

Enbridge Gas Distribution Inc.
RNG Enabling and Geothermal Energy Service Programs
EB-2017-0319
OEB STAFF INTERROGATORIES
April 26, 2018

Issue 1 – New Business Activities

Staff IR-1

Topic: Introduction

Ref: Exhibit B / Tab 1 / Schedule 1 / p. 4 #11 and 12

Preamble:

Enbridge Gas states it intends to offer two services – Upgrading and Injection Services – for RNG producers.

Enbridge Gas also states that it is of the view that the combined effect of the Cap and Trade Framework and the Undertakings (Order in Council/Directives) support the inclusion of carbon abatement activities such as the RNG Enabling Program described in this submission in the regulated utility.

Questions:

- a) Please explain why Enbridge Gas' RNG Enabling Program – Upgrading Service should be a regulated utility business.
 - i) Does Enbridge Gas offer a similar type of service to natural gas producers (for traditional natural gas supplies) to ensure that these natural gas producers inject pipeline quality natural gas into Enbridge Gas' distribution system? Please explain.
 - ii) Please explain why Enbridge Gas believes that cleaning biogas (the Upgrading Service) should be considered a core utility business?
 - iii) Please discuss whether there are unregulated companies in the marketplace that can provide Upgrading Service to RNG suppliers.
 1. Please explain whether Enbridge Gas' proposed regulated service fees will affect market competition in RNG Upgrading Services.
- b) Please explain in detail why the RNG Enabling Program – Upgrading Service could not be offered by an affiliate of Enbridge Gas.

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- c) Please explain why Enbridge Gas' RNG Enabling Program – Injection Services should be a regulated utility business.
 - i) Please discuss whether there are unregulated companies in the marketplace that can provide Injection Service to RNG suppliers.
 - 1. Please explain whether Enbridge Gas' proposed regulated service fees will affect market competition in RNG Injection Services.
- d) Please identify and discuss other regulators that have approved a similar RNG Enabling Program – Upgrading and Injection Services where this Program is part of the natural gas distributor's regulated business.
- e) Over the next ten years, please outline the expected GHG reductions associated with Enbridge Gas' RNG Enabling Program only (i.e., please do not include GHG reductions associated with RNG, the commodity). Please provide all supporting documentation including data, assumptions and analysis.

Staff IR-2

Topic: Context and Background

Ref: Exhibit B / Tab 1 / Schedule 1 / pp. 7-8, #21 and 22

Preamble:

Enbridge Gas states that it is working with the Ontario Geothermal Association (OGA), MOECC and the MOE to find solutions to overcome barriers (initial high costs and inconsistent deployment and installation practices).

Questions:

- a) Please describe all the possible solutions that were considered to potentially overcome high costs and inconsistent practices (e.g., Climate Change Action Plan (CCAP) funding, improved training for industry workers, industry standards, etc.)?
- i) Given the possible solutions discussed above, please explain why the preferred solution is for Enbridge Gas to enter into the geothermal energy industry with its Geothermal Energy Service (GES) Program.

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- b) Has the Heating, Refrigeration and Air Conditioning Institute of Canada (HRAI) (and OGA as an affiliated association) established any industry standards related to the deployment and installation practices of geothermal energy systems?
 - i) Please explain what is OGA's and HRAI's role in reducing inconsistent deployment and installation practices in Ontario?

- c) Has the Ontario government established any industry standards relating to the deployment and installation practices of geothermal energy systems? Please explain.

- d) Has the federal government established any industry standards relating to the deployment and installation practices of geothermal energy systems? Please explain.

- e) Please explain why it's Enbridge Gas' responsibility (or role) as a rate-regulated distributor to reduce inconsistent deployment and installation practices in the Ontario geothermal energy industry?

Staff IR-3

Topic: Geothermal Energy Service (GES) Program

Ref: Exhibit B / Tab 1 / Schedule 1 / p. 21-22 #61 and #62, p. 23 #65 and p. 70 #70

Preamble:

Enbridge Gas indicates that geothermal systems have been available in Ontario for a number of years.

Enbridge Gas states it will see complementary investments between customers, Enbridge Gas and GreenON Funding. The provincial government's GreenON Fund's website¹ provides a list of contractors for the procurement and installation of geothermal energy systems.

¹ <https://www.greenon.ca/programs/greenon-rebates-ground-source-heat-pumps>

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Based on OGA's website², the association represents geothermal energy system designers, drillers, installers, equipment manufacturers and distributors to advance Ontario's geothermal heating and cooling industry. This website lists suppliers and contractors.

Based on HRAI's website³, the association also directs customers to its HRAI Contractor Locator that will find a qualified HRAI Contractor Member in your area.

Questions:

- a) Given GreenON, the OGA and HRAI, please confirm that there are suppliers and contractors in Ontario that will supply and install geothermal energy systems in residential homes.
 - i) Please explain why a company that supplies geothermal energy systems could not ensure that the appropriate equipment is procured and installed for a customer?
 - ii) Please explain why selling and installing geothermal loops should be considered a regulated utility business (i.e., a core utility business)?
 - iii) Please explain why providing support to customers related to ground-source heat pumps should be considered a core utility business?
 - iv) Please explain why Enbridge Gas has decided not to offer this service through an affiliate?
- b) Please explain whether Enbridge Gas believes that the geothermal energy industry is a competitive industry in Ontario?
- c) Please explain under what section of the *OEB Act*, 1988 gives Enbridge Gas the authority to set service fees for its GES Program.
- d) If this Program is deemed a regulated service, how will Enbridge Gas ensure the OEB that it will not use its regulated utility assets to enhance its position in the competitive geothermal energy market. Please explain.

² <http://www.ontariogeothermal.ca>

³ <http://www.hrai.ca>

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- e) Please identify and discuss other regulators that have approved a similar GES Program where this Program is part of the natural gas distributor's regulated business.

Staff IR-4

Topic: Geothermal Energy Service (GES) Program

Ref: Exhibit B / Tab 1 / Schedule 1 /p. 24, #70

Preamble:

Enbridge Gas states that it has been consulting and meeting with the OGA.

Questions:

- a) Has Enbridge Gas entered into an agreement (formal and/or informal) with OGA and/or HRAI? Please explain.
- i) To date, please outline your discussions with OGA and/or HRAI? Did Enbridge Gas prepare any material (e.g., presentations, briefing notes, etc.) for these discussions? If so, please file this material with the OEB.
- b) Please explain how Enbridge Gas intends to leverage the OGA and/or HRAI?
- i) Does Enbridge Gas intend to sub-contract with OGA members for its GES Program? Please explain.
- ii) Does Enbridge Gas intend to sub-contract with the list of contractors on the GreenOn Fund website for its GES Program? Please explain.

Issue 2 – Cost Consequences

Staff IR-5

Topic: Introduction

Ref: Exhibit B / Tab 1 / Schedule 1 / p. 3, # 10

Preamble:

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Enbridge Gas used its Abatement Construct to evaluate multi-year abatement programs.

In Enbridge Gas' 2017 Compliance Plan⁴, the forecasts for its 2017 administrative costs was \$2,917,100 where consulting is \$561,000 and staffing is \$1,120,000.

In Enbridge Gas' 2018 Compliance Plan⁵, the forecasts for its 2018 administrative costs is \$5,251,000 where consulting is \$400,000 and staffing is \$1,500,000.

In Enbridge Gas' 2018 Compliance Plan⁶, it outlines its 2016 Greenhouse Gas Emissions Impact Deferral Account (GGEIDA) balance of \$840,336.

Questions:

- a) For 2016, please explain whether any of the administrative costs (\$840,336) were used to develop its RNG Enabling Program – Upgrading Service?
 - i) If yes, please outline the actual costs (including the cost elements) and actual FTEs that were used to develop its Upgrading Service? Please explain.

- b) For 2017, please explain in detail whether any of the administrative costs (\$2,917,100) were used to develop its RNG Enabling Program – Upgrading Service?
 - i) If yes, please outline the actual costs by cost elements and actual FTEs that were used to develop its Upgrading Service?

- c) For 2018, please explain in detail whether any of the administrative costs (\$5,251,000) were or are intended to be used to develop its RNG Enabling Program – Upgrading Service?
 - i) If yes, please outline the estimated costs (including the cost elements) and estimated FTEs that were used to develop its Upgrading Service? Please explain.

- d) For 2016, please explain whether any of the administrative costs (\$840,336) were used to develop its RNG Enabling Program – Injection Service?

⁴ EB-2017-0224, Exhibit I. 1.EGDI.STAFF. 12, p 4

⁵ EB-2017-0224, Exhibit D / Tab 1 / Schedule 1 / p. 2-3

⁶ EB-2017-0224), Exhibit D / Tab 1 / Schedule 1 / p. 2, Table 1

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- i) If yes, please outline the actual costs (including the cost elements) and actual FTEs that were used to develop its Injection Service? Please explain.
- e) For 2017, please explain in detail whether any of the administrative costs (\$2,917,100) were used to develop its RNG Enabling Program – Injection Service?
 - i) If yes, please outline the actual costs by cost elements and actual FTEs that were used to develop its Injection Service?
- f) For 2018, please explain in detail whether any of the administrative costs (\$5,251,000) were or are intended to be used to develop its RNG Enabling Program – Injection Service?
 - i) If yes, please outline the estimated costs (including the cost elements) and estimated FTEs that were used to develop its Injection Service? Please explain.
- g) For 2016, please explain whether any of the administrative costs (\$840,336) were used to develop its Geothermal Energy Service (GES) Program?
 - i) If yes, please outline the actual costs (including the cost elements) and actual FTEs that were used to develop its GES Program? Please explain.
- h) For 2017, please explain in detail whether any of the administrative costs (\$2,917,100) were used to develop its GES Program?
 - i) If yes, please outline the actual costs (including the cost elements) and actual FTEs in each year that were used to develop its GES Program? Please explain.
- i) For 2018, please explain in detail whether any of the administrative costs (\$5,251,000) were or are intended to be used to develop its GES Program?
 - i) If yes, please outline the estimated costs (including the cost elements) and estimated FTEs that were used to develop its RNG Enabling Program? Please explain.

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Staff IR-6

Topic: RNG Enabling Program

Ref: Exhibit B / Tab 1 / Schedule 1 / p. 15, #44, p. 16, #48, p. 17 # 49, #50 and p.19 #56 and 57

Preamble:

Enbridge Gas states that it can play an important role as facilitator that can assist RNG producers and proposes to offer two services to RNG producers –Upgrading Service and Injection Service. The Upgrading Service is an optional service while the Injection Service is a mandatory service.

In Enbridge Gas' 2018 Compliance Plan (EB-2017-0224, Exhibit C / Tab 5 / Schedule 2 / pp. 8-9, #24 and #25) it also states that it will utilize a tendering process for RNG supplies. Further, it is considering to enter into RNG procurement contracts with terms of up to 10 years in duration.

Enbridge Gas indicates that the appropriate service charge would be included in the contract with the RNG producer. It also outlines its hypothetical example for a single RNG production facility to illustrate how the service charges are to be determined since the service fees will be site specific. For example, under the Injection Service, it will build a pipeline to attach a producer to its distribution system, odourize the bio-methane, measure the gas volumes and energy content of the gas, manage pressures and ensure that the gas meets required specifications.

Questions:

- a) What is status of the provincial funding that is required for Enbridge Gas' procurement of RNG supplies? If Enbridge Gas does not received its required RNG funding from the provincial government, please explain how this will impact its RNG Enabling Program?

- b) Will Enbridge Gas' long-term RNG procurement contracts with RNG suppliers include clauses related to the two services being offered under its RNG Enabling Program? Please explain.
 - i) If so, please provide copies of the contract and/or provide examples of the clauses that will be included in these contracts.

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- c) If an RNG supplier chooses not to procure the Upgrading Service, please explain how Enbridge Gas will ensure that the RNG is of the required quality (i.e., impurities have been removed) ?
 - i) What are Enbridge Gas' estimated resources and costs for years 2018, 2019 and years 3-21 associated with ensuring that the RNG is of the required quality? Please explain.
 - ii) How will these costs be recovered? Please explain.

- d) Please provide the service agreements that Enbridge Gas will use for its RNG Enabling Program – Upgrading Service.
 - i) What is expected length of the contract?

- e) Please provide the service agreements that Enbridge Gas intends to use for its RNG Enabling Program – Injection Service.
 - i) What is expected length of the contract?

- f) Under its Injection Service, Enbridge Gas is proposing to build a pipeline to attach a producer to its distribution system. Please explain the range of the length of the pipeline that Enbridge Gas is proposing to build.
 - i) Please explain what is exactly included under its Injection Service.

Staff IR-7

Topic: RNG Enabling Program

Ref: Exhibit B / Tab 1 / Schedule 1 / p. 12, #38 and p. 14, #43
Exhibit B / Tab 1 / Schedule 1 / p. 17, #50

Preamble:

Enbridge Gas outlines the potential for RNG in Ontario and Canada based on the ICF Report. Enbridge Gas indicates that its primary focus has been on municipalities (which are listed).

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Enbridge Gas states that all RNG producers requesting to inject RNG into its distribution system will be required to contract for the Injection Service, including RNG producers who do not require Upgrading Service.

Questions:

- a) What is Enbridge Gas' role in these discussions with the municipalities? Please explain.
 - i) Are these municipalities (e.g., City of Toronto, Region of Peel, Durham Region, Niagara Region and the City of Peterborough) considered to be RNG suppliers/producers?

- b) Has Enbridge Gas entered into any agreements with the municipalities (e.g., any tax breaks, etc.)? Please explain.

- c) Please explain whether the municipalities (City of Toronto, Region of Peel, Durham Region, Niagara Region and the City of Peterborough) where Enbridge Gas participated in RNG discussions are within Enbridge Gas' current service territory?
 - i) Please explain whether Enbridge Gas will enter into discussions with municipalities that are outside of its current service territory (e.g., in Union Gas' current service territory)? If so, has Enbridge Gas entered into an agreement with Union Gas?
 - ii) Does Enbridge Gas intend to enter into discussions in relation to its RNG Enabling Program with RNG suppliers that produce RNG from farms, forests, etc.? Please explain.

- d) Has Enbridge Gas conducted any surveys in the marketplace for its proposed RNG Enabling Program – Upgrading Services? If so, please file the results.
 - i) How many customers has Enbridge Gas estimated to purchase its RNG Upgrading Service for years 1 to 10? Please explain and provide all documentation including data, analysis and assumptions.
 1. What is this share (number of customers purchasing Enbridge Gas' Upgrading Service) in terms of the Ontario Resource Potential Estimate of 627 m³/y for years 1 to 10?

- e) Has Enbridge Gas conducted any surveys in the marketplace for its proposed RNG Enabling Program – Injection Services? If so, please file the results.

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- i) How many customers has Enbridge Gas estimated to purchase its RNG Injection Service for years 1 to 10? Please explain and provide all documentation including data, analysis and assumptions.
 - 1. What is this share (number of customers purchasing Enbridge Gas' Injection Service) in terms of the Ontario Resource Potential Estimate of 627 m³/y?

Staff IR-8

Topic: RNG Enabling Program

Ref: Exhibit B / Tab 1 / Schedule 1 / p. 17, #49, p. 18 #53 and p.57, #57, Table 1

Preamble:

Enbridge Gas states that its Upgrading Service will be offered to potential RNG producers as an optional service. Producers choosing this option will contract with Enbridge Gas to plan, design, procure, construct, own, operate and maintain biogas conditioning and upgrading equipment on the producer's premises.

Enbridge Gas also states that it will ensure that the RNG injected into the gas distribution system, at a minimum, meets the requirements of CSA Z662 and other applicable codes and standards as specified in its policies.

Questions:

- a) Please explain how Enbridge Gas developed its expertise in planning, designing, operating and maintaining biogas conditioning and upgrading equipment?
 - i) Is this internal expertise? Please explain.
 - 1. If so, how many FTEs were trained and what were the costs for training, etc.?
 - 2. If not, what are costs and resources to hire external expertise? Please explain.

- b) Please explain the circumstances where Enbridge Gas would exceed the requirements of CSA Z662 and other applicable codes and standards as specified in its policies for RNG injected into its gas distribution system. .

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Staff IR-9

Topic: RNG Enabling Program – Calculation of Service Fees

Ref: Exhibit B / Tab 1 / Schedule 1 / p. 18, #54 and p. 20, #59
Exhibit B, Tab 1, Schedule 1, Appendices 5-8

Preamble:

Enbridge Gas indicates that each service fee will be derived from a discounted cash flow (DCF) analysis. Also, Enbridge Gas outlines its annual revenue deficiency or sufficiency associated with the RNG Enabling Program in Appendices 5 - 8.

Questions:

- a) Please identify and discuss the benefits to ratepayers of Enbridge Gas' RNG Enabling Program – Upgrading Service?
- b) Please identify and discuss the benefits to ratepayers of Enbridge Gas' RNG Enabling Program – Injection Service?
- c) Will these service fees be fixed over the length of the contract? Please explain.
- d) For its RNG Enabling Program – Upgrading Service, how will Enbridge Gas determine the size (or capacity) for each of the site-specific facilities it intends to build?
 - i) Please discuss whether some sources of RNG, such as bio-methane from landfill sources, will decline over time?
 1. Please discuss the implications to ratepayers if the feedstock for biogas declines over the next 10 years, over the next 20 years? How will Enbridge Gas mitigate these risks?
 - ii) What are the implications of building upgrading facilities if the expected lifespan of the feedstock is less than service life of its upgrading facilities (e.g., the feedstock has a lifespan of 10 years, while the upgrading facilities have a service life of 20 years)? Please explain.
 1. Who will bear these risks?
 2. How will Enbridge Gas mitigate these risks?

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- e) For its RNG Enabling Program – Injection Service, how will Enbridge Gas determine the size (or capacity) of each of the site-specific pipelines it intends to build?
 - i) What are the implications of building pipelines if the expected lifespan of the feedstock is less than service life of its pipelines (e.g., the feedstock has a lifespan of 10 years, while the pipelines have a service life of 40 years)? Please explain.
 - 1. Who will bear these risks?
 - 2. How will Enbridge Gas mitigate these risks?

- f) Please identify and discuss the service fees calculation methodologies that have been approved in other jurisdictions for programs that are similar to the RNG Enabling Program – Upgrading and Injection Services. For these jurisdictions please discuss the Upgrading and Injection Services separately and include:
 - i) What is the service fees calculation methodology (i.e., DCF analysis and/or full-cost based ratemaking)? Please explain.
 - ii) Who bears the risk of under collections (the annual utility revenue deficiencies) related to the program (i.e., the RNG producer, the gas ratepayer, the shareholder or some combination)? Please explain.

- g) For both the Upgrading and Injection Services, please specify the major cost components for the capital investment.

- h) Please explain whether or not the estimated capital cost include contingency cost.
 - i) If so, please provide the method, assumptions, and inputs of estimating the contingency cost.
 - ii) If not, please explain what is Enbridge Gas' plan to deal with unexpected costs.

- i) For the Upgrading Service, please provide the description of property/rate class used for CCA rate for each component of the plant:
 - i) Energy component
 - ii) Non-Energy component
 - iii) Buildings component

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- j) For the Injection Service, please provide the description of property/rate class used for CCA rate.
- k) Please explain the capital structure, return on equity, and cost of debt used in the analysis.
- l) For both the Upgrading and Injection Services, please specify the major cost components for O&M expenses.
 - i) Please specify the inflation rate assumption used in the analysis.
 - ii) What are the number of FTEs associated with its RNG Enabling Program? Did Enbridge Gas hire additional FTEs or train internal employees? Please explain.
- m) For the Injection Service, Enbridge Gas assumed a municipal tax rate of 0.06%. Please explain how this rate was calculated and provide all supporting documentation including data and assumptions.
- n) For the Upgrading Service, please outline Enbridge Gas' municipal tax rate assumptions included in its DCF analysis?
 - i) If Enbridge Gas assumed that it would not be paying any municipal taxes, please provide the agreements with the municipalities that allowed for this?
 - ii) Please redo Exhibit B, Tab 1, Schedule 1, App 5 and 6 to include a municipal tax rate. Please discuss the impact of including the municipal tax rate on Enbridge Gas' DCF analysis.
- o) For both the Upgrading and Injection Services, please provide discounted cash flow analysis and complete Table 1 and Table 2 below by changing each of the following assumptions in the analysis and calculate accumulated NPV and PI for the 20 year forecast horizon (assuming the annual revenue stays at the same level as the base case).
 - i) Discount rate (i.e. Cost of debt, ROE, Capital structure)
 - ii) Capital investment
 - iii) O&M expense

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Table 1. Scenario Analysis for RNG Upgrading Service			
Scenario	Annual Revenue	Accumulated NPV at Year 20	PI at Year 20
Base Case	\$1,281,000	\$733,495	1.100
Scenario 1(a) Base case cost of debt + 50 bps	\$1,281,000		
Scenario 1(b) Base case cost of debt +100 bps	\$1,281,000		
Scenario 1(c) Base case ROE+100 bps	\$1,281,000		
Scenario 1(d) Base case ROE+300 bps	\$1,281,000		
Scenario 1(e) 50/50 D/E ratio	\$1,281,000		
Scenario 1(f) 35/65 D/E ratio	\$1,281,000		
Scenario 2 Base case capital investment (\$7,419,759) + 10% increase	\$1,281,000		
Scenario 3 Base case O&M expense + 10% increase (Year 1 to Year 20)	\$1,281,000		

Table 2. Scenario Analysis for RNG Injection Service			
Scenario	Annual Revenue	Accumulated NPV at Year 20	PI at Year 20
Base Case	\$725,000	\$544,297	1.100
Scenario 1(a) Base case cost of debt + 50 bps	\$725,000		
Scenario 1(b) Base case cost of debt +100 bps	\$725,000		
Scenario 1(c) Base case ROE+100 bps	\$725,000		
Scenario 1(d) Base case ROE+300 bps	\$725,000		
Scenario 1(e) 50/50 D/E ratio	\$725,000		
Scenario 1(f) 35/65 D/E ratio	\$725,000		

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Table 2. Scenario Analysis for RNG Injection Service			
Scenario	Annual Revenue	Accumulated NPV at Year 20	PI at Year 20
Scenario 2 Base case capital investment (\$5,439,025) + 10% increase	\$725,000		
Scenario 3 Base case O&M expense + 10% increase (Year 1 to Year 20)	\$725,000		

Staff IR-10

Topic: Geothermal Energy Service (GES) Program

Ref: Exhibit B / Tab 1 / Schedule 1 / pp. 21-22 and p. 25, #74

Preamble:

Enbridge Gas indicates that it plans to implement its GES Program in 2018 as a GHG emission abatement program to offset gas usage.

Enbridge Gas also indicates that geothermal systems provides space heating, water heating and cooling are typically electrically powered.

Enbridge Gas states that it sees geothermal as a key way to abate carbon. Deploying geothermal systems where natural gas would otherwise be consumed will offset natural gas usage.

Questions:

- a) Please explain whether Enbridge Gas' GES Program is to install ground-source heat pumps in natural gas heated homes only?
 - i) Please confirm that Enbridge Gas' GES Program does not include installing ground-source heat pumps in electrically heated homes?
 - ii) Please confirm that Enbridge Gas' GES Program does not include installing ground-source heat pumps in propane-heated home?

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- b) Please explain in detail why Enbridge Gas is proposing to implement this Program given that the technology is shown on the OEB's Marginal Abatement Cost Curve⁷ (OEB MACC) to be high cost activity compared to other energy efficiency options for space heating.

- c) Please outline Enbridge Gas' analysis to demonstrate that installing a geothermal energy system in a gas heated home will be cost-effective for a typical residential customer (e.g., when a heat pump is installed in a gas heated home, the net impact of the customer's electricity bill and natural gas bill would be reduced overall for years 1 to 10).
 - i) If Enbridge Gas has not completed this analysis, please conduct this analysis and provide all supporting documentation including data, assumptions and analysis.

Staff IR-11

Topic: Geothermal Energy Service (GES) Program

Ref: Exhibit B / Tab 1 / Schedule 1 / pp. 21-22

Preamble:

Enbridge Gas proposes to implement in 2018 its GES Program.

In Enbridge Gas' 2018 Compliance Plan (EB-2017-0224, Exhibit C / Tab 5 / Schedule 2 / p. 3, Table 1) it outlines a summary of its proposed abatement initiatives and required approvals:

⁷ EB-2016-0359

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Table 1: Abatement Initiatives Summary

Initiative Development Stage	Initiative	2018 OEB Approvals Required
Stage 3: Propose	Renewable Natural Gas Procurement	Approval to procure RNG in 2018 as per the model identified in this exhibit.
	Natural Gas Renewable Enabling Program	Approval of new rates for RNG processing and injection, and approval to record deficiency and sufficiency in the applicable variance account. This program will be addressed in EB-2017-0319.
	Geothermal Energy Services Program	Approval of geothermal energy service fees and approval to record deficiency and sufficiency in the applicable variance account. This program will be addressed in EB-2017-0319.
Stage 2: Formulate	Hydrogen (Power to Gas)	Approval for 2 FTEs to support investigation, planning and project management activities, to be funded through the GGEIDA. Approval of funding of up to \$2M starting in 2018 in the Low Carbon Innovation Fund ("LCIF") to advance pilot projects and research throughout stages one to three of the Initiative Funnel that would enable a more complete assessment of promising technologies and opportunities for eventual implementation. The LCIF would be tracked through the GGEIDA.
	Net-Zero Homes/ Micro-Generation	
	Expanded NGV Program	
	Natural Gas Air-Source Heat Pumps	
Stage 1: Conceptual	Smart Metering	The LCIF would be tracked through the GGEIDA.
	RNG – Gasification	
	Carbon Capture	
Implementation / Existing Activity	Demand Side Management	Enbridge's 2015 to 2020 DSM Plan has already been approved in EB-2015-0029/49. The DSM mid-term review which as one component is assessing the interconnection between DSM and Cap and Trade is in progress (EB-2017-0127 and EB-2017-0129).
	Green Investment Fund Program	Enbridge's incremental residential energy efficiency abatement through the Green Investment Fund has been in place since 2016 and does not require an approval through this 2018 Compliance Plan.

Questions:

- a) Please confirm that Enbridge Gas' GES Program refers to ground-source heat pumps only.
- b) In Table 1 above, natural gas air-source heat pumps are in stage 2 of Enbridge Gas' Abatement Construct. Please explain whether Enbridge Gas intends to expand its GES Program to include natural gas air-source heat pumps?
 - i) If yes, please explain the timing, resources and costs?

Staff IR-12

Topic: Geothermal Energy Service (GES) Program

Ref: Exhibit B / Tab 1 / Schedule 1 / p. 24, #69 and p. 26, #76 and #77

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Enbridge Gas indicates that it plans to offer this Program to the residential market. For customers that participate in this Program, Enbridge Gas will supply and install separate geothermal loops for each home or building owner.

Enbridge Gas also states that the home or building owner will arrange for the installation of the ground source heat pump and other equipment necessary to complete the geothermal energy system. Enbridge Gas will provide support to the customer to ensure that the appropriate equipment is procured and installed.

Questions:

- a) Please explain what Enbridge Gas means by the residential market (e.g., single family homes, multi-family homes, etc.)?
- b) Please explain how Enbridge Gas intends to promote its GES Program to improve residential customer awareness? What are the estimated resources and costs associated with this activity in 2018, 2019 and years 3 – 21? Would these costs be included in its Cap and Trade GGEIDA? Please explain.
- c) Please explain what Enbridge Gas means by the home owner will arrange for the installation of the ground source heat pump system. For example, does this mean that a home owner is responsible for: 1) procuring a geothermal energy system from a supplier and 2) contracting for the installation of that system?
 - i) If so, does Enbridge Gas intend to work with OGA member suppliers and contractors to implement its GES program? Please explain.
 1. Does Enbridge Gas intend to use the same contractor to install its geothermal loops that the customer will use to install its geothermal system? Please explain.
 2. Does Enbridge Gas intend to use internal resources to install the geothermal loops? Please explain.
 - (a) If yes, please outline the resources and costs in 2018, 2019 and years 3-21?
 3. Please explain in detail how Enbridge Gas intends to provide support to the customer to ensure that the appropriate equipment is procured and installed?

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- d) Please explain whether a geothermal energy system (i.e., ground-source heat pump system) that a customer procures typically includes the geothermal loops?
 - i) Are geothermal loops typically sold separately from the geothermal energy system? Please explain.
 - 1. If so, how much does a geothermal loop cost in the marketplace?
 - 2. What percentage of the costs does geothermal loops represent compared to the cost of a geothermal energy system (e.g., 25%, 50%, etc.)?
- e) Does Enbridge Gas intend to enter into a service agreement with the geothermal energy supplier and/or installation contractor? If yes, please provide the service agreement.
 - i) Will these be standardized agreements?
 - ii) What is expected length of the contracts?

Staff IR-13

Topic: Geothermal Energy Service (GES) Program – Calculation of Service Fees

Ref: Exhibit B / Tab 1 / Schedule 1 / pp. 27-28, #79, #80, #81 and #83

Preamble:

Enbridge Gas states that it has built a DCF model using a 10-year customer forecast and it expects about 170 customers in year 1 and over a 10-year period about 18,000 customers. This is based on expected demand, current capacity in the market and ramp up capability of the market to meet demand.

Enbridge Gas also states that costs may depend on geographical and geological construction uncertainties.

Questions:

- a) Please explain whether Enbridge Gas assumed that a ground-source heat pumps used and useful life is 40 years.
- b) Please explain how Enbridge Gas determined that 170 customers in year 1 would purchase geothermal energy systems (e.g., did Enbridge Gas survey

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customers, etc.)? Please provide all supporting documentation including data, assumptions and analysis.

- i) Please explain whether the 170 customers are customers of Enbridge Gas (i.e., connected to Enbridge Gas' distribution system)?
 - ii) Please breakdown the forecast of 170 customers by geographical area and discuss the geological construction uncertainties for each of the areas.
- c) Please explain how Enbridge Gas determined that 18,000 customers by year 10 would purchase geothermal energy systems (e.g., did Enbridge Gas survey customers, etc.)? Please provide all supporting documentation including data, assumptions and analysis.
- i) Please explain whether the forecast of 18,000 customers are customers of Enbridge Gas?
 - ii) Please breakdown the forecast of 18,000 customers by geographical area and discuss the geological construction uncertainties for each of the areas.
- d) Please explain what is the expected demand over the ten year period? Please provide all supporting documentation including data, assumptions and analysis.
- e) Please explain what is the current capacity in the market? Please provide all supporting documentation including data, assumptions and analysis.
- f) Please complete Table 3 below for the 10-year period:

Table 3 – Customers per Housing Stock				
	Year 1	Year 2.....	Year 3....toYear 10
Existing Home with Gas Heating (switch to electrical heating with GES Program)	# customers			
New Construction – Gas Heating (switch to electrical heating with GES Program)	# customers			

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Table 3 – Customers per Housing Stock				
	Year 1	Year 2.....	Year 3....toYear 10
Total – No. of Customers	170	300.....		18,000

i) For Table 1, if Enbridge Gas has estimated customers in different types of dwellings than the ones listed above, please modify the table and complete.

g) Please complete Table 4 below for the 10-year period:

Table 4 – Reductions to GHG Emissions per Housing Stock				
	Year 1	Year 2.....	Year 3 to....Year 10
Existing Home with Gas Heating (switch to electrical heating with GES Program)	GHG emissions			
New Construction – Gas Heating (switch to electrical heating with GES Program)	GHG emissions			
Total – GHG emissions				

i) For Table 4, if Enbridge Gas has estimated customers in different types of dwellings than the ones listed above, please modify the table and complete.

ii) Based on Table 4, please explain how the GHG emission reductions will impact Enbridge Gas' 2018 throughput (Ex B, T2, Sch 1, p. 6, Table 1) and GHG emission forecasts (Ex B, T3, Sch 1, p.3, Table 1) as outlined in its 2018 Compliance Plan (EB-2017-0224).

1. Based on Table 4 above, please explain how the GHG emissions will impact Enbridge Gas' expected throughput in years 2 – 10? Please provide all supporting documentation including data, assumptions and analysis.

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Staff IR-14

Topic: Geothermal Energy Service (GES) Program – Calculation of Service Fees

Ref: Exhibit B / Tab 1 / Schedule 1 / pp. 27-28, #81 and #82

Preamble:

Enbridge Gas indicates that the estimated capital costs for the installation of the geothermal loops are based on unit costs for drilling and trenching. Further, the estimated capital costs will also include construction management, commissioning and quality assurance with contingencies based on geographical and geological construction uncertainties.

Enbridge Gas also indicates the operating and maintenance expenses for the program includes periodic inspection and maintenance, customer care and billing cost, overhead and management costs plus a one-time setup and development costs.

Questions:

- a) Please outline the unit costs for:
 - i) A Geothermal loop
 - ii) Drilling
 - iii) Trenching
 - iv) Construction
 - v) Commissioning
 - vi) Quality Assurance
 - vii) O&M expense (which would include customer care, billing costs, overhead, periodic inspection and maintenance, etc.)

- b) For the unit costs outlined in a) above, please discuss how these costs were determined and provide all supporting documentation including data, assumptions and analysis.

- c) For the unit costs outlined in a) above, please explain how these costs would change with different geography and geology in Ontario.

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- d) Please explain whether the unit costs outlined in a) above, would change if Enbridge Gas installed a geothermal loop in an existing gas heated home vs. a new construction.
- e) Please describe the one-time setup and development costs (e.g., the amount and why this is needed)? Please explain how this cost will be recovered?
- f) For the O&M expenses outlined in a), please provide the costs for each of the following:
- Periodic inspection and maintenance
 - Customer case
 - Overhead and management
 - Billing
- g) Please explain whether Enbridge Gas has to modify its billing system to incorporate its GES Program? If so, what are the costs associated with this modification and how will this cost be recovered?

Staff IR-15

Topic: Geothermal Energy Service (GES) Program – Calculation of Service Fees

Ref: Exhibit B / Tab 1 / Schedule 1 / p. 28, #83

Exhibit B / Tab 1 / Schedule 1 / Appendix 11 and Appendix 12

Preamble:

Enbridge Gas indicates that its service is \$25.20 per tonne and in Appendix 12 outlines its costs assumptions.

Questions:

- a) Does Enbridge Gas intend to enter into a service agreement with the residential customer? Please explain. If yes, please provide the service agreement.
- i) What is expected length of the contract?
- b) Please explain whether the \$25.20 per tonne is \$25.20 t CO₂e per month.

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- i) Does Enbridge Gas intend to charge the customer \$100.80 per month for the geothermal loops ($\$25.20 \text{ per tonne} * 4$ [number of tonnes per customer])? Please explain.
 - ii) Please explain whether the service fees (\$25.20 per tonne) are fixed for the length of the customer's contract? If not, why not?
- c) Line 21, Appendix 12, states that the revenue per tonne per month is \$25.30. Please explain why this is different that the loop service fee of \$25.20 per tonne.
- d) Line 4, Appendix 12, states the number of tonnes per customer is assumed to be 4. Please explain how this number was calculated. Please provide all supporting documentation including data, assumptions and analysis.
- i) Does the number of tonnes per customer depend on the housing stock (e.g., existing vs new construction) and geography/geology? Please explain.
 - 1. If so, please provide the number of tonnes per customer for: 1) an existing home by the potential different geography and geology and 2) a new construction by the potential different geography and geology.
- e) Please explain whether Enbridge considered calculating a service fee for each of the different types of housing stock per geography/geology? If not, why not?
- f) Please explain whether Enbridge Gas included in its DCF Analysis (Appendix 11) any of the GreenOn funding from the provincial government.
- i) If the customer/Enbridge Gas does not receive GreenOn funding for its GES Program, please explain how this will impact Enbridge Gas' feasibility study?
- g) Please provide the description of property/rate class used for CCA rate.
- h) Please provide discounted cash flow analysis and complete Table 5 below by changing each of the following assumptions in the analysis and calculate accumulated NPV and PI for the 40 year forecast horizon (assuming the service fee stays at the same level as the base case).
- i) Discount rate (i.e. Cost of debt, ROE, Capital structure)
 - ii) Capital investment
 - iii) O&M expense

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Table 5. Scenario Analysis for Geothermal Energy Service			
Scenario	Service Fee	Accumulated NPV at Year 40	PI at Year 40
Base Case	\$25.30 per tonne per month	\$17,027,767	1.102
Scenario 1(a) Base case cost of debt + 50 bps	\$25.30 per tonne per month		
Scenario 1(b) Base case cost of debt +100 bps	\$25.30 per tonne per month		
Scenario 1(c) Base case ROE+100 bps	\$25.30 per tonne per month		
Scenario 1(d) Base case ROE+300 bps	\$25.30 per tonne per month		
Scenario 1(e) 50/50 D/E ratio	\$25.30 per tonne per month		
Scenario 1(f) 35/65 D/E ratio	\$25.30 per tonne per month		
Scenario 2 Base case capital investment (\$237,148,543) + 10% increase	\$25.30 per tonne per month		
Scenario 3 Base case O&M expense + 10% increase (Year 1 to Year 40)	\$25.30 per tonne per month		

Issue 3 – Deferral and Variance Accounts

Staff IR-16

Topic: Context and Background
 Regulatory Treatment of Programs

Ref: Exhibit B / Tab 1 / Schedule 1/ p. 8, #24 and p. 10, #30

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Preamble:

Enbridge Gas indicates that it used the OEB's E.B.O. 188 Guidelines in the determination of the charges for these services. This approach aims to ensure that existing ratepayers will not subsidize these new programs.

Enbridge Gas also indicates that the best methodology will be to treat the annual utility revenue deficiencies and sufficiencies as credits or debits to the cost of carbon. Therefore, Enbridge proposes that any deficiencies / sufficiencies would be captured in the GHG-Customer VA and be periodically cleared to ratepayers.

Questions:

- a) Please explain how existing ratepayers would not be subsidizing Enbridge Gas' RNG Enabling Program if the balances in the GHG-Customer VA are to be cleared to these ratepayers?
- b) Please explain how existing ratepayers would not be subsidizing Enbridge Gas' GES Program if the balances in the GHG-Customer VA are to be cleared to these ratepayers?
- c) Please explain why customers who procure these services from Enbridge Gas should not be solely responsible for any deficiencies / sufficiencies related to these new Programs?
- d) Please explain whether Enbridge Gas considered establishing (for OEB approval) three new variance accounts (one for its RNG Enabling Program – Upgrading Service, another one for its RNG Enabling Program – Injection Service and one for its GES Program) that would capture any deficiencies / sufficiencies related to these Programs and that these balances would be cleared to those customers? If not, why not?
- e) Please explain Enbridge Gas' disposition methodology for the balances in its GHG-Customer VA.