75%	95% [16]	$12.7	$23.8	$18.3	$15.4
3	Cordwood	$50 [4]	$250 [5]	per cord	14.1	GJ/cord [10]	63% [17]	84% [17]	$4.2	$28.1	$16.2	$16.2
4	RCEC district heat	$16.0 [6]	$18.2 [6]	per GJ	1	GJ/GJ	95%	100%	$16.0	$19.1	$17.6	$17.6
5	Pellets	$289 [7]	$368 [7]	per tonne	17.6	GJ/tonne [11]	70% [18]	83% [18]	$19.8	$29.8	$24.8	$24.8
6	Propane (Fortis BC)	$17.0 [1,4]	$29.0 [1,4]	per GJ	1	GJ/GJ	75%	95%	$17.9	$38.6	$28.3	$26.0
7	Electric baseboard or furnace	$0.11 [1,2]	$0.16 [1,2]	per kWh	0.0036	GJ/kWh	95%	100%	$29.8	$45.8	$37.8	$37.8
8	Heating oil	$0.86 [8]	$1.55 [8]	per litre	0.0388	GJ/litre [12]	70%	85%	$26.1	$57.0	$41.5	$43.6
9	Distributed propane	$0.59 [9]	$1.32 [9]	per litre	0.0256	GJ/liter [13]	75%	95% [16]	$24.3	$68.7	$46.5	$46.5

Table 2: Conversion cost of end-of-life oil furnace to competing fuels and appliances

		Oil furnace	Propane furnace	Propane furnace	Air-source heat pump	Wood pellet stove
	Unit	Re-placement furnace	Current propane pricing	Subsidized propane		
Equipment cost		$4,250 [1]	$4,400 [2]	$4,400 [2]	$4,995 [5]	$4,737 [7]
Installation cost		$1,000	$1,000	$1,000	$1,000	$650 [7]
Oil tank removal		$0	$1,475 [3]	$1,475 [3]	$1,475 [3]	$1,475 [3]
Other conversion costs		$0	$1,150 [4]	$1,150 [4]	$5,500 [6]	
Total cost per unit		$5,250	$8,025 [2]	$8,025 [2]	$12,970	$6,862
Capital subsidy		0%	0%	0%	0%	0%
		$0	$0	$0	$0	$0
Total cost to owner/user		**$5,250**	**$8,025**	**$8,025**	**$12,970**	**$6,862**
Annuity to owner/user	$/yr.	**$974** [8]	**$1,489** [8]	**$1,489** [8]	**$2,407** [8]	**$1,273** [8]
Heat use	GJ/yr.	103 [9]	103 [9]	103 [9]	103 [9]	103 [9]
Appliance efficiency	%	78% [10]	95% [11]	95% [11]	279% [12]	77% [13]
Heat cost per GJ	$/GJ	$42	$28	$18	$15	$25
Annual heating bill	$/yr.	$5,483	$3,063	$1,978	$543	$3,338
Total annual cost	**$/yr.**	**$6,457**	**$4,552**	**$3,467**	**$2,950**	**$4,611**

2.1 Please confirm "Heat cost per GJ" in Table 2 is equal to the average "Cost per GJ of heat" in Table 1 (second column from the right of Table 1).

2.1.1 If not confirmed, please provide detailed calculations and supporting assumptions for the "Heat cost per GJ" shown in Table 2 of the CBER evidence.

2.2 Please confirm, or explain otherwise, "Annual heating bill" on Table 2 (second row from the bottom) is calculated as follows:

Annual heating bill = (Heat use / Appliance efficiency) x Heat cost per GJ

2.3 Please confirm, or explain otherwise, that the "Heat cost per GJ" in Table 2 of the CBER evidence is $ per GJ of *heating load* as in Table 1 of CBER evidence, not $ per GJ of *fuel consumed* (i.e., the rate charged for the fuel consumed as shown on the customer's bill).

2.3.1 If confirmed, please explain why "Appliance efficiency" appears to be accounted for twice in the calculation of "Annual heating bill", i.e. once in the "Annual heating bill" calculation in Table 2 of CBER evidence and once in the "Heat cost per GJ" which represents the $ per heating load as shown in Table 1 of the CBER evidence?

2.3.2 Please provide a revised Table 2 that shows "cost per GJ of fuel consumed" for each fuel type instead of "Heat cost per GJ" and recalculate "Annual heating bill" based on "cost per GJ of fuel consumed".

Residential energy use for heating in Revelstoke

3.0 Exhibit C1-4: Section A, para. 15, pg. 7

Exhibit C1-4: Section A, Table 4, pg. 8

Provincial Greenhouse Gas Emissions Inventory 2007 to 2017: https://www2.gov.bc.ca/assets/gov/environment/climate-change/data/provincial-inventory/2017/utilities_energy_data_2007-2017.xlsx

On page 7 of the evidence, CBER states "According to the BC Government's Provincial Greenhouse Gas Inventory – Community Energy and Emission Inventory, 79% of Revelstoke buildings use heat energy sources other than piped propane, see the Figure 3 and Table 4 below.[6]".

[6] Data of the Community Energy and Emission Inventory of 2012 to 2016, see Government of BC, "Provincial Greenhouse Gas Emissions Inventory", downloaded on Jan 30, 2020 at https://www2.gov.bc.ca/assets/gov/environment/climate-change/data/provincial-inventory/2017/utilities_energy_data_2007-2017.xlsx

Table 4: Residential energy use for heating in Revelstoke

Average 2012 to 2017	Secondary energy use GJ per year		
Electricity	170,153		
Electricity for heating	28,215	8%	[1]
Piped propane	70,179	21%	
Estimated oil	63,819	19%	
Estimate bottled propane	47,113	14%	
Estimate wood	124,712	37%	
Estimate district heat	600	0.2%	[2]
TOTAL	**334,638**	**100%**	
Total per dwelling	**103**		[3]

[1] Assumption that every household uses 900 kWh/month for non-heating electricity, see https://www.bchydro.com/search.html?site=bchydro-com&client=bchydro-com&proxystylesheet=bchydro-com&output=xml_no_dtd&q=average+apartment+bill

[2] One bed and breakfast at 200 GJ/year and one apartment building with 8 units each 50 GJ/year

[3] 3,250 occupied dwellings according to Census 2016 data

Provincial Greenhouse Gas Emissions Inventory (2012 to 2017) – Estimated Oil (Revelstoke Only)

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	YEAR	SOURCE	Data Source	ORG_UNI	ORG_NAME	ORG_TYP	ORG_PAR	ENERGY_TYPE	ENERGY_UNI	SUB_SECTOR	CATEGORY	SUB_CATEGORY	CONSUMPTION_TOTAL
91	2017	Estimate-Oil	6191	5939019	Revelstoke	City	1005939	OIL	GJ	Res	Res-Total	Res-Total-Total	12,723
322	2016	Estimate-Oil	5191	5939019	Revelstoke	City	1005939	OIL	GJ	Res	Res-Total	Res-Total-Total	11,047
553	2015	Estimate-Oil	4191	5939019	Revelstoke	City	1005939	OIL	GJ	Res	Res-Total	Res-Total-Total	10,904
784	2014	Estimate-Oil	3191	5939019	Revelstoke	City	1005939	OIL	GJ	Res	Res-Total	Res-Total-Total	11,806
1015	2012	Estimate-Oil	2191	5939019	Revelstoke	City	1005939	OIL	GJ	Res	Res-Total	Res-Total-Total	12,723

Provincial Greenhouse Gas Emissions Inventory (2012 to 2017) – Estimated bottled propane (Revelstoke Only)

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	YEAR	SOURCE	Data Source ID	ORG_UNI	ORG_NAME	ORG_TYPE	ORG_PAR	ENERGY_TYPE	ENERGY_UNI	SUB_SECTOR	CATEGORY	SUB_CATEGORY	CONSUMPTION_TOTAL
91	2017	Estimate-Propane	6192	5939019	Revelstoke	City	1005939	DPRO	GJ	Res	Res-Total	Res-Total-Total	22,411
322	2016	Estimate-Propane	5192	5939019	Revelstoke	City	1005939	DPRO	GJ	Res	Res-Total	Res-Total-Total	19,459
553	2015	Estimate-Propane	4192	5939019	Revelstoke	City	1005939	DPRO	GJ	Res	Res-Total	Res-Total-Total	19,208
784	2014	Estimate-Propane	3192	5939019	Revelstoke	City	1005939	DPRO	GJ	Res	Res-Total	Res-Total-Total	20,795
1015	2012	Estimate-Propane	2192	5939019	Revelstoke	City	1005939	DPRO	GJ	Res	Res-Total	Res-Total-Total	22,411

Provincial Greenhouse Gas Emissions Inventory (2012 to 2017) – Estimated Wood (Revelstoke Only)

	YEAR	SOURCE	Data Source ID	ORG_UNIT	ORG_NAME	ORG_TYPE	ORG_PART	ENERGY_TYPE	ENERGY_UNIT	SUB_SECTOR	CATEGORY	SUB_CATEGORY	CONSUMPTION_TOTAL
83	2017	Estimate-Wood	6190	5939019	Revelstoke	City	1005939	WOOD	GJ	Res	Res-Total	Res-Total-Total	94,256
922	2016	Estimate-Wood	5190	5939019	Revelstoke	City	1005939	WOOD	GJ	Res	Res-Total	Res-Total-Total	81,842
953	2015	Estimate-Wood	4190	5939019	Revelstoke	City	1005939	WOOD	GJ	Res	Res-Total	Res-Total-Total	80,782
784	2014	Estimate-Wood	3190	5939019	Revelstoke	City	1005939	WOOD	GJ	Res	Res-Total	Res-Total-Total	87,459
1015	2012	Estimate-Wood	2190	5939019	Revelstoke	City	1005939	WOOD	GJ	Res	Res-Total	Res-Total-Total	94,256

Provincial Greenhouse Gas Emissions Inventory (2012 to 2017) – BC Hydro (Revelstoke Only)

	YEAR	SOURCE	Data Source ID	ORG_UNIT	ORG_NAME	ORG_TYPE	ORG_PART	ENERGY_TYPE	ENERGY_UNIT	SUB_SECTOR	CATEGORY	SUB_CATEGORY	CONSUMPTION_TOTAL	CONNECTION_TOTAL
52	2017	BC Hydro	6080	5939019	Revelstoke	City	1005939	ELEC	kWh	Res	Res-Total	Res-Total-	49,610,836	3,761
446	2016	BC Hydro	5080	5939019	Revelstoke	City	1005939	ELEC	kWh	Res	Res-Total	Res-Total-	45,476,397	3,675
840	2015	BC Hydro	4080	5939019	Revelstoke	City	1005939	ELEC	kWh	Res	Res-Total	Res-Total-	46,336,623	3,647
1234	2014	BC Hydro	3080	5939019	Revelstoke	City	1005939	ELEC	kWh	Res	Res-Total	Res-Total-	48,379,075	3,622
1628	2013	BC Hydro	2580	5939019	Revelstoke	City	1005939	ELEC	kWh	Res	Res-Total	Res-Total-	46,466,135	3,606
2022	2012	BC Hydro	2080	5939019	Revelstoke	City	1005939	ELEC	kWh	Res	Res-Total	Res-Total-	47,319,653	3,593

3.1 FEI calculated the average annual consumption of estimated oil from 2012 to 2017 in Revelstoke for residential homes to be 11,841 GJ using the Provincial Greenhouse Gas Emissions Inventory as provided in footnote no. 6 of the CBER evidence. Please provide explanations and supporting calculations for the 63,819 GJ of estimated oil for residential homes shown in Table 4 of CBER evidence.

3.1.1 Please recalculate the average annual consumption of estimated oil from 2012 to 2017 in Revelstoke if the average is not 63,819 GJ as shown in Table 4 of the CBER evidence.

3.2 FEI calculated the average annual consumption of estimated bottled propane from 2012 to 2017 in Revelstoke for residential homes to be 20,857 GJ using the Provincial Greenhouse Gas Emissions Inventory as provided in footnote no. 6 of the CBER evidence. Please provide explanations and supporting calculations for the 47,113 GJ of estimated bottled propane for residential homes shown in Table 4 of CBER evidence.

3.2.1 Please recalculate the average annual consumption of estimated bottled propane from 2012 to 2017 in Revelstoke if the average is not 47,113 GJ as shown in Table 4 of the CBER evidence.

3.3 FEI calculated the average annual consumption of estimated wood from 2012 to 2017 in Revelstoke to be 87,719 GJ for residential homes using the Provincial Greenhouse Gas Emissions Inventory as provided in footnote no. 6 of the CBER

evidence. Please provide explanations and supporting calculations for the 124,712 GJ of estimated wood for residential homes shown in Table 4 of CBER evidence.

3.3.1 Please recalculate the average annual consumption of estimated wood from 2012 to 2017 in Revelstoke if the average is not 124,712 GJ as shown in Table 4 of the CBER evidence.

3.4 Please provide an updated Table 4 in accordance with the questions above.

3.5 Please confirm the Provincial Greenhouse Gas Emissions Inventory as provided in footnote no. 6 of CBER evidence stated that there are a total 3,761 BC Hydro residential connections in Revelstoke in 2017.

3.5.1 Please provide a revised Table 4 using the 2017 total number of BC Hydro residential electric connections of 3,761 instead of 3,250.

4.0 Exhibit C1-4: Section A, Table 4, pg. 8

BC Hydro: What is the average power usage for a residential customer?
https://www.bchydro.com/search.html?site=bchydro-com&client=bchydro-com&proxystylesheet=bchydro-com&output=xml_no_dtd&q=average+apartment+bill

Note 1) of Table 4 of CBER evidence stated “assumption that every household uses 900 kWh/month for non-heating electricity, see:
https://www.bchydro.com/search.html?site=bchydro-com&client=bchydro-com&proxystylesheet=bchydro-com&output=xml_no_dtd&q=average+apartment+bill”.

4.1 The BC Hydro reference provided in note 1) of Table 4 of CBER evidence does not appear to suggest the average 900 kWh per month is related to non-heating electricity only. The BC Hydro reference suggests that the average households in BC Hydro's service area use about 900 kWh per month of all electricity, including both heating and non-heating electric load. Please explain and provide supporting references for the 900 kWh per month of non-heating electricity used in Table 4 of the CBER evidence.

5.0 Exhibit C1-4: Section A, Table 4, pg. 8

On page 8 of the evidence, CBER calculated the total residential energy use for heating in Revelstoke in Table 4 using the BC Provincial Greenhouse Gas Emission Inventory 2012 to 2017:

Table 4: Residential energy use for heating in Revelstoke

Average 2012 to 2017	Secondary energy use GJ per year		
Electricity	170,153		
Electricity for heating	28,215	8%	[1]
Piped propane	70,179	21%	
Estimated oil	63,819	19%	
Estimate bottled propane	47,113	14%	
Estimate wood	124,712	37%	
Estimate district heat	600	0.2%	[2]
TOTAL	**334,638**	**100%**	
Total per dwelling	**103**		[3]

[1] Assumption that every household uses 900 kWh/month for non-heating electricity, see https://www.bchydro.com/search.html?site=bchydro-com&client=bchydro-com&proxystylesheet=bchydro-com&output=xml_no_dtd&q=average+apartment+bill

[2] One bed and breakfast at 200 GJ/year and one apartment building with 8 units each 50 GJ/year

[3] 3,250 occupied dwellings according to Census 2016 data

5.1 Please confirm the BC Provincial Greenhouse Gas Emission Inventory 2012 to 2017 reports the total consumption of each energy type and not the heating load of any building type?

5.2 Please confirm, or otherwise explain, that the 103 GJ of total residential energy use in Revelstoke is referred to as the average consumption of energy in GJ per household, not the average heating load of a residential household in Revelstoke?

5.2.1 If confirmed, please reconcile how the 103 GJ of "Heat Use" in Table 2 of the CBER evidence suggests it is the average heating load of residential households in Revelstoke.

5.3 Please confirm, or otherwise explain, that the total residential energy use of 103 GJ per household in Revelstoke is calculated based on the sum of total

consumption in GJ of all energy types from the BC Provincial Greenhouse Gas Emission Inventory 2012 to 2017, divided by the occupied dwelling count of 3,250 based on Census 2016.

Wood Burning Appliances

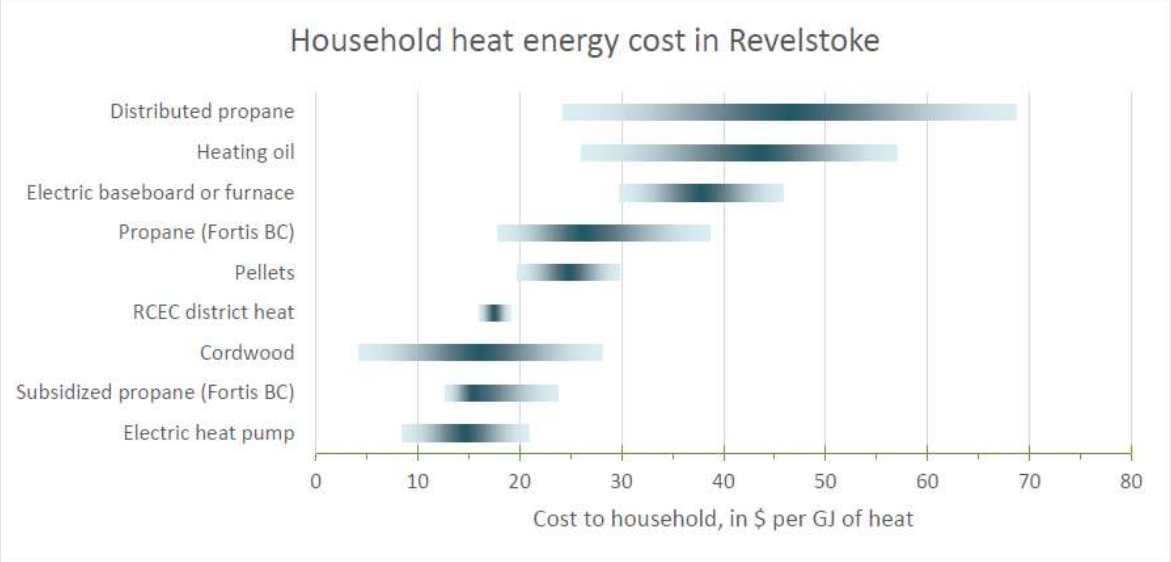
6.0 Exhibit C1-4: Section A, Figure 1, pg. 2

Province of BC: Wood Burning Appliances
https://www2.gov.bc.ca/gov/content/environment/air-land-water/air/air-pollution/smoke-burning/wood-burning-appliances

Province of BC Wood Stove Exchange Program Evaluation Report (2008 to 2014), prepared by Pinna Sustainability Inc., dated August 18, 2015
https://www2.gov.bc.ca/assets/gov/environment/air-land-water/air/reports-pub/wsep_evaluation.pdf

On Figure 1 of the evidence, CBER highlighted residential household heating with wood in Revelstoke includes cordwood and pellets.

Figure 1: Residential heat cost in Revelstoke



The Province of BC indicated that:

> *Using wood for heat is popular in many areas of B.C., however it generates far more pollution than other heating alternatives, such as electricity or natural gas. Wood heating emits a number of pollutants including fine particulate matter (PM2.5), volatile organic compounds, carbon monoxide, and polycyclic aromatic hydrocarbons (PAH).*
>
> *Wood smoke from home heating contributes about 27 percent of PM2.5 emissions in B.C., however studies have shown that in some communities the wood smoke contribution to pollution is much higher.*

In Figure 1 of the BC Wood Stove Exchange Program Evaluation Report (2008 to 2014), dated August 18, 2015, compares the relative emissions of fine particles between different wood burning appliances and oil/gas heating appliances.

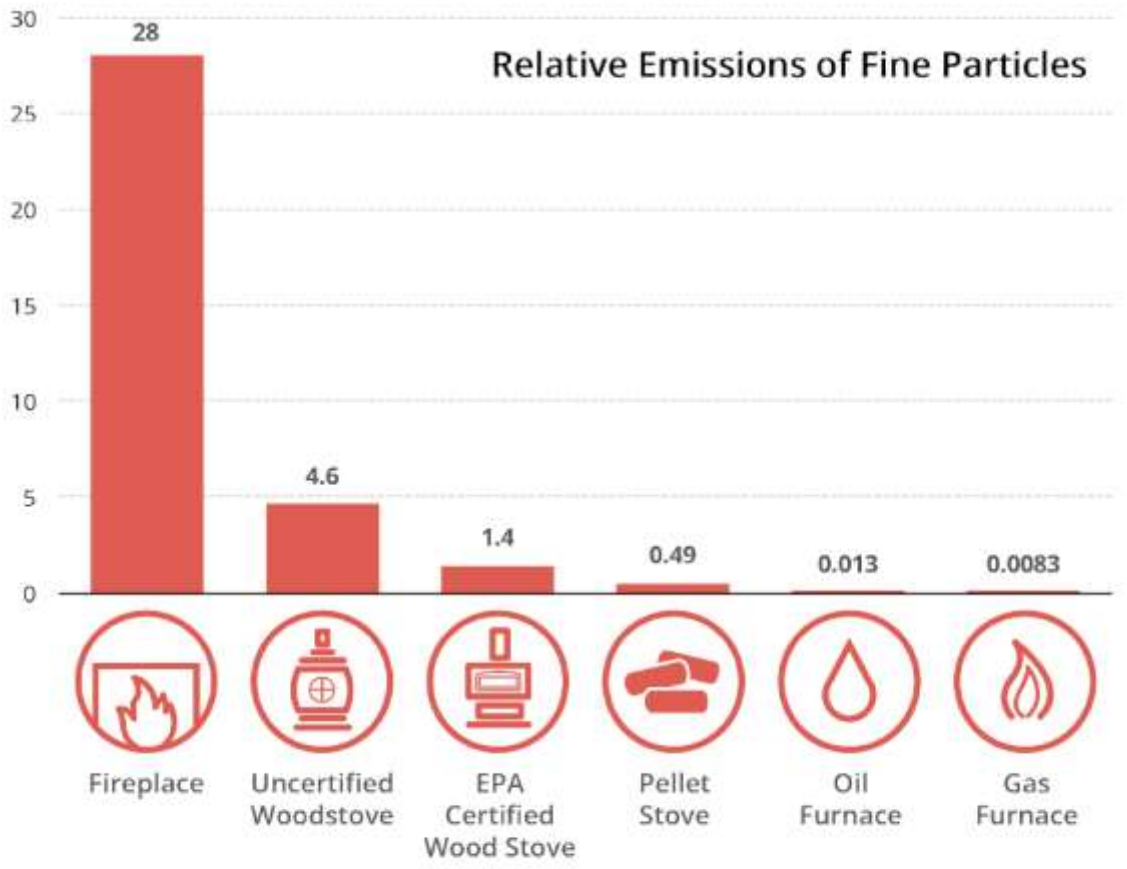


Figure 1. Level of fine particulate emissions (lbs/MMBtu) from various heat sources, based on the US EPA data and diagram for the 1988 standards

6.1 Please provide the breakdown of residential households that use cordwood versus pellets for wood heating.

6.2 Please confirm that propane heating appliances have lower particulate matter (PM) emissions than all types of wood burning appliances for heating.

Annual Heating Bill

7.0 Exhibit C1-4: Section A, para. 13, pg. 4

Exhibit C1-4: Section A, Table 2, pg. 5

cleanBC Home Heating Rebates:
https://betterhomesbc.ca/wp-content/uploads/2019/11/CleanBC_RebateChart_Nov2019.pdf

On page 4 of the evidence, CBER states “propane would also become more cost-competitive with low-GHG emitting heat pumps, increasing the likelihood of heating oil users to switch to a propane furnace rather than a heat pump”.

On page 5 of the evidence, CBER provided Table 2 for the conversion cost of end-of-like oil furnace to competing fuels and appliances:

Table 2: Conversion cost of end-of-life oil furnace to competing fuels and appliances

		Oil furnace	Propane furnace	Propane furnace	Air-source heat pump	Wood pellet stove
	Unit	Re-placement furnace	Current propane pricing	Subsidized propane		
Equipment cost		$4,250 [1]	$4,400 [2]	$4,400 [2]	$4,995 [5]	$4,737 [7]
Installation cost		$1,000	$1,000	$1,000	$1,000	$650 [7]
Oil tank removal		$0	$1,475 [3]	$1,475 [3]	$1,475 [3]	$1,475 [3]
Other conversion costs		$0	$1,150 [4]	$1,150 [4]	$5,500 [6]	
Total cost per unit		$5,250	$8,025 [2]	$8,025 [2]	$12,970	$6,862
Capital subsidy		0%	0%	0%	0%	0%
		$0	$0	$0	$0	$0
Total cost to owner/user		**$5,250**	**$8,025**	**$8,025**	**$12,970**	**$6,862**
Annuity to owner/user	$/yr.	**$974** [8]	**$1,489** [8]	**$1,489** [8]	**$2,407** [8]	**$1,273** [8]
Heat use	GJ/yr.	103 [9]	103 [9]	103 [9]	103 [9]	103 [9]
Appliance efficiency	%	78% [10]	95% [11]	95% [11]	279% [12]	77% [13]
Heat cost per GJ	$/GJ	$42	$28	$18	$15	$25
Annual heating bill	$/yr.	$5,483	$3,063	$1,978	$543	$3,338
Total annual cost	**$/yr.**	**$6,457**	**$4,552**	**$3,467**	**$2,950**	**$4,611**

CleanBC provides rebates of up to $4,300 to homes switching from heating oil to combined space and hot water heat pumps, and $500 for upgrading electrical service when fuel switching:

7.1 Does the rebate available from CleanBC, up to $4,300 for a combined space and hot water heat pump, essentially remove the difference in conversion cost shown in Table 2 of the CBER evidence between converting from heating oil to a propane furnace versus an electric heat pump?

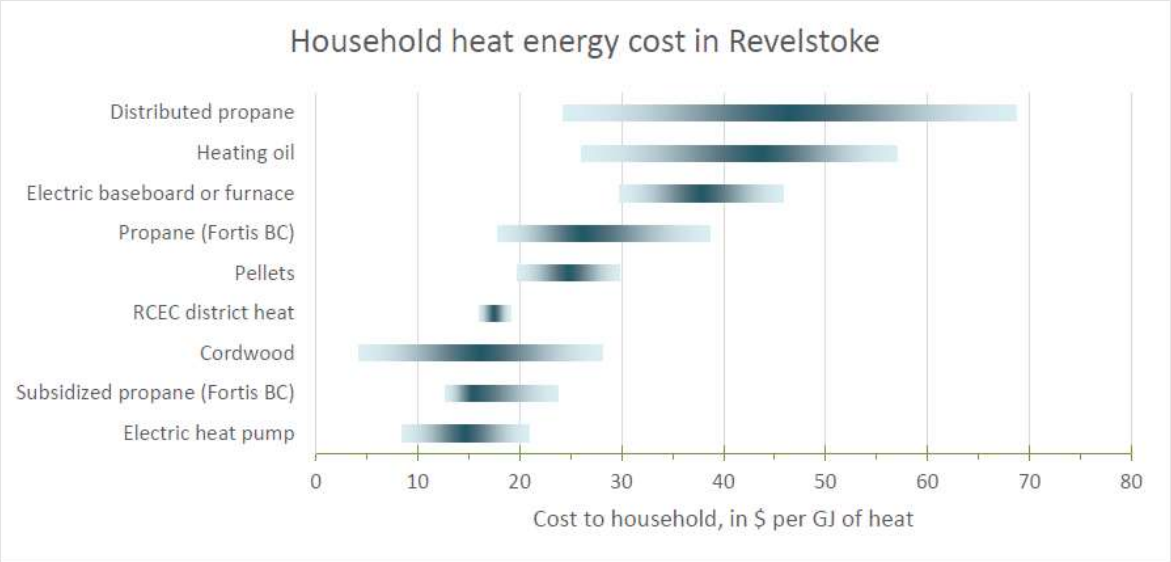
RCEC District Heat

8.0 Exhibit C1-4: Section A, Figure 1, pg. 2

Revelstoke Review: City of Revelstoke company owes millions, November 20, 2019 (https://www.revelstokereview.com/news/city-of-revelstoke-company-owes-millions/)

On page 2 of CBER Evidence, CBER provided the following figure which included RCEC district heat as one of the heating fuel options for household in Revelstoke:

Figure 1: Residential heat cost in Revelstoke



Revelstoke Review: City of Revelstoke company owes millions:

> *Due to the cost of infrastructure, i.e. highly insulated pipes, it's not viable for RCEC to provide heat to residential homes, said Larry Marchand, manager of RCEC.*
>
> *The cost of supplying heat to a single house would be the same as a larger building, thus the return on investment is far higher with larger spaces.*

8.1 Please confirm that Figure 1 of the CBER evidence indicates that the cost to household, in $ per GJ of heat for RCEC district heat has historically been lower on average than the cost to household, in $ per GJ of heat for FortisBC propane.

8.2 Please confirm that RCEC district heat does not currently have any residential customers (i.e. single-family or semi-detached dwelling) in Revelstoke and does not have any residential customers outside of the downtown core area of Revelstoke.

Woody Biomass to gas Plant in Revelstoke

9.0 Exhibit C1-4: Section C, para. 29 to 32, pg. 14

On page 14 of the evidence, CBER stated the following:

> 29. An alternative use of an annual $1.8 million subsidy that would create positive economic impacts for Revelstoke would be to invest that money in a wood to renewable gas facility.
>
> 30. B.C.'s climate goals require substantial decarbonization of all sectors of society. The province's Clean BC plan calls for 15% renewable gas by 2030.[20] Due to B.C.'s northern climate and its small arable land area,[21] agricultural products and by-products have limited potential for bioenergy production, especially in Revelstoke. Woody biomass is the most abundant feedstock available and will be the main resource of the bioeconomy in the future. With its well-established forestry and wood processing sector, Revelstoke is a good location to become a leader in next generation lignocellulosic biofuels, i.e. fuels made from wood. This includes possibilities to convert wood waste to a gas that could replace propane.[22]
>
> 31. Revelstoke has access to more than 76,000 bone-dry tonnes (bdt) of wood waste/biomass available. The cost of these range from $0 (waste) to $100 per bdt.[22] Downie Timber is the largest exporter of low-carbon biomass. It has large amounts of wood waste/biomass that could be used in a renewable gas facility. It is also the largest user of propane in Revelstoke.
>
> 32. A wood to renewable gas plant consuming 1,000 to 2,000 bdt a year would cost around $10 to $20 million whereas a 40,000 bdt-plant would likely require around $80 million in initial capital investment.[22] By comparison, FEI suggested a liquefied natural gas (LNG) plant in 2016 for Revelstoke at capital cost of $25 million.[23]

9.1 Please confirm or otherwise explain whether the proposed wood-to-renewable gas plant could serve all existing propane users in Revelstoke without any

1 alterations to the current piped propane system or current propane users' end-
2 use appliances