ENBRIDGE GAS INC.
DSM MULTI-YEAR PLAN AND FRAMEWORK

Written Interrogatories of Enbridge Gas Inc. to

Environmental Defence (Exhibit L.ED.1)

Issue 10j

10j-EGI-1-ED.1

Reference:

Exhibit L.ED.1, page 13

Preamble:

It is not clear what type of heat pump Enbridge Gas proposes to use in their Low Carbon Transition program and how it will be sized. Their models in Exhibit I.10h.EGI.STAFF.77 use an HSPF 10 system which is designed for cold climate use but models the same 3 ton unit in two homes with very different heating loads. As a consequence, the balance point (where a heat pump is no longer able to meet the full heating load) is -14.3°C in the newer post ‘80s home and -1.6°C in the older pre ‘80s home with higher heat loss.

Question:

a) Please confirm a 3 ton (36,000 BTU) heat pump was used in your analysis? If not, please specify the heating rating of the equipment modelled in the analysis

10j-EGI-2-ED.1

Reference:

Exhibit L.ED.1, page 22

Preamble:

Enbridge Gas and Union Gas avoided cost values (from 1.5.EGI.ED.16) for gas and electricity were averaged. The carbon price schedule outlined by the federal government was used until 2030, after which it was assumed that the price would continue to rise at the same rate ($15 per tonne per year).

Question:

a) Please confirm the carbon tax of $15/ton/year after 2030 used for the analysis is not based on any currently announced policy. Please provide references for Federal Government information if not confirmed.

10j-EGI-3-ED.1

Reference:

Exhibit L.ED.1, page 22

Preamble:

The operational costs for space heating were calculated for every year using:

$$annual\ operational\ heating\ or\ cooling\ cost = \frac{heating\ or\ cooling\ load}{efficiency} * (total\ avoided\ cost\ per\ kWh\ or\ m3)$$

The total operational cost of the HPWH system is includes the cost of generating the heat absorbed from the air by the water heater in winter and the air conditioning energy avoided due to this heat absorption in summer. Since the HPWH also loses heat while in standby, these values are reduced by 5%. The formula used was:

$$HPWH\ operational\ cost = (avoided\ cost\ of\ electricity) * ((water\ heat\ load)/(HPWH\ efficiency) + \left(\frac{0.5 * (water\ heat\ load)}{ccASHP\ efficiency} - \frac{0.5 * (water\ heat\ load)}{ccASHP\ cooling\ efficiency}\right)$$

Question:

a) Please provide the source of this formula.

b) Please confirm, is this an industry accepted calculation to account for the heating penalty and cooling benefit of electric heat pump water heaters in conditioned spaces of a home?

10j-EGI-4-ED.1

Reference:

Exhibit L.ED.1 – Appendix B

Preamble:

Analysis of Enbridge Gas' low carbon transition program for cost-effectiveness and climate alignment.

Question:

a) The EB-2021-0002, Exhibit I.10h.EGI.STAFF.77 Tables 1 & 2 analysis uses a 3 ton heat pump. This equipment requires backup heating to supplement the electric heat pump. As indicated in figure 26 from the NRCan sizing guide, a back up system is required to meet heating demands below the balance point where the heat load exceeds the heat pump capacity. Please confirm if backup heating was considered in your analysis? If not, why not? Confirm the overall system efficiency will decrease if electric backup is used in the analysis for temperatures below the balance point resulting in a higher annual electrical heating costs for an all electricity fueled system. If not, please state all assumptions/rationale.

b) If an electric heat pump water heater is used, additional heating load is required from the home heating system to make up for the energy drawn from the inside air by the HPWH to heat the domestic hot water.
   i. Please confirm if the additional heating load required was included in the total design home heating load calculation?
   ii. Confirm the home heating load is increased due the additional load from the HPWH.
   iii. Confirm this will increase the balance point temperature resulting in the electric backup heating system coming on sooner to provide home heating needs. If any portion of the above is not confirmed please state the assumptions and/or rationale.

c) Confirm that replacing a furnace with a heat pump sized to meet peak heating load without additional heating backup may not adhere/meet manufacturers installation requirements for 2 reasons:
   i. Minimum airflow specification - existing duct work may not accommodate the heat pump max airflow specifications,
   ii. Proper cooling - cooling sizing selection limit as identified in CSA F280-12 is 125% of the cooling load. If not confirmed please state any assumptions or supporting rationale.

10j-EGI-5-ED.1

Reference:

Exhibit L.ED.1 – Appendix B

Preamble:

Analysis of Enbridge Gas' low carbon transition program for cost-effectiveness and climate alignment.

Question:

The results in Attachment A, B and C as referenced below in this interrogatory were adjusted to begin in 2023 to align with the analysis provided by Enbridge in EB-2021-0002, Exhibit I.10h.EGI.STAFF.77. /u

a) Are the adjusted results calculated correctly if the start date is 2023 instead of 2025?

   The results in Attachment A were adjusted to maintain carbon tax constant at $170/ton after 2030. The adjusted 2023 start date from a) was also in addition to the carbon tax adjustment past 2030. /u

b) Please confirm the updated results are correct.

   The manufacturers HSPF rating has historically been based on AHRI Standard 210/240 however on January 1 2023 this will be changed to USA DOE "Appendix to M1 subpart B, Part 430 of Title 10"[1] as outlined in Amendment 17[2] of the Canadian Energy Efficiency Act (i.e. proposal). These new standards including new MEPS that will result in higher AC efficiency regulation and lower HP efficiency regulations, in addition to new test condition which will lower the overall HSPF rating of heat pumps. The results in Attachment B were adjusted by a conservative HSPF reduction of 1. /u /u

c) Please confirm the updated results in Attachment C, which are inclusive of a) & b) adjustments, are correctly calculated. /u

d) Further as it relates to the HSPF reduction of 1, would you agree that in the "ENERGY STAR® Program Requirements Product Specification for Central Air Conditioner and Heat Pump Equipment Eligibility Criteria Draft Version 6.1" on page 6 that it stipulates that the HSPF value tested using the new HSPF 2 test method will result in a significant drop in HSPF value compared with the current test methodology.

[1] https://www.govinfo.gov/content/pkg/CFR-2019-title10-vol3/pdf/CFR-2019-title10-vol3-part430-subpartB-appM1.pdf

[2] Natural Resource Canada (NRCan), Technical bulletin on Amending Standards: Central Air Conditioners and Heat Pumps https://www.nrcan.gc.ca/energy-efficiency/energy-efficiency-regulations/planning-and-reporting/central-air-conditioners-and-heat-pumps/23613