

Residential Home Energy Consumption Survey

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Did you know that buildings are responsible for 40% of global energy use?



Figure 1: Opposite House, designed by Atelier RZLBD, Toronto, Canada

In an effort to combat climate change, this survey attempts to collect data for academic research on building energy consumption in Canada. Data will be used to understand building performance, develop prediction and design models, and lead innovation to reduce building energy consumption. By participation in this survey, your privacy will be protected. To protect individual's data, information will be collected as anonymous and only reported in aggregate form, i.e. by combining large sets of data. By participating in this survey, individuals agree to the consent form provided at the end of this document. This study is organized by Amir A. Aliabadi from Environmental Engineering at the University of Guelph. Please submit your completed survey online at www.aaa-scientists.com. To access the survey visit: www.aaa-scientists.com/ResidentialHomeEnergyConsumptionSurvey.pdf



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1 Basic Information About Your Residential Home

Q1. Your postal code (Example: N1G 1X9 or 02119):

Q2. Type of your residential home:

Other :

Q3. Number of people living in your home:

Q4. What is the approximate footprint area of your residential home? For multi-storey buildings, the footprint area is only associated with one storey of the building; please exclude garages, yards, and other spaces that are not heated or cooled:

Other:

Q5. How many storeys in your residential home are heated and/or cooled?

Other:

Q6. Type of space heating system:

Other:

Q7. Type of space cooling system:

Other:

Q8. Type of water heating system:

Other:

Q9. Type of stove/oven system:

Other:

Q10. Which one of the uncommon devices below depend on substantial amount of energy in your home (choose as many as may apply)?

1 Electric car charged by electricity

2 Fire place powered by natural gas

3 Swimming pool, sauna, etc.

4 No uncommon devices

Other:

Q11. Approximately when was your residential home built?

Q12. When was your residential home retrofitted for energy efficiency?

Q13. If your home has been retrofitted for energy efficiency, click on all the features that apply to your home. Describe any specifics of the system components (e.g. the size of your photovoltaic panels, etc.)?

1 My home was air-leak tested and now it is leak-proof

Specifics:

2 I replaced my windows with energy efficient windows (e.g. double or tripple-layer)

Specifics:

3 I installed a high efficiency furnace

Specifics:

4 I increased the thermal insulation of my building envelop (e.g. increase R-value, foam spray under roof, etc.)

Specifics:

5 I installed a photovoltaic system

Specifics:

6 I installed a heat pump for home heating

Specifics:

7 I installed a solar thermal collector

Specifics:

8 I installed a thermal energy storage system

Specifics:

9 I have installed a green roof

Specifics:

10 I have installed other systems not described above

Specifics:

2 Natural Gas or Other Fuel Consumption Data

Q14. Would you share your natural gas or other fuel consumption data?

- Yes, I will fill the table below to indicate my natural gas (or other fuel) consumption. Note: the entries below can be populated by referring to your natural gas (or other fuel) bills (e.g. Figure 2 below). Please fill up to 12 entries. It is recommended to consider bills for at least 1 full year of natural gas (of other fuel) consumption. Your bills should come from the utility company in your region, such as Enbridge. If you have consumption data for less than 1 full year, that is still fine.

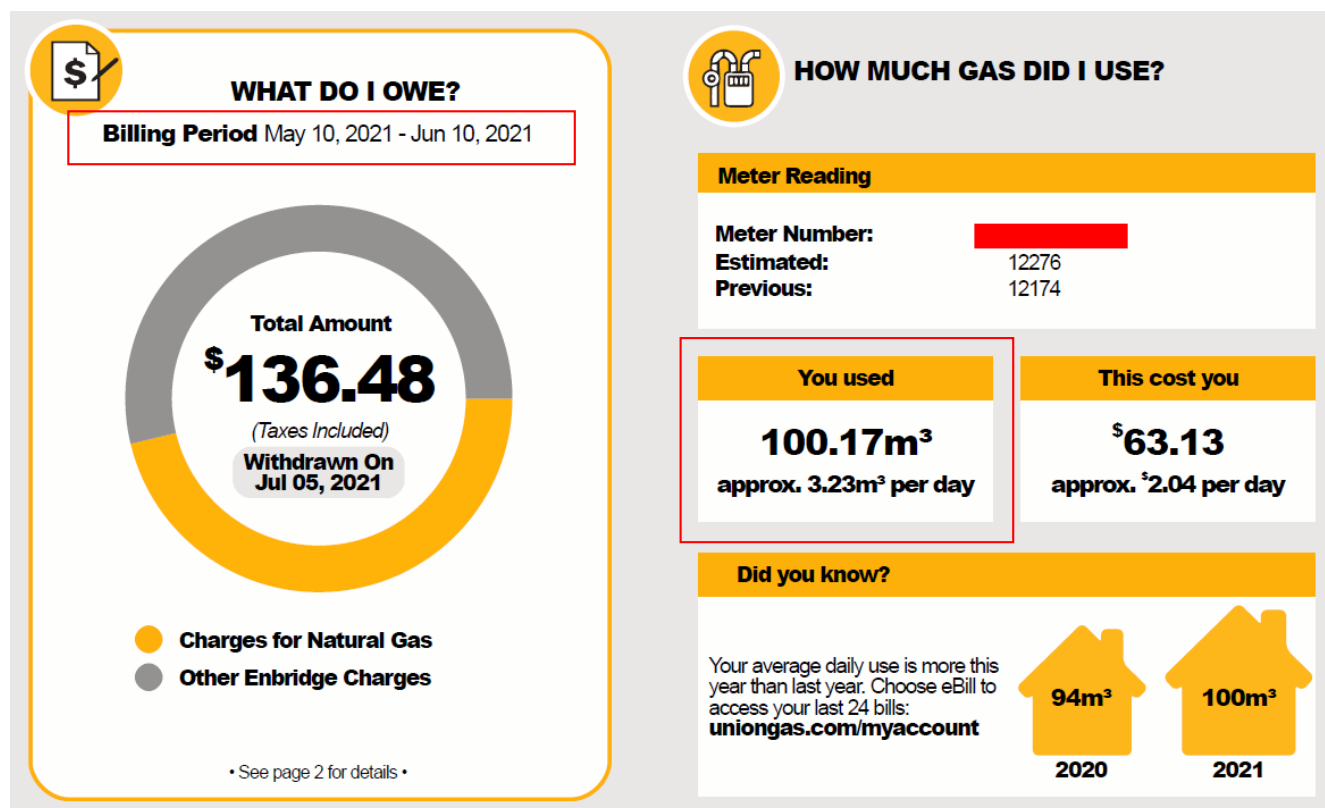


Figure 2: Sample natural gas bill with billing period (May 10, 2021 - Jun 10, 2021) and consumption (100.17 m³) boxed in red

Q15. Provide Information on up to 12 bills: consumption in cubic meters (m³)

Bill 01: Start YYYY	MM	DD	End YYYY	MM	DD	Consumption
Bill 02: Start YYYY	MM	DD	End YYYY	MM	DD	Consumption
Bill 03: Start YYYY	MM	DD	End YYYY	MM	DD	Consumption
Bill 04: Start YYYY	MM	DD	End YYYY	MM	DD	Consumption
Bill 05: Start YYYY	MM	DD	End YYYY	MM	DD	Consumption
Bill 06: Start YYYY	MM	DD	End YYYY	MM	DD	Consumption
Bill 07: Start YYYY	MM	DD	End YYYY	MM	DD	Consumption
Bill 08: Start YYYY	MM	DD	End YYYY	MM	DD	Consumption
Bill 09: Start YYYY	MM	DD	End YYYY	MM	DD	Consumption
Bill 10: Start YYYY	MM	DD	End YYYY	MM	DD	Consumption
Bill 11: Start YYYY	MM	DD	End YYYY	MM	DD	Consumption
Bill 12: Start YYYY	MM	DD	End YYYY	MM	DD	Consumption

3 Electricity Consumption Data

Q16. Would you share your electricity consumption data?

- Yes, I will fill the table below to indicate my electricity consumption. Note: the entries below can be populated by referring to your electricity bills (e.g. Figure 3 below). Please fill up to 12 entries. It is recommended to consider bills for at least 1 full year of electricity consumption. Your bills should come from the utility company in your region, such as Toronto Hydro. If you have consumption data for less than 1 full year, that is still fine.

Metering Information										
Service	Billing Period		Days	Meter #	Multiplier	Units	Current Reading	Previous Reading	Metered Consumption	Adjusted Consumption
Electric	8/23/21	9/21/21	29		1.0000	KWH	65094.18	64841.77	.00	1.0260
Electric	8/23/21	9/21/21	29		1.0000	10N	.00	.00	52.61	1.0260
Electric	8/23/21	9/21/21	29		1.0000	2MID	.00	.00	54.65	1.0260
Electric	8/23/21	9/21/21	29		1.0000	3OFF	.00	.00	145.14	1.0260
Water	8/24/21	9/23/21	30		1.0000	M3	2019.00	2006.00	13.00	1.0000

Figure 3: Sample electricity bill with billing period (8/23/21 to 9/21/21) and consumption ($53.97 + 56.07 + 148.91 = 258.95$ kW – hr) boxed in red; in this example electricity price varies according to time of year and day in three brackets; we consider adding all the consumptions together

Q17. Provide Information on up to 12 bills: consumption in kilo Watt hours (kW-hr); please note that in some regions the electricity price varies according to time of year and day. In such cases, simply report the total electricity used in the billing cycle by adding all the consumptions together.

Bill 01: Start YYYY	MM	DD	End YYYY	MM	DD	Consumption
Bill 02: Start YYYY	MM	DD	End YYYY	MM	DD	Consumption
Bill 03: Start YYYY	MM	DD	End YYYY	MM	DD	Consumption
Bill 04: Start YYYY	MM	DD	End YYYY	MM	DD	Consumption
Bill 05: Start YYYY	MM	DD	End YYYY	MM	DD	Consumption
Bill 06: Start YYYY	MM	DD	End YYYY	MM	DD	Consumption
Bill 07: Start YYYY	MM	DD	End YYYY	MM	DD	Consumption
Bill 08: Start YYYY	MM	DD	End YYYY	MM	DD	Consumption
Bill 09: Start YYYY	MM	DD	End YYYY	MM	DD	Consumption
Bill 10: Start YYYY	MM	DD	End YYYY	MM	DD	Consumption
Bill 11: Start YYYY	MM	DD	End YYYY	MM	DD	Consumption
Bill 12: Start YYYY	MM	DD	End YYYY	MM	DD	Consumption

4 Other Information

Q18. Please provide any other information that you think may help this survey. Please do not disclose any personal, private, or identifying information about yourself.



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5 Participant Consent Form

Title of the Study: Residential Home Energy Consumption Survey

Researcher: Professor Amir A. Aliabadi, School of Engineering, University of Guelph, RICH 2515, University of Guelph, Guelph, ON, Canada, N1G 2W1, 519-824-4120 x.54862, aliabadi@uoguelph.ca

Introduction: You are being invited to participate in a research project that aims to collect information about your residential home fuel (e.g. natural gas) and electricity consumption. Before you decide whether to participate, it is important that you understand why the study is being conducted, what participation involves, and what risks and benefits are associated with participation. Please take the time to read this consent form carefully and ask any questions you may have before making your decision.

Purpose: The purpose of this study is to collect information about your residential home fuel (e.g. natural gas) and electricity consumption patterns in order to gain a better understanding of how these resources are used in Canada. Data will be used to understand building performance, develop prediction and design models, and lead innovation to reduce building energy consumption.

Inclusion and Exclusion Criteria: To be eligible to participate, you must be A home owner or be able to provide information about a home.

Nature of Participation: If you decide to participate, you will be asked to provide information about your fuel (e.g. natural gas) and electricity consumption patterns over a period of up to one year through an online survey. You will also have the option to participate in a follow-up survey at a later date to submit more energy consumption data. Participation is voluntary and you are free to withdraw at any time without penalty.

Duration of Participation: Your participation in this study is expected to last for approximately 20 minutes if completed correctly. You will be asked to complete the online survey once, and may be invited to participate in a follow-up survey in the future.

Procedures: You will be asked to complete an online survey that will take approximately 20 minutes to complete. The survey will include questions about your fuel (e.g. natural gas) and electricity consumption bills and your home general features. Your responses will be kept confidential and will only be used for research purposes.

Responsibilities of the Participant: As a participant in this study, your responsibilities include providing

accurate information about your residential home fuel (e.g. natural gas) and electricity consumption bills, and completing the online survey to the best of your ability.

Risks: There are no anticipated risks associated with participation in this study. Even though energy consumption data is provided, your participation is anonymous, so you cannot be identified.

Benefits: Once we finish our analysis of building energy data, participants can compare their energy consumption with average statistics. This can give them incentive to save extra energy for their buildings. Climate change is the greatest existential threat to humans. 40% of world energy consumption is by buildings, and thus 40% of greenhouse gas emissions are caused by buildings. Understanding building energy consumption and ways to mitigate harmful environmental impact is of paramount priority.

Obligation to Participate: You are under no obligation to participate in this study.

Withdrawal: You are free to withdraw from the survey prior to submitting the data at any time without prejudice to pre-existing entitlements.

Data Withdrawal: You are free to withdraw your data from the study prior to the data analysis and publication of the results without prejudice to pre-existing entitlements. If you choose to withdraw, your data will be destroyed permanently and will not be used in the study. If you have submitted your data but wish to withdraw it prior to data analysis and publication of the results, please provide your postal code to the researcher, so your data can be deleted and removed from the analysis.

Commercialization: There is no commercial interest in the study.

Conflicts of Interest: There are no real, potential, or perceived conflicts of interest on the part of the researchers, their institutions or the research sponsors.

Dissemination of Results: The results of this study will be disseminated through research papers, presentations, posters, reports, etc. based on the data collected. Participants will not be identified directly or indirectly in any reports or publications.

Qualified Designated Representative: If you have any questions about the scientific or scholarly aspects of the research, you may contact Amir A. Aliabadi.

Ethical Issues: If you have any ethical concerns about the study, you may contact Amir A. Aliabadi. If you have any questions regarding your rights and welfare as a research participant in this survey.