CENTRE FOR CLIMATE CHANGE MANAGEMENT AT MOHAWK COLLEGE

May 2023

Better Homes Hamilton Detailed Study Design

Better Homes HAMILTON | Hamilton

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Prepared by The Centre for Climate Change Management

The Centre for Climate Change Management (CCCM) is an applied research institute focused on supporting the transition to a thriving, low-carbon economy.

Our research focuses on working collaboratively with industry, government and community to develop and implement climate change solutions. Given the urgency of the climate crisis, we focus on "deep mitigation" strategies: opportunities to significantly reduce the greenhouse gas emissions that cause climate change.

The CCCM also acts as a hub for climate action on campus and in the Hamilton-Burlington community. We have a "coalitions-in-residence program" for collective action initiatives such as the Bay Area Climate Change Council and the centre is home to the college's Sustainability Office.

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II. ABBREVIATIONS

Abbreviations

- ASHP: Air Source Heat Pump
- BACCC: Bay Area Climate Change Council
- BACCIT: Bay Area Climate Change Implementation Team
- BHH: Better Homes Hamilton
- CCCM: Centre for Climate Change Management at Mohawk College
- CEEP: Community Energy + Emissions Plan
- CUSP: Canadian Urban Sustainability Practitioners
- FCM: Federation of Canadian Municipalities
- FSA: Forward Sortation Area
- GHG: Greenhouse Gas
- HCAS: Hamilton's Climate Action Strategy
- HERO: Home Energy Retrofit Opportunity
- LIC: Local Improvement Charge
- LLR: Loan Loss Reserve
- ME: Monitoring and Evaluation
- $MtCO_2e$: Megatonnes of Carbon Dioxide Equivalent
- NRCan: Natural Resources Canada
- OCCI: Office of Climate Change Initiatives at the City of Hamilton
- PACE: Property Assessed Clean Energy
- PDA: Program Delivery Agent
- QC: Qualified Contractor
- RDC: Retrofit Delivery Centre
- TAF: The Atmospheric Fund
- tCO_2e: Tonnes of Carbon Dioxide Equivalent

III. EXECUTIVE SUMMARY

The Centre for Climate Change Management (CCCM) has been contracted by the City of Hamilton to lead the design of a Home Energy Retrofit Opportunity (HERO) program. Through a marketing and branding exercise henceforth the program recommended for the City of Hamilton is called the Better Homes Hamilton (BHH) program. Direction to undertake this project was provided by City Council during the General Issues Committee meeting on May 19th, 2021. Funding to support the project was acquired via successful application to a study design grant from The Green Municipal Fund, a program from The Federation of Canadian Municipalities.

Purpose of the Better Homes Hamilton Program

- Support the greatest number of homeowners across Hamilton in undertaking upgrades which substantially reduce greenhouse gas (GHG) emissions while improving home energy efficiency;
- Reduce barriers through a combination of access to: competitive financing, an "energy coach" service, and guidance in how to maximize rebates and/or grants from existing energy efficiency and income-qualifying programs; and,
- Work to achieve Low Carbon Transformation 2: Transforming our Buildings within the Community Energy & Emissions Plan (CEEP) as part of Hamilton's Climate Action Strategy (HCAS).

Program Elements

The Better Homes Hamilton program will provide access to low-interest, fixed-rate loans to eligible Hamilton homeowners to serve as the capital required to complete upgrades. This will result in a reduction in household GHG emissions, as well as an increase in home comfort and energy efficiency.

The BHH program proposes to utilize a Local Improvement Charge (LIC) framework which enables the municipality to issue loans against the title of the property as a "special charge" lien, and to collect repayment via regularly scheduled property tax bills.

Financing

- LIC Loan: Maximum of $20,000 per applicant
- Interest rate: 4.5% (with 0% introductory rate recommended)
- Repayment term: 15 years
- Stackable with existing government and utility incentive programs including:

- Government of Canada Greener Homes Grant
- Government of Canada: Greener Homes Loan
- Government of Canada: Oil to Heat Pump Affordability Grant (OHPA Grant)
- Enbridge Gas: Home Efficiency Rebate Plus (HER+) Program
- Enbridge Gas Smart Thermostat Rebate.

And income-qualifying incentive programs such as:

- Enbridge Gas: Home Winterproofing Program
- SaveON Energy: Energy Affordability Program.

Participant Eligibility

- Homeowner of a single-detached, semi-detached or townhome within Hamilton (landlords qualify)
- Participant's Property Tax Account is paid by the owner(s) and is in good standing (i.e., not in arrears) and does not have any other liens against the title
- All homeowners on the Title consent to participation in the BHH program
- Participants inform lenders of participation if the property is under mortgage or receive consent from lenders if property taxes paid by mortgage lender.

Eligible Expenses

Eligible expenses under the BHH program were selected which: substantially reduce GHG emissions from residential units, reduce barrier to entry for participants, and are stackable with existing incentive and rebate programs. Expenses are broken into 4 categories:

1) Assessments & Permitting

- Full cost of NRCan pre and post retrofit EnerGuide audit completed by a Registered Energy Auditor
- Cost of blower door test
- Cost of City of Hamilton building permits

2) Building Envelope

- Air-sealing/draft-proofing
- Insulation: attic, basement, exterior wall, foundation

3) Mechanical Upgrades

- Air source heat pump (ASHP) installation
    - Cold-climate ASHP
    - Hybrid configuration ASHP
    - Ductless mini-splits
- Smart thermostats
- Smart controllers

4) Supporting Infrastructure Upgrades

- Electric breaker panel upgrade (200amp) *
- Ductwork repair*[1]

Contractor Eligibility

In order to have a quote accepted, the Contractor must be able to verify the following criteria:

- Proof of a Hamilton business license
- Quote must show Registered HST#
- Proof of purchased liability insurance that covers all employees
- WSIB compliance

Depending on scope of workorder, proof of applicable licenses:

- Electrical Contractor Licence (ESA)
- 313A or 313D license
- G2 gas ticket
- OBT2 ticket
- Sheet Metal Mechanic license

Participant Supports & Quality Assurance

- **"Energy Coach" Service** – the BHH program provides all participants with access to a trusted City representative who provides guidance relating to the most impactful upgrades per applicant, assists participants in understanding EnerGuide audit reports (if undertaken), reviews contractor quotes, and provides guidance on applying to external rebates (Enbridge HER+, Greener Homes Grant, Enbridge Winterproofing Program).

[1] Supporting infrastructure upgrades are eligible when required to support installation of ASHPs. See Section 4.5.4 for more information

- **Contractor Registry & Eligibility Criteria** - as a reminder, in order to submit a quote for a work order, all contractors must show applicable licensing, certifications and proof of WSIB compliance. Stakeholder consultation has indicated that gathering quotes for desired retrofits is a time consuming, and often intimidating task for participants. To support participants in gathering quotes, and reduce barriers, the CCCM recommends a Contractor Registry be listed on the BHH Program webpage. This Contractor Registry will be monitored by the Senior Project Manager and will contain contractors which have shown proof of applicable training and better business practices (i.e. testimonials, sustainability plans, EDI commitments). This Contractor Registry aims to provide participants of the BHH program with a list of trusted businesses as a starting point for the quotation process. To be clear, the Senior Project Manager will not require participants to collect quotes from contractors listed on the Registry. The City of Hamilton cannot recommend the any one contractor over another, and the City will not be held liable for any work completed by contractors within the registry.

- **Tenant Protections:** Since landlords are eligible to participate in the BHH program, it is advised that the BHH application contain a field which identifies if the property in question is a rental unit. If so a physical mailer should be sent to the address which outlines the BHH program and reiterates tenant rights. The OCCI should work with the City Solicitor to embed wording into the Property Owner agreement which include tenant protections from renoviction and prohibits the landlord from downloading the cost of loan repayments onto tenants.

Implementation – Pilot Program/Incubation Stage

The CCCM recommends the City undertake a" Incubation Stage" in the form of a two-year Pilot Program before proceeding with a full-scale program launch in order to:

- Provide staff the opportunity to gain experience offering the BHH program and establish inter-departmental workflows
- Gain insights into the impact of retrofits across a variety of housing types
- Gather feedback and/or testimonials from participants which may be used to inform communications ahead of full-scale program launch;
- Increase program visibility and drive demand toward full-scale launch by establishing a waitlist of interested parties, and,

- Investigate multiple options for scalability to increase total number of retrofits and different building sectors (e.g. multi-unit, commercial/industrial).

The CCCM recommends that funding and resources for the pilot project be broken down between total loans and operating/staffing expenses and be provided approval to access an upper limit of $1.5M from the existing Climate Change Reserve.

Expense Category	Cost
Total LIC Loan Budget	$1,000,000 (50 homes x $20,000)
Loan Loss Reserve (5)	$50,000
Staffing Impacts – in-kind • 1.0 FTE Sr. Project Manager over 2 years from OCCI • 0.5 FTE total over 2 years from Legal, Taxation, Treasurer, Finance	$317,000 1 FTE (2 years salary) In-kind supports
Marketing & Digital Communications	$60,000
Web Development	$10,000
RETScreen Software	$5,000
Pilot Program Budget	$1,442,000

The CCCM recommends the Pilot Project have the following characteristics.

Program Element	Description
Timeframe	2 years
Target	50 homes sourcing from a variety of eligible building archetypes and demographic groups
Financial Model	Local Improvement Charge
Funding Amount	$20,000 per applicant
Interest Rate	0% introductory rate
Repayment Term	15 years
Administrative Fee	$0 introductory rate
Eligible Building Types	Single-detached, semi-detached, townhome, row home,
Participant Eligibility	• Homeowner within Hamilton

	• Current on Property Tax payments • No other liens against title
Contactor Eligibility	All criteria and licenses satisfied as outlined in section 4.6
Eligible Expenses	All upgrades outlined under section 4.5 including: • Permits and assessments • Building envelope (air sealing, insulation) • Mechanical systems (ASHP, smart thermostat, smart controllers) • Supporting Infrastructure Upgrades (breaker panel upgrade, ductwork repair)

Key characteristics of the Incubation Stage of the program:

- **Interest rate:** recommending a 0% interest rate to incentivize early adopters;
- **Term:** recommending a 15-year term on the loan. This term is informed by industry estimates of the average working lifespan of the most expensive eligible expense (e.g. air source heat pump); and
- **Staffing:** recommend the Project Manager has the requisite building science and/or construction/retrofit skillset to support participants as an "Energy Coach".

Program Scaling

Upon completion of the Pilot Program, the City of Hamilton is encouraged to apply to FCM's Capital Program: Loan or credit enhancement funding. Under this funding program the City would be eligible to receive[2]*:

- Funding to support 80% of program costs up to $10M; and
- A grant for 50% of the approved funding amount.

This funding scenario has been used to build a business case (Appendix E). The CCCM projects that with an additional investment of $1.7M over four years (20% of program cost per FCM requirements), the BHH program could scale to retrofit 410 homes at $20,000 per home.

The City of Hamilton should investigate partnerships with financial institutions or private investments as potential opportunities to scale and to refinance the BHH program in conjunction with or following FCM funding.

[2] As of March 2023

IV. CONSIDERATIONS AND NEXT STEPS

Based on the research completed for this report, the CCCM recommends the City of Hamilton should consider the following next steps:

STEP 1
- OCCI submit Recommendation for City Council approval with this report as appendix outlining the Better Homes Hamilton Program

STEP 2
- OCCI to request approval from Council to access an upper limit of $1.5M from the Climate Reserve to finance LIC loans and operation costs of a two year Pilot Program

STEP 3
- OCCI to hire the Senior Project Manager with requisite Energy Coach skillset

STEP 4
- OCCI staff to work with the City Solicitor and the Legal Staff to draft applicable program bylaws to support an LIC framework to be brought back to Council for approval

STEP 5
- OCCI to enter into service-level agreements with supporting divisions/departments such as Finance, Taxation and Legal

STEP 7
- Senior Project Manager to work with Web Development to design the BHH website using the wireframe provided by Agenda Marketing (Appendix F)

STEP 8
- Upon completion of the Incubation Stage of the BHH Program, OCCI staff submit an application to the Federation of Canadian Municipalities application under the Capital Program funding stream to help cover program costs for the first 4 years of the program

1 INTRODUCTION

1.1 Background

In March 2019, the City of Hamilton declared a climate emergency, recognizing that climate change poses threats to the health and safety of Hamiltonians, the natural environment and city infrastructure. In recognition of these threats, Hamilton City Council set a goal of achieving net-zero greenhouse gas (GHG) emissions by 2050.

In May 2021, City Council directed staff to design a Home Energy Retrofit Opportunity (HERO) program with the goal of reducing GHG emissions from residential buildings. A HERO program, which is referred to throughout and in context to this report is used to generally describe a program that provides incentives and supports to homeowners to increase energy efficiency and reduce GHG emissions from burning fossil fuels for space and water heating. Recognizing the need for an evidence-based program, Council directed staff to enter into an agreement with the CCCM, an applied research institute at Mohawk College, to design the prospective HERO program. Additional funding to support the project was acquired via successful application to a study design grant from The Green Municipal Fund, a program from the Federation of Canadian Municipalities.

1.2 Purpose of Work

The purpose of this study is to provide a detailed recommendation report on the design and implementation of the Better Homes Hamilton program for consideration by the City of Hamilton. The CCCM endeavoured to keep equity front-of-mind while using evidence-based decision making to design a program which empowers the greatest number of Hamiltonians to undertake upgrades which result in an increase in home energy efficiency while decreasing household GHG emissions. The CCCM sought to design a program that is stackable with other energy efficiency incentive programs, and design a financial model which removes barriers to entry so that more Hamilton homeowners may access federal, and utility-based incentives and rebates.

1.3 Alignment with Hamilton's Climate Action Strategy

In August 2022, the City of Hamilton approved Hamilton's Climate Action Strategy (HCAS) which outlines key actions, goals, and benchmarks required to achieve the target of net-zero GHG emissions by 2050. HCAS is comprised of two key documents:

- Hamilton's Climate Change Impact Adaptation Plan and;
- ReCharge Hamilton: Our Community Energy + Emissions Plan (CEEP)

In the CEEP, 8% of city-wide GHG emissions are attributed to residential buildings and was estimated at 691,884 tCO2e in the 2016 base year. Under Low Carbon Transformation 2: Transforming Our Buildings, the CEEP has set a target of retrofitting 100% of existing homes to achieve 50% energy efficiency savings relative to 2016 by 2050. This action is expected to reduce city-wide GHG emissions by 2.8%.

The CEEP identifies several co-benefits of a Low-Carbon future including:

- Potential reduction in household energy bills by 80% below 2016 levels by 2050
- Decrease in household energy poverty (defined as spending >6% after-tax income on energy expenses[3])
- Projected 1600 new jobs created by 2050 to support a holistic building retrofit program, and
- Increase social equity by providing low-income and equity deserving groups a stable and affordable way to access both financing and guidance to complete home energy upgrades.

When designing the BHH program, the CCCM frequently referred back to the objectives and targets laid out within the CEEP as a guiding principle.

1.4 Methodology

The BHH program design was crafted using an evidence-based decision-making framework. The CCCM started by first asking a number of research questions including:

- What are the features of a successful HERO program?
- How can a building retrofit program be designed in a manner which encourages uptake from the greatest number of Hamiltonians? How can an equity lens be applied to this work?
- What features do Hamiltonians want in a HERO program? What are the needs within the community?
- What existing energy efficiency retrofit incentives/rebates are available to homeowners today? How do people interact with these incentive programs?
- What is the capacity of the retrofit workforce within the Hamilton region?

[3] As defined by The Canadian Urban Sustainability Practitioners (CUSP) report, Energy Poverty in Canada: a CUSP Backgrounder

- What is the experience of other municipalities offering HERO programs? How are their programs structured?

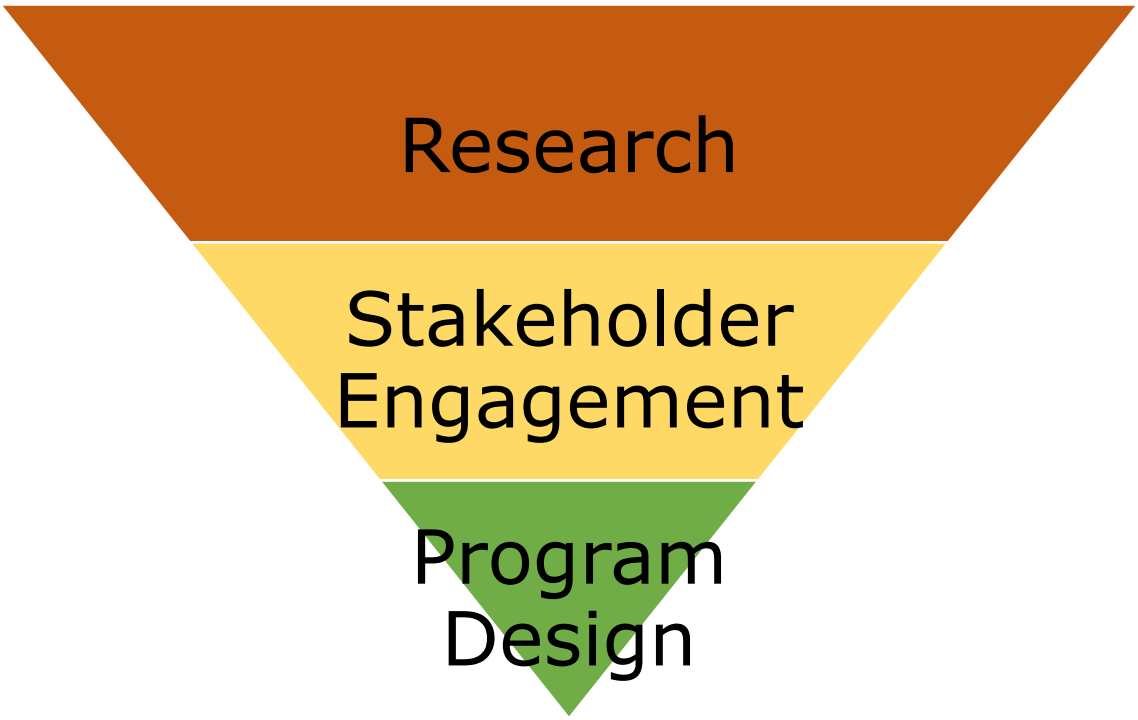


Figure 1 Research approach in evidence-based program design

- **Research**: In-line with the CCCM's primary function as an applied research centre, a significant effort was made to understand:
  - The status and operation of other HERO programs across Canada, the United States and Europe.
  - The legislative, capital, and human resource requirements to offer a HERO program within the province of Ontario.
  - Baseline GHG emissions data within Hamilton drawing from existing municipal reporting.
  - Demographic landscape within Hamilton, examining building types, census data, income levels, and the state of energy poverty across the City.
  - Building data and energy consumption mapping was completed by Lightspark Software Inc. (which can be viewed in full in Appendix D).
  - Homeowner perceptions of retrofit programs were collected via an engagement survey completed by Deloitte. (A complete breakdown can be found within Appendix C.)

  - Examined the parameters of existing incentives and rebate programs offered by government and utility providers.

- **Stakeholder Engagement:** The CCCM gathered feedback from over 40 stakeholders. Stakeholder engagement was conducted primarily through fact-finding interviews and meetings administered by the CCCM. Stakeholder input allowed the CCCM to pressure test program design elements, challenge the research team's conceptions, and understand the experience of those working with, advocating for, and administering HERO programs. Stakeholders such as contractors, energy auditors and HERO program administrators were instrumental in the development of an understanding of the logistics required to complete building retrofits. Other stakeholders such as eNGOs, tenant advocacy groups, citizen activists and working groups such as the Bay Area Climate Change Implementation Team (BACCIT) helped to inform the guiding principles of program design. The CCCM consulted a variety of stakeholders including:
  - Applicable municipal departments
  - Utility providers
  - Environmental non-governmental organizations (eNGOs)
  - Municipalities offering HERO programs
  - Contractors
  - Industry and contractor associations, and
  - Tenant rights organizations.

- **Program Design:**
  - All program elements including the financial model, eligible expenses, consumer support services and staffing requirements were informed by research on other municipalities' HERO programs, and where possible, through in-depth consultations with HERO staff administrators.
  - Best practices were collected from various HERO programs across North America and Europe.
- **Implementation Design:**
  - The CCCM gathered insights from other HERO programs that have successfully launched in order to craft recommendations relating to both a Pilot Program and Program Launch with options for future program scaling.

2 RESEARCH

Major Findings: Research

- Hamiltonians have expressed a clear desire for a municipally-led building retrofit program that will help them
    - 1) reduce utility expenses and;
    - 2) partake in an impactful climate solution
- The average Hamiltonian pays $2,118 in annual utility expenses (electricity and space heating).
- 25% of Hamiltonians live in a state of energy poverty defined by spend >6% of after-tax income on utility expenses, with 41% paying more than the national average expense of 3% after-tax income spend on utility expenses.
- Based on census data, 75% of Hamilton's residential building stock would be eligible to partake in the BHH program as designed.
- Single-detached homes account for 56% of residential dwellings in Hamilton, representing over 125,130 individual dwellings. This indicates an ample target market to support demand for a building retrofit program
- Per Lightspark Inc analysis, the most common single-detached building archetype emits 4.89 tCO_2e per year.
- Conservative estimates show that participants who reduce GHG emissions by 60% can potentially save >$1,800 in carbon tax expenses between 2022-2030, and >$300 per year past 2030.
- There are robust and ample incentive programs offered by government and utility providers to reduce the cost of completing upgrades.
- A Local Improvement Charge (LIC) program framework is best suited to reduce barriers to participation. LIC programs offer fixed rate, low-interest financing to participants, which is repaid via regular property tax payments. This recoverable loan structure limits risk to the municipality while providing stability for participants.

The following section outlines the research completed by the CCCM which informed the BHH program design and implementation planning.

The CCCM began by first examining key Hamilton housing information by examining utility data, 2021 census data, and reported GHG emissions. To further our understanding of the building stock, the CCCM commissioned Lightspark Inc to complete a Building Archetype and Energy Mapping study which can be found in full within Appendix D.

In order to better inform program design, the CCCM reviewed HERO and energy efficiency incentive programs from across Canada, as well as the United States and Europe (see Appendix B for more detail). In municipalities where HERO programs are already offered, the CCCM met with staff in charge of the HERO program and interviewed them extensively about best practices, challenges and opportunities to improve programs.

To best understand how to complement and increase participation in existing programs, the CCCM examined currently offered rebate and incentive programs such as the federal Green Home Programs, the Enbridge HER+ program, as well as income qualifying programs such as Enbridge Gas Home Winterproofing Program, and SaveON Energy's Energy Affordability Program. Researchers took extra care to better understand how to reduce barriers to entry into these programs, how to help Hamiltonians gain access to existing rebates, and how to incentivize Hamiltonians to undertake renovations that will significantly reduce GHG emissions and improve home comfort.

2.1 Hamilton Baseline Data

In order to craft a HERO program which addresses the needs of Hamilton residents, an understanding of the City's demographic characteristics, utility consumption, GHG emissions profile and building stock was established. Research indicated single-detached houses represent the most common building type, which indicates that a HERO program targeting single-detached homes would have a significant impact on GHG emissions.

2.1.1 Housing Data 2021 Census

In order to understand the size of the Hamilton building stock, and the breakdown of building types that would be eligible to participate, 2021 Census data was examined.

The CCCM found that in 2021, Hamilton had a population of 569,353 residents occupying 222,810 dwellings categorized by the following structure types.

- Single-detached house* - 125,130
- Semi-detached house* - 6,770
- Row house* - 27,455

- Apartment or flat in a duplex* – 7,380
- Apartment in a building that has fewer than 5 storeys – 19,045
- Apartment in a building that has 5 or more storeys – 36,465
- Other single-attached house – 415
- Movable dwelling – 145

* Housing types that are eligible under the BHH program design

Of the building types reported, **75% would be eligible to participate in the BHH program as designed.** Moreover, the CCCM has determined that owners of **single-detached homes are the largest target audience** of the BHH program as single-detached buildings represent **56%** of the City's building stock.

The CCCM commissioned Lightspark Software Inc. to complete a building archetype analysis of single-detached homes within Hamilton to better understand their distribution across the city, utility consumption and GHG emission profiles. Section 2.4 expands upon Lightspark's major findings, while a full copy of Lightspark's report can be found in Appendix D.

2.1.2 Hamilton Emissions Profile (CEEP)

Next, the CCCM was interested in understanding how the City of Hamilton reported GHG emissions from residential buildings. The Community Energy & Emissions Plan (CEEP) reports that City-wide GHG emissions totalled 8.70 $MtCO_2e$ in 2016. The vast majority of emissions (64%) can be attributed to industry operations, while Hamilton's residential building stock accounts for 8% or 6.92 $ktCO_2e$.

When considering the fact that eligible building types represent 75% of the residential building stock within the City, the BHH program offers a pathway to significantly reducing GHG emissions from the residential building sector.

2.1.3 Hamilton's Forward Sortation Areas

Hamilton has 16 Forward Sortation Areas (FSA) which describe the first 3 figures of the postal code. It is recommended that City Staff overlay the findings of Lightspark's Building Archetype Analysis with the distribution of eligible building types to inform program communications. That way, the City can target homeowners who would benefit the most from HERO services to reduce both their GHG emissions and energy costs

A full building archetype analysis can be found in Appendix D.

2.2 Hamilton Homeowner Average Utility Consumption

Having understood the types of buildings within Hamilton, and the potential market size for a HERO program, the CCCM next looked to understand the average cost of utility expenditures (electricity and heating fuel) for Hamilton homeowners. Due to the difficulty of data collection, granular utility data at the municipal level is typically not captured. The Financial Accountability Office of Ontario has used aggregated datasets to estimate that in 2019, the average Ontario home spent $2,128 on utilities while the average home in the Hamilton-Niagara region spends $2,118.

Table 1 illustrates a breakdown of these average utility costs by comparing average utility expenditures for Ontario, Hamilton region and Lightspark's utility analysis of the most common single-detached building type:

Lightspark estimates that 54.8% of the single-detached building stock aligns with the following characteristics:

- Late 1950's construction (1957)
- Approximately 170m^2 of floor area
- Primary heating source: condensed natural gas furnace (96% efficient)
- Hot water system: conventional natural gas water heater
- Carbon emissions: 4.89 $tCO2_e$/year
- Annual utility cost $2,226

The full LightSpark Software Inc. analysis on building archetype, energy and carbon emissions can be found within Appendix D.

Table 1 Average annual utility spend in Ontario and Hamilton region

Utility	Ontario Average ($)	% Total	Hamilton Average ($) 2019	% Total	Hamilton Average ($)2022	% Total
Electricity	1,190	56	1,143	54	1,202	54
Natural Gas	811	38	839	39.6	1,023	46
Other	122	6	136	6.4	-	
TOTAL	2,128	100	2,118	99.6	2,226	100

2.3 Projected Carbon Tax Impacts

Beginning in April 2022, the Government of Canada set a price of $50 per tonne of CO_2 equivalent, set to increase $15 per tonne per year to a max of $170/tCO_2e in 2030. This tax takes a blanket approach which covers all combustible fuel sources which emit GHGs, including home heating fuels (natural gas, oil, propane, etc.).

Therefore, carbon pricing will impact every Hamiltonian, and is expected to contribute to an increase cost to operate home heating equipment using fossil fuels.

Figure 1 outlines the difference in carbon pricing under a business-as-usual scenario versus a retrofit scenario wherein home GHG emissions are reduced by 60%.

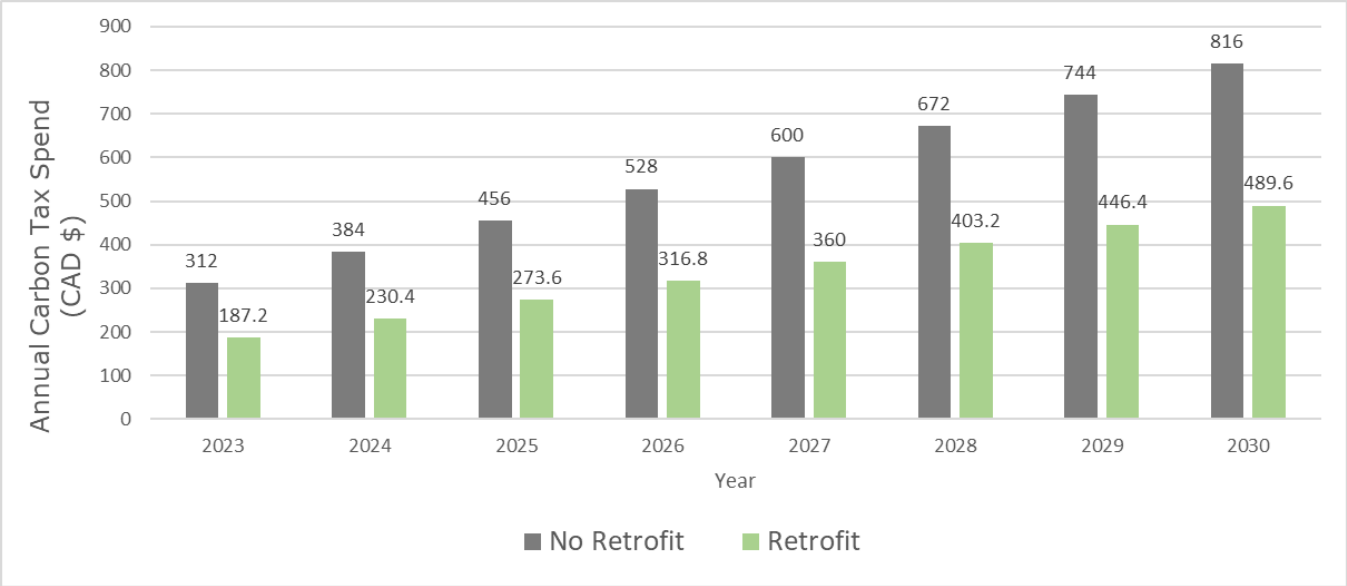


Figure 2 Projected carbon tax spend of average Hamilton home emitting 4.8 tCO2e under business-as-usual vs upgraded scenario.

2.3.1 Carbon pricing under business-as-usual scenario versus a retrofit scenario

Under the business-as-usual scenario, the average homeowner in Hamilton living within the most common building type (1950s single-detached home) operating a 96% efficient natural gas furnace, emitting 4.89 $tCO2_e$/year will pay $312 in carbon taxes in 2023, scaling to $816 per year in carbon taxes by 2030.
Conversely, that same homeowner undertaking efficiency upgrades which reduced residential GHG emissions by a conservative projection of 60% will pay $187.2 in carbon taxes in 2023, scaling to $489.6 by 2030 and beyond.

Based on this conservative retrofit scenario of a 60% GHG reduction through home energy retrofits, the CCCM estimates that by participating in the BHH program, the average participant can save **$1,804.8 between 2023-2030**

in carbon tax savings, and **$326.4 annually past 2030** compared to a business-as-usual scenario.

Table 2 2022-2030 carbon tax spending comparison

Carbon Spending	No Upgrade (CAD $)	Upgrade Completed (CAD $)
2023	312	187.2
2030	816	489.6
Cumulative 2022-2030	**$4,512**	**$2,707.2**
Savings	**$1,804.8 (60%)**	

Carbon tax savings help to justify the upfront capital cost of retrofit upgrades, especially when combined with rebates and incentives.

2.4 Lightspark Building Archetype Analysis

Lightspark Software Inc was commissioned by the CCCM to provide a comprehensive building archetype and energy mapping analysis, and to validate the CCCM's findings and analysis from the 2021 census data. This analysis provides critical insights into the types of >3 storey buildings Hamiltonians live in, categorizing homes into 7 archetypes (see Table 3) based on several variables including; year of construction, floorspace, average air-tightness, primary heating & cooling equipment, average utility consumption, and average GHG emissions profile. This analysis was completed by overlaying the following datasets:

- Energuide Audit Data;
- Utility consumption data;
- Canadian Census Data (2016);
- MPAC datasets;
- Property Tax reports;
- Building footprints;

Lightspark overlaid these datasets to establish an understanding of housing types and utility consumption by Forward Sortation Area (FSA).

The full report can be viewed in Appendix D

2.4.1 Building Archetypes

Lightspark determined there are 121,844 single-family dwellings within Hamilton which have been sorted into 7 archetypes based on the available *Energuide Audit Data.* Given the limitations of the audit dataset, it should be noted that this is not a comprehensive list of building types across the City.

However, Table 3 provides a reasonable overview of the eligible building types.

Table 3 Building archetypes of single-family units within Hamilton

Breakdown of Archetypes - Comparison

Archetype	Year of Construction	Floor Area (m2)	Primary Heat Source	Primary Fuel Type	Hot Water System	Hot Water System Fuel Type	Energy Intensity (GJ/m2)	Carbon Intensity (GJ/m2)	Dwelling Count
A	1952	184.8	Induced Draft Fan Furnace	Natural Gas	Conventional Tank (Pilot)	Natural Gas	0.92	0.04	2018
B	1957	169.1	Condensing Furnace	Natural Gas	Conventional Tank (Pilot)	Natural Gas	0.75	0.03	66810
C	1940	199.1	Furnace With Flame Retention Head	Oil	Conventional Tank	Electricity	1.03	0.05	594
D	1919	327.3	Boiler With Continuous Pilot	Natural Gas	Conventional Tank	Natural Gas	1.04	0.05	982
E	1949	238.2	Baseboard/Hydronic /Plenum(Duct) Htrs.	Electricity	Conventional Tank	Electricity	0.54	0.01	477
F	1931	190.0	Condensing Furnace	Natural Gas	Conventional Tank	Natural Gas	1.08	0.05	19862
G	1986	288.4	Condensing Furnace	Natural Gas	Conventional Tank (Pilot)	Natural Gas	0.51	0.02	31101

From Lightspark's analysis, it has been determined that the most abundant single-family building archetypes found within Hamilton are:

- Type B (54.8%): 1957 construction with condensed natural gas furnace
- Type G (25.5%): 1986 construction with condensed natural gas furnace
- Type F (16.3%): 1931 construction with condensed natural gas furnace

It should be noted that while fewer in number the following archetypes would highly benefit from energy-efficiency upgrades due to the high cost to operate the primary space heating equipment:

- Type C (0.5%) - 1940 construction with an oil-burning furnace
- Type E (0.4%) – 1949 construction with electric baseboard heating

Table 4 Single-dwelling Archetypes Ranked by Carbon Intensity

Archetype	t CO2-e	GJ / year	Energy Cost ($/year)	Dwelling Count
C	10.78	204.26	$6,900	594
D	15.34	338.96	$4,652	982
E	1.47	128.23	$4,331	477
F	8.73	204.58	$3,112	19,862
A	7.02	169.76	$2,723	2,018
G	5.85	145.86	$2,457	31,101
B	4.89	126.75	$2,234	66,810

Table 4 outlines the GHG emissions associated with each building archetype. While archetypes C and D represent high GHG emitting buildings, archetypes B, G and F capture the largest portion of single-detached dwelling and thus should be considered the primary target market.

A fulsome breakdown of archetype characteristics, as well as spatial distribution by FSA can be found within Appendix D.

2.5 Energy Poverty in Hamilton

As discussed in section 2.2, one of the main goals of the research was to better understand Hamilton homeowner's utility bills and how a HERO program might stabilize and/or reduce the cost of household energy consumption. This is especially important for residents who qualify as low income, as well as those on fixed incomes who are especially vulnerable to increasing energy costs.

Energy poverty refers to the experience of households that struggle to heat and cool their homes without undue financial burden. The Canadian Urban Sustainability Practitioners (CUSP) defines those paying greater than 6% of

after-tax income on energy expenses as being in a state of high energy burden. For the sake of this report, this threshold will be used to describe a state of energy poverty.

CUSP has created the Energy Poverty Mapping Tool which cross references census and utility data to determine average spend on energy expenses down to the census tract level.

In addition to this resource, the CCCM commissioned an 8-week student research project to examine the state of energy poverty within the City of Hamilton.

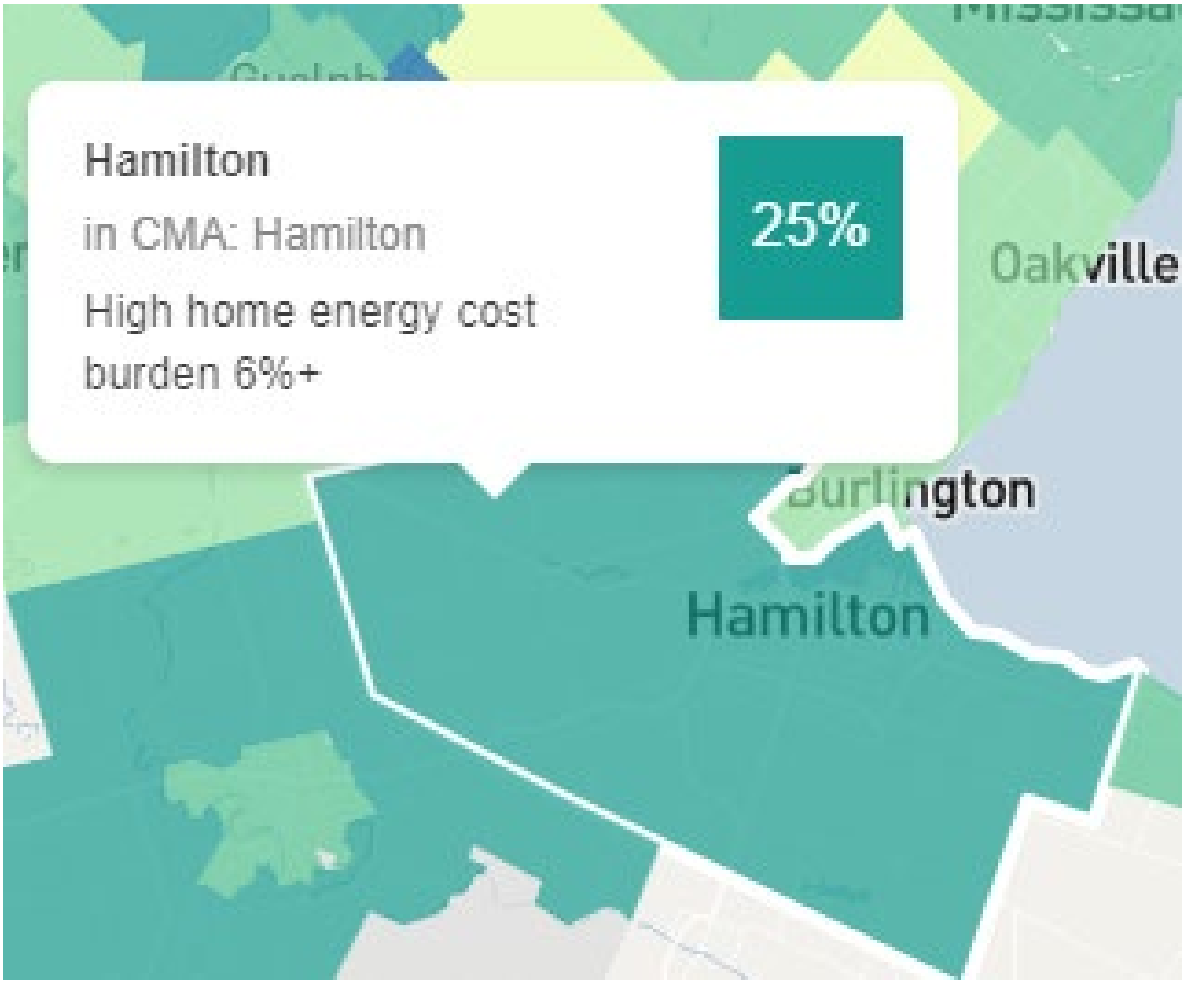


Figure 3 CUSP energy poverty mapping tool

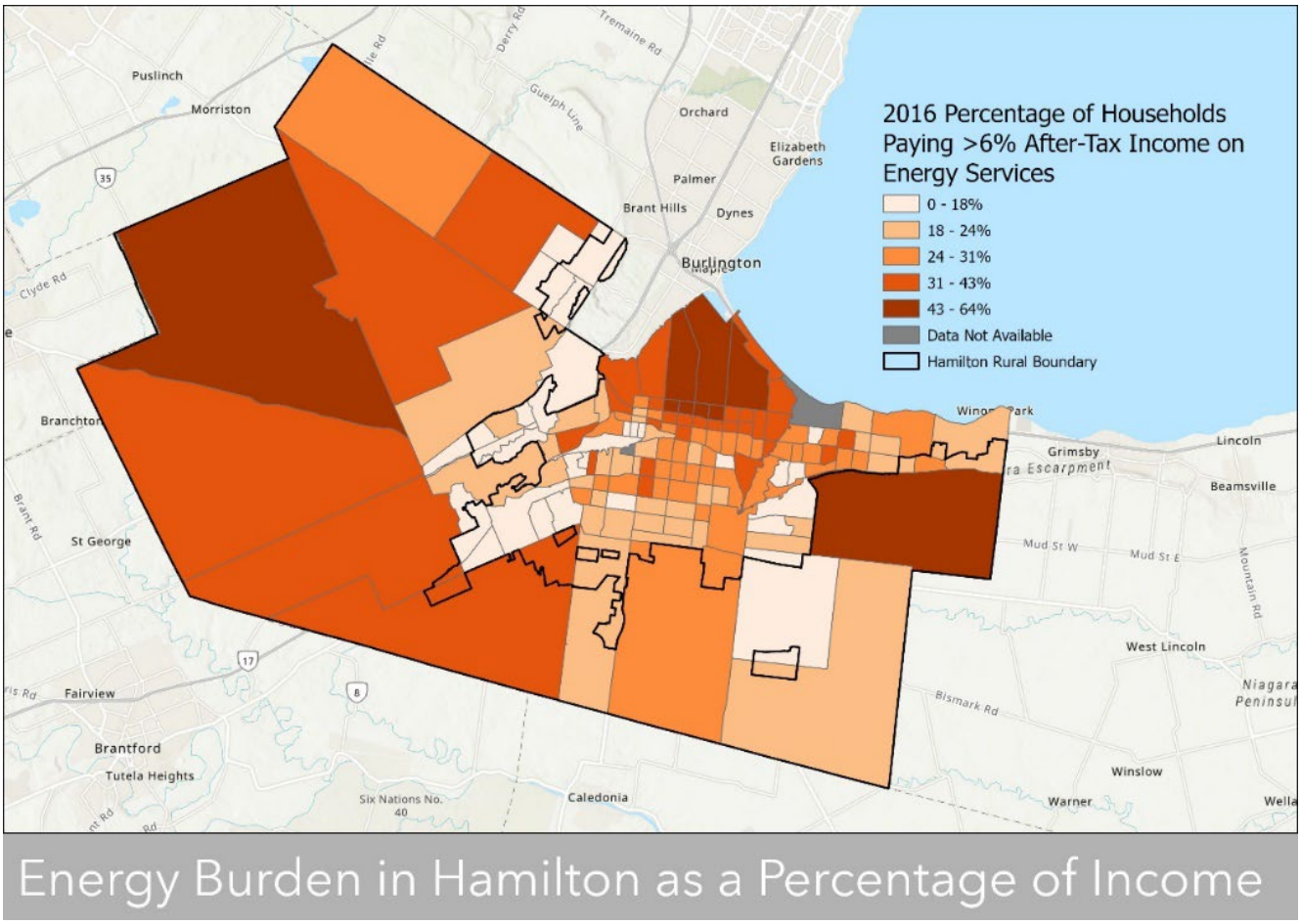


Figure 4 Percentage of homes paying >6% after-tax income on energy expenses

2.5.1 Major Findings: Energy Poverty Research

- 41% of Hamiltonians pay more than the national average for utilities
- Energy poverty occurs in both rural and urban regions of the City
- 25% of Hamiltonians are in a state of energy poverty (>6% after-tax income spend on energy expenses)
- 10% of Hamiltonians experience "high energy burden" (>10% after-tax income spend on energy expenses)
- 4.7% of Hamiltonians are a "extreme energy burden" scenario (>15% after-tax income spend on energy expenses)

These findings demonstrate that nearly half of Hamiltonians are paying more than the national average on their energy bills and that 1 in 4 experience high energy burden. Home retrofits that improve energy efficiency could help to alleviate this burden.

2.6 Homeowner Survey

Having developed an understanding of the need for utility bill relief, and climate action within the City, the CCCM commissioned Deloitte to complete a homeowner survey.

The goals of this survey were to:

- Better understand attitudes and perceptions surrounding the completion of home energy efficiency upgrades;
- Identify potential incentives that may motivate homeowners to undertake energy retrofits;
- Evaluate pricing scenarios which would be most attractive to homeowners considering upgrades; and
- Pressure-test a program model to see if residents would be interested in participating in the program.

A full summary of results can be found in Appendix C.

2.6.1 Homeowner Survey Methodology

The survey collected a total sample of 395 completed interviews of which 204 were carried out over the phone (mix of cell and landline), and 195 were completed via an online survey.

To reach a larger community audience, the CCCM asked the Bay Area Climate Change Council (BACCC) to support survey promotion. Online surveys were distributed with the help of BACCC's social media channels, as well as on the Engage Hamilton platform. Several NGOs and community organizations amplified BACCC's messaging across various social media channels and newsletters.

Questions were identical between surveys and phone interviews that were representatively sampled across all postal codes in order to access homeowners who may not have access to the internet, or miss digital communications.

The survey was open from October 7th-31st, 2022.

2.6.2 Major Findings: Homeowner Survey

- The majority of homeowners (58%) indicated that they were *somewhat **likely*** to undertake home efficiency upgrades in the next two years.

- ***Utility bill savings*** and ***environmental friendliness*** were the top two motivations for home energy upgrades or renovations.
- Respondents felt that ***upfront costs of different upgrade options*** and ***environmental benefits*** were the most important pieces of information when considering moving forward with home energy efficiency upgrades.
- The vast majority of respondents ***(89%) agreed*** that the Home Energy Retrofit program would be ***beneficial*** to homeowners in Hamilton, and ***82% would likely access*** a retrofit program if ***"energy coaching services"*** were provided.

2.7 Retrofit Program Landscape

Having gained a better understanding of the need for a home energy retrofit program within the City of Hamilton, the CCCM examined the structure of existing programs across Canada with the goals of:

- Understanding best practices;
- Examining various program models, and how this impacted program accessibility;
  and,
- Understanding the uptake and efficacy of various upgrades.

2.7.1 Retrofit Program Design Profiles

HERO and other retrofit programs typically incentivize participation through one of three pathways:

- Local Improvement Charge (LIC)
  - A loan issued by the municipality which is then placed as a lien against the property in first position and is repaid via Property Tax payments.
- Grant/Rebate
  - A proactive or retroactive disbursement of funds which typically do not cover the entire cost of upgrade.
- Tax Incentive
  - A retroactive tax break for participants. Can often present a significant barrier to entry due to high capital cost to complete upgrades, and typically services those with the means to absorb the capital cost of upgrades.

2.7.2 Retrofit Program Scan

The CCCM compiled a comprehensive Program Scan which can be found in Appendix B: Municipal Program Scan.

The CCCM consulted the following resources when compiling Appendix B:

- BACCC's Home Retrofit Policy Analysis (2019)
- A Toolkit for Affordability Driven Home Energy Efficiency Retrofits Through Local Improvement Charge Programs by Volta Research (Published Jan 15, 2023)
- Accelerating Home Energy Efficiency Retrofits Through Local Improvement Charge Programs: A Toolkit for Municipalities by Clean Air Partnership (2020)

There are 5 provinces (Alberta, Nova Scotia, Ontario, Prince Edward Island, and Saskatchewan) and 1 territory (Yukon) that have Local Improvement Charge (LIC) /Property Assessed Clean Energy (PACE) enabling legislation. British Columbia is running Pilot Programs but does not have legislation.

There are currently 4 municipalities in Ontario offering LIC programs.

- City of Toronto's Home Efficiency Loan Program (HELP)
- City of Kingston's Home Energy Retrofit Program (KHERP)
- City of Ottawa's Better Homes Ottawa
- Town of Halton Hills's Retrofit Halton Hills (Pilot)

In addition, Durham Region offers the Durham Greener Homes program which partners with local credit unions to finance loan structures.

Enbridge Gas launched the Clean Home Heating Initiative with funding from the Government of Ontario which provides residents of Sault Ste. Marie, St. Catharines, Peterborough, and London up to $4,500 in rebates towards the installation of a hybrid air-source heat pump home heating system.

2.8 Available Incentive Programs

There are a number of incentive programs designed to assist homeowners with reducing the cost of completing home efficiency upgrades. A comprehensive list of current offerings is provided below (current as of April 2023).

- Enbridge Gas: Home Efficiency Rebate Plus (HER+) Program
  - Co-delivery agent of Federal Greener Homes Program
  - Open to all qualifying Ontarians
  - Additional benefits for Enbridge gas customers

    - Receive up to $10,000 in rebates for qualifying upgrades

- Government of Canada: Greener Homes Grant
    - Open to all eligible Canadians
    - Primary federal grant available
    - Receive up to $5,600 in rebates for qualifying upgrades

- Government of Canada: Greener Homes Loan
    - Complimentary program to Greener Homes grant
    - $40,000 unsecured loan at 0% interest repayable in 10 years

- Government of Canada: Oil to Heat Pump Affordability Grant (OHPA Grant)
    - Pre-registration open,
    - $5,000 grant for those fuel-switching from oil furnace to heat pump
    - Stacks with incentives above including Greener Homes Grant and HER+ above

- Enbridge Gas Smart Thermostat Rebate
    - $75 discount code that can be applied at check-out for eligible smart thermostats.
    - Available to all Enbridge customers

Income-qualifying Support Programs

The following programs are available to Hamilton homeowners who qualify as low income, including many seniors on fixed incomes.

- Enbridge Gas: Home Winterproofing Program
    - Free insulation, draft proofing and smart thermostats for income qualifying Enbridge gas customers.

- SaveON Energy: Energy Affordability Program
    - Free energy saving kits to income-qualifying Ontarians.

2.9 Further research on Local Improvement Charge

Having examined various program models, the CCCM spent additional time analysing the most common HERO program financing model; a Local Improvement Charge (LIC) framework. Analyses completed by groups such as The Atmospheric Fund, Clean Air Partnership, Dunsky Energy Consulting,

the Pembina Institute, and the Bay Area Climate Change Council (BACCC) were consulted.

The Pembina Institute outlines the following principles of LIC programs that make them attractive structures to drive maximum participation:

- Participation is **voluntary**.
- Financing **covers most or all of upgrade costs**.
- **Long financing** terms (up to 30 years) enable the opportunity for homeowners to repay the loan in smaller increments over time.
- Financing **can be combined or "stacked"** with other incentive programs.
- Financing is **permanently fixed to the property** so that the loan is tied to the property in which the renovation is taking place.
- LIC is held as a lien on the property that is **transferred to the new owner in the event of a property sale.** During property sale, a title search should be completed which shows the LIC loan affixed to the property. The new owner may elect to adopt the loan payments, or to enter into negotiations with the seller to pay the outstanding balance ahead of finalizing the sale. The seller may choose to recoup the cost of paying out the LIC loan balance by incorporating the value of the outstanding balance into the asking price.

2.9.1 Benefits of a Local Improvement Charge Framework

LICs are seen as a low-risk way to encourage investment in measures with long term paybacks or community benefits by giving homeowners access to capital to overcome the high cost of upgrades, access rebates which otherwise may have been unattainable using personal finances, and complete improvements that lead to an increase in home energy efficiency - often resulting in utility bill savings. Moreover, due to their status as a special charge on the tax roll, LIC assessments stay with the property when it is sold, rather than with the former owner, thus helping to overcome one of the main barriers homeowners face when considering potentially large capital investments in their home.

Table 5 Comparison of incentives across retrofit program frameworks

		LIC	Grant/Rebate	Tax Incentive
Environment & Funding	GHG reduction potential	Highest	Lowest	Medium
	FCM funding available?	Yes	No	No
City Supports	Count towards municipal debt?	No	NA	NA
	Repayment to City?	Yes	No	No
	Impact per dollar spent?	High - Very High	Low - Moderate	Low - Moderate
	City personnel required?	Yes	Yes	Yes
	Agreement with City required?	Yes	Yes	Yes
Homeowner Needs	Homeowners required to pay upfront?	No	Typically	Yes
	Supports Low Income homeowners?	Yes	Only 100% Funded Grant	Yes *(To a Certain Extent)*
	Available to greatest number of Hamiltonians?	Yes	No *(Typically Capped)*	No
	Do repayments stay with the home?	Yes	N/A	No
	Resell concerns?	Potential	No	No
Other	Requires FTEs to administer	Yes	Yes	Yes
	Requires marketing to run program	Yes	Yes	Yes
	Requires municipal bylaw	Yes	Yes	Yes

LICs are the preferred option over other municipal funding options for the following reasons:

Lowest cost to the municipality

- **Rebates and grants are non-repayable**. This makes this model expensive and likely unsustainable for municipalities. Rebate programs have been shown to provide incentives to only a small group of people,

namely those who can afford the upfront capital costs required to purchase equipment/upgrades which are required to unlock rebates. A loan-based program reduces the barrier to entry of requiring participants to absorb the cost of upgrades with person capital.

- **Municipal tax incentives reduce overall tax revenue**, making this model expensive for the municipality.
- **LIC loans are recoverable** and therefore **do not count toward a municipality's debt**.
- **LIC loans are low risk** for the municipality: if loan repayments go in arrears, the overdue amount can be recovered from the property using a special priority lien that takes precedence over other liens on the property, including mortgage liens.
- Municipalities have **access to fixed cost**, long term financing that they can make available to homeowners through LICs.
- **LICs can encourage private investors** in home upgrades by bundling portfolios of upgrades to achieve the scale of cashflow required by many private investors and by providing quality assurance.

LICs have a proven history of success

- This model of building retrofit programs has been proven successful in a number of different jurisdictions, including Toronto, Kingston, Ottawa, Melbourne, and San Francisco
- The Ontario Municipal Act, 2001 (O. Reg. 586/06) allows LIC loans to facilitate the implementation of home upgrade programs by financing energy efficiency and renewable energy measures voluntarily carried out by individual property owners on their buildings.

Makes upgrades affordable to a larger population of homeowners

- **Does not require** homeowners to possess **upfront capital**, thereby allowing low income individuals to upgrade their homes.
- Provides access to **favourable loan terms**, otherwise unavailable to some homeowners.
- **Low income households**, with few collateral assets or limited access to credit, may qualify for financing.
- Allows homeowners facing energy poverty to access capital to purchase technology that can improve utility costs.
- **Loan stays with the property**, and is not tied to an individual, ensuring homeowner does not continue to payback a loan for a home they are no longer living in.
- Reduces homeowner risk in case of moving.
- **Used to complement other programs to see additional savings.**
- Increases equity by allowing a greater number of individuals to access the money to make energy efficiency improvements.
- Can be designed to be cost-neutral through administrative and interest fees from participants.

- Improvements may increase property value.
- Potential for lower utility bills through program participation.
- Other aesthetic and comfort benefits.

Other

- Long term, low fixed-rate financing.
- More GHG emissions reduced through ability to support greater potential number of homeowners versus grants and rebates, which usually have capped funding.
- Most other municipal retrofit programs utilize an LIC model, meaning there is potential for contractors to work across the region in similar programs. An LIC model leaves the door open for collaboration in the future with neighbouring municipalities offering similar programs.

2.9.2 Requirements to support a LIC program

2.9.2.1 Supporting Bylaws

Though Ontario amended *O. Reg 586/06* to allow for the creation of LIC programs within Municipalities, the City must enact a bylaw to allow for energy-related home upgrades on private residential property.

The Clean Air Partnerships LIC toolkit outlines within Appendix B1 a sample municipal-bylaws required to enable an LIC program. Furthermore, section 3 of Pembina Institute's *Property Assessed Clean Energy in Canada: Design considerations for PACE programs and enabling legislation* outlines key aspects of provincial or territorial legislation, but context for inclusions for municipal by-laws may be useful as well. The Clean Air Partnership toolkit outlines additional language that should be included, such as permitting municipal borrowing or bond issue, establishing priority lien status, and creating annual LIC roll.

2.9.2.2 Staffing & Participant Process

An LIC program requires several administrative steps in order to disburse loans to participants. This effort does come with staffing commitments and will require inter-departmental cooperation. Generally the steps to apply an LIC loan to a property are as follows:

1. Homeowner applies to the LIC program which is reviewed by a Program Coordinator, and Taxation.
2. Once the Taxation confirms the applicant's address and that they are current on property taxes – a follow up call is warranted.
3. Guidance is provided, participant collects quotes for required work and likely completed an energy assessment from an NRCan Registered Energy Auditor (although not required).

4. Quotes are submitted and a funding request is generated.
5. A notice to proceed is issued to the participant.
6. Work is completed, invoices are submitted.
7. The approved funds are released for participant to repay contractors.
8. Taxation applies the balance as a "special charge" priority lien on the applicable property.
9. Participant begins repayment of loan through regular property tax payments.

2.9.2.3 Loan Loss Reserve

Loan loss reserves (LLRs) are considered a credit enhancement tool where a **reserve fund is set up and can be drawn from if homeowners cannot make an LIC loan payment**.

Total LLR recommended amounts are a **certain percentage of the overall loan portfolio** (ex. 10%-20%). It should be noted that within FCM's Capital Program 5% of the total loan is required for an LLR, but the total amount should reflect the loan risk. For example, if a municipality has a total debt of $1,000,000 from a home upgrade program, their LLR may have approximately $100,000 in it for municipalities to draw from. The larger the number of loans in the portfolio, the smaller percentage of the loan balance is typically needed. Governments are particularly well-suited to offering an LLR given their ability to aggregate large loan portfolios.

As summarized by Pembina Institute, government entities often set up third-party LLRs for clean energy financing to help advance their energy priorities or catalyze private investment in clean energy projects. Third-party LLRs can offset some of the risks for private investors and mortgage holders by providing bridge payments for any losses incurred on PACE investments (for lenders), or on properties with LIC assessments (for mortgage holders) in the case of default.

LLRs are also able to reduce cost of capital and increase access to capital. Additionally, risks to government and mitigation approaches during periods of high default rates, LLRs can be drawn down significantly, even to the point that claims from lenders exceed the fund balance. Governments should be obligated only to maintain the LLR balance up to a portion of the initial loan values and should not be obligated to rebalance the funds after drawdowns are made. This strategy requires funds being set aside and potentially provided by the municipality.

It should be noted that research shows across over 52,000 homes within US PACE/LIC programs, there has been a 1% or less default rate. Similar

experiences have been shown in municipalities offering LIC programs within Ontario.

3 STAKEHOLDER CONSULTATION

Major Findings: Stakeholder Engagement

- A HERO program has long been advocated for by long-serving environmental groups within the City.
- Homeowners have an increasingly strong expectation for a HERO program which helps them reduce utility expenses and take climate action.
- Contractors are broadly supportive of HERO programs, although they will require advanced notice to prepare and would benefit from messaging which can be deployed to explain the program to customers.
- Although energy audits are required to access utility and government incentive programs, they are seen by many as a barrier to entry which can lengthen workorders sometimes by as much as 6+ weeks. Moreover, the cost of Pre and Post retrofit energy audits can often approach $1,000, while participants can only expect rebates of $600.
- A comprehensive HERO program should make efforts to cover the full range of expenses a homeowner may encounter in order to reduce barrier to entry.
- A HERO program that offers whole-home solutions and high loan cap (>$40,000) may result in a participant profile that skews towards-and incentivizes the participation of a more affluent demographic.
- Special considerations should be made for low-income participants and equity-deserving groups.
- Tenant protections, such as informational mailers, should be put in place to mitigate against renovictions HERO programs perform best when there are minimal barriers to entry, and coaching services are offered to assist participants in project planning and accessing incentives/rebates.

The CCCM engaged with 40+ stakeholders through a combination of interviews and presentations over the course of program development. Stakeholder engagement was completed to:

- Gain insights into the experience of municipalities offering retrofit programs taking lessons learned relating to challenges, barriers to participation and best practices;

- Engage with those actively working within the energy retrofit sector to understand the conditions in the field;
- Develop an understanding of the challenges homeowners and contractors face in accessing incentive programs; logistical constraints surrounding retrofits and customer experience/perceptions;
- Tap into the expertise of eNGOs, tenant rights groups, social advocacy groups and relevant committees to better understand the needs of Hamiltonians, better understand the unique challenges of equity-seeking groups, and to inform the guiding principals used to direct program design;
- Understand the efficacy of various upgrades by engaging with service organizations, energy auditors and retrofit program providers;
- Understand the workforce capacity and expertise of contractors within the retrofit sector across the Greater Hamilton area;
  and,
- Establish connections with contractors and industry organizations in order to socialize the draft BHH program elements, and share relevant program development timeline.

A comprehensive Stakeholder Findings Report can be found within Appendix A.

3.1 Residential Retrofit Sector Trends

Overall, residential retrofits are seen by all stakeholders as a valuable and necessary pathway to achieving Hamilton's climate action goal of net-zero GHG emissions by 2050. Of note, the majority of stakeholders responded favourably to the BHH program elements as described.

General feedback relating to stakeholder perceptions of HERO programs has been aggregated and expressed in Table 6.

Table 6 HERO program feedback across select stakeholder groups

Focus Area	Trend(s)
Homeowners	• High interest in a municipal retrofit program which incentivizes upgrades which increase home energy efficiency. • Primary drivers of participation are 1) utility bill reduction and 2) environmental benefits. • There is an increasing expectation that municipalities should incentivize building retrofits AND provide project management support/guidance.

	• Homeowners experience anxiety/stress when asked to independently navigate project management. • There is generally high knowledge among homeowners about high-visibility incentive programs such as Greener Homes and Enbridge HER+. • Conversely, homeowners struggle to navigate the administrative processes required to access. rebates/incentives from Greener Homes, HER+. • Increasing interest from homeowners to reduce their carbon footprint, though upgrade cost and perceived value is more important. • Identify the high cost of equipment and upgrades required to achieve performance thresholds as a significant barrier to undertaking retrofits. • Express frustration that Greener Homes Grant and Enbridge HER+ rebates typically do not cover the full cost of NRCan energy assessments.
Contractors	• Generally supportive of HERO programs as they drive demand for services. • Increasing demand for contractor services, allowing for contractors to pick and choose jobs, delaying smaller jobs. • Significant under the table work. • Few contractors brand their work to highlight potential positive environmental impacts. • Contractors are aware of incentive programs such as Greener Homes and HER+ but have difficulty explaining rebates to customers. • Contractors state the requirement for NRCan energy assessment to access incentive programs slows process and is perceived as a barrier to completing workorder. • Most HVAC contractors installing ASHPs receive installation training directly from the supplier. • Insulation contractors often do not offer stand-alone draft-proofing/air-sealing as a service due to the low profit margin. Most prefer to include as part of a larger work order. • Some larger insulation contractors have the ability to conduct blower-door testing, and thermal scanning of the home to inform recommendation of insulation measures. • HVAC contractors indicate a panel upgrade may be required to accommodate ASHP install, especially if the existing electrical demand of the home is high. • There continues to be a high demand for skilled labourers.

Energy Auditors & Service Organizations	• Service Organizations continue to experience high demand for energy audit services from homeowners. wishing to access provincial and utility incentive programs. • Energy Auditors have expressed high demand often results in less than adequate time spent sitting with homeowners digesting the energy audit results. • The rebates offered by the Greener Homes Grant and Enbridge's HER+ program are insufficient to cover the full cost of pre- and post-retrofit assessments.
Building Retrofit Program Administrators	• All municipalities offering HERO programs experience strong support and participation. • Municipalities typically experience organic program growth with word of mouth and targeted ads being drivers of participant interest. • HERO programs offering large loans cannot guarantee a return on investment within the repayment period. • Programs typically offer pilot programs which incentivize early adopters by offering 0% interest loans • Programs that offer performance target-based rebates find that homeowners of financial means typically are able to access these "deep retrofits" more readily. • Typically, "deep retrofits" may require an investment of more than $40,000. • Municipalities offering HERO programs with whole home solutions (water conservation, energy efficiency, on-site renewables, building envelope, space & water heating) find participants are drawn to aesthetic upgrades & on-site renewables which may not substantially reduce GHG emissions. • HERO programs that offer windows and doors as an eligible expense see a large portion of homeowners spending tens of thousands of dollars to upgrade windows. This has been described as an ineffective upgrade when considering GHG emissions reduction potential. • HERO programs that require NRCan energy assessments note some participants view this requirement as a barrier to entry. • HERO programs that are administered directly by the municipality require significant resourcing and municipal staff support. Several municipalities have elected to outsource administration of the HERO program to a local non-profit or registered service organization. • Participants who install ASHPs typically experience 80% GHG reduction when the ASHP is the primary heating

	source, and 60-70% reduction when a hybrid ASHP configuration is installed. • Participants who only upgrade insulation and building envelope typically experience 30% GHG reduction. • HERO programs are administratively burdensome to offer, typically requiring 3-8 hours per application. • Work orders average 3-12 months in length, and can be significantly longer if energy auditors are in high demand. • Programs which offer coaching services/ touchpoints with participants experience higher participant satisfaction. • Income qualifying participants should first be directed to free incentive programs such as Enbridge's Home Winterproofing Program.
Industry & Manufacturer Organizations	• Broadly supportive of HERO programs. • Offer training in new technologies (ASHPs), as well as building standards such as Passive House and Net Zero Renovators. • Typically communicate with membership via quarterly meetings and newsletters.
Environmental NGOs	• Broadly supportive of HERO programs as a viable climate solution. • Advise supports for low-income, equity-deserving groups be put in place. • Recommend spending municipal dollars on measures which substantially reduce GHG emissions from residential units today.
Tenant Rights Advocates	• Caution against renoviction tactics which may be employed by landlords. • Recommend program documents prohibit landlords from passing cost of LIC loan repayment onto renters. • Recommend a program information package be physically mailed to address once an application is approved to appraise tenants of scope of work.
General Feedback	• Huge increases in home upgrades since COVID. • Federal 'Greener Homes' and Enbridge HER+ incentive program has driven further upgrade interest.

4 PROGRAM DESIGN

The following section provides a detailed overview of the program design for the Better Homes Hamilton (BHH) program. All elements of the BHH program were designed using an evidence-based decision making process informed by research and stakeholder engagement. At several key milestones, the program design framework was pressure-tested with knowledgeable stakeholders including:

- Relevant City of Hamilton departments,
- The Bay Area Climate Change Implementation Team (BACCIT) on Home Energy Retrofits,
- Contractors (from independent operators to national corporations), NRCan service organizations, and NRCan registered energy auditors and,
- Five municipalities offering or designing HERO programs.

4.1 Guiding Principles

The CCCM was contracted to design a program which has minimal barriers to entry which allows the greatest number of Hamiltonians to participate and substantially reduce household GHG emissions.

With this mandate in mind, the CCCM proceeded to design the BHH program using the following guiding principles:

- To design a program that is scalable and enables the greatest number of Hamiltonians to participate while keeping accessibility and equity front-of-mind;
- To develop a program with “user-friendly” processes free of administrative barriers-wherever possible which assists homeowners in achieving substantial reduction of GHG emissions from their residence while improving home energy efficiency;
- To employ a community-based approach to gathering feedback drawing upon the expertise of relevant NGOs, trades and industry associations, working groups/committees, and regional contractors;
- To proceed with program design by using an evidence-based decision making process informed by primary research and through consultation with other municipalities offering similar programs;
- To identify consumer protections safeguards which mitigate against unintended adverse consequences of participation;
- To design a program that is stackable with existing utility and government incentive programs in order to reduce barriers to entry; and,

- To develop the program in a manner which supports the targets outlined in Low Carbon Transformation 2: Transforming Our Buildings within the CEEP.

4.2 Program Overview and Participant Pathway

At its core, the BHH program is a loan-based program which incentivizes homeowners within Hamilton to undertake upgrades which result in increased residential energy efficiency and decreased GHG emissions.

The BHH program is an LIC program offering low-interest, fixed rate loans which may serve as the capital required to finance upgrades, and access rebates offered within rebate programs such as The Greener Homes Grant, Enbridge HER+, and the Oil to Heat Pump Affordability Grant.

Participant Pathway

The following describes the typical step-wise pathway a participant of the BHH program can expect from application to project closure:

- Participants will apply to the BHH program via an online portal, or in person submission.
- Participants will be required to identify if the property identified within the application is a rental unit. If the property contains rental units, upon successful completion of the application, a physical mailer should be sent out according to the consumer protections recommended in Section 4.7.
- The Project Manager will compile the list of applicants and work with supporting services to determine eligibility.
- If applicants meet the eligibility criteria the Project Manager will schedule a pre-consultation meeting to go over the eligible retrofits for the BHH program, as well as the other incentive rebates programs. At this time, if participants are interested in accessing external rebates and incentive programs (Enbridge HER+, Greener Homes Grant, OHPA Grant, Greener Homes Loan, Enbridge Winterproofing), they will be advised to undertake an energy audit by an NRCan Registered Energy Auditor (REA). It should be noted that a REA assessment is *not required* to enter into the BHH program. After pre-consultation with in-house Energy Coach to determine their goals, participants will gather quotes for the desired upgrades. These quotes, along with the pre-energy audit (if applicable) will be reviewed by the Energy Coach and a Funding Request will be generated.
- The participant will sign a Property Owner Agreement which allows the City of Hamilton to affix the approved funding amount in the form of a LIC loan appearing as a “special charge” on their property tax roll. This

may include an additional approval for a building permit, if applicable and will be determined prior to the Property Owner Agreement being completed. A notice to proceed will be issued and work can begin.
- At this time, if a down payment is required for work to be started, the Project Manager may disburse 30% of the approved funds. Once all work is completed, the participant will submit all invoices.
- Upon the completion of the workorder, if the participant wishes to access external rebate programs, an NRCan post-retrofit EnerGuide assessment is required. This is to be submitted to the Project Manager.
- Once all invoices and energy assessment documents are submitted to the Project Manager, the balance of the approved funds are released to the participant via cheque or EFT transfer to payout the invoices.
- At this time, the participant enters repayment with standard, equal special charges being applied to the Tax Roll and collected via regular property tax payments. The City reserves the right to conduct site-assessments to verify the work is completed.

4.3 Financial Model

As mentioned in section 2.8 Recommended Financial Model, the CCCM is recommending the City employ a Local Improvement Charge (LIC) framework. To recap, features of an LIC model include:

- Allows a municipality to issue low-interest, fixed rate loans to finance energy-efficiency measures on private, residential properties;
- Enables participants to repay in small, scheduled increments a long term (10-30 years);
- Enables participants repay loan via regularly scheduled property tax;
- Facilitates applying loan to the property as a first position lien; and
- Enables a loan to be held against the property rather than the participant so that, if the property is sold, the loan is transferred to the new owner or can be included in the sale negotiation. Secondly, again since the loan is held against the property, low-credit scores are not a barrier to participation.

LIC models are a low-risk and scalable financial model for municipal deployment due to the following reasons:

- LIC loans are recoverable over the term of the loan agreement;
- LIC programs typically experience a low default rate. Research referenced in Section 2.8 shows a less than 1% default rate across existing programs;
- A Loan Loss Reserve representing 5% of the total loan amount should be held back to absorb any potential defaults;

- In the event of a default, since the LIC appears as a "special charge" priority lien, City may recuperate losses following the standard mechanism for properties that are in tax arrears;
- Loans are stackable with existing rebate programs, allowing participants the ability to repay large portions of the loan quickly – hastening municipal recovery of funds; and
- Programs with LIC frameworks are eligible to receive funding from FCM to scale the program across multiple years.

The CCCM recommends each participant within the base BHH program be granted funding under the following framework:

Table 7 Base BHH Program Elements

Maximum Funding Amount	$20,000 per application
Loan Repayment Terms	15 years
Interest Rate	4.5% (subject to change)
Initial Disbursement	30% of approved funds
Administrative Fee	$200 (subject to change)

4.3.1 Financial Model Rationale

The financial model was informed heavily by research – primarily the experience and findings shared by other municipalities offering HERO programs. The following section explores the thought process which went into determining each program element.

Maximum Funding Amount

The CCCM settled on a maximum loan amount of $20,000 based on the following research findings:

- The CCCM was contracted to design a program that would result in maximum GHG emissions reduction per dollar spent. Programs that offer loans in excess of $30,000 have found that consumers often gravitate to upgrades which improve the aesthetic of the residence, but do not substantially reduce GHG emissions (i.e. windows and doors rather than an ASHP).
- Programs that offer larger loans cannot guarantee a positive return on investment within the term of the loan.
- $20,000 was determined to be a sufficient budget for a homeowner to either:

    - Substantially insulate their home across the majority of the building envelope OR;
    - Install an ASHP with budget to still complete attic insulation and/or air-sealing OR;
    - Install an ASHP and upgrade their electrical panel to future-ready their home for further electrification.
- It should be noted that if participants wish to access a deeper funding pool, the Canada Greener Homes Loan program offers a competitive loan structure which compliments the BHH program with up to an additional $40,000 loan from the federal government.

Loan Repayment Term

A 15-year term is recommended as it matches the average lifespan (and often warranty) of the most expensive eligible upgrade: an ASHP. Across Canada 15-20-year terms are common among HERO programs. In addition, it offers a competitive advantage against the Canada Greener Homes Loan program which requires participants repay the entirety of the loan within 10 years.

Interest Rate

A 4.5% fixed interest rate is recommended as this figure is consistent with interest rates in other municipalities. This rate may need to be revised by the City to reflect any "opportunity cost/cost of borrowing" depending on the source of funding if interest rates increase drastically.

It should be noted, the object of this interest rate is not to make money on the loan, but rather to cover the cost of borrowing and support long-term program sustainability.

The interest rate may be informed by the mechanism of funding when scaling the program after the initial pilot. For example, FCM's Community Efficiency Financing Application Guide structures the interest rate of their loan as *Interest Rate at time of disbursement + 2.5%.* Similarly, a financial institution may dictate the rate or "cost of borrowing."

In summary, City Staff will have to re-evaluate the interest rate regularly to ensure that allows for a sustainable interest rate for both the City and for HERO program participants and proceed accordingly.

Initial Disbursement – 30%

LIC programs are administratively intensive with several key documents requiring approval before funds can be released. Notably, in order to disburse the balance of approved funds to a homeowner – all invoices need to be submitted to the Project Manager, and a Work Order Completed form filed.

This process may result in contractors who completed work at the start of the retrofit process waiting months for payment. Under this circumstance, homeowners may experience pressure from contractors to settle invoices with capital that they may not have on hand.

Several HERO programs allow the Project Manager to discretionally release up to 30% of the approved funding before all invoices are compiled and submitted. This may alleviate contractor wait times, or satisfy contractors who require a down payment to begin work.

It should be noted that this mechanism offers little risk to the municipality as the homeowner is still liable for any funds disbursed according to the Property Owner Agreement signed document.

Administrative Fee

Based on conversations with other municipalities offering HERO programs, it is estimated that each participant may require three-eight hours of staff time. Some HERO programs require a base administrative fee to be applied. This may be either added to the loan, or collected separately. Administrative fees serve to cover a portion of staff time, but also deter participants from letting applications or files go idle. A standard fee is approximately $200.

It should be stated that this may be interpreted as a barrier to entry. In some examples, HERO programs add an administrative interest rate (1-2%) on top of the program rate to cover staff time. The CCCM believes that an administrative interest rate applied to the entire life of the loan results in a disproportionate collection of fees with respect to the efforts of staff.

The CCCM advises no administrative fee be added if possible.

4.4 Participant Eligibility Criteria

The BHH program is designed to allow the greatest number of homeowners within Hamilton to participate. In order for the LIC mechanism to work,

loans must be distributed to those who have residences of eligible building types with active Property Tax accounts.

The BHH program is open to applicants who satisfy the following criteria:

- Homeowner within Hamilton with an active Property Tax account in good standing (i.e. account not in arrears, no other liens on title);
- The applicable property may be the primary residence OR a rental property;
- The Property Tax account is in good standing (i.e. current, not in arrears) and has no other liens against the title;
- If the property is under a mortgage, the applicant must **notify** the mortgage holder via a provided form;
- If multiple owners appear on the Property Tax account, authorization from all parties must be collected in order to proceed with the BHH program;
  and,
- Eligible building types include existing low-rise residential properties including:
  - Single-detached
  - Semi-detached
  - Townhome
  - Row home

All eligibility requirements are informed by the LIC framework and FCM funding guides.

As an additional eligibility criterion, the City of Hamilton may wish to ask participants to prove good-financial standing by demonstrating they have not claimed bankruptcy or experienced any mortgage defaults in the last 5 years.

4.5 Eligible Expenses

Eligible expenses under the BHH program were chosen based on the following criteria:

- Substantially reduce GHG emissions immediately from residential units;
- Increase home energy efficiency – likely translating to lower utility costs for residents (especially when future considering carbon tax increases);
- Improve resident quality of life by decreasing noise, bettering indoor air quality and providing increased thermal comfort; and
- Reduce barriers to entry, including covering the cost of permits and assessments.

All eligible expenses were informed by research and stakeholder consultation. Eligible expenses can be broken down into four main categories:

1) Permits and Assessments
2) Building Envelope
3) Mechanical Systems
4) Supporting Infrastructure Upgrades

4.5.1 Permits and Assessments

Currently, incentive programs such as The Greener Homes Grant, and Enbridge HER+ offer $600 for the cost of EnerGuide home evaluations, and no incentives for building permits. Often, the EnerGuide rebates do not cover the full cost of assessments. It is not uncommon for participants of HERO programs to be surprised by additional expenses they did not expect. For someone living on a fixed or low income, this could be a significant barrier to entry. For this reason, the CCCM recommends all assessments and permits relating to retrofit activities be eligible expenses.

1) EnerGuide Assessments (Approximate Cost: $1,000)

The cost of pre and post retrofit assessments can often approach $,1000, exceeding the $600 rebate available to participants through the HER+ and Greener Homes Program. In order to remove the financial barrier to entry he entire cost of the assessments may be eligible to be claimed under the BHH program.

2) Blower Door Test: (Approximate Cost: $600)

If a participant does not partake in an EnerGuide audit, but wishes to have an insulation company complete a blower door assessment, this cost may be claimed under the BHH program.

3) Building Permits: (Approximate Cost: $285)

Building permits are required by the City of Hamilton for substantial work which alters the structure. Changing a heating system requires a standard permit totalling $285. If the contractor does not include the permit in the scope of work, a participant may claim this permit as an eligible expense.

4.5.2 Building Envelope

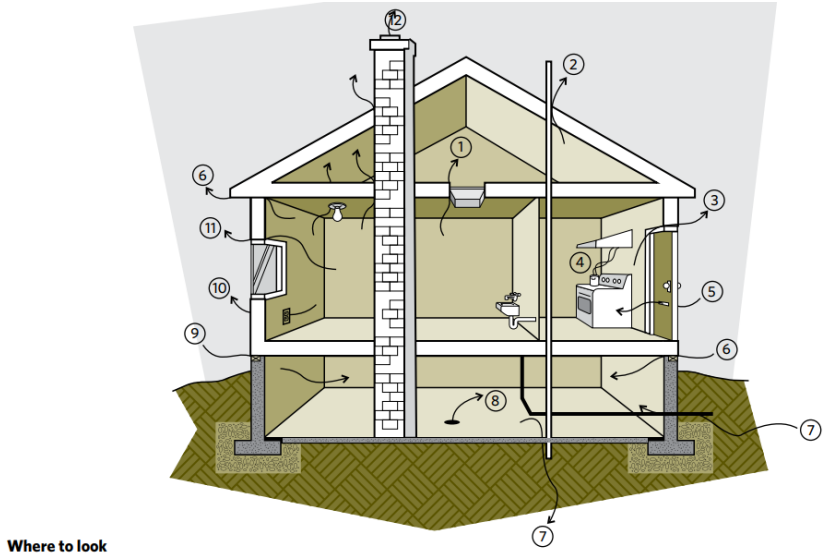
Upgrading the building envelope is the first step to any successful retrofit. The building envelope describes the external structure of a home including: the roof, external walls, and foundation. Often building envelope upgrades have a high ROI since they the measures undertaken remain functional for the lifetime of the structure, and provide incremental year-over-year savings on utility bills. The CCCM recommends two categories of building envelope upgrades: air-sealing and insulation.

1) Air-sealing: (Approximate Cost: $500-$1,000)

Drafty homes can often lose up to 30% of heat during winter months due to small cracks and crevices found throughout the structure. Common areas where heat escapes from homes are chimneys, electrical outlets, windows, doors, exhaust vents and basement floor joists.

Insulation companies have various diagnostic tests to determine where a home is drafty including smoke sticks, and a more comprehensive blower door test. Often, insulation companies will offer basic and comprehensive air-sealing packages, which may result in a significant reduction of air leakage depending on the state of the building envelope. A basic package may include weather stripping windows, while a comprehensive package may include sealing hard-to-reach areas such as attic exhaust vents.

More information about air-sealing can be found within NRCan's landmark report Keeping the Heat In.



Where to look

Key locations to check for leaks

1. attic hatch
2. ceiling penetrations into the attic
3. door
4. exhaust vent
5. mail slot
6. sill and header
7. service entry
8. floor drain
9. foundation crack
10. electrical outlet
11. window
12. chimney

Figure 5: Comprehensive air leakage control in your home. Source: NRCan's Keeping the Heat in

The Enbridge Gas HER+ program offers rebates up to $1,300 on air-sealing measures.

2) Insulation measures (Approximate Cost $2,000 – $12,000)

The CCCM recommends allowing the participant to choose what insulation measures are best for the home through consultation with the contractor, Energy Coach and likely a Registered Energy Auditor. Common insulation measures include:

- Attic insulation (~$2,000-$4,000)
- Floor Joists (~$1,000-$2,000)
- Basement insulation (~$8,000)
- Exterior wall insulation (~$8,000-$12,000)

It should be noted that only insulation materials, labour and activities which support insulation install are eligible expenses. For example, a basement wall insulation workorder that requires supporting materials to ensure warranty-approved installation such as framing/strapping, a moisture barrier or any other supporting materials may be invoiced and considered eligible expenses. However, homeowners may not claim materials used to "finish" the basement such as drywall, paint or aesthetic elements.

The Enbridge Gas HER+ program offers rebates up to $10,000 on eligible insulation measures.

4.5.3 Mechanical Upgrades

Mechanical upgrades describe retrofits which increase the efficiency of space heating and cooling systems. According to NRCAN, space heating accounts for 62% of energy use within residential structures, with 48% being attributed to natural gas as the primary heating fuel. Mechanical system upgrades which either install more efficient heating and cooling systems, or increase the efficiency of existing systems represent the quickest way to substantially reduce GHG emissions from a household.

Mechanical upgrades can be broken down into the following categories:

- Air source heat pumps (ASHP);
  - Including cold-climate (ccASHP), hybrid ASHPs and ductless mini-splits.
- Smart thermostats;
  and,
- Smart controllers.

1) Air Source Heat Pumps (ASHPs) ($3,000-$20,000)

Air source heat pumps are devices which do not create heat, but rather transfer heat which is found within the air from one location to the other. For this reason, ASHPs typically have a 3:1 heat output to energy expense ratio. This ratio is called the coefficient of performance, or COP. ASHP technology utilizes the same heat transfer principles which are found within standard air-conditioning units, refrigerators and car climate controls. Within an external condenser unit, air containing heat is passed over a coil with refrigerant, which captures the heat and transfers it to the distribution point. ASHPs have the added benefit of being reversable, meaning in the winter they operate in a space-heating role, while in the summer they function as an air-conditioner.

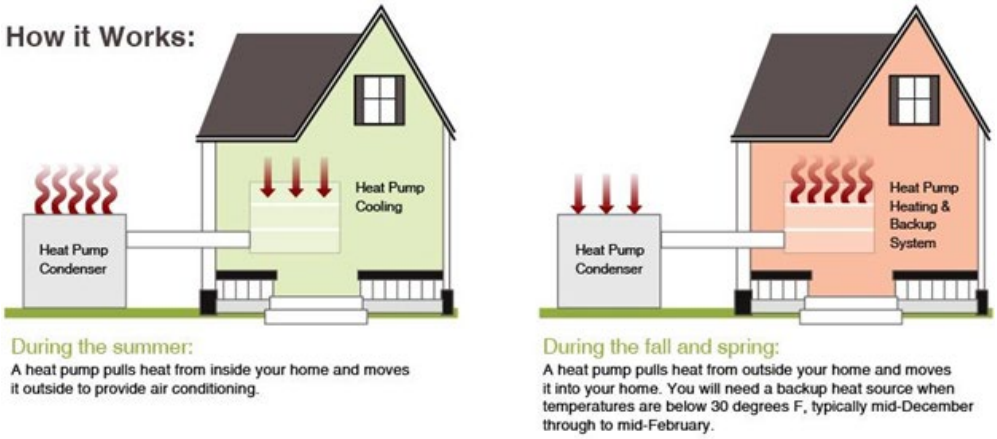


Figure 6 Overview of how heat pump work to move energy between indoors and outdoors, which results in heating and cooling. Image credit[4]

ASHPs come in 3 major types:

i. Full Conversion: ccASHP ($14,000 - >$20,000)
- These configurations completely replace the primary heating and cooling system in the house.
- This configuration works with houses that have central-air and ductwork.
- Typically, can operate efficiently up to -20C, under this point back-up electric resistance heating supplements heating demand.
- Results in substantial GHG reductions.
- Utility savings vary as it operates on electricity, which is currently more expensive than natural gas. Carbon pricing

[4] Image credit: **https://www.ecicomfort.com/blog/what-is-a-hydronic-heat-pump**

is expected to bring this figure to parity. Significant savings when compared to propane and oil-furnaces.

ii. Hybrid Configuration ASHP ($7,000->$15,000)
- This configuration replaces the air-conditioning unit in the house and supplements the existing heating system
- This configuration works with houses that have central-air and ductwork.
- Ideal configuration for a participant with an aging air-conditioner but has a furnace which has not yet reached the end of its operational life.
- Results in substantial GHG savings as the heat pump can accommodate heating during fall and spring, and depending on the model often well into winter.
- When paired with a smart thermostat, the hybrid-ASHP can achieve utility savings under current utility price and market conditions.

iii. Ductless Mini-split ($3,000-$7,000 per interior head)
- These configurations are ideal for homes without ductwork or central air conditioning.
- Interior heads deliver heating and cooling to zones from a centralized outdoors condenser unit.

In order to ensure equipment efficiency measures are met, and that the equipment selected by participants will be eligible to receive rebates from the Greener Homes Grant / Enbridge HER+ program, at this time the CCCM recommends that only ASHPs which appear on NRCan's eligible ASHP inventory be considered as eligible expenses under the BHH program.

Having said that, this requirement should be reviewed periodically as stakeholder consultation has indicated the NRCan eligible ASHP inventory is slowly updated and excludes a number of currently available ASHP models.

2) Smart Thermostats and Smart Controllers ($50-$500)

Smart thermostats and smart controllers are excellent tools to reduce utility costs. These devices are upgrade versions of traditional thermostats and can achieve significant utility savings even in the absence of other upgrades. Smart temperature controls allow homeowners to program setback points which increase or reduce home heating and cooling load according to time of day, occupancy and – in more expensive models – according to real-time weather conditions.

i) Smart Thermostats
- Common in the marketplace, typically accompany ASHP install.
- Can significantly reduce utilities expenditures even on a conventional furnace.
- Typically linked to Wifi and can be controlled remotely.
- Important in a hybrid ASHP configuration as the homeowner can program setback points where the furnace or backup heating will kick on.

ii) Smart Controller
- Simply a smarter version of a smart thermostat.
- Usually more expensive, often require a software subscription to access premium features.
- Offers more real-time data collection and customization of set-back points.
- Some smart controllers can run models which compare real-time electricity prices vs natural gas prices to choose the cheaper fuel source. Conversely, ECO modes also exist in some models which prioritize GHG reduction over commodity pricing.

Smart thermostats and controllers up to $500 may be considered eligible for the BHH program. The Enbridge Gas HER+ program offers a point-of-sale rebate up to $125 for all Enbridge Gas customers.

4.5.4 Supporting Infrastructure Upgrades

Participants may be taken by surprise by unanticipated costs required to accommodate electrification and HVAC install in the home. In order to reduce out-of-pocket expense, the CCCM is recommending the BHH cover up to $3,000 towards the cost of either:

1) Breaker Panel Upgrade*

Based on conversations with contractors, there is a significant number of homes in Hamilton operating on a 60amp electrical/breaker panel. If a home already has a significant electrical demand, a breaker panel upgrade up to 200amp may be required to support an ASHP installation. This upgrade serves to future-ready the home for further electrification such as electric or ASHP water heaters, and Level 2 electric vehicle charging. Upon a contractor recommendation and/or quote this may be considered an eligible expense.

2) Ductwork Repair*

Often, ductwork needs to be repaired or repositioned in order to accommodate an ASHP installation. Moreover, leaky ductwork can significantly reduce the efficiency of an ASHP, wasting utilities and causing premature wear and tear on the equipment. Upon a contractor recommendation and/or quote ductwork repair may be considered an eligible expense.

*Note: Breaker panel upgrades and ductwork repair are eligible expenses only under scenarios where they are required to support ASHP installation, as evidenced by contractor quotes – which are reviewed by the energy coach. It is important to note that the primary mandate of the BHH program is to incentivize upgrades which increase energy efficiency of homes while reducing GHG emissions today. Breaker panel upgrades and ductwork repair will not accomplish these mandates alone, and thus must be paired with an eligible upgrade to be considered an eligible expense under the BHH funding model. A maximum of $3,000 total may be allocated to support these activities. This is not an additional $3,000, but inclusive of the $20,000 max loan amount.

4.6 Contractor Eligibility

To help protect BHH participants, it is recommended that the City provide a list of contractors that have been vetted that adhere to certain basic safety and insurance standards. Being a public entity, City of Hamilton cannot recommend or require participants to select specific contractors for workorders, however, the City can help homeowners find contractors that adhere to several standards.

In addition to the list of contractors, in order to have a quote accepted by the BHH program, all contractors must provide to the homeowners along with their quotes, which the homeowner will provide to the City:

- Proof of a Hamilton business license
- Quote must show Registered HST#
- Proof of purchased liability insurance that covers all employees
- WSIB compliance

4.6.1 Insulation

There are no specific licences for insulation contractors within Ontario.

4.6.2 Electrical

If installing electrical equipment, proof of an Electrical Contractor Licence (ESA) is required.

4.6.3 HVAC

Heating, Ventilation and Air Conditioning (HVAC) is a not a license but a trade comprising multiple skilled strands. Often a contractor will be required to work on multiple types of systems which require independent certification.

For those contractors working with **refrigerants** (heat pump installs, air conditioner removal) proof of a **313A** or 313D license is required.

For those working in **ventilation**, a **Sheet Metal Mechanic** license is required per Skilled Trades Ontario standards.

Those working with **gas and oil burning furnaces** must adhere to the regulatory standards of the Technical Standards & Safety Authority (TSSA) which states:

- A minimum certification of **G2 gas ticket** is required to complete work on residential heating systems.
- If working on oil burning furnaces, a minimum of **level 2 Oil Burning Technician (OBT2)** certification must be shown.

4.7 Consumer Protections

Having explained the major BHH program design elements and the contractor eligibility criteria, the CCCM recommends several additional consumer protections be set in place to ensure participants are well-informed throughout the retrofit process.

4.7.1 Financial Transparency:

The Energy Coach and/or Project Manager will be able to preemptively map out a repayment plan based on the approved funding amount. Participants should be informed of the total loan amount, the total interest paid across the lifetime of the loan, and the amount which will appear on the "special charge" via regular property tax invoices. Participants should also be reminded that they are able to pay-off the total loan at any time. If a participant has an especially long workplan, the Project Manager may wish to advise they investigate bridge financing to cover the cost of invoices (assuming the 30% initial disbursement of funds is insufficient).

If a participant feels they cannot afford the loan repayments, they should be directed to complimentary programming such as the Canada Greener Homes Loan.

If a participant is income-qualifying, they should be directed towards income-qualifying support programs such as:

- Enbridge Gas Home Winterproofing Program
- SaveON Energy Energy Affordability Program

These programs provide **free** upgrades designed to reduce utility expenses and increase home comfort such as:

- Attic, wall and basement insulation;
- Draft proofing;
- Smart thermostats;
- Home energy saving kits;
- Water conservation kits; and
- High efficiency window air conditioner units

4.7.2 Project Management Advice

Participants may struggle with project management – especially when it comes to understanding the work that is required. The Energy Coach will be a touchpoint where participants can gain insights into how to properly plan a retrofit project and will review quotes submitted by the homeowner to ensure eligibility.

4.7.3 Contractor Registry

While the City of Hamilton cannot explicitly recommend contractors, the City can point participants towards contractors who have shown exemplary business practices and the training that goes above and beyond the minimum licensing standards. For example, not all HVAC contractors who have a 313A ticket have experience installing ASHPs to manufacturer standards.

The CCCM recommends creating a Contractor Registry using the format outlined in Appendix G: Contractor Registry. In order for a company to be on the BHH contractor registry, the following must be shown:

For all contractors:

- Proof of good business practice as evidenced by 3 customer testimonials;

- Optional but highly encouraged: Proof of EDI commitments; and,
- Optional but highly encouraged: Proof of sustainability commitments, and/or a corporate sustainability plan.

For insulation contractors:

- Completion of NAIMA Canada's National Insulation and Air Sealing Training Program OR equivalent training.

For HVAC contractors installing ASHPs:

- Proof of manufacturer training on models carried by contractor; and,
- Proof of completion of
  - HRAI: The Heat Pump Advantage
  - HRAI: Residential Heat Loss & Heat Gain Calculations
  - OR equivalent training.

4.7.4 Tenant Protections

Since the BHH program does not exclude landlords from participating, the CCCM gathered insights from tenant advocacy groups to inform recommendations which protect tenants from unforeseen consequences
The CCCM recommends the following protections:

- That the BHH program application form require the applicant to identify if the property being considered is a rental unit;
- If the property is identified as a rental unit, that a physical mailer be sent out to the property which provides tenants with the following information:
  - A program overview explaining how the BHH program works;
  - The contact information of the BHH Project Manager;
  - Information about what an LIC program is, and how it is the responsibility of the landlord to repay this loan via property tax bills; and,
  - Information about the scope of work and their rights as tenants.

That the OCCI work with the City Solicitor to input wording with the Property Owner Agreement which;

- Discourages and mitigates against the risk of renovictions to tenants;
- Clearly states that the financial burden of LIC repayments may not be placed on the tenant through rent increases;
  - The Better Homes Kingston Program embeds the following wording into the Property Owner Agreement:

"If applicable, the Property Owner shall not apply for an above-guideline rent increase pursuant to the *Residential Tenancies Act, 2006*, S.O. 2006, c. 17 to assist the Property Owner in paying the Special Charge (Actual) or any other cost associated with the Work."

- Requires the landlord to abide by and comply with all laws and regulations relating to tenants rights during a renovation; and,
- Requires the landlord to complete work in a timely manner with limited disruption to tenants.

Research suggests that if implemented, these consumer protections will result in an equitable and accessible program with limited unintended consequences for renters.

4.8 Program Delivery

Based on research, and examination of other HERO program delivery models, program delivery takes one of two forms:

- **Municipal delivery** – in which the City manages and administers the program; and,
- **3rd party delivery** – in which the City outsources the program administration to a delivery agent with the requisite skillset. Note: while this model may be able to outsource tasks such as: application intake, marketing, energy coach services and budget management, there will still need to be on-going supports within the City in the form of legal review of POAs, treasurer sign off on POAs, application of LIC loan to tax roll, financial support to set up cheque requisitions/EFT accounts etc.

Table 8 Delivery model comparison from municipal perspective

Delivery Model	Pros	Cons
Municipal Led	• Municipality has complete control of the program. • Municipality may stop or start the program at any time for any reason. • Ability to amend the program as needed. • Municipalities are seen as a trusted actor within the community.	• Staffing cost and staffing inputs • Municipality must generate their own document. tracking systems • Upon program scaling, the municipality must hire or staff-up to accommodate increased demand.
3rd Party Offering	• Less administratively burdensome on the municipality to outsource. • 3rd Party delivery agent brings staff with expertise in the retrofit space. • 3rd Party may have experience offering energy audits or administering retrofit programs. • May have their own marketing and professional networks which may be leveraged.	• Requires municipality to undergo lengthy RFP process. • Some risk to municipality reputation if program is not administered well. • Still requires point of contact within municipality to process program documents (staff time).

The CCCM highly recommends administering the program in-house for the time being in order to:

- Establish trust within the community;
- Establish inter-departmental workflows; and,
- Complete at least one program review/gap-analysis to better understand any insufficient program elements.

Following the proposed 'Incubation Stage' and upon scaling, the municipality may wish to issue a competitive RFP to a 3rd Party for program delivery. It is advised that any 3rd party delivery agent have the following:

- Experience offering HERO/retrofit programs;
- Experience working with, or offering EnerGuide Energy Audits;
- Being an NRCan registered Service Organization is an asset;
- Have adequate staff in place to administer the program; and,
- Good-standing and trust within the community.

4.8.1 Inter-departmental Workflows

The establishment of inter-departmental workflows is crucial for the successful implementation of the BHH program. It should be immediately noted that the general workflow described below will have to be established regardless of the delivery model (in-house vs 3rd party).

In addition, the CCCM can only make recommendations based on the process used at other municipalities offering HERO programs. OCCI staff will have to work with departments across the City of Hamilton to establish a workflow which is both functional and actionable.

In general, supports will be required from the following departments:

- *Legal*: to review Property Owner Agreements (POA) before sending off for approval.
- *Taxation*: to review Property Tax account standing and collect repayment.
- *City Treasurer*: to sign off and approve the POA and apply the LIC special charge to Title.
- *Finance*: to establish a cheque requisition/ EFT and to distribute approved loan amounts to participants, setup internal financial tracking system, and setup the loan loss reserve (if applicable).

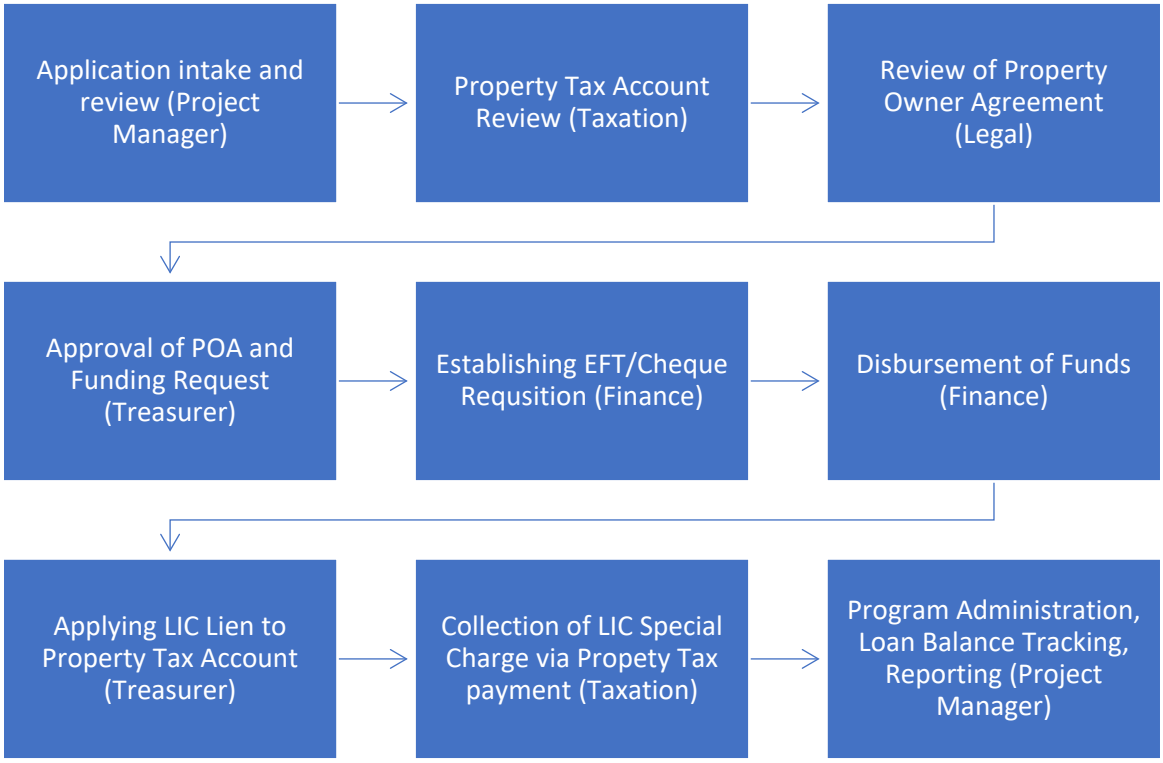


Figure 7 General BHH program interdepartmental workflow

In order to establish and codify responsibilities, the CCCM recommends the OCCI enter into service-level agreements with the departments mentioned above. These agreements should place emphasis to codify on-going in-kind staffing supports, as well as utilize a batch workflow process whereby each department is responsible for completing their contribution to the workflow on a regular basis.

4.9 Monitoring and Evaluation

Monitoring and evaluation is a critical component to any HERO program design. Since NRCan EnerGuide audits are not a mandatory component of the program, the CCCM encourages the BHH Project Manager to utilize software such as RETScreen and complete analysis of participant utility bills both pre and post retrofit. Recommended monitoring techniques are expanded upon below in Table 9.

Table 9 Recommended Monitoring Techniques

Monitoring Technique	Description
NRCan Energy Audit	Similar to the initial energy audit, an NRCan energy advisor will complete a second in-person home visit to take additional information and update the EnerGuide Score. While not required for this program, it is expected that most – if not all – participants will take part in an EnerGuide audit in order to access external rebates.
RETScreen	RETScreen is a clean energy management software which enables users to assess the viability of energy-efficiency upgrades as well as measure the actual and ongoing energy performance of buildings. This software could be used as a method of on-going monitoring of post-retrofit performance.
Access to Utility Bills	Recommended that participants show 12 months of utility bills pre-retrofit and be asked to provide municipal staff with access to utility consumption data five years post-retrofit.
Building Permit Inspection	If building permit is required, a building inspector will complete final inspection. Those results should be sent to the BHH Project Manager for tracking purposes.

Evaluation of program impacts can be interpreted in two ways, impact to the participant and impact on the municipality.

With respect to bringing participants along for the journey, an annual summary could be provided to program participants to further demonstrate upgrade impacts such as:

- **GHGs saved** for the past **year** and **cumulatively**;
- **Changes** in **energy consumption**.
- **Carbon tax savings**.
- Contribution to **local jobs created**.
- Information on **financial payback period**.

The summary would help quantify the value of the program and could be completed for each home or the total program. This process could be completed through *RETScreen* via utility bills for comparison to the initial baseline. Ideally, the use of Green Button would make this process significantly easier. These ongoing touch points also provide a platform for updating past participants on changes to program offerings etc.

With respect to evaluating the program's efficacy, the CCCM recommends the OCCI task the Project Manager with designing a monitoring framework which tracks:

- Total GHG emissions saved;
- Total energy reduction in GJ (electricity, fuel oils, propane, natural gas);
- Total amount and value of loans issued;
- Total number of participants;
- Total number of low-income participants;
- Track the number of applications which were denied, or program drop-outs. Record the reason why the application did not proceed;
- Total estimated hours spent by Energy Coach providing guidance to participants;
- Spatially map the participants across the City, while ensuring privacy, to determine if any FSAs/regions are under serviced;
- Record and gather participant testimonial relating to: "customer experience" working with Program staff, retrofit experience, home comfort and utility savings;
  and,
- Map impacts against Guiding Principles namely the mandate to reduce GHGs across the greatest number of participants possible.

4.10 Scalability and Funding

Funding for the program at scale is yet to be secured. A comprehensive comparative analysis can be found within Appendix E: Business Case, which compares the cost of administering the BHH program relying solely on municipal funds vs a scenario whereby the City is successful in obtaining funds from FCM's Capital Program: Loan or credit enhancement for local home-energy upgrade financing program.

In brief, the program budget depends entirely on 3 variables:

- The total budget for LIC loans;
- The number of homes targeted per year;
  and,
- The staffing and operational costs required to meet demand.

The CCCM has worked with the OCCI to scope out program budgets that include a 2-year Pilot Program that will serve as an incubator to justify and investigate the scalability of the BHH program. Potential scenarios of what could be possible to scale are provided below.

4.10.1 Municipal funding scenario

If the City of Hamilton were to administer a program which reaches 410 dwellings over 4 years and offers loans of $20,000 per participant using entirely municipal funds, the City of Hamilton would likely incur a cost of $11.8M – of which $8.2M is recoverable loans in a 15-year timeframe.

4.10.2 FCM supported funding scenario

Under a scenario whereby the City is successful in an application to FCM's Capital Program: Loan or credit enhancement funding the City would be eligible to receive:

- Funding via a loan to support 80% of program costs up to $10M; and
- A grant for 50% of the approved funding amount

With additional funding, the CCCM estimates the City of Hamilton would be required to make a **total investment** of $3.24M to administer the BHH program supporting 410 home upgrades with a breakdown of:

- $1.44M to administer a two year pilot program using municipal funds
- An investment of an additional $1.8M over four years to cover 20% of the program costs per FCM funding requirements

A full budget breakdown can be found within Appendix E: Business Case.

4.10.3 Future program scaling

It should be noted that funding from sources such as FCM is finite. In order to scale past 410 homes cumulative may require:

- Support of local financial institutions to offer preferred-rate loans which can be administered to participants rather than using municipal dollars;
- Private sector investment;
  and/or,
- Partnership with other municipalities offering HERO programs. A regional delivery model would cut operation and staffing costs considerably.

4.11 Program Expansion

Upon scaling, the City of Hamilton may wish to expand the BHH program with respect to adding eligible expenses, changing the loan amount or interest rate, and adding low-income supports. The CCCM recommends the

City of Hamilton complete program report cards and gap analysis upon the completion of the two year Pilot Program, and again after the four year BHH roll-out. At a high level the CCCM recommends the City:

- Review eligible expenses and expand eligible equipment types which reduce GHG emissions, but may not fall under the current offerings.
    - ASHP hot water heater,
    - Electric hot water heater,
    - Heat Recovery Ventilation (HRV) systems, and/or
    - Additional insulation measures.
- Review the maximum funding amount against future equipment prices. Recall, the goal of the loan is to prevent participants from going out-of-pocket to cover the cost of renovation; and
- Consider a low-income support program that is grant-based rather than loan based. There is an opportunity to offer retrofit "packages" such as insulation and air sealing, or funding ductless mini-split heat pumps.
    - Recall, heat pumps also work as air-conditioning units. Window-heat pump technology is improving. Similar to a window ac unit, installation does not damage the property making it an ideal option for tenants or those living in apartments without central AC systems. There may be a significant climate justice angle to pursue with this offering.

5 IMPLEMENTATION

Research has shown that HERO programs which offer a pilot program experience greater long-term program uptake. Pilot programs have additional benefits that include:

- Opportunity to train staff on the implementation of a HERO program;
- Establishment of public trust, increasing program visibility; and
- Provides an opportunity to incubate the HERO program and report back to Council on program success and recommendations for improvement.

For these reasons, the CCCM advises the City of Hamilton roll out the BHH program using a two-phase approach.

- Phase 1: a two year municipally supported Pilot/Incubation Stage and,
- Phase 2: a four year FCM supported BHH program.

5.1 BHH Pilot/Incubation Stage

The CCCM recommends the City of Hamilton incubate the BHH program via a two year Pilot Program administered by the Office of Climate Change Initiatives. The purpose of the Pilot Program is to:

- Allow OCCI staff the opportunity to gain experience offering a HERO program;
- Establish inter-departmental workflows which may be made more efficient ahead of full-scale program launch;
- Build momentum within the community and drive interest in the BHH program;
- Gather testimonials and data from participants across a variety of demographic groups, building types, and locations across the City;
- Give an opportunity for participants and staff to provide feedback on how to better the BHH program;
  and,
- By offering a Pilot Program in-house, OCCI staff can better speak to the administrative burden – better informing staff recommendation as to whether a 3rd party delivery model is preferred for the full BHH program.

5.1.1 Incubation Stage: Pilot Program Funding

The CCCM, on the recommendation of OCCI, suggests the Pilot Program be funded through existing municipal funds found within the Climate Change Reserve. The Pilot Program will be supported and administered by the OCCI.

The CCCM recommends staff requests access to an upper limit of $1.5M from the Climate Reserve to support the Pilot Program.

Table 10 Rough Pilot Program Budget

Expense Category	Cost
Total LIC Loan Budget	$1,000,000 (50 homes x $20,000)
Loan Loss Reserve	$50,000
Staffing Impacts – in-kind • 1.0FTE Sr. Project Manager over 2 years from OCCI • 0.5 FTE total over 2 years from Legal, Taxation, Treasurer, Finance	$317,000 1 FTE (2 years salary) In-kind supports
Marketing & Digital Communications	$60,000
Web Development	$10,000
RETScreen Software	$5,000
Pilot Program Budget	$1,442,000

*Assumes outsourcing BHH program web development. If possible, design the program website in-house to reduce costs.

5.1.2 Pilot Program Framework

It is recommended that during the Incubation stage, the Pilot Program utilize the same framework as the BHH program with respect to eligibility criteria, funding amount and eligible expenses outlined in Section 4.

The CCCM recommends a manageable yet impactful target of 50 home retrofits completed over two years, with a maximum of $20,000 in funding for each participant.

It is highly recommended the City of Hamilton offer a 0% interest loan and no administrative fee during the Pilot Project for the following reasons:

- 0% interest loans with no admin fee is a common practice among HERO programs;

- The goal of the Pilot is to incentivize early adopters to partake, while building trust and momentum within the community to adopt a full-scale BHH Program;
- 0% interest matches the most competitive external incentive the Canada Greener Homes Loan. The BHH program has the competitive advantage by offering Energy Coach services, as well as using an LIC loan with a longer term, and more consumer protections; and,
- Reduced financial barriers may incentivize low and fixed- income residents to participate, offering the OCCI a valuable insight into that demographic's experience with the program.

5.1.3 Pilot Program Elements

The following section outlines the suggested Pilot Program elements. All program design elements align with the base BHH program described in Section 4 with the exception of the recommendation to offer a 0% interest rate and no administrative fee.

Table 11 BHH Pilot Program Characteristics

Program Element	Description
Timeframe	Two years
Target	50 homes sourcing from a variety of eligible building archetypes, and demographic groups
Financial Model	Local Improvement Charge
Funding Amount	$20,000 per applicant
Interest Rate	0%
Repayment Term	15 years
Administrative Fee	$0
Eligible Building Types	Single-detached, semi-detached, townhome, row home,
Participant Eligibility	Homeowner within Hamilton Current on Property Tax payments No other liens against title
Contactor Eligibility	All criteria and licenses satisfied as outlined in section 4.6
Eligible Expenses	All upgrades outlined under section 4.5 including: • Permits and assessments • Building envelope (air sealing, insulation) • Mechanical systems (ASHP, smart thermostat, smart controllers) • Supporting Infrastructure Upgrades (breaker panel upgrade, ductwork repair)

5.1.4 Pilot Program Staffing Requirements

In order for the Pilot Program to be successful, it must be adequately staffed. The Pilot Program should have 1.0 FTE assigned to program administration, with additional support from existing OCCI staff and in-kind supports from Finance, Taxation, Legal and the Treasurer.

In order to show a fulsome cost to administer the BHH Pilot Program, within Appendix E Table 2, the CCCM has budgeted two years worth of salary for a Project Manager position using all-in salary and benefits figures provided by OCCI.

The CCCM recommends hiring the Project Manager with the requisite skillset to offer the Energy Coach role. The skillset for the Energy Coach role should include:

- A background in building science and/or five+ years working within the energy efficiency & retrofit sector;
- Ability to interpret and discuss EnerGuide assessments and blower door test results with participants;
- Ability to complete carbon accounting and calculations;
- Experience working within RETScreen would be a strong asset;
- Strong interpersonal skills;
  and,
- Proficient in Microsoft Excel.

It should be stated that research has shown that each application can occupy 3-8 hours of staff time between processing loan documents, energy coach services and disbursing funds.

5.1.5 Repayment Methodology

As mentioned previously in section 4.8.1 Interdepartmental Workflows, and OCCI will require the support of several departments including Finance and Taxation.

The CCCM advises that OCCI work with Taxation and Finance to develop a repayment structure which:

- Allows participants to make lump sum payments against the LIC loan balance, thereby allowing participants to leverage any rebates or personal capital to lower their "special charge" owed on each Property Tax bill.
- Allows participants to payout "special charges" incrementally over a 10-month or 12-month payment cycle. As it stands, Taxation applies

special charges two times per year. Large special charges in addition to regular property tax payments may lead to significant financial strain on participants.

In addition, a mechanism should be put in place which supports homeowners that have an arrangement whereby their mortgage lender incorporates property tax payments as part of their mortgage repayment plan.

The OCCI may need to allocate additional resources or acquire financial consulting services to build out the aforementioned mechanisms.

5.2 Marketing and Communications

Successful marketing and communications is essential to any program implementation. Agenda Marketing was contracted to craft a brand identification, logo, a website wireframe and supplementary marketing materials for the Better Homes Hamilton program.

All materials can be found within Appendix H: Marketing Materials.

5.2.1 Core Messaging and Brand Identification

The Better Homes naming convention was chosen for a number of reasons:

- Aligns with other retrofit program names, giving participants a level of reassurance that others are doing this work;
- Better Homes is synonymous with an increased quality of life and improving what is usually a participant's most precious asset – their home;
  and,
- Better Homes is precise enough that it implies improvements/retrofits but general enough that the City may adapt the program structure without having to rebrand.

Figure 8 Better Homes Hamilton program logo

The BHH program logo strongly identifies with the largest portion of the target market – single detached homes. The green arrow and vertical mobility of the logo implies improvement and environmental friendliness.

Messaging surrounding the BHH program should focus on energy efficiency and GHG reductions rather than promising utility savings. Participant utility bills are informed by commodity price of energy, equipment efficiency and participant behaviours. The BHH program can only provide efficiency upgrades – and therefore cannot impact participant behaviours or the price of energy.

Key messages should be crafted to focus on objective facts such as:

- The BHH program offers loans to complete energy-efficiency upgrades;
- The BHH program will help you reduce GHG emissions from your residence, resulting in carbon tax savings year over year;
- The BHH LIC format offers secure, fixed, low-interest loans which can be paid back over time via regular property tax payments; and,
- The BHH program offers competitive financing which can be used to access rebates which may otherwise have been unattainable from government and utility incentive programs.

5.2.2 Marketing Materials

Agenda Marketing has created several marketing assets that can be deployed by the City of Hamilton in advance of the Pilot Program launch.

Two sample assets can be seen below. Figure 9 shows a mock-up social media advertisement which may be used to drive traffic towards an online

application or program website. Figure 10 shows a sample bus-shelter advertisement. It is important to remember that the BHH program communications may have to be adjusted to place emphasis on either home heating or cooling depending on the season.

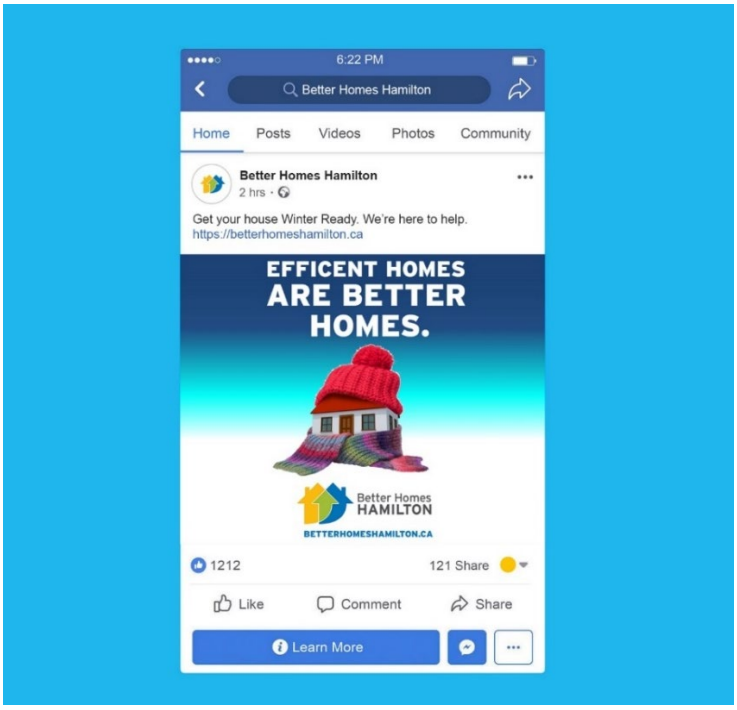


Figure 9 Sample BHH social media advertisement

Figure 10 Sample BHH bus shelter advertisement

The CCCM recommends the City of Hamilton allocate resources to build out a fulsome marketing campaign to support the Pilot Program launch.

Agenda Marketing has provided a high-level analysis of marketing costs across various mediums including; digital advertising, radio advertising, and physical medium such as bus shelters, printout and billboards.

The CCCM recommends utilizing a combination of digital marketing and physical advertisements to communicate the program to a variety of demographic groups. Digital advertising such as Google Ads can be used to target postal codes with a high number of eligible buildings. Physical advertisements such as billboards and bus shelter ads may capture individuals who do not have access to social media, while building the BHH brand as a community-facing program. Last, the City may wish to deploy BHH branded lawn signs for participants to display. Often word-of-mouth from trusted sources (family members, neighbours, community leaders, etc.) is a substantial force which drives demand for municipal retrofit programs.

5.2.3 Tenant Information Mailer

In addition to marketing materials, the CCCM highly recommends OCCI work with Marketing to design a physical mailer that is delivered to any property which has been designated a rental property on the BHH application form.

This tenant information mailer should contain information as described in Section 4.7.4 Tenant Protections.

All assets and budget breakdown can be seen in Agenda H: Marketing Materials.

5.2.4 Web Design

Agenda Marketing has also created a wireframe based on examples of other HERO program websites collected by the CCCM.

The website is the primary consumer-facing element of the BHH program. It is of the utmost importance that the website:

- Concisely explain the benefit to participation;
- Include an online application form;
- Include information about the purpose of the program, how it works and what the eligible upgrades are;
  and,

- Include information on other incentive programs such as the Greener Homes Grant, Enbridge HER+, Oil to Heat Pump Affordability Program, as well as income-qualifying programs such as the Enbridge Gas Home Winterproofing Program, and the SaveON Energy: Energy Affordability Program.

The wireframe can be found within Agenda H: Marketing Materials.

5.3 Community Engagement Campaign

As part of the FCM Detailed Study Design workplan, the Bay Area Climate Change Council will be facilitating a community engagement campaign between May-June 2023.

The object of this campaign is to:

- Provide the public with information about the BHH program;
- Celebrate the City of Hamilton's efforts to take impactful climate action;
- Increase public perception surrounding the BHH program, and the merits of HERO programs;
  and,
- Provide a mechanism whereby Hamiltonians can submit contact information should they wish to be made aware of when the application process for the Pilot Program opens.

BACCC and the CCCM will provide a summary engagement report to the OCCI following campaign closure.

5.4 Contractor Engagement Campaign

As part of the FCM Detailed Study Design workplan, the CCCM will be facilitating a contractor education campaign between May-June 2023.

The purpose of this campaign is to reengage with contractors, and provide industry associations with resources to distribute to their membership. The goals of the contractor education campaign is to:

- Provide contractors with information relating to the final design of the BHH program;
- Inform contractors of rough timelines for the Incubation Stage of the BHH Pilot Program launch;
- Inform contractors about the Registered Contractor list, and how to enroll in it (see more information in Appendix G);

- Provide contractors with messaging relating to how they can speak about the BHH with customers;
  and,
- Gather contact information of contractors within the region who would like to be kept informed of BHH program progress.

The CCCM will provide a summary engagement report to the OCCI following campaign closure.

5.5 BHH Program Budget

The CCCM has recommended a two phase rollout which includes:

- A two year Incubation Phase in the form of a Pilot Program facilitated by the OCCI;
  and,
- A four year BHH Program with FCM support.

As discussed in Section 4.10 Scalability and Funding, the CCCM estimates that in a scenario where the City of Hamilton was successful in obtaining FCM funding to scale the program, the City would be required to make a **total investment of $3.24M** to administer this program with a breakdown of:

- **$1.44M to administer a pilot program** using municipal funds*
- An **investment of an additional $1.8M over four years to cover 20% of the program costs** per FCM funding requirements[5]

Business cases to support both of these recommendations can be found within Appendix E: Business Case, specifically Table 2.

A rough implementation plan, including steps required to support Pilot Launch can be found within Appendix F: Implementation Plan.

5.6 Pre-Launch Considerations & Implementation Planning

The following section provides an overview of **key activities** required to support program launch and implementation. The CCCM has provided a comprehensive implementation plan in Appendix F: Implementation Plan.

[5] *Note: Within 15 years the City will recover $1M from the Pilot Project investment in the form of LIC loan repayments, making the actual cost to administer this stage approximately $400,000.

5.6.1 Short Term: Pre-Launch Activities

Following City Council's approval of the BHH program design, the OCCI must lead the implementation and development of the BHH program. Key activities include:

- Hiring a Project manager with the requisite Energy Coach skillset;
- Directing the Project manager to develop and finalize program documents using the templates provided by the CCCM, and with inputs from Legal;
- OCCI to work with Legal to develop bylaws supporting the BHH program and LIC financial framework;
- OCCI to present bylaws to City Council for approval;
- Program Manager to develop a participant tracking framework which tracks the status of paperwork, approvals, and loan status;
- OCCI to enter into service level agreements with supporting departments (Legal, Finance, Taxation);
- Project Manager to develop batch workflow with applicable departments to ensure applications are reviewed and approved in a timely manner;
- Project Manager to work with City of Hamilton Web Design team to develop the program website with an application portal drawing upon the wireframe provided by Agenda Marketing;
- Project Manager to work with City of Hamilton Corporate Communications to craft a pre-launch communications campaign drawing upon the work of Agenda Marketing;
- Project Manager to develop a metrics tracking and reporting system;
- Project Manager to implement the CCCM's recommendations to generate a list of qualified contractors.

5.6.2 Medium Term: Incubation Stage of BHH Program

- OCCI staff and Project Manager to implement BHH Incubation Stage of the BHH Program;
- Project Manager to gather participant testimonials as workorders are completed;
- OCCI to report back to Council at the end of the Incubation Stage;
- OCCI to examine the Pilot Program to determine if any elements need adjustment before launching the full BHH program;
- OCCI and Project Manager to investigate alternative sources of funding, and/or apply to the FCM Capital Program: Loan or credit enhancement for local home energy upgrade financing program funding.

5.6.3 Long Term: BHH Program Launch & Reporting

- If funding for scaling is successfully obtained, OCCI to either hire additional staffing support, or go to RFP for a 3rd party delivery agent to administer the BHH program;
- Project Manager to work with Corporate Communications to develop and deliver a fulsome communications campaign;
- Project Manager to work with web development to update the BHH website with participant testimonials from the Pilot Program
- Touchpoints as required with Contractor Registry;
- OCCI to investigate alternate sources of funding including private investment, and/or refinancing of the program via investment from financial institutions;
- Annual reporting back to City Council or as required.

6 ADDITIONAL RECOMMENDATIONS

In addition to the comments made throughout the report, the CCCM recommends the following elements be considered to increase the likelihood of program success.

6.1 Additional Considerations

Program Goals

- Direct the Project Manager to fine-tune program goals beyond the broad sentiment of GHG reductions across the greatest number of homeowners. Research suggests that with ASHP install, >60% GHG reduction can be achieved on average, however not all homeowners may install ASHPs;
- Goals should go beyond environmental impacts to include elements of social equity, accessibility, climate justice and increased standard of living;
  and,
- Link goals to City aspirations and existing strategies.

Baseline Data Creation

- Work directly with utility providers to develop a mechanism whereby participants may grant the Project Manager access to utility bills 12 months pre-retrofit and 5 years post retrofit;
  and,
- Invest in RETScreen training for OCCI staff.

Monitoring and Evaluation

- As previously mentioned, design a mechanism whereby the OCCI staff may access participant utility information five years post retrofit; and
- Work with the Building and Permitting office to design a methodology for post-retrofit site-inspections.

Program Delivery

- Consider setting up a Program Advisory Committee with representation from all departments entering into service level agreements with OCCI to facilitate the BHH program. A Program Advisory Committee may be useful in ironing out wrinkles in batched workflows, and serve as a body to report back to;
- Limit the number of steps applicants have to take whereever possible. For example, if a permit needs to be filed, establish a methodology whereby the contractor or Project Manager may apply;

- Ensure frequent touch-points with participants, do not let applications go idle for more than 3 months;
  and,
- Upon scaling past the pilot, additional staffing is highly recommended to handle the volume of applications.

Eligible Expenses

- Upon scaling, the City of Hamilton may elect to expand the eligible expense offerings to include items which further reduce GHGs such as:
  - Heat Pump Water Heater;
  - Electric Water Heater;
  - Heat Recover Ventilator;
  - Windows & Doors;
  - On-site solar photovoltaic;
  - On-site solar thermal;
    and/or,
  - Accessory items such as electric pool heaters

The upgrades above are not currently eligible under the BHH program design because research indicates they do not have the same potential to reduce GHG emissions per dollar spent as the upgrades recommended in section 4.5. Having said that, upon scaling-and depending on the landscape of eligible rebates from external sources-the City may wish to expand the eligible expenses to accommodate homeowners wishing to complete more comprehensive retrofits.

Low Income Supports

Ensuring equity continues to be addressed and at the forefront of consideration the CCCM recommends consideration for:

- If additional funding can be procured, the City is advised to create a pathway for income-qualifying participants to receive additional supports;
- Additional supports may take the shape of a 0% interest loan, and/or a grant-based incentive program;
  and,
- Inspiration can be taken from Enbridge Gas: Home Winterproofing program which provides free air-sealing, attic insulation and smart thermostats to qualifying customers.

6.2 Next Steps & Key Recommendations

The following are next steps and key recommendations:

- OCCI submit Recommendation for City Council approval with this report as appendix outlining the Better Homes Hamilton Program;
- OCCI to request approval from Council to access an upper limit of $1.5M from the Climate Reserve to finance LIC loans and operation costs of a two year Pilot Program
- OCCI to hire the Project Manager with requisite Energy Coach skillset;
- OCCI staff to work with the City Solicitor and the Legal Staff to draft applicable program bylaws to support an LIC framework to be brought back to Council for approval;
- OCCI staff to work with Legal to draft all program documents;
- OCCI to enter into service-level agreements with supporting divisions/departments such as Finance, Taxation and Legal;
- Project Manager to work with Web Development to design the BHH website using the wireframe provided by Agenda Marketing (Appendix F);
- Upon completion of the Incubation Stage of the BHH Program, OCCI staff submit an application to the Federation of Canadian Municipalities application under the Capital Program funding stream to help cover program costs for the first four years of the program.

7 CONCLUSION

The CCCM advises the OCCI follow all steps outlined in section 6.2 to in order to successfully implement the BHH program.

The BHH represents a significant opportunity to support homeowners within Hamilton to partake in an impactful climate action – namely, completing energy efficiency upgrades to their residence which increase home comfort while decreasing GHG emissions.

The BHH program can be generally described as a municipally led incentive program which offers participants low-interest, fixed rate loans to both finance home energy improvements, and assist homeowners in bridging the capital cost required to access external rebates such as the Enbridge HER+ , and Greener Homes Grant programs.

Through a combination of competitive financing, consumer protections and energy coaching services provided by a knowledgeable OCCI staff member, the BHH program offers a tangible pathway for homeowners to reduce GHG emissions.

Thank you to all City staff, departments, and divisions who consulted on the design of the BHH program, in addition to all stakeholders who participated in consultations. Special thanks to the Bay Area Climate Change Council, and its Implementation on Home Energy Retrofits for in-depth consultation throughout the design process.

APPENDIX A: STAKEHOLDER ENGAGEMENT SUMMARY

Summary of Stakeholder Findings
Better Homes Hamilton Program Design

December 2022

Better Homes HAMILTON

Hamilton

CENTRE FOR CLIMATE CHANGE MANAGEMENT AT MOHAWK COLLEGE

Executive Summary

The City of Hamilton's Community Energy & Emissions Plan (CEEP) within the broader Climate Action Strategy (CAS) identifies reducing greenhouse gas (GHG) emissions from residential buildings as a key opportunity for Burlington to achieve its goal of becoming net zero by 2050. Understanding the need to move quickly on the development of a Home Energy Retrofit Opportunity (HERO) program, in May 2021, Council directed staff to undertake the process of entering into an agreement with the Centre for Climate Change Management to design a detailed HERO program, in partnership with City Staff. Recommendations on program design and delivery, including a pilot program, are anticipated to be presented to Council in May 2023.

To date, the CCCM's research progress has focused heavily on stakeholder engagement to understand:

1. **Barriers and drivers** – learning from best practices in HERO program delivery and challenges identified by other municipalities offering similar programs as well as experts in the field
2. **Market development** – supporting contractors to grow their businesses to meet the demand for retrofits
3. **Program administration** – designing a sustainable, feasible program that best meets homeowners' needs while reducing the administrative burden on the City, contractors and homeowners.

Stakeholder outreach to over 40 groups, businesses, program delivery centres, utilities, other municipalities and experts identified two main audiences that must be considered for a successful retrofit program: homeowners and contractors.

To engage in the program, homeowners must understand the value of the retrofit and have a convenient experience using the program. Contractors must be engaged in selling retrofit products to their clients and also experience little friction in buying equipment, installation, and administration. If both groups experience friction in the program – such as delays, equipment backlogs, or outsized administrative burdens – this will likely result in poor program uptake.

Additionally, a wide range of key considerations for program design were recognised to optimize success. This report discusses five key findings that will inform the program design recommendations, including that of a pilot project.

In general, stakeholders identified that the technology or retrofit options on offer are only one component of a successfully implemented program. A program which does not consider the implementation process, co-benefits, and stakeholders beyond the homeowner will see limited uptake. Other success factors include:

- Effectively communicating program benefits beyond financial and Greenhouse Gas (GHG) savings, such as improved home comfort and aesthetics;
- Providing clear, simple information to homeowners on program offerings, price points, and payment methods;
- Providing clear, simple resources to contractors relating to how they can access training for new technologies and net-zero renovation practices, how they can participate in the program and most importantly, how to talk about the retrofit program with customers;
- Initiating a local small-scale pilot on a select group of homes; this tangibly demonstrates the impact of retrofits on homes,
- Promoting relationships with contractors as the on-the-ground advocates for home retrofits;
- Enabling quality assurance mechanisms that build trust between homeowners and contractors (e.g. recommended certifications),
- Upon scaling, harmonizing HERO programs with adjacent cities (e.g. Hamilton and Burlington) to minimize confusion for homeowners, maximize business opportunities for contractors, and drive the scaling of a regional market;
- Using effective marketing programs to drive awareness amongst homeowners and local contractors;
  and,
- Ensuring the best positive experience for homeowners.

Moving forward, two communication campaigns will be completed to more fulsomely engage both **homeowners and contractors** following the CCCM's presentation to Council in May 2023. The CCCM will deliver a contractor education campaign between May and June 2023 with the goal of communicating the parameters of the Better Homes Hamilton Program (pending council approval), and conveying how contractors can join a Qualified

Contractor Registry. At the same time, the Bay Area Climate Change Council (BACCC) will deliver a community education campaign intended to both celebrate a decisive climate action taken by the City in the form of the Better Homes Hamilton Program and drumming up citizen interest in an upcoming Pilot Program.

Introduction

In recent years, municipal home energy retrofit (HERO) programs have been recognized as a key opportunity for cities and towns to fight climate change. Approximately 16 Ontario municipalities have either identified the need for a HERO program to meet municipal climate goals, completed a business case, or plan on completing one with several offering pilot or full-scale program. The City of Toronto's Home Energy Loan Program (HELP) is Ontario's flagship HERO program and was established with the goal to help residents reduce GHG emissions substantially.

Within the CEEP, Hamilton has attributed 8% of city-wide GHG emissions to residential building. The CEEP has set a target of retrofitting 100% of existing homes to achieve 50% energy efficiency savings relative to 2016 by 2050. This action is expected to reduce city-wide GHG emissions by 2.8% (243.6 $ktCO_2e$). In recognition of this significant opportunity for emissions mitigation, in May 2021, the City of Hamilton Council directed staff to undertake the process of entering into an agreement with the Centre for Climate Change Management to designing a detailed HERO program, in partnership with City Staff. Recommendations on program design and delivery, including a pilot program, are anticipated to be presented to Council in May 2023.

HERO programs are typically built on the premise of "the home as a system", as renovating one area of the home (ex. improving insulation) can alter the energy requirements of other areas of the house (ex. furnace size, the need for increased air exchange from the outside environment, etc.). To incentivize these renovations, financing is offered through local improvement charges (LICs). LICs allow homeowners to access low-interest loans, typically offered through municipalities. Loan payments are tied to the property, not the homeowner and are repaid alongside property tax payments; if homeowners sell their home, the loan stays with the home. The rationale is that the benefits of the renovation rest with the current owner and are financed by energy savings from the retrofit.

This report focuses on stakeholder outreach completed by the CCCM to help understand the concerns, priorities, and lessons learned from other home-upgrade retrofit programs. This holistic approach investigates how the construction and retrofit sector works as a system, how key players act within the sector, and it helps to identify barriers and constraints while focusing on the opportunities to optimize the process to increase participation and satisfaction.

Methodology

To establish a better understanding of the parameters which would lead to a successful HERO program within the City of Hamilton, the CCCM completed 40+ stakeholder outreach interviews. Prior to this, an initial literature review of available national programs, progress reports, and primary literature was completed. This was followed by stakeholder outreach, with the goals of:

- Understanding current supply chain process of available programs and retrofit work
- Identifying the motivators and barriers on solutions relating to the development of an effective, streamlined residential home retrofit program that would significantly reduce greenhouse gas emissions from the greatest number of homes in Burlington.

To date, approximately 40 stakeholders falling within the following categories have provided feedback:

- Activists
- Bylaw and Permitting offices
- Contractors
- Developer/ Renovators
- Educational institutions
- Energy auditors
- Environmental organizations and non-profits
- Equipment specialists
- Municipal retrofit program staff
- Incentive providers
- Industry Associations
- Lawyers
- Local associations
- Low-income homeowners
- Poverty advocacy groups
- Program Delivery Agencies

- Realtors
- Researchers
- Retailers
- Tenant-focused organizations and non-profits
- Utilities Providers

Stakeholder engagement was continuous throughout the project which included regular check-ins with:

- Monthly updates and discussions with the BACCC Implementation Team on Building Retrofits. This committee is a collection of local leading experts in home energy efficiency.

- Regular check-ins with City staff in the Office of Climate Change Intiatives.

- Circling back with key stakeholders, including industry associations, NGOs and contractors.

A homeowner survey was completed in October 2023, the results of which can be seen in Appendix C: Homeowner Survey. Major findings include:

- Homeowners within Hamilton broadly support a loan-based retrofit incentive program.
- Homeowners believe it is the responsibility of the municipality to both incentivize building retrofits as well as to provide guidance regarding the process of how to undertake retrofits, and access existing rebates offered by utility providers and government.
- Homeowners identified utility savings and environmental benefits as primary motivators for undertaking residential retrofits.
- In the absence of a municipal retrofit program, homeowners expected to finance upgrades by using personal savings and taking on additional det.

Taken together, stakeholder outreach and survey results have informed program design and implementation to ensure the design of a scalable program that drives homeowner uptake and benefits, and incentivizes a market shift to meet demand.

Stakeholder Findings

Stakeholder discussions led to feedback on a wide variety of retrofit and supply chain topics. The following table summarizes five key findings from the research.

Table 1: Summary of Findings from Stakeholder Engagement

Finding #1: A local municipal HERO program is feasible and desirable. Research showed that potential positive impacts of home retrofits for GHG reduction are of interest to the majority of stakeholders. However, the current complexity of the retrofit market has made uptake and participation difficult. Solving for this complexity – by creating a scalable, customer-focused HERO program – will help residents invest in their homes' value, protect against future impacts of climate change and help Burlington become a net zero community by 2050.	
✓	**Technology for retrofitting residential homes to significantly reduce greenhouse gases is available and affordable.**
✓	**There are significant co-benefits for both homeowners and local businesses.** Homeowners can realize greater home comfort, the potential for reduced energy bills, and increased home value. The demand for retrofit services drive more jobs and increased revenue for local home renovation businesses.
✓	**A municipal program will drive participation.** A municipal program can drive consistency, trust, and complement programs offered by local utility companies, as well as the federal and provincial governments. As the market grows, non-profits and private actors will also likely enter with their own offerings. For example, the federal government has offered the Greener Homes Program which upon launch experienced administrative delay due to the volume of applications. Currently, Enbridge Gas is co-delivering the Greener Homes Program under the Home Efficiency Rebate Plus (HER+) program. A local program can help Hamilton residents navigate these programs and incentives, while also providing additional options for those who are unable to participate because of the program limitations.
✗	**Inconsistent program offerings (i.e. programs only offered for 1-3 years) reduces interest and dissuades contractors from participating.** Until now, a lack of consistent government financial incentives has reduced supply chain actors' interest in retrofit technology and delivery.

✓	A consistent municipal program would help create and then support the development of a stable market for retrofits and help homeowners and contractors plan for the long run.

Finding #2: A municipal program should support a "phased" approach to retrofits.

While desirable, a "whole home" solution – extensive retrofits that help homeowners achieve near net zero greenhouse gas emissions – are unfortunately cost and time-prohibitive for most residents. This solution would require a near-total renovation of the home, which would require a sizeable (often $50,000 or more) loan and be disruptive to homeowners, taking months to complete.

Instead, the CCCM will recommend a program that can provide a simple, foundational offering that will significantly improve energy efficiency and reduce greenhouse gas emissions. The homeowner can then add additional retrofit services over time to further reduce their impact and prepare their home for the challenges of climate change.

✗	**Current whole house retrofit programs typically see lower than expected participation due to the cost and time-consuming nature of extensive home renovations.**
✗ ✓	**Homeowners have difficulty accessing necessary financing to complete a "whole home retrofit."** Programs that provide $5,000-$20,000 loans to upgrade are able to be accessed by a greater number of people of varying income levels and/or equity in their home.
✓	**With guidance, stacking eligible retrofit measures will maximize energy efficiency and reduce GHGs.** Creating a simple, affordable program will enable homeowners to realize immediate energy efficiency savings and co-benefits. And then, over time, homeowners can continue to "stack" home energy projects to multiple the impact. The City can also include more programs, include offerings that help support climate adaptation or neighbourhood beautification over time.
✓	**The "phased approach" also allows the City to offer additional programs to promote equity for low-income homeowners and tenants.** Separate or complementary programs that work directly to support low-income homeowners will be needed in the future to support total equity and access to retrofits. Additional funding streams or incentives for equity-deserving groups may drive participation. Incentives could take the form up income-qualifying grants, preferred interest rates, etc.

Finding #3: Education and outreach to homeowners *and* contractors is needed.

Outreach identified two stakeholder groups critical to program success, homeowners and contractors. Considerations to be addressed for both groups include education on program availability and inclusions, communication of retrofit benefits, and a simplified process. By addressing these program components, a more appealing program for these key stakeholders will work to improve participation and a positive experience.

✓	**Homeowners need to clearly understand the financial return on investment (ROI) and energy savings to help reinforce their decision to retrofit.** Marketing efforts should focus on clear, simple communications on benefits to homeowners.
✗	**The decentralized nature of the construction industry and inconsistency of programs** makes it difficult for homeowners to understand and navigate incentive programs. Confusing communications surrounding the eligibility requirement for rebates is a barrier.
✗ ✓	**A lack of supporting regulations in the home renovation sector creates challenges for guaranteeing quality of work and the advertisement of low carbon technologies.** A local HERO program, administered with quality assurance checks in place, can help drive the market for green renovations.
✗ ✓	**While improving, there is a limited number of trained individuals to complete retrofits using low carbon technologies (e.g. air source heat pumps, air sealing).** The City can work with local business associations and training partners to ensure that trained and certified contractors can participate in the program.
✓	**Informed contractors can provide a wealth of knowledge regarding homeowner feedback and interest in programs, as well as advocate and educate homeowners on the programs.** Marketing efforts targeted at contractors may have a greater impact than direct marketing to consumers.
✓	**The market will need to scale to meet demand.**

	Before starting this program, the City should work to give suppliers and manufacturers 6 months lead time to stock equipment and work to educate their customers (e.g. contractors).
Finding #4: A HERO program can help homeowners "future proof" their homes. A HERO program can help homeowners realize value over time.	
✗ ✓	**The current low cost of natural gas reduces financial incentives for homeowners.** However, with the increasing carbon tax, there is an opportunity to help homeowners "future proof their homes" by reducing energy needs now to significantly save money over time.
✓	**Homeowners using fuel oil (which is more common in rural areas) are already paying higher prices to heat their homes.** This premium will only increase with the carbon tax increase. A retrofit can help these homeowners reduce costs now, and in the future. These homeowners can take advantage of the newly announced Oil to Heat Pump Affordability Program which offers a $5000 upfront payment to those fuel switching.
✓	**Retrofits that use heat pumps can be used for heating *and* cooling.** This will help homeowners be able to install air conditioning – which is becoming more important as the region sees high summer temperatures due to climate change.
Finding #5: Homeowners require supports in navigating the retrofit and rebate application process.	
✓	**An "energy coach" or "energy concierge" service is desired by homeowners.** Homeowners have expressed a strong desire for project management guidance and supports in navigating the application process for various incentive programs.
✗	**Requirement for a home energy audit is a barrier to participation.** Energy audits have been shown to bottleneck the application process and create barriers to entry for participants. It is advised that the "energy coach" work with applicants to understand their goals, timelines and financial situation. In order to access external rebates/incentive programs an Energuide Energy Audit it required – however some homeowners may value speed over accessing rebates.
✗ ✓	**Diversity of housing stock means scaling programs can be difficult.** Homeowners will have individualized needs and need a trusted, helpful expert to speak to about what retrofit best fits their needs.

✗ ✓	**Accurate methods to measure GHGs pre- and post- retrofit are difficult to implement.** Measuring impact is difficult. An Energy Coachcan act as a point of contact to college homeowner testimonials, gather utility bills pre/post retrofit, and collect Energuide Assessments.
✓	**Upon scaling, a local retrofit delivery centre can be a regional delivery model – shared amongst several municipalities to reduce costs for operating the centre.** This can also be helpful for contractors who work across the region to be able to speak to one point of contact about incentives. This one-stop-shop approach would streamline the application process for homeowners.

Overall, the research emphasized that the success of a program is not entirely dependent on the technology and financial support offered to homeowners. Instead, additional considerations including involvement and convenience for contractors, homeowners, and allowing a smooth transition for the supply chain are critical. Additionally, ensuring adequate resources for marketing and communications of the program itself is a key lesson learned from other programs.

Pilot Program

Stakeholders identified that ideally, programs would build towards a whole-home retrofit solution with the primary goal of nearly eliminating GHG emissions. Conversely, this option was noted as currently not realistic for homeowners due to steep upfront financing, lack of clear financial return on investment, and perceived inconvenience during retrofit completion.

Instead, this study found overwhelming evidence to support offering a simple, foundational program that would provide small scale ($5,000- $20,000) loans to local homeowners to undertake specific kinds of renovations. This program could also complement already existing programs (offered through governments and local utilities) and scale over time. This approach would prioritize smaller retrofit projects that reduce GHGs while also being less burdensome on upfront financing and reducing stress on the supply chain.

The CCCM is currently designing the Better Homes Hamilton Program with the expectation that City administer a pilot program that would target homes from a variety of building archetypes especially those using heating oil, propane, or electricity for heating and cooling. These energy sources are either high GHG emitting sources of energy, or are costlier than the typical electricity/natural

gas home heating combination, or both. This approach would focus on piloting a program with homeowners who would realize a significant ROI while also targeting those most at risk of energy poverty (which is defined as a minimum >6% of take-home income dedicated to utilities).

This program would inform future programs, testing solutions to ensure broader applicability for Hamilton residents, while stimulating the retrofit market.

Next Steps

Stakeholder outreach will continue to inform all aspects of the work going forward.

- The completion of a Hamilton Homeowner Communications Campaign by BACCC (May-June 2023).
- The completion of a Hamilton Contractor Education Campaign by CCCM (May-June 2023).
- Continued discussions with local advocacy groups, such as BACCC, to provide ongoing feedback.
- Recommendations on a marketing plan to drive uptake and participation from homeowners and contractors.

By May 2023, the CCCM will be prepared to report back to Council on the pilot project and next steps to develop and offer the HERO program.

APPENDIX B: MUNICIPAL RETROFIT PROGRAM SCAN

The following home energy retrofit opportunity (HERO) programs were examined as part of the background research which informed the recommendations and design of Hamilton's retrofit program.

A comprehensive list of municipalities within Canada that are either designing or offering municipal retrofit programs can be found within:

- A Toolkit for Affordability Driven Home Energy Efficiency Retrofits Through Local Improvement Charge Programs by Volta Research (Published Jan 15, 2023)
- Accelerating Home Energy Efficiency Retrofits Through Local Improvement Charge Programs: A Toolkit for Municipalities by Clean Air Partnership (2020)

There are 5 provinces (Alberta, Nova Scotia, Ontario, Prince Edward Island, and Saskatchewan) and 1 territory (Yukon) that have LIC/PACE enabling legislation. British Columbia is running Pilot Programs but does not have legislation.

Appendix B Figure 11 Status of PACE/LIC enabling legislation in Canada. Source: Volta Research

A comprehensive list of retrofit programs across Canada has been compiled by Volta Research and can be found at under "List of LIC and PACE Programs in Canada" at https://voltaresearch.org/resources/affordable-retrofit-toolkit

Appendix B Table 12 Status of known retrofit programs in Ontario

Municipality	Program Name	Progress	Target Audience	Financial Model	Delivery Model	Metrics of Success	Notes
Toronto	Toronto HELP	Available since 2014	Residential	LIC with low, fixed interest rates (3.7-4.4%) based on repayment 5-20yr Average loan: $22,000 2% Admin charge on loan	Windfall Energy	187 completed projects as of Feb 2019 Goal was 1000 homes by 2016 Projects typically resulted in 30% energy savings, 550tC02e emissions reduction cumulative	A three-year pilot designed and implemented by the City of Toronto Two streams: Residential (HELP) and multi-family (Hi-RIS) First program created under Ontario's LIC regulation (O.Reg 586/06)
Kingston	City of Kingston Home Energy Retrofit Program (KHERP)	Available since 2019	Residential	LIC loan w/ 0% interest up to 40K or 10% of current home valuation Includes rebates for GHG reductions up to $5000 for >30%	Municipally delivered	Requires a minimum 20% reduction in GHGs Targeting average of 30% GHG reduction per home Program target to retrofit 25-50% of pre-1991 homes by 2040	
Ottawa	Better Homes Ottawa	Launched	Single-family homes	LIC	3rd Party Enviro-centre		Pilot phase wrapping
Halton Hills	Retrofit Halton Hills	Pilot Program	Single-family homes	LIC		9 homes accepted	
Durham Region	Durham Greener Homes	Launched	Single-family homes	Loan 3rd party Not LIC	Windfall Ecology Centre		Funded by Pathwise Credit Union and Rapport Credit Union

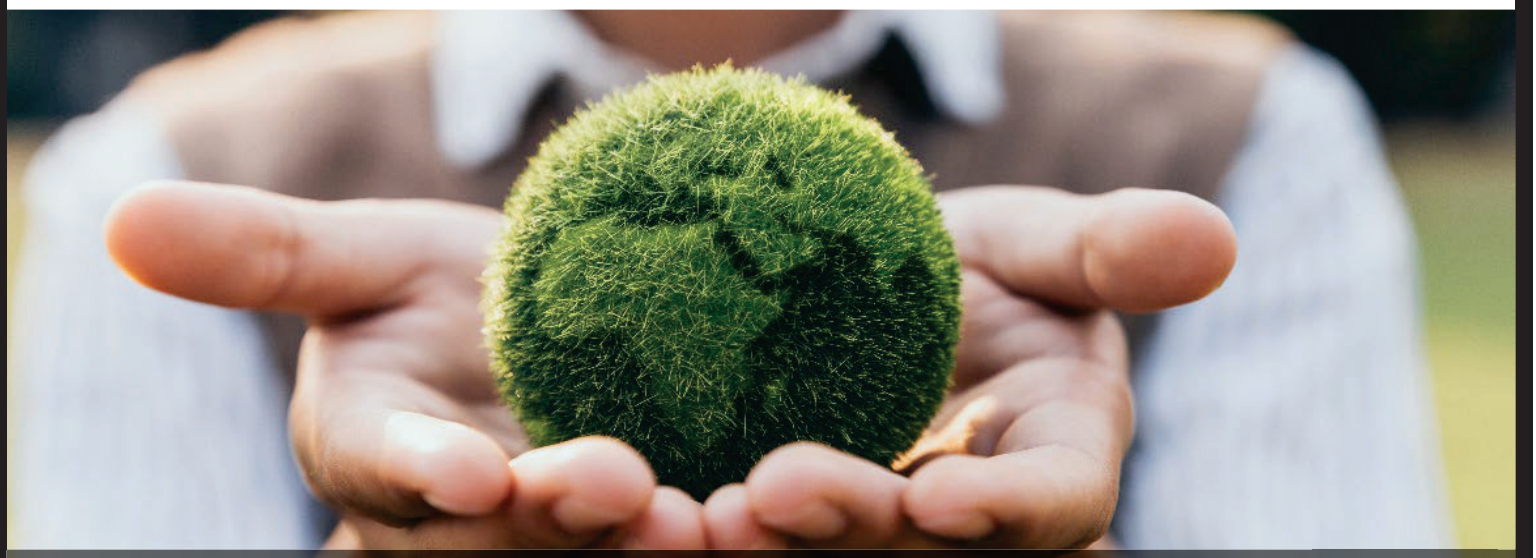
Municipality	Program Name	Progress	Target Audience	Financial Model	Delivery Model	Metrics of Success	Notes
City of Vaughan	-	Launched (operational study)	Low-rise residential	PACE 10% of property value			Operational study with Ontario Climate Consortium which researched LIC program, completed risk assessment, developed LIC toolkit and draft by-laws
City of Burlington	Better Homes Burlington	Designed (Pre-launch)	Single-family	LIC	Municipal	20 Home Pilot	
Town of Newmarket	Town of Newmarket Energy Efficiency Retrofit (NEER)	Designed	Homeowners of single-detached, semi-detached and townhomes	-	Municipal Service Corporation	-	-
City of Peterborough	Home Energy Efficiency Program (HEEP)	Designed	-	-	-	-	To launch 2024
Region of Waterloo		Program Design	Single-family homes		-	-	REEP Green Solutions designed program
City of Windsor	Windsor Residential Deep Energy Efficiency Retrofit (R-DEER)	Study Design Business Case yet to be adopted	Single-family homes	-	-	-	Designed to avoid requirement for energy assessments
Brampton-Caledon-Mississauga	Brampton-Peel Residential Energy Program	Feasibility Study	-	-	-	-	-
Town of Oakville	-	Feasibility Study					Collaborating with Oakville Hydro
Clean Air Partnership	-	Feasibility Study	-	-	-	-	Partnership for feasibility

Municipality	Program Name	Progress	Target Audience	Financial Model	Delivery Model	Metrics of Success	Notes
							study with County of Dufferin, City of London, City of Barrie, Town of Huntsville, City of Kawartha Lakes, Municipality of Clarington
City of Thunder Bay	-	Feasibility Study	-	-	-	-	-
City of Greater Sudbury	-	Study examining retrofit models	-	-	-	-	-
Town of Cobourg	-	Feasibility study	-	-	-	-	-

APPENDIX C: HOMEOWNER SURVEY

The following appendix contains the engagement report from the Homeowner Survey completed by Deloitte. This survey utilized both a web survey and telephone interviews in order to gather a representative sample that was unbiased across all Hamilton wards.

Deloitte.



Mohawk College

Home Energy Retrofit Program Report

November 2022

MAKING AN IMPACT THAT MATTERS since 1945

Deloitte.

Research Objectives

The purpose of the Home Energy Retrofit program survey were to:

- Better understand attitudes and perceptions surrounding the completion of home energy efficiency upgrades.
- Identify potential incentives that may motivate homeowners to undertake energy retrofits.
- Evaluate pricing scenarios which would be most attractive to homeowners considering upgrades.

The survey used the following data collection methods:

Phone Surveys

- Using a mix of cell and landline phone numbers in the region, numbers were randomly dialed by live interviewers.
- Respondents for the phone survey were screened to ensure they currently own homes in Hamilton. This resulted in 204 completed interviews.

Web Surveys

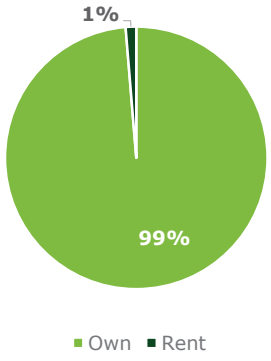
- A web-survey was used, sent through email directly to individuals residing in Hamilton and also through social media platforms.
- The survey was open from October 7th to October 31st and captured 191 completed surveys.

Key Findings from the Market Research Data:

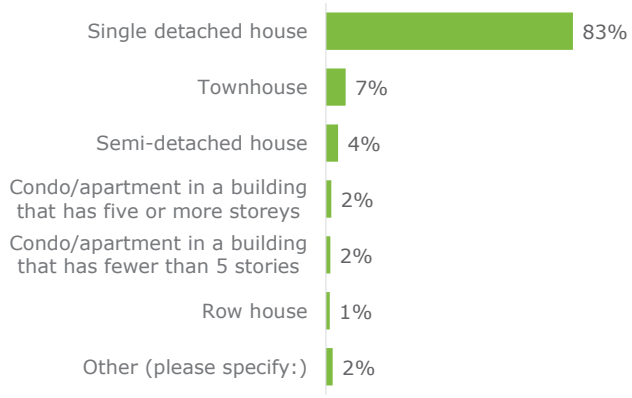
- The majority of homeowners (58%) indicated that they were at least *somewhat likely* to undertake home efficiency upgrades in the next two years.
- *Utility bill savings* and *environmental friendliness* were the top two motivations for home energy upgrades or renovations.
- Respondents felt that *upfront costs of different upgrade options* and *environmental benefits* were the most important pieces of information when considering moving forward with home energy efficiency upgrades.
- The vast majority of respondents (89%) agreed that the Home Energy Retrofit program would be beneficial to homeowners in Hamilton, and 82% would likely access an energy coaching program if it existed.

Detailed Findings from Market Research Data

83% of homeowner respondents owned a single detached house.



Do you own or rent your home? (N=395)*



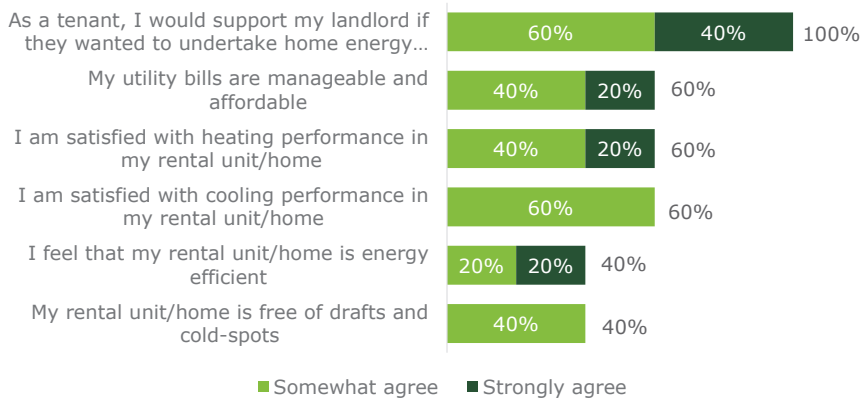
What type of dwelling is your home? (N=395)

*Renters were only included in the online version of the survey.

Deloitte.

Screening Questions

100% of renters surveyed agreed with the statement "As a tenant, I would support my landlord if they wanted to undertake home energy improvements which improve the home's energy efficiency".



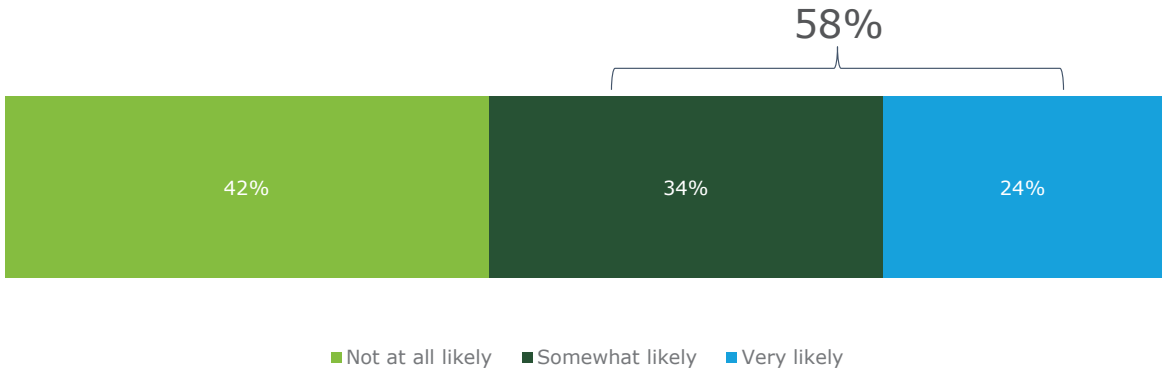
As a renter, please indicate your level of agreement with each statement.

n=5 *Renters were only included in the online version of the survey.

Deloitte.

Home Upgrades

The majority of respondents were very or somewhat likely to undertake a home energy efficiency upgrade in the next 2 years.



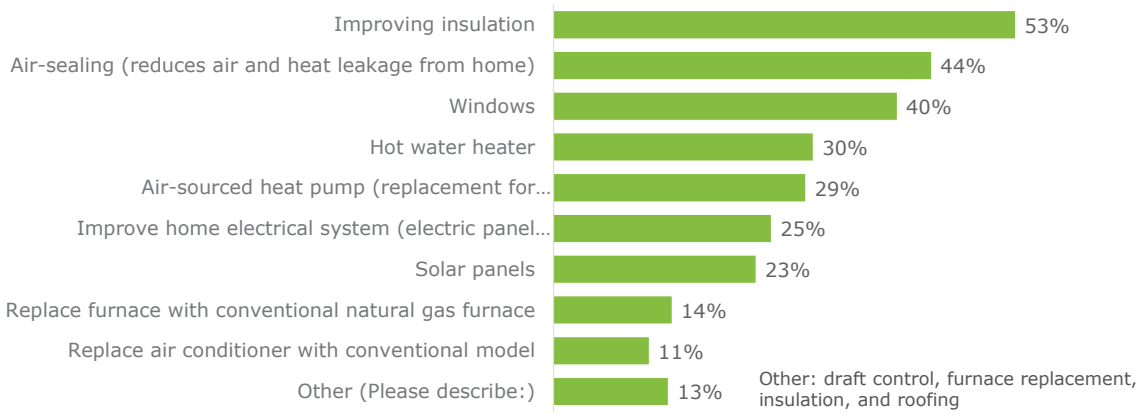
How likely are you to undertake any home energy efficiency upgrades in the next 2 years?

n=390

Deloitte.

Home Upgrades

Improving insulation, air sealing, and new windows were the top mentioned renovations.



Which of the following best describes the type of upgrade or renovation you are considering?

n=227

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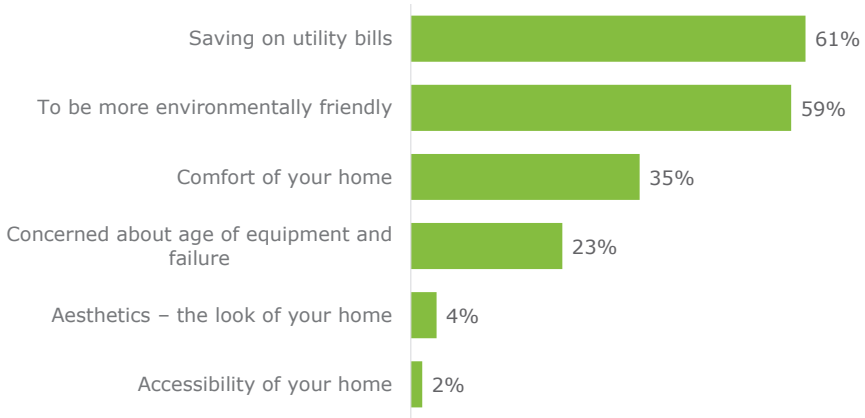
Home Upgrades

The top two most commonly selected motivations for upgrades or renovations were to save on utility bills and to be more environmentally friendly.



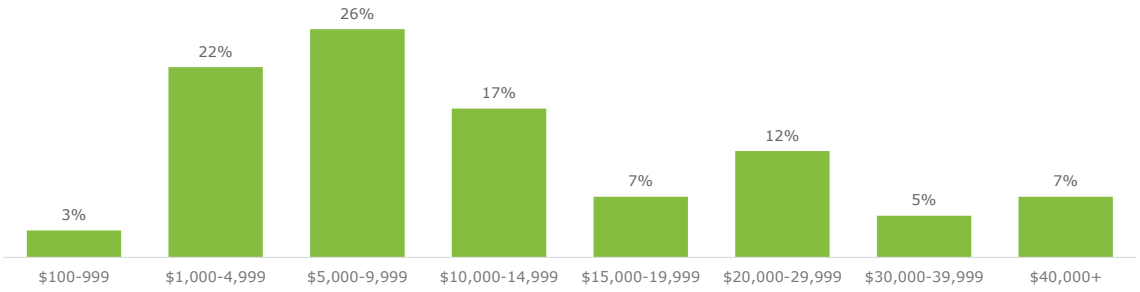
Which of the following are your top two motivations for this upgrade or renovation?

n=395

Deloitte.

Home Upgrades

Approximately two thirds of respondents estimated they would spend between $1,000 and $15,000 on a home energy upgrade.



If you were to consider a home energy efficiency upgrade in the next 2 years how much would you estimate it would cost?

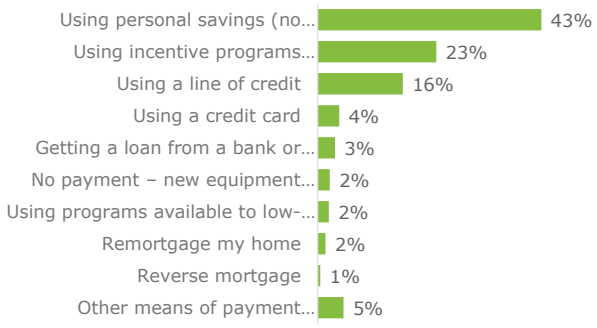
n=227

Deloitte.

Home Upgrades

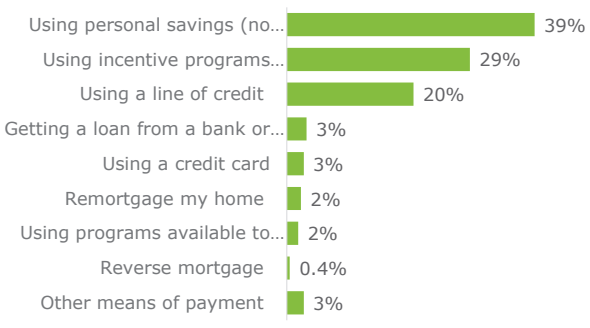
The most commonly selected potential financing options were using personal savings and using incentive programs for home energy efficiency upgrades.

All Respondents
(n=390)



Other: cash, government programs, and not looking to complete home energy efficiency upgrade

Respondents Likely to Undertake Renovation*
(n=227)



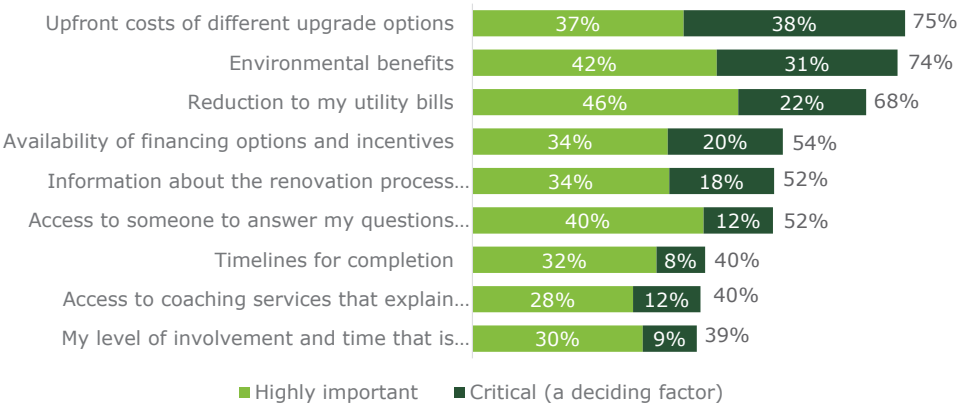
If you were to complete a home energy efficiency upgrade in the next 2 years, which of the following financing options would be your primary source of funding?

*Respondents who selected "Somewhat likely" or "Very Likely" in Q4

Deloitte.

Home Upgrades

The two most important factors that would impact respondents' decisions to move forward with a home energy upgrade are upfront costs and environmental benefits.



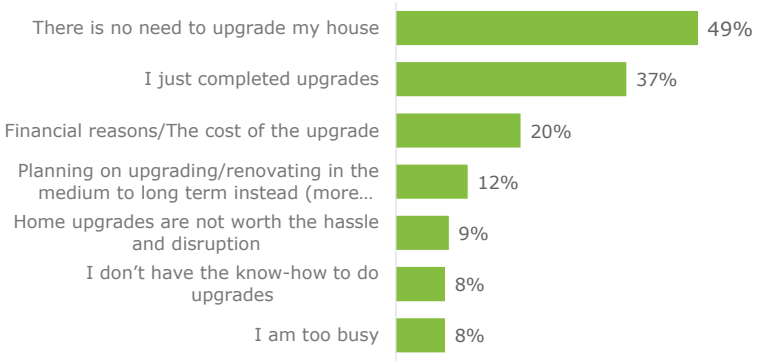
If you were to consider a home energy efficiency upgrade in the next 2 years, how important would the following pieces of information be in your decision to move forward?

n=226

Deloitte.

Home Upgrades

Respondents most commonly selected "There is no need to upgrade my house" (49%) when asked about factors preventing them from undertaking a home energy upgrade.



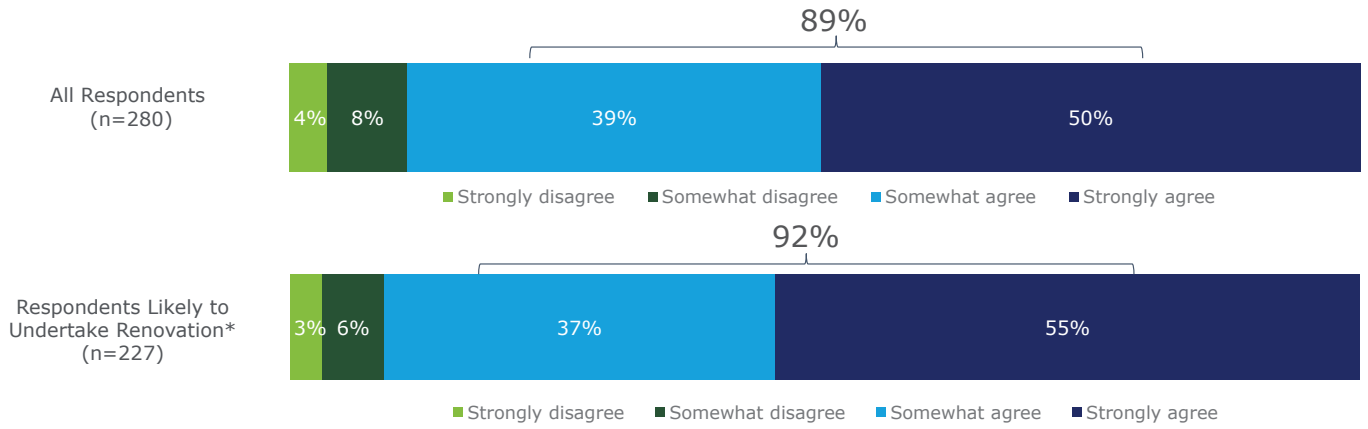
Which of the following factors are preventing you from undertaking a home energy efficiency upgrade?

n=163 *Only respondents who selected "Not at all likely" in Q4

Deloitte.

HERO Program

The vast majority of respondents agree that the Home Energy Retrofit program would be valuable to homeowners in Hamilton, with higher agreement registered with those likely to undertake a renovation (+3%).



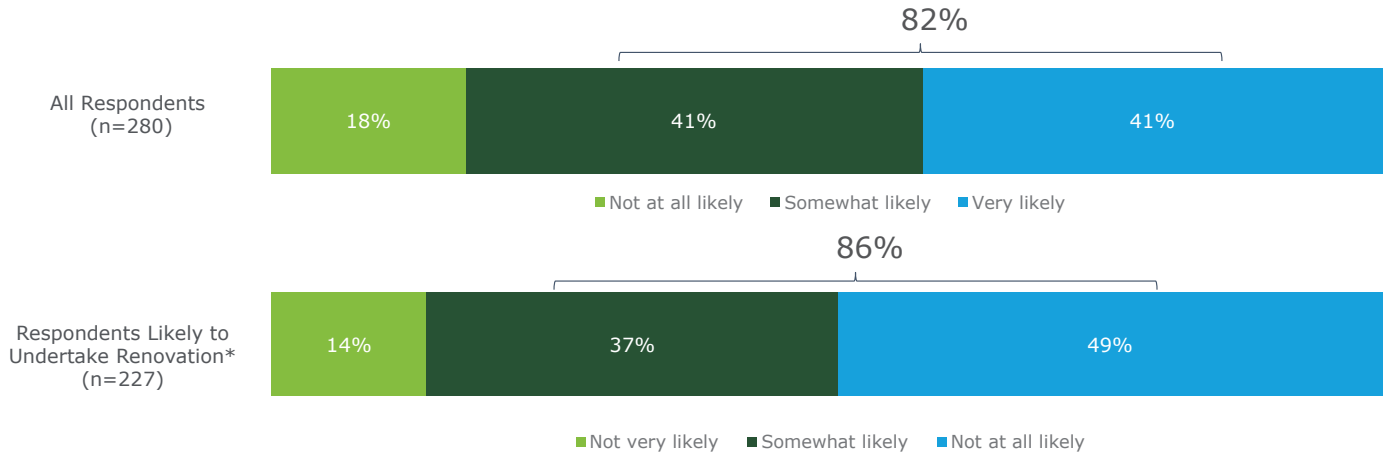
Overall, how much to you agree or disagree that the program, as described, will be valuable to homeowners in Hamilton?

*Respondents who selected "Somewhat likely" or "Very Likely" in Q4

Deloitte.

HERO Program

Respondents who were likely to undertake a renovation were 4% more likely to access an energy coaching program.



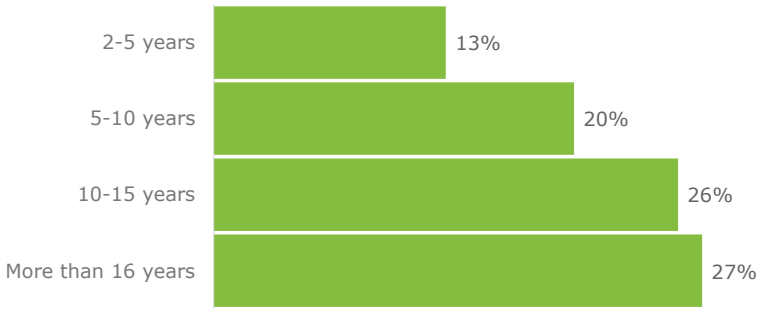
If the energy coaching program existed, how likely would you be to access this type of support?

*Respondents who selected "Somewhat likely" or "Very Likely" in Q4

Deloitte.

HERO Program

Only 13% of respondents would be likely to move forward with a repayment timeframe of 2-5 years, with most respondents being willing to move forward with a timeframe of more than 16 years.



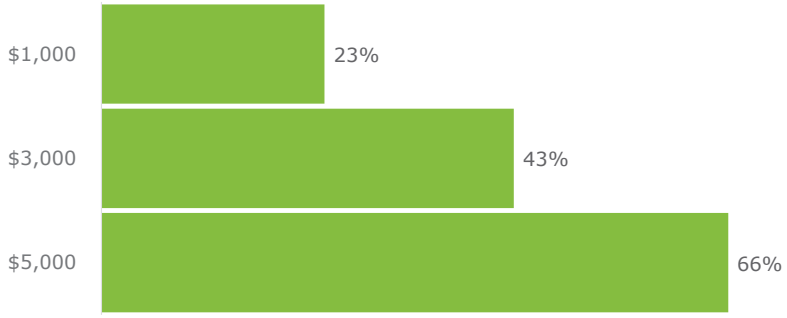
Thinking about the upgrade you are considering, if a loan was available for up to $15,000 with an approximate interest rate of 4-6%, how likely would you be to move forward if the repayment timeframe was...

n=227

Deloitte.

HERO Program

The majority of respondents would definitely move forward with the upgrade if the rebate amount was $5,000.



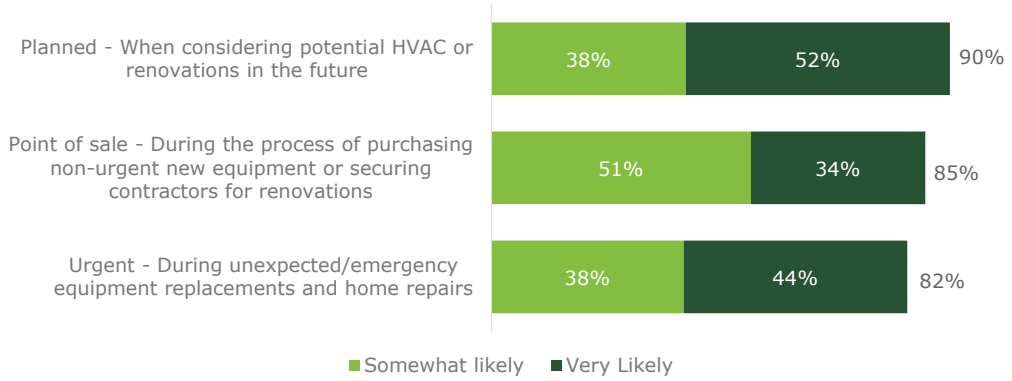
Again, thinking about the upgrade you are considering, if a rebate was available for the following amount which would be transferred to you within 2-3 months of project completion, how likely would you be to move forward if the rebate amount was...

n=227

Deloitte.

HERO Program

Respondents were most likely to use the program when considering potential HVAC or renovations in the future.



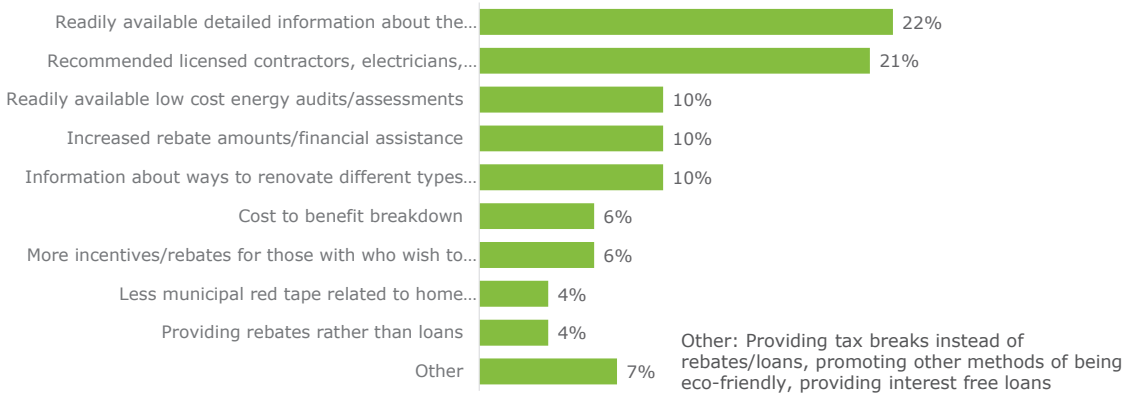
How likely would you be to use the program in the following scenarios, assuming the program would meet all necessary timelines?

n=227

Deloitte.

HERO Program

Respondents most commonly felt that readily available detailed information about the program/rebates and recommended licensed contractors, electricians, and HVAC experts would be helpful when planning a home energy upgrade.

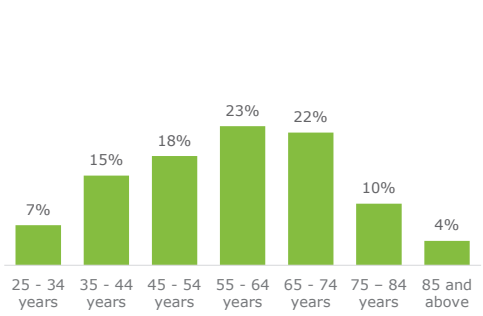


Is there anything else that you would consider to be helpful when planning a Home Energy upgrade?
(Open-ended, coded into themes)

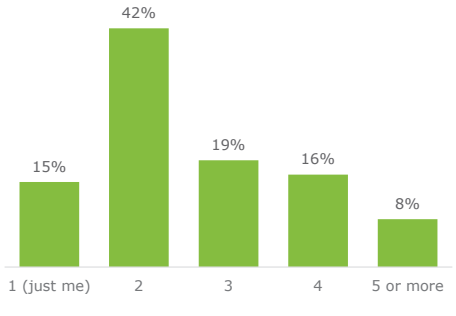
n=81

Deloitte.

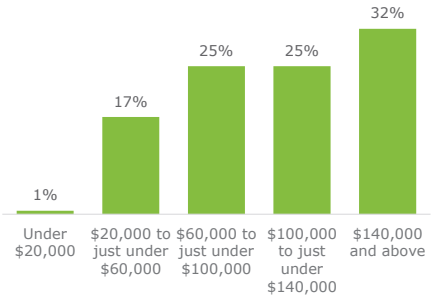
Demographics



What is your age? (N=387)



How many people live in your home? (N=395)



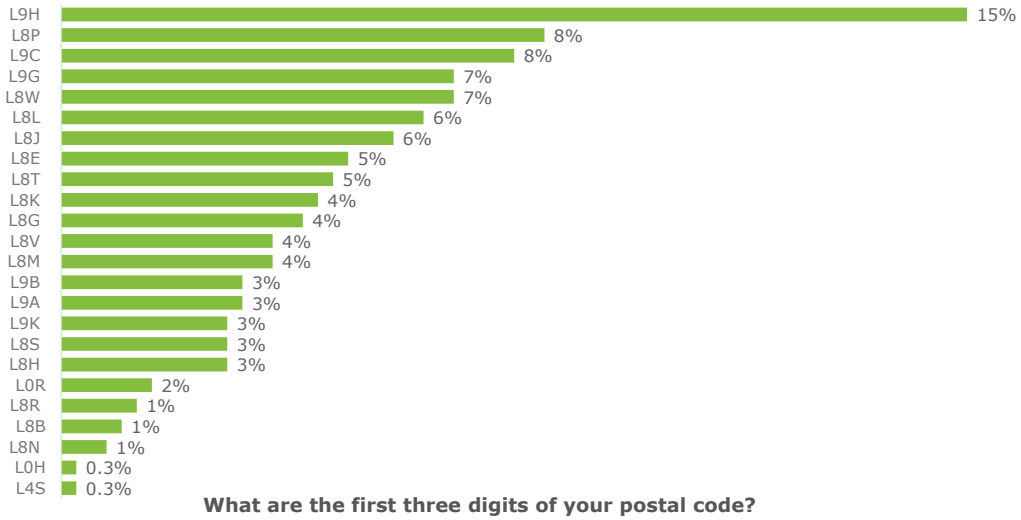
Household income last year, before taxes, from all sources for all household members (N=311)

n=227

Deloitte.

Geographic Areas

Respondents most commonly have postal codes beginning with L9H.



What are the first three digits of your postal code?

n=395

Project completed by

Deloitte.

APPENDIX D: LIGHTSPARK BUILDING ARCHETYPE REPORT

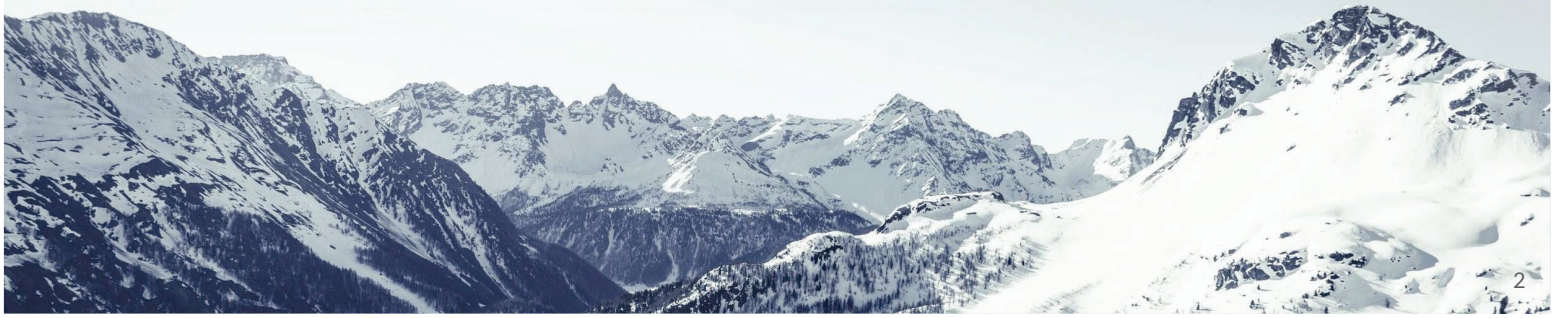
The following appendix includes the full report from Lightspark Inc: Analysis and Mapping of Housing and Energy Data to Inform Policy Development

This report uses existing EnerGuide audit data, utility consumption data by FSA, MPAC and census data to categorizes single-detached homes within Hamilton into 7 distinct archetypes. Average utility consumption and GHG emissions per archetype were analysed. Archetypes were then spatially mapped across the City by FSA.

Confidential and Proprietary
For City of Hamilton Distribution Only

Analysis and Mapping of Housing and Energy Data to Inform Policy Development

For: Nico Strabac, Mohawk College, Hamilton
By: Lindsay Smith & James Riley, Lightspark Software Inc.
Date: February 7th, 2023



Definitions

Archetype A data methodology used to define a grouping of housing types using data science techniques

FSA The first three letters of a postal code, called a “Forward Sortation Area”

Average Annual Energy Costs Average electricity and natural gas usage

tC02e Tonnes of carbon dioxide equivalent, which is a measure that allows you to compare the emissions of other greenhouse gases relative to one unit of $C0_2$

GJ Gigajoule a unit of energy for both natural gas and electricity

TOC

Scope of Work

1. **Executive summary** Summary of analysis and recommendations
2. **City-Wide analysis and Visualization** Use data models to produce key city-wide statistics, representing our Single Family Housing stock
3. **Archetype development** Represent the Hamilton's existing home stock with representative home types
4. **GHG Analysis** The Hamilton can influence GHG emissions, so annual GHG emissions are a key factor for analysis. To answer: how much and how quickly do we need to move to achieve our targets?

Data Sources

1. **Energuide Audit Data :** Subset of building characteristics, heating systems, energy use in the Hamilton
2. **Utility Consumption Data:** Household and postal code level Electricity and Gas consumption numbers, respectively. HydroOne, Alectra, and Enbridge provided data.
3. **Canadian Census:** FSA level income, occupancy, ownership
4. **Building Footprints :** All building shapes in the Hamilton
5. **Building Energy Modelling:** Iterative modeling of varying conditions and characteristics
6. **Property Tax report :** All building tax reports in the Hamilton - **Age, address, floor area, parcel identifier.**

Carbon Reduction Opportunity

Potential tCO2e Reduced

1.1%

With the following Archetypes recommendations made, the city's carbon footprint would be reduced by 5,730 tCO2e (of a total of 533,758 tC02e across the City)

Potential GJ Reduced

0.6%

The data shows that ***quick win*** carbon reduction wins could be found by the following upgrades to **10% of households**

Archetype	Upgrade from Fossil Fuels
D	converting to Air Source Heat Pumps

Archetype	Upgrade
B	upgrading ceiling insulation and reducing air leakage
G	upgrading ceiling insulation and reducing air leakage

The selected archetypes are found throughout most FSA's and account for 81% of the housing stock and 75% of the tCO2e emitted by Single-Family homes.

The potential reductions from these upgrades assumes 10% of all of households of these archetypes will perform the upgrade.

Carbon Reduction Opportunity

The data shows that ***quick win*** carbon reduction wins could be found by the following upgrades to **10% of households**

Potential tCO2e Reduced

1.1%

With the following Archetypes recommendations made, the city's carbon footprint would be reduced by 5,730 tCO2e (of a total of 533,758 tC02e estimated by the City and 718,000 tC02e estimated by Lightspark)

Potential GJ Reduced

0.6%

The data shows that ***quick win*** carbon reduction wins could be found by the following upgrades to **25% of households**

Potential tCO2e Reduced

2.6%

With the following Archetypes recommendations made, the city's carbon footprint would be reduced by 13,650 tCO2e (of a total of 533,758 tC02e estimated by the City and 718,000 tC02e estimated by Lightspark)

Potential GJ Reduced

1.9%

Lightspark Data Methodology

Through unique approach to data handling and combining modelling techniques, Lightspark is able to represent the distribution and frequency energy and carbon profiles across the Hamilton at the FSA and archetype level.

Every single-family dwelling in the Hamilton is assigned an energy and carbon profile based on its age, size and archetype.

In brief we employ the following methods:

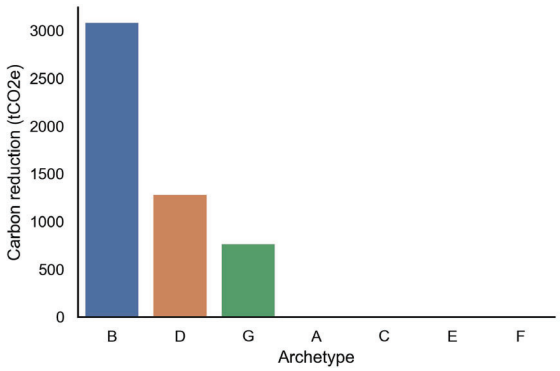
- Combine the data sources into the Lightspark data model
- Using spatial analysis techniques to match data and map data points
- Iterative building energy modelling under varying building characteristics and conditions
- Unsupervised machine learning algorithm used for archetype generation
- Map energy and carbon profiles to every single-family dwelling

Key Insights: Carbon Reduction

There is a strong opportunity to reduce carbon usage in these key archetypes (D, C, and F), across most FSAs by converting to Air Source Heat Pumps (D and C) and upgrading ceiling insulation and reducing air leakage (B and G). **These archetypes account for the majority of carbon emissions.**

- Current carbon emission (tonnes)
  - B - 237,762 tCO2e
  - G - 149,001 tCO2e
  - D - 12,104 tCO2e
- **Total emission - 398,866 tCO2e**

- Potential carbon reductions achieved by upgrading archetypes:
  - B - 3,088 tCO2e
  - D - 1,285 tCO2e
  - G - 770 tCO2e
- **Total reduction - 5,730 tCO2e**



Energy Burden Across Archetypes

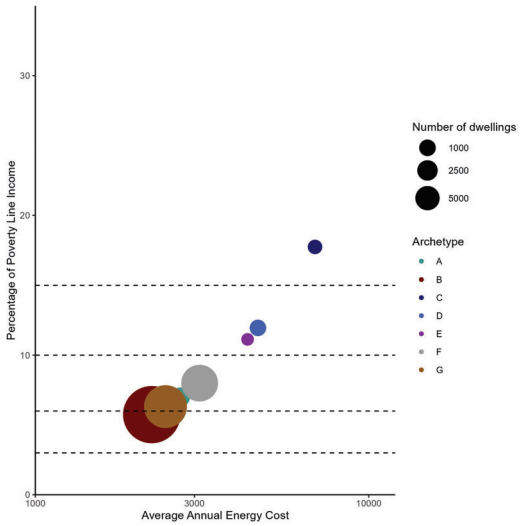
Energy Burden is the percentage of income spent on heating/cooling and electricity

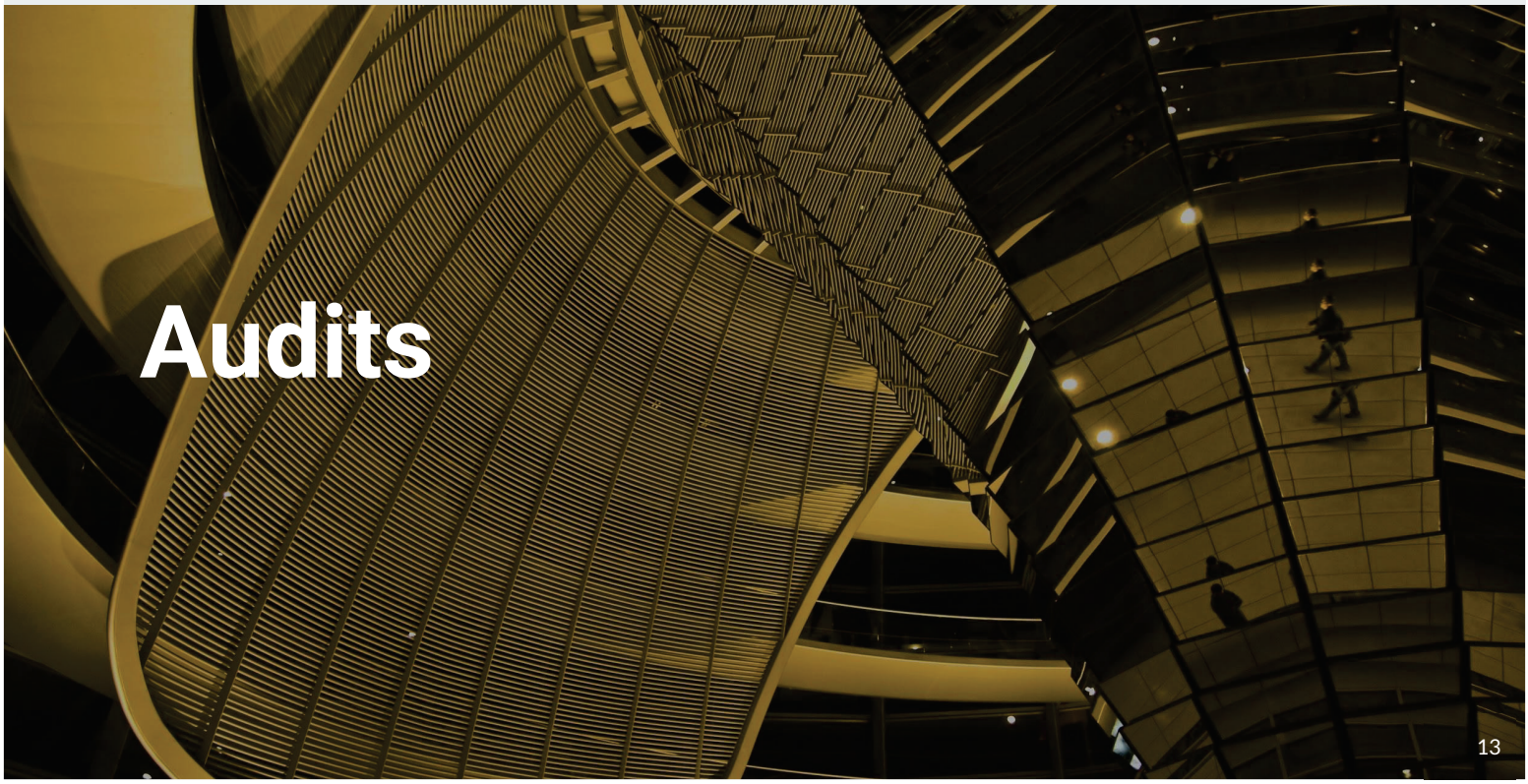
Archetypes C, D, and E have the highest burden.

Using a benchmark annual household income of $38,910, such a household living in a home in Archetype C would be paying 17.7% of their income on heating/cooling and electricity

Archetypes D and E spend 12.0 and 11.1%, respectively, on heating/cooling and electricity.

Moreover C, D, and E account for 1.7% (2,053) of the dwellings

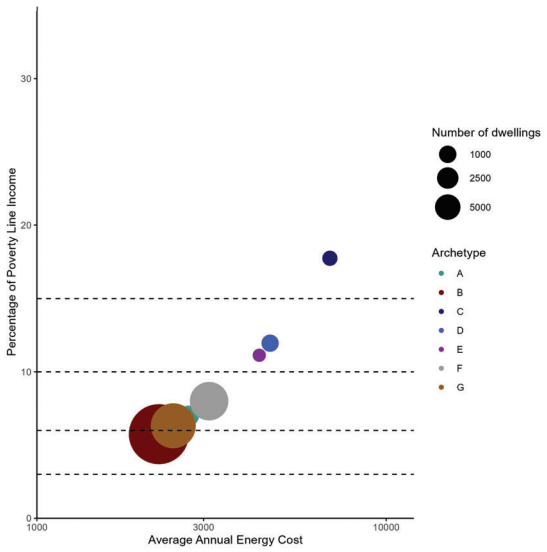




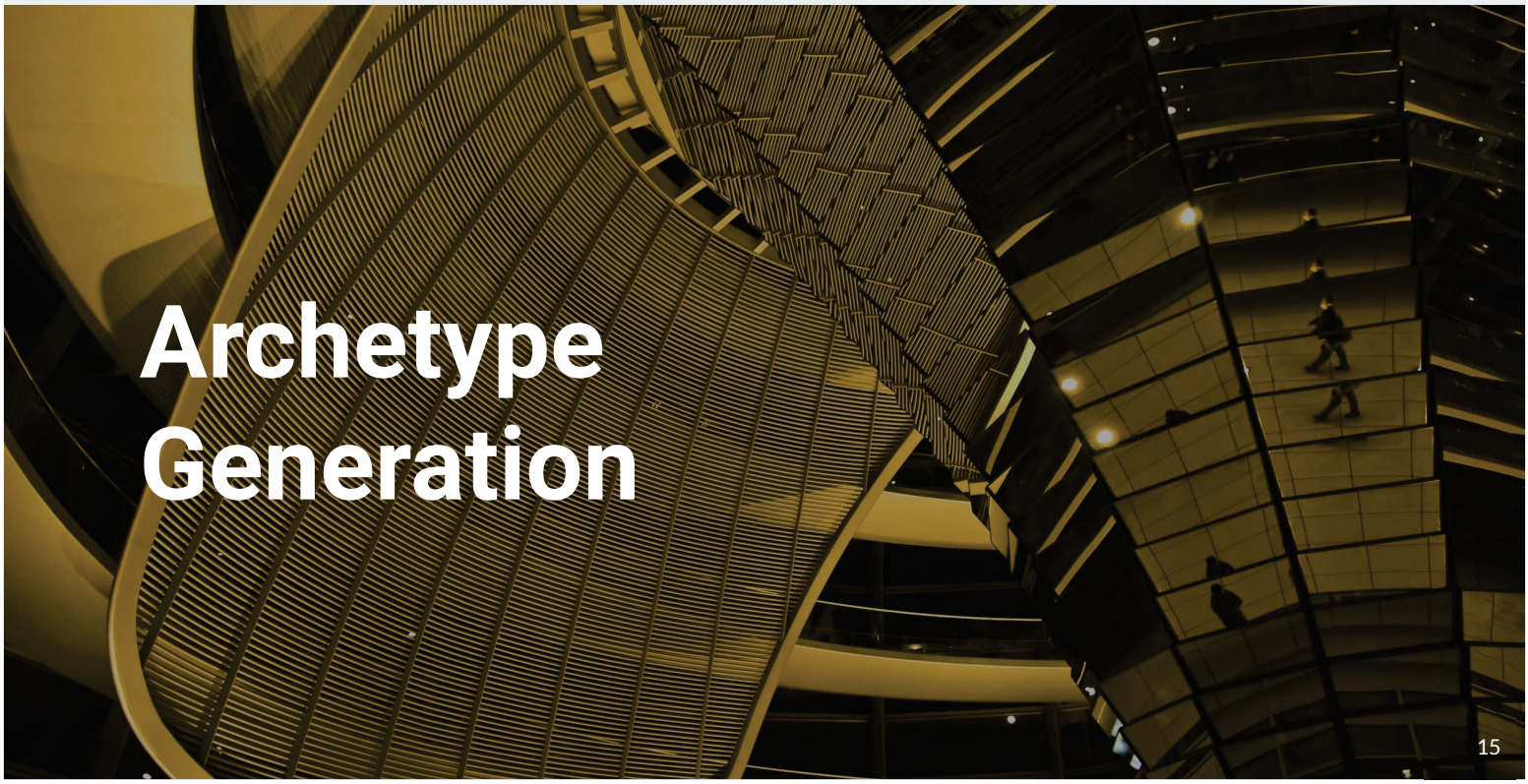
Audit Breakdown

9.22 % (11,243 out of 121,844) of Single Family Dwellings in Hamilton have had an EnerGuide audit.

Archetype	Count
A	687
B	5197
C	115
D	346
E	23
F	2394
G	2481
Total	**11243**



*New homes are homes that were occupied for less than 6 months from the date of the audit.



Key Assumptions Behind Archetype Analysis

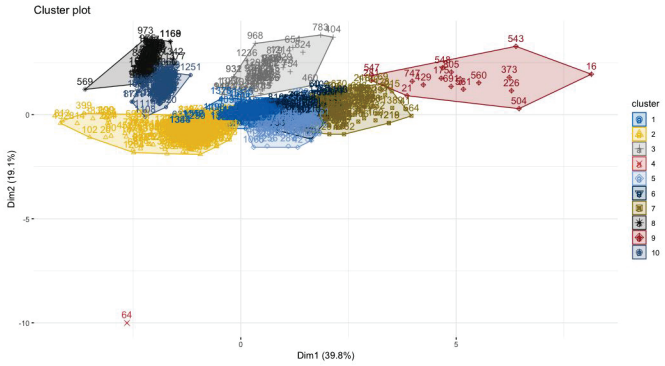
- **Emissions factor:** 12.8 gCO2e/kWh
- **Electricity cost:** $0.11601 + Additional Charges
- **Oil cost:** $1.283/L
- **Propane cost:** $0.8596/L
- **Natural gas cost***: $4.24/GJ + Additional Charges
- **Standard Heat Pump COPh** = 2.55
- **Recommended windows U-value** = 0.32 BTU/ft².℉.h
- **Recommended wall insulation R-value** = 15.8 ft².℉.h/BTU
- **Poverty line for Hamilton household of 4:** $38,910

- Archetype parameters represent average for homes with and without retrofits
- For the home having multiple audits, the latest audit was selected for the analysis

Using Lightspark's Machine Learning Algorithm

A data set of dwelling characteristics were audited on single-family dwellings within the Hamilton. Lightspark utilised an unsupervised machine learning algorithm to sort the audit data into clusters of dwelling types that exhibited similar characteristics, such as year built, size, location, energy consumption and tCO2e production.

Client Implications:
7 clusters were identified as representative of the Hamilton's housing stock: Archetypes A - G

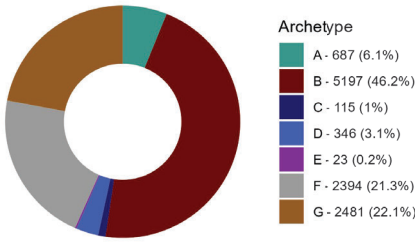


Dwelling Clusters

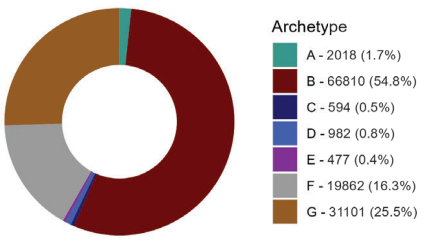
A total of 7 clusters were identified from a total of 11,243 audits of Single Family Dwellings

Breakdown of Archetypes

- Archetypes B, G, and F account for 96.6% of the housing stock and 89.6% of the EnerGuide audits of Single-Family homes.
- A higher number of homes (dwellings) with audits increases data accuracy.



Audit Breakdown



Dwelling Breakdown

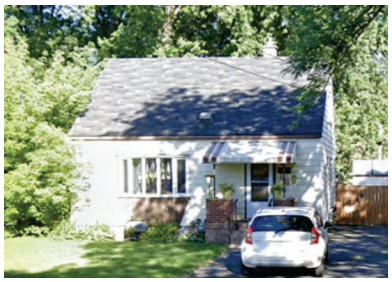
Total dwellings = 121,844

Breakdown of Archetypes - Comparison

Archetype	Year of Construction	Floor Area (m2)	Primary Heat Source	Primary Fuel Type	Hot Water System	Hot Water System Fuel Type	Energy Intensity (GJ/m2)	Carbon Intensity (GJ/m2)	Dwelling Count
A	1952	184.8	Induced Draft Fan Furnace	Natural Gas	Conventional Tank (Pilot)	Natural Gas	0.92	0.04	2018
B	1957	169.1	Condensing Furnace	Natural Gas	Conventional Tank (Pilot)	Natural Gas	0.75	0.03	66810
C	1940	199.1	Furnace With Flame Retention Head	Oil	Conventional Tank	Electricity	1.03	0.05	594
D	1919	327.3	Boiler With Continuous Pilot	Natural Gas	Conventional Tank	Natural Gas	1.04	0.05	982
E	1949	238.2	Baseboard/Hydronic /Plenum(Duct) Htrs.	Electricity	Conventional Tank	Electricity	0.54	0.01	477
F	1931	190.0	Condensing Furnace	Natural Gas	Conventional Tank	Natural Gas	1.08	0.05	19862
G	1986	288.4	Condensing Furnace	Natural Gas	Conventional Tank (Pilot)	Natural Gas	0.51	0.02	31101

Archetype A

01



These homes have an average floor area, and are natural gas heated with low/mid efficiency furnaces and use natural gas hot water systems

Average annual electricity costs: $1,219
Average annual natural gas costs: $1,488

Average annual energy costs: $2,723

Client Implications:
These homes consume 169.76 GJ (0.92 GJ/m2) of energy on average and produce 7.02 tCO2e (0.038 tCO2e/m2) on average. They represent 1.7% of the housing stock and 6.1% of the dwellings that have been audited in the Hamilton.

Variable	A	ESNH Standard*
Year of Construction	1952	-
Floor Area (m2)	184.8	-
Primary Heat Source	Induced Draft Fan Furnace	-
Primary Fuel Type	Natural Gas	-
Primary Heat Source Efficiency (%) AFUE	80.5	96
Heat Pump	No	No
Hot Water System	Conventional Tank (Pilot)	Tankless condensing
Hot Water System Fuel Type	Natural Gas	Natural Gas
Hot Water System Energy Factor	0.58	0.95
Ventilation Type	No	HRV 75% SRE
Ceiling Insulation (RSI)	3.8	10.56
Wall Insulation (RSI)	1.7	3.7
Foundation Insulation (RSI)	1.07	3.52
Number of Windows	14	-
Number of Doors	3	-
Electricity Consumption (GJ)	33.8 GJ (9,378.9 kWh)	-
Natural Gas Consumption (GJ)	135.4 GJ (3,630.6 m3)	-
Energy Score (GJ)	169.76	-
Carbon Score (tCO2e)	7.02	-
Air Tightness (ACH50P)	8.43	2.5+

✶ Minimum standard based on Energy Star
+ Maximum standard value based on Energy Star

Archetype B

02

These homes have an average floor area, and are natural gas heated with high efficiency furnaces and use natural gas hot water systems

Average annual electricity costs: $1,202
Average annual natural gas costs: $1,023

Average annual energy costs: $2,234

Client Implications:
These homes consume 126.75 GJ (0.75 GJ/m2) of energy on average and produce 4.89 tCO2e (0.029 tCO2e/m2) on average. They represent 54.8% of the housing stock and 46.2% of the dwellings that have been audited in the Hamilton.

Variable	B	ESNH Standard*
Year of Construction	1957	-
Floor Area (m2)	169.1	-
Primary Heat Source	Condensing Furnace	-
Primary Fuel Type	Natural Gas	-
Primary Heat Source Efficiency (%)	96.1	96
Heat Pump	No	No
Hot Water System	Conventional Tank (Pilot)	Tankless condensing
Hot Water System Fuel Type	Natural Gas	Natural Gas
Hot Water System Energy Factor	0.61	0.95
Ventilation Type	No	HRV 75% SRE
Ceiling Insulation (RSI)	4.18	10.56
Wall Insulation (RSI)	1.85	3.7
Foundation Insulation (RSI)	1.19	3.52
Number of Windows	14	-
Number of Doors	2	-
Electricity Consumption (GJ)	33.3 GJ (9,243.5 kWh)	-
Natural Gas Consumption (GJ)	93.0 GJ (2,494.4 m3)	-
Energy Score (GJ)	126.75	-
Carbon Score (tCO2e)	4.89	-
Air Tightness (ACH50P)	7.02	2.5+

✶ Minimum standard based on Energy Star
+ Maximum standard value based on Energy Star

Archetype C

04

These homes have an average floor area, and are oil heated with low/mid efficiency furnaces and use electricity hot water systems

Average annual electricity costs: $1,751
Average annual natural gas costs: $53
Average annual oil costs: $5,090

Average annual energy costs: $6,900

Client Implications:
These homes consume 204.26 GJ (1.03 GJ/m2) of energy on average and produce 10.78 tCO2e (0.054 tCO2e/m2) on average. They represent 0.5% of the housing stock and 1.0% of the dwellings that have been audited in the Hamilton.

Variable	D	ESNH Standard*
Year of Construction	1940	-
Floor Area (m2)	199.1	-
Primary Heat Source	Furnace With Flame Retention Head	-
Primary Fuel Type	Oil	-
Primary Heat Source Efficiency (%)	77.0	96
Heat Pump	No	No
Hot Water System	Conventional Tank	Tankless condensing
Hot Water System Fuel Type	Electricity	Natural Gas
Hot Water System Energy Factor	0.73	0.95
Ventilation Type	No	HRV 75% SRE
Ceiling Insulation (RSI)	3.39	10.56
Wall Insulation (RSI)	1.55	3.7
Foundation Insulation (RSI)	0.67	3.52
Number of Windows	16	-
Number of Doors	3	-
Electricity Consumption (GJ)	48.5 GJ (13,470.2 kWh)	-
Natural Gas Consumption (GJ)	4.9 GJ (130.3 m3)	-
Energy Score (GJ)	204.26	-
Carbon Score (tCO2e)	10.78	-
Air Tightness (ACH50P)	8.73	2.5+

✶ Minimum standard based on Energy Star
+ Maximum standard value based on Energy Star

Archetype D

05

These homes have a relatively large floor area, and are natural gas heated with low/mid efficiency furnaces and use natural gas hot water systems

Average annual electricity costs: $1,315
Average annual natural gas costs: $3,317

Average annual energy costs: $4,652

Client Implications:
These homes consume 338.96 GJ (1.04 GJ/m2) of energy on average and produce 15.34 tCO2e (0.047 tCO2e/m2) on average. They represent 0.8% of the housing stock and 3.1% of the dwellings that have been audited in the Hamilton.

Variable	E	ESNH Standard*
Year of Construction	1919	-
Floor Area (m2)	327.3	-
Primary Heat Source	Boiler With Continuous Pilot	-
Primary Fuel Type	Natural Gas	-
Primary Heat Source Efficiency (%)	85.3	96
Heat Pump	No	No
Hot Water System	Conventional Tank	Tankless condensing
Hot Water System Fuel Type	Natural Gas	Natural Gas
Hot Water System Energy Factor	0.59	0.95
Ventilation Type	No	HRV 75% SRE
Ceiling Insulation (RSI)	2.38	10.56
Wall Insulation (RSI)	1.1	3.7
Foundation Insulation (RSI)	0.7	3.52
Number of Windows	26	-
Number of Doors	3	-
Electricity Consumption (GJ)	36.4 GJ (10,117.5 kWh)	-
Natural Gas Consumption (GJ)	301.8 GJ (8,091.6 m3)	-
Energy Score (GJ)	338.96	-
Carbon Score (tCO2e)	15.34	-
Air Tightness (ACH50P)	9.36	2.5+

✶ Minimum standard based on Energy Star
+ Maximum standard value based on Energy Star

Archetype E

06

These homes have an above average floor area, and are electricity heated baseboard/hydronic/plenum(duct) htrs. and use electricity hot water systems

Average annual electricity costs: $4,158
Average annual natural gas costs: $129

Average annual energy costs: $4,331

Client Implications:
These homes consume 128.23 GJ (0.54 GJ/m2) of energy on average and produce 1.47 tCO2e (0.006 tCO2e/m2) on average. They represent 0.4% of the housing stock and 0.2% of the dwellings that have been audited in the Hamilton.

Variable	F	ESNH Standard*
Year of Construction	1949	-
Floor Area (m2)	238.2	-
Primary Heat Source	Baseboard/Hydronic/Plenum(Duct) Htrs.	-
Primary Fuel Type	Electricity	-
Primary Heat Source Efficiency (%)	100.0	96
Heat Pump	No	No
Hot Water System	Conventional Tank	Tankless condensing
Hot Water System Fuel Type	Electricity	Natural Gas
Hot Water System Energy Factor	0.72	0.95
Ventilation Type	No	HRV 75% SRE
Ceiling Insulation (RSI)	3.95	10.56
Wall Insulation (RSI)	1.78	3.7
Foundation Insulation (RSI)	1.16	3.52
Number of Windows	17	-
Number of Doors	3	-
Electricity Consumption (GJ)	115.2 GJ (31,986.5 kWh)	-
Natural Gas Consumption (GJ)	11.7 GJ (314.4 m3)	-
Energy Score (GJ)	128.23	-
Carbon Score (tCO2e)	1.47	-
Air Tightness (ACH50P)	7.37	2.5+

✶ Minimum standard based on Energy Star
+ Maximum standard value based on Energy Star

Archetype F

07

These homes have an average floor area, and are natural gas heated with high efficiency furnaces and use natural gas hot water systems

Average annual electricity costs: $1,236
Average annual natural gas costs: $1,869

Average annual energy costs: $3,112

Client Implications:
These homes consume 204.58 GJ (1.08 GJ/m2) of energy on average and produce 8.73 tCO2e (0.046 tCO2e/m2) on average. They represent 16.3% of the housing stock and 21.3% of the dwellings that have been audited in the Hamilton.

Variable	G	ESNH Standard*
Year of Construction	1931	-
Floor Area (m2)	190.0	-
Primary Heat Source	Condensing Furnace	-
Primary Fuel Type	Natural Gas	-
Primary Heat Source Efficiency (%)	90.8	96
Heat Pump	No	No
Hot Water System	Conventional Tank	Tankless condensing
Hot Water System Fuel Type	Natural Gas	Natural Gas
Hot Water System Energy Factor	0.6	0.95
Ventilation Type	No	HRV 75% SRE
Ceiling Insulation (RSI)	2.91	10.56
Wall Insulation (RSI)	1.27	3.7
Foundation Insulation (RSI)	0.74	3.52
Number of Windows	17	-
Number of Doors	3	-
Electricity Consumption (GJ)	34.2 GJ (9,510.3 kWh)	-
Natural Gas Consumption (GJ)	170.1 GJ (4,559.4 m3)	-
Energy Score (GJ)	204.58	-
Carbon Score (tCO2e)	8.73	-
Air Tightness (ACH50P)	10.64	2.5+

✶ Minimum standard based on Energy Star
+ Maximum standard value based on Energy Star

Archetype G

08

These homes have a relatively large floor area, and are natural gas heated with high efficiency furnaces and use natural gas hot water systems

Average annual electricity costs: $1,202
Average annual natural gas costs: $1,225

Average annual energy costs: $2,457

Client Implications:
These homes consume 145.86 GJ (0.51 GJ/m2) of energy on average and produce 5.85 tCO2e (0.02 tCO2e/m2) on average. They represent 25.5% of the housing stock and 22.1% of the dwellings that have been audited in the Hamilton.

Variable	H	ESNH Standard*
Year of Construction	1986	-
Floor Area (m2)	288.4	-
Primary Heat Source	Condensing Furnace	-
Primary Fuel Type	Natural Gas	-
Primary Heat Source Efficiency (%)	95.7	96
Heat Pump	No	No
Hot Water System	Conventional Tank (Pilot)	Tankless condensing
Hot Water System Fuel Type	Natural Gas	Natural Gas
Hot Water System Energy Factor	0.59	0.95
Ventilation Type	No	HRV 75% SRE
Ceiling Insulation (RSI)	5.06	10.56
Wall Insulation (RSI)	2.3	3.7
Foundation Insulation (RSI)	1.49	3.52
Number of Windows	18	-
Number of Doors	3	-
Electricity Consumption (GJ)	33.3 GJ (9,247.4 kWh)	-
Natural Gas Consumption (GJ)	111.5 GJ (2,988.4 m3)	-
Energy Score (GJ)	145.86	-
Carbon Score (tCO2e)	5.85	-
Air Tightness (ACH50P)	3.94	2.5+

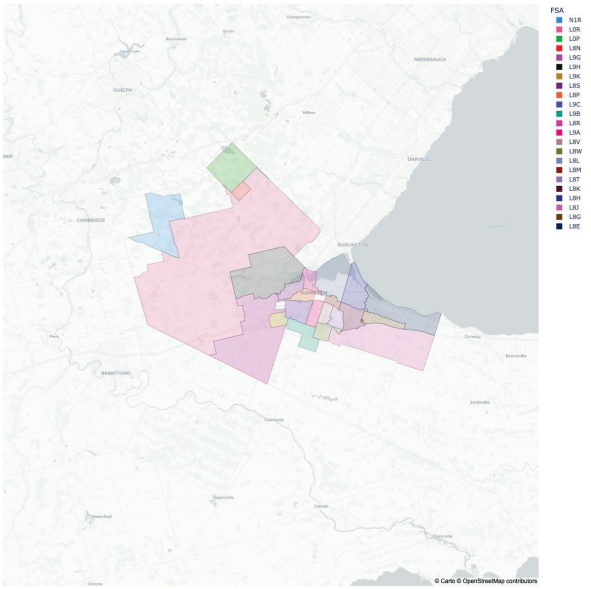
✶ Minimum standard based on Energy Star
+ Maximum standard value based on Energy Star

Archetype Carbon Ranking

- Archetype D, C, and F are the most carbon intensive homes
- Capturing carbon savings by focusing on these homes is an important first step in decarbonization of the full city stock

Archetype	t CO2-e	GJ / year	Energy Cost ($/year)	Dwelling Count
C	10.78	204.26	$6,900	594
D	15.34	338.96	$4,652	982
E	1.47	128.23	$4,331	477
F	8.73	204.58	$3,112	19,862
A	7.02	169.76	$2,723	2,018
G	5.85	145.86	$2,457	31,101
B	4.89	126.75	$2,234	66,810

Hamilton FSA Level



Forward sortation areas (FSA) are the first 3 letters of a post code and provide a means to segment the city using a uniform methodology.

Number of FSAs	31
Number of households	121,844
Total Energy Use (GJ)	13,321,233
Total Electricity Use (GJ)	4,002,660
Total Natural Gas Use (GJ)	13,164,723
Total tCO2e	533,759

Archetype Distribution

Total number of archetypal single detached dwellings in the Hamilton by FSA.

121,844 Single Family Dwellings

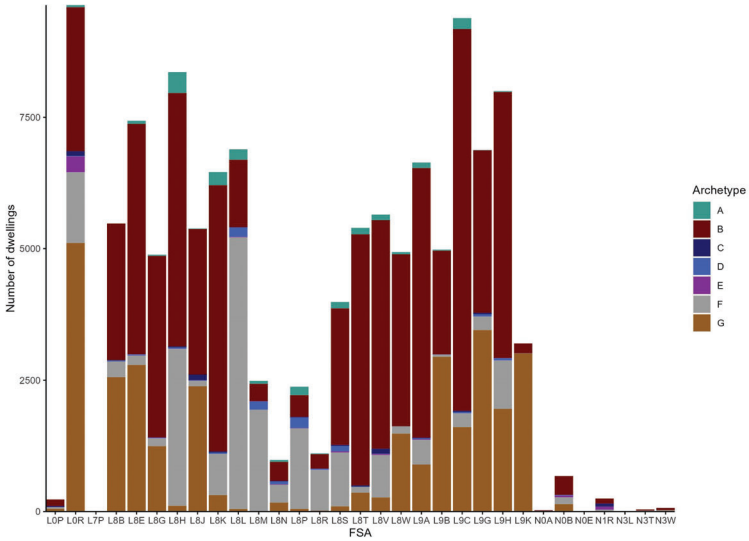
7 Archetypes

Archetype B, G, and F are the most numerous across all FSA's

B - 66,810 dwellings

G - 31,101 dwellings

F - 19,862 dwellings



Total Energy Distribution

Total GJ by archetype distributed across FSA's:

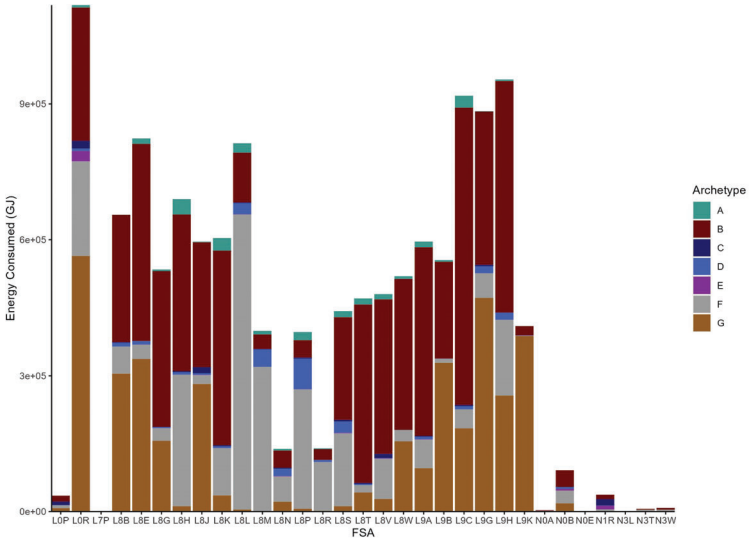
13,321,233 GJ consumed

Archetype B, G, and F consume the highes amount of total energy:

B - 6,161,494 GJ

G - 3,717,553 GJ

F - 2,812,210 GJ



Total Tonnes CO2e Distribution

Total tCO2e by archetype distributed across FSA's:

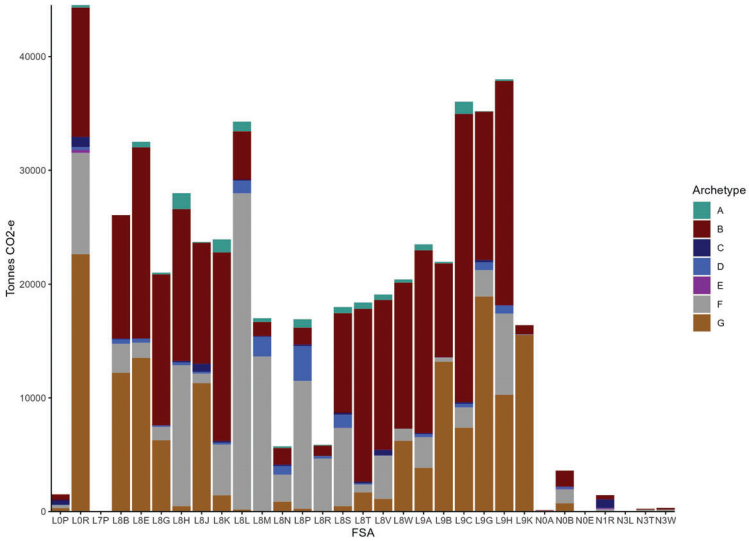
533,759 tCO2e

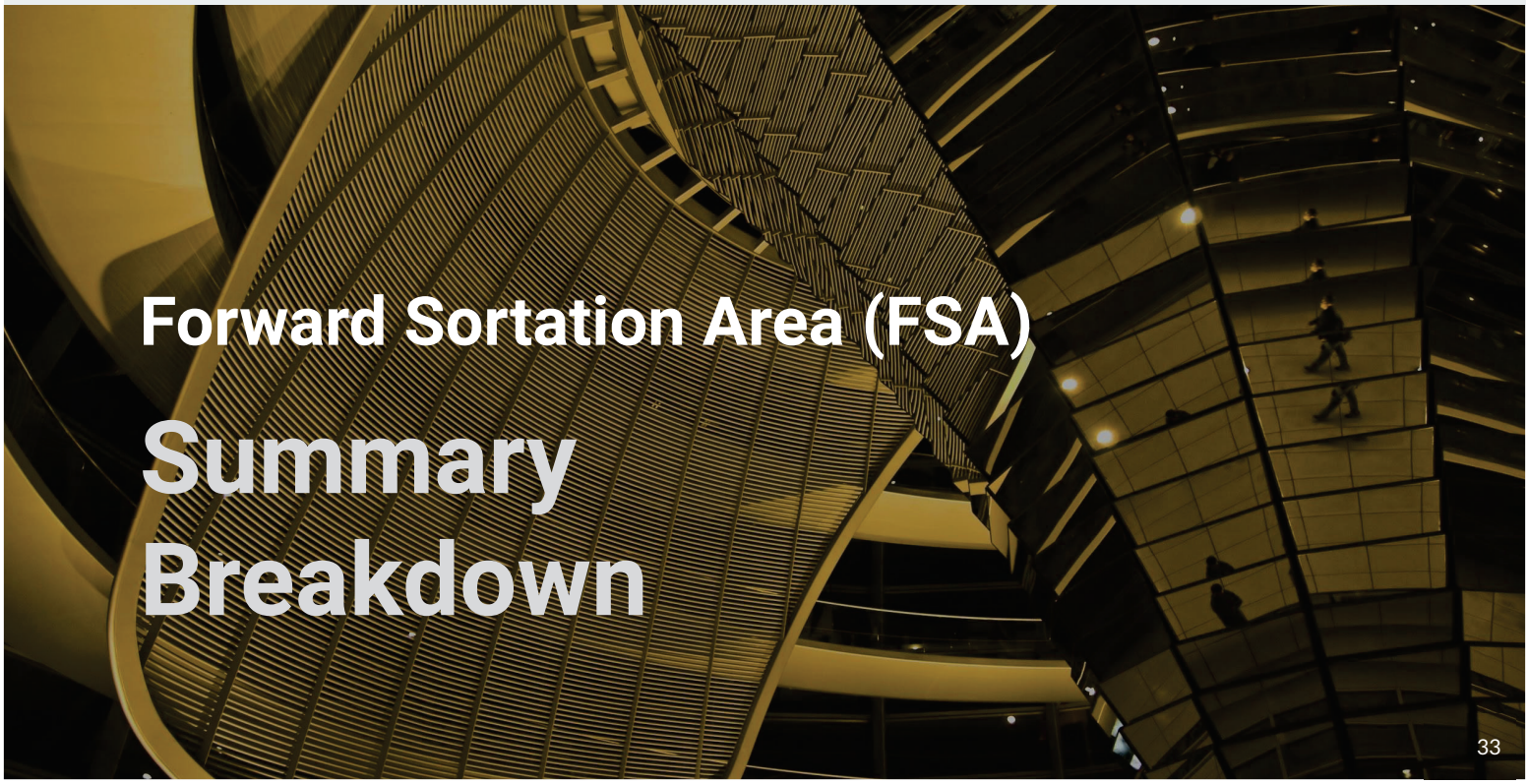
Archetype B, G, and F contribute the highest amount of CO2e:

B - 237,762 CO2-e

G - 149,001 CO2-e

F - 120,032 CO2-e





Forward Sortation Area (FSA)

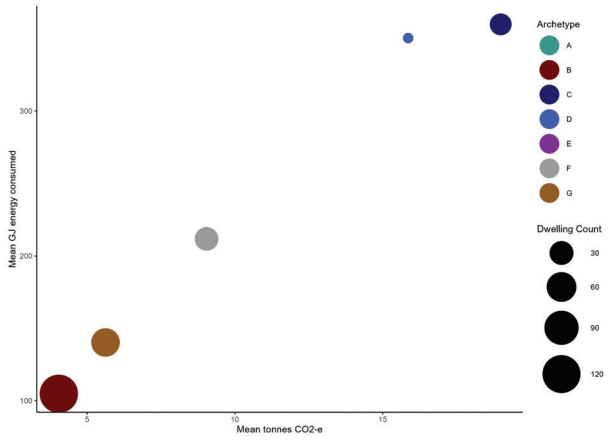
Summary Breakdown

L0P Breakdown

Total number of single family dwellings:	**229**
Annual median income ($):	113,920
Average occupancy per dwelling:	2.9
Owner to renter ratio (%):	92
Total Energy Use (GJ):	35,087
Total tCO2e:	1,507

L0P - Carbon and Energy Average per Archetype

Archetype	Count	Total Energy (GJ)	Total tCO2e
B	123	12,892	497
C	22	7,916	418
D	2	701	32
F	29	6,143	262
G	53	7,435	298
Total	229	35,087	1,507

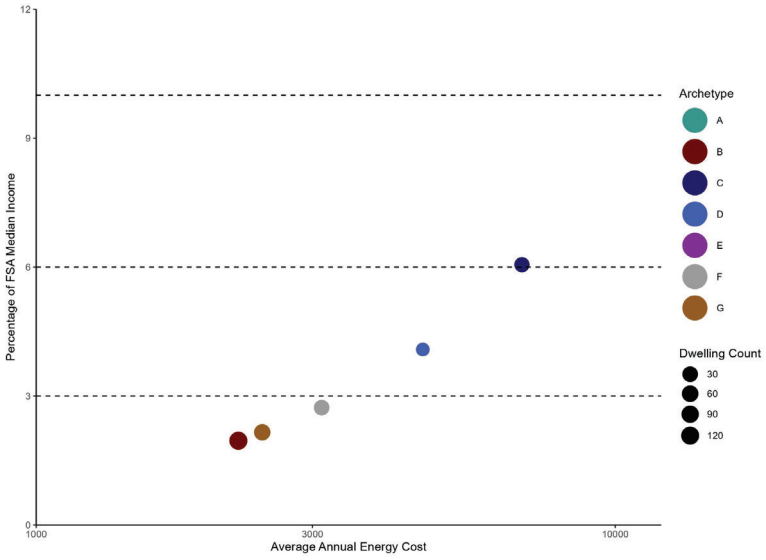


L0P - Energy Burden

Energy Burden: % of income spent on heating/cooling and electricity

The median Canadian household spends under 3% of its income on energy (horizontal line). The benchmark for high energy burden is 6% of annual income.

Archetype D has the burden above 6%, and accounts for 6.1% dwellings in L0P



L0R Breakdown

Total number of single family dwellings:	**229**
Annual median income ($):	113,920
Average occupancy per dwelling:	2.9
Owner to renter ratio (%):	92
Total Energy Use (GJ):	35,087
Total tCO2e:	1,507

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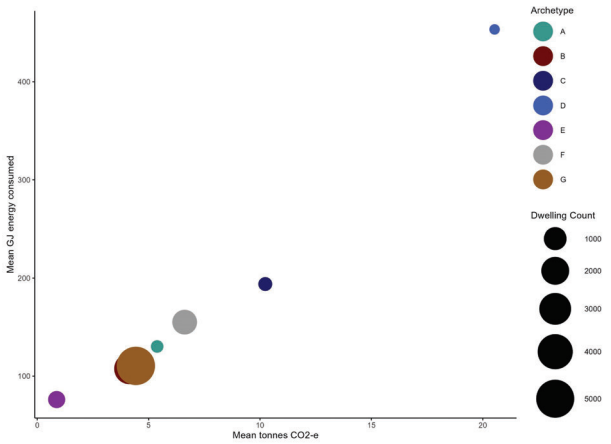
L0R - Carbon and Energy Average per Archetype

Archetype	Count	Total Energy (GJ)	Total tCO2e
B	123	12,892	497
C	22	7,916	418
D	2	701	32
F	29	6,143	262
G	53	7,435	298
Total	229	35,087	1,507

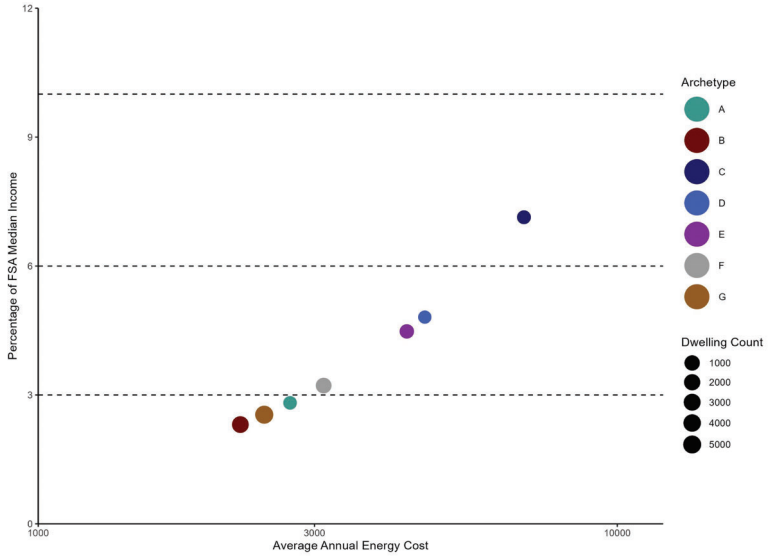


L0R - Energy Burden

Energy Burden: % of income spent on heating/cooling and electricity

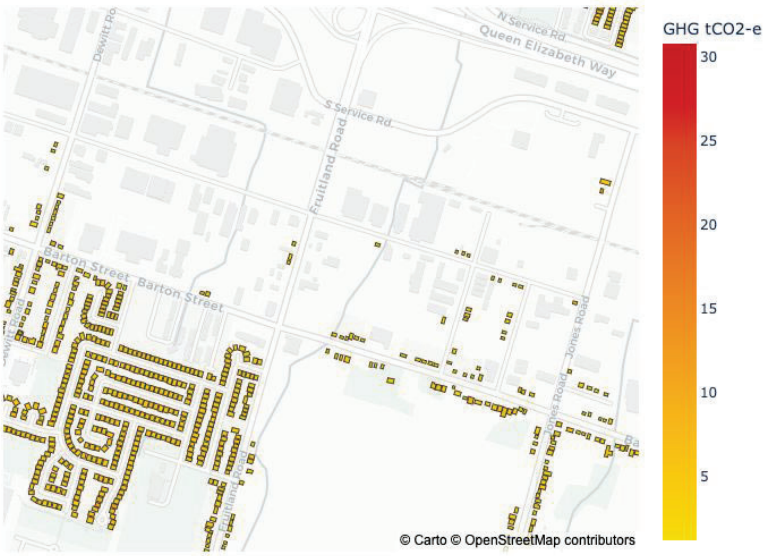
The median Canadian household spends under 3% of its income on energy (horizontal line). The benchmark for high energy burden is 6% of annual income.

Archetype D has the burden above 6%, and accounts for 7.1% dwellings in L0R



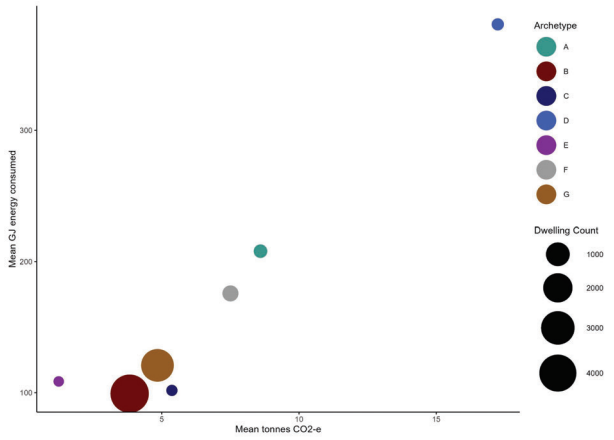
L8E Breakdown

Total number of single family dwellings:	**5,479**
Annual median income ($):	75,771
Average occupancy per dwelling:	2.7
Owner to renter ratio (%):	nan
Total Energy Use (GJ):	655,023
Total tCO2e:	26,052



L8E - Carbon and Energy Average per Archetype

Archetype	Count	Total Energy (GJ)	Total tCO2e
A	1	163	7
B	2,594	280,615	10,828
C	6	1,450	77
D	22	8,267	374
F	298	59,970	2,560
G	2,558	304,558	12,207
Total	5,479	655,023	26,052

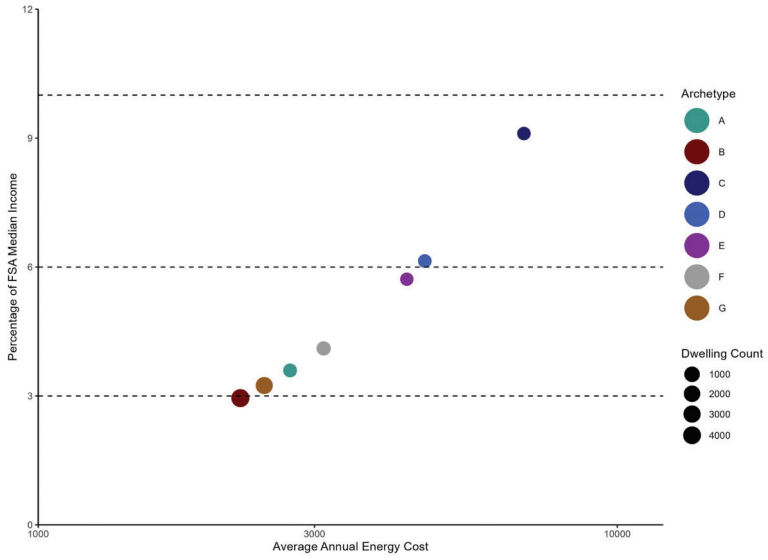


L8E - Energy Burden

Energy Burden: % of income spent on heating/cooling and electricity

The median Canadian household spends under 3% of its income on energy (horizontal line). The benchmark for high energy burden is 6% of annual income.

Archetype D has the burden above 6%, and accounts for 9.1% dwellings in L8E



L8G Breakdown

Total number of single family dwellings:	**7,434**
Annual median income ($):	75,771
Average occupancy per dwelling:	2.7
Owner to renter ratio (%):	72
Total Energy Use (GJ):	823,762
Total tCO2e:	32,505

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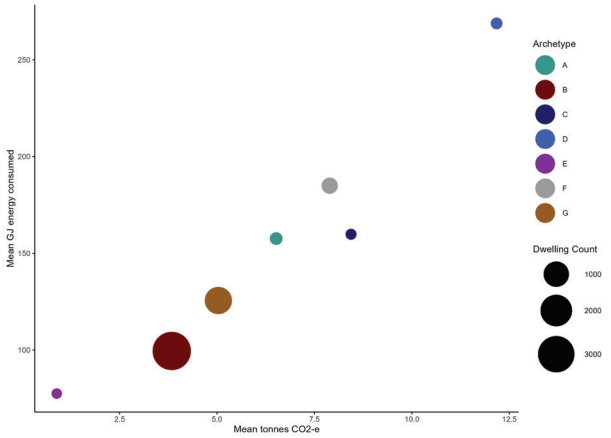
L8G - Carbon and Energy Average per Archetype

Archetype	Count	Total Energy (GJ)	Total tCO2e
A	58	12,063	499
B	4,380	434,719	16,775
C	5	509	27
D	20	7,617	345
E	2	217	2
F	179	31,463	1,343
G	2,790	337,175	13,514
Total	7,434	823,762	32,505

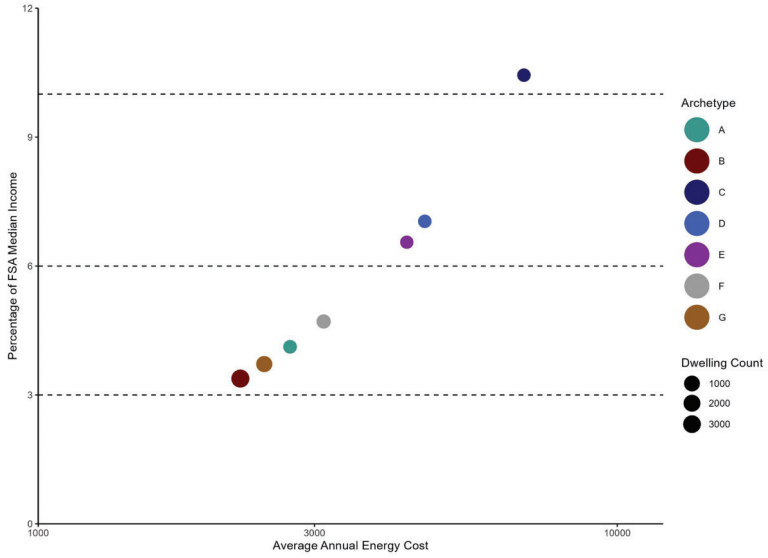


L8G - Energy Burden

Energy Burden: % of income spent on heating/cooling and electricity

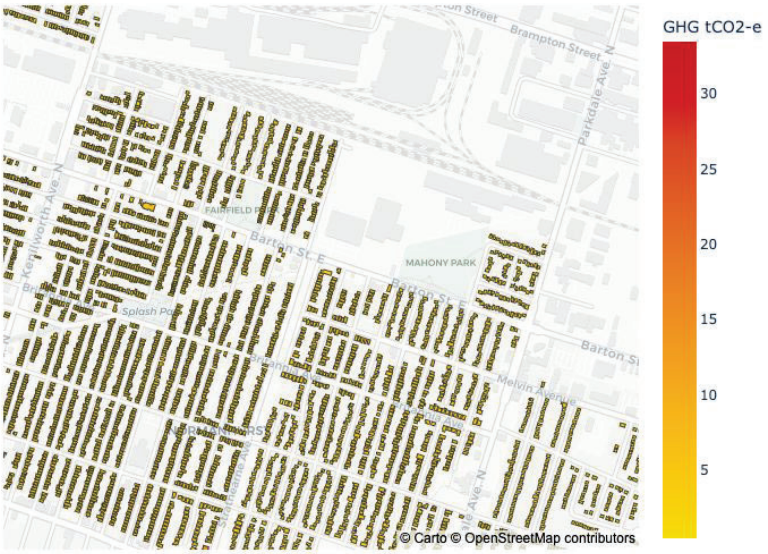
The median Canadian household spends under 3% of its income on energy (horizontal line). The benchmark for high energy burden is 6% of annual income.

Archetype D has the burden above 6%, and accounts for 10.4% dwellings in L8G



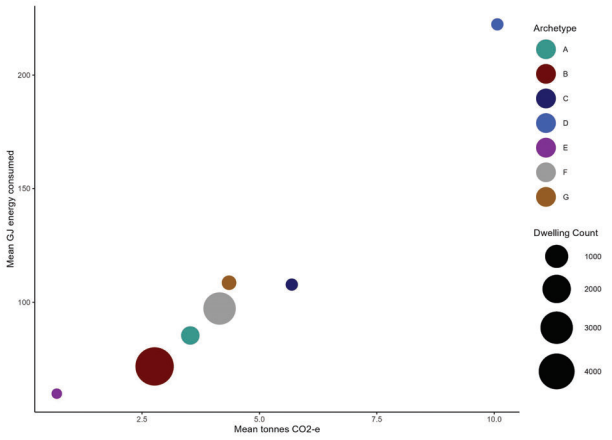
L8H Breakdown

Total number of single family dwellings:	**4,884**
Annual median income ($):	66,083
Average occupancy per dwelling:	2.3
Owner to renter ratio (%):	68
Total Energy Use (GJ):	534,227
Total tCO2e:	20,991



L8H - Carbon and Energy Average per Archetype

Archetype	Count	Total Energy (GJ)	Total tCO2e
A	24	3,784	156
B	3,451	343,282	13,247
C	3	480	25
D	9	2,420	110
E	2	155	2
F	150	27,731	1,184
G	1,245	156,376	6,268
Total	4,884	534,227	20,991

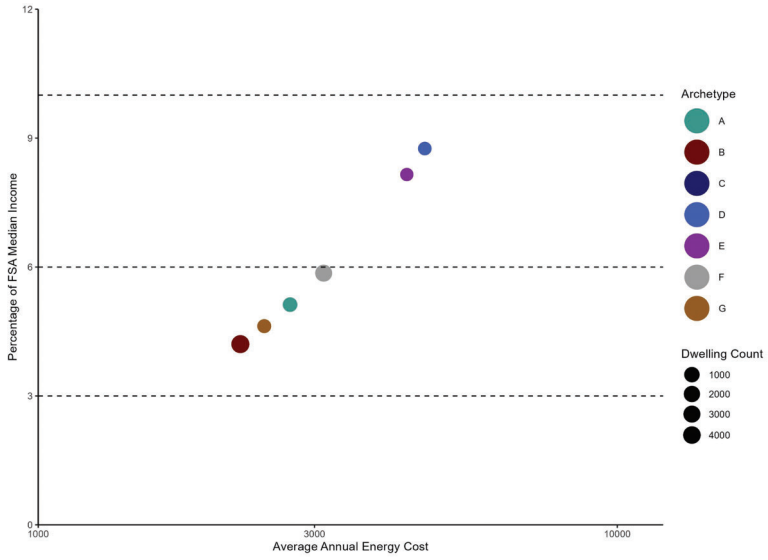


L8H - Energy Burden

Energy Burden: % of income spent on heating/cooling and electricity

The median Canadian household spends under 3% of its income on energy (horizontal line). The benchmark for high energy burden is 6% of annual income.

Archetype D has the burden above 6%, and accounts for 13.0% dwellings in L8H



L8J Breakdown

Total number of single family dwellings:	**8,361**
Annual median income ($):	53,126
Average occupancy per dwelling:	2.3
Owner to renter ratio (%):	68
Total Energy Use (GJ):	689,749
Total tCO2e:	27,980

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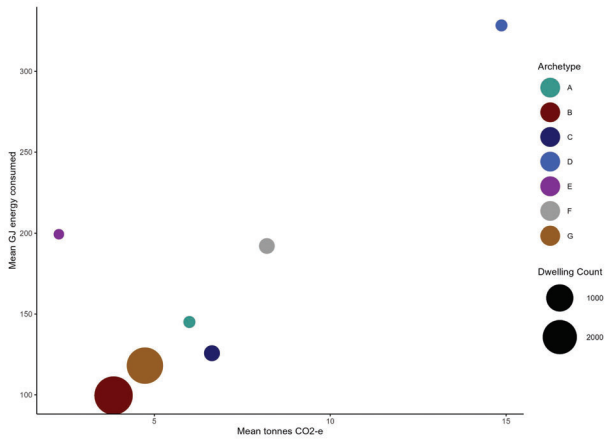
L8J - Carbon and Energy Average per Archetype

Archetype	Count	Total Energy (GJ)	Total tCO2e
A	399	34,059	1,408
B	4,816	345,422	13,329
C	22	2,371	125
D	24	5,336	242
E	4	239	3
F	2,988	290,592	12,403
G	108	11,730	470
Total	8,361	689,749	27,980

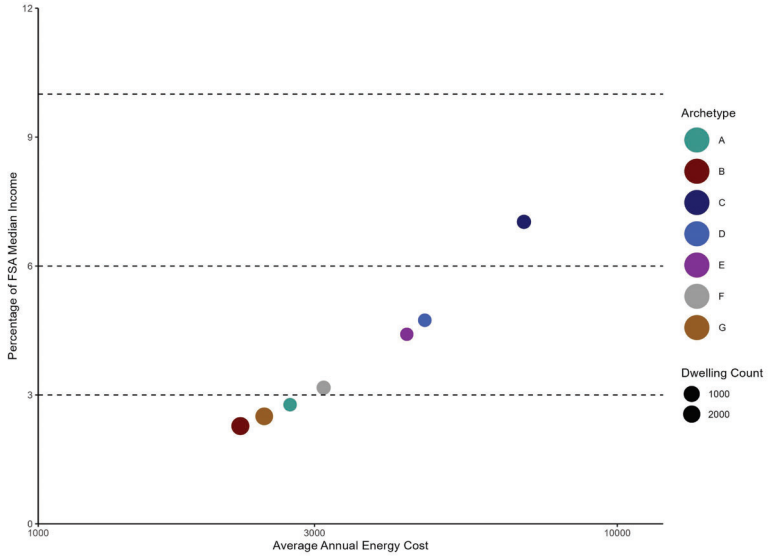


L8J - Energy Burden

Energy Burden: % of income spent on heating/cooling and electricity

The median Canadian household spends under 3% of its income on energy (horizontal line). The benchmark for high energy burden is 6% of annual income.

Archetype D has the burden above 6%, and accounts for 7.0% dwellings in L8J

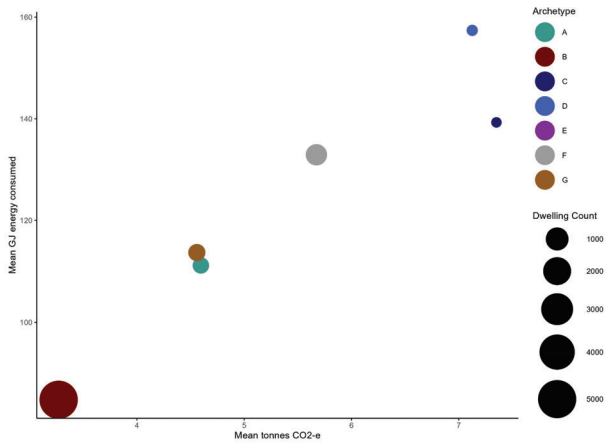


L8K Breakdown

Total number of single family dwellings:	**5,384**
Annual median income ($):	98,176
Average occupancy per dwelling:	3.1
Owner to renter ratio (%):	87
Total Energy Use (GJ):	595,782
Total tCO2e:	23,693

L8K - Carbon and Energy Average per Archetype

Archetype	Count	Total Energy (GJ)	Total tCO2e
A	12	1,741	72
B	2,764	275,167	10,618
C	106	13,332	704
D	11	3,613	164
E	3	598	7
F	102	19,595	836
G	2,386	281,736	11,292
Total	5,384	595,782	23,693

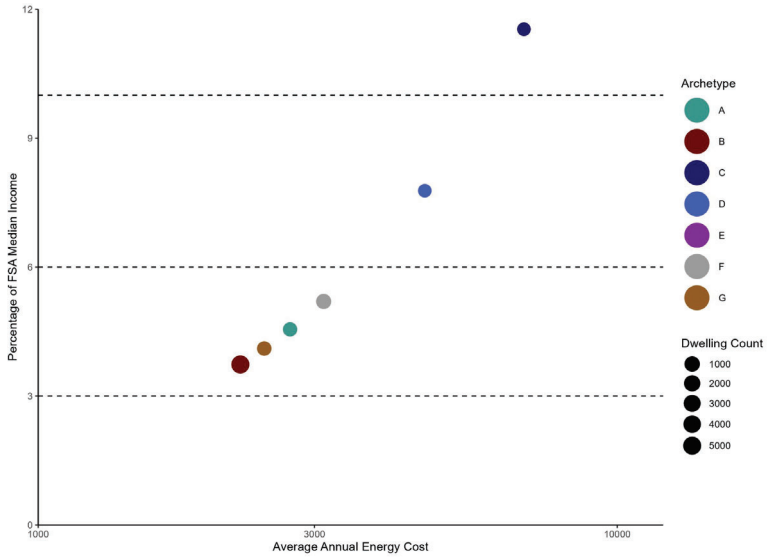


L8K - Energy Burden

Energy Burden: % of income spent on heating/cooling and electricity

The median Canadian household spends under 3% of its income on energy (horizontal line). The benchmark for high energy burden is 6% of annual income.

Archetype D has the burden above 6%, and accounts for 11.5% dwellings in L8K



L8L Breakdown

Total number of single family dwellings:	**6,458**
Annual median income ($):	59,820
Average occupancy per dwelling:	2.3
Owner to renter ratio (%):	64
Total Energy Use (GJ):	603,746
Total tCO2e:	23,920

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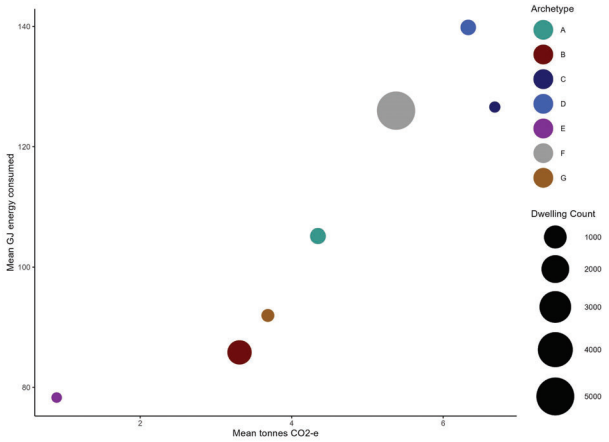
L8L - Carbon and Energy Average per Archetype

Archetype	Count	Total Energy (GJ)	Total tCO2e
A	251	27,909	1,154
B	5,064	429,180	16,561
C	20	2,786	147
D	24	3,778	171
F	787	104,607	4,465
G	312	35,486	1,422
Total	6,458	603,746	23,920

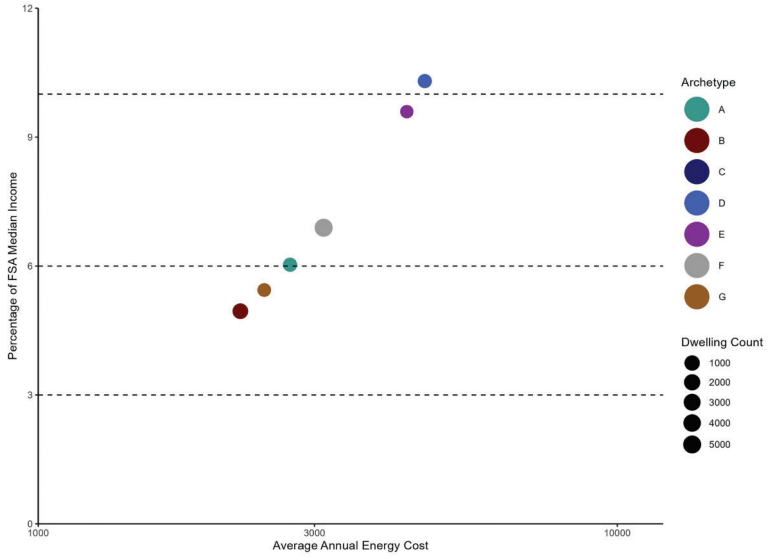


L8L - Energy Burden

Energy Burden: % of income spent on heating/cooling and electricity

The median Canadian household spends under 3% of its income on energy (horizontal line). The benchmark for high energy burden is 6% of annual income.

Archetype D has the burden above 6%, and accounts for 15.3% dwellings in L8L

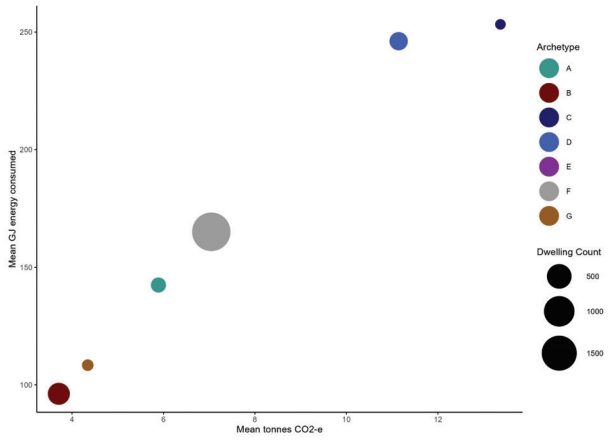


L8M Breakdown

Total number of single family dwellings:	**6,891**
Annual median income ($):	45,151
Average occupancy per dwelling:	2.4
Owner to renter ratio (%):	53
Total Energy Use (GJ):	813,222
Total tCO2e:	34,281

L8M - Carbon and Energy Average per Archetype

Archetype	Count	Total Energy (GJ)	Total tCO2e
A	200	21,033	869
B	1,281	109,945	4,243
C	10	1,266	67
D	178	24,894	1,127
E	7	548	6
F	5,169	651,305	27,799
G	46	4,231	170
Total	6,891	813,222	34,281

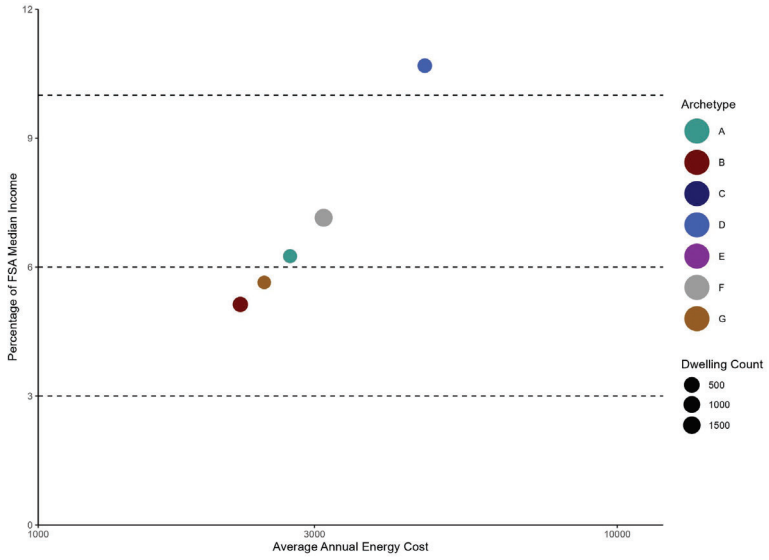


L8M - Energy Burden

Energy Burden: % of income spent on heating/cooling and electricity

The median Canadian household spends under 3% of its income on energy (horizontal line). The benchmark for high energy burden is 6% of annual income.

Archetype D has the burden above 6%, and accounts for 15.9% dwellings in L8M



L8N Breakdown

Total number of single family dwellings:	**2,489**
Annual median income ($):	43,533
Average occupancy per dwelling:	2.1
Owner to renter ratio (%):	42
Total Energy Use (GJ):	399,306
Total tCO2e:	17,009

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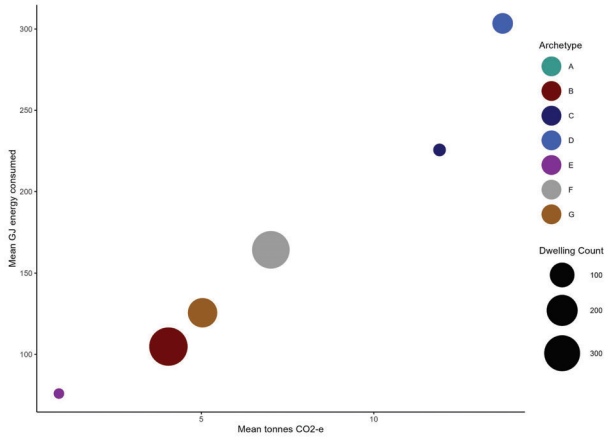
L8N - Carbon and Energy Average per Archetype

Archetype	Count	Total Energy (GJ)	Total tCO2e
A	57	8,122	336
B	332	31,935	1,232
C	4	1,013	53
D	156	38,397	1,738
F	1,933	319,080	13,619
G	7	759	30
Total	2,489	399,306	17,009

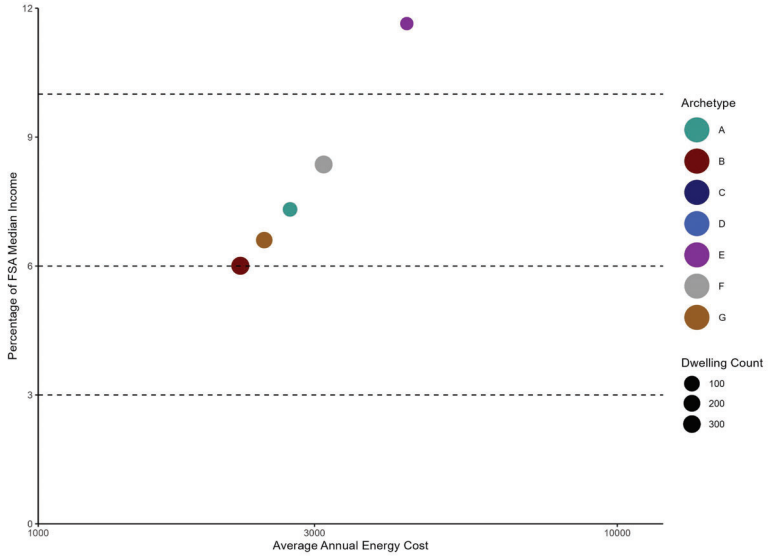


L8N - Energy Burden

Energy Burden: % of income spent on heating/cooling and electricity

The median Canadian household spends under 3% of its income on energy (horizontal line). The benchmark for high energy burden is 6% of annual income.

Archetype D has the burden above 6%, and accounts for 18.5% dwellings in L8N

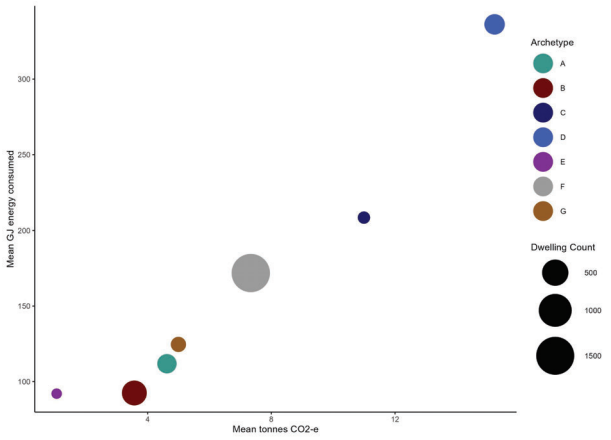


L8P Breakdown

Total number of single family dwellings:	**981**
Annual median income ($):	37,205
Average occupancy per dwelling:	1.9
Owner to renter ratio (%):	25
Total Energy Use (GJ):	138,475
Total tCO2e:	5,743

L8P - Carbon and Energy Average per Archetype

Archetype	Count	Total Energy (GJ)	Total tCO2e
A	37	3,750	155
B	359	37,631	1,452
C	11	2,482	131
D	55	16,690	756
E	9	683	8
F	340	55,883	2,385
G	170	21,357	856
Total	981	138,475	5,743

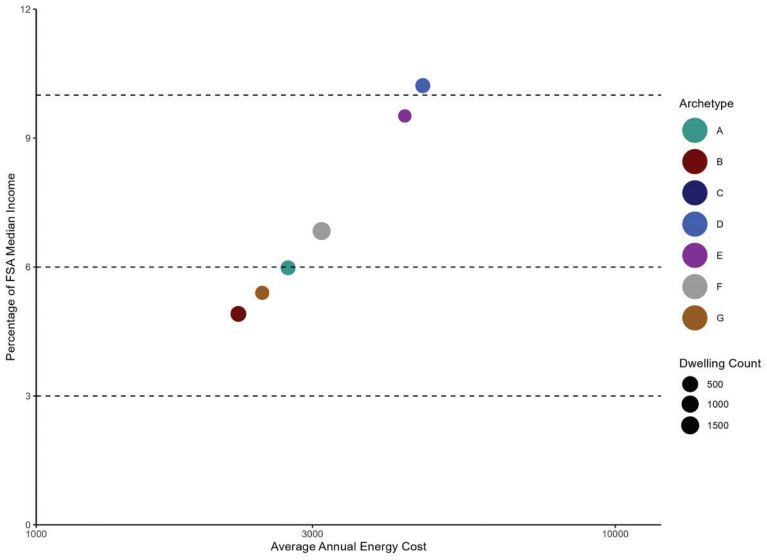


L8P - Energy Burden

Energy Burden: % of income spent on heating/cooling and electricity

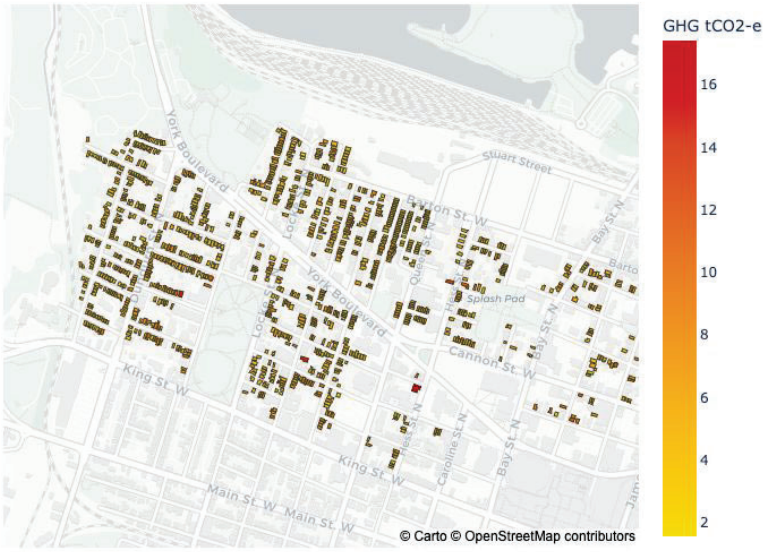
The median Canadian household spends under 3% of its income on energy (horizontal line). The benchmark for high energy burden is 6% of annual income.

Archetype D has the burden above 6%, and accounts for 15.2% dwellings in L8P



L8R Breakdown

Total number of single family dwellings:	**2,377**
Annual median income ($):	45,513
Average occupancy per dwelling:	1.7
Owner to renter ratio (%):	32
Total Energy Use (GJ):	396,675
Total tCO2e:	16,920



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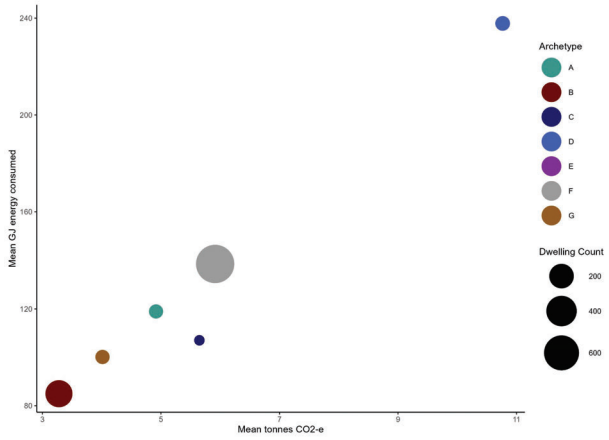
L8R - Carbon and Energy Average per Archetype

Archetype	Count	Total Energy (GJ)	Total tCO2e
A	162	18,117	749
B	414	38,285	1,477
C	12	2,500	132
D	201	67,585	3,060
E	5	460	5
F	1,534	263,622	11,252
G	49	6,106	245
Total	2,377	396,675	16,920

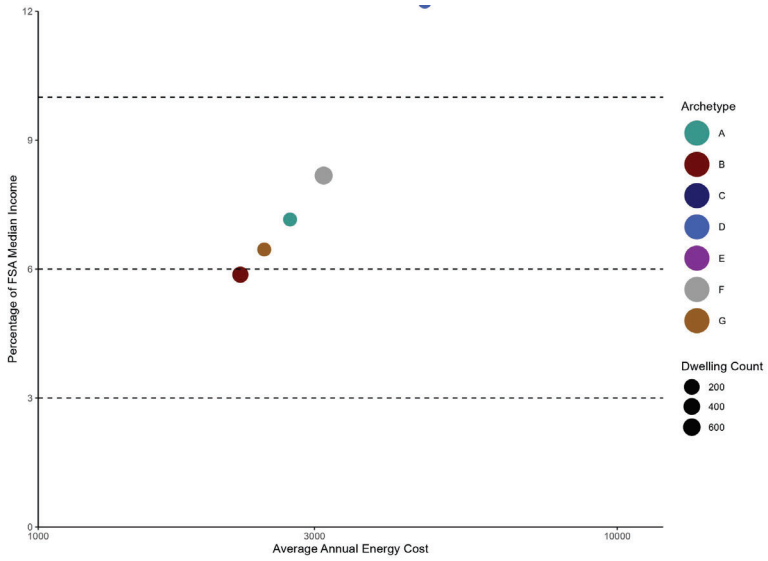


L8R - Energy Burden

Energy Burden: % of income spent on heating/cooling and electricity

The median Canadian household spends under 3% of its income on energy (horizontal line). The benchmark for high energy burden is 6% of annual income.

Archetype D has the burden above 6%, and accounts for 18.1% dwellings in L8R

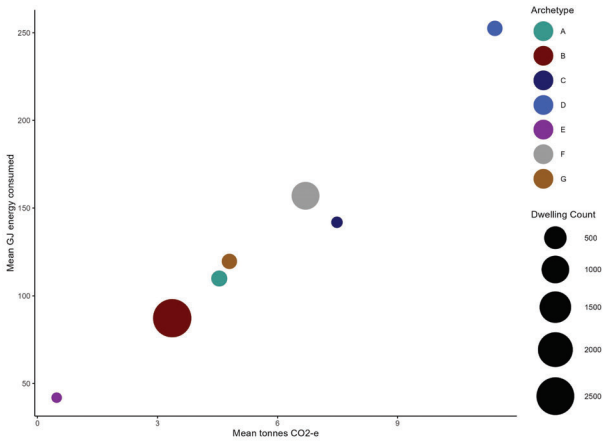


L8S Breakdown

Total number of single family dwellings:	**1,108**
Annual median income ($):	38,054
Average occupancy per dwelling:	2.0
Owner to renter ratio (%):	34
Total Energy Use (GJ):	139,753
Total tCO2e:	5,877

L8S - Carbon and Energy Average per Archetype

Archetype	Count	Total Energy (GJ)	Total tCO2e
A	16	1,903	79
B	276	23,457	905
C	2	214	11
D	20	4,756	215
F	778	107,819	4,602
G	16	1,603	64
Total	1,108	139,753	5,877

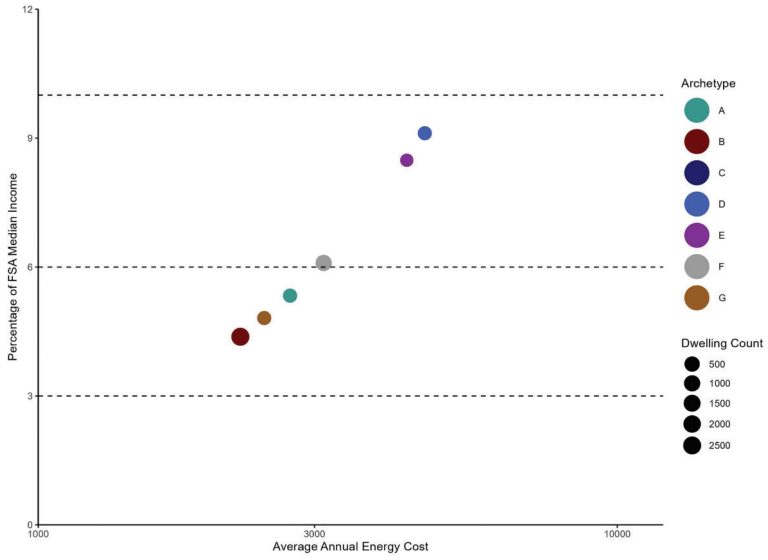


L8S - Energy Burden

Energy Burden: % of income spent on heating/cooling and electricity

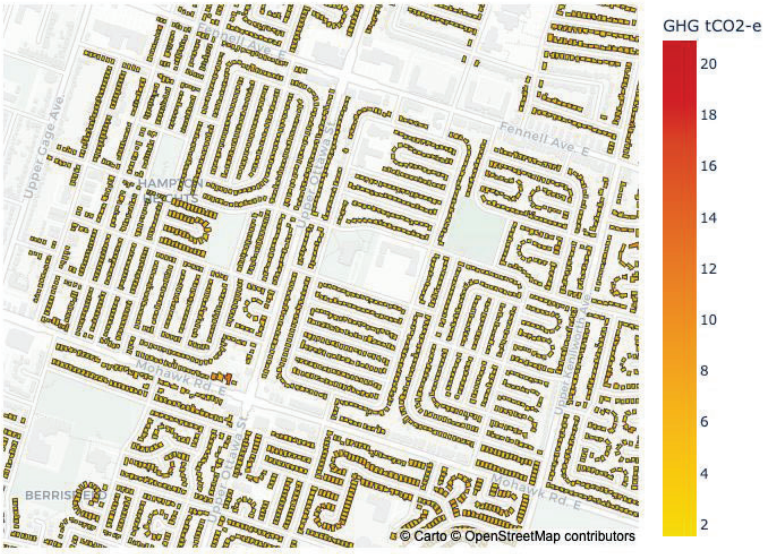
The median Canadian household spends under 3% of its income on energy (horizontal line). The benchmark for high energy burden is 6% of annual income.

Archetype D has the burden above 6%, and accounts for 13.5% dwellings in L8S



L8T Breakdown

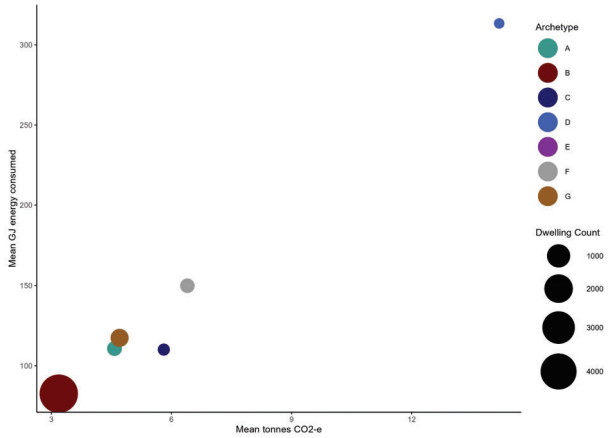
Total number of single family dwellings:	**3,990**
Annual median income ($):	51,045
Average occupancy per dwelling:	2.2
Owner to renter ratio (%):	44
Total Energy Use (GJ):	442,805
Total tCO2e:	17,996



Lightspark

L8T - Carbon and Energy Average per Archetype

Archetype	Count	Total Energy (GJ)	Total tCO2e
A	123	13,521	559
B	2,598	226,739	8,750
C	23	3,262	172
D	101	25,505	1,155
E	20	838	10
F	1,027	161,209	6,881
G	98	11,730	470
Total	3,990	442,805	17,996

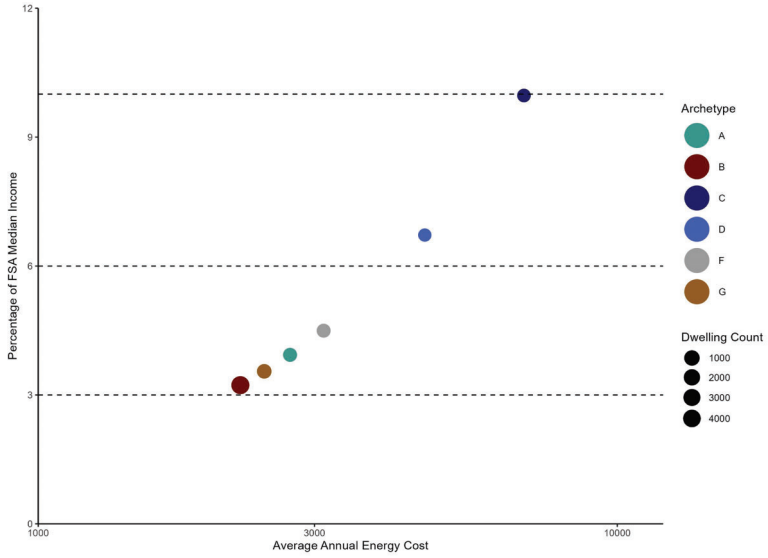


L8T - Energy Burden

Energy Burden: % of income spent on heating/cooling and electricity

The median Canadian household spends under 3% of its income on energy (horizontal line). The benchmark for high energy burden is 6% of annual income.

Archetype D has the burden above 6%, and accounts for 10.0% dwellings in L8T

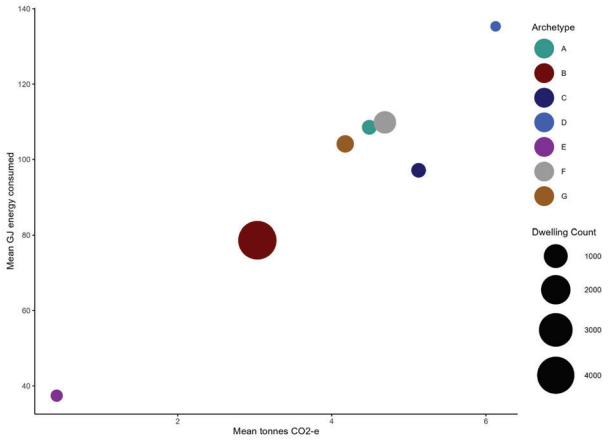


L8V Breakdown

Total number of single family dwellings:	**5,396**
Annual median income ($):	69,221
Average occupancy per dwelling:	2.5
Owner to renter ratio (%):	71
Total Energy Use (GJ):	470,940
Total tCO2e:	18,390

L8V - Carbon and Energy Average per Archetype

Archetype	Count	Total Energy (GJ)	Total tCO2e
A	123	13,618	563
B	4,776	394,236	15,213
C	23	2,531	134
D	7	2,194	99
F	109	16,337	697
G	358	42,024	1,684
Total	5,396	470,940	18,390

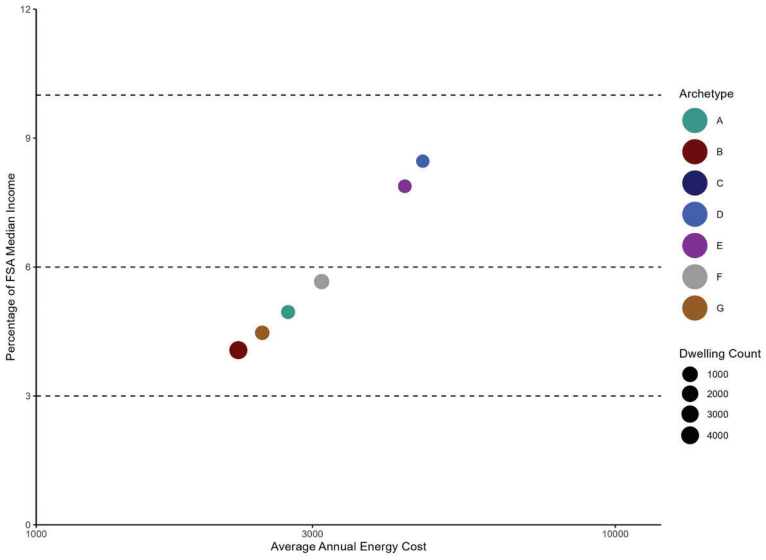


L8V - Energy Burden

Energy Burden: % of income spent on heating/cooling and electricity

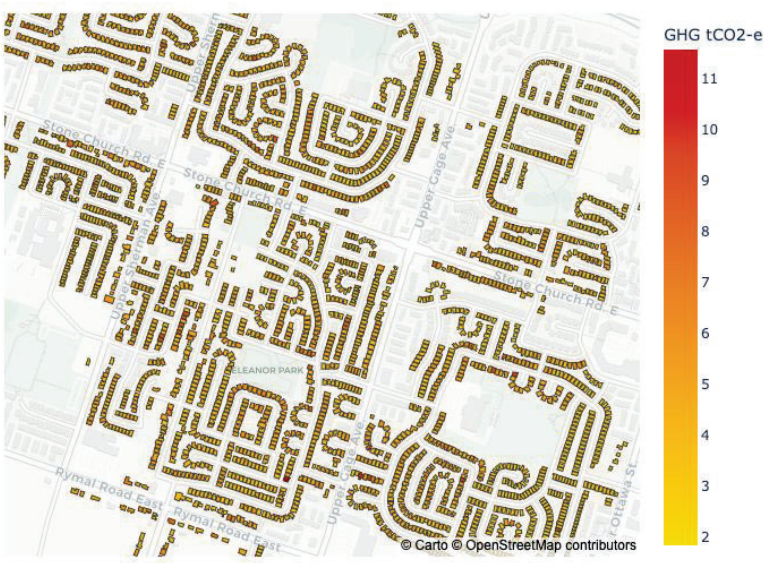
The median Canadian household spends under 3% of its income on energy (horizontal line). The benchmark for high energy burden is 6% of annual income.

Archetype D has the burden above 6%, and accounts for 12.6% dwellings in L8V



L8W Breakdown

Total number of single family dwellings:	**5,648**
Annual median income ($):	54,968
Average occupancy per dwelling:	2.2
Owner to renter ratio (%):	59
Total Energy Use (GJ):	480,516
Total tCO2e:	19,095



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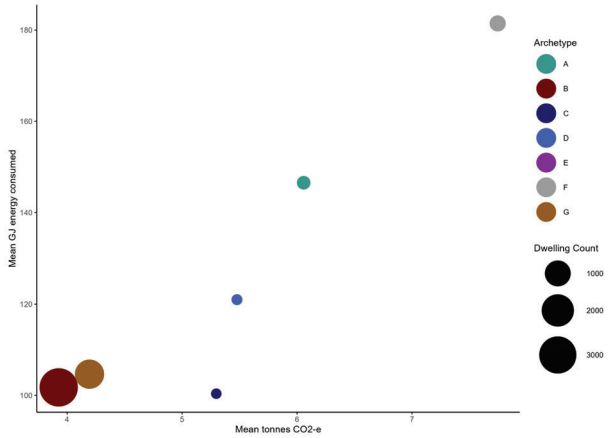
L8W - Carbon and Energy Average per Archetype

Archetype	Count	Total Energy (GJ)	Total tCO2e
A	108	11,723	485
B	4,344	341,509	13,178
C	96	9,325	492
D	4	541	25
E	20	748	9
F	809	88,865	3,793
G	267	27,805	1,114
Total	5,648	480,516	19,095

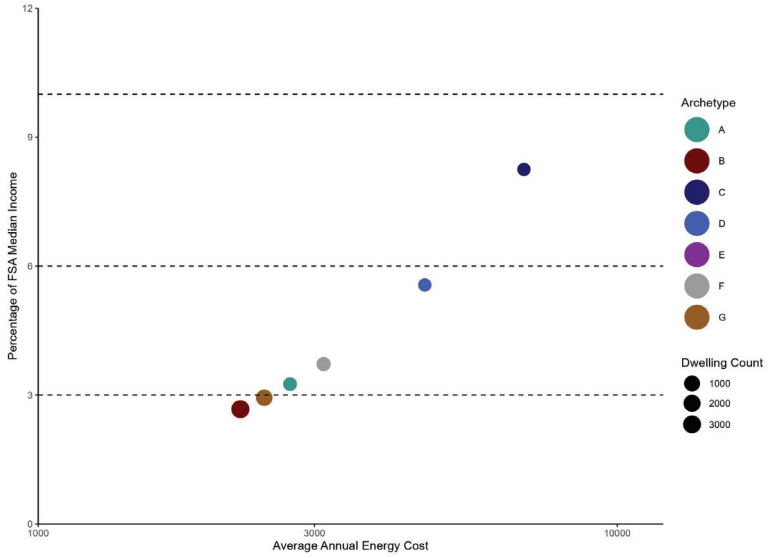


L8W - Energy Burden

Energy Burden: % of income spent on heating/cooling and electricity

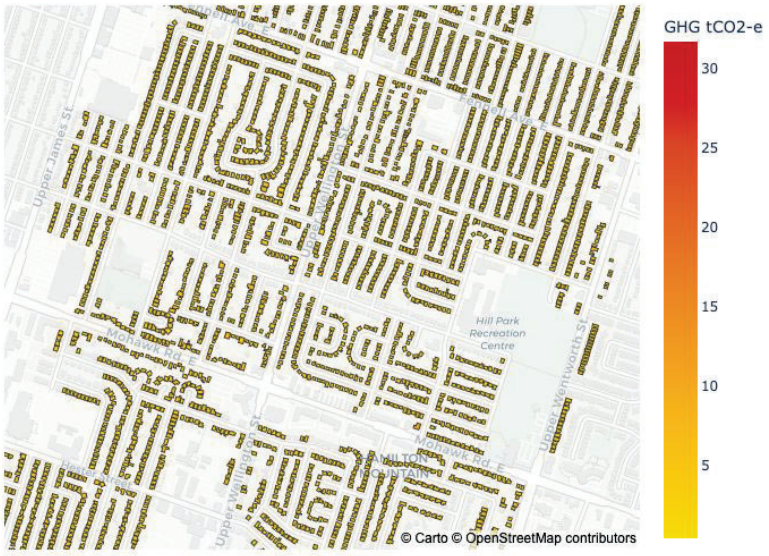
The median Canadian household spends under 3% of its income on energy (horizontal line). The benchmark for high energy burden is 6% of annual income.

Archetype D has the burden above 6%, and accounts for 8.3% dwellings in L8W



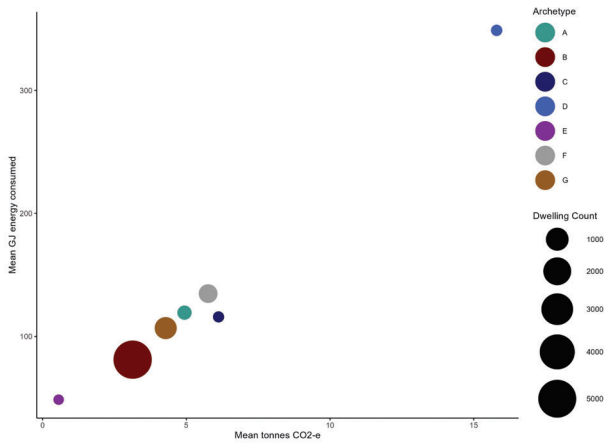
L9A Breakdown

Total number of single family dwellings:	**4,935**
Annual median income ($):	83,636
Average occupancy per dwelling:	3.1
Owner to renter ratio (%):	78
Total Energy Use (GJ):	519,291
Total tCO2e:	20,392



L9A - Carbon and Energy Average per Archetype

Archetype	Count	Total Energy (GJ)	Total tCO2e
A	42	6,155	254
B	3,270	332,736	12,840
C	1	100	5
D	2	242	11
F	137	24,861	1,061
G	1,483	155,197	6,220
Total	4,935	519,291	20,392

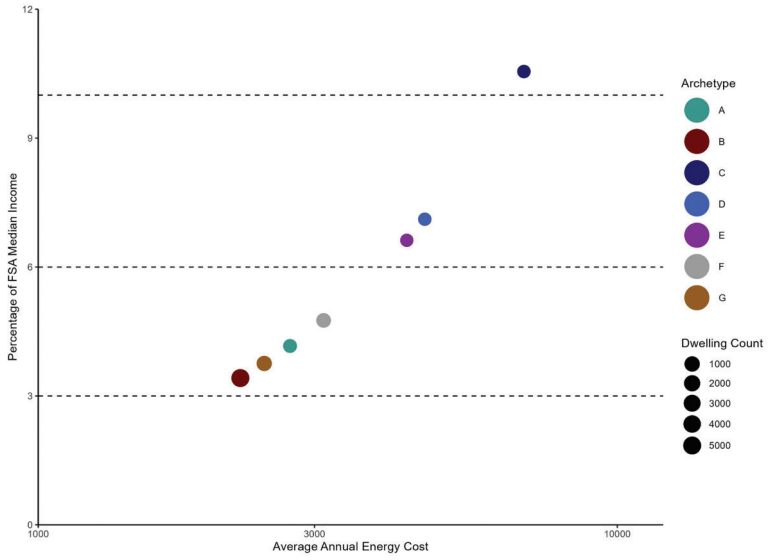


L9A - Energy Burden

Energy Burden: % of income spent on heating/cooling and electricity

The median Canadian household spends under 3% of its income on energy (horizontal line). The benchmark for high energy burden is 6% of annual income.

Archetype D has the burden above 6%, and accounts for 10.5% dwellings in L9A



L9B Breakdown

Total number of single family dwellings:	**6,640**
Annual median income ($):	65,408
Average occupancy per dwelling:	2.5
Owner to renter ratio (%):	70
Total Energy Use (GJ):	595,901
Total tCO2e:	23,480

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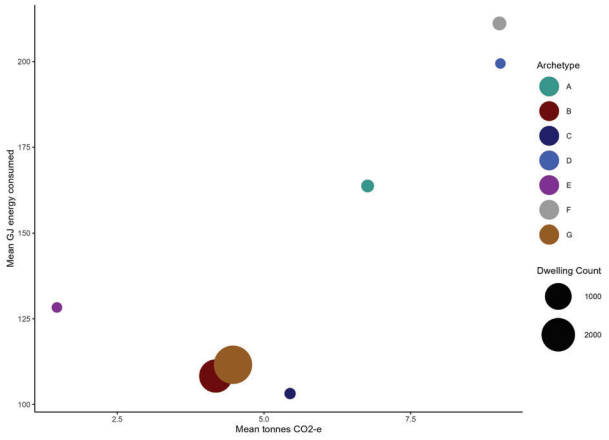
L9B - Carbon and Energy Average per Archetype

Archetype	Count	Total Energy (GJ)	Total tCO2e
A	107	12,777	528
B	5,126	416,026	16,054
C	14	1,624	86
D	17	5,933	269
E	11	534	6
F	469	63,279	2,701
G	896	95,729	3,837
Total	6,640	595,901	23,480

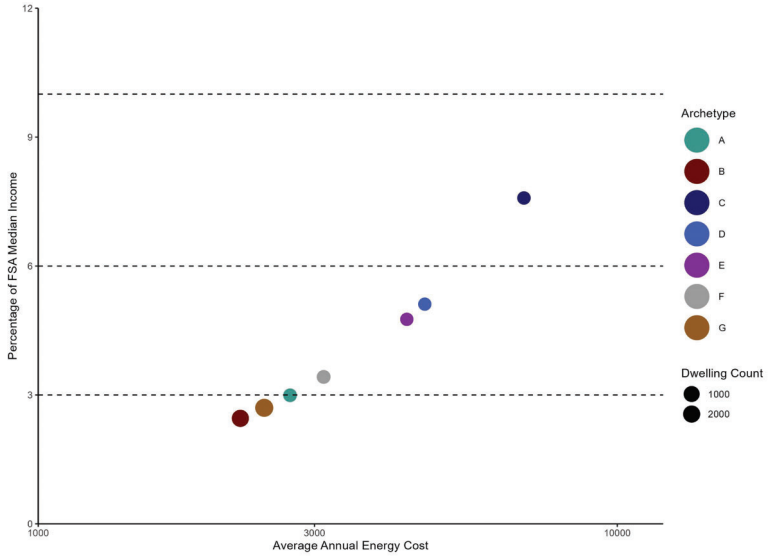


L9B - Energy Burden

Energy Burden: % of income spent on heating/cooling and electricity

The median Canadian household spends under 3% of its income on energy (horizontal line). The benchmark for high energy burden is 6% of annual income.

Archetype D has the burden above 6%, and accounts for 7.6% dwellings in L9B

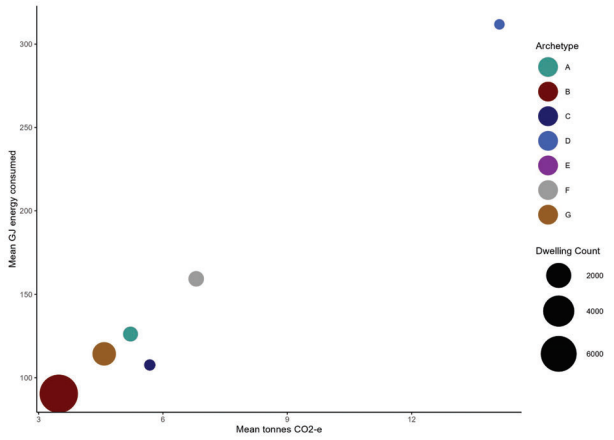


L9C Breakdown

Total number of single family dwellings:	**4,981**
Annual median income ($):	90,991
Average occupancy per dwelling:	3.0
Owner to renter ratio (%):	84
Total Energy Use (GJ):	554,628
Total tCO2e:	21,940

L9C - Carbon and Energy Average per Archetype

Archetype	Count	Total Energy (GJ)	Total tCO2e
A	21	3,438	142
B	1,968	213,118	8,224
C	3	310	16
D	1	199	9
E	1	128	1
F	42	8,869	379
G	2,945	328,567	13,169
Total	4,981	554,628	21,940

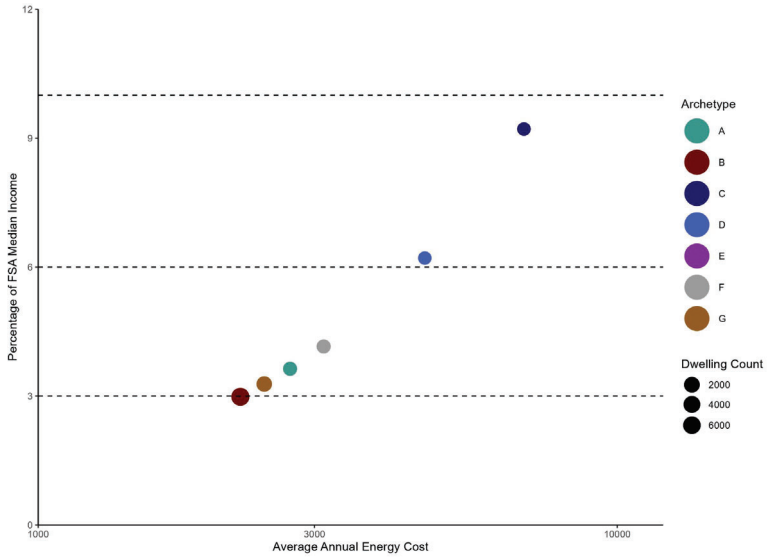


L9C - Energy Burden

Energy Burden: % of income spent on heating/cooling and electricity

The median Canadian household spends under 3% of its income on energy (horizontal line). The benchmark for high energy burden is 6% of annual income.

Archetype D has the burden above 6%, and accounts for 9.2% dwellings in L9C



L9G Breakdown

Total number of single family dwellings:	**9,390**
Annual median income ($):	74,894
Average occupancy per dwelling:	2.7
Owner to renter ratio (%):	73
Total Energy Use (GJ):	918,168
Total tCO2e:	36,037

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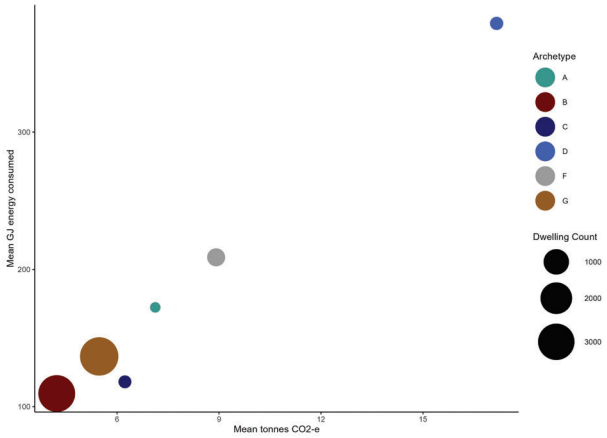
L9G - Carbon and Energy Average per Archetype

Archetype	Count	Total Energy (GJ)	Total tCO2e
A	209	26,381	1,090
B	7,261	656,191	25,321
C	27	2,907	153
D	22	6,861	311
F	264	42,073	1,796
G	1,607	183,755	7,365
Total	9,390	918,168	36,037

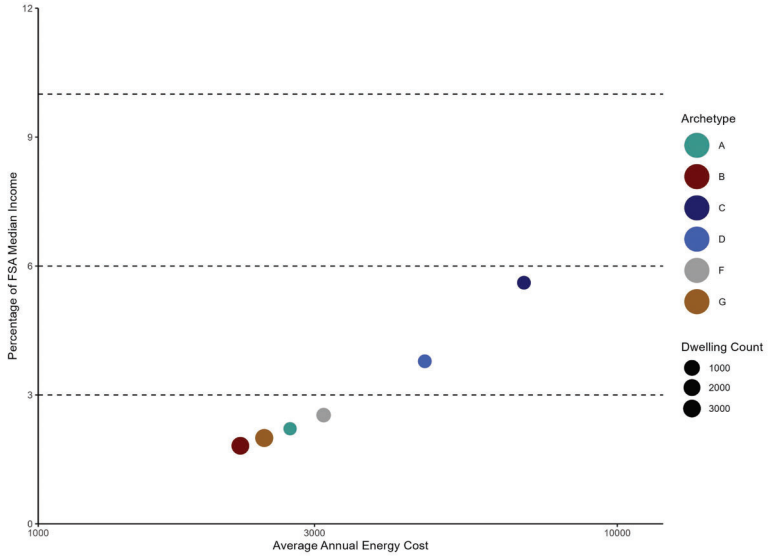


L9G - Energy Burden

Energy Burden: % of income spent on heating/cooling and electricity

The median Canadian household spends under 3% of its income on energy (horizontal line). The benchmark for high energy burden is 6% of annual income.

Archetype D has the burden above 6%, and accounts for 5.6% dwellings in L9G

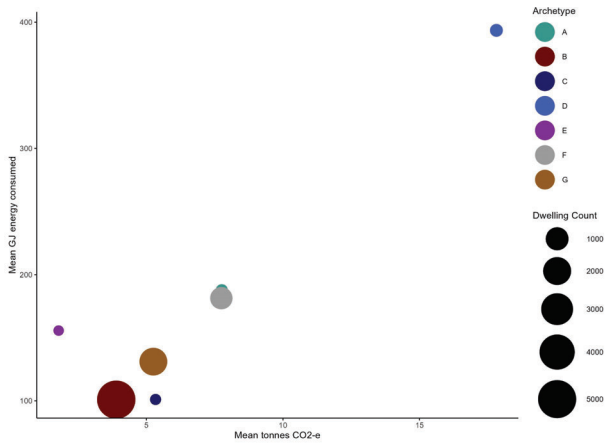


L9H Breakdown

Total number of single family dwellings:	**6,878**
Annual median income ($):	122,965
Average occupancy per dwelling:	2.8
Owner to renter ratio (%):	93
Total Energy Use (GJ):	883,958
Total tCO2e:	35,191

L9H - Carbon and Energy Average per Archetype

Archetype	Count	Total Energy (GJ)	Total tCO2e
A	6	1,034	43
B	3,088	338,230	13,052
C	31	3,661	193
D	40	15,168	687
F	258	53,890	2,300
G	3,455	471,974	18,917
Total	6,878	883,958	35,191

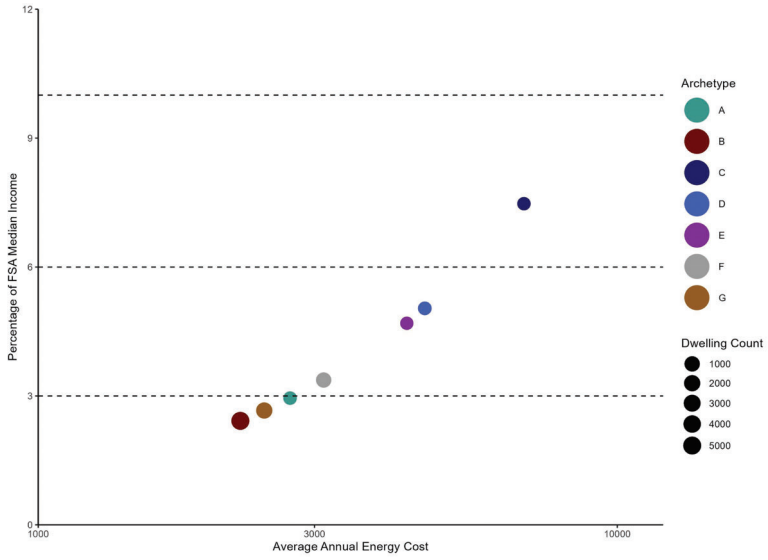


L9H - Energy Burden

Energy Burden: % of income spent on heating/cooling and electricity

The median Canadian household spends under 3% of its income on energy (horizontal line). The benchmark for high energy burden is 6% of annual income.

Archetype D has the burden above 6%, and accounts for 7.5% dwellings in L9H



L9K Breakdown

Total number of single family dwellings:	**8,000**
Annual median income ($):	92,326
Average occupancy per dwelling:	2.4
Owner to renter ratio (%):	79
Total Energy Use (GJ):	954,012
Total tCO2e:	37,997

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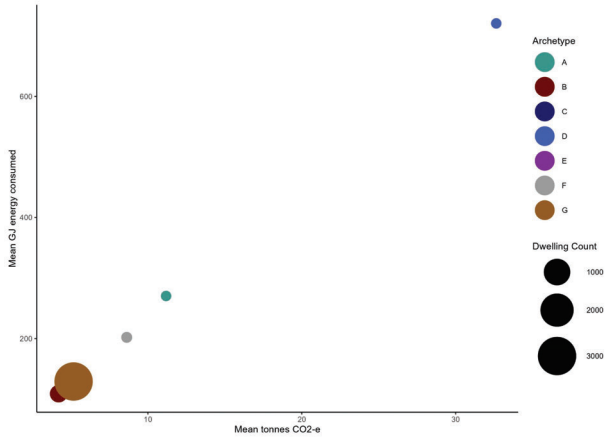
L9K - Carbon and Energy Average per Archetype

Archetype	Count	Total Energy (GJ)	Total tCO2e
A	19	3,567	147
B	5,059	510,616	19,704
C	4	404	21
D	40	15,742	713
E	1	156	2
F	922	167,254	7,139
G	1,955	256,274	10,272
Total	8,000	954,012	37,997

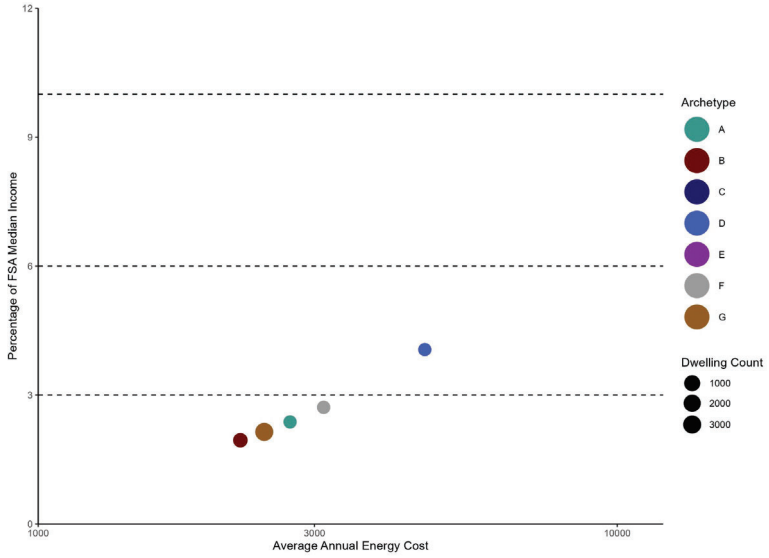


L9K - Energy Burden

Energy Burden: % of income spent on heating/cooling and electricity

The median Canadian household spends under 3% of its income on energy (horizontal line). The benchmark for high energy burden is 6% of annual income.

Archetype E has the burden above 6%, and accounts for 4.1% dwellings in L9K



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- Oil cost
- https://www2.nrcan.gc.ca/eneene/sources/pripri/prices_bycity_e.cfm?productID=7&locationID=2&frequency=M&priceYear=2019&Redisplay=
- Propane cost
- https://www2.nrcan.gc.ca/eneene/sources/pripri/prices_bycity_e.cfm?productID=6&locationID=66&locationID=2&frequency=W&priceYear=2019&Redisplay=
- Standard heat pump COPh
- https://bcbuildinginspections.ca/uploads/cjp/resources/eco/heating_cooling_with_a_heat_pump_brochure.pdf
- Recommended R-value and U-value
- https://www2.gov.bc.ca/assets/gov/farming-natural-resources-and-industry/construction-industry/building-codes-and-standards/guides/climatezone4.pdf
- Poverty lines for Canadian Cities
- https://www.canada.ca/en/employment-social-development/programs/poverty-reduction/reports/strategy.html
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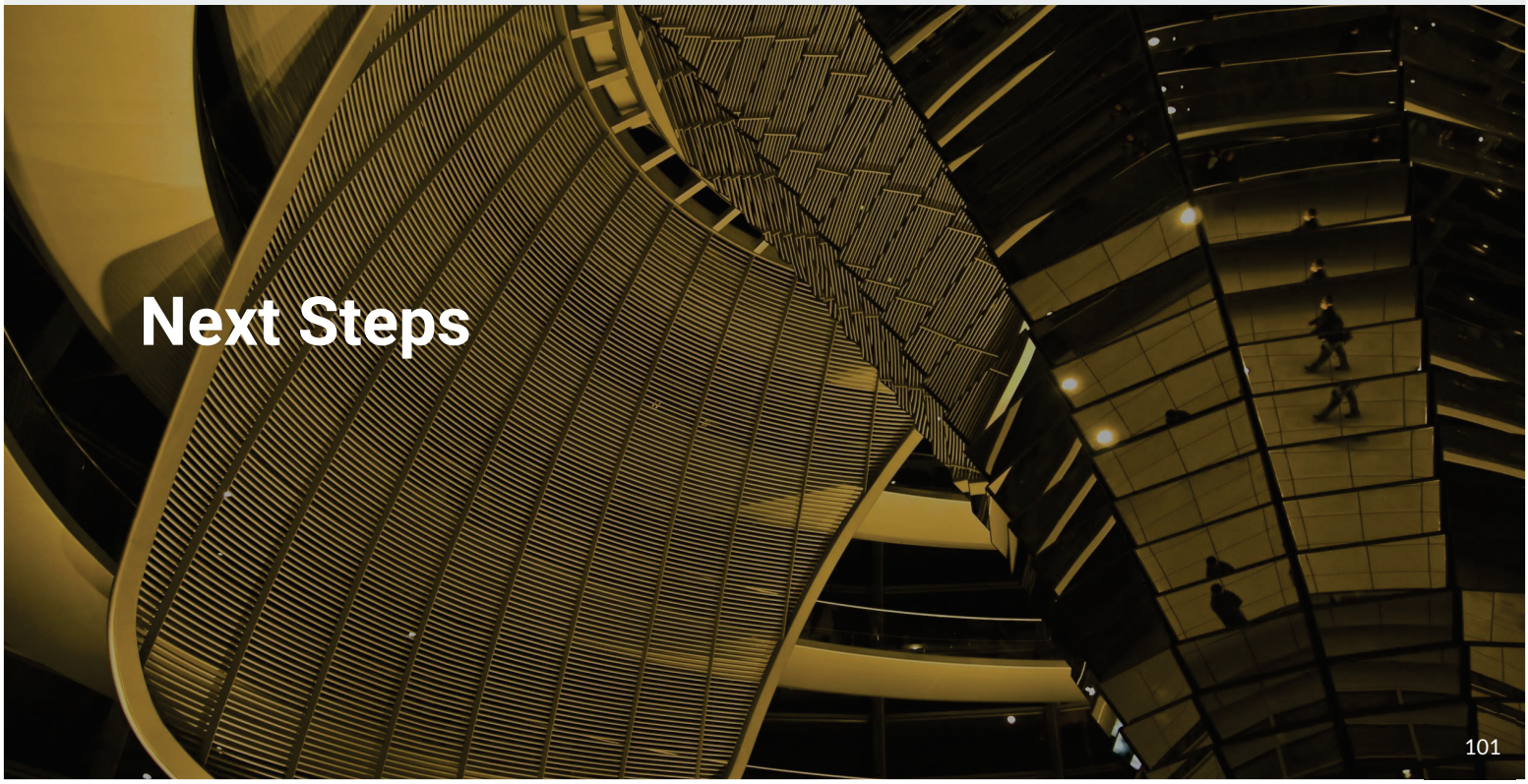

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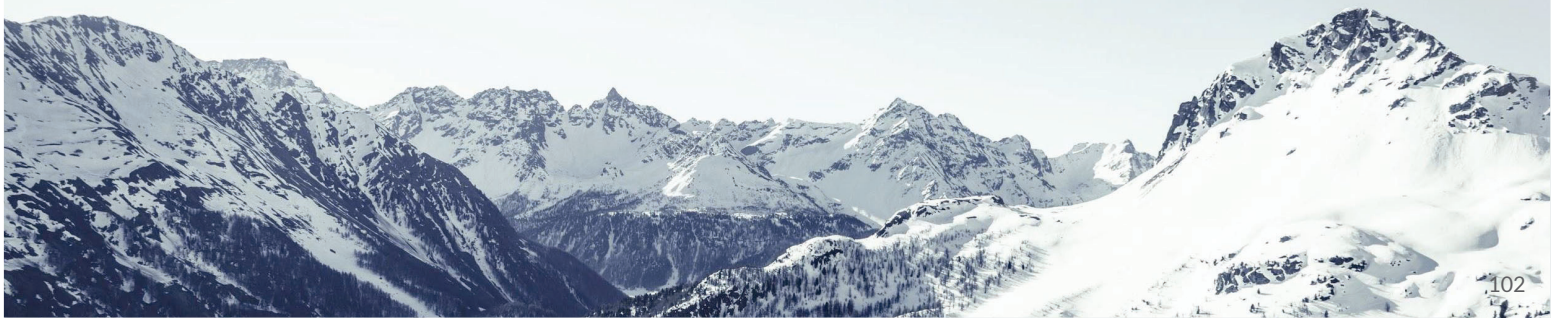

Contact

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Supporting Slides

APPENDIX E: BUSINESS CASE

Table 13 BHH Program Budget using only municipal funds

Municipal Support Only						
REVENUE						
		Climate Reserve	Additional Funding			
Maximum Loan Amount	**$20,000**	**Pilot (2 Years)**	**Year 1**	**Year 2**	**Year 3**	**Year 4**
# Homes upgraded		**50**	**60**	**80**	**100**	**120**
Payment Type	**Frequency**	**Amount ($)**	**Amount ($)**	**Amount ($)**	**Amount ($)**	
Admin and Service Fees						
$200 admin fee	One-time	-	12,000	16,000	20,000	24,000
Grants						
		-	-	-	-	-
External						
Municipal in-kind, partnerships, sponsorships,utilities, youth hring etc.	Annual					
TOTAL PROGRAM REVENUE ($)		-	12,000	16,000	20,000	24,000
EXPENSES						
		Pilot (1-2 Years)	**Year 2**	**Year 3**	**Year 4**	
Staff	**Frequency**		**Amount (base salary) ($)**			
Senior Project Manager	Annual	158381	158381	158381	158381	158381
Additional Staff		142229	142229	142229	142229	142229
Iterdepartmental Support .5 FTE		IN KIND	IN KIND	IN KIND	IN KIND	IN KIND
Legal Support (.2)						
Clerk (.1)						
Finance (.1)						
Taxation (.1)						
TOTAL PAYROLL		**300,610**	**300,610**	**300,610**	**300,610**	**300,610**
Other	**Frequency**		**Amount**			
Marketing and Promo	Annual	60,000	30,000	30,000	30,000	30,000
Web Development (yr 1)	Startup	10,000	0	0	0	0
Website Maintainance	Annual	400	400	400	400	400
RETScreen templates	Startup	5,000	0	0	0	0
TOTAL OTHER		**75,400**	**30,400**	**30,400**	**30,400**	**30,400**
LIC Loan Financing						
Loan Loss Reserve (5%)	Annual	50,000	60,000	80,000	100,000	120,000
Loan Capital	Annual	1,000,000	1,200,000	1,600,000	2,000,000	2,400,000
TOTAL OPERATING COST ($)		**376,010**	**331,010**	**331,010**	**331,010**	**331,010**
TOTAL LIC LOAN + LRR		**1,050,000**	**1,260,000**	**1,680,000**	**2,100,000**	**2,520,000**
TOTAL (Payroll, Loan Amount, Other)($)		**1,726,620**	**1,891,620**	**2,311,620**	**2,731,620**	**3,151,620**
Total Loan Amount (recoverable)	**8,200,000**					
Total Budget	**11,813,100**					

Table 14 BHH program funded with FCM support

FCM + Municipal Support						
REVENUE						
Funding Stream		Climate Reserve	FCM: Capital Loan/Grant (50/50)			
Maximum Loan Amount	**$20,000**	**Pilot (2 Years)**	**Year 1**	**Year 2**	**Year 3**	**Year 4**
# Homes upgraded		**50**	**60**	**80**	**100**	**120**
Payment Type	**Frequency**	**Amount ($)**	**Amount ($)**	**Amount ($)**	**Amount ($)**	**Amount ($)**
Admin and Service Fees						
$200 admin fee	One-time		12,000	16,000	20,000	24,000
Grants						
FCM	Annual		897,404	897,404	897,404	897,404
External						
Municipal in-kind, partnerships, sponsorships,utilities, youth hring etc.	Annual					
TOTAL PROGRAM REVENUE ($)		-	909,404	913,404	917,404	921,404
EXPENSES						
		Pilot (2 yrs)	**Year 1**	**Year 2**	**Year 3**	**Year 4**
Staff	**Frequency**		**Amount (base salary) ($)**			
Senior Project Manager	Annual	316762	158381	158381	158381	158381
Additional Staff			142229	142229	142229	142229
Iterdepartmental Support .5 FTE		IN KIND	IN KIND	IN KIND	IN KIND	IN KIND
Legal Support (.2)						
Clerk (.1)						
Finance (.1)						
Taxation (.1)						
TOTAL PAYROLL		**316,762**	**300,610**	**300,610**	**300,610**	**300,610**
Other	**Frequency**		**Amount**			
Marketing and Promo	Annual	60,000	30,000	60,000	60,000	60,000
Web Development	Startup	10,000				
Website Upkeep	Annual	400	400	400	400	400
RETScreen templates	Startup	5,000	0	0	0	0
TOTAL OTHER		**75,400**	**30,400**	**60,400**	**60,400**	**60,400**
LIC Loan						
Loan Loss Reserve (5% of loan amount provided by FCM as backstop)	Annual	50,000	60,000	80,000	100,000	120,000
Loan Capital	Annual	1,000,000	1,200,000	1,600,000	2,000,000	2,400,000
TOTAL OPERATING COSTS ($)		**392,162**	**331,010**	**361,010**	**361,010**	**361,010**
TOTAL LIC LOAN + LLR		**1,050,000**	**1,260,000**	**1,680,000**	**2,100,000**	**2,520,000**
TOTAL (Payroll, Loan Amount, Other)($)		**1,442,162**	**1,591,010**	**2,041,010**	**2,461,010**	**2,881,010**
Total $ (minus loan as FCM covers this) Cost to Adminster		1,442,162	331,010	361,010	361,010	361,010
Pilot Program Cost	**1,442,162.0**					
Full Program Cost	**8,974,040**					
FCM Funding (80% of Prog Cost)	**7179232**					
FCM Grant (50% of funding amount)	**3589616**					
FCM Loan	**3,589,616**					
Hamilton 4 yr spend (20% Prog Cost)	**1,794,808**					
Total Cost (Pilot + Full Prog)	**3,236,970.0**					

APPENDIX F: IMPLEMENTATION PLAN

LEGEND	
Grey Block	Set up/Launch only
Red Block and Outline	Approximate Pilot Program launch
White Block	Recurring tasks

Pilot Program Launch

Task	Staff Lead	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Pre-Launch Work																										
Hire Program Manager w/ Energy Concierge Skillset	OCCI																									
Develop Service Level Agreements with supporting departments	Program Manager																									
Draft Applicable Program Documents	Program Manager, Legal																									
Draft By-Laws 1) LIC Framework, 2) Apply LIC to Property	City Solicitor																									
Bylaw Approval	Program Manager, Council																									
Develop Loan Tracking Framework	Program Manager																									
Develop Website	Program Manager, Web Development																									
Develop Launch Communications Campaign	Program Manager, Corp Comms																									
Develop Program Advisory Committee	OCCI																									
Operations																										
Finalize application process including webform	OCCI																									
Establish data collection processes (title search. Property liens info, building info)	Program Manager																									
Set up databases	Program Manager																									
Develop reporting tools	Program Manager																									
Connect with Registed Contractors	Program Manager																									
Finalize evaluation and measurement toolkit (i.e. database of Energu Audits, RETScreen)	Program Manager																									
Open Pilot Application	Program Manager																									
Lead Advisory Committee meetings	Program Manager																									
Close Pilot Applications	Program Manager																									
Record tax lien on property	Taxation, Program Manager																									
Collect LIC payments	Taxation																									
Marketing and Communications																										
Launch marketing and communications strategy	Program Manager, Marketing & Comms																									
Launch Program Website	Program Manager, Marketing & Comms																									
Periodic Marketing & Ads	Program Manager, Marketing & Comms																									
Update website	Marketing and Comms																									
Reporting & Review																										
Collect Participant & Contractor Feedback	Program Manager																									
Report to Council Re: Pilot Program	OCCI																									
Review eligible upgrades, expand program criteria if desired	Program Manager																									
Review Qualified Contractor criteria	Program Manager																									
Scaling and Business Development																										
Research funding including FCM capital loan/grant	Program Manager																									
Apply to FCM funding (if desired)	OCCI																									
Hire Addition Staff or generate RFP for program delivery	OCCI																									
Engage with local credit union(s)	OCCI, Program Manager																									
Engage with Contractor Network re: scaling	Program Manager																									

APPENDIX G: CONTRACTOR REGISTRY FRAMEWORK

The CCCM advises the Office of Climate Change Initiatives (OCCI) develop a registry of contractors ahead of the Better Homes Hamilton (BHH) program launch. A template Contractor Registry intake form can be found below.

While the City of Hamilton cannot require participants to select any one contractor to complete a BHH workorder, this Contractor Registry may act as a starting point for participant to gather quotes from organizations that have shown the good business practices, and the training required to install eligible upgrades.

As a reminder, any contractor able to produce the following information may participate in the BHH program:

- Proof of a Hamilton business license
- Quote must show Registered HST#
- Proof of purchased liability insurance that coveralls all employees
- WSIB compliance

Participants of the BHH program are responsible for gathering quotes. It is advised that participants gather a minimum of 3 quotes per upgrade.

Before completing the Funding Request Form, the BHH Program Manager will review quotes with the participant, ensuring all criteria above are in place, as well as reviewing the scope of work to ensure all expenses are eligible under the BHH program guidelines.

The City of Hamilton does not assume any responsibility for quality of work, scheduling of work, or any other aspect of project management.

Better Homes Hamilton
Contractor Registry Intake Form

By filing this form, you are expressing your interest in joining the BHH Contractor Registry. This registry will act as a starting point for BHH participants when gathering quotes.

Participation in the BHH Contractor Registry is voluntary, and membership is subject to review by the Program Manager within the Office of Climate Change Initiatives at the City of Hamilton. As a Registered Contractor, you will have the opportunity to display your organizations logo and website on the BHH program webpage.

Please fill out the form below and return it to [Senior Project Manager Name] at [BHH program email]

Better Homes Hamilton Contractor Registry Form

Baseline Requirements Program

In order to participate in the BHH Program, ***all contractors*** must show:

- Proof of a Hamilton business license
- Quoted work must show Registered HST#
- Proof of purchased liability insurance that coveralls all employees
- WSIB compliance

Contractor Registry Requirements

Please provide the following items via email to the Program Manager upon submission of this form.

☐3 costumer testimonials for workorders relating to eligible BHH expenses
☐If available, a link to your organization's corporate sustainability plan or climate commitments
☐If available, a link to your organization's corporate equity, diversity and inclusion commitments
☐A company logo for display on the BHH program webpage

In addition to the items above, please refer to the requirements under the applicable service areas below.

HVAC Contractors	**Baseline Credentials** Applicable licenses include: ☐313A or 313D license ☐Minimum of G2 gas ticket ☐Minimum of OBT2 oil burning technician ticket ☐308A Sheet Metal Mechanic license
	Contractor Registry Credentials ☐Proof of completion of manufacturer training on ASHP install ☐Proof of heat loss & heat gain competency OR ☐Completion of HRAI: Residential Heat Loss & Heat Gain Calculations ☐**Optional:** Completion of HRAI: The Heat Pump Advantage
Insulation Contractors	**Contractor Registry Credentials** ☐Completion of NAIMA Canada's National Insulation and Air Sealing Training Program OR ☐Equivalent training
Electrical Contractors	**Baseline Credentials** ☐ESA Licence required for any contractor completing electrical services (i.e. upgrading breaker panel)

APPENDIX H: SAMPLE BRANDING, MARKETING AND WEB DESIGN MATERIALS

The following section includes marketing materials, a sample marketing budget and a mock wireframe produced by Agenda Marketing. These assets should be considered a starting point to support future BHH communications campaigns and web design

Sample Marketing Assets

The BHH program should have seasonal communications across a variety of mediums. See sample communications below.

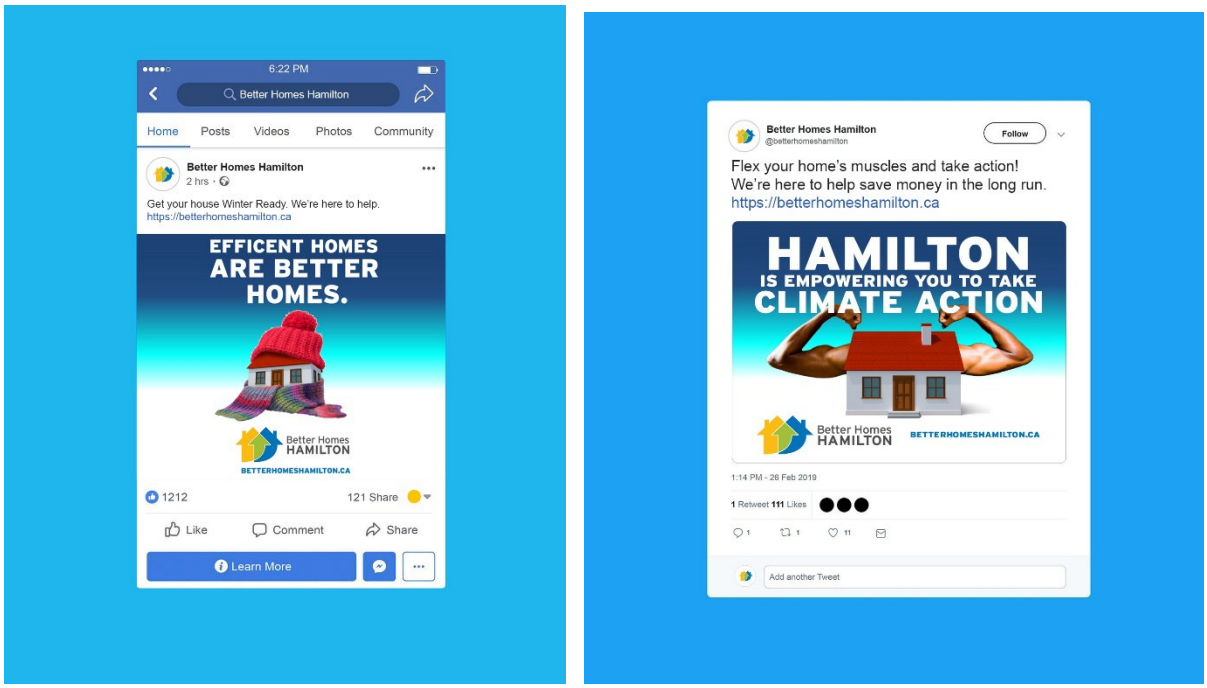


Figure 12 Sample BHH Social Media Advertisements

Figure 13 Sample BHH bus shelter advertisement

Figure 14 Sample BHH billboard advertisement

Figure 15 Mock BHH tote bags

A sample marketing budget overview outlining potential advertising costs, as well as a sample BHH website wireframe can be found below. Please note, these appendices are suggestions based on best practices.

It is recommended that the City of Hamilton Web Development team take inspiration from the wireframe as it contains elements found within retrofit program websites

Facebook ad sizes for examples

Marketing Budget Suggestions

1. INTRODUCTION

Better Homes Hamilton will introduce a new Home Retrofit Program to the Greater Hamilton Area and we require a marketing approach with a large emphasis on awareness.

We hypothesize that once citizens become aware of the program they will take action and search online to learn more. The website we have developed conveys enough information that anyone who has Googled the name, “Better Homes Hamilton”, will be educated on who can benefit from the program and how to proceed.

A two-step customer journey will maximize the marketing budget and deliver results. There are many ways to build awareness in Hamilton and the target audience for this program is wide, Better Homes Hamilton should consider Pay-Per-Click advertising, billboards, Radio spots, TV advertising, furniture ad placements, advertising on the HSR, posters, clothing and social media marketing.

2. COST

Agenda Marketing has researched estimated costs for each of the suggested channels. Below is a breakdown of those costs as of Mar 24, 2023 :

CLOTHING AND ACCESSORIES

Clothing and totes can be given away as incentives to follow social media accounts or as prizes at in-person events.

- 500 x 1 L Canvas Totes - $7,105.00
- 100 x T-Shirts (Gildan 8.8oz) - $1,169.00

Marketing Budget Suggestions

POSTERS AND OUT-OF-HOME MARKETING SUGGESTIONS

Out-of-home marketing placements can grab attention, start conversions and give marketing a physical existence within the city.

- 100 x 12" x 18" Glossy Posters - $82.42
- Billboards in Hamilton - $3,500.00 (monthly cost)
- Kiosks, benches, bus stops and other street furniture placements - $3,000.00 (monthly cost)
- Downtown Hamilton Digital Posters (Main & Dundurn) - $3,500.00 (monthly cost)

RADIO ADVERTISING

30-second spots throughout the day, over the course of a month, will help cement the message and drive people to Google BetterHomesHamilton.ca

- 20, 30-second ads on Bounce 102.9 FM between 5 am and 1 am, Monday through Sunday - $6,640.00 (monthly cost)

SOCIAL MEDIA MARKETING

With graphics and animations supplied by the City, ads on social media can be hyper segmented to various socio-economic strata and geo-targeted to specific areas within the Greater Hamilton Area.

- 600,000 video views on Facebook, Instagram, Twitter and TikTok - $4,000.00 (monthly cost)

PAY-PER-CLICK & ORGANIC SEARCH ENGINE OPTIMIZATION

Better Homes Hamilton can invest in organic search engine optimization to increase visibility on target Google searches as well as pay for key search terms.

Marketing Budget Suggestions

- Rank for organic keywords, like Better Homes Hamilton, future home, greener homes loan, energy suit Hamilton, etc. - $600.00 (monthly cost)
- Pay to get 500 clicks from search terms, like Hamilton home loan, and home loan program Hamilton. - $1,000.00 (approximate budget that buys keywords via auction and is only redeemed for every click)

3. RECOMMENDATION

Agenda Marketing recommendations are a front-loaded campaign, spending more money at the beginning of the campaign to amass marketing material (posters and totes) and then slowly transitioning to digital marketing.

With a budget of $100,000 over two years, radio and out-of-home advertising will be too expensive. Although beneficial in the beginning, we recommend a digital approach supplemented with marketing material that can be given out, used in advertising and strategically placed at events.

Brand Guidelines and Logo Use

The following section showcases the BHH brand guidelines developed by Agenda Marketing. The City of Hamilton brand guidelines were consulted when developing this document.

Better Homes
HAMILTON

Brand Guidelines

for the application of our new identity.

Here are some alternative examples of the use of our logo with the Hamilton city logo ensuring safety areas and visibility in all uses is paramount.

Note we recomend that the Hamiltion City logo is used to the right of the logo as this creates the best visual balance.

The examples here are shown in black and white as a primary alt to our solid colour versions.

As a third alternative we have an outline of the house icon. We would reserve the use of this logo and for the agency to be consulted in its use to determind where and what on.

These brand guidelines are designed to give its users a clear and helpful way to apply our new visual identity that has been developed.

Key to the success of any brand is ensuring it's consistent application across all channels.

This guide takes you through all the steps to use the logo, its typography and colour systems correctly

This guide includes:

- Our new logo
- Rules around its application
- Typefaces and family
- Colour systems & application

The symbol of a house indicates individual homes being improved to bring personal, community and environmental benefit.

Our typeface has been selected to feel both modern & confident but also human and approachable.

Better Homes
HAMILTON

Our colours have been selected to reflect the idea of our local environment and the warmth of a home that has been retro-fit.

The two houses come together to create an arrow a simple icon for improvement and the uplifting of living standards.

The curved base of the homes and rounded corners give our homes a more human feel. Just like the corner of a smile being created.

These versions of our brand have been created to work in different use situations so they maintain legibility and clear function in whatever formats they are used in.

1. Safety Zone

The “Safety Zone” ensures that when our logo is placed with other content it standouts out and is free and clear of any visual clutter.

By using the letter N from the word HAMILTON. it gives a designer an easy way of scalling the required distance in all circumstances.

2. Outlined Logo

Only to be used in limited applcations where a lighter impression of our brand is needed.

3. Black on & white out options

To be used where colour use is restricted.

1

2

3

Our Brand colour system has been checked against AODA colour contrast and accessibility.

For the main brand colours they are AAA rated for either black or white text on them.

Our 3 main colour themes are clearly based on environmental influences.

BHH Yellow
The sun / The warmth of a home.

BHH Green
Nature / calm / Approval (greenlight).

BHH Blue
Air / water / clear skies / easy to see.

Better Homes HAMILTON

Our Core Brand Palette		Our Secondary Brand Palette		Complementary Brand Colours			
#42a5f5	White out AAA	#42a5f5	Black on AAA	#c2185b	White out AA	#f5f5f5	Black on AAA
#9ccc65	Black on AAA	#387002	White out AA	#f00838f	Black on AAA	#000000	White on AAA
#ffa726	Black on AAA	#ac1900	White out AAA	#757575	Black on AA White on AA	#f5f5f5	Black on AAA

Our typeface **Interstate** is our logo typeface digital typeface based on Humanist San Serif themes and can be used across signage & print.

While we use this face for our main identity we have paired it with a freely available font from google **Open Sans**

Open Sans that compliments our logo face, but has the advantages that is is accessible to use across platforms. Use this face for all content and text to support the main brand in its communications.

Logo typeface Interstate

Interstate Regular

ABCDEFGHIJKLMNOPQRSTUVWXYZ
adcdefghijklmnopqrstuvwxyz
1234567890

Interstate Bold

ABCDEFGHIJKLMNOPQRSTUVWXYZ
adcdefghijklmnopqrstuvwxyz
1234567890

Body copy & content typeface Open Sans

Open Sans Light

ABCDEFGHIJKLMNOPQRSTUVWXYZ
adcdefghijklmnopqrstuvwxyz
1234567890

Open Sans Regular

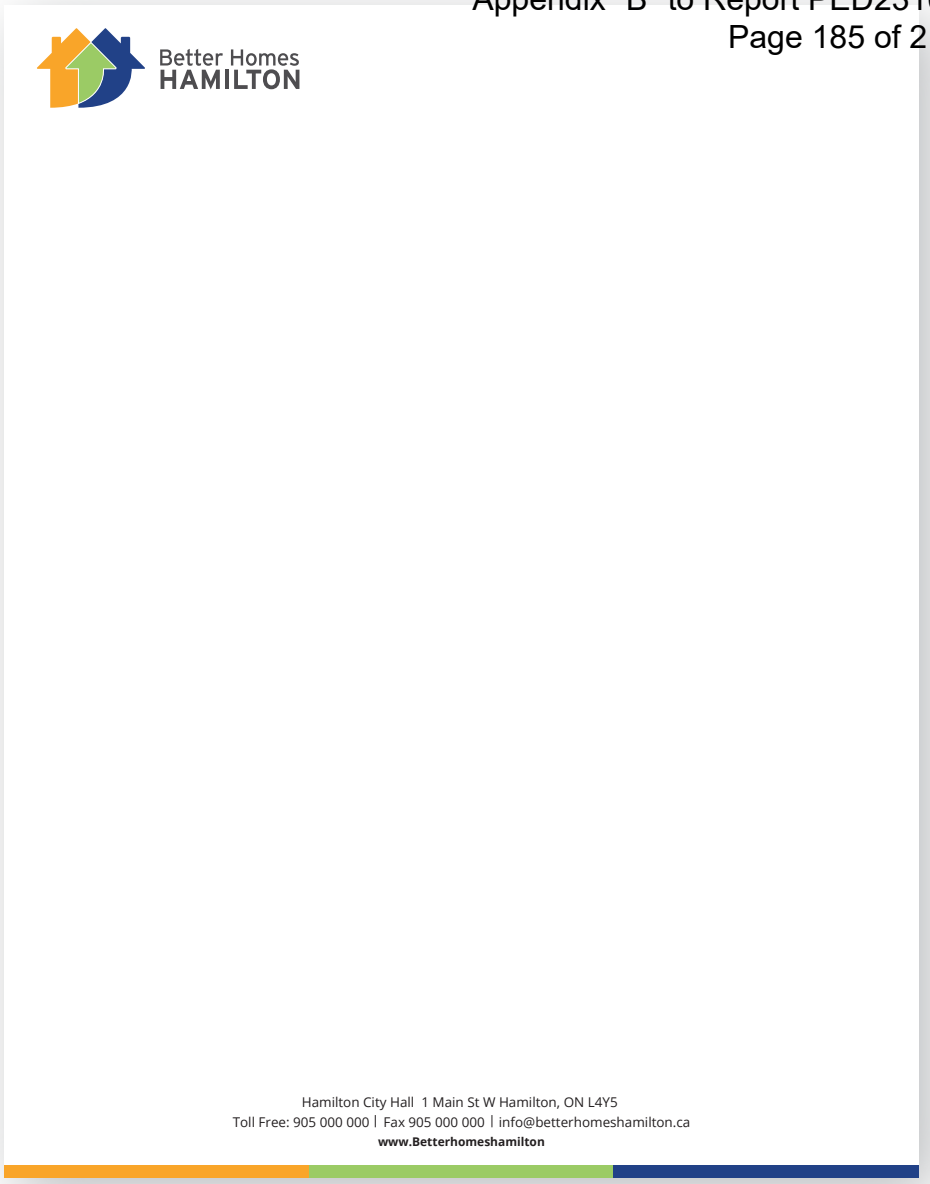
ABCDEFGHIJKLMNOPQRSTUVWXYZ
adcdefghijklmnopqrstuvwxyz
1234567890

Open Sans Light

ABCDEFGHIJKLMNOPQRSTUVWXYZ
adcdefghijklmnopqrstuvwxyz
1234567890

Here are examples of how Open Sans is used for our stationary design. Using different weights to allow key information to he highlighted, for ease of navigation.

The application of a simple colour bar further reinforces our brand colours while helping ground our content & information on the page. To create a simple but effective design system.



Here are examples of use of our logo with the Hamilton city logo ensuring safety areas and visibility in all uses is paramount.

Note, we recomend that the Hamiltion City logo is used to the right of the logo as this creates the best visual balance.

In all cases the N from Hamilton is being used as a guide for spacing.

If the Hamiltion City logo needs to be used to the righthand side of the BHH logo, an additional N space must be added between the logo to achieve the same visual balance as indicated here.

Sample BHH Wireframe

This section includes a wireframe for a potential BHH program website. The CCCM collected examples of other HERO program webpages, and reviewed best practices with the Agenda Marketing Team with respect to user experience and accessible web design.

The CCCM recommends the BHH program webpage contain elements of the wireframe below including;

- Clear BHH branding with eye-catching imagery which speaks to the program's core mandate of financing energy efficiency upgrades
- Minimize click-throughs
- Provide background information about the BHH program, and what kind of experience participants can expect
- Clearly outlines the eligible upgrades and incentives
- Directs users to rebates and other incentive programs that they can access both through the BHH program and independently.

Carousel Images of BHH Program

Get Started

Click here to apply to the Better Homes Hamilton Pilot Project today

Apply

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Icon *Icon* *Icon*

Icon *Icon* *Icon*

Learn More

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Incentives & Resources

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Learn More

HERO image/Logo or Graphic

BHH Project Background

The Better Homes Hamilton program allows Hamiltonians to take climate action by providing access to low-interest, fixed-rate loans to serve as the capital required to complete upgrades which result in a reduction in household GHG emissions, as well as an increase in home comfort and energy efficiency.

The BHH program utilizes a Local Improvement Charge (LIC) framework which enables the municipality to issue loans against the title of a property as a "special charge" lien. Loan repayment is collected via regularly scheduled property tax bills.

Hamilton Climate Action Strategy

Council Decision/directive

Graphic Image with Goals

Graphic Image with Goals

Project Goals

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Upgrade Now

Project Timeline

1 **Step/Phase** — *Icon/Image*

2 **Step/Phase** — *Icon/Image*

3 **Step/Phase** — *Icon/Image*

4 **Step/Phase** — *Icon/Image*

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Participant Elegibility Criteria

Image

Supporting Partners

CCMM Logo

Upgrades and Eligible Expenses Graphic

Permitting and Assessments | Building Envelope | Heating and Cooling | Infrastructure Upgrades

Permitting and Assessments

Image/Graphic

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Complete Cost of Energy Audit

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Applicable Building Permits

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Download PDF

By participating in the BHH pilot project, you can receive:

- A maximum of $20,000 loan at 0% interest on a 15year term
- Access to project management guidance through the energy concierge service
- Guidance relating to applying to applicable rebates

Upgrades and Eligible Expenses Graphic

Building Envelope

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Image/Graphic

Icon

Air-sealing

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Draft Proofing

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By participating in the BHH pilot project, <u>you can receive:</u>

- **A maximum of $20,000 loan at 0% interest on a 15year term**
- **Access to project management guidance through the energy concierge service**
- **Guidance relating to applying to applicable rebates**

Upgrades and Eligible Expenses Graphic

Permitting and Assessments | Building Envelope | **Heating and Cooling** | Infrastructure Upgrades

Heating and Cooling

Image/Graphic

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Smart Controller

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- Guidance relating to applying to applicable rebates

Upgrades and Eligible Expenses Graphic

Permitting and Assessments | Building Envelope | Heating and Cooling | **Infrastructure Upgrades**

Infrastructure Upgrades

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Breaker Panel

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By participating in the BHH pilot project, you can receive:

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- **Access to project management guidance through the energy concierge service**
- **Guidance relating to applying to applicable rebates**

Rebates Graphic

Rebates

Participants may access a number of rebates to immediate begin paying back their loan. Speak with you energy concierge about how to apply!

Icon *Icon* *Icon*

Grants & Rebates	Loans	Income-Qualifying Supports
Enbridge HER+	Greener Homes Loan	Enbridge Winterproofing
Greener Homes Grant		SaveON Energy Energy
OHPA Grant		Affordability Program
Enbridge Smart Thermostat		

Contact Us Graphic

Contact Us

For questions about the Better Homes Hamilton program contact:

betterhomeshamilton@hamilton.ca

To learn more about Climate Action in the City of Hamilton contact:

XXX-XXX-XXXX

Apply Now Graphic

Better Homes Hamilton Application Form (Example)

Name *

Contact Preference *
- ☐ Email
- ☐ Phone

Question/Comment *

Address

City *

Building Type * -

I currently heat with: * -

My electricity provider is: -

My natural gas provider is: -

I am a:
- ☐ Homeowner
- ☐ Renter
- ☐ Strata council representative
- ☐ Indigenous community member
- ☐ Contractor
- ☐ Energy Advisor or Modeller
- ☐ Building manager
- ☐ Other

I heard about the Energy Coach Service from: -

I would like to receive information about future programs
- ○ Yes
- ○ No

Terms and Privacy Policy *
- ☐ I agree to the Terms of Use and Privacy Policy

Read Terms of Use

Submit

Need Help with the Application?

Reach out and we'll
walk you through your options

Contact Us

APPENDIX I: SAMPLE LOCAL IMPROVEMENT CHARGE BYLAWS

The following section shows sample LIC bylaws from Appendix B1 and B2 of the 2020 Clean Air Partnership report, Accelerating Home Energy Efficiency Retrofits Through Local Improvement Charge Programs: A Toolkit for Municipalities

It is recommended that the City of Hamilton consult these template bylaws when generating the LIC bylaws to support the BHH Program.

ACCELERATING HOME ENERGY EFFICIENCY RETROFITS THROUGH LOCAL IMPROVEMENT CHARGE PROGRAMS:

A Toolkit for Municipalities

Canada

FCM FEDERATION OF CANADIAN MUNICIPALITIES FÉDÉRATION CANADIENNE DES MUNICIPALITÉS

Clean Air Partnership

Clean Air Partnership

ABOUT THE CLEAN AIR PARTNERSHIP:

Clean Air Partnership (CAP) is a registered charity that works in partnership to promote and coordinate actions to improve local air quality and reduce greenhouse gases for healthy communities. Our applied research on municipal policies strives to broaden and improve access to public policy debate on air pollution and climate change issues. Clean Air Partnership's mission is to transform cities into more sustainable, resilient, and vibrant communities where resources are used efficiently, the air is clean to breathe and greenhouse gas emissions are minimized.

REPORT AUTHORS:

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Heather McDiarmid, University of Waterloo
Kevin Behan, Clean Air Partnership

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FCM FEDERATION OF CANADIAN MUNICIPALITIES FÉDÉRATION CANADIENNE DES MUNICIPALITÉS

Canada

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Project Lead — Environment and Energy Division, City of Toronto

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Layout Design by Carly Popenko

APPENDIX B1 |

SAMPLE MUNICIPAL BY-LAW FOR ENABLING LIC RETROFIT PROGRAM

APPENDIX B1 | SAMPLE MUNICIPAL BY-LAW FOR ENABLING LIC RETROFIT PROGRAM

Please note that this is just a sample by-law. Specific program details should be added, modified, or removed based on all applicable legislation, regulations, and local context.

A by-law to authorize the undertaking of energy efficiency and water conservation works on private residential property as local improvements under the Residential Retrofit Program.

Whereas Part III of Ontario Regulation 586/06 authorizes Council to pass a by-law to undertake works on private residential property as local improvements for the purpose of raising all or part of the cost of the work by imposing special charges on lots upon which all or some part of the local improvement is or will be located; and

Whereas such a by-law may authorize the undertaking of works which satisfy the requirements of a [MUNICIPALITY] program; and

Whereas at its meeting of [XXXX], [MUNICIPALITY] Council adopted the [Residential Retrofit Program] pursuant to authority of Ontario Regulation 586/06;

The Council of [MUNICIPALITY] enacts:

1. Council authorizes the undertaking of energy efficiency and water conservation works on private residential property as local improvements under the Residential Retrofit Program, as set out in Appendix A to this By-law, for the purpose of raising all or part of the cost of the work by imposing special charges on lots upon which all or some part of the local improvement is or will be located.

Enacted by [MUNICIPALITY] Council this XX day of XX, 20XX.

_____ _____

Mayor **[MUNICIPALITY] Clerk**

Authorized by Item No. ___ of Report No. ___

of the Committee _____

Adopted by [MUNICIPAL] Council on _____

APPENDIX A: RESIDENTIAL RETROFIT PROGRAM DESIGN

I. SINGLE-FAMILY HOUSING PROGRAM STREAM

1.0. | Overview

The Residential Retrofit Program is designed to extend municipal funding to consenting homeowners for the installation of qualifying natural gas, electricity and water conservation improvements and related energy assessments and then to secure payment by imposing a local improvement charge (LIC) on the private residential property, as authorized by the Regulation. This program may be administered completely by the municipality or by the municipality in conjunction with a third party administrator, to be named at a later date.

1.1. | Program Eligibility

Residential low-rise buildings located within the [MUNICIPALITY] of the following forms are eligible: detached, semi-detached, townhouse and more generally housing forms with fewer than [7] units.

The property must have a property tax account with the [MUNICIPALITY]. [The property must also be a customer of [UTILITY/GAS COMPANY].

Participation is voluntary, owner-initiated and subject to the following conditions:

- All registered owner(s) of the property must consent to participating in the Program;
- Property tax, utility bills and all other payment obligations to the [MUNICIPALITY] for the past five years must be in good standing; and
- [OPTIONAL: Consent from all mortgage lenders, if the property is subject to one or more mortgages.]

1.2. | Geographic Scope/ Neighbourhood Selection Process [OPTIONAL]

Any owner of an eligible building in [MUNICIPALITY] can participate in the residential retrofit program.

[OR]

The municipality has selected X neighbourhoods to pilot the Program.

The neighbourhood selection process is to be guided by the preliminary criteria set out below:
[SELECT IF APPLICABLE]

- Above average utility-calculated natural gas and electricityend-use consumption;
- Above average number of pre 1980 building vintages and uniform building types;
- Higher than average ratio of owner-occupied versus rental properties;
- Varying demographic and socio-economic characteristics (i.e. low-income neighbourhoods); and
- Existing community initiatives or organizations interested in being aligned with the Program to achieve efficiencies in terms of program delivery (i.e. marketing and outreach support).

The [MUNICIPALITY] will monitor Program uptake within the pilot neighbourhoods during the implementation of the Program. If appropriate, the Program may be rolled out [MUNICIPALITY] wide to achieve the participation goals.

1.3. | Home Energy Assessments [OPTIONAL]

Similar to the ecoENERGY Home Retrofit Program designed by the Federal Government, the

[MUNICIPALITY]'s Program will utilize the EnerGuide Rating System (the "ERS") that provides a standard measure of a home's energy performance. It provides a standardized tool and process to assess home energy efficiency and can model energy savings projects.

The property owner must hire a Certified Energy Advisor (the "CEA") - certified by Natural Resources Canada ("NR Can") - to perform pre- and post-retrofit assessments in accordance with ERS. CEAs are experts in the field of energy efficiency and well-versed in the 'whole home' approach to home energy systems, technologies and products. The cost of the energy assessments are paid by the homeowner to the CEA.

A homeowner may be eligible for a rebate for the cost of an energy assessment if they participate in a utility energy retrofit incentive program.

Upon completion of the pre-retrofit home energy assessment, a report is provided to the homeowner with the NRCan EnerGuide rating for the home and recommendations for energy improvements that could potentially increase that rating. This report is to be provided to the [MUNICIPALITY] in order to access LIC funding.

After the retrofit is complete, a second and final home assessment is performed by the CEA to obtain a second EnerGuide rating and to verify the completion of work.

Provided that the second assessment that the homeowner provides to the [MUNICIPALITY] indicates that the EnerGuide rating has increased and the improvements have been completed, then the utility incentives (described in Section 1.8. — Access to Utility Rebates & Incentives) can be determined and the [MUNICIPALITY] can issue the final disbursement of funds.

The applicant can determine whether to deduct the utility incentive amounts from the final disbursement.

1.4. | Qualifying Energy Efficiency & Water Conservation Measures

The home energy assessment must demonstrate the potential to achieve cost-effective energy reductions in order to qualify for LIC funding. Financing is designated for capital costs (not maintenance costs) with an expected useful life of 5 years or greater and for measures that are permanently affixed to a property. The expected useful life of the retrofit measures is to be linked with the LIC term. The non-exhaustive list of the categories of measures eligible under the Program, subject to any permitting and regulations, includes:

- **i.** Thermal envelope upgrades: attic, wall and basement insulation, windows, air-sealing.
- **ii.** Mechanical systems (space heating and cooling): high efficiency furnace, boiler and air conditioner replacement, thermostats and controllers, air source heat pumps, ground source heat pumps.
- **iii.** Mechanical systems (water heating): high-efficiency water heaters (e.g., hybrid heat pump, tankless, etc.), drain water heat recovery systems, solar hot water systems.
- **iv.** Renewable energy and energy storage and EV chargers: solar photovoltaic systems, electric vehicle charging stations (Level 2), battery storage devices.
- **v.** Water efficiency: low-flow toilets, hot water circulation pump and system, greywater treatment system, closed-loop shower water recovery system, rainwater harvesting system (subject to eligibility criteria).
- **vi.** Other: New energy efficient (certified) products as they become available will be considered as additional eligible technologies

The cost of an EnerGuide home energy assessment is eligible to include in the LIC financing. Note that utility rebates may be available for this cost.

Ineligible measures include equipment or products not permanently affixed to the property, previously installed in another home and are deemed general maintenance. By recommending categories of retrofit improvements and associated measures, the [MUNICIPALITY] makes no guarantees of the materials, performance, cost-effectiveness or any warranty of the measures supported by the Program.

Only the costs associated with retrofits of up to [X] percent of the Current Value Assessment of the property or to a maximum of $XX,XXX are eligible for the Program.

1.5. | Completing the Retrofit through Contractor Engagement

The [MUNICIPALITY] will provide financing to homeowners for eligible measures covered by the Program that have been:

- recommended by the CEA
- verified by the [MUNICIPALITY] or the assigned Program Administrator
- installed by contractors hired by the property owner

The [MUNICIPALITY/PROGRAM ADMINISTRATOR] will not pre-qualify contractors or procure contractors to perform energy assessments or install retrofit improvements on behalf of homeowners in connection with this Program. The homeowner will use the funds disbursed by the [MUNICIPALITY] to pay contractors directly.

The [MUNICIPALITY/ PROGRAM ADMINISTRATOR] is not responsible for the work quality of any contractors hired in connection with this Program and assumes no liability for the works undertaken. All retrofit improvements and renovations must adhere to local codes and by-laws. The homeowner is responsible for ensuring that hired contractors are licensed, bonded, and insured. Any issues that may arise relating to the quality of workmanship or post-installation performance of energy measures, for example, should be dealt with by the property owner and contractor.

1.6. | Application Process

The steps below outline the process and requirements homeowners need to follow as part of the Program. [MUNICIPALITY /PROGRAM ADMINISTRATOR] staff will periodically review this process to ensure effective Program implementation and, where deemed appropriate, the [MUNICIPALITY /PROGRAM ADMINISTRATOR] may make changes in its sole discretion.

Step 1: Pre-qualification

Homeowners submit an on-line application form that includes, but is not limited to, the following information:

- Property address to confirm location is within eligible municipality;
- Property assessment roll number to confirm no outstanding payments owed to the [MUNICIPALITY] in the last five years; and
- Evidence of mortgage lender consent (where applicable).

If a homeowner has one or more outstanding mortgage(s) associated with the property, then the homeowner must obtain (at his or her own expense) consent from the mortgage lender(s) through a form that the [MUNICIPALITY] will provide. Property owners will advise their mortgage lender(s) of their intention to participate in the Program and receive permission from the lender(s) perhaps up to only a specific dollar amount) as a requirement of the Program.

Once the property owner has been prequalified by [MUNICIPALITY/ PROGRAM ADMINISTRATOR], based on the above criteria, the [MUNICIPALITY/ PROGRAM ADMINISTRATOR], will provide Notice to Proceed to the homeowner.

Step 2: Energy Assessment and Funding Request Form

1. Energy Assessment

The homeowner completes the pre-retrofit home energy assessment in accordance with Section 1.3 *Home Energy Assessments* and submits to the [MUNICIPALITY/ PROGRAM ADMINISTRATOR], the resulting Energy Assessment Report that the CEA provides to the homeowner.

That Energy Assessment Report must include:

- the current NRCan EnerGuide rating for the home;
- recommended improvements that have been customized for the home based on existing conditions which could potentially increase the NR Can EnerGuide rating of the home;
- the estimated useful life of the proposed improvement(s);
- estimated energy cost savings that may be realized after installing the recommended improvements

Potential eligibility for utility rebates and incentives offered by [UTILITY] or through the Save On Energy program is optional to include in the Energy Assessment Report.

Any estimated cost of the works can be included in the Energy Assessment Report, but will require contractor invoices to verify the costs for inclusion in the Funding Request Form.

2. Funding Request Form

Along with the Energy Assessment Report, the homeowner also will need to submit a Funding Request Form that:

- identifies the improvements that the property owner intends to install based on the Energy Assessment Report;
- identifies the cost for each improvement (including equipment, materials and labour costs); and
- the amount of prepayment (up to a maximum of 10% of the estimated cost of the work) being requested from the [MUNICIPALITY] upon signing the POA.

Following receipt of the Funding Request Form, the [MUNICIPALITY/ PROGRAM ADMINISTRATOR], will:

- confirm the eligibility of the works (e.g. items affixed to property);
- verify the reasonableness of retrofit costs and labour costs by consulting manufacturer pricing and prevailing labour rates;
- calculate the administrative costs [FOR EXAMPLE, using a formula that apportions the cost to the [MUNICIPALITY] to operate this program between participating properties as percentage of the cost of the work undertaken relative to the percentage of the cost of the work to the overall Program budget for each Program Stream; (n.b. the "cost to the [MUNICIPALITY]" includes recurring costs and any non-recurring costs not covered by the grant funding that the [MUNICIPALITY] has obtained for the Program); and
- estimate the eligible utility rebates and incentives available to the homeowner.

The above steps will enable the [MUNICIPALITY/ PROGRAM ADMINISTRATOR], to derive the funding amount up to the maximum of [eg.five percent of the property's assessed value] to include in the Property Owner Agreement.

Step 3: Property Owner Agreement

After the [MUNICIPALITY/ PROGRAM ADMINISTRATOR], has confirmed the acceptability of the Energy Assessment Report and the Funding Request Form, the [MUNICIPALITY] will prepare a property owner agreement ("POA"), in accordance with Appendix B for the homeowner(s) to review and sign.

Step 4: Completing Improvements

1. Initial Funding Disbursement

Following execution of the POA, the [MUNICIPALITY] will provide the homeowner with the initial disbursement agreed upon in the POA to a maximum of [X%, EG. 10] of the estimated cost of the work that can be used by the homeowner to pay contractors or suppliers (i.e. security deposit).

The property owner will be contractually obligated to repay this initial disbursement to the [MUNICIPALITY] if the property owner does not complete the improvements.

The property owner can then proceed with hiring contractor(s) and performing the approved energy improvements to the property. The improvements must be completed within a reasonable timeframe, as stipulated in the POA, to be determined by the [MUNICIPALITY] in its sole discretion.

2. Final Funding Disbursement

As will be detailed in the POA, the [MUNICIPALITY] will provide the final disbursement only after the homeowner provides a copy of the post-retrofit assessment report from the CEA that:

- includes a Certificate of Completion that attests the approved retrofit measures havingbeen installed and provides an EnerGuide rating of the home after the retrofit measures have been completed which is greater than the original EnerGuide rating noted on the pre-retrofit assessment report from the CEA; and
- indicates the actual costs and useful life for all the works.

Step 5: LIC Repayment

Following the [MUNICIPALITY] Treasurer's [and CFO'S] periodic certification of the local improvement roll, (which occurs after the improvements on a given set of properties are complete and the final amounts of funding are confirmed), the [MUNICIPALITY] Solicitor will submit a corresponding bill for Council to adopt a by-law pursuant to Section 36.14 of O.Reg 586/06 to impose the special charges on the participating properties. For each property included in the by-law, the Treasurer will then add to the [MUNICIPALITY] 's tax roll for that property each year that portion of the imposed special charge that is due in that year. These collective steps will provide priority lien status for the annual amount that the Treasurer [and CFO] adds to the tax roll and will ensure that any subsequent property owner who was not a party to the POA is bound to pay that amount.

To facilitate repayment of the annual special charge, the POA will require homeowners to signup for the pre-authorized payment plan option for property tax payments.

At any time, a homeowner can make advance payments, including a one-time payment of the total outstanding amount owing to clear the property of the LIC charge. Failure to make payments is treated with the same remedy as uncollected property taxes which may include penalties and interest charges.

1.7. | LIC Disclosure

As indicated above, the subsequent owner of a property on which the [MUNICIPALITY] has imposed a special charge is required to pay the [MUNICIPALITY] the annual LIC amount even though that subsequent owner was not a party to the original POA. In addition to notice that the [MUNICIPALITY] will be providing in accordance with the provisions of O. Reg. 586/06, the [MUNICIPALITY] also will take the following steps to ensure even greater transparency of the LIC to interested parties by:

i) posting on the [MUNICIPALITY]'s website notice of the special charge by-law to impose the charge on the property in advance of its introduction and after its adoption; and

ii) updating the Tax Certificate to include the full LIC amount, amount payable in the current year, outstanding amounts owing and a note to reference the by-law pursuant to which the special charge was imposed.

1.8. | Access to Utility Rebates & Incentives

The [MUNICIPALITY] encourages applicants to review the energy savings programs of utilities and agencies such as [UTILITY] and the Province's Save On Energy program. Energy efficiency and water conservation measures that are eligible under this residential retrofit program may also be eligible for rebates from utilities to applicants.

The applicant can decide whether the financing advanced by the [MUNICIPALITY] will be net of any rebates or other incentives received by the homeowner.

1.9. | Quality Control

As a means of additional oversight to confirm that the funded improvements were completed, the POA will indicate that the [MUNICIPALITY] reserves the right to have a [MUNICIPALITY] official or third-party contractor arrange with the property owner for an inspection. The property owner(s) is also responsible for keeping original copies of contractor invoices and photos of installed measures, especially for harder to verify measures like insulation, and be prepared to disclose this information to the [MUNICIPALITY] upon request.

1.10. | Measurement and Verification

Pursuant to the POA, the property owner(s) must consent to providing the [MUNICIPALITY] with access to the property's utility usage data in order to monitor results and evaluate the Program's effectiveness for a period of five years after completion of the retrofit. Also, the property owner(s) agrees to participate in surveys and other follow-up activities to help the [MUNICIPALITY/ PROGRAM ADMINISTRATOR], evaluate the Program.

APPENDIX B2 |
SAMPLE BY-LAW TO AFFIX LIC TO A PROPERTY

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Please note that this is just a sample by-law. Specific details should be added, modified, or removed based on all applicable legislation, regulations, and local context.

To authorize the imposition of special charges on [PROPERTY ADDRESS] (the "benefitting property").

Whereas at its meeting on [DATE], Council enacted By-law XX-XXX, being a by-law to authorize the undertaking of energy efficiency and water conservation works on private residential property as local improvements under the Residential Retrofit Program, in accordance with Ontario Regulation 586/06 ("O. Reg. 586/06"); and

Whereas the owner(s) of the benefitting property and the MUNICIPALITY (the "MUNICIPALITY") have entered into a Property Owner Agreement (the "POA") pursuant to O. Reg. 586/06 for the [MUNICIPALITY] to undertake work as a local improvement (the "Work") on the benefitting property and to raise the cost of the Work (the "Cost") by imposing a special charge on the benefitting property; and

Whereas the [MUNICIPAL] Clerk has certified the POA pursuant to O. Reg. 586/06; and

Whereas the Work has been completed; and

Whereas a local improvement roll was prepared in accordance with O. Reg. 586/06, setting out the Cost of the Work, the proposed special charges to be imposed on the benefitting property, when the special charges are to be paid, and the lifetime of the Work; and

Whereas the [MUNICIPALITY] has given notice of the proposed local improvement roll to the owner(s) of the benefitting property pursuant to O. Reg. 586/06; and

Whereas the Treasurer has certified the proposed local improvement roll in accordance with O.Reg. 586/06; and

Whereas section O. Reg. 586/06 provides that after the Treasurer has certified the local improvement roll, the [MUNICIPALITY] shall by by-law provide that the amount specially charged on the lot set out in the roll shall be sufficient to raise the lot's share of the cost by a number of equal annual payments and that a special charge shall be imposed in each year on the lot equal to the amount of the payment payable in that year;

The Council of the [MUNICIPALITY] enacts:

» **(13)** The provisions of O. Reg. 586/06 apply to the benefitting property as a result of the completion of the Work pursuant to the POA.

» **(14)** The amounts specially charged on the lot as set out in the certified local improvement roll attached as Schedule A to this by-law (the "Special Charge") is sufficient to raise the lot's share of the Cost and shall be imposed on and collected by annually adding the annual amount payable as set out in Schedule A to this by-law (the "Annual Payment") to the tax roll of the lot.

» **(15)** The Annual Payments as set out in certified local improvement roll attached as Schedule A do not extend beyond the lifetime of the Work.

» **(16)** The amount of each payment made in respect of the Special Charge shall be entered in the local improvement roll by the Treasurer.

» **(17)** This by-law shall be deemed repealed on the date on which the Treasurer certifies that the Special Charge has been paid in full.

Enacted and passed on [DATE]

[MUNICIPAL CLERK NAME]