ACCELERATING HOME ENERGY EFFICIENCY RETROFITS THROUGH LOCAL IMPROVEMENT CHARGE PROGRAMS:

A Toolkit for Municipalities

Canada

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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.

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PURPOSE OF THIS TOOKLIT

This toolkit was created to support the key stakeholders in delivering home energy efficiency retrofit programs: municipal governments, community groups, utilities, contractors, renovators, energy assessors, education and training institutions, financial institutions, and other related associations.

This toolkit will provide municipalities with the information and program options required to meaningfully tackle GHG emissions from their residential buildings. It is designed for municipal staff who are looking to identify key climate actions and implement programs of scale that will help them achieve their GHG reduction targets. It will also help key stakeholders and partners understand the benefit of retrofits, and the role they play in supporting project scale-up.

This toolkit will support you to understand:

- The context and rationale for retrofits
- The benefits that retrofits provide
- Barriers that exist to widespread adoption

- LIC legislation and LIC programs
- Examples of successful LIC programs
- Challenges of LIC programs
- LIC program elements
- Stakeholder Involvement
- Monitoring and Evaluation

It also provides a proposed pilot design of a Residential Home Energy Efficiency LIC Program which outlines:

- Program delivery method
- Program operational flow
- Program design:
  - Eligible Homes
  - Eligible Homeowners
  - Eligible Technologies
  - Eligible Costs
  - Quality Assurance
  - Underwriting Criteria

The suggested program design options discussed in this report were developed with feedback from municipal staff from the following municipalities in Ontario: Burlington, Guelph, Halton Hills, London, Newmarket, Peterborough, Toronto, Vaughan, and Whitby (details of these municipalities can be found in Appendix A). In addition, the experiences, resources and lessons learned from such a program will be used to help other jurisdictions across Canada develop their own LIC/PACE programs to support residential energy efficiency retrofits.

EXECUTIVE SUMMARY AND GLOSSARY

EXECUTIVE SUMMARY

Climate change is a growing concern for municipalities as they are beginning to experience the direct effects of extreme weather events, flooding, heat waves, and forest fires. Recognizing that greenhouse gas (GHG) emissions are driving these climate disruptions, municipalities are leading the way in developing ambitious climate mitigation plans.

Addressing emissions from residential buildings is critical, as they represent one of the biggest sources of GHG emissions in municipalities. However, this has been historically difficult to do, as it requires convincing many thousands of homeowners to invest in energy retrofits — measures to increase the energy efficiency of their homes — which are often disruptive and costly for homeowners. Furthermore, municipalities are unable to offer the financial incentives that have historically been used to promote retrofits.

Local Improvement Charge (LIC) financing, also known as Property Assessed Clean Energy (PACE) financing (LIC/PACE financing) is an effective mechanism that may be a key tool for municipalities wishing to promote GHG emission reductions in residential homes.

Reducing GHG emissions from homes requires significant reductions in their overall energy use. Retrofits can achieve this, and the best results are obtained when homes are treated as a system and retrofit measures are carried out on the entire structure in a coordinated way. The key is first minimizing any opportunities for homes to lose energy, which in turn reduces the amount required to heat and cool the home. There are several measures that can mitigate these losses, including adding insulation, using high performance windows and doors, and sealing air leaks. Once these are complete, homes have the opportunity to achieve near zero emissions by switching to electric heat sources.

Retrofits present an untapped pool of value and can provide benefits for homeowners, entire communities, and all of Canada. The benefits of home energy efficiency retrofits go beyond energy savings. Homeowners can enjoy greater comfort, increased property values, healthier indoor air quality, and greater resilience to power outages. For the community and the municipality, these retrofits can stimulate the local economy with contracting jobs, improve the local building stock, and help municipalities to achieve their climate mitigation targets.

Source: Shutterstock

Despite these benefits, there are still key barriers that prevented widespread uptake of energy efficiency retrofits. Without financing tools, homeowners are dissuaded from pursuing these projects due to the high upfront costs and long payback periods that may exceed their tenure in the home. LIC/PACE financing addresses these barriers by offering low interest loans for energy efficiency upgrades that are repaid through property taxes. The upfront costs of a retrofit are distributed over many years, with loan repayments often approaching the utility bill savings the retrofits generate. In addition, the loan is tied to the property and transfers with homeownership. A homeowner who does not intend to remain in a home for the long term may therefore consider a long-term investment in energy efficiency retrofits because, upon sale, repayments are taken up by the new beneficiary of the retrofits.

The barriers faced by LIC/PACE programs include mortgage lender concerns, limited access to capital to finance the program, risks associated with missed or default payments, lack of municipal capacity to operate such a program, and concerns about the impact of LIC/PACE loans on home sales. Low participation is the greatest risk factor, and can arise due to poor marketing, mortgage lender concerns, and in some cases, high interest rates.

LIC/PACE programs all follow the same basic process. Homeowners who apply are checked for eligibility and qualifying retrofit measures are recommended based on an energy evaluation of the home. Contractors perform the work and the costs are covered by an LIC/PACE loan. The whole program can be delivered by a municipality. Alternatively, a program delivery agent can setup and operate an LIC/PACE program on behalf of one or more municipalities. There are many variations in the program details, however, with pros and cons of each approach.

Setting up an LIC/PACE program requires consideration of many program elements. These are presented in Section 5. Although LIC/PACE programs can be designed such that they have no net cost to the municipality, capital is required to finance the loans. These funds may come from budget surpluses, infrastructure loans, bonds, debentures, even grants. For meaningful scale up of these programs, third party financing must be brought into the discussion, though this has not yet happened in Canada.

To mitigate the small, but real, risk of defaults on payments, municipalities may be required to establish loan loss reserves, employ ability to pay requirements, or require mortgage lender approval. This toolkit details considerations for multi-tiered municipal governance of LIC/PACE programs and describes the stake-holders who should be engaged in designing, marketing and evaluating a program.

Municipalities need new programs to drive energy efficiency retrofits in the residential sector if they are to meet their climate mitigation goals. At the same time, utilities and other agencies are also looking for ways to achieve their energy and GHG reduction mandates. LIC/PACE programs have successfully driven billions of dollars in energy efficiency retrofits across North America since 2009. There are many challenges and considerations in developing a new LIC/PACE program, but if done well, they have the potential to make significant gains in cutting residential GHG emissions and enabling municipalities to lead the way in meeting our climate goals.

GLOSSARY OF TERMS

Building envelope — the shell of the home and includes the outside walls, the attic, the foundations, and the floors over garages or crawlspaces.

CASC — Climate Action Support Centre.

Decarbonize — the process of reducing the carbon dioxide emissions.

Debenture — fixed rate, medium to long term loan, akin to a bond. It is not secured by collateral, but instead relies on the creditworthiness of the organization. These are considered low risk investments.

GHGs — Greenhouse Gas emissions. Carbon dioxide and some other gases trap heat energy in the atmosphere causing a rise in global average temperature and disruptions in our climate. Many of these gases are produced when fossil fuels are burned for energy use.

HRV/ERV — Heat Recovery Ventilator or Energy Recovery Ventilator, these mechanical systems exchange heat between outgoing stale air and incoming fresh air.

LIC — Local Improvement Charge.

Lien — a legal claim placed on a property allowing the creditor to recoup the value of the associated debt from the value of the property in the case of default on payment.

Loan Loss Reserve (LLR) — monies put aside to cover losses on a loan due to defaults or non payments. These may be required when the LIC program is financed by third parties or through loans.

Net zero energy building — a building that produces on average over a year as much renewable energy as it uses.

Net zero emissions building — a building that produces no net GHG emissions, this usually requires a home to use electric space and water heaters with electricity sourced from clean energy.

PACE — Property Assessed Clean Energy.

PDA — Program Delivery Agent.

Priority lien — A lien that is paid out first when there is a foreclosure or property tax sale. Tax liens supersede mortgage liens. With LIC/PACE liens, only the payments that are in arrears are paid out, not the entire loan amount.

Retrofit — to modify a home so that it uses less energy to heat and cool.

1.0 | INTRODUCTION

1.1 | COMMUNITIES AND CLIMATE CHANGE

Climate change is significantly impacting communities across the world, including those in Canada. Municipalities are witnessing rising temperatures, increased severe weather events, threats to agriculture, and impacts to health. In its latest report, the Intergovernmental Panel on Climate Change (IPCC) finds that limiting global temperature increases to 1.5 °C would require rapid and transformational changes to land, energy, industry, buildings, transport, and cities. This would mean reducing global GHG emissions by 45% from 2010 levels by 2030, and reaching net zero around 2050. The impacts and costs of this warming will be far greater than previously forecasted, and will impact ecosystems, human health, and well-being. Achieving the reductions necessary to limit global warming is possible through many actions that are currently underway, but they need to be scaled up and accelerated. In 2015, Canada signed onto the Paris Agreement, committing to reduce annual emissions to 30% below 2005 levels by the year 2030.

Canadian voters are also concerned about climate change. A September 2019 Abacus Data Clean Energy Canada poll found that 9 in 10 voters see climate action as important or urgent. An October 2019 pre-election poll conducted by Ipsos found that 29% of Canadians included climate change among their three most important issues. It is clear that Canadians are concerned about sustainability. However, the majority of Canadians lead high carbon lifestyles — they live and work in energy inefficient buildings that contribute significantly to GHG emissions.

Municipalities play a key role in tackling climate change in their jurisdictions. They have the power to help Canada achieve its Paris targets, and to help the average Canadian's desire to lower their carbon footprint. Furthermore, they stand to be impacted the most by the effects of a changing climates, and thus are on the front lines of leading adaptation and mitigation efforts. Municipalities have the opportunity to create innovative, equitable programs that will benefit their taxpayers in the future.

Hundreds of communities across Canada have developed climate action plans or are in the process of developing such plans. Municipal climate mitigation plans generally address their three main sources of GHGs: transportation, buildings, and waste. The buildings sector includes residential, commercial, industrial and institutional structures. In Ontario, buildings were the second largest contributor of total GHGs in 2017 (22%), following transportation (35%).[1] Just over half of these building emissions come from personal residences. Older buildings and low-rise homes can significantly reduce their emissions through energy efficiency measures.

*In Ontario, **buildings** were the second largest contributor of **total GHGs** in 2017 **(22%)**, following **transportation (35%)**.*[1]

Addressing emissions from residential buildings is critical to helping municipalities, provinces and Canada reach emissions reduction targets. This toolkit will focus on single-family home residential buildings, which includes townhouses, condominiums, and single detached homes. This particular sector has proven very difficult to decarbonize. Reducing the GHGs emitted from homes is not only difficult and expensive, but also requires the participation of a large number of homeowners. Few Canadian municipalities have made significant progress in this sector to date.

This toolkit aims to help municipalities reach their climate goals in the residential sector through the use of a relatively new tool: local improvement charge (LIC) financing, also known as property-assessed clean energy (PACE) financing.

1 Environment and Climate Change Canada Data. (2018). *D tables Canadian economic sector provinces territories*. Retrieved from *http://data.ec.gc.ca/data/substances/monitor/canada-s-official-greenhouse-gas-inventory/D-Tables-Canadian-Economic-Sector-Provinces-Territories/?lang=en*

1.2 | GREENHOUSE GAS EMISSIONS FROM RESIDENTIAL BUILDINGS

In 2017, buildings in Ontario consumed nearly two-fifths (or 946 PJ) of the province's total energy use. Building energy use was 58% natural gas, 35% electricity, and 7% other fossil fuels. These buildings can use much less energy. Large buildings built in 2005 require 50% more energy to operate than those built today, while low-rise homes built in 2005 need twice as much energy as those built today. This energy waste has real economic, environmental, and social costs to Ontarians.

Buildings are also a major contributor to Ontario's greenhouse gas emissions, and were responsible for 34 Mt CO2e or 21% of Ontario's total greenhouse gas emissions in 2016.

> *"Buildings were responsible for **21%** of Ontario's total greenhouse gas **emissions** in 2016."*

While smaller than commercial and industrial buildings, residential buildings account for more than half of all building energy use. In 2015, Ontario's households were the fourth most energy intensive in Canada.[2] Because most residential energy use is fossil fuelled, high energy use also means high greenhouse gas emissions.

About 13% (20 Mt CO2e per year) of Ontario's emissions come from residential energy use, mostly from natural gas fired space and water heating.[3]

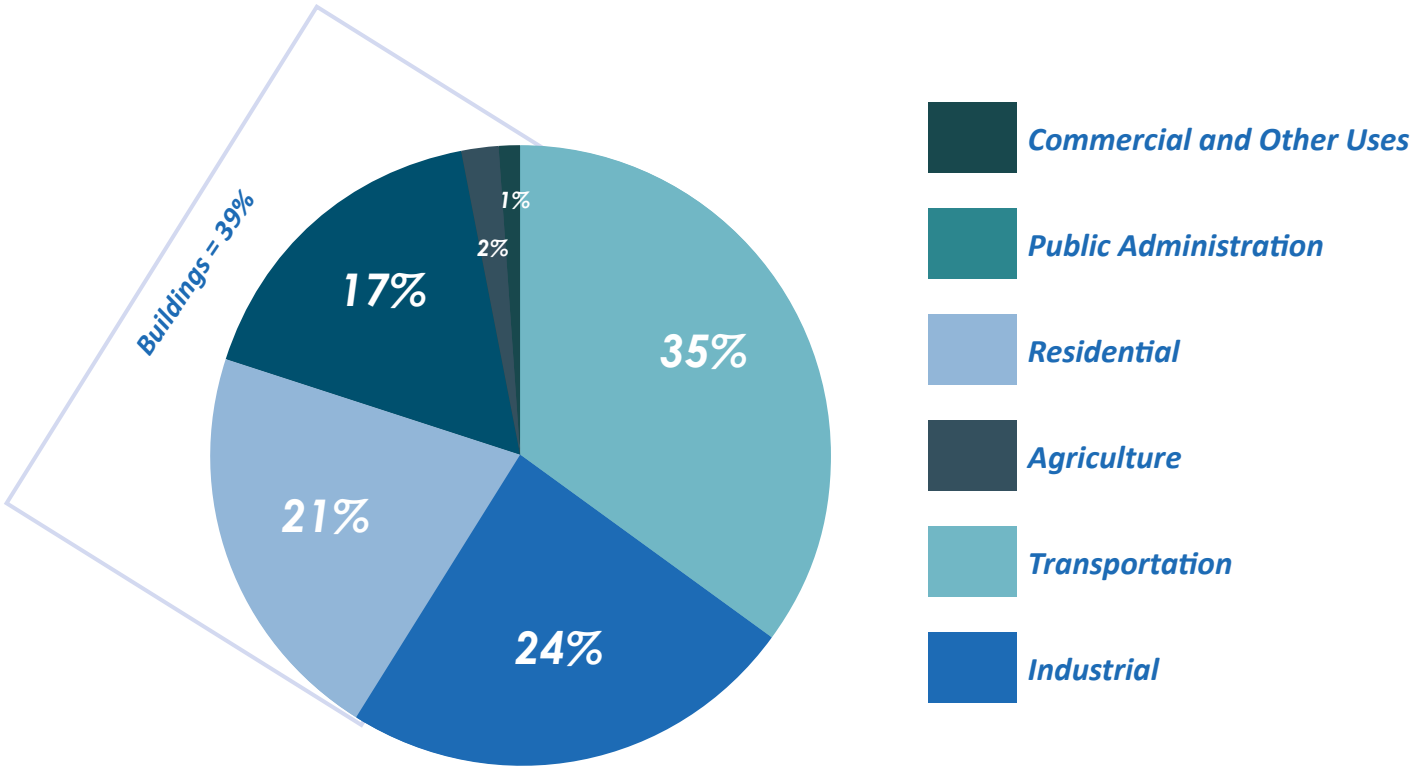
The majority of residential energy use comes from low-rise residential buildings which account for an estimated 83% of all residential energy use. This includes single-detached and single-attached house types as defined by Statistics Canada and Natural Resources Canada.

Residential buildings primarily produce GHGs from fuels used to heat the air and water in a home, and from electricity. Space and water heaters commonly use fossil fuels including natural gas, heating oil, and propane. These produce GHGs directly when burned to generate heat.

2 Statistics Canada, *Supply and Demand of Primary and Secondary Energy in Terajoules*, Annual, Table 25-10-0029-01 (11 February 2019), online: *www150.statcan.gc.ca/t1/tbl1/en/cv.action?pid=2510002901*

3 National Inventory Report 1990-2016: *Greenhouse Gas Sources and Sinks in Canada, Part 3* (13 April 2018) at 53. (18.8 Mt CO2e of emissions from residential plus 30% of electricity emissions).

FIGURE 1: ENERGY USE IN ONTARIO BY SECTOR IN 2017



Source: Statistics Canada, Table 25-10-0029-01 *Supply and demand of primary and secondary energy in terajoules, annual*

Meanwhile, GHGs are also produced when fossil fuels are used to generate the electricity used by homes. In Ontario, on average, over 90% of our electricity is generated from clean energy sources such as nuclear, hydro, and other renewables. However, natural gas power plants are used to ensure supply meets the fluctuating demand. Thus, in Ontario, as more electricity is required, more natural gas may be burned in order to produce it. To reduce the GHGs from residential homes, the energy used to heat and operate the home must be significantly reduced through energy efficiencies and, ultimately, homes will need to switch to clean electric sources for space heating and hot water.

Energy efficiency retrofits reduce GHG emissions by reducing the total energy used by a building for heating, cooling, and normal operations. These renovations include air sealing, adding insulation, upgrading heating and cooling equipment, and upgrading windows and doors. These will be discussed in depth in Section 2.

To reduce the GHGs from residential homes, the energy used to heat and operate the home must be significantly reduced through energy efficiencies and, ultimately, homes will need to switch to clean electric sources for space heating and hot water.

1.3 | THE NECESSARY TIMEFRAME FOR ACTION

Unless significant action is taken to address energy efficiency, Ontario households will continue to pay the increasing costs of energy while impacting the climate. Achieving climate targets will be increasingly difficult unless energy efficiency in existing homes is prioritized, particularly because three in four buildings that will be in use in 2030 already existed as of 2017.[4]

4 Energy and Mines Ministers' Conference, *Build Smart Canada's Buildings Strategy* (August 2017), online: www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/emmc/pdf/Building_Smart_en.pdf

In addition, the opportunities to reduce energy waste are rare, given that energy-related home components are typically used for decades or more. For example, if a homeowner replaces the siding on their home without upgrading the insulation, that home is likely to remain poorly insulated until 2050 or later. On the other hand, progress and good investments made now will provide benefits well into the future.

As Dr. Dianne Saxe, former Environmental Commissioner of Ontario notes, we have a lot of retrofitting to do and not a lot of time to do it. With 3.7 million single-detached and single-attached households in Ontario, the challenge of increasing energy efficiency in this sector is no small feat. Covering 634 million m^2 of area,[5] these households contain almost double the amount of area of commercial buildings in the province — there are only approximately 0.2 million commercial and institutional buildings in Ontario containing 343 million m^2 of area.[6]

The climate crisis requires Ontario and Canada to urgently reduce its fossil fuel use, and achieving deep retrofits of Ontario homes will become more difficult over time. To reach a modest target, say having 60% of homes energy efficient by 2050, Ontario would have to perform deep energy efficiency renovations in 2% of homes every year starting in 2019.[7] That is about 74,000 home renovations per year, equivalent to the number of dwellings of all kinds that were constructed in 2018 in Ontario.[8] It would also mean significantly expanding the supply of skilled workers.

> *"Achieving climate targets will be increasingly* ***difficult*** *unless energy efficiency in existing homes is* ***prioritized****."*

5 Natural Resources Canada, *Comprehensive Energy Use Database* (2019), online: *http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/menus/ trends/comprehensive/trends_res_on.cfm*

6 Statistics Canada, *Survey of Commercial and Institutional Energy Use, 2014* (16 September 2016), online: *www150.statcan.gc.ca/n1/dailyquotidien/160916/dq160916c-eng.pdf*

7 The remaining 40% of buildings are assumed to be replaced with new buildings by 2050 at a rate of 1.3% per year.

8 There were 74,374 housing completions in 2018 in Ontario. See: Statistics Canada, Canada Mortgage and Housing Corporation, Housing Starts, *Under Construction and Completions, All Areas*, Quarterly, Table 34-10-0135-01, online: *www150.statcan.gc.ca/t1/tbl1/en/cv.action?pid=3410013501#timeframe*

2.0 | ENERGY EFFICIENCY RETROFIT MEASURES

Source: Shutterstock

2.0 | ENERGY EFFICIENCY RETROFIT MEASURES

In the context of the Canadian climate, which includes many months of cold weather, retrofits provide a lot of value. Retrofits are projects taken to upgrade or renovate a house so it will keep the heat in during the heating season and keep it cooler during the summer. This means adding insulation, caulking and weather-stripping, improving or replacing windows and doors, and improving the mechanical systems. Retrofitting also means including energy efficiency measures in renovation and repair activities.

The best results are obtained when a whole home approach to energy efficiency is taken, and often the best time to approach homeowners is when they are already planning renovations. Impressive energy and GHG reductions are possible for existing homes: with extensive energy efficiency retrofits and fuel switching, existing homes can reduce their GHG emissions to near zero.

This section will describe how retrofits are designed to reduce the overall energy use of a home and the associated GHGs. It will outline some specific measures that can be used to improve the efficiency of homes.

2.1 | WHOLE HOME RETROFITS

A house operates as a system. All the elements of a house — the environment, envelope, mechanical systems and occupant activities — affect each other, and the result affects the performance of the house as a whole.

Existing homes would be significantly more energy efficient if they get a well-insulated and airtight building envelope (the walls, roof, floor, doors and windows that separate the conditioned space within a home from the outdoor environment). It is almost impossible to reduce energy use in an existing home to the levels seen in new homes without addressing the building envelope. Swapping to more efficient heating and cooling equipment will make only small improvements in overall home energy use. Deep energy retrofits refer to projects that reduce overall home energy use by a significant proportion, ~30%, which generally require improvements to the building envelope. This is like putting a "jacket" on a building first before having its internal systems work harder to heat it.

Source: Shutterstock

To maximize reductions in energy use and GHGs, existing homes should be viewed as a whole system and the retrofit measures implemented in a logical sequence. Retrofits have the greatest impact when done in the following sequence:

- **(1)** Adding insulation
- **(2)** Sealing air leaks
- **(3)** Upgrading the mechanical systems
- **(4)** Replacing windows and/or doors
- **(5)** Water upgrades
- **(6)** Thermal controls

KEY RESOURCES

- For a deeper dive on retrofits, Natural Resources Canada's publication Keeping the Heat In is a guide for homeowners on energy efficiency. It includes basic principles of building science and provides guidance on home retrofit projects such as insulation and air sealing improvements.

- The City of Toronto's BetterHomesTO site also has information cards on a energy efficient technologies, including estimated costs.

- NRCan has a searchable list of energy-efficient product models.

First priority should be given to upgrades to the building envelope: sealing air leaks and adding insulation to exterior walls, floors, foundations, and ceilings. Ideally, this is done all at once for the whole home. This ensures near-continuous coverage with insulation and can address problematic transition areas for air leaks, such as where the foundation meets the wall. Only once these retrofits are completed, should heating systems be replaced. When retrofits are done in this order, smaller heating systems can be installed because the home will have reduced energy losses through the building envelope. These smaller heating systems are generally less expensive to buy and to operate. The overall effect of this approach is larger energy savings and GHG reductions than if many small retrofits are carried out when mechanicals fail or renovations are planned.

It is almost impossible to significantly reduce energy use in a home without addressing the building envelope.

2.2 | RENOVATIONS: AN OPPORTUNITY FOR ENERGY EFFICIENCY MEASURES

In 2018, nearly half of Canadian homeowners reported having plans to renovate their home.[1] Home renovations are a significant opportunity to encourage concurrent air sealing and insulation upgrades as exterior walls may be exposed. With other work already planned, homeowners who include energy retrofits in their renovations could do so with minimal incremental costs or additional disruption. For example, adding insulation and sealing holes in exterior walls is quick and easy to do when the siding is being replaced, but expensive and disruptive otherwise. As well, when finishing a basement is also an ideal time to add insulation to the walls and floor as up to 20% of a home's total heat loss may be through the basement.[2]

Source: Shutterstock

1 CIBC. (2018). *Canadian homeowners trim spending on home renovations in 2018: CIBC poll*. Retrieved from http://cibc.mediaroom.com/2018-05-31-Canadian-homeowners-trim-spending-on-home-renovations-in-2018-CIBC-Poll

2 Natural Resources Canada. (2017). *Keeping the heat in.* Canada: Natural Resources Canada. Retrieved from https://www.nrcan.gc.ca/kthi

Historically, energy efficiency retrofit incentive programs, including the Federal ecoENERGY program, were used primarily for heating and cooling upgrades plus air sealing. There was little uptake for insulation additions to the building envelope in these programs. Utility-based retrofit incentive programs have also failed to stimulate significant retrofits to residential building envelopes.[3] These piecemeal approaches generate far smaller energy and emission reductions and are often less cost-efficient than deep energy retrofits. Whenever possible, whole home deep energy retrofits should be encouraged to optimize savings and GHG reductions.

Energy Assessments

EnerGuide Home Evaluations can help homeowners identify how homes use energy and the impact on the environment. An EnerGuide home evaluation can provide a homeowner with:

- a current energy efficiency rating for the home
- recommended actions to make the home more energy-efficient

The intent of the recommendations for upgrades identified in the evaluation is to lower a home's energy consumption, greenhouse gas emissions, and shrink its carbon footprint. By completing upgrades, a home will be aiming for a score as close to zero as possible.

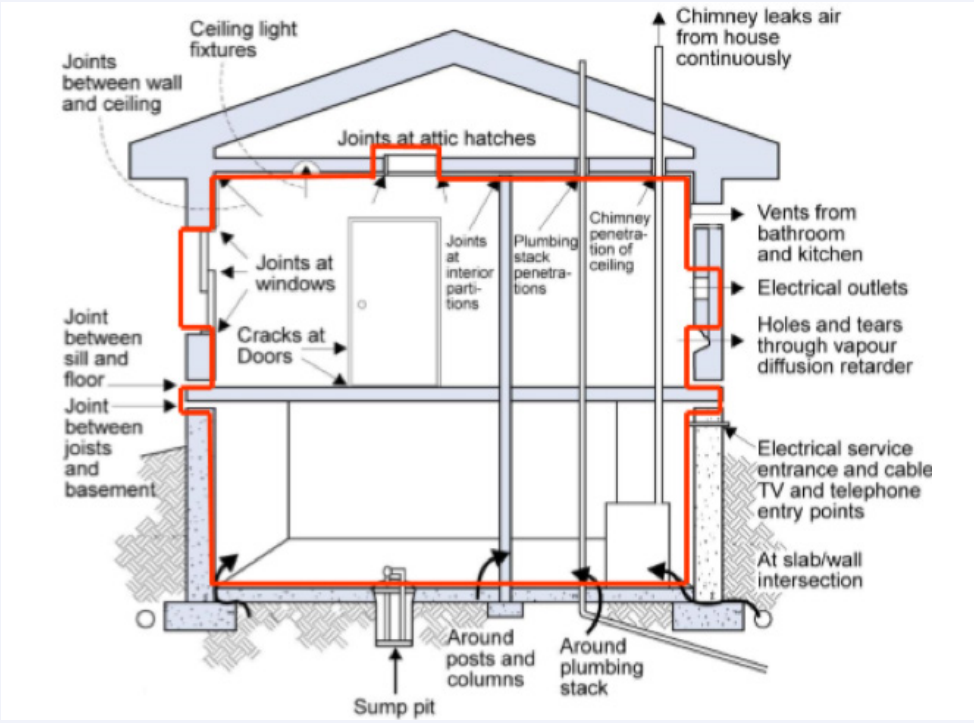
When energy efficiency is not included during renovations, a critical opportunity is missed.

3 Environmental Commissioner of Ontario. (2019). *2019 energy conservation progress report.* Environmental Commissioner of Ontario. Retrieved from https://docs.assets.eco.on.ca/reports/energy/2019/why-energy-conservation.pdf

FIGURE 2: THERMAL IMAGE SHOWING AREAS OF ENERGY LEAKAGE AND HEAT LOSS (AREAS IN YELLOW ARE WARMER THAN THE AREAS IN PURPLE)

Source: City of Vancouver

FIGURE 3: TYPICAL LEAKAGE AREAS



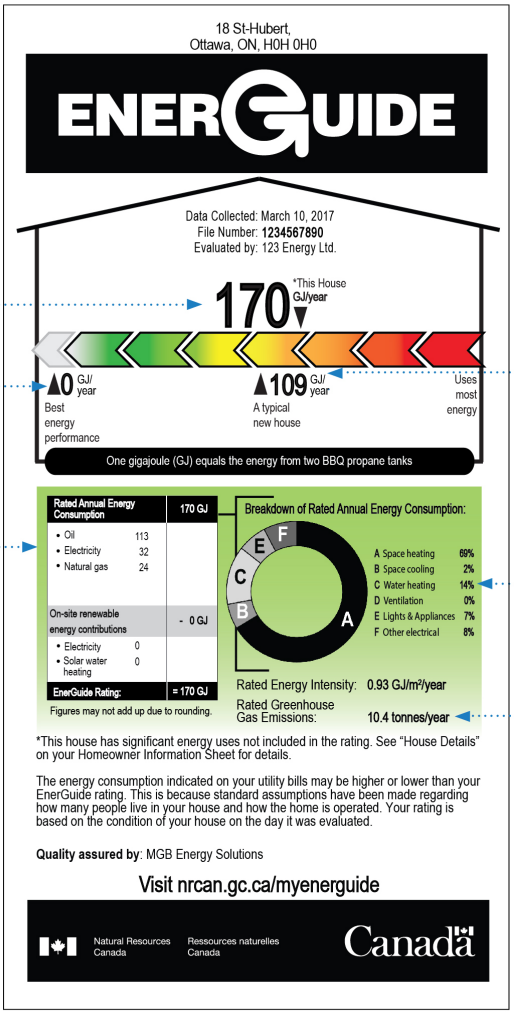
Source: NRCAN

FIGURE 4: EXAMPLE OF A HOME ENERGY RATING LABEL FROM ENERGUIDE

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

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

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



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

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

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

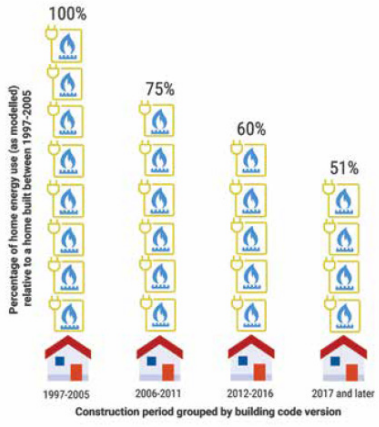
Source: https://www.nrcan.gc.ca/energy-efficiency/energuide-canada/energuide-energy-efficiency-home/after-your-energuide-home-evaluation/20572

2.3 | RETROFIT MEASURES

There are a variety of opportunities and technologies to improve the energy efficiency of a home. These range from small improvements, like efficient light bulbs, to whole home retrofits that address the building envelope. Depending on which measures are installed, some retrofits can cost around $30,000.

This section will describe the general types of measures that homeowners can take to improve their homes. Information on specific upgrades, targeted towards homeowners, can be found here.

FIGURE 5: PERCENTAGE OF MODELED HOME ENERGY USE RELATIVE TO HOMES BUILT 1997-2005



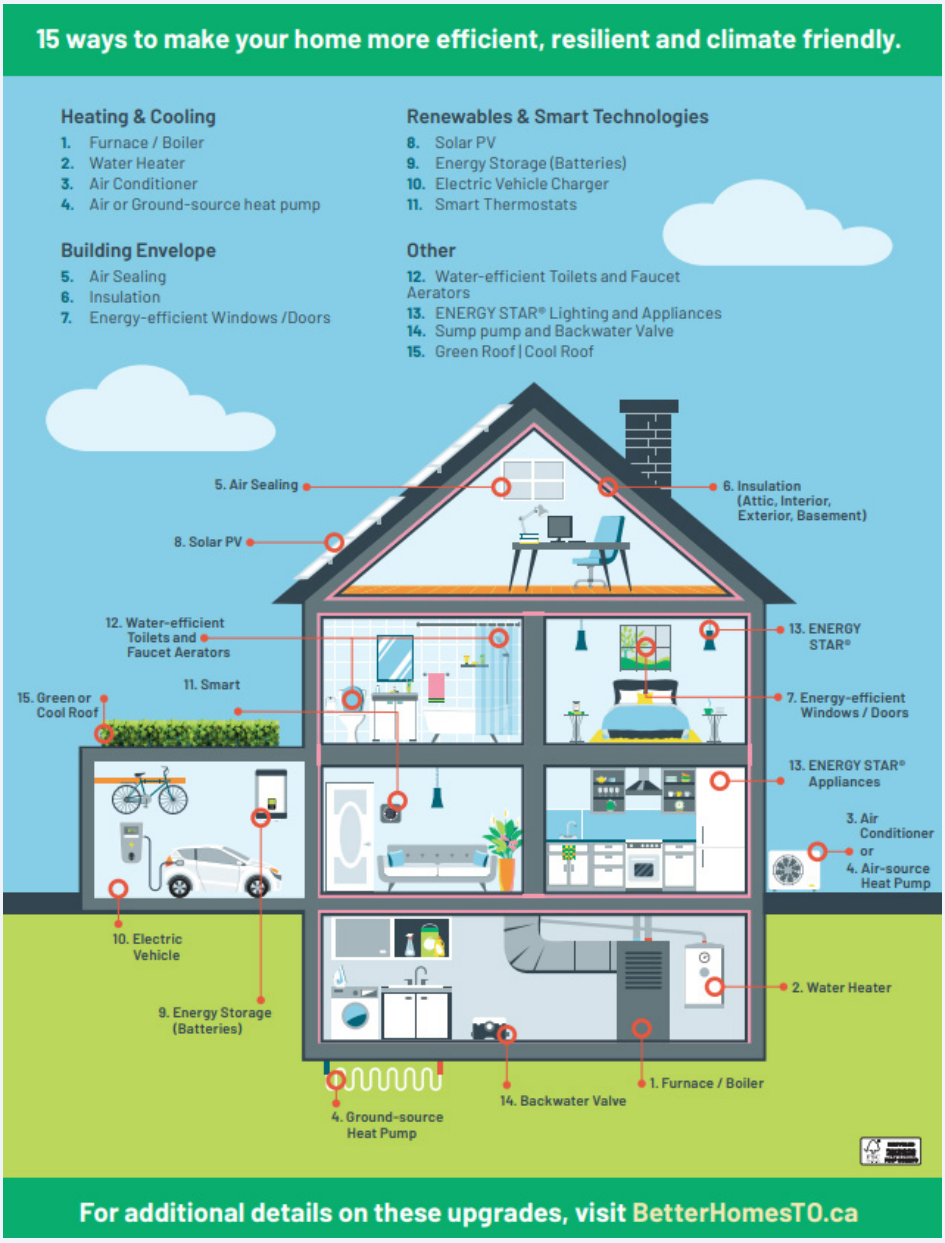
Source: Ministry of Municipal Affairs and Housing
Retrieved from p.98 of *https://docs.assets.eco.on.ca/reports/energy/2019/why-energy-conservation-03.pdf*

2.3.1 | SEALING AIR LEAKS

A critical component of a deep energy retrofit is air sealing. Sealing air leaks, which contribute to loss of indoor air and the energy used to heat and cool it, is a simple and effective measure to increase the efficiency of a home. Small holes exist throughout the home, especially around exterior wall penetrations and where structural elements meet. As humid air passes through these holes, moisture may condense in the spaces between walls causing mould and air quality problems. Air-sealing is often quick and relatively inexpensive, but best results are achieved using professional air sealing contractors.

As a home becomes more airtight, it may require the addition of a ventilation system to improve the indoor air quality and control humidity levels. Heat recovery ventilators (HRV) and energy recovery ventilators (ERV) ensure that incoming fresh air is pre-warmed in winter and pre-cooled in summer by the outgoing stale air. The result is fresh, healthy indoor air with minimized energy losses.

FIGURE 6: HOME EFFICIENCY MEASURES



Source: *https://betterhomesto.ca/wp-content/uploads/2019/11/BHTO-Whole-House-Guide-Nov19.pdf*

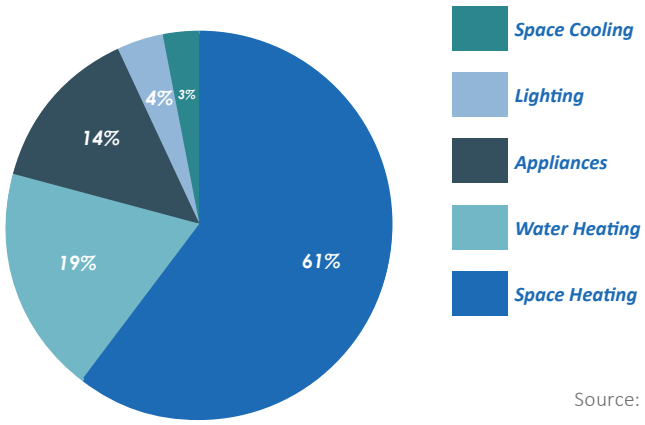
2.3.2 | ADDING INSULATION

Insulation is needed on all sides of a building envelope. The building envelope is the shell of the home and includes the outside walls, the attic, the foundations, and the floors over garages or crawlspaces. Building code requirements for insulation and air sealing have been rising as building codes are upgraded. Homes built after 2017, on average, use half of the total energy as homes built between 1997 and 2005.[4] Homes built prior to 1997 may see more significant energy savings with the addition of extra insulation: indeed, many pre-war homes (before 1941) were built without insulation.

2.3.3 | UPGRADING THE HEAT SOURCES

Space and water heating account for an average of 80% of the energy used in a Canadian home. Increasing the efficiency of these systems can therefore translate into large fuel bill savings and GHG reductions. Newer mechanical systems such as furnaces, boilers, heat pumps (air-source, ductless, or ground source), and hot water heaters have greater energy efficiency than their older counterparts and thus generate the same useful heat with less fuel.

FIGURE 7: DISTRIBUTION OF RESIDENTIAL ENERGY USE IN CANADA (2016)



Source: Natural Resources Canada

4 Environmental Commissioner of Ontario. (2019). *2019 energy conservation progress report.* Environmental Commissioner of Ontario. Retrieved from *https://docs.assets.eco.on.ca/reports/energy/2019/why-energy-conservation.pdf*

When furnaces and hot water heaters are replaced, there is the opportunity to switch from fossil fuel-based systems to electric systems leading to significant reductions in GHGs. Cold climate electric heat pumps that can operate at temperatures of -30°C are now available to heat homes in Canada. Because these heat pumps move heat rather than generating heat, they can be many times more energy efficient than electric resistance heaters. Heat pumps are therefore far less expensive to operate than other electric heat sources and also function as air conditioners in the summer months.

2.3.4 | REPLACING WINDOWS AND/OR DOORS

Up to 35% of a home's energy loss can occur through its windows and doors.[5] Although window replacements are popular for aesthetic reasons, windows and doors are expensive to replace. Furthermore, because glass is a very poor insulator, even the best new products can provide only modest energy and cost savings. Many retrofit programs therefore limit or exclude eligibility of windows and doors from their programs.

One proposal to balance customer demand with energy savings performance is to allow LIC/PACE programs to only cover the cost premium of high-performance windows over their conventional counterparts.[6]

2.3.5 | WATER UPGRADES

Water fixtures can also be included in a retrofit in order to conserve water usage. For example, toilets can account for 30% of a home's water usage. High-efficiency toilets, also called eco-efficient or low-flow toilets, remove waste through water velocity rather than volume. Homeowners can choose either high-efficiency toilets or dual-flush toilets, which have two settings — one for light flushes and one for heavy flushes.

2.3.6 | THERMAL CONTROLS

Along with retrofits, another measure many programs consider are thermal controls. These include building automation systems (BAS), smart thermostats, occupancy sensors and smart outlets. These help to address unnecessary energy consumption when there is little to no occupancy.

5 Natural Resources Canada. (2019). *Windows, doors and skylights.* Retrieved from *https://www.nrcan.gc.ca/energy/products/categories/fenestration/13739*

6 Persram, S. *LIC factsheet*, Sustainable Alternatives Consulting Inc.

BUILDING DEFINITONS

- **NET ZERO ENERGY BUILDING** — a building that produces on average over a year as much renewable energy as it uses.
- **NET ZERO EMISSIONS BUILDING** — a building that produces no net GHG emissions, this usually requires a home to use electric space and water heaters with electricity sourced from clean energy.

2.4 | REACHING NET ZERO EMISSIONS AND NET ZERO ENERGY

If our communities are to achieve their long term GHG reduction targets, homes will have reach net zero emissions. This means that they will need to heat, cool and operate exclusively with clean electricity (electricity generated without fossil fuels). Although currently expensive, the technology exists to fully electrify our homes. The cost of buying and operating electric space and water heaters, however, is significantly lower in a home that has already undergone deep energy retrofits.

If we are to avoid a crisis of energy poverty and a need to significantly increase our electrical energy supply, homes will need to be made far more energy efficient before they switch to electric heat sources.

Some municipalities may want to encourage homes to reach net zero energy. Such homes produce, on a yearly average, as much renewable on-site energy as they use. This is harder to achieve than net zero emissions because a home's energy use must first be reduced to match the renewable energy generating potential of the site. For most existing homes, deep energy retrofits would be necessary to make net zero energy possible.

While natural gas prices are low, convincing homeowners to switch to fuel sources will be difficult. Due to the higher prices of electricity, homes need to be extremely energy efficient in order to minimize using this fuel source.

2.5 | MARKET FOR RESIDENTIAL ENERGY EFFICIENCY RETROFITS

It is projected that 75% of homes that will exist in Canada in 2030 are already built.[7] Many of these homes are older and have inadequate insulation. Due to changes in building codes, the energy efficiency of homes has generally been rising in recent decades. Because national building codes were only introduced to Canada in 1941, homes built prior to that time may have been built with no insulation at all.

Consequently, newer homes can use a fraction of the energy for heating and cooling than older homes of the same size.

In Canada, there are just over 14 million occupied private dwellings, of which 86% were built before 2006 and 22% were built in 1960 or earlier.[8] In Ontario, there are just over 5 million occupied private dwellings, of which 86% were built before 2006, and 25% were built in 1960 or earlier.[9] Furthermore, 6-7% of homes in Canada and Ontario are in need of major repairs.[10] In Canada, 57% of space heating is fueled with fossil fuels,[11] while this number is at least 71% for Ontario.[12] (Data for specific Ontario municipalities that participated in this project can be found in Appendix A.)

7 National Research Council. (2017). *Build smart - Canada's buildings strategy.* Retrieved from https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/emmc/pdf/Building_Smart_en.pdf

8 Statistics Canada. (2019). *Census profile, 2016 census.* Retrieved from https://www12.statcan.gc.ca/census-recensement/2016

9 IBID.

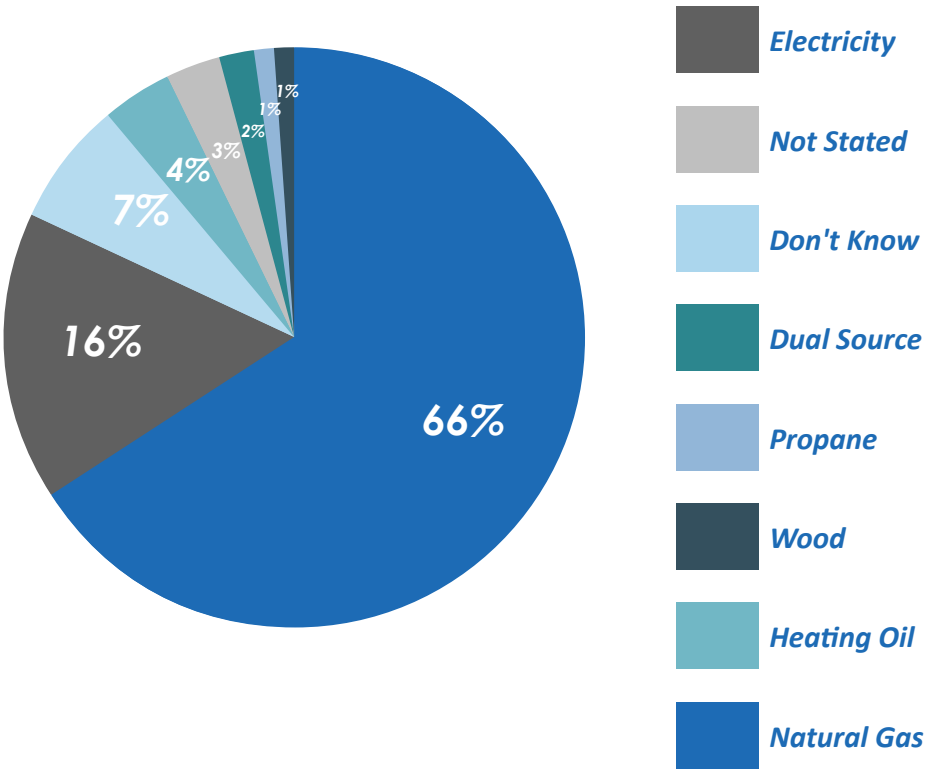
10 IBID.

11 Natural Resources Canada. (2015). *Energy use in the residential sector.* Retrieved from http://oee.nrcan.gc.ca/publications/statistics/trends/2015/residential.cfm#L3

12 Natural Resources Canada. (2014). *Survey of household energy use 2011.* Ottawa, Canada: Natural Resources Canada. Retrieved from http://oee.nrcan.gc.ca/corporate/statistics/neud/dpa/data_e/publications.cfm

Retrofit programs should prioritize homes where the greatest energy efficiency gains and GHG reductions are likely: in homes that are older, in homes that use heating oil, and in those that are already undergoing renovations. The statistics clearly show that that this applies to a large number of homes in Canada, in Ontario, and in our municipalities.

FIGURE 8: ONTARIO RESIDENTIAL MAIN HEATING SOURCE (2011)



Source: Natural Resources Canada, 2011

3.0 | THE BENEFITS OF ENERGY EFFICIENCY RETROFITS

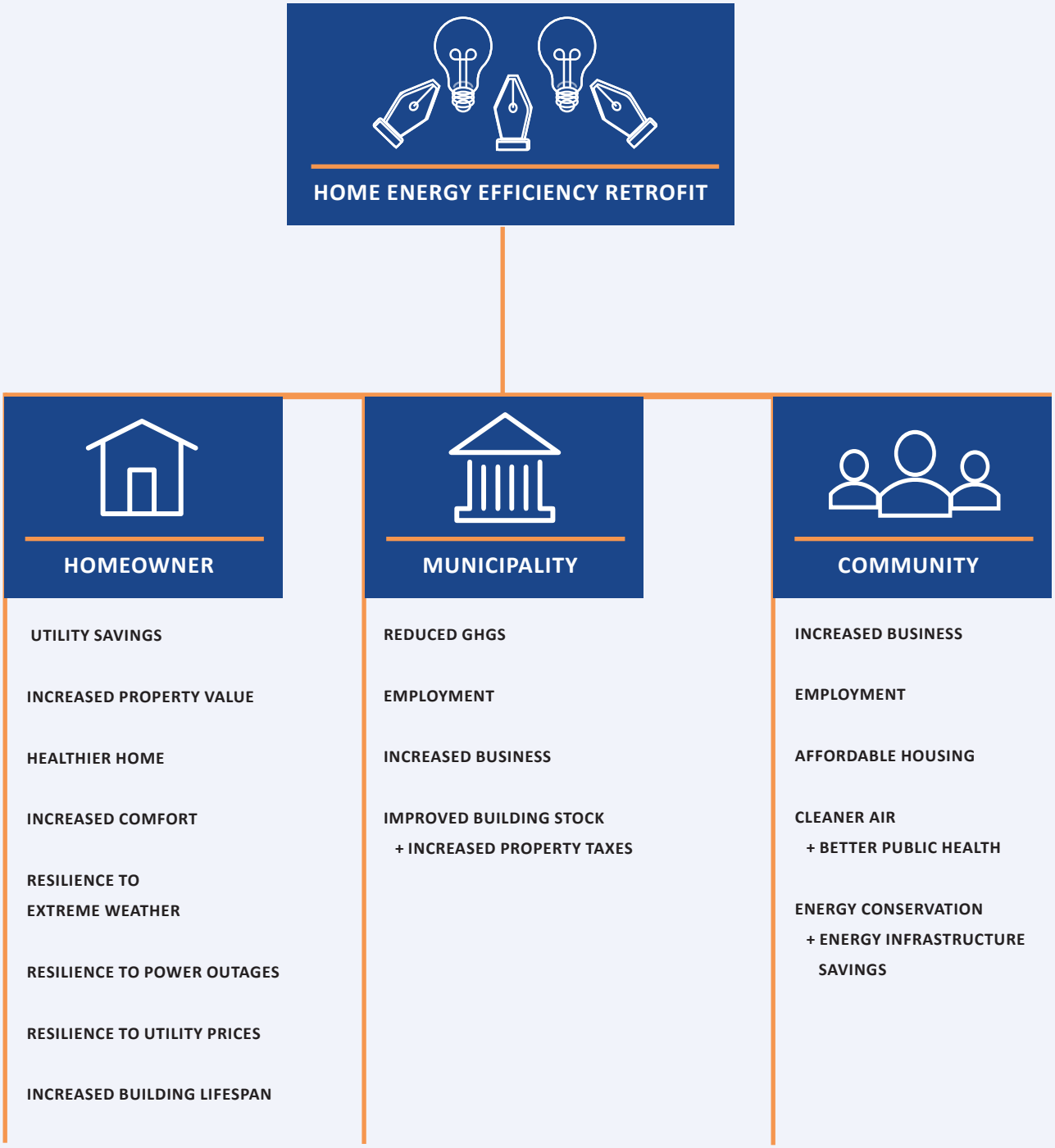
Source: Shutterstock

3.0 | THE BENEFITS OF ENERGY EFFICIENCY RETROFITS

Retrofits present an untapped pool of value and can provide benefits for homeowners, entire communities, and all of Canada. In Ontario communities, there are a large number of homes in that could substantially reduce their GHGs through energy efficiency retrofits. These retrofits provide benefits that extend beyond those living inside of the upgraded home. Retrofits benefit the local municipality and community as well, by reducing air pollution and stimulating the local economy.

Retrofits present an untapped pool of value and can provide benefits for homeowners, entire communities, and all of Canada. For the homeowner, the benefits include economic savings, greater home comfort, healthier environments and greater building resilience. For the community, the benefits include cleaner air and a stronger local economy. The municipality benefits from the improved housing stock and GHG reductions that help them fulfill their energy and climate action targets.

FIGURE 9: BENEFITS AND CO-BENEFITS OF HOME ENERGY EFFICIENCY RETROFITS



Homeowners stand to benefit economically from energy savings, and increase the value of their home through improved health and comfort. Additionally, retrofits make homes more resilient in the face of power outages and disruptions from climate-related events, as better insulated homes can maintain their internal temperatures for longer periods of time. The community also benefits from the retrofits in terms of cleaner air and a stronger local economy. Finally, the municipality benefits from reduced stress on the grid, an improved building stock, and reduced service delivery costs for the utility provider. Retrofits, through their potential to reduce GHGs, also help the municipality and community to meet their climate mitigation goals. Below is a diagram showing the many benefits and co-benefits of home energy efficiency retrofits for homeowners, the municipality and the community.

3.1 | HOMEOWNER AND OCCUPANT BENEFITS

Homeowners have the most to gain from retrofits, and the benefits are wide-ranging and significant. In addition, as retrofit measures are owned, rather than rented, they are also attractive to potential home buyers. The most obvious benefit of energy efficiency retrofits are the energy and long term utility cost savings. In addition, these renovations can make a home healthier, and more comfortable to live in. A building may last longer as a consequence of retrofits, its resale value may increase, and it may also be more resilient to power outages and climate disruptions.

Economic benefits

Because energy efficiency retrofits reduce the energy needs of a home, they may also reduce utility bills and protect against changing energy costs and future carbon pricing. It is expected that energy costs will rise, with analyses showing a potential trend upwards. These cost savings can be substantial and, for some measures, can lead to net savings in just a few years.

Energy savings can often offset the costs of financing, especially at modest interest rates. Table 3.2 from Lawrence Berkeley National Laboratory shows the annual energy savings required to offset the cost of borrowing for upgrades. While some homeowners may not break even on bill savings alone, they can receive additional value when factoring in the improved comfort, higher resale value, and reduced capital equipment costs that come along with deep energy retrofits.

TABLE 1: ENERGY UPGRADE COSTS, INTEREST RATES AND ANNUAL SAVINGS REQUIRED TO BREAK EVEN IN USD. A 30-YEAR LOAN TERM, NO DOWN PAYMENT, AND A 25% MORTGAGE INTEREST DEDUCTION ARE ASSUMED.

INTEREST RATE	ENERGY UPGRADE COSTS (USD)					
	$5,000	$10,000	$15,000	$20,000	$50,000	$100,000
	REQUIRED ANNUAL SAVINGS FOR NEUTRAL NET-COSTS					
3.0%	$204	$408	$612	$817	$2,041	$4,083
3.5%	$221	$442	$663	$884	$2,211	$4,421
4.0%	$239	$477	$716	$954	$2,386	$4,771
4.5%	$257	$513	$770	$1,026	$2,566	$5,132
5.0%	$275	$550	$826	$1,101	$2,752	$5,503

Source: Brennan Less and Iain Walker, *Deep Energy Retrofit Guidance from Building America Solutions Center* (2015) at 14.

Energy efficiency retrofitting is an important tool in addressing escalating energy costs which are an important consideration of the growing issue of energy poverty.

Energy efficiency retrofitting is an important tool in addressing escalating energy costs which are an important consideration of the growing issue of energy poverty. Energy poverty, or energy burden, refers to households that spend too much on their household energy needs. That includes electricity as well as heating and cooling. The most common definition of energy poverty are households that spend greater than 10% of their gross income on energy costs. Research has found that 21% of households in Canada experience energy poverty or 2.8 million households, with many spending over 30% of their income on energy costs.[1] Energy efficiency can drastically improve their quality of life.

Energy efficiency retrofits can also increase the property value of the home. As awareness of the value of reducing energy demand grows, so too will the demand for homes with low energy needs.

Finally, energy efficient homes may be less vulnerable to fuel price fluctuations due to political, resource, and climate events. Carbon pricing and other climate mitigation measures may increase fossil fuel prices, while electricity prices are also expected to increase as growing demand requires the addition of new capacity and infrastructure. In addition, fuel prices will likely fluctuate due to political, resource, and climate events.

Home health and comfort benefits

Retrofits offer important benefits for health, particularly around air quality.

Well insulated homes are less drafty, experience fewer temperature fluctuations, and have more uniform heat throughout the home. This makes homes more comfortable to live in. Added insulation may also improve the soundproofing of the home.

Leaky and poorly insulated homes often have poor air quality due to bad ventilation, condensation, and mould. Much of the mould problems in older homes are due to water from warm, indoor air condensing on or inside the cold outer walls of the building, which is harmful to human health. In addition, bacteria, viruses, and radon can also present air quality concerns for occupants.

1 https://www.cbc.ca/radio/spark/spark-390-full-episode-1.4589536/energy-poverty-the-hidden-technology-gap-1.4589909

Adding insulation to exterior walls, improving ventilation, and sealing leaks reduces water accumulation from condensation. Energy efficiency upgrades can therefore improve air quality and reduce the associated health impacts.

Building resilience benefits

Better insulated homes are more resilient to the impacts of power outages, extreme weather events, and age-related decay. These homes have a greater ability to hold their indoor air temperatures and can therefore better protect their inhabitants from the effects of power outages and extreme hot or cold days. Furthermore, a home's longevity can be increased through regular maintenance and energy efficiency measures that protect the structure from decay.

3.2 | COMMUNITY BENEFITS OF HOME ENERGY RETROFITS

Clean air

All burning of fossil fuels in urban settings contribute to poor outdoor air quality, including those used to heat our homes and hot water. Poor urban air quality is associated with many adverse health outcomes, including asthma, and cardiovascular disease. Energy efficiency retrofits can reduce the amount of pollution generated from the burning of fossil fuels. This translates into better air quality and better public health.

Source: Shutterstock

Stronger local economy

Energy efficiency retrofits support the local economy through increased employment, business transactions, and general spending (GDP). Energy efficiency upgrades must be completed by trained professionals, and benefits local labourers who are contractors, renovators, auditors, installers, and others. An economic study of energy efficiency programs in Canada projected that for every dollar spent on building fuel efficiency, there is an increase in GDP of $3.3-$4.1 and for every million spent on fuel efficiency for buildings, 22-27 job years are generated.[2]

Energy conservation through efficiency upgrades is far cheaper than adding new electricity generation to the grid. Delaying or eliminating the need for expensive electricity infrastructure development can translate into significant savings for public power companies. Indeed, energy conservation is 3.5 to 8 times cheaper than building new electricity generators.[3]

3.3 | MUNICIPAL BENEFITS OF HOME ENERGY RETROFITS

Climate mitigation

Many municipalities in Ontario have energy plans or climate plans that include energy efficiencies and GHG emission reduction targets. Residential buildings are major users of energy and emitters of GHGs in municipalities. Energy efficiency retrofits of these buildings can therefore go a long way toward fulfilling these energy and climate targets.

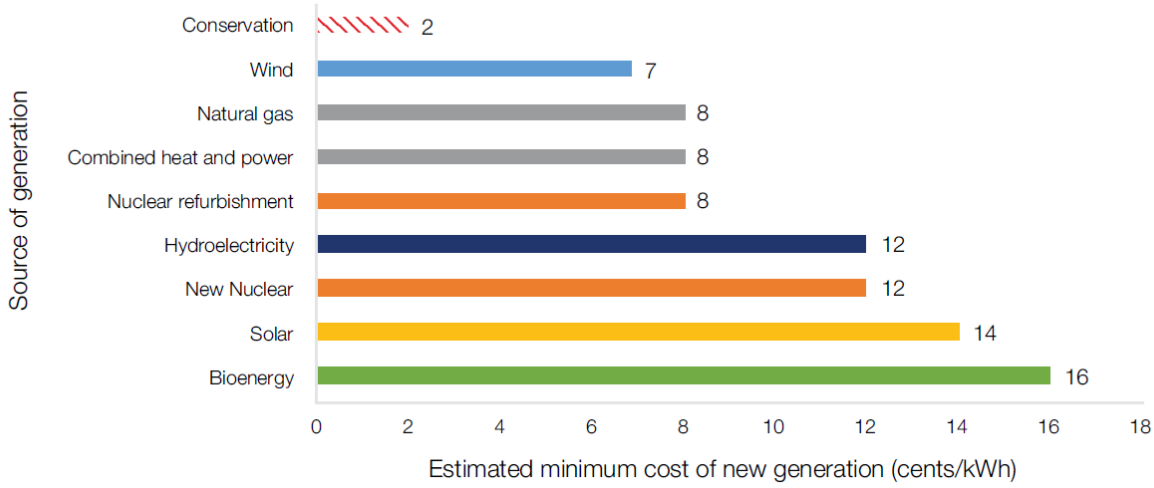
Improved building stock

Retrofits are often combined with renovations. Together, these measures improve the resilience and the visual appeal of a home. For the municipality, this results in reduced liability for the impacts of extreme weather events, as retrofitted buildings display increased resilience.

2 Malone, L., Poirier, M., Langille, B., Gobeil, B., Dunsky, P., & Petraglia, L. (2014). *Energy efficiency: Engine of economic growth in Canada*. Rockport, ME: ENE/Acadia Centre. Retrieved from https://acadiacenter.org/document/energy-efficiency-engine-of-economic-growth-in-canada

3 Environmental Commissioner of Ontario. (2019). *2019 energy conservation progress report*. Environmental Commissioner of Ontario. Retrieved from https://docs.assets.eco.on.ca/reports/energy/2019/why-energy-conservation.pdf

FIGURE 10: ESTIMATED MINIMUM COST OF NEW ELECTRICITY GENERATION IN ONTARIO



Source: Environmental Commissioner of Ontario, 2019

In addition, improving homes improves the quality of the local building stock — bringing homes up to more recent Building Codes, reducing service delivery costs, and moderating the impact of power outages or other impacts from extreme weather events.

These improvements can increase and improve property values when done on a large scale, and may increase resale value. A 2016 US study found that properties with PACE-funded retrofits sold for $199 to $8,882 more than similar homes without the retrofits.[4]

For the municipality, this increase in property values may translate to increased property tax revenue over time, or could help reduce future property tax increases.

Municipal governments should also consider that homes with energy efficiency improvements result in increased affordability for homeowners, as these improvements can encourage people to stay in the community.

4 Goodman, L., & Zhu, J. (2016). *PACE loans: Does sale value reflect improvements?* New York: doi:10.3905/jsf.2016.21.4.006

4.0 | BARRIERS TO ENERGY EFFICIENCY

Source: Shutterstock

4.0 | BARRIERS TO ENERGY EFFICIENCY

Low customer demand, stemming from lack of awareness of energy efficiency benefits, is the primary barrier to widespread energy efficiency adoption. The high upfront costs of retrofits, their long payback times and lack of access to qualified professionals also limit retrofit implementation.

FIGURE 11: BARRIERS TO ENERGY EFFICIENCY

4.1 | LACK OF AWARENESS OF ENERGY EFFICIENCY BENEFITS

The primary barrier to energy efficiency adoption may be a lack of awareness of their multi-dimensional benefits. For a homeowner with a limited budget for home renovations, energy efficiency retrofit projects are often less appealing than an investment in other projects, such as a kitchen upgrade. Part of the reason for this is that homeowners often do not understand the value of retrofits, and those who are interested may not know what upgrades are needed or what to ask for.

It is difficult to quantify how much money will be saved as a result of energy savings over a long period of time. It is also difficult for homeowners to understand and value the other benefits of retrofit projects — such as home comfort and health. In addition, retrofits may not necessarily increase the value of the property as much as cosmetic upgrades.

Retrofit programs will need to devote resources to educating homeowners of the many benefits of energy efficiency retrofits.

4.2 | EXTENDED PAYBACKS

Given the current low price of energy in Ontario, homeowners who invest in deep energy efficiency home retrofits would likely only see paybacks over time periods which can exceed twenty years, with a relatively low rate of return when judged against alternative investments.

LIC program design will also need to consider how to address collecting payments for retrofit measures that are past their useful life cycle.

4.3 | UNCERTAINTY

There are a number of real and perceived risks to energy efficiency improvements, including:

- **(1)** the actual benefits may not meet the estimated benefits (performance risk);
- **(2)** the project risks associated with potential budget and/or timeline overruns; and
- **(3)** uncertainty with regards to the length of ownership.

For example, a homeowner may be reluctant to retrofit a home if they plan to move before recouping the cost through energy savings.

4.4 | SPLIT INCENTIVES

When homes are rented, the problem of split incentives may arise: it is the landlord who is responsible for paying for energy efficiency upgrades, but it is often the tenant who benefits from the utility bill savings. The landlord therefore has limited incentive to invest in energy efficiency retrofits. Conversely, when the landlord pays the utility bills and has an incentive to lower those costs, the tenant has no incentive to modify their behaviour, thus cutting into the potential energy savings.

4.5 | SUPPLY OF TRAINED CONTRACTORS AND ASSESSORS

In some markets, there is a limited supply of contractors knowledgeable about the technical aspects of energy efficiency renovations and willing to do energy efficiency upgrades. Contractors may be reluctant to seek training in energy efficiency retrofits due to concerns about the ability to garner sufficient business in the field. Moreover, they may have limited access to energy efficiency training programs. Contractors have also been dissuaded from entering the market because some residential energy efficiency programs require arduous data collection requirements and/or difficult-to-use modeling tools, which add to the time and cost of the job.

5.0 | LOCAL IMPROVEMENT CHARGES

Source: Shutterstock

5.0 | LOCAL IMPROVEMENT CHARGES

5.1 | WHAT ARE LOCAL IMPROVEMENT CHARGES?

Local improvement charges (LICs) are special temporary charges that are added to a property tax bill to pay for improvements that benefit the property owners. Traditionally, these charges have been used in Ontario as a mechanism to recover the costs of local block level infrastructure improvements from the affected properties.

They have been used to finance a variety of projects including street repaving, the installation of street lighting, construction of traffic calming measures, and the expansion of sewage infrastructure.

More recently, LICs have been used to finance energy efficiency, renewable energy, and water conservation measures voluntarily carried out by individual property owners on their buildings. An LIC program, often delivered by a municipality, provides homeowners with a loan to carry out these measures on their property.

The homeowner pays for the measures and repays the loan through regular charges added to the property tax bills. The full cost of the program, including all associated administration costs and interest charges, are included in the loan or charged as a separate fee.

This program can therefore operate with no net cost to the municipality and does not have to use taxpayer funds. Payments are made through the property tax system using the existing billing system.

A unique characteristic of LIC/PACE financing is that the loan is tied to the property and transferred to the new owner when the home is sold. Because the homeowner pays for the retrofits over a period of time, often aligned with the typical payback period of the measure, a homeowner that does not intend to remain in the home for the long-term is still assured a of a return on their investment.

> *"Local improvement* ***charges*** *have the potential to be an effective* ***financial tool*** *through which municipalities can encourage residents to* ***invest*** *in energy efficiency retrofits."*

In Ontario, several market factors make LICs a good potential fit for municipalities, considering the range of financing tools available:

- most electric Local Distribution Companies (LDCs) are municipally owned and since LICs are implemented at the local level there is an opportunity to align initiatives with utility programs and use existing administrative structures;
- Ontario homeowners hold significant equity in their homes;
- home ownership in Ontario is relatively high (70%) compared to the rest of Canada; and
- municipal property tax default rates are very low.

Local improvement charges have the potential to be an effective financial tool through which municipalities can encourage residents to invest in energy efficiency retrofits. Unlike their federal and provincial counterparts, municipal governments have legislative and financial constraints that limit their ability to use traditional mechanisms, such as direct financial incentives, energy efficiency regulations, or carbon pricing. LIC/PACE financing is likely to be the most effective retrofit incentive tool available to municipalities. This program can easily complement incentive programs from other levels of government leading to potentially high rates of adoption and GHG reductions in the residential building sector.

5.2 | ADVANTAGES OF LIC/PACE FINANCING FOR RETROFITS

LIC/PACE financing is a promising tool that municipalities can use to promote the energy efficiency retrofits that will produce deep cuts to GHG emissions from residential homes. Unlike other upgrade programs or companies that offer financing for mechanical upgrades, LIC/PACE financing can be used for a whole home approach to retrofits — so that building envelope upgrades may reduce heating and cooling loads. This tool has many advantages described below.

5.2.1 | LOW UPFRONT COSTS FOR RETROFITS

The high upfront cost of home energy efficiency retrofits is often a significant barrier to implementation. With LIC/PACE programs, these costs are covered by the loans and repaid over 5-20 years. This can make whole home retrofits affordable to a larger population of homeowners.

Average loans for retrofits can be around $10-20k, for around 20-30% reduction in energy. Retrofitting a home to net zero, or other near zero carbon level, will cost more. The cost of a deep energy retrofit can vary based on size, age, shape of a home.

5.2.2 | FAVOURABLE LOAN TERMS

LIC/PACE loans are designed to be fixed rate, low interest, long term loans. Although conventional lending agencies may be able to offer competitive rates over the short term, they rarely offer fixed interest rates or longer lending terms (See Table 1 below). It should be noted that in the United States, the interest rates offered by residential PACE programs have often been higher than market rates.[1] This may be a consequence of most programs being financed and administered by third party, for-profit entities. As seen in Table 2 of Section 3.5, the interest rates for LIC/PACE loans in Canada are competitive or lower than those offered by major Canadian banks.

TABLE 2: LOAN TERMS AND RATES FOR MAJOR CANADIAN BANKS (MARCH 2020)

LOAN TYPE	LOAN TERMS	RATE
PERSONAL LOAN	5 year, fixed rate	4.6%
SECURED LINE OF CREDIT	Open term, variable rate	4.5-5%
HOME EQUITY LINE OF CREDIT	Open term, variable rate	Prime + 1.5%
LIC/PACE LOANS IN CANADA	5-20 year, fixed rate	1-5%

1 Khanal, M. (2019). A PACE program in Alberta: An analysis of the issues. *The School of Public Policy Publications, 12*(0) doi:10.11575/sppp.v12i0.62862

5.2.3 | LOAN REPAYMENTS MAY BE CLOSELY TIED TO UTILITY BILL SAVINGS

Ideally, retrofit projects should be designed such that loan payments closely match projected utility bill savings, which makes the program affordable and accessible to many homeowners. However, there is the potential for high variability, as it depends on the scope of the project and the loan term. Interest rates for these programs should be low, to make the program payments more affordable. This can reduce the cost burden for homeowners, including low income households, and reduce the risk of default.

5.2.4 | AVAILABLE TO LOW INCOME HOMEOWNERS

When loan repayments approach utility bill savings, low income homeowners can contemplate retrofit measures that increase their long term financial security without an additional cost burden. Furthermore, many of the favourable conventional loan conditions listed in Table 1 are not available to those with few collateral assets or limited access to credit. Such households may only qualify for unsecured lines of credit, or personal loans. LIC/PACE loans can provide financing for these households to conduct energy efficiency upgrades.

5.2.5 | LOANS ARE TIED TO THE PROPERTY

Another benefit to the program is that the loan is tied to the property, not to its owner. When a property is sold, the new owner is responsible for making any remaining loan payments. Since many qualifying retrofits have long payback periods, this can incentivize homeowners to take energy efficiency measures that are otherwise not cost effective over the time they anticipate owning the home. As the new owner also benefits from lower energy costs, so too are they responsible for making remaining payments.

Some municipalities have noticed a trend of new owners preferring for the loan to be repaid prior to finalizing a sale. With better information and understanding of the purpose of the loan payments, new owners may be more receptive to finalizing a sale without this first occurring.

5.2.6 | HOMEOWNER CAN PAY OFF BALANCE AT ANY TIME

With most LIC/PACE financing, a homeowner can pay off the remaining balance at any time with no penalty. This may be particularly desirable when a homeowner wishes to sell a home and has concerns about how LIC/PACE loans may be perceived by real estate agents or potential buyers.

5.2.7 | LOAN DEFAULTS ARE A LOW RISK FOR THE MUNICIPALITY

The LIC/PACE 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. This lien takes precedence over other liens on the property, including mortgage liens when there is a tax sale of the home. Historically the risk of this type of action is very low. To further reduce the risk of defaults, many municipalities screen participants for ability to pay and cap loan amounts based on the assessed property value. Municipalities may also set aside funds in a loan loss reserves to cover late and missed payments or the costs of setting up a tax sale.

5.2.8 | LIC/PACE LOANS MAY HAVE NO NET COST TO THE MUNICIPALITY

LIC/PACE programs are often cost neutral for the municipalities. Administrative and set-up costs may be covered by an additional administrative charge on LIC/PACE loans. Grants may also be used to cover part of these costs.

In some cases, an administrative charge may not fully cover the administrative costs of the program. As many municipalities have declared climate emergencies and set aggressive GHG reduction targets, they must work to develop programs and policies that help to achieve this goal. These programs and policies, including LIC programs, require resources and staff. LIC programs are a key part of the actions that can follow the declaration of a climate emergency.

5.2.9 | MUNICIPALITIES CAN ACHIEVE GHG REDUCTION TARGETS

Municipalities have ambitious GHG reduction targets that they can only meet if emissions from residential homes are reduced. They also have few financial tools to encourage homeowners to take energy efficiency retrofits. LIC/PACE financing may prove to be a critical tool for municipalities wishing to promote GHG emission reductions in residential homes.

LIC programs can be combined or further complemented by other existing retrofit or incentive programs, including those offered by utilities (eg. Save on Energy, and Enbridge programs).

5.3 | CHALLENGES TO USE OF LIC/PACE FINANCING FOR RETROFITS

There are a number of barriers that have prevented the creation of LIC/PACE retrofit programs in Ontario municipalities, despite widespread interest and a critical need for such programs. In addition, existing LIC/PACE programs have encountered roadblocks and barriers to participation. These challenges are outlined as follows.

5.3.1 | MUNICIPAL ACCESS TO CAPITAL AND DEBT LOAD ISSUES

The initial capital costs required to facilitate widespread adoption of retrofit projects through LIC/PACE programs are significant. Municipalities are already struggling to fund programs, services, and infrastructure upgrades. They lack the financial resources to create a program that would rely solely on public funds. Some municipalities also express their aversion to "acting as a bank". Furthermore, municipalities are subject to provincial requirements concerning their debt as set out in legislation. The LIC/PACE loans, however, are recoverable and therefore do not count toward a municipality's debt. Sources of funding that could be used by municipalities to finance an LIC/PACE program are discussed in Section 5.

5.3.2 | MUNICIPAL LACK OF CAPACITY AND RESOURCES

Internally, municipalities may lack the resources, time, and information necessary to coordinate LIC/PACE programs. Financial staff have concerns about the potential impact of loans on municipal credit ratings.

Without an internal "champion" for a retrofit program and adequate time and administrative capacity, it is difficult to prepare a business case for and implement a retrofit program.

5.3.3 | UNCERTAINTIES FOR MUNICIPALITIES

Under the Municipal Act, O. Reg 586/06, a municipality is authorized to undertake work related to energy efficiency, without prescribing specific program design details. However, with only Toronto as an example of implementation of a home energy efficiency program financed using the LIC/PACE mechanism, other municipalities require guidance on how to develop and administer an LIC/PACE program. Some of the program details, such as where the capital will come from, and whether a third party administrator may deliver a program on behalf of a municipality, still remain unclear.

5.3.4 | DEFAULTS ON LOAN REPAYMENTS

There is a small, potential financial risk to municipalities or financial institutions who are providing mortgages for a property with a LIC/PACE lien attached to it. If a property goes into default, there may be a period of time between the default by the original owner and when the property is taken on by a new owner. During this time, there may be issues around the scheduled repayments of the LIC/PACE loan. This can be addressed through loan loss reserves, which are discussed in Section 5.

5.3.5 | MORTGAGE LENDER CONCERNS

Concerns from mortgage lenders continue to be an ongoing challenge in getting LIC programs off the ground. Mortgage lenders and insurers express concern over the senior lien position of LIC/PACE relative to the mortgage. No official policy direction has been issued by the Canadian Mortgage And Housing Corporation (CMHC) or Canadian Bankers Association (CBA) on LICs. In Toronto, mortgage lender approval has been a barrier to nearly half of initial applicants to the program.[2] Furthermore, the Canadian Mortgage and Housing Corporation (CMHC) has not historically extended mortgage insurance to cover LIC loans.

2 City of Toronto. (2018). *Home energy loan program and high-rise retrofit improvement support program update.* (No. PE27.4). Toronto, Ontario: City of Toronto. Retrieved from https://www.toronto.ca/legdocs/mmis/2018/pe/bgrd/backgroundfile-114375.pdf

Homeowners with default-insured mortgages from CMHC have therefore been ineligible to participate in LIC programs. LIC/PACE programs in Quebec and Nova Scotia did not require mortgage lender approval, although it was included as an optional program design element in Nova Scotia.

The Canadian Banker's Association reports that, as of January 2018, only 0.24% of Canadian mortgages are in arears. Data shows that LIC/PACE delinquency rates are lower than general property tax and single-family delinquency levels.

Those familiar with the proliferation of PACE programs in the United State may be concerned that challenges there may be seen in the Canadian context. However, the financial markets in these two countries are significantly different. In the United States, some mortgage companies have been dissatisfied with the priority that LIC/PACE loans have over mortgage debts when a property goes into default. They have been concerned about losing money in the case of payments going into default and foreclosure. Many mortgage lenders have consequently refused to issue mortgages to properties with a LIC/PACE loan.

This has stalled or shut down residential LIC/PACE programs in many states. However, studies have shown very low delinquency rates for LIC/PACE financing programs, with default rates lower than those for general property taxes.[3]

5.3.6 | CONCERNS FROM REAL ESTATE PROFESSIONALS ON IMPACTS TO HOME SALES

Real estate professionals are responsible for communicating and highlighting the positive features of real estate properties. Many real estate professionals have a limited understanding of the benefits and value of energy efficiency, and thus may not accurately communicate their value to prospective homeowners.

In some cases, they may view an LIC/PACE lien on the property as a negative feature that could be a barrier to home sales. If homeowners are forced to pay off their LIC/PACE loans before selling their home, this could negatively impact participation in the program by homeowners who plan to sell their home in the shorter term.

3 Mezzanotte, C., Weilamann, C., & Gutierrez, L. (2018). *Residential PACE delinquency trends.* DBRS. Retrieved from https://pacenation.us/wp-content/uploads/2018/04/DBRS-Residential-PACE-Delinquency-Trends.pdf

5.3.7 | POOR MARKETING

Municipalities typically have limited budgets for and expertise in marketing their programs. There are low levels of awareness of the value and benefits of energy efficiency measures in the general population and in relevant stakeholder groups such as contractors and real estate agents. It is recommended that third parties be used to promote LIC/PACE programs and training programs be developed for relevant stakeholders.

FIGURE 12: THREE PROVINCES AND ONE TERRITORY HAVE PASSED LIC/PACE ENABLING LEGISLATION IN CANADA

5.4 | LIC LEGISLATION IN CANADA

In Canada, to date, three provinces and one territory have passed LIC/PACE enabling legislation. Alberta, Nova Scotia, Ontario, and the Yukon have all passed enabling legislations to allow LIC/PACE financing to be used for building energy efficiency retrofits or renewable energy installation. Before an LIC program can operate, most legislation requires municipalities to pass a bylaw to enable financing for energy efficiency retrofits.

There are differences in programs and regulations across the country. Yukon has a LIC/PACE program, but it is only used for installing renewable energy, and both BC and Quebec ran an LIC/PACE pilot programs without enabling legislation. When comparing between provinces, Alberta's regulations provide the greatest level of guidance to program administrators, while Nova Scotia simply allows PACE programs, and Ontario falls between the two extremes.

TABLE 3 :COMPARISON OF PACE PROGRAM DESIGN LEGISLATED REQUIREMENTS IN THREE PROVINCES

	ALBERTA[4]	ONTARIO[5]	NOVA SCOTIA[6]
ELIGIBLE MEASURES	EE and RE	EE and RE	EE, RE and Water
SAVINGS TO INVESTMENT RATIO	Not mentioned	Not mentioned	Not mentioned
ENERGY AUDITS	Required at program administrator's discretion	Not mentioned	Not mentioned
UNDERWRITING REQUIREMENTS	At minimum, in good standing with payment of taxes in past 5 years	Not mentioned	Not mentioned
REPAYMENT MECHANISM	Follow tax process	Follow tax process	Municipal discretion: follow tax or other process
ADMINISTRATOR FEES	Maximum of 5%	Not mentioned	Not mentioned
LIEN	First lien	First lien	Municipal discretion (allows first lien)
ASSESSMENT EXTINGUISHED OR ACCELERATED IN DEFAULT	No	Not mentioned	Municipal discretion
IMPACT ON DEBT LIMIT	None	Not mentioned	Not mentioned
RIGHT FOR MUNICIPALITY TO IMPOSE FEES	Yes	Yes	Yes
PROGRAM ADMINISTRATOR	Energy Efficiency Alberta, Minister may approve others	Not mentioned	Not mentioned
QUALIFIED CONTRACTOR	Required	Not mentioned	Not mentioned

Source: Dunsky Energy Consulting (2019)

4 Legislation: http://www.assembly.ab.ca/ISYS/LADDAR_files/docs/bills/bill/legislature_29/session_4/20180308_bill-010.pdf
Regulation: http://www.qp.alberta.ca/documents/Regs/2018_212.pdf

5 O. Reg. 586/06: *Local Improvement Charges — Priority Lien Status*. October 25, 2012: https://www.ontario.ca/laws/regulation/060586

6 81A, Municipal Act: https://nslegislature.ca/sites/default/files/legc/statutes/municipal%20government.pdf

Ontario

In Ontario, regulations under the Municipal Act, 2001 (O.Reg. 586/06) and the City of Toronto Act, 2006, allow a municipality to impose an LIC. LICs may finance energy efficiency, renewable energy, or water conservation measures voluntarily carried out by individual property owners on their buildings. A municipality, therefore, may create a program to provide homeowners with a loan to carry out these measures on their property.

The regulations do not specifically exclude third party administrators. Thus, it appears that a third-party organization, such as a charity or community group could administer LIC/PACE programs on behalf of municipalities.

However, the regulation specifies two responsibilities that must be carried out by the municipality:

- The municipality must enter into an agreement with the property owner.
- The repayment should be to the municipality through a special charge on the property.

Many municipalities in Ontario have identified LIC retrofit programs as a key implementation piece of their climate action plans. However, as of writing, only the City of Toronto has launched an LIC program. Toronto currently runs two LIC programs: the **Home Energy Loan Program (HELP)** targeting single-family residences, and the **High-Rise Retrofit Improvement Support Program (Hi-RIS)** targeting residential apartment buildings.

To meet the requirements of the Ontario regulations for LIC/PACE loans (O. Reg. 586/06), the applicant must meet the following criteria:

- ***(1)** The applicant is the homeowner of the property;*
- ***(2)** All property owners consent to participation in the program; and*
- ***(3)** The property is located in the applicable municipality.*

CONSIDERATIONS FOR TWO-TIERED MUNICIPALITIES AND REGIONAL GOVERNANCE

Governance structures may differ across municipalities in Ontario, and Canada. *Ontario municipalities may belong to either a single-tier or two-tier structure. For example, Guelph, London, Peterborough, and Toronto, among others, are single-tier municipalities that are responsible for all local services. Two-tiered municipalities, rather, split responsibility for local services between an upper-tier regional or county government and a lower-tier city or town government. Examples of lower-tier municipalities in Ontario include Burlington, Halton Hills, Newmarket, Vaughan, and Whitby, among others.*

The legislation enabling LIC/PACE retrofit programs for Ontario municipalities gives the broad authority for municipalities to create energy efficiency programs. *It does not prescribe the specifics of program operation or finance. Municipalities should work closely with their legal counsel and finance departments when creating programs, and work with a regional or county government if applicable. Respective roles and responsibilities may lie with upper-tier and lower-tier governments for municipalities in a two-tier government structure. In general, lower-tier municipalities are responsible for passing enabling bylaws, recording the lien on the property, and collecting LIC loan repayments. In addition, in two-tier municipalities with a regional government, only upper tier municipalities can issue debt or debentures, and any borrowing by a lower tier government must be done in consultation with the upper tier of government. Financing in these cases is therefore likely to require involvement of both municipal tiers of government. In two-tier municipalities with a county government, both tiers can issue debts or debentures.*

5.5 | LIC PROGRAMS IN CANADA AND THE US

Legislation enabling LIC/PACE programs for solar projects and/or energy retrofits have been passed in 36 US states and four Canadian provinces or territories. Active LIC/PACE programs for residential energy efficiency upgrades currently exist in several US states and in the Canadian provinces of Nova Scotia and Ontario. A pilot program in Quebec recently ended. Table 2 summarizes the characteristics of these programs. As discussed below, these programs have proven their ability to drive deep energy efficiency improvements of up to 30%. Such improvements can translate into large GHG emission reductions for the municipality.

TABLE 4: AN OVERVIEW OF SELECT LIC/PACE PROGRAMS IN NORTH AMERICA

	TORONTO HELP PROGRAM (ONTARIO)	CLEAN ENERGY FINANCING PROGRAM (NOVA SCOTIA*)	TOWN OF BERWICK (NOVA SCOTIA**)	MY ENERGY IMPROVEMENT PLAN (NOVA SCOTIA***)	HALIFAX SOLAR CITY PROGRAM (NOVA SCOTIA)	QUEBEC [INACTIVE]	ALBERTA [PROPOSED]	US HERO****
MIN FINANCING						$10K-$20K	$3K	$2.5K
MAX FINANCING (% HOME VALUE OR $)	10% up to $75K	$10K-$20K		$10K	75%	1%	$50K	≤ 15-20%
INTEREST RATE	3.7-4.3%	4-4.18%	15%	3.7-3.95%	4.75%	≤20	TBD	2.75-8.35%
TERM (YEARS)	5-20	10	4%	10	10	$72.46	TBD	5-30
ADMIN/APPLICATION FEES	2% +	$550	10	$199		✔	max 5%	varies
EARLY PAYOFF OPTION	✔	✔	5%	✔	✔	✗	✔	✔
MORTGAGE LENDER APPROVAL	✔	✗	✔	✔	✗	✔	TBD	varies
HOME ENERGY AUDIT	✔	✔	✗	✔	N/A	✗	TBD	✗
OTHER CREDIT RATING INFO	✔	✔	✗	✗	✗	✔		✔
PERFORMANCE OR COST-EFFECTIVENESS MEASURES	✗	✔	✗	✔		homeowner	✗	varies
CONTRACTOR PAYOR	homeowner	PDA	✔	PDA		✗	PDA	PDA
PRE-QUALIFIED CONTRACTORS	✗	✗	town	✗	✗	✗	✔	✔
LIST OF APPROVED PRODUCTS/MEASURES	✗	✗	✔	✗	✔	✗	✔	✔
SOLAR ENERGY SYSTEMS	✔	✔	✔	✔	✔		✔	✔
EV INFRASTRUCTURE	✔		✔		✗	Non-profit		
ADMINISTRATOR TYPE	Municipality	Non-profit		Non-profit	Municipality	3	Public agency	Private company
MUNICIPALITIES SERVED	1	4	Municipality/ Private company	2	1	✔	1	many
BUDGET SURPLUSES FOR FINANCING	✔	✔	1			grant	TBD	✗
OTHER FINANCING SOURCES	Green bonds	loans	✔			2016-2017	TBD	3rd party
YEARS OF OPERATION	2014+	2016+		2014+		24		2011+
NUMBER OF PARTICIPANTS TO DATE	202	44	2014+			13,000		125,000+
AVERAGE LOANS	20,000	7-10,000	12	8,000		$500,000		$19K
OVERALL PROGRAM BUDGET	$2.7 million	40 projects/yr	~6000	10 projects/yr		29%		$3 billion
AVERAGE ENERGY REDUCTION	30%							

*Clean Energy Financing Program, operates in Barrington, Bridgewater, Digby, and Lunenburg

** Municipality of Berwick Program

***District of Guysborough and District of Inverness (no longer active)

****California, Missouri, Florida

5.5.1 | TORONTO

In 2014, the City of Toronto launched two Residential Energy Retrofit Programs to provide financing for residential retrofits. The programs operate as two streams: the Home Energy Loan Program (HELP) for houses; and the High-rise Retrofit Improvement Support Program (Hi-RIS) for multi-unit residential buildings. As of June 2019, almost $14.9 million in financing has been committed to projects with over 202 properties participating in the program, which has resulted in an emissions reduction of over 4,000 tonnes of CO2 equivalents.

Program Description

These programs provide financing to support the uptake of energy and water efficiency retrofits in the residential sector. The programs were designed to address key barriers to deep energy efficiency retrofits — such as high upfront costs, long simple payback periods, and concerns around the long-term nature of these investments given the ownership horizon of these properties.

Eligibility

In order to qualify for a low-interest loan from the HELP program, the homeowner must own a detached, semi-detached, or row house. All property owners on title must consent to participate, and the property tax and utility payments to the city must be in good standing. The program also requires written consent from a mortgage lender.

Application Process

The application process for the program includes these steps:

- **(1)** Homeowner fills out application. Once approved, the homeowner receives a funding offer and a letter for the mortgage lender (if applicable). Mortgage lender consent is required before the funding offer.
- **(2)** A home energy assessment with an Energy Advisor is completed, which specifies recommendations for specific improvements.
- **(3)** The homeowner determines which improvements they would like to make and gets quotes from contractors. This is submitted along with the funding request.
- **(4)** The City approves the funding request and the homeowner must sign a Property Owner Agreement (POA) which is the funding agreement between the property owner(s) and the city.

- **(5)** The improvements are completed by contractors, and a post-retrofit home energy assessment is completed. The full funds for the project are transferred from the city to the homeowner in order to pay the contractor.
- **(6)** The loan is repaid over time via the property tax bill. At any time during the term of the loan, the outstanding balance may be paid, without penalty.

Program Results

Table 5 provides a high-level overview of participation, uptake, and results from the two programs.

TABLE 5: PROGRAM RESULTS FROM HELP AND HI-RIS

JANUARY 2014 TO MAY 2019	HELP	HI-RIS
PRE-APPLICATIONS/EXPRESSIONS OF INTEREST RECEIVED	886 properties	53 buildings
RETROFIT PROJECTS COMPLETED AND COMMITTED (#)	187	15 buildings (2,200 units)
RETROFIT PROJECTS COMPLETED AND COMMITTED ($)	$4.8 M	$10.1 M
JOBS CREATED OR SUPPORTED[7]	67	140
GHG EMISSIONS REDUCTION TO DATE	550 tonnes of eCO2	3,500 tonnes of eCO2

7 *Building an Ontario Green Jobs Strategy* (2017). This number reflects a multiplier of 13.41 jobs for every $1,000,000 spent on retrofitting. https://d36rd3gki5z3d3.cloudfront.net/wp-content/uploads/2017/04/EDEF_GreenJobsPrimer-WebRes-FINAL-FINAL.pdf?x47766

The HELP program, for single-family homes, provides LIC/PACE financing for eligible homes undertaking energy efficiency, solar projects, and some water conservation measures. As of June 2019, HELP had provided $4.8 million in loans for 187 completed and committed projects.

An average project in this program has a cost of $22,000, and achieved a 30% reduction in energy use and 28% reduction in greenhouse gas emissions. This translates into an average yearly savings of $560 per home.[8] Loans were provided with interest rates of 3.7-4.3%. Table 6 provides an overview of a typical projects funded through HELP and Hi-RIS.

TABLE 6: OVERVIEW OF A TYPICAL PROJECTS FUNDED THROUGH HELP AND HI-RIS

	HELP	HI-RIS
AVERAGE PROJECT COST	$22,000	$735,000
AVERAGE OPERATING COST SAVINGS PER YEAR	$560	$13,000
AVERAGE TOTAL ENERGY REDUCTION PER YEAR	30%	19%
AVERAGE GREENHOUSE GAS EMISSIONS REDUCTIONS	28%	21%
AVERAGE PROJECT COMPLETION TIMELINE	4 - 6 months	15 - 17 months
TYPES OF ENERGY EFFICIENCY RETROFIT MEASURES UNDERTAKEN	Windows and doors, heating system, insulation, air sealing	Windows and balcony doors, roof, boilers, elevator motors, BAS

8 City of Toronto. (2019). *Extending Successful Energy Retrofitting Programs.* (No. IE6.5). Toronto, Ontario: City of Toronto. Retrieved from https://www.toronto.ca/legdocs/mmis/2019/ie/bgrd/backgroundfile-134697.pdf

After 5 years of program operation, the HELP and Hi-RIS programs have not achieved the level of uptake needed for the City of Toronto to achieve its GHG reduction targets. Since April 2017, both programs experienced an increase in uptake, primarily due to the addition of dedicated staff and resources. In 2018, the HELP program received more than a 100% increase in applications than it had in 2017.

Two of the main issues with program uptake identified were marketing and the mortgage lender approval requirement:

- **Limited marketing of the program meant that many homeowners were not aware of the program or its benefits.** In 2019, the City launched the BetterHomesTO website, which was created to help homeowners understand how to make their homes more energy-efficient and climate friendly, including information on home improvements and financial programs and rebates available.

  In addition, the City of Toronto worked with Humber College and Natural Resources Canada to introduce a no-cost Home Efficiency Animator Training (HEAT) training program to increase professional and community literacy on residential energy efficiency best practices and benefits.

- **Mortgage lender consent has been a key barrier to program participation.** Many of the applications and expressions of interest received were not eligible due to lack of mortgage lender consent. The city took several steps to address this. First, they engaged the Canadian Banking Association (CBA) and its members, as well as individual banks and lenders to give financial institutions a better understanding of the program and support their respective clients in navigating the process. The City also developed a LIC Disclosure page on the City's website to assist banks in identifying which properties were subject to the LIC By-Law, in addition to publicly posted by-laws.

Recent program changes in 2019

In 2019, Toronto made several important changes to the program. These include:

- **Expanded financing terms** for up to 20 years on qualifying projects for the HELP program, including solar photo-voltaic/ solar thermal, geothermal and air source heat pumps. This would apply only to projects with an average estimated useful life of 20 years or more. This improves accessibility and affordability, and helps participants undertake deeper, more comprehensive projects.

- **Expanded eligible measures** to include Electric Vehicle Supply Equipment, energy storage technology, and energy efficient resilience measures. These measures are a key part of supporting the electrification of transportation.

Staffing

The retrofit programs in Toronto are coordinated by staff in the Environment & Energy Division. There is one (1) dedicated FT staff member who coordinates the HELP program, with other staff members providing support with escalated customer service issues, file review and reporting.

Staff from other divisions, including legal and revenue services, among others, are also involved at various points of application approval.

Program Funding

The City of Toronto created a reserve fund for the HELP and HiRis programs. The Local Improvement Charge Energy Works Reserve Fund was established by the City with a $20 million contribution to support a pilot implementation and will continue to be used as the funding source for its proposed extension. As of 2019, $4.8 million has been committed to residents under the Home Energy Loan Program, and $10.1 million under the Hi-RIS Retrofit Improvement Support Program.

5.5.2 | QUEBEC

Quebec has piloted LIC/PACE programs without having enabling legislation. The province's first pilot residential PACE program, Innovative Financing for Efficient Municipalities (Financement Innovateur des Municipalités Efficaces-FIME was operated in three municipalities: Plessisville, Varennes and Verchères. These programs were cancelled in 2019 when their non-profit program administrator ceased operations. While FIME operated in the province, the current legislative context does not provide sufficiently clear direction on the ability to undertake PACE programs. As such, legislative amendments are required for new PACE programs to launch in Quebec.

Quebec ran an LIC/PACE pilot project in the small communities of Varennes, Verchères, and Plessisville between 2016 and 2017. The program was administered by the non-profit agency AQME (Association Québécoise pour la Maîtrise de l'Ēnergie) with Ēcohabitation providing technical support. The program had a minimum 20% improvement in energy efficiency target, which most homes were able to achieve, the average efficiency gain being 29%. Average loan amounts for the 24 participating households were $12,000 and the combined budget for all three communities was $500,000. Because capital for the loans came from budget surpluses, the program was able to operate with loan terms of 1% interest for up to 20 years. Participants of the program were also required to apply for provincial retrofit incentive programs, with average subsidies reaching $4,600. The small size of the pilot program meant that the administrators did not seek mortgage lender approval and operated the program without provincial LIC enabling legislation.

5.5.3 | NOVA SCOTIA

Nova Scotia is currently the most active province in terms of the number of LIC/PACE programs. At present, approximately 10 municipalities have either launched or are currently creating programs. In Nova Scotia, the Clean Foundation has acted as the administrator of several LIC/PACE FINANCING programs operating under the banner of Clean Energy Financing. These are active within several Nova Scotian municipalities. The municipality in question pays for the retrofits, and the debt is then attached to the building and not the owner. Payment is made through the local property tax bill.

Program administrators are either the municipality or a non-governmental organization (i.e. Clean Foundation and Efficiency Nova Scotia administer programs in different jurisdictions). Because the legislation is very broad, program administrators have flexibility in their design. Legal counsel for many of the programs do not consider the loans as counting against the municipality's borrowing cap, as the loans are guaranteed.

> *"Legal counsel for many of the programs do not consider the* ***loans*** *as counting against the municipality's borrowing cap, as the loans are* ***guaranteed****."*

One interesting allowance by the regulation is that the repayment of the financing does not need to be tied to the municipality's property tax repayment schedule. This has allowed several municipalities with PACE programs administered by the Clean Foundation to collect *repayment on a monthly basis* (as opposed to annual or bi-annual in the case of property taxes). A monthly repayment schedule can be beneficial to participants, as it better aligns the benefits of participation (savings on utility bills) with the cost of participation (repayment of the financing).

The Clean Foundation currently runs a program with 7 municipalities. They provide financing of $10-25,000, which can differ depending on the municipality and property value. Interest rates also vary, but are generally 4-5%, varying on the municipality. Over 4 years, 52 people have completed the program. The programs are funded by municipalities, who either use their own funds or have created municipal finance corporations, which are able to access loans. The municipal finance corporation is used as municipalities must consider their debt service ratio and may have limited access to capital.

The Berwick Green Energy Program offers homeowners and commercial buildings the opportunity to implement a broad range of energy upgrades. In general, any equipment that will increase the energy efficiency of a building will be considered. Common projects include heat pumps, insulation and air sealing, windows and doors, smart thermostats and more. Commercial buildings are eligible to install larger options, such as HVAC systems, VFDs, large scale lighting retrofits and Building Automation Systems (BAS). The program offers 10 year repayment terms with a 4% interest rate.

The Halifax Solar City Program offers property owners in the municipality access to innovative solar energy options, which can be financed through a solar collector account with the Halifax Regional Municipality. The program is available to residential property owners, non-profit organizations, places of worship, co-operatives, and charities. Property owners can choose from various solar technologies, including electric, hot water, and hot air. For more information, see here and here.

The Solar Colchester Program is a new program launched in 2019 by the municipality that allows eligible property owners in Colchester to install photovoltaic solar panels with financing assistance from the Municipality. The program is available to homes with a single, owner-occupied dwelling unit and up to one rental unit, as well as certain non-profit institutions. Participants can pay for the project at a low interest rate over 10 years. The Municipality has contracted Supernova Energy Solutions to oversee installations in the first phase of the program. Supernova is a solar PV installer that will design, supply, and install all projects funded through Solar Colchester. Residential applicants are eligible for the Efficiency Nova Scotia SolarHomes rebate, which can cover up to $6,000.

Efficiency Nova Scotia also previously ran 2 LIC/PACE programs, which are no longer active. However, the organization still offers rebates on energy efficient products like heat pumps, hot water heaters, insulation, and others.

5.5.4 | ALBERTA

In 2019, Alberta passed LIC-enabling legislation and began the process of developing a pilot LIC/PACE Program for energy efficiency retrofits and solar panel installation. This program is currently being developed by the City of Edmonton, but at the time of writing, has not yet been approved or launched.

5.5.5 | YUKON

The Yukon was the first jurisdiction in Canada to use LIC/PACE, expanding a program in 1998 to fund individual off-grid alternative energy power systems. The Rural Electrification and Telecommunications Program now offers rural Yukoners a financing opportunity for renewable energy at their homes.[9] This program is different from other Canadian PACE programs, as it is administered by the territorial government for residents living outside of incorporated municipalities.

5.5.4 | BRITISH COLUMBIA (NOT ACTIVE)

There is currently no enabling legislation for LIC/PACE programs in British Columbia. However, there has been a push in the province to develop LIC enabling legislation.[10] At their 2019 Annual Convention, the Union of BC Municipalities endorsed a resolution asking the Province to work with expert stakeholders to study the application of PACE and develop enabling legislation. This is not he province's first experience with PACE; the City of Vancouver ran a pilot program that mimicked PACE in 2011-2012. Vancouver's Home Energy Loan Program (HELP) offered low interest, non-collateralised loans through VanCity Credit Union. Repayment was attached to a homeowner's municipal utility bills, rather than through property taxes, as the City did not have the legal authority to offer PACE. The program was discontinued due to lower than planned uptake.

9 http://www.community.gov.yk.ca/property/ruralelec.html

10 Endorsement of B140, *Support for Property Assessed Clean Energy Legislation for BC*. Accessed at: https://www.ubcm.ca/assets/Resolutions~and~Policy/Resolutions/2019%20UBCM%20Resolutions%20Disposition.pdf

5.5.6 | UNITED STATES

Since their first introduction in 2008, residential PACE programs have been growing rapidly across the United States As of May 2018, US residential PACE programs have enabled 220,000 home upgrades, worth a total of over $5 billion USD. A large portion of these investments, 58%, were for energy efficiency measures, with the remainder being investments in renewable energy and water efficiency. An estimated 42,000 jobs have been created through these programs.[11] Currently, the program is active in four states (California, Florida, Missouri, Maine) but enabled by legislation in 36 states plus D.C. There is variation between these programs, such as the financing available for seismic activity in California. Nearly half of these residential PACE loans have been administered and financed by Renovate America, a for-profit organization. The program details for Renovate America's HERO program are seen in Table 2. California leads with over $4 billion in retrofits. Their success is attributed to a state-sponsored loan loss reserve (LLR) which has opened the door to private PACE providers. Commercial PACE programs have also seen a rapid growth in financing, with 20 states offering PACE programs for the commercial sector.[12]

11 PACENation. (2019). *PACENation building the clean energy economy.* Retrieved from https://pacenation.us

12 IBID.

TABLE 7: OVERVIEW OF SELECT PACE PROGRAMS IN THE UNITED STATES

PROGRAM	JURISDICTION	MODEL	KEY FEATURES	ESTABLISHED
SONOMA	CA	Local government	Early local government-led program that has been successful in generating volume and validated energy savings.	2009
YGREEN	CA/FL	Third-party	A privately funded 3rd party PACE provider operating in multiple states.	2010
HERO	CA	Third-party	An early innovator into effective PACE marketing and quick customer approval, now available in over 300 jurisdictions.	2011
VERMONT PACE	VT	Local government + Third-party	Vermont PACE assessments are subordinate to existing mortgages, with a Loan Loss Reserve to cover private lenders.	2012
MAINE PACE	MN	Local government	Established a $20.4 million revolving loan fund, with underwriting performed by a 3rd party. PACE assessments are subordinate to a home mortgage.	2013
OPEN PACE	CA	Competitive	A turn-key PACE solution that offers a choice among multipe pre-qualified PACE financing providers.	2015

Source: Dunsky Energy Consulting

6.0 | LIC PROGRAM DESIGN ELEMENTS

Source: Shutterstock

6.0 | LIC PROGRAM DESIGN ELEMENTS

There are many design elements to be considered when developing an LIC program. Different options may work in different contexts, and administrators should decide which features will help them to achieve their program goals. Regardless of the choices made, LIC programs should be designed with consideration given to the customer experience, the GHG reduction potential, and the ability to achieve significant uptake.

This section will describe the key components of LIC programs, including delivery options, target audience, eligibility criteria, quality assurance, technologies, and project management types. The purpose of this section is to increase the reader's understanding of the range of program components both necessary and possible for LIC programs and include a discussion of the pros and cons of the possible approaches.

The next section will choose among the variations described here to outline a pilot residential program for home energy efficiency retrofits. The pilot program will specify the design elements and which options were preferred by the project group.

6.1 | TARGET AUDIENCE

The first step in program design is to determine the target audience of the program. To maximize the environmental, economic, and social benefits of home energy retrofits, it makes sense to target homes that are the worst performers for GHGs and utility costs, which are typically:

- Older homes (Pre 1980-90s) and post 1990s homes with saving potential
- Wood and oil-heated homes
- Low-income housing

These homes typically fall into three overlapping categories: older homes, homes heated with wood or heating oil, and low-income housing. In addition, **upgrades to the home envelope are cheaper, easier, and more convenient to carry out when a home is empty or already undergoing major renovations.** Homebuyers and homeowners contemplating renovations should therefore also be specifically targeted.

The most effective retrofits in terms of cost and energy savings are in buildings that start with high energy costs, lack insulation, have low efficiency equipment, and where other renovations and equipment replacements are planned.[1] For example, it has been estimated that half of the potential GHG reductions in the Waterloo Region could be achieved by retrofitting 20% of existing buildings.[2]

Equity is an important consideration for retrofit programs. Program administrators should give careful consideration to not only who the program is accessible to, but how historic inequities have limited the levels of homeownership among equity seeking groups, in particular women, indigenous people, people with disabilities, and racialized groups. Many LIC programs are not accessible to low-income homeowners or occupants of low-income housing, who could benefit immensely from lower energy bills and a healthier indoor air environment. Programs could be designed with special considerations, rebates, or financing terms for these segments.

1 Less, B., & Walker, I. (2015). *Deep energy retrofits - reducing costs and increasing cost-effectiveness.* Retrieved from https://basc.pnnl.gov/sites/default/files/resource/DERs_CostEffectiveness.pdf

2 Parker, P., Rowlands, I. H., & Scott, D. (2003). Innovations to reduce residential energy use and carbon emissions: An integrated approach. *Canadian Geographer, 47*(2), 169-184. doi:10.1111/1541-0064.00006

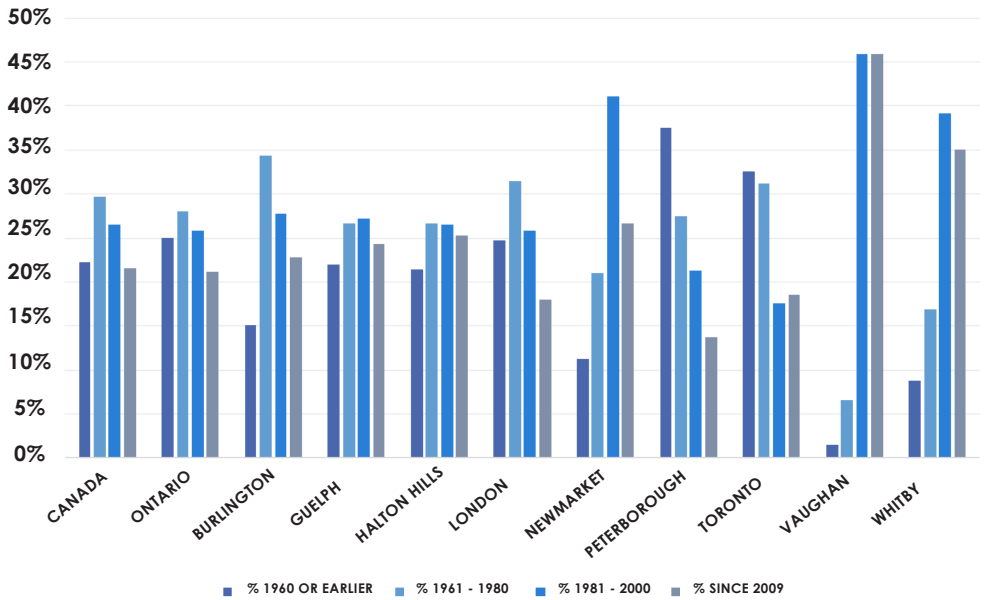
6.1.1 | OLDER HOMES

As discussed earlier, building codes have required ever increasing amounts of insulation, better performing windows, and better air sealing over the past decades. Unimproved older homes are therefore likely to be the worst performers for energy efficiency. This particularly applies to those built before 1941 when building codes were first introduced. In contrast, homes built after 2005 are more energy efficient are likely to generate smaller GHG reductions and utility bill savings following retrofits.

Homes built between 1941 and 2005 will generally offer increasing returns with increasing age. Older homes should therefore be a prime target for LIC/PACE programs.

LIC programs should consider issues and costs that may arise from performing retrofits on older homes, such as the exposure of asbestos when undertaking certain works. These costs may need to be covered by the LIC loan.

FIGURE 13: PERCENTAGE OF OCCUPIED PRIVATE DWELLINGS BY CONSTRUCTION PERIOD AND METROPOLITAN CENSUS AREA



Source: StatsCan, 2016

6.1.2 | HOMES HEATED WITH WOOD OR HEATING OIL

Although relatively rare in urban settings, homes that are heated with wood and heating oil generate high levels of air pollution and GHGs and should therefore be targeted for energy efficiency upgrades plus fuel switching. Home heating oil produces a lot of GHGs and is considerably more expensive than other heating sources.

There may be demand for energy efficiency measures and fuel switching in electrically heated homes because it costs significantly less to heat with natural gas, if it is available for those on this type of heating. Energy efficiency improvements should be encouraged over fuel switching to avoid increasing GHG emissions. Electric resistance heating can be replaced with more energy efficiency electric heat pumps. This will have a big impact on the total energy used by the home but only a small impact on the GHG emissions as Ontario's electricity is largely generated without fossil fuels. Fuel switching from electricity to natural gas should not qualify for LIC/PACE funding as this measure would increase total GHGs.

Programs may also want to look at supporting Energy Star rated wood stoves, or focus on switching from oil to propane.

6.1.3 | LOW INCOME HOUSING AND SENIORS ON FIXED INCOMES

Deep energy efficiency retrofits have the potential to make housing more affordable over the long term for homeowners with low to moderate income (LMI) or fixed incomes, including seniors. It is estimated that 17% of homeowners in Canada struggle to afford housing as defined by households paying more than 30% of income on housing needs.[3]

CASE STUDY: TOWN OF BRIDGEWATER

The Town of Bridgewater, NS, won Infrastructure Canada's $5M Smart Cities Award for its energy poverty reduction idea, which affects 2 out of 5 residents in Bridgewater. The community's goal is to reduce the energy poverty rate by 20% by 2025. Read the final application.

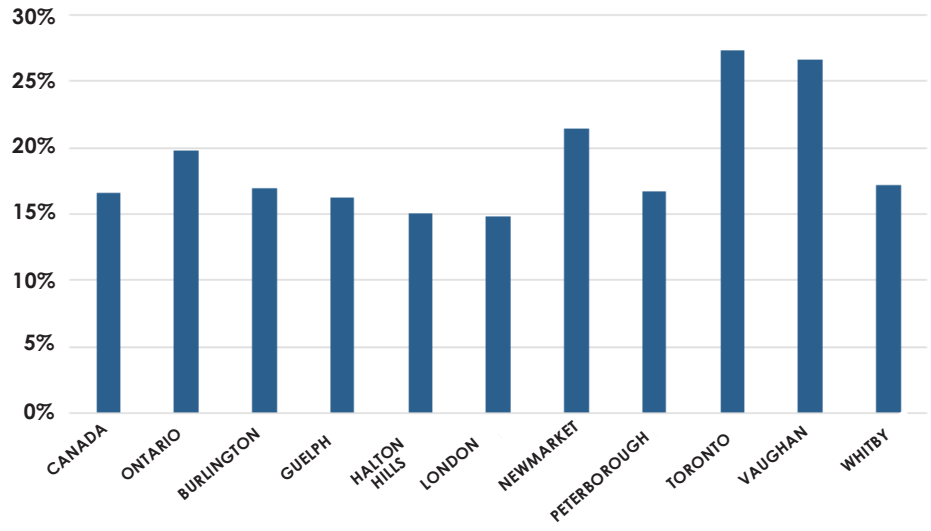
3 Statistics Canada. (2019). *Census profile, 2016 census*. Retrieved from https://www12.statcan.gc.ca/census-recensement/2016

Furthermore, many low-income housing options are found in older buildings that have little insulation, and inefficient heat sources. Their energy costs may therefore be substantially higher than average households, and as energy prices increase, low income households in older buildings may be disproportionately impacted. Finally, these households are generally the least able to pay the upfront costs of energy efficiency measures that have the potential to address energy poverty.

Low income homeowners often do not have access to traditional forms of long-term low interest loans for energy efficiency upgrades. Because LIC/PACE loans are long term with low, fixed interest rates, these homeowners may be able to afford the loan payments through the resulting utility bill savings alone. An LIC/PACE program targeting this population, however, should be designed so that the homeowner is not required to pay the contractors before receiving their loan, which could leave them reliant on expensive bridge financing.

In addition, this type of program can benefit seniors who want to "age in place" but have fixed incomes. This type of financing can expand their ability to undertake these upgrades.

FIGURE 14: PERCENTAGE OF OWNER HOUSEHOLDS SPENDING 30% OR MORE ON SHELTER COSTS



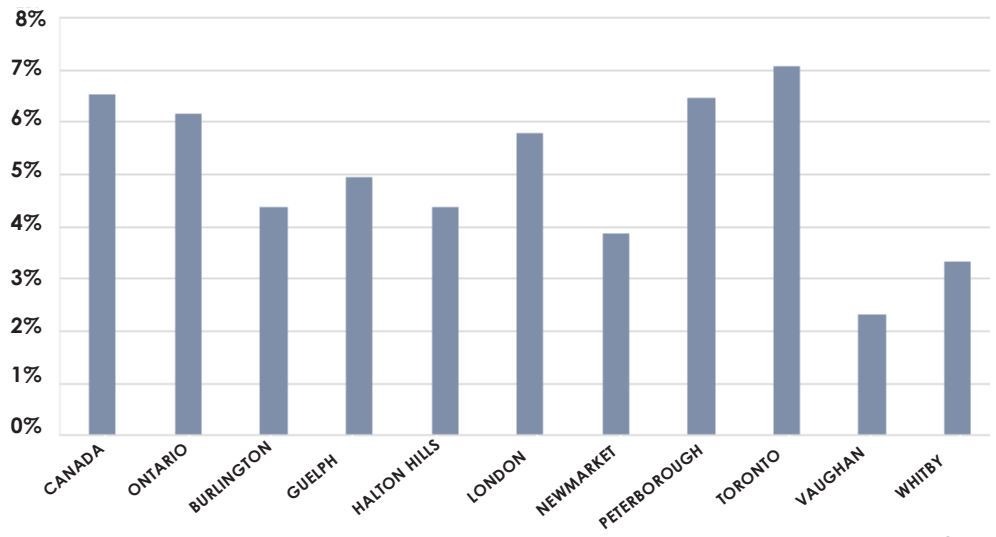
Source: Stats Can, 2016

6.1.4 | HOMES UNDERGOING RENOVATIONS

A good time to add energy efficiency measures is during major renovations. Wall cavities are often exposed at this time making it cheap and easy to add insulation and seal leaks. Moreover, once a renovation is complete, a homeowner may be reluctant to tear out finished work to add insulation. Newly renovated homes may therefore be locked into a low energy performance until the next major renovation is planned. For example, when finishing a basement, insulation can easily be added to the walls and foundation and the added cost to the renovation from the insulation material is minimal. However, adding insulation to the walls and foundation after a basement has been renovated may require tearing up floors and removing drywall making the total cost substantially higher.

Another opportunity to add deep energy retrofits is before a new homeowner moves in. Adding insulation, air sealing and upgrading mechanical systems is easier to do and less disruptive during this time. Furthermore, the touch-ups and repairs that are often needed after a deep energy retrofit can be included in repainting and other finishing touches that many new homeowners undertake before moving in.

FIGURE 15: PERCENTAGE OF HOMES WITH MAJOR REPAIRS NEEDED



Source: Stats Can, 2016

RESOURCE: NATIONAL RENEWABLE ENERGY LABORATORY

The National Renewable Energy Laboratory has resources on its website about serving low-and moderate-income (LMI) communities.

6.1.5 | HOMES THAT ARE REPLACING THEIR MECHANICAL EQUIPMENT

Mechanical heating systems (furnaces, boilers and hot water heaters) are replaced every 10-20 years. Ideally, these replacements should be accompanied by improvements to the building envelope. These improvements can significantly reduce the heat losses from a home thereby reducing the required size of the replacement heating system. Smaller heating systems can cost less to purchase and to operate. Even greater operational savings can be achieved when higher efficiency mechanical systems are chosen. Marketing campaigns should focus heavily on helping homeowners understand the correct sequencing of energy upgrades, and the value of performing energy efficiency upgrades prior to replacing mechanical systems.

6.2 | HOMEOWNER ELIGIBILITY CRITERIA

In Ontario, the regulations for LIC loans (O. Reg. 586/06) specifies that the applicant must meet the following criteria:

- The applicant is the homeowner of the property;
- All property owners consent to participation in the program; and
- The property is in the applicable municipality.

In addition to these criteria, a program may also require some or all the following criteria be met:

- The home is a detached, semi-detached, or rowhouse;
- The property is in good standing on its property taxes, utility bills, and other municipal charges;
- The homeowner passes a credit check, and/or obtains mortgage lender approval.

CASE STUDY: CONSIDERING EQUITY

The City of Toronto assessed its HELP and Hi-RIS programs for equity considerations. The programs are supportive of efforts to improve the quality of housing, and in- particular, affordable rental housing as it relates to the Hi-RIS program (program for multi-unit residential).

While HELP is accessible to any homeowner in Toronto, staff recognize that ***historic inequities have limited the levels of homeownership among equity seeking groups, in particular women, indigenous people, people with disabilities, and racialized groups.*** Staff are actively working to improve more equitable access to the programs through participation in a Federation of Canadian Municipalities (FCM) funded program to assess energy poverty, and staff are also focused on reaching a more representative group of Toronto's population (by translating marketing materials, direct community outreach) as well as efforts to engage key stakeholders, for example, seniors.

By providing financing in the rental apartment market, Hi-RIS is supporting the improvement of housing quality across Toronto. Hi-RIS is delivered as part of the City's Tower Renewal program which aims to improve older apartment towers and communities for an estimated 500,000 renters, approximately 50% of all renters in the city of Toronto which includes individuals with low incomes and newcomers. Many apartment tower clusters are located in areas of the City that have been designated Neighbourhood Improvement Areas (NIAs). To date, Hi-RIS has undertaken targeted outreach in NIAs to spur uptake for retrofits that benefit the residents of these buildings. In addition, as part of the Hi-RIS program, a restriction on Above Guideline Increases to rents is applied to the financing provided by the City which limits the impact of retrofit costs on apartment residents.

Staff are also actively supporting program applicants, even ineligible applicants, in accessing complementary programs including Toronto Renovates, and/or utility supported programs like the AffordAbility Fund and additional affordable housing incentives for multi-residential buildings.

6.2.1 | MORTGAGE LENDER APPROVAL

Mortgage lender approval is an optional requirement used by some programs to ensure participating homeowners are at low risk of default on payments, and participation in the program does not breach mortgage terms. Indeed, breaching mortgage terms can have serious and costly consequences.

However, mortgage lender approval has proven to pose a significant barrier to participation. This was historically the case with Toronto's HELP program, where nearly half of applicants were ineligible due to an inability to get mortgage lender approval.[4]

Mortgage lender approval was not required in Quebec's pilot program or in one of the programs delivered in Nova Scotia. However, these programs used performance or cost-effectiveness criteria to ensure that utility bill savings would closely match the loan repayments. These criteria safeguarded homeowners against financial stress thereby reducing the likelihood of defaulting on any loan payments.

MORTGAGE LENDER APPROVAL

PROS	CONS
Reduces risk of defaults on payments	Significant barrier to participation
Ensures participation does not breach mortgage terms	Delays eligibility assessment
Allays fears of mortgage lender	Adds to administrative burden

4 City of Toronto. (2017). *Home energy loan program and high-rise retrofit improvement support program evaluation.* Toronto, ON: City of Toronto. Retrieved from https://www.toronto.ca/legdocs/mmis/2017/pe/bgrd/backgroundfile-102272.pdf

6.3 | HOME ENERGY EVALUATION OR AUDIT

An energy audit can help identify the best measures for energy improvements and performance. A home energy evaluation or audit is a personalized assessment of a home performed by a certified energy advisor. The advisor examines energy use and energy losses through some or all of the following measures: inspecting the building envelope, insulation, heating and cooling equipment, and measuring the home's air tightness with a blower door test.

The evaluation should consider the home as a whole system with each of these building components affecting the performance of the others. Recommendations are made about which energy efficiency retrofits would have the greatest impact on energy use, utility bills, GHGs, and comfort. The results can help homeowners and program administrators set priorities for renovations. Energy advisors can provide information about other incentives and rebates that can be combined with LIC/PACE financing. Energy evaluations may also be performed after a retrofit is completed to validate improved energy performance.

HOME ENERGY EVALUATION OR AUDIT

PROS	CONS
Provides customized advice	Adds to the retrofit costs
Provides verification that the work is being done	Adds to the administrative burden
Helps set priorities for retrofits	Homeowner must take time to go through home with auditor
Can provide quantitative metrics for homes before/after	Adds to the time to plan and implement a retrofit
Considers house as a whole system	May be a lack of qualified auditors
Other retrofit incentive programs may help cover the costs	

Energy evaluations or audits can cost hundreds of dollars to perform. In some cases, other incentive programs may rebate the cost of the energy audit. The Home Reno Rebate program currently offered by Enbridge and Union Gas in Ontario, for example, provides energy audit rebates of up to $550 when other measures are also taken. When not covered by other programs, the cost of energy evaluations can be included in the total LIC loan.

In Quebec, where the LIC/PACE program aimed for a 20% improvement in energy, performance improvements were also verified through utility bills. Participants were required to submit their utility bills for 1.5 years before and 1 year after energy efficiency retrofits were completed.[5]

6.4 | ELIGIBLE PROJECTS AND MEASURES

Eligible projects are those that meet the program's overall goals of energy efficiency improvements and GHG reductions.

Because the loan is tied to the property, only measures that are permanently attached to the home are generally eligible. This therefore excludes upgrades to lighting and general appliances. It is also best practice to ensure that the useful life of the project is greater than the financing term and that the products used meet regulatory and energy efficiency standards (eg. EnergyStar furnace). For home energy retrofits, these generally fall into the following categories:

- Air sealing,
- Adding insulation,
- Upgrades to heating and cooling systems, and
- Upgrades to windows and doors.

5 Association Quebecoise pour la Maitrise de l'Energie. *FIME guide du proprietaire.* (n.d.). AQME. Retrieved from https://ville.varennes.qc.ca/environnement/fime

For example, the US residential LIC/PACE program HERO maintains a comprehensive product eligibility list. The list includes eligibility specifications and projected product lifespan information.[6] The list can be seen here.

6.4.1 | PERFORMANCE OR COST EFFECTIVENESS ANALYSIS

Some programs only allow retrofit measures that will produce a long term net cost savings, or meet defined performance targets. A savings to investment ratio (SIR) is often used, with a SIR of 1 being a project that breaks even over the lifetime of the measure or the financing period. In Nova Scotia, for example, there must be at least a 1:1 ratio of savings to debt over the financing period. In other words, the anticipated utility savings over the term of the loan must be equal or greater than the total cost of the project. In Quebec, projects were designed with a projected minimum 20% reduction in total energy use in mind.

Utility bills from before and after the retrofit were used to measure total energy savings from the project. It should be noted, however, that homes in Quebec and Nova Scotia are mostly heated with electricity and heating oil respectively: two expensive sources of heat energy.

In Ontario, most homes are heated with natural gas, a fuel source that is currently relatively cheap. This is a major impediment to making these programs fiscally attractive. Energy efficiency measures are therefore unlikely to generate the large utility bill savings that can be achieved with retrofitted homes heated with electricity or oil. Consequently, use of performance targets for a LIC/PACE financing program is not recommended.[7]

6 HERO. (2019). *HERO eligible products list*. HERO. Retrieved from https://9662473e561b2ca15fec-e991096dabe6d2069d3f005000c6b73d.ssl.cf2.rackcdn.com/HEROEligibleProductsList.pdf

7 Dunsky Energy Consulting. (2013). *Local improvement charge (LIC) financing pilot program design for residential buildings in Ontario.* Montreal, Quebec: Dunsky Energy Consulting. Retrieved from https://www.cleanairpartnership.org/wp-content/uploads/2016/08/CHEERIO-LIC-Program-FINAL-REPORT.pdf

PERFORMANCE OR COST-EFFECTIVENESS ANALYSIS

PROS	CONS
Provides quantitative results for tracking GHG and energy savings	Very difficult to receive specific information from the homeowner, unlikely to be provided effectively/efficiently
Helps build business case for retrofits	Cost-effectiveness may be difficult to achieve in homes heated with natural gas
Reduces risk of defaults on payments	May be a significant barrier to participation
	Adds to administrative burden
	Homeowners may be reluctant to share utility bills

6.4.2 | RESILIENCE AND OTHER PROJECT MEASURES

To broaden the appeal to homeowners, or to meet other municipal goals, many LIC/PACE programs also include measures beyond energy efficiency retrofits. These may include renewable energy projects, adding electric vehicle charging infrastructure, water efficiency measures, cool roofs, and resilience measures. This approach has yielded greater participation rates than programs that target energy efficiency retrofits exclusively.

As climate changes increases the frequency and severity of extreme weather events, homes are vulnerable to resulting shocks and stresses, and will need to invest in resiliency measures. With greater and more intense rainfall projected due to climate change, residents should be prepared for flooding. Extreme storms, like one experienced by the City of Toronto in July 2013, are likely to become more common. During the storm, the city received more than 100 mm of rain within 90 minutes, and resulted in almost 4,800 basement flooding complaints.

Repeated basement flooding can result in home and mortgage insurance loss, and diminished property values.

Some of the measures that can be taken to reduce the risks of basement flooding include:

- Installing upgrades like a sump pump with back-up power, flood alarms, and a backwater valve.
- Reducing water runoff by installing a green roof.
- Carry out downspout disconnection from the municipal sewer system (if applicable).

Currently, the Ontario regulations explicitly defines the work that can be done on a property using LIC/PACE loans (O. Reg. 586/06). While resilience measures are not explicitly listed, each municipality may decide which measures to include in their LIC bylaw.

> *"Resilience **measures** are increasingly important to address **extreme** weather events and basement **flooding**. Municipalities may decide which measures to include in their **LIC bylaw.**"*

6.5 | PROGRAM DELIVERY

A key consideration for those developing an LIC program is determining who will be responsible for administering the program. From a customer perspective, the administrator should provide a streamlined, simple experience — whether that is the municipality, a province, or a third party, ease of program navigation is the most important part of their experience. It is up to the administrator to decide who is best positioned to play that role.

There are three main administrative roles involved in an LIC/PACE program:

- **(1)** Program set-up and initiation;
- **(2)** Registering LICs and collecting payments; and
- **(3)** On-going program operations and risk management.

The second role, registering the LICs and requesting payments, can only be done by a municipality (according to Ontario regulation). The other roles, program set-up and operation, however, can be performed by an outside agency, either a non-profit or a for-profit organization.

Often these are third-party "Program Delivery Agents" that also provide a "concierge" service with customer support, and co-ordinate the implementation of retrofit projects.

Outsourcing program set-up and operation can have many advantages. Firstly, most municipalities do not have sufficient capacity or resources to perform this function, as they have many competing priorities and insufficient funds to administer additional programs. Secondly, a third-party organization can develop and leverage expertise in energy efficiency retrofits in order to provide advice and support to homeowners on retrofit options. They may be able to streamline and simplify the application process for the homeowner. Finally, they may have more flexibility in their legislative and bureaucratic requirements. Experience in the US has shown that rapid eligibility assessments and project approval times are a key driver of success of programs administered by third parties.

Some of the key tasks involved in delivering programs include:

- Marketing
- Training and maintaining a list of qualified contractors
- Assisting homeowner in completing applications
- Screening homeowners for eligibility
- Arranging financing
- Conducting home audits
- Planning retrofits
- Facilitating retrofits
- Conducting post-retrofit inspection and arranging homeowner sign-off
- Invoicing the municipality and making contractor payments
- Monitoring and reporting on the program

These tasks can be performed by a third party administrator.

When certain program parameters are standardized, a single Program Delivery Agent can serve many different municipalities. This allows for **economies of scale**, particularly in administration. The for-profit organization Renovate America, for example, has been financing and administering nearly half of residential PACE loans in the US to date. In Nova Scotia and Quebec, smaller municipalities have collectively outsourced LIC/PACE programs administration to private and non-profit organizations.

A Program Delivery Agent (PDA) can perform administrative functions and act as a "concierge" for homeowners.

LIC PROGRAM DELIVERY

PROS	CONS
PDA can operate a program for many municipalities	Programs may be less flexible
More efficient and cost-effective	May take longer to set up
Economies of scale for products and services	May have less localized knowledge
Streamlined application process	Municipalities have less control over the program
Specialized customer service	
Benefit from expertise e.g. energy efficiency, marketing	
Allows smaller municipalities with fewer resources to join	
May enable greater participation rates	
Reduces administrative burden on municipalities	

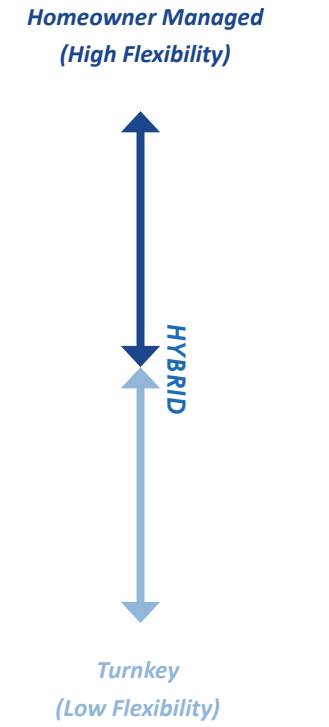
6.6 | PROGRAM MODEL

There are different program models that can used with LIC financing that offer varying degrees of flexibility for the homeowner. These models are:

- **(1)** Homeowner managed model, where the homeowner selects the measures to be installed.
- **(2)** Turnkey model, where the homeowner receives a pre-defined package of project measures.

A hybrid of these two approaches is also possible, where some measures are pre-defined, with add-ons also possible.

FIGURE 16: PROGRAM MODEL PROJECT MANAGEMENT



6.6.1 | HOMEOWNER MANAGED MODEL

In this model, the homeowner, in consultation with the energy advisor and energy concierge, selects the scope of the project. All projects must meet the eligibility of the program, be approved by the program administrator, and should be based on the recommendations of the energy assessment. The homeowner then hires the contractors and manages the project. A key benefit to this approach is that it allows homeowners to customize the project to their needs and it also allows the measures to be integrated into larger renovation projects. Other pros and cons to this approach are listed below.

6.6.2 | TURN-KEY MODEL

With a turn-key approach, homeowners are offered either a menu of pre-defined retrofit measures or a selection of pre-bundled retrofit packages. Once the retrofit option or package is chosen, the Program Delivery Agent (PDA) or concierge arranges for the work to be done. Homeowners are thereby saved the hassles of researching and shopping for products, seeking contractor quotes and scheduling the work. Most turnkey programs also require shorter time periods to be completed, so that the disruption to the homeowner is minimized. Projects may only take a few days.

HOMEOWNER MANAGED

PROS	CONS
Maximizes flexibility to meet customer needs/wants	Fewer controls over work quality (only if post-retrofit assessment not done)
Can be integrated into larger renovations	More difficult for homeowners, must seek quotes, hire and manage contractors
Allows some DIY	Difficult to achieve economies of scale or coordinated neighbourhood delivery
Tradespeople can help market the program	
Reduces burden on program administration to bulk buy and manage supply contracts	

This approach can generate significant cost savings through economies of scale for products and by reducing transaction complexities and costs. Planning and installation costs can also be reduced because projects are more standardized.

This approach can be likened to a factory model that seeks to retrofit large numbers of homes in efficient and standardized way. Other pros and cons to this approach are listed below.

TURNKEY APPROACH

PROS	CONS
Less hassle and intimidating for participants	Harder to integrate with larger renovations
Easier to monitor and control product quality	More administration required by the program administrator
Potential for economies of scale through high volume of sales	Municipal or PDA risks being perceived as accountable for project quality
Bulk purchases of materials can reduce costs for homeowners	Standardized packages may not be ideal or relevant to all homes
Minimized disruption as work can be completed quickly	Less control and customization possible for the homeowner
Audit not always required for every home	Limited opportunities for co-marketing by tradespeople
Ensures contractors are qualified	Significant uptake required in order to achieve cost-effective bulk purchases of materials
May achieve higher participation rates	
May allow partnerships to target affordable and low income housing	
May allow partnerships to target affordable housing	

6.6.3 | ENERGY CONCIERGE ROLE

An energy concierge can be used to provide objective advice to customers about their program and retrofit choices. They can also help the customer understand the program and navigate the application process. Such services may help homeowners select energy efficiency retrofits that best meet their needs and reduce the time and frustrations associated with the application process. This can lead to greater program uptake and customer satisfaction.

6.7 | ELIGIBLE CONTRACTORS

Contractors are important partners for LIC programs. Beyond completing the renovation or installation, contractors often drive marketing efforts and participant uptake by helping customers become aware OF the program. In exchange, contractors often view LIC programs as a "tool to close the sale." A program's contractor network can help educate contractors on PACE. Some programs leave it up to the homeowner to find a contractor, whereas others require retrofits to be performed by contractors from a pre-approved list.

The first case allows the homeowner to do some of their own work or to act as the general contractor for the project. This opens the market to a wider range of contractors, vendors and other tradespeople. However, it is difficult to control the quality of the work when contractors are not directly accountable to program administrators.

Although not required in Ontario, setting up a program's contractor network can be beneficial as it:

- **Helps drive marketing:** As contractors are often a participant's first point of contact for renovation projects, they can guide their customers toward the LIC program, which can help boost participant uptake.
- **Standardizes the customer experience:** Contractor networks generally require participating contractors to meet minimum business and quality requirements (e.g. liability insurance, business licence) and participate in training sessions (e.g. on insulation best practices). This helps spread best practices amongst contractors, ensures a high and consistent customer experience, and helps establish the trustworthiness of the program.
- **Facilitates quality assurance:** Most LIC programs conduct post-installation quality control inspections on a subset of projects. Having a contractor network, which includes onboarding sessions to set expectations upfront, can facilitate quality assurance at the end of the project. Repeated contractor failure to meet program standards often leads to removal from the approved contractor network.*8*

8 Dunsky Energy Consulting (2019) memo to Clean Air Partnership

6.7.1 | USE OF PRE-APPROVED CONTRACTORS

When only contractors from a pre-approved list can be used, they can be instrumental in helping to co-market the program. However, program administrators then have the added responsibility and costs associated with verifying, training and maintaining an accessible list of qualified contractors. This may also increase the risk for liability for unsatisfactory work by the contractor, and would require the program administrators to establish a dispute resolution process.

Program administrators should make it clear that they do not endorse or evaluate the contractor's work. Regular training sessions could be used to cover topics such as the value of deep energy efficiency measures, how to address the whole building, program requirements, code of conduct training, and approved co-marketing approaches. Program administrators should also develop a process for removing unsatisfactory contractors from their pre-approved list.

USE OF PRE-APPROVED CONTRACTORS

PROS	CONS
Allows better quality control	Limits available contractors
Contractors can help market the program	Homeowners cannot act as contractors
Less hassle and intimidating for participants	Municipality or PDA may be liable for poor work
	PDA must verify contractors
	Requires dispute resolution mechanisms and process for removing contractors

6.8 | ADMINISTRATION FEES

Administration fees are added to program costs in order to cover the costs of administration. PACE programs in North America typically rely on three different approaches[9] for recouping costs:

- ***One-time fees — Fixed ("Application fee"):*** fixed one-time fee charged to all participants regardless of the loan value. Option to split the fee and charge it to participants at different stages of the process. Clean Foundation, for example, collects their $450 application fee at three milestones (at initial application, reception of contractor plans, and at reception of contractor invoice).[10]

- ***One-time fees — Percentage ("Administration fee"):*** one-time fee representing a percentage (%) of the participant's financing value. For example, if the program has a 5% administration fee, a participant applying for a $20,000 loan would be charged a $1,000 fee. This is referred to as an "administration fee" in the proposed budget.

- ***Rate rider (additional interest):*** this fee is charged as incremental financing interest to program participants. For example, a rate rider is used in Sonoma County's PACE program, where the program applies a 4% interest rate rider, kept by the program administrator to support operations.

Each approach carries its set of benefits and challenges (see Table 8).

One-time fees enable the program administrator to quickly receive a cash inflow from projects, helping to recover program costs to support the initial capital-intensive start-up period. However, the upfront nature of this fee can be perceived as a barrier by program participants, hindering uptake. For this reason, one-time fees are generally kept low, and often can be repaid through the LIC loan.[11]

9 Dunsky Energy Consulting (2019) Memo to Clean Air Partnership

10 Clean Foundation. *Clean Energy Financing FAQs.* Accessed 7th October 2019, at https://clean.ns.ca/clean-energy-financing/clean-energy-financing-faqs

11 Dunsky Energy Consulting (2019) Memo to Clean Air Partnership

TABLE 8: PROS AND CONS OF DIFFERENT FEE MODELS

	ONE TIME FEES	RATE RIDER
PROS	» Quick cash flow at start-up » Can be incorporated in the financing	» Perceived as less of a barrier to participation » Is incorporated in the financing
CONS	» Upfront fee can be perceived as a barrier to participation » Typically, lower amount charged per participant over life of the financing	» Longer revenue earning period (slow cash inflow at start-up) » Can lead to high costs to participants

Rate riders are not perceived as a barrier to program participation, as it is not an "upfront fee." For the administrator, this recovery method means that revenues for a project will be spread over a longer period, with less upfront. This can lead to a lack of funds during the program's capital-intensive start-up period. However, over time, with a steady flow of projects, revenues can be more predictable and less reliant on finding new participants and projects.

Furthermore, loan interest is often poorly understood by consumers, and can quickly lead to high total project costs for participants. For example, assuming no inflation, over a 20-year period a 0.5% rate rider will generate as much as a 5% one-time application fee.[12]

12 IBID.

6.9 | PROJECT PAYMENT

An LIC/PACE program can be designed with one of two project payment options. In the first option, the homeowner pays the contractor and submits the final invoices to the program administrator for reimbursement. In the second option, the contractor submits the final invoices directly to the program administrator.

6.9.1 | HOMEOWNER PAYS CONTRACTORS

Having the homeowner pay the contractor saves administration costs and protects the program administrator from being perceived as accountable for the quality of the work performed. However, for low income households, covering the costs of a retrofit for even a short term before disbursement of loan funds can be a burden. Such households may need to use high interest loans to pay the contractor, thereby driving up the cost of the retrofit and limiting its accessibility to low income households.

HOMEOWNER PAYS CONTRACTORS

PROS	CONS
Municipality and PDA not perceived as liable for poor work	Homeowner may need bridge financing until loan is issued
May lower administrative costs	More work for the homeowner
Works well when homeowner selects contractor	PDA has limited ability to control quality of work and resolve disputes

6.9.2 | PROGRAM ADMINISTRATORS PAY CONTRACTORS

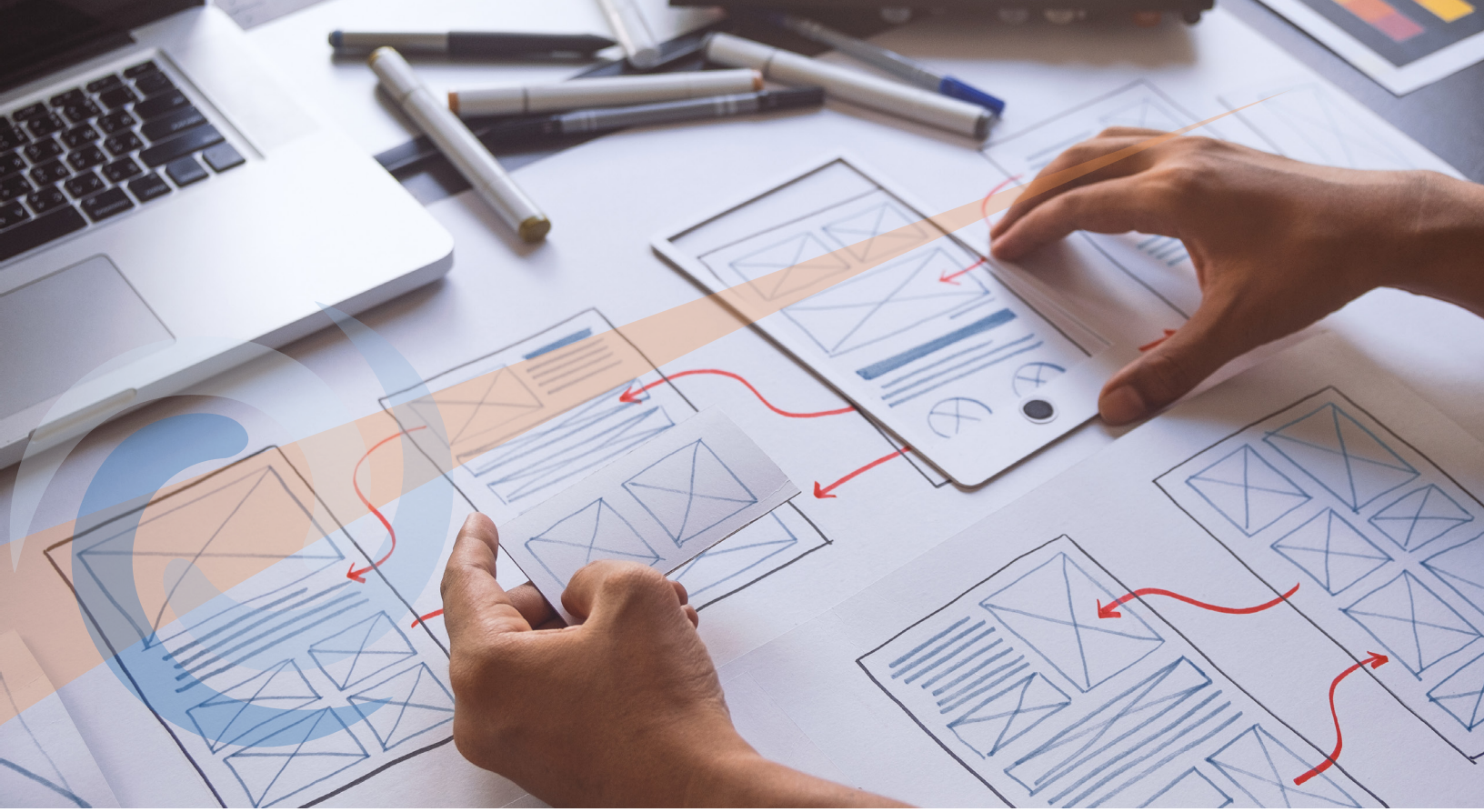
Direct payment of contractors by program administrators is common with turn-key approaches, but is also seen with the homeowner managed approach. The contract may be between the contractor and the homeowner or the PDA, in some cases a three-way contract is used.

This approach may increase administration costs, especially if multiple payments are required for one project. Furthermore, with this system, homeowners may perceive program administrators as being accountable for unsatisfactory work. To circumvent this, the US HERO program only issues payment to the contractor once the homeowner signs off to indicate that the work was done to their satisfaction.

PROGRAM ADMINISTRATOR PAYS CONTRACTORS

PROS	CONS
PDA has better control over contractors used and quality of work	May increase administrative costs
Less hassle and intimidating for participant	PDA may be perceived as liable for quality of work
No bridge financing required	PDA would require dispute resolution mechanisms

7.0 | PILOT PROGRAM DESIGN & OPERATION



Source: Shutterstock

7.0 PILOT PROGRAM DESIGN AND OPERATION

After considering the essential program design elements in the previous section, this section will outline a pilot residential LIC financing program, or the "Ontario Retrofit Program". This is a potential proposed program that could serve the needs of many municipalities in Ontario.

Designing effective LIC programs that achieve the scale-up necessary to meet Canada's GHG reduction targets is challenging. The barriers and challenges described thus far in this toolkit are not insignificant. As a result, and after extensive engagement with municipal governments, there are increasing calls for programs that remove the administrative burden from municipalities and achieve economies of scale. This can be done by externalizing program administration to a third-party, that is not a municipal government, and allowing many municipalities to benefit from their expertise and central coordination.

This following residential pilot program design template describes a program that was designed in collaboration with the municipal partners to this project.

It seeks to address the well-documented barriers and challenges to LIC programs and reduce the duplication of efforts across municipalities. It also considers the experiences of other innovative financing programs across the US and Canada, some of which have achieved and surpassed their goals, and others of which have fallen significantly short.

The operation of this program is described in 7.2, and the program set-up steps are described in 8.0.

7.1 | PILOT PROGRAM DESIGN

The pilot program design describes a program available province-wide, but may initially include a few municipalities at its launch, with the goal of widespread availability across many municipalities over time.

TABLE 9: GENERAL INFORMATION ON THE PILOT RESIDENTIAL RETROFIT PROGRAM

GENERAL PROGRAM INFORMATION	
DESCRIPTION	» A loan program delivered by a third party to help building owners access financing to upgrade their building with energy efficiency, energy, and water efficiency improvements. Loans are paid back through the Local Improvement Charge (LIC) mechanism.
GOAL	» To finance projects for renewable energy and energy efficiency upgrades to homes that results in GHG reductions, energy cost savings and economic development.
OBJECTIVES	» **1) Municipalities:** To provide municipalities with a home energy efficiency retrofit program that is flexible and adaptable to local circumstances and capacity » **2) Customers:** To provide customers with a simple, user-friendly program through a "one-window" service delivery model » **3) Climate Impact:** To achieve deep GHG reductions through targeting old building stock for deep energy efficiency retrofits

TABLE 10: THE PILOT RESIDENTIAL RETROFIT PROGRAM MODEL

PROGRAM MODEL	
DELIVERY MECHANISM	» Third party province-level program with option for municipalities to opt-in
PROPERTY ELIGIBILITY	» **Residential home type:** single-family, detached, rowhouse » **Residential home age:** (Pre 1980-90s construction (priority) & post 1990s homes with savings potential)
HOMEOWNER ELIGIBILITY	» Good credit and tax standing
ELIGIBLE TECHNOLOGIES	» **Thermal envelope upgrades:** Attic, wall and basement insulation, windows, doors, air-sealing and other deep retrofits » **Mechanical systems:** Furnace and boilers, water heaters, thermostats and controls, drain water heat recovery systems, heat pumps, and geo-exchange » **Water efficiency:** Low flow toilets, faucets, shower heads » **Energy storage technologies and EV chargers:** (Details TBD) » **Renewable Energy:** Solar PV » **Other works that enable energy and water conservation retrofits:** (eg. Electrical panels required to handle loads if fuel-switching or installing solar PV) » **Other:** New energy efficient (certified) products as they become available will be considered as additional eligible technologies
ELIGIBLE COSTS	» Cost of Technology » Cost of Installation » Cost of Audit (if not covered by other rebate/incentive) » Other associated costs (TBC)
FUNDING TERMS	» Up to 20 years, and not surpassing the life expectancy of the retrofit » Low interest rate
UNDERWRITING CRITERIA	» Loan does not exceed 10% of property value » Good credit and tax standing
RISK MITIGATION	» Loan Loss Reserve

7.1.1 | PROGRAM DELIVERY

The proposed program in 4.1 is designed using a third party delivery model. This third party, playing the concierge and administrator role, could be an agency or organization such as CAP. Many municipalities have identified the benefits of this delivery approach and expressed their preference for such a model, which could achieve economies of scale and reduce the administrative burden on the municipality.

7.1.2 | PROPERTY ELIGIBILITY

To maximize the environmental, economic, and social benefits of home energy retrofits, the program will target older homes (Pre 1980-90s) and post 1990s homes with saving potential. These are generally the worst performers for energy efficiency. Once the program is launched, the administrator, concierge, and municipalities can work together to create a program stream for low-income households.

7.1.3 | HOMEOWNER ELIGIBILITY

In order to be eligible for the program, homeowners must be in good credit and tax standing with their municipality.

7.1.4 | ELIGIBLE TECHNOLOGIES

The eligible measures for the proposed program include:

- ***Thermal envelope upgrades:*** Attic, wall and basement insulation, windows, doors, air-sealing and other deep retrofits
- ***Mechanical systems:*** High-efficiency furnace and boilers, air conditioners, high-efficiency or tankless water heaters, thermostats and controls, drain-water heat recovery systems, air source heat pumps, and geo-exchange
- ***Water efficiency:*** Low flow toilets, faucets, and other fixtures
- ***Energy storage technologies*** and EV chargers
- ***Renewable Energy:*** Solar PV
- ***Other:*** New energy efficient (certified) products as they become available will be considered as additional eligible technologies

A full list of technologies that will be eligible will be defined. The list will be based off of the HELP program offerings.

7.1.5 | ELIGIBLE CONTRACTORS

The pilot program would not limit homeowners to using a contractor from a pre-approved list. However, the concierge and administrator will work closely with the sector to ensure availability and program knowledge. Engagement with this sector is crucial for marketing and program uptake.

7.1.6 | ENERGY ASSESSMENTS

Energy Assessments will be required for program participation. Before completing any upgrades, the applicant will book a pre-retrofit energy assessment with an Energy Advisor registered by Natural Resources Canada (NRCan). The Energy Advisor will provide an assessment that will include a basement-to-attic assessment of the home's insulation, heating and cooling systems. An initial Energuide rating of the property will be determined and a report of recommended improvements will be provided.

After renovations are complete, the applicant will book a post-retrofit home energy assessment. The Energy Advisor will verify the improvements and provide a new EnerGuide rating for the home. This information will be a requirement for receiving the remainder of the funds.

The audit costs, approximately $650 dollars each, can be covered and included into the loan if the applicant meets certain program requirements, to be specified.

7.1.7 | PROJECT PAYMENT

The pilot program would have the Administrator transfer funds to the municipality, who would disburse payment to the homeowner, who would then pay the contractor. Payment can be done in several installments.

7.1.8 | PROGRAM SUCCESS MEASURES

- Customer satisfaction
- Number of homes
- Aggregated energy/water savings (number of kWh, m^3 of natural gas saved, and cubic litres saved)
- GHG reductions
- Total size of loans ($) provided to projects
- Number and geographic spread of municipalities involved
- Diverse demographic reach (low income, indigenous populations, seniors and others)

7.2 | PROGRAM OPERATION: PASS ENABLING BY-LAW

Before an LIC/PACE program can operate in a municipality in Ontario, a municipal bylaw amendment must be passed.

The main components of an LIC bylaw include:

- General authority to pass bylaw for this program
- Program design
  - *Eligible measures:* municipalities may specify which measures are included for their jurisdiction. This can differ from municipality to municipality.
  - Municipal liability
  - The application process
  - LIC Disclosure
  - Access to rebates and incentives
  - Quality Control
  - Measurement and Verification

Appendix B1 and B2 of this toolkit include sample municipal bylaws for an LIC program that can be adapted to a certain municipality's context.

7.2.1 | PROGRAM ROLES AND RESPONSIBILITIES

In order to carry out an LIC program, it is important for all parties to understand the potential division of responsibilities required to launch and administer such a program. This section describes the distribution of responsibilities for the Ontario Retrofit pilot program with customer support provided by an energy concierge, and minimum administrative requirements from the municipality. In other programs that are delivered solely by a municipality, the municipality is responsible for all of these roles.

TABLE 11: CONCIERGE ROLES AND RESPONSIBILITIES

#	ACTIVITY	DESCRIPTION	FREQUENCY
1	**PROGRAM SET-UP**		
	Misc. Set-Up	Includes creation of forms, on-boarding materials, database set-up, applicant management system(s), and applicant website	One-time, periodically reviewed
	Contractor Network Set-Up	Create contractor network (minimum requirements: provide proof of certification[s] and attend a presentation to learn about the program). (Optional)	One-time
2	**PROGRAM MANAGEMENT**		
	General Program Mgt.	Oversee and coordinate daily activities related to program management.	Ongoing
3	**MARKETING**		
	Administrator Tasks	Create and maintain standardized marketing and communication materials, including webpage.	Ongoing
4	**ADMINISTRATIVE ACTIVITIES**		
	Technical Review	Review applications to ensure projects are technically feasible and/or completed, in conjunction with an EnerGuide pre & post energy audit.	One-time per project
	Assessment & Verification	Review applications to ensure projects are completed (this may be included under technical review, e.g. if EnerGuide audits are required).	One-time per project

#	ACTIVITY	DESCRIPTION	FREQUENCY
	Contractor Network Mgt.	Deliver quarterly training sessions and manage new contractor list. (Optional)	Ongoing
5	**PROGRAM EVALUATION**		
	Program Evaluation	Evaluate the program outcomes and effectiveness. Can include impact and or process evaluation. (Suggested at the 4-year mark)	Ongoing (/4 years)

TABLE 12: LOAN LOSS RESERVE MANAGER ROLES AND RESPONSIBILITIES

#	ACTIVITY	DESCRIPTION	FREQUENCY
1	**PROGRAM SET-UP**		
	Financing	Manage loan loss reserve funds	Ongoing
2	**BORROWING AND INVESTMENT**		
	Capital Acquisition	Seek third party capital for program	Ongoing

TABLE 13: MUNICIPALITY ROLES AND RESPONSIBILITIES

#	ACTIVITY	DESCRIPTION	FREQUENCY
1	**POLICY AND PROGRAM START-UP**		
	Pass bylaw	Pass LIC program bylaw through council	One-time
	Allocate budget	Allocate budget for start-up and operating costs with council approval	One-time
2	**PROGRAM MANAGEMENT**		
		Manage the payments to homeowners once they are accepted into the program	1-2 times per project
3	**MARKETING**		
	Marketing Support	Support uptake to the program via municipal and/or community outreach and promotion opportunities	Ongoing
4	**ADMINISTRATIVE ACTIVITIES**		
	Pass bylaw	Pass LIC bylaw for each participating property	One-time per project (Can be bundled to do multiple at once)
	System upgrade	Upgrade tax system (if required)	One-time
	Tax Lien	Impose the LIC charge by adding the participating properties to the local improvement roll	One-time
	Building Permit	Issue building permits if required	One-time

#	ACTIVITY	DESCRIPTION	FREQUENCY
	Repayment	Collect repayment through the property tax repayment system	Annual

TABLE 14: ADMINISTRATOR ROLES AND RESPONSIBILITIES

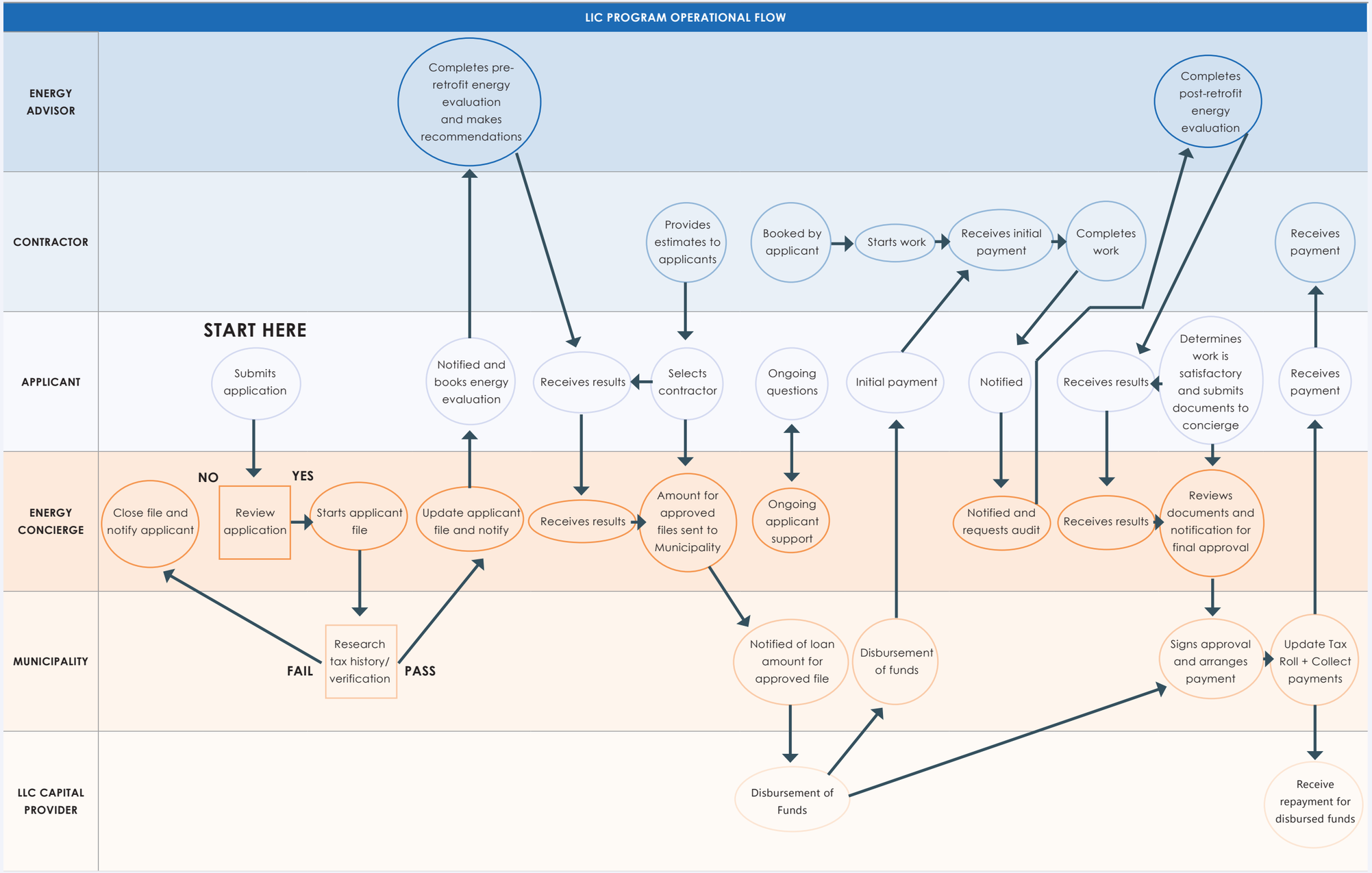
#	ACTIVITY	DESCRIPTION	FREQUENCY
1	**PROGRAM SET-UP AND MANAGEMENT**		
	Recruitment	Recruit municipalities to participate in program and ensure their readiness, including providing support on LIC bylaws	Ongoing
2	**PROGRAM MANAGEMENT**		
		Manage the payments to homeowners once they are accepted into the program	Ongoing
3	**MARKETING**		
	Capital	Manage capital for program and capital agreement	Ongoing

7.2.2 | LIC PROGRAM OPERATIONAL FLOWS

To map the process flow of the customer experience through the program, a high-level operational flow of the pilot program is displayed in Figure 17.

Note that in this scenario, the tasks required of a municipality are the minimum required by Ontario regulation. Screening, technical review, customer support, and other administrative tasks are performed by the concierge. The concierge can perform these functions for many municipalities, thus reducing the burden on municipal staff and maximizing efficiencies.

FIGURE 17: LIC PILOT PROGRAM OPERATIONAL FLOW



8.0 | HOW TO SET UP AN LIC PROGRAM AND MITIGATE RISKS

8.1 | PROGRAM SETUP PROCESS FLOW

Some of the key steps in developing a LIC/ PACE program include:

1)	Conduct a market gap analysis	✓
2)	Conduct a legislative & regulatory assessment	✓
3)	Consult and engage with key stakeholders (e.g. community groups, local renovator and contractor groups, utilities, financial institutions, real estate industry etc.)	✓
4)	Identify funding source(s)	✓
5)	Determine program administration model (i.e. municipal lead, third-party lead)	✓
6)	Identify roles and responsibilities of parties	✓
7)	Determine program eligibility for homeowners	✓
8)	Develop operational process flows for application approvals, agreements, contractor payment, etc.	✓
9)	Develop program forms (e.g. Bylaws, Application, Disclosure, Agreements), webpages, and upgrade tax software	✓
10)	Develop a marketing strategy and materials	✓
11)	Create a plan for monitoring and evaluation	✓
12)	Provide training and information for contractors	✓

8.2 | FUNDING SOURCES

For a municipality setting up an LIC/PACE program, funding is required for set-up, program financing, and administration. Set-up costs include planning and development of all program elements, establishing loan loss reserves if necessary, and training relevant personnel. Program funds are needed to provide the LIC/PACE financing for participants and is the biggest financial consideration. In addition, administrative funds are needed to cover the costs of delivering the program, including customer service, paperwork, invoicing, and exercising the priority lien in the case of a tax sale. Historically, ongoing program delivery costs have generally been paid by the participants, either through a one-time administration fee payment or as a fee added to the LIC/PACE loan.

Municipalities in Ontario have limited abilities to borrow money because they have legislated debt limits. However, monies raised to finance the cost of retrofit work in an LIC/PACE program do not count toward the municipal debt limit. In addition, when there is a two-tiered regional government system, the upper tier are generally responsible for issuing bonds and taking out loans but lower tiers can also make these financial transactions with the permission of their upper tier government.

Ideally all LIC/PACE financing should have low interest rates, long-term fixed rates, be accessible when needed, be simple to access, and have flexible repayment options. Over time, third party financing will be necessary in order to provide the scale necessary to achieve our local and national GHG reduction targets. These conditions are necessary to ensure that the loan conditions offered to the participants are favourable, and to reduce administrative costs while ensuring program flexibility. Possible funding sources are described below.

8.2.1 | FCM COMMUNITY ECOEFFICIENCY ACCELERATION FUND (2020)

In 2020, the Federation of Canadian Municipalities announced the Community Efficiency Financing intitiative, which dedicates $300 million to support financing programs for residential retrofits. The initiative is delivered through the Green Municipal Fund and funded by the Government of Canada.

SPOTLIGHT ON MUNICIPAL DEBT

While Ontario municipalities are limited in the types and amount of debt that they can incur, it is common for municipalities to use long-term debt to finance capital projects. *There are also restrictions on the conditions under which municipalities can incur debt. Research on the legal implications of LIC financing has shown that there are no specific legal barriers to using municipal debt to support LIC financing programs.*[1.0]

However, some restrictions do apply and should be kept in mind by municipalities implementing LIC financing programs. *The Ministry of Municipal Affairs and Housing regulates the level of debt that may be incurred by municipalities, such that no more than 25% of the total Own Source Revenue can be used to service debt and other long term obligations without receiving approval. Moreover, Ontario municipalities are not permitted to take on debt to cover operational deficits; municipal debt is permitted largely to enable municipalities to invest in major improvement and infrastructure projects. It is important to note however that funds issued for LIC financed programs and projects are subtracted from the municipal debt.*[2.0]

1.0 Aird and Berlis LLP (2013)
https://www.cleanairpartnership.org/wp-content/uploads/2018/03/Local-Improvements-on-Private-Property-by-Agreement-1.pdf

2.0 Dunsky Energy Consulting (2013)
https://www.cleanairpartnership.org/wp-content/uploads/2016/08/CHEERIO-LIC-Program-FINAL-REPORT.pdf

It is accepting applications to help municipalities deliver energy efficient financing programs for low-rise residential properties, including Property Assessed Clean Energy (PACE) models and utility on-bill financing. The funds are available to municipalities and partner organizations. The program focuses on existing buildings in the single family housing sector, and supports PACE financing, third party lending, and requires EnerGuide Assessments. The eligible measures include energy efficiency, renewable energy, water conservation, climate adaptation, and health and safety improvements.

8.2.2 | INFRASTRUCTURE ONTARIO LOANS

Infrastructure Ontario (IO) is a Crown corporation dedicated to creating value from Ontario's public assets. It offers low interest loans for up to 30 years for infrastructure projects to public sector partners, including municipalities. These loans are in the form of debentures that are paid back using a fixed payment schedule with the option of serial or amortized payments. Municipalities in Ontario are able to apply for IO loans to finance LIC/PACE home retrofit projects. To apply, municipalities should contact their regional Senior Relationship Manager and submit an online loan application. Municipal lending rates for April 24, 2020 (reflecting changes due to COVID-19) are shown in Table 15 below. More information can be found on their website.

TABLE 15: INFRASTRUCTURE ONTARIO LOAN TERMS FOR MUNICIPALITIES ON APRIL 24, 2020

TERM	INTEREST RATE FOR AMORTIZED PAYMENTS	INTEREST RATE FOR SERIAL PAYMENTS
5 year	1.33%	1.32%
10 year	1.67%	1.66%
15 year	1.95%	1.93%
20 year	2.22%	2.18%
25 year	2.41%	2.36%
30 year	2.53%	2.47%

8.2.3 | MUNICIPAL BONDS AND DEBENTURES

Municipalities can issue municipal bonds to raise financing for capital projects such as LIC/PACE programs. This may be referred to as using debentures. Interest rates and loan conditions for these are not as favourable as those for Infrastructure Ontario loans. Mid-sized municipalities generally issue non-rated bonds that have even higher interest rates. In 2018, Toronto offered its first set of green bonds through its green debenture program. The 30-year bonds offer an interest rate of 3.2% and the resulting $300 million in funds will be used for capital projects that help the city mitigate or adapt to climate change. Toronto's LIC/PACE program is a recipient of funding from the green debenture program.

8.2.4 | GREEN MUNICIPAL FUND LOANS AND GRANTS

The Federation of Canadian Municipalities (FCM) offers loans and grants under the "Retrofit of community projects" program. To qualify, projects must meet or exceed nation and provincial building codes and reduce energy and GHGs in homes by at least 10%. For communities of over 100,000 people, a minimum of 100 homes should participate in the program. For smaller communities, the number of participants can be determined on a case-by-case basis.

Pilot project grants of up to $350,000 are available to cover up to 50% of costs. For further details, please see the FCM retrofit of community projects website.

After pilot projects are successfully completed, municipalities can apply for low interest loans of up to $5 million and a grant worth up to 15% of the loan. Up to 80% of the project costs can be covered by this combination of loans and grants. Other funding sources must be secured at the time of application. For further details, see the FCM retrofit of community projects capital project website.

8.2.5 | THIRD PARTY FINANCING

In the US, many LIC/PACE programs use third party financing and administration. Renovate America is the largest private financial service institution offering LIC/PACE loans to qualified homeowners in the US. They pool the debts from LIC/PACE program participants and sell them as certified green bonds. These HERO (home energy renovation opportunity) green bonds were worth over $2 billion US in 2016. With third party financing, the municipality is still responsible for collecting repayments on the property tax bill, but these funds are then passed on to the third party.

The language in the Ontario Municipal Act does not explicitly allow or forbid 3rd party financing and to date, such an approach has not been tried in our province. It may therefore be necessary to obtain further interpretation of the legislation before 3rd party financing can be considered.

Third party financing may be appealing to municipalities that are averse to "acting as a bank". Program delivery agents that also provide financing have historically achieved very high participation rates and been able to benefit from economies of scale.

The language in the Ontario Municipal Act does not explicitly allow or forbid 3rd party financing and to date, such an approach has not been tried in our province. It may therefore be necessary to obtain further interpretation of the legislation before 3rd party financing can be considered.

However, these programs have often offered higher interest rates and tighter eligibility requirements as the organizations seeks to maximize profits and minimize risk. Tougher customer protection measures and careful project eligibility criteria may be required with 3rd party financing to ensure that standard performance measures are not financed and to avoid predatory lending. Some banks have expressed interest in financing LIC/PACE loans in Ontario.

Under a bank-financed program, the bank would provide the loan capital, the PDA would administer the program, the municipality would collect loan payments from the property taxes, and that money would be transferred to the participating bank. This model has not yet been tried in Canada, but it would appear to be allowed under the current regulations.

Third party private financing companies, akin to those that operate in the US, may also be interested in financing LIC/PACE loans in Canada. However, they may be averse to entering a new market that has not yet demonstrated a potential for large scale participation and an attractive risk/return profile. Since these companies aggregate many small loans into securities that can be sold into secondary markets, the practice only becomes financially practical with aggregated assets of $100 Million USD or more.[1] With average LIC/PACE loans being $10,000 to $20,000, this translates into 5,000 to 10,000 retrofits: far more than Canadian programs have achieved to date.

8.2.6 | OTHER SOURCES OF FUNDING

Utilities, Federal and Provincial Government ministries, and other organizations may be sources of loans or grants to cover start-up, financing or administrative expenses. These programs are in constant flux and should therefore be examined on a case-by-case basis.

Participant fees are a small but important source of funding. Ongoing program administration costs are often covered by the program participants, either through an administration fee or an interest rider. Administration fees may be added to the LIC/PACE loan, or they may be paid by the participants upfront. To maximize the overall economic benefit and appeal of the program to the participants, it is recommended that other sources of funding be sought to cover administrative costs whenever possible.

1 Dunsky Energy Consulting. (2016). *Ontario municipalities local improvement charge programs for energy upgrades: Draft update study.* Dunsky Energy Consulting. Retrieved from https://www.cleanairpartnership.org/projects/cheerio

8.3 | BUDGET

Program design and delivery model will influence the types of costs incurred by an LIC/PACE program. Generally, costs can be fixed and variable (on volume, or participating municipalities in the program).

A high-level sample program budget was prepared by Dunsky Consulting for Clean Air Partnership (CAP) for a pilot program. It is based on a sample program delivered to 8 Ontario municipalities with CAP acting as a Program Administrator (for further details, including model assumptions, see Appendix C). It considers different uptake scenarios. The budget shows the estimated net cost/revenue of administering the program, and the impact of increased participation on program net cost/revenue.

Some of the assumptions in the budget include:

- A one-time fee of $450;
- A one-time administration fee of 5% of financing value; and
- No rate rider.
- Costs of creating and maintaining a contractor network included.

Figure 18 summarizes the program revenues and costs over a four-year start-up period, breaking down which portions of the program's total revenues and costs will be earned/incurred by CAP and the participating municipalities. The budget below is based on a scenario with 8 participating municipalities. The "Municipalities" group aggregates the amounts earned/incurred for all.

FIXED COSTS	VARIABLE COSTS
» Set-up costs (one time) » Contractor network set-up (one time) » Staff costs (fixed) » Marketing » Administration » Program management fees » Contractor network (annual) » Program Evaluation » Staff (variable on municipalities) » Tax system — Fixed one-time (variable on municipalities)	» Marketing costs (variable; > X projects) » Administration » Due Diligence » Tax lien — (Variable) » Assessment & verification — (Variable) » Borrowing

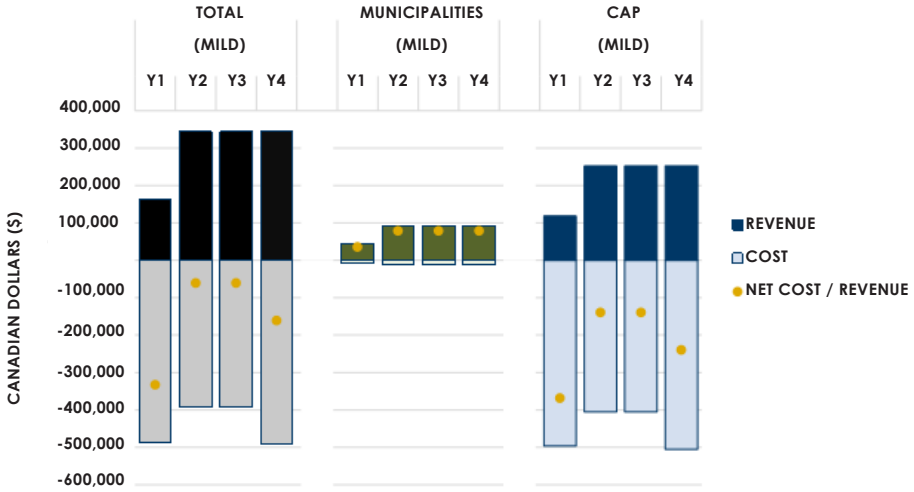
Based on the model and current assumptions:

- **(1) Overall, the program is not expected to breakeven.** All years have a negative net cost/revenue. In the first year, CAP is expected to incur more costs due to one-time set-up costs and a lower number of participants (generating less revenue for the program). In the fourth year, a program evaluation will again result in greater costs. For municipalities, the net cost/revenue is expected to be positive every year. As total program costs and revenues do not offset, additional funding would be required to launch and maintain the program.
- **(2) CAP will incur a larger proportion of the total program revenues and costs.** As PACE administrator, CAP is responsible for the majority of program activities. This analysis excludes any cost of borrowing, which is assumed to be taken on by the municipality and recovered through by charging an interest rate on all financing.

Impact of increased uptake on program budget

Three program uptake scenarios were modelled, to assess the impact that increased program uptake would have on program revenues and costs.

FIGURE 18: PROGRAM COSTS & REVENUES OVER FOUR YEARS (TOTAL, AS WELL AS FOR CAP AND MUNICIPALITIES)

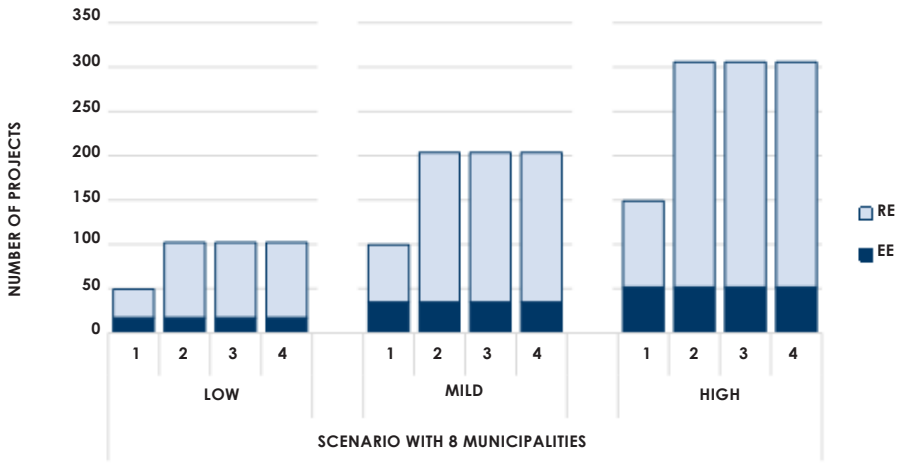


Uptake will vary as a result of external factors. For example, in Sonoma County, program volume dropped as mortgage lender concerns impeded participation. Conversely, Halifax benefited from the launch of a new incentive program (see "New incentives tripled Solar City uptake"), which increased program volume significantly.

The scenarios presented in Figure 18 are based on a combination of historical program uptake in other jurisdictions, prorated to the number of residential households in participating municipalities.

An initial ramp up of project volume is expected, followed by a steady annual average volume. While some programs increased in uptake over time (e.g. Halifax Solar City), others saw both increases and decreases depending on the year (e.g. Toronto HELP, Sonoma County). In all scenarios, we estimate a lower uptake in the first year, followed by a steady average as more participants hear about the program. Furthermore, we estimate **more renewable energy (RE) projects** than energy efficiency (EE) projects, due to the relative project complexity and ease of marketing for each type.

FIGURE 19: PACE PROGRAM PARTICIPANT UPTAKE SCENARIOS FOR EIGHT MUNICIPALITIES



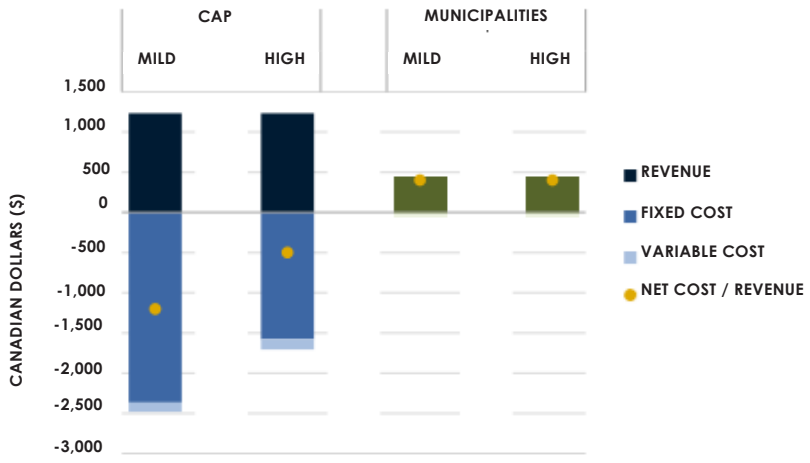
The impact of increased program uptake on per participant costs and revenues (from a Mid to High scenario), for the CAP and Municipality budgets, is shown in Figure 20.

Based on the model and current assumptions:

» **(1) Program net cost/revenue improves with uptake.** For each additional participant, CAP's revenues are greater than the variable costs of adding that participant. However, due to the high fixed costs, the remains a net cost for each participant in the high scenario. As program uptake increases, the fixed costs will continue to be spread over more homeowners; leading total cost per participant to decrease. The alternative is to recover additional revenues from each participant to offset both variable and fixed costs.

» **(2) Higher uptake has no impact on municipalities' revenue.** For municipalities the proposed budget includes mostly variable costs, except for a minimal fixed marketing expense. Their net per participant revenue remains stable regardless of uptake. However, if municipalities require a tax system update to enable PACE tax liens to be placed on properties, this item will constitute a fixed cost, whose payoff will benefit from increased program participation.

FIGURE 20: PER PARTICIPANT COST AND REVENUES UNDER DIFFERENT UPTAKE SCENARIOS



8.4 | MITIGATING DEFAULT RISK

Many stakeholders have concerns about the risks associated with defaults on LIC/PACE loan payments. These stakeholders include mortgage lending agencies, program administrators, third party financiers, and participating municipalities. They are concerned about lost revenues or added program costs from missed or default LIC/PACE payments or if a property goes to a tax sale. LIC/PACE loans exercise priority liens in the case of a tax sale, but only the payments in arrears are collected. LIC/PACE loans, in general, have a history of very low default rates in the US. These rates are lower for than for mortgages and property taxes.[2] Common approaches used to minimize default risks or reduce the losses are described here.

> *"To date, **no claims** have been made against California's **$10M** Loan Loss Reserve."*

8.4.1 | LOAN LOSS RESERVES

Loan Loss Reserves (LLRs) are a crucial component of LIC/PACE programs. These reserves are monies put aside to mitigate losses on a loan due to late or non-payments. Although the financial risk of LIC/PACE financing is very small, LLRs may be required when loans are financed by third parties or when a program is financed through municipal loans. The LLR can address the financial losses associated with the missed loan payments between when a property goes into default and when regular payments are resumed following tax sale.

Mortgage lenders may also be concerned about losses from a tax sale as LIC/PACE loans have priority lien status. If an LIC/PACE program is financed through a third party, LLRs may be necessary to decrease the risks and increase the profitability of the securitized LIC/PACE loans.

2 Mezzanotte, C., Weilamann, C., & Gutierrez, L. (2018). R*esidential PACE delinquency trends.* ().DBRS. Retrieved from https://pacenation.us/wp-content/uploads/2018/04/DBRS-Residential-PACE-Delinquency-Trends.pdf

Some jurisdictions are complementing LIC/PACE programs with credit enhancements. For example, in California, following concerns raised by mortgage lenders and the Federal Housing Financing Agency (FHFA) regarding the potential risks that PACE posed to mortgage holders, many residential PACE programs suspended activity. In response, California launched a $10M PACE Loss Reserve Program in 2013 to mitigate potential losses to mortgage lenders. It is administered by the state treasury, and covers demonstrated mortgage lender losses resulting from their residential PACE program. **To date, no claims have been made against the LLR.**[3] With over 3.6 billion USD in PACE loans in California in 2018, this loan loss reserve has a 360:1 leverage ratio. The size and scope of loan loss reserves should be reviewed regularly to reflect changes in default risk.[4]

8.4.2 | ENERGY SAVINGS GUARANTEE

Some programs have taken measures to ensure that loan repayment amounts are close to utility bill savings from the energy retrofit measures. For example, a modeled 1:1 debt to savings ratio may be used. This means that, over the lifetime of the loan, the retrofit measures will produce utility savings equal to the retrofit investment. This can also be expressed as a savings to investment ratio, with values over 1 being cash-flow positive over the lifetime of the measure or the timeframe of the loan. This standard can be hard to achieve. In 2013, Dunsky consulting modeled the lifetime savings to investment ratio of bundled whole home retrofits for different home types and heating fuel sources in Toronto.[5] Only under the best case scenarios did the homes heated with natural gas approach a savings to investment ratio of 1. Dunsky Energy Consulting therefore recommended LIC/PACE programs not require performance targets.

3 California State Treasurer. (2019). *Property assessed clean energy (PACE) loan loss reserve program.* Retrieved from https://www.treasurer.ca.gov/caeatfa/pace/activity.asp

4 US Department of Energy. (2016). *Best practice guidelines for residential PACE financing programs.* ().US Department of Energy. Retrieved from https://www.energy.gov/sites/prod/files/2016/07/f33/best-practice-pace_0.pdf

5 Dunsky Energy Consulting. (2013). *Local improvement charge (LIC) financing pilot program design for residential buildings in Ontario.* (). Montreal, Quebec: Dunsky Energy Consulting. Retrieved from https://www.cleanairpartnership.org/wp-content/uploads/2016/08/CHEERIO-LIC-Program-FINAL-REPORT.pdf

8.4.3 | ABILITY TO PAY CRITERIA AND OTHER ELIGIBILITY SCREENING

Perhaps the simplest way to address mortgage lender concerns to is to add eligibility criteria that can screen out homeowners who are at higher risk of defaulting on payments. These generally include some form of debt to income ratio analysis designed to ensure income levels are sufficient to cover all debt payments. It is also considered good practice to ensure the total debt on the property (mortgage + LIC/PACE loans) do not exceed the market value of the home.

Most LIC/PACE programs cap funding at 10-15% of a home's assessed value. In Canada, mortgage rules require a minimum 5-20% down payment on a home purchase (depending on the cost of the home). When the down payment is less than 20% of the purchase price, mortgage insurance is required to safeguard the mortgage lender against defaults on payments. Since homes with mortgage insurance have traditionally not received mortgage lender approval for LIC/PACE programs, it seems unlikely that the total debt on a property could exceed the market value of a home in Canada unless there is a dramatic drop in property values. This could be challenging for low-income and first-time homebuyers who don't have much equity in a home.

8.4.4 | MORTGAGE LENDER APPROVAL

Mortgage lender approval is commonly required for LIC/PACE financing, where the mortgage lender is not the financer. This is to ensure that banks, mortgage holders and municipalities all agree to participation in the program and to comply with mortgage agreements that require disclosure of borrowing that could result in charges against a property. As noted above, mortgage lender concerns generally centre around the priority lien that LIC/PACE loans receive when a property goes to a tax sale. This can increase the losses experienced by the mortgage lender during a tax sale or mortgage foreclosure. They may also be concerned about a homeowner's ability to make mortgage payments due to the additional cost burden of LIC/PACE loans. There is, however, no evidence of increased mortgage default rates on homes LIC/PACE loans to date.

Meanwhile, mortgage lender approval can be a significant barrier to participation: it adds administrative and homeowner costs and it can block participation by homeowners with insured mortgages. Both the Canadian Mortgage and Housing Corporation (CMHC) and the Canadian Bankers Association (CBA) have expressed concerns about LIC/PACE financing but have yet to issue an official position.

8.5 | OTHER PROGRAM RISKS: LOW PARTICIPATION RATE

A key risk for an LIC/PACE program is low participation rates that do not allow the program to reach its program goals. Lack of awareness of the value of energy efficiency retrofits can result in low demand for LIC/PACE loans. A strong and sustained professional marketing campaign can be instrumental in raising this awareness to achieve better participation rates.

Interested homeowners may also drop out of a program due to administrative delays, inconvenient program requirements (e.g. home energy audits), mortgage issues, or restrictive program requirements (e.g. energy saving targets). LIC/PACE programs should therefore be designed to

> *"Mortgage lender* ***approval*** *can be a significant* ***barrier*** *to* ***participation.***"

streamline the application and approval process for the homeowner. Furthermore, the program should balance the PDA's need for standardized measures that permit economies of scale with a homeowner's need for flexibility.

8.5.1 | OTHER PROGRAM RISKS: LACK OF QUALIFIED RETROFIT PROFESSIONALS

Once LIC/PACE programs mature and program demand increases, there may be a lack of qualified contractors, installers or energy auditors. An early assessment of available retrofit professionals can highlight where gaps exist. Program administrators and municipalities must work closely with industry groups, local colleges, and training institutions for this sector in order to ensure successful program delivery.

A few of the key actions include:

- **(1)** Limiting initial program intake if contractor availability and capacity is limited
- **(2)** Requiring contractor licensing or specific qualifications as a component of program participation can drive contractors towards training opportunities

8.5.2 | OTHER PROGRAM RISKS: DISPUTES

Disputes can arise between the homeowner and the contractors regarding the quality of the work performed. LIC/PACE programs should develop a formalized dispute resolution process to address outstanding problems efficiently and fairly. It is also best practice to include language in LIC/PACE program customer agreement forms to absolve program administrators and municipalities from liability for poor quality work. When a PDA is responsible for paying the contractor, it is common to require the homeowner to sign off on the completed work before payment is issued. Program design should also consider work warranty, such as who would pay in the event of an equipment malfunction.

8.5.3 | OTHER PROGRAM RISKS: EFFECTS OF LIC LIEN ON HOME SALES

When prospective homebuyers do not understand the value of a more energy efficient home, they may regard an LIC lien as a liability. In the US, it is common for homebuyers to make paying off an LIC/PACE loan a condition of sale. For a homeowner contemplating a retrofit that will not pay for itself during their anticipated tenure, the potential need to pay off an LIC/PACE loan early may make the program unpalatable. Real estate professionals need to be engaged to ensure they can educate their customers about the value of energy efficiency and the LIC/PACE loans that pay for it.

9.0 | KEY ROLES AND STAKEHOLDERS

Source: Shutterstock

9.0 | KEY ROLES AND STAKEHOLDERS

The design of a successful LIC/PACE program will involve the engagement of many stakeholder groups throughout its development and implementation. These stakeholders have roles to play during program design, marketing, and program delivery. They should each be engaged through workshops, discussions, and educational campaigns. Any partner who may play a role in marketing the program should be well versed in the details and many benefits of LIC/PACE programs. Outlined below are descriptions of the potential roles and other considerations for several stakeholders.

Municipalities

Municipalities play a key role in administering and enabling programs. Participating municipalities must pass an LIC by-law, register the LIC liens, and issue property tax bills with LIC repayment charges. They may have additional administrative, financial and marketing roles depending on the design of the LIC/PACE program. During program set-up, municipalities may also advise on or select different program design options.

Contractors and installers

Contractors are often a program participant's first point of contact for LIC/PACE programs and play a significant role in:

- Program marketing
- Customer acquisition
- After-sales services

Contractors and renovators are responsible for performing the retrofit work. Installers may also be engaged to install new mechanical equipment or specialized hardware such as windows. Both these professionals must have liability insurance and clearance with the worker's compensation board. A program may also require contractors and installers to be members in good standing of a trade association. Some LIC/PACE programs maintain a list of qualified contractors for use by their program participants.

Contractors and installers may be the first stakeholder that a homeowner contacts when considering renovation and retrofit work, or when mechanical systems are due for replacement. They can therefore play a key role in marketing LIC/PACE programs and the value of adding home energy efficiency retrofit measures to a project.

As LIC/PACE programs grow, however, they may become constrained by the availability of qualified contractors and installers. It may be necessary to make long term plans to build capacity in this area (see Section 2.9.5).

Energy auditors or assessors

Energy auditors and assessors evaluate the energy use and energy losses of a home. These evaluations can form the basis of customized recommendations on the most cost-effective retrofits for a home, and quantitative data for project evaluation. These professionals may also help to market an LIC/PACE program. The available pool of qualified energy auditors or assessors may be low.

Hardware and renovation businesses

Retail operations that sell the hardware and other materials needed for retrofits may also help to raise awareness about LIC/PACE programs and the value of retrofits. If programs are designed with eligible product lists or using standardized retrofit packages (turnkey models), these stakeholders should be engaged to ensure adequate supply of recommended products. They may also serve as locations that support and market program sign-up.

Financial partners

Banks, municipalities, and/or third party financiers are key partners in retrofit programs. These parties may be responsible for providing the capital for LIC/PACE program set-up, loan financing, and loan loss reserves if applicable. They may also be in a position to help market the program. These partners should be engaged early and made aware of the value of retrofits and the low risk of default for these loans.

Stakeholder input from the financial sector is extremely important. Early and ongoing discussions around mortgage lender sign off, and third party financing, among other issues, is crucial.

Outreach and marketing partners

Program participation rates are often far greater when marketing professionals and local community groups are engaged. These organizations may include environmental groups, community groups and non-governmental organizations. Partnering with other community groups for marketing can provide legitimacy, enhanced trust, and buy-in for different populations. This may be especially true for programs that target neighbourhoods or certain demographics.

Utilities and incentive providers

Utility providers are good marketing partners for LIC/PACE programs, as many homeowners may be eager to reduce their utility bills. Energy efficiency utilities often offer incentive programs and financing options that may contribute to the success of LIC/PACE programs. Utilities may also appreciate LIC/PACE programs for their ability to help meet their demand management goals. Energy use data from utility bills may also be useful in measuring energy efficiency gains from retrofits.

Real estate agents

Real estate agents are responsible for explaining LIC liens on existing homes to prospective homebuyers and educating them about the benefits of a more energy-efficient house. It is therefore important to engage these professionals to help them understand the value of energy efficiency retrofits and the associated LIC charges.

Community colleges

Where training to build trade capacity is required, local community colleges might be an appropriate place to host classes. Trades instructors may even consider incorporating energy efficiency training into their curriculum, allowing students to participate for credit. Also, where possible, in-field training with contractors exposes students to real-word scenarios and contractors to potential new hires.

Community groups/NGOs

Community groups and local NGOs that focus on energy conservation education, awareness, and/or implementation are natural partners in this type of program. Collaborate with on-the ground organizations to expand and enhance outreach.

10.0 | MARKETING TOOLS AND STRATEGIES

Source: Shutterstock

10.0 | MARKETING TOOLS AND STRATEGIES

One of the biggest obstacles to success of the Toronto and the Nova Scotia LIC/PACE programs was effective marketing. As several program updates have shown, energy efficiency is not a high priority for most homeowners, and many do not recognize the value of retrofits. Most reports recommend outsourcing the marketing to specialized agencies, who have the experience, expertise, and connections to launch effective campaigns.

The City of Toronto has recently updated their marketing materials for the Home Energy Loan Program (HELP). The newly launched BetterHomesTO webpage includes information on:

- Rebates and incentives
- Renovations and upgrades
- Net zero homes
- Home energy evaluation
- Financing
- Apartments and condos

The Upgrades page lists all of the eligible improvements a homeowner can make to their property, along with technical information, considerations, and costs. The information comes from Natural Resources Canada.

Funding for these marketing materials, which are available in print, information cards, and multiple languages, was provided by Natural Resources Canada. These materials can be provided to other municipalities to use, at no cost. They can be modified to include branding for other municipalities.

10.1 | KEY APPROACHES

In their operational best practices guide, Efficiency Maine recommends the following marketing strategies[1]:

- **"Sell something people want"** — highlight the benefits that are most likely to appeal
- **"Meet customer needs"** — ensure programs appeal to the different motivations of proactive and reactive customers
- **"Avoid 'Energy Jargon'"** — keep the language simple and use positive framing to earn trust and avoid turning people off, some suggested terms include:
  - Home improvements in lieu of home energy retrofits
  - Home energy assessments in lieu of audits
  - Home in lieu of residence
- **"Engage when most likely to act"** — for example when homeowners are facing equipment replacement or considering a renovation
- **"One-touch is not enough"** — send consistent and coordinated messages, multiple exposures may be necessary
- **"Engage the wider community"**— coordinate with other community-based organizations and leaders such as city councillors, neighbourhood associations, church groups, community building groups, and others.

1 Flanders, A., Johnson, K., & Dunsky, P. (2012). *Evaluation of the efficiency Maine trust PACE loan program: Review of successful practices in financing programs.* Opinion Dynamics Corporation. Retrieved from https://www.efficiencymaine.com/docs/Efficiency-Maine-PACE-Successful-Practices-Report-Final.pdf

Also[2]:

» **Avoid vague language in program messaging** — e.g. include details of program fund sources, how repayment works, how administration fees are covered.

It is also important to consider the type of customer that is being targeted for marketing. Tools and messaging that are effective for low income seniors may be less effective with young professionals in older homes, for example. A study in the UK classified homeowners into groups based on behaviours, attitudes, and motivations for energy efficiency retrofits. They recommend tailoring policies and retrofit promotions to these five groups.[3]

10.2 | KEY MESSAGES

Saving money on utility bills is often not the key motivator for energy efficiency retrofits. Comfort, improved health, modernizing the home, and improving home performance are all reasons why homeowners undertake energy efficiency retrofits.

Some key messages to emphasize in marketing material are:

» **Retrofits make a home more comfortable** — added insulation and air sealing can reduce drafts and create more uniform temperatures throughout the home

» **Retrofits can modernize the home** — bring the energy efficiency up to modern standards and raise the market value of the home

» **Energy efficient homes are healthier** — well insulated and air-sealed homes are less likely to have mould issues and drafts

2 Dunsky Energy Consulting. (2013). *Local improvement charge (LIC) financing pilot program design for residential buildings in Ontario.* Montreal, Quebec: Dunsky Energy Consulting. Retrieved from https://www.cleanairpartnership.org/wp-content/uploads/2016/08/CHEERIO-LIC-Program-FINAL-REPORT.pdf

3 Haines, V., & Mitchell, V. (2014). A persona-based approach to domestic energy retrofit. *Building Research & Information*, 42(4), 462-476. doi:10.1080/09613218.2014.893161

- **Energy efficient homes save money on utility bills** — utility bill savings will always be uncertain so avoid giving concrete values
- **Retrofits can improve indoor air quality** — retrofits can solve moisture problems that lead to mould growth
- **Comprehensiveness matters** — more benefits from whole-home retrofits than individual measures
- **Energy efficient homes are more resilient to power outages**
- **Energy efficient homes generate less GHGs**

In addition, marketing resources for LIC/PACE programs should include the following program information:

- Homeowner eligibility requirements
- Eligible projects and measures
- Loan terms and repayment schedule
- How loans are repaid
- No or minimal upfront costs
- Loans are tied to the property not the owner
- What happens when a home is sold

10.3 | MARKETING METHODS

Municipalities should aim to use multiple channels for raising awareness of the program. The methods used should include both market push mechanisms (promotion by various groups) and market pull mechanisms (community outreach and education). Third party organizations with a marketing strategy can have a larger impact.In addition, it is critical to work closely with utility companies.

Market push

Market push mechanisms involve partnering with local actors that regularly have contact with homeowners who are already considering renovation work or equipment replacement. By co-marketing with these actors, homeowners may be convinced to expand their projects to include energy efficiency measures. This drives up program participation and helps to increase business for the partner organization.

Local actors for co-marketing may include:

- Contractors
- Suppliers and installers of
  - Insulation
  - Furnace and AC equipment
  - Windows and doors
- Building cladding (eg vinyl siding)
- Home improvement retailers
- Building supply stores
- Energy auditors
- Architects and building professionals
- Local influencers

Such co-marketing strategies require partner training on program details and benefits, providing them with marking materials, and listing these partners on the program website. Some programs have offered financial incentives to contractors who bring whole-home, deep energy retrofit projects to the program. Municipalities can target older neighbourhoods and draw the attention of local actors to neighbourhood with high densities of building permit requests.

Market Pull

Market pull involves outreach to the community and education or awareness campaigns. This can occur through branding, special events, community champions, and community programs. Utility companies may be good partners due to their ability to raise awareness with promotional material, bill inserts, and website links. Utilities may also be able to help target the program to neighbourhoods with high utility costs. Community groups, such as faith communities, sustainability-focussed organizations and schools may be able to help communicate the benefits of energy efficiency retrofits and the LIC/PACE financing.

Localized marketing

When a municipality wants to target a particular neighbourhood, it can be helpful to emphasize face-to-face contacts through neighbourhood gatherings, information sessions, and door-to-door canvassing. Signs at retrofit work sites, social networking, and networking through local organizations can all help to spread the word. Case studies and participant endorsement can also be effective marketing tools especially in localized communities.

A targeted neighbourhood may be able to benefit from economies of scale, for example with equipment and contractor services.

Cost analysis of current home energy costs vs. anticipated future costs

In Ontario, one unit of energy from electricity costs nearly four times that of a unit of energy from natural gas in 2019. Even when a home is heated with an air source heat pump capable of providing heat with a fraction of the energy of electric resistance heater, electricity is still more expensive than natural gas for heating. Long term price forecasts for both natural gas and electricity are difficult to make due to the effects political intervention, but supply costs are not expected to change significantly in the short term. Program developers should, consequently, plan for natural gas to remain more cost effective for heating than electricity in the near future.

11.0 | MONITORING AND EVALUATION

Source: Shutterstock

11.0 | MONITORING AND EVALUATION

As an LIC program develops and matures, there is the need to monitor and evaluate its progress, and make adjustments as new technologies become available.

The ultimate purpose of monitoring and evaluation is to ensure that the program is meeting or has met its original goals and to understand the barriers to greater success. In this context, monitoring is the ongoing process of collecting program data to track progress and resources used, and highlight areas for improvement.

Program success can be measured with a set of key indicators such as:

- **(1)** Customer satisfaction
- **(2)** Number of homes
- **(3)** Aggregated energy/water savings (number of kWh, m3 of natural gas saved, and cubic litres saved)
- **(4)** GHG reductions
- **(5)** Total size of loans ($) provided to projects
- **(6)** Number and geographic spread of municipalities involved

- **(7)** Diverse demographic reach (low income, indigenous populations, seniors and others)
- **(8)** Other socioeconomic co-benefits

Evaluation is an interim or final analysis of a program's outcomes to assess its impact, success and lessons learned. To ensure objectivity, evaluations are typically performed by 3rd parties. LIC/PACE programs should plan and budget for monitoring and evaluations from the outset. A recommended evaluation budget for LIC/PACE programs is 10% of total administration fees.[1]

Three types of studies and reports are commonly used for monitoring and evaluation: monitoring reports, process studies, and impact studies.

11.1 | MONITORING REPORTS

Monitoring reports track performance indicators, often taken from the program database. They should be easy to compile, simple in their presentation, and released regularly. These reports allow program administrators to address problems and barriers to success in a timely manner. Some performance indicators that could be used are presented here:

- Measures of program interest
- Participation and dropout rates
- Number and dollar value of projects underway or completed
- Administration, marketing, and municipal loan costs
- Status of property tax accounts with LIC loans
- Participating property information, including building characteristics and energy performance
- Retrofit measures, including cost, estimated E savings and useful life
- Community GHG inventory

1 Dunsky Energy Consulting. (2013). *Local improvement charge (LIC) financing pilot program design for residential buildings in Ontario*. Montreal, Quebec: Dunsky Energy Consulting. Retrieved from https://www.cleanairpartnership.org/wp-content/uploads/2016/08/CHEERIO-LIC-Program-FINAL-REPORT.pdf

11.2 | PROCESS STUDIES

Process studies assess program efficiency and effectiveness part way through a program or at the end of a pilot phase. They evaluate how well the processes involved in the program are working to reach the program goals. When program budgets are tight, M&E should focus on this area as it has the greatest potential to improve program performance. Processes commonly evaluated are marketing and outreach, market evaluations, application process including reasons for participant dropout, financial competitiveness, and internal management plus application processing. These evaluations typically use carefully constructed surveys or interviews with homeowners in all stages of the process, including dropouts plus people involved in delivering and promoting the program: administrators, contractors, energy auditors, etc. These results are analyzed in the context of the program design, marketing strategy, and economic conditions to identify process adjustments that can be used to improve program efficiency and effectiveness.

With LIC/PACE programs, a low participation rate is the most likely obstacle to success. A process study can help to identify barriers to participation, program awareness levels among targeted homeowners, reasons for participant dropouts, and other factors that limit participation. Recommended program adjustments to encourage homeowner participation are made in a process study.

11.3 | IMPACT STUDIES

Impact studies are conducted at the end of a program. If a program runs for many years, an interim impact study may be useful. The goal of the report is to quantify the multidimensional impacts of the program. These results are used to communicate results to stakeholders and funding partners and may be used to build a business case for program expansion, or to recommend design improvements. Some of the impacts that should be included are total participation rates, total money invested, estimates of energy savings, estimates of GHGs reductions, effects on the local economy including job creation, and the total effect on the local building stock. These results will help to communicate the cost-effectiveness of the program.

11.4 | PLANNING FOR MONITORING AND EVALUATION

Plans and budgets for monitoring and evaluations (M&E) should be embedded in the LIC/PACE program design from the outset. In designing monitoring and evaluation processes, it is important to clearly define the program goals; identify the reporting requirements in the context of stakeholder interests; identify timeframes for reporting; and set an M&E budget.

12.0 | ENERGY DISCLOSURE: THE NEXT STEP

Source: Shutterstock

12.0 | ENERGY DISCLOSURE: THE NEXT STEP

Homeowners, buyers, and occupants need to be empowered with energy literacy in order to value energy efficiency retrofits, especially when making the decision to purchase a home. People often consider renovating when they are about to buy or sell a home. One key way of incorporating energy efficiency into the plan is for home sellers to disclose the energy rating of their home and include it on the home listing. This is referred to as home energy rating and disclosure.

By requiring disclosure, homebuyers can factor the energy usage of a home into their purchase decision. Homebuyers and sellers would also be incentivized to improve a home's energy rating before sale or after purchase when renovations are often more convenient. Knowing a home's energy usage enables buyers to make informed choices, much like knowing a car's fuel economy.[1]

1 Environmental Commissioner of Ontario. (2019). *2019 energy conservation progress report. Environmental Commissioner of Ontario.* Retrieved from https://docs.assets.eco.on.ca/reports/energy/2019/why-energy-conservation.pdf

Home energy ratings are most effective when they:

- **(1)** Are highly visible to prospective buyers in order to potentially influence their purchasing decision or post-purchase activities;
- **(2)** Describe the current energy performance of a house (ideally in comparison with other houses);
- **(3)** Outline the impacts (financial and non-financial) of the home's energy use
- **(4)** Identify the steps that could be taken to improve energy efficiency and the costs and benefits of doing so.

Utility costs are a significant concern for Ontarians and disclosure would enable sellers of energy efficient homes to market low energy costs as a selling feature.

A home energy rating allows people to see how energy efficient a home is before they make decisions on whether to buy or not. Just like how getting an A would be great on a report card, having an excellent home energy rating would be attractive for a home.

13.0 | CONCLUSION AND RESOURCES

13.0 | CONCLUSION

Municipalities need new tools if they are to meet their GHG reduction targets. Cutting emissions from the residential sector is particularly challenging as it requires convincing large numbers of homeowners to carry out expensive energy efficiency retrofits and fuel switching. Yet adding insulation, air sealing and replacing windows and doors can generate many benefits for the homeowner, the community and the municipality. LIC/PACE financing is an emerging tool for municipalities wishing to promote GHG emission reductions in residential homes. These long term, low interest loans are tied to the property and repaid through property taxes. They can provide attractive financing options for a variety of homeowners, including those on low income. Municipalities can design their program in a variety of ways to meet their unique needs using existing programs in the US and Canada as a guide. Finding capital to finance the loans, and reducing the default risks for the municipalities are major considerations when setting up a program, as are marketing and program evaluations. When well designed, LIC/PACE programs may prove to be a game changer in paving the way to a GHG emission-free future.

RESOURCES

ENVIRONMENTAL COMMISSIONER OF ONTARIO ENERGY CONSERVATION AND EFFICIENCY REPORT

https://docs.assets.eco.on.ca/reports/energy/2019/why-energy-conservation.pdf

COLLABORATION ON HOME ENERGY EFFICIENCY RETROFITS IN ONTARIO (CHEERIO) PROJECT

https://www.cleanairpartnership.org/projects/cheerio

BYLAW EXAMPLES

https://www.halifax.ca/sites/default/files/documents/city-hall/legislation-by-laws/By-lawS-500.pdf

https://www.colchester.ca/bylaws-1/2563-solar-colchester-pace-by-law-chapter-24-january-2020

https://www.colchester.ca/bylaws-and-policies/2278-solar-colchester-pace-policy-february-2019

https://www.toronto.ca/legdocs/bylaws/2013/law1105.pdf

https://www.toronto.ca/services-payments/water-environment/environmental-grants-incentives/home-energy-loan-program-help/special-charges

ENERGY EFFICIENCY AND NET ZERO INFORMATION FOR HOMEOWNERS

https://www.saveonenergy.ca

http://clean.ns.ca/wp-content/uploads/2019/12/Net-ZeroFAQs-for-Homeowners.pdf

https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/energy/pdf/housing/Keeping%20the%20Heat%20In_e%20.pdf

https://www.efficiencyns.ca/tools-resources

NET ZERO INFORMATION FOR CONTRACTORS

https://www.nrcan.gc.ca/sites/www.nrcan.gc.ca/files/energy/pdf/housing/Keeping%20the%20Heat%20In_e%20.pdf

PACE PROGRAMS (UNITED STATES)

https://pacenation.org

PROGRAMS IN DEVELOPMENT

https://efficiencyalberta.ca/financing/clean-energy-improvement-program

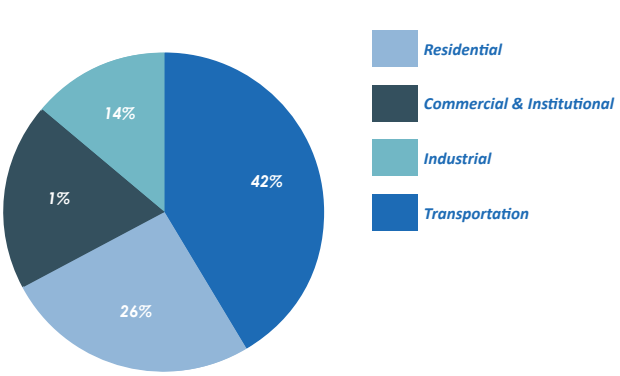
APPENDIX A | CITY-SPECIFIC DETAILS

APPENDIX A | CITY-SPECIFIC DETAILS

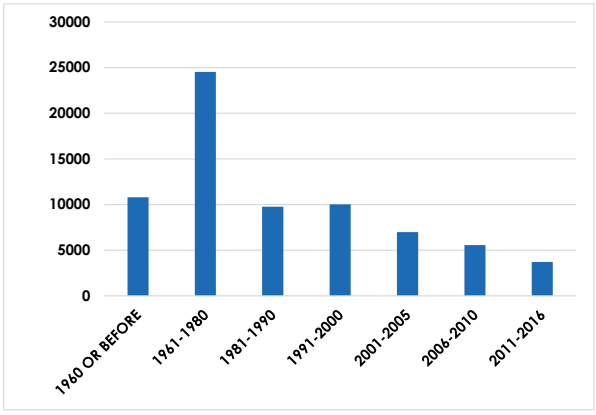
CITY OF BURLINGTON, ONTARIO

- **POPULATION (2016): 183,314**
- **PARTNERS FOR CLIMATE PROTECTION CORPORATE AND COMMUNITY MILESTONE: 5**
- **CLIMATE ACTION PLAN TARGET:**
  - 26% reduction in per capita GHGs below 2011 by 2030
  - Net carbon neutral by 2050
- **CLIMATE ACTION PLAN STRATEGY FOR RESIDENTIAL SECTOR:**
  - Improve the energy efficiency of buildings
  - Implement a deep energy retrofit program in Burlington

COMMUNITY GHG EMISSIONS BY SECTOR (2016)[1]



OCCUPIED PRIVATE DWELLINGS BY CONSTRUCTION PERIOD[2]



1 City of Burlington. (2016). *Energy and greenhouse gas emissions 2016 progress report for community and city operations.* Burlington, Ontario: City of Burlington. Retrieved from : https://www.burlington.ca/en/services-for-you/resources/CW-25-17-Appendix-A---2016-Energy-and-Carbon-Progress-Report.pdf

2 IBID

CITY OF GUELPH, ONTARIO

» **POPULATION (2016): 131,794**

» **PARTNERS FOR CLIMATE PROTECTION CORPORATE AND COMMUNITY MILESTONE: 3**

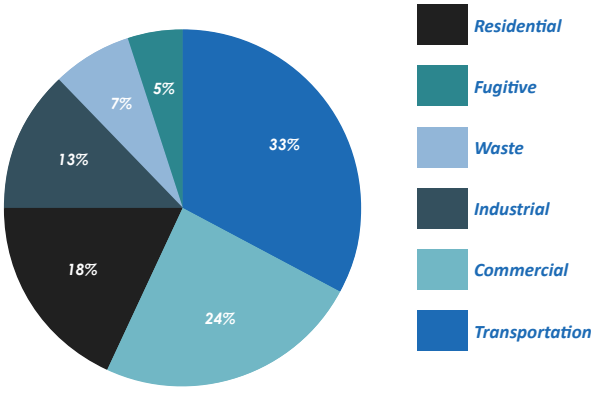
» **CLIMATE ACTION PLAN TARGETS:**

- Net zero carbon community by 2050
- Reduce per capita energy use by 50% and per capita GHGs by 60% below 2006 levels by 2031

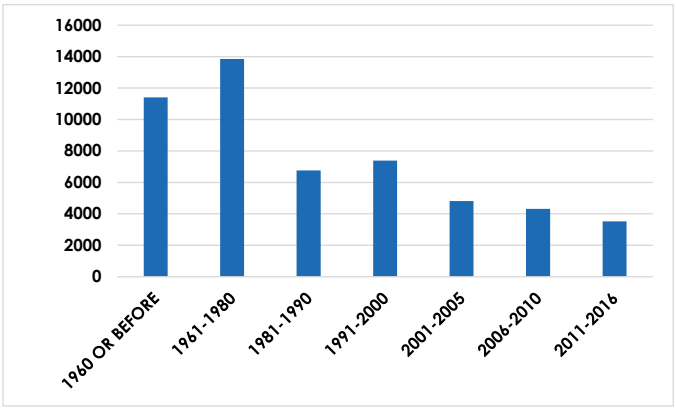
» **CLIMATE ACTION PLAN STRATEGY FOR RESIDENTIAL SECTOR:**

- upgrade 80% of existing building stock by 2031

COMMUNITY GHG EMISSIONS BY SECTOR (2016)[1]



OCCUPIED PRIVATE DWELLINGS BY CONSTRUCTION PERIOD



1 Sustainability Solutions Group. (2018). *City of Guelph, energy and greenhouse gas emissions.* Sustainability Solutions Group. Retrieved from https://www.ourenergyguelph.ca/downloads/baseline-and-business-as-usual-report.pdf

TOWN OF HALTON HILLS, ONTARIO

» **POPULATION (2016): 61,161**

» **PARTNERS FOR CLIMATE PROTECTION CORPORATE AND COMMUNITY MILESTONE: 3**

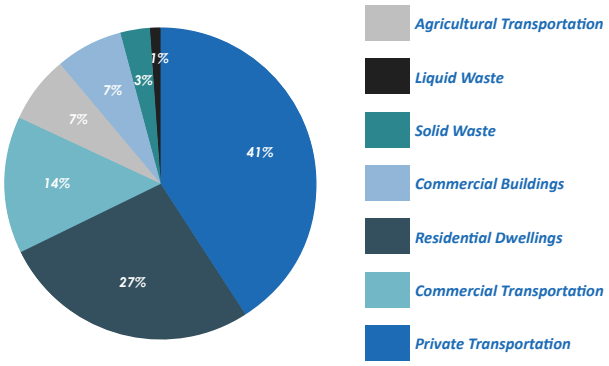
» **CLIMATE ACTION PLAN TARGETS:**

- 80% reduction below 1990 levels by 2050
- Reduce per capita GHGs by 35% below 2011 levels by 2031
- 14% reduction in total GHG emissions below modeled levels by 2031

» **CLIMATE ACTION PLAN STRATEGY FOR RESIDENTIAL SECTOR:**

- retrofit 5% of existing building stock each year

COMMUNITY GHG EMISSIONS BY SECTOR (2011)[1]



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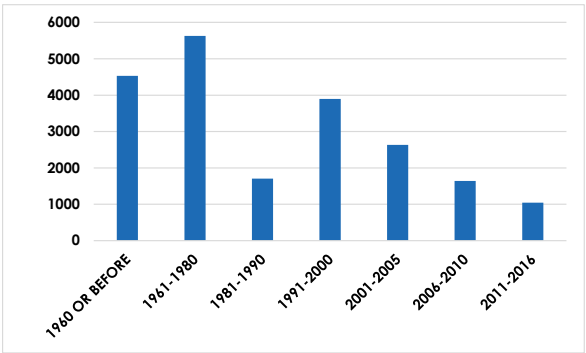


1 Szybalski, D. (2015). *Mayor's community energy plan and draft local action plan.* (No. PDS-2015-0008). Halton Hills, Ontario: Halton Hills. Retrieved from http://haltonhills.ca/Calendars/2015/PDS-2015-0008.pdf

CITY OF LONDON, ONTARIO

» **POPULATION (2016): 383,822**

» **PARTNERS FOR CLIMATE PROTECTION CORPORATE AND COMMUNITY MILESTONE: 5**

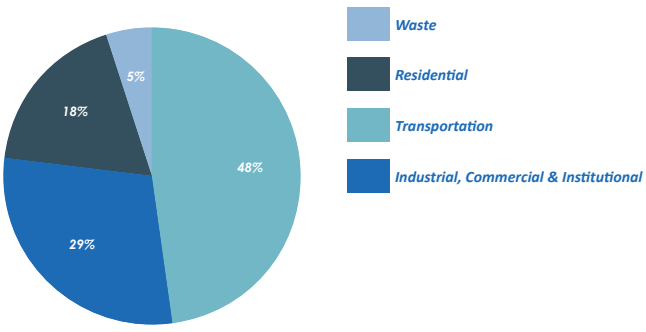
» **CLIMATE ACTION PLAN TARGETS:**

- 15% reduction from 1990 levels by 2020
- 37% reduction from 1990 levels by 2030
- 80% reduction from 1990 levels by 2050

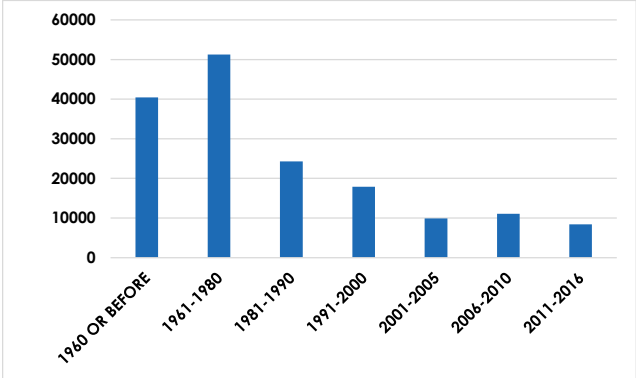
» **CLIMATE ACTION PLAN STRATEGY FOR RESIDENTIAL SECTOR:**

- not available

COMMUNITY GHG EMISSIONS BY SECTOR (2017)[1]



OCCUPIED PRIVATE DWELLINGS BY CONSTRUCTION PERIOD



1 City of London. (2018). *2017 community energy and greenhouse gas emissions inventory.* London, Ontario: City of London. Retrieved from https://www.london.ca/residents/Environment/Energy/Documents/2017%20Inventory%20Report.pdf

TOWN OF NEWMARKET, ONTARIO

» **POPULATION (2017): 94,100**

» **PARTNERS FOR CLIMATE PROTECTION CORPORATE AND COMMUNITY MILESTONE: 3**

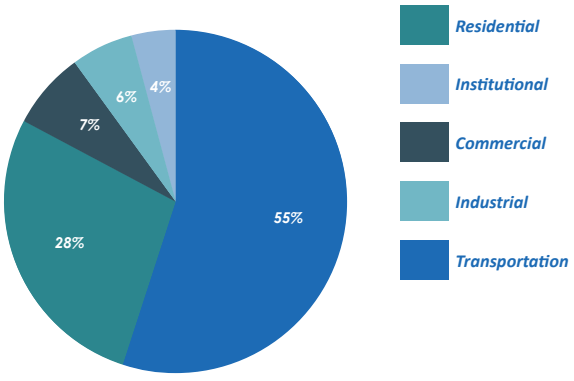
» **CLIMATE ACTION PLAN TARGETS:**

- Reduce per capita primary energy use and GHG emissions by 50% below 2017 levels by 2041
- Reduce per capita GHG emissions by 50% from 2017 baseline by 2041

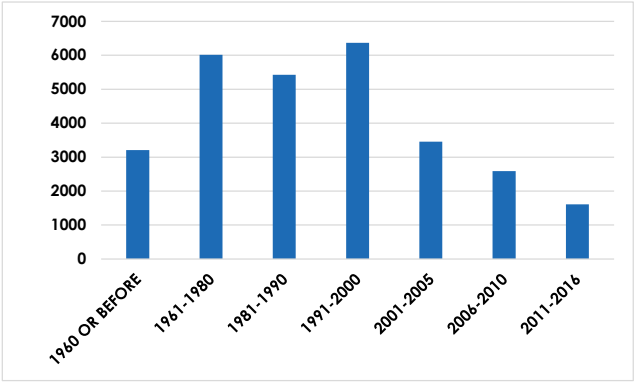
» **CLIMATE ACTION PLAN STRATEGY FOR RESIDENTIAL SECTOR:**

- 30-50% energy efficiency gains through deep energy retrofits facilitated by NEER (Newmarket Energy Efficiency Retrofit)
- 80% of existing buildings undergo deep energy retrofits by 2041

COMMUNITY GHG EMISSIONS BY SECTOR (2013)[1]



OCCUPIED PRIVATE DWELLINGS BY CONSTRUCTION PERIOD

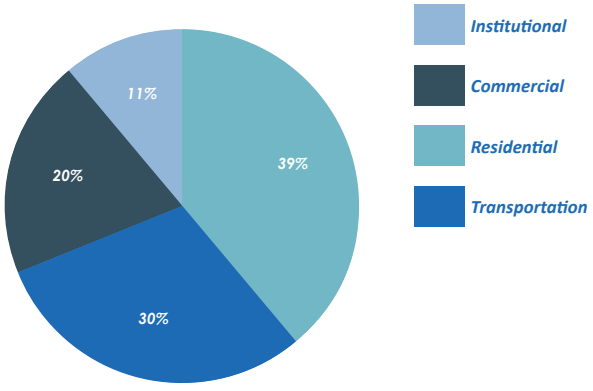


1 Town of Newmarket. (2019). Town of Newmarket Community Energy Plan. Newmarket, Ontario: Newmarket. Retrieved from https://www.newmarket.ca/TownGovernment/PublishingImages/Pages/Strategies%2c%20Plans%20and%20Publications/Plans/Community-Energy-Plan/Community%20Energy%20Plan%20%28Updated%2007.31.2019%29.pdf

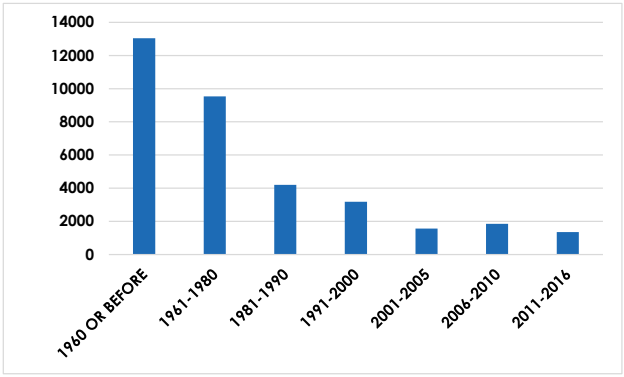
CITY OF PETERBOROUGH, ONTARIO

- **POPULATION (2016): 81,082**
- **PARTNERS FOR CLIMATE PROTECTION CORPORATE AND COMMUNITY MILESTONE: 3**
- **CLIMATE ACTION PLAN TARGETS:**
  - 30% reduction in community GHG emissions below 2011 levels by 2031
- **CLIMATE ACTION PLAN STRATEGY FOR RESIDENTIAL SECTOR:**
  - Retrofit 40% of residential housing by 2031, achieving 30-50% energy efficiency gains
  - All new buildings to be near net zero emissions by 2031

COMMUNITY GHG EMISSIONS BY SECTOR (2011)[1]



OCCUPIED PRIVATE DWELLINGS BY CONSTRUCTION PERIOD



1 City of Peterborough. (2016). *Greater Peterborough area climate change action plan, chapter 1: City of Peterborough community and corporate climate action plans.* Peterborough, Ontario: City of Peterborough. Retrieved from https://sustainablepeterborough.ca/wp-content/uploads/2016/11/Chapter-1-City-of-Peterborough-Climate-Action-Plans-FINAL.pdf

CITY OF TORONTO, ONTARIO

» **POPULATION (2016): 2,731,571**

» **PARTNERS FOR CLIMATE PROTECTION CORPORATE AND COMMUNITY MILESTONE: 5**

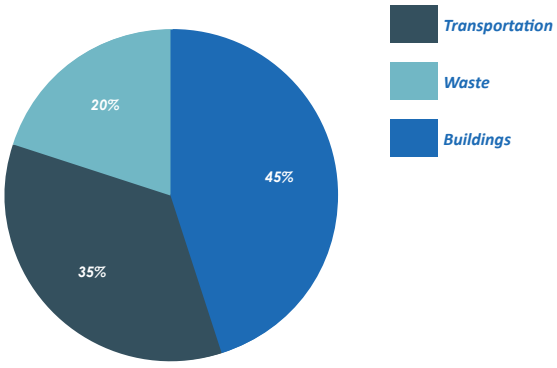
» **CLIMATE ACTION PLAN TARGETS:**

- 30% reduction in GHG emissions below 1990 levels by 2020
- 65% reduction in GHG emissions below 1990 levels by 2030
- 80% reduction in GHG emissions below 1990 levels by 2030

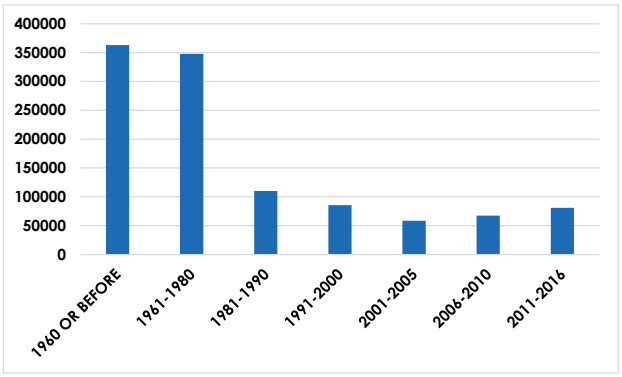
» **CLIMATE ACTION PLAN STRATEGY FOR RESIDENTIAL SECTOR:**

- Reduce energy use of existing buildings by 40% below 2017 levels by 2050 using a variety of incentives and strategies, including an LIC/PACE program
- All new buildings to be near net zero GHGe by 2030

COMMUNITY GHG EMISSIONS BY SECTOR (2016)[1]



OCCUPIED PRIVATE DWELLINGS BY CONSTRUCTION PERIOD



1 Transform TO. (2017). *2050 pathway to a low carbon Toronto: Report 2 highlights of the city of Toronto staff report.* Toronto, Canada: doi: https://www.toronto.ca/wp-content/uploads/2017/10/91c7-TransformTO-2050-Pathway-to-a-Low-Carbon-Toronto-Highlights-Report.pdf

CITY OF VAUGHAN, ONTARIO

» **POPULATION (2016): 306,233**

» **PARTNERS FOR CLIMATE PROTECTION CORPORATE AND COMMUNITY MILESTONE: 3**

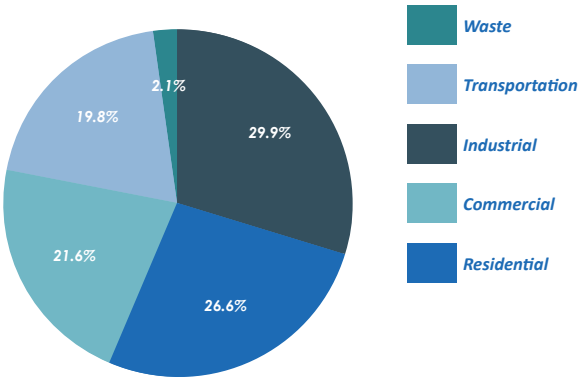
» **CLIMATE ACTION PLAN TARGETS:**

- 20% reduction in per capita GHG emissions below 2006 levels by 2026

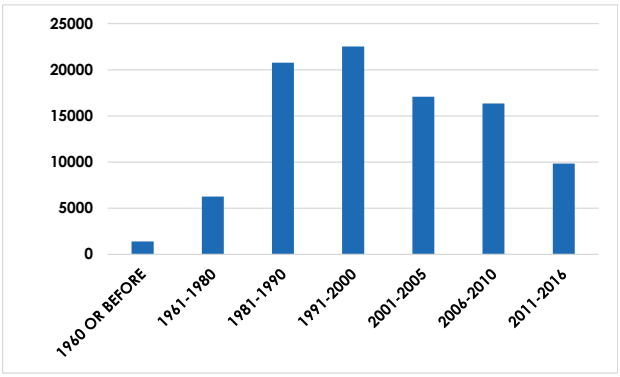
» **CLIMATE ACTION PLAN STRATEGY FOR RESIDENTIAL SECTOR:**

- Develop new construction requirements for residential buildings
- Develop a carbon neutral neighbourhood pilot project using an LIC/PACE program
- Promote existing energy efficiency retrofit programs and establish a district energy system

COMMUNITY GHG EMISSIONS BY SECTOR (2006)[1]



OCCUPIED PRIVATE DWELLINGS BY CONSTRUCTION PERIOD



1 City of Vaughan. (2014). *Community climate action plan.* Vaughan, Ontario: City of Vaughan. Retrieved from https://www.vaughan.ca/cityhall/environmental_sustainability/General%20Documents/Vaughan%20Community%20Climate%20Action%20Plan%20-%20DRAFT.pdf

CITY OF WHITBY, ONTARIO

» **POPULATION (2016): 128,377**

» **PARTNERS FOR CLIMATE PROTECTION CORPORATE AND COMMUNITY MILESTONE: 5**

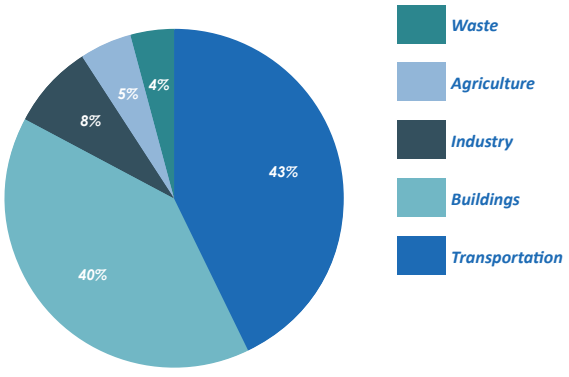
» **CLIMATE ACTION PLAN TARGETS:**

- reduce greenhouse gas emissions by 80 per cent by 2050

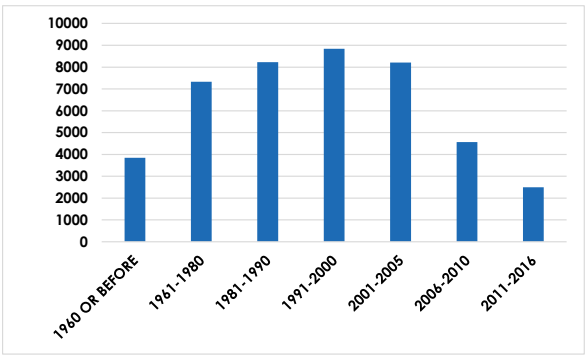
» **CLIMATE ACTION PLAN STRATEGY FOR RESIDENTIAL SECTOR:**

- Climate action plan strategy for residential sector: developing sustainable development guidelines to incentivize developers to consider sustainability when planning and developing new areas of the community
- Deep energy retrofits of existing buildings

COMMUNITY GHG EMISSIONS BY SECTOR[1]



OCCUPIED PRIVATE DWELLINGS BY CONSTRUCTION PERIOD



1 Durham Region Profile. https://taf.ca/gtha-carbon-emissions/durham

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

APPENDIX B2 | SAMPLE BY-LAW TO AFFIX LIC TO A PROPERTY

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]

APPENDIX C |
DUNSKY PROGRAM MEMO

APPENDIX C | DUNSKY PROGRAM MEMO

dunsky

Efficiency | Renewables | Mobility

To: **Kevin Behan, Clean Air Partnership**
From: Matt Poirier
cc: CAP: Gaby Kalapos, Vanessa Cipriani
Dunsky: Alex Hill, Luce Engérant
Date: 2019-10-23
Re: **CAP as a PACE Program Administrator**

Context

The Clean Air Partnership (CAP) is exploring their opportunity to support corporate and community greenhouse gas reduction in Ontario municipalities by administering a Property Assessed Clean Energy (PACE) financing program. This PACE program, targeted at the residential sector, would enable homeowners to upgrade their properties with energy efficiency and renewable energy projects in participating municipalities across the province. In addition, CAP is interested in understanding the potential for PACE programs throughout the remainder of Canada.

To support CAP in this undertaking, this memo includes:

- A **review of PACE enabling legislation** in targeted jurisdictions across the country;
- An **outline of key activities** required to implement and maintain a PACE program in Ontario;
- A discussion of three **key design options**; and
- A high-level **sample program budget**, estimating the net cost/revenue of administering the program, and the impact of increased participation on program net cost/revenue.

An Excel spreadsheet, containing the program administrator budget, accompanies this memo.

PACE Legislative Frameworks in Canada

In most jurisdictions, the legislation governing municipal powers must be amended to allow PACE programs. The Yukon, Alberta, Ontario, and Nova Scotia have all passed enabling legislation. When comparing between provinces (see Table 1), Alberta's regulations provide the greatest level of guidance to program administrators, while Nova Scotia simply allows PACE programs, and Ontario falls between the two extremes.

Figure 1: Three provinces and a territory have passed PACE enabling legislation.

In **Ontario**, province-wide PACE enabling legislation has allowed the City of Toronto to launch two PACE programs: Home Energy Loan Program (HELP) targeting single-family

residences, and High-Rise Retrofit Improvement Support Program (Hi-RIS) targeting residential apartment buildings. Program uptake has been slow for other municipalities.

As the regulations do not specifically exclude third party administrators, it appears that CAP could administer PACE programs on behalf of municipalities. However, two clauses relate to the division of responsibilities:

1. The municipality, however, must enter into an agreement with the property owner;[1] and
2. The repayment should be to the municipality through a special charge on the property.[2]

Table 1: Comparison of PACE program design legislated requirements in three provinces.

	Alberta[3]	Ontario[4]	Nova Scotia[5]
Eligible measures	EE and RE	EE and RE	EE, RE and Water
Savings to Investment Ratio	Not mentioned	Not mentioned	Not mentioned
Energy audits	Required at program administrator's discretion	Not mentioned	Not mentioned
Underwriting requirements	At minimum, in good standing with payment of taxes in past 5 years	Not mentioned	Not mentioned
Repayment mechanism	Follow tax process	Follow tax process	Municipal discretion: follow tax or other process
Administrator fees	Maximum of 5%	Not mentioned	Not mentioned
Lien	First lien	First lien	Municipal discretion (allows first lien)
Assessment extinguished or accelerated in default	No	Not mentioned	Municipal discretion
Impact on debt limit	None	Not mentioned	Not mentioned
Right for municipality to impose fees	Yes	Yes	Yes
Program administrator	Energy Efficiency Alberta, Minister may approve others	Not mentioned	Not mentioned
Qualified contractor	Required	Not mentioned	Not mentioned

[1] Regulation, s.36.2 & 36.4: https://www.ontario.ca/laws/regulation/060586
[2] Regulation, s.36.1
[3] Legislation: http://www.assembly.ab.ca/ISYS/LADDAR_files/docs/bills/bill/legislature_29/session_4/20180308_bill-010.pdf
Regulation: http://www.qp.alberta.ca/documents/Regs/2018_212.pdf
[4] O. Reg. 586/06: Local Improvement Charges – Priority Lien Status. October 25, 2012: https://www.ontario.ca/laws/regulation/060586
[5] 81A, Municipal Act: https://nslegislature.ca/sites/default/files/legc/statutes/municipal%20government.pdf

In **Alberta**, because the enabling legislation and accompanying regulations were recently passed, no PACE programs are currently operational. However, Energy Efficiency Alberta (EEA) and the City of Edmonton have been in discussion to launch the first PACE pilot program in the near term.

Alberta's enabling legislation is the most restrictive of the three versions passed in Canadian provinces. Within the legislation, two requirements stand out which could limit program administrator participation:

1. The program administration fee is limited to a total of 5% of project costs.[6] However, research on PACE programs in other jurisdictions suggests that interest rate riders are commonly applied, often resulting in overall fees that are greater than the 5% threshold; and
2. A tri-party agreement between the property owner, contractor, and program administrator must be entered into.[7] This increases the risks (and likely the costs) associated with administering the program. PACE programs do not typically require the program administrator to enter into these agreements.

As the most active province in terms of the number of PACE programs, **Nova Scotia** has approximately 10 municipalities that have either launched or are currently in the process of creating a program. Program administrators are either the municipality or a non-governmental organization (i.e. Clean Foundation and Efficiency Nova Scotia administer programs in different jurisdictions). Because the legislation is very broad, program administrators have flexibility in their design.

One interesting allowance by the regulation is that the repayment of the financing does not need to be tied to the municipality's property tax repayment schedule. This has allowed several municipalities with PACE programs administered by the Clean Foundation to collect *repayment on a monthly basis* (as opposed to annual or bi-annual in the case of property taxes). A monthly repayment schedule can be beneficial to participants, as it better aligns the benefits of participation (savings on utility bills) with the cost of participation (repayment of the financing).

The **Yukon** was the first jurisdiction in Canada to use PACE, expanding a program in 1998 to fund individual off-grid alternative energy power systems. The Rural Electrification and Telecommunications Program now offers rural Yukoners a financing opportunity for renewable energy at their homes.[8] This program is different from other Canadian PACE programs, as it is administered by the territorial government for residents living outside of incorporated municipalities.

It should be noted that **Quebec** has piloted PACE programs without having enabling legislation. The province's first pilot residential PACE programs (referred to as Financement innovateur pour des municipalités efficaces [FIME]), were operated in three municipalities: Plessisville, Varennes and Verchères. These programs were cancelled in 2019 when their non-profit program administrator ceased operations. While FIME operated in the province, the current legislative context does not

[6] Regulations S.10(5)

[7] Regulations S.11(1)

[8] http://www.community.gov.yk.ca/property/ruralelec.html

provide sufficiently clear direction on the ability to undertake PACE programs. As such, legislative amendments are required for new PACE programs to launch in Quebec.

In **British Columbia**, there has been a push to develop PACE enabling legislation. At their 2019 Annual Convention, the Union of BC Municipalities endorsed a resolution asking the Province to work with expert stakeholders to study the application of PACE and develop enabling legislation.[9] This is not he province's first experience with PACE; the City of Vancouver ran a pilot program that mimicked PACE in 2011-2012. Vancouver's Home Energy Loan Program (HELP) offered low interest, non-collateralised loans through VanCity Credit Union. Repayment was attached to a homeowner's municipal utility bills, rather than through property taxes, as the City did not have the legal authority to offer PACE. The program was discontinued due to lower than planned uptake.

PACE Program Activities

CAP has been approached by various municipalities to potentially act as their PACE program administrator. To support the program design process, it is important to understand the potential division of responsibilities required to launch and administer such a program.

Table 2 outlines how the key activities of a PACE program may be distributed between CAP and the municipalities. This distribution of responsibilities is based on the premise that municipalities will raise their own capital and collect repayment from homeowners; while CAP will manage and administer the program on their behalf. A breakdown on the costs associated with each of these activities is available in the Excel model.

Table 2: Expected division of PACE program activities between CAP and a municipality.

#	Activity	Description	Frequency	Responsibility	
				CAP	Muni
1	**Program Set-Up**				
1.a	Misc. Set-Up	Includes creation of forms, on-boarding materials, and database set-up. Depends on the size and complexity of the program.	One-time	X	
1.b	Contractor Network Set-Up	Create contractor network (minimum requirements: provide proof of certification[s] and attend a presentation to learn about the program). (*Optional*)	One-time	X	
2	**Program Mgt.**				
2.a	General Program Mgt.	Oversee and coordinate daily activities related to program management. Program admin FTE costs fall under this activity.	Ongoing	X	
3	**Marketing**				
3.a	Administrator Tasks	Create and maintain standardized marketing and communication materials, including webpage.	Ongoing	X	

[9] Endorsement of B140, "Support for Property Assessed Clean Energy Legislation for BC". Accessed at: https://www.ubcm.ca/assets/Resolutions~and~Policy/Resolutions/2019%20UBCM%20Resolutions%20Disposition.pdf

#	Activity	Description	Frequency	Responsibility	
				CAP	Muni
3.b	Municipal Tasks	Post program information on the municipality's webpage & support uptake via ad hoc activities. Can vary depending on the municipality's level of interest.	Ongoing		X
4	**Administrative Activities**				
4.a	Technical Review	Review applications to ensure projects are feasible and/or completed. Likely done by having participants complete an EnerGuide pre & post energy audit.	One-time per project	X*[10]	
4.b	Due Diligence	Component of application review—ensure they comply with requirements. Includes title search and may include legal review	One-time per project	X*	
4.c	Tax Lien/Levy	Impose the charge by adding the participating properties to the local improvement roll. Collect repayment through the property tax repayment system (may require municipal tax system upgrade).	One-time & Annual (per new project)		X
4.d	Assessment & Verification	Review applications to ensure projects are completed (this may be included under technical review, e.g. if EnerGuide audits are required).	One-time per project	X	
4.e	Contractor Network Mgt.	Deliver quarterly training sessions and manage new contractor list. (*Optional*)	Ongoing	X	
5	**Program Evaluation**				
5.a	Program Evaluation	Evaluate the program outcomes and effectiveness. Can include impact and or process evaluation. (Suggested at the 4-year mark)	Ongoing (/4 years)	X	
6	**Borrowing**				
6.a	Borrowing Activities	Manage capital (e.g. raise capital for loan issuance). Assumed to be undertaken by municipalities/Association of Municipalities of Ontario (AMO).	Ongoing		X

Key Design Options

Several program design options will impact the cost and revenues associated with PACE program delivery. We have focused on three such key design options.

[10] X* = CAP will coordinate these activities, but they may be outsourced. E.g. for technical review, CAP will ensure application have been reviewed, but the actual review process may rely on EnerGuide pre & post audits; for due diligence, title search may be outsourced to a specialized company.

Administration Fees

PACE programs in North America typically rely on three different approaches for recouping costs:

- **One-time fees — Fixed ("Application fee"):** fixed one-time fee charged to all participants regardless of the loan value. Option to split the fee and charge it to participants at different stages of the process. Clean Foundation, for example, collects their $450 application fee at three milestones (at initial application, reception of contractor plans, and at reception of contractor invoice)[11].
- **One-time fees — Percentage ("Administration fee")**: one-time fee representing a percentage (%) of the participant's financing value. For example, if the program has a 5% administration fee, a participant applying for a $20,000 loan would be charged a $1,000 fee. This is referred to as an "administration fee" in the proposed budget.
- **Rate rider (additional interest):** this fee is charged as incremental financing interest to program participants. For example, a rate rider is used in Sonoma County's PACE program, where the program applies a 4% interest rate rider, kept by the program administrator to support operations[12].

Each approach carries its set of benefits and challenges (see Table 3).

Table 3: Pros and cons of different fee models.

	One time fees	Rate rider
Pros	• Quick cash flow at start-up • Can be incorporated in the financing	• Perceived as less of a barrier to participation • Is incorporated in the financing
Cons	• Upfront fee can be perceived as a barrier to participation • Typically, lower amount charged per participant over life of the financing	• Longer revenue earning period (slow cash inflow at start-up) • Can lead to high costs to participants

One-time fees enable the program administrator to quickly receive a cash inflow from projects, helping to recover program costs to support the initial capital-intensive start-up period. However, the upfront nature of this fee can be perceived as a barrier by program participants, hindering uptake. For this reason, one-time fees are generally kept low, and often can be repaid through the PACE loan.

Rate riders are not perceived as a barrier to program participation, as it is not an "upfront fee." For the administrator, this recovery method means that revenues for a project will be spread over a longer period, with less upfront. This can lead to a lack of funds during the program's capital-intensive start-up period. However, over time, with a steady flow of projects, revenues can be more predictable and less reliant on finding new participants and projects. Furthermore, loan interest is often poorly understood by consumers, and can quickly lead to high total project costs for participants. For example, assuming no inflation, over a 20-year period a 0.5% rate rider will generate as much as a 5% one-time application fee.

[11] Clean Foundation. *Clean Energy Financing FAQs*. Accessed 7th October 2019, at https://clean.ns.ca/clean-energy-financing/clean-energy-financing-faqs/

[12] Dunsky interview with Jane Elias (Sonoma Country). May 2019.

Model assumptions:

- A one-time fee of $450;
- A one-time administration fee of 5% of financing value; and
- No rate rider.

Contractor Network

Contractors are important partners for PACE programs. Beyond completing the renovation or installation, contractors often drive marketing efforts and participant uptake by helping customers become aware the program. In exchange, contractors often view PACE programs as a "tool to close the sale." A program's contractor network can help educate contractors on PACE.

Although not required in Ontario, setting up a program's contractor network can be beneficial as it:

- **Helps drive marketing:** As contractors are often a participant's first point of contact for renovation projects, they can guide their customers toward the PACE program, which can help boost participant uptake.
- **Standardizes the customer experience:** Contractor networks generally require participating contractors to meet minimum business and quality requirements (e.g. liability insurance, business licence) and participate in training sessions (e.g. on insulation best practices). This helps spread best practices amongst contractors, ensures a high and consistent customer experience, and helps establish the trustworthiness of the program.
- **Facilitates quality assurance**: Most PACE programs conduct post-installation quality control inspections on a subset of projects. Having a contractor network, which includes onboarding sessions to set expectations upfront, can facilitate quality assurance at the end of the project. Repeated contractor failure to meet program standards often leads to removal from the approved contractor network.

Model assumptions: Costs of creating and maintaining a contractor network are included.

Program Management Fees (Administrator & Municipality)

In jurisdictions where PACE programs are managed by third parties on behalf of municipalities, an exchange of funds is typically made between the administrator and the participating municipalities.

This flow of funds can go in either direction (from municipalities to the administrator, or vice-versa) depending on the program set-up. For example, the Connecticut Green Bank (program administrator) ***pays*** participating municipalities $500 per year for completing collection of their behalf.[13] In Nova

[13] Dunsky interview with Bert Hunter, Mackey Dykes, Nicholas Zuba (CT Green Bank), May 2019.

Scotia, the Clean Foundation, which administers PACE programs for 6 municipalities, ***charges*** a program set-up fee of $13,000 to each participating municipality. However, this amount can be offset by the provincial Department of Energy, which gives municipalities $15,000 to join a PACE program.[14]

Model assumptions:

- No transfer of funds from "program management fees" between CAP and municipalities;
- CAP receives the % administration fee; and
- Municipalities receive the application fee.

This allows both entities to offset some of the costs of administering a PACE program.

Sample budget for a CAP-delivered program

Based on these activities and key design assumptions, a high-level sample program budget was developed for a CAP-delivered PACE program. The model is based on eight participating municipalities (i.e. Vaughan, Peterborough, London, Burlington, Guelph, Newmarket, Halton Hills, and Whitby), and considers different uptake scenarios (i.e. the total number of households expected to participate in the program). The sample budget allows us to expand on two important topics:

- The **estimated net cost/revenue** of administering the program; and
- The **impact of increased participation** on program net cost/revenue.

[14] Dunsky interview with Sean Kelly (Clean Foundation), July 2019.

Program net cost/revenue assessment

Figure 2 summarizes the program revenues and costs over a four-year start-up period, breaking down which portions of the program's total revenues and costs will be earned/incurred by CAP and the participating municipalities. The budget below is based on a scenario with 8 participating municipalities. The "Municipalities" group aggregates the amounts earned/incurred for all.

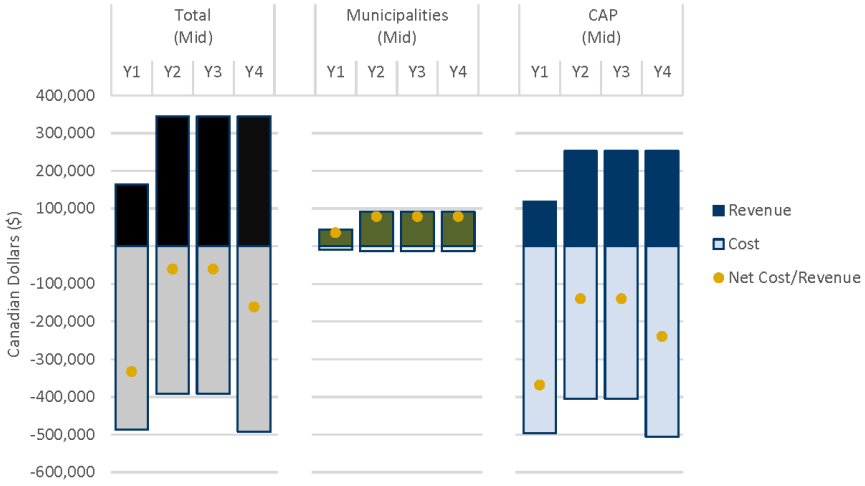


Figure 2: Program Costs & Revenues over Four Years (Total, and for CAP & Municipalities)

Based on the model and current assumptions:

1. Overall, the program is **not expected to breakeven**. All years have a negative net cost/revenue. In the first year, CAP is expected to incur more costs due to one-time set-up costs and a lower number of participants (generating less revenue for the program). In the fourth year, a program evaluation will again result in greater costs. For municipalities, the net cost/revenue is expected to be positive every year.[15] As total program costs and revenues do not offset, additional funding would be required to launch and maintain the program.
2. **CAP will incur a larger proportion of the total program revenues and costs**. As PACE administrator, CAP is responsible for the majority of program activities. This analysis excludes any cost of borrowing, which is assumed to be taken on by the municipality, and recovered through by charging an interest rate on all financing.

[15] Note the budget assumes that no tax system / IT upgrade is required for municipalities to be able to add a PACE tax-lien to homeowners' property tax. If municipalities require tax systems updates, their cost may significantly increase (e.g. the City of Edmonton anticipated a $400k upgrade), which would impact the program net cost/revenue for municipalities.

Impact of increased uptake on program budget

Three program uptake scenarios were modelled, to assess the impact that increased program uptake would have on program revenues and costs.

Uptake will vary as a result of external factors. For example, in Sonoma County, program volume dropped as mortgage lender concerns impeded participation. Conversely, Halifax benefited from the launch of a new incentive program (see "New incentives tripled Solar City uptake"), which increased program volume significantly.

New incentives tripled Solar City uptake

The launch of Efficiency Nova Scotia's SolarHomes incentive ($0.85/kW) in August 2018 corresponded with a drastic increase of Halifax Solar City's uptake; from 47 (2017) to 164 projects (2018).

The scenarios presented in Figure 3 are based on a combination of historical program uptake in other jurisdictions, prorated to the number of residential households in participating municipalities. An **initial ramp up of project volume is expected, followed by a steady annual average volume.** While some programs increased in uptake over time (e.g. Halifax Solar City), others saw both increases and decreases depending on the year (e.g. Toronto HELP, Sonoma County). In all scenarios, we estimate a lower uptake in the first year, followed by a steady average as more participants hear about the program. Furthermore, we estimate **more renewable energy (RE) projects than energy efficiency (EE) projects**, due to the relative project complexity and ease of marketing for each type.

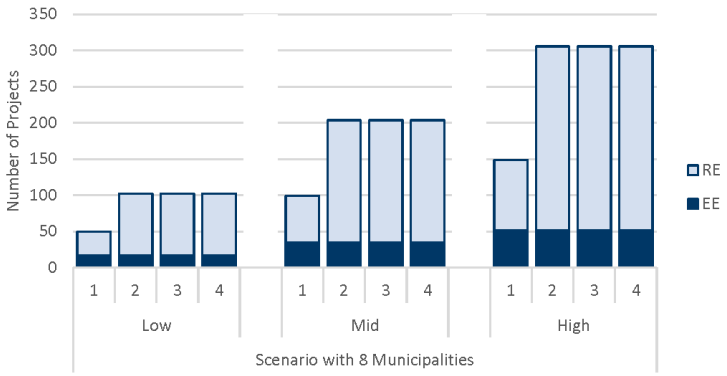


Figure 3: PACE program participant uptake scenarios for eight municipalities.

The impact of increased program uptake on per participant costs and revenues (from a Mid to High scenario), for the CAP and Municipality budgets, is shown in Figure 4.

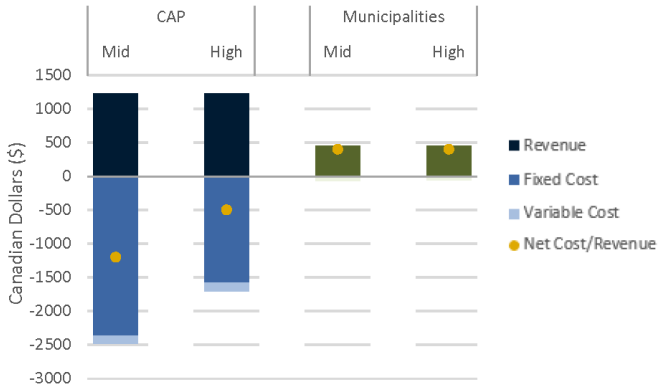


Figure 4: Per participant cost and revenues under different uptake scenarios.

Based on the model and current assumptions:

1. **Program net cost/revenue improves with uptake.** For each additional participant, CAP's revenues are greater than the variable costs of adding that participant. However, due to the high fixed costs, the remains a net cost for each participant in the high scenario. As program uptake increases, the fixed costs will continue to be spread over more homeowners; leading total cost per participant to decrease. The alternative is to recover additional revenues from each participant to offset both variable and fixed costs.
2. **Higher uptake has no impact on municipalities' revenue.** For municipalities the proposed budget includes mostly variable costs, except for a minimal fixed marketing expense. Their net per participant revenue remains stable regardless of uptake. However, if municipalities require a tax system update to enable PACE tax liens to be placed on properties, this item will constitute a fixed cost, whose payoff will benefit from increased program participation.