EB-2022-0200

Enbridge Gas 2024 Rebasing

TFG Compendium for Panel #7 – Equity Thickness

Tab 1

ENBRIDGE GAS INC.

Answer to Interrogatory from
Environmental Defence (ED)

Interrogatory

Reference:

Exhibit 5, Tab 3, Schedule 1, Attachment 1 (Concentric Cost of Capital Report)

Question(s):

a) Concentric states: "A future "death spiral" is far from certain, and we anticipate that the Company will work proactively to avoid such an outcome. However, it is possible." Is this a material possibility? Please make best efforts to quantify the possibility.

b) Concentric states: "In 2020, residential customers accounted for approximately 57% of the Company's revenues but just 32% of its sales volumes. If a meaningful portion of these customers switch to non-gas heating sources, whether due to technological advancements, environmental concerns, or policy mandates, costs will increase for the Company's remaining customers. Such a scenario could potentially spark a so-called 'death spiral.'"

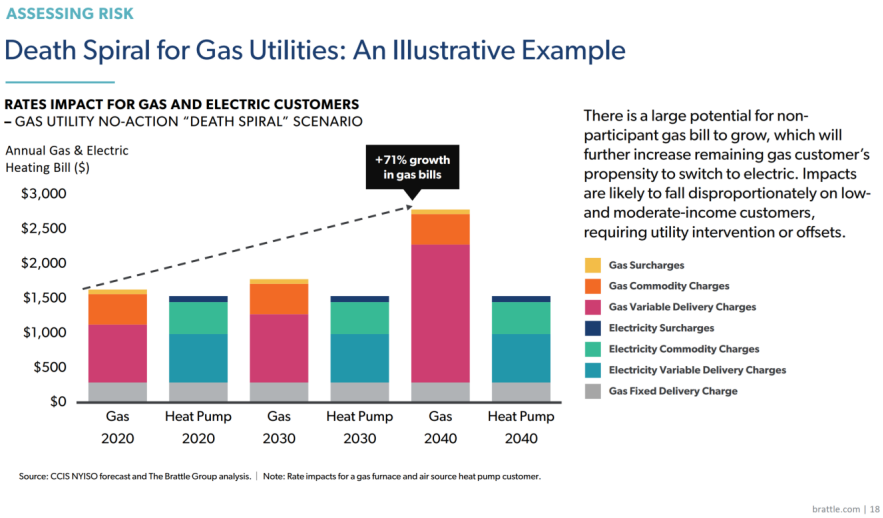
   i. Please discuss how likely this is to occur.
   ii. Please elaborate on the reference to "technical advancements."
   iii. Why does Concentric single out residential customers as being at a particular risk of exiting the gas system?

c) Concentric states that "the Company's assets are, on average, much less depreciated than the assets of any of the proxy groups." Why is that?

Response:

The following response was provided by Concentric Energy Advisors, Inc.:

a) Concentric believes there is material risk related to a "death spiral" scenario, but we are unable to quantify the probability as there are many factors that impact the future of the gas industry, and each of these factors carries its own range of potential outcomes. Among these factors are international, national and local public policies, technological innovation, customer preferences and behavior, and the costs of competing energy sources. In the Brattle report cited in Concentric's report provided at Exhibit 5, Tab 3, Schedule 1, Attachment 1, p. 37, footnote 94, Brattle illustrates one example:



In this specific case study for New York, a residential heating customer would see a flat profile for future electric costs against a 71% increase in gas costs by 2040. Under such circumstances one would expect a steady decline in gas customers exacerbating the cost increases for remaining customers. These are the types of circumstances that would lead to a "death spiral". Please also see the response at Exhibit I.5.3-STAFF-208 part b) for an additional example.

b)

i. Please see response at Exhibit 1.5.3-ED-148 part a).

ii. Technical advancements that promote residential switching to non-gas alternatives (or reduced gas use) would include: ultra efficient electric heat pumps, dual-fuel heat pumps, geothermal heat pumps, district heating/cooling, induction cooktops, heat pump cycle clothes dryers, on demand water heaters, and advanced home energy sensors ("smart" homes).

iii. Commercial and Industrial customers have always been price sensitive loads for gas utilities, although depending on the nature of their load (e.g., HVAC or cooking vs. industrial process), some of these loads are more resilient than others. Residential load has typically been the most stable and reliable, with the exception of variations due to weather. The focus on residential customers leaving the system is due to greater risk from new end-use technologies for heating and cooking, in combination with improved economics of electric alternatives, environmental policies and customer preferences that are all posed to undermine the predictable stability of residential load.

c) Please see response at Exhibit I.5.3-STAFF-230 part a).

Tab 2

ENBRIDGE GAS INC.

Answer to Interrogatory from
Environmental Defence (ED)

Interrogatory

Reference:

Exhibit 5, Tab 3, Schedule 1, Attachment 1 (Concentric Cost of Capital Report)

Question(s):

a) Concentric cites: The Brattle Group, "The Future of Gas Utilities Series: Transition Gas Utilities To A Decarbonized Future" in footnote 94. Please provide a copy or link.

b) Concentric cites the Brattle Group as stating: "In the past decade, gas utility capital expenditures have grown by around double the rate of water and electric utilities' spending, largely driven by safety and reliability. Utilities will need to recover their costs from a changing – and possibly shrinking – customer base. With energy and environmental policy targets rapidly approaching, gas utilities need to decide today how best to invest capital in long-lived assets and avoid stranded asset risks." Does Concentric agree?

Response:

The following response was provided by Concentric Energy Advisors, Inc.:

a) Please see Attachment 1 for a copy of the referenced report.

b) Yes, Concentric agrees. It is important for gas distributors, such as Enbridge Gas, to consider the impacts of environmental mandates and public policy on their customers and system requirements. Please also see response at Exhibit I.5.3-IGUA 34 for a description of how Enbridge Gas incorporates Energy Transition in its planning process.

The Future of Gas Utilities Series

TRANSITIONING GAS UTILITIES TO A DECARBONIZED FUTURE

Part 1 of 3

AUGUST 2021

Brattle

Agenda

A. Risk and opportunities for transition
B. Regulatory and financial expectations
C. Heating electrification
D. Investor reactions
E. Equity and energy justice

SERIES INTRODUCTION

Energy Sector's Changing Landscape Threatens Natural Gas Utilities

Sources: S&P Market Intelligence; American Gas Association; EIA 2015 Residential Energy Consumption Survey.

Filed: 2023-03-08, EB-2022-0200, Exhibit I.5.3-ED-146, Attachment 1, Page 4 of 31

Impact Will Differ for Pure-Play, Combination, and Electric Utilities

The natural gas transition will impact all three types of utilities:

- **Combination utilities** may be better positioned to transition business from gas to electricity investment and sales. Gas sale declines presents downside risk, but electrification can present upside potential.
- Electrification serves as a boon to **electric utilities**, which can increase electricity investments and sales.
- **Pure-play gas utilities** face the most downside risk, and will need to be innovative and proactive to grow business.

Regulation will fundamentally answer the question of "who pays" for the transition, highlighting the need for well-designed regulatory strategy.

Who pays?

- Gas, electric, or combination utilities
- Shareholders or utility customers
- Gas or electric customers
- Current or future customers
- Advantaged vs. vulnerable populations

This series provides commentary on these issues and aims to help gas and combination utilities navigate the transition in a fiscally and socially responsible way.

Filed: 2023-03-08, EB-2022-0200, Exhibit I.5.3-ED-146, Attachment 1, Page 5 of 31

Waiting Passively Is Not a Sustainable Option for Utilities or Customers

If gas utilities defer building a long-term strategy, they risk not having a voice in the policy, planning, and regulation process.

Gas demand reduction and bill increases for remaining customers will come with or without utility involvement. However, the needed change is likely to be delayed or inefficient without utility involvement.

The scale of the transition is massive: displacing natural gas in the US would involve replacing nearly 150 million heating and cooking appliances, in addition to the gas distribution system infrastructure.

Proactive implementation of suitable solutions affords utilities the following benefits:

- Allows utilities to build a diversified and tailored strategy ahead of regulatory mandates
- Finding substitute capital deployments makes gas utilities part of the solution, not an obstacle
- Satisfy customers, reduce costs, and head off or offset probable customer defection
- Address investor concerns

The transition process will play out over many years, **but the planning must start now**.

Filed: 2023-03-08, EB-2022-0200, Exhibit I.5.3-ED-146, Attachment 1, Page 6 of 31

The Transition Presents Significant Growth Opportunities

Natural gas utilities can create new business opportunities as an enabler of the energy transition, through proactive and innovative approaches.

- Utilities' access to capital, capabilities in large-scale planning and execution, and experience in working with regulatory authorities make them uniquely positioned to help plan and implement large infrastructure transitions.
- Clean fuels, such as renewable natural gas (RNG) and hydrogen, can provide growth opportunities while re-utilizing gas utilities' existing infrastructure or right-of-ways.

Gas utilities have options to create and capture value and reduce customer costs.

- Utilities' pathways will depend on their characteristics (pure-play versus combination), location, customer base, and regulatory environment.

Natural gas utilities will need to work closely with legislators, regulators, and stakeholders to **design and pursue enabling regulatory mechanisms and policies** to navigate this transition.

Filed: 2023-03-08, EB-2022-0200, Exhibit I.5.3-ED-146, Attachment 1, Page 7 of 31

Building Blocks for a Successful Energy Transition

1 **Is it a real risk? How big is it, and how immediate?**

2 **What strategies will enable solutions?**

- Regulatory framework for transition
- New technologies and infrastructure
- Securing life of existing assets

3 **What steps can be taken to get there?**

- Performance-based regulation
- Multi-year rate plan
- New programs

Filed: 2023-03-08, EB-2022-0200, Exhibit I.5.3-ED-146, Attachment 1, Page 8 of 31

The Brattle Group's Future of Gas Utilities Presentation Series

The Brattle Group's Future of Gas Utilities building blocks will be presented in a series of three presentations to be released in the summer and fall of 2021.

The Brattle Group's Future of Gas Utilities Series will culminate in a **Symposium**, where industry and Brattle experts will convene to debate key challenges and opportunities facing the gas industry.

The remainder of this slide deck will cover the first building block: **Assessing Risk**.

Part 1: Assessing Risk

The Future of Gas Utilities Series

ASSESSING RISK

Risks and Opportunities of the Transition

- Even though certain states are moving against this trend and enacting prohibitions on bans on new gas connections, cost declines related to technology innovation and federal, state, and municipal policy support will increase the deployment of lower-carbon alternatives to natural gas, as happened with renewables in the electricity sector.
- The transition is already underway: at the current rate, the number of homes with electric space heating could exceed the number of homes with gas space heating by 2032.

- In the past decade, gas utility capital expenditures have grown by around double the rate of water and electric utilities' spending, largely driven by safety and reliability.
- Utilities will need to recover their costs from a changing – and possibly shrinking – customer base.
- With energy and environmental policy targets rapidly approaching, gas utilities need to decide today how best to invest capital in long-lived assets and avoid stranded asset risks.
- Heightened perceptions of business risk are increasing financing costs for gas utilities. In early 2021, gas utilities traded at a ~20% discount relative to electric utilities.

Any strategic plan (including electrification and alternative gas technologies) must address equity and energy justice by considering financial, health, and economic impacts to vulnerable communities.

Filed: 2023-03-08, EB-2022-0200, Exhibit I.5.3-ED-146, Attachment 1, Page 11 of 31

The Debate on the Future of Natural Gas Is Widespread

The **landscape for natural gas has shifted dramatically**, as states and cities across the country have passed natural gas bans and electrification mandates.

States are also launching proceedings on the role gas utilities will play in meeting the state's greenhouse gas (GHG) emissions and clean energy goals.

Proposed approaches include "electrify everything" or leveraging alternative gas technologies such as RNG, hydrogen, etc.

The outcomes being debated vary widely: while some states have banned the use of gas in new buildings, **others have prohibited the enactment of such bans**.

STATES ENACTING GAS BANS | AS OF JULY 21, 2021

	STATE-WIDE	CITY			
	Proceeding on Future Role of Natural Gas	Proposed Gas Bans	Enacted Gas Bans	Implemented Moratoriums	Electrification "Reach" Codes
California	✓		✓		✓
Oregon	✓	✓			
Washington	✓	✓	✓		
New York	✓	✓		✓ PARTIALLY LIFTED	✓
Massachusetts	✓	✓	✓		
Colorado	✓	✓			✓
Washington, DC	✓				
Vermont					✓

Proposed Prohibition on Gas Bans	CO, MI, MN, NC, PA
Enacted Prohibition on Gas Bans	AL, AR, AZ, FL, GA, IA, IN, KS, KY, LA, MO, MS, OH, OK, TN, TX, UT, WV, WY

Filed: 2023-03-08, EB-2022-0200, Exhibit I.5.3-ED-146, Attachment 1, Page 12 of 31

Gas Utilities Can Participate in a Decarbonized Future to Mitigate a Potential Death Spiral and Control Customer Costs

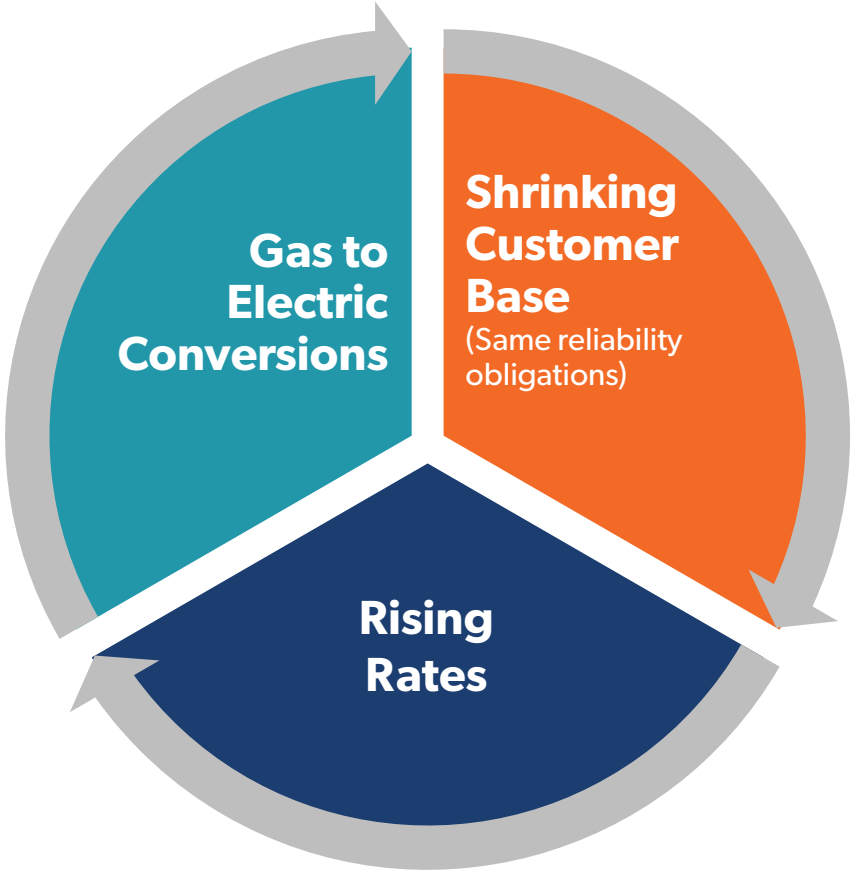
As states pursue degasification policies and homes convert to electric heating, **utilities risk losing customers and load.**

- Nationally, electric heating is outpacing gas heating adoption.
- Technology mandates and policy further accelerate the problem.

Utilities will likely **continue investing in their existing system for safety and reliability but need to recover those costs from a shrinking customer base.**

- This puts remaining customers at risk, a "death spiral" trend pushing more customers to electrification.
- Up to $150–180 billion of gas distribution assets could be under-recovered as a result of the transition.

This spiral will increase customer costs and increase energy burdens, especially for low-income and vulnerable populations.



Gas utilities may reverse this problem if they quickly become part of the solution to a decarbonized future.

Filed: 2023-03-08, EB-2022-0200, Exhibit I.5.3-ED-146, Attachment 1, Page 13 of 31

Gas Utilities' Risks and Opportunities with Decarbonization

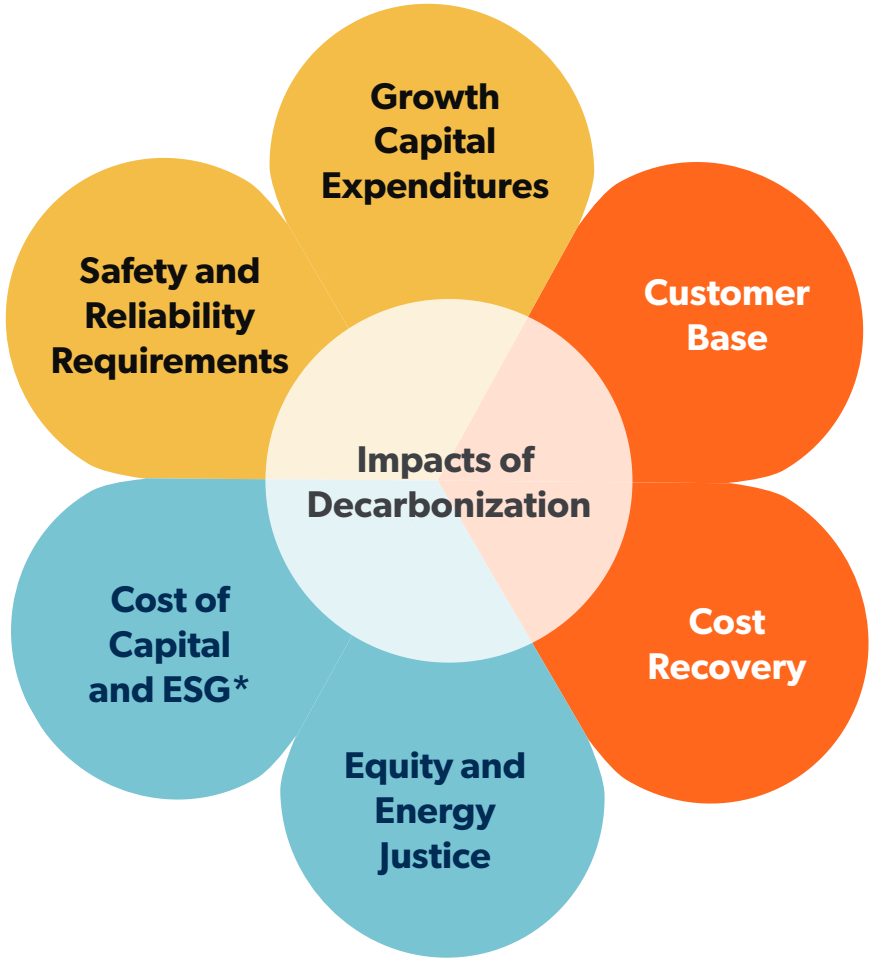
Proposed decarbonization pathways generally emphasize electrification, challenging the traditional business model of natural gas utilities.

Without proactive adjustments, utilities face increasing **cost recovery risks from capital investments** to grow the gas system or to maintain safety and reliability requirements.

There are **offsetting opportunities**, such as:

- Alternative fuels (RNG, hydrogen) are a viable alternative for end-uses that lack cost-effective electrification options.
- Long-run deep degasification may be expensive to achieve, requiring utilities to invest in clean performance of existing assets.
- Utilities could own and rate base gas replacement infrastructure, earning a return on these decarbonization assets.

The transition will take time and depends on factors such as costs, regulatory and legislative mandates, and customer adoption.



*ESG stands for Environmental, Social, Governance investing

Filed: 2023-03-08, EB-2022-0200, Exhibit I.5.3-ED-146, Attachment 1, Page 14 of 31

Traditional Planning Faces Conflicting Regulatory and Financial Expectations

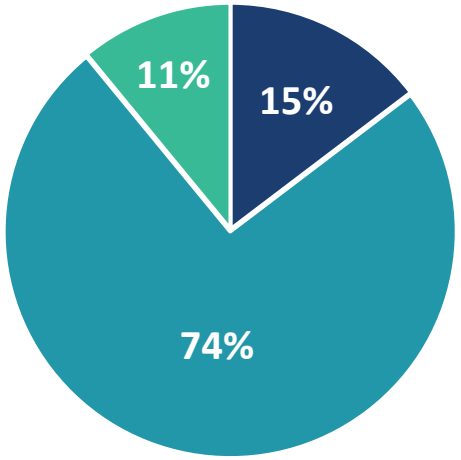
New gas assets placed into service today have a useful life of ~40 years – well beyond target dates for many decarbonization goals, creating cost-recovery risk.

- Gas utility capital expenditures have grown by around double the rate of water and electric utilities' capital expenditures.

Regulators are requiring gas utilities to develop gas long-range capital investment plans that conform to state climate and energy policy goals. Gas utilities and regulators need to decide today how best to deploy capital and avoid cost recovery risks due to the transition.

- **Alternative depreciation schedules** may be required to fully recover traditional gas investments before policy target dates.
- **Diversifying into gas decarbonization technologies** can limit exposure to lost growth opportunities and reduce stranded asset risk.

FORECASTED CAPITAL EXPENDITURES



Source: Investor Presentations, 2020. Utilities in the sample include Atmos Energy (ATO), New Jersey Resources (NJR), NiSource Inc. (NI), Northwest Natural Gas (NWN) and Southwest Gas (SWX).

NYS DPS Staff Proposal, 20-G-0131, February 12, 2021.

NY GAS PLANNING PROCEEDING | STAFF PROPOSAL

Utilities must incorporate demand-side solutions into their long-term planning to **reduce gas demand and the need for gas infrastructure investments.**

LDCs must **identify opportunities to avoid replacing leak prone pipe** and instead deploy "Non-Pipeline Alternative" investments.

Filed: 2023-03-08, EB-2022-0200, Exhibit I.5.3-ED-146, Attachment 1, Page 15 of 31

Safety and Reliability Investments Will Remain a Priority

Utilities are under increasing pressure and are making **significant investments to meet new and existing safety and reliability requirements**.

- PHMSA's Mega Rule went into effect in 2020, mandating confirmation of Maximum Allowed Operating Pressures (MAOP), more frequent and regular pipeline integrity assessments, and new repair and leak detection requirements, amongst other requirements.
- This will require material investments, but increases the risk of obsolescence before the end of normal asset life (~40 years).

Utilities are also focused on replacing **leak-prone pipe,** which reduces methane emissions and helps meet state and corporate GHG emission targets.

- 32 natural gas utilities have pledged to reduce methane intensity to 1% by 2025.
- New York is asking utilities to identify opportunities to retire leak prone pipe and instead deploy non-pipeline alternatives, such as electrification of heating.
- Methane is a more potent GHG than CO_2 even though it is short-lived. Its 20-year warming potential is 80x – and its 100-year warming power is 25x – that of CO_2, per ton emitted.

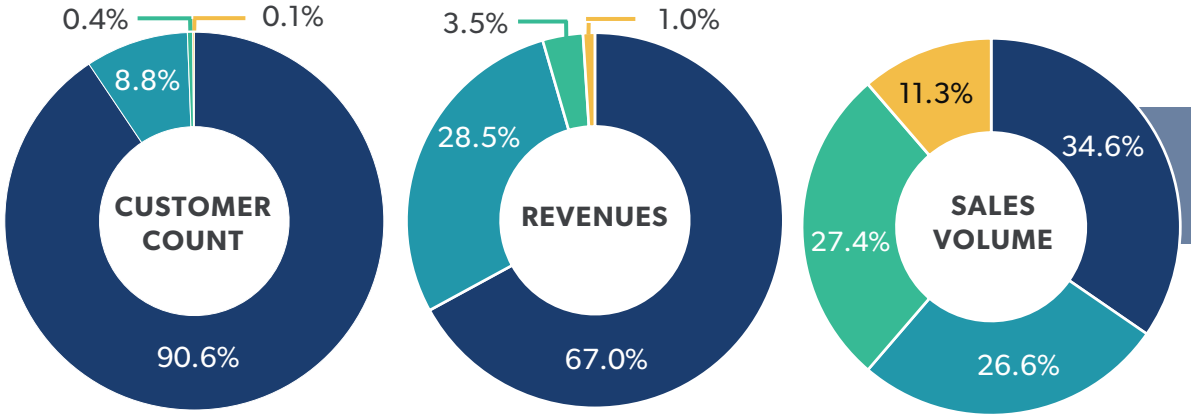
Enabling regulatory mechanisms will need to be designed and implemented to recover safety and reliability costs from a changing and/or declining customer base.

Filed: 2023-03-08, EB-2022-0200, Exhibit I.5.3-ED-146, Attachment 1, Page 16 of 31

Shifts in Customer Base Increase Cost Recovery Risks

The transition **will not occur at the same pace or magnitude across customer classes**, which compounds cost recovery risks (cost allocation, appropriate tariff designs, equity and energy justice).

- Residential customers, who are more likely to convert to electric alternatives, comprise 90% of total natural gas utility customers and 67% of revenues, but they account for only one-third of total system volumes.
- Harder to electrify industrial customers are a small portion of total customers but about 27% of total sales volumes.
- Differences in customer transition trends will impact the pace and feasibility of achieving state GHG emission targets.



Gas utilities can mitigate this risk by focusing on degasification solutions for commercial and industrial customers, which could most effectively help meet state and corporate decarbonization goals.

Declines in customer base, starting with easy-to-electrify customers, will raise costs for remaining customers, such as for low-income and other vulnerable customer populations.

Gas Utility Customer Base

Industrial | Commercial | Residential | Other

68M	$67B	29.7B
total customers	total revenues	MMBtu*

Source: S&P Market Intelligence, data as of year-end 2019.
Note: Other revenues and sales volumes reflect electric power revenues and sales.
*American Gas Association summary statistics

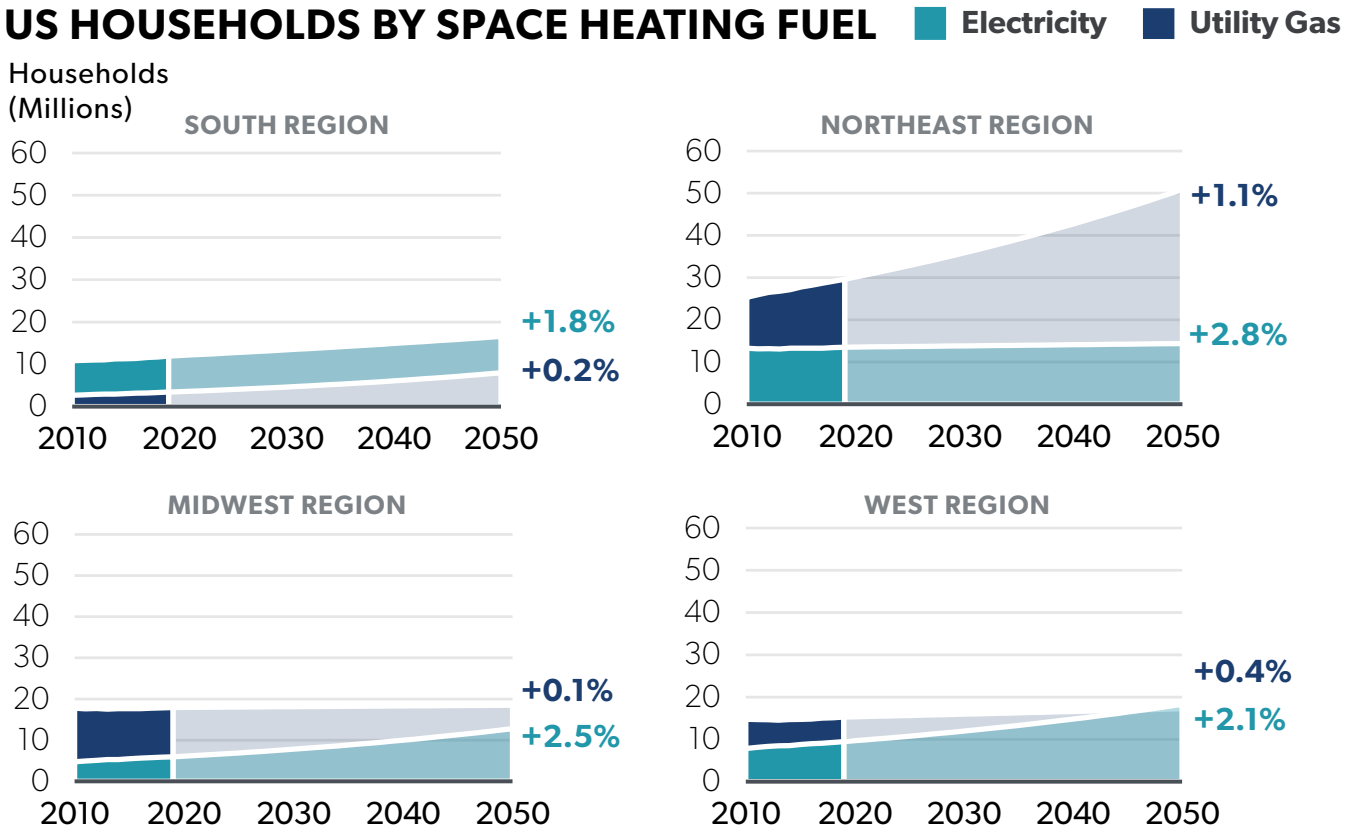
Filed: 2023-03-08, EB-2022-0200, Exhibit I.5.3-ED-146, Attachment 1, Page 17 of 31

Heating Electrification Will Accelerate Declines in Gas Customer Base

Heating electrification is outpacing gas growth in some parts of the country. At the current pace, the number of homes with electric space heating could surpass homes with gas space heating by 2032.

- Heat pumps remain more expensive than gas furnaces, but could become more competitive with technological improvements and financial incentives.
- Economics of heat pump water heaters (HPWH) can be more appealing because of lower upfront costs relative to heat pumps. HPWH also has a higher efficiency than its gas counterpart.

Electric utilities are promoting rebates for heat pumps and HPWHs to accelerate adoption. As heat pumps and other decarbonization technologies become more popular, **gas utilities need to think strategically about how to participate in this transition in order to remain viable.**



Source: US Census Data, 2019. | Note: Electricity includes both heat pumps and electric resistance heating.

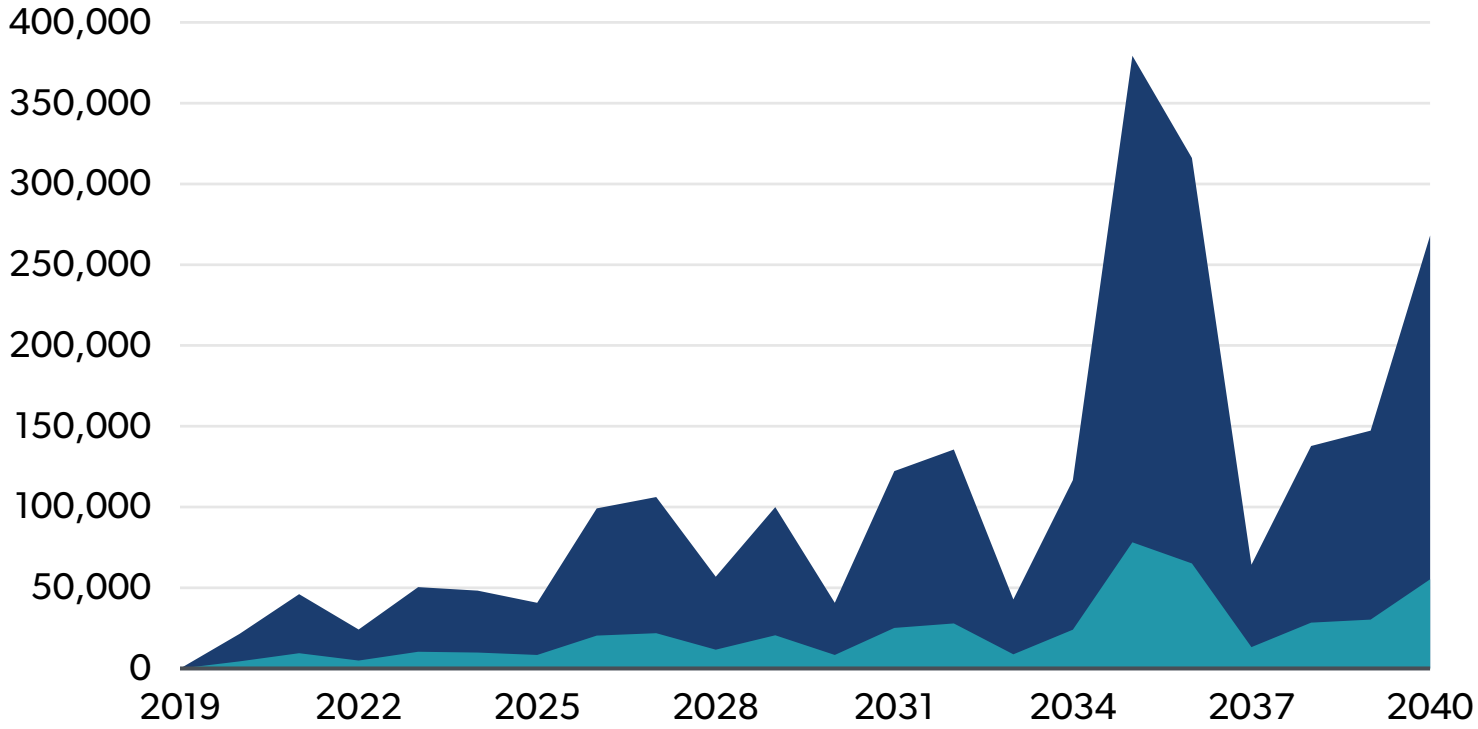
At current rates, homes with electric heating could surpass homes with gas heating by 2032 nationally.

Filed: 2023-03-08, EB-2022-0200, Exhibit I.5.3-ED-146, Attachment 1, Page 18 of 31

Death Spiral for Gas Utilities: An Illustrative Example

ELECTRIFICATION OF HEATING SECTOR CASE STUDY: NEW YORK GENERIC UTILITY

Forecasted Newly Electrified Load



Source: CCIS NYISO forecast.
*Assumed forecast of new heat pumps from CCIS forecast, calculated new load and related costs. We assume AHSP at $12,800 and GHSP at $35,700 in real dollars. Capital cost assumptions come from New Efficiency NY Analysis of Residential Heat Pumps.

The impact of increasing electrification will vary based on state and local regulations and decarbonization goals.

For example, up to **60% of New York's gas heating sector may be electrified by 2040.**

- This requires around **4 million additional heat pumps**, costing about **$80 billion.***
- Adds about 20% to residential electric consumption.

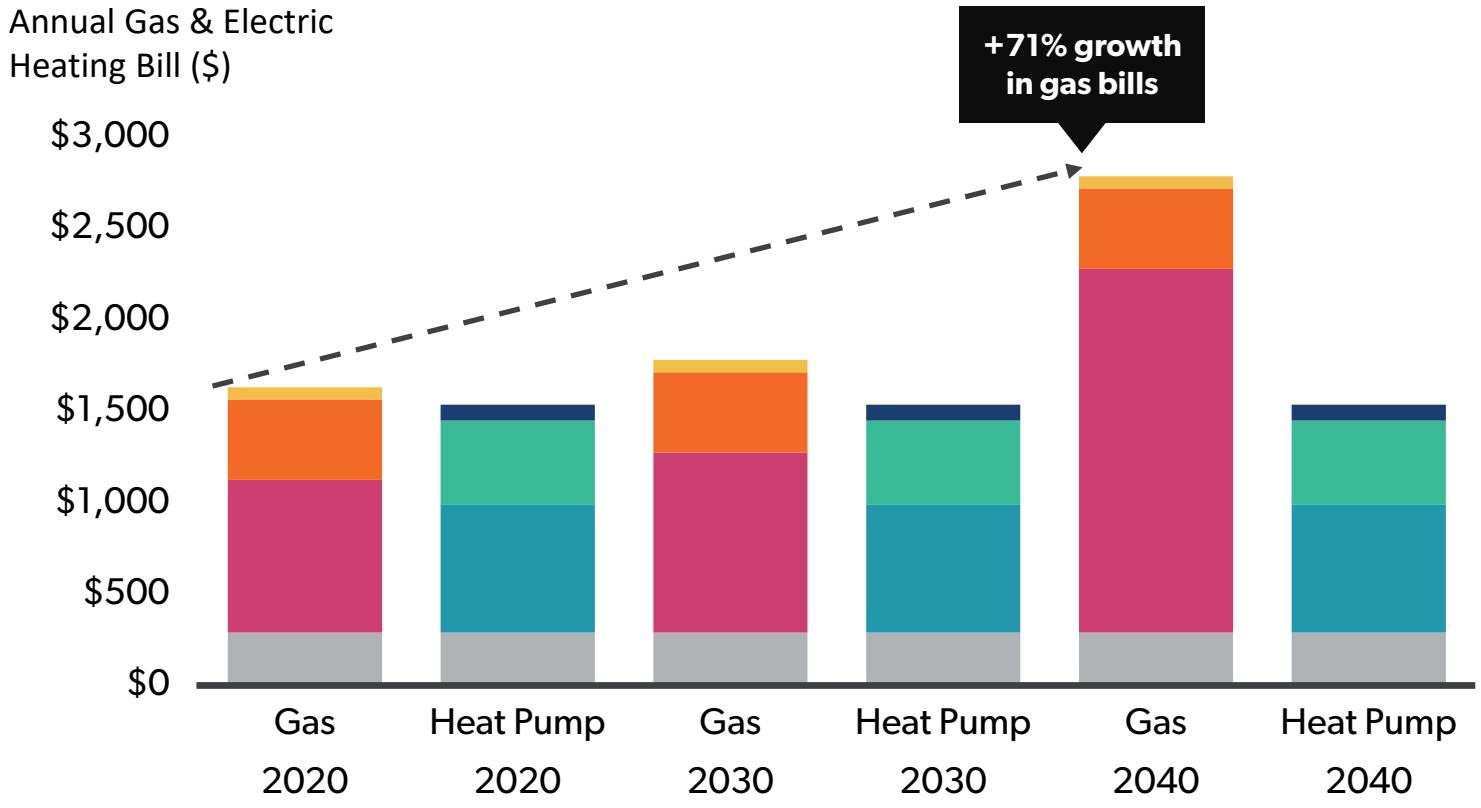
New Electric Load (MWh)

New Heat Pumps (Num. of units)

Filed: 2023-03-08, EB-2022-0200, Exhibit I.5.3-ED-146, Attachment 1, Page 19 of 31

Death Spiral for Gas Utilities: An Illustrative Example

RATES IMPACT FOR GAS AND ELECTRIC CUSTOMERS
– GAS UTILITY NO-ACTION "DEATH SPIRAL" SCENARIO



There is a large potential for non-participant gas bill to grow, which will further increase remaining gas customer's propensity to switch to electric. Impacts are likely to fall disproportionately on low- and moderate-income customers, requiring utility intervention or offsets.

- Gas Surcharges
- Gas Commodity Charges
- Gas Variable Delivery Charges
- Electricity Surcharges
- Electricity Commodity Charges
- Electricity Variable Delivery Charges
- Gas Fixed Delivery Charge

Source: CCIS NYISO forecast and The Brattle Group analysis. | Note: Rate impacts for a gas furnace and air source heat pump customer.

Adverse Investor Reactions to Risks Are Emerging

Investors' **risk perceptions are shifting** as states and locales transition away from natural gas and reduce GHG emissions.

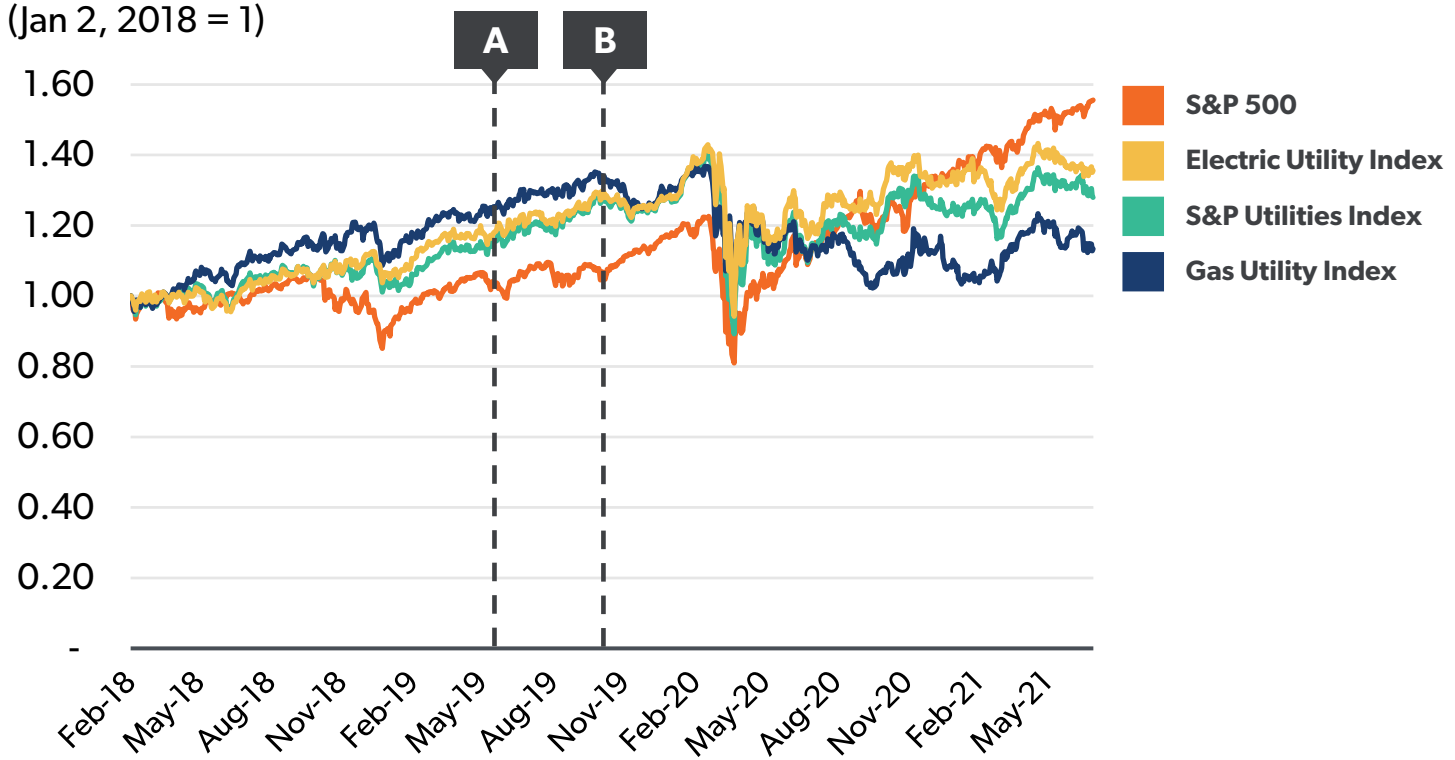
A Berkeley, CA passes the nation's first gas ban (July 2019)

B Brookline, MA passes first East Coast gas ban (Nov 2019)
Five additional CA municipalities have enacted gas bans

All else equal, gas utilities have to **issue more shares to raise the same amount of equity capital**, relative to other utilities.

- Gas utilities currently trade at a ~20% discount relative to electric.
- However, P/E ratios for gas utilities remain elevated at approximately 18 (vs. 19 for electric utilities and 18.5 for S&P util.)

UTILITY STOCK PERFORMANCE



Notes: **Gas Utility Index includes:** Atmos Energy, Chesapeake Utilities, New Jersey Resources, NiSource, NW Natural, ONE Gas, South Jersey Industries, Southwest Gas, Spire. **Electric Utility Index includes:** AEP, Southern, FirstEnergy, Exelon, Duke, Progress Energy, Evergy, NextEra, Edison International, Dominion. Electric Utility Index is currently trading 3% above S&P Utility Index and 20% above the Gas Utility Index. Data through June 30, 2021.

1: United Nations Environment Programme, Net Zero Banking Alliance.

Investors Are Becoming Actively Involved in the Debate

Environment, Social, and Governance (ESG) investors are pressuring gas utilities to reduce GHG emissions and eliminate usage of fossil fuels.

43 banks across 23 countries announced a pledge to achieve "net-zero banking," meaning their lending and investment portfolios are on track to reach net zero emissions by 2050.[1]

Utilities are increasingly highlighting RNG, hydrogen, and emission reduction efforts in their investor materials.

70 gas utilities across 31 states have set corporate carbon emission reduction targets.

1: United Nations Environment Programme, Net Zero Banking Alliance.

Equity and Energy Justice Concerns Must Be Considered

Gas utilities and regulators will also need to **consider the risks and impact of the transition on low-income and less advantaged communities**, who may experience rising bills and longer exposure to emissions.

- Public policy is increasingly focused on fairness of service and equitable access to decarbonization technology.
- As more affluent customers adopt electric heating, low-income gas customers could disproportionately experience rate increases and/or be neglected by developers for obtaining new decarbonization technologies.
- For example, adverse effects from electrification on low-income communities can be observed in rooftop adoption, in which low-income communities subsidize delivery costs for homes with rooftop solar receiving net energy metering (NEM).

Emission Reductions

Physical and Mental Health

Environmental Justice

Equity

Affordability

Quality of Service

Community Citizenship

Job Creation

Filed: 2023-03-08, EB-2022-0200, Exhibit I.5.3-ED-146, Attachment 1, Page 23 of 31

Turning Increasing Risk into Opportunity

Gas utilities need to **create an adaptive, long-term business plan that anticipates** the pathways, drivers, accelerators, and decelerators of the transition and identify the type and timing of impacts.

Long-term modeling tools can help

> **Economy Decarbonization Model:** How different might the pace and means of decarbonization be? There are many enabling technologies and policy "knobs" yet to be turned or applied. What are these pathways, and how can they be realized or adjusted? When and how will gas utilities be affected under these different pathways?

> **Distribution System Planning Model:** How can gas distribution investments, operations, pricing, and financing be altered so that utilities not only survive but grow in the face of the transition's long-term effects?

By understanding the possible pathways, utilities can identify their comparative advantages, target market niches, and needed operational and regulatory adjustments.

- A "base case" would look at sales and profits with a passive response to trends in electrification.
- Responsive strategies are then developed for how to influence the path(s) that are likely to occur and how to prepare for their contingencies by selectively avoiding some risks and embracing others.

In Part 2 of this series, we will examine the solution elements available to gas utilities.

How Brattle Can Help

Brattle's Unique Interdisciplinary Experience Provides a Holistic Skillset to Guide Transition

Assess Transition Risks

Analyze how natural gas bans, electrification mandates, and ESG investment trends will impact business risk and cost of capital.

Estimate revenue loss to electrification under different future scenarios.

Use system dynamics to identify rate risks and customer feedback effects.

Evaluate Strategy and Solutions

Facilitate strategy workshops to establish transition principles, identify potential business strategies, and determine near- and long-term action items.

Identify revenue potential from owning and rate-basing electrification infrastructure and evaluate rate impacts using system dynamics.

Implement Regulatory Changes

Design and calculate tariffs to incentivize transition and protect customer costs.

Filed: 2023-03-08, EB-2022-0200, Exhibit I.5.3-ED-146, Attachment 1, Page 26 of 31

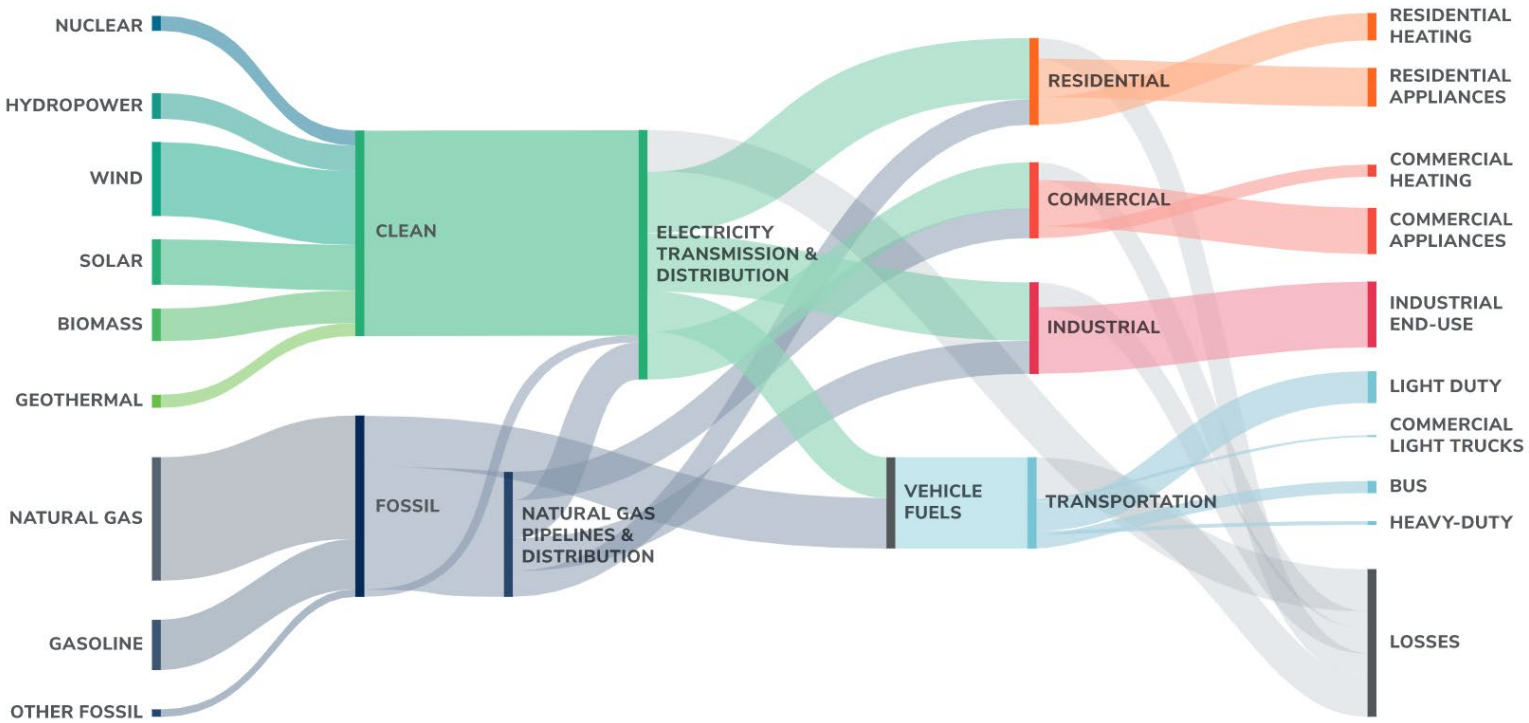
DEEP Can Help Utilities Understand Risks and Evaluate Solutions

Brattle's **Decarbonization, Electrification & Economic Planning (DEEP) Model** is an energy economy modeling tool that can evaluate:

- The uptake of technologies and impact on gas consumption
- The roles of efficiency, electrification, and fuel-switching
- The utility and customer costs of specific technology pathways

DEEP can evaluate long-term planning impacts and the interactions of:

- Technology adoption
- Decarbonization policies
- Macroeconomic conditions
- Supply and demand

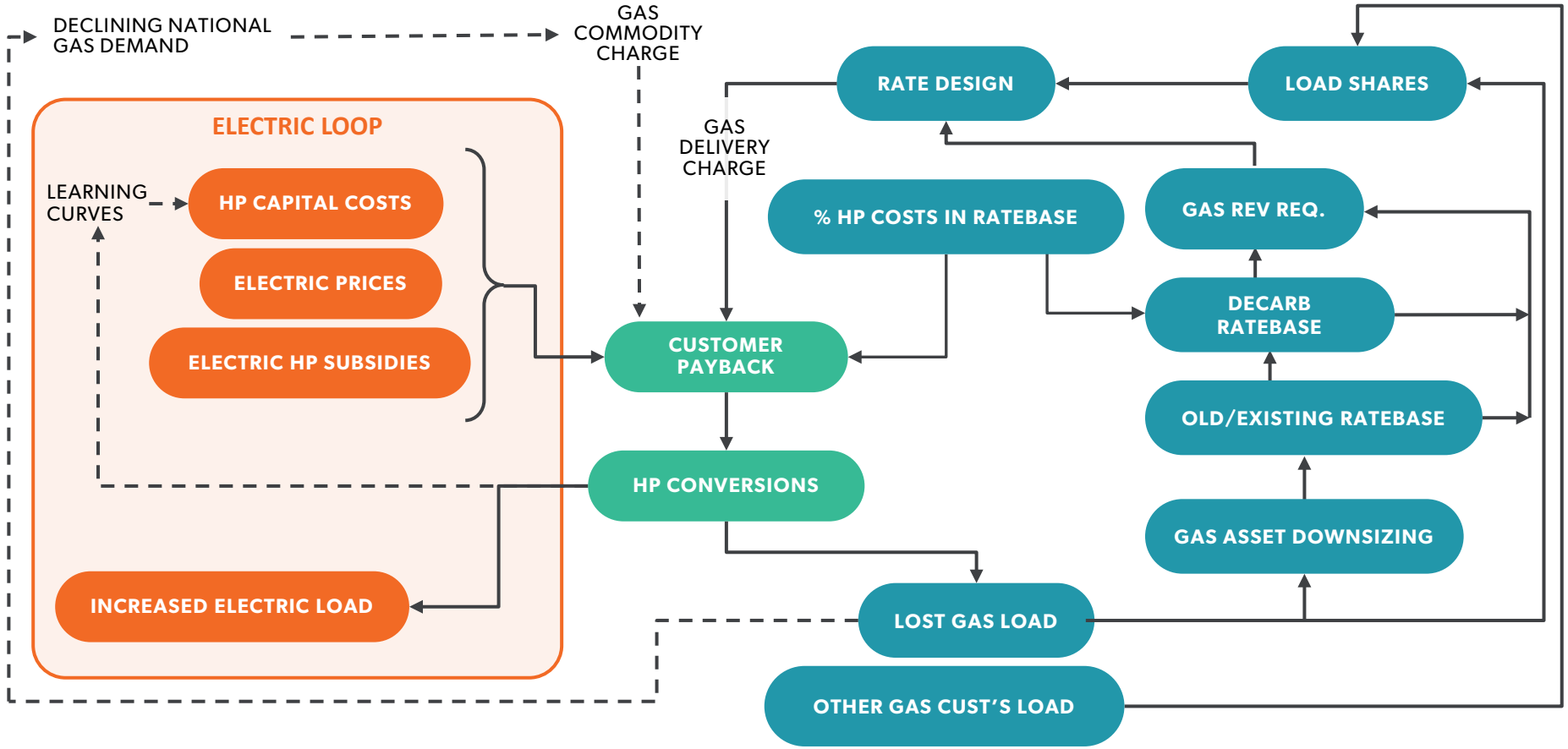


The model can be run in **(1) planning mode** and **(2) optimization mode** to meet client-specific needs.

Filed: 2023-03-08, EB-2022-0200, Exhibit I.5.3-ED-146, Attachment 1, Page 27 of 31

Dynamic Modeling Can Help Utilities Understand Risk and Evaluate Potential Strategies

Brattle's technical and analytical abilities can model pathways for decarbonization and the complex interdependencies both within and between the gas and electric sectors, many of which have not yet been thoroughly studied.



Brattle's **System Dynamics Model** can help utilities analyze the complex feedbacks and interdependencies associated with the transition.

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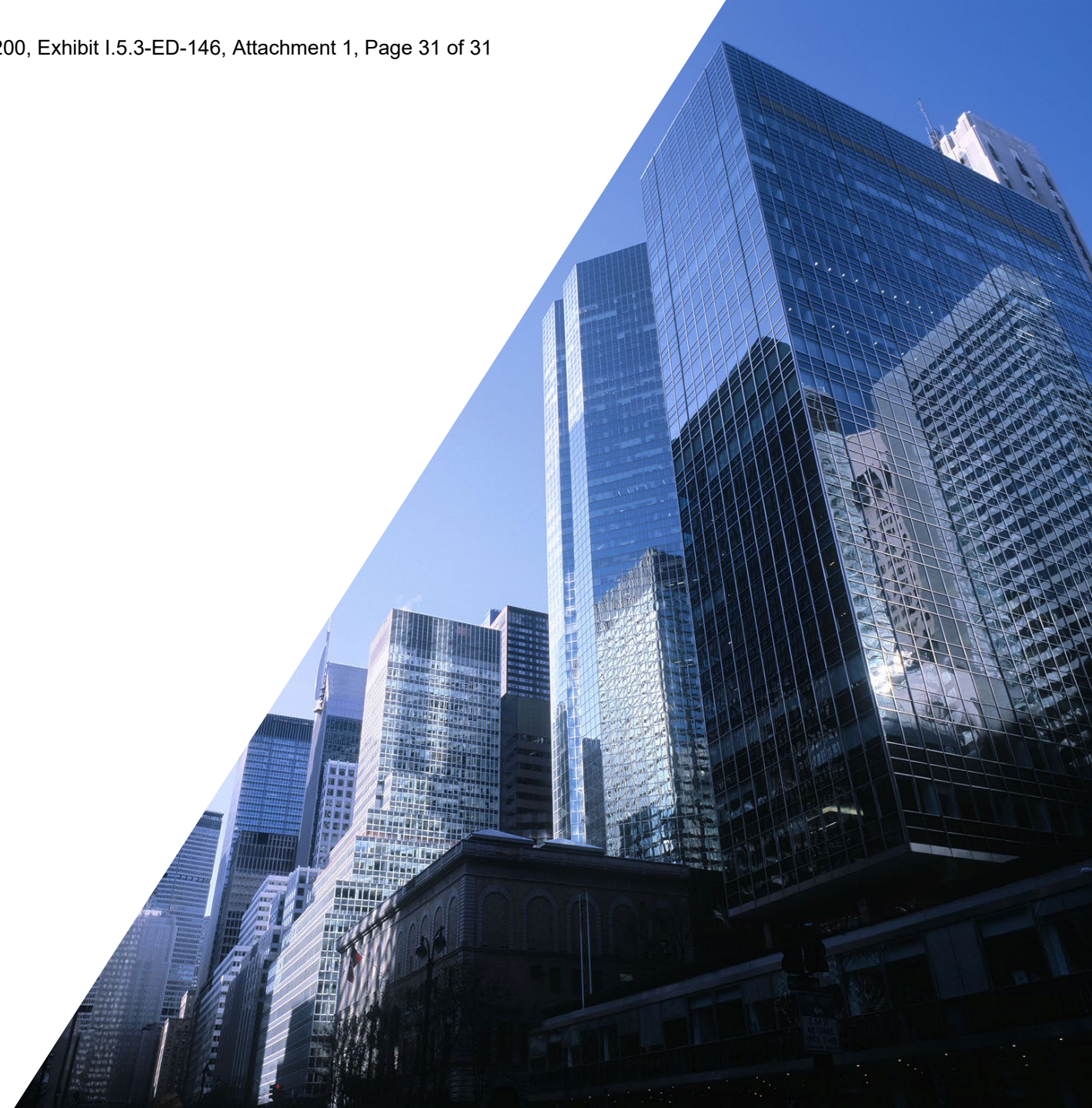
Clarity in the face of complexity

Brattle



Tab 3

ENBRIDGE GAS INC.

Answer to Interrogatory from
Industrial Gas Users Association (IGUA)

Interrogatory

Reference:

Exhibit 5, Tab 3, Schedule 1, Attachment 1, Page 58 of 164

Preamble:

Concentric states:
A future "death spiral" is far from certain, and we anticipate that the Company will work proactively to avoid such an outcome.

Question(s):

a) Please identify all actions that Concentric or EGI have evaluated or analyzed that the Company could use to "work proactively to avoid such an outcome."

b) Please provide the evaluations or analyses conducted. Please provide copies of the spreadsheets (with working formulas and links) used to conduct the analyses or evaluations.

Response:

The following response was provided by Concentric Energy Advisors, Inc.:

As a matter of definition, a "death spiral" can take many forms with several alternative end states. The fundamental problem represented by the "death spiral" is a utility (or any company) with a high level of fixed costs losing customers or revenues and needing to recover its costs from a shrinking customer base. In this scenario, the company's product is increasingly uncompetitive, accelerating its loss of customers. Some of the tools available for response include: changes in rate structures designed to retain the most price sensitive loads; introduction of advanced gas end-use technologies; conservation and energy efficiency programs designed to lower customer costs; accelerated depreciation for vulnerable distribution system assets; blending with RNG and hydrogen fuels. Please see Exhibit 1, Tab 10, Schedule 4 for a description of Enbridge Gas's planning activities in relation to Energy Transition. As provided in responses at Exhibit I.5.3-STAFF-208, and Exhibit I.5.3-ED-148, a gas utility death

spiral can occur even with proactive steps to avoid such an outcome when public policy mandates exceed the capacity of the gas industry to offer viable alternatives.

The following response was provided by Enbridge Gas:

a-b) Please see response at Exhibit I.1.10-STAFF-34 part a).

ENBRIDGE GAS INC.

Answer to Interrogatory from
Ontario Energy Board Staff (STAFF)

Interrogatory

Reference:

Exhibit 1, Tab 10, Schedule 4, p. 13-14, 18-19, Exhibit 1, Tab 15, Schedule 1, p. 1

Question(s):

Enbridge Gas discusses how the AMP, including the growth asset class incorporates energy transition assumptions. Enbridge Gas notes the increased risk of stranded assets from energy transition and has proposed changes to its deemed capital structure. Enbridge Gas further requests approval of its harmonized customer connection policies.

a) Please describe how Enbridge Gas has considered and attempted to mitigate the risks of stranded assets associated with the proposed capital expenditures identified in its AMP (particularly growth-related capital expenditures including customer connections and distribution/transmission system reinforcement/expansion projects, but also considering system renewal expenditures to extend the service life of assets), related to uncertainty in future volumes or number of customers arising from the energy transition.

b) In Enbridge Gas's opinion, should ratepayers bear 100% of the cost recoveries related to stranded assets?

c) Has Enbridge Gas considered whether the proposal to increase Enbridge Gas's equity ratio may work at cross-purposes to the intent of managing energy transition risk, by increasing rates and potentially increasing the risk of customers exiting the natural gas system?

d) Has Enbridge Gas given consideration to adjustments to its customer connection policies to mitigate the risk of stranded assets associated with new customer connections who may leave the natural gas system before Enbridge's investment is recovered, e.g., by reducing the customer revenue horizon, requiring greater upfront customer contributions, eliminating the free service allowance for residential infills, introducing exit fees for new customers, etc.? If so, please provide details.

Response:

a) Enbridge Gas's proposed 2024 to 2028 AMP capital expenditures are predicated on fulfilling its obligation to (1) maintain a safe and reliable system, (2) connect customers based on OEB-approved connection policies and (3) implement IRP alternatives where technically and economically feasible. Enbridge Gas acknowledges that there exists some uncertainty about how the energy transition will unfold in Ontario; however, this does not absolve Enbridge Gas from the aforementioned obligations, especially when, despite pathway uncertainty, a project's underlying need/constraint has a high degree of certainty (e.g., minimum five-year demand forecast) and /or there is an absence of other technically or economically feasible alternatives.

Enbridge Gas has taken many steps to mitigate the risk of stranded assets associated with the proposed capital expenditures within and beyond the five-year regulatory plan period. These include:

- Completing an Energy Transition Scenario Analysis (ETSA) to understand the impacts of energy transition and the associated climate policies on natural gas demand in Enbridge Gas's distribution system.

- Commissioning the Pathways to Net Zero Emissions in Ontario Study, conducted by Guidehouse to understand how Enbridge Gas's system could play a role in a net-zero future. The study built upon the ETSA work and found that a Diversified scenario achieves net zero with significant savings and more reliability, relative to an electrification scenario. The Diversified scenario would also increase the need for pipeline infrastructure to deliver large quantities of low carbon fuels like hydrogen and RNG. Please see Exhibit 1, Tab 10, Schedule 5.

- Ongoing review and incorporation of energy transition assumptions into the demand forecasting process for new construction and existing customers replacing gas appliances and updates to annual and peak demand for gas. Please see Exhibit 1, Tab 10, Schedule 4, Table 2.

- Ongoing updates to the asset management plan to respond to a changing pace of energy transition and to ensure that facilities projects' underlying needs/constraints (e.g., minimum five-year demand forecast) have a high degree of certainty when they are brought forward for approval. Please see Exhibit 1, Tab 10, Schedule 4, paragraph 37.

- Incorporation of the IRP framework into the asset management process to defer or avoid new infrastructure, where possible, due to uncertainty related to energy transition. Please see Exhibit 1, Tab 10, Schedule 4, paragraph 43.

- Enhancements to the Distribution Integrity Management Program will allow the Company to further optimize its vintage steel main replacement program. Please see Exhibit 1, Tab 13, Schedule 3.

- Ongoing monitoring of Federal/ Provincial/Municipal policy across all sectors, including buildings, industry, transportation, and electricity generation and policies supporting energy efficiency, electrification, low carbon fuels and CCUS.

- As provided at Exhibit 1, Tab 10, Schedule 6, paragraph 106, Enbridge Gas will seek to understand how the Ontario government's Energy Transition and Electrification panel work will inform the Ontario government's energy transition policy and consequently the long-term viability of Enbridge Gas's assets. The Company has highlighted to the panel, the resiliency, reliability and future value of Ontario's 150,000 kms of underground gas storage, transmission and distribution assets in relation to the future cost of providing equivalent resiliency and reliability from a largely above ground electric transmission and distribution system. Enbridge Gas supports the panel's focus on integrating gas and electricity system planning and believes in the prudence of programs like the Ontario government's Clean Home Heating program that offers incentives for installation of heat pumps with smart controls in gas heated homes.

b) Yes. It is Enbridge Gas's view that the company should fully recover the costs of prudently invested capital. As provided in response at Exhibit I.1.10-SEC-28, Enbridge Gas has shown that in 2021, $16 billion of invested capital in the gas storage, transmission and distribution system delivers over four times the peak capacity delivered by the $25 billion invested in the electricity distribution system. The *current* unit cost of invested capital to deliver peak capacity in the form of natural gas is a quarter of that for electricity. Also, the underground gas system is more resilient than the largely above ground electricity system in Ontario.

Enbridge Gas has invested shareholder capital to serve its customers under a regulatory compact that allows the Company to earn a fair rate of return and for the recovery of prudently invested capital through the rates charged to its customers. Enbridge Gas expects its underground storage, transmission and distribution assets to be used or useful for the foreseeable future due to their current capacity to deliver vast amounts of energy annually and on a peak basis, inherent resiliency and the low cost of connecting to the gas system.

Enbridge Gas expects to fully recover from its customers the cost of prudently invested long-lived capital and operating and maintenance costs of providing safe, reliable and affordable energy to them. Increasing the fixed charges to connect to the system as proposed in this Application will provide cost recovery even if the amount of natural gas consumed is gradually displaced by non-emitting electricity.

Should the government institute a policy mandating disconnection from the gas system, the Company expects that it will accelerate recovery of its invested capital through regulatory measures such as higher depreciation rates and other tools including cost allocation changes to reflect a changing customer mix over time.

c) Enbridge Gas's perspective is that the increase in equity thickness mitigates the risk of investors attributing higher risk premiums with consequential impacts on the Company's cost of capital and more significant impact on customer rates.

d) Enbridge Gas is currently not experiencing a trend towards customers leaving the system nor does it have information suggesting that existing customers intend to leave the system. As noted above, Enbridge Gas is supportive of hybrid heating technologies which can reduce customers' annual GHG emissions by pairing non-emitting electricity with natural gas use to meet peak heating demands. Enbridge Gas's proposed connections policies, including the free service allowance for in-fills are established in such a manner as to ensure compliance with E.B.O 188 and the underlying principle that new customer revenues are sufficient to support their costs and do not impact the rates of existing customers. In addition, feasibility parameters such as the revenue horizon are set out in E.B.O 188 Section 2.2 Specific Parameters.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Industrial Gas Users Association (IGUA)

Interrogatory

Reference:

Exhibit 5, Tab 3, Schedule 1, Attachment 1, Page 44-45 of 164

Preamble:

Concentric's report states:
Another risk of the Energy Transition is that a significant portion of the Company's gas plant investments could become stranded. Generally, the term "stranded asset" refers to an investment that becomes no longer used or useful in the provision of service to customers before the end of its depreciable life. At that point in time, the undepreciated value of the asset (i.e., its net book value) is "stranded" with costs to be borne by either investors or customers. Gas distribution utilities such as the Company generally depreciate capital invested in their systems over the expected useful life of the underlying physical property, which is often many decades. Therefore, the Energy Transition creates stranded asset risk for the Company by introducing the possibility that significant portions of the Company's property will cease being used or useful before it is fully depreciated. In fact, the OEB recently acknowledged the risk of stranded assets when evaluating the Company's IRP proposal.
…
Like Moody's, Concentric expects that the OEB will approve measures to mitigate the Company's stranded asset risk, up to and potentially including the acceleration of depreciation rates as appropriate. However, we note that this is a "downside-only" area for the Company. In other words, while regulatory changes (e.g., the acceleration of depreciation rates) may improve the Company's prospects of recovering its investment, there remains a chance that investors are not able to earn a full "return of" their invested capital.

Question(s):

a) Has Concentric or EGI (and in the case of EGI either directly, through a consultant or as part of any industry association) or any affiliate of EGI (either directly, through a consultant or as part of any industry association) conducted any financial analysis (that is, analysis of the finances of EGI as a company) for specific pathway(s) or scenarios in which the Company's investors are not able to earn a full "return of" their invested capital?

b) If so, please identify the pathway(s) or scenarios and provide the analyses. Please provide copies of the spreadsheets (with working formulas and links) used to conduct the analyses.

c) Has EGI identified any specific assets that are at risk of becoming stranded because of the Energy Transition or other cause?
   i. If so, please identify those assets, the conditions under which they may become stranded, and the date or timeline on which they may become stranded. Please provide copies of the spreadsheets or other models (with working formulas and links) used to conduct this analysis.

d) Please identify all analyses conducted by EGI or otherwise in EGI's possession which analyze changes in EGI's gas system operations and maintenance costs along different potential decarbonization pathways or Energy Transition scenarios.
   i. Please provide the identified analyses. Please provide copies of the spreadsheets (with working formulas and links) used to conduct the analysis.

e) Please identify all analyses conducted by EGI or otherwise in EGI's possession which quantify infrastructure investment on EGI's system along different potential decarbonization pathways or Energy Transition scenarios.
   i. Please provide the identified analyses. Please provide copies of the spreadsheets (with working formulas and links) used to conduct the analyses.

f) Please identify all analyses conducted by EGI or otherwise in EGI's possession which quantify infrastructure retirements on EGI's system along different potential decarbonization pathways or Energy Transition scenarios.
   i. Please provide the identified analyses. Please provide copies of the spreadsheets (with working formulas and links) used to conduct the analyses.

Response:

The following response was provided by Concentric Energy Advisors, Inc.:

a-f) Concentric has not done the requested analysis.

The following response was provided by Enbridge Gas:

a) Neither Enbridge Gas nor any of its affiliates either directly or through a consultant or industry association have conducted any financial analysis for specific pathway(s) or scenarios in which the Company's investors are not able to earn a full "return of" their invested capital. Please also see response at Exhibit I.1.10-STAFF-34.

b) Please see response to part a) above.

c) Enbridge Gas has not identified any specific assets that are at risk of becoming stranded because of the Energy Transition or other cause.

d-f) Enbridge Gas has not completed this analysis.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Industrial Gas Users Association (IGUA)

Interrogatory

Reference:

Exhibit 5, Tab 3, Schedule 1, Attachment 1, Page 58 of 164

Preamble:

Concentric's report states:
In 2020, residential customers accounted for approximately 57% of the Company's revenues but just 32% of its sales volumes. If a meaningful portion of these customers switch to non-gas heating sources, whether due to technological advancements, environmental concerns, or policy mandates, costs will increase for the Company's remaining customers. Such a scenario could potentially spark a so-called "death spiral."

Question(s):
a) Please define "meaningful" as used in this sentence.

b) Please define "spark" as used in this sentence.

c) Have Concentric or EGI quantified the number of customers switching to non-gas heating sources that would be required to "spark a so-called 'death spiral'" as referenced in this sentence? If so, how many customers? Please provide copies of the spreadsheets (with working formulas and links) used to conduct the analysis.

Response:

The following response was provided by Concentric Energy Advisors, Inc.:

a) Concentric did not have a specific number or percentage of residential customers in mind. Rather, Concentric uses the word "meaningful" to refer to a tipping point where enough residential customers of Enbridge Gas switch to non-gas heating sources that costs will increase for the Company's remaining customers.

b) As used in the referenced passage, "spark" means cause, lead to, or precipitate.

c) Concentric has not quantified the number of customers switching to non-gas heating sources that would be required to “spark a so-called ‘death spiral’”.

The following response was provided by Enbridge Gas:

c) Enbridge Gas has not quantified the number of customers switching to non-gas heating sources that would be required to “spark a so-called ‘death spiral’”.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Industrial Gas Users Association (IGUA)

Interrogatory

Reference:

Exhibit 5, Tab 3, Schedule 1, Attachment 1, Page 58 of 164

Preamble:

Concentric states:
Due to the acceleration of declines in average use per residential customer, declines in the rate of customer additions, a relatively weaker economic growth outlook, the OEB's encouragement of competition, and the Energy Transition pressures, we conclude that the risk of a "death spiral" is higher today than it was in 2012.

Question(s):

a) Please describe in detail how "acceleration of declines in average use per residential customer" is causally related to the risk of a "death spiral."

b) Have Concentric or EGI quantified the impact of "acceleration of declines in average use per residential customer" on the likelihood of a "death spiral" or the conditions or timeframe under which a "death spiral" occurs? If so, please provide the analysis conducted. Please provide copies of the spreadsheets (with working formulas and links) used to conduct the analysis.

c) Please describe in detail how "declines in the rate of customer additions" is causally related to the risk of a "death spiral."

d) Have Concentric or EGI quantified the impact of "declines in the rate of customer additions" on the likelihood of a "death spiral" or the conditions or timeframe under which a "death spiral" occurs? If so, please provide the analysis conducted. Please provide copies of the spreadsheets (with working formulas and links) used to conduct the analysis.

e) Please describe in detail how "a relatively weaker economic growth outlook" is causally related to the risk of a "death spiral."

f) Have Concentric or EGI quantified the impact of "a relatively weaker economic growth outlook" on the likelihood of a "death spiral" or the conditions or timeframe under

which a “death spiral” occurs? If so, please provide the analysis conducted. Please provide copies of the spreadsheets (with working formulas and links) used to conduct the analysis.

g) Please describe in detail how “the OEB’s encouragement of competition” is causally related to the risk of a “death spiral.”

h) Have Concentric or EGI quantified the impact of “the OEB’s encouragement of competition” on the likelihood of a “death spiral” or the conditions or timeframe under which a “death spiral” occurs? If so, please provide the analysis conducted. Please provide copies of the spreadsheets (with working formulas and links) used to conduct the analysis.

i) Please describe in detail how “Energy Transition pressures” is causally related to the risk of a “death spiral.”

j) Have Concentric or EGI quantified the impact of “Energy Transition pressures” on the likelihood of a “death spiral” or the conditions or timeframe under which a “death spiral” occurs? If so, please provide the analysis conducted. Please provide copies of the spreadsheets (with working formulas and links) used to conduct the analysis.

Response:

The following response was provided by Concentric Energy Advisors, Inc.:

a) As average use declines among residential customers, the cost of the system is spread across lower volumes, increasing the cost per cubic meter and lessening the competitive positioning of gas versus alternative energy sources. Further, in a straight-fixed-variable rate design, declines in average use per customer increases the ratio of fixed to variable costs, which may also contribute to customer decision-making with regard to fuel switching.

b) Concentric has not quantified the impacts of declining use per customer on the likelihood of a death spiral.

c) As fewer customers are added to Enbridge Gas’s system, the cost of the system is spread across fewer customers, increasing the cost per customer and lessening the competitive positioning of gas versus alternative energy sources.

d) Concentric has not quantified the impacts of declining customer additions on the likelihood of a death spiral.

e) A weaker economic outlook contributes to both fewer customer additions and lower use per customer.

f) Concentric has not quantified the impacts of a weaker economic outlook on the likelihood of a death spiral.

g) Competition from alternative fuels or alternative suppliers reduces customers and increases costs for remaining customers.

h) Concentric has not quantified the impacts of increased competition on the likelihood of a death spiral.

i) Please see response at Exhibit 1.5.3-ED-148 parts a and b).

j) Please see response at Exhibit 1.5.3-ED-148 parts a and b).

The following response was provided by Enbridge Gas:

b) Enbridge Gas has not quantified the impact of accelerating declines in average use per residential customer on the likelihood of a death spiral.

d) Enbridge Gas has not quantified the impact of declines in the rate of customer additions on the likelihood of a death spiral.

f) Enbridge Gas has not quantified the impact of a relatively weaker economic growth profile on the likelihood of a death spiral.

h) Enbridge Gas has not quantified the impact of increased competition the likelihood of a death spiral.

j) Enbridge Gas has not quantified the impact of energy transition pressures on the likelihood of a death spiral.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Industrial Gas Users Association (IGUA)

Interrogatory

Reference:

Exhibit 5, Tab 3, Schedule 1, Attachment 1, Page 66-67 of 164, Figure 20

Question(s):

a) Please provide the workpapers (with working formulas and links) used to calculate the values in Figure 20.

b) Has EGI or anyone on its behalf conducted, or does EGI have access to, an analysis quantifying the impacts on EGI's Debt/EBITDA, FFO/Debt, FFO/Interest Coverage, EBIT/Interest Coverage, or Debt/Capitalization of any of the following;
   i. Changes in depreciation rates
   ii. Infrastructure investment
   iii. Infrastructure retirement
   iv. Any decarbonization pathway

c) Please provide each analysis identified in part (a) of this question. Please provide copies of the spreadsheets or models (with working formulas and links) used to conduct the analysis.

Response:

a) The following response was provided by Concentric Energy Advisors, Inc.:

   Please see Attachment 1.

b) Enbridge Gas has not conducted nor has access to any such analysis.

c) The following response was provided by Concentric Energy Advisors, Inc.:

   Please see response to a) above.

Financial Metrics (Utility) ($M)

	UGL 2012 Actuals	EGD 2012 Actuals	UGL 2013 Actuals	EGD 2013 Actuals	UGL 2014 Actuals	EGD 2014 Actuals	UGL 2015 Actuals	EGD 2015 Actuals	UGL 2016 Actuals	EGD 2016 Actuals	UGL 2017 Actuals	EGD 2017 Actuals	UGL 2018 Actuals	EGD 2018 Actuals	EGI 2019 Actuals	EGI 2020 Actuals	EGI 2021 Actuals	EGI 2022 Estimate	EGI 2023 Bridge Year	EGI 2024 Test Year	EGI 2024 36% Equity
OEB Case Number	EB-2013-0109	EB-2013-0046	EB-2014-0145	EB-2012-0459	EB-2015-0010	EB-2015-0122	EB-2016-0118	EB-2016-0142	EB-2017-0091	EB-2017-0102	EB-2018-0105	EB-2018-0131	EB-2019-0105	EB-2019-0105	EB-2020-0134	EB-2021-0149	EB-2022-0110	EB-2022-0200	EB-2022-0200	EB-2022-0200	N/A
Utility Financial Results As Filed																					
Utility Income Statement (as filed)																					
Total Operating Revenues	$ 1,569.96	$ 2,324.10	$ 1,771.56	$ 2,566.30	$ 1,919.73	$ 2,642.40	$ 1,821.59	$ 2,766.90	$ 1,704.64	$ 2,637.50	$ 2,100.82	$ 2,830.60	$ 2,059.08	$ 2,791.30	$ 4,779.70	$ 4,266.70	$ 4,628.50	$ 5,095.30	$ 5,809.70	$ 6,279.10	$ 6,257.90
Gas Commodity and Distribution Costs	$ (636.56)	$ (1,314.10)	$ (830.30)	$ (1,522.80)	$ (958.52)	$ (1,644.90)	$ (856.84)	$ (1,724.30)	$ (700.44)	$ (1,497.10)	$ (1,030.97)	$ (1,668.00)	$ (907.14)	$ (1,566.00)	$ (2,265.30)	$ (1,781.20)	$ (2,110.50)	$ (2,440.10)	$ (3,047.30)	$ (3,228.00)	$ (3,228.00)
Operating and Administrative Expenses	$ (426.35)	$ (429.60)	$ (444.89)	$ (450.90)	$ (444.08)	$ (448.50)	$ (448.83)	$ (472.30)	$ (467.42)	$ (492.80)	$ (485.75)	$ (476.10)	$ (523.23)	$ (482.40)	$ (1,036.00)	$ (1,073.00)	$ (1,036.80)	$ (1,082.40)	$ (1,092.20)	$ (1,118.90)	$ (1,118.90)
Depreciation and Amortization	$ (200.86)	$ (292.90)	$ (192.96)	$ (278.00)	$ (200.37)	$ (255.90)	$ (212.22)	$ (259.70)	$ (228.40)	$ (292.70)	$ (254.88)	$ (301.30)	$ (276.87)	$ (294.70)	$ (601.70)	$ (618.20)	$ (640.10)	$ (705.40)	$ (725.40)	$ (921.00)	$ (921.00)
Other Revenue	$ 19.89	$ 36.80	$ 18.05	$ 41.20	$ 14.87	$ 43.60	$ 19.90	$ 44.10	$ 16.53	$ 41.90	$ 17.30	$ 42.10	$ 17.81	$ 42.30	$ 49.60	$ 47.70	$ 49.10	$ 60.00	$ 63.20	$ 64.30	$ 64.30
Other Income	$ (1.19)	$ 6.10	$ (0.59)	$ 1.60	$ (1.05)	$ 0.30	$ (0.44)	$ 6.00	$ 1.16	$ 1.10	$ (1.44)	$ 0.30	$ 1.26	$ 0.20	$ (1.80)	$ 4.50	$ 0.90	$ -	$ -	$ -	$ -
Interest Expense	$ (145.35)	$ (142.30)	$ (148.39)	$ (145.80)	$ (150.93)	$ (151.50)	$ (154.59)	$ (159.50)	$ (161.00)	$ (177.90)	$ (167.15)	$ (185.30)	$ (165.47)	$ (190.30)	$ (369.10)	$ (381.70)	$ (379.90)	$ (401.40)	$ (416.00)	$ (422.20)	$ (438.90)
Income Tax Expense	$ (27.07)	$ (47.50)	$ (25.11)	$ (48.20)	$ (23.76)	$ (6.10)	$ (15.36)	$ (19.40)	$ (4.11)	$ (17.30)	$ 5.28	$ (1.00)	$ 6.30	$ (38.10)	$ (59.90)	$ (39.20)	$ (41.80)	$ (34.10)	$ (48.90)	$ (120.70)	$ (110.80)
Pref Share Dividends	$ (3.11)	$ (2.40)	$ (2.06)	$ (2.40)	$ (2.83)	$ (2.40)	$ (2.66)	$ (2.20)	$ (2.60)	$ (2.20)	$ (2.77)	$ (2.30)	$ (2.90)	$ (2.60)	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Net Income Applicable To Common Equity	$ 149.36	$ 138.20	$ 145.31	$ 161.00	$ 153.06	$ 177.00	$ 150.55	$ 179.60	$ 158.36	$ 200.50	$ 180.44	$ 239.00	$ 208.84	$ 259.70	$ 495.50	$ 425.60	$ 469.40	$ 491.90	$ 543.10	$ 532.60	$ 504.60
Total Debt																					
Short Term Debt	$ 145.62	$ 113.70	$ 56.69	$ 236.50	$ (60.51)	$ 203.10	$ (143.53)	$ 165.40	$ (219.47)	$ 209.00	$ 80.16	$ 360.40	$ 187.55	$ 381.00	$ 407.00	$ 111.10	$ 596.50	$ 521.70	$ 318.20	$ 6.20	$ (128.40)
Long Term Debt	$ 2,151.08	$ 2,353.10	$ 2,262.10	$ 2,411.10	$ 2,502.25	$ 2,705.70	$ 2,746.66	$ 2,985.70	$ 3,161.48	$ 3,472.80	$ 3,319.04	$ 3,677.30	$ 3,572.95	$ 3,838.20	$ 8,002.00	$ 8,568.60	$ 8,505.30	$ 9,079.60	$ 9,628.80	$ 10,028.10	$ 10,486.40
	$ 2,296.70	$ 2,466.80	$ 2,318.79	$ 2,647.60	$ 2,441.74	$ 2,908.80	$ 2,603.13	$ 3,151.10	$ 2,942.01	$ 3,681.80	$ 3,399.20	$ 4,037.70	$ 3,760.50	$ 4,219.20	$ 8,409.00	$ 8,679.70	$ 9,101.80	$ 9,601.30	$ 9,947.00	$ 10,034.30	$ 10,358.00
Common Equity	$ 1,349.68	$ 1,443.80	$ 1,362.19	$ 1,545.60	$ 1,431.51	$ 1,692.50	$ 1,522.23	$ 1,828.70	$ 1,713.03	$ 2,127.20	$ 1,970.61	$ 2,327.50	$ 2,166.61	$ 2,422.50	$ 4,730.00	$ 4,882.30	$ 5,119.80	$ 5,400.80	$ 5,595.20	$ 6,150.00	$ 5,826.30
Preference Shares	$ 102.73	$ 100.00	$ 102.88	$ 100.00	$ 103.17	$ 100.00	$ 103.04	$ 100.00	$ 103.38	$ 100.00	$ 104.10	$ 100.00	$ 91.26	$ 87.50	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Utility Rate Base	$ 3,749.11	$ 4,010.60	$ 3,783.86	$ 4,293.20	$ 3,976.42	$ 4,701.30	$ 4,228.40	$ 5,079.80	$ 4,758.42	$ 5,909.00	$ 5,473.91	$ 6,465.20	$ 6,018.37	$ 6,729.20	$ 13,139.00	$ 13,562.00	$ 14,221.60	$ 15,002.10	$ 15,542.20	$ 16,184.30	$ 16,184.30
Utility Common Equity	36.000%	36.000%	36.000%	36.000%	36.000%	36.000%	36.000%	36.000%	36.000%	36.000%	36.000%	36.000%	36.000%	36.000%	36.000%	36.000%	36.000%	36.000%	36.000%	38.000%	36.000%
Achieved or Allowed Return On Common Equity (pre-ESM a	11.070%	9.570%	10.667%	10.414%	10.690%	10.460%	9.890%	9.819%	9.240%	9.423%	9.160%	10.269%	9.640%	10.721%	10.475%	8.717%	9.168%	8.660%	8.660%	8.660%	8.660%
Adjustments To Utility Financial Results																					
Weather Normalization Revenue (negative = warmer)	$ -	$ (108.50)	$ -	$ 47.10	$ -	$ 218.90	$ -	$ 125.20	$ -	$ (48.70)	$ -	$ (42.50)	$ -	$ 72.20	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Weather Normalization Costs (positive = warmer)	$ -	$ 76.80	$ -	$ (34.00)	$ -	$ (170.60)	$ -	$ (110.50)	$ -	$ 30.40	$ -	$ 27.20	$ -	$ (46.70)	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Weather Normalization Tax Impact	$ -	$ 8.40	$ -	$ (3.47)	$ -	$ (12.80)	$ -	$ (3.90)	$ -	$ 4.85	$ -	$ 4.05	$ -	$ (6.76)	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Pre-Tax Earnings Sharing Mechanism (as filed)	$ (15.73)	$ (10.31)	$ -	$ -	$ (7.42)	$ (12.66)	$ -	$ (6.46)	$ -	$ (3.38)	$ -	$ (23.56)	$ -	$ (28.37)	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Earnings Sharing Tax Impact	$ 4.17	$ 2.73	$ -	$ -	$ 1.97	$ 3.35	$ -	$ 1.71	$ -	$ 0.90	$ -	$ 6.24	$ -	$ 7.52	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Adjusted Income Applicable To Common Equity	$ 137.80	$ 107.32	$ 145.31	$ 170.63	$ 147.60	$ 203.20	$ 150.55	$ 185.66	$ 158.36	$ 184.57	$ 180.44	$ 210.44	$ 208.84	$ 257.59	$ 495.50	$ 425.60	$ 469.40	$ 491.90	$ 543.10	$ 532.60	$ 504.60
Adjusted Earnings	$ 140.91	$ 109.72	$ 147.37	$ 173.03	$ 150.43	$ 205.60	$ 153.21	$ 187.86	$ 160.96	$ 186.77	$ 183.21	$ 212.74	$ 211.74	$ 260.19	$ 495.50	$ 425.60	$ 469.40	$ 491.90	$ 543.10	$ 532.60	$ 504.60
Adjusted EBIT	$ 309.16	$ 288.39	$ 320.87	$ 370.50	$ 323.16	$ 372.64	$ 323.16	$ 368.94	$ 326.07	$ 376.22	$ 345.08	$ 388.74	$ 370.91	$ 487.83	$ 924.50	$ 846.50	$ 891.10	$ 927.40	$ 1,008.00	$ 1,075.50	$ 1,054.30
Adjusted EBITDA	$ 510.02	$ 581.29	$ 513.83	$ 648.50	$ 523.53	$ 628.54	$ 535.38	$ 628.64	$ 554.47	$ 668.92	$ 599.96	$ 690.04	$ 647.78	$ 782.53	$ 1,526.20	$ 1,464.70	$ 1,531.20	$ 1,632.80	$ 1,733.40	$ 1,996.50	$ 1,975.30
Funds From Operations (FFO)																					
Earnings	$ 140.9	$ 109.7	$ 147.4	$ 173.0	$ 150.4	$ 205.6	$ 153.2	$ 187.9	$ 161.0	$ 186.8	$ 183.2	$ 212.7	$ 211.7	$ 260.2	$ 495.5	$ 425.6	$ 469.4	$ 491.9	$ 543.1	$ 532.6	$ 504.6
Depreciation and Amortization	$ 200.9	$ 292.9	$ 193.0	$ 278.0	$ 200.4	$ 255.9	$ 212.2	$ 259.7	$ 228.4	$ 292.7	$ 254.9	$ 301.3	$ 276.9	$ 294.7	$ 601.7	$ 618.2	$ 640.1	$ 705.4	$ 725.4	$ 921.0	$ 921.0
	$ 341.8	$ 402.6	$ 340.3	$ 451.0	$ 350.8	$ 461.5	$ 365.4	$ 447.6	$ 389.4	$ 479.5	$ 438.1	$ 514.0	$ 488.6	$ 554.9	$ 1,097.2	$ 1,043.8	$ 1,109.5	$ 1,197.3	$ 1,268.5	$ 1,453.6	$ 1,425.6

Adjusted Metrics

																	2021 A	2022 F	2023 F	2024 F	2024 F - no chang
FFO Cash Interest Coverage	3.35	3.83	3.29	4.09	3.32	4.05	3.36	3.81	3.42	3.70	3.62	3.77	3.95	3.92	3.97	3.73	3.92	3.98	4.05	4.44	4.25
EBIT Interest Coverage	2.13	2.03	2.16	2.54	2.14	2.46	2.09	2.31	2.03	2.11	2.06	2.10	2.24	2.56	2.50	2.22	2.35	2.31	2.42	2.55	2.40
Debt to EBITDA (regulatory)	4.70	4.42	4.71	4.24	4.86	4.79	5.05	5.17	5.49	5.65	5.84	6.00	5.95	5.50	5.51	5.93	5.94	5.88	5.74	5.03	5.24
FFO/Debt (regulatory)	14.24%	15.69%	14.05%	16.42%	13.78%	15.34%	13.50%	13.77%	12.79%	12.68%	12.51%	12.42%	12.69%	12.88%	13.05%	12.03%	12.19%	12.47%	12.75%	14.49%	13.76%
Debt/Capitalization (regulatory)	64.00%	64.00%	64.00%	64.00%	64.00%	64.00%	64.00%	64.00%	64.00%	64.00%	64.00%	64.00%	64.00%	64.00%	64.00%	64.00%	64.00%	64.00%	64.00%	62.00%	64.00%
Debt to EBITDA (US GAAP)	4.50	4.24	4.51	4.08	4.66	4.63	4.86	5.01	5.31	5.50	5.67	5.85	5.81	5.39	5.51	5.93	5.94	5.88	5.74	5.03	5.24
FFO/Debt (US GAAP)	14.88%	16.32%	14.68%	17.04%	14.37%	15.87%	14.04%	14.20%	13.23%	13.02%	12.89%	12.73%	12.99%	13.15%	13.05%	12.03%	12.19%	12.47%	12.75%	14.49%	13.76%
Debt/Capitalization (US GAAP)	61.26%	61.51%	61.28%	61.67%	61.41%	61.87%	61.56%	62.03%	61.83%	62.31%	62.10%	62.45%	62.48%	62.70%	64.00%	64.00%	64.00%	64.00%	64.00%	62.00%	64.00%
Calculated Return on Common Equity	10.21%	7.43%	10.67%	11.04%	10.31%	12.01%	9.89%	10.15%	9.24%	8.68%	9.16%	9.04%	9.64%	10.63%	10.48%	8.72%	9.17%	9.11%	9.71%	8.66%	8.66%

Notes:
1) The figures above have been extracted from OEB regulatory filings (as filed evidence). These filings do not contain the same details as US GAAP audited financial statements (and the notes to the financials).
As such, certain adjustments to reported amounts have not been made that would otherwise have been made (by the credit rating agencies) if the source of the financial information were audited financial statements.
2) Balance sheet figures are the average of monthly averages for a particular year and not the year end balance (consistent with the calculations for rate base).
3) Utility financial results and the adjusted metrics have not been updated for adjustments between as filed and approved results.
As filed Earning Sharing and the impact of weather normalization have been incorporated into the ratios as adjustments.
4) FSLI groupings for OEB regulatory purposes may not be consistent with US GAAP FSLI groupings. However each adjustment is materially consistent across the historical data set.
5) In 2019 EGD and UGL amalgamated as EGI and combined harmonized utility results were filed with the OEB. Any differences from harmonizing calculation methodologies have not been reflected retrospectively in comparative years.

Tab 4

ENBRIDGE GAS INC.

Answer to Interrogatory from
Three Fires Group Inc. (Three Fires)

Interrogatory

Reference:

Exhibit 5, Tab 3, Schedule 1
Exhibit 5, Tab 3, Schedule 1, Attachment 1

Preamble:

Enbridge submits that significant changes in the environment in which it operates have occurred since the time of the 2013 Rates proceedings. Enbridge has produced a report by Concentric Energy Advisors Inc., which considers changes in Enbridge's business and financial risk pictures, concluding Enbridge's risk has significantly increased since 2012.

Among other things, Concentric concludes that the energy transition began in earnest in the last five years, substantially affecting the risk profile of North American gas distribution utilities. It also concludes that a weaker economic outlook, the introduction of competition from alternative gas suppliers, and increased competition from electricity have combined to increase Enbridge's risk, particularly in the long term.

Among other things, Concentric notes the risk of a "death spiral" scenario, whereby declines in customer base produce increased per capita costs for those who remain, creating a negative loop of rate increases and customer departures.

Question(s):

a) Please confirm whether the reports by Posterity Group produced in this Application account for the risk of Concentric's "death spiral" scenario. If so, please provide a brief description as to how it is addressed in their analysis.

b) Given Concentric's comments that regulated entities operate in an integrated North American market for capital, please ask Concentric to provide summary comment on the following:

   1. What would the implications on Concentric's risk analysis be, if any, if other jurisdictions in North America begin to electrify at a faster rate than Ontario; and

2. What would the implications on Concentric's risk analysis be, if any, if a trend of border carbon adjustments begins to emerge globally?[1]

c) In the event a "death spiral" scenario materializes, what is the likelihood that certain customers or groups will suffer a disproportional impact? In your answer, please provide specific comment on the impact Indigenous groups and communities could expect, as well as the impact on any groups or communities that do not have ready access to energy alternatives at the time any such scenario begins.

d) Will certain customers, groups and/or communities be less able to exit from a "death spiral" scenario due to a lack of viable alternatives, geography, or other considerations?

Response:

a) The following response was provided by Posterity Group:

Posterity Group has not reviewed the report prepared by Concentric Energy Advisors Inc.

While the scenarios in our reports include assumptions about how fuel switching could impact customer account trajectories (see response at Exhibit 1.10-SEC-39), we did not conduct rate impact analysis for the scenarios.

b) The following response was provided by Concentric Energy Advisors, Inc.:

1. As discussed in Concentric's report, at page 93, Concentric concludes that the Company faces Energy Transition risk that is greater than the proxy groups on average, and both the Company and the proxy companies face substantial Energy Transition risk because they engage in the provision of regulated natural gas distribution service. Concentric's conclusion is based on three primary factors: (1) the Company's assets are, on average, much less depreciated than the assets of any of the proxy groups (indicating greater cost recovery risk); (2) the relatively high percentage of residents that use natural gas for space heating (indicating higher risk than other Canadian gas utilities due to its exposure to customers that could leave its system via conversions to alternative fuels, including electrification); and (3) the fact that, unlike certain other Canadian utilities, Enbridge Gas operates exclusively as a gas distribution utility and does not provide electric utility services. If other jurisdictions in North America begin to electrify at a faster rate than Ontario, that could increase (or at least accelerate)

[1] See, for example, recent developments in Europe: https://www.akingump.com/en/news-insights/eu-reaches-provisional-agreement-on-carbon-import-charge.html.

Energy Transition risk for those jurisdictions relative to Ontario. Concentric does not expect, however, that this would materially affect our overall opinion and recommendations, because Energy Transition risk would remain elevated for the Company, and our recommended deemed equity ratio is already below those of many of Enbridge Gas's peer utilities.

2. In a hypothetical scenario where a trend of border carbon adjustments begins to emerge globally, that would likely increase the price of natural gas, which would increase risks related to fuel conversions and electrification. Concentric does not anticipate that would materially affect our relative risk analysis, however, as our study is focused on local distribution companies that largely face similar commodity-related recovery risk, and Concentric does not anticipate this would change in the scenario described in the question.

The following response was provided by Enbridge Gas:

c-d) Enbridge Gas agrees that in the event a death spiral occurs in an energy system, certain groups of customers might be less able to exit the system and, therefore, could bear a disproportional impact. Enbridge Gas applies postage stamp rating making in the derivation of rates and is, therefore, unable to speak to the specific impact on indigenous groups and communities. Enbridge Gas also notes that its assets provide unparalleled resiliency and reliability relative to the electricity system due to the cost effectiveness and resiliency of its underground storage, transmission and distribution assets. It is Enbridge Gas's view that the province of Ontario will be best served by keeping Ontarians connected to the gas grid while reducing the emissions associated with combusting natural gas through energy efficiency, pairing with non-emitting electricity and introduction of low carbon fuels.