Patricia Squires
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Enbridge Gas Inc.
500 Consumers Road
North York ON
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November 26, 2024

Nancy Marconi
Registrar
Ontario Energy Board
2300 Yonge Street, Suite 2700
Toronto, ON M4P 1E4

Dear Nancy Marconi,

Re: Enbridge Gas Inc. (Enbridge Gas or the Company)
Ontario Enery Board (OEB) File No. EB-2024-0200
St. Laurent Pipeline Replacement Project
Technical Conference Undertaking Responses

Consistent with the OEB's Procedural Order No. 4, enclosed are Enbridge Gas's written responses to undertakings received during the Technical Conference held on November 13, 2024.

If you have any questions, please contact the undersigned.

Sincerely,

Patricia Squires
Manager, Regulatory Applications – Leave to Construct

Cc: Zora Crnojacki (OEB Staff)
Charles Keizer (Torys)
Arlen Sternberg (Torys)
Intervenors (EB-2024-0200)

ENBRIDGE GAS INC.

Answer to Undertaking from
Environmental Defence (ED)

Undertaking:

Tr: 5

To provide a breakdown of peak demand excluded from the posterity study, between the amount exported and the contract customers.

Response:

The load breakdown by regular rate/contract loads excluded from the Posterity Report (at the time of analysis) is outlined in Table 1. This includes both loads in Ontario and in Gazifère. All excluded regular rate loads are in Gazifère. Contract loads, both interruptible and firm, are provided for both Ontario and Gazifère, and aggregated due to customer confidentiality requirements.

Table 1

Contract Load Excluded (Ontario & Gazifère)	18,900 m^3/h
Regular Rate Load Excluded (Gazifère)	59,800 m^3/h

ENBRIDGE GAS INC.

Answer to Undertaking from
Environmental Defence (ED)

Undertaking:

Tr: 19

To consider ED's request to describe the future rate impact of a decline in customers across the entire gas system, and to advise if Enbridge gas is not able or prepared to respond to this request.

Response:

Enbridge Gas notes that the scenario requested by ED was previously posed in Exhibit I.2-ED-14 part b). The Company declined to respond to the IR as the question was not relevant to the issues that the OEB will need to determine in the St. Laurent LTC application. Enbridge Gas understands that this hypothetical future scenario again being raised by ED in this request is in respect of the Company's entire gas system. Enbridge Gas maintains that this question is beyond the scope of this LTC application as it does not pertain to the St. Laurent system or its customers and is too broad and general to be answered with any precision in an LTC proceeding. Please refer to Exhibit I.4-CAFES-Ottawa-22 part d) for a hypothetical scenario whereby consumption for customers served by the SLP system drops by 76% by 2050.

ENBRIDGE GAS INC.

Answer to Undertaking from
Environmental Defence (ED)

Undertaking:

Tr: 32

To undertake to provide the average age of furnace replacement and air conditioner replacement.

Response:

In the Integral model, the average age of an air conditioner at replacement is 13.5 years, and the average age of a furnace at replacement is ~13.3 years. The average age of a furnace when it is replaced is slightly less than an air conditioner because of the effect of air conditioner end-of-life on the furnace replacement decision. The average ages for this equipment are less than the peak values for the assumed end-of-life distributions noted in Exhibit B, Tab 3, Schedule 1, page 12 and discussed during the November 13th technical conference[1] because the assumed distributions are non-symmetric.

[1] TC Tr. Vol. 3, p.30-32

ENBRIDGE GAS INC.

Answer to Undertaking from Environmental Defence (ED)

Undertaking:

Tr: 33

(A) To confirm whether Mr. Bandstra is put forward as an expert, and if so, to describe the expertise; (b) to provide Mr. Bandstra's latest cv; (c) regarding the request for a description of the work Enbridge relies on for the expertise that Enbridge says he has, to consider and respond if possible, and if not, to so indicate.

Response:

Enbridge Gas confirms Mr. Bandstra is being put forward as an expert witness (in respect of his report filed at Attachment 1 to Exhibit B, Tab 3, Schedule 1), as an expert in probabilistic modeling in the energy industry, including in respect of energy asset risk, reliability management, integrity management, and structural reliability analysis.

Please see Attachment 1 for a copy of Mr. Bandstra's CV. Enbridge Gas relies on the various relevant work and experience (along with publications and education) referred to in his CV in support of him being put forward as an expert.

Integral
ENGINEERING

Daryl Bandstra, P.Eng

Senior Consulting Engineer

Expertise

Probabilistic and machine learning model development, energy asset risk, reliability management, integrity management, structural reliability analysis

Professional Experience

2023-Present	Senior Consulting Engineer, Integral Engineering
2018-2023	Consulting Engineer, Integral Engineering
2016-2018	Research Engineer, Integrity and Operations, C-FER Technologies
2015-2016	Design Engineer, Raxtar BV
2010-2015	Research Engineer, Integrity and Operations, C-FER Technologies

Professional Accreditation

P.Eng, Registered Professional Engineer in Alberta and Ontario.

Experience Summary

Daryl has 15 years of experience in the energy industry specializing in probabilistic and machine learning model development, energy asset risk, reliability management, integrity management, and structural reliability analysis. He has taught courses for conferences and operators on probabilistic modeling, machine learning, and asset integrity. He has also published papers at events such as the International Pipeline Conference and the International Pipeline Risk Management Forum.

Publications

Lu, D., Dessein, T., Bandstra, D., & Ayello, F. 2024. Proper Probabilistic Characterization Of Uncertainties And Its Impact To Reliability-based Pipeline Integrity And Risk Management. 15th International Pipeline Conference. IPC2024-133749. Calgary, Alberta, Canada.

Sun, X., Bandstra, D., He, Z., Li, C. & Safari, M. 2024. Advancing Data Completeness And Strategically Directing Record Reviews With A Machine Learning Approach. 15th International Pipeline Conference. IPC2024-134143. Calgary, Alberta, Canada.

Bandstra, D., Dessein, T. Mortiz, J. & Schwing, A. 2024. A Framework For Calculating Life Safety And Environmental Reliability Benchmarks For Highly Volatile Liquid (HVL) Pipelines. 15th International Pipeline Conference. IPC2024-133369. Calgary, Alberta, Canada.

Bandstra, D., Fraser, A., Safari, M. and Ji, K. 2024. Reducing Conservatism in Probabilistic Corrosion Analyses using Cluster Profiles. Pipeline Pigging and Integrity Management Conference. Clarion Technical Conferences. February 12-16, 2024. Houston, Texas.

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Integral
ENGINEERING

Bandstra, D. and Mortiz, J. 2023. Framework for Calculating Reliability Benchmarks for Highly Volatile Liquid (HVL) Pipelines. [Conference Presentation]. The International Pipeline Risk Management Forum. Clarion Technical Conferences. November 8-9, 2023. Houston, Texas.

Bandstra, D., Rojas, J. S., Fraser, A. M., & Shironishi, M. 2022. Comparison of Machine Learning Models for Quantitative Risk Modelling of Pipeline Systems. 14th International Pipeline Conference. IPC2022-87258. Calgary, Alberta, Canada.

Bandstra, D., Fraser, A. M., Rojas, J. S., & Dessein, T. 2022. Subset Simulation of Pipeline Corrosion, Crack, and Dent Defects Considering Multiple Limit States with Large-Scale Validation. 14th International Pipeline Conference. IPC2022-87255. Calgary, Alberta, Canada.

Langlois-Rahme, G., Bandstra, D., Iacobellis, V., & Safari, M. 2022. Prioritizing Retrofits of Non-Piggable Transmission Pipelines using an Internal Corrosion Structural Reliability Model. 14th International Pipeline Conference. IPC2022-87273. Calgary, Alberta, Canada.

Smith, S. & Bandstra, D. Considerations for Developing and Deploying Machine Learning Models for Pipeline Risk and Integrity Assessment. 2022. The Digital Pipeline Solutions Forum. May 18-19, 2022. Houston, Texas, United States.

Bandstra, D. and Aleman, M. 2022. Application of a Machine Learning-Based Quantitative Risk Model to Distribution Mains. [Conference Presentation]. 2022 AGA Operations Conference. American Gas Association. May 3-5, 2022. New Orleans, Louisiana, United States.

Bandstra, D. and Fraser, A. M. 2020. Subset Simulation for Structural Reliability Analysis of Pipeline Corrosion Defects. 13th International Pipeline Conference. IPC2020-9586. Calgary, Alberta, Canada.

Bandstra, D., Dessein, T., Schwing, A., Andrew, J. and Mortiz, J. 2020. Reliability Performance Benchmarks for Low Vapor Pressure Liquids Pipelines. 13th International Pipeline Conference. IPC2020-9367. Calgary, Alberta, Canada.

Bandstra, D. and Shironishi, M. 2020. Using Machine Learning to Enhance Pipeline Reliability Assessment. [Conference Presentation]. PRCI 2020 Research Exchange. Pipeline Research Council International. March 3-4, 2020. San Diego, California, United States.

Bandstra, D., and Skow, J. B. 2017. Removing the Effects of Measurements Error When Using Statistical Methods to Estimate the Yield Strength of Pipelines. Rio Pipeline Conference & Exhibition 2017. IBP2368_17. Rio de Janeiro, Brazil.

Bandstra, D., and Gorrill, C. 2014. The Effects of Corrosion Measurement Error on a Safety Risk Assessment: A TransGas Case Study. 10th International Pipeline Conference. IPC2014-33471. Calgary, Alberta, Canada.

Ozkan, I.F., Bandstra, D.J., Timms, C.M.J. and Zielinski, A.T. 2013. Employing Visual Image Correlation for the Measurement of Compressive Strains for Arctic Onshore Pipelines. 32nd International Conference on Ocean, Offshore and Arctic Engineering. OMAE 2013. OMAE2013-10952. Nantes, France.

Integral
ENGINEERING

Training Courses Delivered

Bandstra, D., Smith, S., & Langlois-Rahme, G 2024. Machine Learning for Pipelines: Basics, Best Practices, and Projects. [Course Instructor]. Tutorial at the 15th International Pipeline Conference. Calgary, Alberta, Canada.

Bandstra, D. and Dessein, T. 2023. Probabilistic Failure Models for Pipeline Risk Assessment. [Course Instructor]. Clarion Technical Conferences. December 6-7, 2023

Bandstra, D. and Dessein, T. 2023. Probabilistic Failure Models for Pipeline Risk Assessment. [Course Instructor]. Clarion Technical Conferences. July 26-27, 2023

Bandstra, D. and Dessein, T. 2023. Pipeline Risk and Reliability Management. [Course Instructor]. Client Confidential. November 27-29, 2023.

Bandstra, D. Dessein, T., and Vanselow, J. 2023. Pipeline Risk and Reliability Management. [Course Instructor]. Client Confidential. October 4-6, 2023.

Bandstra, D. and Dessein, T. 2023. Pipeline Reliability Assessment Training Course. [Course Instructor]. Client Confidential. September 11-12, 2023.

Bandstra, D. and Dessein, T. 2023. Fundamentals of Structural Reliability Analysis. [Course Instructor]. Client Confidential. March 27-29, 2023.

Bandstra, D., Smith, S., Santana, E., Aronson, D. 2022. Machine Learning and Data Science Basics for Pipeliners Workshop. [Course Instructor]. Tutorial at the 14th International Pipeline Conference. Calgary, Alberta, Canada.

Bandstra, D., Smith, M., and Santana, E., 2020. Machine Learning Basics for the Pipeline Industry Workshop. [Course Instructor]. Tutorial at the 13th International Pipeline Conference. Calgary, Alberta, Canada.

Education

BSc, Bachelor of Science in Mechanical Engineering, University of Alberta, 2010.

ENBRIDGE GAS INC.

Answer to Undertaking from
Environmental Defence (ED)

Undertaking:

Tr: 39

With reference to ED-17, to provide the value of the gas savings as a dollar figure, not only as a cubic metre, making caveats and assumptions as necessary; either a societal value or a customer-based value, based on the existing price of gas, or both if there is a distinction between them; to describe the calculation used.

Response:

The following response was provided by Posterity:

We interpret the existing price of gas to mean the 2024 value. We further interpret the societal value to be based on the volumetric total customer bill amount, which is a sum of the delivery cost (excluding fixed cost), commodity cost, transportation cost, and federal carbon cost, grossed up by 15%. We finally interpret the customer-based value to be based on the volumetric total customer bill amount.

As noted in Exhibit I.ED-17, the potential lifetime annual natural gas volume savings across the study period are 393,697,619 m^3. The societal value of the lifetime gas savings is $179,041,210. The customer-based value of the lifetime gas savings is $155,688,009.

Posterity Group calculated these results via the following steps:

1. Identify the sector of each applicable lifetime savings measure from the St. Laurent Replacement IRPA model run.
2. Sum the individual measure lifetime savings by sector.
3. Assign the appropriate $/m^3 values based on the most current approved Enbridge Gas rates (October 2024):
    a. In the St. Laurent IRPA model, the dominant rate by volume is Rate 1 for the residential sector and Rate 6 for the commercial and industrial sectors.
    b. The table below outlines the resulting assumed $/m^3 values:

Sector	Customer-Based Value ($/m^3)	Societal Value ($/m^3)
Residential	0.4053	0.4661
Commercial	0.3770	0.4335
Industrial	0.3770	0.4335

4. Multiply each measure lifetime savings by the assigned $/m^3 values.
5. Sum the resulting $ values across all lifetime savings measures.

ENBRIDGE GAS INC.

Answer to Undertaking from
Pollution Probe (PP)

Undertaking:

Tr: 44

To confirm the peak day split between the city of Ottawa and Quebec as a percentage, rather than by volume.

Response:

As outlined in EB-2024-0200 Exhibit I.1-PP-35, the total peak demand for the Winter 23/24 condition is approximately 105,000m^3/hr serving Ontario and 41,000m^3/hr serving Quebec, at a 47 HDD IOFF Winter Condition. This equates to ~71.9% serving Ontario, with ~28.1% of the demand serving Quebec.

ENBRIDGE GAS INC.

Answer to Undertaking from
Pollution Probe (PP)

Undertaking:

Tr: 59

To describe the treatment of the capital when a customer suspends or removes their account; is it removed, or does it remain?

Response:

When a customer suspends or removes their account, the capital remains. The costs of fixed assets remain unless assets are physically abandoned.

ENBRIDGE GAS INC.

Answer to Undertaking from
School Energy Coalition (SEC)

Undertaking:

Tr: 65

Enbridge to reconcile costs information provided in this current application with those provided in the AMP.

a) Reconcile the $172.2 million in Appendix B of the 2025-2034 AMP (i.e. the sum of the investment codes for the St. Laurent project) with the project costs in the application (Exhibit E, Tab 1, Schedule 1, Table 1, page 2)

b) Reconcile the Net Base Capex amount of $159.97 million in Appendix A of the 2025-2034 AMP with the project costs in the application (Exhibit E, Tab 1, Schedule 1, Table 1, page 2)

Response:

a) The Estimated Project Costs presented in Exhibit E, Tab 1, Schedule 1, page 2 of the application include total project costs (actual and forecast) reported for the period 2019-2027, whereas the costs included in the 2025-2034 AMP are typically forward looking and don't typically include historical actuals.

   Please refer to Table 1 below for a comparison of the net base capex and indirect overhead/interest during construction costs between the application and those provided in the 2025-2034 AMP, for the 2025-2027 forecast period.

Table 1

	St Laurent Pipeline Replacement Project			2025-2034 AMP		
Investment Code	**2025-2027F Net Base Capex**	**2025-2027F OH/IDC**	**2025-2027 Total**	**2025-2027F Net Base Capex**	**2025-2027F OH/IDC**	**2025-2027 Total**
742622	$59,193,444	$13,763,069	$72,956,514	$59,193,445	$6,653,922	$65,847,367
10294	$27,972,315	$6,779,409	$34,751,724	$27,972,315	$5,161,623	$33,133,938
10293	$25,907,129	$6,552,644	$32,459,773	$25,907,129	$4,809,246	$30,716,375
10288	$17,274,678	$4,180,711	$21,455,389	$17,274,678	$3,215,662	$20,490,340
10290	$8,795,061	$2,252,654	$11,047,715	$8,795,061	$1,033,787	$9,828,848
742761	$7,459,539	$1,892,024	$9,351,562	$7,459,539	$891,740	$8,351,279
10292	$3,385,791	$900,938	$4,286,730	$3,385,791	$402,240	$3,788,031
Total	$149,987,958	$36,321,449	$186,309,407	$149,987,958	$22,168,220	$172,156,178

The 2025-2027 Net Base Capex cost forecasts are identical between this LTC application and those provided in the 2025-2034 AMP. However, the indirect overhead and interest during construction costs are different due to the timing of the St. Laurent LTC application versus the 2025-2034 AMP. The 2025-2034 AMP's overhead amounts (Labour, Loadings and Interest During Construction) are approximated based on the most recent approved plan at the time of optimization and then refined at the investment level once project timing is confirmed. Since investment timing can shift during optimization while overheads remain fixed, the annual capitalized overheads are treated as a separate investment during optimization. Once optimization is complete, overheads are applied to all investments.

To reconcile the $208,715,452 total project cost in the application (Exhibit E, Tab 1, Schedule 1, Table 1, Item 10) with the $186,309,407 amount shown in Table 1 above, Table 2 summarizes the costs that were not included in Table 1 above. The pre-2025 costs shown in Table 2 are for the years 2019 to 2024.

Table 2

Investment Code	Costs Excluded from Table 1			
	Pre-2025 Costs	Pre-2025 OH/IDC	Abandonments	Total
742622	$221,756	$65,343		
10294	$1,593,997	$512,271		
10293	$6,657,456	$2,012,860	$7,384,529	
10288	$602,523	$198,412	$1,281,350	
10290	$582,597	$199,047		
742761	$279,801	$80,441		
10292	$527,442	$206,221		
Total	**$10,465,571**	**$3,274,595**	**$8,665,878**	**$22,406,044**

b) The Investment Summary Report for the Project in the 2025-2034 AMP (Appendix A) shows a total Net Base Capex of $159,967,170. This figure represents the expected full cost of the project (actual plus forecast) and includes the same forecasted Net Base Capex of $149,987,958[1] for the years 2025-2027 as shown in Table 1 above. The variance of $9,979,212 is due to the inclusion of Net Base Capex from 2020 to 2024 and the exclusion of abandonment (dismantlement) costs.

[1] Sum of line item 'Base CAPEX O'.