ENBRIDGE GAS DISTRIBUTION INC. (ENBRIDGE)
RESPONSES TO INTERROGATORIES OF FRPO

INTERROGATORY #1

REF: Enbridge Evidence, page 9, paragraph 30 and
EPCOR Evidence page 9, paragraph 22

Preamble: "*There are likely other options that could be considered and are likely to be tabled in this proceeding. Enbridge is open to learn of these ideas and consider incorporating them in its proposal where appropriate*."

What are Enbridge's views on the approach described in paragraph 22 of the EPCOR evidence describing an initial lowering rates to promote conversion and utilization.

RESPONSE

Please see the Company's response to Board Staff Interrogatory #6 at Exhibit S3.EGDI.BSTAFF.6, part (b).

ENBRIDGE GAS DISTRIBUTION INC. (ENBRIDGE)
RESPONSES TO INTERROGATORIES OF FRPO

INTERROGATORY #2

REF: Enbridge Evidence, page 11, paragraph 35

Preamble: "*Enbridge is in the planning stage of constructing a Power-to-Gas, energy storage plant to provide "green hydrogen" in the GTA which will convert off-peak, surplus renewable electricity (wind, hydro, etc.) to hydrogen and inject this into pipelines for delivery to consumers as zero-carbon transportation fuel, green heat, or redelivery back to the power grid where and when most needed*."

Is Enbridge promoting the idea of injecting hydrogen into its natural gas pipelines?

RESPONSE

Enbridge is considering the potential for a portfolio of green gas supplies to reduce the greenhouse gas emissions associated with combustion of natural gas. Part of this portfolio review includes the evaluation of how hydrogen blending in the gas supply portfolio can support the emission reduction goals.

ENBRIDGE GAS DISTRIBUTION INC. (ENBRIDGE)
RESPONSES TO INTERROGATORIES OF FRPO

INTERROGATORY #3

REF: Enbridge Evidence, page 11, paragraph 35

Preamble: "*Enbridge is in the planning stage of constructing a Power-to-Gas, energy storage plant to provide "green hydrogen" in the GTA which will convert off-peak, surplus renewable electricity (wind, hydro, etc.) to hydrogen and inject this into pipelines for delivery to consumers as zero-carbon transportation fuel, green heat, or redelivery back to the power grid where and when most needed*."

Has Enbridge investigated the impact of hydrogen embrittlement on steel pipelines and leakage characteristics of hydrogen?

RESPONSE

As part of the technical due diligence that supports the development of a green gas supply portfolio, understanding the effects of hydrogen on pipeline materials is included. This technical assessment involves embrittlement effects, leakage and other technical characteristics involving hydrogen blends.

ENBRIDGE GAS DISTRIBUTION INC. (ENBRIDGE)
RESPONSES TO INTERROGATORIES OF FRPO

INTERROGATORY #4

REF: Enbridge Evidence, page 11, paragraph 35

Preamble: "*Enbridge is in the planning stage of constructing a Power-to-Gas, energy storage plant to provide "green hydrogen" in the GTA which will convert off-peak, surplus renewable electricity (wind, hydro, etc.) to hydrogen and inject this into pipelines for delivery to consumers as zero-carbon transportation fuel, green heat, or redelivery back to the power grid where and when most needed*."

How does Enbridge recommend that safety implications be addressed?

RESPONSE

In various markets, like Europe and Hawaii, hydrogen-natural gas blended fuels already exist within the natural gas pipelines. Enbridge is working with North American pipeline stakeholders to establish technical guidance for blended fuels. This includes a review of best practices from other markets, like Europe, where this is already in place.

ENBRIDGE GAS DISTRIBUTION INC. (ENBRIDGE)
RESPONSES TO INTERROGATORIES OF FRPO

INTERROGATORY #5

REF: Enbridge Evidence, page 12, paragraph 36

Preamble: "In terms of the impact of transitioning users of alternate fuels to natural gas the Canadian Gas Association recently released a report completed by ICF that quantifies the national economic benefit of the expansion of the country's natural gas system."

Please file the reference ICF Report.

RESPONSE

The ICF report referenced above can be found at EB-2015-0179, Exhibit B.CCC.5, Attachment 1.

ENBRIDGE GAS DISTRIBUTION INC. (ENBRIDGE)
RESPONSES TO INTERROGATORIES OF FRPO

INTERROGATORY #6

REF: Enbridge Evidence, page 12, paragraph 38

Preamble: "*With respect to electricity the natural gas carbon advantage is clear when comparing the carbon footprint of natural gas to electricity for specific applications. Although counterintuitive, when natural gas is considered as the marginal fuel supporting electricity generation converting heating and water heating loads from electricity to natural gas will lead to reductions in the Province's CO2 emissions*."

Please provide Enbridge's assumptions behind this statement.

a. At what percentage threshold of contribution to provincial electricity generation must natural gas fired generation be to make the above statement true?

RESPONSE

The following assumptions were used to demonstrate the GHG benefit of converting heating and domestic hot water heating loads from electricity to natural gas:

Heating with Marginal Electricity

Average effciency of gas-fired peaker plants (HHV) =	45%	
Line losses =	5%	
Electric resistance heating efficiency =	100%	
Gas consumption by gas-fired peakers =	0.22	m3/kWh
GHG emissions =	416	g/kWh

Heating with Natural Gas

Space heating load as a % of toal heating load =	70%	
DHW heating load as a % of toal heating load =	30%	
Gas furnace efficiency (HHV) =	90%	
DHW gas-fired heater (HHV) =	67%	
Gas consumption of the furnace and DHW heater =	0.12	m3/kWh
GHG emissions =	218	g/kWh

GHG Emission Reductoin = 200 g/kWh of electricity displaced

a. The statement is true since the amount of electricity displaced by converting electrically heated homes to natural gas represents less than 1% of electricity produced by the gas-fired power plants. For example, the gas-fired peaking plants alone (without counting non-utility generators) produced about 6,160,000 MWH of electricity in 2014. By comparison, the electricity consumed by the electrically heated homes considered in Community Expansion project is estimated to be about 60,000 MWh which is less than 1% of total electricity produced by the gas-fired peaking plants.

ENBRIDGE GAS DISTRIBUTION INC. (ENBRIDGE)
RESPONSES TO INTERROGATORIES OF FRPO

INTERROGATORY #7

REF: Enbridge Evidence, page 12, paragraph 39

Preamble: "*It is the Company's view that the Province's cap and trade program should not be considered in isolation in the determination as how best to consider the impact of this program on the feasibility of potential natural gas system expansion projects*."

If the Board determines that the reality of the Cap and Trade program cannot be viewed in isolation, how would Enbridge propose assessing the costs economically?

RESPONSE

Enbridge is of the view that the Province's proposed Cap and Trade carbon pricing regime should be considered in terms of how it may impact the relative costs of fuels competing with natural gas and the extent to which the extension of the Province's gas distribution infrastructure will assist in the reduction of greenhouse gas emissions.

ENBRIDGE GAS DISTRIBUTION INC. (ENBRIDGE)
RESPONSES TO INTERROGATORIES OF FRPO

INTERROGATORY #8

REF: Enbridge Evidence, page 15, Table 1 and
CPA_EVD_20160321 Exhibit 9, Tab 9, Figure 1

What is the source of the annual bill costs for heating with oil and propane?

a. Please provide the applicable dates of the source data?
b. Please update Table 1 using a price of $1650 for propane as estimated from Figure 1 provided in the above referenced evidence.

RESPONSE

(a) Please see the Company's response to CCC interrogatory #8 at Exhibit S3.EGDI.CCC.8.
(b) Please see the table below.

Table 1
Estimated Annual Fuel Cost Savings, Equipment Conversion Cost and Payback Period for a Typical Residential Customer

Primary Fuel Type	Penetration %	Annual Bill	Natural Gas Saving (no SES)	Natural Gas Saving (with SES)	Estimated Conversion Cost	Payback Period (Years) (with SES)
Natural Gas	n/a	949				
Electricity	18%	3,114	2,165	1,613	7,250	4.5
Heating Oil	27%	2,771	1,822	1,270	3,500	2.8
Propane	43%	1,650	701	149	1,525	10.2
Wood	13%	1,537	588	36	3,500	96.3
Other (Equal Mix)	0%	2,619	1,670	1,118	3,500	3.1
Weighted Average	0.00	0	1,661	1,103	3,361	3.0

ENBRIDGE GAS DISTRIBUTION INC. (ENBRIDGE)
RESPONSES TO INTERROGATORIES OF FRPO

INTERROGATORY #9

REF: Enbridge Evidence, page 25, paragraph 79 and Tables 4 and 5

Preamble: "*The calculation of Project PIs in Tables 3 through 6 does not include reinforcement costs. The anticipated cost of system reinforcement has been included in the calculation of the expected Rolling Portfolio PI set-out in Table 7 and estimated ratepayer impacts, shown in Table 9*."

and

REF: Exhibit A, Tab 1, pages 8 and 9

Preamble:" *In addition to the costs outlined in E.B.O. 188, Union proposes that, subject to several conditions, costs for upstream distribution system reinforcement be included in the economic assessment for any new attachments or load additions. The rationale for this is the Board decision for the Wingham Expansion Project in 1995. In the Order following this proceeding the Board indicated*:

> "*In future facilities applications Union is directed to… file an estimate of the costs of any reinforcement of existing lines that may be necessary as a result of the specific application, and an assessment of the impact of these costs on the economics of the project;…"*

Please provide Enbridge's reasoning for excluding reinforcement costs for individual project economics?

RESPONSE

Enbridge would like to clarify that in assessing feasibility of individual projects, Enbridge Gas Distribution includes estimates of Normalized Reinforcement Costs ("NR") as prescribed in EBO 188 – Appendix B, page 4 section 2.1. These NR costs are estimated every year based on the procedure described in EBO 188, section 2.3.7 and includes costs of all reinforcements projects budgeted for the test year or already completed in the past. Estimated NR costs are applied to all new connections on an equal basis.

In assessing feasibility of community expansion, Enbridge Gas Distribution applied normalized reinforcement costs based on 2016 cost study, which is consistent with the regulation. 2016 cost study factored in all reinforcement projects budgeted in 2016 or completed in the past. The cost of future reinforcement projects will be included in determination of NR cost in the corresponding years and would be applied to new connections in those years. As such, Enbridge Gas Distribution's treatment of reinforcement cost for project feasibility is consistent with EBO 188 guidelines.

ENBRIDGE GAS DISTRIBUTION INC. (ENBRIDGE)
RESPONSES TO INTERROGATORIES OF FRPO

INTERROGATORY #10

REF: Enbridge Evidence, page 25, paragraph 79 and Tables 4 and 5

Preamble: "*The calculation of Project PIs in Tables 3 through 6 does not include reinforcement costs. The anticipated cost of system reinforcement has been included in the calculation of the expected Rolling Portfolio PI set-out in Table 7 and estimated ratepayer impacts, shown in Table 9*."

and

REF: Exhibit A, Tab 1, pages 8 and 9

Preamble:" *In addition to the costs outlined in E.B.O. 188, Union proposes that, subject to several conditions, costs for upstream distribution system reinforcement be included in the economic assessment for any new attachments or load additions. The rationale for this is the Board decision for the Wingham Expansion Project in 1995. In the Order following this proceeding the Board indicated*:

> "*In future facilities applications Union is directed to… file an estimate of the costs of any reinforcement of existing lines that may be necessary as a result of the specific application, and an assessment of the impact of these costs on the economics of the project;…"*

Since Enbridge has included reinforcement costs for the purposes of subsequent tables, we assume that these costs are readily available without undue additional analysis. Please provide the results for Tables 4 and 5 for those projects whose profitability would be materially different if the Board required reinforcement costs be included.

RESPONSE

Please see the Company's responses to BOMA Interrogatory #7 at Exhibit S3.EGDI.BOMA.7 and FRPO Interrogatory #9 at Exhibit S3.EGDI.FRPO.9. Normalized reinforcement costs have been included in assessing feasibility of individual projects. As such, the Company has not restated Tables 4 and 5.

ENBRIDGE GAS DISTRIBUTION INC. (ENBRIDGE)
RESPONSES TO INTERROGATORIES OF FRPO

INTERROGATORY #11

REF: Enbridge Evidence, page 25, paragraph 79 and Tables 4 and 5

Preamble: "*The calculation of Project PIs in Tables 3 through 6 does not include reinforcement costs. The anticipated cost of system reinforcement has been included in the calculation of the expected Rolling Portfolio PI set-out in Table 7 and estimated ratepayer impacts, shown in Table 9*."

and

REF: Exhibit A, Tab 1, pages 8 and 9

Preamble:" *In addition to the costs outlined in E.B.O. 188, Union proposes that, subject to several conditions, costs for upstream distribution system reinforcement be included in the economic assessment for any new attachments or load additions. The rationale for this is the Board decision for the Wingham Expansion Project in 1995. In the Order following this proceeding the Board indicated*:

> "*In future facilities applications Union is directed to… file an estimate of the costs of any reinforcement of existing lines that may be necessary as a result of the specific application, and an assessment of the impact of these costs on the economics of the project;…"*

If a third party were chosen for a new franchise for one of the targeted projects on Enbridge's list that required reinforcement, how would those reinforcement costs to feed the new franchise be treated by Enbridge.

RESPONSE

Please see Enbridge's response to FRPO Interrogatory #9 at Exhibit S3.EGDI.FRPO.9 for treatment of reinforcement cost.