



Retrofit Halton Hills Pilot Program

Business Case Report

Prepared for:

Rija Rasul, Senior Climate Change Specialist
Climate Change & Asset Management Town of Halton Hills



Submitted to:

Town of Halton Hills

Rija Rasul
Senior Climate Change Specialist

haltonhills.ca



Prepared by:

Dunsky Energy Consulting

50 Ste-Catherine St. West, suite 420
Montreal, QC, H2X 3V4

www.dunsky.com | info@dunsky.com
+ 1 514 504 9030



About Dunsky

Dunsky provides strategic analysis and counsel focused exclusively on helping our clients accelerate the clean energy transition, effectively and responsibly.

Overview

Expertise



EFFICIENCY



RENEWABLES



MOBILITY

Services



QUANTIFY
Opportunities



DESIGN
Strategies



EVALUATE
Performance



With a focus on buildings, renewables and mobility, our 30+ experts support our clients – governments, utilities and others – through three key services: we **assess** opportunities (technical, economic, market); **design** strategies (programs, plans, policies); and **evaluate** performance (with a view to continuous improvement).

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The Town of Halton Hills (the Town) displayed climate leadership in 2015 when they developed their first Mayor's Community Energy Plan (MCEP) providing a framework to move toward a low-carbon community. **After declaring a climate emergency in 2019 a new, more ambitious target to achieve net-zero by 2030 was set.** The new Low-Carbon Transition Strategy will guide the Town's path, actions, and implementation strategies to achieve this new goal.

The residential building sector is the Town's second largest source of greenhouse gas (GHG) emissions representing 22% of total GHG emissions¹, and thus encouraging home energy retrofits is important to meet the town's GHG reduction goals.

While the benefits of energy efficiency and renewable energy (EE and RE) are significant (e.g. energy and utility bill savings, improved air quality, increased comfort and health, increased property values, etc.) there are several barriers (financial, institutional, technical, informational, behavioural, etc.) that prevent or slow adoption of EE and RE improvements. These include high upfront costs, difficulty managing contractors, lack of awareness and knowledge about which retrofits to prioritize and whether savings will materialize. In addition, homeowners often face competing capital priorities, are limited in their ability to access financing, have limited time to navigate the application process or implement a project and are concerned about possible disruptions. There can also be supply-chain constraints where technologies are poorly understood among key market actors (e.g. contractors) who are often the first point of contact for homeowners seeking to make home improvements. Effective programs can be instrumental in addressing these barriers, and thereby encouraging homeowners to undertake GHG reducing retrofits.

In response, The Town sought the assistance of Dunsky Energy Consulting (Dunsky) to design the Retrofit Halton Hills pilot program (the Program), a program to encourage deep home energy retrofits by addressing homeowner barriers and offering an attractive financing option via the local improvement charge (LIC) mechanism. As a first step in the design process, a business case for the Program has been developed and is presented in this report to support the program rationale and program design decisions.

Methodology

The purpose of the business case report is to determine the economic and GHG impacts associated with offering an LIC program. This analysis focusses on quantifying the anticipated costs and benefits, along with the resulting contributions to the Town's GHG emissions reduction goals.

To support the business case, the approach included the following tasks:

- **Desktop review.** The desktop review included a review of the Mayor's Community Energy Plan (MCEP), review of the data and assumptions for the new Low-Carbon Transition Strategy, the Town's local available data like home ownership, house vintage, fuel mix, etc., other relevant studies conducted by the Town related to the housing stock, energy use and GHG emissions.

¹ Sustainability Solutions Group & Whatif? Technologies Inc. 2020. Town of Halton Hills Reference Scenario Results supporting the Low Carbon Transition Strategy

- **Applied our Team's knowledge and expertise.** We complemented the Town's previous work with our knowledge and expertise studying and designing similar programs summarizing the key barriers preventing homeowners from adopting EE and RE measures and the current energy efficiency financing landscape (in Canada and the U.S.).
- **Program impacts model and economic analysis.** We developed three retrofit archetypes representing typical retrofits feasible in the Halton Hills market based on advanced data analysis of the housing stock, analyzed the energy and utility costs impacts of the retrofit packages and analysed the economic impacts of the program for homeowners, the Town. We will also qualitatively assess the non-energy benefits key stakeholders are expected to experience (e.g. job creation, increased comfort, improved air quality/health, improved property values, etc.).

Structure of report

The report is divided into three sections:

1. **Local Improvement Charge (LIC) Financing Model.** This section provides an overview of LICs, benefits and how they can support the Town's GHG emissions reduction goals, and experience in other jurisdictions, including funding opportunities (third party lenders, credit enhancements), trends, challenges, municipal involvement and key partners and different levels of municipal involvement, risks and mitigation strategies.
2. **Energy and Economic Analysis.** This section details the analysis results, including expected uptake (at pilot and full scale program), potential impacts (energy use and GHG reductions, program costs, economic impacts) and the costs and resources required to implement the program to 2030. This also includes a qualitative assessment of non-energy benefits.
3. **Conclusion and Next Steps.** This section outlines next steps to move forward with the recommended program concept, including critical internal discussions and additional stakeholder engagement.

Local Improvement Charge Solution

To accelerate adoption of energy efficiency (EE) and Renewable Energy (RE) technologies, the Low-Carbon Transition Strategy assumes financing through a local improvement charge (LIC) mechanism will be a key feature.

LIC financing, also referred to as Property-Assessed Clean Energy (PACE) financing, is a municipality-led or supported program enabled by Provincial/Territorial legislation. PACE financing has emerged as an increasingly popular tool in the U.S. to accelerate the adoption of energy efficiency (EE) and renewable energy (RE) technologies, but it has been slower to take hold in Canada.

Four provinces/territories (ON, NS, AB, YT) currently have enabling legislation in place with NS having the most municipalities offering PACE.

Province	Programs
NS	Halifax Solar City - the first PACE program in Canada Clean Energy Financing created by Clean Foundation with seven partner municipalities SolarColchester Berwick Green Energy Program
ON	City of Toronto's HELP and HiRIS programs
AB	CEIP (entering pilot phase)
YK	REPT PACE focussed on solar, wind and hydro
QC	FIME R-PACE Pilot (now concluded)

Several other municipalities are expected to establish their own programs following the launch of the FCM Community Efficiency Financing (CEF) funding stream.

How LIC financing works

LIC financing programs are designed to provide the capital needed to conduct EE and RE energy retrofits. Under this model, the municipality (or a partner third-party financial institution) provides the capital needed to conduct the retrofit. A special charge is then imposed on the benefitting property and repaid over time via the municipal property tax bill. PACE/LIC programs can cover a range of buildings and measures (see Figure 1).

Specifically, LIC's provide the following:

- Long-term financing with a fixed interest rate making it possible for participants to invest in deeper, more comprehensive retrofit opportunities with longer simple paybacks not traditionally available through private financial institutions.

Figure 1: Buildings and measures supported by LICs



- Financing secured by a tax lien on the property (i.e. transferrable) versus the owner allowing for more relaxed underwriting.
- Simplicity and convenience of one bill and by repaying the loan through a line item on the municipal property tax bill.
- Energy savings resulting from the improvement can help to offset the monthly financing costs partially or entirely.

LIC financing benefits

Financing offers several benefits, including lower repayment risk, overcoming barriers, and complementing existing policies and programs. Each is described below.

Lowers repayment risk. Property tax-based repayments tend to be extremely secure, enjoying a priority lien over outstanding mortgage balances. Given low rates of delinquency on property tax bills, risk premiums and interest rates can be lowered as compared to conventional financing products.

Addresses barriers. EE and RE programs are entirely about overcoming market barriers to adopt more energy efficient measures. It is critical to identify and understand all major barriers to design a program that truly meets Halton Hills homeowner's needs. There are several common barriers that hinder or prevent homeowners from undertaking EE and RE projects (see Figure 2). Financing programs help increase the number of upgrades undertaken by reducing the upfront cost barrier for homeowners who are either unwilling or unable to access capital for such projects. And LICs can also help overcome split incentive barriers, by attaching financing to the property rather than an individual and allowing transferability of payments and benefits.

Figure 2: Common barriers preventing or hindering homeowners from undertaking EE and RE projects

ACCESS TO CAPITAL	Short payback periods are often favoured, to the detriment of capital-intensive projects.	OCCUPANCY DURATION	Uncertainty with respect to the length of ownership or tenure in a home or rental unit.
COMPETING CAPITAL PRIORITIES	Homeowners have to choose between competing projects (e.g. prioritizing cosmetic renovations over efficiency).	TIME & DISRUPTION	Programs require time to navigate the application processes and find and coordinate contractors. The home environment can also be disrupted.
CUSTOMER DEBT LIMITS	High levels of existing debt is a barrier to financing new projects.	SUPPLY CHAIN CONSTRAINTS	Technologies are often poorly understood among key market actors (e.g. contractors, engineers, equipment suppliers and retailers). This can lead to higher prices and uncertainty.
UNCERTAINTY	Projects have risks, including: 1) actual savings / generation may underperform estimates 2) potential budget / time overruns 3) the value the property gains from improvements	SPLIT INCENTIVES	Benefits may not accrue to the party who paid for the retrofit; commonly the case between tenants and landlords.

Complementary to other efficiency policies and programs. While incentives improve the financial attractiveness of efficiency upgrades (i.e., rebates typically cover a portion of the incremental measure

costs), financing provides the capital needed for building owners to act by covering the full cost of the project. Financing can also complement and enable homeowners to comply with other municipal strategies and tools to improve building performance like building energy rating and disclosure policies, codes, standards, permitting, etc.

LIC administrative and finance models

Municipalities play a key role in de-risking LIC financing using property tax assessments. Municipal involvement can span from a light touch to deep involvement and several other stakeholders are usually involved. Figure 3 provides a high-level illustrative example.

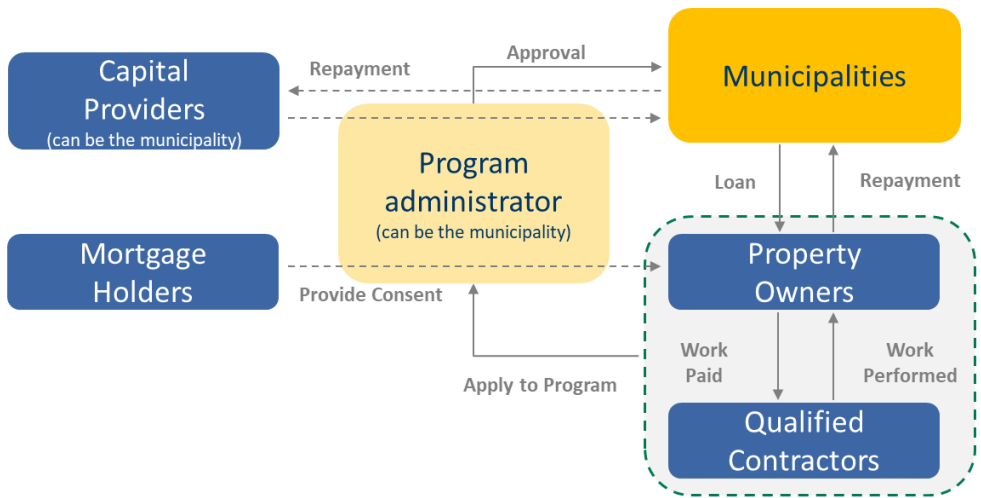


Figure 3: LIC administration

The first LIC programs originated in the U.S., between 2008-2010 and were primarily administered by municipalities with limited uptake. Today LIC programs include a mix of third party and public administrators. Each model shifts risk and responsibilities to different entities and include unique elements that influence outcomes and potentially different results. Choosing alternative mechanisms can expand access and increase project attractiveness but must be careful to optimize the use of program funds. The administrative model chosen also affects the time it takes to get the program off the ground.

LIC administrative and finance models are described in Table 1.

Table 1: Summary of LIC administrative models

LIC Model	Municipal Administration	Municipal/3 rd Party Administrator	3 rd Party Turnkey
Municipal Role	- Deliver all program components, which may include customer service, application processing and approval, tax collection, financial and legal advising, training to approved contractors. - Capital comes from municipal reserves, bonds, or other sources.	- Subscribe to the program and register the LIC assessments and collect the repayments - Capital comes from municipal reserves, bonds, or other sources	Register the tax assessments and collect the repayments
Partners Role	- Rebate program administrators may coordinate with LIC programs - Energy Advisors may perform home evaluation - Contractor networks may be developed	- Program administered by a third-party responsible for marketing and promotion, training, and contractor registration. - Program Administrator may underwrite the loans and issue payments (or contract that to a loan originator / servicer) - Rebate program administrators may coordinate with LIC program - Energy Advisors may perform home evaluation - Contractor networks may be developed	- Program administered by a third-party responsible for marketing and promotion, training, and contractor registration - Program Administrator may underwrite the loans and issue payments (or contract that to a loan originator / servicer) - Private capital provided by third parties - Rebate program administrators may coordinate with LIC program - Energy Advisors may perform home evaluation - Contractor networks may be developed
Examples	Toronto HELP, Halifax Solar City, Yukon REPT PACE, Sonoma County Energy Independence Program	Clean Foundation (NS), PACE Maine	California HERO, YGreene, CSCDA Open PACE

LIC program experience in other jurisdictions

We present three case studies, including Toronto's Home Energy Loan Program (HELP), PACE Maine, and California HERO. Each demonstrate the various LIC administrative models (government vs private), broad vs prescriptive measures, the benefits and challenges of each and the uptake achieved. These along with other programs Dunsky has studied are used to help establish the model inputs and parameters for Halton Hills.



Program Features	Toronto HELP Details ²
Administrative Model	Municipal
Source Capital	Municipal
Year Started	2014
Financing Volume (as of 2018)	\$2.8M (CAD)
Annual Number of Projects	~40
Average value	\$18,500 CAD
Repayment Terms	up to 20 years
Interest Rate	2.0 - 3.5%
Administration Fee	2% of project value, paid over repayment term
Eligibility	• Own a detached, semi-detached, or rowhouse • Ensure all property owners on title consent to the Program • Be in good standing on all property tax and utility payments to the City for the past five years • Written consent from their mortgage lender
Requires Home Energy Assessment	Yes (pre- and post- upgrades)

HELP launched in 2014 funded and administered by the City of Toronto. Initially established as a three-year pilot and funded with \$10M from the City's reserve funds, the pilot continues today. The HELP program is delivered by four staff, who are responsible for conducting outreach, processing the applications, and supporting participants throughout the process. HELP participation has been lower than the targeted number of homes (330/year) due to several factors, notably the mortgage lender consent requirement. A 2017 evaluation conducted by Dunsky found that over 30% of HELP applicants did not proceed due to a failure to obtain mortgage lender consent. There has been renewed interest in the program in recent years; after a 2017 pilot evaluation and the City implementing several recommendations (e.g., increasing eligible measures, improving processes) applications in 2018 were more than double those received in 2017. To date the program has not been self-sustaining financially; however, it has advanced various City public policy priorities, like improved economic prosperity, public health, and quality jobs & livable incomes.

HELP Key features / Lessons Learned

- Simple underwriting criteria (property tax repayment history, etc.)
- Low risk nature (due to senior lien position) enables the provision of long-term financing at competitive rates. However, concerns from mortgage lenders and insurers over senior lien position of LIC hinders residential program deployment
- Complex program structure, requiring coordination between several stakeholders
- Deep retrofit requirements can inhibit uptake

² Dunsky. 2019. City of Toronto HELP-HiRIS Opportunity Assessment Report.



Program Features	Efficiency Maine Details ³⁴
Administrative Model	Municipal/3 rd Party Administrator
Source Capital	Municipal
Year Started	2011
Annual Financing Volume (FY 2019)	\$7.2M (CAD)
Annual Number of Projects (FY 2019)	761
Average value	\$9,523 (CAD)
Repayment Terms	up to 15 years
Interest Rate	4.99%
Administration Fee	None
Eligibility	• Maximum Debt-To-Income Ratio: 50% • Bankruptcy, Foreclosure, Repossession must be fully discharged. No outstanding reverse mortgages, default mortgages foreclosure or delinquency • Must undertake at least one upgrade eligible for an Efficiency Maine Rebate
Requires Home Energy Assessment	No (however residents can take advantage of a \$400 rebate for air sealing and energy assessment)

The statewide agency responsible for energy efficiency, Efficiency Maine, administers the program, which includes Property Assessed Clean Energy (PACE) loans and unsecured Home Energy Loans. Cities subscribe to the program and register the PACE assessments. Efficiency Maine is also responsible for marketing and promotion, providing comarketing materials, training, and registration to contractors.

The program leverages federal government funds. A \$20M U.S. revolving fund was established through a federal government grant (ARRA funds) and is administered by the private financing group AFC First, who is responsible for underwriting the loans and issuing payments. The PACE lien is junior to primary mortgages and existing liens.

All upgrades must be installed by an Efficiency Maine Residential Registered Vendor and participants have the option to include health and safety measures if necessary, to complete upgrades; non-energy related measures cannot exceed 25% of the loan.

The program went through changes in 2014, adding incentives back into the program as well as the option of unsecured loans. Additional changes occurred in 2018 including streamlining the application process,

³ <https://www.efficiencymaine.com/at-home/energy-loans/>

⁴ Efficiency Maine Trust. Efficiency Maine FY 2019 Annual Report. Accessed at https://www.efficiencymaine.com/docs/FY19-Annual-Report_final.pdf

historically high-rebate volumes and an expansion of eligible measures resulting in a significant increase in year over year participation (497 projects in FY2018 and 761 in FY 2019)⁴.

PACE Maine Key Features/Lessons Learned

- A third-party can help to minimize municipal resources and costs to administer and market the program
- Third-party program administrator can allow multiple municipalities to offer the same program
- A streamlined application process, no home energy assessment requirement and allowing non-energy related measures can increase program attractiveness
- Leveraging funding from other sources (e.g., federal government, FCM) to establish a revolving fund can avoid the need for municipal capital
- PACE lien junior to primary mortgages and existing liens can help mitigate mortgage lender concerns, but increases risk to municipalities



Program Features	California HERO Details ⁵
Administrative Model	3 rd Party Turnkey
Source Capital	Private (Renovate America)
Year Started	2014
Financing Volume (as of 2019)	\$1.8B (CAD)
Annual Number of Projects	~11,500
Average Value	~\$26,250 (CAD)
Repayment Terms	5, 10, 25, 20 years
Interest Rate	6.75-8.35%
Administration Fee	1. Closing fee: 4.99% of project value 2. Interest rider: approx. 3% (included in the interest rate)
Eligibility	• Own a detached, semi-detached, or row house; • Ensure all property owners on title consent to the Program; • Property tax status - No late mortgage payments over 12 months
Requires Home Energy Assessment	No

⁵ <https://www.treasurer.ca.gov/caeatfa/pace/activity.asp>

California leads the Residential PACE market with over \$4B in volume⁶. California HERO is part of the second generation of PACE programs in the state, and it pioneered the private program administration model, as well as leveraging private capital. The key differentiating element of the HERO program lies in its quick web-based approval process that enables large volumes.

The HERO program is also renowned for its marketing training and tools to contractors; contractors use the HERO program to sell their services to homeowners. The HERO program has been successful in accessing private capital and establishing a financially viable model; driving large volumes and aggregating PACE projects. The role for municipalities is limited to registering the tax assessments and collecting the repayments. Joint powers authority also allows multiple municipalities to offer the same program.

However, in 2017 concerns over lack of consumer protections related to PACE resulted in the U.S. Department of Housing and Urban Development (HUD) announcing that properties encumbered with PACE obligations are no longer be eligible for FHA-insured forward mortgages⁷. The California state treasury established a \$10M loan loss reserve to cover mortgage lender losses resulting from defaults.

California also enacted PACE consumer protection legislation in 2017 (Senate Bill 242 and Assembly Bill 1284). In addition to codifying enhanced consumer protection, the California Department of Business Oversight was given regulatory authority over PACE providers and will serve as a watchdog.

California PACE Key Features/Lessons Learned

- High interest rates do not hinder uptake
- Loan loss reserves may be required to mitigate mortgage lender concerns
- De-risking can unlock a market
- Third-party program administrator can allow multiple municipalities to offer the same program
- Effective marketing, contractor origination, an easy application process and limiting barriers to entry (e.g., no home energy assessment) can increase participation
- Significant volume required to attract private investors

⁶ <https://pacenation.org/pace-market-data/>

⁷ HUD. Mortgagee Letter 2017-18. December 7, 2017. <https://www.hud.gov/sites/dfiles/OCHCO/documents/17-18ml.pdf>

Benchmarking

Benchmarking the three LIC programs, HELP's program volumes are much lower than the other programs. While the average loan size is comparable across HELP and Efficiency Maine, they are smaller than the average California HERO loan. Similarly, the interest rates (including administrative costs) are similar across HELP and Efficiency Maine, while California's HERO program is significantly higher. HELP's current administration costs per participant are comparable to the other jurisdictions.

Table 2: Benchmarking LIC Programs Summary

	HELP	Efficiency Maine	California HERO
Annual Participation	40	~760	~11,500
Number of Single-Family Dwellings ^a	402,535	528,983 ⁸	8,206,562 ⁸
Annual Market Penetration Rate	0.01%	0.14%	0.14%
Average Loan	\$18,500	\$17,500	\$26,250
Interest Rate	2% - 3.5%	4.99%	6.85% - 8.35%
Admin Costs per Participant ⁹	\$5,000	\$5,100	\$5,200
Revenue per participant	2% project value paid over loan term	\$0	4.99% project value upfront + approx. 3% interest rider (included in the interest rate)

^a This includes the technical market potential, including homes that are not likely to participate (e.g., newer homes, projects not cost-effective, low-income, etc.)

Potential LIC risks and mitigation strategies

Various factors (e.g., objectives, other strategies deployed, program design) will affect what a program can achieve and the associated impacts. We identify ten potential LIC risks and mitigation strategies in the table below.

⁸ Data for number of occupied single-family homes (one-unit detached homes) per state sourced from American FactFinder (<https://data.census.gov/cedsci/>).

⁹ Dunskey. 2019. City of Toronto HELP-HiRIS Opportunity Assessment Report

Table 3: Potential LIC risks and mitigation strategies

Potential LIC Risks	Description	Mitigation Strategies
Securing program capital	Municipalities can fund LICs in several different ways: using their own reserves, issuing bonds, borrowing from other sources, or using third party capital. Programs must minimize impacts to the tax base, debt servicing limits and municipal cashflow.	Increase effectiveness and use of limited public funds by leveraging private capital. This may require a municipality to demonstrate proof of concept first with their own funding and/or offering a credit enhancement (e.g., partial loan guarantee or loan loss reserve) to mitigate private investor risk.
High operating costs	LIC administration is intended to be cost-neutral paid by participants and to avoid generating revenue through the general tax base. But that is not always the case if participation is low (e.g., Toronto HELP).	Keep fixed costs low, consider a third-party administrator to share costs among multiple municipalities, and/or explore ways to collect more revenue (e.g., applying or increasing administration fees and/or interest rates).
Municipal capacity to administer program	All municipalities struggle with lack of capacity to plan, design and implement programs in addition to delivering essential/core services. Even with additional funding or knowledge sharing and training, there is often not enough staff to implement planned programs. Additionally, municipalities do not often have the financial expertise to perform underwriting (if required by the program).	Leverage external program partners and/or third-party administrators to help offset the burden placed on municipal resources.
Mortgage lender consent	PACE/LIC programs have been challenged when mortgage lender consent is required. In Toronto HELP (the only program studied that requires mortgage lender consent) mortgage lenders are reluctant to grant homeowner approval because the LIC places primary mortgage lenders in subordinate position in the event of a default.	If possible, avoid requiring lender consent or offer a loan loss reserve to mitigate lender risk.

Potential LIC Risks	Description	Mitigation Strategies
Balancing relaxed underwriting with consumer protection	Without proper design, LIC programs may be inappropriate for lower income homeowners eligible for free or lower cost efficiency programs. The program must also ensure that eligible homeowners can afford the LIC payments and do not become over-leveraged. Further, without establishing consumer protection mechanisms, expensive loans may be pushed by aggressive contractors for projects with questionable savings.	Consumer protection must be a cornerstone of any financing program – especially in the residential sector. PACENation – a U.S. industry group – has established a set of voluntary best practice Consumer Protection Policies that have largely been adopted by PACE program administrators ¹⁰ .
LIC transferability	An LIC is attached to the property, not to the property owner; if the property is sold before the loan is repaid, the new owner can assume the balance of the loan and continue to repay it through the property tax bill. While this is perceived as a benefit, an evaluation of Toronto's HELP program found those who sold their home or who were thinking about this possibility in the future, often view this feature as a disadvantage. Potential buyers see the loan as something the seller should deal with prior to the sale of the home and Realtors want to ensure a seamless sale and typically advise the seller to pay it off before the sale.	Be clear and transparent about the selling and repayment process. Provide information and tools to improve homeowners and Realtors understanding, and manage expectations around the home sale experience. In addition, maintain a list of LIC's imposed on homes, including information on LIC monthly payments, status and end date on the program webpage (similar to Toronto HELP).

¹⁰ See https://www.paceab.ca/resources/07_PACENation_Consumer_Protection_Policies_v2.0.pdf

Potential LIC Risks	Description	Mitigation Strategies
Financing must be part of a broader integrated strategy	Financing itself is only one piece of a successful program and is not sufficient to drive demand alone.	Implement/ other enabling strategies to support the market, including other financial incentives (rebates) and non-finance activities such as: • Linking with other rebate programs. There are existing government and utility initiatives underway that should be factored into the development (e.g., Enbridge, Affordability Fund) • Effective marketing and outreach including education and outreach to raise awareness of the benefits of the EE and RE financing and other programs available to support homeowners. • Creating a positive customer experience. Make it fast, easy and compelling by offering hands-on support and/or a centralized call centre to help homeowners throughout the home renovation journey. Quick, online approval and avoid process “disconnects” where too much of the onus is in the hands of participants. EfficiencyMaine’s credit qualification is online or by phone and homeowners are notified within 3 business days whether they qualify. • Engaging and training contractors. Contractors must be trained and equipped to market the program while in the home at point of sale. They are key influencers and crucial to success.
Trade capacity issues	Trade sector capacity issues (e.g. availability of good contractors) and costs (e.g. trades from larger centres further away increase costs) can create barriers to implementing home energy upgrades.	Support contractor training, including program- and trade-specific training (e.g., NAIMA Insulation Training ¹¹)

¹¹ See <https://www.naimacanada.ca/insulation-training/>

Potential LIC Risks	Description	Mitigation Strategies
Poor performing contractors	Unqualified contractors performing work can create a poor participant experience and may result in energy and GHG savings not materializing if measures are not installed correctly.	• Develop a preferred contractor list that requires specific contractor training, qualifications, credit, customer reviews, and insurance coverages OR leverage existing contractor lists (Enbridge) and official trade directories (e.g., Renomark¹², HRAI¹³ and insulateandairseal.ca¹⁴) • Establish a disciplinary process that includes probation or expulsion of contractors from the program. • Manage, track, resolve and implement preventative actions in response to homeowner inquiries and complaints.
Go broad or go deep	Key trade-offs faced by program administrators is whether to focus on broad market applicability (but minimal complexity and value added) that encourages high loan volume versus a program that supports deeper savings per project and requires a savings to investment ratio of one or greater (i.e. larger, higher-quality projects) but may have limited uptake (see text box below).	Allow for a portion of the LIC to include non-energy related measures ¹⁵ may be more attractive to homeowners that are planning larger home renovation projects and can incorporate EE and RE into the mix.

¹² See <https://renomark.ca/findarenomarkrenovator>

¹³ See <https://www.hrai.ca/>

¹⁴ See <https://insulateandairseal.ca/>

¹⁵ EfficiencyMaine allows homeowners to include health and safety measures, if necessary, to complete the upgrade. Not to exceed 25% of the loan. See <https://www.efficiencymaine.com/at-home/energy-loans/>; California HERO allows homeowners to finance any type of home improvement, including energy efficiency, water conservation and home improvement/comfort (new decks, bath and kitchen upgrades). See <https://www.renovateamerica.com/financing/benji>; The California Residential Energy Efficiency Loan (REEL) program allows up to 30% of loan amount to go toward non-energy improvements. See <https://gogreenfinancing.com/residential>

Savings to Investment Ratio (SIR) is where the energy savings of measures installed are expected to offset the measure or project costs partially or entirely. This will maintain monthly payments near a level homeowners' are accustomed to and ensure loans can be paid off while mitigating cash flow impacts. However, programs that prescribe a Savings to Investment Ratio (SIR) > 1 ¹⁶ need to focus almost entirely on energy saving measures. In this case, a program may lose participants because they cannot finance the project(s) they want to pursue, including a mix of energy and non-energy related projects neglecting other benefits such as thermal comfort, reduced operational hassles and increased property values, thereby discounting the value of the efficiency equipment to the program participant. Moreover, demonstrating the SIR returns adds administrative burden to the applicant, contractor, and program¹⁷.

¹⁶ An SIR is the ratio of the present value of the energy savings divided by the cost of the efficiency measures. An SIR > 1 indicates that the measure or project cost will be offset entirely by the energy savings over the lifetime of the measure.

¹⁷ The Green Jobs Green New York 2017 Annual Report suggests that while NYSERDA 's OBR financing options are favored by applicants the strict cost-effectiveness requirements deem many applicants ineligible.

Energy and Economic Analysis

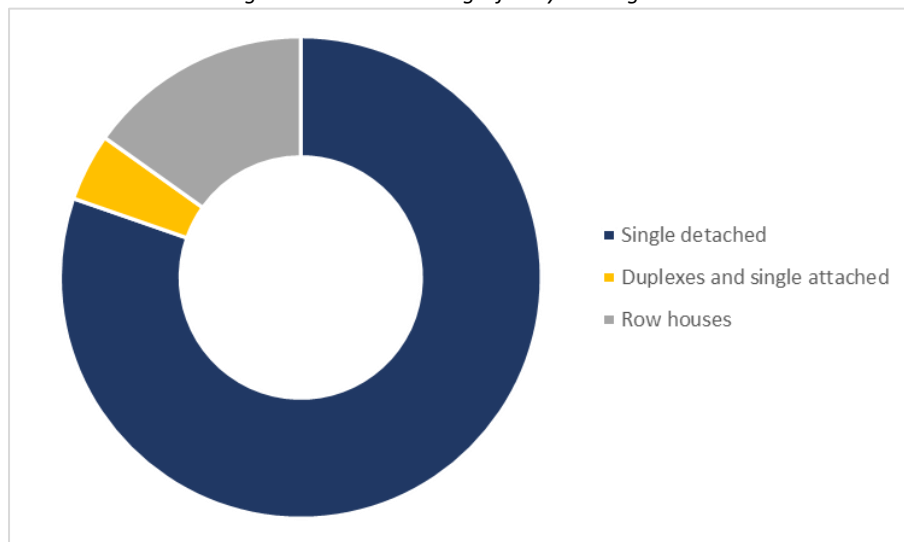
The program plans to start as a pilot eventually expanding to a full-scale program (with a future administrative model yet to be determined). This section presents the estimated pilot and program participation, loan volume, and impacts (energy and GHG emissions savings, economic impacts) to 2030, including costs to administer the program.

This section starts with describing the current single-family housing stock, followed by a summary of key model inputs and assumptions, projected uptake, impacts and administrative costs.

Halton Hills single-family housing market

The single-family housing stock consists of single detached, single-attached/duplexes and row homes with single family detached homes representing the largest proportion of the housing stock (79%). See Figure 4.

Figure 4: Halton Hills single family housing stock



For each housing type, space heating makes up the largest proportion of energy end use, followed by water heating. Space and water heating are dominated by natural gas. Because single family detached homes make up the largest proportion of the housing stock, we present the energy end use and space and water heating fuel mix below for that housing type (see Figure 5, Figure 6, and Figure 7). Single-attached, duplexes and row houses have similar profiles.

Figure 5: Single detached energy use by end use (MJ)

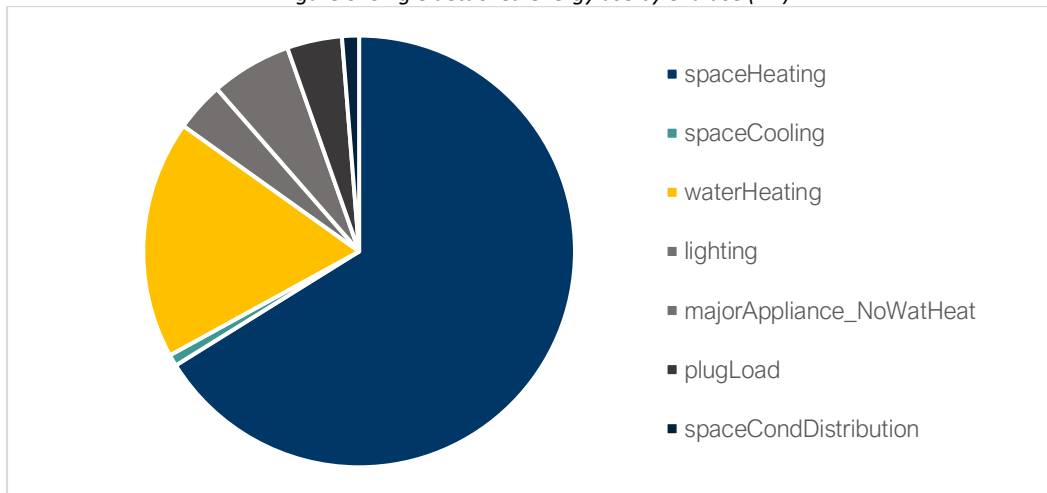


Figure 6: Single-family space heating

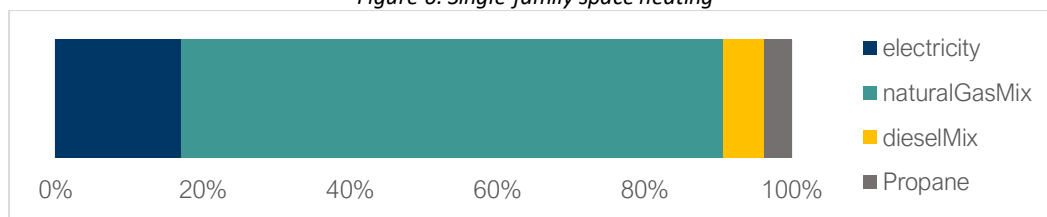
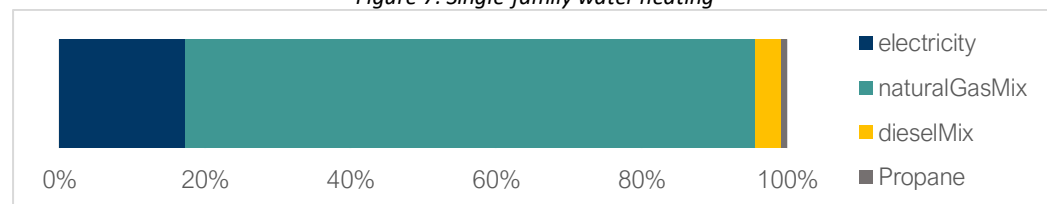


Figure 7: Single-family water heating



Energy and economic analysis inputs and assumptions

Using building stock data and energy use data provided by the Town, based on analysis completed for the Low Carbon Transition Strategy, and the experience of other jurisdictions, Dunsky performed an energy and economic analysis based on the following:

Achievable market potential. Considering the total number of single-family residential homes (detached, attached, duplexes and row homes) we identified the percent that are owner-occupied (86%), the space and water heating type (natural gas vs diesel and propane) and assumed a percent of homes where each retrofit package is technically feasible.

Four retrofit packages. We identified potential energy and GHG reducing measures that would likely be considered depending on the space and water heating characteristics, including fuel switching, medium retrofit and deep retrofit and solar. Each is described below.

	 Fuel Switching	 Medium Retrofit	 Deep Retrofit	 SolarPV
Space & Water Heating	Diesel or Propane	All fuels	All fuels	All fuels
Measures	- Heat pump (central high or low efficiency) - Air Sealing - Insulation (attic and basement) - Fuel switching from water heating	- Heat pump - Air sealing - Insulation (attic, basement, exterior wall) - Space cooling - Water heating - Efficient Windows/ Doors	- Heat pump - Air Sealing - Insulation (attic, basement, exterior wall) - Space cooling - Water heating - Drain water heat recovery - Heat/Energy Recovery Ventilator	- Electrification of water heating - Electrification of space heating (heat pump) - Solar array
Estimated Costs (excludes utility rebates)	\$11,500	\$18,500	\$30,000	\$24,000
Repayment Terms	5 years	10 years	15 years	15 years
GHG Reductions (tCo2e)	4.9	3.2	4.1	4.3

Note: The retrofit packages are illustrative to model estimated economic, energy and GHG impacts. Homeowners will ultimately choose the energy conservation measures that are tailored to their home and preferences. There may be many permutations.

GHG Reductions Do Not Always = Utility Costs Savings

The goal of net-zero carbon by 2030 requires rapid and deep emissions reductions. Inexpensive “low-hanging fruit” can help to reduce emissions, but deeper cuts often incur much higher costs. While some activities appear expensive in the short term (and savings will not entirely offset the LIC payments), as costs for these technologies decrease, and utility costs and cost of carbon increases, these may actually turn out to be low-cost approaches in the long term. Additionally, homeowner decision-making is complex; often not solely based on costs. The Town is surveying homeowners in parallel to identify key motivators that drive homeowner demand for home energy improvements. It will be crucial that program design consider how to communicate openly and transparently all the benefits and costs to ensure homeowners can make informed decisions.

A pilot phase immediately followed by a full program. The pilot phase has been modelled as a regular year and the program is modelled over a 10-year period considering the full market potential. Due to the high levels of commitment required from municipalities and external stakeholders (i.e. contractors or financial institutions), financing pilots tend to be large initiatives. Given the cost and complexity of setting up a financing initiative, the costs to deliver the pilot and program are considered the same.

Program costs. Program costs considered in the model include:

- Initial set up costs
- Staff costs for program administration
- Marketing and outreach costs that vary throughout three different phases of the program
- Supporting enabling strategies (e.g., technical/hands-on support, tools, contractor support, among others), which will be defined and updated during the program design phase
- Defaults from a proportion of program participants

While currently not included in Dunsky's model, other program costs that stem from program design options can be modelled, including subsidies for EnerGuide evaluations, existing rebates offered by Enbridge, additional rebates for measures not covered by Enbridge, and other enabling strategies. These will be discussed with the Town and considered at the detailed design stage. See Figure 14 for program costs).

Capital requirements. We identified yearly capital requirements based on total project costs for different retrofit packages and the associated adoption rate. As early program participants start repayments, reimbursements are rolled-back into the next loan disbursements.

Interest rates. Our model considers different interest rates.

- **Participant interest rate by retrofit package term.** Each retrofit package has a different loan term and can have a different interest rate. For our model we used a participant interest rate slightly higher than the best Home Equity Line of Credit (HELOC) rate available in Halton Hills (3%) assuming the LIC must remain competitive with private finance products available.
- **Interest rate on capital loan for the Town.** Our preliminary modelling assumed that the Town is using its own reserves for capital. Once more information on the source of the capital and the associated rate for the Town, interest accrued to the Town on its loans will be included in the business case.

Market Adoption. Three adoption scenarios were considered based on the experience in other jurisdictions¹⁸. Each scenario is shown in Table 4 as a % of market potential.

¹⁸ The low adoption scenario is based on the early Toronto HELP pilot, the medium adoption scenario is based on a revised Toronto HELP program following pilot modifications and the high scenario is based on the California HERO program.

Table 4: Program adoption scenarios (low, medium, and high)

Adoption Scenario	2021	2030
Low	0.01%	0.20%
Medium	0.10%	0.45%
High	0.30%	1.00%

Note: Not everyone will be interested (or able) to take on financing. However, the Halton Hills program may influence homeowner's to undertake home improvements that choose to finance projects through other sources. For the business case, we only modelled the impacts of an LIC, but the model can be updated at the final program design stage to estimate the program's influence on the broader market.

Projected program adoption

Because the program is new and there is uncertainty as to how the market may respond we present all projections as a range. Estimates can be affected by various factors, including externalities outside the Town's control (COVID impacts, economic conditions); change in political priorities; future programs (continuation of rebate programs and introduction of new financing programs); industry capacity and capability, the effectiveness of marketing and outreach and the size and scope of projects homeowners choose to undertake, among other things.

The estimated yearly and cumulative program participation from 2021 – 2030 based on the three adoption scenarios are shown in Figure 8 and Figure 9, respectively.

Figure 8: Yearly program participation

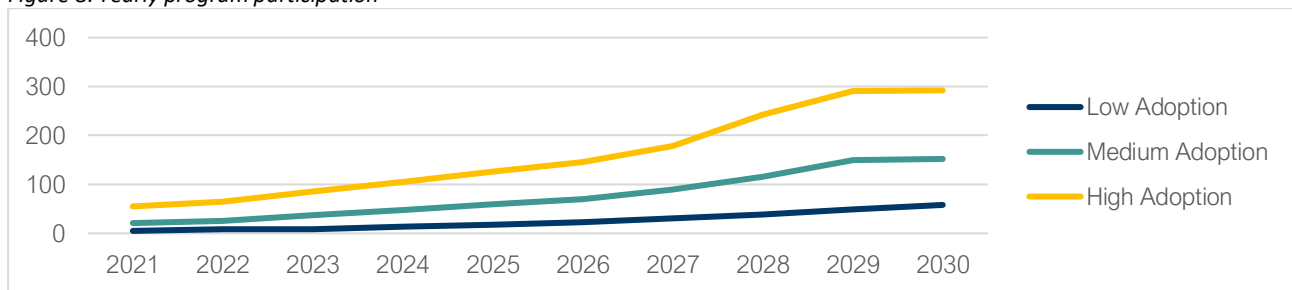
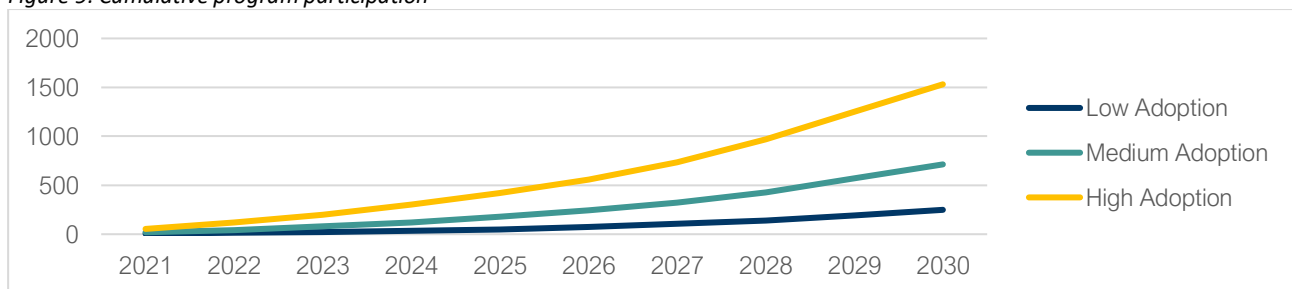


Figure 9: Cumulative program participation



The estimated yearly and cumulative adoption by retrofit package in the medium adoption scenario is shown in Figure 10 and Figure 11.

Figure 10: Yearly program participation by retrofit package for the medium adoption scenario

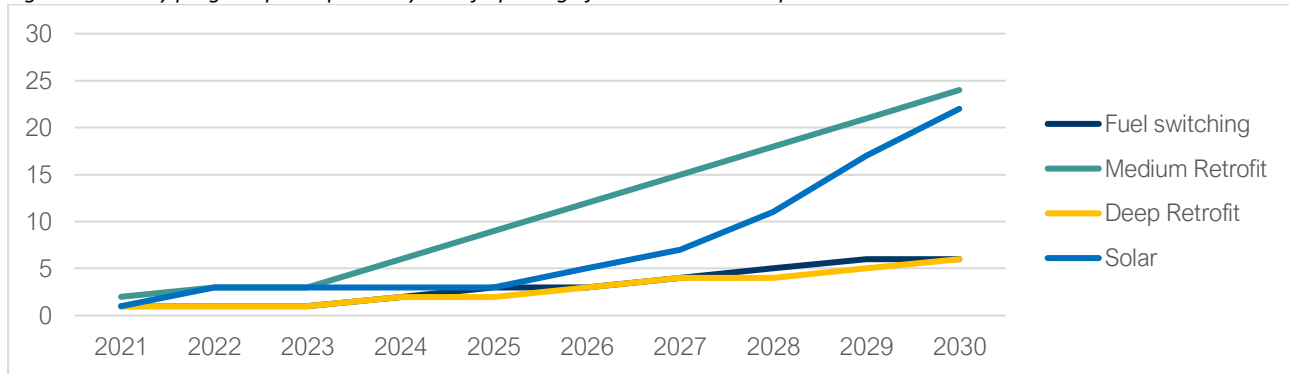
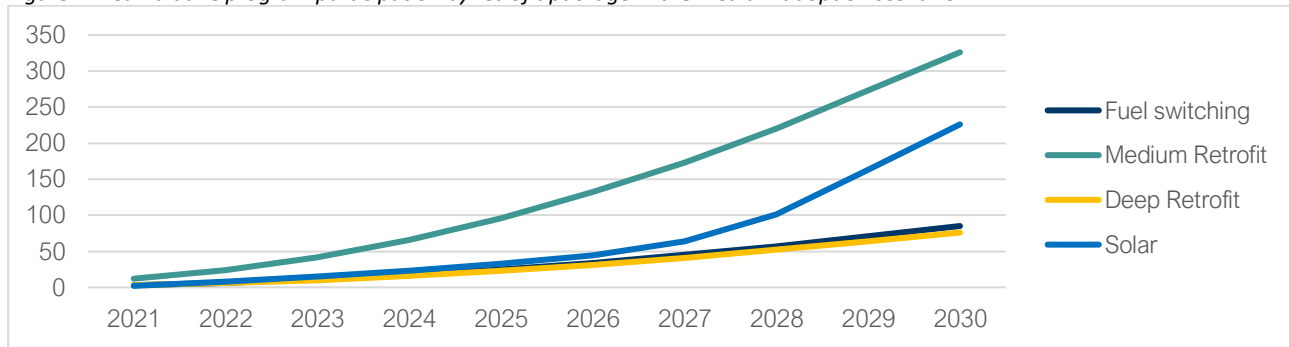


Figure 11: Cumulative program participation by retrofit package in the medium adoption scenario



A few notable observations can be made:

- The **medium retrofit package drives program participation** as it covers the largest proportion of homes and is likely attainable for most.
- There is a **high interest in solar**, as experience in other jurisdictions has shown (e.g., Halifax Solar City), and solar costs are expected to decrease over time. Although the model does not attempt to determine the rate, and degree to which costs will decrease, the model assumes solar will help drive participation.
- **Deep retrofit participation is lower** based on what has been seen in other programs. It can be explained by high upfront costs, difficulty to perform and lower number of homes for which retrofits are technically feasible.
- **Fuel switching participation is lower as the market is much smaller**; this retrofit package is specific to homes that currently use propane or diesel for space heating (representing 9% of the market). A subset of these homes uses these fuels for both space and water heating.

Projected program impacts

The estimated program impacts for each scenario are shown in Table 5. The lower bound assumes that the program is relatively lean on program enhancements that will further reduce barriers. Program design considerations (i.e., integrating financing into a broader EE and RE ecosystem) could increase program adoption and associated impacts (as illustrated in the medium and high adoption scenario).

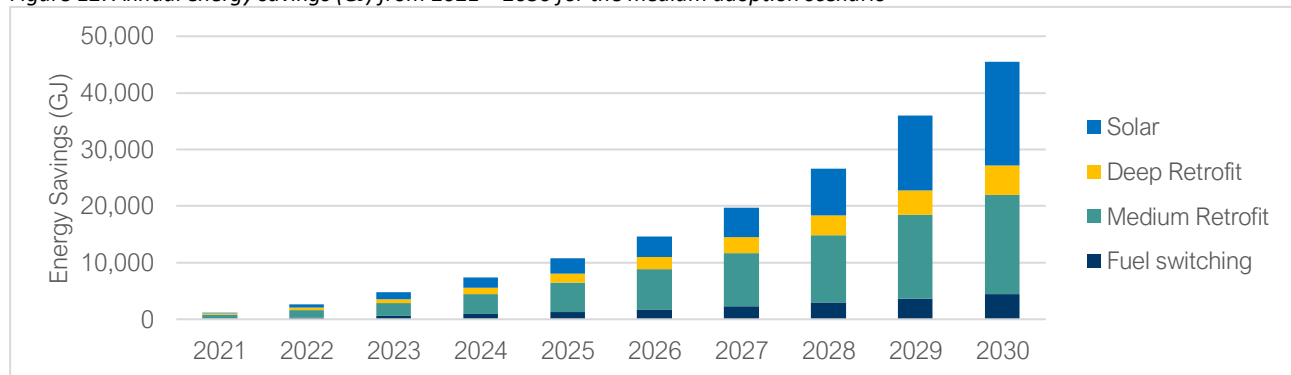
Table 5: Preliminary estimated 2030 cumulative impacts for low, medium, and high adoption scenario from 2021 - 2030

Impacts	Low	Med	High
Number of program participants	250	720	1,530
Loan disbursement (M)	\$5	\$14.7	\$31.1
Energy impacts (GJ)	15,650	27,190	95,410
GHG impacts (tCO2e)	980	1,810	5,800

GHG savings represent a 1% - 5% reduction in residential building GHG emissions relative to the 2016 baseline¹⁹.

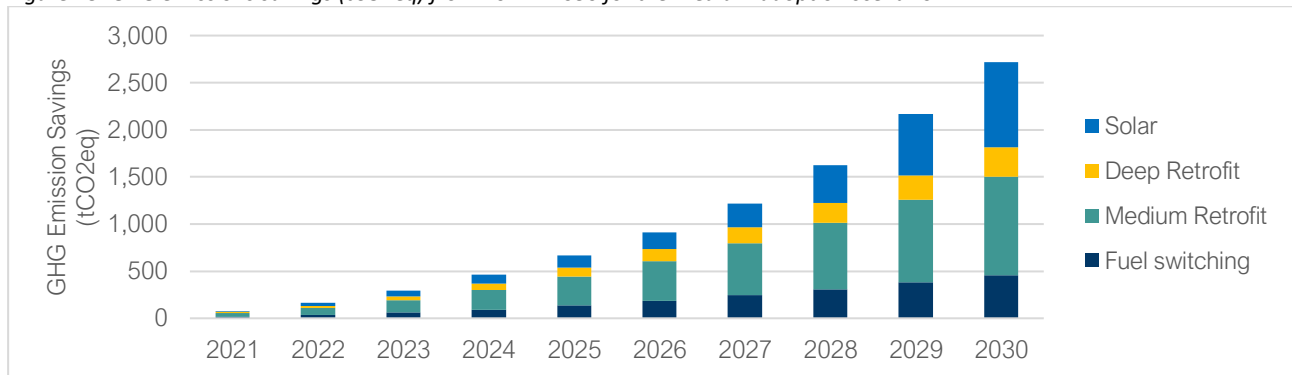
The estimated annual energy and GHG emissions savings for the medium adoption scenario are illustrated in Figure 12 and Figure 13, respectively.

Figure 12: Annual energy savings (GJ) from 2021 – 2030 for the medium adoption scenario



¹⁹ The Halton Hills Reference Scenario for the Low-Carbon Transition Strategy shows that 2016 baseline residential sector emissions are approximately 120 ktCO2e.

Figure 13: GHG emissions savings (tCO2eq) from 2021 - 2030 for the medium adoption scenario

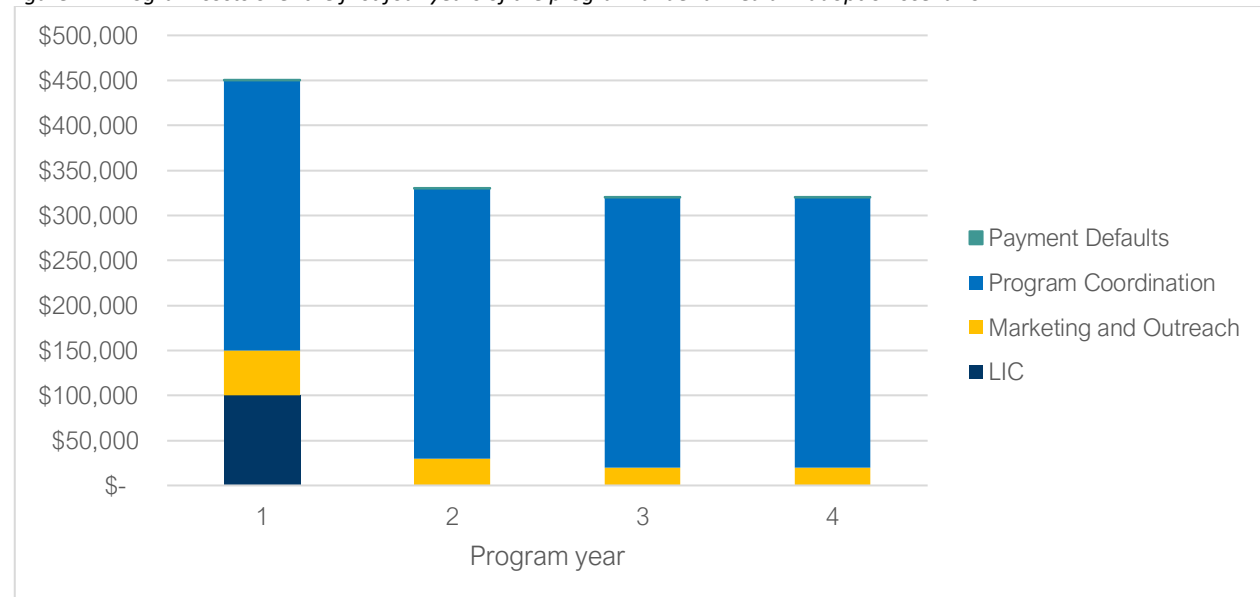


The targeted fuel switching retrofits are interesting in terms of GHG reduction. They have been calculated specifically to account for the Town's mix of energy, assuming the diesel displaced is purely 'fossil' (i.e. not renewable or bio).

Administrative costs and resource requirements

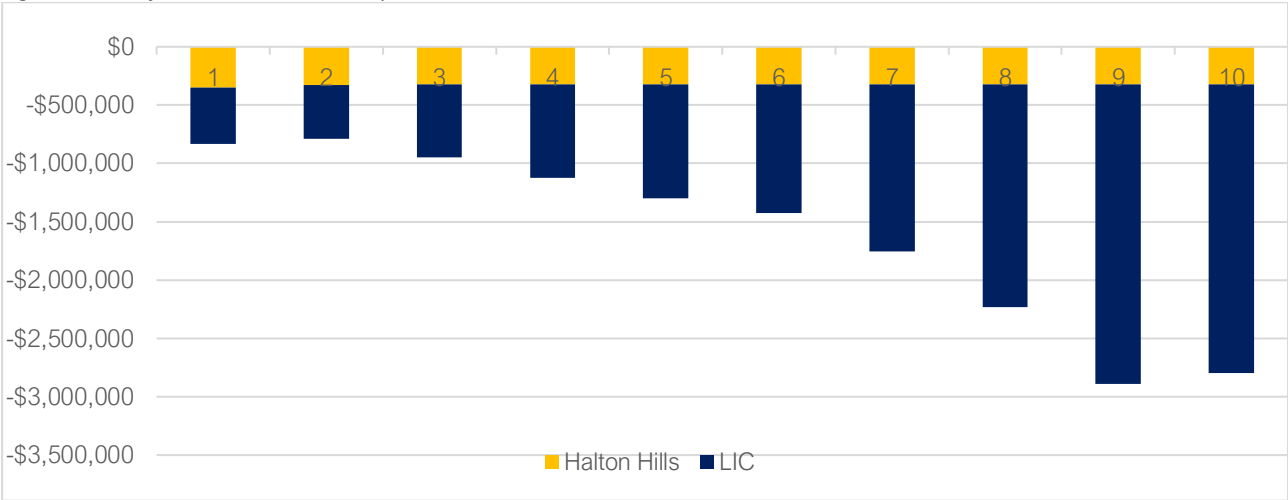
The cost to administer the program in the first four years is shown in Figure 14. An initial one-time investment to set-up the LIC program will be required in the first year. Currently, costs are expected to be moderate under a medium-adoption scenario. To achieve higher participation the Town may need to make greater investments and LIC capital requirements will increase.

Figure 14: Program costs over the first four years of the program under a medium-adoption scenario



The program's first ten years cashflow under the medium adoption scenario is shown in Figure 15.

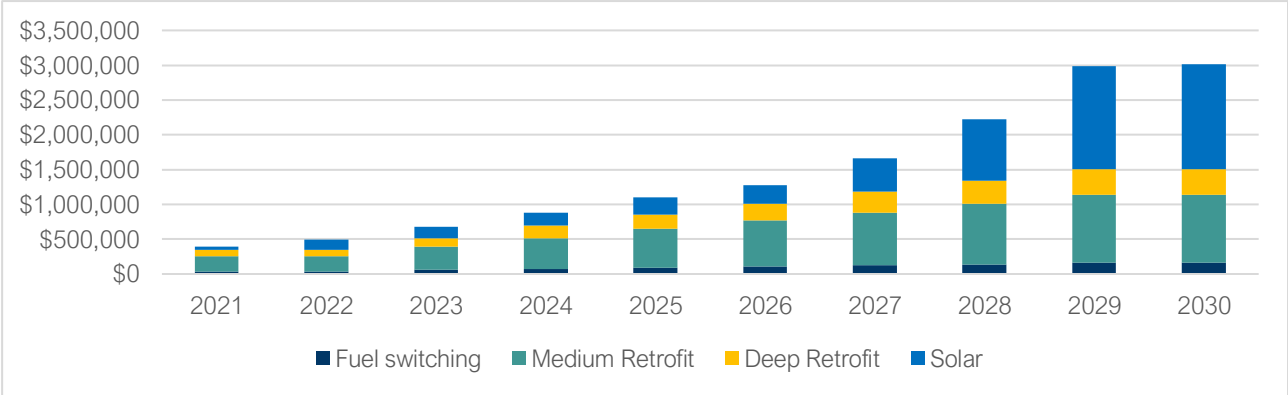
Figure 15: Cashflow in the medium adoption scenario



For a medium adoption scenario, the capital requirements for loans accounts for the largest proportion of the program’s cashflow requirements. The total yearly cashflow needed increases over time to close to \$3M, which is driven by accelerated participation. The cashflow requirements are slightly lower than the total disbursement of loans, as loan reimbursements from past participants can be used to fund new projects.

Figure 16 shows the annual loan disbursements from 2021 to 2030 under the medium adoption scenario. Participant loan disbursements increase steadily over time. This is linked to the discussion above regarding cashflow whereby the capital requirement decreases as the LICs are repaid and funds are recirculated.

Figure 16: Annual loan disbursements under the medium-adoption scenario



Qualitative benefits

While not quantified here, the program is expected to achieve additional benefits, including:

- Increased economic activity (number of jobs created or supported, more skilled and qualified workforce),
- Improved homeowner comfort (e.g., fewer drafts in winter, maintain more constant temperatures in the summer and winters)
- Improved health and safety (e.g., improved air quality)
- Improved resiliency when non-energy related measures are installed (e.g., flood mitigation)
- Improved housing stock and home values
- Reduced energy poverty

These impacts can be captured after the program has launched through surveys with program partners, contractors, homeowners, and other local stakeholders. These benefits should be reported alongside the quantitative impacts.

Conclusion and Next Steps

An LIC financing mechanism will contribute to the Town's goal to reduce energy use and associated GHG emissions in the residential building sector saving between 15,650 - 95,410 GJ in energy and 980 tCO₂e - 5,800 tCO₂e of GHG emissions by 2030. This represents a 1% - 5% reduction in residential building GHG emissions relative to the 2016 baseline. Additionally, an LIC can address other municipal goals like improving the building stock, increasing affordability, growing the economy, and improving the comfort, health, and safety of the community.

To increase success, an LIC must be part of a broader energy efficiency and renewable energy ecosystem that maximizes coordination and collaboration with other policies and programs (e.g., building codes and standards, rebates, etc.).

It is important to note that financing programs can be challenging to deliver, requiring flexibility and iteration to get right. Leveraging the experience of others and considering how several program design decisions (e.g., eligible measures, savings to investment ratio, underwriting, effective marketing, program complexity, contractor engagement, etc.) may influence program uptake and impact will ensure pilot success.

FINANCING MUST BE PART OF AN INTEGRATED APPROACH

To meet the Town's ambitious objectives financing must be part of an integrated strategy along with other policy and program levers outlined in the Mayor's Community Energy Plan and the new Low-Carbon Transition Strategy (under development). These include, continued focus on intensification, green development standards, incentives, etc.

After finalizing the business case report, the program design will evolve through the following steps:

- **Internal Staff Workshop.** We will meet with staff to present the summary findings in a two-hour virtual workshop. Engaging key Town staff facilitates good program design and sets the stage for successful delivery by identifying internal considerations to operationalize and securing early buy-in. The purpose of the first workshop will be to present a summary of findings from the background review, energy model and economic analysis, and the preliminary program concept.
- **Draft Program Design.** The program design report will set out all major program components including participant and measure eligibility, financing terms, program theory logic model, applicant requirements, program administration and implementation, etc.
- **Feedback on Draft Program Design.** We will capture feedback on the draft program design through a second virtual workshop with Town staff and up to five targeted interviews with external stakeholders.
- **Finalize Program Design.** Based on feedback from Town staff, supplemented with targeted interviews, we will update and deliver the final program design report.



This report was prepared by Dunsky Energy Consulting. It represents our professional judgment based on data and information available at the time the work was conducted. Dunsky makes no warranties or representations, expressed or implied, in relation to the data, information, findings and recommendations from this report or related work products.