

Understanding barriers to and opportunities for residential deep energy retrofits in the Hamilton-Burlington region

A report to the Bay Area Climate Change Council prepared by The Centre for Climate Change Management at Mohawk College

June 2020

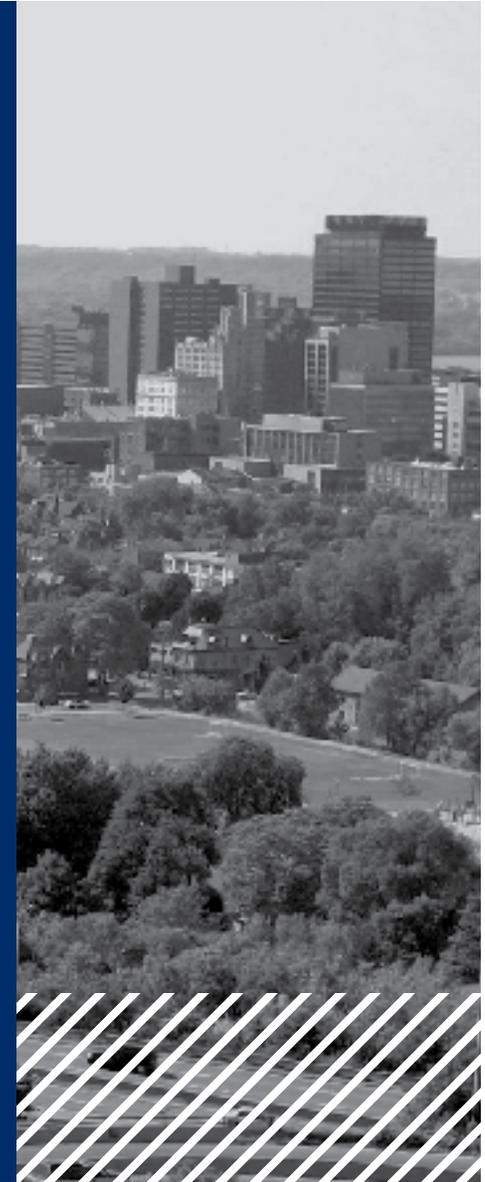
Executive summary

The following research report was commissioned by the Bay Area Climate Change Council in spring 2020. Its objective is to provide members of the Bay Area Climate Change Council (BACCC) with a better understanding of the current barriers to and opportunities for creating a deep energy retrofit program for residential low-rise buildings (below three storeys) in the cities of Hamilton and Burlington.

A successful home energy retrofit program will help the Bay Area cities of Hamilton and Burlington achieve deep reductions in greenhouse gas emissions, help homeowners achieve energy savings, and help prepare homeowners for the effects of climate change. The report focuses on initiatives that must happen in the next five years to achieve deep reductions on a time scale that meets Burlington's goal of becoming a carbon-neutral city by 2040, and Hamilton's goal of becoming a carbon-neutral city by 2050.

The Centre for Climate Change Management at Mohawk College (the Centre) recommends that BACCC undertakes the following actions:

1. Advocate for the cities of Hamilton and Burlington to join the third-party municipal consortium program led by the Clean Air Partnership (CAP) to develop and deliver a home energy retrofit program in the Bay Area. The cities must join this consortium by fall 2020;
2. Develop a business plan for the implementation of a regional "retrofits accelerator" program for Hamilton-Burlington;
3. Convene multi-stakeholder conferences or learning opportunities to educate and engage supply-chain actors in the home energy retrofit market. This should include opportunities for realtors, architects, contractors, skilled trades associations and tradespeople, inspectors and permitting officers;
4. Advocate for the removal of legislative barriers to the implementation of residential deep energy retrofits;
5. Apply an equity lens to the development to all advocacy, planning and program development activities.



1.0 Introduction

The adoption of a home energy retrofit program has been identified as one of the most important opportunities to reduce greenhouse gas emissions in the Hamilton-Burlington Bay Area region, and prepare our communities for climate change.

In order for the cities of Burlington and Hamilton to meet their climate goals of becoming carbon neutral by 2040 and 2050 respectively, 98% of the residential buildings built before 2017 need to be retrofitted to achieve thermal and electrical savings of 50% or more.¹

Home energy retrofit programs can help homeowners access the low-cost loans, resources and expertise they need in order to make their homes more efficient, while reducing the use of fossil fuels.

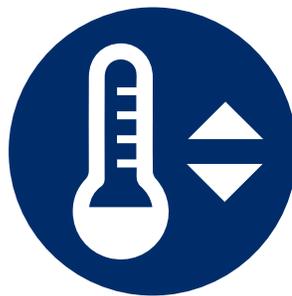
Home energy retrofit programs have also shown important co-benefits. Retrofits can help homeowners save money on energy bills and can increase resident comfort by addressing air leaks and implementing smart heating and cooling options. Home energy retrofit programs also have important economic benefits

by increasing the demand for home renovation and energy advisory services.

The following report provides an overview of the barriers to and opportunities for establishing a deep energy retrofit for low-rise buildings in the Burlington-Hamilton area. This report focuses on programs for low-rise residential homes. The majority of residents in Burlington and Hamilton live in single, or low-rise (under three-storey) buildings.^{2,3} Therefore, deep energy retrofits for low-rise buildings represent one of the most significant opportunities to reduce greenhouse gas emissions in the buildings sector. It also represents an excellent opportunity to engage and support residents in climate action, and in making their homes more comfortable and climate resilient.

The report also provides BACCC with recommendations on actions that it can successfully undertake to catalyze and accelerate the success of home retrofit programs.

This report focuses on providing context to the priority actions that need to be undertaken within the next year.



2.0 Methodology

The objective of this research report is to provide members of the Bay Area Climate Change Council (BACCC) with a better understanding of the current barriers to and opportunities for supporting deep energy retrofits for low-rise buildings in the Hamilton-Burlington region.

The findings will inform BACCC's development of an "implementation team" – a multi-sector working group that will focus on one or two specific actions in the next two to three years to help catalyze GHG reductions through deep energy retrofits.

In order to identify these barriers and find potential opportunities, staff at the Centre for Climate Change Management (the Centre) undertook the following research:

- Literature review;
- Attending webinars on relevant topics;
- Interviews with select stakeholders within the region.

2.1 Literature review

Staff at the Centre started with reviewing regional greenhouse gas inventories, and current municipal plans, such as the *Burlington Climate Action Plan (2020)*⁴ and the City of Hamilton's *Low-Carbon Actions Catalogue (2020)*⁵.

Staff then reviewed studies, reports, analyses, and educational materials from other municipalities, climate change organizations, and academic journals. The goal of this review was to understand best practices and precedents in Canada, the United States and Europe. The focus was on understanding current programming, policy, and legislation in municipalities with retrofit programs. A select number of academic papers and white papers were also reviewed.

The literature findings were aligned with the stakeholder discussions to focus on key elements:

- **Problem framing:** mapping the system, naming current assets and key stakeholders, understanding drivers, barriers and gaps in the system;
- **Identifying potential interventions:** priority areas for action that may lead to systemic change;
- **Evaluating readiness:** understanding the necessary conditions for uptake of solutions.

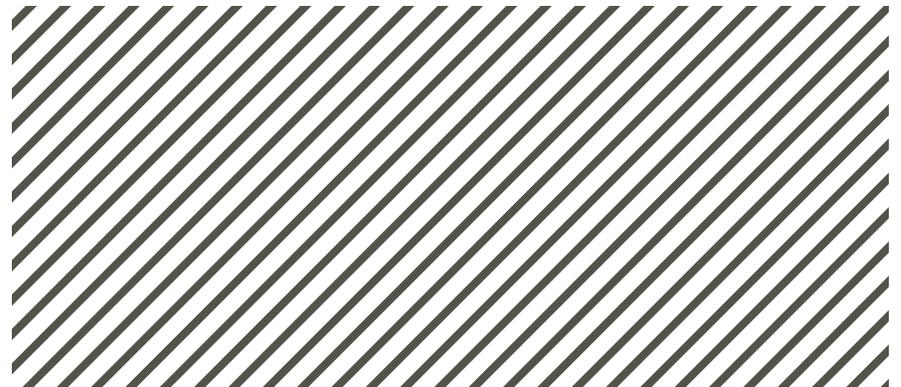
2.2 Webinars

During the COVID-19 pandemic, several webinars were hosted on the topic of deep energy retrofits. Three of these webinars helped to inform the report. One was hosted by Corporate Knights⁶, and another two were hosted by the Pembina Institute⁷.

2.3 Stakeholder interviews

In May and June 2020, Centre staff spoke with 10 stakeholders who have been involved in developing deep energy retrofit programs or have supported deep energy retrofits as contractors, architects or homeowners.

These interviews were semi-structured to allow interviewees to speak about their direct experience and expertise.



3.0 Definitions

Residential Deep Energy Retrofit

A renovation undertaken to improve the energy efficiency of the building, increase tenant comfort, and reduce or eliminate the need for fossil fuels as an energy source. It can also serve to help the home be more resilient to the effects of climate change. For example, in Ontario, retrofits may also include home flooding prevention measures.

Home Energy Retrofit Programs

The following definition is adapted from the City of Burlington's staff report *Options for a Residential Deep Energy Retrofit Program (CW-07-20)*.⁸

"A deep energy retrofit program involves a systems approach to reduce carbon emissions from existing buildings, with a focus on those measures which will reduce and/or eliminate the use of fossil fuels as a source of energy. Typically, there is a hierarchy of measures which can be implemented:

- *Adding insulation*
- *Sealing air leaks*
- *Upgrading mechanical systems*
- *Replacing windows and/or doors*
- *Water efficiency upgrades*
- *Thermal controls*
- *Renewable energy."*

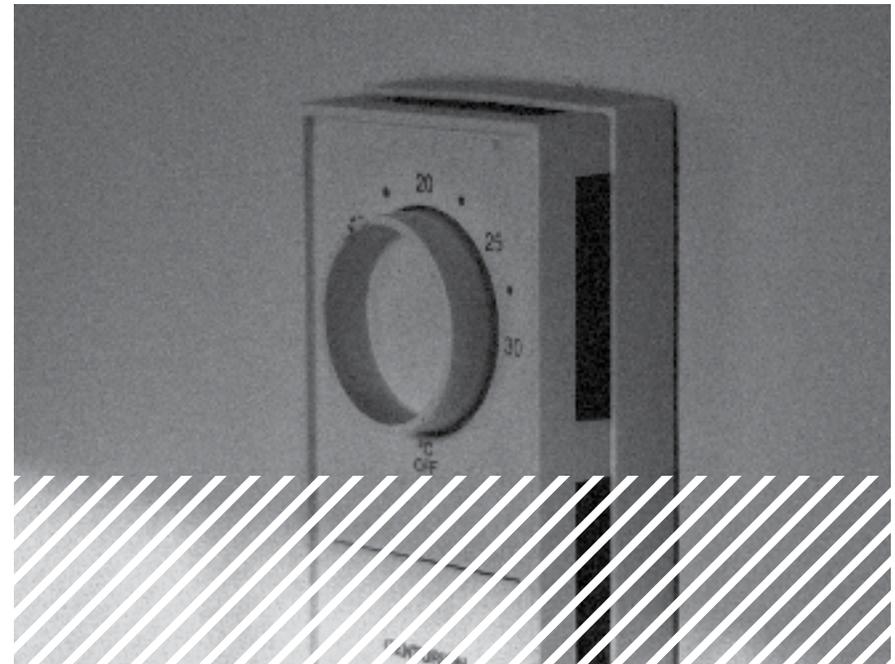
Home energy retrofit programs can focus on multi-unit residential or low-rise residential buildings. This report focuses on home energy retrofit programs for low-rise buildings – dwellings under three storeys. It's important to note that the barriers and opportunities for multi-unit buildings (i.e. apartment buildings) are different than those for low-rise buildings.

In some cases, municipalities might have home retrofit support services that connect consumers to energy advisors who advise homeowners throughout the retrofit process. In Europe, some

governments have supported the development of "turn-key" solutions where the homeowner is able to pick a pre-determined package of energy-efficiency installations (e.g. photovoltaic solar, photovoltaic domestic hot water heater, and an air source heat pump).

Globally, many state and local governments offer these programs as part of their climate change commitments. These programs often offer low-cost financing options and incentives.

Many of these retrofits can total over \$30,000. While these retrofits can be performed in stages, it's often most efficient to complete all or most of the work at once. Retrofits are most often initiated when a homeowner is interested in completing a renovation of their home, or need to replace several mechanical systems, rather than just replacing one piece of equipment (e.g. a boiler). Renovations also often occur when a homeowner is buying a home, or preparing their home for sale.



4.0 BACCC's role in supporting climate action

The Bay Area Climate Change Council (BACCC) is a social impact initiative made up of 14 community leaders from Hamilton and Burlington. BACCC's vision is for the Bay Area to be a thriving and resilient zero-carbon community by 2050.

In order for both Hamilton and Burlington to meet their climate goals, 98% of single-family homes in the region built before 2017 must be retrofitted to achieve greater than 50% energy efficiency.¹ The majority of residents in both cities live in low-rise buildings (under three storeys).^{2,3} Therefore, supporting deep energy retrofits of existing homes is one of the most important ways through which BACCC can support our region in meeting its climate goals.

As a collective impact initiative, BACCC has a unique opportunity to catalyze climate initiatives that support a wide range of citizens, and public and private organizations.

While BACCC has not formally established a theory of change, it is understood that BACCC's best efforts are spent on the following areas of action:

1. Advocacy in support of smart climate policies, programs and initiatives in the greater Hamilton-Burlington region;
2. Identifying gaps and convening stakeholders to design projects that create solutions;
3. Securing initial support to help launch priority climate projects;
4. Measuring and reporting on greenhouse gas emissions through regional emissions inventories.

Progress is reported back to the community at BACCC's annual climate change forum.

BACCC, at its core, is a network of leaders and organizations committed to supporting climate action. But fundamental to BACCC's mission is recognition that BACCC cannot lead

all climate actions. In many cases, other organizations and networks are better equipped to lead necessary actions. BACCC can support, but does not lead the following:

1. "On the ground" outreach and education on climate change;
2. Leading and sustaining multi-year programs;
3. Financially supporting programs beyond their development phase.

The recommendations provided in this report therefore focus on BACCC's unique position and the work it is best positioned to realize.



5.0 Summary of key findings and recommendations

5.1 Hamilton and Burlington should commit to taking a regional approach to home energy retrofit programs

Timeline: Complete in the next 6 months

To meet Canada's climate goals, the majority of existing buildings – both commercial and residential – need to be retrofitted to be more energy efficient and reduce the use of fossil fuels. In recognition of this, many Canadian cities have implemented or are planning to implement home energy retrofit programs for commercial and residential buildings.

For residential buildings, most of these programs use Local Improvement Charges (LICs) to offer low-cost loans that are tied to the property, instead of the homeowner. When the homeowner sells the property, the loan continues to be paid by the new owner. This helps the homeowner access the necessary capital to complete the retrofits – which often total \$30,000 or more for a single-family home – and allows the payback to continue to be realized over time.

Programs have been successfully implemented in the City of Vancouver and the City of Toronto⁹, among others – though participation in some has been lower than anticipated.

Given the number of municipalities looking to adopt these programs, there are important opportunities for municipalities to collaborate. It is inefficient for each municipality to develop a separate business plan, create a unique program, and offer programming on its own. For example, the City of Windsor and the Town of Newmarket have each spent approximately \$200,000 to date to complete feasibility studies.¹⁰

A regional approach would allow the cities of Burlington and Hamilton to reduce costs, share resources, reduce risk, and achieve efficiencies.

In fall 2020, the Clean Air Partnership will be forming a consortium of 8-12 municipalities that will partner to pilot a province-wide retrofit program with support from the Independent Electricity System Operator (IESO), Association of Municipalities Ontario (AMO), and the Heating, Refrigerant and Air Conditioning Institute of Canada (HRAI). The consortium will then apply to the Federation of Canadian Municipalities (FCM) for funding support. This will drastically reduce the cost of initiating a program. The consortium approach will also provide guidance and support to the cities, which will accelerate implementation. If the cities of Burlington and Hamilton join the consortium, they will still be able to adapt the program to local needs and circumstances.

Recommended action

BACCC should advocate to encourage the cities of Burlington and Hamilton to join the CAP consortium of 8-12 municipalities in fall 2020.

Joining will require the immediate next steps to be undertaken:

- Pass a LIC bylaw through council in both Burlington and Hamilton;
- Request that council direct city staff to work with CAP to join the consortium;
- Secure 20% of the total application amount to apply to the FCM grant program.

5.2 Home energy retrofit programs must be paired with support services for homeowners

Timeline: Initiate in the next 6 months

Research shows that home energy retrofit programs succeed when they are paired with support services directed at educating and assisting homeowners to undertake retrofits. That approach drives participation and successful energy savings. A retrofit support service is often called “a concierge service” or “retrofit accelerator.” The service offers a “one-stop shop” for consumers to access the information they need to undertake a deep energy retrofit.

Currently, Bay Area homeowners who want to undertake deep energy retrofits are left to navigate a complex system on their own – from trying to find a trusted energy advisor, to securing financing and incentives, to comparing the costs of new technologies with limited information. Interviews with stakeholders revealed this is a time-intensive, often frustrating and expensive process.

A retrofit accelerator program can remove the burden from the homeowner to learn and manage a complex system. It can also serve to streamline services, reducing risk, cost, and time, while delivering a better consumer experience.

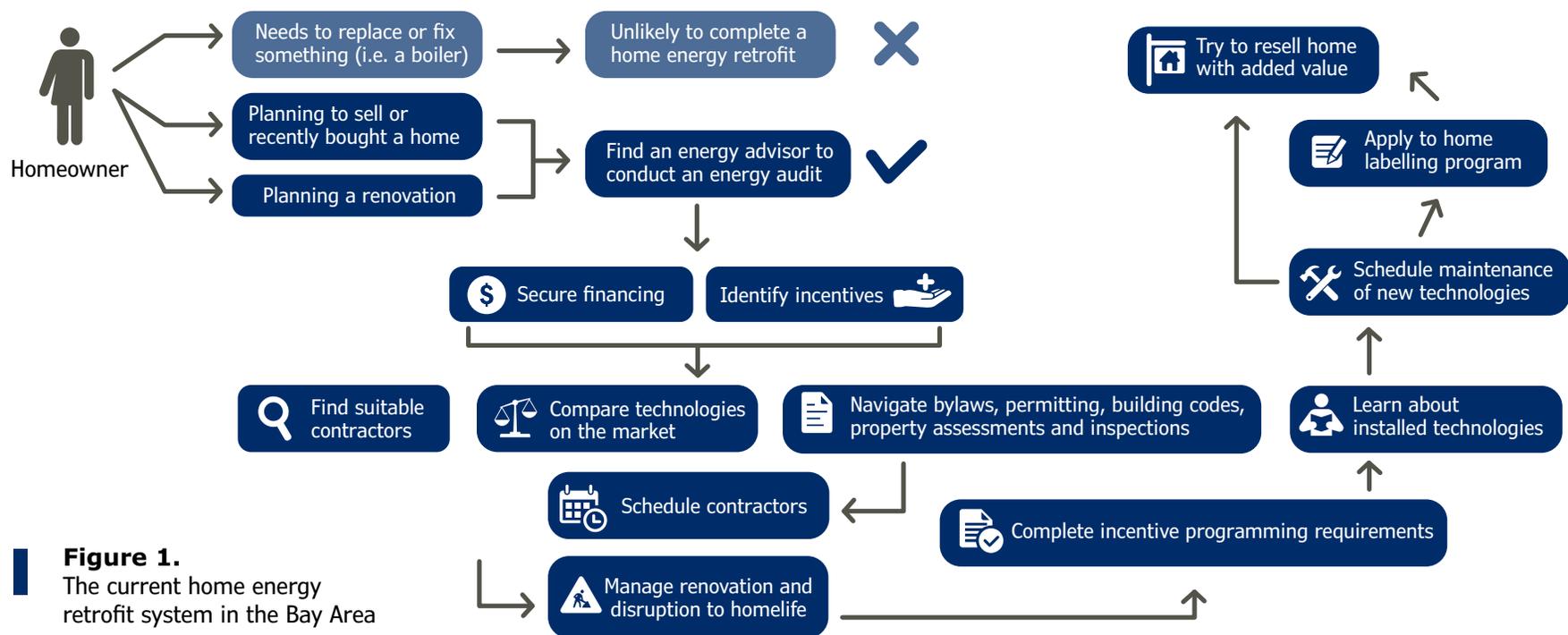


Figure 1. The current home energy retrofit system in the Bay Area

An accelerator program in the Bay Area could provide the following services:

1. Hosting a consumer-facing website

The local retrofit accelerator has an easy-to-use, consumer-facing website that helps homeowners understand the retrofit process. The website connects the homeowner to an energy advisor, financial options and incentive programs. The website is intuitive and only provides the information the homeowner needs to make informed decisions.

2. Establishing meaningful connections with energy advisors

The program helps consumers access energy advisors to conduct energy audits. Based on the audit results, the advisor then walks the homeowner through the retrofit options that best work for their home.

In the most successful programs, the energy advisor also acts as a “concierge.” They support the homeowner throughout the retrofit. In addition to conducting the energy audit, the advisor helps the homeowner understand financing, grants, and incentives, manages the different contractors, and undertakes follow-ups to ensure the homeowner can use the equipment as intended. Energy advisors can help establish a long-term vision for the home, and make suggestions based on unique preferences and needs. If unable to complete the retrofit all at once, they can help the owner plan for incremental changes over time.

3. Connecting consumers to contractors

Retrofit accelerators can connect consumers to qualified contractors. Research revealed that consumers could benefit from a list of pre-qualified contractors. This helps establish trust and reduces the burden on the homeowner to find reputable and competent candidates.

This can also be beneficial to local companies that can directly advertise their services to local consumers.

4. Marketing retrofits to consumers

To reach more consumers and create a dynamic market for retrofits, these programs require targeted marketing and outreach campaigns. Retrofit accelerators can commission these campaigns to drive uptake.

Accelerators can also host informational workshops, exhibits, and training events to help both homeowners and providers learn about retrofits.

5. Measuring and reporting on reach and impact

To measure the effectiveness of home energy retrofit programs, it is important for a central body to collect data. This data can be easily collected by asking homeowners to provide utility data before and after retrofit projects. Utility data can be used to measure greenhouse gas emissions reductions, energy savings, and returns on investment.

Tracking, measuring and reporting will be critical to enable programs to show success, and pivot and adapt as needed.

Recommended action

BACCC can task an implementation team (BACCIT) to develop a business plan for a Bay Area Home Energy Retrofit Accelerator. This business plan will:

- Assess the feasibility of a sustainable business model;
- Ensure that the retrofits accelerator can launch before, or in tandem with, the establishment of a regional home energy retrofit program.



5.3 Supply-chain actors need education and training to meet the market for home energy retrofits

Timeline: Initiate within the next year

Once a home energy retrofit program is established, the market for retrofit services will grow exponentially. Demand will grow for energy advisory services, renovations, and energy-efficient equipment sales, installation and maintenance.

There is an opportunity to meet the market by growing the number of trained professionals for residential retrofits. There will be new jobs for energy advisors, tradespeople and HVAC professionals. New graduates will find a new set of skills in demand. Professionals currently in the field will require training to learn new technologies and techniques.

Education will also be needed in real estate and financial services sectors. Realtors, appraisers, inspectors, and loan officers will have to learn about home energy retrofits and their impact on home values and loans. For example, a realtor will need to be able to confidently educate their clients on the benefits and value of an energy-efficient home.

Municipal inspectors and permitting staff will also need education on the new technologies, installation practices, and changing legislation and bylaws.

BACCC can play an important role in advocating for the development of new educational opportunities. In the next one to three years, BACCC can convene stakeholders to educate them about the upcoming retrofit program and its impacts. In the long term, BACCC can encourage training providers, such as colleges and vocational schools, to develop new in-class and on-the-job training programs. It can also liaise with industry associations to develop educational programming and convene professionals in the field.

BACCC's position as a convener and advisor should begin within the next year in order to ensure the market is ready for the launch of the municipal retrofit programs and can meet the demand as it grows.

Recommended action

BACCC should undertake the following actions to help educate and inform key stakeholders in the retrofits market.

In the next year:

- Host an educational conference with key stakeholders in the home energy retrofits supply chain (i.e. realtors, contractors, business owners, and municipal agents) to educate and inform about the developing retrofits market;
- Promote the development of training workshops for homeowners, like Humber College's HEAT program.

In the next five years:

- Advocate for the development of contractor training programs;
- Support a community of practice for energy advisors;
- Support educational opportunities for realtors;
- Support the expansion of consumer education programming to scale with evolving retrofits markets.



5.4 Advocacy is needed to remove barriers to the home energy retrofits market

Timeline: Starting in Year 1

Multiple levels of government must work to create a conducive legislative environment to support the uptake of residential retrofits. Government must remove known legislative and policy barriers, and implement new legislation as needed as the retrofit market scales.

Current barriers can be grouped into two key areas: barriers to technology adoption, and barriers to information access.

1. Legislative barriers to technology adoption

Some home energy efficiency technologies are unable to be adopted due to legislative barriers. For example, a recent study of air source heat pumps found that noise bylaws can prohibit homeowners from purchasing them, even if they are the best solution to reduce fossil fuel use in the home.¹¹

This is because some high-efficiency air source heat pumps register in the mid-50 decibel range. These models are illegal to install in neighbourhoods with mechanical sound tolerances limits that prohibit noise above 40 decibels.¹¹

Another legislative barrier is the absence of green building standards for renovations. Currently, owners are not required to consider energy efficiency when renovating a home. This is a missed opportunity to encourage, or require, homeowners to make energy-efficient upgrades when undertaking extensive renovations.

While building codes are currently set by the province, voluntary green building standards can be set locally. Additionally, permitting offices could be required to issue educational material to homeowners pulling permits for renovations. This could educate homeowners about their options and the incentives available.

1. Legislative barriers to information access

One of the barriers identified in the research is the lack of

publicly available energy efficiency data on low-rise residential buildings. This makes it difficult to baseline, compare, and report on energy efficiency gains in the region.

At the moment, homeowners who undergo an energy audit have no ability to compare their home to others in the neighbourhood. There is no publicly available data on energy usage by house. This makes it difficult for municipalities to measure, track and report on current greenhouse gas emissions caused by home energy use. It also makes it difficult to measure improvements over time. Finally, homeowners cannot compare their home's efficiency to others locally and make informed decisions about necessary upgrades.

This is a particular problem for homeowners purchasing or selling a home. The seller or buyer can conduct a thorough energy audit to evaluate the efficiency of a home at the point of sale, but this is an extra expense and a time-consuming process.

Home-labelling programs can be part of the solution. A home-labelling program, such as NRCAN'S EnerGuide, is a voluntary home evaluation program in which homeowners can apply for a standardized energy-efficiency label based on their home's performance. However, this is a voluntary program and it puts the responsibility on the homeowner to apply and advocate to their realtor to advertise it as a selling feature. Low consumer awareness of these programs also makes it challenging to realize the value.

Adopting legislation that supports home energy disclosure and labelling can help drive the home energy retrofits market. It can also enable consumers to make educated and informed decisions when buying a home.

BACCC has a unique role in understanding and advocating for the removal of these legislative barriers. The implementation team (BACCIT) can collect information on barriers by engaging stakeholders through the retrofit accelerator and through the networks and associations with which it liaises. This information can then be used to advocate for the removal of legislative barriers at the municipal and provincial levels.

Recommended action

BACCC can undertake the following actions to support the removal of legislative and informational barriers:

- Advocate for the development or reform of bylaws to support energy retrofits;
- Ensure that support for home energy retrofits is a ballot issue during local elections;
- Develop a way to track, measure and report on home energy retrofit program(s);
- Advocate for the adoption of a home energy labelling system;
- Advocate for green development standards for renovations and retrofits.

5.5 Apply an equity lens to the development to all advocacy, planning and program development activities

Timeline: Ongoing

Homeownership in Canada is intimately connected to the persistence of issues of poverty, racism, and ableism. To provide equitable access to climate change-ready homes for all homeowners and tenants in the Bay Area, BACCC should advocate for the development of alternative programs that support access and equity.

Housing vulnerability can take many forms. For example, many homeowners in the Hamilton-Burlington region may be unable to make investments in their homes because of fiscal constraints. They also may be living in energy poverty, unable to pay their utility bills. Some homeowners may be particularly vulnerable to the effects of climate change because of the location of their home or their inability to pay for heating and/or cooling. They may also be at risk of losing their homes to extreme weather events because of the cost of insurance and/or repairs.

Additionally, many Bay Area residents rent apartments in low-rise homes. It is important that home energy retrofit programs ensure that this does not unsustainably increase rental prices or result in the removal of tenants because of renovations.

It is important for BACCC and its partners to bring an equity lens to the programs that it initiates, the policies it advocates for, and the events that it convenes. This can happen in a number of ways, but to start:

- BACCC can ensure there is diverse representation on the implementation teams;
- BACCC can adopt policies and practices that require an equity lens for new and existing projects;
- BACCC can enact a policy that, whenever possible, stakeholders are consulted on BACCC or BACCIT's plans.

Recommended action

BACCC can undertake the following actions to support the development of equitable home energy retrofit programs:

- Ensure an equity lens is applied to all projects the BACCC and BACCITs undertake;
- Support the development of multiple funding mechanisms for retrofit programs – including forms of community investment, such as community bonds;
- Advocate for the development of specialized deep home energy retrofit programs for low-income or fixed-income homeowners;
- Catalyze programs that train vulnerable populations with the skills needed to work in the home energy retrofits sector.



6.0 Conclusion

The adoption of a home energy retrofit program is one of the most important opportunities to reduce greenhouse gas emissions in the Hamilton-Burlington “Bay Area” region, and prepare our communities for climate change. This program can also help residents realize improved comfort, utility savings, and resilience.

In order for the cities of Burlington and Hamilton to meet their goals of becoming carbon neutral by 2040 and 2050 respectively, nearly every home built before 2017 will need to be retrofitted to achieve thermal and electrical savings of 50% or more.¹

BACCC has an important role in supporting the development and successful implementation of a home energy retrofit program that helps homeowners realize deep energy efficiency gains while reducing their use of fossil fuels. BACCC can help design effective programming, ensure market readiness, and engage and inform stakeholders to drive success.

To meet this opportunity, BACCC will need to support action within the next six months and continue to advocate, catalyze and initiate action over the coming years.

Establishing a home energy retrofit program is both a timely and impactful opportunity to drive climate action in the Bay Area.

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