MGA Capstone

CITY OF TORONTO: RECOMMENDATIONS FOR A HOME ENERGY RATING AND DISCLOSURE (HERD) PROGRAM

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Prepared By: Gabriella Baert, Noor Bhandal, Emily Greiss, Heejae Yang

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Executive Summary

This report seeks to evaluate the feasibility of and identify the necessary implementation mechanisms for a Home Energy Rating and Disclosure (HERD) program in the City of Toronto. HERD represents a prospective initiative to advance targets under TransformTO, which is the City's climate action strategy. TransformTO establishes a city-wide target to reach net zero emissions by 2050, which will require retrofitting all existing buildings to improve energy performance by an average of 40 percent. In the following literature review and jurisdictional scan of existing programs, HERD programs will be demonstrated to offer several meaningful benefits to advance market transformation towards a reduction of residential greenhouse gas (GHG) emissions, through the means of labeling and reports that inform stakeholder and consumer market awareness and retrofitting. However, alongside its benefits, several challenges limit the effectiveness of HERD programs when they are not complemented by necessary implementation mechanisms. Based on jurisdictional scans conducted and an analysis of the feasibility of existing programs in the City of Toronto, the MGA consulting team recommends the implementation of a HERD program in the City of Toronto. According to best practices, a program of this kind should mandate existing single-family homes to evaluate and disclose their home ratings at the time of listing and renovation, immediately following a voluntary program transition period. To maximize HERD benefits and minimize its challenges, the implementation of relevant by-laws and infrastructure are recommended, including: low-income protection programs to maximize program equity; building a rating registry system in the City that protects privacy; professional training; and public communication, such as educational workshops for enhanced stakeholder and public adoption.

Project Background

Introduction

TransformTO is the City of Toronto's climate action plan to establish an ambitious city-wide target to reach net zero greenhouse gas (GHG) emissions by 2050. A possible TransformTO initiative under evaluation is the Home Energy Rating and Disclosure (HERD) program in efforts to reduce residential emissions and promote retrofitting amongst existing homes. The project undertaken by the MGA consulting team seeks to assess the best means of implementing a HERD program in the City of Toronto in a way that addresses the unique needs of relevant stakeholders and produces the intended impacts. We seek to understand how the City of Toronto could roll-out the HERD program in a way that will maximize behavioural change resulting in higher energy efficiency in residential homes. The challenge will be implementing a program that supports broader socio-economic impacts for all residents, with specific protections for vulnerable populations (e.g. low-income, seniors, etc.), while enhancing residential energy efficiency, job creation, consumer awareness, and improved health outcomes.

Questions to be Addressed

Two questions to address include: (1) What HERD programs have been implemented successfully in other jurisdictions to maximize uptake, market transformation, and reduction of residential emissions? And (2) How can HERD be implemented feasibly in the context of the City of Toronto in a means that maximizes its benefits and minimizes its challenges? It is important to note that although numerous jurisdictions employ HERD programs, many provide external incentives to advance the objectives and minimize the limitations of these programs. As such, our analysis will include the enabling energy efficiency programs and incentives that maximize the success of HERD programs.

Objectives and Methodology

The objectives of the MGA team can be outlined in three principal steps:

1. Produce an evaluation criteria framework, in consultation with the City, to determine the feasibility of implementing similar programs employed in other jurisdictions with established success in the context of Toronto. The criteria framework includes existing programs that are suitable in the City of Toronto, given demographics, income levels, and other socio-economic characteristics. The framework's categories include scope/scale, governance, implementation process, behavioural theories (e.g. public communication), and effectiveness. Key information is outlined in **Appendix 1**.
2. Conduct a jurisdictional scan of existing programs in Vancouver, Edmonton, Portland, and the European Union (EU) based on the evaluation criteria framework outlined above. This scan will help identify best practices concerning city by-laws, enforcing mandatory audits, how to incentivize compliance, and more.
3. Based on the results of the jurisdictional scan and evaluation framework, produce recommendations on the best possible approach and methodology for implementing a HERD program in the City of Toronto.

EnerGuide Rating System

EnerGuide is the official standardized assessment tool used by Natural Resources Canada for its energy performance rating and labeling program of key consumer items, ranging from light-duty vehicles, to energy-using products, to houses.[1] EnerGuide is the nationally recognized asset rating tool for home evaluations across Canada to help homeowners understand and improve the energy performance of their home. The rating system measures energy efficiency in gigajoules (GJ) per year. In addition to the rating score, the EnerGuide assessment produces a rating details report demonstrating a breakdown of how the rating was calculated, where energy

[1] "EnerGuide in Canada." Natural Resources Canada. Government of Canada. March 11, 2020. https://www.nrcan.gc.ca/energy-efficiency/energuide/12523.

is consumed, as well as renovation recommendations for homeowners. A sample EnerGuide rating and report is included in **Appendix 2**.

Context: City of Toronto

According to a 2016 TransformTO analysis, of the City's 455,000 residential homes, fully-detached (46 percent), semi-detached (12 percent) and row houses (7 percent) account for 65 percent of the City of Toronto's residential emissions.[2] As such, a HERD program will support the City's progress towards its net zero emissions by 2050 target. Our jurisdictional scan analyzes other HERD programs in other municipalities and countries that offer some social and economic comparability to Toronto. **Appendix 3** highlights key statistical information between Toronto, Vancouver, Edmonton, and Portland. This includes population sizes; population densities; average and median household values; average and median household incomes; low-income populations; the number of households by type; and the jurisdictions' energy efficiency targets.

Particularly in the context of Toronto, it is important to consider the size of its low-income population. As 20 percent of the City's population struggles financially (**Appendix 3**), barriers of income inequality must be addressed in the implementation of a HERD program. Two programs supporting low-income populations have been identified as especially relevant enabling mechanisms that can be built into the HERD context: (1) Hydro One's Home Assistance Program (HAP)[3] and (2) Enbridge Gas Inc.'s Free Home Winterproofing Program.[4]

For eligible low-income customers, the HAP program offers free home energy assessments with following upgrades, and expert advice on more ways to improve energy efficiency. Similarly, Enbridge Gas Inc. runs a Free Home Winterproofing

[2] Sustainability Solutions Group. *Modelling Toronto's Low Carbon Future: Technical Paper #1: BAP Results.* (Vancouver, 2016), 8. https://www.toronto.ca/wp-content/uploads/2017/10/970e-TransformTO-Business-As-Planned-Report-November-2016.pdf.
[3] "Home Assistance Program." Hydro One. Hydro One Networks Inc. Accessed March 4, 2020. https://www.hydroone.com/saving-money-and-energy/residential/financial-assistance/hap.
[4] "Free Home Winterproofing Program." Enbridge. Enbridge Gas Inc. Accessed March 4, 2020. https://energy-savings-programs.ca/winterproofing-program/.

Program which provides free home audits, new insulation, draft proofing, and smart thermostats for low-income customers. Despite the availability of these existing programs, home energy ratings obtained through these methods are not publicly disclosed. Additionally, they do not address the barrier of paying for a home audit at the time of listing for those who are unable to access the funds before the closing date.

As many Canadian cities are setting climate action goals to reach close to net-zero GHG emissions, effective HERD programs present an opportunity for success. Other Canadian cities are expressing interest in rolling out similar programs due to a nation-wide push for greater and more transparent home energy efficiency.The context for climate action means there is no better time for the City of Toronto to implement and roll out a HERD program simultaneously alongside other interested Canadian municipalities.

Finally, it is important to note that the municipality and international community are currently combating the COVID-19 pandemic. This report's research and analysis were conducted prior to the emerging global health crisis and the economic downturn that has followed. The consequences of this economic downturn must be factored into implementation processes of a HERD program by relevant stakeholders. For example, the implications on a HERD program may consist of an extended voluntary period for rating and disclosure of a home's energy efficiency and implementing mandatory rating and disclosure only for homes at the time of listing, rather than renovation due to the severity of pre-existing barriers to retrofits and renovations in this economic climate. As promoting collective measures toward climate action remains a high priority, with particular relevance to health outcomes and home comfort in the aftermath of COVID-19, it is important to consider the implications of the economic and global health crisis that may heighten financial limitations towards renovating, retrofitting, and improving a home's energy efficiency.

Barriers to Implementation

Some identified barriers to implementation for the City of Toronto are described in **Appendix 4**. These barriers include stakeholder will; financial costs; privacy; industry capacity; consumer awareness and motivation; the delayed observable impact on the housing market; and income inequality.

Jurisdictional Scan:
European Union (EU)

The EU legislation applies to all EU member states.[5] However, following the principle of subsidiarity, each member state applies EU Directives in a manner best fitting their national singularities.[6] Due to this regional characteristic and its status as an early advocate and adopter of HERD programs to boost home renovation rates since 2002,[7] the EU serves as an effective incubator of ideas with regards to such programs.[8] The EU equivalent of EnerGuide is the Energy Performance Certificates (EPCs),[9] also referred to as the Energy Performance Diagnosis (EPD) in France. Currently, the Energy Performance of Buildings Directive 2010/31/EU (EPBD) and the Energy Efficiency Directive 2012/27/EU have made the EPC a standardized process,[10] mandatory for all properties constructed, sold or rented out in Europe.[11] The EPC process is twofold: it evaluates the energy consumption of the building, and provides both an energy label and a climate label in the form of a letter from A to G according to a home's energy performance and its GHG emissions (**Appendix 5**). The two EPC labels are accompanied by recommendations and guidelines to achieve better

[5] "Consolidated Version of the Treaty on the Functioning of ..." Accessed April 9, 2020. https://eur-lex.europa.eu/resource.html?uri=cellar:9e8d52e1-2c70-11e6-b497-01aa75ed71a1.0006.01/DOC_3&format=PDF.
[6] "Consolidated Version of the Treaty on the Functioning of the European Union PART SIX - INSTITUTIONAL AND FINANCIAL PROVISIONS TITLE I - INSTITUTIONAL PROVISIONS Chapter 2 - Legal Acts of the Union, Adoption Procedures and Other Provisions Section 1 - The Legal Acts of the Union Article 288 (Ex Article 249 TEC)." EUR. Accessed April 9, 2020. https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:12012E288.
[7] "97% Of Buildings in the EU Need to Be Upgraded: BPIE - Buildings Performance Institute Europe." BPIE. Accessed April 9, 2020. http://bpie.eu/publication/97-of-buildings-in-the-eu-need-to-be-upgraded/.
[8] Batiactu. "L'Europe, La Solution Pour Une Massification De La Rénovation Énergétique ?" Batiactu, May 16, 2019. https://www.batiactu.com/edito/europe-solution-massification-renovation-energetique-56431.php.
[9] Deloitte, *Energy Efficiency in Europe: The Levers to Deliver the Potential*, 2016, p.10. https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Energy-and-Resources/energy-efficiency-in-europe.pdf.
[10] "Energy Performance of Buildings Directive - European Commission." Energy - European Commission, March 12, 2020. https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/energy-performance-buildings-directive_en.
[11] "Le Diagnostic De Performance Énergetique Est Il Obligatoire?" Picbleu, accessed January 29, 2020, https://www.picbleu.fr/page/le-diagnostic-de-performance-energetique-est-il-obligatoire.

results. EPCs aim to encourage energy efficiency renovations as part of an overall policy package to reduce energy consumption.

Lessons Learned

EPCs are proven to be successful. Whether EPCs ultimately reduce GHG emissions by inducing more energy retrofits is yet difficult to assess. However, if the labels' success is measured by its capacity to influence prices in the real estate market, create local jobs, and deliver crucial information to policy makers, then energy rating labels do work.[12] Recent studies confirmed initial findings that greater energy efficiency increases domestic property prices. EPCs increase the transparency of the real estate market, thereby influencing housing prices. Results from 2010 studies on the residential housing market in the EU and the Netherlands demonstrated that homebuyers are willing to pay a premium for homes that have been labeled as more energy efficient; findings suggest this price premium is not significantly influenced by variations in housing quality and is more than the expected economic savings on energy bills.[13] A 2019 study also finds positive associations between a higher energy rating and prices of sale are observed in multiple countries.[14] The positive effect on prices seems to be attenuated as demand for energy efficient housing increases. Although there is not yet sufficient evidence to identify a significant correlation, data points towards inherent benefits of the labels in democratizing social "environmental sensitivity," which in turns stimulates the eco-label use[15] and could result in more sustainable energy consumption overall.

[12] "What Will You Pay for an 'A'? – a Review of the Impact of Building Energy Efficiency Labelling on Building Value." : ECEEE Summer Study 2017 Partners, 2017. https://www.eceee.org/library/conference_proceedings/eceee_Summer_Studies/2017/6-buildings-policies-directives-and-programmes/what-will-you-pay-for-an-a-a-review-of-the-impact-of-building-energy-efficiency-labelling-on-building-value/.
[13] Brounen, Dirk and Kok, Nils, On the Economics of Energy Labels in the Housing Market (May 19, 2010). https://ssrn.com/abstract=1611988 or http://dx.doi.org/10.2139/ssrn.1611988.
[14] "Energy Efficiency and Residential Values: a Changing European Landscape" (London, UK: Royal Institution of Chartered Surveyors (RICS), 2019), p. 35, https://www.rics.org/globalassets/rics-website/media/knowledge/research/insights/energy-efficiency-and-residential-values.pdf.
[15] "La Rénovation Énergétique Des Bâtiments Politiques Publiques Et Comportements Privés" (Paris, France: Conseil économique pour le développement durable, 2013), https://www.ecologique-solidaire.gouv.fr/sites/default/files/CEDD - La rénovation énergétique des bâtiments - Politiques publiques et comportements privés.pdf.

EPCs are a powerful tool to monitor the state of the housing stock. EPCs offer a unique opportunity to collect information on the housing stock to inform policies. Data collection can be done in multiple manners as shown in **Appendix 6**, and different database models are also possible. Some European countries have regional databases (e.g. Italy), national databases (e.g. Austria), or databases separated by building types (e.g. the UK).[16] Challenges of comparability may arise when running several database models with varied information collection methods. Additionally, some databases are publicly available, while others are kept private or accessible upon request.[17]

Energy performance labels work within a coherent policy/regulation package. EPCs are a signaling tool that convey energy performance information in the housing market and contribute to raising awareness among professionals and the general public. EPCs have little utility if the barriers to energy evaluation and retrofitting are not simultaneously addressed by complementary measures. For example, the French EPD is underpinned by the French National Program for the Improvement of Energy Efficiency, which includes an umbrella of policies encouraging retrofits[18] including an interest-free eco-loan (eco-PTZ), the Energy Transition Tax Credit (CITE) and, since January 1, 2020, MaPrimeRénov[19] — provided that the retrofit is carried out by certified professionals.[20] In order to maximize effectiveness, incentives must be simple to obtain, expeditious, and calculated according to income and the amount of planned retrofitting work.

EPCs' influence on retrofitting decisions is limited by its credibility. Reliability and reproducibility challenges of evaluations must be dealt with from the onset to foster public trust in EPCs so they can inform purchases or retrofitting. In France, the possible EPD score gap between two different evaluations has been significantly

[16] "Energy Performance Certificates across the EU: BPIE - Buildings Performance Institute Europe." BPIE. p.35-37 Accessed April 9, 2020. http://bpie.eu/publication/energy-performance-certificates-across-the-eu/.
[17] Ibid.
[18] French Ministry of Environment, Energy, and the Sea, PNAEE, 2017, https://www.ecologique-solidaire.gouv.fr/sites/default/files/PNAEE%202017.pdf.
[19] "MaPrimeRénov : La Nouvelle Prime Pour La Rénovation Énergétique." Accueil. Accessed April 9, 2020. https://www.economie.gouv.fr/particuliers/prime-renovation-energetique.
[20] French Ministry of Environment, Energy, and the Sea, PNAEE, 2017, 19, https://www.ecologique-solidaire.gouv.fr/sites/default/files/PNAEE%202017.pdf.

reduced by several measures: increasing the number of checkpoints for auditors from 30 to 60; using only a few certified softwares to calculate EPC scores; and improving auditors' training.[21]

Legislation is key for the success of EPCs. In France, the EPD is also undermined by the weak regulatory framework. There is a risk of fraudulent assessments and the repercussions can be serious as households have no legal recourse to challenge their scores. As a result of the ELAN law, the EPD will become legally enforceable, contestable, and no longer merely informative, as of January 1, 2021.[22] By contrast, the numerous opt-outs in other countries, such as the Netherlands, has allowed homeowners to avoid certification of dwellings.[23]

The success of EPCs also depends on communication. The Netherlands demonstrates that neglecting communication around EPCs to the general public and real estate professionals is extremely detrimental to their efficiency. Lack of adequate communication hindered market uptake, resulting in a lack of consumer trust in the EPCs which is costly to repair.[24] In the EU, the implementation of EPCs for existing buildings is still under development and public perception varies among countries. French individuals consider EPCs as informative during transactions but in most European countries, EPCs are not considered useful. An important difference might explain this result: in France, the EPCs are also used for advertising and at the point of listing whereas in other countries, EPCs are required only at the point of sale.[25]

[21] Ministère de l'Intérieur. Les services de l'État en Isère. Accessed March 17, 2020. http://www.isere.gouv.fr/Politiques-publiques/Amenagement-du-territoire-construction-logement-et-associations-de-proprietaires/Construction-logement/Construction/Energie-Thermique-du-batiment/Le-Diagnostic-de-Performance-Energetique-DPE.
[22] Batiactu. "Les Diagnostiqueurs Immobiliers Alertent Sur Le Calendrier Du Nouveau DPE." Batiactu, December 10, 2019. https://www.batiactu.com/edito/diagnostiqueurs-immobiliers-alertent-sur-calendrier-58245.php.
[23] Isurv. "On the Economics of EU Energy Labels in the Housing Market (RICS)." ISURV. Accessed April 9, 2020. https://www.isurv.com/downloads/download/1249/on_the_economics_of_eu_energy_labels_in_the_housing_market_rics.
[24] Ibid.
[25] "Energy Performance Certificates, from Design to Implementation: BPIE - Buildings Performance Institute Europe." BPIE. p.33 Accessed April 9, 2020. http://bpie.eu/publication/energy-performance-certificates-from-design-to-implementation/.

Jurisdictional Scan:
Vancouver, British Columbia

City of Vancouver By-laws

In April 2014, the City of Vancouver implemented a Building By-law which introduced mandatory energy efficiency requirements for all new residential buildings up to six storeys tall.[26] Builders must work with an EnerGuide Energy Advisor throughout the design and inspection stages. City Green's Report[27] shows that nearly 62,000 new and existing homes had EnerGuide ratings between 2007 and 2017. This amounts to approximately 11 percent of total eligible housing. Moreover, the existing homes that underwent retrofits reduced GHG emissions by 102,135 tonnes of carbon dioxide equivalent per year.

In November 2019, the City of Vancouver enacted an updated Building By-law. The By-law restates the 2014 requirements for new homes and applies mandatory energy requirements for renovations done to existing single-family and one to three storey homes. Any renovation projects that cost from $20,000 to $74,999 require an EnerGuide Home Evaluation, and those that cost more than $75,000 require a pre- and post- renovation EnerGuide Home Evaluation, air sealing, and improved attic insulation.[28] Since this By-law was introduced so recently, no data has yet been released about existing homes undergoing renovations under the new requirements.

[26] "Energy-efficiency requirements and resources for new homes up to 6 storeys." City of Vancouver. Accessed February 20, 2020. https://vancouver.ca/home-property-development/energy-efficiency-requirements-and-resources-for-homes.aspx.
[27] Metro Vancouver EnerGuide Rating System Critical Mass Report." City Green Solutions. 2017. https://www.citygreen.ca/projects/metro-vancouver-energuide-rating-system-critical-mass-report/.
[28] "Energy requirements for single family and 1-3 storey home renovations." City of Vancouver. Accessed February 20, 2020. https://vancouver.ca/home-property-development/energy-requirements-for-single-family-home-renovations.aspx.

Importantly, Vancouver's Building By-laws do not require homeowners to publicly disclose their home energy ratings. Though homeowners have the option to voluntarily disclose their ratings on RateOurHome.ca,[29] the uptake is negligible. However, the City of Vancouver does administer fines to homeowners if they neglect to follow the By-law requirements. The regulation states, "Every person who commits an offence against this By-law is liable to a fine of no less than $250 and not more than $10,000 for each offence."[30]

Challenge of Compliance

On one hand, we can assume that the compliance rate for new homes is quite high given that builders must acquire a building permit from the City and EnerGuide assessments are automatically integrated into the new inspection process. On the other hand, evidence exists to demonstrate that the compliance rate for renovations is not nearly as high. The lower compliance rate is largely due to the high costs associated with renovation permits. A 2018 study states, "Survey findings equally confirm that opinions about the costs involved in obtaining residential renovation permits are quite negative."[31] Along with costs, the long waiting periods to obtain a permit and the potential complications when applying for a permit make the likelihood of unpermitted renovations much higher.[32]

Moreover, it is important to address the need for enabling low-income programs that target single-family homes. As seen in **Appendix 3**, low-income individuals account for 19 percent of Vancouver's total population. Although rebates are offered to homeowners conducting renovations through the Home Renovation Rebates and CleanBC Better Homes Program (a partnership between the Province of BC, BC

[29] "RateOurHome.ca." Metro Vancouver. Rate Our Home. Accessed March 8, 2020. http://rateourhome.ca/Pages/default.aspx.
[30] City of Vancouver. By-law No. 12511, Division C, Section 3.2. *A By-law to regulate the construction of buildings and related matters* (01 November, 2019).
[31] Neuberger, Michaela. "Renovation Permits and the Challenge of Reducing Emissions from Legacy Buildings." (master's thesis, University of British Columbia, 2018), 146.
[32] Ibid., 216.

Hydro, and FortisBC)[33] or to owners of heritage homes,[34] no additional financial assistance is currently available to low-income households.

Despite measures taken since 2014 to promote energy efficient homes, Vancouver is nowhere close to its -33 percent GHG reduction target for 2020. Between 2007 and 2018, the City had only accomplished a -12 percent GHG reduction.[35] In fact, "the city has only managed to bring emissions down from existing buildings by 11 percent from 2007, whereas the goal is to cut that by 20 percent."[36] One of Vancouver's biggest challenges, crucial to meet its targets, will be the transition towards low- or zero- emission heat pumps in residential buildings.

Lessons Learned

Coordinate with bill payment assistance programs. Rebate eligibility requirements can be coordinated between the HERD program and bill payment assistance programs, such as the Low-Income Energy Assistance Program (LEAP) from Toronto Hydro,[37] to encourage more streamlined participation. It may also be possible for these programs to share consumer information amongst each other to help identify the energy needs of low-income households.

Develop partnerships with other organizations. The City of Toronto can coordinate with existing organizations that serve low-income households, particularly those that are well-known in communities. These may include organizations such as Enbridge Gas' Free Home Winterproofing Program[38] that supports the province's weatherization efforts.

[33] "Home renovation rebates." City of Vancouver. Accessed February 20, 2020. https://vancouver.ca/green-vancouver/home-renovation-rebate-program.aspx.
[34] "Heritage Energy Retrofit Grant." Vancouver Heritage Foundation. Accessed February 20, 2020. https://www.vancouverheritagefoundation.org/get-a-grant/heritage-energy-retrofit-grant/.
[35] Smith, Charlie. "City of Vancouver still far short of achieving 2020 greenhouse gas reduction target." The Georgia Straight. Vancouver Free Press Publishing Corp. Accessed March 3, 2020. https://www.straight.com/news/1326906/city-vancouver-still-nearly-800000-tonnes-short-achieving-2020-greenhouse-gas-reduction.
[36] Ibid.
[37] "Electricity bill financial assistance." Toronto Hydro. Toronto Hydro Corp. Accessed March 3, 2020. https://www.torontohydro.com/for-home/financial-assistance.
[38] "Free Home Winterproofing Program." Enbridge.

Incentives to publicly disclose home energy ratings are critical to reach emissions targets. When disclosure is considered voluntary, there is little to no uptake from homeowners. Incentive programs may be successful in inducing behavioural change in this regard. Importantly, incentives should not be for hiring an energy advisor or completing a home evaluation, but rather for disclosing the energy label.[39] Enforcing mandatory disclosure will improve the issue of uptake; however, this may not be politically possible in many contexts.

Provide energy efficiency education to homeowners. To ensure quick and informed adoption of the HERD program, Toronto can build interest at the community-level with energy education programs and materials. The integration of education may also improve the follow-through of recommended renovations by homeowners. The issue of privacy and public disclosure of a home's energy rating has often been cited by HERD critics. Programs and materials can communicate that "a home energy rating is a rating of the home…and not personal energy consumption, and that no personal information is included on the home energy label."[40]

Publicly disclose information on the economic and environmental impact of the program. The City of Vancouver has little public information available on the number of homes that have recently received energy labels, or have been built or renovated to be more energy efficient. Without transparent data, the positive impacts of a labelling program are rendered invisible to other governments and stakeholders, including homeowners, that could help improve its uptake.

[39] City Green Solutions. *Put a Label On It: The BC Energy Step Code & Home Energy Labelling Disclosure* (Vancouver, 2018). http://energystepcode.ca/app/uploads/sites/257/2019/11/PutALabelOnIt_FINAL_V1.2.pdf.
[40] Ibid.

The real estate industry should be consulted and regarded as an important stakeholder. The real estate industry in the Province of Ontario often challenges mandatory energy labelling programs. As mentioned by City Green, "In Ontario the opposition to mandated energy labelling disclosure appears to be more focused on the perceived negative impacts of the policy on existing homes, rather than new construction."[41] Therefore, less criticism from the real estate associations may come if the program first only requires mandatory energy labelling of newly constructed homes; as seen in the City of Vancouver.

[41] Ibid.

Jurisdictional Scan:
Edmonton, Alberta

Evaluation Program

Following Canada's Federal Pan-Canadian Framework on Clean Growth and Climate Change, the City of Edmonton launched the EnerGuide Home Evaluation Program in June 2017. The Home Evaluation Program is a stepping stone to achieve the long-term goal of transforming the City to carbon-neutral by 2050.

The City of Edmonton outlines several reasons why homeowners should participate in the evaluation program and the benefits of doing so.[42] For instance, the City promotes the EnerGuide evaluation program by emphasizing participants' contribution to climate change mitigation, particularly in the community they belong to. Additionally, Edmonton promotes EnerGuide evaluations as an investment, which provides key insights for homeowners to become aware of their home's energy performance and the means through which they can reduce the costs of energy consumption. Further, the City claims that having the EnerGuide label can be a crucial selling point when putting the home on the market, as an investment in its market value.

Rebate Program: Home Energy Plan

The City launched the Home Energy Plan in 2017 as a three-year long pilot program to encourage EnerGuide home evaluations. The Home Energy Plan is a government rebate program that provides financial support for participants to evaluate and renovate their home based on the evaluation's recommendations. The aim of the

[42] "EnerGuide in Edmonton - Frequently Asked Questions." City of Edmonton. Accessed April 9, 2020. https://www.edmonton.ca/city_government/urban_planning_and_design/energuide-for-homes-faq.aspx

program is to collect information and consult with possible stakeholders to gain key insights before establishing a mandatory energy rating program.

In Edmonton, rebates were available for both energy evaluations and renovations. However, in order to apply for the rebates covering the evaluation cost, homeowners were required to consent to publishing their energy rating on the City of Edmonton's online EnerGuide for Homes map. For rebates covering renovations,[43] rebates were proportional to the rate at which renovations serve to increase the home's energy efficiency. Those performing proactive or more expeditious renovations qualified for a bonus rebate,[44] and all rebates were financed by the City of Edmonton.[45] The program targeted existing residential homes, including those listed in **Appendix 3**.

The Home Energy Program ended recently as of January 24, 2020. While the evaluation program continues under a voluntary basis without a rebate program, no publicly available review of the Home Energy Program is available as of yet.

Under a combination of voluntary participation and financially incentivized mandatory disclosure, only over 3,600 EnerGuide home energy evaluations were conducted at the end of 2018 out of more than 320,000 eligible homes.[46] However, a considerable number of EnerGuide ratings are published online. EnerGuide rating disclosure is a crucial feature of an effective evaluation program, as the published rating helps establish a transparent housing market and provides greater protection for homebuyers.[47]

[43] "Home Energy Plan." Energy Efficiency Alberta. Accessed April 9, 2020. https://efficiencyalberta.ca/residential/home-energy-plan.
[44] Additional $1,000 bonus is available to homeowners who complete three or more of the following measures within 18 months of the pre-upgrade Home Energy Evaluation.
[45] "A Community Energy Transition Strategy Policy Brief_ Mandatory Energy Labeling & Disclosure 2019." Accessed April 9, 2020. https://www.edmonton.ca/city_government/documents/PDF/MandatoryEnergyLabellingAndDisclosure.pdf.
[46] Kornik, Slav. "Edmonton's New Energy Efficiency Program Could Save You Cash," January 23, 2019. https://globalnews.ca/news/4874476/edmonton-home-energy-plan/.
[47] "A Community Energy Transition Strategy Policy Brief - Mandatory Energy Labeling & Disclosure 2019." Accessed April 9, 2020. https://www.edmonton.ca/city_government/documents/PDF/MandatoryEnergyLabellingAndDisclosure.pdf.

Complementary Toolkit Program

Additionally, the City of Edmonton promotes the Home Energy Toolkit program for a 'do-it-yourself' energy evaluation, with support from the Alberta Real Estate Foundation (AREF).[48] This program aims to lend energy evaluating tools through municipal libraries and provides guidelines for self-evaluation based on the framework of EnerGuide evaluations.[49] The Toolkit supports the success of Edmonton's home evaluation program for several reasons:

First, the program engages with the real estate industry. This is crucial as the real estate industry is a key stakeholder facilitating the housing market who are in a central role to promote the EnerGuide label. Second, the Toolkit program mitigates the financial cost of home evaluations for those who want to analyze their home energy performance, but are discouraged by the cost of a formal evaluation. Lastly, the realization of self-evaluation may motivate homeowners to receive an official assessment.[50]

Lessons Learned

Policy communication and promotion of the evaluation program has to be more inclusive. Mainly, the City of Edmonton promotes its evaluation program by emphasizing financial incentives. The benefits mentioned above may only work for citizens who, given their socioeconomic background, can consider the cost and benefits of an EnerGuide home evaluation. A failure to consider the concerns of low-income populations and other minority groups in Toronto would be a limitation to achieving an inclusive carbon-neutral city. The Toronto HERD program should communicate the benefits of a home energy evaluation in a more socioeconomically inclusive manner than the City of Edmonton, through emphasizing reduced energy utility costs and existing financial support for low-income households..

[48] "Home Energy Toolkit." City of Edmonton. Accessed March 11, 2020. https://www.edmonton.ca/programs_services/environmental/energy-toolkit.aspx.
[49] "Home Energy Toolkit - Edmonton." Accessed April 9, 2020. https://www.edmonton.ca/programs_services/documents/PDF/HomeEnergyToolkit-web.pdf.
[50] Ibid.

Home rating participation rate was low while the rate for incentivized rating disclosure was relatively high. Without relevant city by-laws to enforce the program, participation in home energy evaluations is voluntary. As such, the City of Edmonton could only offer financial incentives for mandatory rating disclosure. Therefore, while the participation rate was very low, the disclosure rate was relatively high. This observation indicates that the initial stage of implementing the evaluation program posed a challenge in Edmonton, but rating disclosure was increasingly likely for participating homeowners.

If there is insufficient data about public and industry readiness concerning carbon neutrality, voluntary programs are helpful methods to collect information. In the absence of enforcing by-laws and relevant data about the readiness of the public and the energy efficiency industry, running a short-term voluntary program is a suitable course of action to build community readiness and industry capacity.[51] It also provides an opportunity to educate the public on the importance of home energy efficiency.

If a self-evaluation Home Energy Toolkit is an attractive complementary option, it should be well-promoted through public education. The Toolkit provided by the City of Edmonton includes six different tools to holistically measure home energy consumption. The guidelines themselves are very lengthy with many technical terms. The Toolkit also includes a DVD providing explanations and accompanying guidelines. However, the complexity of self-evaluation is a main hindrance to the effectiveness of the Toolkit program. If the City of Toronto plans to implement this complementary program, or a similar option, it should be well-communicated to the public through educational resources.

[51] "A Community Energy Transition Strategy Policy Brief - Mandatory Energy Labeling & Disclosure 2019."

Jurisdictional Scan:
Portland, Oregon

U.S. Home Energy Score

The framework used by several U.S cities to facilitate home energy labeling programs, including the City of Portland, is the Home Energy Score standardized assessment tool developed by the U.S Department of Energy and its national laboratories.[52] The Home Energy Score offers an asset rating examining the fixed and structural characteristics of a home's energy use to produce a score on a scale of 1 to 10, where 10 represents higher energy efficiency.[53] A sample of the U.S. Home Energy Score and Report is included in **Appendix 7**. Similar to EnerGuide, this report estimates home energy use, associated costs, and provides energy recommendations to improve the home's efficiency in a cost effective manner.[54] It is intended to improve home energy performance and share home energy information in the real estate market through listings, home appraisals, and mortgage financing. As a key policy decision, Portland chose to use the Home Energy Score framework due to its simplicity, connections to mortgage products, and potential to link regional markets to a national standard.[55] The average cost of a Home Energy Score assessment is US$150 to $250.[56] In comparison, EnerGuide assessments in Canada average CAD$400 pre-renovation and CAD$250 post-renovation.

[52] U.S Department of Energy. Office of Energy Efficiency and Renewable Energy. Home Energy Score. Accessed March 15, 2020. https://www.energy.gov/eere/buildings/downloads/home-energy-score.
[53] ACEEE. Home Energy Efficiency Policies: Ratings, Assessments, Labels, and Disclosure. Washington, DC: ACEEE, 2018. Accessed March 10, 2020. https://www.aceee.org/sites/default/files/pdf/topic-home-energy-assessment.pdf.
[54] U.S DOE, Home Energy Score.
[55] ACEEE. Home Energy Efficiency Policies, 2018.
[56] Ibid.

Portland's Home Energy Score Policy and Program

Portland's Home Energy Score city ordinance came into effect on January 1, 2018 and requires residential single-family buildings to obtain and disclose Home Energy Reports at or before time of listing to promote transparency in housing costs and reduction in local carbon emissions.[57] The primary driver of Portland's city ordinance is the 2015 Portland Climate Action Plan, establishing a target to reduce local carbon emissions from 1990 levels by 80 percent by 2050.[58] Prior to Portland's City Ordinance, the City was subject to Oregon Legislature establishing a voluntary framework for home energy scoring, in effect since 2009.[59] However, voluntary energy scoring programs were not well accepted or utilized within real estate markets with less than two percent of Portland's 160,000 single-family homes having a Home Energy Score in 2017.[60] Portland's Bureau of Planning and Sustainability (BPS) led the policy development process through 2016,[61] resulting in the adoption of Portland City Code Chapter 17.108.[62]

As a critical element of the policy development process, the Portland BPS cultivated the support of local stakeholders including: representatives from the real estate, energy efficiency, and home performance industries; energy advocates; climate protection advocates; equity organizations representing low-income homeowners and communities of colour; advocates for homeownership and affordable housing; and the general public. Stakeholder engagement included consumer focus groups, facilitated discussions with industry stakeholders, a forum on equity issues, and informal technical advisory groups and training to introduce Home Energy Scores to the real estate market.[63]

[57] City of Portland. Ordinance No. 188143 As Amended. Accessed February 13, 2020. https://beta.portland.gov/sites/default/files/2019-12/cityau_1.pdf
[58] City of Portland. Climate Action Plan June 2015. Portland, OR: City of Portland, 2015. https://beta.portland.gov/sites/default/files/2019-07/cap-2015_june30-2015_web_0.pdf.
[59] City of Portland. Home Energy Score Program. Accessed February 13, 2020. https://www.pdxhes.com/program.
[60] Ibid.
[61] ACEEE, Home Energy Efficiency Policies, 2018.
[62] City of Portland. Ordinance No. 188143.
[63] ACEEE. Home Energy Efficiency Policies, 2018.

Portland's HERD policy includes several implementation mechanisms. First, the Ordinance is enforced by the issuance of US$500 fines for homeowners who refuse to comply 90 days after receiving a written warning.[64] Scores are valid for up to eight years from the date of assessment[65] and homes that have received an assessment are viewable on the Portland Green Building Registry at www.greenbuildingregistry.com/portland.

Preliminary Data for Portland's Home Energy Score Policy[66, 67, 68, 69]

Element	Value
Potential Effect of Policy on Residential Carbon Emissions	-25% by 2030
Number of Homes Scored	12,973 (As of June 2019)
Average Score	4.6
Average Upgrade Score (if implemented)	7.3
Compliance Rate	65% (based on random checks on listings)
Average Predicted Upgrade Energy Savings	1,600 kWh
Average Predicted Energy Cost Savings Per Home Per Year After Retrofit	US$303
Number of Authorized Home Energy Assessors	121 (As of September 2018)

[64] City of Portland. Bureau of Planning and Sustainability. Administrative Rules Residential Energy Performance Rating and Disclosure. Accessed February 25, 2020. https://beta.portland.gov/sites/default/files/2019-08/final-amended-administrative-rules-for-home-energy-score.pdf.
[65] Ibid.
[66] C40 Cities. "Home Energy Scoring in Portland's Housing Market." February 3, 2020. https://www.c40.org/case_studies/portland-home-scoring.
[67] ACEEE. Home Energy Efficiency Policies, 2018.
[68] Seibel, Brendan "Mandatory Home Energy Scores a 'Slow-Burn Play,' Advocates Say," *Next City*, July 24, 2019, https://nextcity.org/daily/entry/mandatory-home-energy-scores-a-slow-burn-play.
[69] No data is available thus far regarding how many homeowners have followed the efficiency recommendations of Portland Home Energy Score reports or whether these reports have had an impact on increased housing values. However, findings from a similar city ordinance in Austin, Texas in effect since 2009 demonstrated that 12% of home buyers were influenced by HERD report recommendations when making renovations in the first year of the program.

Lessons Learned

It is crucial to transition HERD programs from voluntary to mandatory and implement enforcement mechanisms to increase consumer uptake and promote market transformation. Portland's transition from voluntary to mandatory increased its compliance rate from 2 percent in 2017 prior to the City Ordinance's enforcement to 65 percent of single-family homes listed as of June 2019. The enforcement of a warning and fines thereafter for non-compliance, as well as the chain of communication between consumers and stakeholders, has resulted in defined benefits of homeowners' compliance with the policy, and consequences for their non-compliance. In establishing a HERD program, the City of Toronto should ensure it defines clear benefits of compliance and consequences of non-compliance for relevant stakeholders.

HERD programs must offer stakeholder and consumer trust, engagement, and accessibility, therefore providing equitable solutions to low-income households and vulnerable populations. To develop its HERD policy, the City of Portland relied on consumer focus groups and technical advisory groups to respond to stakeholder concerns, particularly from the real estate community and low-income households. Similarly, the Ontario Real Estate Association and Toronto Real Estate Association, as well as low-income groups in the city, are crucial populations for the City of Toronto to consult in order to garner support, address concerns, and produce equitable solutions. In Portland, consultations resulted in offering free assessments for households 60 percent below the median income of the Portland metropolitan area, certain exclusions from the policy, and consumer protection benefits. However, many people in Portland are unaware of local organizations offering incentives for retrofitting or home energy upgrades. It is recommended for the City of Toronto to disseminate this information alongside assessments to increase public awareness and uptake of personalized recommendations from evaluations. Ultimately, the City of Portland passed its Ordinance despite opposition from realtors, due to its commission government and the support of city council members. The City of Toronto should explore means of engaging with and responding to stakeholder

concerns, and foster support from city council to enforce a HERD program in an equitable and effective way.

HERD programs that require rating and disclosure at the time of listing or renovation, rather than at the time of sale, are generally more well accepted by stakeholders involved in property transactions. Realtors, title companies, and mortgage providers are more likely to support HERD programs when they do not complicate the process of closing a sale. When the home's energy efficiency information is provided for homebuyers to factor into their decision-making process, market transformation is more likely. Similarly, when an audit is provided pre-renovation, market transformation is more likely to occur as homeowners factor in recommendations to retrofit or upgrade their home's energy efficiency in the renovation process. If the City of Toronto implements a HERD program, it is more likely to garner acceptance and market transformation if required for renovations and/or at the time of listing.

Recommendations for the City of Toronto

1. ***The start year of the HERD program will depend on the nature of the program, whether it is mandatory or voluntary, and the relevant infrastructure.***

The start year of the HERD program will depend on whether the City of Toronto implements rating and disclosure practices that are voluntary or mandatory, which requires supporting City by-laws. If voluntary, we recommend the HERD program begin immediately after sufficient program infrastructure is set up. Conversely, if mandatory, the HERD program should be rolled out after relevant City by-laws have been passed by Toronto City Council and sufficient program infrastructure is set up.

Sufficient program infrastructure should include creating the framework for a building rating registry (similar to the City of Portland's Green Building Registry), consumer and industry education, and training and capacity building for key stakeholders. For example, the City will need to support the energy efficiency industry's capacity (e.g. communicating with and transmitting knowledge to EnerGuide advisors and tradespeople who can perform the recommended EnerGuide recommendations such as air sealing and improving insulation), and train real estate agents on how to best convey the EnerGuide rating to prospective homebuyers.

2. ***Eligible single-family homes for the HERD program should include homes at the time of listing and/or homes undergoing renovations above a specific cost.***

We recommend the HERD program targets existing single-family homes that are either (1) planning to undergo renovations, or (2) planning to be sold. As a result,

energy rating and disclosure would occur pre- and post- renovations (similar to the City of Vancouver) or at the time of listing (similar to the City of Portland). Eligibility may need to include a minimum renovation cost. For example, in the City of Vancouver, energy efficiency requirements are applicable to renovations costing $20,000 or more.

It is important to note the high risk of an 'underground' economy to facilitate renovations for homeowners that are unwilling or unable to go through the proper channels of acquiring a City permit, and therefore follow the HERD requirements. We suggest that this may be particularly likely if the minimum renovation cost is set too low (e.g. $5,000). A greater number of home renovations that must follow the HERD guidelines also may result in a greater absolute number of unpermitted renovations. Not only is this to the detriment of the City of Toronto and the effectiveness of the HERD program, but it also puts homeowners at risk of poorer quality renovation work by potentially uncertified construction workers.

3. The HERD program must be accessible to homeowners of all socioeconomic backgrounds.

We recommend the City of Toronto integrate existing home energy programs that protect low-income populations, including: (1) Hydro One's Home Assistance Program (HAP), and (2) Enbridge Gas Inc.'s Free Home Winterproofing Program. As we have learned from the City of Vancouver, ignoring program inaccessibility for low-income individuals will result in a large segment of the population being unable to follow energy efficiency requirements, and therefore will impact the effectiveness of the HERD program. Although feasibility may be a concern in the short-term, we suggest that the City of Toronto look into possible channels to provide its own HERD rebates for homeowners planning renovations.

4. ***The HERD program should advocate to implement mandatory energy ratings immediately after a transition period.***

We recommend mandatory energy ratings in the City of Toronto for single-family homes at the time of listing and/or for those being renovated above a specific cost. As we have seen in the City of Edmonton, uptake with voluntary rating is little or negligible so far. However, in the City of Portland, a transition from voluntary to mandatory rating increased compliance from 2 percent to 65 percent.

5. ***The HERD program should advocate for immediate disclosure of energy ratings to the City of Toronto immediately after a transition period.***

We recommend the creation of a building rating registry, by and only available to the City of Toronto initially, which includes mandatory rating disclosure of renovated homes and homes at the time of listing, as described above, in a means that is transparent to potential homebuyers. These home energy ratings are only viewable by the City of Toronto but are made publicly available when a home is put up for sale.

In this case, the energy rating would be displayed on the home's official real estate listing (i.e. City of Portland). We suggest that any supporting City by-law include that real estate companies cannot make public or sell the energy rating data of their customers. All homeowners in the City of Toronto would have the option of voluntarily disclosing their energy rating on an online platform (e.g. City of Vancouver's RateOurHome.ca).

6. ***Supporting City by-laws for the HERD program must include penalties for non-compliance.***

For homeowners who do not comply with the HERD program requirements, we recommend providing an initial written warning. If no action is taken after 90 days, a fine of $250 would be issued. Fines should be issued on a discretionary basis and

should not be issued in cases of financial distress. If non-compliance continues, the fine may increase. An initial written warning is suggested so as to not further marginalize the low-income population or other vulnerable homeowners.

7. ***Compliance to the HERD program requirements must include at least a Version 15 EnerGuide label, where labels have a lifetime of five years after acquisition.***

We recommend the latest version of the EnerGuide label be eligible for meeting HERD program requirements. As of January 1, 2019, EnerGuide home evaluations are only being conducted using Version 15 of the EnerGuide Rating System. Older EnerGuide labels, based on a 0-100 scale, cannot be converted into the new Rating System and therefore homeowners will need to conduct a new home evaluation to update their rating. We recommend the latest version of the EnerGuide label as it includes additional information such as a breakdown of how the rating was calculated, where energy is consumed within the home, and the home's GHG emissions.

We suggest that if an EnerGuide label has been acquired in 2019 (i.e. a Version 15 label), the lifetime of the label is five years after obtainment (e.g. if the label was acquired on January 1, 2019, the label will expire and require renewal on January 1, 2024).

8. ***Public communication of the HERD program must include consultations with key stakeholders, industry training, widespread advertising, and public education.***

As demonstrated by the City of Edmonton, the means through which HERD programs are communicated to the public are vitally important for its effectiveness. Importantly, the City of Toronto's marketing should convey the importance of the HERD program as a 'public good' and to the livelihoods of all homeowners. In particular, a HERD program can decrease homeowners' utility costs; increase a

home's resale value; improve a home's safety and comfortability during weather- and health- related crises (particularly during periods when individuals must spend most of their days indoors); and directly and indirectly benefit residents' health (e.g. higher air quality, better mental well-being, and reduced hospitalization).[70] As such, HERD programs also offer a way for individuals to contribute to the protection of their communities in the face of global challenges.

In order to communicate the HERD program to the public, we recommend: consumer focus groups including real estate associations, energy providers, low income households, etc.; a technical advisory group to support realtor engagement, trust, and understanding of EnerGuide ratings and home energy efficiency reports; a mailer sent out to all homes outlining the new requirements and the importance of energy efficient homes; ensuring local news media and radio coverage; listing the new requirements on the City of Toronto website; reaching out to housing associations to host webinars or workshops on the new requirements, along with those provided by the City itself; and educational advertising (e.g. TTC advertising).

[70] Heerema, Dylan, Vivian Chung and Steven Cretney. "The many benefits of energy efficient homes and buildings." Pembina Institute. March 2, 2017. https://www.pembina.org/pub/efficient-buildings-infographic.

Conclusion

The comparative analysis of the global jurisdictional scan results and of the context of the city of Toronto presented above point towards eight recommendations to best roll out the HERD program in the months to come. The three main takeaways from this report are:

1. **HERD programs work** by creating jobs, democratizing energy efficiency, generating key data for policy makers, and producing residential emissions reduction.
2. **HERD programs must be as inclusive as possible.** Energy retrofitting should be normalized and democratized, which means offering protections and financial support for low-income households.
3. **Rating and disclosure must be mandatory at time of listing and/or for renovations above a certain cost after a certain transition period,** in order to maximize market transformation.

Finally, the benefits of a HERD program are maximized when it belongs to a broader policy package that encourages market transformation towards GHG minimization. HERD practices are essential enablers for the growth of the energy efficiency industry by stimulating long-term investments in residential energy performance, facilitating collaboration and partnerships among relevant organizations and stakeholders, and producing tangible results for a more energy efficient future. Nevertheless, it is crucial to recognize a HERD program not as a stand-alone policy instrument, but as part of a greater effort for sustainable market transformation.

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APPENDIX 1: Evaluation Criteria Framework

	SCOPE/SCALE				GOVERNANCE						
LOCATION	PROGRAM START YEAR?	APPLICABLE TO NEW OR EXISTING HOMES?	SCALE (TYPE OF HOMES)? NUMBER OF HOMES THAT ARE POTENTIALLY AFFECTED?	ACCESSIBLE TO ENTIRE POPULATION?	MANDATORY OR VOLUNTARY RATING?	MANDATORY OR VOLUNTARY DISCLOSURE?	DO THEY PROVIDE REBATES? FOR COMPLIANCE, LOW-INCOME, ETC.?	DO THEY CHARGE FINES FOR NON-COMPLIANCE?	LIFETIME OF ENERGY LABEL? e.g. WHEN DOES THE LABEL EXPIRE?	RELEVANT CITY BYLAWS OR POLICY SUPPORT PROGRAMS?	POLITICAL WILL? ARE THEY OPEN TO CLIMATE POLICY, OR IS THERE PUSH BACK?
VANCOUVER	April 2014 = new homes Nov 2019 = renovations	New homes + renovations to existing homes	New homes up to 6 storeys; 1-3 storey home renovations. Over 62,000 home ratings	Rebates not available for low-income or minority groups	New homes = mandatory Renovations = mandatory for >/= $20,000	Voluntary	Rebates for renovations, for heritage homes	2019 By-law, Section 3.2.2: fine of no less than $250 and no more than $10,000	For renovations, an evaluation completed within the last 4 years is permitted	2014 (new homes) and 2019 (new homes + renos) Vancouver Building By-law	2019-2024 Climate Emergency Action Plan. Greenest City Action Plan.
EDMONTON	2017-2020 Pilot Program	Existing residential homes	Single-family detached, single-family attached (duplex, triplex, quadruplex), or row housing unit not exceeding three stories	Rebates to cover the audit cost up to $10,000 for eligible buildings	Voluntary	Mandatory if want to apply rebates	Rebates to cover energy audit cost and renovation cost (rebate is no longer effective as of january 24th in 2020)	No direct benefit, no harm as it's voluntary	N/A	No policy support	Open to climate policy
PORTLAND	January 1, 2018	New and existing homes at or before time of listing	Applies to residential single family buildings.	Financial assistance for low income home sellers. Free audits offered for those 60% below median income by application.	Mandatory (at or before time of listing)	Mandatory (at or before time of listing)	Free Home Energy Assessments, exemptions based on income	First, a written warning then a civil penalty up to $500 if no action taken within 90 days	8 years from date of assessment	Portland City Council Ordinance Chapter 17.108: Residential Energy Performance Rating and Disclosure	2015 Portland Climate Action Policy. Home Energy Score Ordinance.

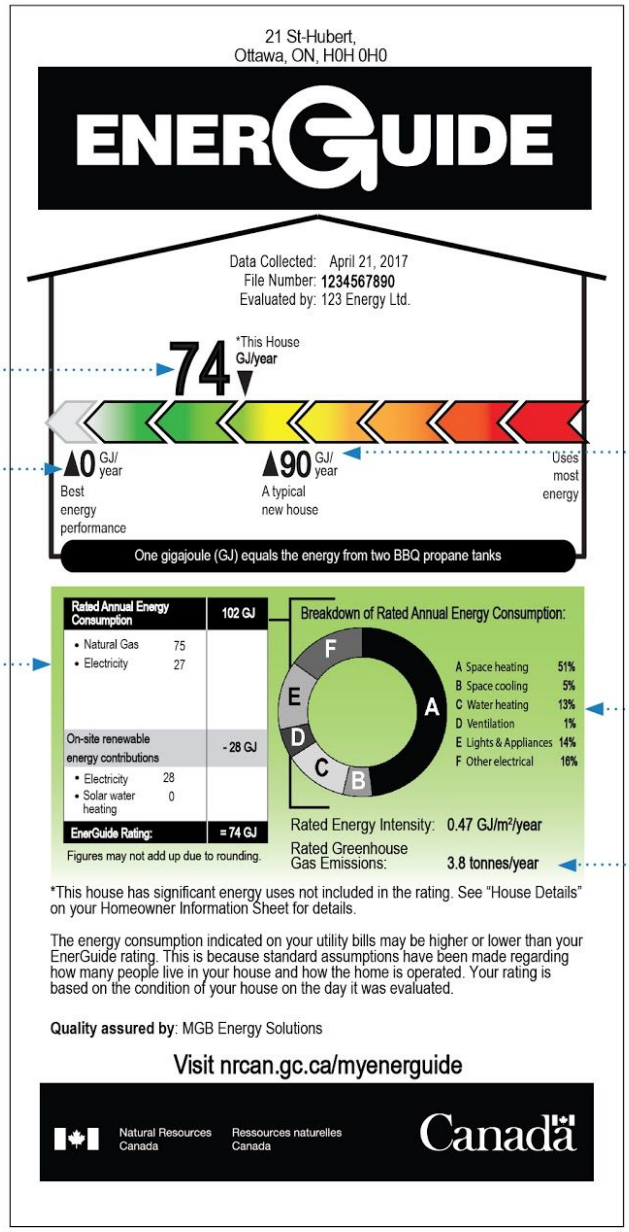
	IMPLEMENTATION PROCESS		BEHAVIOURAL THEORY		EFFECTIVENESS		
LOCATION	EASE OF CUSTOMER IMPLEMENTATION? (e.g. HOW EASY IS IT TO DISCLOSE RATING?)	AUDITS: WHEN ARE THEY REQUIRED? e.g. AT TIME OF LISTING? AT POINT OF SALE? COST OF THE AUDIT? DURATION OF THE AUDIT PROCESS	HOW DID THEY COMMUNICATE THE PROGRAM TO THE PUBLIC?	DID THE HOUSING MARKET PRICE INCREASE OR NO?	UPTAKE, IF VOLUNTARY?	REDUCTION IN EMISSIONS?	COMPLIANCE RATE?
VANCOUVER	RateOurHome.ca allows voluntary disclosure by submitting an online form - but little incentive	New homes = during design and inspection stage Renovations = prior to	Requirements listed on the City website. BC Housing provides workshops	2014: steady increase after April. Sharp increase starting in Jan 2015 2019/20: steady increase Nov 2019-Jan 2020	No uptake in disclosure	-12% GHG reduction at the end of 2018; nowhere near the -33% 2020 target	No real data. Lower compliance re: renovations due to high costs
EDMONTON	For disclosure, energy advisor agency does it on behalf of customers, yet update of the renovated outcome is on customer's responsibility	Audit is optional	N/A	N/A	3,600 homes across Edmonton participated as of 2018	N/A	N/A
PORTLAND	Real Estate Listings must disclose rating (brokers) - one click on RMLS. Auditors post on Green Building Registry.	At or before time of listing	Focus groups, meetings with realtor associations + sustainability industry	No data available.	Mandatory. June 2019: 12,973 homes scored	18% of carbon emissions come from the residential sector. 2017: residential sector emissions have declined 19% below 1990 levels (41% decrease per person). Total carbon emissions -15% from 1990 levels. Home Energy Score has the potential to decrease residential emissions by 25% by 2030.	65%

APPENDIX 2: Sample EnerGuide Rating and Report

LEARN ABOUT YOUR HOME'S ENERGY
rating
You will receive a rating of the home's energy consumption in gigajoules

AIM TOWARDS
zero
The lower the number on the new **EnerGuide** scale, the better the energy performance of your home

UNDERSTAND HOW YOU USE
energy
The label breaks down energy consumed by source



COMPARE YOUR HOME'S
performance
The label shows how your home's performance compares to a benchmark home

FIND OUT WHERE MOST ENERGY IS
consumed
The label shows proportion of energy consumed by heating, cooling, ventilation, etc.

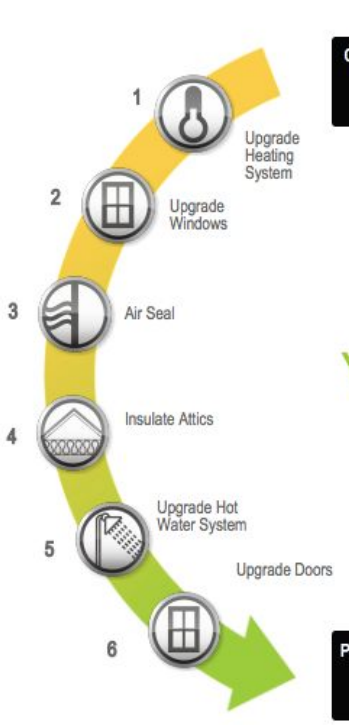
SEE YOUR IMPACT ON THE
environment
The label shows your home's Greenhouse Gas Emissions

Source: Natural Resources Canada

ENERGY EFFICIENCY ACTION ROADMAP

The route to making your home more energy efficient

In developing your prioritized list of recommended upgrades, your energy advisor has used the house-as-a-system concept (described later in this report) and has considered potential renovation plans, the financial considerations of each upgrade, and the extent that each upgrade contributes to energy savings. This is your customized roadmap for improving your home's energy performance and is based on your household operating conditions, if provided. If you have questions or concerns about these recommendations, please contact your energy advisor or your service organization.



Before Recommended Upgrades

Current ENERGUIDE Rating	Estimated Household Energy Use
178 GJ/year	183 GJ/year
Calculated using standard operating conditions	Calculated using your household operating conditions

YOUR ENERGY EFFICIENCY ACTION ROADMAP

After recommended upgrades

Potential ENERGUIDE Rating	Estimated Household Energy Use
66 GJ/year	71 GJ/year
Calculated using standard operating conditions	Calculated using your household operating conditions

RECOMMENDED UPGRADES AND RESULTS

RECOMMENDED ENERGY EFFICIENCY UPGRADES	RATING REDUCTIONS[A] (GJ/year)	ESTIMATED HOUSEHOLD SAVINGS[A] (GJ/year)
Total reductions for all recommended upgrades	**112**	**112**
1. Upgrade Heating System • Supplementary 1: Install a new ENERGY STAR certified air-source heat pump that has a heating seasonal performance factor (HSPF) of 7.1.	**92**	**92**
2. Upgrade Windows • Replace 23 window(s)/skylight(s) with ENERGY STAR certified models for zone 1.	**28**	**28**
3. Air Seal • Improve the airtightness of your home by 10% to achieve an air changes per hour rate of 6.72 at 50 pascals.	**0[B]**	**0[B]**
4. Insulate Attics • Ceiling01: Increase the insulation value of your attic by RSI 4.10 / R 23.3.	**4**	**4**
5. Upgrade Hot Water System • Install a new ENERGY STAR certified tankless gas-fired water heater with an energy factor (EF) of 0.95.	**5**	**5**
6. Upgrade Doors • Replace 4 door(s) with ENERGY STAR certified models for zone 1.	**1**	**1**

TABLE NOTES:

A. The individual rating reductions and estimated household savings are calculated with upgrade measures undertaken in isolation. Combinations of upgrades may produce slightly different results.

B. Because of the very house-specific results associated with air sealing, there is a broader error range for the estimated impact of this upgrade.

Source: Natural Resources Canada

APPENDIX 3: Jurisdictional Comparison

LOCATION	POPULATION SIZE	POPULATION DENSITY (PEOPLE PER SQUARE KM)	AVERAGE VALUE OF DWELLINGS (CAN$)	AVERAGE HOUSEHOLD INCOME (CAN$)	LOW-INCOME POPULATION (% OF TOTAL POPULATION)	NUMBER OF HOUSEHOLDS BY DWELLING TYPE	ENERGY EFFICIENCY TARGETS
TORONTO*	2,731,571	4,334.4	$754,015	$102,721	20.2%	Single-Detached = 269,675 (24.2%) Semi-Detached = 71,230 (6.4%) Row = 61,630 (5.5%) Low-Rise Apts = 214,165 (19.2%) Apts 5+ Storeys = 493,280 (44.3%)	Net-zero GHG emissions by 2050
VANCOUVER*	631,486	5,492.6	$1,414,191	$93,947	18.8%	Single-Detached = 41,330 (14.6%) Semi-Detached = 4,480 (1.6%) Row = 9,845 (3.5%) Low-Rise Apts = 144,355 (50.8%) Apts 5+ Storeys = 83,250 (29.3%)	80% GHG reduction target by 2050
EDMONTON*	932,546	1,360.9	$424,715	$112,619	10.9%	Single-Detached = 180,215 (50%) Semi-Detached = 22,215 (6.2%) Row = 36,075 (10%) Low-Rise Apts = 93,785 (26%) Apts 5+ Storeys = 25,790 (7.1%)	Net-zero GHG emissions by 2050
PORTLAND	647,805	1,236.3 (2010 census)	$536,892.31**	$104,821***	16.2%	1 unit, detached = 152,246 (61%) 1 unit, attached = 7,498 (3%) 2 units = 9,997 (4%) 3 or 4 units = 14,996 (6%) 5+ units = 62,482 (25%) Mobile homes = 2,499 (1%)****	80% reduction of local carbon emissions by 2050

* Data retrieved from 2016 Census
** Median household value retrieved from 2018 Census (converted from 2018 USD to 2020 CAD)
*** Median household income retrieved from 2018 Census (converted from 2018 USD to 2020 CAD)
**** 2007 Portland Housing Stock

APPENDIX 4: Barriers to Implementation

(Based on City Green Solutions' 2018 Report, *Put a Label On It*)

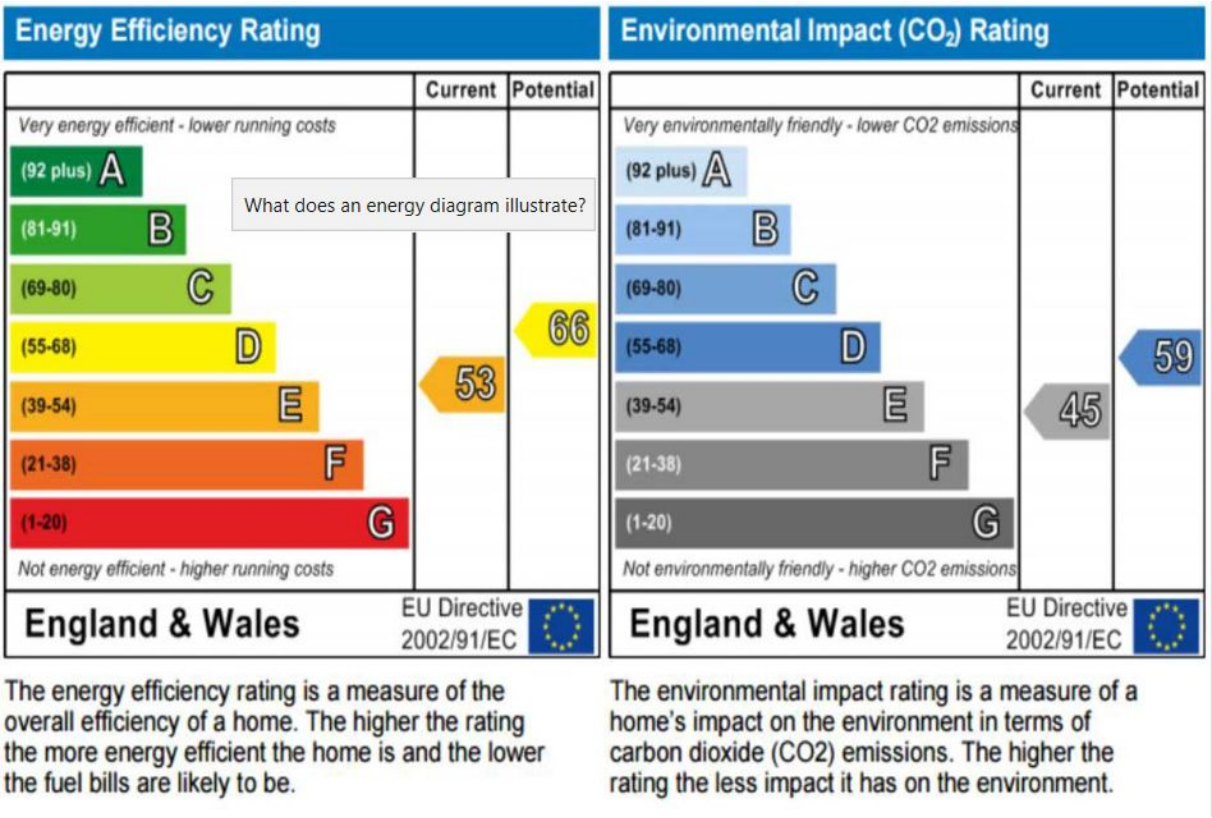
BARRIERS TO IMPLEMENTING A HERD PROGRAM	
CATEGORY	**BARRIERS**
Stakeholder Will	Stakeholders, including all levels of government (local, provincial, federal), are often hesitant to use their political capital to establish a HERD program. This is especially the case if there are complicated regulations in place or if they are likely to face opposition from other groups.
Financial Costs	A well-constructed HERD program requires significant operating costs once it is first implemented and throughout its existence. For the program infrastructure, long-term financial investment is required from stakeholders, such as the municipality, hydro or natural gas companies.
Privacy	A main criticism of rating disclosure, and a frequent reason for HERD opposition, is the perceived infringement on a homeowner's privacy. To address this concern, the HERD program should communicate to the public that no personal data or information is released along with the home energy rating. Moreover, a home energy rating is calculated given the build of the home, not personal energy consumption.
Industry Capacity	In order to successfully roll-out mandatory energy rating, the jurisdiction must have a sufficient amount of energy advisors, particularly those working or willing to work in rural or more inaccessible areas. To increase the number of knowledgeable advisors, and therefore the capacity of the energy efficiency industry, more education and training for these professionals is also needed.
Consumer Awareness/ Motivation	Most consumers are still unfamiliar with EnerGuide labels on appliances, etc. In fact, so are many sellers of these products. As such, greater education must be built up around understanding the EnerGuide Rating System and how it is used to rate homes. However, education is not enough to incentivize homeowners to acquire an energy rating. To ensure the effectiveness of a HERD program, it should implement several initiatives that help boost uptake, including consumer education, industry education and training, and marketing campaigns.
Delayed Market Transformation	With a HERD program, widespread transformation within the housing market is a long-term goal, requiring potentially 5 to 10 years. The jurisdiction would therefore need to recruit the support of stakeholders who are willing to invest their resources and finances long term in order to see a return.
Income Inequality	For those who cannot afford to consider improving their home energy efficiency, a HERD program may be an additional financial burden. As well, as a HERD program is heavily linked with the housing market, it may increase the disparities of house prices between homes that underwent an energy evaluation and the relevant upgrades, and those that did not.

APPENDIX 5: Sample EPC and EPD

An EPC (or EPD) rating is composed of two items: the energy label to know the primary energy consumption, and the climate label to know the amount of greenhouse gases emitted.

The interest in combining these two items of information is that energy consumption and GHG emissions are not always correlated. In fact, some households may use little energy and be classified as A, B or C while using mainly gas, which emits a lot of GHGs compared to other energy sources.[1]

EPC Example:



Retrieved from: https://www.onthemarket.com/content/how-energy-efficient-is-your-home/

[1] COMMISSARIAT Général au développement Durable n° 534, « Le parc des logements en France métropolitaine, en 2012 : plus de la moitié des résidences principales ont une étiquette énergie D ou E », Juillet 2014.

EPD Example:

Diagnostic de performance énergétique - (6.1 neuf) logement

N°: 1456N100209
Valable jusqu'au :
Type de bâtiment :
Année de construction :
Surface habitable : m²
Adresse :

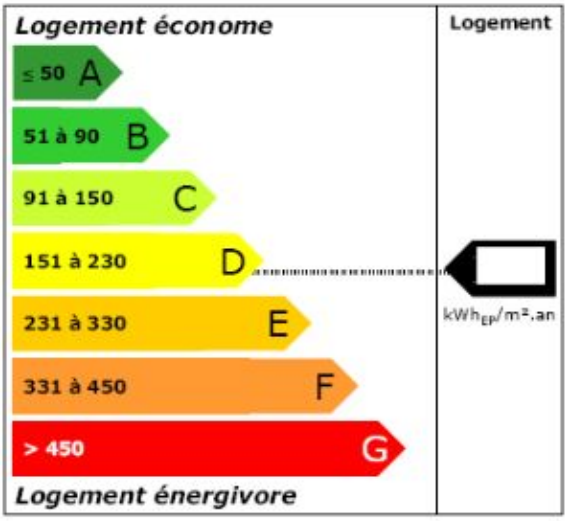
Date : Date de visite :
Diagnostiqueur :
Numéro certification :
Signature :

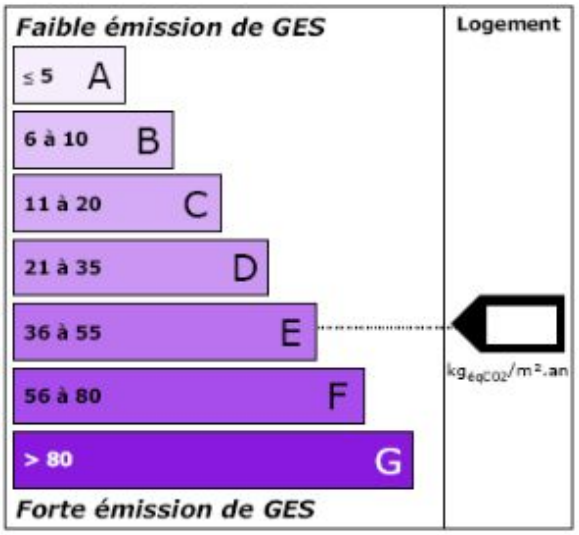
Propriétaire :
Nom :
Adresse :

Propriét. des installations communes (s'il y a lieu) :
Nom :
Adresse :

Consommations annuelles par énergie
obtenus par la méthode Th-BCE 2012, estimées au logement, prix moyen des énergies indexés au XX/XX/20XX

	Consommations en énergies finales	Consommations en énergie primaire	Frais annuels d'énergie
	Détail par énergie et par usage en kWhEF	**Détail par usage en kWhEP**	
Chauffage	Electricité : XXX,00 kWhEF	XXXX,XX kWhEP	XXX,XX €
Eau chaude sanitaire	Electricité :XXX,00 kWhEF	XXXX,XX kWhEP	XX,XX €
Refroidissement			
Production d'électricité à demeure			
CONSOMMATIONS D'ÉNERGIE POUR LES USAGES RECENSES	Electricité :XXXX,00kWhEF	XXXX,XX kWhEP	XXX,XX €

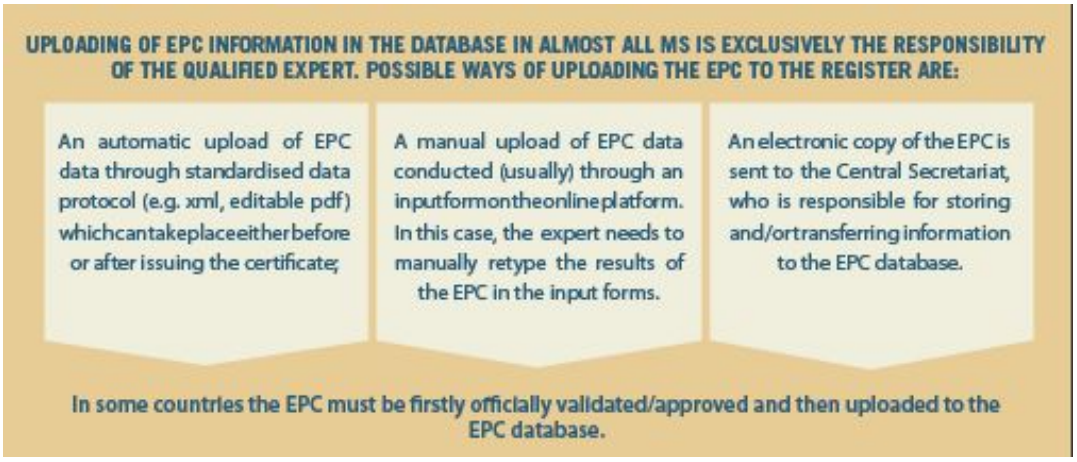


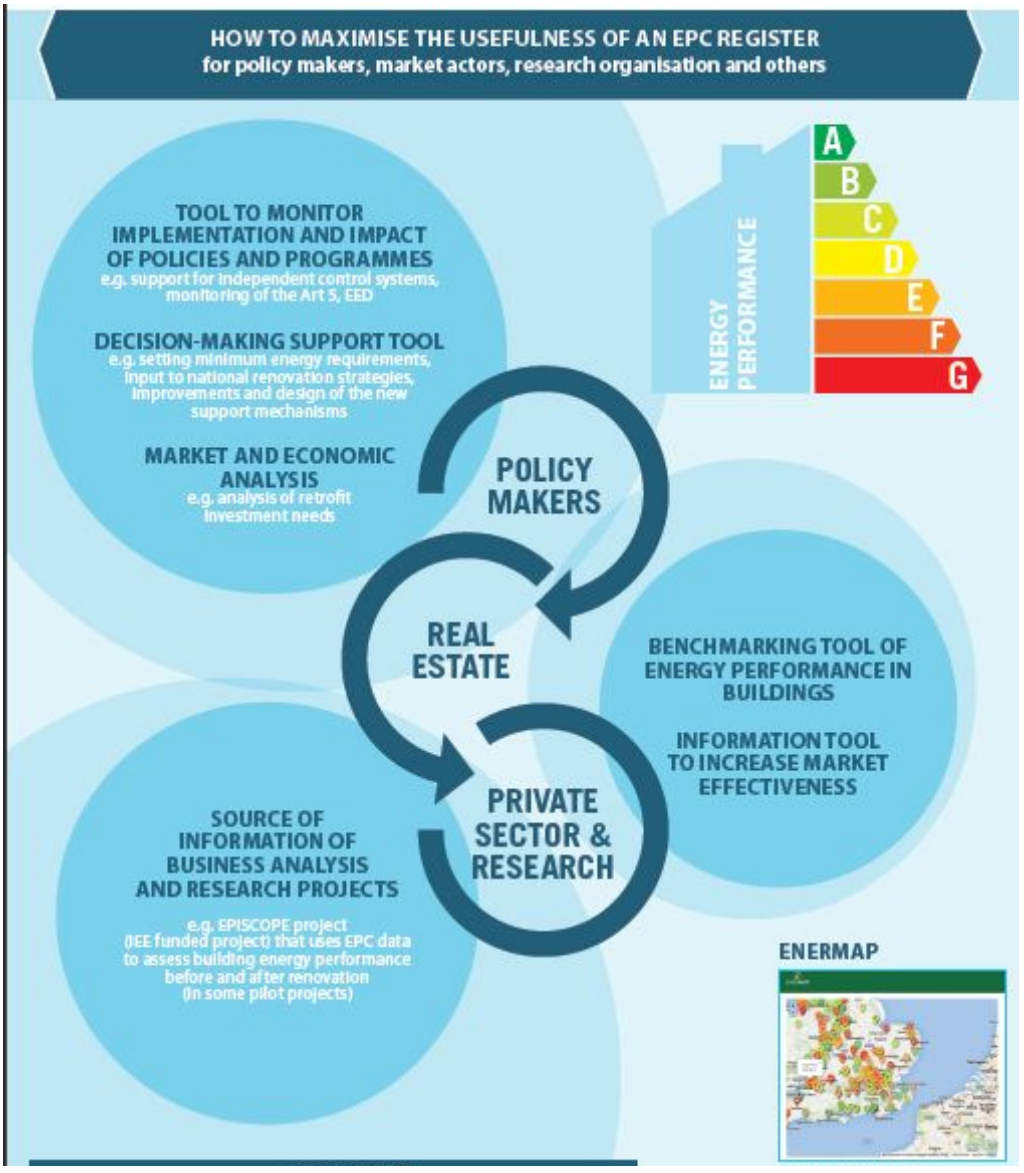


Retrieved from:
https://selectra.info/demenagement/guides/diagnostics/dpe#comment-lire-un-diagnostic-de-performance-energetique

Retrieved from: French Ministry of Ecology and Solidary Transition, https://www.ecologique-solidaire.gouv.fr/diagnostic-performance-energetique-dpe, 2020

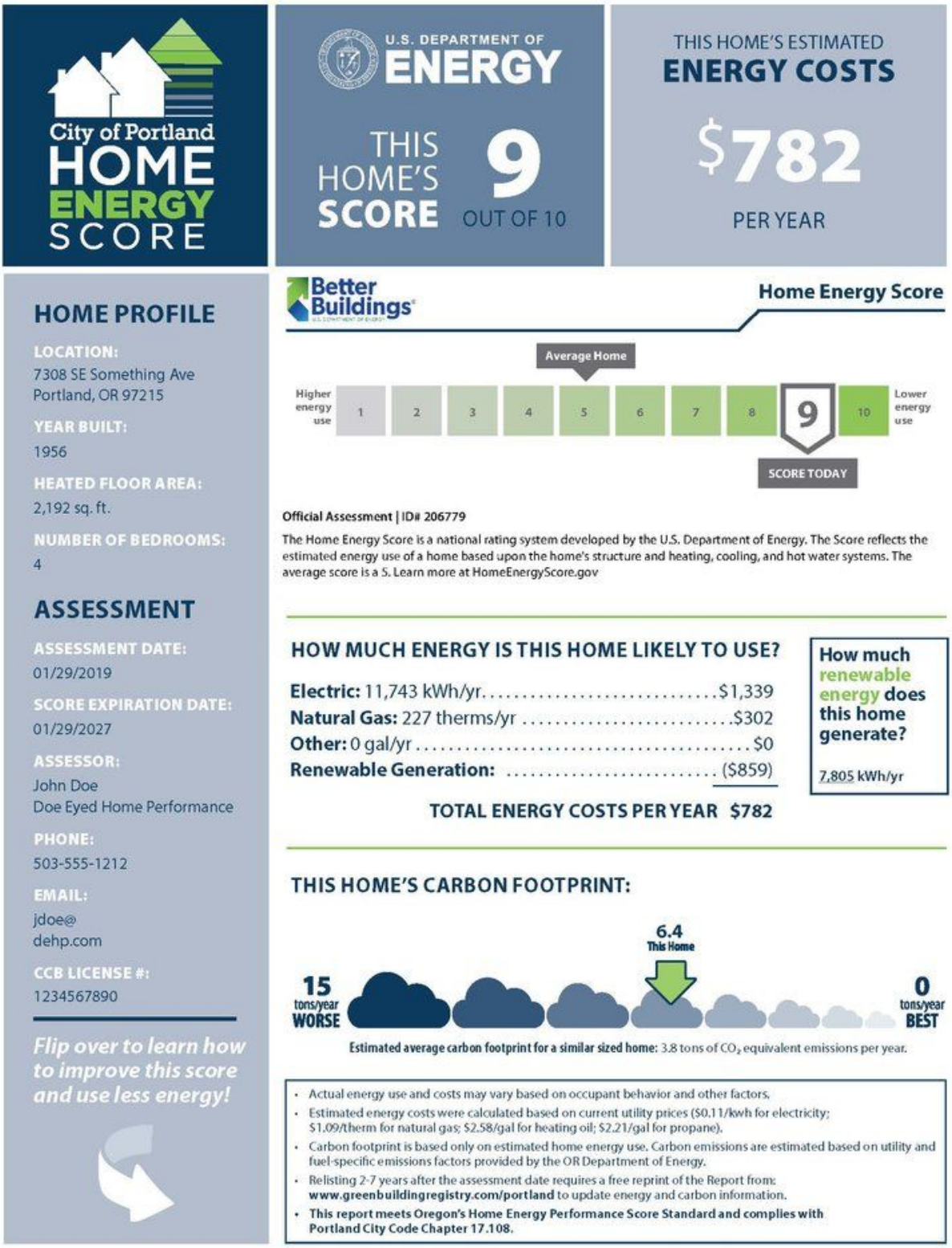
APPENDIX 6: EPCs' Registers





Source: Aleksandra Arcipowska, Buildings Performance Institute Europe (BPIE), "Central Energy Performance Certificate Register, an Opportunity for Systematic Data Collection For Policy Monitoring and EU-wide Building Performance Evaluation", Brussels, 2015. http://bpie.eu/wp-content/uploads/2015/10/EPC_poster.pdf

APPENDIX 7: Sample of City of Portland's Home Energy Score and Report



City of Portland HOME ENERGY SCORE

U.S. DEPARTMENT OF ENERGY

THIS HOME'S SCORE 9 OUT OF 10

THIS HOME'S ESTIMATED ENERGY COSTS

$782 PER YEAR

HOME PROFILE

LOCATION:
7308 SE Something Ave
Portland, OR 97215

YEAR BUILT:
1956

HEATED FLOOR AREA:
2,192 sq. ft.

NUMBER OF BEDROOMS:
4

ASSESSMENT

ASSESSMENT DATE:
01/29/2019

SCORE EXPIRATION DATE:
01/29/2027

ASSESSOR:
John Doe
Doe Eyed Home Performance

PHONE:
503-555-1212

EMAIL:
jdoe@
dehp.com

CCB LICENSE #:
1234567890

Flip over to learn how to improve this score and use less energy!

Better Buildings

Home Energy Score

Average Home

Higher energy use 1 2 3 4 5 6 7 8 **9** 10 Lower energy use

SCORE TODAY

Official Assessment | ID# 206779

The Home Energy Score is a national rating system developed by the U.S. Department of Energy. The Score reflects the estimated energy use of a home based upon the home's structure and heating, cooling, and hot water systems. The average score is a 5. Learn more at HomeEnergyScore.gov

HOW MUCH ENERGY IS THIS HOME LIKELY TO USE?

Electric: 11,743 kWh/yr. $1,339
Natural Gas: 227 therms/yr $302
Other: 0 gal/yr $0
Renewable Generation: ..... ($859)

TOTAL ENERGY COSTS PER YEAR $782

How much renewable energy does this home generate?

7,805 kWh/yr

THIS HOME'S CARBON FOOTPRINT:

6.4 This Home

15 tons/year WORSE — 0 tons/year BEST

Estimated average carbon footprint for a similar sized home: 3.8 tons of CO_2 equivalent emissions per year.

- Actual energy use and costs may vary based on occupant behavior and other factors.
- Estimated energy costs were calculated based on current utility prices ($0.11/kwh for electricity; $1.09/therm for natural gas; $2.58/gal for heating oil; $2.21/gal for propane).
- Carbon footprint is based only on estimated home energy use. Carbon emissions are estimated based on utility and fuel-specific emissions factors provided by the OR Department of Energy.
- Relisting 2-7 years after the assessment date requires a free reprint of the Report from: **www.greenbuildingregistry.com/portland** to update energy and carbon information.
- **This report meets Oregon's Home Energy Performance Score Standard and complies with Portland City Code Chapter 17.108.**

Score today:	Score with priority improvements:*	Estimated energy savings with priority improvements:	Estimated carbon reduction with priority improvements:
9	10	$267 PER YEAR	15% PER YEAR

TACKLE ENERGY WASTE TODAY!

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

- [x] Get your home energy assessment. Done!
- [ ] Choose energy improvements from the list of recommendations below.
- [ ] Select a contractor (or two, for comparison) and obtain bids. Checkout **energytrust.org/findacontractor** or call toll free **1-866-368-7878**.
- [ ] Explore financing options at **communityenergyproject.org** or **energytrust.org**.
- [ ] Visit the following resources to learn about easy changes you can make today: **communityenergyproject.org/services** or **energytrust.org/solutions/insulation-and-air-sealing/**

*PRIORITY ENERGY IMPROVEMENTS | 10 YEAR PAYBACK OR LESS [1]

FEATURE	TODAY'S CONDITION[4]	RECOMMENDED IMPROVEMENTS
Duct insulation	Un-insulated	Insulate to R-8
Envelope/Air Sealing	Not professionally air sealed	Professionally air seal
Heating Equipment	Oil furnace 60% AFUE	When replacing, upgrade to ENERGY STAR [3]
Heating Equipment	Natural Gas/Propane Furnace	When replacing, upgrade to ENERGY STAR
Water Heater	Standard electric tank	When replacing, upgrade to ENERGY STAR, minimum 2.76 EF (Energy Factor)

ADDITIONAL ENERGY IMPROVEMENTS [2]

FEATURE	TODAY'S CONDITION[4]	RECOMMENDED IMPROVEMENTS
Attic insulation	Ceiling insulated to R-0	Insulate to R-38 or R-49 if code requires it
Duct sealing	Un-sealed	Reduce leakage to a maximum of 10% of total airflow
Envelope/Air Sealing	Not professionally air sealed	Professionally air seal
Wall insulation	Insulated to R-0	Fully insulate wall cavities
Solar PV	Capacity of 7.8 kWh in DC	
Windows	Multiple types	When replacing, upgrade to ENERGY STAR
Air Conditioner	N/A	
Basement wall insulation	N/A	
Floor insulation	Insulated to R-0	
Foundation wall insulation	N/A	

1. To achieve the "Score with priority improvements" all recommended improvements in this section must be completed. These improvements have a simple payback of ten years or less.
2. Additional energy efficiency improvements may take longer than ten years to make a return on investment but can have a significant impact on the comfort, efficiency and environmental impact of your home.
3. If your home has an oil furnace it is recommended you replace it with a high efficiency electric or gas furnace.
4. Today's Condition represents the majority condition for that feature in the home.