EB-2020-0293
Enbridge St. Laurent Ottawa North Replacement Project

Interrogatories of Environmental Defence
To Enbridge re Reply Evidence

February 8, 2022

Note: Most of the below interrogatories are relevant to issues 1 and 2.

Interrogatory # M-1-ED-21

Reference: Exhibit M (EGI Reply Evidence), p. 2

Preamble: Enbridge states:

> "The Sponsors claim that their plans may result in total annual natural gas reductions of up to 12,086 103 m3 in the area served by the Project by 2050.
> …
> The Sponsor's evidence is incongruent with the basic principles of natural gas system design in that it relies upon 2019 annual natural gas demand volumes to support its conclusions, whereas Enbridge Gas's pipeline systems are designed to serve the current peak design day demands of existing natural gas consumers."

Question(s):

(a) Please provide the annual demand (m3) and design day demand (m3/d) for the area served by the project. Please also express these as a ratio of annual demand to demand on a design day. Does Enbridge have any reason to believe that the ratio of annual demand to demand on a design day would differ as between the stock of all buildings in the area and those owned by the City of Ottawa?

(b) To assist us in assessing how consistently annual and design day demands track together, please complete the following table based on the latest Annual Gas Supply Plan Update.

	Annual Demand (m3)	Design Day Demand (m3/d)	Ratio of Annual Demand to Design Day Demand
Year 1			
EGD			
Union North West			
Union North East			
Union South			
… Year n[1]			
EGD			
Union North West			

[1] The available information is likely 2020/21 to 2024/25 per the latest gas supply plan.

Union North East			
Union South			

Interrogatory # M-1-ED-22

Reference: Exhibit M (EGI Reply Evidence), p. 2-5

Questions:

(a) Why has Enbridge expressed the design day demand as m3/h instead of m3/d?
(b) Please provide a list of the 5 most recent leave to construct applications and for each (i) indicate whether the design demands were described as m3/h or m3/d in Enbridge's evidence, and (ii) provide citations to where this is stated.
(c) What is the design day demand for the pipelines proposed to be replaced (m3/d)?
(d) What is the design day capacity of the pipelines to be replaced (m3/d)?
(e) Please recalculate Table 1 on page 4 as design day demand (m3/d).
(f) Please describe at a high level the instances in which Enbridge uses m3/h instead of m3/d for design demand calculations.

Interrogatory # M-1-ED-23

Reference: Exhibit M (EGI Reply Evidence), p. 2

Question(s):

(a) The evidence from Ottawa states that: "The ESAP plans to reduce GHG emissions in the National Capital Region to 35% of 2005 baseline by 2025 and to less than 10% by 2030." Please quantify the impact of this on the St. Laurent pipeline expressed in terms of design day demand and annual demand (m3).
(b) The evidence from Ottawa describes plans to reduce consumption of fossil gas in Ottawa Community Housing to zero in 2040 (see e.g. page 8 of Ottawa's evidence). Please quantify the impact of this on the St. Laurent pipeline expressed in terms of design day demand and annual demand (m3).
(c) The evidence from Ottawa describes plans to reduce consumption of fossil gas in all City of Ottawa buildings to net-zero in 2040. Please quantify the impact of this on the St. Laurent pipeline expressed in terms of design day demand and annual demand (m3).
(d) What is the threshold (or thresholds) at which pipelines in question can be safely downsized?
(e) Please express the figures calculated pursuant to questions (a), (b), and (c) as a percent of the total demand on the St. Laurent pipeline, both design day demand and annual throughput.

Interrogatory # M-1-ED-24

Reference: Exhibit M (EGI Reply Evidence), p. 4

Preamble:

Table 1: Peak Design Day Demand Reduction[5]

Customer Group	Peak Design Day Demand (m^3/h)
Cliff Street Heating	7,565
City of Ottawa Sites	667
OCHC Sites	1,797
Total	10,029

Footnote 5: Conservatively, the peak design day demand impacts in Table 1 were calculated using the assumption that demand reduction is 100% effective immediately, with no use of methane (including natural gas or renewable natural gas). The calculation also assumes that the demand reduction is located in the most optimal part of the St. Laurent pipeline system. Table 1 excludes peak design day demand for buildings cited in the Evidence where the Company was not able to confirm their address and location relative to the St. Laurent pipeline system. The volumes associated with these excluded buildings would not materially change the Company's conclusions regarding peak design day demand or the design of the Project.

Question(s):

(a) Please request a list of addresses of buildings owned by the City of Ottawa and calculate the gas demand (m3) from those buildings (e.g. from billing data) that are served by the St. Laurent pipeline both in terms of design day demand and annual demand. Please provide a complete breakdown on a building-by-building. Note that we have asked Ottawa an interrogatory requesting that they provide this information to Enbridge.
(b) Please also describe how the design day demand was calculated in responding to (a) and include all calculations and equations. Please describe in detail how this exercise was conducted in comparison to Enbridge's methodology for design day forecasting as part of LTC applications (e.g. whether modelled data or actual billing data is used).
(c) Please provide a complete breakdown of the data underlying table 1 above. For each building, please also provide the annual demand.

Interrogatory # M-1-ED-25

Reference: Exhibit M (EGI Reply Evidence), p. 5

Preamble: Enbridge states:

> As the Sponsors are opposed to the replacement Project which is required to ensure that the Company can safely and reliably meet the peak design day demands of existing customers served via the St. Laurent pipeline system, it is essential that the OEB also consider the scale of investment into construction of new electricity infrastructure that would be required to eliminate the same. The equivalent amount of energy from

> electricity required to replace the energy provided by the proposed Project over the course of 1 hour is approximately 1.64 GW.[2]
> …
> In other words, electricity generation, transmission and/or distribution infrastructure amounting to up to double the current peak demands for the City of Ottawa (served via Hydro Ottawa) or more than half of the generation capacity of the Pickering Nuclear Generating Station would need to be built and placed into service in order to eliminate the St. Laurent pipeline system.

Questions:

(a) Enbridge describes the energy provided by the project as 1.64 GW. However, fossil gas is combusted at efficiencies less than 100% and therefore it generates less than 1.64 GW of heat. Approximately how many GW of heat would be generated by 1.64 GW of gas? Please provide an answer on a best estimate basis with whatever simplifying assumptions and caveats are necessary. For example, please consider any data that Enbridge has access to on average customer equipment efficiencies for furnaces and water heaters. Please provide all calculations and explain the basis for the answer.
(b) The 1.64 GW figure is based on the capacity of the pipeline (155,300 m3/h), not the forecast demand. Enbridge states that the peak design day demand is 139,800 m3/h. Please calculate the energetic value (GW) of the peak hour demand of 139,800 m3/h and the heat that would be created via equipment of average efficiency (GW).
(c) What is the temperature and other criteria for design day demand calculations?
(d) Please confirm that the energy required for heating can be reduced through cost-effective energy efficiency measures, which pay for themselves over time in avoided energy costs.
(e) Please confirm that NRCan states that "On a seasonal basis, the heating seasonal performance factor (HSPF) of market available units can vary from 7.1 to 13.2 (Region V). It is important to note that these HSPF estimates are for an area with a climate similar to Ottawa."[3] Does Enbridge disagree with NRCan?
(f) Please confirm that HSPF 13.2 (region 5) is equivalent to a seasonal Co-efficient of Performance (sCOP) of 3.86. Please also confirm that the sCOP is the kWs of heat created by 1 kW of electricity input over an average heating season. Please also confirm that this is sometimes described as an efficiency of 386%. If any of this is not confirmed, please explain in detail and provide the correct answer.
(g) Please confirm that cold climate air-source heat pumps can have a COP greater than 2 even at -21 degrees Celsius.[4]

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[2] (155,300 m^3/h × 1h × 37.98 MJ/m^3) ÷ 3,600 MJ/MWh = 1,638.415 MW -or- 1.64 GW

[3] https://www.nrcan.gc.ca/energy-efficiency/energy-star-canada/about/energy-star-announcements/publications/heating-and-cooling-heat-pump/6817

[4] E.g.
https://mylinkdrive.com/viewPdf?srcUrl=http://enter.mehvac.com.s3.amazonaws.com/DAMRoot/Original/10006\M_SUBMITTAL_MSZ-FS06NA_MUZ-FS06NAH_en.pdf
https://mylinkdrive.com/viewPdf?srcUrl=http://enter.mehvac.com.s3.amazonaws.com/DAMRoot/Original/10006\M_SUBMITTAL_MSZ-FS09NA_MUZ-FS09NAH_en.pdf
https://mylinkdrive.com/viewPdf?srcUrl=http://enter.mehvac.com.s3.amazonaws.com/DAMRoot/Original/10006\M_SUBMITTAL_MSZ-FS12NA_MUZ-FS12NAH_en.pdf

(h) Please confirm that NRCan states that the range of available ground-source heat pumps goes up to a heating COP of 4.2 for closed loop applications and 5 for open loop applications. [5]

(i) Please confirm that a $10,000 incentive is available to customers in Quebec with fossil fuel based central heating (including fossil gas) to convert to an electric thermal storage system.[6]

(j) Please confirm that incentives are available in Nova Scotia for electric thermal storage systems.[7]

(k) Please confirm that electric thermal storage systems are intended to reduce peak electrical heating demand.

(l) Please provide any analysis that Enbridge is capable of generating on the degree to which Enbridge's calculation of 1.64 GW peak demand for electrifying the buildings in the project area would be decreased by accounting for following:
    i. The implementation of all cost-effective energy efficiency and demand management measures;
    ii. The efficiency levels of existing gas-fired equipment being less than 100%;
    iii. The efficiency levels of ground-source heat pumps being up to 500%;
    iv. The efficiency levels of the latest air-source heat pumps being up to 386% seasonally and around 200% at -20 Celsius; and/or
    v. The implementation of electric thermal storage to reduce peak demand.

(m) If Enbridge cannot provide the estimates described in the above question, please explain how it is qualified to opine on the feasibility of electrification or the transmission, distribution, and generation capacity that would be needed to replace the St. Laurent pipeline system.

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https://mylinkdrive.com/viewPdf?srcUrl=http://enter.mehvac.com.s3.amazonaws.com/DAMRoot/Original/10006\M_SUBMITTAL_MSZ-FS15NA_MUZ-FS15NAH_en.pdf; https://mylinkdrive.com/viewPdf?srcUrl=http://enter.mehvac.com.s3.amazonaws.com/DAMRoot/Original/10006\M_SUBMITTAL_MSZ-FS18NA_MUZ-FS18NAH_en.pdf

[5] https://www.nrcan.gc.ca/energy-efficiency/energy-star-canada/about/energy-star-announcements/publications/heating-and-cooling-heat-pump/6817

[6] https://www.hydroquebec.com/residential/energy-wise/windows-heating-air-conditioning/thermal-storage/

[7] https://www.nspower.ca/your-home/energy-products/electric-thermal-storage