Mandatory Home Energy Rating and Disclosure for Existing Houses:

Opportunities and Risks for Consumers

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Executive Summary

Home energy ratings and their disclosure at the time of sale could help inform consumers regarding the energy performance of a home they are planning to sell, buy, or upgrade. This report discovered that there was overwhelming agreement from homeowners in the focus groups and national survey, as well as the key informants that homeowners should have access to the energy performance information about a home. By being better informed of the energy performance of their homes, and how to improve it, homeowners could become better equipped to understand the effect of their home on the environment and manage their energy costs and efficiency. It could fundamentally change the nature of real estate transactions and impact the value of homes.

A home energy rating and disclosure system (HER&D) was emphasized in the 2016 Ontario Climate Change Action Plan (CCAP). According to the CCAP, buildings and the energy that they consume represent one quarter of Ontario's GHG emissions (Government of Ontario 2016). Single detached housing represents 55.8% (or 2.93 million households) of Ontario's household building types (Natural Resources Canada 2015).

The Ontario government is currently developing options for the design of a Home Energy Rating and Disclosure (HER&D) program for Ontario as part of the Ontario Green Energy Act (GEA), with the objective to launch the program by 2019.

The central objective for all the HER&D systems was empowering the consumer with accurate and insightful information about a home they're planning on selling, buying or upgrading. The data from this study suggests that a home energy label is only useful if it can inform decisions and drive action from the homeowner. The literature suggests that homeowners with a home energy rating are undertaking energy efficiency upgrades, while little evidence exists to suggest that they would carry out more upgrades than homeowners without a rating. The literature revealed that simply mandating HER&D will not achieve a significant uptake of home upgrades. For homeowners, what is important is a home energy report that includes the upgrade information a homeowner seeks.

There were many concerns that were raised as well. Both the opportunities and risks for consumers are summarized below:

Figure A- Mandatory HER&D Opportunities

Opportunities for the individual homeowner
To be provided the energy consumption information for a home to be bought, sold, or upgraded.
To improve the energy literacy of homeowners.
To use the home's energy consumption information to help a homebuyer assess the home's value when setting a price or making a buying decision.
To use the energy consumption information of a home to detect changes in energy efficiency performance for a home.
To improve awareness on operating costs in relation to energy use.
To improve the energy efficiency of the home and reducing energy costs.
To engage with an accredited energy advisor to understand what the options are to upgrade a home.
To receive unbiased, third-party recommendations from an energy advisor who is a trusted partner.
To understand how much each upgrade option will cost, and what benefits could accrue from

adopting the options.
To improve a home's performance by enhancing comfort, reducing noise and better managing moisture.
To receive and provide home pricing that more accurately reflects the energy efficiency (and operating costs) of a home.

Shared Opportunities
To improve Canada's housing stock and reduce Core Housing Need[1].
To reduce GHG emissions and mitigate climate change.
To improve the standard of living of individual's and the country.

Figure C - Mandatory HER&D risks

Risks for Homeowners
When obtaining a home energy rating, there is a risk of:
A homeowner or homebuyer not knowing how to understand the home energy rating and label.
A homeowner being a target of fraudulent behaviour because of homeowner knowledge gaps.
A homeowner hiring an untrained, unaccredited, unqualified and/or incapable energy advisor.
A homeowner hiring an energy advisor with conflicts of interest and bad intentions.
A homeowner being unable to find a certified energy advisor because of a home's geographic location.
A homeowner being delayed in selling one's house because its home energy label was not ready.
A home energy evaluation that takes too long and delays renovations or other timely activities for a homeowner or homebuyer.
A home energy evaluation that is too disruptive to a homeowner's normal daily activities.
A home energy advisor produces a fraudulent home energy rating and recommendations for use by the homeowner or homebuyer.
After obtaining a home energy rating:
Being unable to get redress for an inaccurate or fraudulent home energy rating.
Being unable to act on the upgrade options in a home energy rating because of financial barriers.
Being unable to act on a list of options because of lack of knowledge, or access to trades.
Undertaking upgrades that don't perform as intended, e.g. lower cost savings than expected, poor heating, poor air circulation, moisture issues, poor indoor air quality, etc.
Personal information about the homeowner has been inappropriately disclosed.
Receiving unsolicited marketing inquiries, (robo-calls and door-to-door sales etc.) if the homes' energy rating is available publicly.
During the home transaction process:
A house being stigmatized because of a poor rating.

[1] As defined by Canada Mortgage and Housing Corporation: https://www.cmhc-schl.gc.ca/en/hoficlincl/observer/observer_044.cfm

	A house price being adversely affected by a poor rating particularly where the homeowner does not have the means to upgrade the home.
	Being required to undertake an energy evaluation that costs more than expected.
	Being required to undertake an energy evaluation for a house that is newly built and whose energy performance characteristics are already known.
	Being required to undertake an energy evaluation for a house that had been recently upgraded or labelled.
	Being required to undertake an energy evaluation for a house that will be demolished after purchase.
	Being required to undertake an energy evaluation for a house that is received as part of a will.
	Being required to undertake an energy evaluation for a house that is received as part of certain ownership changes or title transfers.

This study focuses on the opportunities and risks for consumers under a mandatory HER&D system. The study consists of a literature review, key informant interviews, and results from a national omnibus survey and two focus groups of homeowners. The findings of the research led to the report's conclusions and recommendations.

The ideal mandatory HER&D system in place in Ontario is described from the perspective of a homeowner below:

> *I can learn about home energy ratings and labels from information that is easy to understand, easy to access, and available across different information platforms. I know what an energy rating and label is.*
>
> *I can learn about the home assessment procedure from information that is easy to understand, easy to access, and available across different information platforms. I understand that only certified and licensed Energy Advisors can perform the work. I know how to identify and select the right energy advisor.*
>
> *I can easily find an energy advisor who is certified and licensed and whom I can trust in my community, in a timely manner. I am assured that there are no conflicts of interests between my energy advisor and any other individual involved in the process of obtaining a home energy rating and label for my home. I know that if there are any perceived conflicts, I will be notified of this and I am able to make my own decision.*
>
> *I can contact the energy advisor and make an appointment for a rating and evaluation report. The advisor will be available to perform an energy evaluation in a timely manner without causing delay to any of my plans to sell or renovate my home.*
>
> *My energy advisor has sufficient training and is demonstrably qualified to do unbiased and good work. They have the necessary knowledge to complete home assessments accurately and consistently. My EA has the knowledge to act as a guide throughout the home rating and label process and helps to answer my questions. They comply with a code of conduct, and professional standards, and regulations that are specified by the rating system they use. I trust my energy advisor. I know that there is a third-party audit of the work of the energy advisor. I know that there are meaningful consequences if the work is done incorrectly.*

My energy advisor performs a home energy assessment and issues a rating, label, and options report in a timely manner without causing disruption to my normal routine or my plans for my house (selling or renovating). I can read about or ask someone about what an evaluation report typically contains and think about the questions I might have for the energy advisor.

I can get rating/report verified if desired even if the evaluation was paid for by the home's seller. I am provided with the energy consumption information for a home I intend to buy, sell or upgrade in a timely manner that is not disruptive. I receive a report that tells me how much energy my home is consuming, and how each recommendation will change my consumption. I know the nature of the recommendations I receive with the report and the costs and benefits of undertaking them (including notional costs and savings), to myself and to society.

I can make an informed decision on the upgrade options I wish to undertake. I can act on the upgrade options without being hindered by lack of finances, knowledge, or ability. I know that if I require any financial aid, I can access financing and/or incentive programs that are available to me.

I am provided with a clear redress process should any problems arise. I know that my comments, feedback and complaints will be responded to, and become part of the public record so other homeowners are aware of my experiences.

I understand and trust that a home's listing price accurately reflects the energy efficiency and operating costs of a home.

I am assured that any data sets generated from my home energy label is not shared with third party marketing companies and my personal data is not compromised.

To help achieve this ideal scenario, the following recommendations are made:

1. **Ensure access to good quality information and homeowner education:**
    a. Ensure the information that communicates how to read, understand, and use a home energy rating and options report is easily accessible by homeowners across media platforms.
        i. All communication should be easily available (print and electronic) in various languages and in a way that's easy to understand.
    b. Establish a web portal to provide guidance to homeowners on the entire HER&D system and process, including:
        i. What will be involved in the home assessment process, and the process of receiving a label (including length of time it will take to process any paperwork).
        ii. How to find, identify and hire trained and qualified energy advisors.
        iii. What homeowners can do to protect themselves against fraud and deception.
        iv. Who to contact for more information or if there are any problems or to complain.
        v. The incentive program qualification requirements (including limitations on participation, record keeping, the pre-retrofit energy assessment requirements, etc.)

c. Create a list of certified and licensed energy advisors that is easily accessible, searchable and located on the consumer facing website.
d. Ensure staff is available to answer homeowner questions and assist them throughout all stages of the HER&D process (including finding an energy advisor, undertaking upgrades, obtaining incentives etc.)

2. Reduce the complexity, cost and time needed to obtain a home energy rating

a. Allow a simplified version of the home assessment without a blower door.
b. Simplify the home assessment by eliminating a computer simulation that requires building area measurements and insulation assumptions.
    i. The execution of a home assessment is a cost that, in some cases, is borne by the incentive provider. In such cases, simplifying the home assessment will result in a lower cost, freeing up funds to incent retrofits.
c. Consider allowing homeowners to conduct a self-assessment, allow homeowners to receive an auto-generated label through public building data.
    i. 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.
d. Ensure HER&D incentives are accessible for households from all socio-economic backgrounds.
e. Provide financing programs that are paid out through the energy savings that result from the upgrade. These should be available for low-income households under a mandatory HER&D system.
f. Establish an upper limit to the cost of an energy audit for single-family homes.
g. Build energy advisor infrastructure as the foundation for a mandatory HER&D system:
    i. Ensure energy advisors are available in communities across Canada, and that rural and remote communities are not disadvantaged due to the lack of availability of energy
    ii. Offer standardized training for new energy advisors.
    iii. Establish or adopt a licensing and certification program for all advisors.
    iv. Establish or adopt an energy advisor code of conduct.

3. Maintain quality assurance

a. Establish minimum requirements for potential candidates as part of the accreditation process to become an Energy advisor.
b. Energy advisors should be free of any conflict of interest with regard to the contractors performing the work.
    i. If an Energy advisor has working relationships that could be seen as a conflict of interest, the energy advisor should state this to both the licensing

organization and their homeowner prior to performing any work on the home.

c. Provide third-party quality assurance through frequent, random, quality checks of home energy labels, after a label has been issued, to ensure that the assessment was done correctly and remediate problems as soon as possible.
d. Develop meaningful consequences for energy advisors who fail to meet a minimum level of performance, which should extend to suspension of qualification.
e. As part of the quality assurance review, conduct a follow-up where calculated energy savings are misaligned with actual energy savings.
f. Establish a clear and robust redress process for homeowners. Homeowner complaints should be recorded, and responded to. Both substantiated complaints and their resolution should become part of the public record.
g. Publish the complaint record of all energy advisors to foster accountability.

4. **Recognize that homeowners value the upgrade recommendations and that ratings are generally poorly understood and are less important.**
    a. Provide short, mid and long-term recommendations for home upgrades.
    b. Provide home upgrade recommendations that a homeowner could undertake on their own.
    c. Provide a guide on how to reduce energy consumption.
    d. Provide a range of estimated costs for all upgrade options.
    e. Provide a range of estimated savings and payback times for all upgrade options.
    f. Provide a comparison of the home's energy consumption with a similar house that is considered to be typical.
    g. Provide an estimate of the improvement to a home's energy consumption (costs) that each of the recommended upgrades could bring to the homeowner.
    h. Provide an estimate of the home's current GHG emissions, and a comparison with a similar house that is considered to be typical.
5. **Allow exemptions to mandatory HER&D**

    Allow exemptions to be made for:
    a. A house that has been newly built and does not need energy efficiency upgrades.
    b. A house that had undertaken approved energy efficiency improvements within the last 10 years.
    c. A house that will be demolished.
        i. Require a publicly filed declaration in a purchase of intent to demolish to get an exemption.
    d. A house that is received as part of a will.
    e. A house that is received as part of certain ownership changes or title transfers.
    f. A house that has already received a home energy rating and label previously.
    g. Allow the onus of obtaining a home energy label to be transferred from the homeowner to the buyer, if agreed to by both parties.

6. **Build capacity slowly and steadily**
    a. Phase-in the mandatory HER&D requirements gradually, to sustain buy-in from stakeholders. Establish the framework for each phase in consultation with industry stakeholders.
        i. Apply HER&D requirements to different market segments over time. Adapt and adjust requirements as necessary.
    b. After a home has obtained a label, allow the rating and label to be valid for a set period of time, unless the home has undergone a major renovation.
    c. Consider training and certifying home inspectors to provide energy labels as part of the home inspection process.

7. **Ensure homeowner privacy where explicit consent has not been provided**
    a. A full home energy report should be provided to potential home buyers before they prepare an offer to purchase.
    b. Give homeowners the option to list their home's energy rating on a publicly accessible database.
    c. Any data sets to be made publicly available and gathered through HER&D should be anonymized and stored in aggregate.
    d. Ensure that any datasets that are shared cannot be attributed to any specific individual or home.
    e. Let data and information gathered by labels inform the development of future incentive programs.
    f. Let data and feedback gained through the initial implementation phases inform how the policy should be changed and improved in the future.
    g. Let anonymized data be made publicly available for use by researchers and other studies.

1 Introduction

Home energy ratings and their disclosure at the time of sale could help inform consumers regarding the energy performance of a home they are planning to sell, buy, or upgrade. By being better informed of the energy performance of their homes, and how to improve it, homeowners could become better equipped to understand the effect of their home on the environment and manage their energy costs and efficiency. They would be in possession of information that could fundamentally change how they view a real estate transaction and how they value homes.

The Pan-Canadian Framework on Clean Growth and Climate Change (PCF) highlighted the goal to have the federal, provincial, and territorial governments work together to require labelling of building energy use by as early as 2019. A number of jurisdictions across Canada are contemplating new laws to mandate home energy ratings and their disclosure to potential homebuyers and to the general public. The new legislation would hope to motivate homeowners to upgrade their homes to improve energy efficiency and ultimately to reduce GHG emissions.

According to the CCAP, buildings and the energy that they consume represent one quarter of Ontario's GHG emissions (Government of Ontario 2016). Single detached housing represents 55.8% (or 2.93 million households) of Ontario's household building types (Natural Resources Canada 2015).

The Ontario government is currently developing options for the design of a Home Energy Rating and Disclosure (HER&D) system for Ontario as part of the Ontario Green Energy Act (GEA), with the objective to launch the program by 2019. The 2016 Ontario Climate Change Action Plan (CCAP) emphasized HER&D.

There are now several research papers examining the feasibility of a Canadian HER&D program (Union des Consommateurs 2010, Dunsky 2015, Pembina Institute 2015), however, a number of these did not focus on the opportunities and risks for consumers. This report will add to the existing body of research, but will focus on the consumer perspective.

This report focuses on the opportunities and risks for Canadian consumers should a mandatory home energy rating and disclosure system be regulated. This report will examine options for mandatory home energy rating and disclosure systems and their potential impact on homeowners, from the consumer perspective only. The economic benefit and job creation associated with the implementation of a mandatory home energy rating system will not be detailed in the report.

The study consists of a literature review, key informant interviews, two homeowner focus groups, and a national omnibus survey of homeowners' experiences with home energy assessments and ratings.

The project's literature review includes a review of Canadian information on potential HER&D programs, an updated review of Canadian voluntary home energy labelling programs, and an international jurisdictional review.

A national omnibus survey was conducted on the homeowner opinion of HER&D programs including the value that they may attribute to home ratings, whether home ratings would drive energy efficiency retrofits, and whether they would be concerned with regard to any identified risks. The objective was to measure homeowner views on their perceived benefits, risks and expectations.

Key informant interviews were conducted by the research team with individuals from selected organizations. These interviews gauged stakeholder opinion appreciating that some views could be different from those expressed by consumers. The key informant interviews also helped to validate the findings of the literature review.

Two focus groups with homeowners were conducted in Toronto and Montreal. The focus groups augmented the survey and helped to clarify its results.

The combination of the literature review, key informant interviews, homeowner survey, and focus groups provided the necessary evidence facilitating an understanding of the issues, risks, and precedents. The research findings led to the report's conclusions and recommendations.

The report details the opportunities and risks for homeowners and identifies approaches that could strengthen opportunities and mitigate or avoid risks. Its recommendations attempt to promote consumer protection and enhance consumer confidence. The hope is that this study represents an important step in the development of robust home energy rating and disclosure systems.

2 Literature Review

The following is a literature review from a variety of sources related to home energy ratings and their disclosure. The goal was to learn the different mandatory home energy rating programs now available in Canada and other jurisdictions, the disclosure systems that they use, lessons learned, and information on risks and consumer protection previously identified.

2.1 Why mandate home energy ratings and their disclosure?

In May 2015, Canada submitted to the United Nations Framework Convention on Climate Change its commitment to reducing greenhouse gas emissions by 30% from 2005 levels by 2030 (Government of Canada 2016). In April 2016, Canada committed to the Paris Agreement, the climate change treaty negotiated by representatives from 195 (now 175) countries which aims to keep global temperatures to below 2˚C above pre-industrial levels in order to reduce the risks and impact of climate change (Mas 2016) (Government of Canada 2016).

The Pan-Canadian Framework on Clean Growth and Climate Change (PCF), released December 2016, describes the federal, provincial, and territorial governments' objective to expand efforts to retrofit existing buildings to increase energy efficiency (Government of Canada 2016). As part of this effort, the PCF asks the provincial and territorial governments' to require labelling of building energy use by 2019. The International Energy Agency documented some of the key drivers of energy efficiency policy, shown in Figure 1.

Figure 1 - Drivers of Energy Efficiency Policy (International Energy Agency 2010)

Driver	Typical Objectives
Energy security	• Reduce imported energy • Reduce domestic demand to maximize exports • Increase reliability • Control growth in energy demand
Economic development and competitiveness	• Reduce energy intensity • Improve industrial competitiveness • Reduce production costs • More affordable energy customer costs
Climate change	• Contribute to global mitigation and adaptation efforts • Meet international obligations under the United Nations Framework Convention on Climate Change (UNFCCC) • Meet supra-national (e.g. European Union) accession requirements or directives
Public health	• Reduce indoor and local pollution

In Ontario, the provincial government released its Climate Change Strategy in November 2015, which set out the government vision to reduce greenhouse gas (GHG) emissions to 80% below 1990 levels, and build a low-carbon economy (Government of Ontario 2015). The Climate Change Strategy was followed by the Climate Change Action Plan (CCAP), released in June 2016. The CCAP lays out the specific strategies and commitments Ontario is undertaking to reduce GHG emissions.

With the CCAP, Ontario has signalled its intention to require home energy disclosure for single-family homes at the time of listing; known as the "Home Energy Rating and Disclosure" (HER&D) program (Government of Ontario 2016). The goal of the HER&D program is to improve consumer awareness, allow a comparison of home energy ratings between homes, and to improve the energy efficiency of homes through renovations (Government of Ontario 2016).

In the 'Households and the Environment Survey: Energy use, 2015' report, Statistics Canada revealed that Canadian households consumed 1.3 million terajoules of energy in their homes in 2015 (Statistics Canada 2013). On average, the amount of energy consumed per household was 92.5 gigajoules in 2015 (Statistics Canada 2017). In Ontario, the average amount of energy consumed per household increased slightly from 2013 to 2015, 100.2 gigajoules to 101.0 gigajoules, respectively (Statistics Canada n.d.).

Homes in Canada contribute to GHG emissions through the use natural gas, propane, heating fuel and through the use of electricity (Milito and Gagnon 2008). Natural gas represents the highest total energy consumed by Canadian households at 51%, with electricity representing 45% (Statistics Canada 2013). The 2015 Census data reveals that electricity is the primary heating source for 64% of Canadian households (Natural Resources Canada 2015). Electricity use in homes indirectly contributes to greenhouse gas emissions to the extent that the gases are emitted when electricity is generated using fossil fuels, such as coal and natural gas (Milito and Gagnon 2008).

According to the CCAP, buildings and the energy that they consume represent one quarter of Ontario's GHG emissions (Government of Ontario 2016). Single detached housing represents 55.8% (or 2.93 million households) of Ontario's household building types (Natural Resources Canada 2015). The total GHG Emissions, excluding electricity, produced by this housing type decreased from 2014 to 2015, represented by (Natural Resources Canada 2015).

Table 1 - Single Detached Secondary Energy Use and GHG Emissions (Natural Resources Canada 2015)

	2011	2012	2013	2014	2015
Total Single Detached GHG Emissions Excluding Electricity (Mt of CO_2e)	14.3	12.7	14.0	15.0	14.3

The CCAP mentions that the HER&D program will provide audits to homeowners, free of charge, and the energy rating disclosure would be required in the real estate listing (Government of Ontario 2016). The objective is to improve consumer awareness, allow a comparison of home energy ratings, and encourage uptake of retrofit incentive programs (Government of Ontario 2016). By improving consumer awareness and encouraging homeowners to undertake energy efficient upgrades, the CCAP hopes to further reduce the consumption of energy, thus further reducing GHG emissions. The International Energy Agency highlights the consumer barriers in relation to adopting energy efficiency, shown in Figure 1.

Figure 1 - Barriers to Energy Efficiency (International Energy Agency 2010)

Barrier	Examples
Market	• market organization and price distortions that prevent customers from appraising the true value of energy efficiency • the principal agent problem, in which the investor does not reap the rewards or improved efficiency (the classic case being the landlord-tenant situation) • transaction costs (project development costs are high relative to potential energy savings)
Financial	• lack of understanding of energy efficiency investments, or aversion to perceived risk on the part of financial institutions
Information and awareness	• lack of sufficient information and understanding on the part of consumers to make rational consumption and investment decisions
Regulatory and institutional	• energy tariffs that discourage energy efficiency investment (such as declining block prices) • incentive structures that encourage energy providers to sell energy rather than invest in cost-effective energy efficiency • institutional bias towards supply-side investments
Technical	• lack of affordable energy efficiency technologies suitable to local conditions • insufficient local capacities for identifying, developing, implementing and maintaining energy efficiency investments

2.2 Definitions – Assessment, Rating and Label

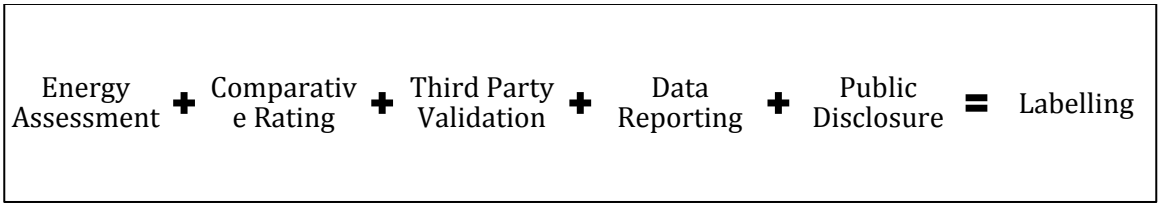
There can be any number of ways that a home's energy performance is assessed. That assessment can be converted into a rating, and the rating can be converted to a label. The label can be disclosed to the home buyers or the public to let them know about how a home performs.

A home energy rating measures the simulated or actual energy performance of the home or involves the benchmarking a home's energy performance against other similar homes. A home energy label communicates that performance to consumers through a label. An energy rating will result in a home receiving a 'score' and involves the first three components shown in Figure 2 below. An energy assessment may simply include the first component of Figure 2.

In a number of common labelling systems, an energy rating gives homeowners, and prospective buyers, an idea of how energy efficient a home is, compared with another home with similar features (RESNET 2018). The comparison home is usually called a reference house, and it is the same home, built according to the requirements set out in the local building code. Energy audits identify a home's energy problems and provide the homeowner with cost-effective solutions to those problems (RESNET 2018).

In their 2015 report, the Pembina Institute describes the five components of labelling as: home energy assessment, comparative rating (either against a standard or another home), third party validation and issuing of label, data reporting to the government and public disclosure either through a sticker or providing the information on a public website (Frappé-Sénéclauze, Pond and Cretney 2015). Figure 2 below illustrates the components involved in the labelling process.

Figure 2 - The components involved in a home energy label, (Frappé-Sénéclauze, Pond and Cretney 2015)



2.1 Home Energy Assessments

To obtain a home energy rating or a label, most systems will involve a home energy assessment. A home energy assessment is a process where an energy advisor will conduct an in-person inspection of a house features such as the type of windows, and the amount of insulation. The air tightness of a house is verified using a blower-door test. The typical time for this procedure is between 2-3 hours. The energy advisor then models the house using computer simulation software, and provides a report on the energy performance of the house.

There is also a 'light' version of the home energy assessment. As part of its' installation programs, Green Ontario Fund offers an in-person inspection which conducted with a checklist, but without a blower-door test (Green Ontario Fund 2017).

2.2 Home Energy Rating Systems in Canada

The most established home energy rating system in Canada is the EnerGuide Rating System, which underpins the national ENERGY STAR® for New Homes and R-2000 Housing programs for new homes.

2.2.1 EnerGuide Rating System

The EnerGuide Rating System (ERS) is the national home energy rating system managed by Natural Resources Canada (NRCan), in collaboration with regional partners (Natural Resources Canada 2016). The Rating system was designed to achieve the following objectives, taken from the introductory wording in the Standard:

- *Help Canadian owners, industry and stakeholders, become "energy literate" regarding homes and decisions related to them;*
- *Provide specific, readily accessible energy performance information that is widely used to support decision making in designing, constructing, purchasing, renovating or operating a home;*

- *Facilitate energy performance advancements in new and existing low-rise housing sectors by encouraging home builders and homeowners to improve the houses they live in, build or renovate. This should lower operating costs, increase occupant comfort and reduce the environment impact of energy use in Canada.*

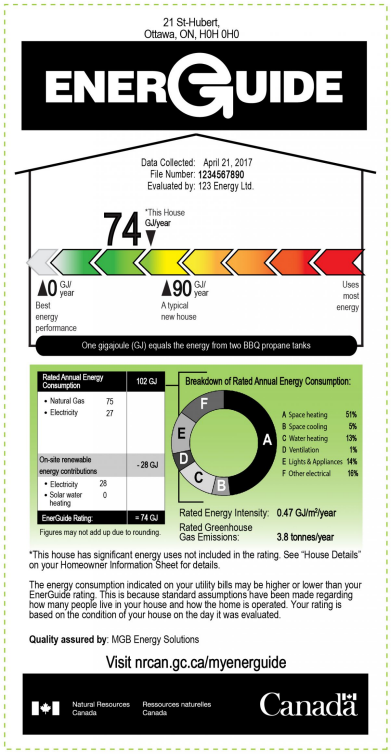
(Natural Resources Canada 2016)

The ERS system uses the HOT2000 software to model the energy consumption of a house. The software is also developed and maintained by NRCan and is free to download and use by the public on a Personal Computer (PC) with the Windows operating system.

NRCan is responsible for the management and delivery of the housing program including the coordination of administration at a national level and to advise service organizations in the field. The ERS can be used for both new and existing residential homes. Figure 3 presents an overview of the Rating System as of 2017.

Figure 3 - EnerGuide Rating System Overview (Natural Resources Canada 2018)

Administrating Body	NRCan is responsible for the administration of the EnerGuide system and Service Organizations are licensed to administer EnerGuide.
Rating Scale	There are two rating scales used: 1. 1-100 scale is the older system (being phased out across Canada) 2. GJ per year is the new system implemented (used in every province except Quebec. Quebec is expected to transition to the GJ scale on January 1, 2019.)
Applicable Building Types	New and existing residential homes. Houses, houses with secondary suites and buildings containing only dwelling units and common spaces are eligible if meeting the following conditions: • Not greater than three storeys in building height; • Not greater than 600m^2 (6458ft^2) in *building area*; and • On *permanent foundations* (includes a parking garage), or permanently moored *float homes* Mixed-use buildings, defined as: a building that is used for residential and non-residential purposes, are eligible if the following conditions are met: • At least 50 percent of the total floor area (including the basement) is used as one or more permanent residences; and • Must not contain any commercial or industrial equipment
Process and details	Option 1: A Home Rating • An energy advisor working for a licensed service organization visits your home and conducts the EnerGuide home evaluation • The service organization provides you with your EnerGuide rating and label which shows rated energy consumption in gigajoules per year • You receive your Homeowner Information Sheet that has detailed information about the home and its rated energy use Option 2: Upgrade Recommendations • You also receive Renovation Upgrade Report, which provides a detailed customized roadmap indicating recommendations for improving your home's energy performance Option 3: Follow-up Home Rating • An energy advisor will perform a follow-up evaluation after your home

	renovations are complete • The follow-up evaluation will result in a new EnerGuide rating, Homeowner Information Sheet, and label indicating how your improvements have impacted your home's energy performance.
When/What triggers an assessment	Varies. Some incentive programs require an evaluation and an EnerGuide rating, prior and after a renovation.
Cost	$300 approximately (varies by Service Organization and by region)
Certification for Service Organizations	Service organizations must be licensed by taking and passing exams through NRCan. Exams are required as part of licensing. Third-party test centres administer all exams.
Certification for Energy Auditors	Energy advisors are registered with NRCan. Exams required prior to registration. Exams are required as part of licensing.
Enforcement	Voluntary. In certain jurisdictions ERS ratings can be a means for energy compliance for the local building code, instead of completing a performance or prescriptive path. For example, the technical procedures for the EnerGuide Rating System are standard practice for performance compliance modelling in British Columbia.
Sample Label	

2.2.2 HERS Index

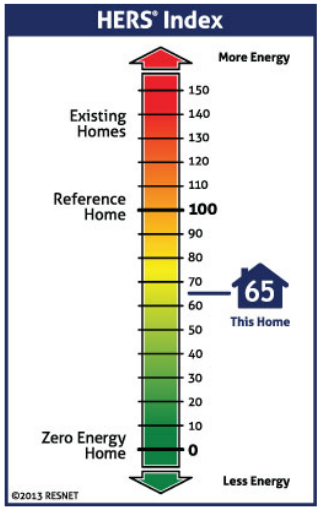
Another rating system focused on energy efficiency for existing housing is the HERS Index. This rating system was developed by RESNET (Residential Energy Services Network) in the United States, and adopted for use in Canada by the Canadian Residential Energy Services Network (CRESNET). RESNET's goal is, "to develop national standards for home energy ratings and to create a market for home energy rating systems and energy mortgages." (RESNET 2013). Chapter 7 of RESNET's National Standards, titled 'National Standards for Home Energy Audits," describe the purpose of the Standard as:

> *A certified auditor, an accredited Provider and/or a program will apply this standard to improve the energy performance of existing homes through uniform, comprehensive home energy surveys, audits and ratings for existing residential buildings. This standard is intended to encourage investments by building owners that produce the following outcomes:*
>
> - *Increase the energy efficiency of homes;*
> - *Increase the comfort of homes;*
> - *Increase the durability of homes;*
> - *Reduce the risk that energy improvement recommendations will contribute to health, safety, or building durability problems;*
> - *Reduce waste and pollution, protecting the environment; and*
> - *Ensure that the recommendations are within the community standards (e.g. historic districts, flood zones, subdivision covenants).*
>
> *And to ensure that throughout the process, energy improvement recommendations are portrayed with reasonable and consistent projections of energy savings.*
>
> (RESNET 2013)

Energy advisors and professionals using the HERS Index can choose from four different accredited software programs to model the energy consumption of a house. Accredited software must meet the requirements in Procedures for Verification of RESNET Accredited HERS Software Tools (RESNET 2015). The software is developed and maintained by their respective third-party providers. In Canada, the delivery and adaptation of the standards are the responsibility of CRESNET. A summary of HERS Index is provided below in

Figure 4, taken from the sources indicated.

Figure 4 - HERS Index Overview (RESNET n.d.)

Administrating Body	RESNET/CRESNET
Rating Scale	An energy efficient home conforming to the 2004/2006 International Energy Conservation Code (IECC) has a HERS Index Score of 100. This means homes with lower scores are more energy efficient while those with higher scores are not energy efficient.
Applicable Building Type	Existing or proposed, site-constructed or manufactured, one and two-family dwelling units in residential buildings not over three stories in height above grade containing multiple dwelling units excepting hotels and motels.
Process and Details	A certified RESNET Home Energy Rater assesses the energy efficiency of a home, assigning it a relative performance score (the HERS Index Score). A typical resale home scores 130 on the HERS Index while a home built to the 2004 International Energy Conservation Code is awarded a rating of 100. To calculate a home's HERS Index Score, a certified RESNET HERS Rater does an energy rating on the home and compares the data against a 'reference home'. Some variables included in an energy rating are: • All exterior walls (both above and below grade) • Floors over unconditioned spaces (like garages or cellars) • Ceilings and roofs • Attics, foundations and crawlspaces • Windows and doors, vents and ductwork • HVAC system, water heating system, and your thermostat. • Air leakage of the home • Leakage in the heating and cooling distribution system
When/what triggers an assessment	Varies, depending on local jurisdiction and building type.
Rater Certification Requirements	The national training and certification standards for HERS (Home Energy Rating System) Raters and Home Energy Survey Professionals were created by RESNET and are recognized by federal government agencies. RESNET Home Energy Professionals must complete the training required and agree to abide by the RESNET Code of Conduct.
Sample Label	

2.3 Home Energy Labels and Programs for new homes in Canada

The majority of home energy labels in Canada are certifications focused on newly built homes. Programs for new home labels are designed to differentiate and identify newly constructed homes that meet a higher building standard. While the rating systems EnerGuide or HERS index are evaluations, home energy labels can be seen as an award for achieving a certain standard of home building.

The home energy labels and programs function primarily as a way for home builders to differentiate their product from the standard code-built home. In general, these programs set energy efficiency levels higher than their local building code. By adopting these voluntary programs and their technical standards, home builders are able to test new technologies and techniques that help them achieve higher levels of energy efficiency. Over time, if the program is successful, the local building code will often adopt of these higher energy efficiency levels as well. A summary of home energy labels and programs for new homes is provided in Appendix A – **Overview of Existing Home Energy Rating Systems and Labels**, and sample labels from different HER&D systems are provided in Appendix B.

2.4 Mandatory Home Energy Ratings and Disclosure in other jurisdictions

In the past decade, several countries have introduced mandatory home energy ratings for new and existing homes. The following section will review the impact of HER&D in Europe, United States and Australia.

For each jurisdiction, there will be a brief overview of the mandatory system, including the rating scale used, if any, when the rating and label is provided and the disclosure requirements. Each jurisdictional review will also contain a summary of the lessons learned from each jurisdiction.

2.4.1 Europe

In Europe, the energy efficiency of a home is communicated through a rating and label called the Energy Performance Certificate (EPC). The Energy Performance of Buildings Directive (EPBD) is the main legislation that European Union (EU) introduced to improve the energy efficiency of buildings (Geissler and Altmann-Mavaddat, Certification: Overview and Outcomes 2016). Mandatory EPCs were gradually introduced to each Member State (MS) starting in 2006, with the final deadline to implement the labelling scheme being 2009 (Olaussen, Oust and Solstad 2017). The objective of the EPCs is described as follows:

> *The EPC plays a key role in this process, as it informs potential tenants and buyers about the energy performance of a building unit (e.g., an apartment or office) or of an entire building and allows for comparison of buildings and building units in terms of energy efficiency. The underlying idea is that the EPC should influence the demand for buildings with excellent energy efficiency performance and a high proportion of energy from renewable sources, increase their market value, and thus influence building owners to renovate their buildings.*
>
> (Geissler and Altmann-Mavaddat, Certification: Overview and Outcomes 2016)

2.4.1.1 Administration

The administrative bodies of the EPC programs vary from government to third-party companies. Seven MSs have appointed third party companies to implement the compliance and control system

in their jurisdictions. In the remaining 22 countries, the government or a governmental agency is responsible for the administration (Roelens, Loncour and Antinucci 2016).

2.4.1.2 Applicable Building Types and Responsibility

In most MSs, the responsibility of obtaining an EPC falls onto the seller, owner, or real estate agent. The EPC must be presented and handed over to a prospective tenant or buyer prior to selling the property, or at the point of sale. In 2010, in conjunction with mandatory central EPC databases, EPCs were required to be published when advertising a property (Geissler and Altmann-Mavaddat, Certification: Overview and Outcomes 2016). An example of this can be seen in Figure 5 below:

Figure 5 – Example of building energy label in Portuguese advertisement (Geissler and Altmann-Mavaddat, Certification: Overview and Outcomes 2016)

EPCs are required for all residential and non-residential building types, when either selling or renting (Geissler and Altmann-Mavaddat, Certification: Overview and Outcomes 2016). EPCs are also required for both existing and new buildings. Public buildings are required to obtain and subsequently display their EPCs. Once issued, an EPC is valid for 10 years, unless the building undergoes a major renovation (Arcipowska, et al. 2014). An exception to the 10-year validity period is Denmark, where the validity of the EPC will vary between 7 to 10 years depending on if the building has a high or low energy saving potential, respectively (Geissler and Altmann 2015).

2.4.1.3 Rating Scale and Content

The EPC is comprised of a scale, selected energy indicators, general information about the building and a comprehensive attachment, which details the buildings' components and energy systems. The EPC also includes a set of recommendations on how to improve the building's energy efficiency. A sample of the UK EPC is included in Appendix B – Sample Reports and Labels.

Figure 6 - Rating scale used in Denmark's Energy Performance Certificates (Maldonado 2016)

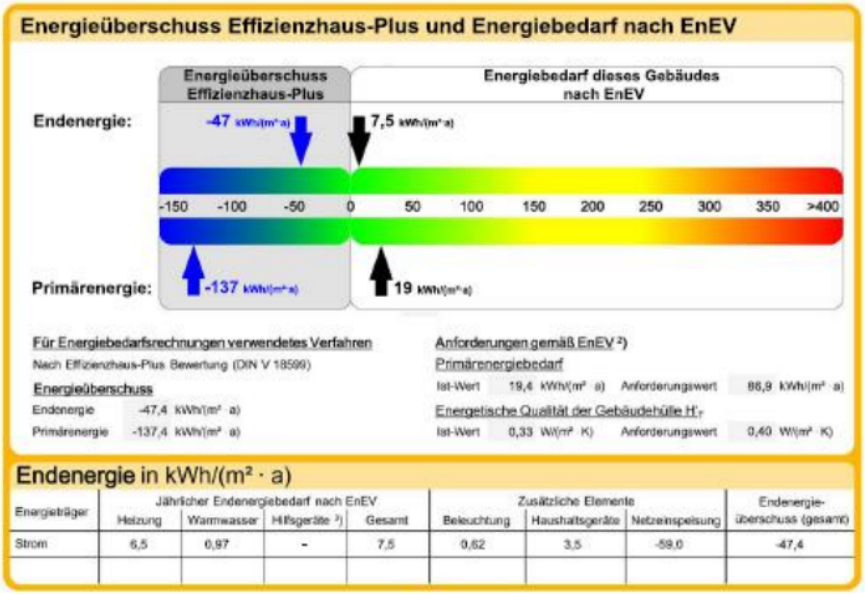
Energy efficiency rating	Numerical criteria for each class [kWh/m^2.year]	
	Residential	Non-residential
A2020	20.0	25.0
A2015	≤ 30.0 + 1,000/A	≤ 41.0 + 1,000/A
A2010	≤ 52.5 + 1,650/A	≤ 71.3 + 1,650/A
B	≤ 70.0 + 2,200/A	≤ 95.0 + 2,200/A
C	≤ 110 + 3,200/A	≤ 135 + 3,200/A
D	≤ 150 + 4,200/A	≤ 175 + 4,200/A
E	≤ 190 + 5,200/A	≤ 215 + 5,200/A
F	≤ 240 + 6,500/A	≤ 265 + 6,500/A
G	> 240 + 6,500/A	> 265 + 6,500/A

A = conditioned area in m^2

The energy indicator is displayed as both a quantitative value (kWh/m^2) and as rating results on a letter scale from A to G, the rating scale used in Denmark is shown in

Figure 6 above (Geissler and Altmann 2015). The letter scale allows for a simple comparison between different buildings. Germany uses both the letter scale and the 'Passivhaus' scale, shown in Figure 7. A full-page version can be found in Appendix B – Sample Reports and Labels.

Figure 7 - The German EPC rating system uses both the A to G, and 1-100 scale (Geissler and Altmann-Mavaddat, Certification: Overview and Outcomes 2016)



The EPC is an asset rating, based on the characteristics of the building itself, such as heating, ventilation and lighting (Maldonado 2016). Ratings are produced by qualified experts that carry out a visual inspection of the home, with no blower door testing (Weatherall 2018).

2.4.1.4 Requirements for qualified experts

MSs have designed their own systems of training and/accrediting 'qualified experts', the EU equivalent of an energy advisor. In general, there are five areas where minimum requirements could be set: education and/or professional experience, training programs and examinations, professional development, and accreditation (Arcipowska, et al. 2014). Appendix C – Minimum Training Requirements for Home Energy Auditors/assessors in Europedetails the minimum requirements to become a qualified expert across the EU.

Minimum requirements for the level of education are required by 25 MS and Norway, while requirements for professional experience are mandatory for 17 MS and Norway (Arcipowska, et al. 2014). Compulsory and officially recognised training programs are required in 14 MSs, compared with 20 MSs requiring a mandatory examination (Arcipowska, et al. 2014). Continuous development is required by a small but growing number of MSs, 8 out of 28, but 20 MSs require accreditation (Arcipowska, et al. 2014). Qualified experts carry out a visual inspection in the home, without a blower door test (Weatherall 2018).

2.4.1.5 Database

In 2010, the Directive 2010/31/EC replaced the original Directive 2002/91/EC to include a mandatory requirement for MSs to set up a central database to track and store all EPCs issued (Maldonado 2016) Table 2 - Overview of EPC databases in each Member State in the European Union in 2016 below provides an overview of the central databases in each MS.

Table 2 - Overview of EPC databases in each Member State in the European Union in 2016 (Maldonado 2016)

Country	EPC database available?
Bulgaria	Public access Total Countries: 12
Denmark (2014)	
Estonia (2014)	
Lithuania	
Norway	
Slovakia	
Slovenia	
Sweden	
Wales	
England	
Northern Ireland	
Scotland	
Croatia	Restricted access Total Countries: 14
Cyprus	
Czech Republic (2014)	
Finland	
France (2014)	
Germany (2014)	
Greece	
Hungary	
Ireland	
Italy	
Malta	
Netherlands	
Portugal	
Romania	
Luxemborg	In progress
Austria	None to date Total Countries: 5
Belgium	
Latvia	
Poland	
Spain	

2.4.1.6 Outcomes

A report on the progress of each MS' efforts in implementing the EPBD is published every two years by the Concerted Action of Energy Performance of Buildings initiative. The most recent publication was in 2016, which covers the years 2012 to 2015. According to this progress report, all EU MSs, plus Norway, has implemented the mandatory EPC system (Maldonado 2016). The last MSs to implement a mandatory system did so in 2014 (Maldonado 2016). Table 3 below shows the number and percentage of EPCs issued in selected countries, in a single year of reference.

Table 3 - Number of EPCs issued in selected countries in the EU, in a single year of reference (Concerted Action Energy Performance of Buildings 2015)

COUNTRY	Buildings in the country (year of reference)	Buildings with EPC (year of reference)	Percentage of buildings with EPC (year of reference)	EPCs issued, EXISTING buildings (year of reference)	EPCs issued, NEW buildings (year of reference)
Croatia	887,321 (2012)	5,000 (2012)	1% (2012)	1,100 (2012)	2,900 (2012)
Denmark (2014)	1,900,000 (2014)	483,000 (2014)	25% (2014)	71,000 (2014)	6,200 (2014)
France (2014)	30,000,000 (2014)	6,000,000 (2014)	20% (2014)	650,000 (2014)	350,000 (2014)
Germany (2014)	21,000,000 (2012)	no EPC system before May 2014		300,929 (May-Dec. 2014)	21,178 (May-Dec. 2014)
Hungary (2014)	2,704,183 (2011)	201,134 (2014)	7.4% (2014)	191,000 (2014)	10,000 (2014)
Italy (2013)	14,515,795 (2013)	3,637,166 (2013)	N/A	394,471 (2013)	16,786 (2013)
Netherlands*	7,587,028 (2014)	2,499,336 (2014)	33%	435,000 (Jan-Nov 2015)	
Portugal	5,925,125 (2014)	180,107 (2014)	14% (2014)	169,452 (2014)	10,655 (2014)
Sweden	2,100,000 (2012)	420,000 (2012)	20% (2012)	57,000 (2012)	300 (2012)
England	23,600,000 (2015)	11,197,891	47%	not recorded	

*Residential buildings only

When the EPCs were first implemented, problems relating to quality assurance, which in turn affected public trust in the EPCs, became apparent (Maldonado 2016). As well, problems relating to compliance and enforcement of the mandatory requirements, public awareness, and the usability of the EPCs were all called into question (Maldonado 2016).

To address these issues, a subsequent Directive (2010/31/EC) was issued and replaced the original Directive 2002/91/EC, 8 years later. This newer Directive asked the MSs to address the several areas of improvement:

- *Introduction of an independent EPC control system*
- *Assuring the competence of the certifiers in the accreditation procedure*
- *Introduction of penalties for non-compliance, including for poor quality of the EPCs*
- *Increasing the availability of EPCs in sale and rent transactions and the visibility of the energy label in commercial advertisement*

With improvements in quality assurance processes and general compliance, mandatory home energy ratings could become an important source of information for tracking the energy performance of a region's building stock, and an effective tool to measure energy policies. However, from the perspective of the building owners and tenants, a different set of information must be present for the ratings to be useful. Recognizing these consumer needs, the Directive 2010/31/EC also included requirements and recommendations regarding the additional information included in the EPCs:

- *EPCs shall include recommendations for the cost-effective or cost-optimal improvement of the energy performance of a building or building unit unless there is no reasonable potential for such improvement compared to the energy performance requirements in force (obligation).*
- *Recommendations included in the EPC shall be technically feasible for the specific building (obligation).*
- *EPCs shall provide an indication as to where the owner or tenant can receive more detailed information (obligation).*
- *EPCs may include additional information, such as the annual energy consumption for non-residential buildings and the percentage of energy from renewable sources in the total energy consumption (recommendation).*
- *EPCs may include additional information, such as the actual impact of heating and cooling on the energy needs of the building, on its primary consumption and the carbon dioxide emissions (recommendation).*
- *EPCs may provide an estimate for the range of payback periods or cost-benefits over its economic lifecycle, as well as incentives of a financial or other nature, as well as financing possibilities (recommendation).*

(Arcipowska, et al. 2014)

2.4.2 United States

The United States (U.S.) has several home energy rating programs. Some states have mandated home energy ratings, while others continue to be voluntary. In 2017, there were two jurisdictions in the U.S. that have adopted mandatory home energy audits and ratings for single-family residential buildings (Institute for Market Transformation 2017): Austin, Texas and Berkeley, California. The City of Portland, Oregon recently passed a Home Energy Score ordinance, which took effect on January 1st, 2018 (City of Portland 2016). All three of these jurisdictions have adopted a simplified audit process, with no blower door testing involved. The final reports delivered to homeowners are focused on recommendations for upgrades and the potential money to be saved on utility bills. This section will explore the first two jurisdictions and briefly describe the third.

2.4.2.1 Austin, Texas – Energy Conservation Audit and Disclosure (ECAD)

In 2008 the City of Austin approved the Energy Conservation Audit and Disclosure (ECAD) ordinance, requiring mandatory energy audits for homes and apartment complexes (Hill and Dunsky 2013). Effective 2009, single-family homes and residential buildings with four units or less, are required to complete an energy audit prior to the sale of the property (Austin Energy 2014). A copy of the results of the audit must be provided to the prospective buyer no later than three days prior to the end of the buyer's option period (Hill and Dunsky 2013). It is important to note that the home energy audit in Austin does not result in an energy rating. As well, the requirement only applies to homes that are older than 10 years (Austin Energy 2018).

Austin Energy, the eighth largest municipality-owned utility in the U.S., was a key proponent of the ordinance, and provides the administrative support and financial incentives required to implement and maintain the program (Hill and Dunsky 2013). Homes not serviced by Austin Energy are exempt from the ECAD disclosure requirements. There are several other exemptions as well, namely:

- *If a home is outside of the Austin city limits.*
- *If a home is less than 10 years old at the time of sale.*
- *If a home had undertaken qualifying energy efficiency improvements through selected Austin Energy programs within the last 10 years*
- *If a home is manufactured and built on a permanent chassis and designed for use without a permanent foundation*
- *Certain ownership changes or title transfers: foreclosure sale, trustee sale, deed in lieu of foreclosure sale, pre-foreclosure sale, threat or exercise of eminent domain, gift from family member, court order, dissolution of marriage or property settlement agreement.*

(Austin Energy 2018)

Austin's single-family residential audit provides an example of a tailored program designed to keep residential audits affordable and provide information that can spur homeowners to act and carry out energy efficiency upgrades. The ECAD ordinance had specified an upper limit to the cost of an energy audit for single-family homes ($300) (Hill and Dunsky 2013). This monetary limit was lower than the usual rate energy professionals charged to perform a comprehensive home audit (Hill and Dunsky 2013). Austin Energy had to develop its own audit template, focused specifically on the typical Austin home, which does not include a basement. The audit process does not result in an energy rating for the home; instead, the single-family audit form focuses home improvement recommendations in four areas:

- Windows and shading
- Attic insulation
- Air infiltration (tightness)
- Heating, Ventilation and Air Conditioning (HVAC)

An example of the audit report that a homeowner would receive is in Appendix B – Sample Reports and Labels.

'Energy professionals' are the official designation for qualified personnel performing the energy audit and are certified through RESNET as a home energy rater or certified by Building Performance Institute as a building analyst (Austin Energy 2018). The Austin Energy website provides a list of certified professionals as well as a contact for any complaints (Austin Energy 2018). As of March 2018, the City of Austin has 28 certified energy professionals for single-family homes.

This can be compared with the approximate number of single-family home sales in the City in 2013 at 11,000 and the number of audits performed: 4344 (Austin Energy 2014). This results in 25% of single-family homes audited, or exempt. Table 4 below shows the number of audits performed in selected years. There is no public database of building audit reports. Austin Energy retains aggregated results.

Table 4 - Number of single family audits in Austin, Texas (Austin Energy 2014)

Year	Home Sales	Homes Exempt	Homes Not Exempt	Homes Audited (%)
2012	11,230	4,118	7,112	3,538 (50%)
2011	10,370	4,514	5,856	2,895 (49%)
2010	10,440	5,221	5,219	3,640 (70%)

2.4.2.2 Berkeley, California

The City of Berkeley adopted the Berkeley Energy Savings Ordinance unanimously in March 2015 (Institute for Market Transformation 2017). The adoption of BESO replaces a previous Ordinance that required verification of 10 minimum prescriptive measures at time of sale (Glickman, et al. 2016). Instead, BESO uses the Home Energy Score to produce energy scores and reports to the customer and the City. The goal of the new ordinance was to be easy, affordable and valuable (City of Berkeley 2016).

The ordinance requires homeowners to complete and publicly report energy assessments and reports at the time of sale (City of Berkeley 2016). Table 5 below shows the phased-in approach adopted by BESO.

Table 5 - BESO Phased-in schedule

Building Size	Due Date	Reporting Cycle
Large buildings: 50,000 or more	7/1/2018	Energy Assessment every 5 years AND ENERGY STAR Performance Report annually
Large buildings: 25,000- 49,999	7/1/2019	
Medium/Small buildings: 15,000-24,999	7/1/2020	Energy Assessment every 10 years
Medium/Small buildings: 5,000-14,999	7/1/2021	
Small buildings: Less than 5,000 (excluding 1-4 unit homes)	7/1/2022	

Exemptions from the home energy assessments are granted for 'high-performance buildings', which refer to buildings that have specific energy efficient program standards (City of Berkeley 2016):

- ENERGY STAR Whole Home Certification
- GreenPoint Rated Existing Whole Building
- LEED Existing Building Operations and Maintenance
- Verified Passive House
- Zero Net Energy Building Certification

Additionally, a home seller may pass on the responsibility of obtaining the assessment to the buyer (City of Berkeley 2016). Under these circumstances, the new homeowner must comply with BESO within 12 months of purchasing the home (City of Berkeley 2016).

Scores and reports are provided to the homeowner and potential buyers. The report provides a 'fact sheet' on the home, but focuses primarily on the recommendations for upgrades and renovations. This section contains both the recommendation actions as well as a timeframe (City of Berkeley 2016). A sample report is provided in Appendix B – Sample Reports and Labels.

Energy Assessors must be registered with the City and be certified as a Home Energy Score Provider. For stacked units and multi-unit buildings, the assessor must be certified with two of three recognized programs: HERS whole house rater, BPI certified multifamily building analyst, or GreenPoint Rater Existing Home Multifamily (City of Berkeley 2016). It has been noted that home sellers often hire home inspectors, who have been recommended by real estate agents (due to their long-term relationship), whereas buyers often hire independent contractors (Glickman, et al. 2016).

All scores are made publicly available on the City website and updated regularly. The City's list notes compliance status, address and type of building. Figure 8 below shows the City's list, last updated on March 15, 2018.

Figure 8 - BESO Property Status List, publicly available (City of Berkeley 2016)

Building Address		Status	Building Size	Next Energy Report Due
60	ACACIA AVE	Compliant - Form A on file.	House	not required
1307	ACTON ST	Compliant - Form A on file.	House	not required
1385	ACTON ST	Compliant - High performance building.	House	not required
1544	ACTON ST	Compliant - Form A on file.	House	not required
1548	ACTON ST	Compliant - High performance building.	House	not required
1555	ACTON ST	Compliant - High performance building.	House	not required

The demographic of the City of Berkeley played a vital role in the approval of BESO. 81% of the voters supported the Climate Action Plan (Glickman, et al. 2016). Local real estate agents recognize that existing building energy efficiency is highly valued and have established a partnership to educate buyers and sellers on the BESO requirements (Glickman, et al. 2016).

In the first year of BESO, there were approximately 21,000 single-family buildings in the City Berkeley, with 921 homes achieving compliance, or 4% (City of Berkeley 2016).

2.4.2.3 Portland, Oregon

The City of Portland Home Energy Score ordinance will take effect on January 1, 2018, requiring sellers of single-family homes to disclose a Home Energy Report and Score at time of listing (City of Portland 2016). Portland City Council unanimously adopted the policy (Portland City Code Chapter 17.108) in December 2016 (City of Portland 2016).

Home sellers are required to obtain a home energy performance report prior to publicly listing the home for sale (City of Portland 2016). The report is provided to the homeowner's real estate agents, potential buyers that are visiting the home while it is listed, as well as provided to the City (City of Portland 2016). The Home Energy Performance Score that is included in the report must be included in all real estate listings, while the report itself must be included in the listing if attachments are permitted by the listing service (City of Portland 2016). Exemptions apply to foreclosures, trustee and pre-foreclosure sales, as well as 'high-performance' homes. A sample of the City of Portland's Home Energy Report is provided in Appendix B – Sample Reports and Labels.

The City of Portland also has an online database, called the Green Building Registry, where real estate agents and the public can search a property by its address and postal code. This database will be discussed in a later section.

2.4.2.4 Attempted: Vermont and Connecticut

Two jurisdictions have attempted to introduce mandatory home energy ratings: Vermont and Connecticut. In their 2013 paper, 'Building Energy Rating and Disclosure Policies Update and Lessons from the Field," Dunsky and Hill have given a summary of the counter arguments in these jurisdictions, ultimately leading to these jurisdictions rejecting mandatory HER&D policies:

- There will be increased building owner costs
- The state will fail to provide financial assistance for owners to perform energy audits and upgrades to their buildings' energy performance
- The energy rating and audit process during the sale of a building property would increase the real estate transaction costs and further slow an already depressed market.
- HER&D would diminish the market value of the older and less efficient homes and buildings in a jurisdiction where this represents a majority of the properties and in an already depressed housing market

(Hill and Dunsky 2013)

2.4.3 Australia

2.4.3.1 Australian Capital Territory

Since 1999, home sellers in the Australian Capital Territory (ACT) have had to disclose their homes' energy efficiency information to potential buyers (Australian Department of the Environment, Water, Heritage and the Arts (ADEWHA) 2008). The Energy Efficiency Rating (EER) must be provided to consumers in all advertising material and the full certificate must be provided with the sale transaction. The EERs use the ACT House Energy Rating Scheme (ACTHERS). Under ACTHERS, houses can achieve 0 to 10 stars, with 10 being the highest. ACTHERS produces a calculated rating through energy modelling. The house energy rating is independent of the size and type of housing. Since 2006 the Building of Code of Australia has been requiring a minimum star rating for all new houses.

The EER is calculated by an accredited assessor using a house energy rating computer software program. Assessors must be accredited by one of two assessor accrediting organizations (national service organizations) and be trained and certified (Nationwide House Energy Rating Scheme n.d.). Eligible energy assessors are sorted into two classes, A and B (Nationwide House Energy Rating Scheme n.d.). Class A assessors are permitted to perform on-site assessments.

A review of the literature and Internet search reveals that the EER is prominent in the mind of the consumer when searching for homes. Consumers use the EER as a measure of building quality (riotact 2009). Criticism of the EER includes the lack of rigorous training for energy assessors, inconsistent rating results and a confusing rating system, further exacerbated by the phasing out of an older scale in favour of a new scale (Kelly 2015). There is no penalty for non-disclosure, and some homeowners have opted to accept a '0 star' rating, in order to avoid paying for an assessment that can cost upwards of $1,000 (Kelly 2015) (Residential Reports 2017).

2.4.3.2 Queensland

Mandatory ratings for dwellings were introduced by the Queensland State Government in January 2010 (Eves and Bryant 2011). These are called Sustainability Declarations (SD). These Declarations require all residential sellers to complete a declaration of their dwelling's environmental and social sustainability features in four key areas: energy, water, safety and access. The SD requires specific action from the three parties involved in a house transaction: the seller, the sales agent, and the buyer:

- The seller is required to complete a "Sustainability Declaration" checklist ("the form") prior to the property being put on the market.
- The seller can complete the form themselves and may leave items on the form blank if they do not know the answer.
- The seller can be liable for any losses incurred by the buyer because of false or misleading information contained on the form.
- The sales agent is required to include information on where a copy of the Sustainability Declaration is available in all forms of advertising.
- A copy of the completed form is to be on display whenever the home is open to the public for inspection and a copy must be provided to any prospective buyer on request.
- The onus is on the buyer to ask for a copy of the form from the selling agent.

(Eves and Bryant 2011)

A survey focused on buyer and seller awareness was conducted to determine feasibility, using real estate agents. The survey found widespread disengagement with the SD process. Results indicate that most of the buyers do not ask for a copy of the sustainability declaration at any time during the sales process (Eves and Bryant 2011). Real estate agents are not required by law to provide sustainability declarations to potential buyers, although many do (Eves and Bryant 2011). Up to 40% of the forms completed by sellers are never provided to any potential buyer (Eves and Bryant 2011). Of those that are used, virtually none (96%) impact the buyer's decision-making process (Eves and Bryant 2011). In 2012 the Sustainability Declaration was scrapped.

2.5 Examples of HER&D Databases

This section provides some examples of online databases that display home energy ratings. These examples of databases are located in Europe, United States and Canada.

2.5.1 Europe

All EPCs produced in the member states of the European Union are stored in their respective countries' databases. Although the level of disclosure involved with each database varies, some of the EPCs in the databases are publicly available. For example, in the United Kingdom, an individual may access the database through the website and search for an EPC by its unique reference number, or by a postal code.

Other levels of disclosure also exist, as shown in Table 2 - Overview of EPC databases in each Member State in the European Union in 2016 from the previous section. Figure 9 below shows some examples of the kinds of data available in some databases.

Figure 9 - Example of data collected in EPC databases (Arcipowska, et al. 2014)

	Building's general information	Energy performance data	Recommendations	Qualified Expert details	Calculation input	Comment
Germany	✔	✘	✘	✔	✘	Only registration number of the EPC, the building type, the EPC (asset or operational rating), region where the building is located
Romania	✔	✔	✔	✔	✘	Electronic copy of the EPC, all data provided in the EPC
Slovakia	✔	✔	✔	✔	✘	All data provided in the EPC
Lithuania	✔	✔	✔	✔	✔	All input to calculation software, all data provided in the EPC
Greece	✔	✔	✔	✔	✔	All input to EPC calculation, all data provided in the EPC, xlm and PDF version of EPC stored in the database
Portugal	✔	✔	✔	✔	✔	The system requires ~250 inputs; all data provided in the EPC; qualitative/quantitative information for benchmark
Hungary	✔	✔	✔	✔	✔	The system requires 80 inputs; all data provided in the EPC
France	✔	✔	✔	✔	✔	The system requires 105 inputs; all data provided in the EPC
Ireland	✔	✔	✔	✔	✔	All inputs to calculation software, all data provided in the EPC, background of the certifier

2.5.2 United States – Green Building Registry

Green Building Registry stores and displays the City of Portland's Home Energy Score reports. This allows buyers to check the Home Energy Score of a property they are interested in, without waiting for the homes' seller or real estate agent to provide it (City of Portland, Bureau of Planning and Sustainability 2018). A user can search for properties using the property address. Figure 10 below shows the search screen.

Figure 10 - Search page for greenbuildingregistry.com

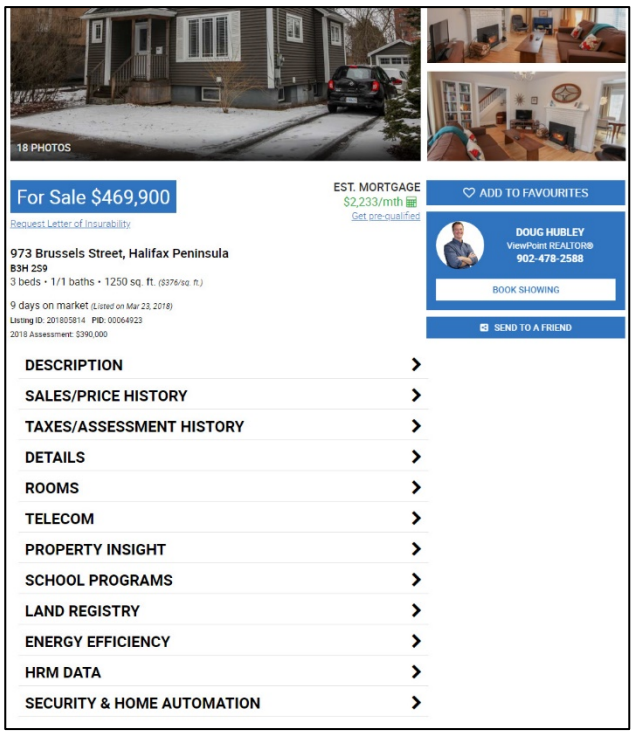
2.5.3 Canadian examples

2.5.3.1 Viewpoint.ca

A Canadian example of an online database would be viewpoint.ca. This is a real estate listing website which includes a homes' EnerGuide rating in its list of features. Home sellers sign up for an EnerGuide home energy assessment through Efficiency Nova Scotia (Efficiency Nova Scotia 2018). The home receives an EnerGuide rating, and the homeowner receives the EnerGuide label, homeowner information sheet and a renovation upgrade report (Efficiency Nova Scotia 2018). Property owners can upload their full EnerGuide label and homeowner information sheet onto Viewpoint. There are incentives offered if the recommended upgrades are undertaken. A screen capture from a listing on viewpoint.ca can be seen in Figure 11.

This project received funding form the Government of Canada is a joint venture between Efficiency Nova Scotia, Province of Nova Scotia, Nova Scotia Association of Realtors and Viewpoint (viewpoint n.d.).

Figure 11 - A viewpoint.ca listing, which includes a section for EnerGuide ratings (viewpoint n.d.)



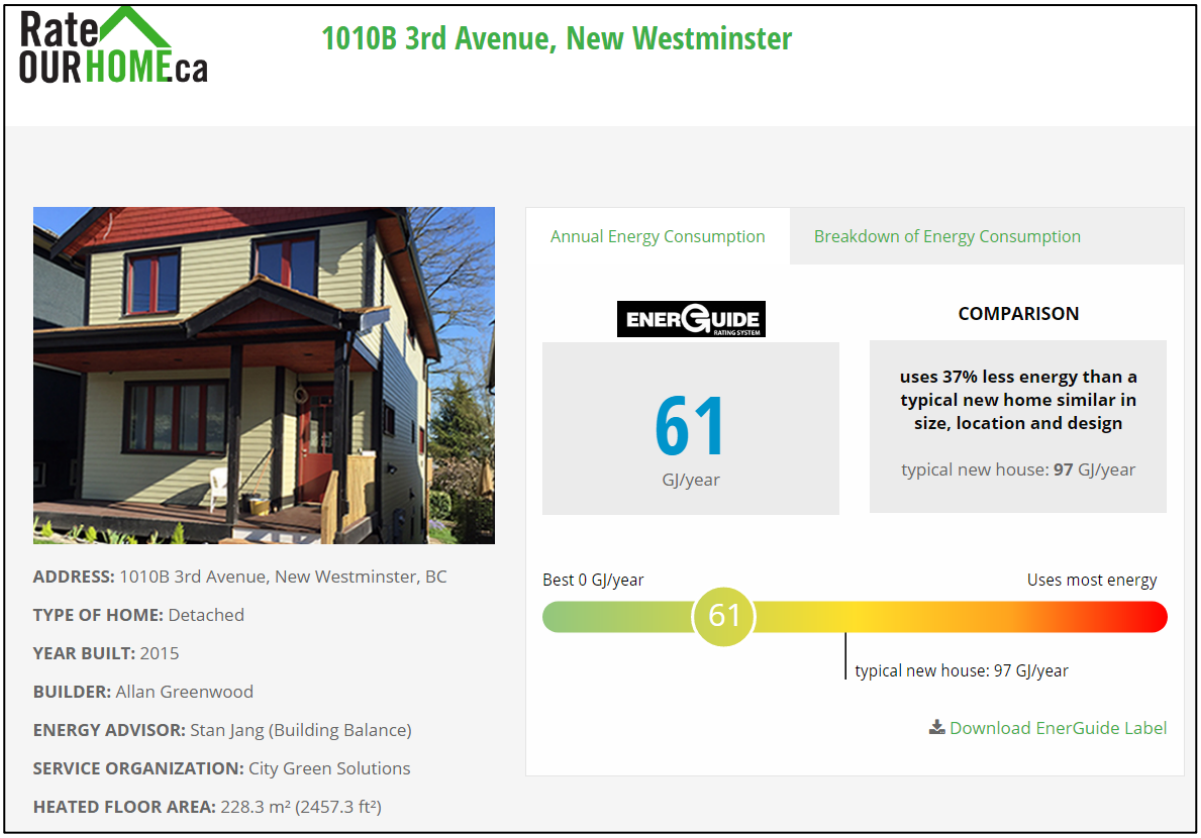
2.5.3.2 Rateourhome.ca

Another Canadian example is rateourhome.ca from Vancouver. Similar to viewpoint.ca, home-sellers voluntarily obtain an EnerGuide rating and display the rating online. Homes with a rating are listed on the website alongside a map of Vancouver. A user can search by using filters, or through a range of EnerGuide rating values. The website is an outreach campaign by Metro Vancouver, funded in part by the Homeowner Protection Office and by Natural Resources Canada from the Driving BC Demand for Energy Star for New Homes program.

Figure 12 shows a selected homes' 'fact sheet' page. A user also has the option to download the EnerGuide label for the home.

The website is an outreach campaign by Metro Vancouver, funded in part by the Homeowner Protection Office and by Natural Resources Canada from the Driving BC Demand for Energy Star for New Homes program.

Figure 12 - A selected homes' 'factsheet' page on rateourhome.ca



2.5.4 Automatically generated labels

2.5.4.1 The Netherlands

In 2012 the Netherlands government decided to introduce a new and more consumer-friendly system for homeowners. The new system was implemented in 2015 and gave homeowners direct feedback on the energy performance of their homes. The new system consists of a web-based tool where homeowners can apply for an EPC for their house. Since 1 January 2015, all residential building owners (in total 4.5 million) received a temporary EPC (calculated based on the national cadastral data) by mail. This certificate gives an indication of the energy performance of the residence. The owner can digitally add or change information to the intake data of the Dutch cadastre on which the preliminary EPC is based. This data is trustworthy, so the owner only adds limited modifications. Both existing and new data are checked by an “energiedeskundige” who oversees producing the definitive EPC registered in the RVO database.

Figure 13 - Infographic describing the 4 steps of the Dutch labelling process for residential building owners: 1) login, 2) uploaded proof, 3) validation by a recognised expert and 4) registration. (Eck 2016)

2.5.4.2 MyUtilityScore.com

MyUtilityScore is a U.S. based website that provides an estimated energy rating of single-family homes, based on home characteristics, climate and local utility rates (myutilityscore 2018). Each home receives a rating from 1 to 100 with 1 meaning high utility bills and energy and water usage. The score also compares the rating of the home with other homes in the area (myutilityscore 2018).

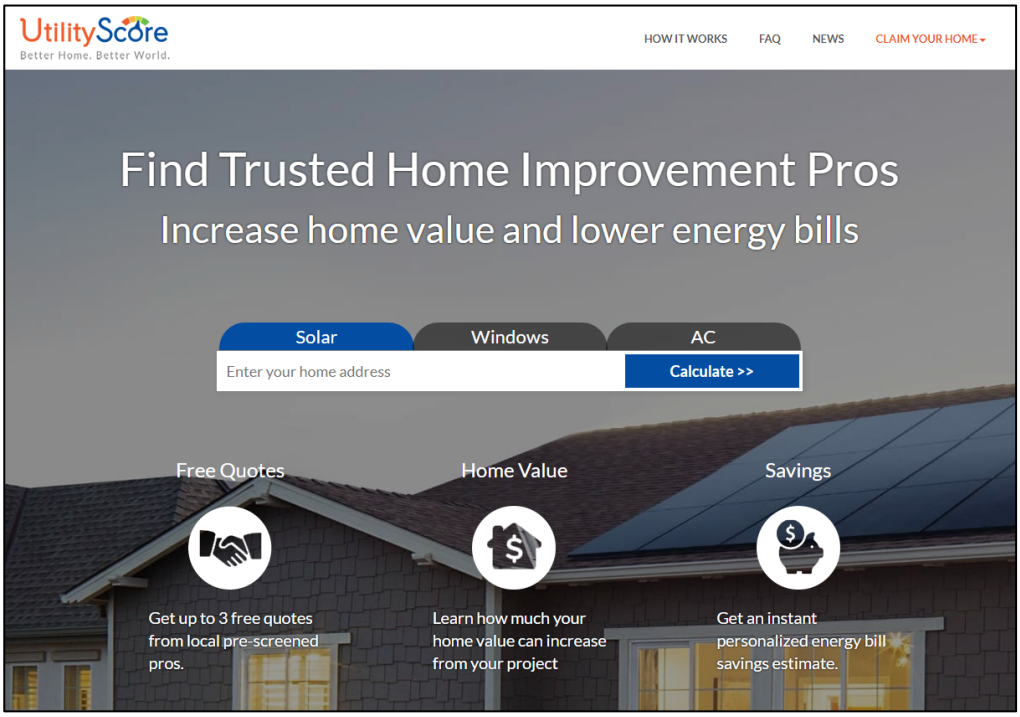
Users can enter a home's address on the main page or choose to further refine a home's score by 'claiming' it and filling in missing details that are known only to the homeowner. This provides a more accurate rating. The website also provides free quotes from contractors that could carry out the recommended upgrades.

A description of the website can be found below:

> *We provide personalized utility bill savings estimates for solar, new windows, heating and air conditioning upgrades, and other home improvement projects that save money on utility bills. We also estimate energy and water bills to help you consider these costs before you buy or rent.*
>
> *UtilityScore provides utility bill and savings estimates based on property characteristics, local utility rates, and local climate data. Actual bills may vary based on the behaviors and number of people living in the home. Users can refine the estimates by indicating the number of occupants, preferred thermostat settings, and if the home will be occupied during the work week. Homeowners can claim their home and update their Home Facts to increase accuracy of the saving estimates.*

(myutilityscore 2018)

Figure 14 - A screen capture of myutilityscore.com



3 National Survey

A national omnibus survey was conducted in December 2017 in order to provide insights into homeowner opinions on and experience with home energy ratings, assessments and their participation in government and utility incentive programs. Oraclepoll Research Ltd conducted a telephone survey of 1,000 homeowners across Canada. The margin of error is +/- 3.1%, 19/20 times.

The following table represents the sample distribution by region.

	Frequency (N)	Percent %
Maritimes	70	7%
Ontario	390	39%
Quebec	240	24%
Manitoba / Saskatoon	70	7%
Alberta	100	10%
BC	130	13%
Total	**N=1000**	**100%**

The answers to the questions are shown in chart format in Appendix D – National Homeowner Omnibus Survey. A summary of the answers are provided below, with both the national averages and significant provincial averages provided.

3.1 Question 1

The survey participants were screened to verify that they were homeowners who do not reside in a condominium or strata. A preamble shown in italics below was then read to each participant:

> *I am going to ask a series of questions about home energy ratings and your opinions on them. There can be any number of ways that a home's energy performance is assessed. That assessment can be converted into a rating, and the rating can be converted to a label. The label can be disclosed to the home buyers or the public to let them know about how a home performs. A number of jurisdictions across Canada are contemplating new laws to mandate home energy ratings and their disclosure to potential homebuyers and to the general public. The new legislation would hope to motivate homeowners to upgrade their homes to improve energy efficiency and ultimately to reduce GHG emissions.*

3.2 Question 2 and 3

How old is your home? How long have you lived in your home?

The survey respondents were then asked questions about their residence including its age and how long that they have lived in the dwelling.

	Percent %
Under 5 years	**8%**
5-9 years	**14%**
10-14 years	**19%**
15-19 years	**27%**
20 years or more	**28%**
Don't know	**3%**

Millennials 18-35, are most likely to be short term residents or have lived in their home for less than 5 years at 40%, followed by those aged 36-53 (29%), while most of those aged 52-62 have lived in their home for 10-14 years (52%). Older residents 71+ have lived in their home for 20 or more years (71%), while those aged 63-70 were more likely to have lived in their home for 15-19 years (26%) and 20+ years (39%).

3.3 Questions 5 to 15

I'm going to read a list of factors that you may have considered when you bought your home. For each item, could you tell me how important they were in affecting your home buying decision? (choose from very important, important, not very important, not at all important)

	Total important	Total unimportant	Don't know
Q5. Price of the home	**94%**	**5%**	**4%**
Q9. The neighbourhood and community	**90%**	**9%**	**1%**
Q7. Location	**88%**	**12%**	**1%**
Q8. Condition of the home	**83%**	**17%**	**<1%**
Q14. Condition of heating and air conditioning equipment	**80%**	**18%**	**2%**
Q7. Size of the lot	**77%**	**22%**	**1%**
Q6. Number of bedrooms	**71%**	**28%**	**2%**
Q13. The home's energy consumption	**68%**	**30%**	**2%**
Q12. Interior room layout	**65%**	**33%**	**2%**
Q11. Interior finishes	**57%**	**41%**	**2%**
Q15. Nearby amenities, including shopping, restaurants, etc.	**56%**	**43%**	**1%**
Q10.The exterior aesthetics	**48%**	**50%**	**2%**

Price was rated as the most important consideration by almost all or 94%, followed the neighbourhood or community by nine in 10 or 90%, closely followed by the related topic of location at 88%. Next highest scored was the condition of the home at 83%, the condition of the heating or air conditioning systems at 80% and the size of the lot at 77%.

Although the house price was rated high across all cohorts, it was rated lower among those earning more than $150,000 (73%), while 12% of seniors 71+ could not recall. A significant 40% of respondents aged 18-35 said that the condition of the home was not important. This same group also had the highest response of 'unimportant' for location (22%) and the neighbourhood or community (18%). With respect to the heating and air conditioning equipment (HVAC), the oldest cohorts most recalled that this was not an important factor (71 or older – 61% 'unimportant' and 63 to 70 – 39% 'unimportant'). In comparison, 97% of respondents aged 18-35 years old considered HVAC as important, and 94% of 36-51-year olds rated it as important.

Of moderately high importance were the number of bedrooms in the home (68%), the home's energy consumption (68%) and the interior room layout (65%). Those that tended to rate bedrooms as being unimportant were younger 18-35-year olds (55%) and older respondents 63-70 (35%) as well as Ontario residents (35%) – 16% of those 71+ didn't know or could not recall. There was a similar demographic pattern for room layout, with unimportance highest among 18-35- (39%) and 63-70-year old's (52%), as well as Ontario residents (43%) – 16% of those 71+ didn't know or could not recall.

The main variance with respect to energy consumption was evident as a function of age with almost all (97%) of 18-35-year olds rating it as important, followed by 91% of those 36-51. Overall, energy consumption was in the middle of the list of preferences.

Lowest rated among the 12 categories were interior finishes (57%), nearby amenities (56%) and especially exterior aesthetics (48%). A large number of price-driven millennials (aged 18-35) rated as unimportant exterior aesthetics (73%) and nearby amenities (60%). On the other hand, those in the mid-aged cohort of 36-51 had high responses of important for interior finishes (75%), nearby amenities (73%) and exterior aesthetics (65%). When considering the responses overall, these responses were all lower than a home's energy information.

3.4 Question 16

Have you ever had your home's energy performance evaluated?

In total, 55% of respondents said that they have had their home's energy performance evaluated. Those residing in Quebec (60%) and Ontario (57%) were most likely to have had an evaluation, as were younger respondents 18-35 (66%) and 36-51 (69%). Evaluations were also more common among those living in newer homes (under 5 years – 63% & 5-9 years old – 69%) and respondents who have resided in their dwellings for fewer than 15 years (10-14 years – 61%, 5-9 years 64% & under 5 years – 65%). Conversely the oldest Canadians aged 71+ (11%) and 63-70 (39%) were least likely to say they have had an evaluation, as were residents of the Maritimes (43%).

Have you ever had your home's energy performance evaluated?	Percent %
Yes	55%
No	45%

3.5 Question 17 (for those who have had their home's energy performance evaluated)

What are the reasons you had your home's energy performance evaluated?

The 55% or N=552 of respondents that had their home's energy performance evaluated were then asked about the reasons for getting the assessment.

Reasons for energy performance evaluation	Percent %
I wanted to know where I could save money on my monthly energy bills	38%
I wanted to increase the value of my home	16%
I wanted to do my part to protect the environment	14%
I needed to replace/repair my furnace or HVAC equipment	12%
I needed advice on upgrades to its walls, windows, or insulation	10%
I was required to do an audit as part of a government or utility incentive program prior to renovation	7%
Don't know	3%

The most named reason with 38% (N=257) of combined mentions was 'wanting to know where money could be saved' on their monthly energy bills. Other responses were varied and ranged from 16% (N=108) that wanted to increase the value of their home, 14% (N=92) that did so for the environment, 12% (N=83) needed to repair or replace equipment and 10% (N=68) that wanted advice for upgrades they were undertaking. There were 7% (N=46) that said they were required to do so as part of an incentive program and 3% (N=21) did not know or could not recall.

3.6 Question 18 (for those who have not had their home's energy performance evaluated)

What is the main reason that you have not conducted an energy evaluation?

The 45% or N=448 that have not had an energy evaluation were asked about the reasons why they have not had one conducted.

Reasons for not having energy performance evaluation	Percent %
It is not a priority at the moment	24%
I don't understand the value of an energy evaluation or assessment	15%
I don't know what an energy evaluation or assessment is	13%
I have already performed several of the upgrades for which an evaluation would be required	9%
My home is new	8%
I use my energy bills to tell me about my home's energy efficiency	7%
It costs too much	7%
Don't know	6%
I don't know how to choose an energy advisor	5%
It takes too much time and effort finding an energy advisor	4%
I am moving out of the home soon	3%

In general, older respondents aged 63-70 and 71+ years old were less likely to know what an energy evaluation or assessment was (29.2% and 20.5% respectively). The same respondents were also less likely to understand the value of an energy evaluation or assessment. For the remaining respondents the main reason for not having an energy evaluation conducted was 'it is not a priority at the moment', at 27% to 29%)

The main reason given by a significant number of 36-51-year-old respondents for not conducting an energy evaluation was 'it is not a priority' (29.7%). This same reason is also given for respondents in the 18-35 years old and 52-62 years old group (27.3% and 27.7% respectively). Variance occurs where more respondents in the 36-51-year-old group said that their home was new (20.9%), compared to those 18-35 years old (10%) and 52-62 years old (5%).

Another variance was evident with education level. Respondents with "some high school" education chose "I don't know what an energy evaluation is," as their main reason (33.3%), in comparison to 16.7% of respondents with PhD or Masters.

34.5% of respondents with household incomes of under $50,000 said that an energy evaluation costs too much. On the other hand, the main reason for respondents with household incomes of $150,000 was 'it is not a priority' and 'I don't know what an energy evaluation or assessment is.'

3.7 Question 19

Could you tell me what you thought was useful or helpful from the home energy evaluation report?

An open-ended or unaided question allowing for one top of mind response was asked to the 55% or N=552 of respondents that had their home's energy performance evaluated. In it they were asked to name what they thought was useful or helpful from the home energy evaluation report.

What consumers thought was most useful or helpful from a home evaluation assessment	Percent
Ways to save money	31.5%
Energy usage / consumption	20.3%
Advice for heating / cooling system	10.1%
Leakages / losses	10.0%
Advised where to spend money (in general)	7.4%
Don't know	6.9%
Advice on insulation / windows / doors	5.3%
Comparison of savings	2.7%
Information on incentives	2.5%
Water savings / tank / heat pump	2.0%
Nothing	1.3%

Providing them with ways to save money was the top mention by 17%, followed by 11% that said it told them of their energy use and ways to save energy. There were 6% that stated that the advice for their heating / cooling system was most useful, 6% information about leakages or heat loss, 4% the guidance it gave them on where to spend their resources and 3% advice on issues related to insulation, windows or doors. Lesser citations included a comparison of cost savings by 2%, information about incentives by 1% and 1% information about water savings (tank, heat pump). There were 4% that were unsure about what was most useful and 1% said nothing was helpful.

3.8 Question 20

Did an incentive program affect your decision to make home energy upgrades?

	Percent %
Yes	53%
No	47%

The N=552 of respondents that had their home's energy performance evaluated were next questioned if an incentive program had an impact on their decision to make energy upgrades at

their residence. Slightly more than half or 53% claimed that a program affected their decision to make upgrades. Results were higher among 18-35-year old's (58%), those aged 36-51 years old (58%) and residents of Manitoba/Saskatchewan (61%) and Quebec (58%). Response rates relative to income were relatively even. Those earning less than $50,000 per year had a positive response rate of 54.2%, compared to the 57% of those earning more than $150,000 per year.

3.9 Question 21

Did the result of the home energy evaluation affect your decision to make home energy upgrades?

	Percent %
Yes	58%
No	42%

The N=552 of respondents that had their home's energy performance evaluated were asked if the results of their home energy evaluation affected their decision to make energy upgrades. Almost six in ten or 58% (N=320) stated that the result of their energy evaluation affected their decision to make home energy upgrades. The impact of the evaluation was somewhat elevated among 18-35-year olds (65%), those aged 36-51 (57%) and 63-70 year olds (53%) and among residents of Manitoba/Saskatchewan (74%), followed by Quebec (62%) and Ontario (58%). Those with a combined household income of under $50,000 were more inclined to be affected by the results of an energy evaluation (63%).

3.10 Question 22

Based on the recommended energy efficiency measures that you implemented, were your expectations met?

	Percent %
Yes	82%
No	14%
Don't know	4%

A follow-up satisfaction question was presented to the N=320 of respondents that in Q21 stated the energy evaluation affected their decision to make home energy upgrades. A very strong 82% stated that their expectations were met – based on the recommended energy efficiency measures they implemented.

3.11 Question 23

If you were planning on selling your home and had to do an energy evaluation, where would you look for an energy advisor?

All respondents were questioned about their knowledge of energy advisors, starting with where they would look for one if they were planning to do an evaluation. They were read a list of six options and asked which ones applied. The following table combines the results from the N=1448 responses provided.

Where would you look for an energy advisor?	**Percent %**
Government website	29%
Internet search	27%
Ask the local energy utility	24%
Don't know	7%
Ask my realtor as part of my preparing my real estate listing	6%
Ask friends or family	5%
Ask my renovator	2%

Online sources were the most named by 56% with 29% citing government websites and 27% Internet searches, while the next highest mention was for local utilities (24%). Lesser-named mentions included realtors (6%), friends or family (5%) and renovators (2%), while 7% did not know. Government websites were most popular among those 36-51 (42%), 18-35 (35%) and 52-62 (24%), while Internet searches were most named by the age cohorts of 18-35 (41%), 36-51 (29%) and 52-62 (25%). Older Canadians tended to name their utility (63 to 70 – 39% & 71 or older – 33%) and realtors (63 to 70 – 15% & 71 or older – 18%), while a high number of older respondents were also unsure (63 to 70 – 19% & 71 or older – 21%).

3.12 Question 24

Which of the following types of qualifications or credentials do you feel that an energy advisor needs?

All respondents were read three qualifications or credentials and were asked which ones they felt an energy advisor would require. The following table combines the results from the N=1345 responses provided.

Qualifications or credentials an energy advisor should have	Percent %
Certification - completion of Certified Energy Advisor training	68%
College certificate e.g. engineering technologist	16%
Professional degree e.g. architect or engineer	9%
Don't know	6%
Nothing	1%

Almost seven in ten or 68% (N=909) of all responses related to the requirement of certification through the successful completion of Certified Energy Advisor training. There were 16% (N=220) that named a college certificate and 9% (N=125) a professional degree, while 6% were unsure and 1% said nothing or none.

3.13 Question 25

Would a home's energy rating be something that you would want to see if you were shopping for a home?

	Percent %
Yes	92%
No	5%
Don't know	3%

All respondents were asked if they would want to have access to a home energy rating if they were in the market to purchase a residence. Results were very strong at 92% and across all cohorts in wanting to have access to an energy rating for a home when purchasing.

3.14 Question 26

Do you think that a home's price would be significantly affected by requiring its sellers to disclose their homes' energy rating?

	Percent %
Yes	56%
No	27%
Don't know	17%

All respondents were asked if the felt a dwellings price would be significantly affected if sellers were required to disclose the energy rating of the property. The majority of respondents believed that a home's price would be affected, with 56% saying yes, 27% no or it would not and 18% did not know. Respondents more likely to say yes were 18-35 (66%), earning $50,000 to $74,999 (65%), who have lived in their home for under five years (68%) and whose dwelling is under five (66%) and 5-9 years old (67%).

3.15 Question 27

Considering the value you attach to a home inspection, how much would you be willing to pay to have your home energy rated?

Amount consumers willing to pay to obtain a home energy rating	Percent %
$100-$200	52%
$200-$300	16%
Greater than $300	16%
Nothing	6%
Don't know	10%

Respondents were read three price points and were asked how much they would be willing to pay to have their home energy rated. The lowest $100-$200 price was most selected by 52%, while 16% named $200-$300 and 16% more than $300. There were 10% that were unsure and 6% stated that they would not pay anything. Higher earners making more than $150,000 per annum were most inclined to pay $300+ (46%), while those in the lowest income cohort were most likely to be unsure (27%) or say nothing (13%).

3.16 Question 28

Are you in favour of the government requiring home sellers to get an energy rating of their home?

	Percent %
Yes	76%
No	19%
Don't know	5%

A more than three-quarters majority of all respondents, or 76% support the energy rating requirement, only 19% do not and 5% did not know. Support was strong across all regions but highest in Ontario (78%), Quebec (77%) and BC (76%), among 18-35 (84%) and 36-51 year old's (85%), but by only 53% of the oldest respondents 71+.

3.17 Question 29

Are you in favour of the government requiring home sellers to share their homes' energy rating with the public?

	Percent %
Yes	67%
No	30%
Don't know	3%

All respondents were probed in this last question about a potential requirement for sellers to share their home energy rating with the public. While results were lower in this public disclosure question, two-thirds (67%) still back the requirement, 30% do not and 3% were unsure. Opposition or responses from those answering "no" were highest among Canadians 71 years of age or older (61%) and 63-70 (53%) as well as respondents living in older homes aged 15-19 (37%) and 20+ years (40%).

4 Focus Groups

Oraclepoll Research conducted two focus groups, one in Toronto and one in Montreal. The objectives of the focus groups were to explore themes that appeared in the survey results. The focus groups allowed a deeper probe into homeowner opinions about and experience with HER&D, energy efficiency renovations, and government and utility incentive programs. The participants were screened and represented homeowners who make decisions about their home. The questions used in the focus groups are included in Appendix E – Homeowner Focus Groups.

4.1 Group Responses by Topic

4.2 Home Purchasing Motivators

The session opened with a question to participants about the most important factors they took into consideration when purchasing their home. In Toronto, the most named reasons included the price of the residence (N=4), its location or area (N=4), its proximity to public transit (N=3), schools in the area (N=3), the areas itself (N=2) and shopping (N=2). The homes characteristics such as the number of bedrooms, its kitchen or square footage were named by N=2, while no one cited or recalled issues related to its energy efficiency or utility bill costs.

For the Montreal group, the most named reasons included the age of the home or that it was newer (N=3), its proximity to services in the area or the area itself (N=3), the building type including amenities such as parking, appliances or number of bedrooms (N=3) and the condition of the residence such as being renovated (e.g. new roof, insulation etc.). While most wanted a ready to move in home without needing to do work, one participant said that they wanted to undertake and completed renovations – including the heating system and insulation.

4.3 Evaluations or Ratings

Prior to the next set of questions, participants were read the following descriptive statements about home energy ratings, energy evaluations and energy advisors.

> *During this session I am going to ask a series of questions about home energy ratings and your opinions about them. There can be any number of ways that a home's energy performance is assessed. That assessment can be converted into a rating, and the rating can be converted to a label. A number of jurisdictions across Canada are contemplating new laws to mandate home energy ratings and their disclosure to potential homebuyers and to the general public. The new legislation would hope to educate homeowners to make appropriate choices to improve energy efficiency and ultimately to reduce Greenhouse gas emissions.*
>
> *For some context, an energy assessment or evaluation is a process where an energy advisor will inspect your house for things like the number and type of windows, and the amount of insulation. They will sometimes check the air tightness of your house by putting a fan on your front door. The typical time for this procedure is between 2-3 hours. The advisor then provides a report on the energy performance of your home together with recommendations for upgrades. Now I'm going to start. I want you to approach each question as someone who is going to sell or buy a house.*

When asked if they ever had their home's energy efficiency assessed or evaluated, six (N=6) participants said they did. In Montreal, N=2 participants said that they did. Across both cities there were eight out of nineteen participants that have had their homes energy efficiency assessed or evaluated. These eight were then asked a series of follow-up questions.

4.4 Energy Efficiency Evaluation Participants

The eight participants that had an evaluation were first asked to name the main reason why they had it conducted and how much it cost. In Toronto, the main reasons cited were to lower energy bills and to take part in programs that provided either incentives or free upgrades. These included window and door replacements, insulation upgrades or assistance in getting a new furnace. One person said their hydro utility contacted them and offered the inspection, which recommended changing light bulbs – the inspection and advice were free, as the participant said they would not have paid. Two people stated they took part in a program to upgrade windows, doors and their furnace at a cost of $150 - $165, which was reimbursed once their modifications were complete. Some participants mentioned that they changed their furnaces as part of an initiative, while others undertook insulation upgrades and hot water tank replacements.

All the Toronto participants claimed that their evaluation was part of a program that covered the cost of the energy evaluation. When pressed for the name of the program, there were references to Enercare, their hydro utility (for light bulbs) and federal (for window and doors) or provincial governments in general. Enbridge was also named, cited as recently providing a couple of participants with insulation upgrades. In all cases upgrades or renovations were recommended which all six undertook.

In Montreal, the reasons named included it being part of a process when they switched their home from oil heat to hydro and taking part in an initiative from Hydro Quebec to help reduce their utility bill costs. Both Montreal respondents said that there was no cost to them as it was absorbed by the utility as part of the program or initiative. On the issue of other upgrades or renovations recommended by the advisor, one person said that they found out that the residence has no insulation after which they followed the advice and "totally insulated the home". The other participant said that the changes proposed were minimal and included items such as replacing faucets or shower heads.

The ability of participants to recall the rating they were given was low. In Toronto, participants were able to provide an answer. The highest named was "79" with others giving ratings in the mid-70s. When asked, all agreed that a higher numerical rating would be best. In Montreal, when asked about the rating they were provided, one said none was provided or they could not recall, while the other claimed that the number "125" came to mind.

4.5 Non-Energy Efficiency Evaluation Participants

In Toronto, the group was then asked directly if a series of 10 reasons acted as a barrier preventing them from getting an energy evaluation. When prompted, the only areas mentioned related to their home being new (N=3), that energy bills serve as an indicator (N=2) and they did not know where to start to find an advisor (N=1).

1.	*Don't know what an energy evaluation is:*	*None*
2.	*Home is new / needs no upgrades:*	*N=3 - yes*
3.	*Use energy bills to tell you about your home's energy efficiency:*	*N=2- yes*
4.	*You thought that it would cost too much:*	*None*
5.	*Didn't know where to start to find an Energy Advisor / could not find*	*N=1 - yes*
6.	*Already renovated house / no use for upgrade recommendations:*	*None*
7.	*You were worried that the assessment wouldn't be accurate:*	*None*
8.	*You were concerned that you might be ripped off:*	*None*
9.	*Concerned upgrades or renovations wouldn't meet expectations:*	*None*
10.	*You were or are way too busy:*	*None*

The main top of mind reasons included their home being new or newer and that energy efficiency was not a concern to them. There were two that claimed their bills were reasonable or not an issue and another cited the cost of an evaluation.

In Montreal, the most cited reasons included the fact their residence is newer and did not need upgrades (N=2), that it has already been updated (N=2) and that energy bills are used to determine efficiency (N=2). Single mentions were given for concerns over cost and fear that the work would not meet their expectations.

1.	*Don't know what an energy evaluation is:*	*None*
2.	*Home is new / needs no upgrades:*	*N=2 - yes*
3.	*Use energy bills to tell you about your home's energy efficiency:*	*N=2- yes*
4.	*You thought that it would cost too much:*	*N=1 - yes*
5.	*Didn't know where to start to find an Energy Advisor / could not find*	*None*
6.	*Already renovated house / no use for upgrade recommendations:*	*N=2 - yes*
7.	*You were worried that the assessment wouldn't be accurate:*	*None*
8.	*You were concerned that you might be ripped off:*	*None*
9.	*Concerned upgrades or renovations wouldn't meet expectations:*	*N=1 - yes*
10.	*You were or are way too busy:*	*None*

Among those that have not had an evaluation, the most named reason for not doing so related to the belief that their home was newer, has had upgrades and as a result did not need any efficiency improvements – let alone an evaluation. There were also some that use their energy bill as an indicator of efficiency, while issues related to accuracy or being "ripped off' were not named.

4.6 All Group Participants – Energy Assessments

Participants were then questioned about what they felt keeps people from getting a home energy assessment or evaluation. Torontonians tended to name a perceived lack of need, the belief that their homes were efficient as well as cost and being too busy. Montrealer's on the other hand most cited trust as an issue or a lack of faith in private contractors. At this point a theme was raised that persisted throughout the session that related to only or primarily trusting Quebec Hydro for this type of service.

In Toronto, a lack of time or being too busy was named by N=2, financial barriers or cost by N=2 (including long-term payoff or benefits), age was named by one and language or cultural barriers by another. There were single mentions of laziness and a lack of information or knowledge of the programs available. This shows that a HER&D system would need to address ease of use features, such as having the program available in multiple languages.

When asked what they thought the energy rating for an efficient home would be, respondents in both cities were unaware of what that would be. In Toronto, of the six that provided a response, most identified the 75 to 80 range (N=5), with one naming "85-90". Some referred to a percentage almost like a school grade. In Montreal, there was no one in the group that was aware of what an efficient rating would be. Most did not deem this to be an important factor and felt that other issues related to the home were most important – from a purchasing perspective. Comments related to liking the idea of a rating, but few are aware of the details despite in some cases having received a label with a rating. Some identified issues relating to trusting the individual who provided the rating.

In an open-question, respondents were asked what they would find most useful in a home evaluation report. Most would want "targeted" information that would tell them what specific or actual items would need to be addressed in order for them to save money. These improvement areas would include leakages, caulking and how older homes could be made to be efficient. As well, information on appliances including their usage would be beneficial. Participants would also like to see a clear report showing these savings and justifying not only the cost of the assessment but also of the potential upgrades.

Participants were then read four sections of a report and asked which ones they would find useful. All participants in both cities said they would like to see their energy usage and recommendations on where to upgrade.

In Toronto, approximately half would want a comparison of their home to others and how airtight their residence is. In Montreal, N=6 wanted recommendations provided related to upgrades or improvements and N=5 a comparison of their dwelling to others. The least desire aspect (N=2) was finding out how airtight their home is.

4.7 Energy Advisors

Participants were read the following lead-in statement prior to the next set of questions.

> *Next, I am going to focus on the home energy advisor. In Canada, an energy advisor is generally an independent contractor that often uses Natural Resources Canada (NRCan's) rating system to assess the energy performance of a home.*

Participants were asked if they would expect an energy advisor, who is conducting a home energy evaluation on their residence, to be licensed or regulated. Across both cities there was unanimous agreement that related to the expectation or having the energy advisor, who is conducting a home energy evaluation on their residence to be licensed or regulated.

In Toronto, comments reflected the need for them to be regulated in order that they can be trusted – as there were concerns expressed with unregulated individuals and potential scams.

- *"They better be I don't want anyone off the street"*
- *"Don't like the door to door salesmen"*
- *"Enbridge used to send people to the door or the phone calls every single day worse than telemarketers"*
- *"Most definitely just to be reputable"*
- *"Definitely do not want someone who does not know what to do"*
- *"Definitely they need license, need proof"*
- *"Needs to be regulated because otherwise we could not trust them"*
- *"Many of them out there are not regulated; the company is not so the employees aren't"*
- *"Many are not qualified"*
- *"They need to be licensed to trust them"*

The group was then asked how they would go about finding an energy advisor. Results were varied, but the most common response was through a real estate agent (N=3), online or a web search (N=3), word of mouth from friends or family (N-3), their utility company (N=2) and home inspectors (N=1).

In Montreal, the fact that Hydro Quebec is trusted in the market was reinforced as half the group said they would contact the provincial utility to help them in their search to find an advisor. Other responses included doing an Internet search, contacting people that they know and looking at established businesses or professionals in the field.

Participants were asked about their thoughts on having the energy advisor also being the person who is the contractor or renovator doing the recommended upgrades to their home. In both cities, no respondents were in favour and most felt it would be a conflict of interest. There were comments related to "many scams going around "and that they would want a "second" or "more than one opinion". In Montreal, it was once again mentioned that it "would be hard to trust them" or that it "would appear that they are "trying to sell something". Five participants felt that only if Hydro Quebec recommended the contractor would they trust this person, while only one dissented on this issue claiming, "I don't trust anyone".

The discussion then moved to opinions on advisors recommending contractors and if they should be required to disclose any conflicts of interest or relationships with these parties. There were roughly half of participants that definitely wanted full disclosure. Some felt that even with disclosure there could be conflicts or "scams" and others had a "buyer beware" approach – one where the onus should be on the homeowner to do their background check. There was a sense among a few that they would want the option to choose their own contractor or have the option of selecting from a list of potential providers. In Montreal once again, there were five respondents that claimed they would find this situation acceptable only if the contractor was certified by Hydro Quebec, while one said so if it was recommended by their insurance company.

All participants in both cities held the view that they would want to have the ability to challenge a rating provided for their home that they felt was incorrect. Some participants cited, "it should be our right" and "you never know if they are truthful".

4.8 Home Resale Process, Price & Regulations

Respondents were probed about the length of time that they would expect to wait for a home energy rating after the evaluation – specifically if they needed it to list and sell their house. Responses in Toronto were split three ways, with almost one-third saying each of within a week, within two weeks and 30 days or a month.

On the other hand, responses in Montreal fell in the one – two-week category (N=3) or two weeks up to a month (N=3), while the remaining two had no firm timeline or said prior to them putting their home on the market.

Participants were asked if a house they wanted to buy had a "below average" energy rating, under what circumstances would they renovate to improve the rating after they have purchased the home. In Toronto, most held the view that they would make improvements that fit their budget or was "within their means". Several said that it would be dependent on the cost or payoff, or a function of what the ultimate long-term payoff would be – the number of years to get their money back in relation to how long they would keep the residence. Some would assess if it would be worthwhile to make the changes, while a couple said they would try to do as much as they could themselves. While these comments were also reflected in some participants in Montreal, there were also comments related to wanting to find out more information about the report first, including getting a full copy – not just the label or rating score. This would include information about who did the evaluation as one person said they "would get a second one" to make sure.

Next, they were told to think from the perspective of selling their home and if they received a "below average" energy rating. They were questioned if they would undertake the necessary renovations needed to improve their rating – why or why not.

In Toronto, the consensus was that they would make only the necessary or minimum upgrades needed to meet requirements or to secure the price that they wanted. Some referenced cost as being a challenge, that they would "do the basics only" while others said that current buyers are not concerned with or "looking at ratings" in this market.

In Montreal, the results were varied with two persons saying that they would simply lower the price of the home rather than upgrading, while another claimed it would depend on the amount and extent of renovations needed and another that they would not have the time to make changes. Others said it would depend on how quickly they wanted to sell, everything sells regardless of efficiency and how important efficiency would be to a serious buyer. One respondent said they would not disclose the information, and another would only make changes if a bank required it, while one said it was difficult to answer as they would want to know the full parameters of the law. Only one participant firmly committed to making changes as they are "in construction and would never sell something below average".

Still asking participants to think in terms of selling their home, they were asked what role or impact the energy performance of their home would have on them when setting a selling price. Most claimed that it would depend on the rating – namely if it was good – then they would take this into consideration. It was felt that with a better rating a higher price could be asked, because "improvements will bring up the value of your home". In Montreal the consensus was that efficiency would be important, but only along with other factors in setting their home price. This would include renovations as a whole along with energy efficiency upgrades (furnace, windows, and doors). However other issues may be more important such as location and comparable home prices in the area.

When asked if they thought that home buyers take the energy efficiency of a home into account when purchasing, the consensus across both cities was that they do not. It was said that "not all people are aware of it", in part because "it is not law" or "only a last thought" and that many other factors are more important such as price and location. Some said people continue to waste energy but still complain about utility costs – so this should be a more important issue.

In Toronto there was no one in the group that felt there was any value or benefit to be gained from having an energy evaluation or rating – this if they were a seller in the market. This sentiment was reflected in most of the participants in Montreal. However, there was one individual in the Montreal group that definitely felt there would be value or a benefit to be gained from having an energy evaluation or rating if they were a seller in the market. Another said if there was a poor rating they would tend to question other factors, such as the lifestyle of the residents.

Prior to the final question in this section related to the cost of an energy evaluation, respondents were read the following statement containing the results from a national telephone survey. They were then asked their opinion about the response.

> *Fifty-two percent of respondents from our national survey indicated that they would be willing to pay $100-$200. What do you think of this response?*

Most participants felt that the price range was acceptable or fair and that they would pay this amount if it was beneficial to them. In Montreal there were even those that claimed $200-$300 and even $300-$500 was a fair price. In Toronto there were some that said the "audits need to be regulated", that it would "depend on the circumstance" and only "if their home was older". Only two said outright that they would not pay or that the only reason that they had an audit in the past was because it was free.

4.9 Disclosure & Privacy

Prior to the next set of questions, participants were read the following description about the MLS or Multiple Listing System.

> *An MLS, also known as a multiple listing system, is a tool that real estate brokers use to share information with other brokers and/or make contractual offers on behalf of their clients. The information and data of a listing stored in a MLS database is owned by the broker who has obtained a listing contract with a property seller. In Canada, the MLS is owned by the Canadian Real Estate Association. A public database with limited property details is available for consumers.*

The first question asked about how they would feel if their home's energy rating was listed automatically on the MLS as a part of the listing, for comparison to other residences.

Overall, this was well received, and the group felt that this would be a "good idea" or that they had "no problem" with it. It was mentioned that the "scoring should be available", that it would be "nice to know as a buyer" but one person said, "It would need to be regulated". In Montreal, the group thought this "would be a plus", if was "standardized" "with criteria" and it would avoid having them view a "home with a rating below what I want". There were those that claimed this will be an "inevitability" or "required" and they "will have no choice". There was some trepidation as referenced by one who said they were split on the topic as this would benefit buyers, another claimed people may over-rely on a rating thereby missing out on properties.

Participants were more cautious when it came to the issue of having their home's energy rating available for the general public to view in an online database. In Toronto there was a sense that this information should be available on a "need to know basis" only as "no one needs to know how many bathrooms I have either". Most said that only "buyers or sellers should have access," as "privacy is a concern" and that "people are nosy", while some felt that this system would also need regulation by a government body.

For the Montreal participants, it was stated that "MLS is enough" as there were trepidations over having contractors being able to access their data. Comments included worries over contractors trying to contact them to sell services as their issue was not with other buyers but with these businesses. One questioned if this system would result in higher taxes, while the lone backer of the system claimed they had nothing to hide.

The group was also split when asked if the mandatory disclosure of a home's energy evaluation would provide them with different information than energy or utility bills. There were those on the fence, while some said that it would be beneficial, and others that preferred bills. Concerns were raised over privacy and that the data would need to be kept up to date. For Montrealers, there was a sense that it would not or that there would be "no real difference". One person said that "Hydro Quebec does it already. This is useless". The only way it would be of more benefit: if the reporting was more "specific" or "detailed".

4.10 Closing Questions

All participants in Toronto and Montreal were in favour of home sellers being required to tell buyers about the energy performance of their residence.

However, in Montreal, while all agreed in principle about the need for having an energy performance rating, there was no clear response when it came to responsibility. There were N=3 that felt the onus including the cost should be the buyers, one said the seller, one both the buyer and seller and another that it should be the government. With a feeling that having this as a mandatory requirement could "be either good or bad" the group felt that if the cost was free or low it would be "mutually acceptable to all".

In Toronto, all in attendance held the view that the government should either pay or subsidize the cost of an evaluation. It was stated that if made mandatory the government needs to help sellers by sharing the cost of this expense. In Montreal six of eight in attendance held the view that the government should either pay or subsidize the cost of an evaluation. One person thought that it was already being subsidized and another felt that this would be a waste of tax dollars.

There was also a strong sense that they individually had a role to play with respect to climate change or reducing their carbon footprint. Most said that "it is important", they "should all do something" and "play a part". Only one participant questioned this and did not believe in climate change.

All Montreal participants stated that climate change requires their personal attention, as it is not the sole responsibility of government. The environment was important to everyone in the room, and they went on to describe the measures they take themselves to reduce their carbon footprint.

In a final probe, participants were asked if they felt a consumer advocacy group like the Consumers Council of Canada could help and protect consumers who want to improve homes, undertake renovations or reduce their carbon footprint.

For Torontonians, a small minority felt that they could have a role to play as an advocacy group. Several wondered who they are and what they are about. There were those that remained uncertain or had no comment or opinion with one questioning the motive saying, "They just want donations – it's a money thing".

This was contrasted with the responses from the Montreal participants, where overall, participants would favour having a third party like the Council playing a role, to "offer expertise", "offer information", have a "number to call for information" and to entice people to "make their homes energy efficient". They suggested that as some people are not interested in the issue, an information campaign would serve to encourage the public, by using media announcements, literature in retail outlets, mailings, or by "offering funds or incentives".

5 Key Informant Interviews

A series of key informant interviews were conducted during the months of December 2017 and January 2018. The primary objectives for these interviews were to gather insights from experts on home energy ratings and disclosure systems used across Canada or other jurisdictions including issues relating to consumer protection and the various components of each system such as energy advisor licensing.

The key informants were assured that their comments would be gathered without attribution. The interview questions were generally the same for all key informants and are listed in Appendix F – Key Informant Interview Guide. Individuals from the following organizations were interviewed:

- NRCan
- The Fourth Pig
- EnerGuy
- New York Institute of Technology/Remi Consulting
- Enbridge
- Efficiency PEI
- Ontario Ministry of Energy
- COHA
- Niagara Peninsula Energy
- IESO
- Realtors Association of Grey Bruce Owen Sound
- Coleman Dias Construction
- Building and Safety Standards, MMAH BC
- British Columbia Real Estate Association

5.1 Should homebuyers have access to the energy performance information about a home that they are thinking of buying?

Respondents agreed unanimously that homeowners should have access to the energy performance information about a home. A general theme in the responses was that providing this information is key homeowner education. One respondent stated that the energy performance information about a home should be considered basic information, and that it should be provided proactively to consumers.

Respondents believed that access to this information will help with:

- Making informed decision by enabling the comparison of different houses
- Validating third-party information
- Improving consumer energy literacy
- Improving transparency in home sales
- Understanding the general health of the home
- Understanding the running costs of the home

Other comments included:

- Providing information must also inspire action, otherwise it is 'simply providing numbers'.
- Access to information should be separated from mandating its disclosure.
- Information could be provided through distributors and utilities, as their customers already have access to the information of their own homes through their accounts.

5.2 What are the opportunities related to mandatory home energy ratings and disclosure? What is the goal? Either for consumers, the government, the industry, or for society? What is the policy trying to accomplish?

Respondents reported that the opportunities and goals related to mandatory home energy ratings and disclosure were the following:

- Reducing the negative impact of climate change
- Reducing greenhouse gas emissions
- Reducing energy use
- Raising energy efficiency standards
- Giving homeowners the tools to take further action
- Motivating homeowners to make energy efficiency design decisions
- Enhancing homeowner education by keeping buyers informed and well protected
- Facilitating choice when buying a home
- Driving the demand for higher performance homes and change the market
- Improving accountability in the building industry
- Making homes more comfortable
- Providing a diagnostic tool: making information available to industry, government and society

All respondents agreed that the home energy ratings could inform potential homebuyers about energy use. Opinions differed when mandatory requirements and disclosure were involved. Some respondents wondered whether mandatory home energy ratings would help achieve the goal of reducing emissions, or if it would simply be information for information's sake.

Some respondents communicated that there is a shift in focus from incenting specific actions, but providing more public outreach, options and information for homeowners and buyers to make informed decisions.

Some respondents also brought up the opportunity of the creation of information and data points. They suggested that home energy ratings would be beneficial to government incentive programs, voluntary programs, system planners and LDCs as a valuable dataset.

One respondent mentioned that HER&D could also inform financial institutions; for example, institutions could start to evaluate if homebuyers could keep up with home energy bills, based on the energy performance of their house. This could become part of the criteria used to establish mortgage eligibility.

5.3 In your opinion, what are the challenges related to mandatory home energy ratings? Let's uncouple ratings from the disclosure. Think about the challenges for the consumer, to government, to the industry, or to society. What can go wrong?

Respondents unanimously agreed that industry capacity is a big challenge. All the respondents indicated there would be a need for a "ramping up" of the energy auditing sector. Because of this, many respondents felt that the associated quality control, regulations and licensing of energy advisors and inspections would also be a challenge.

Other challenges include:

- Discrepancy between the label, actual consumption and predicted savings
- The current deficiency in consumer energy and energy efficiency literacy
- Converting consumer awareness and interest into consumer action
- Potential market confusion from the use of different rating systems
- Labelling consistency across different building types
- Rebuilding the home energy rating industry infrastructure in the shadow of the termination of the federal government's EcoEnergy Program.

The application of the HER&D system to single-family homes was called into question. Respondents also highlighted the fact that a significant number of homeowners reside in apartments, condominiums, or other multi-family homes. Several respondents stated that other housing types must also be considered early in the development of a HER&D system.

Several respondents believe that implementing a mandatory system will unfairly target lower income homeowners and seniors. As a seller with no financial means to undertake upgrades and improve their rating, they might need to adjust their selling price in order to sell their property. Lower income buyers might be forced to live in a home with no upgrades and higher utility bills.

Aside from the challenges, the respondents also cited recommendations as to what would be a useful as part of a rating for the public. Respondents suggested that a rating should also contain a set of recommendations or actions that a homeowner could undertake to improve the energy efficiency of their home. The recommendations should include short-term, medium term and long-term actions for a homeowner to undertake.

Respondents unanimously recommended adopting a phased approach to HER&D system implementation. Respondents indicated that phasing would allow the system to be properly tested. Phasing could also provide the time needed to train the number of new advisors that would be needed.

Some respondents recommended adopting a phased approach based on market segments, for example, at the beginning only houses of a certain vintage would require a rating.

Respondents indicated the need for a clear set of requirements to be established, to address logistical concerns such as the period of validity of the label, who would administer the labelling system and the central question of which rating system would be utilized.

All respondents emphasized the importance of the energy advisor in this process. The consensus was that a knowledgeable energy advisor to guide the homeowner throughout the evaluation and to provide unbiased recommendations was essential. Respondents expressed concern about consistency in energy assessments where different advisors produce different ratings for the same house or advisors who provide unfounded advice, or who engage in selling of upgrades they recommend.

Nearly all respondents suggested that incentives would be necessary to prevent market pushback, especially if a phased approach was adopted.

Respondents reiterated that if these challenges were not resolved, homeowners would be more inclined to look to the cash-market for ratings, renovations and upgrades. Some respondents expressed that the most recent update of the EnerGuide Rating System addresses some of these issues, including energy advisor qualifications.

5.4 Energy ratings and labels have been around for a long time. Some of them are based on an EA performing a full on-site audit. The pushback we've heard about the on-site audit is the sourcing, cost, precision, and timeliness. What do you think? Are these legitimate concerns? Is there a different way to get useful information to the buyer and yet avoid some of these issues?

Many of the challenges associated with the on-site audit have been iterated in the previous section. Respondents were asked to further identify specific issues in the areas of sourcing, cost, precision and timeliness.

5.4.1 EA Sourcing

Participants regard NRCan and the ERS as the appropriate system to deliver mandatory HERD. Respondents questioned if the current infrastructure could handle the sudden surge in volume brought on by the introduction of mandatory ratings. Respondents highlighted the importance of a phased in approach to build capacity.

5.4.2 Cost

Several respondents pointed to the fact that the Ontario government, in the Climate Change Action Plan has declared it would subsidize the cost of ratings. Other respondents stated that the market would determine the price, linking it to industry capacity.

5.4.3 Precision

Some respondents pointed to the blower door test as the only feature that could be reliably and consistently reproduced, and therefore as the most precise aspect of the audit, while other respondents claimed that a blower-door test would be easy to game with an open window during the first audit. The system they suggested relies heavily on the honesty of the Energy Advisor.

5.5 To our way of thinking, there are three levels of disclosure. You can disclose at time of purchase of sale to the buyer owner, or through MLS listing, or to force disclosure through a public database searchable by address. Which do you favour? Which do you think would be the most effective public disclosure system? Are there issues relating to privacy? Are there any other challenges associated with each of the three?

In general, respondents agreed that for the consumer, what matters is the ability to be able to make comparisons between homes, and that this comparison could be with a "benchmark" house. One respondent noted that a public database, with ratings that are searchable by address would not add any value for the average consumer.

5.5.1 Privacy:

Nearly all respondents held the view that privacy would only be a concern if it included occupant behaviour data.

It should be noted that the EnerGuide Rating system is a federal tool, therefore it is subject to the federal Privacy Act. If a home energy rating and disclosure system were to utilize EnerGuide, the ratings and labels that were generated would be considered private information, if it is linked to personal identifiers such as the names and addresses of homeowners. Under the Privacy Act, the federal government can only share this private information with partners if they have received the homeowner's explicit consent.

5.5.2 Purpose:

Most respondents agreed that the three levels of disclosure served different purposes. The first level, where the rating is only disclosed to a buyer would have the least impact. Some respondents stated that by requiring disclosure as part of the closing transaction, it could impede the sales process and provide the information too late for the buyer to make any meaningful decisions when purchasing. If the objective of a HER&D program was to improve homeowner awareness and equip buyers with the tools to make house-versus-house comparisons, then a home energy rating should be available when a buyer is still looking at different house options. One respondent preferred the first level of disclosure, stating that the home's energy rating is considered private information and should only be provided to the buyer.

Most respondents preferred the second level of disclosure, where the rating would be included in a homes' listing information and available on the MLS, or other form of online database. Respondents indicated that including a home's rating would be similar to including taxes or a utility bill. Most respondents thought that the information should be included in a homes' information sheet that is provided to all potential buyers. Respondents unanimously stated that the rating should not be a feature that is searchable by home addresses.

One respondent asked what would happen if a home obtained a "below average" rating, they questioned if the mandatory disclosure would require all ratings to be disclosed publicly, or would it only apply to ratings that passed a certain threshold.

Respondents also cited concerns about indicating the MLS only for the posting of a homes' energy rating, as a mandatory rating requirement could easily be avoided if a home is not listed on the MLS, and instead resold through a private sale.

5.5.3 Suggestions

Respondents had several suggestions:

- Home rating and disclosure system should be phased.
- Consumer literacy should be the priority.
- Disclosure of building energy use of public and civic buildings should be a priority.
- The final phase could be the optional disclosure by the homeowner for residential buildings.
- Real estate agents should be included early, as part of the consumer education phase.
- Training on how to communicate the new market information will need to be deployed for real estate agents.
- Adapt an already established rating system, such as the EnerGuide Rating system.
- The data used to produce the label should not include behavioural data, but utilize standardized occupancy data instead.

5.6 We're seeing some evidence that suggest that mandatory home energy ratings do not lead directly to a decrease in energy consumption. How might we better capture the real relationship?

The majority of respondents were not surprised by these statements and emphasized that a HER&D system is one part of a larger system to motivate and educate the homeowner. Respondents acknowledged that a rating and resulting label would have little impact on homeowner behaviour and energy consumption, but the real benefit lies in the subsequent renovation and upgrades. More homeowners undertaking upgrades will create more public demand for higher energy efficiency and ultimately lead to more energy efficient homes.

Some respondents further emphasized that energy consumption is not necessarily linked with energy efficiency, and that lower energy consumption is not the goal of a mandatory HER&D program. The key driver for the program is to improve the standard of living and provide shelter that is healthy, comfortable and resilient.

Several respondents also reiterated the need for an incentive program, to induce and support homeowner action after a rating and label is received. Another respondent stated that the role of the energy advisor is also important after receiving a rating, so the homeowner has a guide for the next steps. Without the energy advisor, the homeowner may feel overwhelmed by the upgrade options available.

Respondents reiterated that there was a need for a list of recommendations and an action plan for a homeowner to consider improving the energy efficiency of their home. The recommendations should include short-term, medium term and long-term actions for a homeowner to undertake. However, one respondent pointed out that for elderly homeowners (presumably with limited means) who wanted to sell their home, an action plan would be of limited value.

As part of a continued effort to raise awareness on energy efficiency after home upgrades, one respondent suggested the use of a smart thermostat or monitoring system. This would help the homeowner track which appliances or features contribute the most to their utility bills. The respondent stated that, when trying to change homeowner behaviour 'the power of loss' would be more effective than 'the power of gain.'

In response to the potential situation where homeowners might not be financially capable of undertaking upgrades and instead accept an adjustment in their selling price, one respondent considered this justified as the price should reflect the condition of the home. The respondent felt that this initial 'levelling of the playing field' would be a necessary step to price homes more fairly, particularly in markets where most of the selling price is determined by location.

5.7 Do you have any data related to mandatory home energy rating programs that you can share?

In general, respondents shared the sentiment that there is a shift in consumer appetite towards wanting to know more about a homes' energy use, and that building capacity in the energy advisor industry would be a vital first step. One respondent stated that the focus of the HER&D system should be on reducing carbon emissions and embodied carbon of materials, not simply on energy consumption.

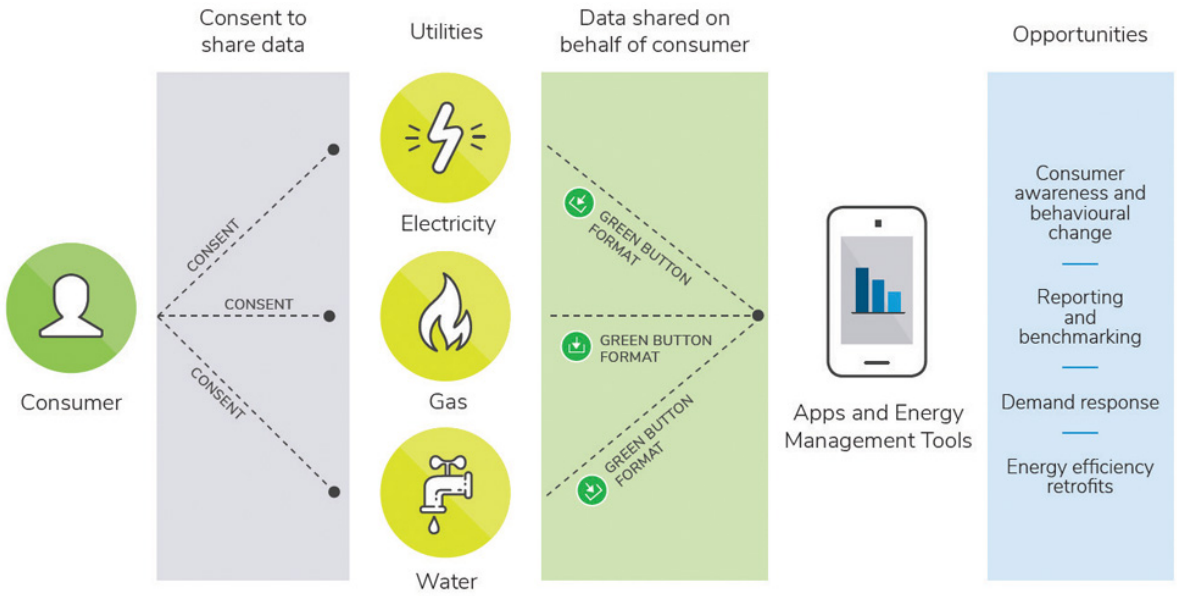
Other closing remarks included:

- Specifying what would happen to private resale homes that do not utilize a listing service
- Establishing a public review system for energy advisors
- Obtaining stakeholder approval

Several references were suggested by the respondents, including:

- Geolinc Plus: A searchable database maintained by the Department of Finance, Energy and Municipal Affairs in Prince Edward Island. The database allows registered users to search for properties and generate reports on their selected properties. The reports include an Assessment Report, Lease Code report, Map, Neighbours, Registry, and Tax Report. There is a small cost associated with generating a report (from $0.50 to $2.00). To use the database, an individual must apply for an account. Opening an account costs $25.
- Green Button Alliance: A program that standardizes the data that is collected by smart meters and allows utilities to share their customers' energy use data, these customers can then in turn choose to share this data securely with third party applications that help benchmark, report and manage energy consumption in a home.

Figure 15 - Diagram explaining how the Green Button program works to standardize energy use data sets. (Association of Power Producers of Ontario 2018)



6 Discussion

6.1 A Framework for Understanding Consumer Opportunities and Risks

There is now abundant data to evaluate the efficacy of mandatory energy labels, and whether they are helping to achieve the goals that they were designed for. There are numerous studies that discuss the conversion rates for energy efficiency renovations, energy consumption, emissions and house prices.

One of the first mandatory home energy ratings schemes was implemented over 10 years ago in Denmark (Lausten and Lorentzen 2003). Ontario has the benefit of many years of lessons learned from over 30 jurisdictions. Successful HER&D programs have been careful to consider the needs of consumers and other stakeholders and adapt and respond to criticism and feedback.

This section will summarize the opportunities and risks that were identified by the literature reviews, homeowner surveys, focus groups and key informant interviews. As a starting point to understand opportunities and risks from the consumer perspective, it is helpful to review the Charter of Consumer Rights, presented by the Consumers Council of Canada and shown in the figure below. These, first promoted by President John F. Kennedy are now recognized by the United Nations and consumer advocacy organizations around the world. The consumer rights and responsibilities provide a framework that can be used to examine what consumers deserve. Specifically, the following rights are particularly noteworthy:

The right:

- to live and work in an environment that is neither threatening nor dangerous and that permits a life of dignity and wellbeing,
- to express the consumer interests in the making of decisions particularly as new mandatory HER&D policies and programs are developed,
- to be given the facts needed to make informed choices when buying or upgrading homes,
- to be protected against misleading labelling of homes,
- to acquire the knowledge and skills to be an informed consumer,
- to be protected against renovation services that can be hazardous to occupant health and that may be triggered by HER&D,
- to choose energy efficiency products and services at competitive prices with an assurance of acceptable quality,
- to be compensated for misrepresentation, shoddy goods, or unsatisfactory services,
- to privacy particularly as it applies to personal information.

Figure 16 - The Charter of Consumer Rights (Consumers Council of Canada 2016)

The Eight International Consumer Rights and Responsibilities + One	
1. Basic Needs	• The right to basic goods and services which guarantee survival. • The responsibility to use these goods and services appropriately. To take action to ensure that basic needs are available.
2. Safety	• The right to be protected against goods or services that are hazardous to health and life. • The responsibility to read instructions and take precautions. To take action to choose safety equipment, use products as instructed and teach safety to children.
3. Information	• The right to be given the facts needed to make an informed choice, to be protected against misleading advertising or labelling. • The responsibility to search out and use available information. To take action to read and follow labels and research before purchase.
4. Choice	• The right to choose products and services at competitive prices with an assurance of satisfactory quality. • The responsibility to make informed and responsible choices. To take action to resist high-pressure sales and to comparison shop.
5. Representation	• The right to express consumer interests in the making of decisions. • The responsibility to make opinions known. To take action to join an association such as the Consumers Council to make your voice heard and to encourage others to participate.
6. Redress	• The right to be compensated for misrepresentation, shoddy goods or unsatisfactory services. • The responsibility to fight for the quality that should be provided. To take action by complaining effectively and refusing to accept shoddy workmanship.
7. Consumer Education	• The right to acquire the knowledge and skills necessary to be an informed consumer. • The responsibility to take advantage of consumer opportunities. To take action by attending seminars and workshops, work to ensure consumer education takes place in schools.
8. Healthy Environment	• The right to live and work in an environment that is neither threatening nor dangerous and which permits a life of dignity and well-being. • The responsibility to minimize environmental damage through careful choice and use of consumer goods and services. To take action to reduce waste, to reuse products whenever possible and to recycle whenever possible.
PLUS - Privacy	• The right to privacy particularly as it applies to personal information. • The responsibility to know how information will be used and to divulge personal information only when appropriate.

6.2 Information & Education

An important opportunity for consumers under a HER&D program is access to the energy efficiency information about their home. The central objective in HER&D programs is to empower the homeowner with accurate and insightful information about the home they are planning to sell, buy, or upgrade.

The HER&D system should be able to produce a home energy label with accurate, unbiased, third-party information about the home, allowing the homeowner or potential buyer to make an informed decision about energy efficiency upgrades, or whether to purchase the home. Inaccurate information resulting from error or fraud could give homeowners the wrong signals and undermine the entire HER&D system. Homeowners could be left with home energy ratings and labels that lead them to undertake costly, unnecessary renovations, or buyers could be falsely led into purchasing inefficient homes.

This study suggests there is very strong agreement that homeowners should have access to the energy performance information about a home. Respondents in this study believe that access to validated, accurate third-party information will help with:

- Improving consumer energy literacy,
- Improving transparency in home sales,
- Improving the understanding of home's energy costs,
- Improving the understanding of the home's general health,
- Comparing the energy performance of similar homes,
- Facilitating informed home purchasing decisions, and
- Encouraging energy efficient upgrades.

In this study's homeowner survey, the most named reason for obtaining a home energy rating is 'wanting to know where money could be saved' on their monthly energy bills. Most respondents also would 'want to see' a home's energy rating when shopping for a home.

Key informants stated that providing information must inspire action. Consumers look for information that can benefit their homes in the future. In the focus groups, respondents in both Toronto and Montreal expressed the desire for information tailored for them about the energy efficiency of their home. The information should address specific items that the homeowner needs to improve or change for them to save money.

According to the homeowner survey, 30% of respondents wanted more information on the value of the home energy report, and what it is. The respondents from the focus groups and homeowner surveys gave examples of the type of information they wished to see in a home energy report. Figure 17 - Home energy information homeowners would like to see in an energy report below provides a summary of their information needs. HER&D may be able to provide the information consumers need, while the report and advice provided by an independent energy advisor can educate homeowners on what actions they can take.

Figure 17 - Home energy information homeowners would like to see in an energy report

Home Energy Information of Interest to Homeowners
How to fix air leaks and apply caulking
How to make older homes more efficient
How to reduce energy costs
Information on different appliances and how their usage affects consumption
Recommendations that will justify the cost of the evaluation
Recommendations that help improve the comfort of the home
How the cost of upgrades could be justified
The monetary savings that could be gained through upgrades

6.3 Home energy ratings' ability to drive energy efficient upgrades

Many jurisdictions have performed surveys to determine the influence of post-audit HER&D reports on a homeowner's decision to undertake upgrades. The percentage of homeowners that undertake upgrades can be referred to as a conversion rate. A 2016 study predicting how a mandatory program would affect North American jurisdictions revealed that conversion rates can vary quite significantly (Hill, et al. 2016). From the precedents studied, the lowest conversion rate was 12% in Austin and the highest was 37% in France (Hill, et al. 2016). While these results indicate that there is evidence HER&D audits may influence homeowner renovation decisions, it should be noted that there have been no HER&D programs that have been implemented without an incentive program (Hill, et al. 2016). Dunsky, in a 2015 analysis on the costs and benefits of HER&D stated that, "it is difficult to attribute specific energy efficiency renovations to HER&D programs as they are often implemented in conjunction with other incentives and programs." (Dunsky 2015). Moreover, because renovations are performed over a long period of time, it is difficult to determine if they are a direct result of a HER&D rating (Dunsky 2015).

In Denmark approximately 45,000 to 50,000 single-family houses are labeled every year, representing 20% of all single-family houses (Kjærbye 2008). Even here, there is little evidence that HER&D induces more energy efficiency investments in houses with a label than in those without one (Kjærbye 2008). In 2001 an evaluation of the Danish energy labelling scheme was carried out by Madsen, Ramlau and Pedersen (2001), where they found that energy efficient upgrades and energy savings in labelled and non-labelled houses were very similar. An early survey by Gram-Hanssen and Jensen (2006) revealed that respondents were able to remember a label and thought that the labelling scheme was a good idea, but also felt that they had no use for the information that was presented (Kjærbye 2008). In 2011, when a retrospective study in the United Kingdom noted that its EPC report was well suited for energy experts, but did not meet the consumers' needs, and was impacting consumer less than originally predicted (Hill, et al. 2016).

More recent studies suggest that while homeowners are undertaking energy efficiency upgrades as a result of a home energy label (Murphy 2013) (Tigchelaar, Backhaus and de Best Waldhober 2011) (D. Brounen 2011), little evidence exists to suggest that they would carry out more renovations than homeowners without a label. These studies suggest that the label was not persuasive in encouraging upgrade decisions. The causal relationship between labels and home upgrades including the impact of incentives and free-riders will need additional research.

In Canada, the conversion rates for the voluntary retrofit incentive programs fared better. In British Columbia energy upgrades were undertaken from the LiveSmart (2011) and ecoENERGY retrofit (2007 to 2012) labelling program, when coupled with incentive programs: 77% of 96,816 homes in B.C. followed through with retrofits (Frappé-Sénéclauze, Pond and Cretney 2015). The average energy savings from these upgrades is estimated to be 26%, although over half of these resulted from participants that would have undertaken upgrades without the incentive program (free riders) (Frappé-Sénéclauze, Pond and Cretney 2015). Free ridership was low for draftproofing (less than 15%), which indicates that without the home energy audit and incentive program in place, few participants would have completed these air-tightness upgrades (Frappé-Sénéclauze, Pond and Cretney 2015).

Similar results were observed for Canadian homes during the ecoENERGY retrofit program, with 791,000 pre-audits performed, resulting in 641,000 retrofits (Natural Resources Canada 2018). However, these high conversion rates are likely attributed to selection bias, where the participants involved in the program were already more inclined to complete retrofits, or already intended to do so, than the average homeowner.

An overwhelming majority of homeowners from the focus groups felt that they had a personal responsibility and role to play to mitigate climate change or reduce their carbon footprint. Key informant respondents listed that reducing the negative impact of climate change and carbon emissions should be an objective of a mandatory HER&D program.

The survey and focus group results of this study indicate that homeowners accept the rating without drawing value from it. The rating is seen as a requirement of the incentive program. The incentive is what they truly seek, and they take the rating because it comes at no cost. If no rating were required, the cost savings could be used to enhance the incentive.

The results from this study indicate that the rating is not understood or valued. It is not clear if the new GJ scale for the ERS rating will further enlarge the gap in consumer understanding. Homeowners in this study attach significant value to the recommended actions report that is provided as part of the rating. There may be an opportunity to reduce the cost of the home assessment and to increase incentives if the focus of the house assessment shifts from providing a rating to providing upgrade recommendations that include ranges of costs and paybacks. Forgoing a computer simulation with the on-site building measurements, for instance, could significantly reduce the cost of the home assessment. Where the cost savings associated with simplified performance assessments are significant, these savings could then be used to enhance incentives, or lower the cost burden for homeowners.

6.4 Supplying Accurate, Timely Ratings

All key informants emphasized the importance of the energy advisor as a part of a mandatory HER&D system. There is recognition that industry capacity was a significant challenge. All of the respondents indicated there will need to be a "ramping up" of the energy advisor industry. As a consequence, many respondents felt that the associated quality control, regulation, and licensing of energy advisors would be necessary.

The Ontario Ministry of Energy also recognizes the need to increase capacity – estimating that a market of 1,900 energy advisors will be needed to meet the increased demand (Wessel 2016). This can be compared with the current number of energy advisors across Canada of 770 with approximately 350 in Ontario. This implies an increase in number by more than 500%. (Natural Resources Canada 2017).

NRCan's ERS is generally viewed as the incumbent system to deliver mandatory HER&D programs across Canada. Through Natural Resources Canada, individuals can become registered to conduct ERS home evaluations (Natural Resources Canada 2016). NRCan has developed their advisor licensing system over several decades. As detailed in Chapter 2, examinations administered by NRCan help ensure minimum competencies (Natural Resources Canada 2016). While the system is well developed, it is costly and time consuming to deliver a rating to a home. The cost of the rating is difficult to justify when consumers really just want a list of upgrade options that they can consider together with the home's energy bills. Recently, the Green Ontario Fund has successfully adopted a light audit as part of the incentive programs it offers through the Independent Electricity System Operator in Ontario[2]. As data becomes available, this new approach may resolve the current capacity constraints.

Key informants recognized the difficulties for the current infrastructure to handle the sudden surge implied by the hurried introduction of mandatory ratings. Most recognize issues of quality assurance, advisor training and system administration as top of mind concerns.

The distribution of energy advisors across the country was seen as equally as important as the number is. For many rural homeowners, access to an energy advisor is difficult. Indeed, five of the 10 provinces when this study was written had fewer than 10 certified NRCan energy advisors. Table 6 below shows the distribution of energy advisors across the Canada.

Both the homeowner survey and focus groups indicated that homeowners did not want to wait for more than 30 days for a home energy rating.

Table 6 - Distribution of certified energy advisors across Canada (Natural Resources Canada 2017)

Province/Territory	Approximate # of EAs, as of November 2017
Alberta	30
British Columbia	50
Manitoba	<10
New Brunswick	<10
Newfoundland	0
Nova Scotia	50
Northwest Territories	<10
Nunavut	0
Ontario	350
PEI	1
Quebec	230
Saskatchewan	<10
Yukon	<10

[2] As per the Green Ontario Fund: https://www.greenon.ca/how-greenon-installations-works

For homeowners in remote locations, waiting for an energy advisor to assess, rate, then label their home represents a significant amount of time lost.

Figure 18 - Service Organizations for Thunder Bay, ON

The number of advisors will need to substantially increase in every province, territory and municipality to permit the timely delivery of ratings should a mandatory HER&D system be regulated.

6.4.1 Quality Assurance Risk

A home energy rating and label serves two purposes:

- It shows the energy performance of the building in order to make it possible to compare it with other buildings (Geissler and Altmann-Mavaddat 2016).
- It informs homeowners of the energy savings potential in their home in order to motivate them to invest in improving the energy efficiency of the building (Geissler and Altmann-Mavaddat 2016).

The quality of the home energy rating and label depends on the competence and professionalism of the energy advisor. Key informants identified concerns relating to the reproducibility and consistency of the home assessment methods and results. Two different energy advisors could produce very different energy ratings depending on the assumptions they make, the skill they possess, the presence of physical measurement constraints, their ability with the computer software or air test equipment, and the limitations of the evaluation procedures (Porter 2007).

Some key informants said that the blower door test was the only feature that could be consistently reproduced, and is the most precise aspect of the assessment, while other respondents claimed that a blower-door test could be easy to game with an open window and relying heavily on the honesty of the energy advisor. Pressed for time, an advisor could be tempted to run the air test during windy conditions which could result in bad readings and an invalid test.

In most EU HER&D systems, assessors must satisfy minimum requirements for education and/or professional experience, as well as training and a mandatory exam. In Austin, Texas, audits are performed by auditors certified by RESNET or Building Performance Institute (Austin Energy 2018). In the Australian Capital Territory, assessors must be accredited (Dunsky 2015). For a house in Ontario with an EnerGuide rating, quality control comes from the energy advisor company that is responsible for its staff. In addition, Natural Resources Canada conducts random, independent quality assurance as well (T.-P. e. Frappé-Sénéclauze 2012).

Energy advisors registered with NRCan abide by a Code of Ethics, Code of Conduct, and Conflict of Interest requirements (Natural Resources Canada 2016). NRCan can suspend or de-license an energy advisor if they fail to comply with the EnerGuide Rating System Procedures or the roles and responsibilities of energy advisors (Natural Resources Canada 2016). In addition to passing the foundation level and energy advisor exams, the energy advisor needs to be affiliated with a licensed service organization.

The success of a mandatory HER&D system depends on the 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.

6.4.2 Scams and Frauds Risk

Respondents from focus groups in both Toronto and Montreal were very cautious and aware of the potential to be scammed. Across both cities there was unanimous agreement that the energy advisor should be licensed or regulated. In addition to providing proof of a license, homeowners closely associated regulation to trustworthiness.

With the growth of the home rating industry associated with a mandatory HER&D system, there will be more incentive for a homeowner or energy advisor to engage in fraudulent behaviour. Situations where a fraudulent rating could be produced are:

- An EA providing a fraudulent, inaccurate rating, so they can move on to the next customer faster
- An EA providing a low energy rating to convince the homeowner to undertake upgrades:
    - Performed by companies related to EA or,
    - Performed by the EA themselves
- A homeowner putting pressure on the EA to make a false rating, to appeal to potential buyers (Roelens, Loncour and Antinucci 2016)
- A scam artist impersonating an EA and taking payment to conduct an energy assessment

Homeowners in the national survey and focus groups expressed a strong opinion about the potential for conflicts of interest during the energy assessment. For example, if the energy advisor is also the person who is the contractor or renovator doing the recommended upgrades to their home, respondents felt it would be a conflict of interest. A few homeowners also wanted the option to choose their own contractor or have the option of selecting from a list of pre-screened providers. This list could be provided by Natural Resources Canada in similar fashion to the listing they already provide for Service Organizations.

Another situation is described in the Ontario Real Estate Association's (OREA) opinion letter, *'Energy Conservation Helps, HER&D Hurts: Don't Force Home Energy Audits - Encourage Them.'* OREA states that consumers must contact the service organization when there is a complaint about an energy advisor. This presents a conflict of interest because consumers do not pay an EA directly – payment is made to an SO who then remits the payment (Ontario Real Estate Association (OREA) 2015)

Results from the homeowner survey and focus group participants show that for homeowners, an efficient means of redress is an important feature to have. Some participants cited that, "it should be our right." If a homeowner feels that a rating they received was inaccurate, they need a means of redress. If they want a second opinion, a mandated HER&D system should have a system in place to rectify the situation with the homeowner, without requiring them to go through the home assessment process again. Without a robust and systematic means of controlling quality, the energy advisor industry may become an easy place for unscrupulous characters to prey on unsuspecting consumers.

Other risks that are associated, but not directly related to HER&D are renovation risks. The risks associated with undertaking renovations are detailed in the Consumer's Council of Canada's 2017 report: '*Incenting Energy Efficient Retrofits: Risks and Opportunities for Consumers.'*

6.4.3 Market confusion risk

In the national homeowner survey, respondents said they would refer to a government website to search for an energy advisor. The focus group respondents were not a clear in answering this question. Better sourcing of energy advisors may be needed.

Focus groups respondents had trouble recalling the home rating they were given, the name of the label, the program and the incentive provider. Those that could recall a name for the program provider often cited the wrong one (Enercare versus NRCan). What homeowners could recall were the tangible benefits and the upgrade recommendations. Homeowners also remembered the price of the recommended upgrades. Participants said that they would not have rated their homes if it had a cost.

6.5 Access to Capital

The responses from the focus groups in this study revealed that while informed homeowners are willing to make upgrades and renovations, they are not always financially capable of doing so. When a household has to allocate more than 10% of its budget to energy costs, it is considered to be suffering from energy poverty (Option consommateurs 2012). For many of these households, the upfront capital is not available to enable them to invest in energy upgrades. Without, at least, financing programs that are paid out through the resulting energy savings, these households could be left with a poor rating on their house with no ability to reduce their energy costs.

A study carried out by Statistics Canada titled, "Environmentally friendly behaviours of Canadian households and the impact on residential energy consumption," further supports this point. The study revealed that "green households" have a different socio-economic profile from other households. These households are more educated, wealthier, with a majority owning a home and that is larger than average (See

Table 7 below) (Legault 2012). The study also revealed that these green households consume 15% more energy than average households (Legault 2012).

Table 7 - Green households versus Other households (Legault 2012)

	Green households [1]	Other households
	%	
Type of dwelling		
Single house	72	54
Double house, row house or duplex	15	16
Apartment	12	28
Mobile home	1	2
Homeowner	**83**	**67**
Level of education		
0 to 8 years or some secondary	6	12
Grade 11 to 13, graduate	10	14
Some postsecondary or postsecondary certificate	44	41
University	39	33
	number of persons	
Household size	**3**	**2**
	%	
Household income		
Less than $20,000	6	13
$20,000 to less than $40,000	17	20
$40,000 to less than $60,000	17	17
$60,000 to less than $80,000	18	13
$80,000 to less than $100,000	11	9
$100,000 to less than $150,000	17	12
$150,000 and over	9	7
	square metres	
Average heated area per household	**139**	**125**
	gigajoules	
Annual energy consumption per household	**118**	**102**

1. Units in the upper quartile are designated as green households, that is, households with better ecological behaviour than the other units.

These higher income households are better able to *afford* energy efficiency upgrades while simultaneously consuming more energy than the average household. A mandatory HER&D program will need to address the barriers to accessing capital to pay for upgrades that provide a net cost benefit to homeowners.

The Toronto homeowner focus groups demonstrated a certain level of 'house pride'. In general, homeowners are proud of their home and their ability to improve it. A home energy rating that affects this pride risks causing homeowners to feel threatened.

6.6 Home energy ratings' effect on house price

There is inconclusive evidence on the effect of home energy ratings on house prices. A summary of notable studies is provided in Table 8 below:

Table 8 - Studies that show both sides of the house price debate (Olaussen, Oust and Solstad 2017)

Studies that show a price premium for houses labeled as more energy efficient	Studies that show EPCs have none or a negligible impact on house prices
2008 – Sales data of 5,000 homes in the Australian Capital Territory revealed that there was a 3% increase in the house sale price for each additional program star rating. The maximum amount of star ratings is six. (Australian Department of the Environment, Water, Heritage and the Arts (ADEWHA) 2008).	**2011** – A survey and report carried out in the UK by L. Laine, concluded that EPCs only have a modest or negligible impact on price and purchaser decisions (Laine 2011).
2010 – A study by Eichholtz et al. found that US office buildings with a "green rating" sold for about 16 percent higher prices (Eichholtz, Kok and Quigley 2010).	**2011** – A survey and in-depth interviews by Backhaus, J., Tigchelaar, C., and deBest-Waldhober with homeowners in ten EU countries concluded that EPCs have a small or negligible impact on price and purchaser decisions (Tigchelaar, Backhaus and de Best Waldhober 2011).
2011 – A study by Brounen and Kok performed a hedonic regression analysis based on some 170,000 housing transactions in the Netherlands and concluded that there is a price premium for houses labeled as more energy efficient (D. Brounen 2011).	**2012** – A survey on EPCs in Germany by Herman Amecke shows that EPCs have little impact on purchasing decisions (Amecke 2012).
2013 – A report prepared for the European Commission by Bio Intelligence Service et al. concluded that EPCs "overwhelmingly points to energy efficiency being rewarded by the market". (Bio Intelligence Service 2013)	**2014** – A report by L. Murphy studied the role of EPCs in the Netherlands using an online questionnaire. The report concluded that few householders use the EPC during the transaction process and maintains that the EPC will not have the intended impact even if fully implemented (Murphy 2013).
2013 – A study of nine EU jurisdictions found that a one-letter grade improvement translated into 2-6% increase in home value (Mudgal, Lyons and Cohen 2015).	**2016** – A study by Parkinson et. al of U.K. office buildings found a low and almost negligible, premium for U.K. office buildings (Parkinson and Guthrie 2014).

This table was produced using the references provided in the report, (Energy Performance Certificates - Informing the informed or the indifferent?)

A recent report from 2017 (Olaussen, Oust and Solstad 2017) has attempted to explain the inconclusive and contradictory results of these studies. The report highlighted the case of the Netherlands – where two studies were carried out at approximately at the same time, but one study by Brounen and Kok (2011) indicated that EPCs reflect a price premium, while the other study by Murphy (2014) concluded that EPCs failed to have a direct influence.

The report claims that previous studies which showed a positive price effect of EPCs was due to other variables that were not captured in the price modelling. The report used data from the Norwegian real estate market from before the EPCs came into effect (2010) and compared the same houses with its energy label from after the EPCs were in effect (2014) (Olaussen, Oust and Solstad 2017). The study found that the houses which had a good energy rating on their label in 2014 had already commanded a price premium in 2010. The price premium had existed before the EPCs were implemented (Olaussen, Oust and Solstad 2017). This means that the price premium is capturing the effect of another variable and not that of the energy label itself. This conclusion makes explicit what a homeowner already knows. For example, if a potential buyer visits a home that is for sale, they would be able to see for themselves if a home had been recently upgraded, or if the windows are old and single pane, if a new, efficient furnace were recently installed, or if the house is drafty and in need of upkeep.

In a 2016 paper, Hill notes that a precise measure of the impact is affected by a number of compounding factors (Hill, et al. 2016). First is the fact that potential home buyers may interpret the rating as a proxy for the general state of maintenance of a particular house (a state that may be observable without an explicit energy rating). Second, that it is not possible to attribute the specific impact of HER&D initiatives when it is part of a broader policy package which may include financial incentives and minimum energy requirements or Code. This was discussed in Section 6.2.

Therefore, from a consumer perspective, the presence of a HER&D system is unlikely to change the chance that a homeowner will upgrade a home to make it more appealing to a potential buyer. Consumers are not paying more for a good energy rating; they are paying more for a well maintained, recently upgraded home. While there appears to be a positive correlation between a good energy rating and higher prices, it is unclear to what extent an energy rating alone influences differences in pricing. It seems pricing differences can be attributed to readily observable house characteristics that homeowners consider in their personal pricing analogues, including the installation of new equipment, the house condition, and the home's utility bills. This view is reinforced by the demonstrated lack of understanding of the energy rating by the homeowners in this study.

6.7 Privacy and Disclosure

With any online database, there is always a risk of data being stolen or hacked, then sold to third parties. Such fears are especially prevalent in consumers' minds today. Focus groups highlighted the potential for homes listed on public or online databases to become targets for unwanted marketing. Regardless, privacy issues have become top of mind and any public disclosure of home ratings would require significant additional research.

Key informant interviews revealed that as a federal tool the EnerGuide Rating System is subject to the federal Privacy Act and therefore any results created that contains personal identifiers such as names and addresses is considered private information and cannot be published without a homeowner's consent (Natural Resources Canada 2017).

For the homeowners that decide to conduct a private sale of their home, without publicly listing the property, there is a risk of non-compliance and the potential buyer not being provided with a home energy report. Ontario's Climate Change Action Plan does not specify where a home's energy rating and label will be displayed; only that it is required before a listing. For homes that are being sold without a listing, there are no means of verifying compliance. Any mandatory HER&D system would need to address this gap.

Exemptions were identified through the literature reviews, national surveys, focus groups and key informant interviews. These were identified as situations where a obtaining a home energy report was an unnecessary burden. The situations are:

- Requiring a home energy rating and label for a house that has already received a home energy label in its recent history
- Requiring a home energy rating and label for resale houses that will be demolished
- Requiring a home energy rating and label for houses that are transferred through a will
- Requiring a home energy rating and label for certain ownership changes or title transfers, such as:
    - foreclosure sale,
    - trustee sale,
    - deed in lieu of foreclosure sale,
    - pre-foreclosure sale,
    - threat or exercise of eminent domain,
    - gift from family member,
    - court order,
    - dissolution of marriage,
    - property settlement agreement.

These exemptions will require further assessment if they are to be implemented into a mandatory HER&D system.

7 Conclusions and Recommendations

In the past decade, several countries have introduced mandatory home energy ratings for new and existing homes. This study looked at the impact of HER&D in Europe, United States and Australia. The HER&D systems were similar in their overall structure, but varied in the details: some jurisdictions mandated rental units whereas most only required single family homes to comply, most jurisdictions included a visual inspection without a blower door test, but some jurisdictions also allowed the homeowners to self-assess, and permitted the use of online databases.

The central objective for all the HER&D systems was empowering the consumer with accurate and insightful information about a home they're planning on selling, buying or upgrading. The data from this study suggests that a home energy label is only useful if it can inform decisions and drive action from the homeowner. The literature suggests that homeowners with a home energy rating are undertaking energy efficiency upgrades, while little evidence exists to suggest that they would carry out more additional upgrades than homeowners without a rating. The literature revealed that mandating HER&D on its own and in the absence of other measures will not lead to significantly more home upgrading. For homeowners, the rating is less important than a home energy report which includes the upgrade information a homeowner is looking for.

There was unanimous agreement from homeowners in the focus groups and national survey, as well as the key informants that homeowners should have access to the energy performance information about a home. Many already refer to utility bills of homes they are considering purchasing. Home energy information is the key to homeowner education. Below are the opportunities and risks that were identified:

Figure 19 - Mandatory HER&D Opportunities

Opportunities for the individual homeowner
To be provided the energy consumption information for a home to be bought, sold, or upgraded.
To improve the energy literacy of homeowners.
To use the home's energy consumption information to help a homebuyer assess the home's value when setting a price or making a buying decision.
To use the energy consumption information of a home to detect changes in energy efficiency performance for a home.
To improve awareness on operating costs in relation to energy use.
To improve the energy efficiency of the home and reducing energy costs.
To engage with an accredited energy advisor to understand what the options are to upgrade a home.
To receive unbiased, third-party recommendations from an energy advisor who is a trusted partner.
To understand how much each upgrade option will cost, and what benefits could accrue from adopting the options.
To improve a home's performance by enhancing comfort, reducing noise and better managing moisture.
To receive and provide home pricing that more accurately reflects the energy efficiency (and operating costs) of a home.

Shared Opportunities
To improve Canada's housing stock and reduce Core Housing Need[3].
To reduce GHG emissions and mitigate climate change.
To improve the standard of living of individual's and the country.

Figure 20 - Mandatory HER&D Risks

Risks for Homeowners
When obtaining a home energy rating, there is a risk of:
A homeowner or homebuyer not knowing how to understand the home energy rating and label.
A homeowner being a target of fraudulent behaviour because of homeowner knowledge gaps.
A homeowner hiring an untrained, unaccredited, unqualified and/or incapable energy advisor.
A homeowner hiring an energy advisor with conflicts of interest and bad intentions.
A homeowner being unable to find a certified energy advisor because of a home's geographic location.
A homeowner being delayed in selling one's house because its home energy label was not ready.
A home energy evaluation that takes too long and delays renovations or other timely activities for a homeowner or homebuyer.
A home energy evaluation that is too disruptive to a homeowner's normal daily activities.
A home energy advisor produces a fraudulent home energy rating and recommendations for use by the homeowner or homebuyer.
After obtaining a home energy rating:
Being unable to get redress for an inaccurate or fraudulent home energy rating.
Being unable to act on the upgrade options in a home energy rating because of financial barriers.
Being unable to act on a list of options because of lack of knowledge, or access to trades.
Undertaking upgrades that don't perform as intended e.g. lower cost savings than expected, poor heating, poor air circulation, moisture issues, poor indoor air quality, etc.
Personal information about the homeowner has been inappropriately disclosed.
Receiving unsolicited marketing inquiries, (robo-calls and door-to-door sales etc.) because the homes' energy rating is available publicly.
During the home transaction process:
A house being stigmatized because of a poor rating.
A house price being adversely affected by a poor rating particularly where the homeowner does not have the means to upgrade the home.
Being required to undertake an energy evaluation that costs more than expected.
Being required to undertake an energy evaluation for a house that is newly built and whose energy performance characteristics are already known.
Being required to undertake an energy evaluation for a house that had been recently upgraded or labelled.

[3] As defined by Canada Mortgage and Housing Corporation: https://www.cmhc-schl.gc.ca/en/hoficlincl/observer/observer_044.cfm

	Being required to undertake an energy evaluation for a house that will be demolished after purchase.
	Being required to undertake an energy evaluation for a house that is received as part of a will.
	Being required to undertake an energy evaluation for a house that is received as part of certain ownership changes or title transfers.

As with any consumer facing service, the development of a mandatory HER&D program must be guided by consumer rights. The ideal mandatory HER&D system in place in Ontario is described from the perspective of a homeowner below:

> *I can learn about home energy ratings and labels from information that is easy to understand, easy to access, and available across different information platforms. I know what an energy rating and label is.*
>
> *I can learn about the home assessment procedure from information that is easy to understand, easy to access, and available across different information platforms. I understand that only certified and licensed Energy Advisors can perform the work. I know how to identify and select the right energy advisor.*
>
> *I can easily find an energy advisor who is certified and licensed and whom I can trust in my community, in a timely manner. I am assured that there are no conflicts of interests between my energy advisor and any other individual involved in the process of obtaining a home energy rating and label for my home. I know that if there are any perceived conflicts, I will be notified of this and I am able to make my own decision.*
>
> *I can contact the energy advisor and make an appointment for a rating and evaluation report. The advisor will be available to perform an energy evaluation in a timely manner without causing delay to any of my plans to sell or renovate my home.*
>
> *My energy advisor has sufficient training and is demonstrably qualified to do unbiased and good work. They have the necessary knowledge to complete home assessments accurately and consistently. My EA has the knowledge to act as a guide throughout the home rating and label process and helps to answer my questions. They comply with a code of conduct, and professional standards, and regulations that are specified by the rating system they use. I trust my energy advisor. I know that there is a third-party audit of the work of the energy advisor. I know that there are meaningful consequences if the work is done incorrectly.*
>
> *My energy advisor performs a home energy assessment and issues a rating, label, and options report in a timely manner without causing disruption to my normal routine or my plans for my house (selling or renovating). I can read about or ask someone about what an evaluation report typically contains and think about the questions I might have for the energy advisor.*

I can get rating/report verified if desired even if the evaluation was paid for by the home's seller. I am provided with the energy consumption information for a home I intend to buy, sell or upgrade in a timely manner that is not disruptive. I receive a report that tells me how much energy my home is consuming, and how each recommendation will change my consumption. I know the nature of the recommendations I receive with the report and the costs and benefits of undertaking them (including notional costs and savings), to myself and to society.

I can make an informed decision on the upgrade options I wish to undertake. I can act on the upgrade options without being hindered by lack of finances, knowledge, or ability. I know that if I require any financial aid, I can access financing and/or incentive programs that are available to me.

I am provided with a clear redress process should any problems arise. I know that my comments, feedback and complaints will be responded to, and become part of the public record so other homeowners are aware of my experiences.

I understand and trust that a home's listing price accurately reflects the energy efficiency and operating costs of a home.

I am assured that any data sets generated from my home energy label is not shared with third party marketing companies and my personal data is not compromised.

To help achieve this ideal scenario, the following recommendations are made:

1. **Ensure access to good quality information and homeowner education:**
    a. Ensure the information that communicates how to read, understand, and use a home energy rating and options report is easily accessible by homeowners across media platforms.
        i. All communication should be easily available (print and electronic) in various languages and in a way that's easy to understand.
    b. Establish a web portal to provide guidance to homeowners on the entire HER&D system and process, including:
        i. What will be involved in the home assessment process, and the process of receiving a label (including length of time it will take to process any paperwork).
        ii. How to find, identify and hire trained and qualified energy advisors.
        iii. What homeowners can do to protect themselves against fraud and deception.
        iv. Who to contact for more information or if there are any problems or to complain.
        v. The incentive program qualification requirements (including limitations on participation, record keeping, the pre-retrofit energy assessment requirements, etc.)
    c. Create a list of certified and licensed energy advisors that is easily accessible, searchable and located on the consumer facing website.

d. Ensure staff is available to answer homeowner questions and assist them throughout all stages of the HER&D process (including finding an energy advisor, undertaking upgrades, obtaining incentives etc.)

2. Reduce the complexity, cost and time needed to obtain a home energy rating

a. Allow a simplified version of the home assessment without a blower door.
b. Simplify the home assessment by eliminating a computer simulation that requires building area measurements and insulation assumptions.
    i. The execution of a home assessment is a cost that, in some cases, is borne by the incentive provider. In such cases, simplifying the home assessment will result in a lower cost, freeing up funds to incent retrofits.
c. Consider allowing homeowners to conduct a self-assessment, allow homeowners to receive an auto-generated label through public building data.
    i. 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.
d. Ensure HER&D incentives are accessible for households from all socio-economic backgrounds.
e. Provide financing programs that are paid out through the energy savings that result from the upgrade. These should be available for low-income households under a mandatory HER&D system.
f. Establish an upper limit to the cost of an energy audit for single-family homes.
g. Build energy advisor infrastructure as the foundation for a mandatory HER&D system:
    i. Ensure energy advisors are available in communities across Canada, and that rural and remote communities are not disadvantaged due to the lack of availability of energy advisors.
    ii. Offer standardized training for new energy advisors.
    iii. Establish or adopt a licensing and certification program for all advisors.
    iv. Establish or adopt an energy advisor code of conduct.

3. Maintain quality assurance

a. Establish minimum requirements for potential candidates as part of the accreditation process to become an Energy advisor.
b. Energy advisors should be free of any conflict of interest with regard to the contractors performing the work.
    i. If an Energy advisor has working relationships that could be seen as a conflict of interest, the energy advisor should state this to both the licensing organization and their homeowner prior to performing any work on the home.

c. Provide third-party quality assurance through frequent, random, quality checks of home energy labels, after a label has been issued, to ensure that the assessment was done correctly and remediate problems as soon as possible.
d. Develop meaningful consequences for energy advisors who fail to meet a minimum level of performance, which should extend to suspension of qualification.
e. As part of the quality assurance review, conduct a follow-up where calculated energy savings are misaligned with actual energy savings.
f. Establish a clear and robust redress process for homeowners. Homeowner complaints should be recorded, and responded to. Both substantiated complaints and their resolution should become part of the public record.
g. Publish the complaint record of all energy advisors to foster accountability.

4. Recognize that homeowners value the upgrade recommendations and that ratings are generally poorly understood and are less important.

a. Provide short, mid and long-term recommendations for home upgrades.
b. Provide home upgrade recommendations that a homeowner could undertake on their own.
c. Provide a guide on how to reduce energy consumption.
d. Provide a range of estimated costs for all upgrade options.
e. Provide a range of estimated savings and payback times for all upgrade options.
f. Provide a comparison of the home's energy consumption with a similar house that is considered to be typical.
g. Provide an estimate of the improvement to a home's energy consumption (costs) that each of the recommended upgrades could bring to the homeowner.
h. Provide an estimate of the home's current GHG emissions, and a comparison with a similar house that is considered to be typical.

5. Allow exemptions to mandatory HER&D

Allow exemptions to be made for:

a. A house that has been newly built and does not need energy efficiency upgrades.
b. A house that had undertaken approved energy efficiency improvements within the last 10 years.
c. A house that will be demolished.
    i. Require a publicly filed declaration in a purchase of intent to demolish to get an exemption.
d. A house that is received as part of a will.
e. A house that is received as part of certain ownership changes or title transfers.
f. A house that has already received a home energy rating and label previously.
g. Allow the onus of obtaining a home energy label to be transferred from the homeowner to the buyer, if agreed to by both parties.

6. **Build capacity slowly and steadily**
    a. Phase-in the mandatory HER&D requirements gradually, to sustain buy-in from stakeholders. Establish the framework for each phase in consultation with industry stakeholders.
        i. Apply HER&D requirements to different market segments over time. Adapt and adjust requirements as necessary.
    b. After a home has obtained a label, allow the rating and label to be valid for a set period of time, unless the home has undergone a major renovation.
    c. Consider training and certifying home inspectors to provide energy labels as part of the home inspection process.

7. **Ensure homeowner privacy**
    a. A full home energy report should be provided to potential home buyers before they prepare an offer to purchases.
    b. Give homeowners the option to list their home's energy rating on a publicly accessible database.
    c. Any data sets to be made publicly available and gathered through HER&D should be anonymized and stored in aggregate.
    d. Ensure that any datasets that are shared cannot be attributed to any specific individual or home.
    e. Let data and information gathered by labels inform the development of future incentive programs.
    f. Let data and feedback gained through the initial implementation phases inform how the policy should be changed and improved in the future.
    g. Let anonymized data be made publicly available for use by researchers and other studies.

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Appendices

Appendix A – Overview of Existing Home Energy Rating Systems and Labels

Program[4]	**GreenON Installations Program**
Offered by	Green Ontario Fund
Description and focus	With the GreenON Installations program, it's never been easier to start reducing your carbon footprint at home. Take control of your home's energy use with a no-cost smart thermostat, and uncover new ways to save with an in home energy review. Homeowners or renters living in single-detached, semi-detached, townhome or row homes, are eligible to take part. If you rent, you will be contacted about submitting a landlord consent form. Similarly, if you are an owner or manager of a rental property you will need your tenant's permission to participate. Do you live in an apartment or condo? You may be interested in the Smart Thermostat $100 Rebate for Ontario Homes. The program representative will complete the in-home energy review by filling out a checklist and asking you questions about your home, such as its age. The review will require them to access various places around your home such as your windows and basement. Once your program representative has completed the in-home energy review, they will provide you with additional materials on the program. The information gathered from the in-home energy review will be used to create a customized home energy profile that will be sent to you a few weeks following your appointment. This report will help you understand your energy usage and costs, suggesting ways to save energy and money by participating in other energy efficiency programs.
Process and details	1. Booking an appointment A GreenON Installations program representative will contact you to schedule an appointment to install your smart thermostat and conduct an in-home energy review. The program representative will ask you to select your preferred smart thermostat brand. They will also ask a few questions about your home set up to ensure the smart thermostat will be compatible. Before the installation, you'll need to sign the participant agreement. If you rent, you will be contacted about submitting a landlord consent form. Likewise, if you an owner or manager of a rental property you will need your tenants permission to participate. 2. The home visit A trained GreenON Installations program representative will arrive at your home as scheduled, and will present photo ID. The process of installing the new smart thermostat and performing an in-home review will take approximately two hours. The program representative will complete the in-home energy review by filling out a checklist that will require them to access various places around your home such as windows, the basement, attic, the breaker panel and other areas with wiring. Next, the program representative will remove your old thermostat and safely dispose it. They will then install your new smart thermostat, show you how to use it, and complete the warranty registration process with you, which will require you to agree to the smart thermostat manufacturer's terms and use and privacy policy. Please note that this will require access to your Wi-Fi. 3. The home energy report

[4] The information was taken directly from the links provided.

	The information gathered from the in-home energy review will be used to create a customized home energy profile that will be sent to you within a few weeks. This report will help you understand your energy usage and costs, suggesting ways to save energy and money by participating in other energy efficiency programs. Once your program representative has completed the in-home energy review, they will provide you with an information pack with other energy conservation tips and programs to consider.
Evaluation method	A trained GreenON Installations program representative will arrive at your home as scheduled, and will present photo ID. The process of installing the new smart thermostat and performing an in-home review will take approximately two hours. The program representative will complete the in-home energy review by filling out a checklist that will require them to access various places around your home such as windows, the basement, attic, the breaker panel and other areas with wiring. Next, the program representative will remove your old thermostat and safely dispose it. They will then install your new smart thermostat, show you how to use it, and complete the warranty registration process with you, which will require you to agree to the smart thermostat manufacturer's terms and use and privacy policy. Please note that this will require access to your Wi-Fi.
Sources	https://www.greenon.ca/how-greenon-installations-works

Program[5]	ENERGY STAR for New Homes Standard
Offered by	Natural Resources Canada

Description and focus	ENERGY STAR for New Homes (ESNH) was introduced in 2005 in Canada. The ENSH is a voluntary program that outlines technical requirements that a home must meet in order to be awarded an ENERGY STAR label. ENERGY STAR Certified Homes are designed to encourage energy-efficient practices that help reduce greenhouse gas emissions.
	The ESNH initiative promotes energy efficient guidelines that enable new homes to be approximately 20 percent more energy efficient than those built to provincial or national building code.
	
	The ESNH label is designed for new residential buildings. A property that is already built but less than 6 months old cannot be labelled with ESNH. that fall into the following criteria:
	• Not more than three stories in building height and not more than 600m^2 in building area;
	• On permanent foundations; and
	• Are one of the following types;
	  ○ Detached houses; including houses with secondary suites
	  ○ Attached houses with include semi-detached houses row houses and attached houses with secondary suites and
	  ○ Multi-unit residential buildings (MURBS), which include stacked townhouses, duplexes, triplexes and apartment buildings

Process and details	ESNH provides both a prescriptive (as Builder Option Packages (BOPs)) and performance paths for builders. The performance compliance option uses the EnerGuide rating system to ensure that the energy targeted in the standard is met. An energy evaluation is required for new ENERGY STAR homes.
Rater Certification requirements	• SOs are licensed by NRCan. • EAs and builders are registered by NRCan. NRCan may also activate or deactivate EAs or builders registrations. • An SO must have an EnerGuide SO license, as well as an ESNH SO license. Requirements for SOs are detailed in the previous section, under EnerGuide Rating System. SOs will recruit, train and perform quality assurance on EAs and builders. • EAs must be affiliated with an SO, have an executed ENERGY STAR agreement with NRCan, and be activated by NRCan to deliver the program. Each EA must hold an active ERS registration agreement. Requirements to become a certified EA are detailed in the previous section, under EnerGuide Rating System. In addition to these requirements, an EA must complete all training modules required by the SO on the most recent ESNH standard. As of January, 2018 EAs must take and successfully complete NRCan's ENERGY STAR for New Homes, Energy Advisor exam. • Builders must hold an active ERS registration agreement and sign an ESNH agreement to be registered with NRCan. Although currently not required, it is recommended to take builder training courses on the ESNH standards and building science in general.
Sources	http://www.nrcan.gc.ca/energy/efficiency/housing/new-homes/5057 Ontario: ENERGY STAR for New Homes Version 17.0 Canada (except Ontario): ENERGY STAR for New Homes Version 12.8

[5] The information was taken directly from the report: *Role of NRCan's Housing Programs in the Marketplace* (buildABILITY Corporation 2018). Full citation is provided in the references section.

Program[6]	**Leadership in Energy and Environmental Design (LEED)**
Offered by	Canada Green Building Council and LEED Canada
Description	*LEED Canada for homes* is an initiative designed to promote the transformation of the mainstream homebuilding industry toward more sustainable practices. *LEED Canada for homes* is targeting the top 20% of new homes with best practice environmental features. *LEED Canada for homes* is a collaborative initiative that actively works with all sectors of the homebuilding industry. By recognizing sustainable design and construction in homes nationwide *LEED Canada for homes* helps homebuilders differentiate their homes as some of the best homes in their markets, using a recognized national brand. Furthermore, homebuyers can more readily identify 3rs party verified green homes. While there are already a number of local or regional green homebuilding programs, *LEED Canada for homes* is attempting to provide national consistency in defining the features of a green home and to enable builders anywhere I the country to obtain a green rating on their homes. *LEED Canada for homes* represents a consensus standard for green homebuilding developed and refined by a drivers cadre of nation experts and experience green builders. The *LEED Canada for homes* rating system is part of the comprehensive suite of LEED assessment tools forefended by the CaBGC to promote sustainable design, construction and operations practices in buildings nationwide.
Levels	EXHIBIT 1: LEED® CANADA FOR HOMES CERTIFICATION LEVELS LEED® CANADA FOR HOMES CERTIFICATION LEVELS / NUMBER OF LEED® CANADA FOR HOMES POINTS REQUIRED Certified — 45—59 Silver — 60—74 Gold — 75—89 Platinum — 90—136 Total available points — 136
Evaluation Method	Providers and Green Raters, in-field inspections and performance testing
Sources	http://www.cagbc.org/CAGBC/LEED/CAGBC/Programs/LEED/_LEED.aspx?hkey=54c44792-442b-450a-a286-4aa710bf5c64 http://www.cagbc.org/cagbcdocs/LEED_Canada_for_Homes_2009_RS+addendum_EN.pdf

[6] The information was taken directly from the report: *Role of NRCan's Housing Programs in the Marketplace* (buildABILITY Corporation 2018). Full citation is provided in the references section.

Program[7]	WELL Building Standard
Offered by	Canada Green Building Council is working with Green Business Certification Inc. Third-party certification for WELL is provided through the International WELL Building Institute's (IWBI) collaboration with Green Business Certification Inc. (GBCI). The WELL Building Standard® was pioneered by Delos.
Description	WELL is the first building standard to focus exclusively on the health and wellness of the people in buildings. WELL is a performance-based system for measuring, certifying and monitoring features of the built environment that impact human health and well-being, through air, water, nourishment, light, fitness, comfort and mind. It marries best practices in design and construction with evidence-based medical and scientific research – harnessing the built environment as a vehicle to support human health and wellbeing. WELL is grounded in a body of medical research that explores the connection between the buildings where we spend more than 90 percent of our time and the health and wellness impacts on us as occupants. WELL Certified™ spaces and WELL Core and Shell Compliant™ developments can help create a built environment that improves the nutrition, fitness, mood, sleep patterns and performance of its occupants. Certification allows building owners and employers to know that their space is performing as intended to support human health and wellness.
Levels	There are three levels of WELL Certification: Silver, Gold and Platinum. WELL is composed of over 100 features, and WELL Certification is achieved when projects demonstrate all precondition features, higher certification levels above Silver can be achieved by pursuing optimization features. Silver level certification is achieved by meeting 100% of the preconditions applicable to the typology in all concepts. Gold level certification is achieved by meeting 100% of the preconditions applicable to the typology, as well as 40% or more of the optimizations. Platinum level certification is achieved by meeting 100% of the preconditions applicable to the typology, as well as 80% or more of the optimizations.
Evaluation Method	In order to achieve the requirements of the WELL Building Standard, the space must undergo a process that includes an on-site assessment and performance testing by a third party.
Sources	https://www.cagbc.org/CAGBC/Programs/WELL_Building_Standard/The_WELL_Building_Standard.aspx https://www.wellcertified.com/system/files/WELL%20Building%20Standard_v1%20with%20January%202017%20addenda%20.pdf https://www.wellcertified.com/our-standard

[7] The information was taken directly from the report: *Role of NRCan's Housing Programs in the Marketplace* (buildABILITY Corporation 2018). Full citation is provided in the references section.

Program[8]	US Energy Star Inspection Checklists
Offered by	US EPA
Description	US Energy Star Certification of a home also requires the completion of the following: • Rater Design Review Checklist and Rater Field Checklist • HVAC Design Report • HVAC Commissioning Checklist • Water Management System Builder Requirements
Levels	n/a, checklist
Metrics	Thermal Enclosures Systems and HVAC System Checklist https://www.energystar.gov/ia/partners/bldrs_lenders_raters/downloads/HVAC_Design_Report_v100_2015-011-20_clean_fillable.pdf?c41a-3697 HVAC Commissioning Checklist https://www.energystar.gov/ia/partners/bldrs_lenders_raters/downloads/HVAC_Commissioning_Checklist_v99_nohighlight_2015-09-15_clean_fillable.pdf?c41a-3697 Water Management System Builder Requirements https://www.energystar.gov/ia/partners/bldrs_lenders_raters/downloads/water_mgmt_sys_bldr_req.pdf?c41a-3697
Evaluation Method	The term 'Rater' refers to the person completing the third-party inspections required for certification. This person shall: a) be a certified Home Energy Rater, Rating Field Inspector, or an equivalent designation as determined by a Verification Oversight Organization such as RESNET; and, b) have attended and successfully completed an EPA-recognized training class. Water Management System Builder Requirements It is the exclusive responsibility of builders to ensure that each certified home is constructed to meet these requirements. While builders are not required to maintain documentation demonstrating compliance for each individual certified home, builders are required to develop a process to ensure compliance for each certified home (e.g., incorporate these requirements into the Scope of Work for relevant sub-contractors, require the site supervisor to inspect each home for these requirements, and / or sub-contract the verification of these requirements to a Rater). In the event that the EPA determines that a certified home was constructed without meeting these requirements, the home may be decertified.
Sources	https://www.energystar.gov/index.cfm?c=bldrs_lenders_raters.nh_v3_guidelines https://www.energystar.gov/ia/partners/bldrs_lenders_raters/downloads/Rater_Checklists.pdf?c41a-3697 https://www.energystar.gov/ia/partners/bldrs_lenders_raters/downloads/HVAC_Commissioning_Checklist_v99_nohighlight_2015-09-15_clean_fillable.pdf?c41a-3697 https://www.energystar.gov/ia/partners/bldrs_lenders_raters/downloads/water_mgmt_sys_bldr_req.pdf?c41a-3697

[8] The information was taken directly from the report: *Role of NRCan's Housing Programs in the Marketplace* (buildABILITY Corporation 2018). Full citation is provided in the references section.

Program[9]	Living Building Challenge
Offered by	International Living Future Institute
Description	The Living Building Challenge is the world's most rigorous proven performance standard for buildings. People from around the world use our regenerative design framework to create spaces that, like a flower, give more than they take. With the Living Building Challenge, you can create buildings that are: • Regenerative spaces that connect occupants to light, air, food, nature, and community. • Self-sufficient and remain within the resource limits of their site. Living Buildings produce more energy than they use and collect and treat all water on site. • Creating a positive impact on the human and natural systems that interact with them. • Places that last. Living Buildings need to be designed to operate for a hundred years' time. • Healthy and beautiful. • Living buildings give more than they take. THE LIVING BUILDING CHALLENGE HAS TWO CORE RULES 1. All Imperatives assigned to a Typology are mandatory. Some Typologies require fewer than twenty Imperatives because the conditions are either not applicable or may compromise other critical needs. 2. Living Building Challenge certification requires actual, rather than modeled or anticipated, performance. Therefore, projects must be operational for at least twelve consecutive months prior to evaluation.
Levels	CERTIFICATION OPTIONS: Living Certification Projects obtain Living Certification by attaining all requirements assigned to a Typology. Petal Certification Project teams may pursue Petal Certification by satisfying the requirements of three or more Petals (at least one of which must be Water, Energy, or Materials). Net Zero Energy Building Certification The Net Zero Energy Building Certification program requires achievement of the NZEB portions of four of the Living Building Challenge Imperatives: 01, Limits to Growth; 06, Net Positive Energy, 19, Beauty + Spirit; and 20, Inspiration + Education. The requirements for Imperative 06, Net Positive Energy, are reduced to one hundred percent of energy demand, and no storage for resilience, for NZEB Certification only. Two-Part Certification Two-Part Certification is available for projects that wish to have a preliminary ruling issued on the Imperatives that are not required to have a performance period. The Preliminary Audit may take place any time after construction is complete. Performance Period All projects require twelve months of occupancy data before they can submit for certification. The exception is a Petal Certification when the project is not pursuing any Imperatives that require a performance period.
Evaluation Method	THE AUDIT PROCESS Auditors perform an independent, third-party audit of projects that have submitted

[9] The information was taken directly from the report: *Role of NRCan's Housing Programs in the Marketplace* (buildABILITY Corporation 2018). Full citation is provided in the references section.

	documentation for certification under Living Certification, Petal Certification, and Net Zero Energy Building Certification. PRELIMINARY AUDIT The preliminary audit ruling is an assessment to determine if the Imperatives reviewed are in compliance with the requirements. The ruling on each Imperative will be carried forward to the final audit. The preliminary audit follows the same certification process as a regular audit, including a site visit. However, if teams have completed work on the project that involved the use of new materials, an additional Materials Tracking Sheet should be submitted outlining the materials used listing compliance with for Imperatives 11, 13 and 14. FINAL AUDIT For most projects, the same auditor will perform both reviews, although this cannot be guaranteed. The final review will involve a ruling by the auditor for certification. What Happens During the Final Audit? • Review all documentation submitted by the project team. • Perform an onsite review of the project, complete an auditor report, and make a certification recommendation. • Once a project team is notified of its certification determination, an appeal may be requested. In this instance, the Institute may ask the auditor to provide a further review, or in some instances, ask a second auditor to perform the review necessary for the appeal.
Sources	https://living-future.org/lbc/ https://living-future.org/lbc/certification/

Program[10]	One Planet Living
Offered by	Bioregional North America
Description	One Planet Living is an initiative of Bioregional and its partners to make truly sustainable living a reality. One Planet Living uses ecological footprinting and carbon footprinting as its headline indicators. It is based on ten guiding principles of sustainability as a framework.
Levels	n/a, either achieves or does not achieve continuous evaluation
Evaluation Method	A gap analysis compares existing practices or plans to the 10 principles and the 'Common International Targets' for One Planet Living, identifying where you are performing well and where there are opportunities for improvement. Bioregional leads you and your stakeholders through a visioning session and workshops to see how the 10 One Planet Living principles and Common International Targets can work for you. The result is the creation of a One Planet Action Plan. Every partner project or organisation in the One Planet Living initiative develops a 'One Planet Action Plan' based on the 10 principles. This Action Plan outlines the strategies, actions and targets to achieve One Planet Living. It provides a route map that can be monitored and adapted over time. The Action Plan is made public so everyone can see the commitments being made. As well as an Action Plan, every project or organisation reports annually on progress and publishes their results. In order for a project or organisation to become a partner in One Planet Living, its One Planet Action Plan undergoes a review by Bioregional's One Planet Living Steering Group, supported by its Expert Panel, after which the Action Plan can be 'endorsed'. A Collaboration Agreement is signed with the partner project or organisation, which includes a licence to use one of the One Planet sub-brands – i.e. One Planet Community, One Planet Company or One Planet Region. Processes to remove endorsement if the partner is no longer committed or able to meet the commitments in the One Planet Action Plan are also included. The aim is to integrate the One Planet Action Plan seamlessly into the operation of the project or organisation so it can be delivered by existing staff. With some Partners, Bioregional does provide Sustainability Integrator services where the Partner desires it. Bioregional works with Partners to undertake an Annual Review of progress. This review is as much about learning practical lessons for the future as it is a review of progress implementing the Action Plan. Like the Action Plan, these Annual Reviews are made public.
Sources	http://www.bioregional.com/oneplanetliving/ http://www.bioregional.com/one-planet-living-our-unique-framework/be-involved/

[10] The information was taken directly from the report: *Role of NRCan's Housing Programs in the Marketplace* (buildABILITY Corporation 2018). Full citation is provided in the references section.

Program[11]	National Green Building Standard
Offered by	US National Association of Homebuilders
Description	The National Green Building Standard™ certification goes well beyond saying a home is energy efficient; it provides independent, third-party verification that a home, apartment building, or land development is designed and built to achieve high performance in six key areas: Site Design, Resource Efficiency, Water Efficiency, Energy Efficiency, Indoor Environmental Quality, and Building Operation & Maintenance. Our stringent third-party verified certification program ensures homes and apartments are built in compliance with the NGBS and focuses on three primary attributes that are highly marketable to today's discerning consumers: Healthy Homes Providing fresh air ventilation that improves indoor air quality Limiting pollutants and contaminants in the home Preventing moisture problems that can contribute to mould and attract pests Lower Operating Costs Reducing utility costs through cost-effective energy and water efficiency practices Controlling maintenance costs through durable construction and product selection Providing technical and educational resources to ensure the home's optimum performance Sustainable Lifestyle Promoting walkability Reducing home maintenance through enhanced durability Preserving natural resources through responsible land development practices
Levels	A new green home can be awarded a Bronze, Silver, Gold, or Emerald certification level, depending on the number of green practices successfully incorporated in its design and construction. Existing single-family homes can also attain one of the four levels of certification when remodeled according to the requirements of the NGBS.
Metrics	Under the NGBS, green building practices are assigned point values. A home can attain one of four performance levels — Bronze, Silver, Gold, or Emerald. For a building to attain any certification level, all of the applicable mandatory provisions must be correctly implemented. In addition to the mandatory provisions, the NGBS requires the home include sufficient green building practices in each of the six categories to meet the category minimums for each green certification level.

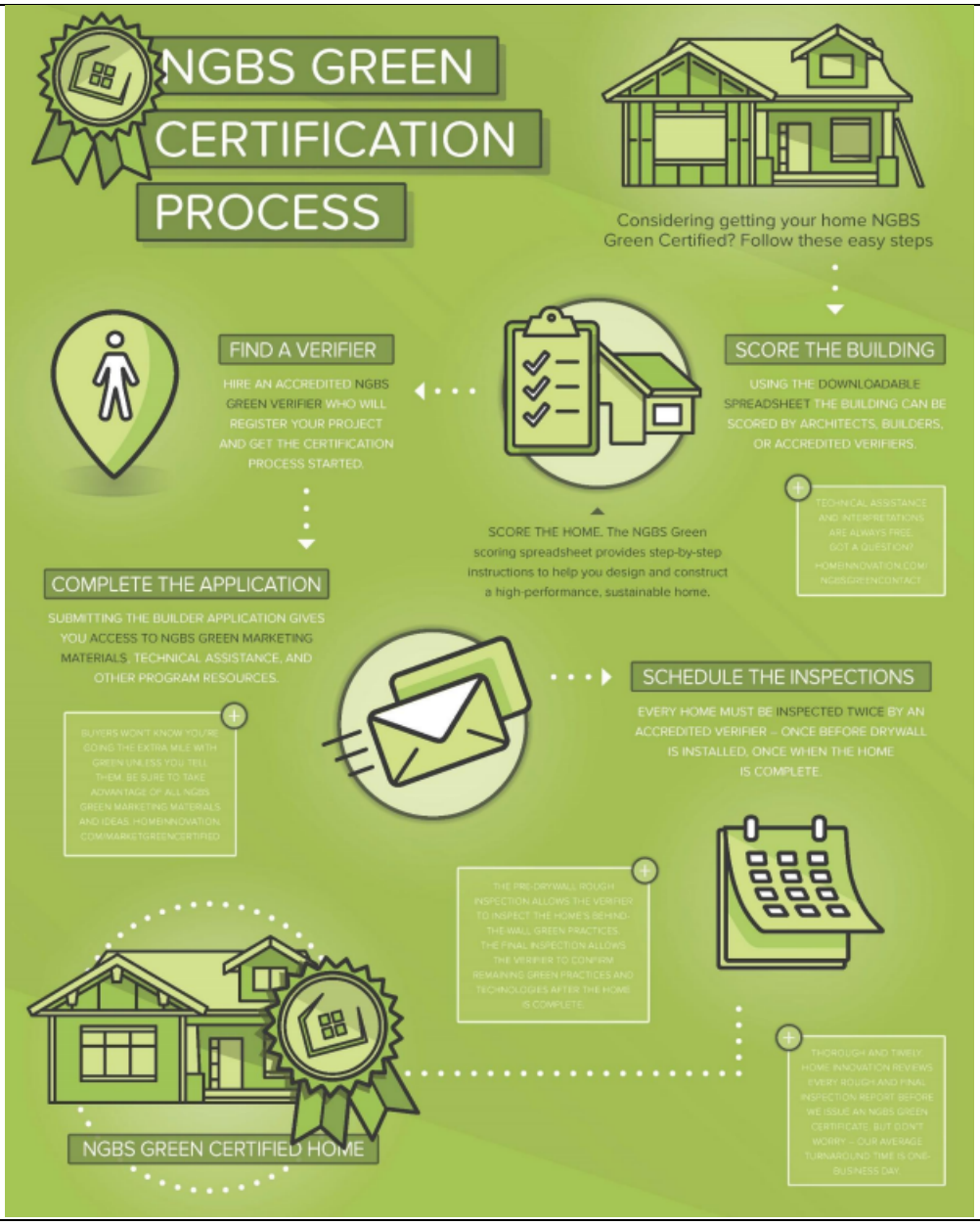
Table 303
Threshold Point Ratings for Green Buildings

Green Building Categories			Rating Level Points [(a) (b)]			
			BRONZE	SILVER	GOLD	EMERALD
1.	Chapter 5	Lot Design, Preparation, and Development	50	64	93	121
2.	Chapter 6	Resource Efficiency	43	59	89	119
3.	Chapter 7	Energy Efficiency	30	45	60	70
4.	Chapter 8	Water Efficiency	25	39	67	92
5.	Chapter 9	Indoor Environmental Quality	25	42	69	97
6.	Chapter 10	Operation, Maintenance, and Building Owner Education	8	10	11	12
7.		Additional Points from Any Category	50	75	100	100
		Total Points:	231	334	489	611

(a) In addition to the threshold number of points in each category, all mandatory provisions of each category shall be implemented.

(b) For dwelling units greater than 4,000 square feet (372 m^2), the number of points in Category 7 (Additional Points from Any Category) shall be increased in accordance with Section 601.1. The "Total Points" shall be increased by the same number of points.

[11] The information was taken directly from the report: *Role of NRCan's Housing Programs in the Marketplace* (buildABILITY Corporation 2018). Full citation is provided in the references section.

Evaluation Method	
Sources	http://www.homeinnovation.com/green http://www.nahbclassic.org/fileUpload_details.aspx?contentID=250713 http://www.homeinnovation.com/services/certification/green_homes/~/media/Files/Certification/Green%20Building/NGBS-Builders-Resource-Guide.pdf

Program[12]	Home Energy Score
Location	USA
Offered by	US DOE
Description and Focus	The Home Energy Score is an easy-to-produce rating designed to help homeowners and homebuyers gain useful information about a home's energy performance. Home Energy Score Assessors have scored over 50,000 homes nationwide. Objectives: • Provide homeowners and homebuyers knowledge of home energy efficiency and cost-effective improvements in order to reduce energy use and costs. • Encourage use of reliable, consistent home energy efficiency information in real estate transactions to inform decisions, and build a market value for comfortable, energy efficient homes. • Integrate the Score into financing products to help drive the market for comfortable, energy efficient homes.
Process and Details	Based on an in-home assessment that can be completed in less than an hour, the Home Energy Score not only lets a homeowner understand how efficient the home is and how it compares to others, but also provides recommendations on how to cost-effectively improve the home's energy efficiency. The Home Energy Score uses a simple 1-to-10 scale where a 10 represents the most energy efficient homes. • An energy efficiency score based on the home's envelope (foundation, roof, walls, insulation, windows) and heating, cooling, and hot water systems. • A total energy use estimate, as well as estimates by fuel type assuming standard operating conditions and occupant behaviour. • Recommendations for cost-effective improvements and associated annual cost savings estimates. • A "Score with Improvements" reflecting the home's expected score if cost-effective improvements are implemented.
Rater Certification Requirements	Home Energy Score Assessors must work with a Home Energy Score Partner and hold a relevant credential, such as a home inspector, HVAC contractor, or other residential professional (the program website lists additional credentials). They must then complete Simulation Training and write an exam that together are estimated to require 8-12 hours of time to complete. The Assessor candidates must then score a home with a mentor. Assessors must take a refresher course if they have not used the Scoring Tool in more than six months. Five percent of homes must be re-scored by a mentor or QA provider.
Sources	https://betterbuildingssolutioncenter.energy.gov/home-energy-score

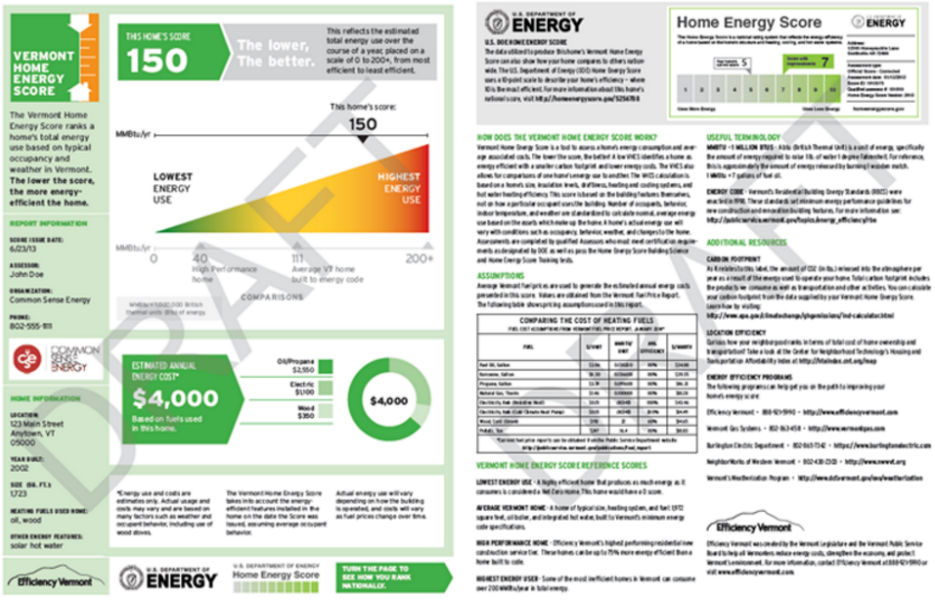
[12] The information was taken directly from the report: *Role of NRCan's Housing Programs in the Marketplace* (buildABILITY Corporation 2018). Full citation is provided in the references section.

Program[13]	US Energy Star Home Energy Yardstick
Location	USA
Offered by	US Energy Star
Description and Focus	EPA's Home Energy Yardstick provides a simple assessment of your home's annual energy use compared to similar homes. By answering a few basic questions about your home, you can get: • Your home's Home Energy Yardstick score (on a scale of 0 to 10); • Insights into how much of your home's energy use is related to heating and cooling versus other everyday uses like appliances, lighting, and hot water; • Links to guidance from ENERGY STAR on how to increase your home's score, improve comfort, and lower utility bills; and • An estimate of your home's annual carbon emissions. The Home Energy Yardstick is not meant to replace a home energy audit conducted by a professional. The best way to assess the root causes of high energy bills or uncomfortable spaces is to have a home energy professional assess your home.
Process and Details	The Home Energy Yardstick is a basic performance-based home assessment that looks at the actual energy use of your home (based on your last 12 months of utility bills) compared to that of similar homes. To ensure that homes across the country can be properly compared, the Yardstick uses a statistical algorithm to take into account the effects of local weather, home size, and number of occupants on your home's energy use. A home that scores a '10' on the Yardstick scale used less energy over the last 12 months and performed well compared to its peers; while a home that scores a '1' used more energy and performed poorly compared to its peers. To calculate your Yardstick score, all you need is some basic information about your home: • Your ZIP code; • Your home's square footage; • Number of full time home occupants; • A list of all the different fuels used in your home (e.g., electricity, natural gas, fuel oil); and • Your home's last 12 months of utility bills
Rater Certification Requirements	n/a Homeowners input data from their utility bills
Sources	https://www.energystar.gov/index.cfm?fuseaction=home_energy_yardstick.showgetstarted

[13] The information was taken directly from the report: *Role of NRCan's Housing Programs in the Marketplace* (buildABILITY Corporation 2018). Full citation is provided in the references section.

Program[14]	HERS
Location	USA
Offered by	RESNET
Description and Focus	An energy efficient home conforming to the 2004/2006 International Energy Conservation Code (IECC) has a HERS Index Score of 100. This means homes with lower scores are more energy efficient while those with higher scores are not energy efficient.
Process and Details	A certified RESNET Home Energy Rater assesses the energy efficiency of a home, assigning it a relative performance score (the HERS Index Score). The lower the number, the more energy efficient the home. The U.S. Department of Energy has determined that a typical resale home scores 130 on the HERS Index while a home built to the 2004 International Energy Conservation Code is awarded a rating of 100. A home with a HERS Index Score of 70 is 30% more energy efficient than the RESNET Reference Home. A home with a HERS Index Score of 130 is 30% less energy efficient than the RESNET Reference Home. To calculate a home's HERS Index Score, a certified RESNET HERS Rater does an energy rating on your home and compares the data against a 'reference home'– a designed-model home of the same size and shape as the actual home, so your score is always relative to the size, shape and type of house you live in. Some variables included in an energy rating are: • All exterior walls (both above and below grade) • Floors over unconditioned spaces (like garages or cellars) • Ceilings and roofs • Attics, foundations and crawlspaces • Windows and doors, vents and ductwork • HVAC system, water heating system, and your thermostat. • Air leakage of the home • Leakage in the heating and cooling distribution system
Rater Certification Requirements	The national training and certification standards for HERS (Home Energy Rating System) Raters and Home Energy Survey Professionals were created by RESNET and are recognized by federal government agencies such as the Environmental Protection Agency (EPA), the U.S. Department of Energy (DOE) and the U.S. Mortgage Industry. Certification doesn't come easy. RESNET Home Energy Professionals must complete the rigorous training required and agree to abide by the RESNET Code of Conduct.
Sources	http://www.hersindex.com/understanding http://www.resnet.us/hers-index-large-scale http://www.resnet.us/certified-auditor-rater

[14] The information was taken directly from the report: *Role of NRCan's Housing Programs in the Marketplace* (buildABILITY Corporation 2018). Full citation is provided in the references section.

Program[15]	Home Energy Profile
Location	Vermont
Offered by	Efficiency Vermont
Description and Focus	Vermont has a long history of energy rating our housing stock; we have been rating single and multi-family homes using the national Home Energy Rating System (HERS) methodology since 1987. However, HERS ratings have primarily been applied to new construction homes. In the last 5 years, Vermont has realized the need for a lower-cost, accessible, simplified approach to energy labeling of our existing buildings.
Process and Details	This tool is an independent, unbiased assessment that summarizes the estimated annual energy usage, estimated annual costs, and a national energy efficiency score of a home. The VHES estimates a home's total energy use based on typical occupancy and weather in Vermont. A lower score means a more energy-efficient home, and 0 is a net-zero home. The label also helps home occupants to understand the estimated annual energy costs of the home and gives the home a national ranking based on the U.S. DOE Home Energy Score. • The estimated electricity, wood and fossil fuel usage in a home, converted into one standard unit for comparison purposes: MMBtus. • The expected annual energy costs of a home, based on estimated usage and average fuel costs. • A home's energy efficiency score, presented on a scale of one to 10 (10 being the most efficient), provided by the U.S. Department of Energy (DOE).
Rater Certification Requirements	The Profile is available through Vermont contractors, home inspectors, and energy auditors who have been certified as Vermont Home Energy Profile assessors.
Sample Label	
Sources	https://www.efficiencyvermont.com/news-blog/blog/the-vermont-home-energy-score-a-label-that-matters https://www.efficiencyvermont.com/Media/Default/docs/services/brochures/efficiency-vermont-home-energy-profile-pilot.pdf http://publicservice.vermont.gov/sites/dps/files/documents/Energy_Efficiency/BEDWG/Vermont%20Energy%20Score%20Request%20for%20Comment.pdf

[15] The information was taken directly from the links provided.

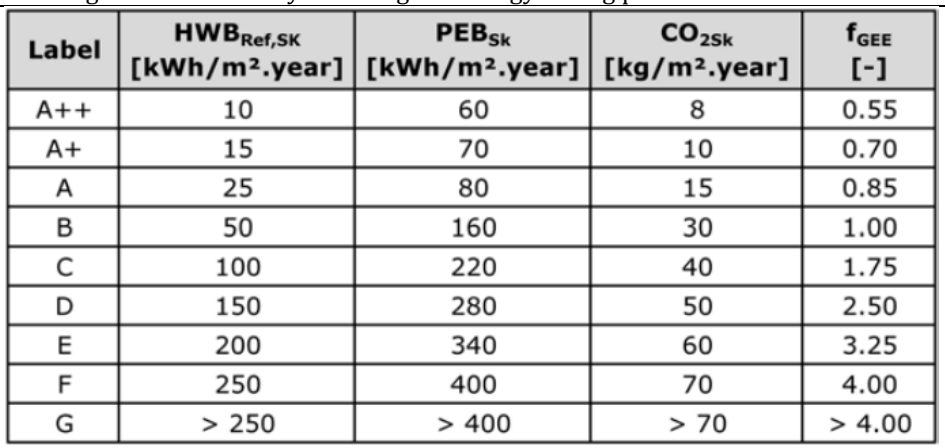
Program[16]	Energy Fit Homes
Location	Minnesota
Offered by	Center for Energy and Environment
Description and Focus	Energy Fit Homes is the only certification on the market that is customized for existing older homes, has a low administrative cost, and is focused on energy efficiency upgrades that are cost-effective to the homeowner. Designed specifically for existing residential properties, the score provides a snapshot of the energy performance level of your home, and determines if you qualify for Energy Fit Homes℠ certification. Once you know how a house stacks up against energy performance standards, you can make wise, cost-effective upgrades to improve its energy efficiency — a benefit to your family, your wallet and your environment. Absolute-scale home scoring systems demonstrate a zone of unattainability for the majority of older homes, which will never be able to match the scores of newer homes despite completing valuable, cost-effective upgrades. The widespread use of these scoring systems can create frustration among owners of older homes and discourage them from conducting energy upgrades that would still (after the upgrades) earn them a relatively low score. The goal of a scoring system or certification for existing homes should be to motivate homeowners to invest in energy upgrades, and improve the energy efficiency of existing housing. Energy Fit Homes uses an energy model designed for existing homes that determines whether a home substantially complies, within a certain tolerance, with the program standards and therefore can be certified. Energy Fit Homes uses the Home Energy Fitness (HEF) model, which was developed specifically for Minnesota's existing housing stock. It is simple to use, collects only the inputs that are important for older homes, and can be performed quickly and inexpensively, keeping the certification program's administrative costs low.
Process and Details	The HEF score compares an energy-efficient reference home to the home being assessed, using a reference home of the same building type as the home being scored (e.g., a 1.5-story bungalow house with knee walls). There are currently nine basic house types that are used for the HEF model. The score of a specific home represents the energy performance level (in terms of annual energy usage) that the home has achieved compared to an efficient reference home — an Energy Fit Homes-certified home. A home with a score of 100 is as efficient as the reference home; a home with a score of 0 is the lowest efficiency for that type of home. A home can be certified by achieving a HEF score greater than 95, and meeting all the other requirements. The advantage of using the HEF energy performance model for determining compliance is that there can be greater flexibility in achieving certification, while still ensuring that all homes meet a basic level of energy performance. During your home assessment, an auditor will conduct an on-site inspection, evaluating the performance and efficiency of five main areas of your home: • Heating system • Insulation and air sealing • Windows • Lighting • Ventilation and combustion safety

[16] The information was taken directly from the report: *Role of NRCan's Housing Programs in the Marketplace* (buildABILITY Corporation 2018). Full citation is provided in the references section.

	The information is then entered into our database to generate an ENERGY FITNESS SCORE™ from 0 to 100. The higher the score, the more energy efficient the home, and a score of greater than 95 is the first step to qualify your home for Energy Fit Homes certification (additional lighting, ventilation and combustion safety upgrades may be necessary; if required, they will be specified by the auditor). If your home receives an ENERGY FITNESS SCORE™ of 95 or below, the auditor will provide you a report that details the areas of your home that meet energy performance standards and the upgrades necessary to improve your total score. Upgrades are listed in order of priority and include the estimated costs as well as any eligible rebates for homeowners. Once you've completed the recommended upgrades, submit an application along with any required documentation. Upon verification, we'll provide you with an Energy Fit Homes certificate.
Rater Certification Requirements	It is being provided by the Center for Energy and Environment (CEE), a Minneapolis non-profit that has been helping Minnesota residents reduce their energy use for 35 years, and Neighborhood Energy Connection, a Saint Paul based non-profit that has delivered high quality energy conservation services for 29 years.
Sources	https://www.mncee.org/energy-fit-homes/home/ https://www.mncee.org/getattachment/Energy-Fit-Homes/How-to-Qualify/EFH-Report-example.pdf.aspx https://www.mncee.org/getattachment/Resources/Resource-Center/Technical-Reports/Energy-Fit-Homes-A-Tool-to-Transform-the-Market-f/EFHReport_web.pdf.aspx

Program[17]	eScore
Location	Tennessee Valley
Offered by	Tennessee Valley Authority
Description and Focus	eScore is a residential energy efficiency program that provides homeowners with a clear path to make their home a 10 – its most energy efficient. The program also increases home comfort and saves you money. eScore allows homeowners to work toward a score of 10 for their home at their own pace, earning rebates on qualified energy efficiency upgrades and re-engaging with the program as many times as needed to achieve their home's best possible energy performance.
Process and Details	A certified energy advisor will visit and evaluate the home to provide an eScore and a customized list of upgrades and rebates available and install instant savings measures. An eScore evaluation includes a detailed eScore report, containing: • An eScore card, which ranks the home from 1 to 10 (10 being the best), • A customized list of recommended energy efficiency upgrades that can be made over time to help a home become a 10, • A list of rebates for all qualified energy efficiency upgrades, • Photos of the areas evaluated, • Instant saving measures installed at the time of home evaluation visit (LEDs and low-flow shower heads). The evaluation should take between one and a half to two hours for the average home. Select a QCN member from our list and begin making your energy efficiency improvements.
Rater Certification Requirements	TVA-certified energy advisor
Sources	https://2escore.com/Documents/eScore_Overview_01242017_v7.pdf https://2escore.com/Documents/eScore_FAQ_1114_v6.pdf https://2escore.com/

[17] The information was taken directly from the report: *Role of NRCan's Housing Programs in the Marketplace* (buildABILITY Corporation 2018). Full citation is provided in the references section.

Program[18]	**Energy Performance Certificates – Austria**
Offered by	EU – EPBD
Administration	Each province in Austria is responsible for the implementation and QA of the EPCs. The issuing of EPCs is performed by a person or entity authorised according to the relevant regulations of the trade, or by a person qualified through cooperation between building trades. These persons receive their trade's license by authorities in the Lander (nine provinces of Austria is collectively known as Bundeslander, or Lander)
Applicable Building	Issuing an EPC is mandatory when purchasing or renting a building or a building unit in a residential or non-residential building.
Objective	The aim is to promote energy savings by visualising the amount of energy that a building consumes and by outlining the energy saving possibilities.
Label	
Audit/Assessment trigger	The presentation of the EPC is mandatory at the point of sale or rent by the building owner. Assessments must be conducted at the stage of applying for a "building permit". An EPC is valid for 10 years.
Cost	Existing buildings: 150 euro for a small building, 2,000 euro for a building size of 2,500m^2 New buildings: 150 euro for a small building, 4,000 euro for a 5,000m2 apartment building Average cost of single-family houses is between 300 euros and 500 euros The cost averages 1 euro/m2 for buildings with a living area over 1,000m^2
Rater Certification Requirements	The issuing of EPCs is performed by a person or entity authorised according to the relevant regulations of the trade, or by a person qualified through cooperation between building trades. These persons receive their trade's license by authorities in the Lander. See below in 'context' for details. Austria has a 'profession law', which automatically provides the right to perform an assessment by those who have a certain technical degree: usually for professionals with a three year degree, after they have completed additional educational training. As well for engineers and architects with a five year degree with three years of practice.

Label	$HWB_{Ref,SK}$ [kWh/m².year]	PEB_{Sk} [kWh/m².year]	CO_{2Sk} [kg/m².year]	f_{GEE} [-]
A++	10	60	8	0.55
A+	15	70	10	0.70
A	25	80	15	0.85
B	50	160	30	1.00
C	100	220	40	1.75
D	150	280	50	2.50
E	200	340	60	3.25
F	250	400	70	4.00
G	> 250	> 400	> 70	> 4.00

[18] The information was taken directly from the links provided and the report: *Implementing the Energy Performance of Buildings Directive 2016. Full citation is provided in the references section.*

On-going Requirements /Quality Assurance/ Enforcement	• None – training courses for the calculation of EPCs are on a voluntary basis • There is no official list of EPC assessors in Austria • Since December 2012, a penalty was foreseen in case of infringement, which could be up to 1,450 Euros • The administrative penalty is imposed by City authorities. • Austrian provinces conduct random automated EPC control checks • The EPC assessor is liable for the accuracy and correctness of the EPC • There is currently no record of any penalty being imposed for incorrect EPCs and it is unclear who can issue them • There is currently a national EPC database being built
Outcomes/ Impact	• There is no national database for the EPC. The following numbers are based on regional databases, subsidy activities and the federal real estate company. • The regional database covers 3 provinces in Austria (called ZEUS-database) • There are 112,000 EPCs registered in the ZEUS-database • In 2011 the percentage of issued EPCs was estimated to be 20% of the building stock (there are more than 2.19 million buildings in Austria). • In 2013 more than 2,820 EPCs were issued for existing buildings after renovation. • The subsidy programme called 'Wohnbauförderung' (subsidy for residential buildings), aiming to help Austrian citizens have an affordable dwelling, is about hundred years old. • The building's EPC has become one of the main documents that needs to be provided for receiving subsidies for renovation, both before and after the implementation of the renovation measures. • In the provinces that use the ZEUS database, all the EPCs of buildings receiving a renovation subsidy is recorded • In the province of Salzburg, in order to receive subsidies for heat pumps and PVs, the applicant must enter data on the amount of energy the building needs and produces
Sources	http://www.epbd-ca.org/

<table>
<tr><td>Program[19]</td><td>Energy Performance Certificates – Denmark</td></tr>
<tr><td>Offered by</td><td>EU – EPBD</td></tr>
<tr><td>Administration</td><td>The Danish Energy Agency is responsible for implementing the EPC, including operations, supervision and development. QA is partly performed by a private company.</td></tr>
<tr><td>Applicable Building</td><td>All buildings for sale or rent
Large buildings over 1000 m², not public buildings, must always have a EPC even if it is not being sold or rented.</td></tr>
<tr><td>Objective</td><td>The aim is to promote energy savings by visualising the amount of energy that a building consumes and by outlining the energy saving possibilities.</td></tr>
<tr><td>Label</td><td>A to G scale
Class A is divided into three sub-categories, A2020, A2015 and A2010, reflecting the EE requirements of the building code for those years.
 
<table><tr><th rowspan="2">Energy efficiency rating</th><th colspan="2">Numerical criteria for each class [kWh/m².year]</th></tr><tr><th>Residential</th><th>Non-residential</th></tr><tr><td>A2020</td><td>20.0</td><td>25.0</td></tr><tr><td>A2015</td><td>≤ 30.0 + 1,000/A</td><td>≤ 41 + 1,000/A</td></tr><tr><td>A2010</td><td>≤ 52.5 + 1,650/A</td><td>≤ 71.3 + 1,650/A</td></tr><tr><td>B</td><td>≤ 70.0 + 2,200/A</td><td>≤ 95.0 + 2,200/A</td></tr><tr><td>C</td><td>≤ 110 + 3,200/A</td><td>≤ 135 + 3,200/A</td></tr><tr><td>D</td><td>≤ 150 + 4,200/A</td><td>≤ 175 + 4,200/A</td></tr><tr><td>E</td><td>≤ 190 + 5,200/A</td><td>≤ 215 + 5,200/A</td></tr><tr><td>F</td><td>≤ 240 + 6,500/A</td><td>≤ 265 + 6,500/A</td></tr><tr><td>G</td><td>> 240 + 6,500/A</td><td>> 265 + 6,500/A</td></tr></table>A=conditioned area in m².</td></tr>
<tr><td>Audit/Assessment trigger</td><td>It is mandatory to have an energy performance certificate (EPC) when selling or renting out buildings. It is also mandatory to display the label of the EPC if a building is advertised for rent or sale in commercial media.
The owner/ real estate agent is required to obtain and provide an EPC.</td></tr>
<tr><td>Cost</td><td>The cost of an EPC is regulated for small buildings (up to 288m²)
In 2014 the maximum price of EPC for a small building varied from 5,824 DKK to 6,988 DKK including taxes.</td></tr>
<tr><td>Rater Certification Requirements</td><td>Only certified companies can issue EPCs. Certified companies are found on the DEA's consumer website www.sparenergi.dk
Experts are separated into two kinds:
Single or two-family houses less than 50m²
Multi-family houses, public buildings and trade/service sectors
Energy experts have mandatory training courses, online tests and practical tests. No prior education is required</td></tr>
<tr><td>On-going Requirements /Quality</td><td>The DEA carries out QCs on a regular basis, but also when there is a complaint.
QA checks are mandatory. EPCs are randomly selected from a central database.
A technical revision, which includes a re-certification by a specially appointed expert,</td></tr>
</table>

[19] The information was taken directly from the links provided and the report: *Implementing the Energy Performance of Buildings Directive 2016. Full citation is provided in the references section.*

Assurance	must be carried out for 0.25% of all issued EPCs. An electronic analysis of all EPCs in the database is carried out to identify outliers Certified companies must carry out their own quality checks according to DS/EN ISO 9001.
Enforcement (if mandatory)	There are three levels of sanctions if errors are detected. Certified companies must correct the EPC and, if the errors are substantial, the company may also receive a first or second degree notification by the Danish Energy Agency. For grave or repeated errors and/or numerous notifications, the company will face a warning. The warning will be sent to the accreditation agency that certified the company. In addition, a warning will be displayed in connection with the online register of experts. In the worst case, the certified company may have its certification suspended. The Danish Energy Agency has issued 45 warnings.
Background/Context	• Campaigns: Denmark has produced several information campaigns aimed at educating homeowners: • Better Homes: a government-funded campaign launched to help building owners to choose the best solutions for their renovation projects. It aims to accelerate energy renovation of private homes • Digital EPC: This displays the EPC online. The sale ad links directly to a digital energy label which makes the EPC easily accessible. • Casebank: The DEA has developed a file bank that contains a large number of case studies that illustrates how other homeowners have renovated their home. • List of craftsmen: A published list of trades on the DEA website. Trades are listed by their ranking with regards to energy solutions
Outcomes/ Impact	• Energy certification has been mandatory since 1997. All data from the certifications are gathered in a national database. • Since 2006 the data has been validated by use of a scale similar to the current scale (with minor changes) • Public database of individual properties providing the EPC and other public information such as property and land value; • Limited (paid) access to a more extensive database and Property Data Report with additional information (i.e. water supply and soil contamination) is available; • For the recognized property owner: sensitive information is available (e.g. overdue debt to the municipality); • Public access to aggregated statistics on energy performance of Danish building stock. • There has been an impact on the price of buildings: single family house prices have increased in line with improved EPC ratings. • Over time, the EPC has had a growing and strong effect on sales prices. This is partly attributed to the EU statement that from 2011 EPC labels should be published as part of house transactions. (Jensen, Kragh and Hansen 2013) • A large effort has been made by the DEA and others to raise public awareness on energy use. Information campaigns, web-based tools etc. have been widely initiated and public awareness has risen considerably as a result
Sources	https://ens.dk/en/our-responsibilities/energy-labels-buildings

Program[20]	Energy Performance Certificates – England, UK
Offered by Administration	EU – EPBD
	DCLG runs high-level administration. The DCLG also licenses Accreditation Schemes (AS). AS is responsible for the certification of EAs.
Applicable Building	EPCs are produced for buildings on construction, sale and rent. Residential – existing, new, apartments, detached, semi-detached. Non-residential – public/government buildings.
Objective	The aim is to promote energy savings by visualising the amount of energy that a building consumes and by outlining the energy saving possibilities.
Label	Apartments (new): individual EPCs are required for each apartment in the building. However, target C02 emission rate, Target Fabric Energy Efficiency Rate may be calculated for the entire building Apartments (existing): certification for individual apartments/units may be based on the assessment of another representative apartment/unit in the same block. The EPC provides an asset rating of the current and potential energy efficiency of the building on a scale from A to G. The potential rating shows the effect of undertaking the recommendations included in the EPC. The current rating is based on: • the characteristics of the building itself • its services, • a standardised occupancy profile and the building's energy consumption cost. The EPC also contains (applicable to new and existing): • an environmental impact rating, which is a measure of a house's impact on the environment in terms of carbon dioxide (CO2) emissions. • a list of cost-effective recommendations specific to the residential unit to improve the energy rating.
Audit/Assessment trigger	• An EPC must be commissioned before the property is marketed. • Estate or letting agents must be satisfied that an EPC is available or commissioned before the property is marketed. • All EPCs must be registered in the national register, before it is given to a requester. • EPCs become legally valid after they have been recorded in the national register. **Who is responsible for compliance?** • Sellers and landlords are responsible for commissioning an EPC. Constructor/builder are responsible for an EPC if the building is new.
Cost	• The cost of certificates varies greatly. • Indicative starting costs, i.e., lowest market costs (based on internet search in July 2014) are: from 35 £ to 60 £ (ca. 44 € to 75 €); This includes the registration fee payable each time an EPC is recorded on the register. The fee for registering a residential EPC reduced from 1.67 £ to 1.30 £ (ca. 2.12 € to 1.65 €).
Rater Certification Requirements	• National Occupational Standards (NOS) specify the qualifications and skills which Energy Assessors (EAs) should meet to be accredited to produce regulatory outputs.

[20] The information was taken directly from the links provided and the report: *Implementing the Energy Performance of Buildings Directive 2016. Full citation is provided in the references section.*

	• Different types of accreditations are available depending on the building type (residential or non-residential), the complexity of the building and software to be used. The AS must adhere to NOS requirements. Minimum continuous professional development (CPD) is required for EAs, but differs depending on the type of EA.
On-going Requirements /Quality Assurance	An EPC is valid for ten years. The Government introduced AS requirements to achieve minimum quality standards. The Scheme Operating Requirements (SORs) dictate that: • random sampling of at least 2% of certificates of each AS should be checked at least one each semester • no more than 10% of the certificates checked can be defective • Defective means that calculations are within 2.5% of the QA assessment AS have the power to rescind EAs licenses. The Government also carries out QA of the AS and may suspend or revoke an AS license. Penalties for non-compliance vary depending on the type of building: • residential: 200 £ (ca. 250 €) • non-residential: the sum equivalent to 12.5% of the rateable value of the building, subject to a minimum of 500 £ (ca. 625 €) and a maximum of 5,000 £ (ca. 6,250 €).
Enforcement (if mandatory)	There are three levels of sanctions if errors are detected. Certified companies must correct the EPC and, if the errors are substantial, the company may also receive a first or second degree notification by the Danish Energy Agency. For grave or repeated errors and/or numerous notifications, the company will face a warning. The warning will be sent to the accreditation agency that certified the company. In addition, a warning will be displayed in connection with the online register of experts. In the worst case, the certified company may have its certification suspended. The Danish Energy Agency has issued 45 warnings.
Outcomes/ Impact	• The registry contains 13 million EPCs (includes multiple EPCs on a single property, cancelled and "not for issue" EPCs) • Estimated to be growing at 1 million EPCs per year • In 2013 over 2 million residential EPCs were recorded on the register • All EPCs have a unique reference number that allow it to be publicly searchable • Most EPCs are searchable by address (the building owner can opt out) • EPCs records statistics are accessible through the register • As of 2012 England had 22.1 million homes and 10.5 million EPCs • During the 2017 year, (ending in June), a total of 1,334,000 EPCs were registered. This is a decrease of 19 percent compared to 2016
Sources	www.epcregister.com https://epc.opendatacommunities.org/ https://www.gov.uk/government/collections/energy-performance-of-buildings-certificates https://www.gov.uk/government/statistics/energy-performance-of-buildings-certificates-in-england-and-wales-2008-to-june-2017

Program[21]	Energy Performance Certificates – Scotland, UK
Offered by	EU – EPBD
Administration	The Scottish Government entered into protocols with a number of "Approved Organisations" (AO) to deliver EPCs. AOs prepare and issue EPCs which must be created using Government approved calculation methodologies and software tools.
Applicable Building	EPCs are produced for buildings on construction, sale and rent. Residential – existing, new, apartments, detached, semi-detached. Non-residential – public/government buildings.
Objective	The aim is to promote energy savings by visualising the amount of energy that a building consumes and by outlining the energy saving possibilities.
Label	The residential label itself is the same as England and rest of UK • The non-residential label differs from the rest of the UK as the A to G scale is based on absolute C02 emissions, and not relative emissions (England, Wales) • All EPCs must be produced from data recorded on the Scottish EPC Register which holds both residential and non-residential EPCs data. • An EPC becomes legally valid after the data used to produce it has been registered on the Scottish central register (the Home Energy Efficiency Database, or HEED). • EPCs may be retrieved from the register by members of the public using the EPC's unique Report Reference Number (RRN). • The Building (Scotland) Regulations require that the EPC is 'affixed' to the building (suggested to be located in a boiler or meter cupboard.)
Audit/Assessment trigger	• An EPC must be commissioned before the property is marketed. • Estate or letting agents must be satisfied that an EPC is available or commissioned before the property is marketed. • All EPCs must be registered in the national register, before it is given to a requester. • EPCs become legally valid after they have been recorded in the national register. **Who is responsible for compliance?** • Sellers and landlords are responsible for commissioning an EPC. Constructor/builder are responsible for an EPC if the building is new.
Cost	The cost of EPCs varies greatly. Indicative starting costs, i.e., lowest market costs: • Residential buildings: from 35 £ to 60 £ (ca. 44 € to 75 €); • Non-residential buildings: from 129 £ to 150 £ (ca. 160 € to 190 €). This includes the registration fee payable each time an EPC is recorded on the Scottish register. Registering a residential EPC is maximum 1.15 £ (ca. 1.5 €) and 5.36 £ (ca. 7.25 €) for a non-residential EPC record.
Rater Certification Requirements	• AOs reference the UK NOS (same as England, Wales) when establishing requirements for EAs At the time of the report there were 2,316 assessors for domestic existing buildings EPCs
On-going	• AOs specify their own Continuing professional development hours for their EAs

[21] The information was taken directly from the links provided and the report: *Implementing the Energy Performance of Buildings Directive 2016. Full citation is provided in the references section.*

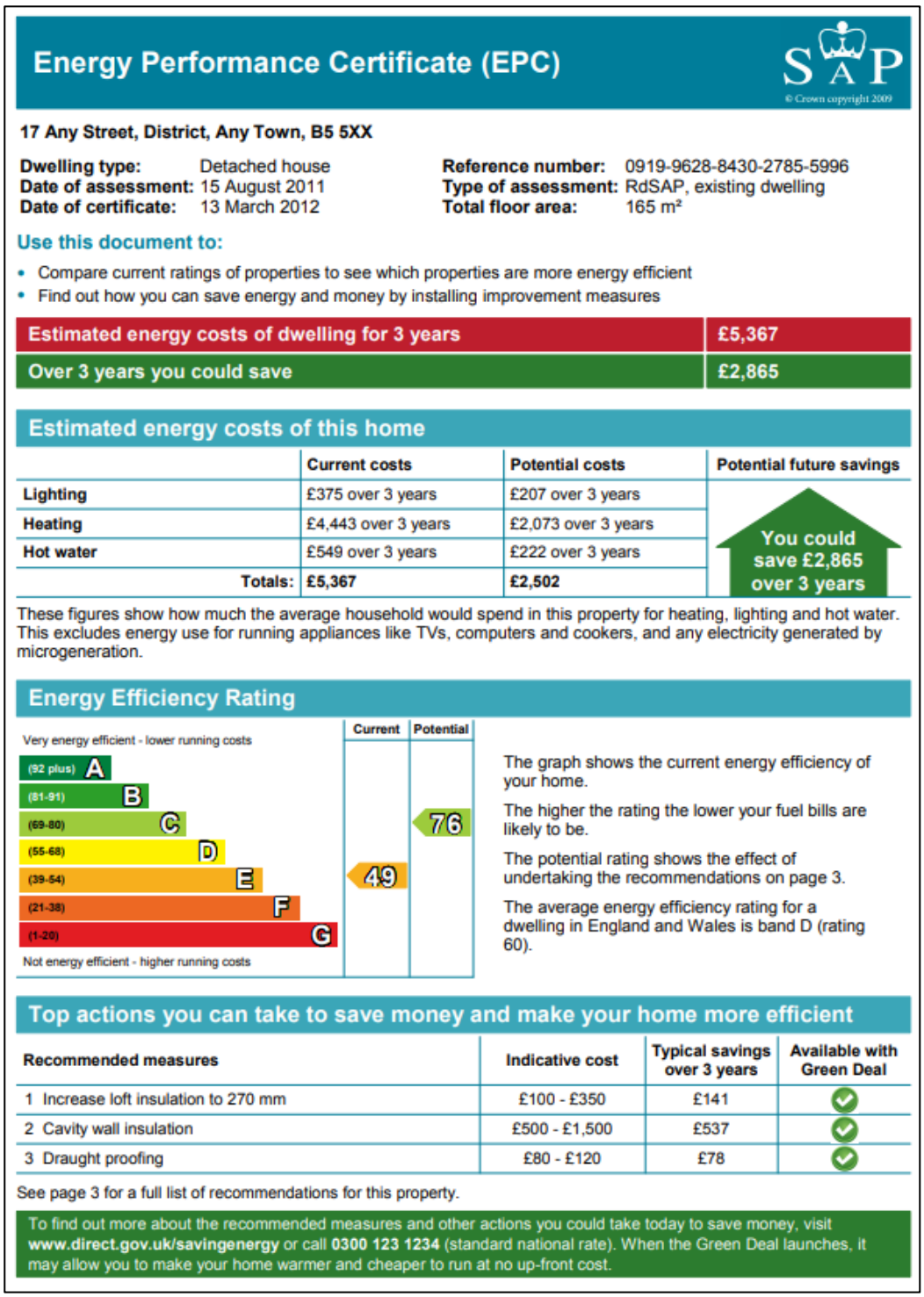
Requirements /Quality Assurance	• AOs have specific QA responsibilities under an agreed operating framework • A register of assessors is maintained and • At least 2% of EPCs produced are spot checked for accuracy. • AOs are audited by the Government

Enforcement (if mandatory)	• Local Authorities are the enforcement authorities in their respective jurisdictions. They have the powers to require building owners to produce copies of the EPC for inspection and to take copies if necessary.
	• Penalties in the form of fees depend on the type of building
	  o Residential units 500 £ (ca. 625 €);
	  o Any other case, the penalty is 1,000 £ (ca. 1,250 €).
	At the time of writing this report, the Scottish Government has no statistical information detailing enforcement proceedings or penalties paid for noncompliance since the coming into force of the EPC requirements in 2008.

Outcomes/ Impact	• EPCs recorded in 2013, for new and existing, residential and non-residential buildings in Scotland was 252,520. • From the implementation of the program until the end of 2014, the register has 1.14 million residential EPCs in Scotland • The introduction of EPCs coincided with the introduction of domestic legislation to provide comprehensive information to potential purchasers of marketed residential units. • All owners of residential units marketed for sale have to provide a 'Home Report'. This is a pack of three documents: a Single Survey, an Energy Report (includes the EPC) and a Property Questionnaire. • The Home Report is provided free of charge to prospective home buyers. A building expert provides all documents for the Home Report (incl. EPC), after one visit to the property and for a fixed fee. This process ensures that the EPC rating is available for inclusion in advertisements and ensures a significantly high rate of compliance.
Sources	www.epcregister.com http://www.epbd-ca.org/

Appendix B – Sample Reports and Labels

United Kingdom [22]



Energy Performance Certificate (EPC)

SAP

17 Any Street, District, Any Town, B5 5XX

Dwelling type:	Detached house	**Reference number:**	0919-9628-8430-2785-5996
Date of assessment:	15 August 2011	**Type of assessment:**	RdSAP, existing dwelling
Date of certificate:	13 March 2012	**Total floor area:**	165 m²

Use this document to:

- Compare current ratings of properties to see which properties are more energy efficient
- Find out how you can save energy and money by installing improvement measures

Estimated energy costs of dwelling for 3 years	**£5,367**
Over 3 years you could save	**£2,865**

Estimated energy costs of this home

	Current costs	Potential costs	Potential future savings
Lighting	£375 over 3 years	£207 over 3 years	You could save £2,865 over 3 years
Heating	£4,443 over 3 years	£2,073 over 3 years	
Hot water	£549 over 3 years	£222 over 3 years	
Totals:	**£5,367**	**£2,502**	

These figures show how much the average household would spend in this property for heating, lighting and hot water. This excludes energy use for running appliances like TVs, computers and cookers, and any electricity generated by microgeneration.

Energy Efficiency Rating

	Current	Potential
Very energy efficient - lower running costs		
(92 plus) A		
(81-91) B		
(69-80) C		76
(55-68) D		
(39-54) E	49	
(21-38) F		
(1-20) G		
Not energy efficient - higher running costs		

The graph shows the current energy efficiency of your home.

The higher the rating the lower your fuel bills are likely to be.

The potential rating shows the effect of undertaking the recommendations on page 3.

The average energy efficiency rating for a dwelling in England and Wales is band D (rating 60).

Top actions you can take to save money and make your home more efficient

Recommended measures	Indicative cost	Typical savings over 3 years	Available with Green Deal
1 Increase loft insulation to 270 mm	£100 - £350	£141	✓
2 Cavity wall insulation	£500 - £1,500	£537	✓
3 Draught proofing	£80 - £120	£78	✓

See page 3 for a full list of recommendations for this property.

To find out more about the recommended measures and other actions you could take today to save money, visit **www.direct.gov.uk/savingenergy** or call **0300 123 1234** (standard national rate). When the Green Deal launches, it may allow you to make your home warmer and cheaper to run at no up-front cost.

[22] This sample report is taken directly from: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/5996/2116821.pdf

17 Any Street, District, Any Town, B5 5XX
13 March 2012 RRN: 0919-9628-8430-2785-5996

Energy Performance Certificate

Summary of this home's energy performance related features

Element	Description	Energy Efficiency
Walls	Cavity wall, as built, partial insulation (assumed)	★★★☆☆
Roof	Pitched, 75 mm loft insulation	★★★☆☆
Floor	Solid, no insulation (assumed)	–
Windows	Partial double glazing	★★☆☆☆
Main heating	Boiler and radiators, mains gas	★★★☆☆
Main heating controls	Programmer, room thermostat and TRVs	★★★★☆
Secondary heating	None	–
Hot water	From main system	★★★☆☆
Lighting	Low energy lighting in 17% of fixed outlets	★★☆☆☆

Current primary energy use per square metre of floor area: 298 kWh/m² per year

The assessment does not take into consideration the physical condition of any element. 'Assumed' means that the insulation could not be inspected and an assumption has been made in the methodology based on age and type of construction.

Low and zero carbon energy sources

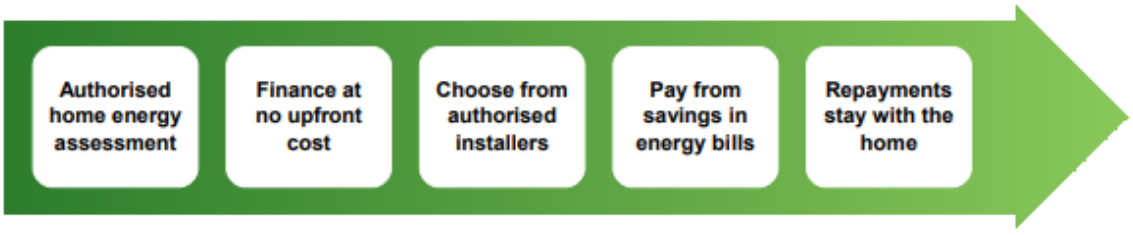
Low and zero carbon energy sources are sources of energy that release either very little or no carbon dioxide into the atmosphere when they are used. Installing these sources may help reduce energy bills as well as cutting carbon. There are none provided for this home.

Opportunity to benefit from a Green Deal on this property

When the Green Deal launches, it may enable tenants or owners to improve the property they live in to make it more energy efficient, more comfortable and cheaper to run, without having to pay for the work upfront. To see which measures are recommended for this property, please turn to page 3. You can choose which measures you want and ask for a quote from an authorised Green Deal provider. They will organise installation by an authorised installer. You pay for the improvements over time through your electricity bill, at a level no greater than the estimated savings to energy bills. If you move home, the Green Deal charge stays with the property and the repayments pass to the new bill payer.

For householders in receipt of income-related benefits, additional help may be available.

To find out more, visit **www.direct.gov.uk/savingenergy** or call **0300 123 1234**.



17 Any Street, District, Any Town, B5 5XX
13 March 2012 RRN: 0919-9628-8430-2785-5996

Energy Performance Certificate

Recommendations

The measures below will improve the energy performance of your dwelling. The performance ratings after improvements listed below are cumulative; that is, they assume the improvements have been installed in the order that they appear in the table. Further information about the recommended measures and other simple actions you could take today to save money is available at **www.direct.gov.uk/savingenergy**. Before installing measures, you should make sure you have secured the appropriate permissions, where necessary. Such permissions might include permission from your landlord (if you are a tenant) or approval under Building Regulations for certain types of work.

Measures with a green tick are likely to be fully financed through the Green Deal, when the scheme launches, since the cost of the measures should be covered by the energy they save. Additional support may be available for homes where solid wall insulation is recommended. If you want to take up measures with an orange tick be aware you may need to contribute some payment up-front.

Recommended measures	Indicative cost	Typical savings per year	Rating after improvement	Green Deal finance
Increase loft insulation to 270 mm	£100 - £350	£47	E 51	✓
Cavity wall insulation	£500 - £1,500	£179	D 59	✓
Draught proofing	£80 - £120	£26	D 60	✓
Low energy lighting for all fixed outlets	£50	£43	D 61	
Replace boiler with new condensing boiler	£2,200 - £3,000	£339	C 74	✓
Solar water heating	£4,000 - £6,000	£34	C 75	✓
Replace single glazed windows with low-E double glazing	£3,300 - £6,500	£41	C 76	✓

Alternative measures

There are alternative measures below which you could also consider for your home.

- External insulation with cavity wall insulation
- Biomass boiler (Exempted Appliance if in Smoke Control Area)
- Air or ground source heat pump
- Micro CHP

Choosing the right package

Visit **www.epcadviser.direct.gov.uk**, our online tool which uses information from this EPC to show you how to save money on your fuel bills. You can use this tool to personalise your Green Deal package.

Directgov
Public services all in one place

Green Deal package	Typical annual savings
Loft insulation	**Total savings of £587**
Cavity wall insulation	
Draught proofing	
Condensing boiler	
Electricity/gas/other fuel savings	£0 / £587 / £0

You could finance this package of measures under the Green Deal. It could **save you £587 a year** in energy costs, based on typical energy use. Some or all of this saving would be recouped through the charge on your bill.

17 Any Street, District, Any Town, B5 5XX
13 March 2012 RRN: 0919-9628-8430-2785-5996

Energy Performance Certificate

About this document

The Energy Performance Certificate for this dwelling was produced following an energy assessment undertaken by a qualified assessor, accredited by AAA Energy Assessors Ltd. You can get contact details of the accreditation scheme at www.aaa.co.uk, together with details of their procedures for confirming authenticity of a certificate and for making a complaint. A copy of this EPC has been lodged on a national register. It will be publicly available and some of the underlying data may be shared with others for the purposes of research, compliance and direct mailing of relevant energy efficiency information. The current property owner and/or tenant may opt out of having this information disclosed.

Assessor's accreditation number: AAA_123456
Assessor's name: John Smith
Phone number: 030 5555 1234
E-mail address: john.smith@isp.net
Related party disclosure: No related party

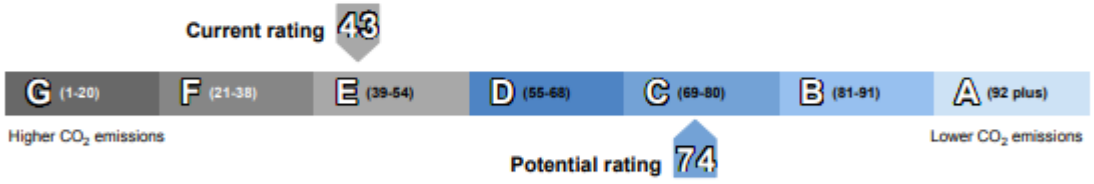
Further information about Energy Performance Certificates can be found under Frequently Asked Questions at **www.epcregister.com**.

About the impact of buildings on the environment

One of the biggest contributors to global warming is carbon dioxide. The energy we use for heating, lighting and power in homes produces over a quarter of the UK's carbon dioxide emissions.

The average household causes about 6 tonnes of carbon dioxide every year. Based on this assessment, your home currently produces approximately 9.5 tonnes of carbon dioxide every year. Adopting the recommendations in this report can reduce emissions and protect the environment. If you were to install these recommendations you could reduce this amount by 5.5 tonnes per year. You could reduce emissions even more by switching to renewable energy sources.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.



Your home's heat demand

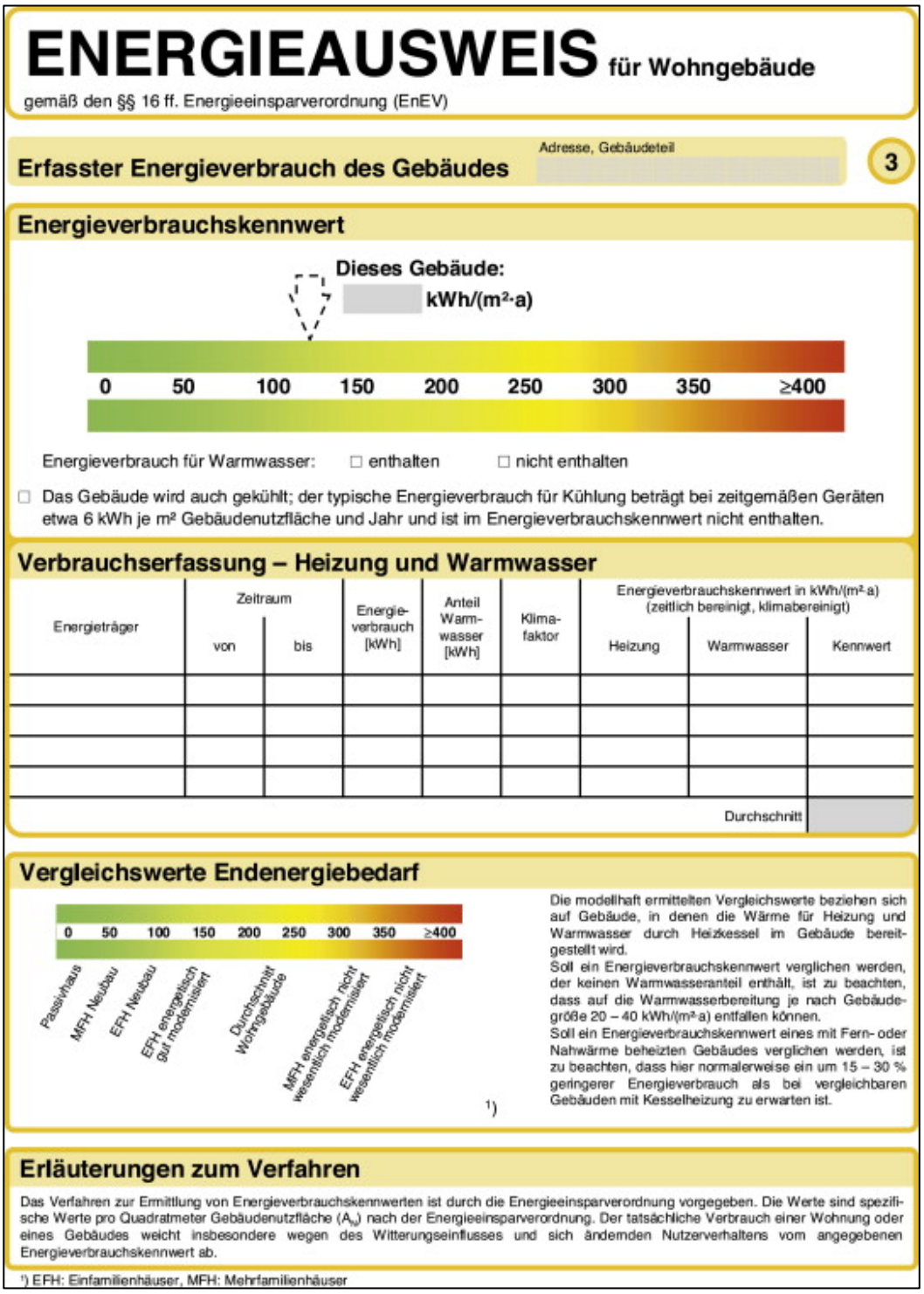
For most homes, the vast majority of energy costs derive from heating the home. Where applicable, this table shows the energy that could be saved in this property by insulating the loft and walls, based on typical energy use (shown within brackets as it is a reduction in energy use).

Heat demand	Existing dwelling	Impact of loft insulation	Impact of cavity wall insulation	Impact of solid wall insulation
Space heating (kWh per year)	22,154	(1179)	(4535)	N/A
Water heating (kWh per year)	2,792			

Addendum

This dwelling may have narrow cavities and so requires further investigation to determine which type of cavity wall insulation is best suited.

Germany [23]



ENERGIEAUSWEIS für Wohngebäude

gemäß den §§ 16 ff. Energieeinsparverordnung (EnEV)

Erfasster Energieverbrauch des Gebäudes

Adresse, Gebäudeteil

3

Energieverbrauchskennwert

Dieses Gebäude: kWh/(m²·a)

0 50 100 150 200 250 300 350 ≥400

Energieverbrauch für Warmwasser: ☐ enthalten ☐ nicht enthalten

☐ Das Gebäude wird auch gekühlt; der typische Energieverbrauch für Kühlung beträgt bei zeitgemäßen Geräten etwa 6 kWh je m² Gebäudenutzfläche und Jahr und ist im Energieverbrauchskennwert nicht enthalten.

Verbrauchserfassung – Heizung und Warmwasser

Energieträger	Zeitraum von	Zeitraum bis	Energieverbrauch [kWh]	Anteil Warmwasser [kWh]	Klimafaktor	Energieverbrauchskennwert in kWh/(m²·a) (zeitlich bereinigt, klimabereinigt) Heizung	Warmwasser	Kennwert
							Durchschnitt	

Vergleichswerte Endenergiebedarf

0 50 100 150 200 250 300 350 ≥400

Passivhaus; MFH Neubau; EFH Neubau; EFH energetisch gut modernisiert; Durchschnitt Wohngebäude; MFH energetisch nicht wesentlich modernisiert; EFH energetisch nicht wesentlich modernisiert

[1])

Die modellhaft ermittelten Vergleichswerte beziehen sich auf Gebäude, in denen die Wärme für Heizung und Warmwasser durch Heizkessel im Gebäude bereitgestellt wird.
Soll ein Energieverbrauchskennwert verglichen werden, der keinen Warmwasseranteil enthält, ist zu beachten, dass auf die Warmwasserbereitung je nach Gebäudegröße 20 – 40 kWh/(m²·a) entfallen können.
Soll ein Energieverbrauchskennwert eines mit Fern- oder Nahwärme beheizten Gebäudes verglichen werden, ist zu beachten, dass hier normalerweise ein um 15 – 30 % geringerer Energieverbrauch als bei vergleichbaren Gebäuden mit Kesselheizung zu erwarten ist.

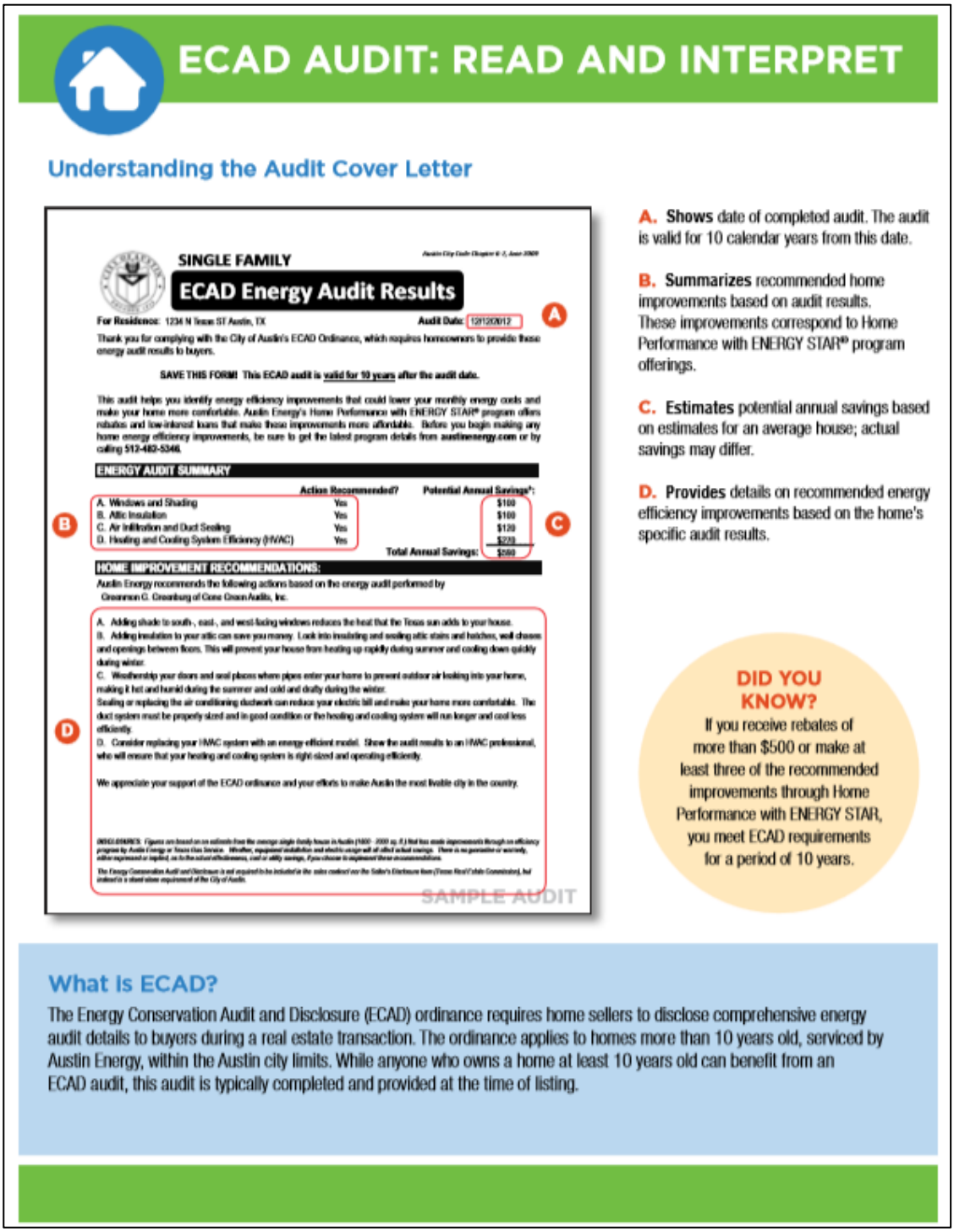
Erläuterungen zum Verfahren

Das Verfahren zur Ermittlung von Energieverbrauchskennwerten ist durch die Energieeinsparverordnung vorgegeben. Die Werte sind spezifische Werte pro Quadratmeter Gebäudenutzfläche (A_N) nach der Energieeinsparverordnung. Der tatsächliche Verbrauch einer Wohnung oder eines Gebäudes weicht insbesondere wegen des Witterungseinflusses und sich ändernden Nutzerverhaltens vom angegebenen Energieverbrauchskennwert ab.

[1]) EFH: Einfamilienhäuser, MFH: Mehrfamilienhäuser

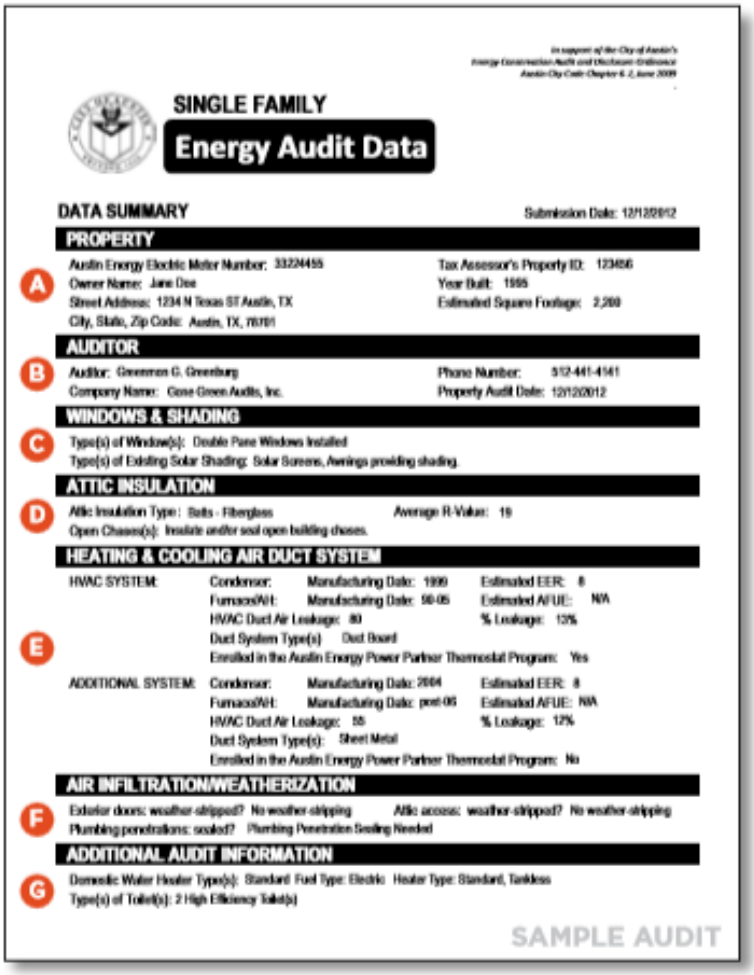
[23] This sample report is taken directly from the 2012 report by Hermann Amecke: *The Impact of Energy Performance Certificates: A survey of German Home owner*. Full citation is provided in the references section.

Austin, Texas [24]



[24] This sample report is taken directly from Austin Energy's residential homeowner guide, at: https://austinenergy.com/ae/

Understanding the Audit Data



SINGLE FAMILY

Energy Audit Data

DATA SUMMARY — Submission Date: 12/12/2012

PROPERTY

Austin Energy Electric Meter Number: 33224455 — Tax Assessor's Property ID: 123456
Owner Name: Jane Doe — Year Built: 1995
Street Address: 1234 N Texas ST Austin, TX — Estimated Square Footage: 2,200
City, State, Zip Code: Austin, TX, 78701

AUDITOR

Auditor: Greenmon G. Greenburg — Phone Number: 512-441-4141
Company Name: Gone Green Audits, Inc. — Property Audit Date: 12/12/2012

WINDOWS & SHADING

Type(s) of Window(s): Double Pane Windows Installed
Type(s) of Existing Solar Shading: Solar Screens, Awnings providing shading.

ATTIC INSULATION

Attic Insulation Type: Batts - Fiberglass — Average R-Value: 19
Open Chases(s): Insulate and/or seal open building chases.

HEATING & COOLING AIR DUCT SYSTEM

HVAC SYSTEM: Condenser: Manufacturing Date: 1999 — Estimated EER: 8
Furnace/Air: Manufacturing Date: 98-05 — Estimated AFUE: N/A
HVAC Duct Air Leakage: 80 — % Leakage: 13%
Duct System Type(s): Duct Board
Enrolled in the Austin Energy Power Partner Thermostat Program: Yes

ADDITIONAL SYSTEM: Condenser: Manufacturing Date: 2004 — Estimated EER: 8
Furnace/Air: Manufacturing Date: post-05 — Estimated AFUE: N/A
HVAC Duct Air Leakage: 55 — % Leakage: 12%
Duct System Type(s): Sheet Metal
Enrolled in the Austin Energy Power Partner Thermostat Program: No

AIR INFILTRATION/WEATHERIZATION

Exterior doors: weather-stripped? No weather-stripping — Attic access: weather-stripped? No weather-stripping
Plumbing penetrations: sealed? Plumbing Penetration Sealing Needed

ADDITIONAL AUDIT INFORMATION

Domestic Water Heater Type(s): Standard Fuel Type: Electric Heater Type: Standard, Tankless
Type(s) of Toilet(s): 2 High Efficiency Toilet(s)

SAMPLE AUDIT

A. Identifies the audited property. Square footage represents actual size, not necessarily property appraisal district size.

B. Gives auditor contact information. Contact the auditor for more information on possible improvements or to update the audit data after improvements have been made.

C. Lists all types of windows and shade providers, including trees and other buildings.

D. Details insulation type and R-Value for entire overhead, including any cathedral ceilings. Chases are "tunnels" for the duct system, for plumbing or for wiring which should be insulated.

E. Lists key efficiency information and measurement for up to two HVAC systems. If more than two, see additional audit data sheets.

F. Identifies common locations for potential weatherization and air sealing improvements that affect the performance of the home, or identifies if those improvements are in place.

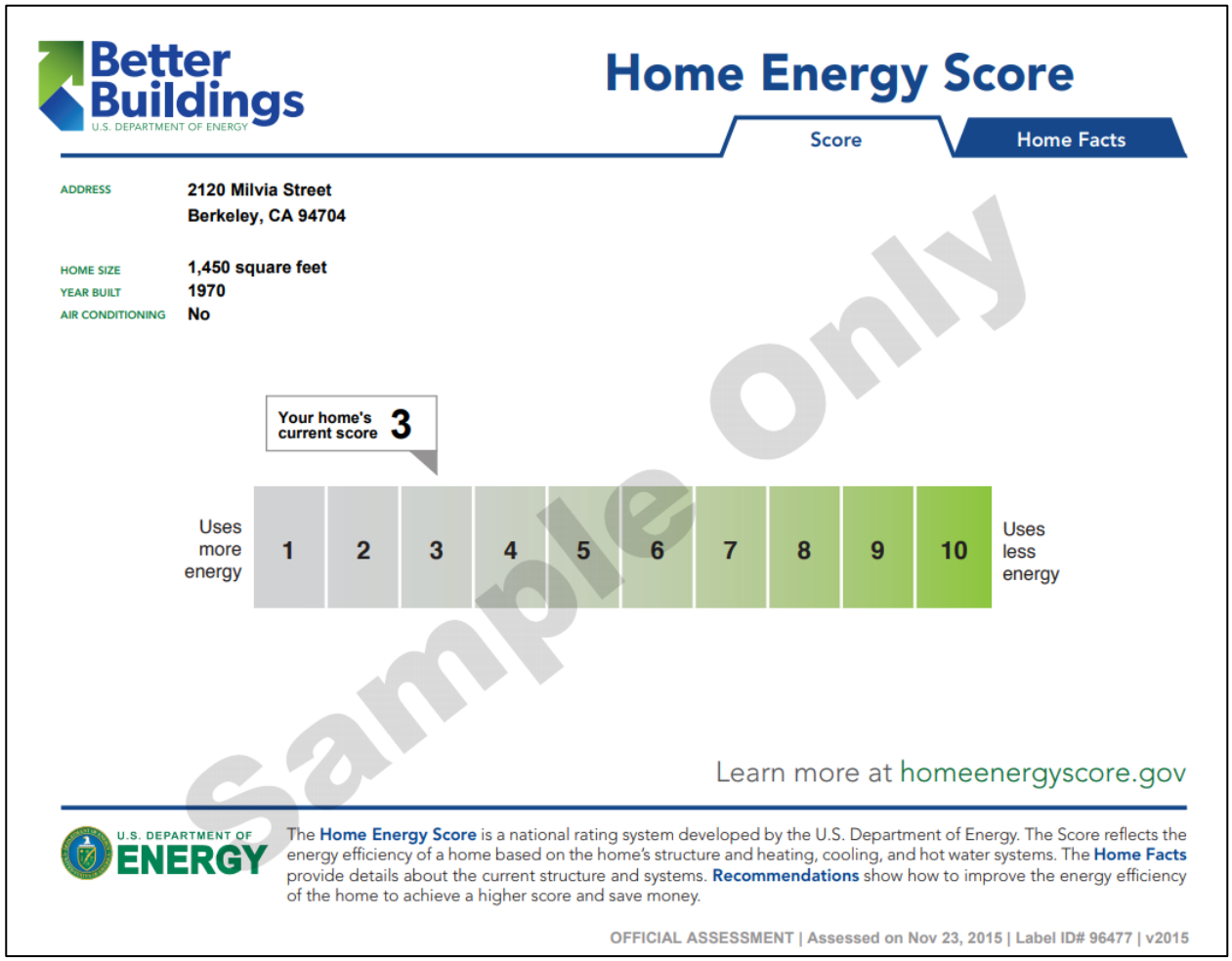
G. Highlights additional opportunities for energy and water efficiency improvements in the house, as applicable.

ECAD Benefits Await You

- **Identify Hidden Opportunities** - Discover potentially hidden home management-related costs as well as opportunities for valuable home and health improvement.
- **Increase Your Home Value** - Make your house more distinct and attractive in the competitive real estate marketplace with energy efficiency upgrades.
- **Reduce Energy Bills** - Save up to 20 percent or more on monthly energy bills by implementing energy efficiency improvements through Home Performance with ENERGY STAR.

austinenergy.com/go/ecad | 512-482-5346

Berkeley, California [25]



[25] This sample report is taken directly from City of Berkeley's information page at: https://www.cityofberkeley.info/uploadedFiles/Planning_and_Development/Level_3_-_Energy_and_Sustainable_Development/Sample%20Home%20Energy%20Report.pdf

Better Buildings
U.S. DEPARTMENT OF ENERGY

Home Energy Score

Score | Home Facts

About this home

Assessment date	Nov 23, 2015
Address	2120 Milvia Street
City, state, zip	Berkeley, CA 94704
Year built	1970
Number of bedrooms	3
Stories above ground level	1
Interior floor-to-ceiling height (feet)	8
Conditioned floor area (all stories combined, square feet)	1,450
Direction faced by front of house	South
Has the house been air sealed?	No

Estimated energy use per year

Total (MBTUs)	131
Score basis (MBTUs)	69
Electricity (kWh)	6093
Natural gas (therms)	624

Comments

For more information on calculation methods, technical terms and units of measure, please visit the Home Energy Score web site.

homeenergyscore.gov

OFFICIAL ASSESSMENT | Assessed on Nov 23, 2015 | Label ID# 96477 | v2015

Better Buildings
U.S. DEPARTMENT OF ENERGY

Home Energy Score

Score | Home Facts

Roof, attic & foundation

Roof / Attic 1	Construction type / Exterior Finish / Insulation level
Attic floor area (square feet)	1450
Roof construction	Roof Standard Roof / Composition Shingles or Metal / R-0
Roof color	Medium Dark
Attic or ceiling type	Unconditioned Attic
Attic floor insulation	R-0
Foundation / Floor 1	
Floor area (square feet)	1450
Foundation type	Slab-on-grade foundation
Foundation walls insulation level	R-0

Sample Only

For more information on calculation methods, technical terms and units of measure, please visit the Home Energy Score web site.

homeenergyscore.gov

OFFICIAL ASSESSMENT | Assessed on Nov 23, 2015 | Label ID# 96477 | v2015

Better Buildings
U.S. DEPARTMENT OF ENERGY

Home Energy Score

Score | Home Facts

Walls

Construction type / Exterior Finish / Insulation level
All sides	Wood Frame / Wood,Asbestos,Fiber Cement,Composite Shingle, or Masonite Siding / R-3

Windows & skylights

Skylights	Roof / Attic 1	Roof / Attic 2
Does the house have skylights?	No	No

Windows	Square feet
Window area front	35
Window area back	49
Window area right	52
Window area left	32

Window Construction	Panes / Frame / Glazing U-value SHGC
All sides	Single-Pane / Aluminum / Clear

For more information on calculation methods, technical terms and units of measure, please visit the Home Energy Score web site.

homeenergyscore.gov

Better Buildings
U.S. DEPARTMENT OF ENERGY

Home Energy Score

Score | Home Facts

Systems

HVAC System 1

Percent of conditioned floor area served by system 100

Heating	
Type	Central gas furnace
Efficiency value	80% AFUE

Cooling	
Type	None

Duct location	Are the ducts insulated?	Are the ducts sealed?	Percent in this location
Unconditioned attic	No	No	85%
Conditioned space	No	No	15%

Hot water	
Type	Natural gas storage
Efficiency value	0.59 EF

For more information on calculation methods, technical terms and units of measure, please visit the Home Energy Score web site.

homeenergyscore.gov

OFFICIAL ASSESSMENT | Assessed on Nov 23, 2015 | Label ID# 96477 | v2015

RECOMMENDED HOME ENERGY IMPROVEMENTS

BUILDING & CUSTOMER INFORMATION			
FIRST NAME Joe	LAST NAME Smith	PHONE NUMBER (123) 456-7891	EMAIL joe.smith@gmail.com
PRIMARY STREET ADDRESS 2120 Milvia Street		CITY/STATE/ZIP Berkeley, CA 94704	
TOTAL NUMBER OF ATTACHED DWELLING UNITS IN BUILDING (1-4) 1		CONDITIONED FLOOR AREA (SQ FT) 1450	HISTORIC STRUCTURE (Y/N) No

HOME ENERGY SCORE INFORMATION		
SCORE ID 96477	CURRENT HOME ENERGY SCORE (1-10) 3	HOME ENERGY SCORE ASSESSOR NAME Johnny Energy
ASSESSMENT DATE 11/23/15	ASSESSMENT COST (EXCLUDING FILING FEE)	HOME ENERGY SCORE ASSESSOR NUMBER CA-SWST-0000

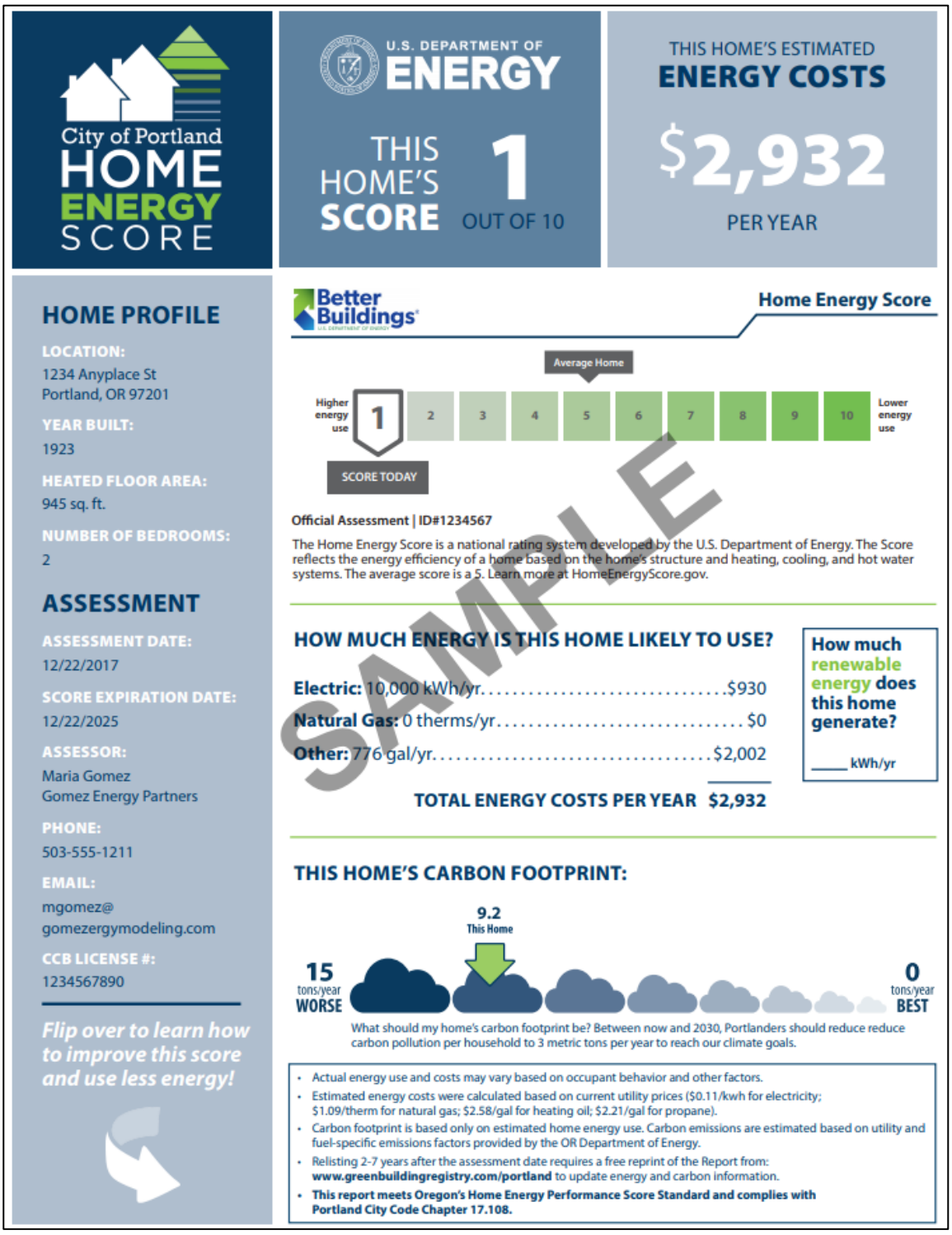
BAY AREA Regional Energy Network

You can improve your home's efficiency by making the following recommended measures. Projects combining two or more recommended efficiency measures can earn rebates **ranging from $1,000 to $6,500**. For more information regarding the measures recommended below, available incentives and expert third party advice, contact a **Home Upgrade Advisor** for free at 866-878-6008, advisor@bayren.org or visit bayareaenergyupgrade.org.

	RECOMMENDED MEASURE	RECOMMENDATION DETAILS	RECOMMENDED WHEN
✔	**Attic Insulation**	Insulation ≥R-30 (≥R-38 in climate zones 1 & 11-16)	Existing average ≤R-11 and accessible attic exists
	Wall Insulation	Insulate ≥R-13	Existing =R-0
	Floor Insulation	Insulate ≥R-19	Existing =R-0 and accessible crawlspace exists
✔	**Whole Building Air Sealing**	≥15% leakage reduction from vintage table defaults	Recommending attic insulation or homeowner experiences drafts
✔	**Duct Repair**	Repair may include sealing, insulating, or replacement. See Additional Comments for more information.	Visual inspection reveals duct leakage
✔	**Central Gas Furnace**	≥92% AFUE	Unit ≥15 years old and AFUE ≤80%
	Central Air Conditioner	≥15 SEER / 12.7 EER	Unit ≥15 years old and SEER ≤10
	Gas Storage Water Heater	EF ≥0.67	Natural gas unit ≥10 years old
	Natural Gas Wall Heater or Ductless Heat Pump	≥70% AFUE (wall heater) ≥8.5 HSPF / ≥15 SEER (heat pump)	Unit ≥15 years old
✔	**Fireplace Door and/or Damper**	Sealing fireplace	Not existing
	Pool Pump	Variable speed	Single speed

ADDITIONAL RECOMMENDATIONS, COMMENTS, & SAFETY OBSERVATIONS
Recommend attic to be air sealed and insulated to R-38
Recommend ducts to be professionally sealed and insulated

Portland, Oregon [26]



[26] This sample report is taken directly from City of Portland's website at: https://www.portlandoregon.gov/bps/71421

Score today:	Score with improvements:*	Estimated energy savings with improvements:	Estimated carbon reduction with improvements:
1	9	$1,672 PER YEAR	57% PER YEAR

TACKLE ENERGY WASTE TODAY!

Enjoy the rewards of a comfortable, energy efficient home that saves you money.

- ☑ Get your home energy assessment. Done!
- ☐ Choose energy improvements from the list of recommendations below.

  Need help deciding what to do first? Non-profit Enhabit offers free 15-minute phone consults with expert home advisors. Call 855-870-0049.
- ☐ Select a contractor (or two, for comparison) and obtain bids.

  Checkout **www.energytrust.org/findacontractor** or call toll free **1-866-368-7878**.
- ☐ Explore financing options at **www.enhabit.org** or **www.energytrust.org**.

* PRACTICAL ENERGY IMPROVEMENTS | COMPLETE NOW OR LATER

To achieve the "score with improvements," all recommended improvements listed below must be completed. Improvements all have a simple payback of ten years or less and may be eligible for mortgage financing. For a more detailed explanation of costs and payback, please get a bid from a contractor.

FEATURE	TODAY'S CONDITION	RECOMMENDED IMPROVEMENTS
Attic insulation	Ceiling insulated to R-0	Insulate to R-38 or R-49 if code requires it
Attic insulation	Ceiling insulated to R-19	Insulate to R-38 or R-49 if code requires it
Duct insulation	Un-insulated	Insulate to R-8
Duct sealing	Un-sealed	Reduce leakage to a maximum of 10% of total airflow
Envelope/Air Sealing	Not professionally air sealed	Professionally air seal
Heating Equipment	Oil furnace 60% AFUE	Upgrade to ENERGY STAR
Heating Equipment	Natural Gas/Propane Furnace	Upgrade to ENERGY STAR
Wall insulation	Insulated to R-0	Fully insulate wall cavities
Water Heater	Standard electric tank	Upgrade to ENERGY STAR, minimum 2.76 EF (Energy Factor)
Windows	Multiple types	Upgrade to ENERGY STAR
Air Conditioner	None	
Basement wall insulation	None	
Floor insulation	Insulated to R-0	
Foundation wall insulation	None	
Skylights	None	
Cathedral ceiling	None	
Solar PV	None	Visit www.energytrust.org/solar to learn more

YOU CAN DO IT YOURSELF!

Looking for low-cost ways to cut energy waste, boost your comfort and lower your energy bills? Visit the resources below to learn about easy changes you can make today:

www.energytrust.org/tips and **www.communityenergyproject.org/services**

Appendix C – Minimum Training Requirements for Home Energy Auditors/assessors in Europe

The table below is taken directly from Building Performance Institute Europe's 2014 report: *Energy Performance Certificates Across the EU*. Full citation is provided in Works Cited section.

		MINIMUM REQUIREMENTS (I.E. RELEVANT DEGREE, PROFESSIONAL EXPERIENCE)	TRAINING	MANDATORY EXAM	CONTINUOUS PROFESSIONAL DEVELOPMENT	ACCREDITATION PROCEDURE
1	AT	Required technical education or relevant training	Voluntary training	No		No additional accreditation required[RS]
2	BE	Required engineering degree or professional experience of at least two years: Wallonia & Flanders	Mandatory or voluntary training	Yes	Flanders and Wallonia: support for assessors (i.e. FAQ, phone line)	Accreditation based on exam results; In Wallonia proof of insurance is required.
		No minimum requirements: Brussels				
3	BG	Required technical education and the professional experience of 2-3 years	Mandatory training	Yes	Every three years assessor needs to pass the exam to renew the license	Accreditation based on exam results;
4	CZ	The professional experience of 3-6 years depending on the level of education	Voluntary training [4]	Yes	Mandatory training every three years after the license is issued	Accreditation based on exam results;
5	DE	Required technical education or relevant training [1] and at least two years of professional experience	Mandatory training (if no engineering degree)	Yes (if no engineering degree)		Not in place (self-declaration of experts)
6	DK	Required engineering degree and the professional experience of at least 2-6 years [1]	Voluntary training	No		Required, only companies that follow EN ISO 9001 standards can be accredited
7	EE	Required engineering degree and the professional experience of at least two years	Mandatory training	Yes		Accreditation based on exam results;
8	ES	Required engineering degree (i.e. architect, engineer)	Voluntary training	No		Not required
9	FR	At least two years of initial educations in the relevant field	Mandatory training	Yes	Every five years assessor needs to attend the 3-days mandatory training to renew the license	Accreditation based on exam results;
10	GR	Required engineering degree (i.e. architect, engineer) and the professional experience of at least two years	Mandatory training	Yes	Every ten years assessor needs to renew the license with the proof of experience	Accreditation based on exam results or directly through professional association.
11	HR	Required engineering degree and/or professional experience of at least five years.	Mandatory training	Yes	every; three years assessor's licence needs to be renewed based on attendance in professional training every year	Accreditation based on exam results;
12	HU	Required higher degree education and at least one year of professional experience	Voluntary training	Yes	Not considered	Accreditation based on exam results;
13	IE	Required technical education or relevant training	Mandatory and voluntary training [1]	Yes	Every 2 years assessor needs to pass the exam to renew the license	Accreditation based on exam results;
14	IT	Required technical education or relevant training	Mandatory and voluntary training [2]	Yes [2]		Rules depend on the region
15	LV	Required technical training and at least two years of professional experience;	Voluntary training	Yes		Accreditation based on exam results
16	LT	Required engineering degree and the professional experience of at least three years	Mandatory training	Yes	Every five years assessor needs to pass the exam to renew the license	Accreditation based on exam results
17	NL	No minimum requirements	Voluntary training	Yes		Accreditation based on exam results
18	NO	Required bachelor degree and (in some cases) at least two years of relevant professional experience[1];	Voluntary training	No		Accreditation required only for some assessment
19	PL	Required engineering degree and/or relevant training	Voluntary training	No		Accreditation after approval of the competence
20	PT	Required architect or engineering degree and the professional experience of at least five years	Voluntary training	Yes		Accreditation based on exam results
21	RO	Required engineering degree and the professional experience of at least three years	Mandatory training	Yes	Every five years assessor needs to renew the license (i.e. proof of experience)	Accreditation based on exam results;
22	SK	Required engineering degree and the professional experience of at least three years	Voluntary training	Yes		Accreditation based on exam results
23	SI	Required engineering degree and/or at least two years of professional experience	Mandatory training	Yes		Accreditation based on exam results
24	SE	Required technical education and professional experience of at least five years	Voluntary training	Yes	Every five years assessor needs to pass the exam to renew the license	Required, after approval of the competence
25	UK	No minimum requirements	Mandatory training [2] [3] except for Scotland	Yes [2]	England and Wales: min. 5-10h of CPD per year; Scotland: periodic training	Accreditation procedure depends on the region

Source: BPIE Survey 2014 and CA EPBD 2013
Note: No data available for: Finland, Cyprus, Malta and Luxembourg;

Appendix D – National Homeowner Omnibus Survey

Screener:

1. For the next set of questions, we are looking for respondents who own a house that is not part of a condominium or strata. Do you own your home?

   Yes
   No (END Survey)

Introduction:
I am going to ask a series of questions about home energy ratings and your opinions on them. There can be any number of ways that a home's energy performance is assessed. That assessment can be converted into a rating, and the rating can be converted to a label. The label can be disclosed to the home buyers or the public to let them know about how a home performs. A number of jurisdictions across Canada are contemplating new laws to mandate home energy ratings and their disclosure to potential homebuyers and to the general public. The new legislation would hope to motivate homeowners to upgrade their homes to improve energy efficiency and ultimately to reduce GHG emissions.

2. How old is your home?
   Open (RECORD RESPONSE)

3. How long have you lived in your home?
   Open (RECORD RESPONSE)

Questions on the home buying decision:

I'm going to read a list of factors that you may have considered when you bought your home. For each item, could you tell me how important they were in affecting your home buying decision? (choose from very important, important, not very important, not at all important)

4. Size of the lot
5. Price of the home
6. Number of bedrooms
7. Location
8. Condition of the home
9. The neighbourhood and community e.g. schools, parks, libraries, recreation centres etc.
10. The exterior aesthetics
11. Interior finishes e.g. granite countertops
12. Interior room layout
13. The home's energy consumption
14. Condition of heating and air conditioning equipment
15. Nearby amenities, including shopping, restaurants, entertainment etc.

Questions on whether or not they are inclined to get an audit:

16. Have you ever had your home's energy performance evaluated? E.g. Received a EnerGuide rating

    Yes (Go to Q17)
    No (Go to Q18)

17. What are the reasons you had your home's energy performance evaluated? (READ/accept any that apply)

    - I was required to do an audit as part of a government or utility incentive program prior to renovation
    - I needed advice on upgrades to its walls, windows, or insulation.
    - I wanted to do my part to protect the environment
    - I wanted to know where I could save money on my monthly energy bills
    - I wanted to increase the value of my home
    - I needed to replace/repair my furnace or HVAC equipment

    Other RECORD RESPONSE

    SKIP TO Q19

18. What is the main reason that you have not conducted an energy evaluation? (READ/accept any that apply)

    - I don't know what an energy evaluation or assessment is
    - I don't understand the value of an energy evaluation or assessment
    - I am moving out of the home soon
    - My home is new
    - I use my energy bills to tell me about my home's energy efficiency
    - I have already performed several of the upgrades for which an evaluation would be required
    - It costs too much
    - It takes too much time and effort finding an energy advisor
    - I don't know how to choose an energy advisor
    - It is not a priority at the moment

    Other RECORD RESPONSE

    SKIP TO Q23

Questions for those that have done an energy assessment or evaluation before:

19. Could you tell me what you thought was useful or helpful from the home energy evaluation report?

    OPEN RECORD

20. Did an incentive program affect your decision to make home energy upgrades?

    Yes
    No

21. Did the result of the home energy evaluation affect your decision to make home energy upgrades?
    Yes
    No (SKIP TO Q22)

22. Based on the recommended energy efficiency measures that you implemented, were you expectations met? (i.e. energy savings, improved comfort, reduced energy use etc.)
    Yes
    No

Questions about consumer awareness of the professions involved:

23. If you were planning on selling your home and had to do an energy evaluation, where would you look for an energy advisor? READ / ACCEPT ALL THAT APPLY

    - Internet search
    - Government website
    - Ask my renovator
    - Ask my realtor as part of my preparing my real estate listing
    - Ask friends or family
    - Ask the local energy utility

    Other RECORD RESPONSE

24. Which of the following types of qualifications or credentials do you feel that an Energy Advisor needs? READ / ACCEPT ALL THAT APPLY

    - Professional degree e.g. architect or engineer
    - College certificate e.g. engineering technologist
    - Certification through successful completion of Certified Energy Advisor training
    - Nothing

    Other RECORD RESPONSE

Questions on consumer opinion:

25. Would a home's energy rating be something that you would want to see if you were shopping for a home?
    Yes
    No

26. Do you think that a home's price would be significantly affected by requiring its sellers to disclose their homes' energy rating?
    Yes
    No
    Not sure

27. Considering the value you attach to a home inspection, how much would you be willing to pay to have your home energy rated? READ
    - $100 - $200
    - $200 - $300
    - Greater than $500
    - Nothing
    - Don't know

28. Are you in favour of the government requiring home sellers to get an energy rating of their home?
    Yes
    No

29. Are you in favour of the government requiring home sellers to share their homes' energy rating with the public?
    Yes
    No

Demographic questions:

- Which of the following age groups may I place you in?
- What is your level of education?
- What is your combined household income?
- Which Province are you in?
- What is your gender?

Appendix E – Homeowner Focus Groups

Moderator introduction.

My name is <name> and I'm with the research firm Oraclepoll. Today we'd like to gather some feedback from you on Mandatory Home Energy Ratings and their disclosure for existing homes.

I want this to be an open discussion over the next hour and a half. I'll be asking some questions and I want your honest open opinions – remember there are no right or wrong answers – your opinions are important and we want to hear them.

<Advise of audio recording for reporting only> Everything that you say will remain confidential; we are not going to report on your names. We just want to hear from each one of you.

Are there any questions before we start?

Warm Up Questions

I'd like to start by having you introduce yourself. Tell me a little bit about yourself. In what kind of home do you live? How old is your home and how long have you lived there?

Questions on home buying decision

Q1. I want you to tell me, what the most important factors that you considered when you purchased your home? OPEN

Introduction 2

During this session I am going to ask a series of questions about home energy ratings and your opinions about them. There can be any number of ways that a home's energy performance is assessed. That assessment can be converted into a rating, and the rating can be converted to a label. A number of jurisdictions across Canada are contemplating new laws to mandate home energy ratings and their disclosure to potential homebuyers and to the general public. The new legislation would hope to educate homeowners to make appropriate choices to improve energy efficiency and ultimately to reduce Greenhouse gas emissions.

General Questions on evaluations and ratings

For some context, an energy assessment or evaluation is a process where an energy advisor will inspect your house for things like the number and type of windows, and the amount of insulation. They will sometimes check the air tightness of your house by putting a fan on your front door. The typical time for this procedure is between 2-3 hours. The advisor then provides a report on the energy performance of your home together with recommendations for upgrades.

Now I'm going to start. I want you to approach each question as someone who is going to sell or buy a house. Remember that there are no right or wrong answers. Let's start

Q2. Raise your hands if you've had your home's energy efficiency assessed or evaluated?

PARTICIPANTS IN PROGRAM

Q3. Let me ask some questions to those of you that have had an evaluation done.
   a. What was the main reason that you decided to get a home energy evaluation? And how much did it cost?
   b. I want to know the answers to the following three questions through a show of hands: Do you remember what your rating was? Out of the ratings here, which is better?
   c. Was the home evaluation that you received through an energy efficiency incentive program? Do any of you remember the program?
   d. Did the advisor recommend any upgrades or renovations?

NON- PROGRAM PARTICIPANTS

Now I'm going to talk to those of you that have not had a home energy evaluation.

Q4. I am now going to read a list of examples or reasons for not participating. After I read each, please raise your hand if this was a barrier to getting a home energy evaluation and subsequent rating.
   a. Don't know what an energy evaluation is
   b. Home is new / needs no upgrades
   c. You use energy bills to tell you about your home's energy efficiency
   d. You thought that it would cost too much
   e. Didn't know where to start to find an Energy Advisor, and thought it would take too much time and effort to find one in your area / You could not find an Energy Advisor in your area
   f. You already renovated your house to increase the energy efficiency of your home. So you had no use for upgrade recommendations.
   g. You were worried that the assessment wouldn't be accurate
   h. You were concerned that you might be ripped off
   i. You are concerned that the upgrades or renovations that were recommended won't meet your expectations
   j. You were or are way too busy

ALL

Q5. So this is for everyone – from the list I just mentioned or from your experience or what you have heard, what do you think is the biggest barrier that keeps people from getting a home energy assessment or evaluation? OPEN

Q6. What do you think the energy rating would be for a really efficient home?

Q7. As a home owner, what would you find useful from a home evaluation report? I'm going to read some examples, but feel free to add anything I might have missed. Raise your hand.

a. My home's energy consumption or use
b. How efficient my home is compared to other homes that are similar
c. How airtight my home is
d. Recommendations on what to upgrade or renovate in my home to improve comfort or energy costs

Questions on Energy Advisors

Next, I am going to focus on the home energy advisor. In Canada, an energy advisor is generally an independent contractor that often uses Natural Resources Canada (NRCan's) rating system to assess the energy performance of a home.

Q8. As a homeowner, would you expect an energy advisor, who's conducting the home energy evaluation on your home, to be licensed or regulated?

Q9. Can you tell me about how you would find an energy advisor?

Q10. How would you feel if the energy advisor (who is recommending what upgrades you should complete) was also the contractor or renovator doing this type of work?

Q11. How would you feel if the advisor recommends a contractor? Should they be required to tell you about any relationships to contractors they recommend? If yes, how do you want the disclosure – in writing? Verbally?

Q12. If you thought the rating for your home was incorrect, would you want to be able to challenge the home's energy rating?

Questions on the home resale process, price, and regulations

Q13. If you were a homeowner, and you needed a home energy rating to list and sell your house, how long would you be willing to wait for the rating, after the evaluation? (Think about the process of finding an energy advisor, and if there are none near you, how far they would need to travel, and the time it takes to process your label).

Q14. If a house you're wanting to buy had a "below average" energy rating, under what circumstances would you renovate to improve the rating, after you have purchased the home? Why or why not?

Q15. Now let's think about this from the other perspective: If you were looking to sell your home and your house received a "below average" energy rating, would you undertake the recommended renovations to improve your rating? Why or why not? How would you decide if the renovations would be worth your while?

Q16. Let's talk about home prices for a little bit. If you were a homeowner looking to sell, what are the factors that you would consider when deciding on a selling price? Would knowing the energy performance of your house in advance have a bearing on the price that you set?

Q17. As a homeowner, do you think that home buyers already take into account the energy efficiency of a house when they are buying? What features do you think they consider?

Q18. If you were a home seller and you needed to conduct a home energy evaluation to sell your home, do you feel there is any value or benefit to be gained with an energy evaluation and rating? If yes, what is the maximum amount you would be willing to pay to get an energy evaluation and rating?

AFTER RESPONDENTS ANSWER, AS PART OF THE DISCUSSION: 52% of respondents from our national survey indicated that they would be willing to pay $100-$200. What do you think of this response?

Questions on Disclosure and privacy

OPTIONAL EXPLANATION FOR THOSE THAT DON'T KNOW WHAT AN MLS IS: a MLS, also known as a multiple listing system, is a tool that real estate brokers use to share information with other brokers and/or make contractual offers on behalf of their clients. The information and data of a listing stored in a MLS database is owned by the broker who has obtained a listing contract with a property seller.

In Canada, the MLS is owned by the Canadian Real Estate Association. A public database with limited property details is available for consumers. (REALTOR.ca)

Q19. How would you feel if a home's energy rating is listed automatically on the MLS as a part of the listing, like square footage, age, number of rooms, or property taxes, for comparison to other homes for sale?

Q20. How do you feel about having your home's energy rating be available to the public for comparison through online database like the MLS? Would you feel differently if the information was only used for the listing? What about if the information was used for research or a way to identify homes for incentive programs?

Q21. How do you think that the mandatory disclosure of a home's energy evaluation would provide you with different information when compared to an energy/utility bill?

Closing questions:

Q22. Next a quick show of hands: Are you in favour of home sellers being required to tell buyers about the energy performance of their home to buyers? Should the government subsidize the cost of the energy evaluation?

Q23. According to the Pan-Canadian Framework on Clean Growth and Climate Change, the energy used to heat and cool our buildings accounted for 12 percent of the national greenhouse gas emissions. Do you think climate change requires your personal attention or is it something that the government needs to act on, on society's behalf?

Q24. How do you think a consumer advocacy group like the Consumer's Council of Canada can help and protect consumers who want to improve homes, undertake renovations or reduce their carbon footprint? Should consumer groups do this kind of work? What are other problems could they address?

Q25. Is there anything you would like to add that we might have missed?

We have completed our session. Thank you for your time and feedback.

Appendix F – Key Informant Interview Guide

Key Informant Interview Questions

Thank you for taking the time and agreeing to take part in today's interview. We are conducting research for the Consumers Council of Canada, on Mandatory Home Energy Rating and Disclosure (HER&D) for Existing Houses. We are looking for both the opportunities and risks for consumers.

The Council's project is funded by Innovation, Science and Economic Development Canada's Contributions Program for Non-Profit Consumer and Voluntary Organizations. This project is intended to clarify the many issues that must be considered prior to mandating energy rating and disclosure requirement.

We are going to treat all interview responses in aggregate. There will be no attribution. Responses will be anonymous. You will have access to the final report. The interview will provide us with information and guidance. Our goal is to try to develop recommendations from what we are told.

1. Tell us about your organization, and your role within your organization.
2. Should homebuyers have access to the energy performance information about a home that they are thinking of buying?
3. What are the opportunities related to mandatory home energy ratings and disclosure? What is the big promise? The goal? I really want you to focus on goals for consumers; government, for the industry, or for society. What are they trying to accomplish?
4. In your opinion, what are the challenges related to mandatory home energy ratings? Let's uncouple ratings from the disclosure. Think about the challenges for the consumer, to government, to the industry, or to society. What can go wrong?
5. Energy ratings and labels have been around for a long time. Some of them are based on an EA performing a full on-site audit. The pushback we've heard about the on-site audit is the sourcing, cost, precision, and timeliness. What do you think? Are these legitimate concerns? Is there a different way to get useful information to the buyer and yet avoid some of these issues?
6. To our way of thinking, there are three levels of disclosure. You can disclose at time of purchase of sale to the buyer owner, or through MLS listing, or to force disclosure through a public database searchable by address etc. did we miss anything? Which do you favour? Which do you think would be the most effective public disclosure system? As you think about this, do you think are there issues relating to privacy? Are there any other challenges associated with each of the three?
7. We're seeing some evidence that suggest that mandatory home energy ratings do not lead directly to decreased energy consumption. How might we better capture the real relationship? (if we're doing firsthand data gathering, how would we find this out?)

Do you have any data related to mandatory home energy rating programs that you can share?