

April 5, 2023

BY EMAIL AND FILED VIA RESS

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

Dear Ms. Marconi:

**Re: Enbridge Gas Inc. ("Enbridge Gas")
EB-2022-0200 – 2024 Rates Application
Updated Guidehouse datasets and related deliverables**

We represent Enbridge Gas.

Further to our letter from yesterday, we write to provide a letter from Guidehouse along with their Low Carbon Pathways (LCP) Model input and output datasets and the response to Exhibit JT 1.28 (which includes excel spreadsheets). Guidehouse's summary of the corrections, changes and improvements made is also attached.

For reference, the following files are being provided in a zip file along with this letter:

Datasets responsive to items listed in Guidehouse March 19th letter

- Intervenor Requests 2022-03-24_Submission - Updated 2023-04-05
- Intervenor Requests HP Contribution and Peak Demand 2022-03-31_Submission Updated 2023-04-04

These files will be available on the OEB's webdrawer.

Spreadsheets response to Exhibit JT 1.28

- JT1.28-Attachment-1-Building Space Heating.xlsx
- JT1.28-Attachment-2-Enbridge Transport Industry Demand Decade Forecast.xlsx
- JT1.28-Attachment-3-Enbridge Buildings Demand Decade Forecast.xlsx
- JT1.28-Attachment-4-Loadshapes.xlsx
- JT1.28-Attachment-5-LCP-Inputs.xlsx

- JT1.28-Attachment-6-LCP Results ON Electrification Scenario.xlsx
- JT1.28-Attachment-7-LCP Results ON Diversified Scenario.xlsx
- JT1.28-Attachment-8-Pathway Costs Electrification Scenario.xlsx
- JT1.28-Attachment-9-Pathway Costs Diversified Scenario.xlsx
- JT1.28-Attachment-10-Emissions Results.xlsx
- JT1.28-Attachment-11-Scenario Development Methodology.pdf

These files will be included in Enbridge Gas's undertakings filing tomorrow, and thereafter available on the OEB's webdrawer.

In our letter from yesterday, we proposed some revisions to scheduled dates relevant to the Guidehouse P2NZ Report and the pending report from Energy Futures Group. We will discuss those proposed dates/steps with the most impacted intervenors after they have had the opportunity to understand what is being provided with this letter. We will provide updates as appropriate.

Please let us know if you have questions about this letter.

Yours truly,

AIRD & BERLIS LLP



David Stevens
DS/

c: All parties registered in EB-2022-0200



April 5, 2023

Via Email: dstevens@airdberlis.com

David Stevens
Aird & Berlis LLP
Brookfield Place,
181 Bay Street, Suite 1800,
Toronto, Ontario M5J 2T9

Re: Enbridge Gas Inc. 2024 to 2028 Rates Application EB-2022-0200

Dear Mr. Stevens:

Guidehouse Inc. (“**Guidehouse**”) is writing to provide updated information to Enbridge Gas Inc. (“**Enbridge Gas**”) relating to inputs and outputs underlying Guidehouse’s Pathways to New Zero Emissions for Ontario Report, dated June 2022 (“**Pathways Report**”).

As you know, Guidehouse has been engaged in responding to several undertakings from the technical conference proceedings in EB-2022-0200 (the “**Application**”) before the Ontario Energy Board (“**OEB**”). During the process of collating the spreadsheets related to the inputs and outputs of Guidehouse’s model used in the Pathways Report in response to undertaking JT1.28, Guidehouse identified certain corrections to the Pathways Report. Guidehouse has taken this opportunity to also include certain enhancements, clarifications and improvements to the modeling data that further refines the information in the Pathways Report. These enhancements, clarifications and improvements arise primarily from questions posed by intervenors at the technical conference held the week of March 20 in this Application.

In an effort to make Guidehouse’s input as useful as possible, enclosed with this letter is a summary of the corrections, enhancements, clarifications and improvements that may be shared with the OEB and intervenors to the Application. Furthermore, the requested spreadsheets in response to JT1.28, which reflect the updated inputs and outputs, have been provided to Enbridge Gas and labelled as JT 1.28 attachments 1 through 11, respectively. The Guidehouse deliverables under cover of our March 24 email that were sent to certain intervenors and OEB staff have also all been updated and those updates have been provided to Enbridge Gas and labelled as Intervenor Requests 2022-03-24_Submission - Updated 2023-04-05.

For ease of reference, Guidehouse is in the process of preparing an updated report which incorporates the corrections, enhancements and improvements which it expects to deliver to Enbridge Gas by April 21, 2023. If needed, Guidehouse can be available to attend a further technical conference on May 2 or 3, 2023.

Very truly yours,

Guidehouse Inc.

A handwritten signature in black ink that reads "Max J. Brady".

By: Max J. Brady, Associate General Counsel

Summary of Changes in P2NZ Analysis

Categorization	Change	Type of input/output
Consistency Improvement	Reconciled maximum allowed capacity build out across the scenarios for a number of supply technologies including onshore wind, offshore wind, solar, hydro, and nuclear.	Input Workbook: Supply Technology Costs, Maximum ON New Supply
Consistency Improvement	Reconciled uranium cost assumptions across both scenarios.	Input Workbook: Fuel Import Costs, Supply Technology Costs
Consistency Improvement	Energy efficiency of residential gas-heated homes was increased to 15% energy savings by 2050 instead of 5-7% energy savings, to make the Diversified scenario and electrification consistent	Buildings demand forecast
Consistency Improvement	Performance of gas heat pumps projected to improve by 15% by 2050 in both scenarios, instead of just the Diversified scenario.	Buildings demand forecast
Consistency Improvement	Updated electricity reference case scenario to IESO APS 2019 to be consistent with methane reference case	Buildings demand forecast
Consistency Improvement	Aligned commercial building efficiencies across both scenarios.	Buildings demand forecast
Consistency Improvement	Changed residential space heating equipment and retrofit costs to account for salvage value. This aligns the approach with the capital costs of new supply technologies.	Pathway Cost Results: End User Costs
Post Processing Correction	Total electricity capacity and energy tables/figures now include all electricity generation assets, including Nuclear SMR and Biomass + CCS.	Energy System Results
Model Enhancement	Updated H2 turbine cost to be 115% of natural gas turbine value to reflect likely cost differential between these technologies	Input Workbook: Supply Technology Costs
Post Processing Correction	Ensure inclusion of Nuclear SMR costs in all cost totals	Pathway Cost Results: SupplyTechCosts - Elec
Model Enhancement	Relaxed minimum fuel limit for RNG to allow for better model decision making regarding use of RNG versus fossil methane, while meeting emissions targets	Input Workbook: Annual Fuel Limits
Consistency Improvement	Make Diversified and Electrification Winter Peak Wind dispatch consistent with "no wind" condition, to make scenarios consistent	Input Workbook: Supply Tech Efficiency by Szn
Consistency Improvement	Updated hydro costs in the Diversified scenario to be aligned with the Electrification scenario	Input Workbook: Supply Technology Costs
Consistency Improvement	Updated hydrogen transmission retrofit capital costs to be consistent between intra and inter-regional pipelines	Input Workbook: Infrastructure Costs
Input Correction	Updated nuclear SMR costs to reflect the cost of fuel (uranium) and to have a fixed O&M of 2.5% of the CAPEX cost.	Input Workbook: Supply Technology Costs
Consistency Improvement	Updated the maximum allowed electricity transmission lines in the Diversified workbook to reflect the Electrification scenario.	Input Workbook: Maximum ON New Infrastructure
Model Enhancement	Updated hydrogen storage to better reflect seasonality of H2 storage and improve consistency with methane storage	Input Workbook: Supply Tech Characteristics
Input Correction	Updated discount rate to 4% to be consistent with OEB source	Input Workbook: Financial Parameters
Input Correction	Corrected data entry error in the carbon price in the Electrification scenario.	Input Workbook: Carbon Costs
Input Correction	Updated loadshape for electric vehicles to reference the light duty load profile from NREL.	Light duty transport loadshape
Input Correction	Updated power generator emissions factor to account for efficiency of power plant. This is consistent with the National Inventory Report.	Input Workbook: Supply Tech Characteristics
Model Enhancement	Included hydrogen transmission capital costs for intraregional pipelines into the model inputs (previously only included in post processing)	Input Workbook: Infrastructure Costs
NO CHANGE, Clarification	Emissions rates for fossil methane for power generation and end users contain a small factor associated with upstream emissions associated with extraction and processing. This rate was included in the original P2NZ analysis and has not changed in the updated analysis. Inclusion or exclusion of this factor has a negligible impact on the study results.	Input Workbook: Emissions Rates

ENBRIDGE GAS INC.

Answer to Undertaking from
Environmental Defence (ED)

Undertaking

Tr: 190

With reference to the table in ED-56, for all of those parameters that were produced upstream of the model or downstream of the model to provide the underlying calculations and assumptions, and to do that with the actual spreadsheets that were used, (under advisement.)

Response:

The following response was provided by Guidehouse Canada Ltd.:

Guidehouse provides the files listed in the tables below that were used for the development of inputs to the LCP model.

The table below maps the modeling parameters discussed in JT1.27 to specific files. The inputs represent Guidehouse's research and professional judgement at the time of the analysis.

Modeling Parameter	Source	Submitted Material
Natural gas price forecast	Determined by Guidehouse, based on Dawn Hub consensus forecast	<i>JT1.28-Attachment-5-LCP-Inputs.xlsx</i>
Carbon price forecast	Sourced from ETSA	<i>JT1.28-Attachment-5-LCP-Inputs.xlsx</i>
Discount rate	OEB guidance	<i>JT1.28-Attachment-5-LCP-Inputs.xlsx</i>
Overall scenario definitions and high-level implications for the buildings, industry, transportation, and power sectors	Determined by Guidehouse, with input from Enbridge Gas subject matter experts	<i>JT1.28-Attachment-11-Scenario Development Methodology.pdf</i> <i>[Note: this document is a historical artifact and snapshot of the intent of these scenarios towards the beginning of the analysis – the exact scenarios including model input parameters evolved over time in the analysis within the framework set forth in this document]</i>

Modeling Parameter	Source	Submitted Material
Estimated gas savings in the buildings sector due to retrofit building codes	Sourced from ETSA	<i>JT1.28-Attachment-3-Enbridge Buildings Demand Decade Forecast.xlsx</i>
Forecasts of natural gas, RNG, and hydrogen demand for Enbridge customers, for 2020-2038	Sourced from ETSA	<i>JT1.28-Attachment-5-LCP-Inputs.xlsx</i>
Forecasts of natural gas, RNG, and hydrogen demand for Enbridge customers, for 2039-2050	Determined by Guidehouse	<i>JT1.28-Attachment-5-LCP-Inputs.xlsx</i>
Forecasts of natural gas, RNG, and hydrogen demand outside Enbridge network, for 2020-2050	Determined by Guidehouse	<i>JT1.28-Attachment-5-LCP-Inputs.xlsx</i>
Forecasts of annual electricity consumption and peak electricity demand	Determined by Guidehouse	<i>JT1.28-Attachment-5-LCP-Inputs.xlsx</i>
Forecasts of conversions of space conditioning and water heating technologies in the buildings sector	Determined by Guidehouse	<i>JT1.28-Attachment-3-Enbridge Buildings Demand Decade Forecast.xlsx</i>
Forecasts of conversions of transportation sector technologies	Determined by Guidehouse	<i>JT1.28-Attachment-2-Enbridge Transport Industry Demand Decade Forecast.xlsx</i>

Modeling Parameter	Source	Submitted Material
Forecasts of conversions of industrial sector technologies	Determined by Guidehouse	<i>JT1.28-Attachment-2-Enbridge Transport Industry Demand Decade Forecast.xlsx</i>
Equipment efficiency ratings	Determined by Guidehouse	<i>JT1.28-Attachment-3-Enbridge Buildings Demand Decade Forecast.xlsx</i>
Electric generation capacity expansion	Determined by Guidehouse	<i>JT1.28-Attachment-5-LCP-Inputs.xlsx</i>

Guidehouse also provides the following files used in the development of demand inputs.

Modeling Input	File
Demand Forecast	<i>JT1.28-Attachment-1-Building Space Heating.xlsx</i> <i>JT1.28-Attachment-2-Enbridge Transport Industry Demand Decade Forecast.xlsx</i> <i>JT1.28-Attachment-3-Enbridge Buildings Demand Decade Forecast.xlsx</i> <i>JT1.28-Attachment-4-Loadshapes.xlsx</i>

Guidehouse provides the following files listed in the table below that are the outputs of the LCP model for both the Diversified and Electrification scenarios.

Modeling Output	Submitted Material
Energy System Results	<i>JT1.28-Attachment-6-LCP Results ON Electrification Scenario.xlsx</i> <i>JT1.28-Attachment-7-LCP Results ON Diversified Scenario.xlsx</i>
Cost Results	<i>JT1.28-Attachment-8-Pathway Costs Electrification Scenario.xlsx</i> <i>JT1.28-Attachment-9-Pathway Costs Diversified Scenario.xlsx</i>
Emissions Results	<i>JT1.28-Attachment-10-Emissions Results.xlsx</i>