

**Town of Oakville
Home Energy Retrofit
Feasibility Study**

in support of

Oakville's Community Energy Strategy

prepared for

**The Town of Oakville
and
Oakville Enterprises Corporation**

by



July 28, 2022

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Acknowledgements

The Home Energy Efficiency Retrofit program was identified as a Priority Project (or Project) of the Oakville Community Energy Strategy (CES) and is being evaluated under the framework developed by **Future Energy Oakville (FEO)**. FEO's mission is to facilitate the holistic implementation of Oakville's Community Energy Strategy.

The Oakville Home Energy Retrofit Feasibility Study (Study) was completed by Garforth International Canada Inc. A **Project Working Team (PWT)** was formed to complete and manage the project. .

The PWT consisted of members from the Town of Oakville's staff, OEC and the consulting partners at Garforth International Canada Inc.

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The Project Working Team would like to acknowledge the efforts of various stakeholders who gave their time and shared their expertise in providing meaningful feedback to the development of this Feasibility Study including members of the local contractor community and hundreds of Oakville residents and Homeowners, along with individuals from the investment community.

The preparation of this Study was carried out with assistance from the Government of Canada and the Federation of Canadian Municipalities. Notwithstanding this support, the views expressed are those of the authors, and the Federation of Canadian Municipalities and the Government of Canada accept no responsibility for them.

About This Report

This report is the documentation of a Technical Feasibility Study following on the recommendations of the Community Energy Strategy and the Buildings Efficiency Priority Project of Future Energy Oakville.

Described as a Business Case when Oakville Town Council received and approved an update to the Community Energy Strategy in April 2021. The update called for the Town of Oakville and Oakville Enterprise Corp., on behalf of Future Energy Oakville to act as convener to “*complete a Business Case for establishing a company to deliver energy retrofits for homes and buildings in Oakville.*”

The Business Case herein sets out to define the technical feasibility of a program framework that seeks to retrofit up to 80% of Oakville’s existing residential building stock. It provides analysis and stakeholder engagement to support a set of assumptions that define the framework.

Although the Business Case identifies a framework that allows for a determination of technical feasibility, it is not an effort to design the specifics of a program that is understood as the next step, to be decided by the FEO, based on input from this Study. This next step is referred to in this Study as the Business Plan that will define the Achievable Potential to an Oakville Home Energy Retrofit Program.

The Federation of Canadian Municipalities (FCM) has provided financial support for this Study and is anticipated to provide support for the next stage of developing a Business Plan under their Community Energy Efficiency program.

To avoid confusion with semantics, this report mainly refers to both the Business Case and Technical Feasibility Study as simply the “Study”

The report is structured as follows:

Section 1.0 Study Summary provides an overview of the entire Study along with conclusions and recommendations.

Section 2.0 Study Policy, Planning and Governance Context describes the policy basis and the governance and oversight framework for developing this Study.

Section 3.0 Study Detail provides further detail on the Study’s assumptions and findings.

Section 4.0 Program Framework describes the basic elements of a potential Home Energy Retrofit Program, including process flow, financing/lending requirements, program structure etc. that set boundaries for this Study, as well as informing the next-step development of a Business Plan. The Study uses the approved strategic framework from the CES.

Section 5.0 Next Steps – Business Plan outlines suggested next steps for the Business Planning process to determine the achievable potential of an Oakville Home Energy Retrofit Program.

Appendices provide the highest level of detail in this Study for both the analytical and stakeholder engagement components of the work. Where appropriate, specific references to the Appendices are made in the body of the report.

1.0 Study Summary

1.1 Background

At a special Council meeting held on February 25, 2020, Oakville's Town Council made an historic leap forward in taking action on climate change by unanimously endorsing the Oakville Energy Task Force's [Community Energy Strategy](#) (CES). The CES establishes community-wide goals for 2041 as the following:

- **Energy Efficiency Goal** – Increase source energy efficiency by at least 40%.
- **GHG Emissions Reduction Goal** – Enable transition to carbon neutrality by reducing greenhouse gas emissions by at least 50%.
- **Economic Goal** – Return at least \$7 billion in cumulative energy cost savings to the community.

Increasing the energy efficiency of existing homes was one of the strategies identified to support these goals. The CES calls for the comprehensive retrofit of 80% of existing homes by 2041¹, with each retrofit achieving a 30% improvement in energy efficiency. To achieve this scale outcome, the CES strategic guidance was the following:

- An Entity will be created to oversee the delivery of retrofits standardized by home age, type, and size.
- The Entity will team with contractors, investors, lenders, and material suppliers to help transform the energy efficiency retrofit market.
- The program will use Local Improvement Charge (LIC) financing and standardized retrofit pricing² to minimize interest costs and simplify transactions.

In 2021, Town Council approved the development of a **Home Energy Retrofit Feasibility Study** (Study), to be co-managed by the Town of Oakville and OEC, to assess the technical feasibility of the home retrofit strategic guidance in the CES. A Project Working Team (PWT) was tasked to oversee the project, to engage stakeholders and to report back with findings and recommendations.

The following key framing goals were used in the Study to ensure the Project met performance levels that clearly support the CES 2041 targets:

- By 2051³ the existing homes sector will be:
 - 60% less carbon intensive
 - 35% more source energy efficient
 - 20% more water efficient

¹ The Council-approved target of retrofitting 80% of Oakville homes is based on the required contribution to the energy efficiency and greenhouse gas emission reduction targets of the Community Energy Strategy. Over 80% of Oakville's 2019 residential building stock is single-detached homes that were built between 1955 and 1997.

² The standardized pricing will be set by the Program once established and will reflect market pricing and cost efficiencies offered by the Program Entity. See Section 4.2.5.1

³ The approved CES was based on a 2041 planning horizon which was the standard planning horizon at the time. The standard planning horizon in 2022 is 2051. The Study is following this revised horizon.

- Homeowners' utility savings will be more than retrofit cost over the 20 years of the assumed LIC-based "financing period".
- Investors & Lenders will receive attractive returns
 - Lenders – Equal to a Provincial 20-year bond rate + 1%
 - Investors – Comparable to a typical municipal utility (*To be clarified in detailed Business Planning phase*)
- Contractors gain sales volume and increased margins
- Town of Oakville is not exposed to unacceptable financial risks

These framing goals guided the Study's analytical and engagement processes.

The purpose of the Study was to investigate the technical feasibility (or "Business Case") of establishing a program to deliver high quality, standardized residential energy efficiency retrofit packages to 80% of Oakville's approximately 81,000⁴ homes (2019) as per the strategy recommended and approved in the Community Energy Strategy.

This Study is essentially a technical potential Study that sets out to answer the question "*Under a defined set of assumptions, can a technical Business Case be made for implementing the Oakville's Community Energy Strategy (CES) – Home Energy Retrofit Strategy that meets reasonable community, market, and economic goals?*" The Study was supported by a grant to the Town of Oakville and OEC from the Federation of Canadian Municipalities (FCM). The scope of the Study, as per the submission to FCM, can be found in Appendix A

The findings of the Study conclude the answer to be a qualified "yes," based on a technical potential analysis. For greater certainty, this conclusion is based on full participation of all eligible homes in Oakville (i.e. technical potential). A Stress Test of Medium and Low penetration rates is provided. See Figure 7 for details. A full range of program design, delivery and related penetration rates would be assessed in a comprehensive Business Plan as recommended in Section 5. The next step will be to identify/establish a Priority Project lead and provide them with adequate resources to complete the due diligence, including supplemental market testing and risk assessment, to develop an investment grade Home Energy Efficiency Retrofit Business Plan. Ideally, this Priority Project lead will be motivated to implement the Program as well.

1.2 Key Elements of a Home Retrofit Program

The potential home retrofit Program has several key elements that have been used to establish a framework, that in theory, has the potential to drive an improved "value proposition" for Homeowners and scale necessary to achieve the CES goals.

1.2.1 Program Operation and Administration

The creation of a new Entity is recommended to administer the ongoing development and implementation of a Business Plan. However, the development of a Business Plan may be completed without an Entity in place and could be overseen by an FEO-directed project lead. While there are a number of viable options for the structure of the Entity, a Municipal Services Corporation (MSC) (explained in Section 4.3) is considered the most feasible structure to manage the Program for the following reasons:

⁴ MPAC has provided residential data in square footage. This data has been analyzed based on averages area of the Study's residential archetypes to determine a total figure.

- It allows for a flexible financing approach that manages municipal liability and better leverages private sector investment and lending.
- An MSC would be better positioned to enter into arrangements with the private sector than the municipality (e.g., contractors, material suppliers and investors).
- The majority of program delivery risks rests with the MSC.
- The Town carries some risk of LIC repayments failure. See Section 1.2.3
- Program borrowing is on the balance sheet of the MSC, not the Town of Oakville
- The MSC is not limited to working within municipal boundaries and can enter into beneficial arrangements with other municipalities in Halton Region or beyond.

There is no major risks to proceeding to the Business Planning stage without an MSC in place other than the delays and administrative expenses of setting up an MSC if a Business Plan identifies that an MSC is the basis for a program.

As recommended in Section 5, the next step is to complete a Business Plan to confirm a path forward for the Oakville Home Energy Retrofit program. This could be undertaken in two ways:

1. The Entity may not be set up before the Business Plan is complete. A Business Plan could be completed as a stand-alone effort.
2. An executing body could be contracted with the intention to do both a Business Plan and delivery of the program with some certainty that they will not be at risk. For example, if a Business Plan is not acceptable to all parties, then the costs can be mostly recoverable. The Study estimates that approximately \$300,000 would be required to establish the Entity and provide it with adequate resources to finalize the Business Plan. The Federation of Canadian Municipalities (FCM) provides support for Business Planning activities under their Community Efficiency Financing Program. While FCM funding may cover part of these planning costs, the Entity may need to find some matching initial investments.

Please note that although the Study indicates an MSC as the most feasible legal form for an entity, it is recommended that the next-step business case acquire a legal opinion regarding the appropriate legal framework for the Entity.

Also note that funding to finalize the Business Plan is distinct from the working capital needed by the Entity following the launch the Project. The Study estimates this working capital to be a maximum of \$1.75M. This is the maximum negative cash flow for the Reference Case as a program moves to break-even (See Figure 6). This could possibly be provided by government financing/granting programs, such as FCM's Community Efficiency Financing program and/or private investors/lenders. This would need to be detailed in the Business Plan.

1.2.2 Standardized Deep Energy Efficiency Retrofit Packages

The current energy efficiency retrofit market for Homeowners and contractors is relatively unattractive. From the perspective of the contractor, the effort to prepare customized proposals is high and the closing rate is low. These low volumes and the fact that every project is specific to each household means that material and labour costs are high. In addition, performance guarantees are challenging to define and manage.

From the Homeowner's perspective, obtaining understandable bids from various contractors is burdensome. They are responsible for finding their own financing based on

their individual credit rating. Generally, the high cost for retrofits typically exceeds the expected energy savings, even over many years. Some of this value gap may be closed by various incentives and subsidies but can add to the transaction's complexity and inconvenience.

The Study assumes no government or utility incentives when determining the costs of retrofit packages. However, it is recommended that they are pursued when developing the program as long as they contribute to the high-level goals of the program. It is anticipated that incentives will have a positive impact on program penetration rates and the resulting cost efficiencies that come from program scale. The Business Plan will assess the level and impact of potential incentives.

The Study assessed a hypothetical solution framework to address these common market challenges by offering Homeowners attractively priced, high-quality, standardized energy retrofit packages with convenient financing and repayment options. Because this offer aims to be more attractive to Homeowners it is assumed it will create higher market volumes and uptake for the Program. However, this is to be further assessed in Business Plan.

Hypothetically, or it is assumed, that the Entity's contractors will benefit from greatly increased and predictable retrofit project flow, and predictable margins. Homeowners benefit from a simplified transaction, guaranteed pricing, lower cost pre-financed retrofits and a simple billing and payment mechanism.

The proposed standardized retrofit packages would be designed by the Entity to target annual energy savings on average of 30% along with at least 20% water savings for Homeowners. The Study's building models confirm these savings can be achieved with existing materials and technology. The Business Plan would aim to standardize package pricing to minimize transaction costs and complexity.

A key challenge to the Study's overall engagement activities, particularly with some stakeholders, is whether enough Homeowners would be interested in a standardized retrofit that would contribute to the penetration rates defined in this Study. Further discussion on penetration rates can be found in Section 1.4.

The Study identifies retrofit package costs, with a program at scale, to be approximately \$35,000. The community survey conducted for this Study (See Appendix I) indicated that approximately 30% of the respondents may have installed, over the past 5 years, some selected energy efficiency measures largely supported by previous or existing government and utility programs.

The Study does not exclude homeowners who have already completed some form of energy efficiency retrofit(s). The next-stage Business Plan will further evaluate how to continue to offer a standardized package while providing credit for the elements of the package already installed by the homeowner.

Although this survey result does not definitively determine the potential uptake of an Oakville Home Energy Retrofit program, it does provide an indication that retrofit cost reductions can have an impact on uptake. These market-impact assessments will be further addressed as part of the final Business Plan and incorporated on the final marketing and sales approach for the Entity.

Delivering comprehensive, standardised retrofits at high volumes to Oakville's Homeowners is a core feature of the recommended approach, designed to drive market

transformation through efficiencies of scale. The significant reduction of non-productive overhead in the typical contractor's business model could reduce the cost of the average retrofit by as much as 30%. Interviews with currently active home retrofit contractors in the region have indicated that this is a reasonable assumption. Cost efficiencies are achieved through:

- reduced selling costs through standardized offerings and pricing;
- elimination of comprehensive, home-by-home pre- and post-retrofit audits;
- elimination of contractors' costs to promote and prepare customized proposals, a high proportion of which fail to turn into orders which contributes to reduced selling costs;
- increased contractor labour productivity;
- volume pricing for key material categories;
- lower cost retrofit financing through consolidation; and
- reduced post-installation rectification costs through rigorous quality control provided by the Entity.

Although the Study's contractor interviews do not definitively determine the potential uptake of an Oakville Home Energy Retrofit program, they do provide an indication that an Oakville Home Energy Retrofit program could contribute to cost efficiencies to the retrofit program. These market-impact assessments will be further addressed as part of the final Business Plan and incorporated on the final marketing and sales approach for the Entity.

1.2.3 Local Improvement Charge (LIC) Financing

Property-assessed financing has the singular advantage of tying the efficiency retrofit investment to the property, eliminating the concern of the Homeowner that their payback period may be longer than the time they will remain (or intend to remain) in the home. This reduces the current Homeowner's risk from the initial investment and increases transparency at time of sale.

It is assumed that attractive interest rates and borrowing terms can be achieved for Homeowners, while eliminating any up-front payments. It is recommended in the Feasibility Study that the Town pass an LIC By-law and enter into an agreement with the Entity that would enable the Town to collect LIC payments on behalf of the Entity.

A recent municipal risk assessment of this approach was completed in a study completed by the Ontario Climate Coalition in collaboration with the City of Vaughan. The Study was funded by FCM. This assessed the risk to all key players, including the Town, as a Municipal Corporation, to be low.

1.2.4 Critical Assumptions

The following are the high-impact factors included in the Study.

- Market uptake – 80% of Oakville's approximately 81,000 homes (2019) as per the strategy recommended and approved in the Community Energy Strategy. *Note – Section 1.4 describes the results of a stress test at Low and Medium penetration rates. Retrofit packages that improve home efficiency by at least 30%*
- Energy efficiency modelled for 30 different residential archetypes (6 types and 5 ages)
- Accuracy of estimated retrofit package costs in both current and transformed markets

- Current and future energy, water, and carbon prices – both higher and lower price outlooks
- Does not exclude customers that have already completed some measures.

1.3 Project Performance Assessment (Reference Case)

Project Performance, as assessed in the Study, can be viewed from four perspectives. It is important to emphasize that there are no subsidies or incentives of any kind included in this assessment:

1.3.1 Entity as an “Energy Efficiency Utility”

Over the time horizon of the Oakville Home Energy Retrofit program, the annual total of all customer payments to the Entity essentially matches the avoided utility (electricity, natural gas, and water) costs in each year, at the higher price outlook. As for any utility costs, the customer payments are sufficient to cover all the Entity costs, including their payments to contractors, financing costs to lenders, and the Entity’s own operating costs and profits and potential dividends to the FEO to supports mandate to oversee the implementation of the CES. Starting in about 2043, the first LIC loans close out and the gap between total annual Homeowner payments and total annual avoided costs widens.

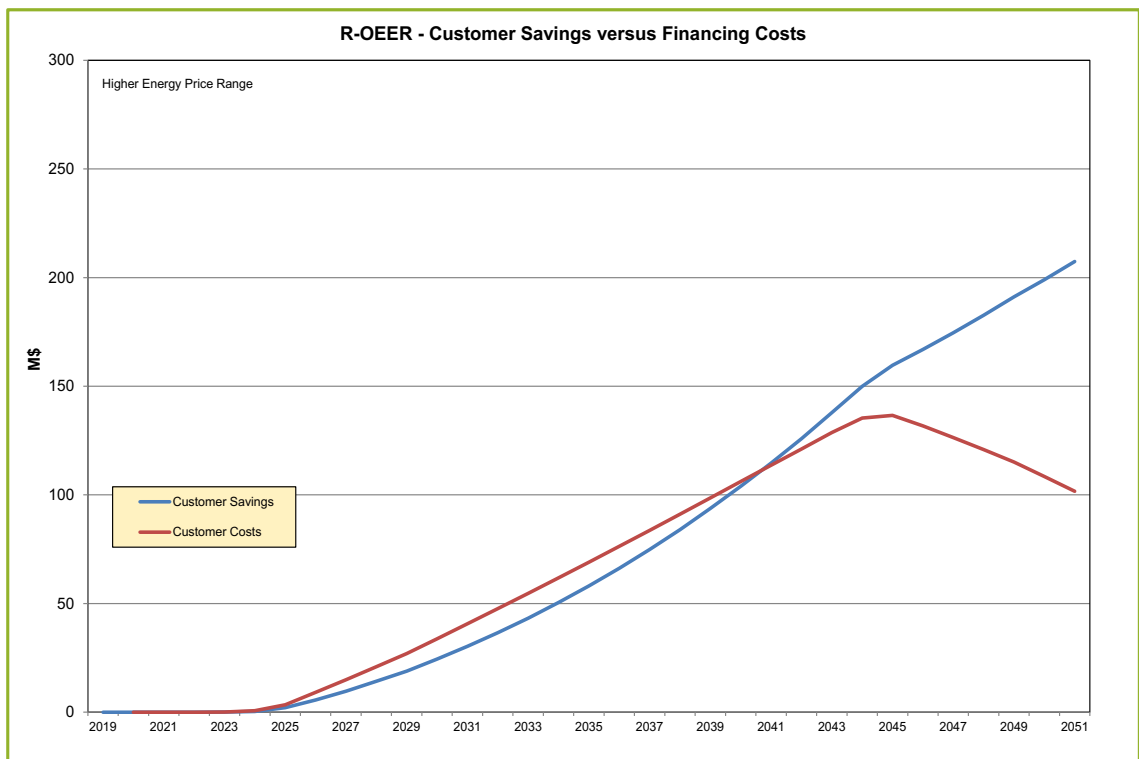


Figure 1 - Reference Case - Customer Savings Versus Financing Costs

1.3.2 Homeowner Perspective

The Study assessment allows a snapshot of the Homeowner payments and avoided costs for any of the 30 archetypes used. Each has a slightly different profile when viewed from the Homeowner’s perspective. A typical example could be a detached home built between 1975 and 1997 implementing a retrofit package in 2025 that includes replacing the gas furnace and air conditioner with higher efficiency versions or replacing both with an air-source heat pump. Figures 2 through 5 illustrate the savings versus costs for these two retrofit scenarios at both the high and low predicted energy costs. Although the “break-even for each scenario varies, there is a positive result when viewed through the lens of the Project Framing Goal of “Homeowners’ utility saving [will be] more than retrofit cost” for both the higher and lower utility price outlooks.

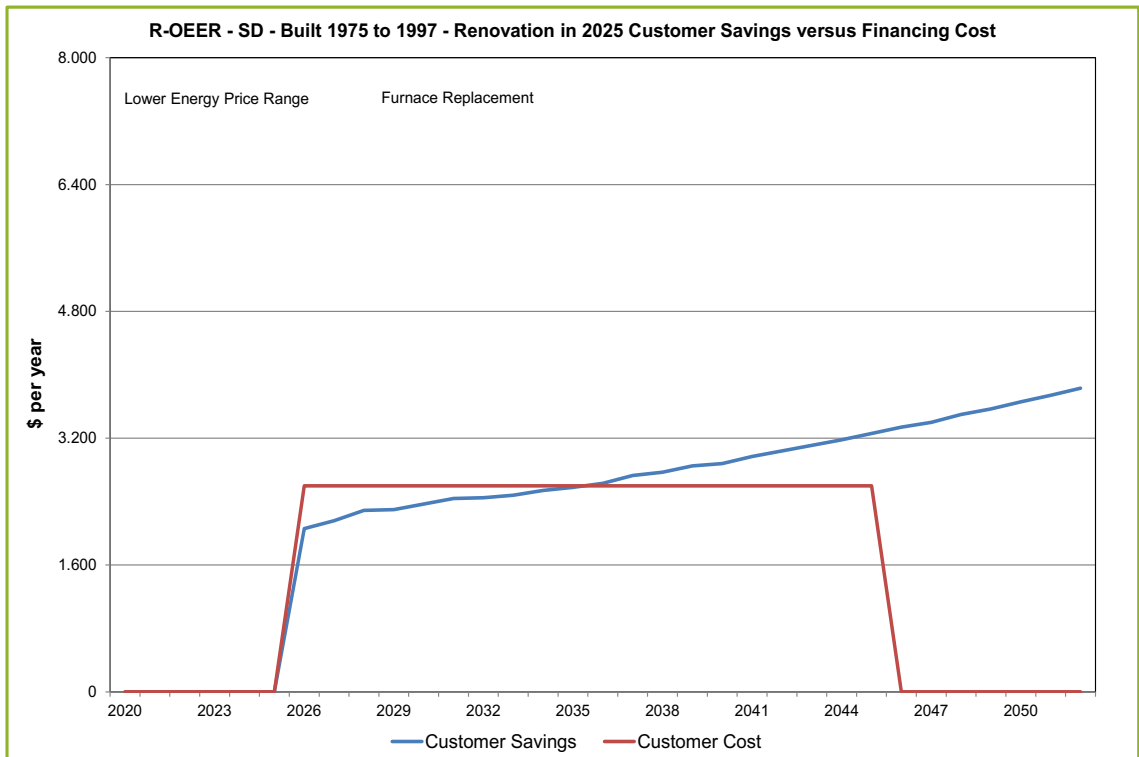


Figure 2 - Reference Case Example, Customer Costs vs Energy Savings (thousand \$) (Low Energy Costs, Furnace Replacement)

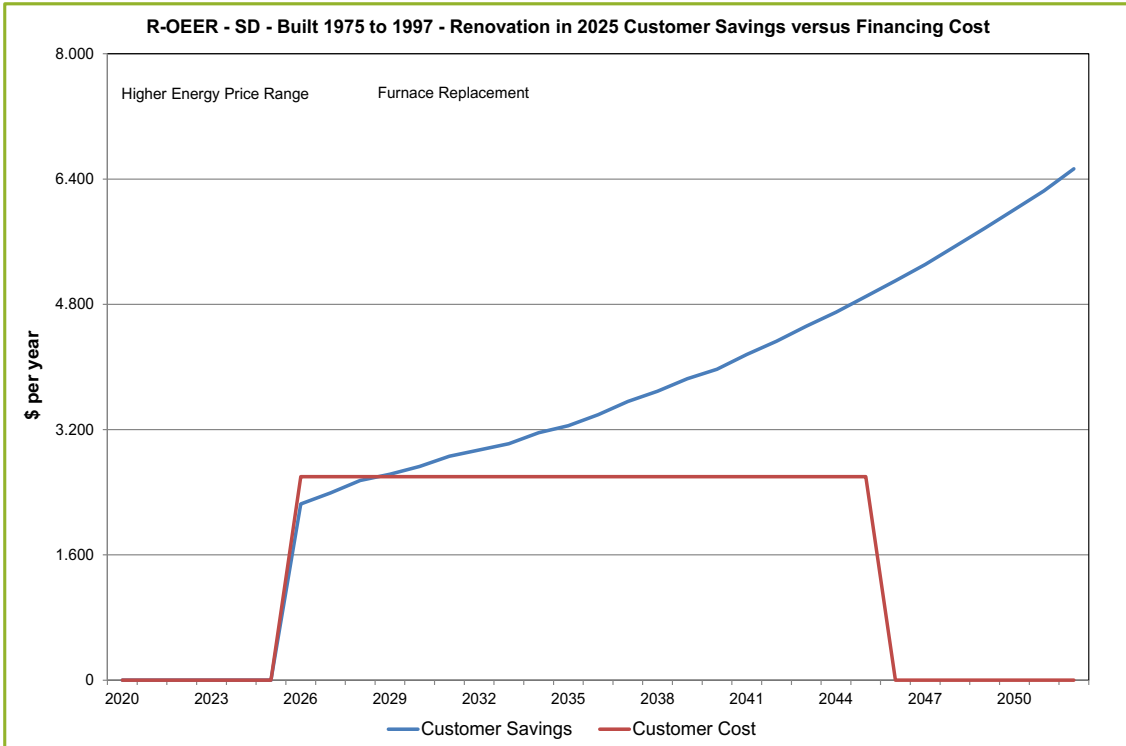


Figure 3 - Reference Case Example, Customer Costs vs Energy Savings (thousand \$) (High Energy Costs, Furnace Replacement)

As further illustration, if the Homeowner opts for a package with a heat pump for heating and cooling, there is still a positive cost benefit at the higher utility price outlook, with the lower price outlook being marginal to negative.

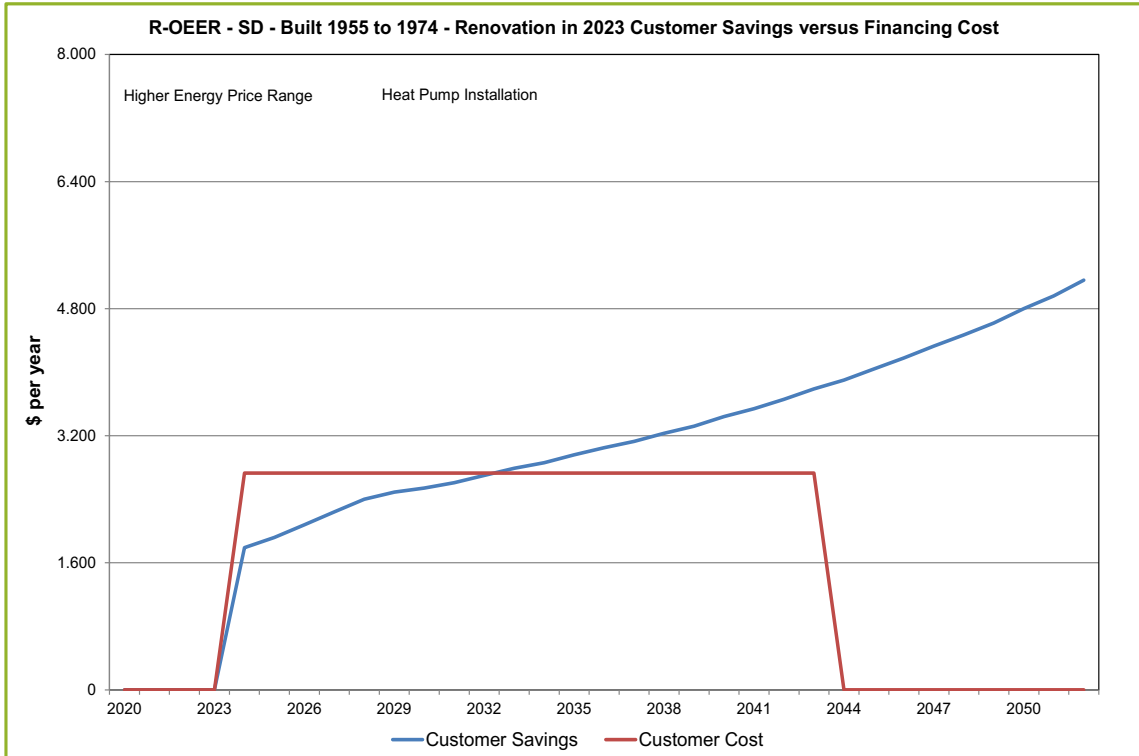


Figure 4 - Reference Case Example, Customer Costs vs Energy Savings (thousand \$) (High Energy Costs, Heat Pump Replacement)

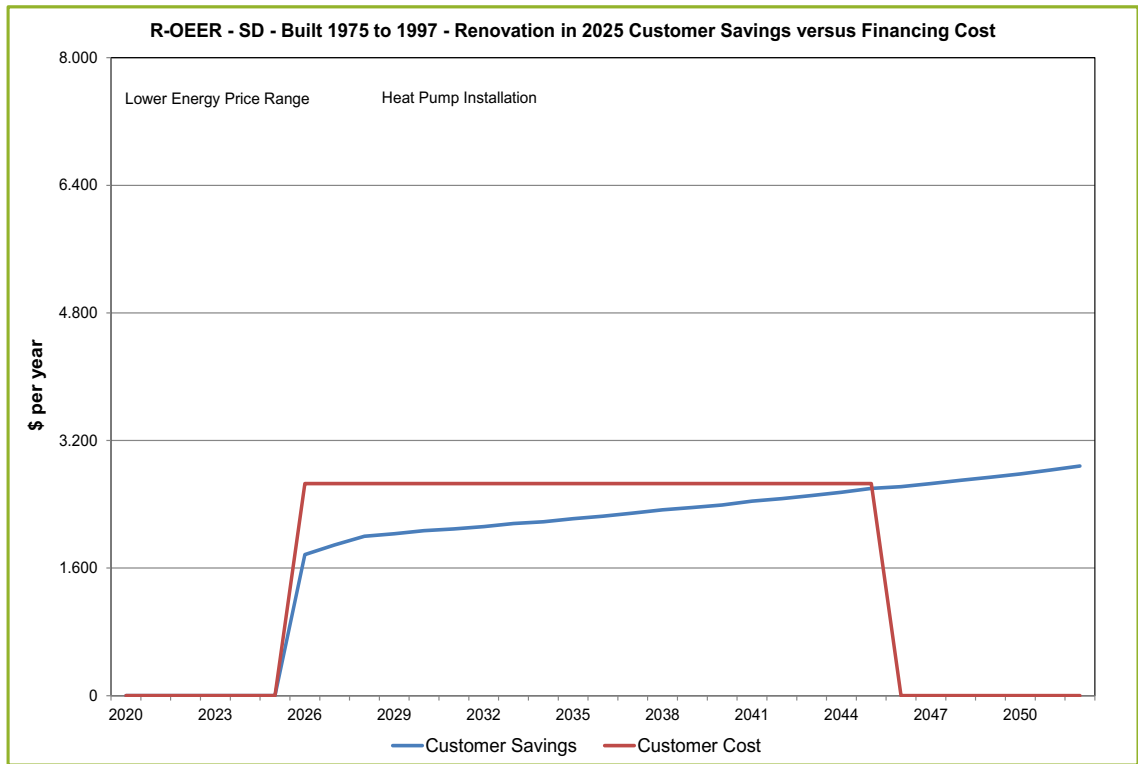


Figure 5 - Reference Case Example, Customer Costs vs Energy Savings (thousand \$) (Low Energy Costs, Heat Pump Replacement)

There are other collateral benefits for the Homeowner including improved property value and comfort which were not quantified in the Study.

Note that the above charts are examples only. Each home archetype and age category have its own cost versus saving balance. Some are positive and some are marginal as illustrated above. The Study has modelled market penetration targets that are segmented by home archetype that focus on pursuing the home demographics that show the most positive cost/benefit. See page 92 of Appendix F.

1.3.3 Entity Perspective

The Entity is recommended to be a “for-profit MSC”⁵ that has been modelled to deliver its first retrofits in 2023. Please note that this recommended start-up year was chosen to anchor much of the modelling for the Reference Case for a number of reasons:

- Home retrofits are the number one Priority Project for Future Energy Oakville – the entity mandated to oversee the implementation of the CES.
- The CES recommended an initiation date for the development of a home retrofit program by 2022. Although it explores different scenarios, this Study is following the core recommendations of the CES.

⁵ Profits would be reinvested in the operation or distributed as dividends.

- The modelled program calls for only 20 retrofits in the first year to accommodate start up refinements. Details of these refinements are to be determined in the recommended next-step Business Plan development.
- Remodeling the Reference Case by pushing the initiation dates out by a year or two, would have negligible implication to the results.

R-OEER Entity P&L Item	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Interest from customers	0	40,000	370,000	1,930,000	5,090,000	8,190,000	11,270,000	14,300,000	17,610,000	20,810,000
Interest paid to lenders	0	0	110,000	430,000	1,810,000	4,460,000	7,120,000	9,670,000	12,220,000	14,880,000
Net interest income	0	40,000	260,000	1,500,000	3,280,000	3,730,000	4,150,000	4,630,000	5,390,000	5,930,000
Fees & commission income	0	0	0	0	0	0	0	0	0	0
Fees & commission expenses	0	0	0	0	0	0	0	0	0	0
Net fee and commission income	0	0	0	0	0	0	0	0	0	0
Net gain (loss) on financial assets & liabilities	0	100,000	890,000	4,230,000	8,680,000	8,790,000	9,060,000	9,240,000	10,360,000	10,460,000
Other operating income - Options & Services	0	0	0	0	0	0	0	0	0	0
Total operating income	0	140,000	1,150,000	5,730,000	11,960,000	12,520,000	13,210,000	13,870,000	15,750,000	16,390,000
Credit loss expense										
Impairment loss on financial investments										
Net Operating Income	0	140,000	1,150,000	5,730,000	11,960,000	12,520,000	13,210,000	13,870,000	15,750,000	16,390,000
S, G & A	610,000	1,220,000	1,260,000	1,650,000	2,010,000	2,030,000	2,060,000	2,080,000	2,160,000	2,170,000
Community sales sponsorship	0	0	20,000	110,000	240,000	240,000	250,000	250,000	290,000	290,000
FEO Sponsorship	0	0	0	130,000	260,000	325,000	395,000	450,000	450,000	450,000
Depreciation of property & equipment										
Amortisation of intangible assets										
Other operating expenses										
Total operating expenses	610,000	1,220,000	1,280,000	1,890,000	2,510,000	2,595,000	2,705,000	2,780,000	2,900,000	2,910,000
Profit before tax	-610,000	-1,080,000	-130,000	3,840,000	9,450,000	9,925,000	10,505,000	11,090,000	12,850,000	13,480,000
Income tax expenses	0	0	0	1,020,000	2,500,000	2,630,000	2,780,000	2,940,000	3,410,000	3,570,000
Profit after tax	-610,000	-1,080,000	-130,000	2,820,000	6,950,000	7,295,000	7,725,000	8,150,000	9,440,000	9,910,000
Investor Dividends	0	0	0	0	0	0	0	0	0	0
Retained Earnings in the year	-610,000	-1,690,000	-1,820,000	1,000,000	7,950,000	15,245,000	22,970,000	31,120,000	40,560,000	50,470,000

Figure 6 - Entity Financial Summary 2022 to 2031

NOTE: Please further detail for the Reference Case P&L statements can be found in Appendix F. P&L detail for the Medium and Low Case can be found in Appendix G.

The Study shows the Entity will have working capital requirements of less than \$2M (See page 111 of Appendix F) during the startup phase. By year four, the Entity has both positive operating income and positive retained earnings. Note that no incentives have been assumed and potential contributions, in form of dividends (presumably to the FEO) have been included. A staged market approach has been recommended, based on home archetypes. See Page 92 or Appendix F. The analysis calls for a Program to be serving all home archetypes by 2032. The full Profit and Loss tables can be found on pages 111 to 114 in Appendix F.

1.3.4 Community and Climate Perspective

Over the lifetime of the Project through 2051, the Study' Reference Case assumed 59,100⁶ homes of those existing in 2019 need to be retrofitted by 2051 in order to achieve the CES-recommended targets. This will reduce GHG emissions caused by existing homes from 402,000 tonnes CO₂e to 251,000 tonnes CO₂e; a 40% reduction.

While a major contribution to the CES emissions reduction goals, this falls short of the Study Framing Goal of 60%.

⁶ See Figure 7 for penetration rates of target home types.

1.4 Stress Test – Medium and Low Penetration Rates

The core analysis for this Study, described above, assesses the Business Case for implementing the retrofit recommendation of the CES and in support of the FEO's initial priority project of building retrofits. The resulting modeling and analysis has been referenced against the original Study's Framing Goals.

Under the framework of a Stress Test several of the modelling variables have been adjusted to determine the impact on the Framing Goals. See Figure 7 for the full illustration of the Study variables. The major highlights for the Stress Test are:

- Maximum Penetration by Applicable Home Types has been reduced for the Medium and Low Cases. See footnote for home archetype codes.
- Incorporation of the Entity and Delivery of first retrofits has been pushed back by one year for the Medium and Low Cases.
- Retrofit Cost Productivity Discount is reduced to 25% and 10%, respectively for the Medium and Low Cases. This discount is tied to retrofit volumes, which have also been reduced for the Medium and Low Cases.
- The Contractor Entity Fee Factor is the "Contractor/Entity Fee Calculation". It is the share split (in percentage) between the Contractor and the Entity after the "Customer Productivity Discount" (or total retrofit cost). For example, the Reference Case defines a Discount of 30%. If the current market cost of the retrofit is 100%, then we have a total cost of 70% (after discount) which is shared between the contractor and Entity at 62%/8%. Cost recovery is provided to the Entity for marketing, promotion and administrative roles on behalf of the contractor
- This same arithmetic applies to the Medium and Low Cases.
- Ramp-up for Home Type Start-Up Profile extended by one year for the Medium and Low Cases.
- All other Study variables remain the same.

ITEM	REFERENCE CASE	MEDIUM CASE	LOW CASE
Incorporation of Entity	2022	2023	2023
Deliver first retrofits	2023	2024	2024
Retrofit Cost Productivity Discount	30%	25%	10%
Contractor/ Entity Fee Factor	62/8	63/12	86/4
Target Homes	All homes in 2019	All homes in 2019	SD/SSD in 2019 Only
Target start years by target home types	Study	Study adjusted for start year	Study adjusted for start year
Maximum penetration by applicable home types	80% for SD/SSD/TH 60% for MU-L, MU-M /20% MU-H	30% for SD/SSD/TH 10% for MU-L, MU-M, MU-H	5% for SD/SSD
Ramp-up for home type start-up profile	4-yrs to full run-rate 25% 50% 75% 100%	5-yrs to full run-rate 20% 40% 60% 80% 100%	5-yrs to full run-rate 10% 30% 50% 80% 100%
Entity Structure and Cost	Study	Study – volume adjusted	Study - volume adjusted
Retrofit packages (Content)	Study	Study	Study
Retrofit package (Cost before discount)	Study	Study	Study
Interest rate	4.25%	Study	Study
Utility Pricing (through 2051)	Study	Study	Study
Carbon Tax (through 2051)	Study	Study	Study
Cost Inflation	Study	Study	Study
Contractor relationship to Entity	Partner with contracted terms	Study	Partner meeting Entity standards
FEO Contribution	Study (FEO estimates)	Study indexed by volume	Zero

Figure 7 - Table of Assumptions - Reference, Medium and Low Cases⁷

1.5 Stress Test Impacts

This section summarizes the impacts of the Stress Testing, by adjusting the variables as described above, and comparing the results to the Framing Goals as stated in the introduction to this report.

Full analysis of the Low and Medium Case Stress Tests can be found in Appendix G.

1.5.1 Penetration Rates

Variations in program penetration rates is the most impactful variable in the assumptions table show in Figure 7. Figure 8 below demonstrates visually the significant differences between the Reference Case and the Low and Medium Stress Test cases.

⁷ SD-Single Detached, SSD – Single Semi Detached, TH – Town House, MU-L, M, H – Multi Unit Low, Medium, and High.

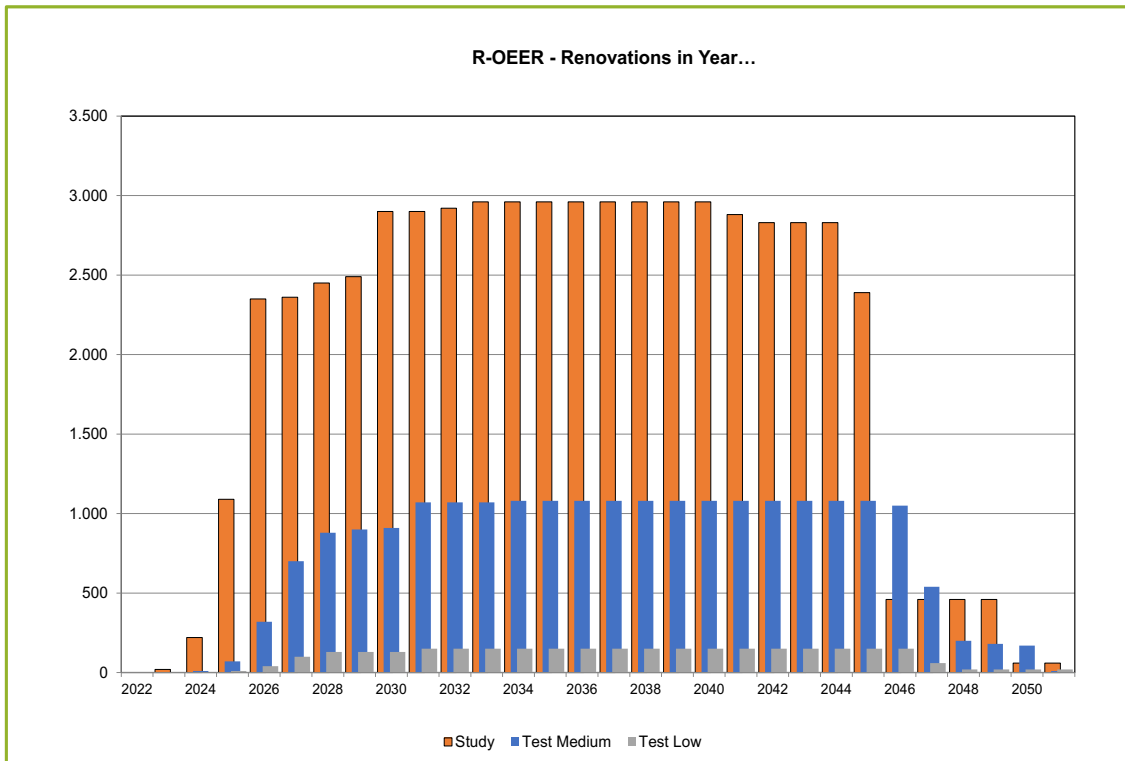


Figure 8 – Renovation Rates for Reference Case, Medium and Low Cases

1.5.2 Entity as an “Energy Efficiency Utility”

For the Medium Case, as illustrated in Figure 9, over the horizon of the Oakville Home Energy Retrofit program, including all home archetypes, the annual total of all customer payments to the Entity is only slightly more than the avoided utility (Electricity, natural gas, and water) costs in each year, at the higher price outlook. Because the costs of home retrofits are modeled to be slightly higher in the Medium Case (due to a decrease in the value from market scale) as well as some fixed costs related to the Entity, this gap between aggregated Homeowner costs versus savings is slightly larger than in the Reference Case. Starting in about 2045, two years later than the Reference Case, the first LIC loans close out and the Program sees reduced payments and steady increases in annual avoided costs.

For the Low Case, Figure 10, there is slightly wider gap between the aggregated Homeowner savings and costs. Also, the point at which the first LIC loans close out and the Program sees reduced payments and steady increases in annual avoided costs is pushed out to 2049.

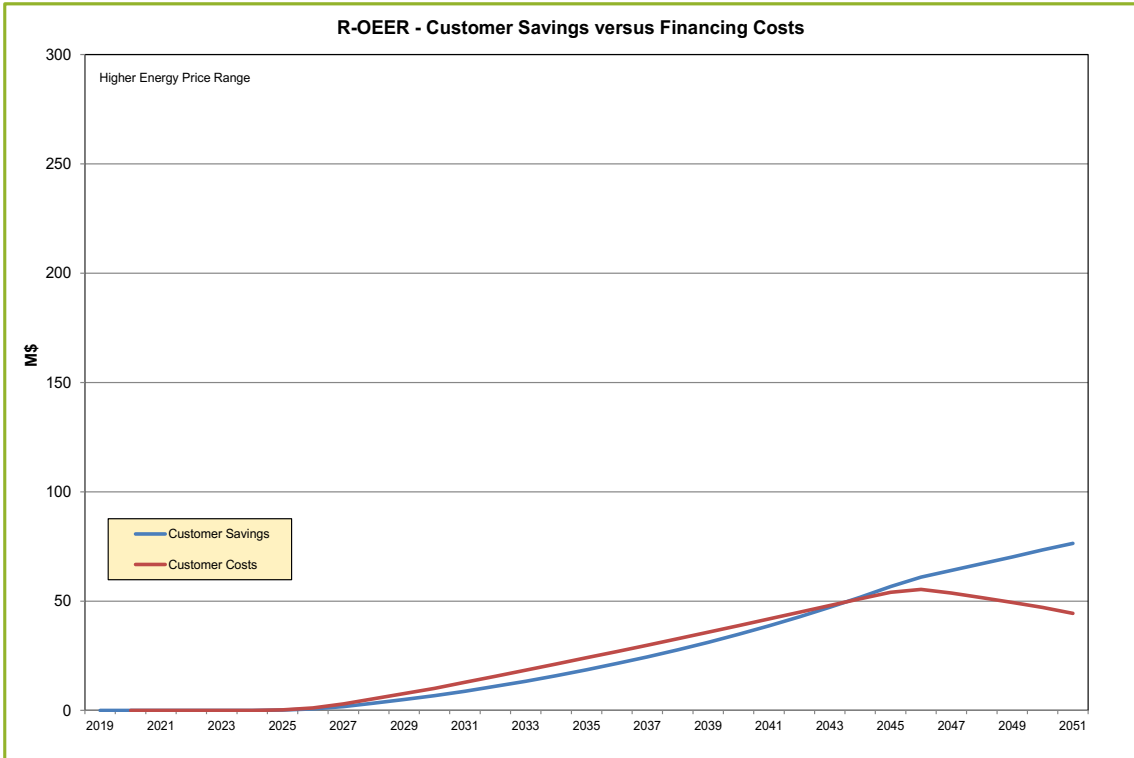


Figure 9 – Medium Case - Customer Savings Versus Financing Costs

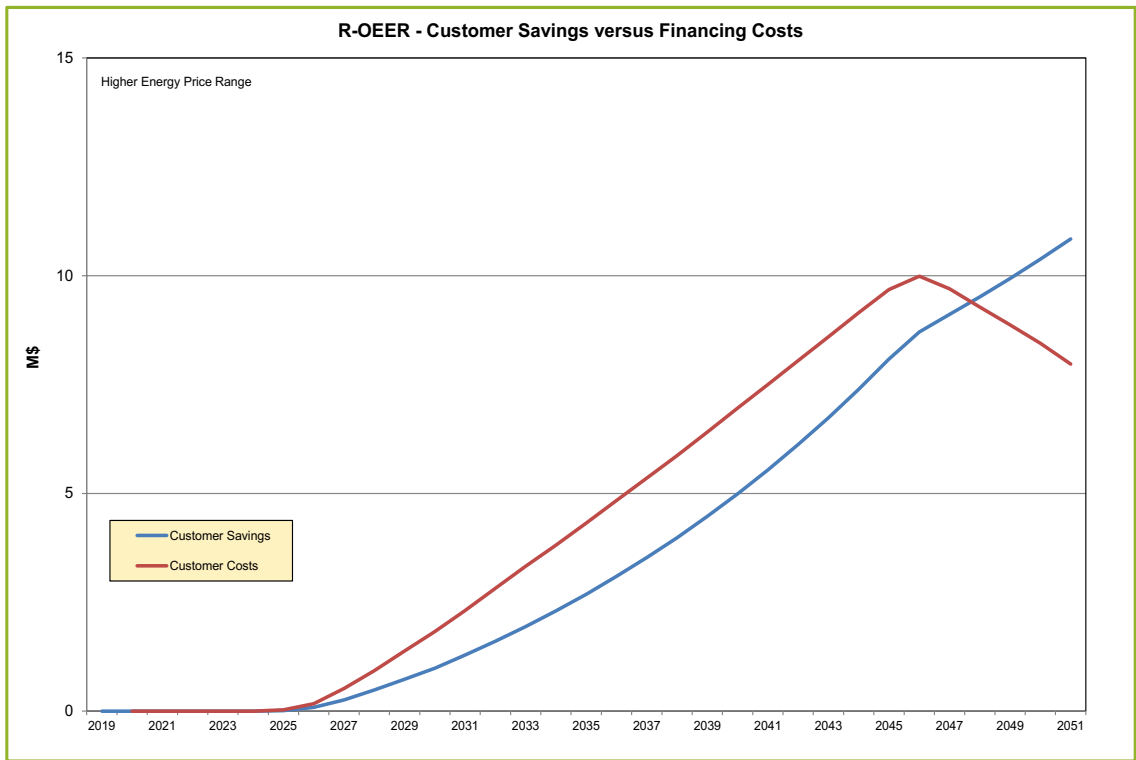


Figure 10 -Low Case - Customer Savings Versus Financing Costs

1.5.3 Homeowner Perspective

The Study assessment allows a snapshot of the Homeowner payments and avoided costs for any of the 30 archetypes used. Each has a slightly different profile when viewed from the Homeowner's perspective. For comparison purposes, Figures 11 and 12 below illustrate the Medium Case for savings versus cost analysis for a detached home built between 1975 and 1997 implementing a retrofit package in 2025 that includes replacing the gas furnace and air-conditioner with higher efficiency versions. When compared to the Reference Case, Figures 2 and 3, there is negligible difference between Reference Case and the Medium for this, and all of the other archetypes.

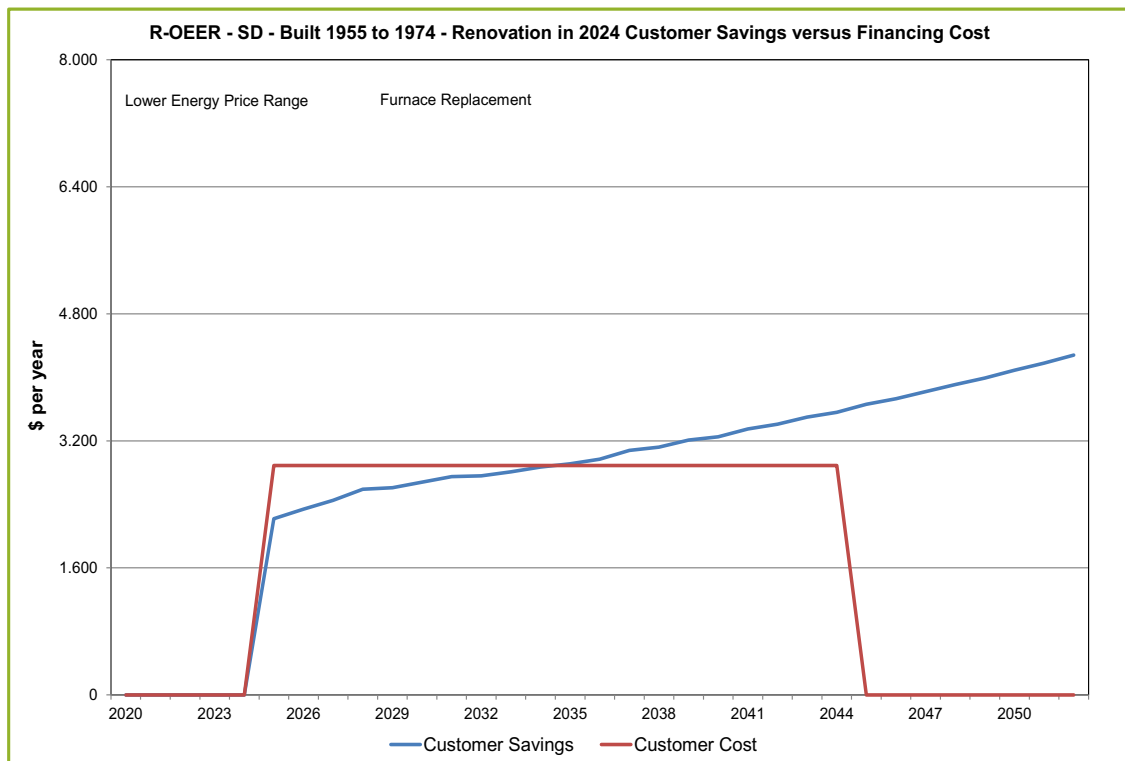


Figure 11 – Medium Case, Customer Costs vs Energy Savings (thousand \$) (Low Energy Costs, Furnace Replacement)

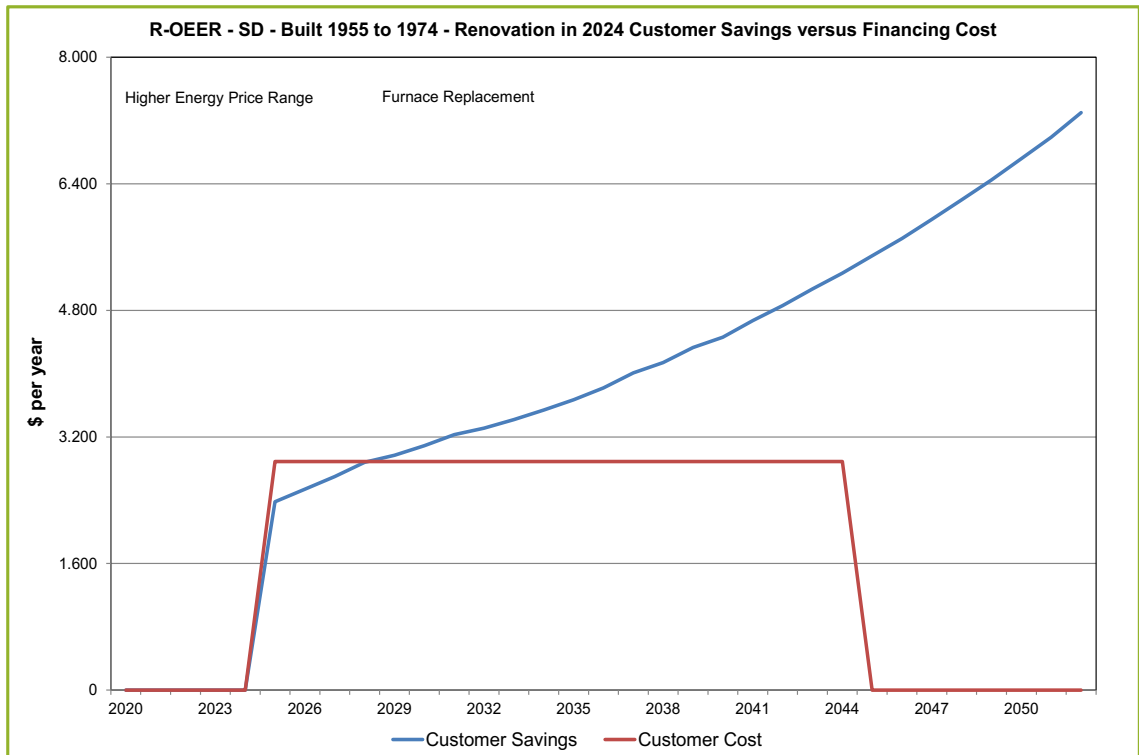


Figure 12 - Medium Case, Customer Costs vs Energy Savings (thousand \$) (High Energy Costs, Furnace Replacement)

For comparison between the Reference Case and Low Case see Figures 13 and 14 which illustrate the costs vs energy saving for a detached home built between 1975 and 1997 implementing a retrofit package in 2025 that includes replacing the gas furnace and air-conditioner with an air-source heat pump. When compared to Figures 4 and 5, there is significant impact on the break-even point for this example to the point where the Framing Goal of “Homeowners’ utility saving [will be] more than retrofit cost” is not achieved.

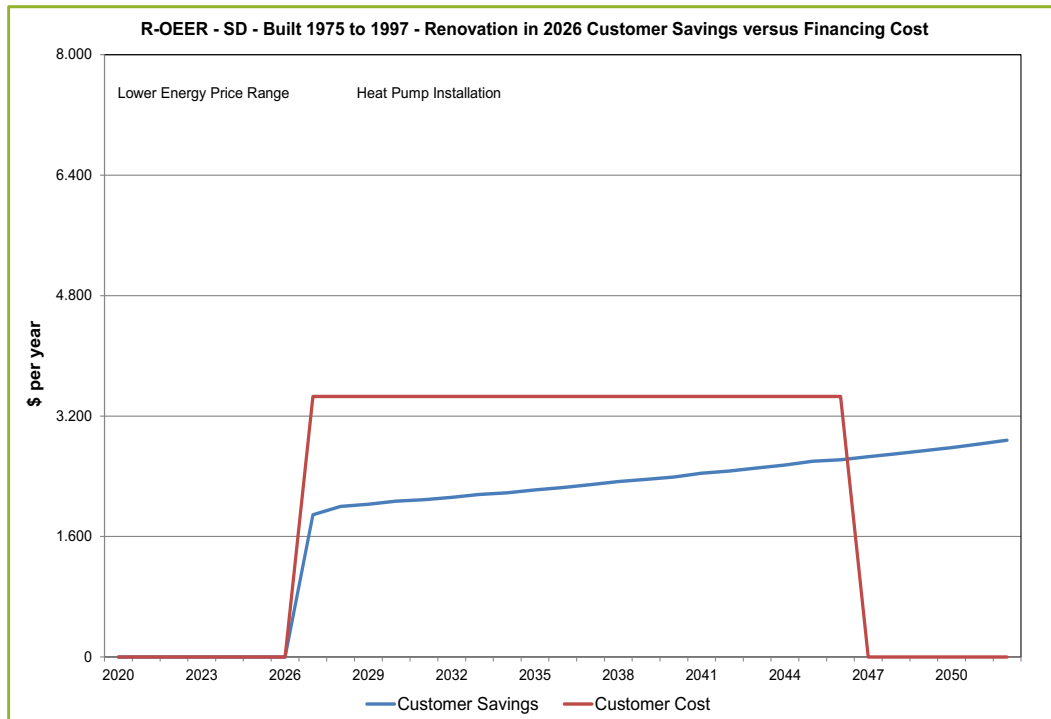


Figure 13 – Low Case, Customer Costs vs Energy Savings (thousand \$) (Low Energy Costs, Heat Pump Replacement)

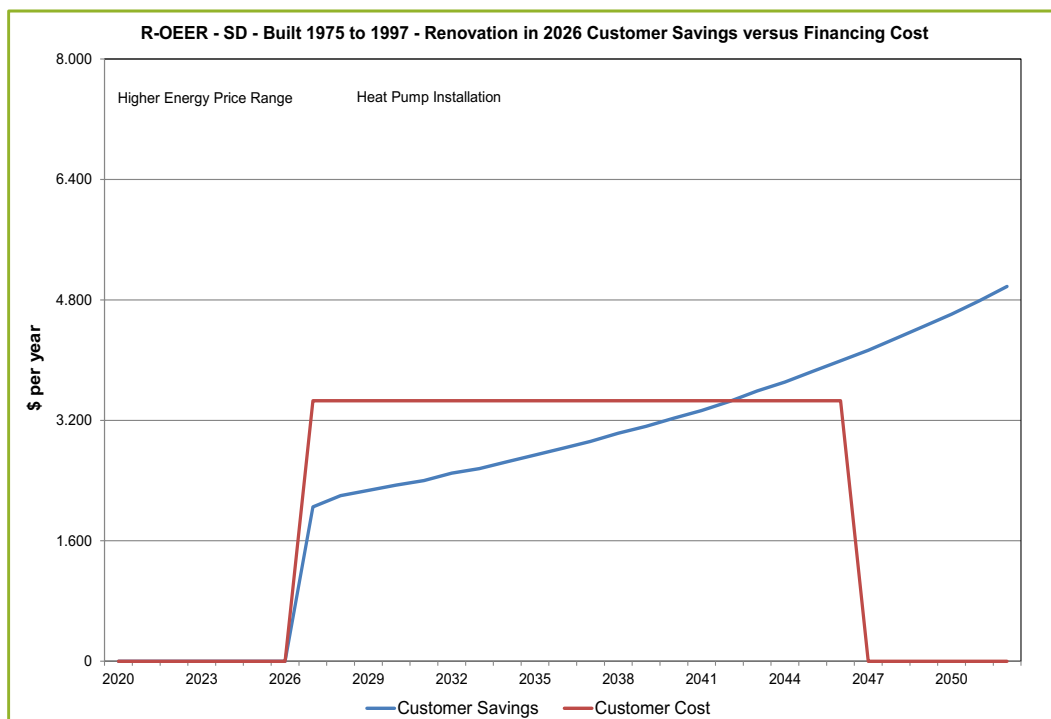


Figure 14 – Low Case, Customer Costs vs Energy Savings (thousand \$) (High Energy Costs, Heat Pump Replacement)

There are other collateral benefits for the Homeowner including improved property value and comfort which were not quantified in the Study.

Note that the above charts are examples only. Each home archetype and age category has its own cost versus saving balance. Some are positive and some are marginal as illustrated above. The Study has modelled market penetration targets that are segmented by home archetype that focus on pursuing the home demographics that show the most positive cost/benefit. See page 92 of Appendix F.

1.5.4 Entity Perspective

Figure 15 illustrates the retained earnings for the Reference Case (see Figure 6 for detail) as well as the Medium and Low Cases. All Case models are based on the variables described in Figure 7.

The analysis shows that the Reference Case and Medium Case both turn to positive retained earnings in 2025 and 2027, respectively.

The Reference Case and the Medium Case show a maximum operational investment (i.e., negative retained earnings) of approximately \$2 million and \$2.5 million, respectively.

The Low Case, mainly based on fixed program costs and low program volume, does not rise above negative retained earnings.

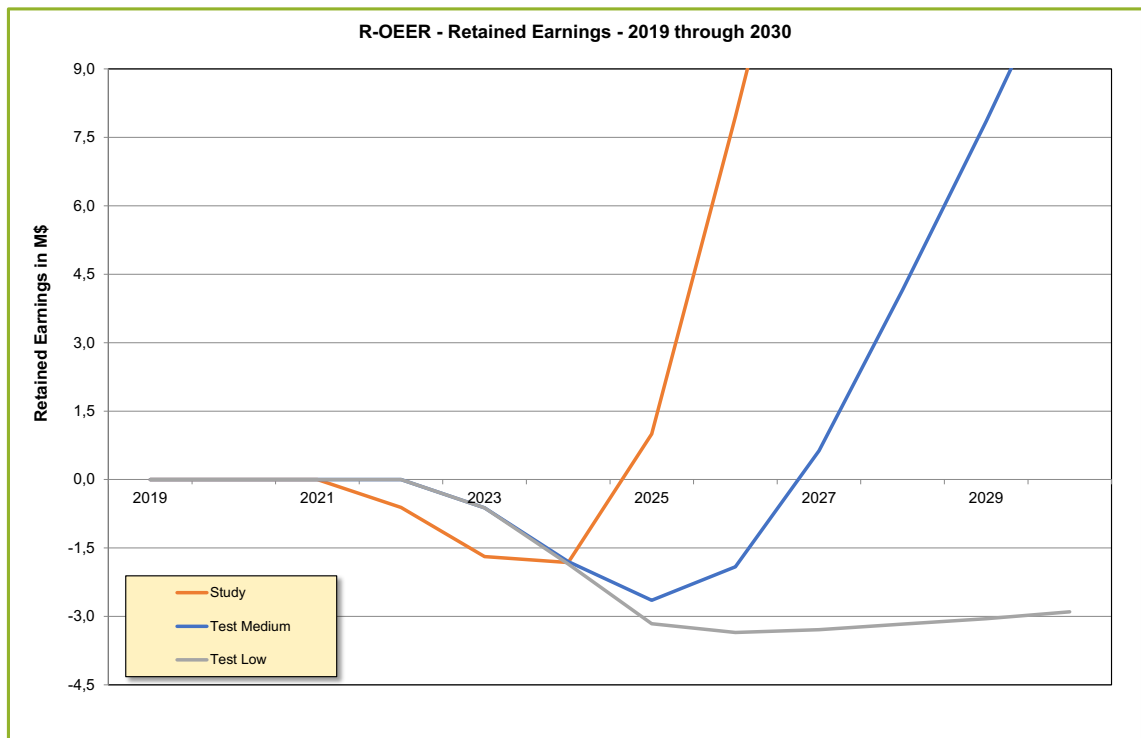


Figure 15 – Entity Retained Earnings for Reference, Medium and Low Case.

1.5.5 Oakville Home Energy Retrofit Framing Goals

The most impactful result of reduced penetration rates is the impact on the GHG Framing Goal for the sector as a whole. The Reference Case itself demonstrates that, with its qualified assumptions, it will reach 67% of the GHG Framing Goal Target of a 60% reduction.

Figure 9 shows energy related GHG energy-related emissions for all home existing in Oakville in 2019 (base Case) The Medium Case achieves 50% of the original Framing Goal while the Low Case achieves 28% of the original Framing Goal.

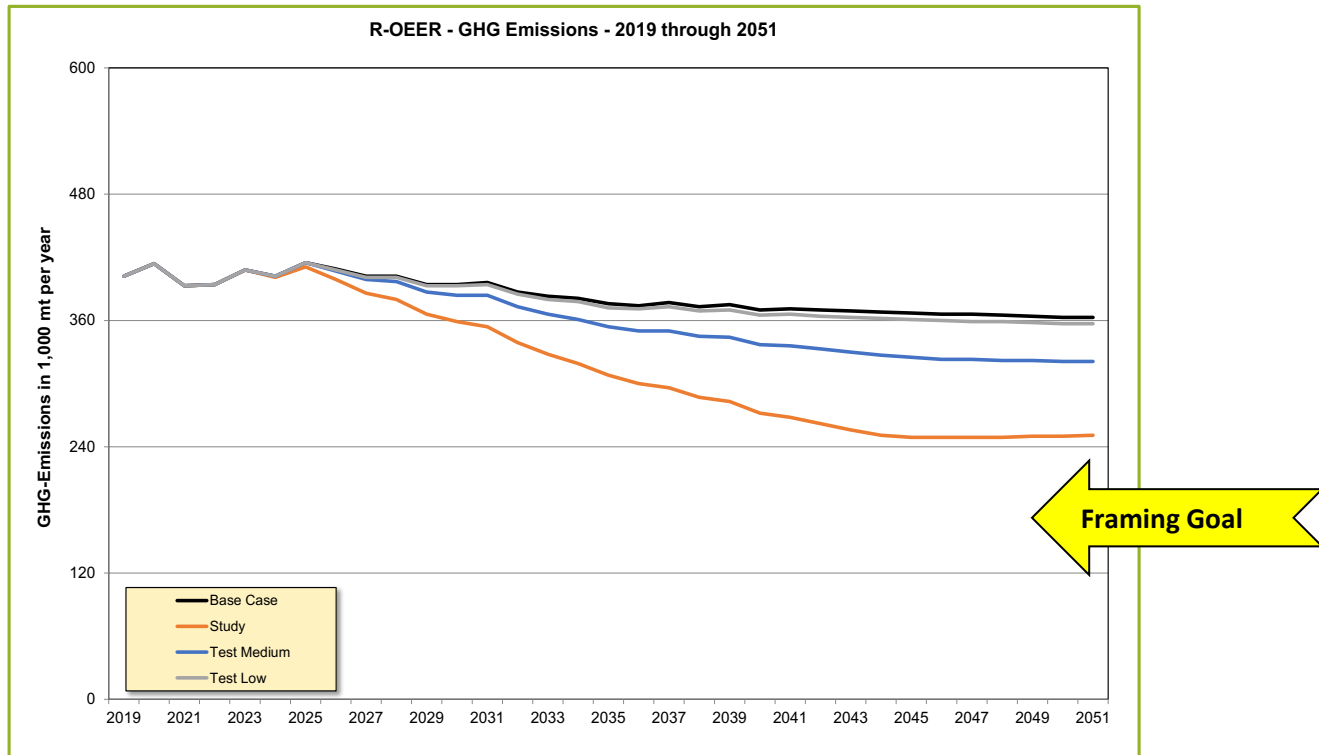


Figure 16 – Overall Program Emissions Reductions for Reference, Medium and Low Cases.

1.6 Program Conclusions

As presented to board of Future Energy Oakville (FEO) on April 22, 2012, this Study has been completed as the first stage of a four-stage process.

1. **Feasibility Study (Business Case)**
2. FEO considers the results of the Business Case
3. Development of a Home Retrofit Business Plan (Program Design)
4. Launch Program (incorporate Entity to deliver standardized retrofits based on the results of the Business Plan)

Based on the analytical findings and stakeholder engagement of this Study, the conclusion is that there is technical feasibility and a preliminary Business Case, for both the Reference Case and

the Medium Case, to support further development of the Oakville Home Energy Retrofit Program via Business Plan development.

The Low Case scenario does not present a reasonable feasibility under the framework of this Study as it closely resembles the current market reality. While it does not support further development as analyzed, the Business Plan will be used to assess program design and approaches to maximize market penetration to mitigate low case scenario risks and set a roadmap for further market penetration as described by this Study's Framing Goals. The Business Plan will also explore the incentives that will support greater penetration rates and help inform the FEO as well as future potential government programs on the level of incentive funding necessary for municipalities to be successful in achieve their GHG targets.

This Study is built on a defined set of assumptions that are articulated in this report. It assumes no government or utility subsidies, nor does it attempt to monetize added value (i.e., comfort, increased home value) to the Homeowner.

The reason for the NOT including government or utility subsidies in the Study is to understand the core business case for retrofits that are not reliant on subsidy programs that may not be reliant over time. However, it is acknowledged that subsidies at the initial stage will play a key role in a potential future program. In fact, penetration rates to achieve and exceed the Low Case, as described in this Study, cannot be expected without the application of subsidies. Note, as with all incentive programs, they are designed to overcome initial market barriers e.g., customer investment economics, maturity of new technology, etc., and as the market matures and transforms over time, they are less needed - leading to a self-sustaining program.

This Study provides a first-stage basis to proceed to the next step of developing a Business Plan which will define the approach and evidence to support a program implementation decision by the FEO and Town.

The assumptions, on which this Study is based, support a target-based approach to contributing to the goals of the Community Energy Strategy. They also identify the conditions that are required for a reasonable business case to pursue the development of a next-step Business Plan. This Business Plan will essentially address the gaps and mitigate the risks, including the current market reality and the transformed market described by the Study's assumptions.

There are a number of critical observations from the Study that inform the recommendations of this Study as well as the objectives of the next-step Business Plan.

- There are two major risk categories that will be key to informing next steps:
 - The uptake of program (i.e., Homeowner) participation is market driven. The more improved the "value-proposition" to Homeowners the lower the risk of non-participation.
 - Start-up costs before the program starts generating revenue.
- This Study provides a framework that is attractive for public-sector or utility sector grants, incentives or subsidies that improve Homeowner's value proposition, reduce program risk, further reduce retrofit cost, and drive market uptake. To move the potential program from the current market reality to a transformed market, as defined in the Study, it is strongly recommended that the next-step Business Plan consider all possible utility (electric, natural gas and water)incentive programs as well as FCM, NRCan, etc., to bolster the customer value proposition and help mitigate the penetration-rate risks that may come with the Low Case scenario.

- The Study (based on its technical potential) shows that a home retrofit program has the potential to reduce GHG emissions caused by existing homes from 402,000 tonnes CO₂e to 251,000 tonnes CO₂e; a 40% reduction. While a major contribution to the CES emissions reduction goals, this falls short of the Study Framing Goal of 60%.
- Pursuing penetration rates of 80% of the Town's 2019 residential building stock (as the Study's Framing Goals) is critical to achieving the residential energy efficiency and maximum achievable emission reduction goals of the CES.
- The "value proposition", based on retrofit costs versus utility savings, is fairly strong to the majority of Oakville Homeowners – 80% of them being single detached homes.
- Penetration rates can be effectively improved by strategic program design and delivery models that addresses key risks and elements such as effective marketing, contractor origination, complimentary financial incentives, application processes, etc.
- The Local Improvement Charge mechanism aggregates the investment opportunity and related risk to potential program investors.
- The Study defines a framework that technically achieves the Source Energy Efficiency Framing Goal of the Study. The framework does not, however, achieve the Greenhouse Gas Emissions reduction Framing Goal.
- Both the Reference Case and the Medium Case penetration rates support further development of a Business Plan .

1.7 Study Recommendations

1. That Future Energy Oakville and the Town endorse this Town of Oakville Home Energy Retrofit Study as the basis to move to the next step of developing a Business Plan. The Study elements, assumptions and conclusions are described in more detail in this report.
2. Apply to the Federation of Canadian Municipalities' (FCM) Community Efficiency Fund to fund the development of the Oakville Home Energy Retrofit Program Business Plan..
3. At the appropriate time, enact a Local Improvement Charge (LIC) By-law and enter into an agreement with a Municipal Services Corporation (or equivalent), with appropriate terms and conditions, to make optional LIC financing available to Homeowners participating in the Oakville Home Energy Retrofit Program.

2.0 Study Policy, Planning and Governance Context

2.1 Climate Change and the Paris Agreement

As a signatory to the Paris Climate Agreement, The Government of Canada is committed to achieving net-zero greenhouse gas (GHG) emissions by 2050. The built environment is currently the third largest GHG emitting sector in Canada and most buildings that exist now will still be in operation in 30 years. Consequently, the Pan-Canadian Framework on Clean Growth and Climate has identified energy retrofits of existing buildings as a priority. The 2022 Federal budget included significant funding for home retrofits as identified in the recently released *2030 Emissions Reduction Plan: Canada's Next Steps for Clean Air and a Strong Economy*.

2.2 Provincial Policy and Local Improvement Charge Legislation

Climate and energy policies continue to be “mainstreamed” into provincial legislation, policies, and programs. Provincial Local Improvement Charges (LIC) regulations have been amended to enable voluntary energy and water efficiency upgrades of private homes and buildings, allowing Ontario municipalities to provide long-term, low-cost financing for residential, commercial, and industrial building energy and water conservation retrofits.

Property-assessed financing has the distinct advantage of tying the efficiency investment to the property, mitigating the risk of the Homeowner that their payback period is longer than the time they will remain (or intend to remain) in the home. Attractive interest rates and borrowing terms can be achieved for Homeowners while reducing or eliminating their up-front capital costs.

In addition to the City of Toronto (2014), recently, Ottawa, Halton Hills, and Durham Region have launched similar programs and many other municipalities are in the process of developing their own. Municipalities in the southern Ontario region, such as Brampton, Caledon, Mississauga, Newmarket, and Windsor, have publicly indicated their intention to move forward with the initial stages of developing home retrofit programs that support the goals of their respective community energy plans.

2.3 Strategic Alignment with Town Council Priorities

The potential Home Energy Retrofit program aligns with Council's strategic priorities. By introducing the potential home energy retrofit initiative to Oakville, the Town will showcase its pledge to the following strategic priorities:

1. *Livability - To be the most livable town in Canada.* The potential home retrofit program will address a number of issues related to livability.
 - Improving the operational costs of home ownership.
 - Stimulate job creation and attract investment into the community.
 - Keep energy dollars local, providing secondary economic stimulus for local products and services.
2. *Engaged Community - Foster a community environment that engages residents of all ages, abilities, and backgrounds.* Potential The Home Energy Retrofit program aims to address up to 80% of the Town's 81,000+ homes and address homes of all ages and locations in the Town.

3. *Accountable Government - Inspire public confidence through open, accountable, and efficient delivery of government services.* The potential Home Energy Retrofit program will have two main factors that speak to accountable government and financial stability. It will:
 - establish a self-sustaining entity that will collaborate with the community while achieving financial stability.
 - provide an affordable finance method for Homeowners to better integrate energy-efficient solutions which can result in significant energy/water savings.
4. *Mobility - Improve the Town's multi-modal transportation network to support effective movement of people and goods.* While in the scope of the CES, this was not in the scope of this Feasibility Study.
5. *Environment - Protect greenspace and promote environmentally sustainable practices.* The potential Home Energy Retrofit program confirms the Town's commitment to environmental stewardship in two ways.
 - By implementing the Community Energy Strategy (CES). The Home Energy Retrofit program is the first strategy outlined in the Council-approved CES and is the first Priority Project for Future Energy Oakville (FEO)
 - By contributing to the federal environmental goals and objectives and supporting Canada in fulfilled its commitments to the Paris Agreement.

2.4 Town Leadership

In 2020, the Town of Oakville approved the Community Energy Strategy with a community-wide goal to increase energy efficiency by at least 40% by 2041, based on 2016 levels, and reduce GHG emissions by at least 50% by 2041.

2.5 Oakville Community Energy Strategy (CES)

Increasing residential energy efficiency was one of the strategies identified to achieve the goals of the CES. To CES recommendation called for **energy efficiency retrofits to 80% of Oakville's existing homes with an average efficiency improvement of approximately 30%**. The enabling strategies identified to support this recommendation include:

- creating a new Residential Energy Efficiency Retrofit Entity.
- offering standard retrofits by property type.
- delivering retrofits using quality-controlled contractors.
- using property tax increment for payments via an LIC mechanism (or similar).
- establishing third-party financing/lending.

2.6 Creation of Future Energy Oakville

At its meeting of April 26, 2021, Town Council received a Community Energy Strategy Implementation Update which reported that, in February of 2021, Future Energy Oakville (FEO - originally the Implementation Management Office) was legally incorporated. At that time, the town established a Service Agreement with the FEO that defines the actions and services that “*accelerate and coordinate implementation of the Community Energy Strategy in Oakville.*”

The initial initiative identified in the April 26, 2021 report is for the Town to collaborate “with Oakville Enterprises Corporation to submit a funding application that would support the development of a residential retrofit Business Case/feasibility Study to the Federation of Canadian Municipalities’ Community Efficiency Financing program.”

Further, in alignment with the Priority Projects of the FEO, the report identified the initial activity, represented by this report, to “complete a Business Case for establishing a company to deliver energy retrofits for homes and buildings in Oakville.” This is one of 17 FEO Priority Projects.

3.0 Study Detail

3.1 Home Energy Retrofit Study Assumptions

This Study has been developed under a number of defined assumptions that have been established to provide the appropriate analysis, observations, and conclusions.

3.1.1 Framing Goals

As Described in Section 1 of this Study, the Framing Goals were initially set out to broadly define the objectives of the Study which was to investigate the technical feasibility (or “Business Case”) of establishing a program to deliver high quality, standardized residential energy efficiency retrofit packages to 80% of Oakville’s approximately 81,000 homes (2019) as per the strategy recommended and approved in the Community Energy Strategy.

. The following key framing goals were used the Study to ensure the Project met performance levels that clearly support the CES 2041 targets:

- By 2051 the entire existing homes sector will be:
 - 60% less carbon intensive
 - 35% more source energy efficient
 - 20% more water efficient
- Homeowners’ utility savings will be more than retrofit cost
- Investors & Lenders will receive attractive returns
 - Lenders – Provincial 20-year bond + 1%
 - Investors – Comparable to a typical municipal utility (*To be clarified in detailed Business Planning phase*)
- Contractors gain sales volume and increase margins
- Town of Oakville is not exposed to unacceptable financial risks

These framing goals guided both the Study’s analytical and engagement processes.

3.1.2 Analytical Assumptions

As described in Figure 7, there are a number of key analytical assumption that define the analytical process for the main Reference Case, as described by the initial Framing Goals (3.1.1 above) as well as analytical stress tests mainly based on reduced penetration rates represented by the number of homes retrofitted per year. Figure 7 is repeated here for readability convenience.

ITEM	REFERENCE CASE	MEDIUM CASE	LOW CASE
Incorporation of Entity	2022	2023	2023
Deliver first retrofits	2023	2024	2024
Retrofit Cost Productivity Discount	30%	25%	10%
Contractor/ Entity Fee Factor	62/8	63/12	86/4
Target Homes	All homes in 2019	All homes in 2019	SD/SSD in 2019 Only
Target start years by target home types	Study	Study adjusted for start year	Study adjusted for start year
Maximum penetration by applicable home types	80% for SD/SSD/TH 60% for MU-L, MU-M /20% MU-H	30% for SD/SSD/TH 10% for MU-L, MU-M, MU-H	5% for SD/SSD
Ramp-up for home type start-up profile	4-yrs to full run-rate 25% 50% 75% 100%	5-yrs to full run-rate 20% 40% 60% 80% 100%	5-yrs to full run-rate 10% 30% 50% 80% 100%
Entity Structure and Cost	Study	Study – volume adjusted	Study - volume adjusted
Retrofit packages (Content)	Study	Study	Study
Retrofit package (Cost before discount)	Study	Study	Study
Interest rate	4.25%	Study	Study
Utility Pricing (through 2051)	Study	Study	Study
Carbon Tax (through 2051)	Study	Study	Study
Cost Inflation	Study	Study	Study
Contractor relationship to Entity	Partner with contracted terms	Study	Partner meeting Entity standards
FEO Contribution	Study (FEO estimates)	Study indexed by volume	Zero

3.1.3 Programmatic Functions

In addition to technical assumptions, the Feasibility Study includes three programmatic assumptions.

1. A Municipal Services Corporation (MSC) would be established to serve as the Program Administrator. See Section 4.3 Program Administrator for more details.
2. Standardized energy efficiency retrofit packages would be delivered to Homeowners by quality-controlled contractors. See Section 4.2.5.1 Standardized Energy Efficiency Retrofits for more details.
3. The Town would make LIC financing (or similar) available to Homeowners. See Section 4.4.1 – LIC By-law.

3.2 Feasibility Study Findings

With the assumptions established for the Feasibility Study, the analysis determined the technical feasibility of the CES home retrofit strategy. Key findings are summarized below. Additional detail is provided in Appendix F – Full Feasibility Study and Appendix G – Stress Test Low and Medium Cases. Specific page references are provided. Findings for the Reference Case, Medium Case and Low Case are provided as required.

3.2.1 Entity Profitability

Based on the assumptions described elsewhere in this report, the profitability, expressed in retained earnings for all Cases, are illustrated in Figure 17. Based mainly on home retrofit penetration rates, and the related impact on other cost efficiencies, we see that a decrease in penetration rates can increase the absolute cost of start-up expenses (i.e., initial working capital) in the in the Medium Case, when compared to the Reference Case. In the Low Case, the Program never achieves profitability.

Further Detail on Entity costs can be found in:

Appendix F Full Feasibility Study – Reference Case: page 88 and pages 111 to 115.

Appendix G Stress Test – Low and Medium Cases: pages 11 and 16

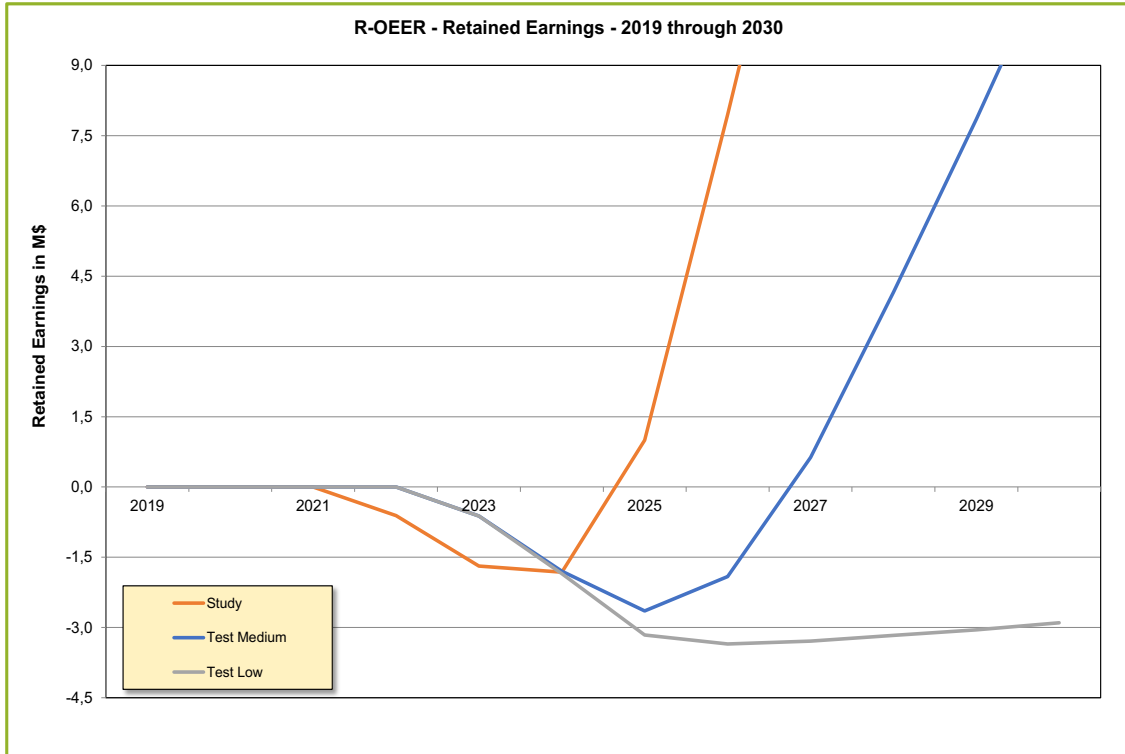


Figure 17 - Retained Earnings - All Cases

3.2.2 Net Borrowing Requirements

The need for financing is driven by retrofit orders, i.e., the success of the Entity and the penetration rates of home retrofits completed per year. Figures 18 through 20 illustrate the total borrowing requirements of each of the Reference, Medium and Low Cases.

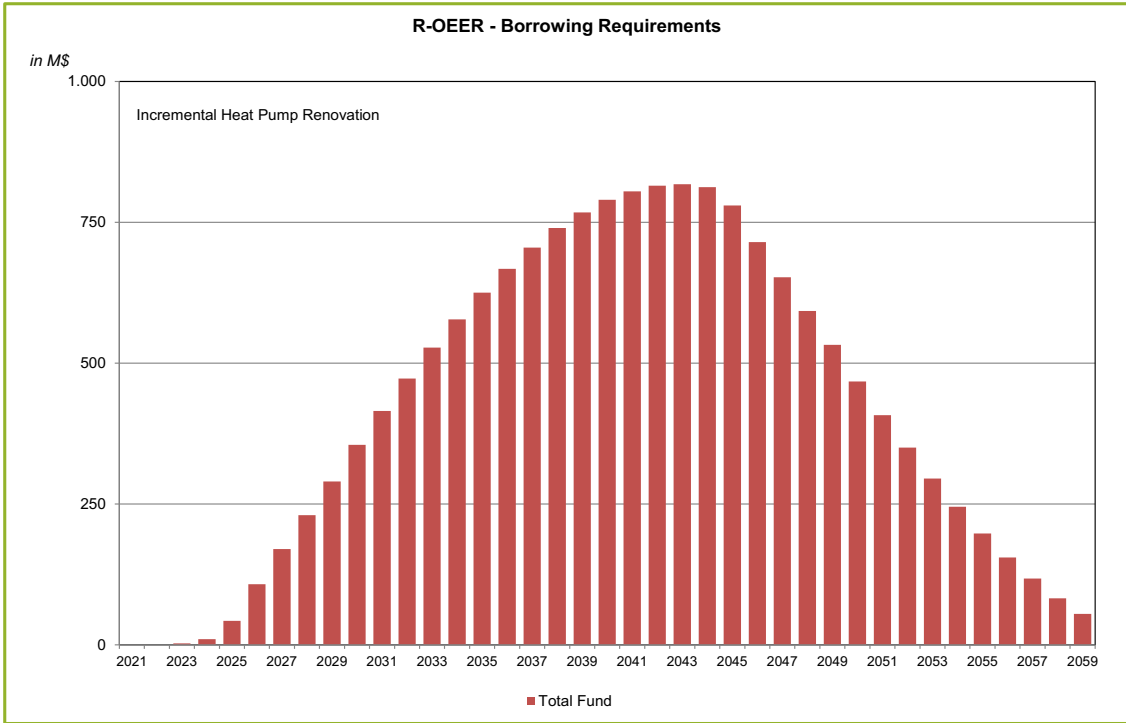


Figure 18 - Peak Net Borrowing \$818M - Reference Case

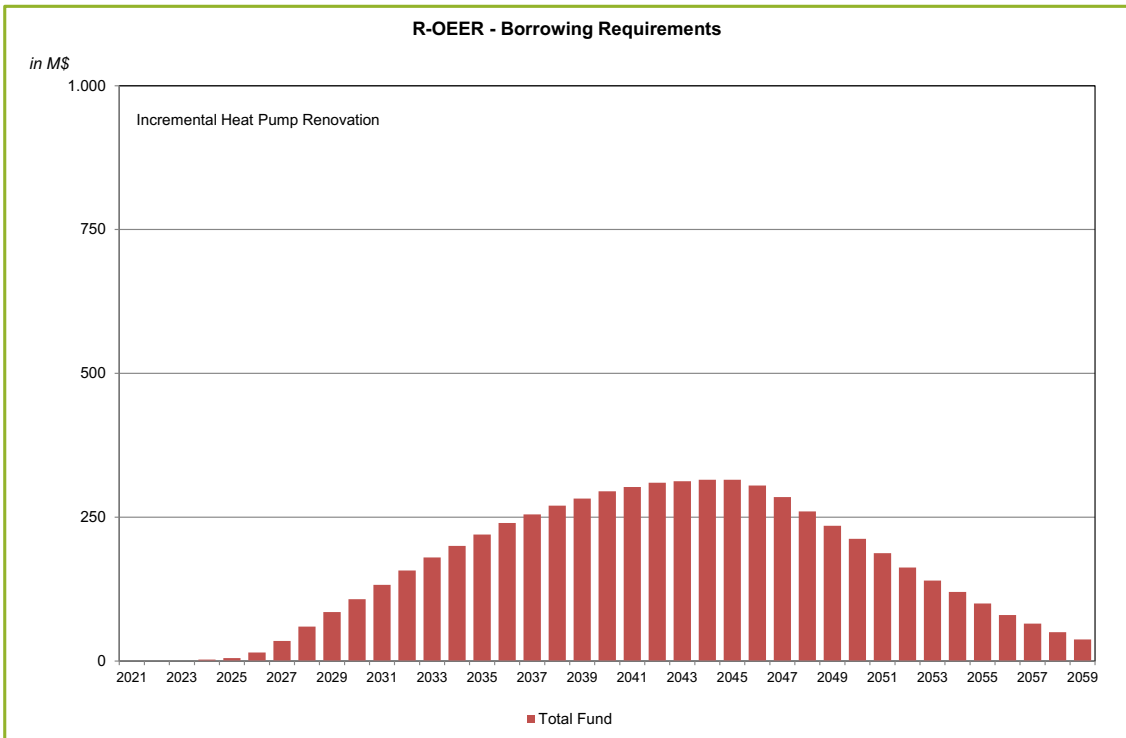


Figure 19 - Peak Net Borrowing \$315 - Medium Case

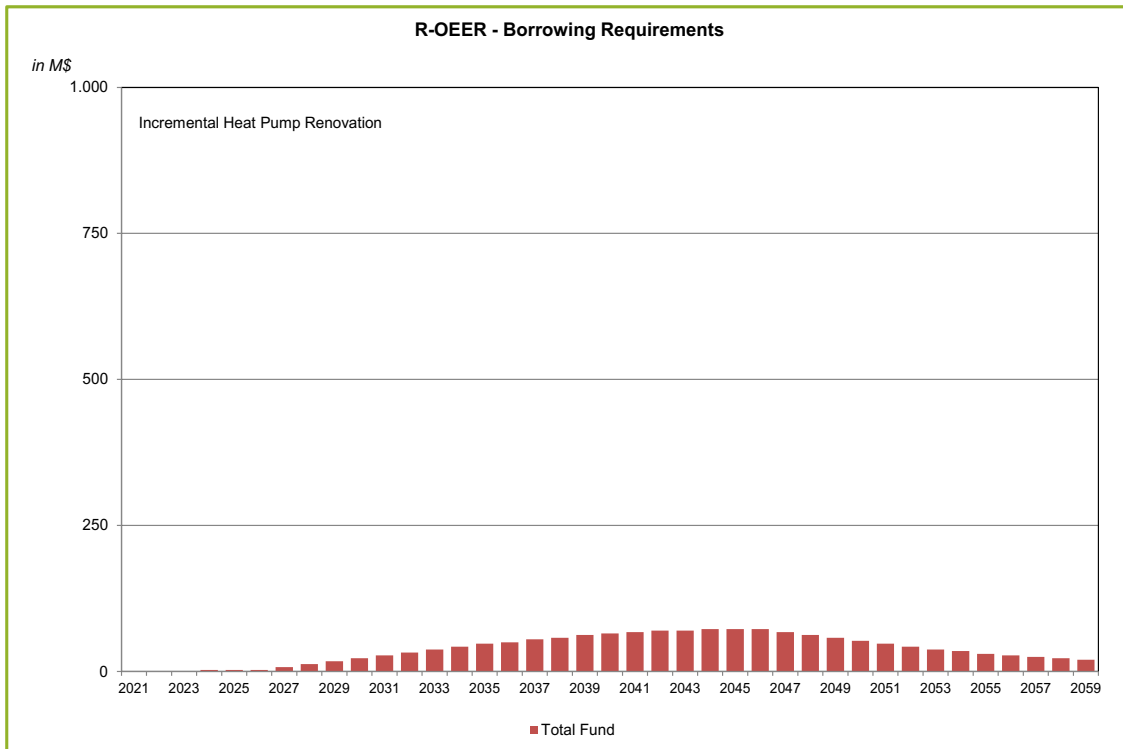


Figure 20 - Peak Net Borrowing \$72M - Low Case

3.2.3 Homeowner Perspective

It should be noted that Homeowner engagement with a future program is critical for success based on a favourable “value proposition” that addresses economic and other benefits. From this perspective, the Homeowner is taking on a significant amount of the early program risk, recognising that this risk falls rapidly as the program gains volume and efficiency.

The Homeowner is a critical part of the program framework in that their willingness to engage with the program drives the scale and cash flow of the model. The “value proposition” to the Homeowner needs to offer a compelling financial benefit as well as other co-benefits related to home comfort and potential improved asset value. This Study has focussed mainly on the economic benefit as described throughout this report. The engagement activities, as described in Section 3.2.5, and the Homeowner Survey and Focus Group as per Appendices I and J provide some initial insight to Homeowner motivation that will inform the marketing sales strategies anticipated in the next-step Business Plan.

Oakville’s residential sector is comprised of 85% single-detached, semi-detached and townhouses, approximately 68,000 homes from a total of 81,000. All three residential building archetypes, at both low and high predicted future energy costs show that annual cost savings outpacing Homeowner retrofit payments well within the 20-year LIC-based borrowing horizon.

3.2.4 Market Penetration

Market penetration, expressed in the number of homes retrofitted per year, is the most important variable in the analytical model used in this Study. To determine the impact of variations to the home retrofit penetration rates, the Study provides three scenarios:

Reference Case: This is the full program scenario that calls for retrofits at the highest rate in order to serve the goals of the CES which is also defined as technical potential and was the bases of the CES strategy. The Reference Case calls for a maximum penetration rate of 80% of all Single Detached, Single Semi Detached and Town Homes, 60% of Low and Medium Multi-Residential and 20% of High Multi-Residential. After a four year ramp up this results in a maximum run rate of approximately 2,900 homes retrofitted per year.

Medium Case: This scenario, developed as part of the Stress Test calls for a maximum penetration rate of 30% of all Single Detached, Single Semi Detached and Town Homes, and 10% of all Multi-Residential. After a five year ramp up this results in a maximum run rate of approximately 1,100 homes retrofitted per year.

Low Case: This scenario, developed as part of the Stress Test calls for a maximum penetration rate of 5% of all Single Detached and Single Semi-Detached homes. After a five year ramp up this results in a maximum run rate of approximately 100 home per year.

3.2.5 Stakeholder Engagement

The Study included a framework that engaged contractors, investors, Homeowners, and municipal staff in order to verify program analysis assumption, roles and potential barriers. It is anticipated that the engagement activities conducted under the terms of this Study will act as a basis for developing further stakeholder relations and market understanding in the future development of the Business Plan. Further detail on the engagement activities that took place during the Study can be found in Appendix D: Stakeholder Engagement Summary, Appendix I: Homeowner Survey Report and Appendix J: Homeowner Focus Group.

At a high level, the engagement activities provide valuable feedback from the stakeholders that will be critical actors in a potential future Home Energy Retrofit program.

- Three hundred, thirty-five (335) Homeowners responded to the survey, providing some key inputs to the Study. The following highlights were further explored in a Focus Group format:
 - Managing the costs of operating a home (including energy) is roughly equal in importance to home comfort and home location.
 - Approximately 2/3 of respondents have completed some form of energy retrofit in the past.
 - Retrofit costs are a barrier for approximately 2/3 of respondents.
 - Almost 80% of respondents indicated “yes”, or “maybe” as to their interest in a potential LIC-based home energy retrofit program.
 - Approximately 2/3 of respondents indicated interest in a program that provided a “turn-key” approach that had an Entity manage all aspects of organizing and executing home energy retrofits.

- Several contractors from the Town of Oakville, within the Region as well as interviews with contractors outside of the scope of this Study indicate that:
 - Cost efficiencies for the contractors can be significantly achieved with an Entity that managed marketing, promotion, and customer education and that the retrofit cost efficiencies identified in the Reference Case (See page 73, Appendix F).
 - Contractors would make investments in expanding their business if they had the confidence of a program that provided scaled up opportunity.
- Interviews with investors/lenders indicated that:
 - The technical feasibility of a potential community-wide home retrofit program provides the level of scale most investors/lenders are seeking.
 - The risk of default is well understood as it is linked to the Local Improvement Charge mechanism.
 - Investors/lenders will be motivated to participate as potential stakeholders once a go-to-market Business Plan is complete or underway.
 - *(Note – discussion with potential investors have been defined as commercially confidential. Potential investors have requested that they not be named publicly)*
- Discussion with Municipal Staff in Planning, Finance, Legal and Economic Development indicate that there is a basic understanding that the municipality will play specific roles in a potential home energy retrofit program by:
 - Administering the LIC mechanism.
 - Developing the appropriate LIC by-laws and municipal-Entity agreements.
 - Potentially requiring permitting services for certain aspects of a home retrofit.
 - Overseeing planning implications to retrofits on homes with existing or future heritage designations.
 - Promoting a potential home retrofit program through existing economic development activity..
- Two presentations on the goals and progress of this Study presented to the board of Future Energy Oakville.

4.0 Program Framework

In order to assess technical feasibility and develop a Business Case for a potential Home Energy Retrofit program, the Study made several assumptions about program design and structure which are summarized in this section. Building on the Study, the Entity would also need to conduct its own supplemental due diligence to ensure a successful entry into the market. Final program design, in the form of a Business Plan, would be the responsibility of either:

1. Program Overseer, by the FEO or on behalf of the FEO,
2. Program Administrator (i.e., the Entity) created for purpose of developing a Business Plan

4.1 Program Capitalization

4.1.1 Financing and Fund Flows

The Study's proposed financial model was designed to be flexible. Over time it could be adapted to include additional lenders, contractors, and third-party public or private investors. These investors could include private commercial entities and even other municipalities and other public entities. The financial model was designed such that the Town would only be responsible for collection of the LIC payments and transfers to the Entity. The Town's administrative costs are also proposed to be recovered in the retrofit price. All borrowing would be on the balance sheet of the Entity.

Town staff have indicated that, if the Entity is an MSC and the Town is the shareholder, then borrowing *may* have an impact on the Town's balance sheet. The Municipal LIC Risk Assessment, as presented in Appendix H, indicates that the debt of an MSC is not attributed to the owner municipality. A legal opinion for clarification is recommended in the next-step Business Plan.

Specific to LIC's, the Town's risk is mainly limited to outstanding LIC loans and is secured through the same mechanism as standard tax collection.

Funding sources include:

- Loans from Lenders
- Customer payments via property taxes
- Interest on unused loans
- Initial working capital to form Entity
- Government and utility incentives (assumed to be zero in this Study).

These funds would be used for:

- Lender interest payments
- Lender capital repayments
- Contractor payments
- Entity operational expenses
- Community Group sponsorship

- FEO Sponsorship

The Study assumed a 4.25% interest rate⁸ on retrofit lending and borrowing. This will need to be stress tested and refined during the development of the Business Plan based on prevailing interest rates. The Business Plan would also be stress tested to consider fluctuations in interest rates moving forward.

4.1.2 Capital Utilization

4.1.2.1 Start-up and Initial Working Capital

The Entity would require start-up funding to develop a final Business Plan and initial working capital for program launch. Start-up and working capital would be recovered once the business turns profitable. This would be supplied by the initial investors, possibly the Town, the Town’s holding company and/or grant funding. See Section 4.1.1 for additional commentary.

4.1.2.2 Ongoing Capital

Ongoing capital in the form of lending, to fund the program would be sourced from impact investors, insurance companies, pension funds and other sources of patient capital.

4.1.3 Funding Flow

The funding flow for the Program is illustrated in Figure 21 below.

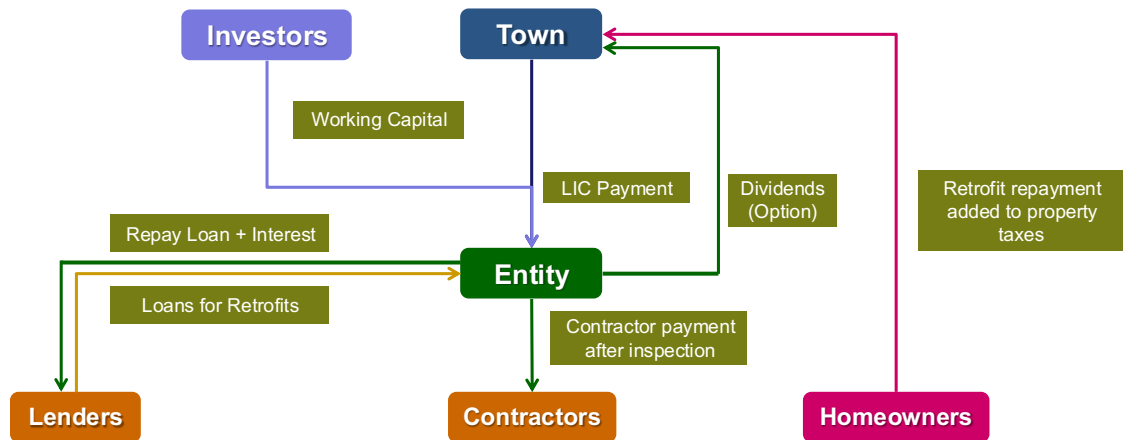


Figure 21 – Program Funding Flow

⁸ In the higher price outlook, an interest rate of 5% was used.

The process flow for an individual retrofit is illustrated in Figure 22 below.

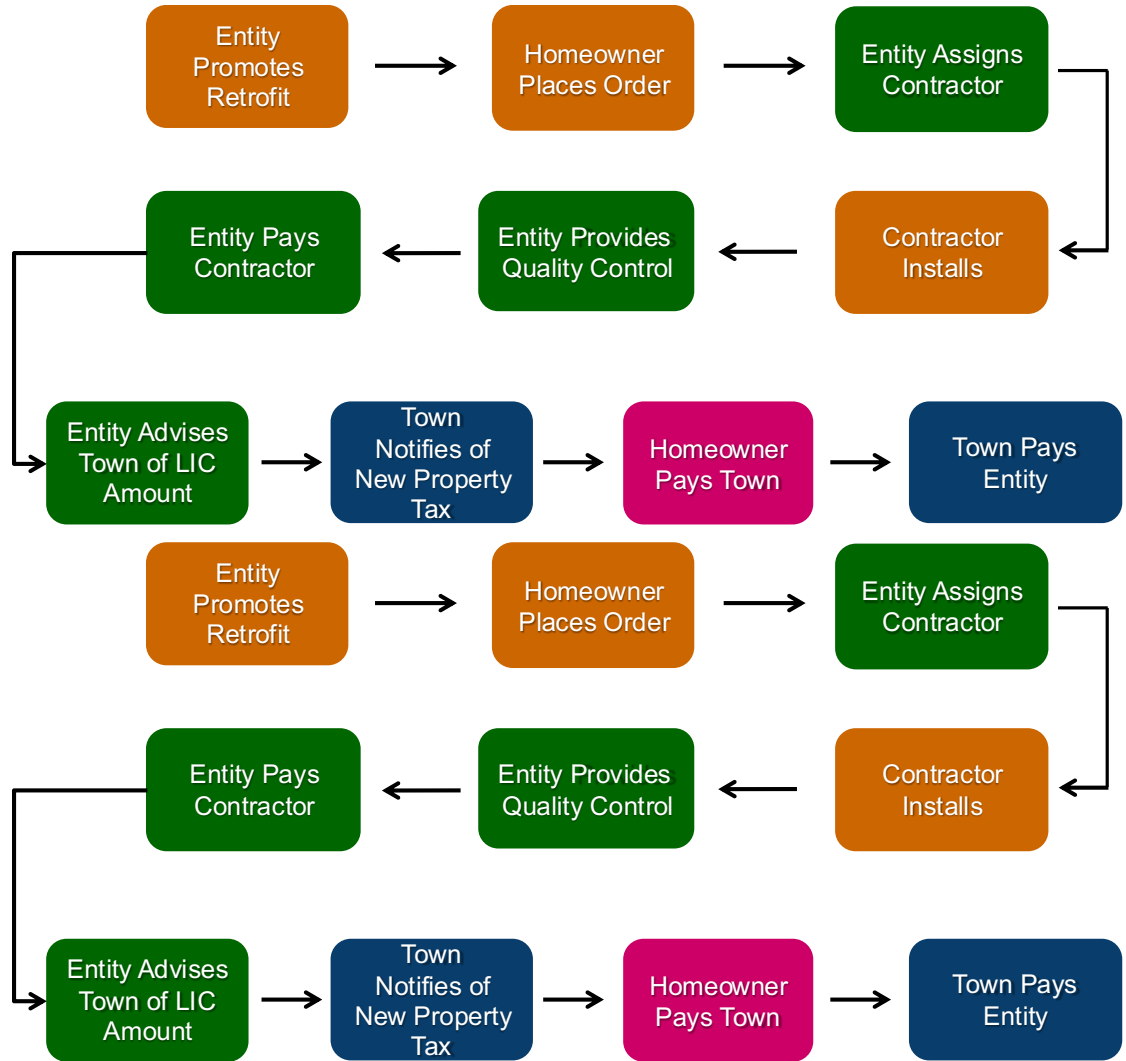


Figure 22 – Retrofit Process Flow

4.1.4 Credit Enhancement

Loan Loss Reserves (LLR) have been utilized in other jurisdictions (i.e., Durham Region) to manage mortgage lender and investor concerns regarding Homeowner default on the LIC payment. During the announcement of the FCM Community Efficiency Financing program, the potential to support a municipality to establish an LLR for a retrofit program was noted.

4.1.5 Existing Incentives

The framework for the Study **did not** include public incentives and/or grants for two primary reasons.

1. To demonstrate the viability of the technical potential business model. Market penetration rates in the Low and Medium Cases are included to provide a proxy range to be further analyzed in the Business Plan.
2. The Entity would promote any available government and utility programs to Homeowners and, where appropriate, aggregate and integrate them into the “value-proposition” to the Homeowner.

4.2 Property Eligibility

4.2.1 Sector

The Study assumes the program would be developed for residential properties aligned with the first strategy proposed in the CES (Strategy 1a).

4.2.2 Housing Type

The Study assumes standardized retrofit packages would be offered to single-detached, semi-detached and townhouses. Packages for multi-unit properties would be introduced after the second year of operation. Primarily homes 20 years or older would be targeted.

The rationale for this Sector and Housing Type includes:

- Optimizing achieving the CES goals for energy and emissions reduction in this sector.
- Oakville’s residential sector is comprised of 85% single-detached, semi-detached and townhouses, approximately 68,000 homes from a total of 81,000. 87% of Oakville homes were built before 2012, the year that Ontario’s building code required energy efficiency standards.
- Single-detached, semi-detached and townhouses over 20 years old account for about 50% of the residential sector’s energy costs and use, as well as 56% of GHG emissions
 - This target market is considerable at approximately 36,000 homes and is half as energy efficient than global best practice, so it has the greatest potential for cost-effective and environmentally impactful energy efficiency retrofits.
- Each year, an additional portion of the current housing stock reaches an age (i.e., 20 years) where reinvestments are required to maintain or improve serviceability. Such renewal work provides an excellent opportunity to cost-effectively include energy efficiency measures in the improvement.
- The retrofit of multi-unit buildings is more complex and better tackled once the Entity’s business systems are functioning smoothly. However, even though a potential customer may not fall under the scheduled market

penetration, the Entity would not be expected to refuse to accept an order if it can be effectively fulfilled.

4.2.3 Homeowner Eligibility

Participation would be voluntary, and owner initiated. All registered owners of the property would have to consent to participate. Prudent Homeowner eligibility requirements would be established by the Program Administrator during program design phase to balance risk with accessibility. Provision of utility data to support measurement, evaluation and verification would also be required (see Section 4.5) for program level evaluation. It is not for evaluating each individual retrofit independently. The risk to the Homeowner when performance and/or marketed benefit commitments are not met are addressed through the general quality control provisions of the Entity.

4.2.4 CMHC-Insured Mortgages

Currently, mortgages insured by the Canadian Mortgage and Housing Corporation (CMHC) would not be eligible for LIC financing. In the [2019 Final Report of the Expert Panel on Sustainable Finance](#) it is recommended that in the case of municipality-sponsored PACE programs, CMHC could provide guarantees for Local Improvement Charge (LIC) financing programming.⁹ It should be noted the number of Homeowners with CMHC mortgage insurance in Oakville is presumed to be low, only representing approximately 7% of mortgages in Ontario. More detail on this can be found in Appendix H – Municipal LIC Risk Assessment.

4.2.5 Project Eligibility

4.2.5.1 Standardized Energy Efficiency Retrofits

Standardized retrofit packages would be designed by the Entity to deliver annual energy savings of approximately 30% and 20% water savings, to Homeowners. Modelling for the Study demonstrated these savings would be achieved with existing materials and technologies. The package cost would be dependent on home size, age, and type. New and innovative measures will be added to the program as they gain market maturity and are tested and proven.

4.2.5.2 Market Analysis

One of the more challenging features of this business model is understanding the market for a fixed offering rather than a more traditional “a-la-carte” retrofit approach. To begin to understand the market, the Study explored several marketing approaches.

- Mapping of homes by type and age (Appendix F: Full Feasibility Study, pages 22 and 23)

⁹ Source: <https://www.canada.ca/en/environment-climate-change/services/climate-change/expert-panel-sustainable-finance.html>

- Home energy modelling by type and age (Appendix F: Full Feasibility Study and Appendix G: Stress Test – Low and Medium Cases)
- Homeowner Survey Report (Appendix I)
- Homeowners Focus Group Report (Appendix J)

A more rigorous market analysis, using this data and additional primary (e.g., additional surveys and focus groups) and secondary research (e.g., sources of existing market data), would be conducted to support the development of the Business Plan and a successful program launch.

4.2.6 Project Measures

The Study assumed that the Entity’s offering would be comprised of a standard package of energy and water efficiency measures. A review of the measures assumed in the Feasibility Study would minimize any impact on Building Department workflows. Although not included in this Study, over time, and in consultation with municipal stakeholders, it is expected the Entity would consider offering other energy retrofit options in addition to the standard package (e.g., solar power, solar hot water, vehicle charging stations). It is recognized that the Entity could serve as an effective channel to support other CES strategies (e.g., the large-scale installation of solar PV) as well as other complementary government, regulatory, and utility future programs.

4.3 Program Administrator

The Feasibility Study assumes that the Entity would be initiated by a group of founding investors, one of which could be the Town of Oakville. Notwithstanding the final ownership, the Study recommends the Town proceed to establish an Entity, as a Municipal Services Corporation (MSC)¹⁰, to administer the program for the reasons listed below. The FEO is not envisioned to be the Program administrator but could play the role of overseer of the Entity in the context of FEO’s mission to implement the Community Energy Strategy.

- This administrative model enables a more flexible financing approach that will minimize municipal liability and better leverage private sector investment.
- An MSC would be better positioned to enter into arrangements with the private sector than the municipality (e.g., contractors, material suppliers and investors).
- Critical program delivery risks rest with the MSC and not the Town.
- Borrowing is placed on the MSC’s balance sheet, not the Town’s.
- The MSC is not limited to working within municipal boundaries and can enter into beneficial partnerships with other municipalities in Halton Region or beyond.
- The MSC should be responsible for the final Business Plan as the Program Administrator.

¹⁰ O.Reg. 599/06 allows Ontario municipalities to establish a Municipal Services Corporation (MSC). An MSC is a corporation whose shares are owned by a municipality, or a municipality and one or more other public-sector entities. An MSC can only provide a system, service, or thing that the municipality could provide.

The Feasibility Study recommendation is based on the LIC Risk Assessment as detailed in Appendix H.

The Study estimates that approximately \$300,000 would be required to establish the Entity and provide it with adequate resources to finalize the Business Plan. Approximately \$200,000,000 would be devoted to the Business Plan with \$100,000 estimated for legal services and management and oversight of the Entity's development. The Federation of Canadian Municipalities (FCM) provides support for Business Planning activities¹¹ under their Community Efficiency Financing Program. While FCM funding may cover part of these estimated planning costs, matching funds may be required. Clearly these could come in whole, or in part, as at-risk funding by interested potential investors.

The working capital requirements for the Entity to fully launch the business (see Section 3.1.2.1), would be shared between the initial investors and would be determined in the Business Plan.

4.4 Town-Entity Partnership Agreement

The Municipal Risk Assessment for an LIC Energy Retrofit Loan Program (see Appendix H) identified a potential reputational risk for the Town should the Entity fail to effectively deliver the retrofit program. Robust due diligence in establishing an agreement between the municipality and the Entity would help mitigate this risk (e.g., performance standards). The agreement would outline the terms and conditions for the municipality making LIC financing available to Homeowners participating in the retrofit program administered by the Entity.

4.4.1 LIC By-law

The Framing Goals for this Study identify the Town as making LIC financing available to Homeowners under the terms and conditions of a Town-Entity Partnership Agreement. The potential municipal risks associated with an LIC financing program are summarized in Appendix H: Municipal LIC Risk Assessment. The assessment of potential risks to the Town concluded that the risks are low and/or can be mitigated. Notably, the establishment of an Entity to serve as the Program Administrator transfers program-related risk from the municipality to the Entity, including debt management. A special charges By-law would need to be enacted by the Town to enable an LIC program. Proposed enactment of the LIC By-law is recommended in 2023 and will inform the execution of the Town-Entity Agreement.

4.4.2 Mortgage Lender Consent

A concern regarding mortgage lender consent was raised during the Feasibility Study engagement activities and was considered extensively during the development of the Municipal LIC Risk Assessment. The final rating of this risk was low, given identified mitigation strategies and ongoing monitoring by the Entity. The following is an extract from the Municipal LIC Risk Assessment (see Appendix H for the full document):

The Canadian Bankers Association has raised a concern that the LIC could put Homeowners/borrowers in an unexpected default position under most lenders'

¹¹ The Federation of Canadian Municipalities' Community Efficiency Financing program supports Business Planning activities under the category of "program design".

standard charge term for residential mortgages. Almost all lenders obtain covenants from their borrowers with respect to additional borrowing that could result in charges against the property or that might impair priority of the lender's charge.

The City of Toronto has addressed this risk by requiring Homeowners to seek the consent of their mortgage lender which limited participation. However, there has been limited appetite of traditional mortgage providers to agree to new senior covenants for retrofit loans tied to property tax.

Currently, mortgages insured by the Canadian Mortgage and Housing Corporation (7% of mortgages in Ontario) would not be approved for LIC financing.

The Clean Energy Financing program in Nova Scotia has addressed this risk by recommending Homeowners notify their mortgage lender about their participation in program. During the initial program design process, mortgage lenders were consulted, and an internal legal discussion was conducted to address lender concerns. To date, the Clean Foundation has not encountered any bank putting their customer in a default position and it has not impacted program uptake.

Loan Loss Reserves (LLR) have been successful in other jurisdictions to manage mortgage lender concerns. The announcement for the FCM Community Efficiency Financing program noted the potential to establish an LLR for a retrofit program.

The retrofit cost relative to the value of the asset is low. The risk of a mortgage lender not renewing a mortgage, if the Homeowner is current with both their mortgage and property tax payments, is considered low.

In The Government of Canada's Final Report of the Expert Panel on Sustainable Finance¹² it is recommended that in the case of municipality-sponsored PACE programs, CMHC could provide guarantees for Local Improvement Charge (LIC) financing programming.

4.5 Measuring Program Impact

4.5.1 Estimating Economic Impact

The Study estimates significant electricity, gas, and water savings and GHG reductions are achieved (See Appendix F: Full Feasibility Study). Annual total residential cumulative cost savings are estimated to be between \$1.7B to \$2.7B by 2051. The Medium Case indicates estimated annual total residential cumulative cost savings between \$0.57B and \$0.87B. Low Case indicates estimated annual total residential cumulative cost savings between \$81M and \$125M. See Appendix G: Stress Test – Low and Medium Case.

¹² Full report can be found at: <https://www.canada.ca/en/environment-climate-change/services/climate-change/expert-panel-sustainable-finance.html>

4.5.1 Documentation (Evaluation, Measurement & Verification)

The Study assumed that Homeowners would provide access to annual utility bills to evaluate, measure and verify the overall performance of the program in terms of improved energy efficiency and emission reductions rather than adding the expense and inconvenience of pre- and post-energy audits to each Homeowner's costs. This information would also be valuable to support any under, or over, performance assessments for an individual customer.

5.0 Next Steps – Business Plan

The Entity, as Program Administrator and potential implementer, is recommended to be responsible for the development of a viable Business Plan, building from this Study, which includes additional market research, program design, program delivery, funding sources, risk assessment, etc. for the approval of the MSC Board of Directors.¹³ .

5.1 Business Plan

To develop a strong framework for feasibility analysis, elements of a Business Plan were considered. It would require significant resources to complete the Business Plan's due diligence, including supplemental market testing and program risk assessment, to finalize a Business Plan for the approval of the MSC Board of Directors.

In the development of the Business Plan, it is recommended that the following be considered.

- Conduct additional market research (e.g., the impact of age and income) to refine the size and timing of the market for standardized energy efficiency retrofits and the penetration rates assumed in the Study.
- Identify strategies to grow a new market for standardized energy efficiency retrofits through community engagement.
- Seek legal opinion(s) concerning the appropriate legal framework for the recommended Entity with particular attention to the implications to the Town as a potential shareholder and the effect of Entity debt on the Town's balance sheet.
- Continue to learn from the experience (e.g., data and tools) of previous energy conservation programs in Ontario and other jurisdictions in Canada and elsewhere, recognizing "business as usual practices" are part of the market problem to be solved¹⁴.
- Consider how to promote or integrate other government and utility energy conservation or fuel switching programs into the standardized offering, to enhance the viability of the core business model. Collaborate with, and leverage, the utilities' (power/gas/water/waste) conservation interests on an ongoing basis. Early engagement is key to ensure that the programs are complementary, if not jointly designed/developed, and so both the town and the residents realize the synergies and enjoy the full benefits of these programs. In certain US states where utilities are "attributed" a specific % of their energy efficiency and carbon reduction plans, utility programs are considered the base programs, and further enhanced based on the specific needs of local jurisdictions.
- Work with local utilities to identify other potential program synergies (e.g., fuel switching, demand response, demand management, load displacement through the promotion of Distributed Energy Resources to name a few).

¹³ In the event that the Business Plan is initiated prior to the creation of an Entity, the FEO could potentially act as proxy to the Entity.

¹⁴ Enbridge and Oakville Hydro have collected considerable current-market data from the residential sector through Demand Side Management (DSM) and Conservation and Demand Management (CDM) programs which would provide valuable input into the development of the final Business Plan.

- Address the accessibility of the program for harder-to-serve segments¹⁵ of the residential sector (e.g., seniors on fixed incomes).
 - Consider the changing regulatory and market environment, review the technology mix offered in the standardized package to optimize energy savings, emission reductions and residential savings. There are several emerging and newly commercialized low carbon technologies that will find their way into mainstream during the plan period.
 - The product/technology mix of the retrofit package will evolve and will fall on the shoulders of the Entity to regularly review and adjust the standard retrofits.
 - Continue to seek stakeholder input in the development of the detailed Business Plan, designed through the Feasibility Study process. Engage the real estate sector to identify ways to promote the underlying incremental market value of retrofitted homes, and to identify new Homeowners planning extensive home renovations.
 - Update financial assumptions to reflect prevailing market conditions, recognizing these would also be updated in annual Entity Operating Plans.
 - Develop workforce capacity and capability for energy retrofit associated work within the Town as this will be essential in meeting the economic goals of the program. Strategic partnerships will help accelerate the capacity and capability building efforts.¹⁶
 - Education and awareness should accompany any equipment or physical home energy retrofit program. Behavioral shifts will be necessary to help ensure that the savings and carbon reductions persist.

Note: Preliminary Business Plan elements have been considered in this Study that will address potential program barriers, challenges, risks, including a more comprehensive analysis of market penetration risks and program design opportunities that will help mitigate the risks and support achievement of the CES goals.

Coupled with this and a main challenge is the increasing time pressure to complete Business Plan due diligence, program design, seek approval, source financing and execute in time to achieve the CES targets. To overcome the time pressure challenge, the Town and/or OEC are considering a turn-key solution that would incorporate the completion of the Business Plan with program design and execution by the same business entity. This approach will help fast-track program development and the execution process which should help mitigate timing risks. Please see Section 4 of the Study for further details

The following is a preliminary general scope of work for the proposed Business Plan:

- Conduct additional market research to refine the key program design inputs,
- Identify strategies and program opportunities to maximize market penetration, efficiency investment and community engagement,
- Research and leverage previous energy conservation and demand management programs in Canada and elsewhere, including how to promote and integrate other

¹⁵ The City of Windsor Residential Deep Energy Efficiency Business Case analytically includes cost effectively serving lower income residents as a structural part of the Business Case. This approach could be adapted for Oakville.

¹⁶ The CES called for a possible teaming with Sheridan College for workforce development

- government and utility energy conservation or fuel switching programs into the standardized offering,
- Address the accessibility of the program for harder-to-serve segments of the residential sector (e.g., seniors on fixed incomes).
 - Consider the changing regulatory and market environment, review the technology mix offered in the standardized package to optimize energy savings, emission reductions and residential savings,
 - Seek stakeholder input in the development of the key program design elements and detailed Business Plan,
 - Update financial assumptions to reflect prevailing and future market conditions,
 - Develop local workforce capacity and capability for energy retrofit associated work within the Town,
 - Conduct education and awareness to help ensure that the savings and carbon reductions persist,
 - Design a program framework complete with a governance structure, delivery agent and partners,
 - Source financing, and
 - Seek approvals and execute.

5.1.1 Program Set-Up Costs

The Study estimated initial working capital requirements, defined as maximum negative cash flow, will be about \$1.8M. In 2022, there are 6 months of organisation costs with no countervailing retrofit revenues. In 2024 the retrofit activity supports about half of the organisation costs, and by 2025 organisation costs are fully covered, and the Entity generates profit. Once profitable, the Entity will start being a sustaining Sponsor of Future Energy Oakville. A faster start-up would reduce the net start-up working capital required.

5.1.2 Ongoing Operation Tasks and Costs

The Study identified core business functions as follows:

- General Administration
- Finance and Credit (including order acceptance and fund management)
- Marketing, Sales, Retrofit Management (including quality control and materials management)

For additional details see:

Appendix F: Full Feasibility Study – Reference Case

Appendices

Appendix A:	Project Scope Summary
Appendix B:	Oakville Residential Energy and Emissions Profile
Appendix C:	Project Working Team (PWT)
Appendix D:	Stakeholder Engagement Summary
Appendix E:	Summary of Feasibility Study Assumptions
Appendix F:	Full Feasibility Study – Reference Case
Appendix G:	Stress Test – Low and Medium Cases
Appendix H:	Municipal LIC Risk Assessment
Appendix I:	Homeowner Survey Report
Appendix J:	Homeowner Focus Group
Appendix K:	Recommended Business Plan Structure
