



Haris Ginis
Technical Manager
Leave to Construct Applications
Regulatory Affairs

Tel: (416) 495-5827
Email: haris.ginis@enbridge.com
EGIRegulatoryProceedings@enbridge.com

Enbridge Gas Inc.
500 Consumers Rd.
North York, Ontario, M2J 1P8
Canada

November 28, 2022

BY RESS AND EMAIL

Nancy Marconi
Acting Registrar
Ontario Energy Board
2300 Yonge Street, 27th Floor
Toronto, ON M4P 1E4

Dear Ms. Marconi:

**Re: Enbridge Gas Inc. (“Enbridge Gas” or “the Company”)
Ontario Energy Board (“OEB”) File: EB-2022-0157
Panhandle Regional Expansion Project
Interrogatory Responses to Enbridge Gas Reply Evidence**

Consistent with the OEB’s Procedural Order No. 3, enclosed please find Enbridge Gas’s written responses to interrogatories related to the Company’s Reply Evidence in the above noted proceeding.

If you have any questions, please contact the undersigned.

Sincerely,

(Original Digitally Signed)

Haris Ginis
Technical Manager, Leave to Construct Applications

c.c. Charles Keizer (Torys)
Zora Cronojacki (OEB Staff)
Intervenors (EB-2022-0157)

ENBRIDGE GAS INC.

Answer to Interrogatory from
OEB Staff ("STAFF")

INTERROGATORY

Reference:

Enbridge Gas Inc. Reply Evidence, page 6, paragraph iii) 14

Preamble:

Enbridge Gas notes that the results of its 2021 Residential Single Family End Use Study indicate that 77% of customers prefer natural gas for home heating in a new home.

Question:

- a) Please provide a copy of Enbridge gas Inc. 2021 Residential Single Family End Use Study.
- b) Is Enbridge Gas aware of any additional recent empirical data sources (e.g. data on installed space heating systems in new construction, builder/end user surveys, etc.) that could form an improved basis for input assumptions in the DCF test regarding expected customer space heating market share in residential new construction in Ontario (in the presence or absence of natural gas availability)? If so, please provide references or links.

Response

- a) Please see Attachment 1 to this response.
- b) The results from the from the Company's 2021 Residential Single Family End Use Study observed that, without consideration of any energy system limitations or constraints, most customers (77%) prefer natural gas for home heating in a new home. Regarding a scenario where natural gas is not available, the Company used the Statistics Canada report *Households and the Environment: Energy Use*,¹

¹ Statistics Canada Catalogue no. 11-526-S, Households and the Environment: Energy Use - 2011
Page 19, Table 2

assuming the exclusion of natural gas and wood from the data, in its Stage 2 analysis. See the response to Exhibit I.STAFF.15 c) part ii). This source has been used in previous OEB-approved leave to construct applications. The Company does not have additional information regarding fuel mix market share for residential new construction homes in Ontario where natural gas is not available.

Residential: Single Family Natural Gas End Use Study

2021 Annual Results

Residential: 2021 Single Family Natural Gas End Use Study



Objectives

- To measure the penetration of natural gas appliances in the single family residential customer market;
- To understand customer perceptions of the levels of insulation in their home;
- To determine awareness of Enbridge Gas' energy conservation programs, and understand where customers turn to for more information.



Methodology

- Sponsor-identified telephone interviews were completed by Leger between November 23 and December 17, 2021.
- Interviews were completed with customers who reside in single family dwellings and are (mainly) responsible for making energy-related decisions for the home.
- The total number of completed interviews is 2,404 with 1,200 for each of LUG and LEG in total, and final franchise-wide results are calculated based on true geographic proportions.
- Overall results yield a margin of error of +/-2.8% at the 95% confidence interval.
- Unless otherwise noted, results in this report are based on all customers (EGI, comprised of LUG and LEG combined).
- The regions reported in this report are defined as follows:

Region Name	Includes	
Northern	Northeast, Northwest	LUG
LUG Eastern	Eastern	LUG
LEG Eastern	DMA 65	LEG
GTA West & Niagara	DMA 76, DMA 53, DMA 21	LEG
Toronto	DMA 01	LEG
GTA East	DMA 35, DMA 45, DMA 47	LEG
Southeast	Waterloo/Brantford, Hamilton/Halton	LUG
Southwest	Windsor/Chatham, Sarnia/London	LUG



Executive Summary (1 of 2)

Natural Gas Penetration

- There was a statistically significant decrease in the penetration of natural gas heating and natural gas water heating in 2021 compared to the previous year. These trends should be monitored.
- When asked to think about a new home, barring any other considerations, most customers continue to choose natural gas, though a small, but growing, proportion would choose alternate sources, such as geothermal or solar for home and water heating, respectively.
- The prevalence of natural gas in secondary appliances is consistent over the last few years for cooktop/stove and clothes dryers. Fireplace and barbecue show signs of decrease. Across secondary appliances, some regional variation continues to exist.

Ownership

- Furnace ownership continues to be very high (84%), though an increasing trend in renting is observed. Renting is a bit more common among newer homes and among younger customers. Overall, in the case of future ownership, most customers intend to own (79%), but this is significantly lower compared to 2020 (92%).
- Ownership of water heaters remains steady over the last several years for LUG customers and is similar among LEG customers. It continues to remain much lower than furnace ownership. Among those who are at least fairly likely to replace their water heater in the next 2 years, interest in ownership is much stronger (69%) than current ownership (43%).

Furnace Efficiency

- A different approach to asking customers about the efficiency level of their furnace was introduced in 2020. A higher proportion of customers continue to report that their furnace is high-efficiency.
- A sizable group of customers do not know the efficiency level of their furnace (this has not changed much over the past decade) – customers who don't know are not likely to be aware of and act on the potential for upgrades.
- There is a continued increase in the proportion of customers who have a Smart Thermostat (27%), up from 23%, as customers upgrade their thermostats; about 2-in-3 customers with a programmable or Smart thermostat actively program it to reduce energy consumption.



Executive Summary (2 of 2)

Insulation

- About 2-in-5 customers (43%) deem their house to be “well insulated” while 7% indicate it is “poorly insulated” or “not insulated,” which varies by the age of the home. A sizeable proportion of customers (14%) don’t know the level of insulation for their home, but most are able to communicate the level of draftiness they experience in their home.
- About 1-in-3 customers whose home is not “well insulated” would improve insulation to “save money on utility bills”, while 26% would do so to increased comfort. Another 22% of customers would not bother improving their insulation.

Energy Efficiency (EE) and DSM offerings

- The proportion of customers planning to make energy efficiency updates returned to the 2019 level (26%) at the end of 2021 (18% in 2020 and 25% in 2019).
- Awareness that Enbridge Gas offers energy conservation programs sits at 64% among LUG customers and at 52% among LEG customers – this varies by customer age group and region.
- Overall, customer awareness of the HWP and HER programs remains strong at 21% and 31%, respectively. Among all customers, 29% are aware of the rebates and discounts on a Smart Thermostat. Among those aware of the respective programs, 16% have participated in HWP, 25% in HER and 20% in Smart Thermostat.
- Though decreasing over time, the internet continues to be the most important source of general energy efficiency information – highlighting the importance of digital marketing and strong website content. “Direct from Enbridge Gas” accounts for 10% of the mentions as an energy efficiency information source.



Overview of Natural Gas (NG) Equipment

- Comparing 2021 to 2020, the penetration of natural gas is down directionally for home heating, water heaters, indoor fireplaces and barbecues. The penetration of natural gas clothes dryers and cooktops/stoves remains unchanged.
- Natural gas for home heating is just slightly higher in LUG compared to LEG, and the use of natural gas for clothes dryers continues to be significantly higher in LUG.

Natural Gas Penetration Rates across Appliances

	2014	2015	2016	2017	2018	2019	2020			2021		
			LUG			EGI	EGI	LUG	LEG	EGI	LUG	LEG
Home Heating	96%	96%	95%	96%	94%	96%	96%	96%	97%	94%	95%*	93%
Water Heater	85%	86%	86%	83%	82%	82%	85%	83%	86%	80%	79%	81%
Fireplace	38%	41%	44%	36%	42%	35%	42%	43%	42%	37%	38%	36%
Cooktop/Stove	29%	26%	31%	29%	31%	30%	31%	30%	32%	32%	32%	32%
Barbecue	27%	23%	26%	20%	24%	24%	27%	28%	25%	23%	25%	23%
Clothes Dryer	21%	20%	19%	17%	19%	16%	15%	17%*	13%	14%	17%*	10%
Pool Heater	(--)	(--)	(--)	(--)	5%	6%		(--)		5%	3%	3%

(--) = was not measured

* Indicates result is significantly higher at a 95% confidence level for this customer group compared to the other (comparing LUG and LEG customers) or against the total.



Home Heating: Preference

- Most customers (77%) would prefer natural gas for home heating in a new home (down from 83% in 2020 and 86% in 2019).
- Preference for geothermal (11%) and electricity (6%) in new homes continues to trend upward.
- Preference for natural gas is strongest in the Northern (82%) region, while lowest in the Toronto (66%) region.
- Key reasons for choosing an alternate fuel source include the perception that it is more environmentally friendly / energy efficient (especially for geothermal) and has lower operation costs. Also, electricity is deemed to be safer by some customers.

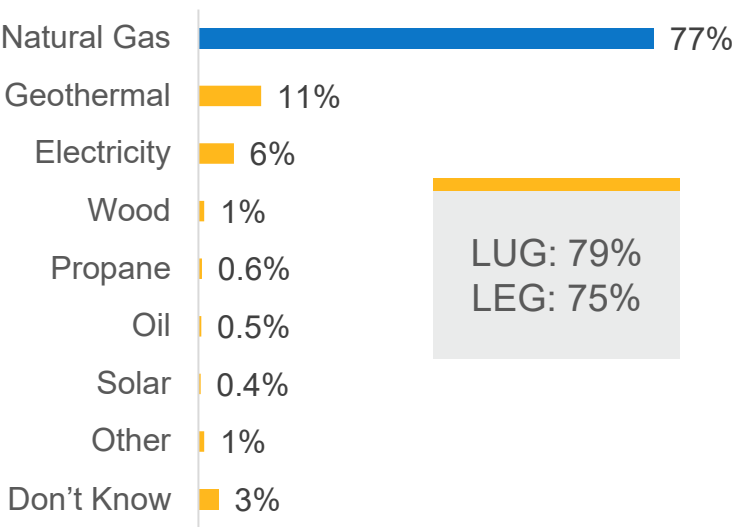
Reason for Preferred Fuel Source

(Base: all customers who indicated a preferred fuel source)

	Natural Gas (n=1,841)	Electricity (n=143)	Geothermal (n=254)
Lower operation cost	54%	18%	33%
Environmentally friendly / Energy efficient	21%	37%	70%
It is what I am used to / Used in the past	16%	7%	2%
Easier / More convenient	14%	8%	1%
Reliable / Dependable heat source/ Best option	11%	8%	7%
It is what is available/ Preferred source not available	8%	4%	1%
More heat generated / It's warmer	3%	1%	0.4%
Safer / Safety concerns	2%	13%	1%
Other	3%	8%	8%
DK/NA/Refused	4%	11%	2%

Preferred Fuel Source for Home Heating

(Base: all customers, n=2,404)



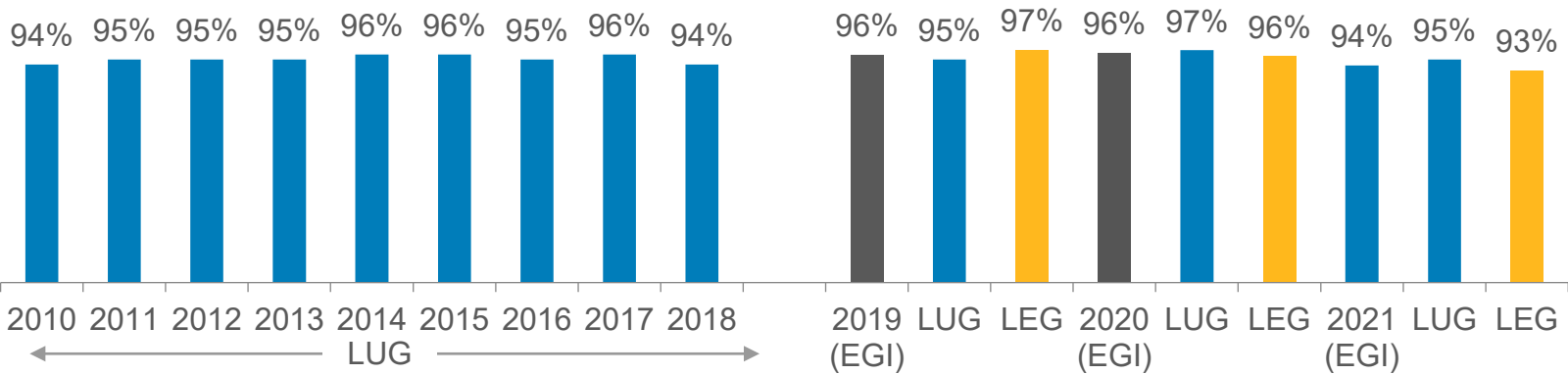
Q: I would now like you to assume that you are moving into a new home. Which energy source would you choose for each of the following? PRIMARY home heating Q: What would you say are your main reasons for choosing (insert choice) as your primary source for your home heating? (Total mentions)



Home Heating: NG Adoption & Equipment

- Natural gas forced air furnaces continue to be the most used heating equipment across the franchise.
- A sizable portion of customers are not aware of the specific type of heating equipment they have in their home (1-in-10 among those who heat with natural gas)
- Those who don't use natural gas for home heating use electricity (5%) followed by only handfuls in the sample of customers who heat with wood, propane, or oil.

Natural Gas Penetration: Home Heating
(Base: all customers)



Q: What is the MAIN energy source for heating your home? Q: What type of (PROPANE/NATURAL GAS/OIL) furnace or heating system do you have? Q: What type of electric system are you using to heat your home?

Type of Natural Gas Heating Equipment (n=2,236)	
Forced Air	78%
Hydronic	4%
Space Heaters	0%
Combination	2%
Hybrid or dual-fuel system of a forced air furnace and electric air source heat pump	3%
Don't Know	13%
Type of Electric Heating Equipment (n=111)	
Forced Air	62%
Baseboard Heaters	14%
Air Source Heat Pumps	1%
A hybrid or dual-fuel system of a forced air furnace and electric air source heat pump	5%
Electric boiler (radiator)	2%
Other	5%
Don't Know	13%

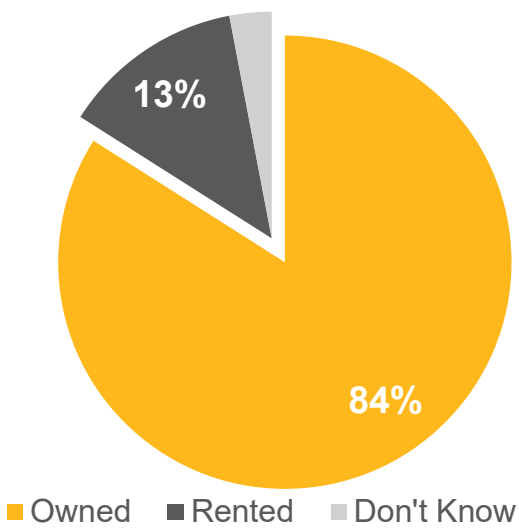


Home Heating: Furnace Ownership

- Most customers own their furnace (or heating system), and most customers who anticipate replacing their furnace or heating system in the future would continue to own it (rather than rent it). Furnace ownership is down considerably compared to 2020 (from 89% for 84%) and future ownership intention (from 92% to 79%).
- Rental rates are higher among some customer groups, including households that also rent the water heater (16%), in homes built since 2000 (16%), those with incomes under \$40K (19%) and among younger (18-34) customers (18%).

Ownership of Current Furnace / Heating System

(Base: customers who use electricity, natural gas or oil for home heating, n=2,354)

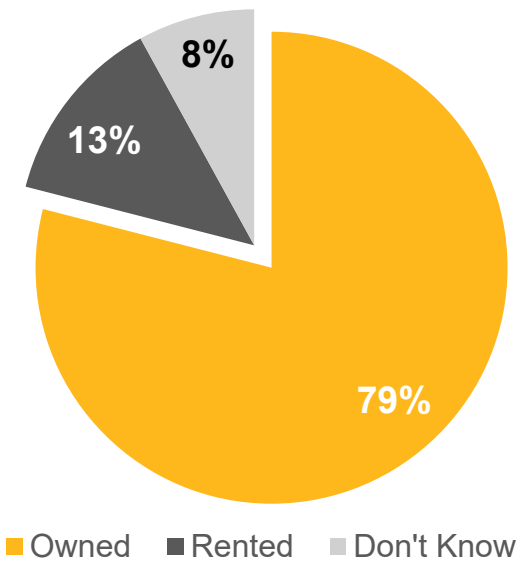


Region	Owns (%)
Northern	88%
LUG Eastern	93%
LEG Eastern	84%
GTA West & Niagara	78%
Toronto	85%
GTA East	79%
Southeast	86%
Southwest	87%

Among younger customers (age 18-34) ownership level is lower at 76% compared to their counterparts, especially those age 65+ (90%)

Ownership of Replacement Furnace / Heating System

(Base: customers who are at least fairly likely to replace their furnace n=301)



Q: Is your furnace or heating system owned or rented? Q: Is your replacement furnace or heating system most likely to be owned or rented?
* Indicates result is significantly higher at a 95% confidence level for this customer group compared to the other (comparing LUG and LEG customers) or against the total.

Residential: Single Family Natural Gas End Use Study



- Most forced air furnaces are less than 10 years old (71%) with 2-in-5 of those whose furnace is less than 5 years old indicating that they replaced it in the last 2 years, with about half of those also replacing their air conditioner at the same time.
- The Northern and Southwest region has a larger proportion of older furnaces, specifically those aged 16-20 years (10%) compared to the average (6%).
- When asked about furnace efficiency most indicated that their furnace is high efficiency, and with a change in the question last year (using the age of furnace as a starting point) this proportion is higher than in previous years and should be interpreted with caution.

Age of Forced Air Furnace (all fuels)	
5 years or less	41%
6 to 10 years	30%
11 to 20 years	20%
More than 20 years	5%
Don't Know	5%

38% of those who currently have a furnace that is less than 5 years old have replaced it in the last 2 years (or 13% of the total)

50% of customers who replaced their furnace in the past 2 years and also had an air conditioner also replaced it at the same time

90% of customers whose furnace is less than 10 years old indicate that their furnace is high-efficiency

68% of customers whose furnace is more than 10 years old indicate that their furnace is high-efficiency, among the remainder, 10% indicate having a mid-efficiency furnace and 10% a conventional furnace (9% indicate "don't know")

Fuel Source for Original (replaced) Furnace	
Natural Gas	87%
Electricity	4%
Oil	5%
Other	1%
Don't Know	3%

Forced Air Furnace Efficiency (natural gas)*	
High efficiency (over 90% efficiency)	81%
Medium efficiency	3%
Conventional (less than 75%)	3%
Don't Know	14%

Q: How old is your furnace? Q: Is this a high-efficiency furnace? IF NEEDED: it would likely have one or two plastic vent pipes (often white) that vent out a side wall. Q: What would you say the efficiency level of your furnace is? Would it be a high-efficiency furnace that vents through the side of the house, like dryer, but with a smaller plastic pipe? Q: Is it a furnace with a metal chimney coming up through the roof, such as a conventional furnace (which has a continuously lit pilot light) or a mid-efficiency furnace (which does not have a pilot light)?

Residential: Single Family Natural Gas End Use Study

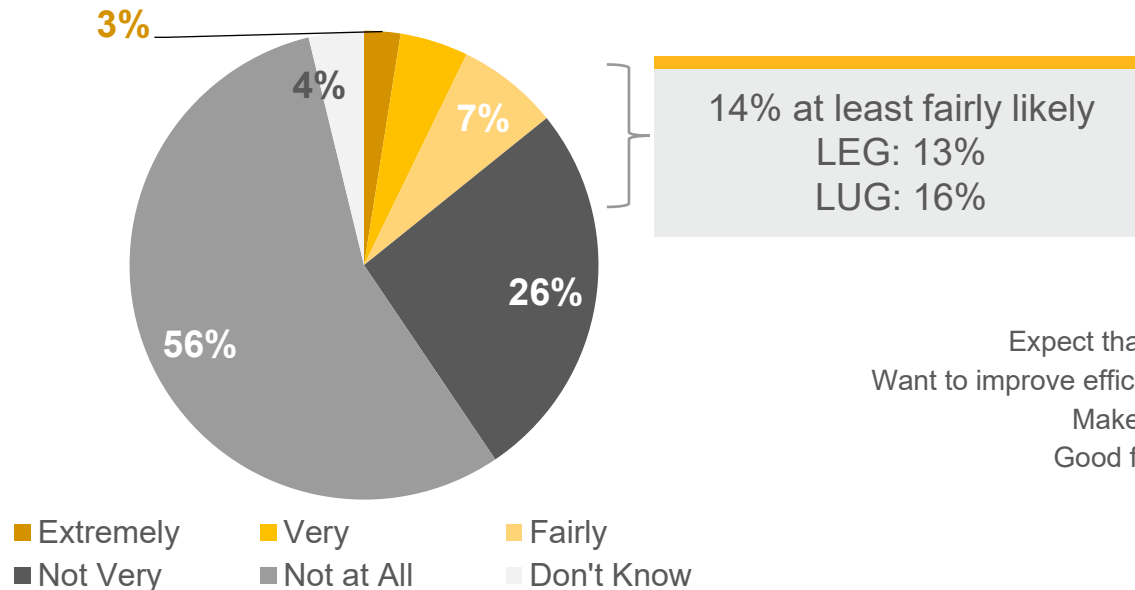


Home Heating: Furnace Replacement

- A small proportion of customers (14%) indicate that they are at least likely to replace their furnace in the next 2 year because it is likely to break down – among them most would get a natural gas furnace.
- Making use of current rebates/program increased by 2% over 2020.
- Of those likely to switch home heating source from natural gas cited “environmental impact” as the main factor.

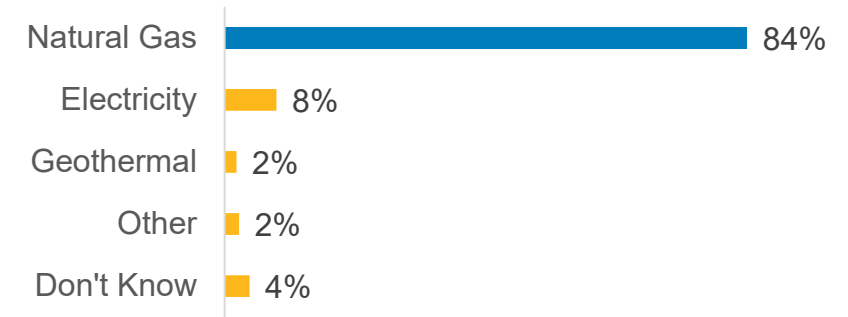
Likely to Replace Furnace in Next 2 Years

(Base: customers who have not replaced their furnace in the past 2 years, n=2,108)



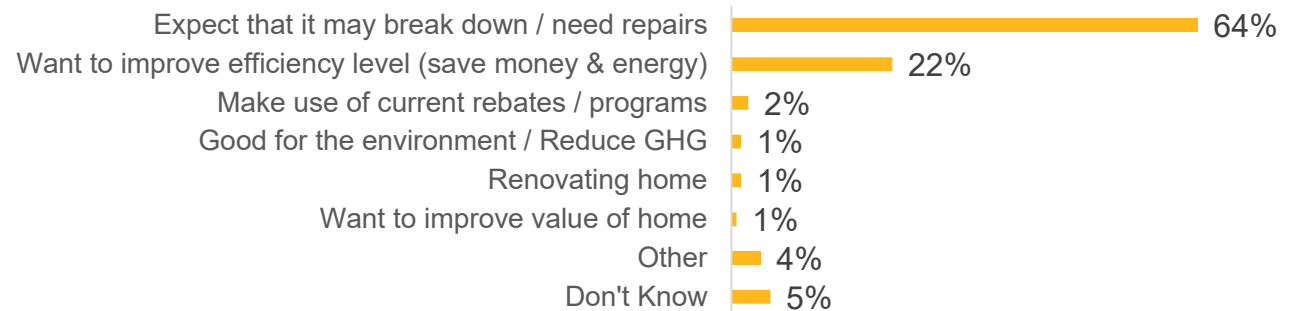
Fuel Source of New Furnace

(Base: customers who are at least fairly likely to replace their furnace n=301)



Reason For Replacing Furnace

(Base: customers who are at least fairly likely to replace their furnace n=301)



Residential: Single Family Natural Gas End Use Study

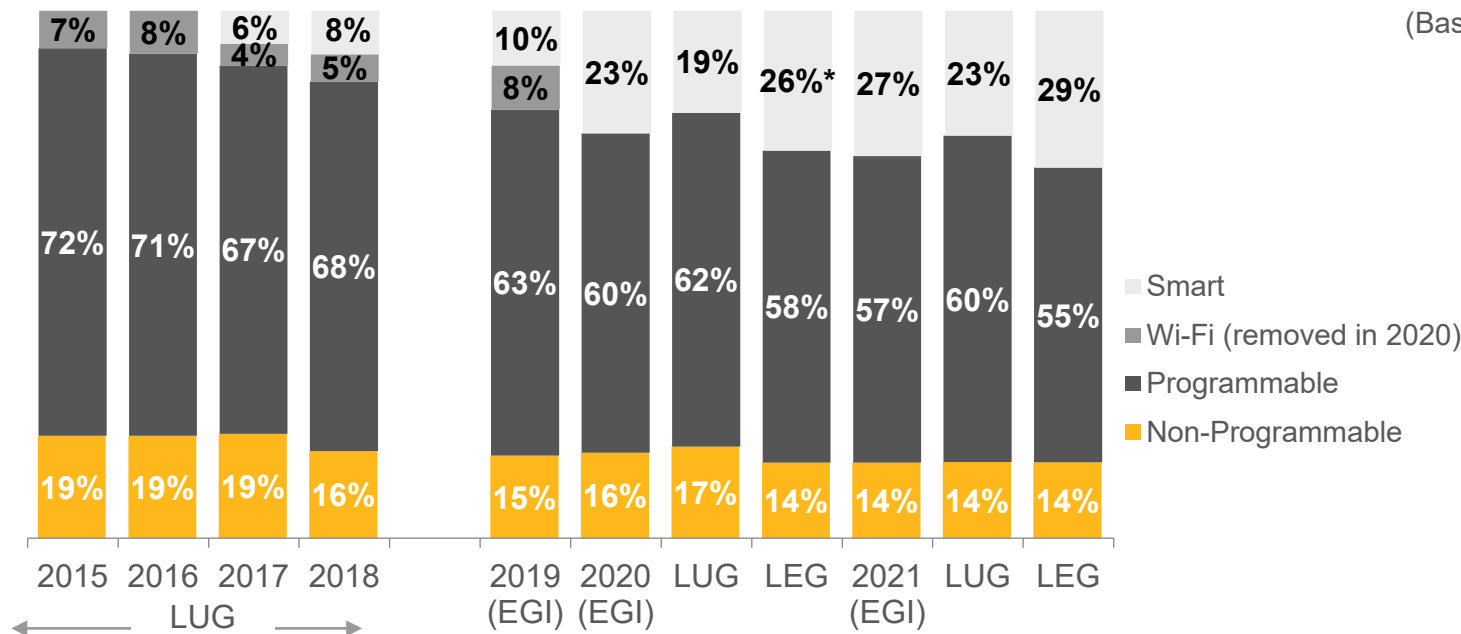


Home Heating: Thermostats

- Smart thermostats continue to gain in popularity. They are most popular in the GTA East area (36%; up from 30% in 2020), in newer homes (37%), and among higher earning households (42%), and younger customers (40%).
- Non-programmable thermostats appear disproportionately among customers in the Northern (22%) and Toronto (20%) regions, and in older (17%), smaller (18%), lower income (26%), and senior (18%) occupied homes. Opportunities to upgrade thermostats continue to exist, as well as opportunities to encourage customers to actively program their thermostats.

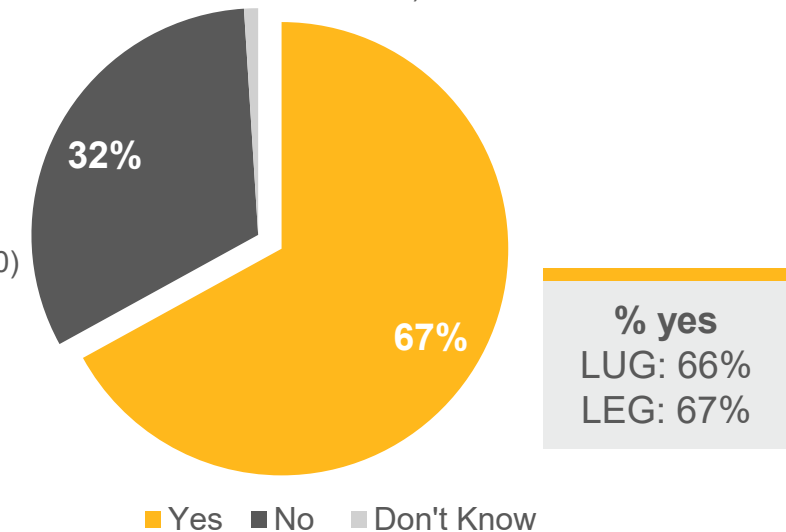
Type of Thermostat

(Base: all customers, n=2,404)



Actively program thermostat to help reduce energy use

(Base: all customers with Smart or Programmable thermostat, n=2,354)



% yes
LUG: 66%
LEG: 67%

Q: Which of the following thermostats do you have? Q: Do you actively program your thermostat to help reduce your energy use? Response options changed in 2017, and again changed in 2020.

* Indicates result is significantly higher at a 95% confidence level for this customer group compared to the other (comparing LUG and LEG customers) or against the total.

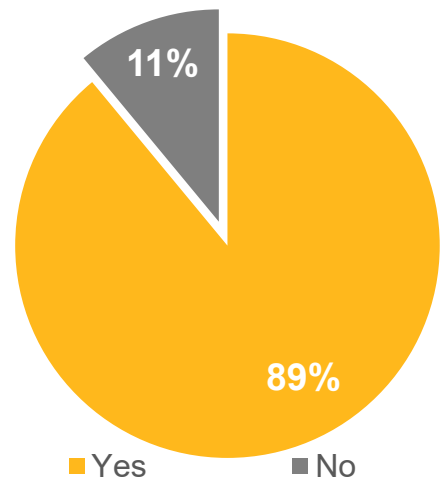


Air Conditioning

- There is considerable variation across the franchise ranging from 92% among LEG customers to 85% among LUG customers, and from 69% in the Northern region to 93% in the GTA West and LEG Eastern regions in terms of whether a customer has air conditioning or not.
- Air conditioning is also significantly more common in newer houses with 98% of homes built since 2000 having central air conditioning vs. only 75% of homes built before 1950. Proportions are similar by income with air conditioning in 94% of households earning at least \$140K vs. 82% of households earning less than \$40K.
- Just over half (56%) of customers who replaced their furnace or heating system in the past 2 years also replaced the air conditioner. Homes built between 1990-1999 were significantly more likely to have replaced the air conditioner (73%).

Have Air Conditioning

(Base: all customers, n=2,404)

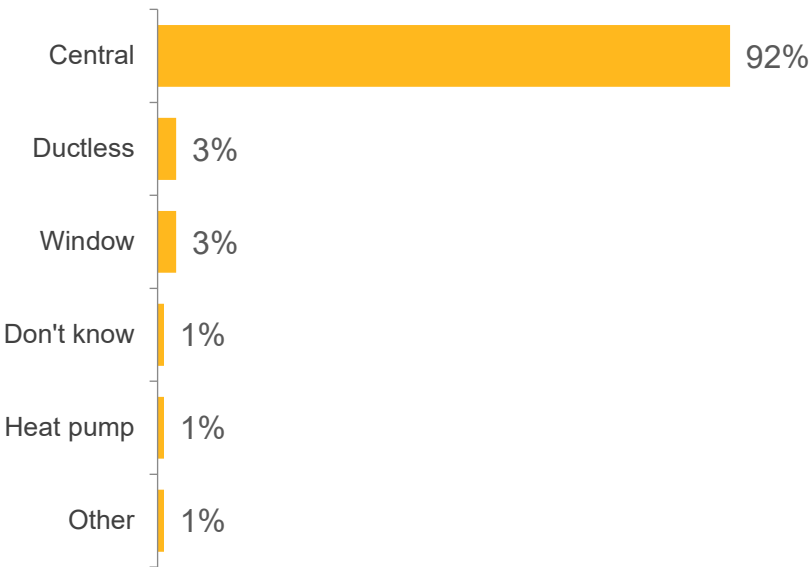


Region	Yes (%)
Northern	69%
LUG Eastern	80%
LEG Eastern	93%*
GTA West & Niagara	93%*
Toronto	90%
GTA East	92%*
Southeast	92%*
Southwest	89%



Type of Air Conditioning

(Base: customers who have air conditioning, n=2,130)



Q: Do you have air conditioning in your home? Q: Which of the following types of air conditioning do you use in your home?
 * Indicates result is significantly higher at a 95% confidence level for this customer group compared to the other (comparing LUG and LEG customers) or against the total.

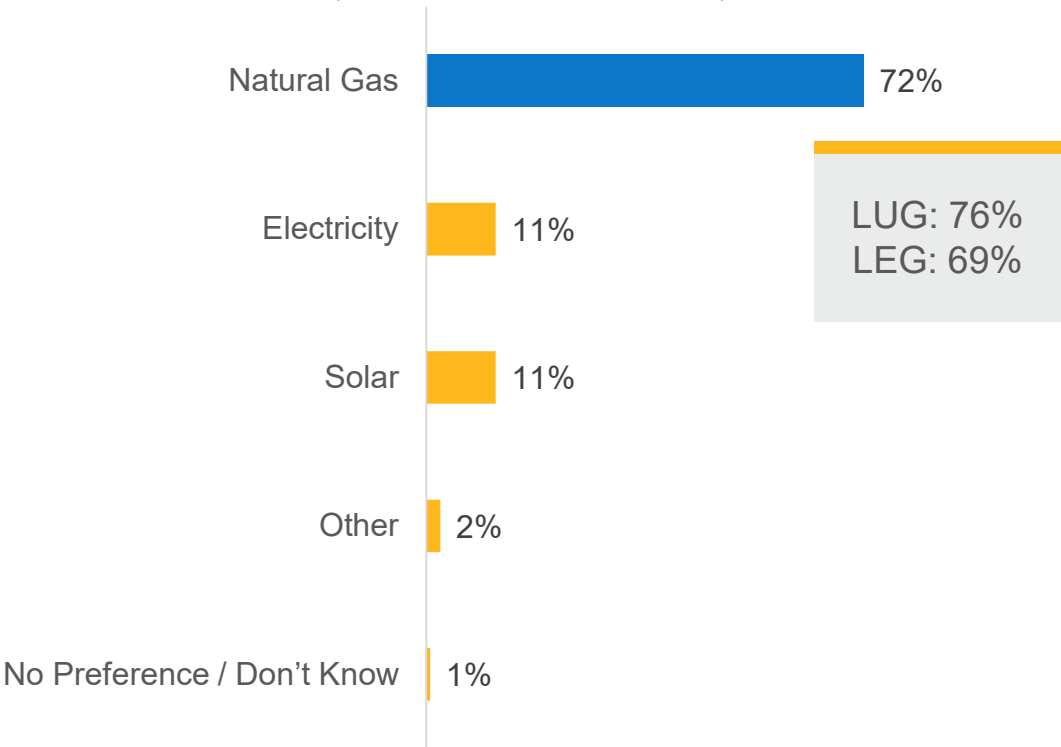


Water Heating: Preference

- Most customers (72%) would prefer natural gas for water heating in a new home (down from 78% in 2020 and 81% in 2019), followed by electricity (11%) and solar (11%). The preference for natural gas is slightly higher among LUG customers, and regionally is highest in the Southwest (80%) and Eastern (76%) regions.

Preferred Fuel Source for Water Heating

(Base: all customers, n=2,404)



Region	Natural Gas (%)
Northern	74%
LUG Eastern	69%
LEG Eastern	76%
GTA West & Niagara	73%
Toronto	62%
GTA East	71%
Southeast	75%
Southwest	80%*

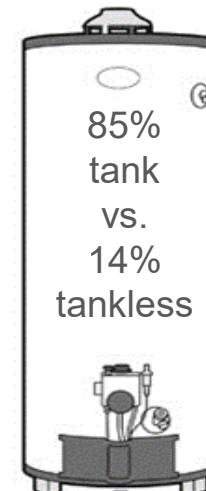
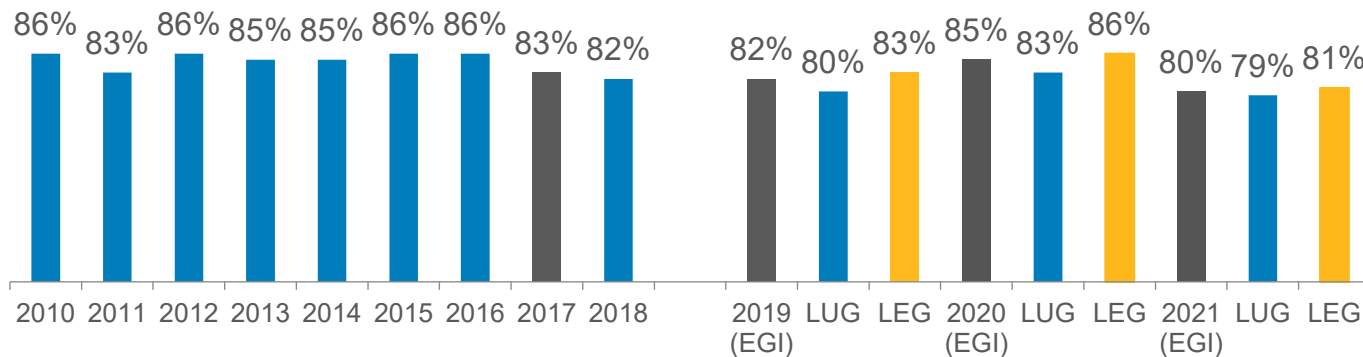
Q: I would now like you to assume that you are moving into a new home. Which energy source would you choose for each of the following? Water heater?
 * Indicates result is significantly higher at a 95% confidence level for this customer group compared to the other (comparing LUG and LEG customers) or against the total.



Water Heating: NG Adoption & Equipment

- Penetration of natural gas water heaters has continued to trend downward over the past few years. Natural gas use for water heating ranges from 76% in the Eastern and Northern regions to 83% in the Southeast and Southwest regions.
- The proportion of tankless water heaters continues to grow slowly up from 6% in 2017 to 14% in 2021. Tankless water heaters are more prevalent in homes built after 2000 with 2,500+ square feet.

Natural Gas Penetration: Water Heating
(Base: all customers)



Age of Water Heater (all)	
5 years or less	48%
6 to 10 years	30%
11 to 15 years	10%
More than 15 years	5%
Don't Know	7%

Region	Tankless (%)
Northern	18%
LUG Eastern	12%
LEG Eastern	12%
GTA West & Niagara	16%
Toronto	16%
GTA East	14%
Southeast	10%
Southwest	14%

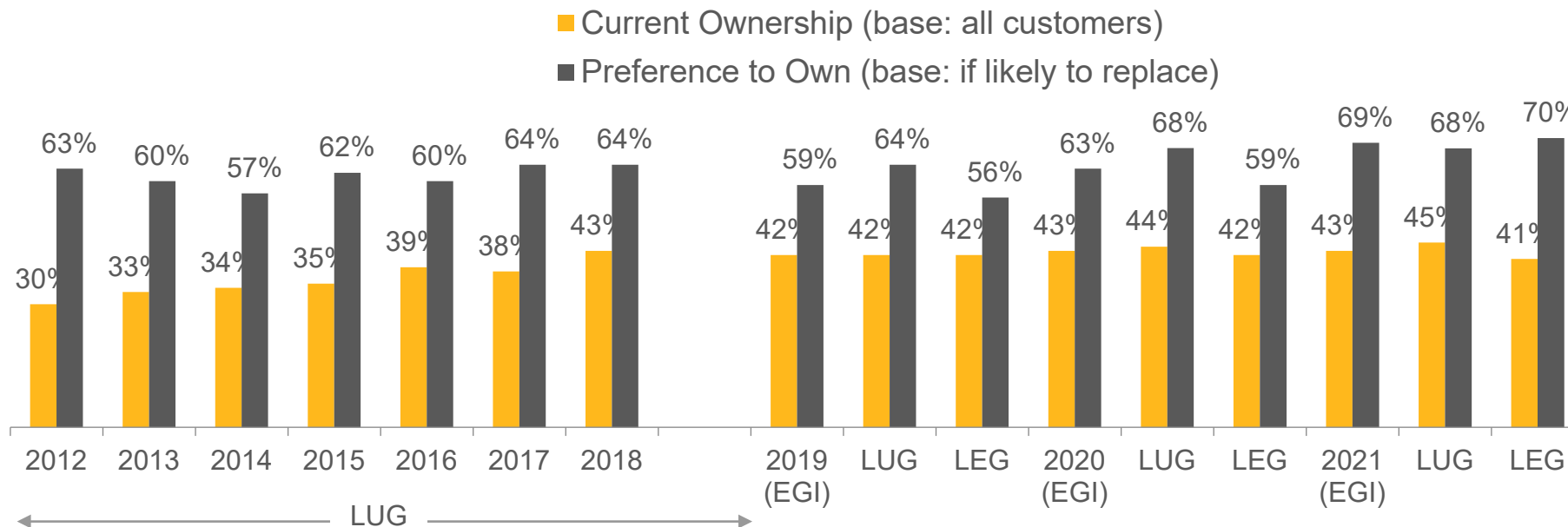
Q: What type of water heater do you have? Is it...? Q: How old is your water heater? Q: Does your water heater have a tank or is it tankless? IF
NEEDED READ Tankless water heaters are also called continuous or instantaneous water heaters.



Water Heating: Ownership

- Current ownership is the same among LUG and LEG customers and is quite consistent for LUG over the last couple of years.
- Ownership tends to be higher among customers who have an electric water heater compared to one that is fueled by natural gas.
- Future intentions continue to lean toward ownership – 70% plan to own, (69% among LUG customers and 70% among LEG customers).

Water Heater Trends in Ownership



Owned % by type of water heater
Natural Gas: 40%
Electricity: 56%

Residential: Single Family Natural Gas End Use Study

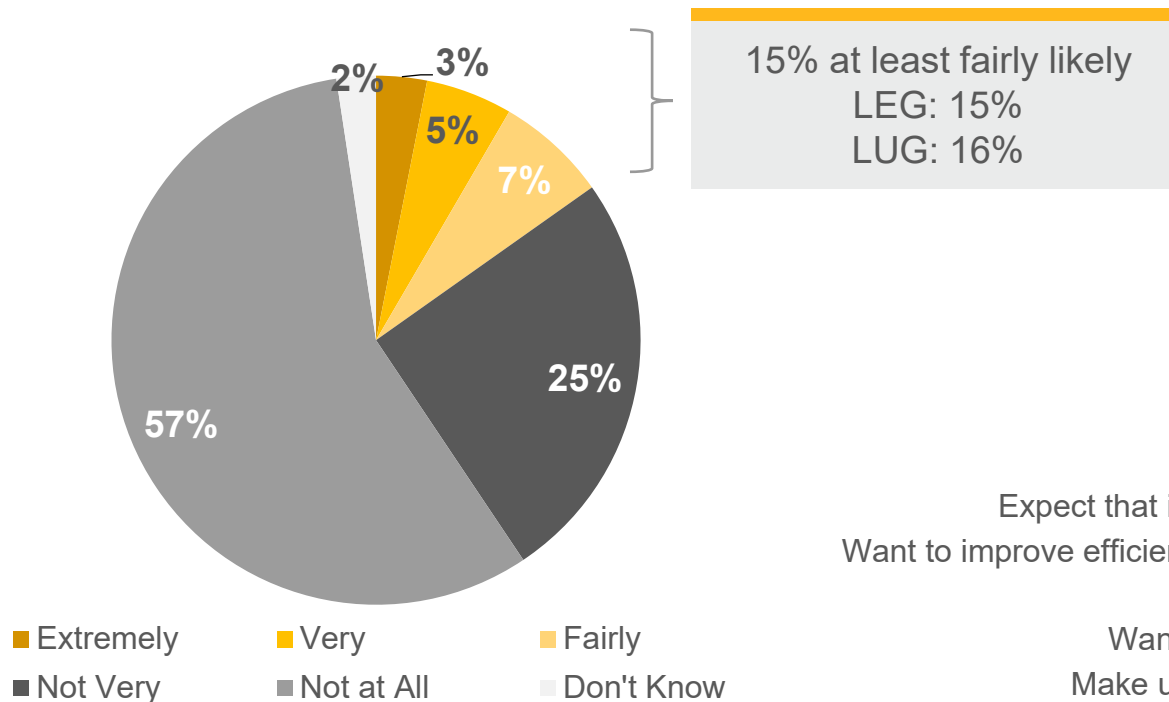


Water Heating: Replacement

- Similar to furnaces, a small proportion of customers (15%) indicate that they are at least likely to replace their water heater in the next 2 years because it is likely to break down or because they're looking to improve the efficiency level – among them, most would get a natural gas water heater.
 - Customers' desire to improve the efficiency level of the water heater increase 10 points compared to 2020 (17% vs. 27%)

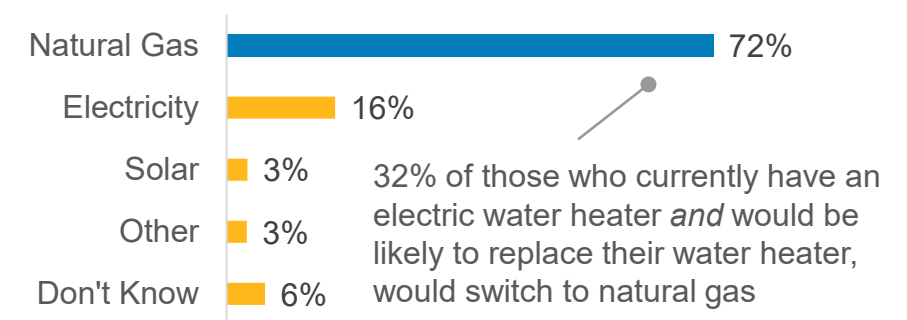
Likely to Replace Water Heater in Next 2 Years

(Base: customers who have a water heater and own their home n=2,079)



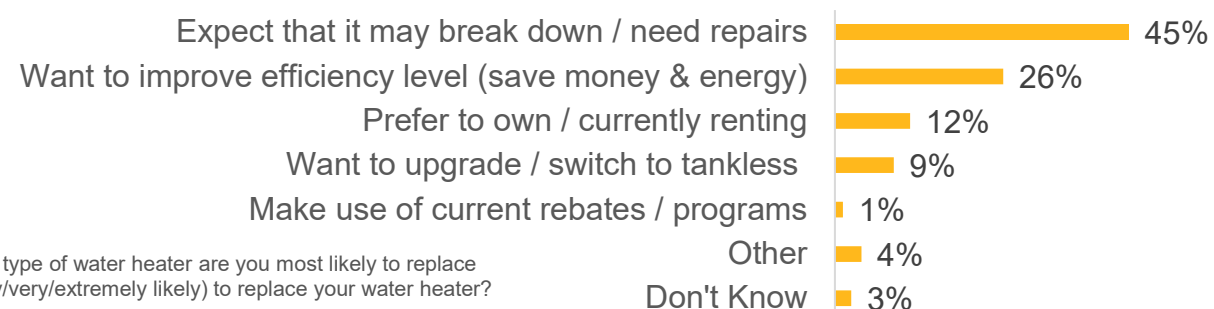
Fuel Source of New Water Heater

(Base: customers who are at least fairly likely to replace their water heater n=319)



Reason For Replacing Water Heater

(Base: customers who are at least fairly likely to replace their water heater n=319)



Q: How likely are you to replace your water heater in the next 2 years? Are you...? Q: What type of water heater are you most likely to replace your current water heater with? Q: What would you say is the main reason that you are (fairly/very/extremely likely) to replace your water heater?

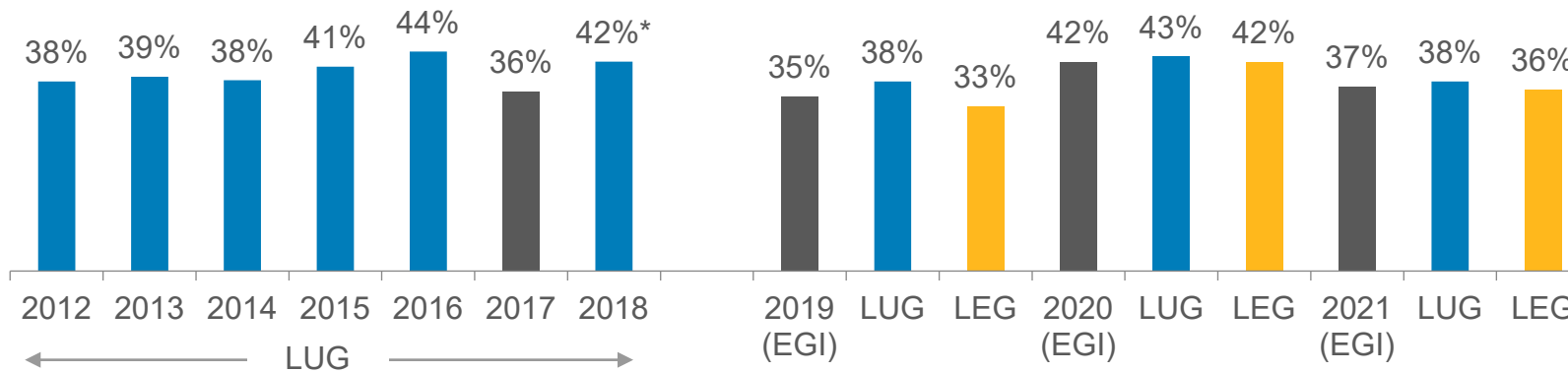


Fireplaces: NG Adoption & Equipment

- More LEG customers (55%) have fireplaces compared to LUG customers (52%). Natural gas fireplaces continue to be popular among those who have a fireplace or would like to install one (interest in electric fireplaces is increasing, up from 17% in 2020 and 13% in 2019).
- Just over half of customers with a fireplace indicate that they use it for supplementary heating, while 1-in-3 indicate they use it for ambiance. LEG customers are more likely to use the fireplace as a supplementary heating source.

Natural Gas Penetration: Fireplaces

(Base: all customers)



53% of households have a fireplace

- 77% have just one
- 22% have 2 or more

Fuel Type: 69% 24% 14%

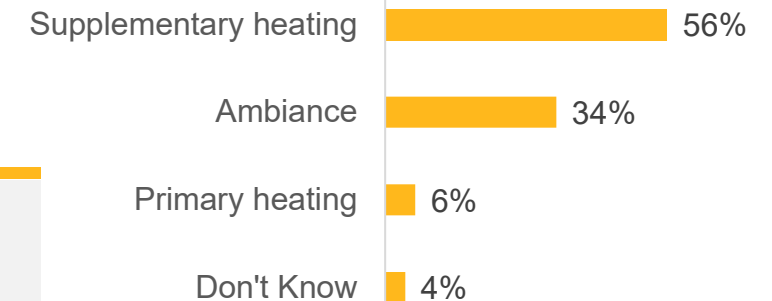
Age of Fireplaces (all)

2-in-5 (42%) fireplaces are less than 10 years old

10% are at least fairly likely to install a fireplace in the next 2 years, and among them 65% would install one that uses natural gas, 20% would use electricity and 13% would use wood as a fuel source

Use of Natural Gas Fireplace

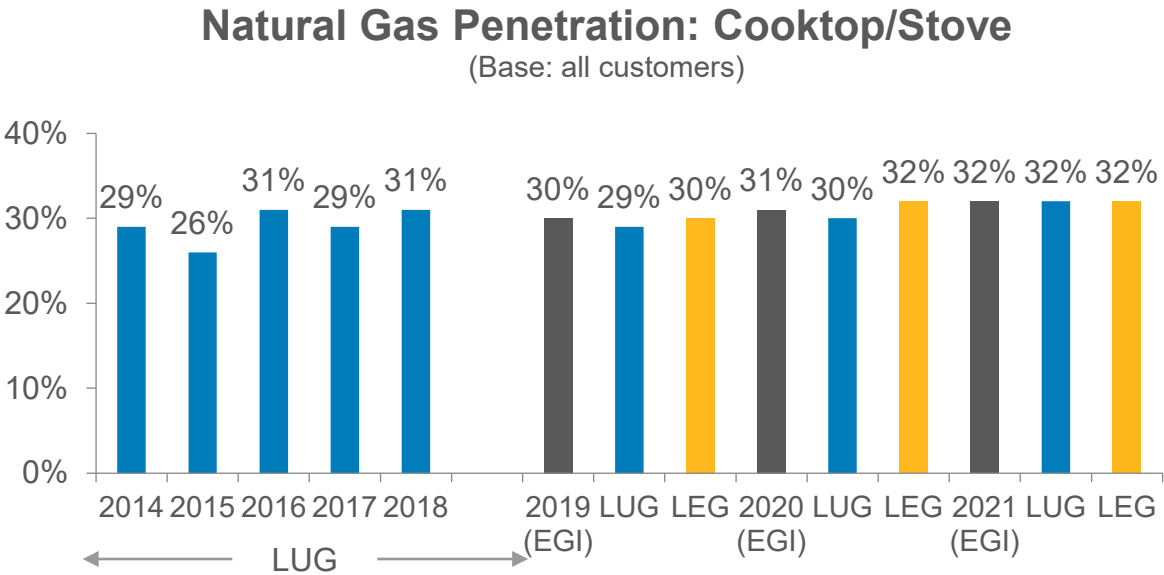
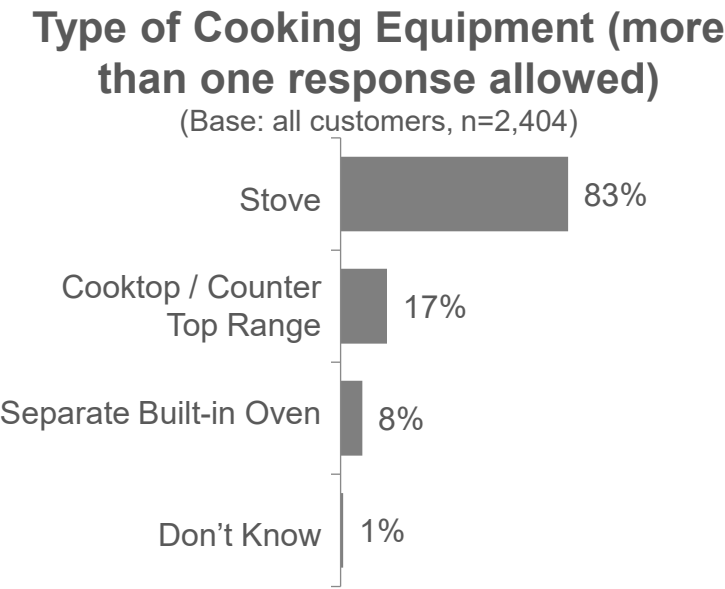
(Base: customers who have natural gas fireplace, n=890)





Cooking: NG Adoption & Equipment

- At 32%, penetration of natural gas for indoor cooking continues to be relatively stable. While similar across franchise areas, regionally differences exist, with the Northern region (20%) being least likely to use natural gas for cooking while Southwest (38%), Toronto (37%), and Southeast (36%) regions being most likely to.
- Both natural gas fueled stoves and counter top ranges are the most prevalent in the highest earning households (33%, 41%), and the largest homes (in sq ft) (49%, 34%)



Region	Natural Gas (%)
Northern	20%
LUG Eastern	29%
LEG Eastern	25%
GTA West & Niagara	33%
Toronto	37%
GTA East	30%
Southeast	36%
Southwest	38%

Q: Do you have a stove, or do you have a cook top with a separate oven? Q: Is your (ITEM) fueled by natural gas or electricity?
 * Indicates result is significantly higher at a 95% confidence level for this customer group compared to the other (comparing LUG and LEG customers) or against the total.

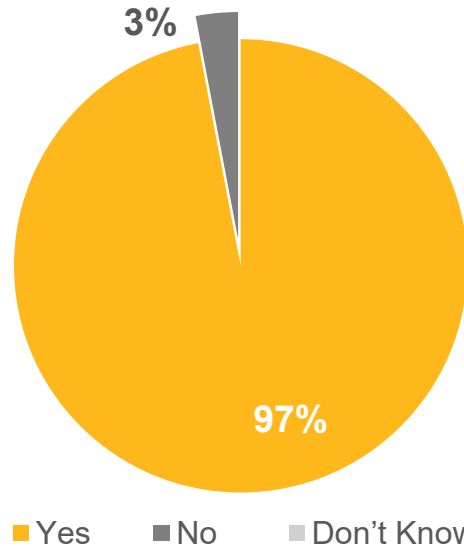
Residential: Single Family Natural Gas End Use Study



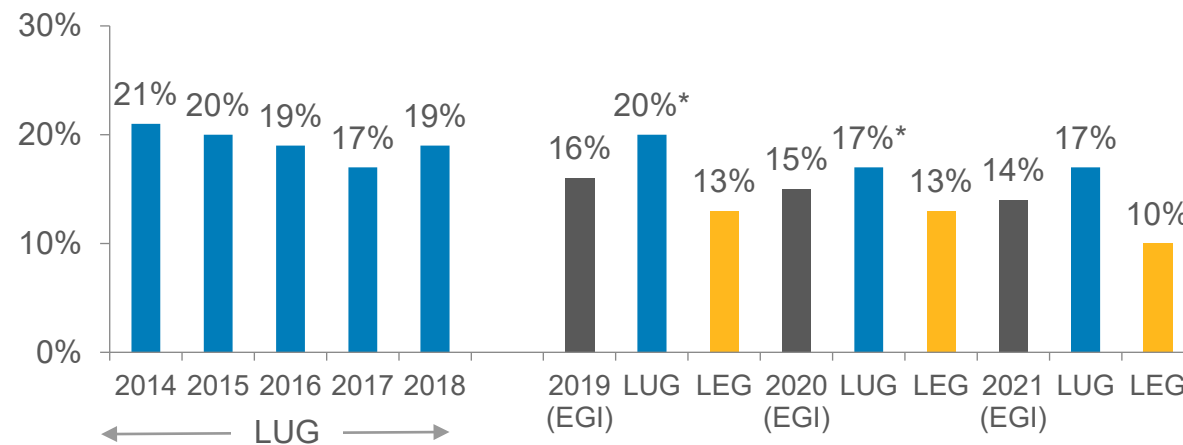
Clothes Dryer: NG Adoption & Equipment

- Almost all single-family homes have a clothes dryer (97%) with electricity being used by most across the franchise (83%) followed by natural gas (14%), with significant differences between LUG and LEG.
- Significantly more dryers in the Southwest region are fueled by natural gas compared to other regions.
- Newer homes are less likely to have a natural gas dryer (12%) compared to older homes.

Have a Dryer
(Base: all customers, n=2,404)



Natural Gas Penetration: Clothes Dryers
(Base: all customers)



Region	Natural Gas (%)
Northern	10%
LUG Eastern	11%
LEG Eastern	8%
GTA West & Niagara	9%
Toronto	11%
GTA East	9%
Southeast	18%
Southwest	26%*

Age of Home	Natural Gas (%)
Before 1950	15%
1950-1969	15%
1970-1989	13%
1990-1999	19%*
2000-2020	12%

Q: Do you have a clothes dryer? Q: And is it a natural gas or an electric dryer?

* Indicates result is significantly higher at a 95% confidence level for this customer group compared to the other (comparing LUG and LEG customers) or against the total.

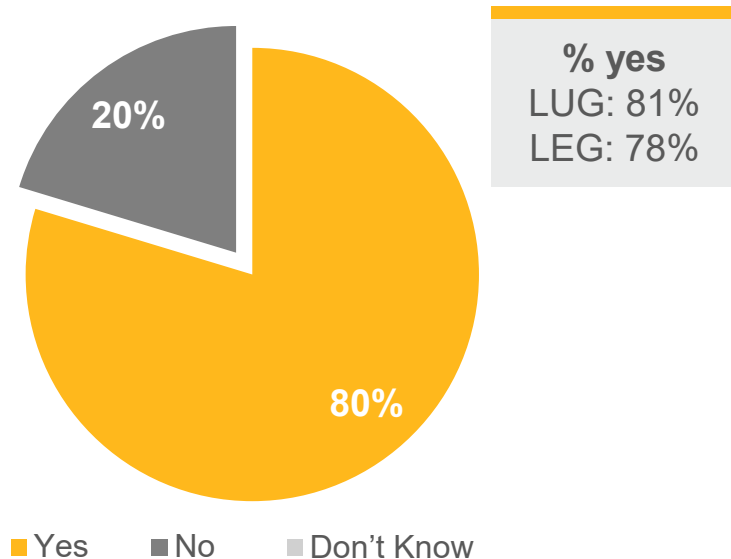
Residential: Single Family Natural Gas End Use Study



Barbecues: NG Adoption & Equipment

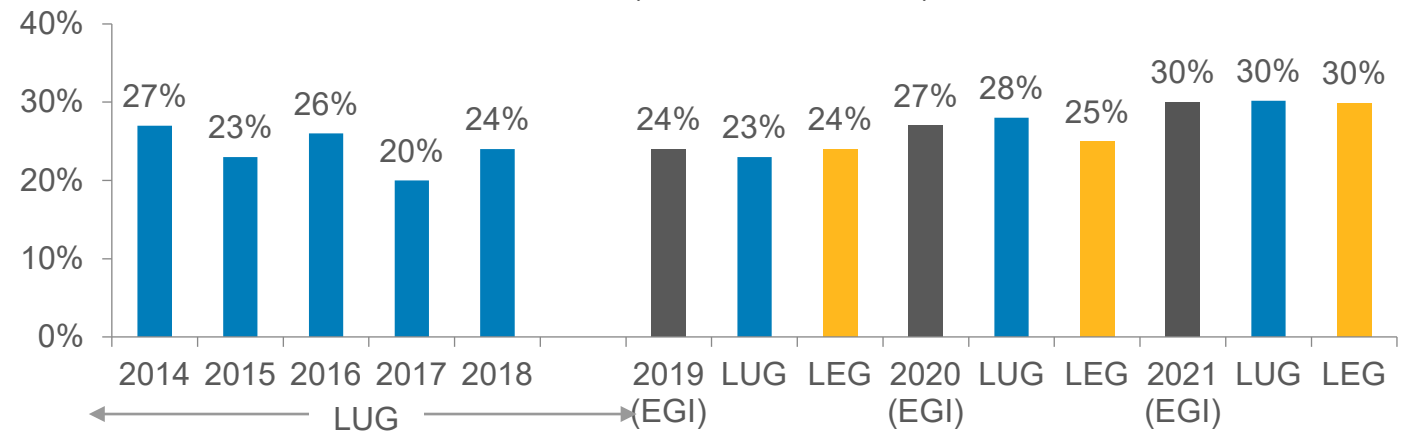
- Most single-family homes have an outdoor barbecue (80%) – among them propane (62%) remains the most common fuel type, followed by natural gas (30%) and charcoal briquettes (6%).
- Households with higher incomes (\$140K+) are more likely to have a barbecue and to use natural gas to fuel it (88% ownership, among them 37% using natural gas), compared to lower income households. Just over 2-in-3 of those earning under \$40K have a barbecue of which only 21% use natural gas.

Have a Barbecue
(Base: all customers, n=2,404)



Natural Gas Penetration: Barbecues

(Base: all customers)

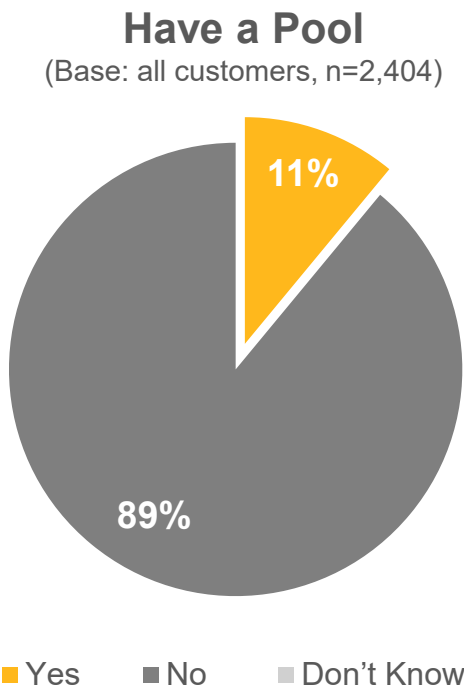


Residential: Single Family Natural Gas End Use Study

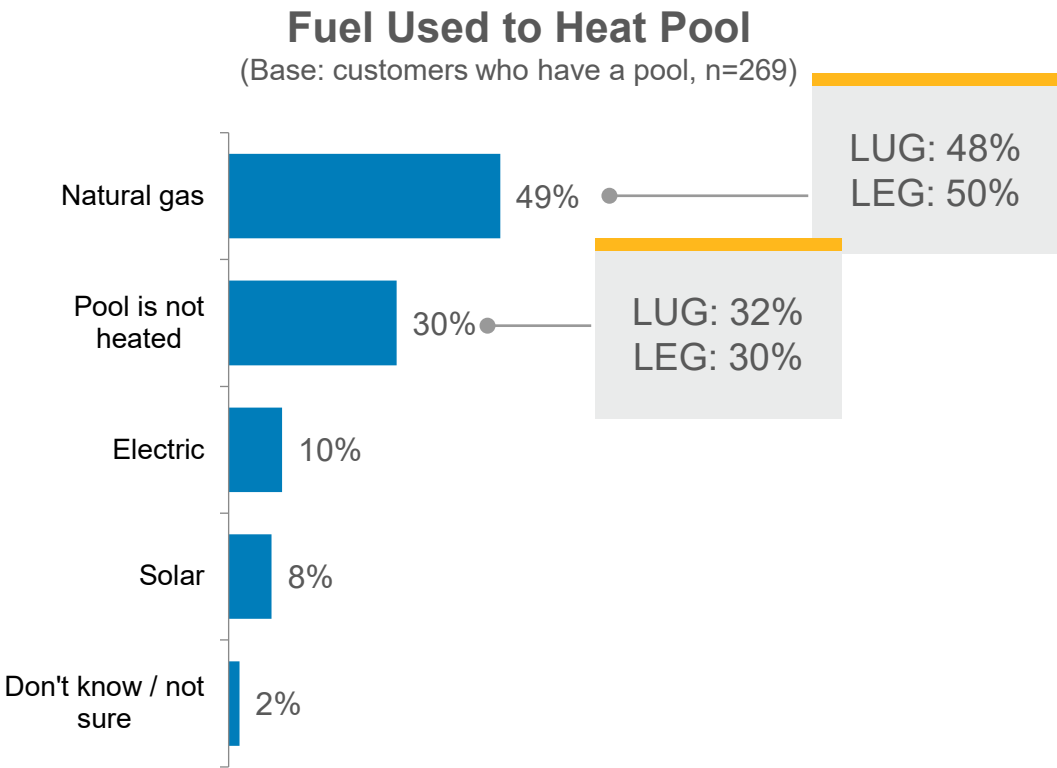
Pools



- Pools are not as common in Toronto (6%), in lower income households (6%), or among young customers (6%).
- In terms of heating, pools located in LEG are more likely to be heated with than those in LUG with natural gas being the top fuel choice across the board.



Region	Natural Gas (%)
Northern	43%
LUG Eastern	29%
LEG Eastern	46%
GTA West & Niagara	37%
Toronto	71%*
GTA East	60%
Southeast	71%*
Southwest	38%



* Indicates result is significantly higher at a 95% confidence level for this customer group compared to the other (comparing LUG and LEG customers).

Residential: Single Family Natural Gas End Use Study

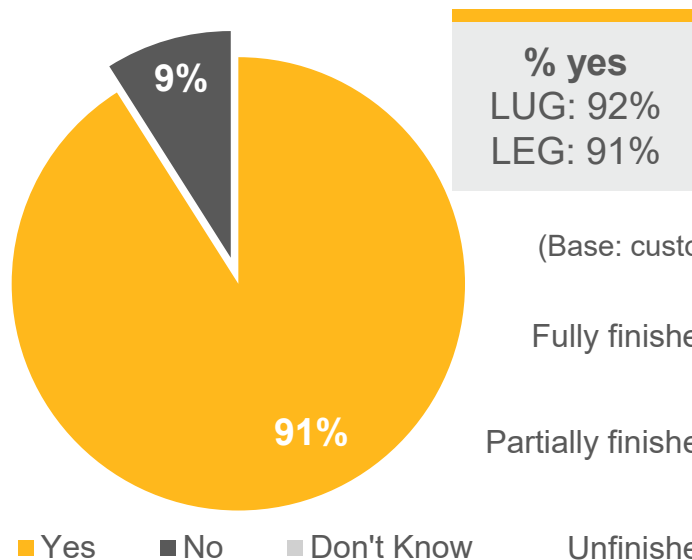


Insulation: Basement

- 91% of single-family homes have a basement. Homes built before 1950 and since 2000 are less likely to have a basement (90% and 91%).
- Across the franchise, older homes are more likely to have poorly insulated or uninsulated basements.
- Household income also appears to be a factor – among low-income customers 25% have poorly or uninsulated basements. This represents customers who may be eligible for the Home Winterproofing Program.

Have a Basement

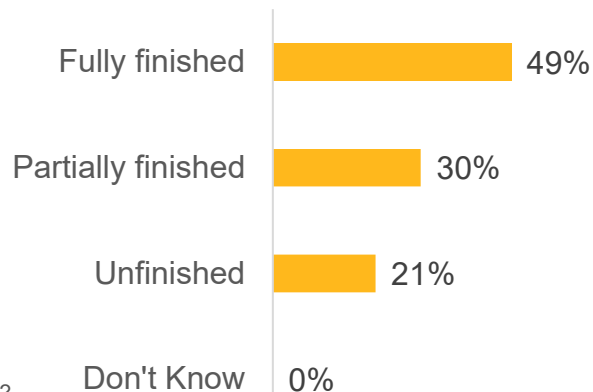
(Base: all customers, n=2,404)



% yes
LUG: 92%
LEG: 91%

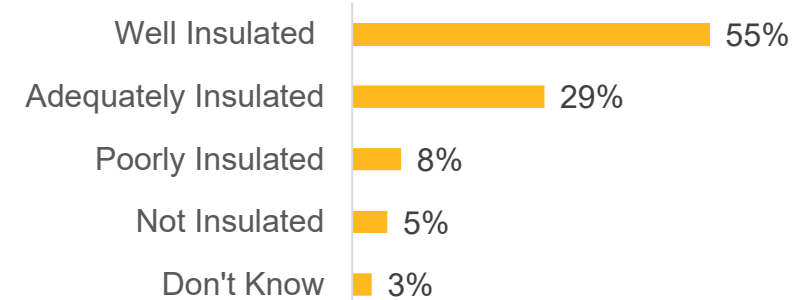
Level of Finish

(Base: customers who have a basement, n=2,191)



Level of Insulation

(Base: customers who have a basement, n=2,191)



Age of Home	Well (%)	Not (%)	Household Income	Well (%)	Not (%)
Before 1950	37%	17%*	Under \$40K	43%	11%*
1950-1969	43%	7%	\$40K-\$80K	48%	8%*
1970-1989	55%*	3%	\$80K-\$100K	49%	7%
1990-1999	65%*	2%	\$100K-\$140K	55%*	4%
2000-2020	69%*	1%	\$140K+	63%*	3%

Q: Do you have a basement?; Q: Is your basement...?

* Indicates result is significantly higher at a 95% confidence level for this customer group compared to the other (comparing LUG and LEG customers) or against the total.

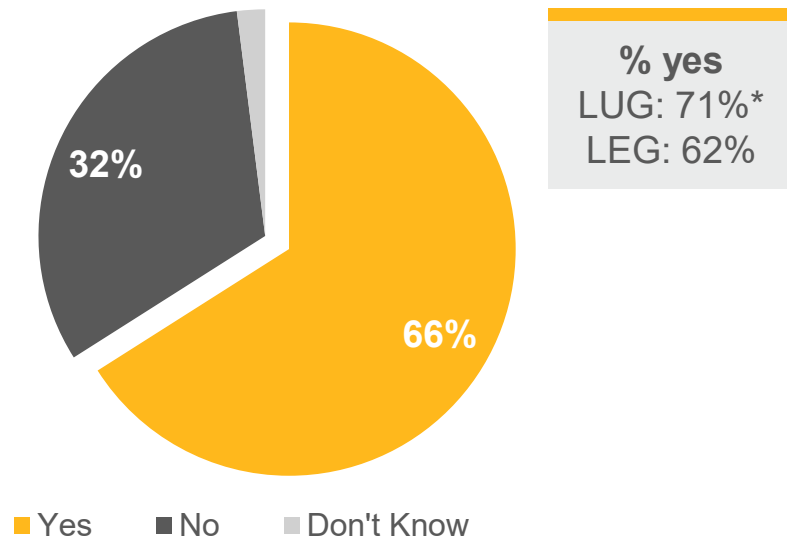
Residential: Single Family Natural Gas End Use Study



Insulation: Attic

- About 2-in-3 single family homes have an attic ranging from a low of 52% in the Toronto region to a high of 77% in the Northern region. Across the franchise, older homes are more likely to have poorly insulated or uninsulated attics.
- Household income also appears to be a factor – among low-income customers more attics are poorly (11%) or not at all (3%) insulated, and a significant proportion don't know their insulation levels (as high as 12%, higher for attics than for basements), which represents customers who may be eligible for the Home Winterproofing Program.

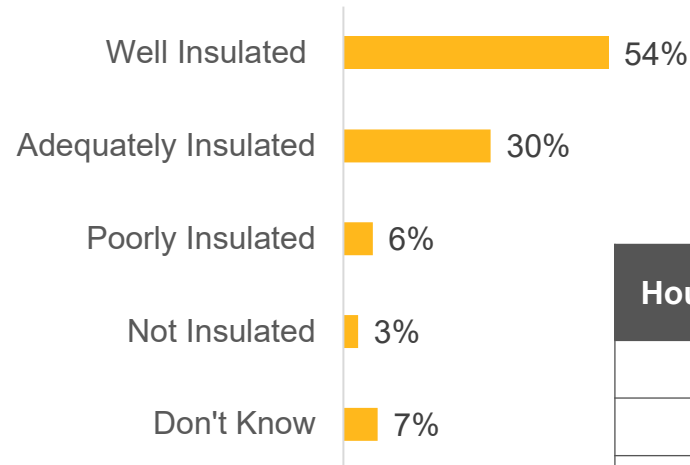
Have an Attic
(Base: all customers, n=2,404)



Q: Do you have an attic? Q: Is your attic ...?

* Indicates result is significantly higher at a 95% confidence level for this customer group compared to the other (comparing LUG and LEG customers) or against the total.

Level of Insulation
(Base: customers who have an attic, n=1,588)



Age of Home	Well (%)	Poorly (%)	Not (%)
Before 1950	47%	10%*	6%*
1950-1969	52%	11%*	2%
1970-1989	55%	4%	1%
1990-1999	60%	3%	3%
2000-2020	60%*	2%	3%

Household Income	Well (%)	Not (%)	Don't Know (%)
Under \$40K	53%	3%	12%
\$40K-\$80K	50%	2%	6%
\$80K-\$100K	54%	3%	6%
\$100K-\$140K	52%	2%	7%
\$140K+	55%	4%	5%

Residential: Single Family Natural Gas End Use Study

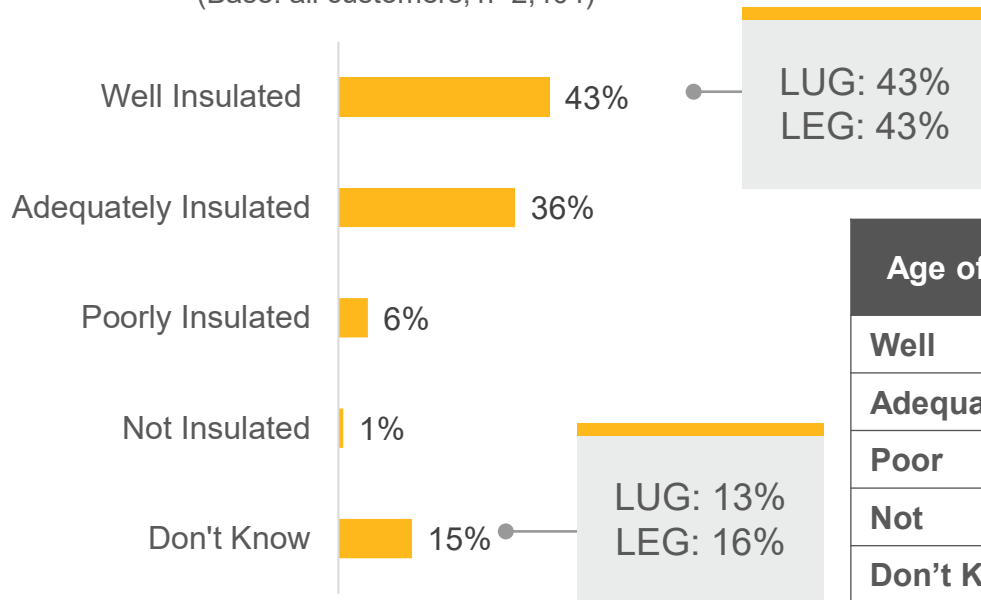


Insulation: Home and Exterior Wall

- The number of customers describing their home as being “well insulated” is stable. Toronto customers are more likely to say their home is ‘poorly’ or ‘not’ insulated (12% vs. 6% total).
- Perceptions of insulation vary by the age of the home, where newer homes are more likely to be well-insulated compared to homes built before 1950, which sees 14% of customers indicating that their home is poorly insulated.
- Note that 1% of customers were unable to categorize the insulation level of their home.

Level of Home Insulation

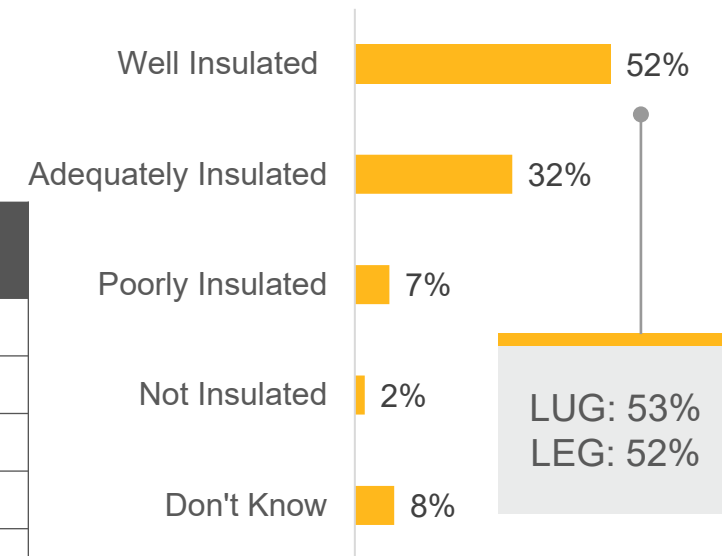
(Base: all customers, n=2,404)



Age of Home	Before 1950	1950-1969	1970-1989	1990-1999	2000-2020
Well	29%	29%	38%	55%*	63%*
Adequate	46%*	43%	43%	30%	23%
Poor	14%*	11%	5%	3%	1%
Not	2%*	1%	0%	0%	0%
Don't Know	10%	15%	14%	12%	12%

Level of Exterior Wall Insulation

(Base: all customers, n=2,404)



Q: How about your exterior, outside walls, are they...?; Q: Which best describes the insulation level of your home?

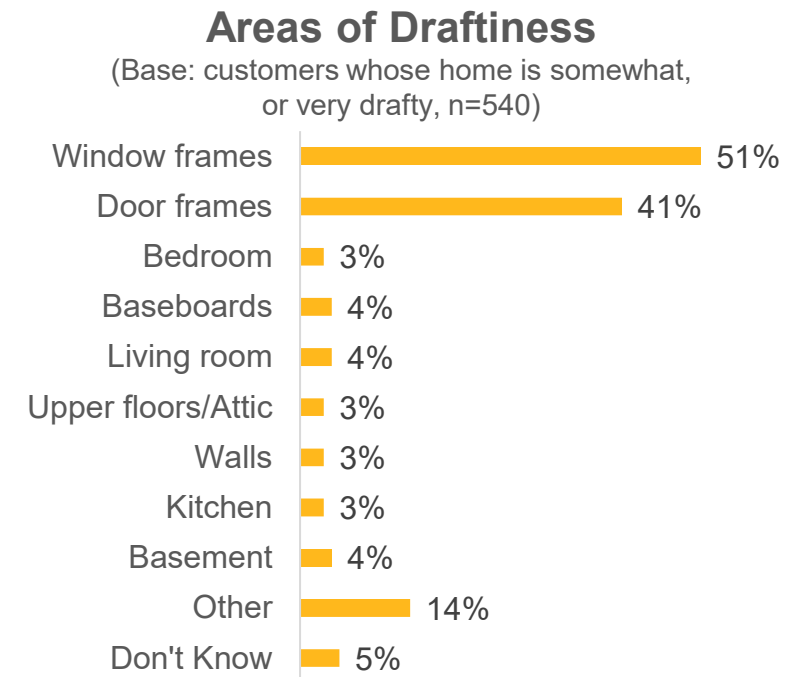
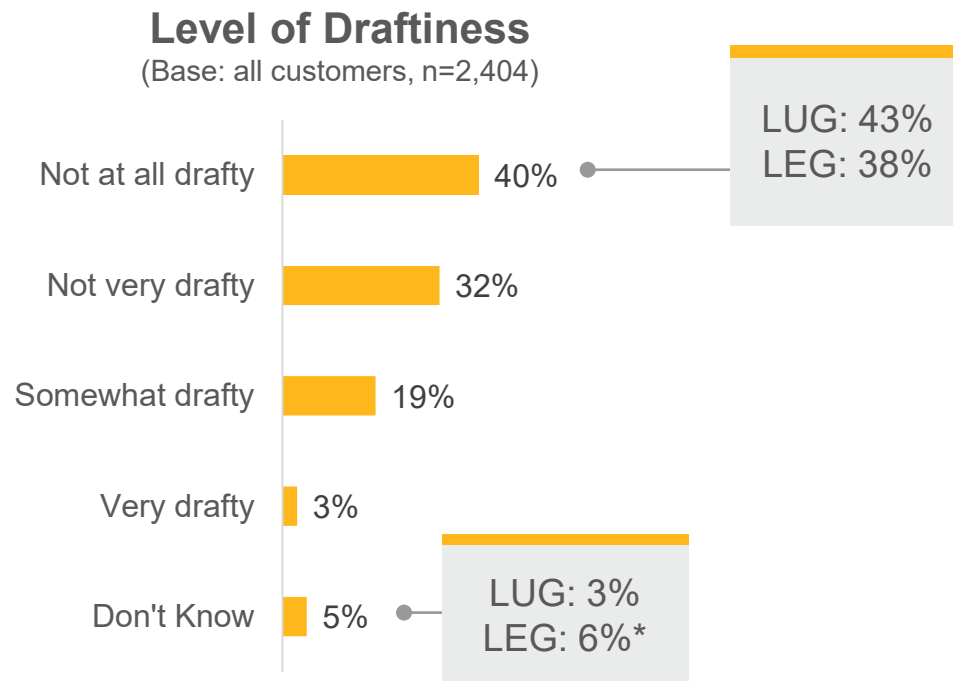
* Indicates result is significantly higher at a 95% confidence level for this customer group compared to the other (comparing LUG and LEG customers) or against the total.

Residential: Single Family Natural Gas End Use Study



Insulation: Level of Draftiness

- A new question about levels of draftiness was asked among customers in 2020 and the 2021 results are very similar. Customers are more likely to indicated the level of draftiness (don't know is 5%) compared to the level of insulation (don't know is 15%) in their home.
- Window frames and door frames are most commonly mentioned as areas of draftiness, with door frames especially being mentioned in the Northern region (51%) and bedroom in the GTA East region (7%).



Q: How would you describe the level of draftiness in your home? Q: Where would you say the main areas of draftiness are in your home? (Total mentions)

* Indicates result is significantly higher at a 95% confidence level for this customer group compared to the other (comparing LUG and LEG customers) or against the total.

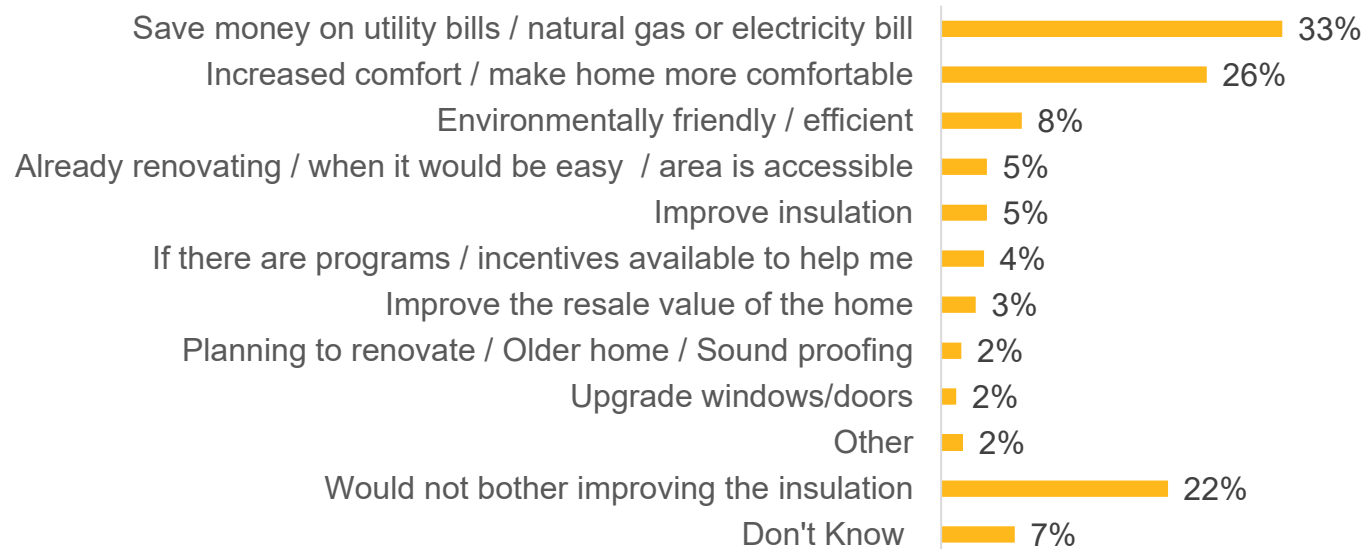


Insulation: Motivations for Improving Insulation

- "Customers who indicated their home is not already “well” insulated were asked what would motivate them to improve their insulation. While one-in-five indicated that they would not bother (nothing would motivate them), among the remainder, saving money on their utility bills was a key motivator, followed by increasing the comfort of their home.
- Saving money was mentioned more often among men (33%). Additionally, increased comfort and being environmentally friendly were also mentioned more often among household with \$100K+ income.

Motivation for Improving Insulation

(Base: customers who indicate that their home is not “well” insulated, n=1,367)



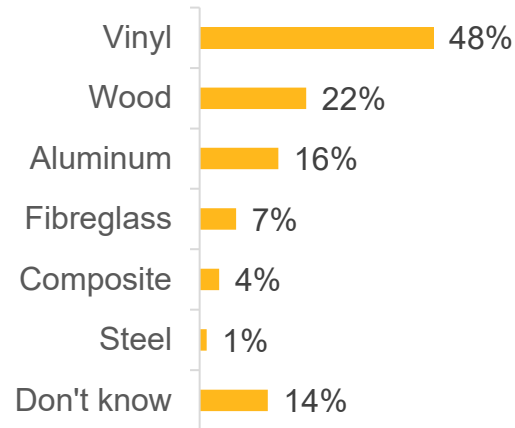


Windows

- Vinyl is the top window material across the franchise with notably higher use among LUG customers (LUG 54% vs. 42% LEG).
- Higher rates of aluminum (24%) and fibreglass (10%) are found in the Toronto Region where use of these materials is much higher than the rest of the franchise.
- Customers in the Northern region are more likely to have replaced windows since moving in than others (51% vs. 43% total).
- Note that a significant number (21%) of customers were unable to answer if the replaced windows were Energy Star certified or not.

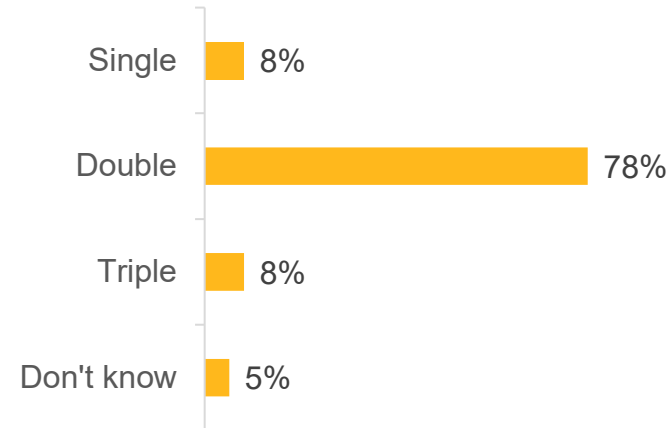
Window Material (multiple mentions)

(Base: all customers, n=2,404)



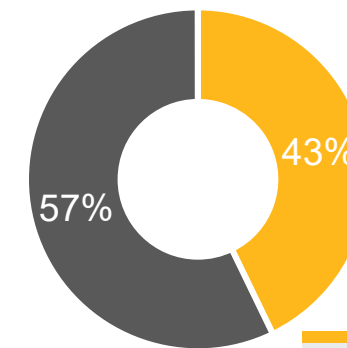
of panes

(Base: all customers, n=2,404)



Replaced any Windows Since Moving in

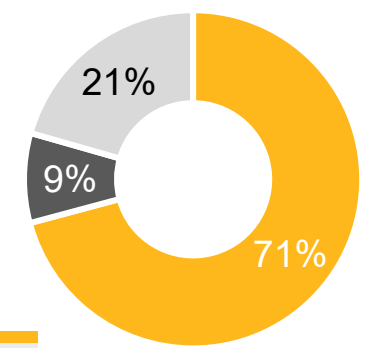
(Base: all customers, n=2,404)



■ Yes ■ No ■ Don't know

Were any Energy Star certified

(Base: all customers who replaced windows, n=1,026)



■ Yes
■ No
■ Don't know

% yes
LUG: 45%
LEG: 40%

Residential: Single Family Natural Gas End Use Study

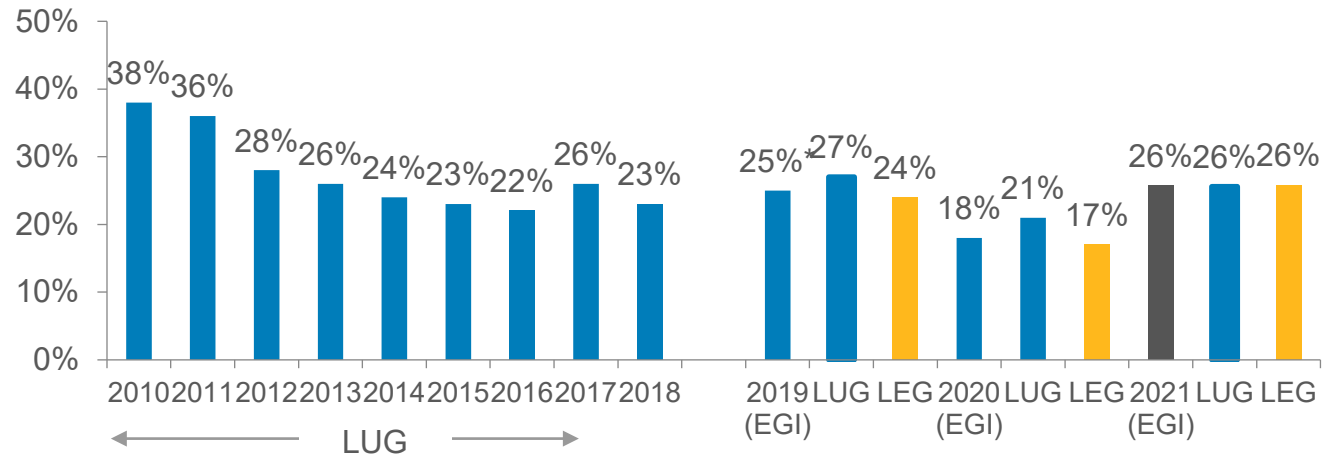


Energy Efficiency: Future Intentions

- After the lowest result observed in 2020, the number of customers intend to make their home more energy efficient in the next 2 years bounced back to previous years (26%).
- This intention is similar across all regions, ranging from 23% to 28%, and is highest among customers with homes built before 1950 (33%).
- Younger customers, and larger households (3+) with children are more likely to have plans to make their home more energy efficient.

Plans to make home more energy efficient in next 2 years (% yes)

(Base: all customers, n=2,404)



	Age Group	Plans (% yes)
	18 – 34	36%*
	35 – 54	31%*
	55 – 64	26%
	65+	14%

Region	Yes (%)
Northern	28%
LUG Eastern	23%
LEG Eastern	27%
GTA West & Niagara	26%
Toronto	23%
GTA East	28%
Southeast	24%
Southwest	27%

Age of Home	Yes (%)
Before 1950	33%
1950-1969	24%
1970-1989	28%
1990-1999	25%
2000-2021	22%

Q: Do you have any plans to make your home more energy efficient within the next two years?

* Indicates result is significantly higher at a 95% confidence level for this customer group compared to the other (comparing LUG and LEG customers) or against the total.

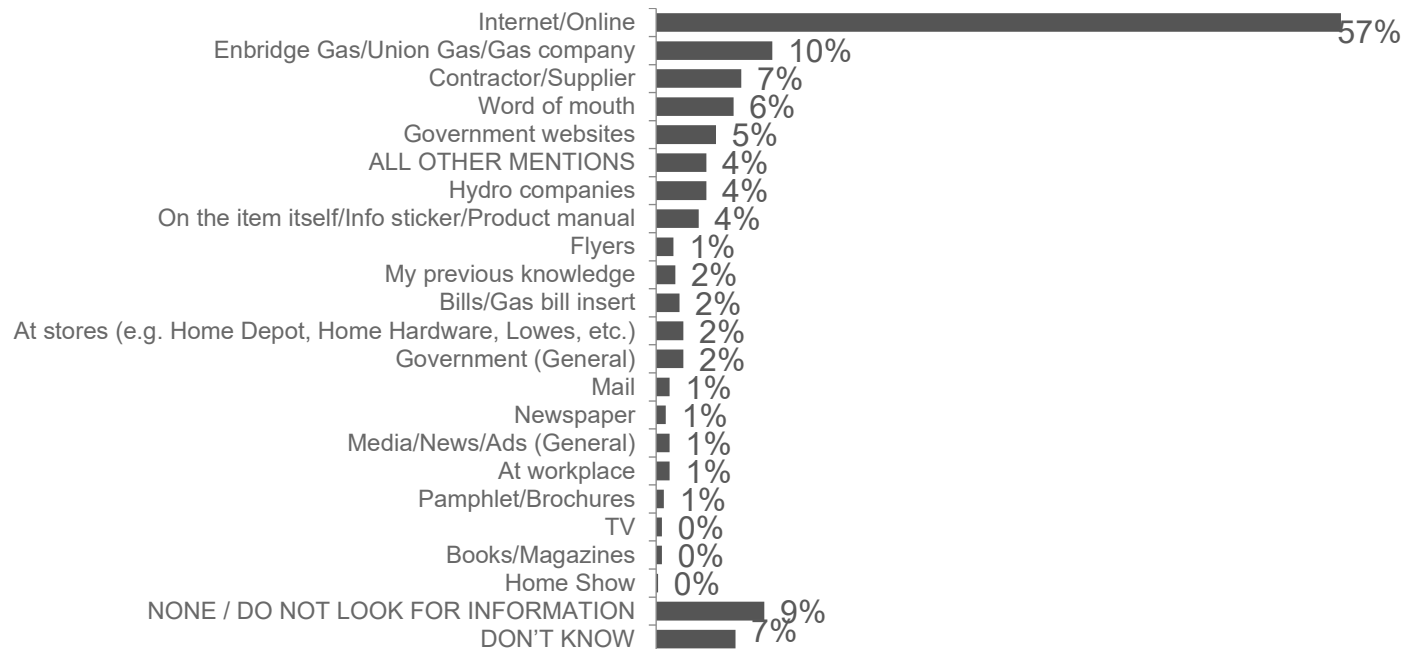


Energy Efficiency: Sources of Information

- Most customers planning to make their home more energy efficient go online to look for information – senior-led households and lower income households do so at lower rates.
- The internet/online continue to be the source of information for customers. However, at 57%, it is down from 60% in 2020 and 65% in 2019. About 1 in 10 customers mentioned Enbridge Gas as their source of information for energy efficiency followed by Contractor/Supplier.

Top Sources of Information (Unaided)

(Base: all customers who plan to make their home more energy efficient, n=620)



	Age Group	Internet / Online	From LEG/LUG
	18 – 34	60%	8%
	35 – 54	64%	9%
	55 – 64	50%	9%
	65+	45%	12%

Q: Where do you look for energy efficiency information? IF NECESSARY: What sources do you consider?

* Indicates result is significantly higher at a 95% confidence level for this customer group compared to the other (comparing LUG and LEG customers) or against the total.

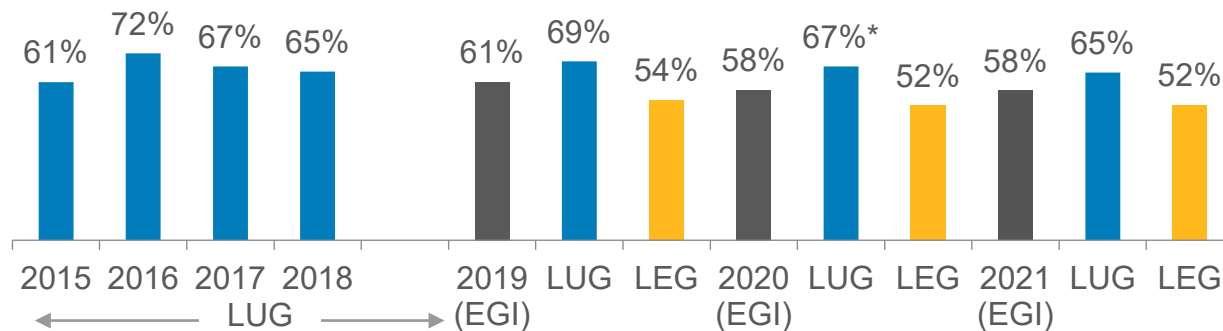


Energy Efficiency: Awareness of Any Programs

- Awareness that Enbridge Gas offers energy conservation and energy efficiency improvement programs and incentives is significantly higher among LUG customers, and ranges from highest in the Northern and LUG Eastern (68%) to lowest in the GTA East region (49%).
- Awareness is also stronger among customers aged 65+, though they're not as likely to have plans to make their homes more energy efficient compared to their younger counterparts. Awareness is also higher among those whose homes are well insulated compared to those whose homes are adequately or poorly insulated, providing an opportunity for further marketing.

Aware that LUG/LEG offers Energy Conservation & Efficiency Programs

(Base: all customers, n=2,404)



	Age Group	Aware (% yes)
	18 – 34	50%
	35 – 54	52%
	55 – 64	63%
	65+	66%

Region	Yes (%)
Northern	68%
LUG Eastern	68%
LEG Eastern	58%
GTA West & Niagara	53%
Toronto	51%
GTA East	49%
Southeast	61%
Southwest	66%

Q: Are you aware that Union Gas / Enbridge Gas offers energy conservation & energy efficiency improvement programs & incentives to help residential customers like you to save money on their energy bills?

* Indicates result is significantly higher at a 95% confidence level for this customer group compared to the other (comparing LUG and LEG customers) or against the total.

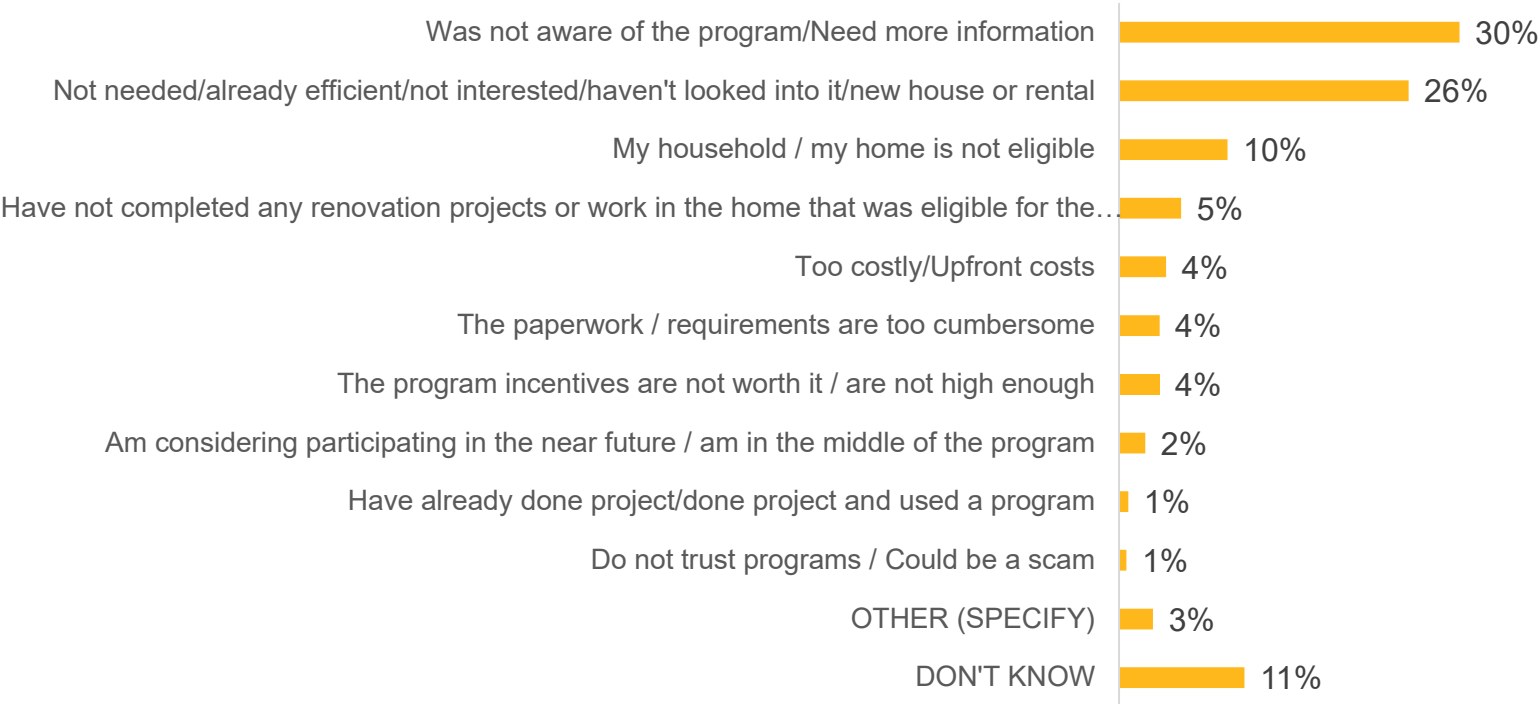


Energy Efficiency: Reasons for not Participating

- Customers who were aware of Enbridge Gas’ offerings but did not participate in any indicated that they did were not aware of the program(s) or needed more information. Others indicated that their home is already efficient or not interested.

Reasons for Not Participating in Any Enbridge Gas Program

(Base: customers who are aware of any program but have not participated, n=1,730)



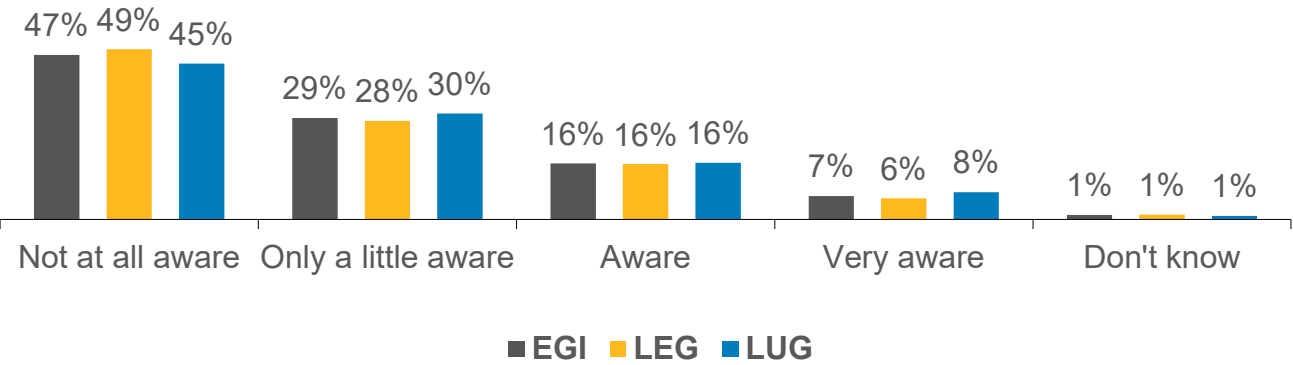
Q: What would you say are the main reasons that you have not participated in any of Enbridge Gas’ energy conservation programs? (Total mentions)



Awareness of Renewable Natural Gas (RNG)

- Nearly half of all customers are not at all aware of renewable natural gas (47%).
- RNG awareness level are similar across Enbridge Gas regions and respondent’s age.
- Household income is a factor in the awareness of RNG. Customers with higher household income are more aware of RNG.

Awareness of RNG
(Base: all customers, n=2,404)



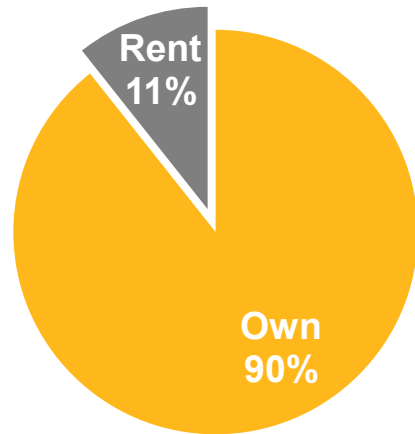
	Age Group	Very Aware	Not at all Aware
	18 – 34	5%	47%
	35 – 54	6%	48%
	55 – 64	8%	46%
	65+	7%	47%

Q: How aware would you say that you are about renewable natural gas, this is sometimes also referred to as bio methane gas, or biogas?
* Indicates result is significantly higher at a 95% confidence level for this customer group compared to the other (comparing LUG and LEG customers) or against the total.

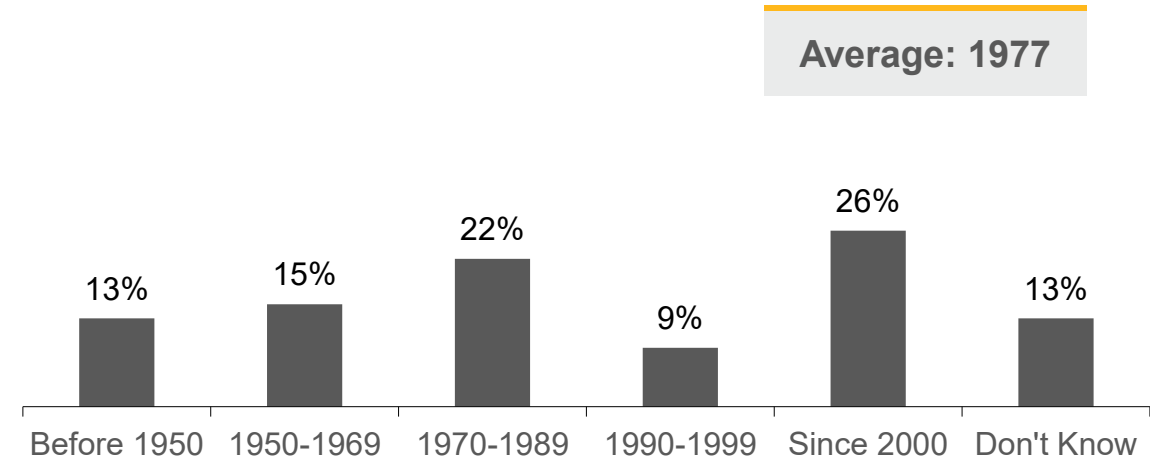


Demographics: House Characteristics (EGI)

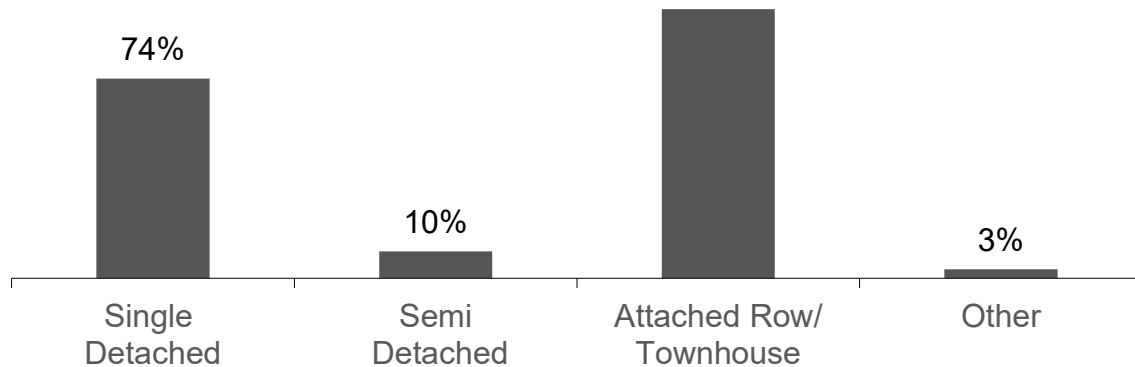
Home Ownership



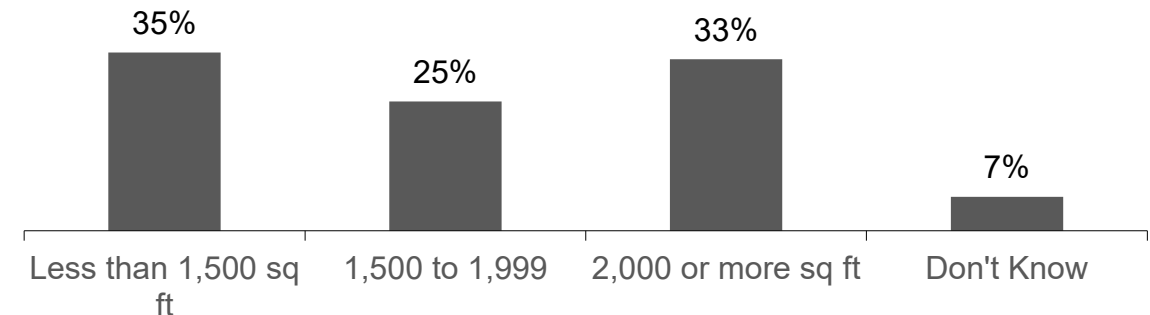
Age of Home



Type of Home



Size of Home

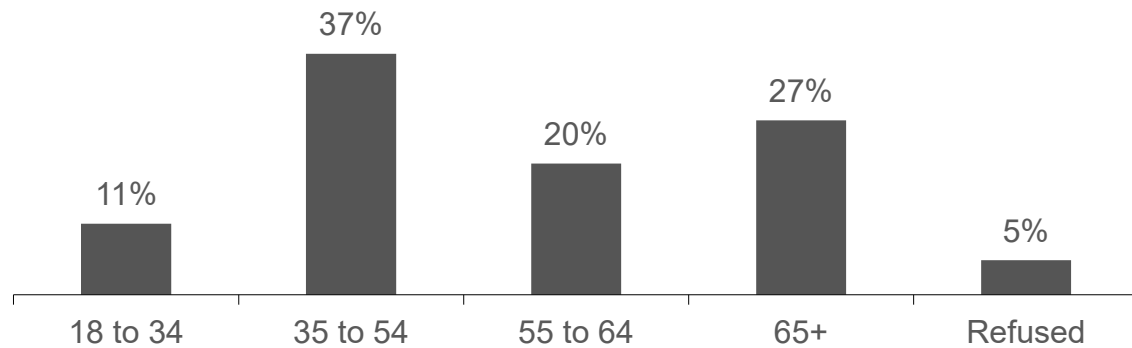


Residential: Single Family Natural Gas End Use Study

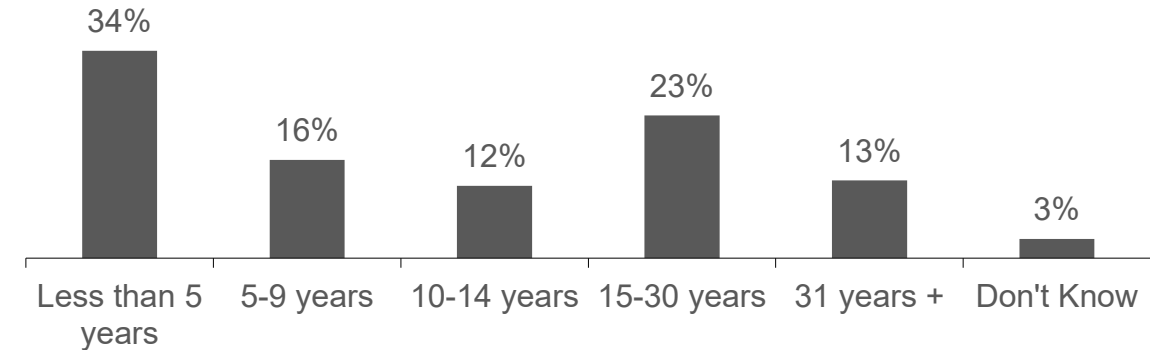


Demographics: Customer Characteristics (EGI)

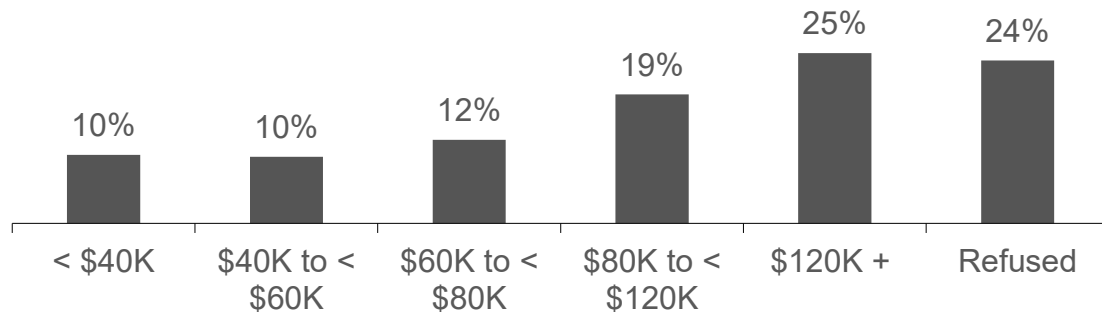
Age



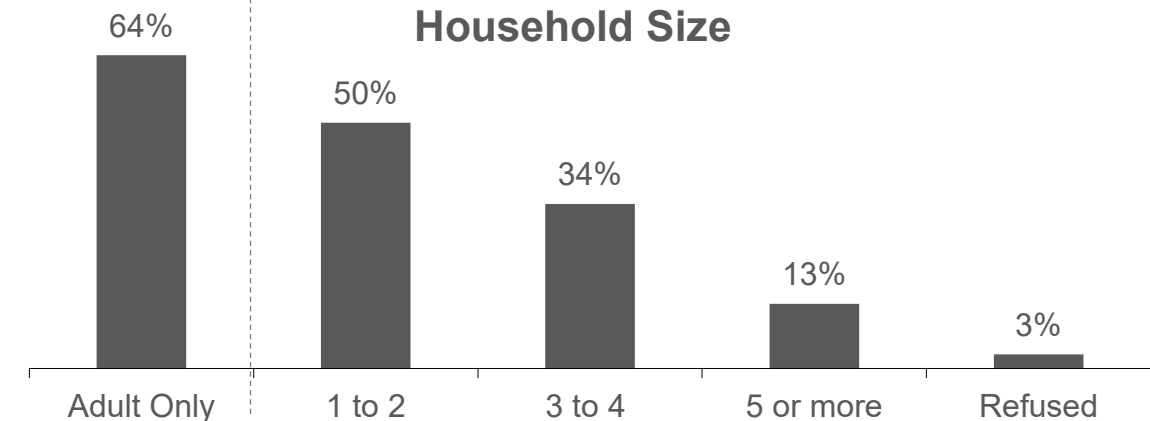
Length of Residence



Household Income



Household Size



ENBRIDGE GAS INC.

Answer to Interrogatory from
OEB Staff ("STAFF")

INTERROGATORY

Reference:

Enbridge Gas Inc. Reply Evidence, page 4, paragraph 9

Preamble:

Enbridge Gas notes that "it is not appropriate to include the result of Dr. McDiarmid's assessment in the E.B.O. 134 economic evaluation since it is not consistent with and therefore not additive to the results of Stages 1 and 3 with respect to the pipeline in question."

Question:

- a) With the exception of Dr. McDiarmid's treatment of incremental revenues, please clarify why Enbridge believes that the Stage 2 NPV result calculated by Dr. McDiarmid would not be consistent with or additive to the results of Enbridge Gas's Stages 1 and 3 results (recognizing that Enbridge disagrees with some of the input assumptions in Dr. McDiarmid's Stage 2 calculation, and the calculated Stage 2 NPV result).

Response

Since its inception and as approved by the OEB, the E.B.O. 134 economic test is a cumulative three-stage assessment that measures the net benefits of a transmission system expansion, i.e., an assessment of the benefits associated with the pipeline compared to the costs associated with the pipeline. More specifically:

- Stage 1 is an assessment of the Project's natural gas infrastructure costs compared to the incremental revenues it will generate. If the Stage 1 NPV is less than zero, Stages 2 and 3 must be undertaken.
- Stage 2 is a sequential assessment that builds upon Stage 1, which calculates the benefits incremental general service customers will realize by attaching to the

natural gas system, made possible by the natural gas infrastructure from Stage 1.

- Stage 3 is an additional assessment that builds upon Stages 1 and 2, which calculates other quantifiable benefits and costs related to the construction of the Project not included in Stage 2, and other non-quantifiable public interest considerations.

Dr. McDiarmid's analysis does not amount to a cumulative three-stage economic assessment of natural gas infrastructure. Dr. McDiarmid converts the Stage 2 analysis into an analysis of an electrification scenario whereby general service customers use all-electric high-efficiency configurations instead of natural gas. Dr. McDiarmid concludes that general service customers would experience an \$84 million energy bill benefit from the electrification scenario, and attributes that outcome as a cost to the pipeline. This is counterintuitive to the Stage 2 analysis under the E.B.O. 134 economic test, since Dr. McDiarmid's analysis is premised on the notion that a benefit from an alternative infrastructure solution is a cost to the natural gas infrastructure Project, even though no costs have been incurred.

Dr. McDiarmid's analysis suggests that incremental general service premises would not attach to the natural gas system, but instead would choose all-electric high-efficiency configurations, regardless of the availability of natural gas.¹ In other words, there would be no benefit to general service customer from the availability of natural gas. As a result, as described in Enbridge Gas's Reply Evidence, the outcome of this assumption would be that the Project's Stage 2 analysis results in zero, not a negative benefit of \$84 million as per the ED Evidence.

While doing so would not amount to a cumulative-three stage economic assessment of natural gas transmission expansion, it should also be noted that Dr. McDiarmid does not provide information in the ED Evidence as to whether the \$84 million benefit from the electrification scenario is greater than or less than the cost of the electricity infrastructure required to deliver those benefits.

E.B.O. 134 is not an economic assessment that compares infrastructure solutions; it is an economic assessment of a natural gas transmission expansion project. Dr. McDiarmid's analysis is neither an economic assessment of natural gas transmission expansion, nor an economic assessment of an electricity infrastructure solution (as it does not consider the costs of the electricity infrastructure solution).

¹ Dr. McDiarmid displays this through her analysis which concludes a positive \$6,792 NPV for all-electric high-efficiency configurations compared to natural gas.

ENBRIDGE GAS INC.

Answer to Interrogatory from
OEB Staff ("STAFF")

INTERROGATORY

Reference:

Enbridge Gas Inc. Reply Evidence, page 5, paragraph 11

Preamble:

Enbridge notes that "if no incremental general service premises attach to the natural gas system and all-electric configurations were chosen instead, there would be no benefit in Stage 2 to incremental general service customers from the natural gas expansion project. Consequently, there would also be no cost in Stage 2 to incremental general service customers from the natural gas expansion project. The cost of the proposed transmission pipeline project is already included in Stage 1."

Question:

Please provide the results of Enbridge's Stage 1 NPV calculation under this assumption (i.e. no incremental revenues from general service customers).

Response

The Stage 1 NPV result using the requested scenario of no incremental general service revenues is negative \$100 million.¹ This scenario assumes that the total capacity of the Project is not fully utilized, which Enbridge Gas does not believe is a reasonable assumption. A more appropriate assumption given the scenario that there would be no capacity used by incremental general service customers is that the excess capacity would be used by contract rate customers.

¹ Compared to the Stage 1 NPV result of negative \$95 million provided in Table 3 at Exhibit E, Tab 1, Schedule 1, Page 9.

ENBRIDGE GAS INC.

Answer to Interrogatory from
OEB Staff ("STAFF")

INTERROGATORY

Reference:

Enbridge Gas Inc. Reply Evidence, page 6, paragraph ii) 13; "[Refining Enbridge's IRP Cost Effectiveness Test](#)" (presentation by Chris Neme to IRP Working Group, March 22, 2022), slides 12-17

Preamble:

Enbridge Gas indicates that "Dr. McDiarmid inappropriately nullifies incremental Project revenues in Stage 2"

Question:

Please confirm that Enbridge Gas's existing approach to the treatment of project revenues (i.e., counting project revenues from customers as a benefit in stage 1 but not removing this benefit in stage 2) has been identified as a methodological concern by members of the OEB's Integrated Resource Planning Working Group.

Response

Varying opinions have been expressed by members of the OEB's Integrated Resource Planning Working Group in this regard, however, no conclusions have been established by that working group. It should also be noted that the scope of the OEB's Integrated Resource Planning Working Group relates to the economic evaluation of IRP alternatives (i.e., DCF+ test) and not specifically the economic evaluation of natural gas transmission projects (i.e., E.B.O. 134 economic test).

ENBRIDGE GAS INC.

Answer to Interrogatory from
Environmental Defence ("ED")

INTERROGATORY

Reference:

Reference: Reply Evidence, p. 3

Question:

- a) Please indicate which Enbridge employees prepared the reply evidence. If more than one employee was involved, please indicate the role of each.
- b) Please provide the CV of each of the Enbridge employees referred to in (a).
- c) Please indicate if Enbridge is asking that the evidence of the employees referred to in (a) be accepted as expert evidence, and if yes, please indicate the scope of expertise. If not, please explain why that is not necessary

Response

a) – c)

The Reply Evidence is the evidence of Enbridge Gas and is adopted by its witnesses on its behalf for the purpose of this application. Enbridge Gas's Reply Evidence was prepared and reviewed by the witnesses who attended the Technical Conference on behalf of the Company on October 6-7, 2022, with support from various staff across the Company. Curricula vitae for those Enbridge Gas witnesses were previously filed with the OEB on October 3, 2022.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Environmental Defence ("ED")

INTERROGATORY

Reference:

Reply Evidence, p. 4-5, Attachment 2

Preamble:

On page 4, Enbridge states: "Stage 2 assesses the net benefits that new general service customers realize by attaching to the natural gas system due to the incremental capacity provided by the transmission system expansion project that is the subject of the assessment."

On page 5, Enbridge refers to "Dr. McDiarmid's assumption that as of 2023 all incremental residential and commercial general service natural gas attachments would choose high-efficiency all-electric configurations instead of attaching to the natural gas" and describes this as an "unrealistic and baseless assumption"

Cells D1 to J14 of Attachment 2 to the reply evidence state as follows:

Assumed Mix of Alt Fuel Market Share if Gas Not Available

Residential & Commercial		
Heating Oil	%	24%
Propane	%	10%
Electricity	%	67%
Total		100%

Question:

- (a) Please confirm that the stage 2 analysis focuses only on new general service customers that attach to the natural gas system due to the incremental capacity provided by the transmission system expansion project in question (i.e. only those incremental attachments that are made possible by the expansion project). If that is not confirmed, please reconcile that with the quote from page 4 listed above.
- (b) If the stage 2 analysis focuses on customers connecting to the gas system that would not have been able to connect but for the transmission system expansion,

please confirm that these customers would not have the option of choosing gas if the transmission expansion is not put in place.

- (c) Please confirm that, according to Exhibit I.ED.2, 2-5% of the general service customer attachments are assumed to be fuel conversions, and therefore 95% to 98% would be new construction. If that is not confirmed, please explain and provide the correct figures.
- (d) Please confirm that Enbridge's stage 2 analysis, including its recalculated analysis at Attachment 1 and 2 of the reply evidence, assume that 24% of customer attachments will use heating oil and 10% will use propane if gas is not available.
- (e) In light of the fact that 95% to 98% of customer attachments are new construction, please justify Enbridge's fuel mix assumption among customer attachments.
- (f) Where gas is not available, please provide Enbridge's best estimate for the percent of new construction homes that will install (i) a new oil heating system and (ii) a new propane heating system. If possible, please provide an estimate specific to the Panhandle region. Please justify the answer.
- (g) Please provide data on the fuel mix used in new construction in Ontario.

Response

- (a) – (d)
Confirmed.

- (e) – (g)
See response to Exhibit I.STAFF.EGIReply.1 b).

ENBRIDGE GAS INC.

Answer to Interrogatory from
Environmental Defence ("ED")

INTERROGATORY

Reference:

Reply Evidence, p. 4-5, Attachment 2

Preamble:

On page 5, Enbridge refers to "Dr. McDiarmid's assumption that as of 2023 all incremental residential and commercial general service natural gas attachments would choose high-efficiency all-electric configurations instead of attaching to the natural gas" and describes this as an "unrealistic and baseless assumption"

Cells D1 to J14 of Attachment 2 to the reply evidence state as follows:

Assumed Mix of Alt Fuel Market Share if Gas Not Available

Residential & Commercial		
Heating Oil	%	24%
Propane	%	10%
Electricity	%	67%
Total		100%

Question:

(a) Please confirm that:

- (i) Enbridge's stage 2 analysis relies on an "assumed mix of alt fuel market share if gas not available";
- (ii) 95% to 98% of customer attachments are new construction in this case (per I.ED.2); and
- (iii) Dr. McDiarmid's recalculation of Enbridge's stage 2 analysis does not assume that all incremental residential and commercial general service natural gas attachments would choose high-efficiency all-electric configurations instead of attaching to the natural gas *because the relevant analysis assumes that gas is not available (as noted in (i) above).*

(b) If that is confirmed, please refile the a corrected version of the reply or retract the above statement.

Response

a)

- (i) In the OEB-approved use of the E.B.O. 134 economic test, each of the three stages of the test are premised on the assumption that the pipeline is in place and represents the cumulative benefits of that natural gas infrastructure. More specifically:
- Stage 1 is an assessment of the natural gas infrastructure costs compared to the incremental revenues it will generate.
 - Stage 2 is a sequential assessment that builds upon Stage 1, which calculates the benefits incremental general service customers will realize by attaching to the natural gas system, made possible by the natural gas infrastructure from Stage 1.
 - Stage 3 is an assessment of the social benefit of the natural gas infrastructure, made possible by the natural gas infrastructure from Stage 1.

Stage 2, in particular, is composed of two parts necessary to formulate the result for that stage. The first is the calculation of energy costs for incremental general service customers without the pipeline's construction based upon a fuel mix that does not include natural gas. The second is the calculation of energy costs on the premise that the natural gas pipeline is available. The alternative fuel mix in Stage 2 is used to calculate the benefits to incremental general service customers when the natural gas system expansion from Stage 1 is made available.

Enbridge Gas's analysis concludes that general service customers would benefit from attaching to the natural gas system. As such, the benefits to those incremental general service premises are determined by calculating the difference between their natural gas energy costs and the energy costs of alternative fuels.

(ii) Confirmed.

(iii) See the response to part (i) above. Enbridge Gas cannot confirm what Dr. McDiarmid intended when selectively modifying the OEB's E.B.O. 134 economic test in the ED Evidence. Enbridge Gas can only describe the ways in which Dr.

McDiarmid's analysis is inconsistent with a cumulative three-stage economic assessment of natural gas transmission system expansion.

As per the response to part (i) above, the Stage 2 analysis relies on the assumption that the natural gas system is available, due to the cumulative nature of the three-stage economic test, and the fact that Stage 1 includes the natural gas infrastructure costs. Dr. McDiarmid does not adjust (and therefore maintains) the natural gas infrastructure costs in Stage 1, suggesting her Stage 2 analysis assumes the natural gas infrastructure is available to the incremental general service premises.

If Dr. McDiarmid's analysis is assuming, as the interrogatory suggests, that natural gas is not available in the Stage 2 analysis, this would highlight the conclusion outlined in Enbridge Gas's Reply Evidence that Dr. McDiarmid's analysis does not amount to a cumulative three-stage economic assessment of natural gas infrastructure.

In the ED Evidence, Dr. McDiarmid provides an analysis that suggests if general service premises attach to the natural gas system, they would realize negative energy bill benefits (i.e., it is more cost-effective for general service premises to use all-electric high-efficiency configurations compared to natural gas).¹ This analysis suggests that incremental general service premises would not attach to the natural gas system, but instead would choose all-electric high-efficiency configurations, regardless of the availability of natural gas. As described in Enbridge Gas's Reply Evidence, the outcome of this assumption would be that the Project's Stage 2 analysis results in zero, not negative \$84 million as per the ED Evidence.

b) See response to part a) above.

¹ Dr. McDiarmid displays this through her analysis which concludes a positive \$6,792 NPV for all-electric high-efficiency configurations compared to natural gas.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Environmental Defence ("ED")

INTERROGATORY

Reference:

Reply Evidence, p. 5

Preamble:

Enbridge states as follows at paragraph 12 of its Reply Evidence: "In the alternative, for illustrative purposes, if the assumption used by Dr. McDiarmid in the ED Evidence (that high-efficiency electric end-use equipment is 312% efficient) was incorporated into Enbridge Gas's Stage 2 assessment by adjusting the cost of electricity in the alternative energy mix, this results in a 20-year Stage 2 NPV of positive \$97 million.¹ This calculation incorporates the electric efficiency assumption and also provides for a more appropriate representative alternative energy mix.

Enbridge states as follows in I.ED.2: "The general service attachments on the Panhandle System is assumed to be approximately 2-5% fuel conversions."

Enbridge confirmed in JT1.18 that the customer attachments in the stage 2 analysis and those in I.ED.2 are not materially different.

Question:

- (a) Please recalculate and re-file Attachment 2 on the assumption that the fuel mix for the customer attachments in the stage 2 analysis are 100% electric heat pumps for all new construction.
- (b) Please recalculate and file Attachment 2 on the assumption that the fuel mix for the customer attachments in the stage 2 analysis are 100% electric heat pumps for all new construction and for 50% of the anticipated fuel conversions.
- (c) Please provide Enbridge's estimate from its DSM proceeding of the cost of installing a cold-climate heat pump versus a gas furnace and air conditioner.
- (d) Please provide details on the incentives available for customers to install cold-climate heat pumps.

Response

a) & b)

Enbridge Gas respectfully declines to provide the requested adjustments to its Stage 2 analysis. Enbridge Gas has no basis to assume that the alternative fuel mix for customer attachments in the Stage 2 analysis would be 100% electric air-source heat pumps for new construction. See the response to Exhibit I.STAFF.EGIReply.1 b).

- c) The requested information was provided in the Multi-Year Demand Side Management Plan (2022 to 2027) (EB-2021-0002) proceeding at Exhibit JT1.21. The estimate provided by Enbridge Gas to install an HSPF 10 region 4 electric air-source heat pump (and air handler) was \$11,100. The estimate to install a natural gas furnace and electric air conditioner was \$8,000.
- d) The joint residential whole home program (Enbridge Gas and Canada Greener Homes Grant) provides up to \$6,500 in grants to Enbridge Gas customers for qualifying electric air-source heat pumps for existing homes (i.e., retrofit applications). The joint program is expected to be available in January 2023.

Alternatively, non-Enbridge Gas customers in Ontario can be eligible for up to \$5,000 in grants for qualifying electric air-source heat pumps for existing owner-occupied homes, via the Canada Greener Homes Grant.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Environmental Defence ("ED")

INTERROGATORY

Reference:

Reply Evidence, p. 8

Preamble:

Enbridge states as follows at paragraphs 19 & 20 of the reply evidence:

"For additional clarity, region 4 refers to a warmer climate than region 5. Region 4 represents "climates similar to the Midwestern US" while region 5 "would cover most of the southern half of the provinces in Canada". The Project area is understood to reside in region 5.

Enbridge Gas did not claim that the upfront cost of an HSPF 10 region 5 electric air-source heat pump is \$11,100. Enbridge Gas's understanding of its own information is that the upfront cost of \$11,100 is relevant to an HSPF 10 region 4 electric air-source heat pump."

Question:

- (a) Please confirm that Enbridge concurs with the following statement by NRCan: "On a seasonal basis, the heating seasonal performance factor (HSPF) of market available [air-source heat pump] units can vary from 7.1 to 13.2 (Region V). It is important to note that these HSPF estimates are for an area with a climate similar to Ottawa."¹ If Enbridge disagrees, please explain why and provide the correct figures.
- (b) The reference to HSPF 10 is from Exhibit I.10h.EGI.STAFF.77 in EB-2021-0002. Please confirm that analysis was based on "2 archetype homes in Toronto" and that Toronto is in region 5.
- (c) If the HSPF figure used in Exhibit I.10h.EGI.STAFF.77 in EB-2021-0002 was indeed a region 4 figure, even though the analysis would require a region 5 figure, please indicate whether that was intentional or an error.

¹ <https://www.nrcan.gc.ca/energy-efficiency/energy-star-canada/about/energy-star-announcements/publications/heating-and-cooling-heat-pump/6817>

Response

- a) Enbridge Gas takes no issue with the statement that market available electric air-source heat pumps in region 5 can range from HSPFs of 7.1 to 13.2. However, Enbridge Gas notes that this statement does not address the costs to achieve those HSPFs in region 5.

With respect to Ottawa's climate, it is not necessarily clear whether it resides in region 5 or region 6 (i.e., a colder climate than region 5). The NAIMA Canada ("NAIMA") website provides relevant information for the Province of Ontario, suggesting that Ottawa resides in region 6 with heating degree day ("HDD") assumptions of 4400 to 4520. This varies from NAIMA's HDD assumptions of 3520 for Toronto (region 5) and 3400 for Leamington (region 5).²

- b) Confirmed. However, please also see the response to part c) for additional context.
- c) Enbridge Gas is not aware of any errors or inappropriate approaches taken by the Company in the information/analysis it provided in the Multi-Year Demand Side Management Plan (2022 to 2027) (EB-2021-0002) proceeding.

For clarity, Enbridge Gas's analysis in the DSM proceeding referenced an electric air-source heat pump rated HSPF 10 region 4 with a cost of \$11,100 which could be converted to HSPF 8.7 for region 5 (Toronto) using a simplified conversion factor.

However, when modelling electric air-source heat pump consumption for the Toronto archetype homes in the DSM proceeding, Enbridge Gas did not use HSPF values. Enbridge Gas used an NRCAN tool (which does not use HSPF values) to calculate consumption using more accurate coefficient of performance values at varying temperatures taken from the Northeast Energy Efficiency Partnerships database. The NRCAN tool conducts an hourly analysis for a full year to accurately predict the performance of electric air-source heat pumps at each hour of the day, for the climate being assessed (i.e., region 5 for Toronto). This analysis can also determine when the home heating loads exceed the capacity of the electric air-source heat pump and when a less efficient backup is required. Enbridge Gas understands that ED and Dr. McDiarmid were given permission to use the NRCAN tool for the purposes of the DSM proceeding and have a general understanding of the tool.

² https://www.naimacanada.ca/insulation-requirements/?utm_campaign=ecohome&utm_source=ecohome.net&utm_medium=referral&utm_content=/guides/3521/

ENBRIDGE GAS INC.

Answer to Interrogatory from
Environmental Defence ("ED")

INTERROGATORY

Reference:

Reply Evidence, p. 9

Preamble:

Enbridge states as follows at paragraph 21 of the reply evidence:

Rather than using an average natural gas commodity cost over a defined period (e.g., previous 12 months, or previous calendar year), Dr. McDiarmid states on page 3 of the ED Evidence that, "I adjusted fuel costs to reflect the full October 2022 costs". This approach is problematic, because it does not account for the potential short-term price volatility of the natural gas commodity, as is currently being experienced in 2022 due to various economic fundamentals and unique geo-political issues (e.g., war in Ukraine).

Question:

- (a) Please confirm that Enbridge's October 2022 gas commodity prices do not reflect the full increases in market gas commodity prices at that time due to the price smoothing that Enbridge has implemented.
- (b) Without price smoothing, approximately what percent higher would Enbridge's gas commodity prices have been as of October 2022.

Response

- (a) The OEB approved an extended 24-month (rather than the typical 12-month) smoothing period to recover Purchased Gas Variance Account balances in Enbridge Gas's April 2022 and July 2022 QRAMs. The October QRAM does not include an extended smoothing period, however, the extended smoothing periods from April and July continue to impact the effective price as of October 2022.

- (b) Without the impact of the extended smoothing period from April and July, the effective price of natural gas as of October 2022 would be approximately 12% higher.

The Company cautions against drawing conclusions based on selective modifications due to broader policy decisions such as the OEB-approved extended smoothing period. For example, the electricity price used in Dr. McDiarmid's calculation includes the Ontario Electricity Rebate, and the exclusion of this electricity rebate would have the impact of raising the total electricity price used in Dr. McDiarmid's calculation by approximately 21%.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Environmental Defence ("ED")

INTERROGATORY

Reference:

Reply Evidence, pages 10-15

Question:

- (a) Please compare the cost-effectiveness of decarbonizing commercial greenhouses using options that do not require pipelines (e.g. biomass or high-efficiency electric heat pumps) versus options that involve gaseous fuels delivered via pipelines of the type proposed for this project.
- (b) Please provide any studies or analysis comparing the cost-effectiveness of decarbonizing commercial greenhouses using options that do not require pipelines (e.g. biomass or high-efficiency electric heat pumps) versus options that involve gaseous fuels delivered via pipelines of the type proposed for this project.

Response

- (a) & (b)
Enbridge Gas respectfully declines to respond as it has not completed the specific analysis/studies requested by ED and thus did not address the cost-effectiveness of decarbonizing greenhouses using non-pipeline options such as biomass, or high-efficiency electric heat pumps within its Reply Evidence.¹

¹ Procedural Order No. 3 (November 10, 2022), p. 3

ENBRIDGE GAS INC.

Answer to Interrogatory from
Ontario Greenhouse Vegetable Growers ("OGVG")

INTERROGATORY

References:

EB-2022-0157 Exhibit E Tab 1 Schedule 1 Page 7.

McDiarmid Climate Consulting, Evidence regarding stage 2 analysis and gas alternatives for greenhouses (submitted October 28, 2022), pages 6-7.
Enbridge Gas Inc. Reply Evidence (submitted November 10, 2022), pages 10-15.

Preamble:

In the Leave to Construct Application EGI provides the following evidence:

The non-availability of natural gas will cause contract rate customers to expand or move their operations to other jurisdictions, likely outside of Ontario, where their natural gas needs can be served.

Question:

- a) Having reviewed the evidence provided by McDiarmid Climate Consulting and provided reply evidence, please either:
- i) confirm Enbridge Gas Inc.'s evidence (as it relates to greenhouse operators) that the non-availability of natural gas will cause contract rate customers to expand or move their operations to other jurisdictions, likely outside of Ontario, where their natural gas needs can be served, or
 - ii) update Enbridge Gas Inc.'s evidence (as it relates to greenhouse operators) with respect to the effect the non-availability of natural gas will have on contract rate customers' decision on where to locate expanded or new operations.

Response

a) Confirmed.

Greenhouse operators in the Project area have consistently communicated to Enbridge Gas that, without continued access to natural gas, they would likely delay or defer their expansion plans and/or seek to re-locate operations to alternative jurisdictions where natural gas is available. This sentiment was also indicated in the letters of support received for the Project from three of the largest greenhouse operators in the region, provided at Exhibit B, Tab 1, Schedule 1, Attachment 4, Pages 2 to 4 **[emphasis added]**:

“Mastronardi Canada’s gross annual sales exceeded \$1.6 billion USD in 2019. As the largest fresh produce protected agriculture company in North America, Mastronardi’s continued operations and those of its subsidiaries are vital to production and distribution of both Canadian food supplies. **The lack of gas supply/capacity has significantly hindered our plans to expand and has pushed expansion elsewhere.**”

This project is also critical for attracting future developments by guaranteeing increased access to energy for all sectors of the local economy”

- Christopher Gill, Mastronardi Produce Ltd.

“Natural gas continues to be the main source of fuel for heating the greenhouses in Kingsville. It is important to Mucci Farms to have a stable, economically sound, and viable source of energy for our operations today and in the future. **If the availability of natural gas is limited or restricted in the future, it would be catastrophic for our company and the greenhouse industry in the Kingsville area.**”

- George Dekker, Mucci Farms Limited

“We believe that Canada’s domestic food supply is critical to the security of our country and that further expansion of this industry is the best way to ensure that all Canadians have the nutrition they need to live happy, productive lives. **To this end, we have big plans for future expansion which are contingent upon being able to access the utilities, including natural gas that modern greenhouses require.**”

- John Ketler, Nature Fresh Farms

ENBRIDGE GAS INC.

Answer to Interrogatory from
Pollution Probe ("PP")

INTERROGATORY

Question:

- a) Please provide a CV and related information for the Enbridge witness(es) that are adopting the Reply Evidence.
- b) If the Enbridge witness(es) related to the Reply Evidence have been adopted as expert witness(es) by the OEB, please provide the docket number and reference.

Response

- a) & b)
See the response to Exhibit I.ED.EGIReply.17.

ENBRIDGE GAS INC.

Answer to Interrogatory from
Pollution Probe ("PP")

INTERROGATORY

Question:

- a) Please list all activities (e.g. consumer promotion, communication, incentives, etc.) and program offers that Enbridge has made to potential customers in the Panhandle region to promote IRP alternatives (e.g. electric heat pumps) to avoid additional natural gas demand on the system.
- b) Please list all activities (e.g. consumer promotion, communication, incentives, etc.) and program offers that Enbridge intends to make to potential customers in the Panhandle region to promote IRP alternatives (e.g. electric heat pumps) to avoid additional natural gas demand on the system.
- c) Please list all activities (e.g. consumer promotion, communication, incentives, etc.) and program offers that Enbridge has made to existing customers in the Panhandle region to promote IRP alternatives (e.g. electric heat pumps) to avoid additional natural gas demand on the system.
- d) Please list all activities (e.g. consumer promotion, communication, incentives, etc.) and program offers that Enbridge intends to make to existing customers in the Panhandle region to promote IRP alternatives (e.g. electric heat pumps) to avoid additional natural gas demand on the system.

Response

- a) – d)
As PP's questions are entirely unrelated to the Company's Reply Evidence Enbridge Gas respectfully declines to respond.¹

¹ Procedural Order No. 3 (November 10, 2022), p. 3

ENBRIDGE GAS INC.

Answer to Interrogatory from
Pollution Probe ("PP")

INTERROGATORY

Question:

- a) Please list all IRP alternatives leveraged (for new/potential and existing customers) in the analysis provided by Enbridge, including measure, number applied and gas demand reduction per measure.
- b) Please list all DSM program reductions included in the Enbridge model (for new/potential and existing customers) in the analysis provided by Enbridge, including measure, number applied and energy reduction per measure.

Response

- a) & b)
As PP's questions are entirely unrelated to the Company's Reply Evidence Enbridge Gas respectfully declines to respond.¹

¹ Procedural Order No. 3 (November 10, 2022), p. 3