



ENERGUIDE LABELING OF HOMES AT THE TIME OF SALE

DESIGN RECOMMENDATIONS AND ALTERNATIVES

SEPTEMBER 2022



**Smart Prosperity
Institute**

About Smart Prosperity Institute

Smart Prosperity Institute is a national research network and policy think tank based at the University of Ottawa. We deliver world-class research and work with public and private partners – all to advance practical policies and market solutions for a stronger, cleaner economy.
institute.smartprosperity.ca

About Canadian Real Estate Association

The Canadian Real Estate Association (CREA) is one of Canada's largest single-industry Associations. Our membership includes more than 135,000 real estate brokers, agents and salespeople, working through 78 real estate Boards and Associations across Canada.
crea.ca

Acknowledgements

This report was written by Mike Moffatt, Alison Dudu and Maryam Hosseini, with funding from the Canadian Real Estate Association. Responsibility for the final product and its conclusions is Smart Prosperity Institute's alone, and should not be assigned to the reviewers, interviewees, or any external party.

Suggested Citation

Moffatt, M., Dudu, A., Hosseini, M. (2022). *Energide Labeling of Homes at the Time Of Sale: Design Recommendations and Alternatives*. Smart Prosperity Institute.

September 2022

With support from



ENERGUIDE LABELING OF HOMES AT THE TIME OF SALE

Ten Key Points From This Report

1. The federal government is considering requiring EnerGuide labelling of existing homes at the time of sale. Experience from other jurisdictions and the Ontario government's cancelled Home Energy Rating and Disclosure (HER&D) program show that a program designed to require efficiency ratings and labels for existing homes must be carefully designed to succeed. A well-intentioned but poorly implemented system may jeopardize public support for energy efficiency labelling. **As such, the federal government must tread carefully and consider alternative approaches to a mandatory time-of-sale system.**
2. As part of the *Canada Greener Homes Initiative*, EnerGuide evaluations are exceptionally popular with Canadian homeowners, with some having to wait a year or more to obtain an evaluation, as the demand for obtaining an EnerGuide evaluation exceeds the supply of NRCan registered energy advisors. As such, **it is unclear why the federal government is focusing on increasing the demand for labels (by making them mandatory), as the bottlenecks are currently on the supply side.**
3. If the government can successfully address the supply-side barriers, it would be possible to design a successful time-of-sale system, so long as it is carefully designed. By examining existing and proposed time-of-sale systems, we identify five design principles required for a successful program, all beginning with the letter A. **The program must be designed such that the labels are accurate, actionable, attainable, affordable, and all-inclusive.**
4. **Accurate:** Given the large number of existing homes that currently lack an EnerGuide rating, policymakers may be tempted to replace the existing EnerGuide Home Energy Assessment, which utilizes an on-site inspection with a blower door test with a less labour-intensive, more automated process that can be conducted in a shorter time and does not require an on-site inspection. Policymakers should tread carefully, as these methods are certainly less accurate, devaluing the home buyer's or renter's information and eroding public trust in energy efficiency labelling.
5. **Actionable:** Much of the value of the Home Energy Assessment evaluation process is in the renovation upgrade report it provides the homeowner, which includes a list of recommended upgrades and energy-saving results. This report is an important feature that should be retained in any mandatory labelling program.
6. **Attainable:** It can take a year or more for a homeowner to obtain a Home Energy Assessment with an EnerGuide rating, label, and renovation upgrade report. It is unreasonable to ask Canadians to wait several months before selling a home, if not a year or more. Even the three months the federal government has set as the "service standard" to obtain an evaluation is too

long to wait for a Canadian to sell their home. The system must be designed so Canadians can still put their homes up for sale quickly when needed.

7. **Affordable:** The initial Home Energy Evaluation cost can be anywhere from \$300-1000, with a follow-up (post-upgrade) evaluation costing \$200 or more, a price that can create hardships for homeowners on a fixed income. The federal government should continue to provide the *Canada Greener Homes Initiative* subsidies for the evaluations. Furthermore, they should consider making the evaluations free of charge to homeowners, as was planned under Ontario's Home Energy Rating and Disclosure program.
8. In designing any new program, policymakers must be aware of unintended consequences. One potential unintended consequence of mandatory home energy labelling is that it may cause homebuyers to favour new homes in less walkable neighbourhoods with fewer transit options rather than older, less energy-efficient homes in more walkable neighbourhoods with good access to public transit. The shift in demand towards newer homes could have the perverse effect of increasing energy use and greenhouse gas emissions, as any savings in building energy use (and emissions) is more than offset by higher energy use through transportation. The design of a mandatory labelling system should ensure that potential home buyers and renters have access to the total energy use (and emissions) data from living in a particular home, not just those associated with the building itself. **Information on energy use and GHG emissions from transportation should be added to the EnerGuide rating.** Identifying this potential unintended consequence creates a fifth design principle: **All-Inclusive**. Labels should include energy use and GHG emissions from the home's features and location.
9. There is an inherent trade-off between these five design principles. Given the persistent shortage of energy evaluators, it is unrealistic to expect that all homeowners will be able to attain labels at the time of sale while still ensuring that they are accurate and provide actionable advice. This report provides six recommendations on how government can navigate these trade-offs while respecting all five design principles.
10. **Requiring homeowners to obtain a Home Energy Assessment rating and home label before putting their home up for sale is currently impractical, as it would take up to a year for a homeowner to attain a label and rating,** which is both accurate and actionable. An unreasonable requirement would erode public support for EnerGuide home labelling. **One possible workaround would require a home seller to either have a label or an evaluation scheduled before placing a home on the market.** In the period before obtaining the completed evaluation and label, home sellers would need to generate a temporary label based on a self-assessment. While these will be less accurate than the complete evaluation and not include a renovation upgrade report, they would give potential purchasers at least some information about the property's energy efficiency. **Other possible solutions include abandoning the mandatory time-of-sale requirement and replacing it with a focus on increasing the supply of evaluators or a staged plan to assess every pre-existing home in Canada based on alternative criteria (e.g. the age of the home or the last digit of the home's postal code).**

ENERGUIDE LABELING OF HOMES AT THE TIME OF SALE

Table of Contents

Acknowledgements	1
Ten Key Points From This Report	2
Introduction	5
The Federal Government's Proposal	7
The Importance of Existing Homes to Achieving Net Zero	9
How Do the Canada Greener Home Initiative and EnerGuide Labelling System for Homes Work?	10
What Could a Mandatory System Look Like and What Problem is it Meant to Solve?	15
Mandatory Time-of-Sale Systems in Other Jurisdictions: What Lessons Can Canada Learn?	16
Cost of Obtaining a Label and Length of Time to Procure a Label	17
Are Labels Seen as Accurate and Useful?	19
Are the Regulations Complied With?	21
What Impact Do Mandatory Labels Have on Home Prices?	24
Summary of Lessons from Existing International Experiences	25
The First Four Properties Needed to Ensure A Successful Home Energy Efficiency Labelling System	25
Accurate	26
Actionable	26
Attainable	26
Affordable	27
The Tensions Between the A's	28
A Potential Unintended Consequence from Energy Efficiency Labelling for Homes: Increased Sprawl	29
The Fifth Property Needed to Ensure A Successful Home Energy Efficiency Labelling System: All-Inclusive	32
Designing Policy to Achieve All Five As: Recommendations	33
Conclusion: EnerGuide Labels for Homes are Valuable and Popular. A Mandatory Time-of-Sale Requirement Needs to be Well-Designed to Ensure Continued Success of the Program	38
References	39

ENERGUIDE LABELING OF HOMES AT THE TIME OF SALE

Introduction

The federal government is considering making it a requirement for anyone who sells a newly built or pre-existing home in Canada to have an EnerGuide label for that home at the time of sale. Currently, EnerGuide labels are voluntary, but as part of the *Canada Greener Homes Grant Initiative*¹, they are exceptionally popular with Canadian homeowners, with some waiting up to a year to obtain the EnerGuide evaluation needed to obtain a label. Making such labels mandatory at the time of sale will only increase the demand for those labels, an unorthodox choice when the demand for EnerGuide home evaluations far exceeds the supply. These supply shortages, however, do also illustrate the desire of Canadians to live more energy-efficient lives and the overall value of tools such as EnerGuide labels.

Reducing the carbon footprint of residential housing is vital for Canada to reach its 2030 and 2050 emissions targets. EnerGuide audits and labels can be essential in reaching that goal, along with the *Pan-Canadian Approach to Carbon Pollution Pricing (PCF)*, which sets a minimum national price on carbon pollution.² Requiring EnerGuide labels at the time of sale for existing homes can drive further decarbonization and give homebuyers additional information about the most significant purchase they will make in their lifetime. However, to be successful, such an initiative must be carefully designed, as a poorly developed or implemented plan will do more harm than good. Fortunately, Canada can look to systems in other jurisdictions, including the European Union and the United Kingdom, along with Ontario's cancelled Home Energy Rating and Disclosure (HER&D)³ program for best practices (and pitfalls) in designing a mandatory time-of-sale program.

From that experience, we identify five design principles that must be met for a successful time-of-sale initiative:

Accurate: The EnerGuide audits and labels must accurately assess the home's energy efficiency and carbon footprint. Inaccurate or misleading labels will erode public confidence in energy efficiency labels.

Actionable: Providing an efficiency rating is insufficient; homeowners must be given information and recommendations on improving their homes' energy efficiency.

Attainable: Homeowners must be able to obtain an audit and label in a reasonable amount of time if it is a requirement to sell a home. Requiring Canadians to wait several months or a year to sell a home is unreasonable and would create a backlash among Canadians who would otherwise support energy efficiency initiatives.

¹ Government of Canada (2022a)

² The PCF notes that “[p]utting a price on carbon pollution is widely recognized as the most efficient means to drive innovation and energy efficiency in order to reduce greenhouse gas (GHG) emissions.” Government of Canada (2021a)

³ Government of Ontario (2016)

Affordable: Home energy audits can cost from \$300 to \$1,000. Well-designed programs can keep the out-of-pocket costs low, or zero, to help seniors and other homeowners on a fixed income.

All-Inclusive: To provide homeowners with details on their expected energy usage and greenhouse gas emissions, labels should also include expected energy usage, and greenhouse gas emissions from transportation, as where a home is located is a critical factor in a family's energy use and GHG emissions from transportation.

That final design principle is vital. Any policy must seek to avoid or reduce potential unintended consequences. One of the purposes of home energy labelling is to cause home buyers to seek more energy-efficient homes. While newer homes are likely to be more energy efficient than older ones, older homes are often in more walkable neighbourhoods closer to where Canadians work, shop, and play. Mandatory energy efficiency labelling could cause Canadians to favour newer homes over older ones, thus inadvertently encouraging sprawl by promoting exurban homes over urban ones.

If the federal government were to proceed with a mandatory time-of-sale system, it must be carefully designed for the program to succeed. A poorly designed system that prevents Canadians from selling their homes will erode public support for energy efficiency labelling and lead to many embarrassing front-page stories in the media. To satisfy those five design principles and to ensure mandatory EnerGuide labelling of homes at the time of sale program is a success, we provide six policy recommendations:

Recommendation 1: The federal government should retain the existing incentives for homeowners to obtain labels *before* the time of sale and dramatically increase the number of qualified auditors to reduce waiting lists. These steps would help address both the attainability and affordability issues.

Recommendation 2: To ensure the EnerGuide program remains accurate and actionable, the federal government should keep the existing audit methodology and four components of the energy evaluation system. Although eliminating the requirement to provide a list of suggested upgrades would speed up the process, making obtaining a label more attainable, it would undermine the value of the EnerGuide program. The federal government should not sacrifice accuracy or actionability in pursuit of increased attainability.

Recommendation 3: Allow exemptions to be made to mandatory labelling, specifically the exemptions recommended by the Consumers Council of Canada in 2018⁴.

Recommendation 4: The federal government should fully finance the cost of energy audits, making them free of charge to homeowners, as was planned under Ontario's Home Energy Rating and Disclosure program. Furthermore, the government should pay those costs up-front rather than requiring the homeowner to pay and be reimbursed later.

⁴ Consumers Council of Canada (2018)

Recommendation 5: The federal government should recognize it will not always be practical or possible to have a complete energy evaluation at the time of sale and should not penalize homeowners who make a good-faith effort to obtain an audit and label. To ensure homeowners are not penalized for good-faith efforts to obtain an audit, the time-of-sale requirement should be that the evaluation has been scheduled, not that it has been completed. A temporary pre-audit label could be provided to give the homebuyer some, albeit incomplete, information about the home.

Recommendation 6: To avoid encouraging sprawl and give homebuyers information on expected energy use from transportation, the EnerGuide label should be expanded to include projected energy consumption and GHG emissions from transportation on the EnerGuide label.

However, we would also suggest the government consider alternative approaches. **We question the logic of introducing a demand-side solution (making labels mandatory) to correct a supply-side bottleneck (a lack of trained EnerGuide evaluators).** We recommend that the federal government first introduce supply-side reforms to ensure an adequate supply of EnerGuide evaluators before enacting any measures that would increase the demand for EnerGuide evaluations. Furthermore, we recommend that the government consider alternative demand-side approaches, including tying evaluations to the age of the home or the home's postal code, rather than at time-of-sale, where the homeowner is facing a time constraint.

We start our analysis by examining the federal government's proposal to make EnerGuide labels mandatory at the time of sale for existing homes. To understand the basis of this proposal, we ask the question, *what problem is the government trying to solve?* After examining that question, we consider how a mandatory time-of-sale policy can be designed for maximum success; we examine similar initiatives in the European Union and the United Kingdom. Their experience, along with Canada's experience under the current voluntary system and the cancelled Ontario HER&D program design, allows us to identify five design principles that act as best practices when designing a mandatory time-of-sale label system. Only by following the five A's of: accurate, actionable, attainable, affordable and all-inclusive can the federal government ensure the plan is successful. The paper closes by offering six policy recommendations to help achieve these design principles while ensuring that a mandatory EnerGuide labelling program does not inadvertently accelerate sprawl.

The Federal Government's Proposal

Shortly after the 2021 election, the federal government reaffirmed its commitment to requiring EnerGuide labelling at the time of sale when the Prime Minister set out the following housing-related commitments in the mandate letter to the Minister of Natural Resources:⁵

Work with provinces and territories, communities and Indigenous Peoples to develop and implement a National Net-Zero Emissions Building Strategy to achieve net-zero emissions from buildings by 2050, with interim milestones, **that include accelerating net-zero emissions new builds and deep retrofits of existing buildings through codes and incentives, requiring**

⁵ Government of Canada (2021b)

EnerGuide labeling of homes at the time of sale, transitioning away from fossil-fuel home heating systems, and launching a community level net-zero emissions homes initiative.
[emphasis added]

This commitment is a holdover from the 2016 *Pan-Canadian Framework on Clean Growth and Climate Change*, which states that the “[f]ederal, provincial, and territorial governments will work together with the aim of requiring labelling of building energy use by as early as 2019.”⁶ The Government of Ontario had been an enthusiastic supporter of the energy use label requirement, incorporating it into their *Climate Change Action Plan 2016-2020*, released on June 6, 2016⁷:

Provide free energy audits for pre-sale homes: Energy audits would be required before a new or existing single-family home can be listed for sale, and the energy rating will be included in the real estate listing. These audits are intended to be provided free of charge under this plan. The Home Energy Rating and Disclosure program will improve consumer awareness by allowing homebuyers to compare homes by energy rating. It will also encourage uptake of retrofit incentive programs. To meet the expected demand for home energy auditors, Ontario will support development of energy audit training programs and will further consult before launching this program in 2019.

This Home Energy Rating and Disclosure (HER&D) program proposal attempted to alleviate concerns Ontarians had with a mandatory energy efficiency labelling program, as it is clear Ontario was at least considering three of the five A’s this paper identifies as necessary for a mandatory labelling system to function:

Actionable: The HER&D energy audits would recommend upgrades and retrofits to homes, and retrofit incentive programs would be in place to encourage those upgrades.

Attainable: The HER&D proposal acknowledged the lack of trained energy auditors and vowed to put measures in place to increase the supply of auditors.

Affordable: To address homeowners’ concerns about the cost of audits, HER&D audits and labels were provided at no cost, with expenses financed through revenues collected from the province’s cap-and-trade program.

Despite these measures, the proposal did not receive universal support, with the Ontario Real Estate Association (OREA) being particularly vocal in its opposition. Their concerns included arguments that, despite the audits being provided at no charge, low-income households could not afford retrofits recommended by auditors and how the program would treat older homes in rural and remote areas, where heating by wood, gas or oil is a necessity. Of primary concern was the time it would take to receive an audit⁸:

⁶ Government of Canada (2016)

⁷ Government of Ontario (2016)

⁸ Ontario Real Estate Association (2018)

Moreover, in cases where a homeowner is forced to sell quickly for personal reasons – a divorce, or job relocation – a mandatory audit scheme would punish these people by delaying their sale. This puts the weight of additional mortgage payments, bill payments and delays on their shoulders during an otherwise trying time.

In short, the significant disagreements around the policy were on the *attainability* design principle, with OREA (and others) expressing concerns that those selling homes would not have timely access to the audits necessary to comply with the policy.

This system would never be implemented in Ontario, as the newly-elected Progressive Conservative government ended the Initiative by passing Bill 34, the *Green Energy Repeal Act, 2018*.⁹ While the policy was never enacted, this history remains relevant today, as it illustrates the possible challenges presented by a mandatory time-of-sale system and how a well-designed policy can alleviate some of those concerns. The Ontario government was able to address the cost of audits by offering them free of charge, but other concerns remained, most notably the length of time it would take to get an audit.

Despite these concerns, the federal government plans to introduce mandatory EnerGuide labelling at the time of sale due to the importance of reducing emissions in existing homes to hit Canada's net-zero by 2050 target.

The Importance of Existing Homes to Achieving Net Zero

To decarbonize the country, it is necessary to decarbonize buildings. Currently, buildings directly account for approximately 12% of Canadian GHG emissions, which rise to 17% when electricity generation for those buildings is considered.¹⁰ And this does not include the emissions generated from the materials used to build those structures. In short, governments across Canada recognize that there is no pathway to net-zero without addressing the emissions generated by buildings.

The federal government's *2030 Emissions Reduction Plan*¹¹ sets a bold overall greenhouse gas emissions target for 2030 of 470 megatonnes (Mt), a 35% reduction from the 723Mt emitted in 2019. The target for residential buildings is equally bold, calling for a 39% reduction from 2019's 44Mt to 27Mt by 2030. These reduction numbers understate the challenge as this target only includes emissions generated in the home and does not include the off-site generation of electricity for use in buildings or the embodied carbon from manufacturing building materials. Adding these to the analysis further increases the emissions cuts needed to hit the target.

Achieving this target will be challenging for at least two reasons. The first is the sheer diversity of sources of emissions in a residential building, as described by the emissions reduction plan:

Over 85% of buildings sector emissions come from space and water heating, due to the use of fossil fuel equipment, such as natural gas furnaces, and extra energy demand to heat and cool buildings with insufficient envelope performance. Remaining emissions come from electricity used to power appliances, lighting, and auxiliary equipment.

⁹ Government of Ontario (2018)

¹⁰ Government of Canada (2022b)

¹¹ *Ibid.*

The second reason this challenge will not be met by simply changing how new buildings are constructed is that most of the homes that will exist in 2030, and 2050, have already been built. The federal government's *2030 Emissions Reduction Plan* notes that, in 2030, more than 80% of Canada's building stock will be made of existing buildings that exist right now.

Reducing the carbon footprint of existing buildings will require knowledge of where energy savings can be made, along with retrofits to reduce the energy consumption of those homes. The federal government's current Initiative to accomplish this is the *Canada Greener Homes Grant Initiative*¹², which provides both EnerGuide evaluations (and labels) for homes and subsidies for retrofits.

How Do the Canada Greener Home Initiative and EnerGuide Labelling System for Homes Work?

Launched in May 2021, the *Canada Greener Homes Grant* provides homeowners with grants of up to \$5,000 for home retrofits and up to \$600 to support the cost of an EnerGuide home evaluation.¹³ The program is currently capped at 700,000 homes¹⁴ (of the approximately 10 million homes across Canada that are theoretically eligible for the program), with various housing forms being eligible for the program, from single detached to townhomes to mobile homes on a permanent foundation.¹⁵

Anticipating high demand for the program, the federal government also announced they would "recruit up to 2,000 new energy advisor jobs" to manage the increased demand. The day after the program was announced, waitlists to receive an audit were reported in the range of two to three months, illustrating both Canadians' interest in upgrading their homes' energy efficiency and the lack of qualified auditors.¹⁶

Interest in the program continued to climb during the first week it was launched, at one point crashing the government's website providing program details.¹⁷ By February 2022, the *Globe and Mail* had reported that some homeowners were told it would be "years" before they could get an audit.¹⁸ In response to this discussion, the government made several investments to increase the number of auditors, stating that "all Canadians will soon be able to access a pre-retrofit audit within a three-month service standard."¹⁹

This discussion was not limited to the mainstream media. Complaints about being unable to book an evaluation or long waiting times to receive an evaluation spread through social media. Here are a few examples from the popular social media site, Reddit, along with the date they were posted:

¹² *Supra*, note 1.

¹³ Government of Canada (2021c)

¹⁴ To put this number into perspective, in 2021 there were 7.8 million single-detached homes in Canada. Deschamps (2022)

¹⁵ Government of Canada (2022g)

¹⁶ Sharkey (2021)

¹⁷ Thurton (2021)

¹⁸ Blaze Baum (2022)

¹⁹ Government of Canada (2022h)

I gave up on this process when I couldn't even find a certified inspector to come assess my place. Everyone I tried to contact either never responded to me, or said they were booked solid for months and weren't taking new bookings at this time.²⁰ (October 26, 2021)

Finally a post I can speak to! I run one of the NRCan qualified service organisations that does the audits in NS/NL/PEI. Let me know if I can help with any questions... As is historically the case, we had some inkling that a federal program was coming, but no firm date or details, until the day they announced it. And then it was immediately "open". We went from booking appointments a couple weeks out to booking months out in a matter of days, and hiring new staff to train as Energy Advisors.²¹ (October 26, 2021)

I signed up the day the program was announced, must have been May 27? Around there any way. I didn't hear anything till September 30, when the inspector contacted me.²² (October 17, 2021)

I was approved on January 24 and have yet to hear from the company doing the assessment. I forgot about it until now.²³ (June 21, 2022)

We applied back in August last year and received an email saying we were approved and would hear from the company handling Manitoba. We have heard nothing at all. Wondering if anyone has actually had them in their homes to assess.²⁴ (March 29, 2022)

The first part of the process is to get a home energy assessment. We requested (for the second time because they lost our first request) an assessment August 2021 and got a March 2022 appointment.²⁵ (March 29, 2022)

I recently completed an application for the greener homes grant. The service provider I picked initially is now booking into late 2022.²⁶ (March 15, 2022)

[Service provider] told me they were booking 6-8 months out in January.²⁷ (March 15, 2022)

The popularity of the program and associated waiting lists as high demand exceeds limited supply can be explained by the program's design. Homeowners can obtain substantial subsidies to evaluate their homes for energy efficiency and make upgrades. To obtain an EnerGuide label and to reimburse the

²⁰ Reddit (2021)

²¹ *Ibid.*

²² Reddit (2022a)

²³ Reddit (2022b)

²⁴ Reddit (2022c)

²⁵ Reddit (2022d)

²⁶ Reddit (2022e)

²⁷ *Ibid.*

relevant costs through the Canada Greener Home Grant, it is necessary to go through the following steps.²⁸

First, the homeowner must ask for a pre-evaluation by an energy advisor registered with Natural Resources Canada from one of the service organizations, independent organizations licensed by Natural Resources Canada (NRCan). Independent of the government, these agents assess the energy performance and potential energy savings for homes. Homeowners can choose to use any authorized service organization to conduct the audit, each having its wait times and associated costs.

After booking an inspection time, the energy advisor will perform an on-site inspection from the exterior to the interior of the home after signing the consent form by the homeowner at the intended time.

Before the inspection, the homeowner is obligated to remove any ashes from the wood-burning appliance so that they are not drawn into the house during the blower door test. The hard-to-reach areas must also have clear access. Blower testing door equipment is used in the inspection process to determine the home's airtightness.

During the inspection, the energy advisor takes pictures from outside the home, mechanical systems, the attic space, and any wood-burning appliances and collects data about all the elements that impact the energy performance. All pictures and data are strictly protected by privacy legislation, and only one photo from the front of the house is placed in the customized report.

The on-site inspection will depend on the size and nature of the house²⁹, but it can take up to three hours. The inspection process usually starts from the exterior and continues inside the home. The collected information includes the following:

- The level of the home's airtightness, using a blower door test,
- The insulation levels of the walls, ceilings, and basement,
- The size and efficiency ratings of the space heating, space cooling (air conditioning) and water heating equipment,
- The number, type and location of all windows and exterior doors,
- Information about any ventilation equipment,
- Any other information relevant to the home energy performance

Afterward the inspection, the energy advisor enters the data into NRCan's HOT2000 energy simulation software, which models the home taking into account the mechanical equipment's efficiency and calculates the heat loss through the building envelope depending on the home's insulation level and the air leakage rate, as determined through the blower door test³⁰. The output of the above actions in the software will be used to provide the following three documents to the homeowner:

- An EnerGuide rating and label

²⁸ It is worth noting that the rules are not uniform across Canada. Québec and Nova Scotia have specific programs for the applicants to receive the Canada Greener Home Grant. Réncolimat and Home Energy Assessment are the provincial programs for Québec and Nova Scotia residents, respectively, to book their EnerGuide evaluation and register for the grant. New Brunswick and British Columbia (West Kootenay) have requested a local program as well.

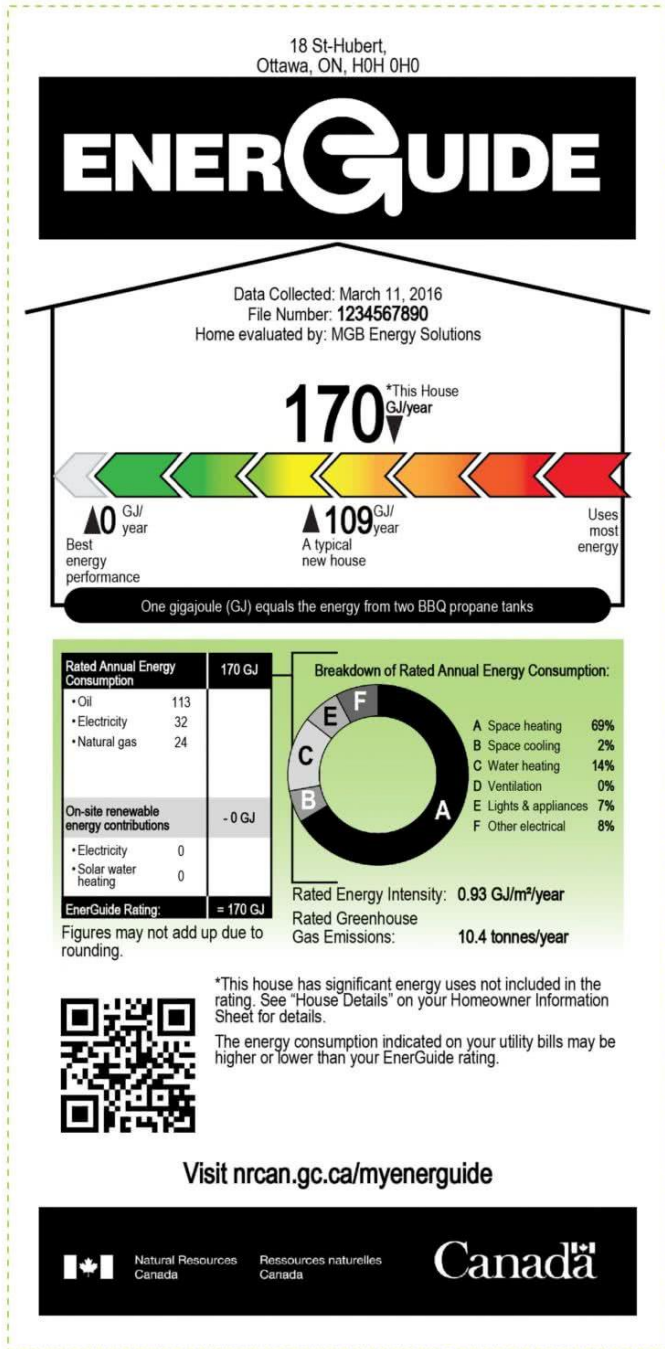
²⁹ All Season Inspection (2022)

³⁰ Greensaver (2022)

- A Homeowner Information Sheet
- A Renovation Upgrade Report

The contents of the EnerGuide rating and label can be seen in the sample in Figure 1.

Figure 1: Sample EnerGuide Rating and Label³¹



³¹ Sample label obtained from cleanBC (2022)

The label refers to a benchmark home, which is the reference point to compare the energy efficiency of the evaluation home. The benchmark home is a version of the assessed home if built to typical new construction standards for energy performance. In addition, the label includes the house address, the date of the evaluation, file number which is the unique number used for additional services from the service organization, the name of the energy advisor, EnerGuide rating scale of the assessed home and the reference home which is the total home energy consumption in a year in terms of Gigajoule (G.J.), the source of energy consumption, the estimated annual amount of renewable energy generated on-site, the pie chart showing the primary energy uses in the home with an initial overview of where the energy cost can be decreased, rated energy intensity, rated greenhouse gas emissions, and the name of the service organization that quality assured the home file.

A sample renovation upgrade report can be found in Appendix A. The report includes information categorized into the following parts: a list of recommended upgrades and energy-saving results, a breakdown of the home energy usage, before and after charts showing heat loss by building components, EnerGuide home rating before and after mentioned upgrades, customized comments from the energy advisor, and tips for energy saving.³² The homeowner can find the upgrade recommendations in the renovation upgrade report that helps them decide which upgrades would save the most energy.³³

Under the Canada Greener Home Grant Initiative, both the EnerGuide audit and the recommended upgrades are subsidized by the federal government as follows:

- A \$125 to \$5,000 grant if recommended upgrades and retrofits are purchased (note that not all retrofits and upgrades are eligible for the grant)³⁴.
- Reimbursement of up to \$600 for the initial home evaluation and post-renovation evaluation (if completed),
- Interest-free loans with a repayment term of 10 years, for up to \$40,000 for significant home retrofits.³⁵

The homeowner can apply for the retrofit grant after completing the upgrades by booking a post-retrofit evaluation and submitting the required documents. In this post-upgrade evaluation, the energy advisor expresses how much energy has been saved, the performed energy improvement, how much greenhouse gas emissions have declined, and the amount the energy advisor has recommended to be received as the grant.³⁶

Assuming the homeowner submits all required and valid documents accurately, they receive an email to confirm the grant total. The final step will be sending the cheque by mail after confirming the grant amount by the homeowner, with the grant process taking up to 30 business days after submitting the

³² Government of Canada (2022c)

³³ *Ibid.*

³⁴ Government of Canada (2022e)

³⁵ Government of Canada (2022d)

³⁶ Government of Canada (2022f)

documents. To be eligible for the grant, the homeowner must provide proof of ownership; in the meantime, they must demonstrate that the property is their primary residence through a driving license or government-issued I.D.

A shift to a mandatory system would take some or all of the features of this existing system to implement the new one. Which features will be retained and which new features will be added are still to be determined.

What Could a Mandatory System Look Like and What Problem is it Meant to Solve?

Given the existing supply constraints, it is reasonable to ask, *Given the shortage of trained energy auditors, what purpose would be served by making EnerGuide audits and labels mandatory?* We can examine the Ontario government's cancelled Home Energy Rating and Disclosure program to answer this question. This program had two explicit goals, as described in the *Climate Change Action Plan 2016-2020*:

1. Increase the uptake of retrofit incentive programs to reduce emissions and achieve emissions reduction targets.
2. Allow homebuyers to compare homes by energy rating.

These are almost certainly the same goals the federal government has in mind with their proposed mandatory time-of-sale proposal. And the logic makes intuitive sense: by making EnerGuide audits mandatory at the time of sale, the demand for audits will rise, and more audits will be completed. And the only way to ensure that homebuyers can compare homes by energy rating is if all homes have an energy rating, which necessitates making the system mandatory.

That intuitive logic, however, presupposes that the bottleneck to increasing the number of energy audits is on the demand side, not the supply side. Furthermore, it assumes that there is a sufficient supplier of auditors to give an energy rating to the over 600,000 homes sold each year in Canada.³⁷ At present, that is not the case.

Despite these challenges, a mandatory system could still have merit, as it could be designed with these supply constraints in mind. Designing to take into account supply constraints could be done through one or both of the following approaches:

Approach 1: Alter the EnerGuide audit and label approach to be less labour intensive, which could relieve the supply bottleneck and allow evaluations to be completed promptly.

Approach 2: Increase the supply of energy evaluators, encourage homeowners to obtain audits well before they sell their homes, require that homeowners *attempt* to get an EnerGuide label

³⁷ Deschamps (2022)

and evaluation before the sale, but waive any penalties for homeowners who make a good faith attempt to obtain a label before sale but cannot due to a shortage of auditors.

Fortunately, Canada is not the first jurisdiction to consider making energy-efficient labels required at the time of sale. Mandatory time-of-sale systems for residential real estate exist in other jurisdictions, most notably the United Kingdom, the European Union, and several municipalities in the United States. Their experience can guide the design of a Canadian system.

Mandatory Time-of-Sale Systems in Other Jurisdictions: What Lessons Can Canada Learn?

Should Canada adopt a mandatory time-of-sale labelling program for residential houses, it would not be the first country in the world to do so, as the European Union adopted a system two decades ago. Nor are they the only government that is currently contemplating implementing a program. Australia is currently designing a *National Framework for Disclosure of Residential Energy Efficiency Information*³⁸ which, if implemented, would give state and territorial governments the tools to implement mandatory time-of-sale systems³⁹.

In the European Union, energy efficiency labels for buildings, known as *Energy Performance Certificates* (EPCs), were introduced to the European Union in 2002 through Directive 2002/91/EC⁴⁰. The Directive mandated that “Member States shall ensure that, when buildings are constructed, sold or rented out, an energy performance certificate is made available to the owner or by the owner to the prospective buyer or tenant, as the case might be. The validity of the certificate shall not exceed 10 years.”⁴¹ By 2006, each of the then 28 European Union countries had implemented 2002/91/EC into their national laws⁴², including the provisions requiring an EPC at the time of sale or rent. These rules were further revised in 2010 through Directive 2010/31/EU⁴³ and again in 2018 with E.U. Directive 2018/844⁴⁴. Despite leaving the E.U., the United Kingdom retains a mandatory requirement through their Energy Performance of Buildings Regulations, 2012.⁴⁵ As of March 2020, the U.S. municipalities of Berkeley, California and Portland, Oregon, also have mandatory time-of-sale rules for residential homes. Austin, Texas, has a mandatory program, though houses are chosen by location and age, not whether they are for sale.⁴⁶

³⁸ Australian Government (2021)

³⁹ Australian Government (2022). Under the proposed National Framework, state and territorial governments would not be required to implement mandatory time-of-sale systems, but rather be given a framework should they wish to implement such a system.

⁴⁰ European Commission (2002)

⁴¹ European Commission (2002)

⁴² City of Edmonton (2019)

⁴³ European Union (2010)

⁴⁴ European Union (2018)

⁴⁵ United Kingdom Ministry of Housing, Communities & Local Government (2020)

⁴⁶ Riddiough and Schatzki (2020)

There are substantial differences between the rules in each jurisdiction. While the E.U. Directives set out broad frameworks that Member States must follow, they leave significant room for each country to craft regulations appropriate to the local context. As such, between the European Union and the United Kingdom, there are 28 different systems for mandatory energy efficiency labelling for residential homes. While that lack of harmonization has been cited as problematic⁴⁷, it is helpful for those wishing to design a labelling regime as it provides a wealth of examples to choose from.

This paper does not provide in-depth analysis or summary of the 27 different E.U. systems, the U.K. Directive, the Australian proposal and the handful of mandatory time-of-sale systems adopted at the municipal level in the United States.⁴⁸ Instead, our goal is to look for the best (and worst) practices in the design of a mandatory time-of-sale residential labelling system through the following four questions:

- How much does the label cost homeowners, and how long does it take to procure one?
- How do homeowners, homebuyers, and renters perceive the labels? Are they seen as accurate and useful?
- Are the regulations complied with? Are EPCs made available by the owner to the prospective buyer or tenant?
- What impact do mandatory labelling systems have on home prices?

The answers to these questions differ by jurisdiction, with the cost of procurement serving as a prime example.

Cost of Obtaining a Label and Length of Time to Procure a Label

In most E.U. countries, the price to obtain a label is determined by the market, though a handful of countries have a set price capped by law, which ranges from €40 (\$54 Canadian) in Hungary to €884 (\$1194 Canadian) in Denmark.⁴⁹ A 2020 analysis by the Buildings Performance Institute Europe⁵⁰ shows a wide variation of prices across and within some European Union countries, as shown in Figure 2. Prices charged in U.S. municipal systems fit within this range, with Riddiough and Schatzki (2020) finding that the prices in Austin, Texas range between 100 and 130 U.S. dollars (\$130 to \$169 Canadian) and 150 to 250 U.S. dollars (\$195 to \$235 Canadian) in Portland, Oregon. In Portland, the cost is borne by home sellers, with low-income households able to access a program to have their fees paid for by the municipality.

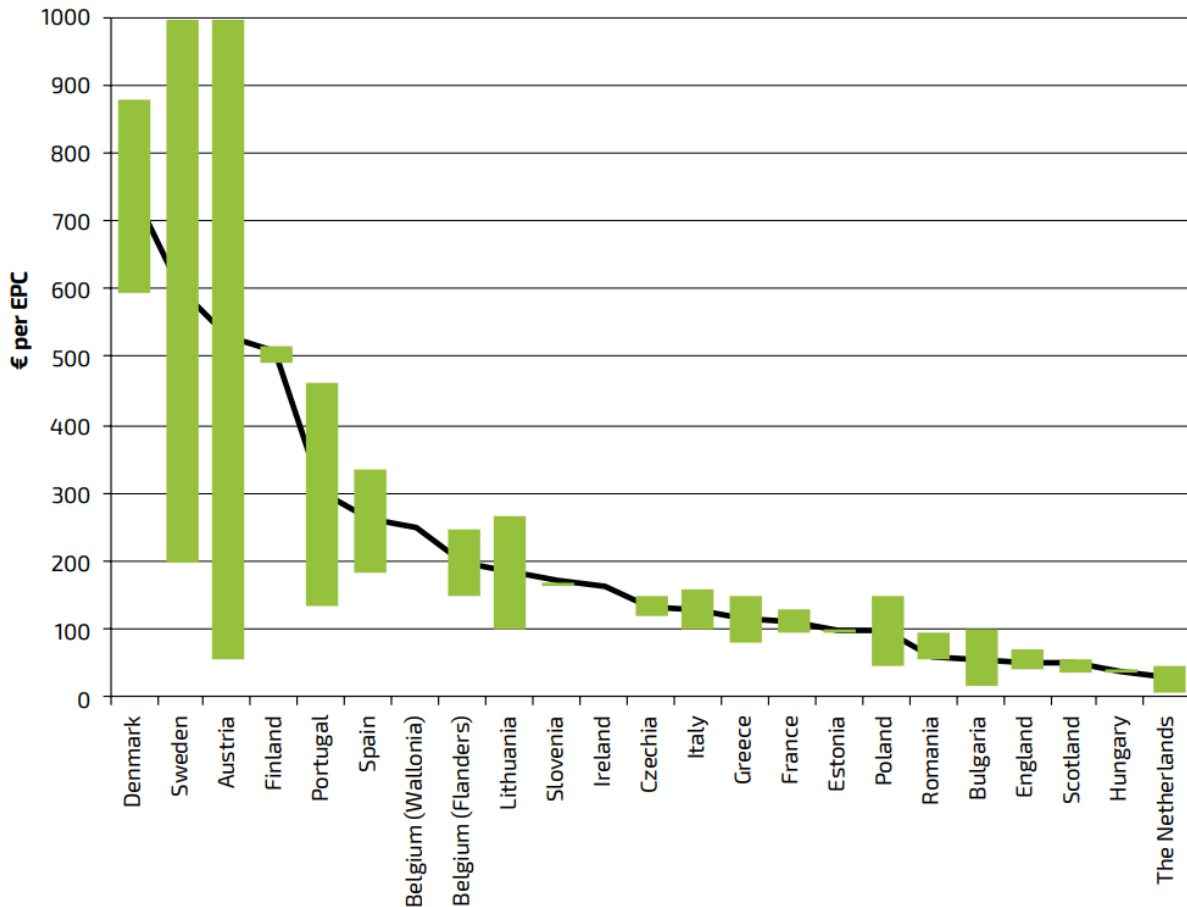
⁴⁷ Buildings Performance Institute Europe (2020). For an example of the level of disharmonization, Zirngibl and Bendžalová (2015) identify 35 different calculation methods used in the European Union to evaluate the energy performance of buildings, as some country-level systems use more than one method depending on the type and age of the building or allow for choice in the method used.

⁴⁸ For such an analysis, the International Partnership for Energy Efficiency Cooperation's report *Building Energy Rating Schemes: Assessing Issues and Impacts* provides a detailed, if now dated, comparison of national-level building level energy rating systems. (International Partnership for Energy Efficiency Cooperation, 2014)

⁴⁹ Buildings Performance Institute Europe (2020)

⁵⁰ Buildings Performance Institute Europe (2020)

Figure 2: Cost range for an Energy Performance Certificate for a single-family house, from Buildings Performance Institute Europe (2020)⁵¹. 1 Euro = 1.35 Canadian Dollars on July 1, 2022



The difference in cost is due to several factors, with Buildings Performance Institute Europe identifying “quality/comprehensiveness of the EPC methodology, variation in labour cost across E.U., number of competing actors on the market, cost of EPC software, involvement of trained experts, on-site audits, verification by an independent organisation”⁵² as among the most important. Keeping costs of obtaining a label to a minimum has been the focus of many European Union (E.U.) countries, primarily due to homeowner concerns. In a 2016 survey of 618 real estate agents in 8 E.U. countries⁵³, “additional costs for the owners” was cited as the most significant barrier to adopting an EPC, as shown in Figure 3:

⁵¹ Buildings Performance Institute Europe (2020)

⁵² Buildings Performance Institute Europe (2020)

⁵³ Pascuas et. al. (2017)

Figure 3: Do you see any problem with the current EPC? (Multiple answers were possible), from Pascuas et al. (2017)⁵⁴



Interestingly, while issues around the quality and usability of labels were cited as significant barriers to adoption, the time to obtain an EPC was not. The short waiting times are in sharp contrast to Canada, where the wait to obtain an EnerGuide label can take several months or more. Europe’s ability to keep waiting times to a reasonable level can be explained through methodological differences and less-than-full compliance with the regulations.

Are Labels Seen as Accurate and Useful?

Much of the difference in the cost of preparing a label is due to differences in the methodologies between countries used to calculate energy efficiency. Annex I of Directive 2010/31/EU⁵⁵ requires that the “energy performance of a building shall be determined on the basis of the calculated or actual annual energy that is consumed.” The structure of this requirement gives countries a great deal of flexibility in designing their national systems, as it allows for energy efficiency to be calculated based on the features of the building (known as the *asset rating*) or based on the actual past energy consumption of the property (known as the *operational rating*). The Buildings Performance Institute Europe found that 12 of 27 E.U. countries and the U.K. have adopted a methodology based on the operational rating.

⁵⁶

⁵⁴ Pascuas et. al. (2017)

⁵⁵ European Union (2010)

⁵⁶ Buildings Performance Institute Europe (2020)

Preparing labels based solely on the operational rating will tend to lower costs and speed up the time to prepare a label, as less information is required about the property. Much of the cost of preparing a label is in the on-site visit or inspection. As of 2014, six E.U. countries (Austria, Czech Republic, Estonia, Germany, Italy, and Poland) did not require any on-site visits for existing residential buildings⁵⁷. Finally, less comprehensive audit systems dispense with individualized recommendations for energy efficiency upgrades, replacing them with generic advice. The decisions to rely on operational rating, not to require an on-site visit, and not give tailored retrofit recommendations erode the label's accuracy and perceived quality. In the words of the Buildings Energy Saving Trust, there is an inherent tradeoff between the cost of producing a label and its usefulness⁵⁸:

There is a tension between speed/cost, accuracy and reproducibility... A very short and very simple survey would be fast and reproducible but not accurate, while a very detailed in-home survey delivered over several hours would be reproducible and accurate, but not fast or cost-effective.

The Buildings Performance Institute Europe (2020) has expressed concerns that this low-cost “cookie-cutter” approach taken by many E.U. countries is limiting the effectiveness of EPCs as a tool to drive down emissions⁵⁹:

The EPCs themselves have not been effective in driving renovations. Cost and time constraints often result in EPCs containing poorly tailored recommendations. Evidence suggests that an onsite visit, including the chance for the user to interact with the expert, influences the perceived quality and reliability of the recommendations and the chance that they will be implemented.

The Energy Saving Trust would echo these concerns about the perceived quality of labels, stating that “homeowners regard the EPC as a bureaucratic necessity, rather than an important document in its own right, and are keen (usually working with their estate agent) to get it procured as quickly and cheaply as possible.”⁶⁰ The 2016 survey of E.U. real estate agents, only 32 percent of agents surveyed answered “yes” to the question “Do you think there is a link between EPCs and the improvement of the energy efficiency of buildings?”⁶¹

Canada can learn from this history that focusing on keeping costs low can damage the accuracy of labels and their ability to drive energy efficiency renovations. These lessons have not been lost on the E.U., with the Buildings Performance Institute Europe (BPIE)’s 2014 report calling for improvements to the system to correct both perceived and real flaws in the mandatory labelling regime⁶²:

As long as EPCs remain mainly an administrative burden, the motivation to improve the system will remain low. EPCs need to become the starting point of individual improvement plans for each building, providing detailed, tailor-made recommendations. Improving the reliability and understanding among buyers and tenants of the benefits of having a better energy rating,

⁵⁷ Buildings Performance Institute Europe (2014)

⁵⁸ Energy Saving Trust (2018)

⁵⁹ Buildings Performance Institute Europe (2020)

⁶⁰ Energy Saving Trust (2018)

⁶¹ Pascuas et. al. (2017)

⁶² Buildings Performance Institute Europe (2014)

particularly regarding its impacts on energy bills, will influence the perceived usefulness of EPCs, together with the needed (political) push to improve the system.

Perceptions of the usefulness of EPCs not only affect their perceived value with homebuyers, home sellers, and renters but also whether or not the extent to which the rules are followed. And across the E.U., there is less than full compliance with the regulations.

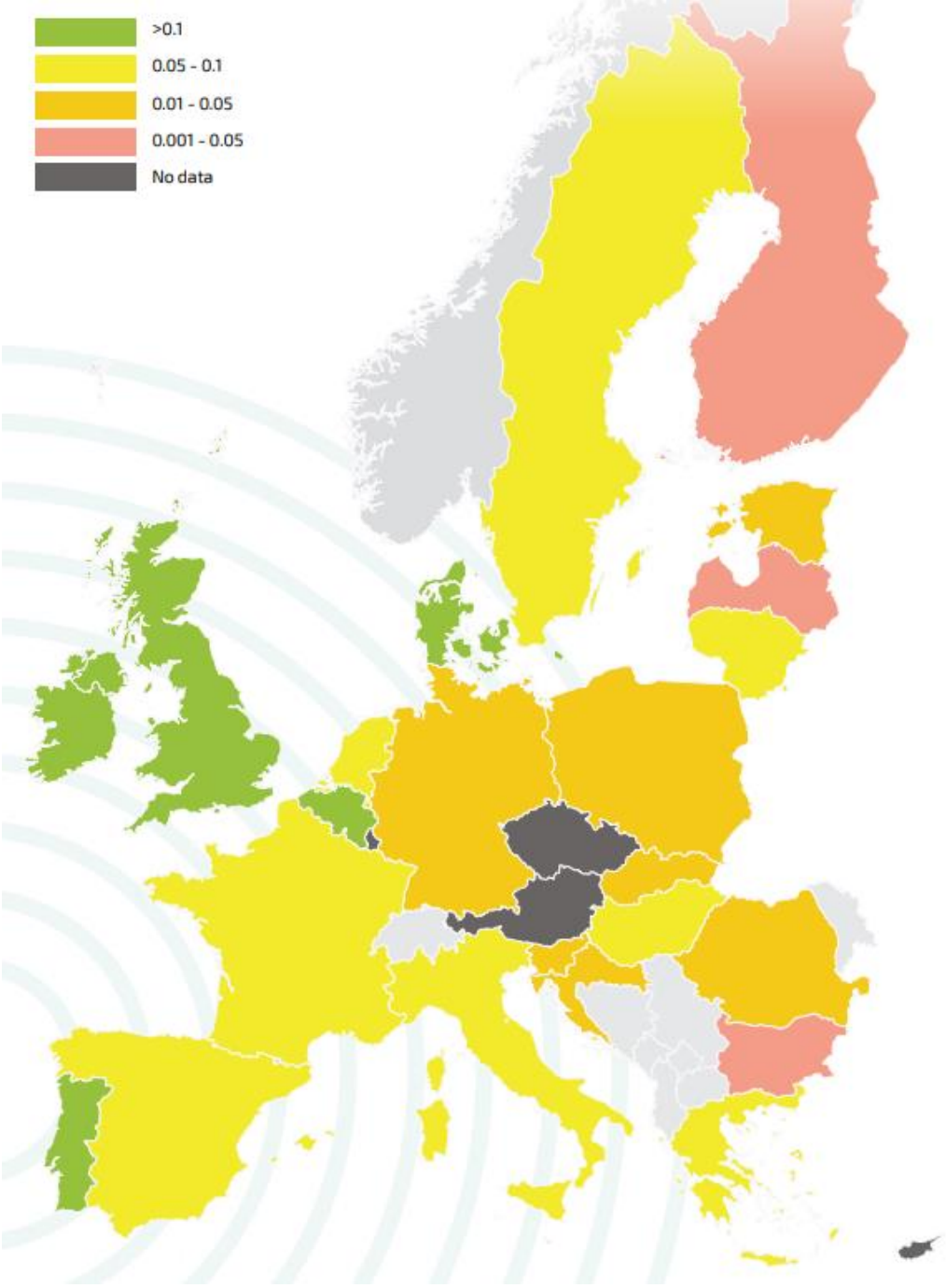
Are the Regulations Complied With?

Non-compliance with the E.U. directive can take many forms, but the most relevant for this paper is home sellers or renters not obtaining the required EPC when offering a home for sale or rent. The BPIE flagged this non-compliance as an issue in 2014, though indicated countries were taking proactive steps to address the problem. They noted that “in Belgium (Flanders), the introduction of a relatively simple control mechanism for real-estate advertisements increased the availability of the EPC only for sale and renting transactions. In 2010, 68% of dwellings advertised in commercial media had an EPC, while in 2012, this stood at nearly 95%.”

Unfortunately, detailed data does not exist on how often a home is sold or rented without a valid EPC. However, we can infer from other data sources that compliance is less than complete. For example, BPIE’s 2020 report finds that in some E.U. countries, there is less than one registered EPC for every 100 residents⁶³, as shown in Figure 4. While we cannot use this to estimate the level of non-compliance, as we do not know how many homes were sold, rented, or built since the regulations went into force, it certainly does show the number of properties with an EPC is relatively small.

⁶³ Buildings Performance Institute Europe (2020)

Figure 4: Total number of registered EPCs per capita, from Buildings Performance Institute Europe (2020)⁶⁴



⁶⁴ Buildings Performance Institute Europe (2020)

The 2016 survey of E.U. real estate agents provides additional context to the question of non-compliance. Of the 618 real estate agents surveyed, 59% stated that EPCs are always available at the time of sale or rent agreement⁶⁵, as shown in Figure 5. The figures differed substantially between countries, with 90% of real agents in France stating that EPCs are always available, but only 41% of real estate agents in Spain and 8% in Poland. It is worth noting that, outside of Poland, the percentage of agents stating that labels are rarely or never available does not exceed 15%. This low figure indicates at least some compliance with the regulations.

Figure 5: How often are EPCs presented at the time of signing a sale or rent agreement?, from Pascuas et al. (2017)⁶⁶



It is important to note that exemptions to the mandatory labelling requirements have existed in the past, so the non-existence of a label does not necessarily indicate non-compliance. Brounen and Kok (2009)⁶⁷ show how a provision in the Netherlands that allowed homebuyers to waive the seller's obligation to provide an EPC led to low adoption rates:

⁶⁵ Pascuas et. al. (2017)

⁶⁶ Pascuas et. al. (2017)

⁶⁷ Brounen and Kok (2009)

Energy performance certification is not fully mandatory in the Netherlands: homebuyers are allowed to sign a waiver that obviates the seller's obligation to certify the dwelling. Based on some 177,000 housing transactions from January 2008 through August 2009, we find that during the first three months of 2008, more than 25 percent of all housing transactions had an energy label. Soon after, the adoption rate of energy labels started to decline, eventually reaching an adoption rate of less than seven percent of the 150,000 homes that were for sale as of September 2009.

Additional research needs to be conducted to determine the compliance rates by country and the factors that determine those compliance rates. The cost of obtaining a label appears to play a role, as countries where labels can be obtained inexpensively tend to have higher compliance rates. Enforcement mechanisms and perceived 'usefulness' of labels also appear to play a role, but other factors are likely.

Compliance with the regulations is one indicator of the perceived value of labels. Another one is the impact those labels have on relative real estate prices.

What Impact Do Mandatory Labels Have on Home Prices?

If homebuyers and renters are given EPCs and find the information on those EPCs credible, then they should favour homes that rate well over those that rate poorly. This relative change in demand should cause the relative price of highly rated homes to rise and poorly rated homes to fall. Empirically, this is challenging to test for, as the question is not do homebuyers and renters value energy efficiency but instead does the existence of an EPC cause a relative shift in demand over other forms of estimating the energy use of the property, such as through electricity bills.

Riddiough and Schatzki (2020) provide an extensive literature review of the studies conducted to answer this question. There are significant differences in the findings of the studies, but Riddiough and Schatzki show that the weight of evidence does show a relationship between energy ratings on labels and relative home prices⁶⁸:

Across these studies, energy ratings and green labels are associated with differences in property values, which supports the conclusion that energy ratings and green labels affect property values. All else being equal, on average properties with higher energy ratings (or green labels) had higher property values (that is, they sold at a premium), and those with low ratings had lower property values (that is, they sold at a discount). Magnitudes vary across studies, but the impacts are material. Estimated premiums from high energy ratings or green labels range from approximately 1.2% to 27% relative to comparable properties of average energy efficiency. In contrast, estimated discounts for properties with low energy ratings range from approximately 3.6% to 10.6% relative to properties with average energy efficiency.

These results need to be approached with caution, as many of the studies simply show that higher-rated homes have higher values, without determining if it is the information on the label that is generating additional value or it is simply the energy efficiency of the home, which buyers and renters could

⁶⁸ Riddiough and Schatzki (2020)

determine through other means. While additional research needs to be conducted, the current weight of evidence does support the conclusion that energy efficiency labelling can increase the value of energy-efficient homes and decrease the value of lower-rated properties.

Summary of Lessons from Existing International Experiences

By designing their mandatory time-of-sale systems well after the European Union had implemented theirs, Australia and Canada can benefit from the E.U.'s experience. Given the current state of energy efficiency labelling at the Member State level and the reform recommendations made by the BPIE⁶⁹ and other groups, we believe there are three essential lessons Canada and Australia can learn from Europe:

1. **On-site inspections matter.** Retrofits drive energy efficiency improvements and emission reductions, not the labels themselves. A high-quality labelling system can spur energy efficiency investments if coupled with high-quality upgrade recommendations and a chance to interact with energy efficiency experts. If procuring a label is seen simply as meeting a regulatory requirement, investments in energy efficiency are likely to be minimal.
2. **Policymakers must know the trade-off between accuracy and cost (and speed).** High-quality labels and tailored recommendations will naturally be labour-intensive and expensive. This tradeoff creates a dilemma for policy-makers: A simple system for generating efficiency ratings is affordable for homeowners, leaving more money in their pockets and compliance rates higher. However, those ratings will lack accuracy and are less likely to drive energy efficiency upgrades. On the other hand, a more labour-intensive method will be more expensive for homeowners and buyers (in the absence of subsidies) and may generate higher rates of non-compliance.
3. **Compliance will likely be low without proper incentives and/or strictly enforced regulations.** If enforcement is low, if the out-of-pocket cost or time it takes to obtain a label is high, or if the labels are perceived to have little value, then rates of non-compliance are likely to be high.

This international experience and the lessons learned allow us to create a set of design principles that we believe are necessary for a mandatory time-of-sale labelling system to be a success.

The First Four Properties Needed to Ensure A Successful Home Energy Efficiency Labelling System

Recall the two goals of the Ontario government's cancelled Home Energy Rating and Disclosure, which are almost certainly the same goals the federal government has in mind for a mandatory time-of-sale rating system:

1. Increase the uptake of retrofit incentive programs to reduce emissions and achieve emissions reduction targets.
2. Allow homebuyers to compare homes by energy rating.

⁶⁹ Buildings Performance Institute Europe (2020)

The program must be well-designed to achieve those goals. Furthermore, it must be well-designed to have Canadians' support to continue existing long enough to achieve those goals. If the public loses faith in the program, it will be scrapped, and the government's role in efficiency disclosure and emissions reductions through residential retrofits will come into question.

Based on the international experience described in the previous section, along with the 2018 *Mandatory Home Energy Rating and Disclosure for Existing Houses* report from the Consumers Council of Canada, and the debate surrounding the Ontario HER&D program, we identify four design principles that the federal government should follow in their program, each beginning with the letter A.

Accurate

The Consumers Council makes it clear that a perceived lack of accuracy would threaten the support and viability of a mandatory time-of-sale program:

The success of a mandatory HER&D system depends on public trust in the quality of the rating. Without quality checks to ensure accuracy and honesty, and without a consumer redress process a mandatory HER&D could quickly lose favour with consumers.⁷⁰

The quality checks and redress process are vital to success. So is the method in which the energy efficiency rating is calculated. The current evaluation process, which includes an on-site assessment of the home and blower door test, is more labour and time-intensive than methodologies used in other jurisdictions. The E.U. experience suggests that labels that lack on-site inspections and use overly simple methodologies will not be perceived as accurate by consumers.

Actionable

Labels alone do not reduce energy usage and GHG emission reductions. Instead, homeowners must invest in substantial upgrades and deep retrofits to make their homes more energy-efficient. These upgrades could come through either incoming homeowners making those investments or existing homeowners upgrading their homes before putting them on the market to make those homes more attractive to potential buyers. The Consumer Council of Canada puts it bluntly that policymakers must "recognize that homeowners value the upgrade recommendations and that ratings are generally poorly understood and are less important."⁷¹ While this is arguably an overstatement, it is not enough to rate the home's energy efficiency. Homeowners must be given the tools to improve their energy efficiency (and thus the ratings). A renovation upgrade report is vital to a well-functioning mandatory time-of-sale labelling requirement.

Attainable

The Consumer Council included the following three items on their list of potential risks in Ontario's HER&D program (in their words):

⁷⁰ Consumer Council of Canada (2018)

⁷¹ *Ibid.*

1. A homeowner being unable to find a certified energy advisor because of a home's geographic location.
2. A homeowner being delayed in selling one's house because its home energy label was not ready.
3. A home energy evaluation that takes too long and delays renovations or other timely activities for a homeowner or homebuyer.

The potential for delays was the primary concern of the Ontario Real Estate Association during the design of Ontario's HER&D program. The long delays and inability of some Canadians to obtain energy evaluations after the launch of the *Canada Greener Homes Initiative* prove that these concerns were warranted.

Requiring, using the force of law, that home sellers obtain a label but not providing them with the means to do so would rapidly undermine support for the Initiative. Stories about how someone needed to sell a home in a hurry due to an essential new job or to leave an abusive situation but was blocked from doing so because they could not attain a label would generate significant sympathy and backlash against any government that introduced the system. Furthermore, many home sellers who could not obtain a label, through no fault of their own, would disregard the system and put their home up for sale anyway, risking a financial penalty. These fines would create additional costs and stress when selling a home and generate ill-will toward the program without increasing energy efficiency or reducing greenhouse gas emissions.

Homeowners choosing to pay a fine rather than wait months to obtain an energy audit assumes that the mandatory time-of-sale requirement would be enforced. When writing this paper, it is unclear who would be responsible for enforcing the requirement. While a regulation with lax or non-existent enforcement would mitigate the concerns about unnecessary transaction costs, it would also undermine the goal of ensuring that potential homebuyers could compare the energy efficiency of homes they were considering purchasing.

Affordable

The cost to obtain an energy evaluation under the existing *Canada Greener Homes Initiative* can vary substantially between providers but typically are in the range of \$300 to \$1,000. In a Reddit thread from October 26, 2021⁷², several users described the costs they paid as follows:

- "GNI came and gave me a quote before BSG did the pre-audit. (\$497.20)... BSG came and did the post-audit on February 12, 2022. (\$265.55)"
- "I burned 400\$ with the audit done"
- "I'm in Ontario. I paid \$550 for my audit."
- "My first was 500+tax for Ottawa, ON. Second I think is half of that (haven't done it yet and am still going through the consultation process with contractors). I won't get the full 600 which is annoying but it will cover most of the cost."
- "\$750 i was quoted for the pre and post audits is a lot of money to spend"
- "\$700 for the audit both pre and post."

⁷² Reddit (2021)

- "Mine quoted me for \$450 for first inspection and then \$250 for post-inspection. But other companies may charge differently."

We obtained similar figures when calling energy evaluation companies across Canada or visiting their websites. The federation of municipalities known as metrovancouver noted that an EnerGuide home energy evaluation costs \$350-\$400 for an existing home and \$600-\$900 for a new home.⁷³ Windfall Home Energy, located in Ontario, listed pre-retrofit evaluation costs as \$450 plus tax and post-retrofit evaluation costs as \$230 plus tax.⁷⁴ Based on Alberta Real Estate Foundation⁷⁵, an EnerGuide home evaluation will cost anywhere from \$300-\$750.

In the telephone survey conducted by the Consumers Council, 52% of homeowners (sample size 1000) indicated that they would be willing to pay \$100 to \$200 for an energy audit, which is well below the prices currently charged by firms. However, under *Canada Greener Homes*, the federal government provides refunds of up to \$600 for the evaluation. Hence, the out-of-pocket cost for consumers is typical \$200 or less, in line with what surveyed Canadians believe is reasonable.

There have been some complaints on social media about the time it takes to get rebated and the necessity to pay for an audit up front, then wait months or more to have the money rebated back. Although the net cost of the evaluation is low, the need to outlay cash upfront to be rebated at an unspecified later date may act as a barrier to adoption for Canadian homeowners on a fixed income.

Simultaneously satisfying all four of these design principles is vital but will also prove a challenge as they act in conflict with each other.

The Tensions Between the A's

There are two apparent tensions between the four design principles identified so far:

1. A system that is accurate and actionable will struggle to remain affordable, as a labour-intensive system is inherently expensive.
2. Obtaining accurate and actionable labels will take time and, therefore, is not attainable for those needing to sell a home quickly.

The solution to the first tension is having the cost of labels subsidized by the government, as is the case with the *Canada Greener Homes Grant* and Ontario's HER&D program. The second tension will prove more difficult, as it is unlikely (and inefficient) to have a reserve pool of energy auditors ready at a moment's notice, to ensure that any homeowner that needs an evaluation can immediately obtain one, thus an accurate and actionable system is likely to lack attainability. Watering down the evaluation criteria or abandoning the requirement for a renovation upgrade report can improve attainability but at the expense of accuracy and actionability. In short, improving on one dimension creates the unintended consequence of weakening another.

⁷³ Metrovancouver (2022)

⁷⁴ Windfall Energy Centre (2022)

⁷⁵ Alberta Real Estate Foundation (2022)

The attainability trade-off is not the only unintended consequence of a mandatory time-of-sale system. Another is a possible trade-off between emissions from buildings and emissions from transportation.

A Potential Unintended Consequence from Energy Efficiency Labelling for Homes: Increased Sprawl

One of the two stated goals of Ontario's proposed Home Energy and Rating Disclosure Program was to "[allow] homebuyers to compare homes by energy rating." The thinking goes that a large segment of homebuyers care about energy efficiency or reducing their carbon footprint (or both), so presented with accurate information, they are more likely to choose energy-efficient homes. This shift would increase the relative demand for energy-efficient homes and decrease the demand for less energy-efficient homes, changing the relative price of those homes. This demand rebalancing can cause further investments in energy efficiency, as owners of less energy-efficient homes will have an added incentive to invest in upgrades and retrofits before selling their homes, so their homes will have higher energy efficiency ratings when they hit the market. The evidence in the European Union suggests that this effect is real.

If energy efficiency is a consideration in buying a new home, sellers of homes can respond by making the recommended upgrades in their renovation upgrade report. However, a home's energy efficiency depends on other characteristics unrelated to these factors. In a study of energy efficiency scores in Portland, Oregon, Riddiough and Schatzki found that "[l]arger size and more bedrooms are associated with lower ratings, while older houses and more bathrooms are associated with higher ratings."⁷⁶ These findings were statistically significant and controlled for other differences in the homes, such as types of windows and heating systems. These results should not be surprising; a 2008 U.S. Department of Energy report found that the average home built in the 1990s consumed less energy per square foot than the average home built in the 1940s.⁷⁷ Due to changes in building codes and methods, newer homes are inherently more energy-efficient than older ones.

Energy efficiency is not the only difference between older homes and newer ones. Because of land availability, newer homes are typically (but not always) built on the periphery of communities. Since they are built farther away from city centres, they are further from the places families shop, work, and play. They are also less likely to be served by public transit. Our net-zero targets will require households to reduce their emissions from both their homes and their transportation.

The differences in energy expenditure and greenhouse gas emissions due to transit can be significant. Welegedara et al. (2021)⁷⁸, in the journal *Environmental Challenges*, examined average greenhouse gas emissions by household, at the neighbourhood level, in the city of Edmonton. They used an existing City of Edmonton taxonomy to divide twelve residential neighbourhoods into four types⁷⁹:

⁷⁶ Riddiough and Schatzki (2020)

⁷⁷ Walls (2014)

⁷⁸ Welegedara et. al. (2021)

⁷⁹ *Ibid.*

These neighbourhoods are mainly residential (on average 87% of the built area in the selected neighbourhoods is residential) but also consist of some neighbourhood level commercials and offices. The City of Edmonton broadly classifies its residential neighbourhoods into four types based on the order in which the city grew in the last century or so. Neighbourhoods that are in the downtown area or its immediate periphery are classified as core, followed by mature, established, and developing neighbourhoods in that order expanding outwards from the city center (downtown).

Not surprisingly, they found that transportation emissions were proportional to the distance to downtown. Residential and commercial emissions are higher, per capita, in core than in established ones. These results are not surprising, given that homes in core neighbourhoods are, on average, older than in established neighbourhoods. However, emissions from transportation are significantly *higher* on average in established neighbourhoods. When considering both building and transportation emissions, per capita emissions are *higher* in established neighbourhoods than in core, indicating that any difference in building emissions is more than offset by the difference in transportation emissions. Both transportation and building emissions are highest in developing neighbourhoods. While these have the newest residences, these residences are much larger per person than ones in other neighbourhoods, which explains their relatively high levels of emissions. The results of the Welegedara et al. study can be found in Figure 6.

Figure 6: Per Capita GHG emissions by Edmonton neighbourhood type, from Welegedara et al. (2021)⁸⁰

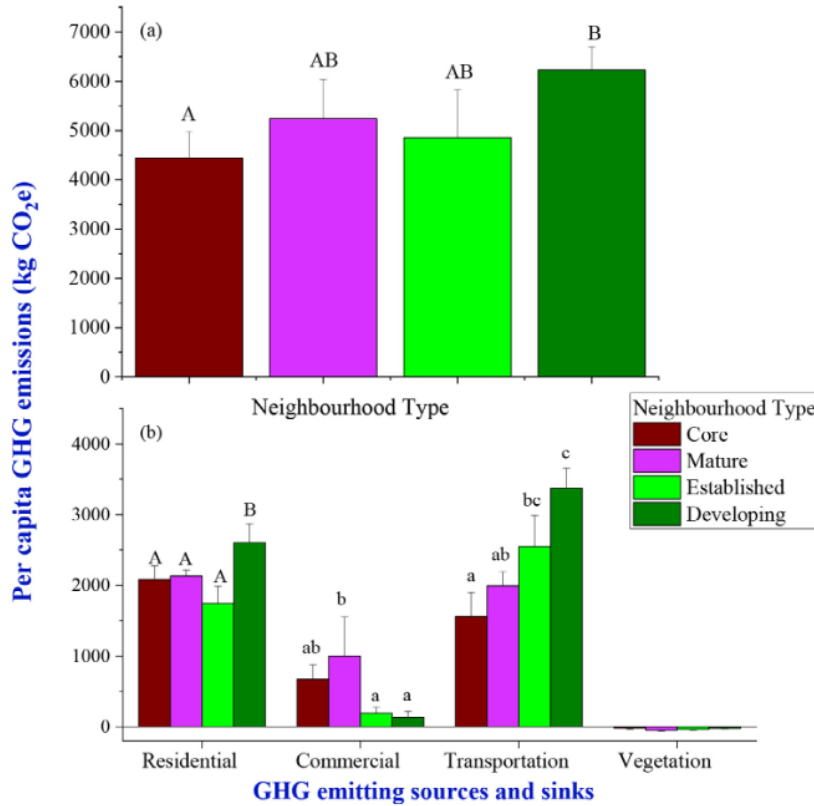


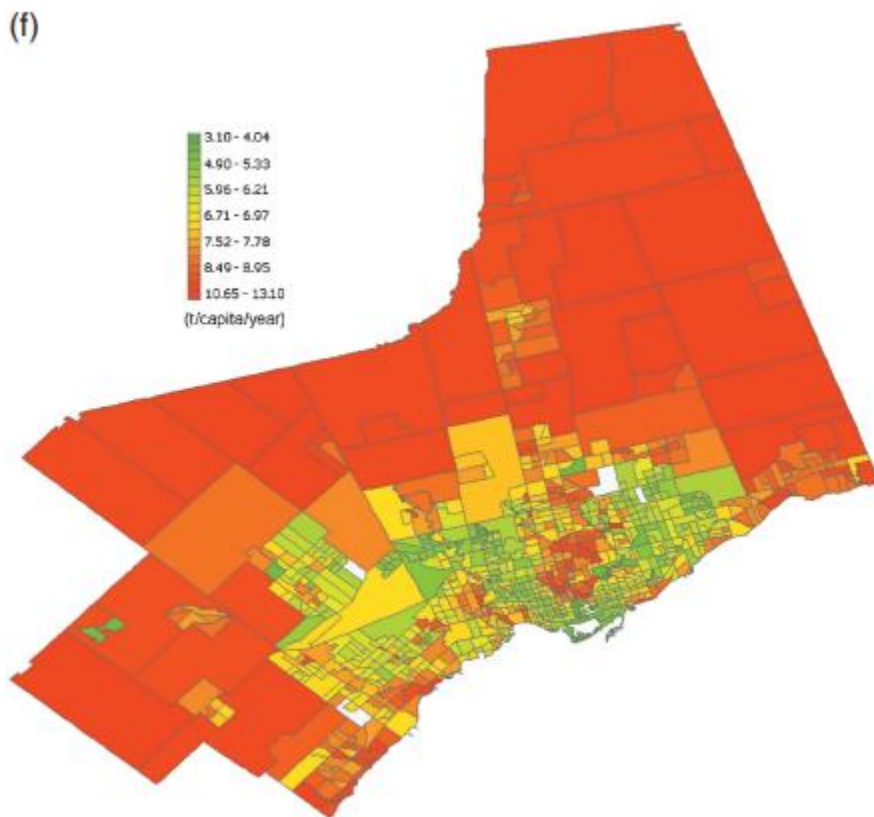
Fig. 4. Per capita GHG emissions (a) total (b) from different sources in different neighbourhood types in 2015. Vertical bars represent one standard deviation of the mean ($n = 3$). Lowercase letters ($\alpha = 0.05$) and uppercase letters ($\alpha = 0.1$) indicate significant differences in GHG emissions among neighbourhood types.

Similar dynamics can be found in other Canadian cities. VandeWeghe and Kennedy's 2007 study⁸¹, *A Spatial Analysis of Residential Greenhouse Gas Emissions in the Toronto Census Metropolitan Area*, shows a direct relationship between proximity to downtown Toronto and GHG emissions. Figure 7 shows per capita GHG emissions from 'combined residential activities,' which includes emissions from total building operations, electricity use, building fuel use, total transportation and transit by neighbourhood in 2001.

⁸⁰ *Ibid.*

⁸¹ VandeWeghe and Kenedy (2007)

Figure 7: Annual per capita residential GHG emissions combined residential activities, Toronto CMA, from VandeWeghe and Kennedy (2007)⁸²



As with buildings, emissions from transportation are partly a function of technology, and these emissions will decline due to innovations in fuel efficiency and a switch to electric vehicles. While these innovations reduce transportation emissions, they do not eliminate them, as there are still some emissions from fuel usage, along with the emissions from manufacturing vehicles and batteries. We also need to consider that land-use changes can contribute to emissions, as carbon sinks are replaced by development.

These trade-offs lead to the addition of 'all-inclusive' as a design element.

The Fifth Property Needed to Ensure A Successful Home Energy Efficiency Labelling System: All-Inclusive

The goal of the Canadian government is not to reduce emissions in one sector of the economy. Instead, their goal is to reduce emissions across the board so Canada can achieve their 2030 and 2050 climate targets. A family's choice of home will impact not only their carbon footprint from the structure of the

⁸² *Ibid.*

building but also their footprint from transportation. Both are important and relevant and should be disclosed to the purchaser, which creates our fifth design principle:

All-Inclusive: To provide homeowners with details on their expected energy usage and greenhouse gas emissions, labels should also include expected energy usage, and greenhouse gas emissions from transportation, as where a home is located is a critical factor in a family's energy use and GHG emissions from transportation.

With this final design principle in mind, we can construct a series of recommendations to assist the federal government in designing an effective mandatory time-of-sale label program.

Designing Policy to Achieve All Five As: Recommendations

Ours is not the first Canadian report to offer recommendations for a mandatory time-of-sale EnerGuide labelling system. In March 2018, the Consumers Council of Canada published *Mandatory Home Energy Rating and Disclosure for Existing Houses: Opportunities and Risks for Consumers*⁸³ to provide advice on the Ontario government's proposed Home Energy and Rating Disclosure Program. As part of their report, they conducted interviews with key stakeholders, two homeowner focus groups, and a national survey. Their report and recommendations focused on reducing homeowners' risks to increase consumer confidence and protection once the system was implemented. The report provided 43 recommendations, which they divided into seven categories, which they named as follows:

1. Ensure access to good quality information and homeowner education
2. Reduce the complexity, cost and time needed to obtain a home energy rating
3. Maintain quality assurance
4. Recognize that homeowners value the upgrade recommendations and that ratings are generally poorly understood and are less important.
5. Allow exemptions to mandatory HER&D
6. Build capacity slowly and steadily
7. Ensure homeowner privacy where explicit consent has not been provided

Our approach differed from the Consumers Council of Canada, as our focus was on examining best (and less-than-best) practices from jurisdictions with existing time-of-sale labelling systems. Despite this difference in approach, this paper comes to similar but not identical conclusions. Analogs to the *accurate, actionable, attainable, and affordable* framework developed in this paper can be seen in the recommendations made by the Council.

While our recommendations share some similarities to those advanced by the Council, there are some differences.

⁸³ Consumer Council of Canada (2018)

Recommendation 1: *The federal government should retain the existing incentives for homeowners to obtain labels before the time of sale and dramatically increase the number of qualified auditors to reduce waiting lists. Having homeowners obtain labels well before a sale and the increase in auditors would help address both the attainability and affordability issues.*

Since the *Canada Greener Homes Initiative* launch, the government has made several announcements and investments to increase the number of energy advisors, including one in January 2022, providing \$903,000 to the Manitoba Environmental Industries Association (MEIA).⁸⁴ These investments must continue to ensure the government lives up to its three-month service standard to obtain an evaluation, so Canadians can enroll in the Initiative rather than simply giving up hope.

If a homeowner is not planning on selling their home, then a three-month wait for an evaluation is reasonable, mainly since the federal government subsidizes both the audit and potential renovations. However, asking someone considering selling a home to wait three months to obtain an audit is unreasonable. As much as possible, the government should encourage and incentivize homeowners to have their evaluations done well before putting their homes on the market. Suppose most Canadian homeowners have already completed a still-valid evaluation. In that case, they will not need to obtain another evaluation when they put their home on the market. Attainability is reduced as an issue if most Canadian homeowners already have an EnerGuide label when considering selling a home.

The federal government should also recognize the scope of the challenge this presents. In June 2022, the government announced that “almost 300 new homeowners each day” are applying for the *Canada Greener Homes Grant*.⁸⁵ There are roughly 10 million Canadian homes that may need an EnerGuide label. At the current pace, it would take over 90 years to provide audits to every Canadian home that requires one.

Recommendation 2: *To ensure the EnerGuide program remains accurate and actionable, the federal government should keep the existing audit methodology and four components of the energy evaluation system. Although eliminating the requirement to provide a list of suggested upgrades would speed up the process, making obtaining a label more attainable, it would undermine the value of the EnerGuide program. The federal government should not sacrifice accuracy or actionability in pursuit of increased attainability.*

The upgrades drive decarbonization to homes, not the labels themselves. In the authors' view, abandoning the renovation upgrade report to reduce waiting times should be a non-starter. Furthermore, any reduction in accuracy in the evaluation process harms the program's credibility, so the government should tread carefully if considering reforming the on-site inspection process. In short, if there is a trade-off between attainability on one hand and accuracy and actionability on the other, we recommend the government lean towards accuracy and actionability and find other ways to improve attainability.

⁸⁴ Government of Canada (2022h)

⁸⁵ Government of Canada (2022i)

Recommendation 3: Allow exemptions to be made to mandatory labelling, specifically the exemptions recommended by the Consumers Council of Canada in 2018.

Given the shortage of trained energy auditors, energy assessments mustn't be wasted on properties that do not require them, such as homes that will be torn down or have already received a home energy rating. The Consumers Council of Canada recommended the following exemptions (in their words), all of which appear reasonable⁸⁶:

- A house that has been newly built and does not need energy efficiency upgrades.
- A house that had undertaken approved energy efficiency improvements within the last 10 years.
- A house that will be demolished
- A house that is received as part of a will.
- A house that is received as part of certain ownership changes or title transfers.
- A house that has already received a home energy rating and label previously.
- Allow the onus of obtaining a home energy label to be transferred from the homeowner to the buyer, if agreed to by both parties.

The federal government should not consider exempting homes purchased through private sale or auction (unless they already fall into one of the other exempted categories). Home sellers should not be able to 'opt out' of their energy efficiency obligations by choosing alternative selling methods.

Recommendation 4: The federal government should fully finance the cost of energy audits, making them free of charge to homeowners, as was planned under Ontario's Home Energy Rating and Disclosure program. Furthermore, the government should pay those costs up-front rather than requiring the homeowner to pay and be reimbursed later.

According to the Consumers Council of Canada report⁸⁷, one of Canadians' most significant concerns about mandatory time-of-sale labelling requirements is the cost to consumers. The Council's survey found that the financial cost of an energy evaluation was the most significant barrier to obtaining one for one-third of respondents with household incomes under \$50,000 a year. In their focus group conducted in Montreal, six of eight respondents believed the government should subsidize the cost of a label, either partially or entirely. All in attendance in the Toronto focus group held those views.

The government fully financing a mandatory labelling initiative will not be an inexpensive undertaking. The bill to audit Canada's estimated 7.9 million single-detached homes alone would be almost 5 billion dollars if the cost per audit were roughly \$600 per home. In a mandatory system, *someone* will be footing the bill for these audits to occur, either government (and ultimately taxpayers) or homeowners. By having the bill footed by the government, they can negotiate a better price because they would buy in bulk. The public support for the Initiative is likely higher, based on the responses to the Council focus groups.

⁸⁶ Consumer Council of Canada (2018)

⁸⁷ *Ibid*

As with the current *Canada Greener Homes Grant*, homeowners could still choose the evaluation company from a list of providers approved by Natural Resources Canada. Consumer choice would allow for competition in the space, where households could choose a provider based on their needs and distinguish between providers based on professionalism and turn-around time.

Recommendation 5: *The federal government should recognize it will not always be practical or possible to have a complete energy evaluation at the time of sale and should not penalize homeowners who make a good-faith effort to obtain an audit and label. To ensure homeowners are not penalized for good-faith efforts to obtain an audit, the time-of-sale requirement should be that the evaluation has been scheduled, not that it has been completed. A temporary pre-audit label could be provided to give the homebuyer some, albeit incomplete, information about the home.*

Simply put, it is unrealistic to have accurate labels, with an actionable renovation upgrade report, at the time of sale with a 100 percent compliance rate. The waiting times for energy evaluations are too long and will likely remain too long to allow homeowners who need to sell their houses quickly to comply with the regulation. High rates of non-compliance will erode public goodwill toward the program, notably if homeowners in hardship situations are fined for factors outside of their control.

One possibility would be to require less labour and time-intensive evaluation methods or to eliminate the preparation of a renovation upgrade report (or both). Based on experience in other jurisdictions, we believe these moves would do more harm than good. Upgrades and retrofits will primarily reduce emissions on existing residential buildings, so eliminating this requirement would be counterproductive. Watering down the evaluation method would yield less accurate results and provide less insight into the renovations needed to increase efficiency.

With that in mind, we offer a compromise solution, which would still allow homebuyers to compare properties when purchasing a home, but does not punish homeowners who make a good faith attempt to obtain an energy evaluation and label. It is based on the Consumer Council of Canada's recommendation 2c:

Consider allowing homeowners to conduct a self-assessment, allow homeowners to receive an auto-generated label through public building data. This is a web-based application that is self-administered and uses energy bills and occupant supplied housing characteristics. This initial label will be a temporary label until it is verified by a third-party energy advisor. This temporary label will be valid to proceed with all real estate transactions. A final home energy label will be issued within a pre-described amount of time after issuing of the temporary label.

We recommend that home sellers be allowed to generate such a label during the waiting period between booking an energy audit and receiving their completed final label. That is, we would recommend that the mandatory time-of-sale requirement be structured as follows:

1. Before an existing single-family home can be listed for sale or sold, homeowners must have obtained an energy evaluation and label *or* have one scheduled for the future.

2. In cases where energy evaluations have been scheduled but not completed, homeowners must conduct a self-assessment, which would generate a temporary label. This label would indicate that the label is temporary and that the results are less accurate than those obtained under the complete evaluation.

These provisions would retain both the logic and the spirit of the mandatory time-of-sale requirement while recognizing the practical limitations of providing evaluations to 100 percent of home sellers in a reasonable time standard.

Recommendation 6: *To avoid encouraging sprawl and give homebuyers information on expected energy use from transportation, the EnerGuide label should be expanded to include projected energy consumption and GHG emissions from transportation on the EnerGuide label.*

Providing potential homebuyers only with data on GHG emissions and energy use from the house's structure paints an incomplete picture. The location of the house matters, often more so than the structure. Home buyers should be given expected GHG emissions and energy use from transportation. These estimates could be incorporated into the software that prepares the labels, with the estimate being tied to the postal code of the home, creating no additional work for the evaluator. Although incorporating these estimates and regularly updating them as transportation emissions change through technological innovation would require additional effort for the federal government, we believe this effort to be worth it to provide a complete picture of the energy efficiency of how and where a family lives.

While these recommendations will increase the probability that a mandatory time-of-sale system works well, they cannot guarantee it will be a success. The current supply shortages leading to long and variable waiting times to receive an evaluation and label must be addressed before a mandatory time-of-sale system is even considered. Even with that in place, there will be occasions when Canadians who need to sell a home quickly, perhaps to take a new job, or leave an abusive situation, may feel they are prevented from doing so. Unfortunately, these situations would likely lead to media stories that could embarrass the government, from outlets wishing to discredit energy efficiency systems entirely.

The government may wish to consider making a mandatory system tied to something other than time-of-sale. One possibility would be to require *all* homes of a certain age to obtain an evaluation, regardless of whether or not they are for sale. Another would be a staggered approach to ensure every house receives an evaluation in the next ten years. This staggered approach could be tied to postal code; for example, it could be a requirement that in the year 2027, every home with a postal code ending in 7 (e.g. K1S 2B7) obtain an energy efficiency audit. The benefit of such an approach is that it gives the homeowner time to obtain an evaluation by decoupling it from a sale activity. Furthermore, the federal government can better control the demand for evaluations; if it knows that 10% of all homes will receive an audit in a current year, it can ensure an adequate supply of evaluators to match that demand. In summary, a little creativity could create a system that achieves the same goals as a mandatory time-of-sale system but with fewer unintended consequences.

Conclusion: EnerGuide Labels for Homes are Valuable and Popular. A Mandatory Time-of-Sale Requirement Needs to be Well-Designed to Ensure Continued Success of the Program

Home energy retrofits are an essential tool for Canada to hit its 2030 and 2050 climate targets. Programs to encourage those retrofits and the home energy evaluations, which are necessary first step for those retrofits, should be encouraged. Under the current *Canada Greener Homes Grant Initiative*, the demand to obtain an evaluation and EnerGuide home label vastly outstrip the supply. Given this demand-supply imbalance, the government's primary focus should be on increasing the supply of inputs required to make labels rather than increasing the already high demand levels. It is an unorthodox choice to require home energy labelling for existing homes at the time of sale when supply outstrips demand. Despite these concerns, it is possible to design a successful mandatory time-of-sale system that does acknowledge the existence of these supply constraints. By following the five design principles: accurate, actionable, attainable, affordable, and all-inclusive, that are identified in this paper, the federal government can maximize the chance of success. However, the government must address chronic supply-side shortages and consider alternative approaches to a mandatory time-of-sale system.

References

1. Alberta Real Estate Foundation (2022) *EnerGuide: How does your home rate?* <https://aref.ab.ca/energuide-how-does-your-home-rate/>
2. All Season Inspection (2022) *Energy Audit* <https://allseasoninspection.ca/energy-audit>
3. Australian Government (2021) *National Framework for Disclosure of Residential Energy Efficiency Information* <https://www.energy.gov.au/sites/default/files/2022-02/Draft%20National%20Framework%20for%20Disclosure%20of%20Residential%20Energy%20Efficiency%20Information.PDF>
4. Australian Government (2022) *Improving the Nationwide House Energy Rating Scheme (NatHERS)* https://www.nathers.gov.au/sites/default/files/2022-05/consultation_summary_report_april_2022.PDF
5. Blaze Baum, Kathryn (2022) *Ottawa's next Push on 'Green Homes' Is to Require an Energy Audit before You Can Sell* The Globe and Mail <https://www.theglobeandmail.com/business/article-ottawas-next-push-on-green-homes-is-to-require-an-energy-audit-before/>.
6. Buildings Performance Institute Europe (2014) *Energy Performance Certificates Across the E.U.* <https://bpie.eu/wp-content/uploads/2015/10/Energy-Performance-Certificates-EPC-across-the-EU.-A-mapping-of-national-approaches-2014.pdf>
7. Buildings Performance Institute Europe (2020) *Energy Performance Certificates: Assessing their Status and Potential* https://www.bpie.eu/wp-content/uploads/2020/06/X-TENDO-REPORT_FINAL_200519_pages.pdf
8. cleanBC (2022) *What is an EnerGuide home label?* <https://betterhomesbc.ca/faqs/what-is-an-energuide-home-label/>
9. City of Edmonton (2019) *Mandatory Energy Labelling & Disclosure* <https://cuspnetwork.ca/documents/members/edmonton/casr/policybriefs/MandatoryEnergyLabellingAndDisclosure.pdf>
10. Consumers Council of Canada (2018) *Mandatory Home Energy Rating and Disclosure for Existing Houses: Opportunities and Risks for Consumers* https://www.consumerscouncil.com/wp-content/uploads/sites/19/2020/03/810796_ccc_energy_rating_report_english_web.pdfhttps://www.consumerscouncil.com/wp-content/uploads/sites/19/2020/03/810796_ccc_energy_rating_report_english_web.pdf
11. Deschamps, Tara (2022) *Apartment, Row House Growth Outpaces Single-Detached Homes: Census, CP24* <https://www.cp24.com/news/apartment-row-house-growth-outpaces-single-detached-homes-census-1.5878885>.
12. Energy Saving Trust (2018) *Building Energy Labelling System in Scotland* <https://energysavingtrust.org.uk/sites/default/files/Building%20Energy%20Labelling%20in%20Scotland%20-%20FINAL%20Exec.%20Summary.pdf>
13. European Commission (2002) *DIRECTIVE 2002/91/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 December 2002 on the energy performance of buildings* <https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:001:0065:0071:EN:PDF>
14. Government of Canada (2016) *Pan-Canadian Framework on Clean Growth and Climate Change: Canada's Plan to Address Climate Change and Grow the Economy,* "Government of Canada" <https://www.canada.ca/en/services/environment/weather/climatechange/pan-canadian-framework/climate-change-plan.html>.

15. Government of Canada (2021a) *Update to the Pan-Canadian Approach to Carbon Pollution Pricing 2023-2030* <https://www.canada.ca/en/environment-climate-change/services/climate-change/pricing-pollution-how-it-will-work/carbon-pollution-pricing-federal-benchmark-information/federal-benchmark-2023-2030.html>
16. Government of Canada (2021b) *Minister of Natural Resources Mandate Letter* <https://pm.gc.ca/en/mandate-letters/2021/12/16/minister-natural-resources-mandate-letter>.
17. Government of Canada (2021c) Natural Resources Canada, *Government of Canada Invests in Energy-Efficient Homes* <https://www.canada.ca/en/natural-resources-canada/news/2021/05/government-of-canada-invests-in-energy-efficient-homes.html>.
18. Government of Canada (2022a) *Start Your Energy-Efficient Retrofits* <https://www.nrcan.gc.ca/energy-efficiency/homes/canada-greener-homes-grant/start-your-energy-efficient-retrofits/23443>.
19. Government of Canada (2022b) *2030 Emissions Reduction Plan: Canada's Next Steps for Clean Air and a Strong Economy," 2030 Emissions Reduction Plan: Canada's Next Steps for Clean Air and a Strong Economy § (2022)* <https://www.canada.ca/content/dam/eccc/documents/pdf/climate-change/erp/Canada-2030-Emissions-Reduction-Plan-eng.pdf>.
20. Government of Canada (2022c) *After your EnerGuide home evaluation* <https://www.nrcan.gc.ca/energy-efficiency/energuguide/energuguide-energy-efficiency-home-evaluations/after-your-energuguide-home-evaluation/20572>
21. Government of Canada (2022d) *Canada Greener Homes Initiative* <https://www.nrcan.gc.ca/energy-efficiency/homes/canada-greener-homes-grant/23441>
22. Government of Canada (2022e) *Eligible grants for my home retrofit* <https://www.nrcan.gc.ca/energy-efficiency/homes/canada-greener-homes-grant/start-your-energy-efficient-retrofits/plan-document-and-complete-your-home-retrofits/eligible-grants-for-my-home-retrofit/23504>
23. Government of Canada (2022f) *Book your post-retrofit EnerGuide evaluation and apply for the grant* <https://www.nrcan.gc.ca/energy-efficiency/homes/canada-greener-homes-grant/start-your-energy-efficient-retrofits/book-your-post-retrofit-evaluation-and-apply-for-reimbursement/23482>
24. Government of Canada (2022g) *Learn about the Canada Greener Homes Grant Initiative* <https://www.nrcan.gc.ca/energy-efficiency/homes/canada-greener-homes-grant/start-your-energy-efficient-retrofits/all-about-the-canada-greener-homes-initiative/23476>
25. Government of Canada (2022h) *Minister Wilkinson Provides Update to Canada Greener Homes Initiative, Including More Energy Advisors Coming to Manitoba* <https://www.newswire.ca/news-releases/minister-wilkinson-provides-update-to-canada-greener-homes-initiative-including-more-energy-advisors-coming-to-manitoba-887307215.html>
26. Government of Canada (2022i) *Canada Greener Homes Grant Spring 2022 Update* <https://www.nrcan.gc.ca/energy-efficiency/homes/canada-greener-homes-grant/canada-greener-homes-grant-spring-2022-update/24060>
27. Government of Ontario (2016) *Ontario's Five Year Climate Change Action Plan 2016-* https://web.archive.org/web/20170708231223/http://www.applications.ene.gov.on.ca/ccap/products/CCAP_ENGLISH.pdf.

28. Government of Ontario (2018) *Green Energy Repeal Act*, SO 2018, c. 16, <https://www.ontario.ca/laws/statute/s18016>.
29. Greensaver (2022) *EnerGuide Home Energy Evaluation* <https://greensaver.org/energide-energy-evaluation/>
30. International Partnership for Energy Efficiency Cooperation (2014) *Building Energy Rating Schemes: Assessing Issues and Impacts* <https://www.energy.gov.au/sites/default/files/BEET%201%20Building%20Energy%20Rating%20Schemes%202014%20%E2%80%93%20Assessing%20Issues%20and%20Impacts.pdf>
31. metrovancouver (2022) *Get an EnerGuide Rating and Label* <http://rateourhome.ca/home-energy-labels/energide-label/Pages/default.aspx#:~:text=Call%20a%20licensed%20Service%20Organization,900%20for%20a%20new%20home>.
32. Ontario Real Estate Association (2018) *REALTORS Support Government's Decision to Put the Brakes on Mandatory Home Energy Audits* <https://www.orea.com/News-and-Events/News-and-Press-Releases/Press-Releases/October-31-2018>.
33. Pascuas et al. (2017) *Impact and reliability of EPCs in the real estate market*, Energy Procedia <https://www.sciencedirect.com/science/article/pii/S1876610217355388>
34. Reddit (2021) *the Federal Greener Homes Grant Is a Hot Mess. before You Spend Money on Renovations Know That You Probably Wont See Your Rebate until Sumer 2022 If You See It at All*, R/Personalfinancecanada https://www.reddit.com/r/PersonalFinanceCanada/comments/qg440w/the_federal_greener_homes_grant_is_a_hot_mess/hi5hzcl/?utm_source=reddit&utm_medium=web2x&context=3.
35. Reddit (2022a) *Energide Evaluation Cost?*, R/Victoriabc https://www.reddit.com/r/VictoriaBC/comments/qaa7xn/energide_evaluation_cost/.
36. Reddit (2022b) *Canada Greener Homes Grant Initiative*, R/Ottawa https://www.reddit.com/r/ottawa/comments/vhg32j/canada_greener_homes_grant_initiative/.
37. Reddit (2022c) *Greener Homes Grant*, R/Winnipeg https://www.reddit.com/r/Winnipeg/comments/tru197/greener_homes_grant/?utm_source=hare&utm_medium=web2x&context=3.
38. Reddit (2022d) *Anyone Here Apply for the 'Canada Greener Homes Grant' before? the Info I Found Says You Can Get up to \$5k in Grant toward Things like Insulation. How Long Does the Approval Process Take? Do You Need to Get the Work Done through Someone from an Approved Vendor List? Any Help Would Be Appreciated*, "R/Personalfinancecanada https://www.reddit.com/r/PersonalFinanceCanada/comments/th34qw/anyone_here_apply_for_the_canada_greener_homes/.
39. Reddit (2022e) *Greener Homes Grant Service Providers*, R/Kitchener https://www.reddit.com/r/kitchener/comments/tf0cte/greener_homes_grant_service_provider_s/.
40. Riddiough and Schatzki (2020) *Implications of Energy Ratings for Residential Real Estate Markets*, Analysis Group https://www.analysisgroup.com/globalassets/insights/publishing/re_impact_of_energy_rating.pdf

41. Sharkey, Jackie (2021) *Why You May Need to Be Patient to Take Advantage of the New Canada Greener Homes Grant*, CBC News <https://www.cbc.ca/news/canada/kitchener-waterloo/canada-greener-homes-grants-reep-ameri-spec-canada-1.6043180>.
42. Thurton, David (2022) *How to Make the Most of That New, Federal, 'Green' Home Retrofit Grant*, CBC News <https://www.cbc.ca/news/politics/retrofit-grant-green-homes-1.6051064>.
43. United Kingdom Ministry of Housing, Communities & Local Government (2020) *Energy Performance of Buildings Regulations, 2012: Implementation Report* https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/885223/Implementation_Report_-_EPB_Regs_2012.pdf
44. 2012
45. Walls, Margaret (2014) *Comparing Subsidies, Loans, and Standards for Improving Home Energy Efficiency*, Cityscape <https://www.jstor.org/stable/26326870>
46. Welegedara et al. (2021) *Variations in direct greenhouse gas emissions across neighbourhoods: A case of Edmonton in Canada*, Environmental Challenges <https://www.sciencedirect.com/science/article/pii/S2667010021002900>
47. Windfall Energy Centre (2022) *Take the First Step to Energy Savings and a More Comfortable Home* <https://windfallcentre.ca/energy/evaluation/>
48. Zirngibl and Bendžalová (2015) *Technical assessment of national/regional calculation methodologies for the energy performance of building* European Commission – Energy Directorate General https://ec.europa.eu/energy/sites/ener/files/documents/EPB_calculations_in_EU.pdf



**Smart Prosperity
Institute**

1 Stewart St. (3rd Floor)
Ottawa, ON K1N 6N5