



## **Final Report**

# **City of Windsor Residential Deep Energy Efficiency Retrofits (R-DEER)**

## **Business Case**

**December 20, 2019**

**"© 2019, The Corporation of the City of Windsor. All Rights Reserved.**

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 the personal views of the authors, and the Federation of Canadian Municipalities and the Government of Canada accept no responsibility for them.

# Table of Contents

## Contents

- Acknowledgements..... 5
- Executive Summary..... 6
- 1. Project Overview..... 9
  - 1.1 Project Purpose ..... 9
  - 1.2 Strategic Alignment with Council Priorities ..... 9
  - 1.3 Planning and Decision-making Process ..... 10
- 2. Program Enablement..... 12
  - 2.1 Climate Change and the Paris Agreement..... 12
  - 2.2 Provincial Policy and LIC Legislation ..... 12
  - 2.3 Elements of the Windsor Deep Energy Efficiency Retrofit Program..... 12
    - 2.3.1 Windsor Community Energy Plan (CEP)..... 12
    - 2.3.2 Windsor Residential Deep Energy Efficiency Retrofit (R-DEER) Program ..... 13
    - 2.3.3 R-DEER Business Case ..... 14
    - 2.3.4 Program Administrator ..... 16
  - 2.4 FCM Community EcoEfficiency Acceleration program ..... 18
- 3. Program Design..... 19
  - 3.1. Program Capitalization ..... 19
    - 3.1.1 Financing and Fund Flows..... 19
    - 3.1.2 Capital Provider ..... 19
    - 3.1.3 Funding Flow ..... 19
    - 3.1.4 Credit Enhancement..... 20
    - 3.1.5 Existing Incentives ..... 20
  - 3.2 Program Scope..... 20
    - 3.2.1 Property Eligibility..... 20
    - 3.2.2 Homeowner Eligibility ..... 21
    - 3.2.3 Project Eligibility ..... 21
    - 3.2.4 Project Measures ..... 22
  - 3.3. Program Impact..... 23
    - 3.3.1 Estimating Impact..... 23
    - 3.3.2 Documentation (Evaluation, Measurement & Verification) ..... 23
- 4. Program Launch ..... 24

4.1 Business Plan .....	24
4.1.1 Program Set-Up Costs .....	24
4.1.2 Ongoing Operation Tasks .....	25
4.1.3 Ongoing Operating Costs .....	26
4.2 Pre-Launch .....	26
4.3 Launch .....	26
5. Conclusion & Recommendations .....	27
5.1 The Market Problem .....	27
5.2 The Product Solution .....	27
5.3 Conclusion .....	27
5.4 Recommendations .....	27
List of Appendices.....	29

## Acknowledgements

The Windsor Residential Deep Energy Efficiency Retrofit (R-DEER) Business Case was developed with the oversight of a **Project Working Team** consisting of members from City staff and the consulting partnerships under the leadership of Garforth International llc.

### *City and Local Representatives*

<b>Dr. Kyle Bassett</b>	Community Energy Plan Administrator, Environmental Sustainability and Climate Change, City of Windsor
<b>Karina Richters</b>	Supervisor, Environmental Sustainability and Climate Change
<b>Jennifer Gyorgy</b>	Manager Property Taxation and Taxpayer Support
<b>Allison Charko</b>	GIS Supervisor
<b>Greg Atkinson</b>	Planner III, Economic Development
<b>Jill Braido</b>	Marketing and Communications Officer
<b>John Wladarski</b>	VP Customer Operations and Business Development & COO, Enwin Utilities
<b>Brian Lennie</b>	Senior Advisor, Municipal Affairs & Stakeholder Relations, Enbridge

### *R-DEER Consulting Team*

<b>Peter Garforth</b>	(Business Strategy), Principal, Garforth International llc
<b>Katie Rinas</b>	(Project Manager), Project and Program Manager- Sustainable Energy Systems, Sheridan College
<b>Ajit Naik</b>	(Homes Energy Analysis), Commissioning and Energy Engineer, Baumann Consulting
<b>Gerd Fleischhammer</b>	(Supply and Integration), Principal, Ingenieurbüro Gerd Fleischhammer
<b>Rob Kerr</b>	(Engagement Plan and Policy), President, Robert J. Kerr + Associates
<b>Karen Farbridge</b>	(Engagement and Policy Advisor), President, Karen Farbridge and Associates
<b>Cindy Palmatier</b>	(Project Administration), Garforth International llc

The City of Windsor would like to acknowledge the effort of the stakeholders who gave their time and shared their expertise in providing meaningful feedback to the development of this Business Case including members of the local contractor community and dozens of Windsor residents and homeowners, along with individuals from the investment community.

# Executive Summary

## Background and Context

In 2017, the City of Windsor approved a Community Energy Plan (CEP) with a community-wide goal to reduce GHG emissions by 40% of 2014 levels and to reduce per-capita energy consumption by 40%. Increasing residential energy efficiency was one of the strategies prioritized to achieve this goal. The CEP set a target to deep-retrofit 80% of Windsor's existing homes by 2041 to achieve a 30 to 50% increase in energy efficiency depending on the age and type of home. The CEP strategy to achieve this target proposed completing a Business Case that reviewed:

- the creation of an Entity to deliver retrofits standardized by home age and type;
- to team with local contractors, material suppliers and investors to transform the energy retrofit market;
- to use LIC financing and standardized pricing approaches to create scale.

In 2018, City Council approved the development of a Windsor Residential Deep Energy Efficiency Retrofit (R-DEER) Business Case to investigate the feasibility of the CEP home retrofit strategy. A Project Working Team (PWT) was tasked to oversee the project, engage stakeholders and report back to the City with recommendations.

The purpose of this project was to investigate the feasibility (or "Business Case") of establishing an Entity to deliver high quality, standardized residential energy efficiency retrofit packages to most Windsor homes.

The purpose of the Business Case is to answer the question:

*Under a credible set of assumptions, can a business case be made for the City of Windsor Community Energy Plan (CEP) home energy retrofit strategy that meets reasonable community, market and economic goals?*

If the answer is yes, then the next step would be to identify/establish a program administrator and provide them with reasonable resources to complete the due diligence – including supplemental market testing and risk assessment – for the development of an implementable Business Plan based on what is presented in this Business Case.

During engagements with various stakeholders, the PWT identified several issues to be further explored during the development of the Business Plan. They are documented in this report. In particular, the PWT members felt strongly that the final program design should ensure retrofits are accessible to Windsor residents on low and/or fixed incomes, so they too would benefit from reduced energy bills.

## Program Administrator

The PWT recommends the City proceed to establish an Entity, as a Municipal Services Corporation (MSC), to administer the program for the following reasons:

- 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 partnerships with the private sector than the municipality (e.g., contractors, material suppliers and investors);
- program delivery risks rest with the MSC and not the City;
- borrowing is placed on the MSC's balance sheet;
- the MSC is not limited to working within municipal boundaries and can enter beneficial partnerships with other municipalities in the immediate region or beyond; and

- the MSC should be responsible for the final R-DEER Business Plan as program administrator.

Seed funding of approximately \$400,000 would be required to establish the Entity and provide it with adequate resources to finalize the Business Plan which would include the hiring of a General Manager. The PWT recommends the City apply for funding to support the next steps. The upcoming FCM Community Eco-Efficiency Accelerator Program is one grant that may assist with these start-up costs. These start-up costs are at risk should the Entity be unsuccessful in finalizing an approved the Business Plan.

The long-term working capital requirements for the Entity to fully launch the business, whether from the City and/or private investors, would be contingent upon the final Business Plan.

### **Standardized Deep Energy 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. Low volumes and the fact that every project is specific to each household means that material costs are expensive and performance guarantees are risky. From the homeowner's perspective, obtaining understandable bids from various contractors is burdensome. They are responsible for finding their own sources of funding based on their individual credit rating. Finally, the low volumes result in retrofit costs that typically exceed the value of the energy savings, even over many years.

The R-DEER product solution to address this market problem is to offer standardized energy retrofits to homeowners at high volumes. Contractors benefit from increased project predictability, improved margins and vastly higher project volumes. Homeowners benefit from a simplified transaction, guaranteed pricing, lower cost pre-financed retrofits, and a simple billing and payment mechanism.

Standardized retrofit packages would be designed by the Entity to deliver annual energy savings of 30 to 50%, and 20% water saving to homeowners. Modelling for the R-DEER Business Case demonstrated these savings could be achieved with existing technologies. The package cost would be dependent on home size, age and type. Using pricing based on a fixed index per specific area (\$ per m<sup>2</sup>) depending on home category, minimizes transaction costs and complexity.

Concerns were expressed during the engagements from some stakeholders as to whether enough homeowners would be interested in a standardized retrofit valued at \$25,000 to \$30,000. Additionally, many Windsor residents have already completed partial retrofits through previous government and utility programs and may not be eligible for the full program. These concerns will be addressed during the final Business Plan, along with considering any "go-to-market" strategies that would mitigate prevailing market conditions.

The creation of an Entity provides an additional delivery vehicle for the City's Basement Flooding Protection Subsidy Program. It is estimated that 80% of the program's retrofits will qualify for the subsidy program. The homeowner will benefit from Entity-managed contractor cost and quality control and the City will benefit from increased uptake of the program.

The delivery of standardized retrofits at high volumes to Windsor homeowners is an essential feature of the Business Case and has been designed to drive market transformation. The business model reduces the cost of the average retrofit by 33%. This is achieved through efficiencies in:

- Reduced selling costs through standardized offerings and pricing
- Elimination of contractors' costs to promote and prepare customized proposals

- Increased contractor labour productivity
- Volume pricing for key material categories
- Lower cost financing through consolidation

## LIC Financing

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 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. It is proposed that the City would collect LIC payments on behalf of the Entity from homeowners participating in the retrofit program by passing an LIC By-law and entering into an agreement with the Entity. A robust municipal risk assessment was completed through collaboration with the City of Vaughan. A concern regarding mortgage lender consent was raised during the engagements 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.

## Conclusions

***Based on the analytical findings and stakeholder engagement, the PWT concludes there are reasonable grounds to proceed to implement the CEP recommendation of a Residential Deep Energy Retrofit Program. This conclusion is made with the understanding that the Entity established to administer the program would need to complete a final Business Plan prior to starting implementation. However, without establishing an Entity with a mandate to deliver high volumes of high quality, standardized residential energy efficiency retrofit packages to most Windsor homes, the City's energy and efficiency goals, as approved in the CEP, are unlikely to be realized.***

## Recommendations:

The PWT recommends that City Council:

1. Endorses the Final Report of the Project Working Team: Windsor's Residential Deep Energy Efficiency Retrofit (R-DEER) Business Case.
2. Incorporates a Municipal Services Corporation to serve as the Program Administrator with a mandate to develop an R-DEER Business Plan.
3. Applies for grants including the FCM Community Eco-Efficiency Accelerator program funding to support program set-up and launch, including the development of a final R-DEER Business Plan.
4. At the appropriate time, enacts an LIC By-law and enters into an agreement with the Municipal Services Corporation, with appropriate terms and conditions, to make optional LIC financing available to homeowners participating in the program.
5. Encourages the Municipal Services Corporation to consider program accessibility during final program design and the potential to leverage retained earnings over time to address the needs of low-income residents and/or seniors on fixed incomes.



# 1. Project Overview

## 1.1 Project Purpose

The purpose of this project was to investigate the feasibility (the “Business Case”) of establishing an entity to deliver high quality, standardized residential energy efficiency retrofit packages to most Windsor homes.

The purpose of developing a Business Case is to answer the question:

*Under a credible set of assumptions, can a case be made for the City of Windsor Community Energy Plan (CEP) home energy retrofit strategy that meets reasonable community, market and economic goals?*

If the answer to this question is yes, then the next step for the City would be to identify/establish a Program Administrator and provide them with reasonable resources to conduct additional marketing testing and program risk assessment to develop a final Business Plan.

## 1.2 Strategic Alignment with Council Priorities

The project aligns with Council’s 20-Year Strategic vision for:

1. More Jobs in Windsor
2. Addressing Windsor’s reputation
3. Improving Quality of Life in Windsor

### Community Energy Plan

The R-DEER Program is consistent with the Vision of the Community Energy Plan as approved by Council in July of 2017.

*The Community Energy Plan aims to create **economic advantage, mitigate climate change and improve energy performance**. It aims to position Windsor as an **energy centre of excellence** that boasts efficient, innovative, and reliable energy systems that contribute to the quality of life of residents and businesses.*

The R-DEER Program’s will drive transformative reductions in energy end-use and GHG emissions, as described in detail in this report, and will stimulate local job creation by keeping millions of energy dollars local. The financial calculation in the Business Case has been based on financial returns consistent with the CEP. All of these contribute directly to the overall targets of the Community Energy Plan.

- *Create at least 3,000 jobs by 2025 implementing the core CEP sub-strategies*
- *Emissions reduction will support global efforts to stabilize and reverse climate change and meet the 2016 Ontario Climate Action Plan*
  - *Target: 40% below 2014 levels by 2041*
- *Energy use per capita by 2041 will be at today’s global best practices*
  - *Target: 40% below 2014 levels by 2041*
- *Energy-related investments by the community will be at least as attractive a 20 year public bonds*

The R-DEER Program is a direct response to CEP’s Strategy #1: *Create a Deep Energy Retrofit Program for Existing Homes*. The design of the R-DEER Program, described in this report, is based on the recommended approach to this strategy.

- Retrofit 80% of homes by 2041
- Create local entity
- Public/private partnership
- Quality controlled standardized retrofits
- Standardized pricing
- Efficiency gain 30 to 50%
- Payments using Local Improvement Charges

### **Climate Change Emergency Declaration**

On November 18, 2019 Windsor City Council passed a declaration that contained the following resolution:

***THEREFORE BE IT RESOLVED*** that the City of Windsor declare a Climate Emergency in the knowledge that this is an emergency with no foreseeable conclusion which will require robust and permanent changes in how the City and County conduct their business; and further,

*That in response to this emergency, the need to reduce overall emissions from the City of Windsor and the County of Essex as well as continue to prepare for Windsor-Essex County's climate future are deemed to be high priorities when considering budget direction and in all decisions of council; and further,*

***That*** the City of Windsor administration **BE DIRECTED** to prepare reports for consideration by their respective Councils within 90 days containing recommendations for priority actions items, implementation measures, cost requirements to accelerate and urgently work towards the reduction of emissions and preparing for our climate future and include any initiatives that we are aware of by our Detroit neighbours and any other neighbouring municipalities across the border

This Business Case will be identified in the report back to City Council outlining priorities under the climate change emergency declaration.

### **1.3 Planning and Decision-making Process**

The Final Report of the Project Working Team (PWT) is organized to reflect a planning and decision-making process comprised of three phases (see Figure 1 on next page):

- Phase 1 - Program Enablement
- Phase 2 - Program Design
- Phase 3 - Program Launch

The City of Windsor is in the *Program Enablement* phase. A Program Administrator would normally lead Phases 2 and 3. The development of a Business Case was advanced for two primary reasons:

- to build the rationale for investing in establishing a Program Administrator (the Entity); and
- the CEP proposes to transform the energy retrofit market to achieve the community's energy and emissions reduction goals.

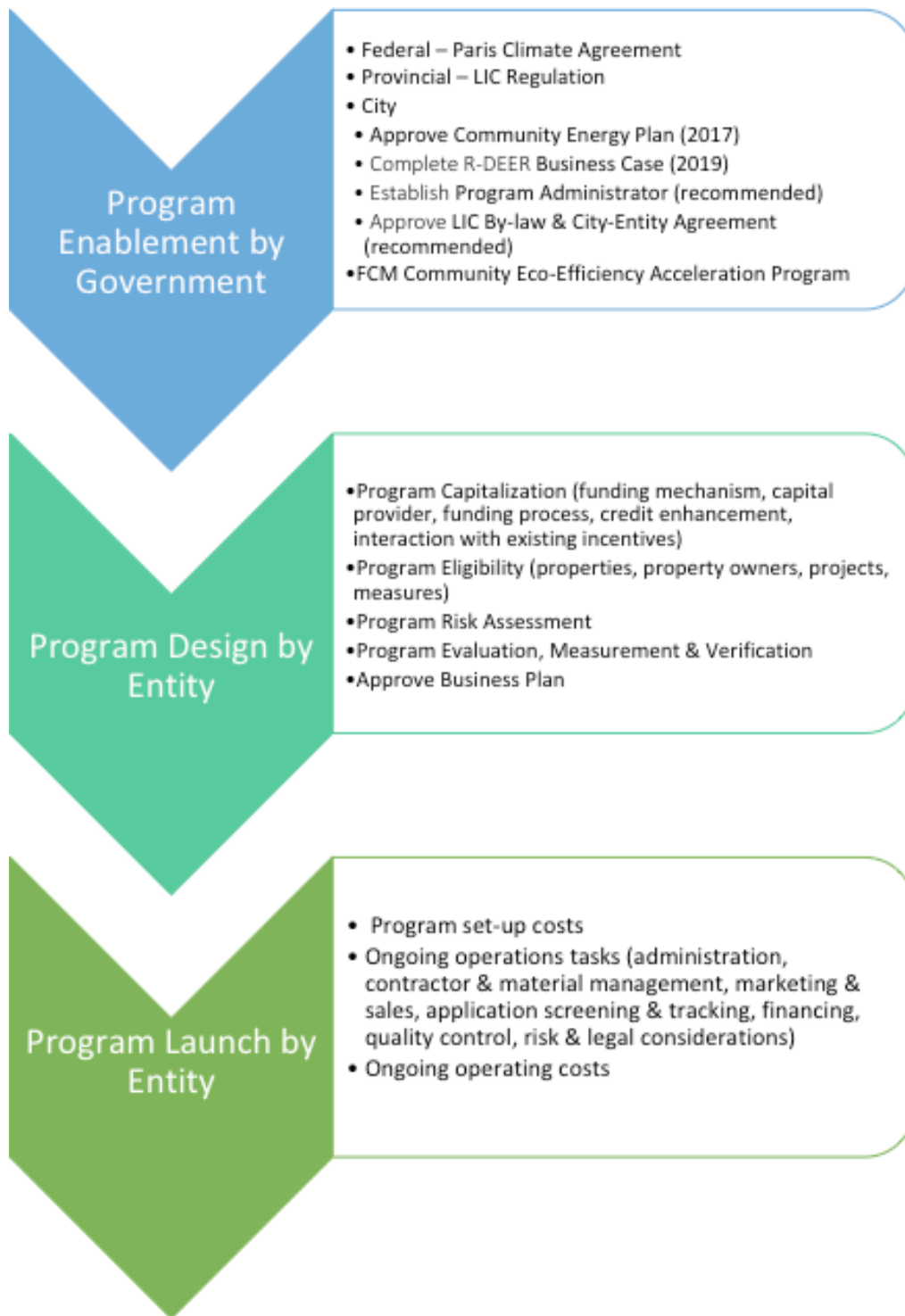


Figure 1: Residential R-DEER Planning & Decision-Making Process

## 2. Program Enablement

In addition to summarizing the findings of the Windsor Residential Deep Energy Efficiency Retrofit (R-DEER) Business Case, this section summarizes 1) existing enabling legislation, policies and programs and 2) the additional enabling steps required to support the development of a program to deliver high quality, standardized residential energy efficiency retrofit packages to most Windsor homes.

The opportunity for a municipal government to enable the uptake of home energy retrofits has never been better. Despite the cost advantages of energy efficiency, there are substantial barriers to achieving the technical potential for the residential sector, a challenge well-recognized by Ontario's utilities.

### 2.1 Climate Change and the Paris Agreement

As a signatory to the Paris Climate Agreement, Canada has committed to reducing greenhouse gas (GHG) emissions. The built environment is the third largest emitting sector in Canada and most existing buildings will still be in operation in 30 years from now. Consequently, the Pan-Canadian Framework on Clean Growth and Climate has identified energy retrofits of existing buildings as a priority. The 2019 Federal budget included funding for municipal-led energy retrofit programs to be administered by the Federation of Canadian Municipalities (FCM).

### 2.2 Provincial Policy and LIC 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 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.

### 2.3 Elements of the Windsor Deep Energy Efficiency Retrofit Program

*“...implementing climate action and making a transition to a low-carbon economy also represents a significant opportunity to stimulate economic growth, increase job opportunities and develop new technologies”*

**Excerpt from Climate Change Emergency Declaration – Passed by Windsor City Council, November 18, 2019**

#### 2.3.1 Windsor Community Energy Plan (CEP)

In 2017, the City of Windsor approved a CEP with a community-wide goal to reduce energy consumption and GHG emissions by 40% per capita from 2014 levels. Increasing residential energy efficiency was a prioritized strategy identified to achieve this goal.

### 2.3.2 Windsor Residential Deep Energy Efficiency Retrofit (R-DEER) Program

Windsor residences consume 24% of the community’s energy use to heat and power their homes. The residential sector contributes 22% of the community’s GHG emissions. In total, homeowners and tenants paid \$184 million for the energy and water they needed in 2018. Over the next two decades, these energy and water costs are expected to more than double or even triple, with most of these energy dollars leaving the community (see *Appendix A – Windsor Residential Energy and Emissions Profile*).

The energy efficiency of the Windsor residential sector is 35% below the Provincial average and approximately half that of global best practice. Table 1 is from the 2017 Community Energy Plan.

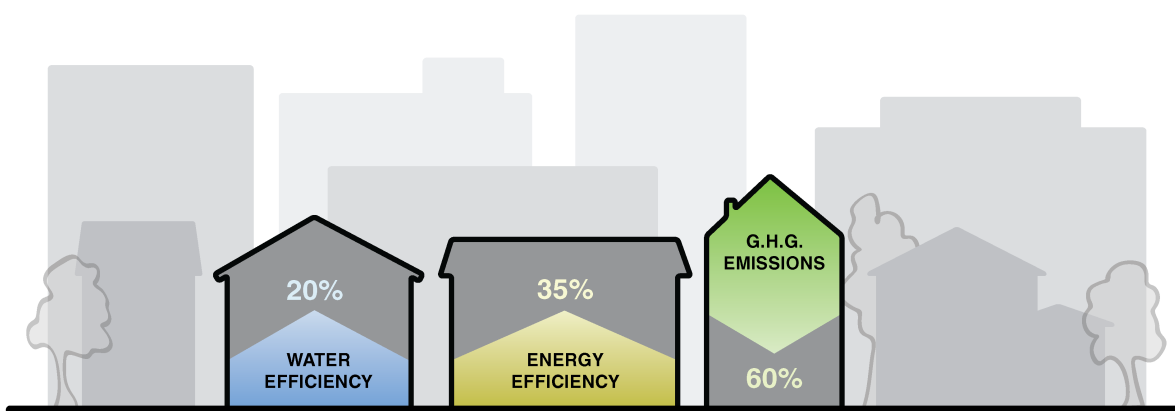
**Table 1: Windsor’s Energy and Emissions Benchmarking**

Item	Windsor Baseline	Canada Average	Ontario Average	Comparable Best Practice <sup>1</sup>
Utility/household (GJ)	142	106	107	68 <sup>a</sup>
Utility/m <sup>2</sup> (Res) (GJ)	1.00	0.79		0.29 <sup>b</sup>
Utility/m <sup>2</sup> (non-res) (GJ)	1.61	1.65		0.72 <sup>c</sup>
GHG / person (Tonnes CO <sub>2e</sub> )	8.8	9.7	6.2	3.5 <sup>d</sup>

<sup>1</sup> Superscripts: (a) Use per home is 35 per cent above Ontario average and more than twice Danish average; (b) Use per square meter of home 20 per cent higher than Ontario average which is more than 3 times the typical German A-rated home which represents about 30 per cent of the current new construction market; (c) Use per square meter of non-residential is around the Canadian average but more than twice German average; and (d) GHG/capita is comparable to Canada average but nearly 3 times the average per capita emissions for the City of Copenhagen.

Consequently, the CEP set a target to deep-retrofit 80% of existing homes by 2041 to achieve a 30 to 50% increase in energy efficiency depending on the age and type of home. The CEP strategy to achieve this target proposes:

- the creation of an Entity to deliver retrofits standardized by home age and type;
- to team with local contractors, material suppliers and investors to transform the energy retrofit market;
- to use LIC financing and standardized pricing approaches to create scale.



### 2.3.3 R-DEER Business Case

In 2018, City Council approved the development of a Windsor Energy Efficiency Retrofit (R-DEER) Business Case to investigate the feasibility of the CEP home retrofit strategy. A Project Working Team (PWT) was tasked to oversee the project, engage stakeholders and report back with recommendations. Additional information about their work can be found in the following appendices:

- *Appendix B – Project Working Team (PWT)*
- *Appendix C – Stakeholder Engagement Summary*

#### 2.3.3.1 Assumptions

As noted earlier in this report, several assumptions related to *Program Design* (Phase 2) and *Program Launch* (Phase 3) were necessary to build the R-DEER Business Case. Should the project proceed, these design parameters would be further tested during the development of a R-DEER Business Plan by the Program Administrator. A summary of these key assumptions is found in *Appendix D*. Additional detail is also provided in *Appendix E - Full Business Case*. The PWT also identified several considerations for the development of a Business Plan, and these are summarized in Section 4.1 Business Plan.

In addition to technical assumptions, the R-DEER Business Case makes three programmatic assumptions:

1. A Municipal Services Corporation (MSC) would be established to serve as the Program Administrator (see *Section 2.3.4 Program Administrator* for more details);
2. Standardized deep energy retrofit packages would be delivered to homeowners (see *Section 3.2.3.1 Standardized Deep Retrofits* for more details) and;

3. The City would make available LIC financing available to homeowners (see *Section 2.3.4.2 – LIC By-law*)

### 2.3.3.2 Findings

With the assumptions established for the R-DEER Business Case, the analysis demonstrated the feasibility of the CEP home retrofit strategy.

Key findings are summarized below. Additional detail is provided in *Appendix E – Full Business Case*.

#### MSC Profitability

The MSC would operate at breakeven by the end of Year 3, rising to an average of approximately \$6M to \$8M per year through to 2041. The total potential retained earnings by 2041 would exceed \$123M (net of low-income refunds) and would continue to rise as the LIC payments from later retrofits flow in. This assumes no diversification of business lines, subsidy programs or dividend payments to the City. The retained earnings could be potentially assigned to pay dividends to the City, or be allocated to other social goals, or both. The MSC Board would establish the acceptable level of profit (or loss) consistent with its social mission. The PWT recommends that the Entity addresses program accessibility during final program design and the potential to leverage retained earnings to meet the needs of low-income residents and/or seniors on fixed incomes.

#### Lender Perspective

The need for loans from the private sector is driven by retrofit orders, i.e., the success of the MSC. The MSC would have net borrowing requirements of about \$7.5M by the end of year 1, rising to \$15M in year 2, to \$25M in year 3, and \$32.5M by year 4. Year 4 is when the MSC achieves its targeted retrofit delivery rate. Maximum net borrowing increases at about \$35M for the following few years. For the Lenders these represent low-risk loans with acceptable returns.

The annual increase declines over time due to the accumulated effect of the incoming LIC payments. The maximum net borrowing requirement for the MSC is approximately \$498M in year 2041 and falls to zero by 2062.

#### Homeowner Perspective

Utility annual savings will outpace homeowner's payments under both the low-case and high-case utility price scenarios. This is in addition to immediate comfort benefits and potential increase in property value. The average cost of the retrofit is approximately \$25,000 to \$30,000.

#### Residential sector emissions and source energy

The program will achieve the R-DEER energy goal and exceed the R-DEER emissions goal while placing the community on the path to achieving its CEP goals and contributing to Canada's commitment to the Paris Climate Agreement targets.

#### Program savings versus costs

Annual utility cost savings for all R-DEER customers will surpass the total annual retrofit payments for these customers within 10-15 years of the first retrofit. Individual customers will see savings and payments balance out almost immediately after the retrofit.

### 2.3.3.3 Stress Testing

The R-DEER Business Model proposes to transform the energy retrofit market by offering standardized retrofits at high volume to the community. As such, there are no market equivalents to inform two key assumptions: 1) market penetration and 2) support subsidies for low-income homeowners. Consequently, the PWT and other stakeholders asked the PWT to stress test these two assumptions. The financial business case remains viable with 25% less market penetration.

## Market penetration

See *Appendix D – Summary of Business Case Assumptions* for specifics on market penetration.

## Support for Low Income Homeowners

See *Appendix F – Stress Test – Potential for Low Income Customers* for details. Eligible low-income homeowners are anticipated to have access to special program conditions. As described elsewhere in this report, retrofit packages are priced simply and competitively. However, the program will provide a substantial refund on standard retrofit payments. This Business Case assumes a 70% refund. Embedding support for low-income homeowners into the R-DEER Program will provide the following benefits:

- immediate low-income homeowner cost savings far exceeds program payments;
- addresses least efficient homes;
- manages perception of inequity;
- maintain normal customer/contractor relationship;
- over-proportional impact on home equity value; and
- contributes to programme scale benefits.

### 2.3.4 Program Administrator

The R-DEER Business Case assumes the Entity would be owned by the City of Windsor. An existing Third-Party Entity is also a possibility to serve as the Program Administrator, as is a partnership with other municipalities in the formation of joint municipally-owned Entity.

The PWT recommends the City proceed to establish an Entity, as a Municipal Services Corporation (MSC)<sup>2</sup>, to administer the program for the following reasons:

- 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 partnerships with the private sector than the municipality (e.g., contractors, material suppliers and investors);
- program delivery risks rest with the MSC and not the City;
- borrowing is placed on the MSC's balance sheet;
- the MSC is not limited to working within municipal boundaries and can enter beneficial partnerships with other Ontario municipalities or beyond; and
- the MSC should be responsible for developing the final R-DEER Business Plan as the Program Administrator.

Seed funding of approximately \$400,000 would be required to establish the Entity and provide it with adequate resources to finalize the Business Plan which would include the hiring of a General Manager. The PWT recommends the City apply for funding from the FCM Community EcoEfficiency Accelerator Program to assist with these start-up costs. This FCM program has been announced, however at the time of this report (January 2020) the details have not been disclosed. FCM funding may cover all or some of the start-up costs. If this proves not to be the case, the City would need to find alternative sources of seed funding. These start-up costs are “at risk” should the Entity be unsuccessful in finalizing an approved Business Plan.

---

<sup>2</sup> 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 long-term working capital requirements for the Entity to fully launch the business (see Section 3.1.2.1), whether sought from the City and/or private investors, would be contingent upon the final Business Plan.

#### **2.3.4.1 City-Entity Partnership Agreement**

The *Municipal Risk Assessment for an LIC Energy Retrofit Loan Program* (see Appendix G) identified a potential reputational risk for the City 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 an LIC financing available to homeowners participating in the retrofit program administered by the Entity. The PWT recommends aiming to have the agreement executed in 2021, assuming Council proceeds with the next phase of the project.

#### **2.3.4.2 LIC By-law**

The use of Local Improvement Charges (LICs) is a well-known practice in the municipal sector, enabled under the Municipal Act. In 2012, The Municipal Act was amended to allow for the investment in energy efficiency activity on private property. The PWT recommends the City would make LIC financing available to homeowners under the terms and conditions of a City-Entity Partnership Agreement. The potential municipal risks associated with an LIC financing program are summarized in *Appendix G – Municipal LIC Risk Assessment*. The assessment of potential risks concluded 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 City to enable an LIC program. Proposed enactment of the LIC By-law would be in 2021 and inform the execution of the City-Entity Partnership Agreement.

#### **Mortgage Lender Consent**

A concern regarding mortgage lender consent was raised during the engagements 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 G 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' 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<sup>3</sup>) would not be approved for LIC financing, regardless of the business case.*

---

<sup>3</sup> Dunksy Energy Consulting (2018). Report 7 – Local Improvement Charges, Final Report. Prepared for the Green Ontario Fund.

*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 Energy Financing program 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 EcoAction 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 recent 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.*

## **2.4 FCM Community EcoEfficiency Acceleration program**

The PWT recommends the City apply for FCM Community EcoEfficiency Acceleration Program funding to secure some or all the resources for the Entity to complete its due diligence and to develop a final R-DEER Business Plan.

The goal of the Community Eco-Efficiency Acceleration Fund is to accelerate community financing for homeowners as they make their homes more affordable and energy efficient. Though the program has been announced, the final details of the program were not available at the time of this report (January 2020). The program details should be available in early 2020.

## 3. Program Design

The R-DEER Business Case made several assumptions about program design which are summarized in this section. Notwithstanding the considerable work done to complete the R-DEER Business Case, the Entity would also need to conduct its own supplemental due diligence to ensure a successful entry into the market. Final program design would be the responsibility of the Program Administrator (i.e., the Entity).

### 3.1. Program Capitalization

#### 3.1.1 Financing and Fund Flows

The R-DEER Business Case'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 model was designed such that the City will only be responsible for collection of the LIC payments and their transfer to the Entity. The City's administrative costs are assumed to be recovered in the retrofit price. All borrowing is on the balance sheet of the Entity. The debt of an MSC is not attributed to the owner municipality.

See *Appendix G – Municipal LIC Risk Assessment* for more details.

Funding sources include:

- Loans from Lender Partners
- Customer payments via property taxes
- Interest on unused loans
- Initial working capital to form Entity
- Government and utility incentives (assumed to be zero in the Business Case analysis)

These funds would be used for:

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

The business case assumed at least a 4.25% return for lenders. This will be further validated and refined in the R-DEER Business Plan based on prevailing interest rates. The R-DEER Business Plan would also be stress tested to assess impacts of fluctuations in interest rates moving forward.

#### 3.1.2 Capital Provider

##### 3.1.2.1 Start-up and Working Capital

The MSC would require start-up funding to develop a final R-DEER Business Plan and working capital to set-up for program launch. Start-up and working capital will be recovered once the business is launched and be supplied by the City, the City's holding company and/or grant funding (see Section 4.1.1 for additional commentary).

##### 3.1.2.1 Ongoing Capital

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

#### 3.1.3 Funding Flow

The funding flow is illustrated in Figure 2.

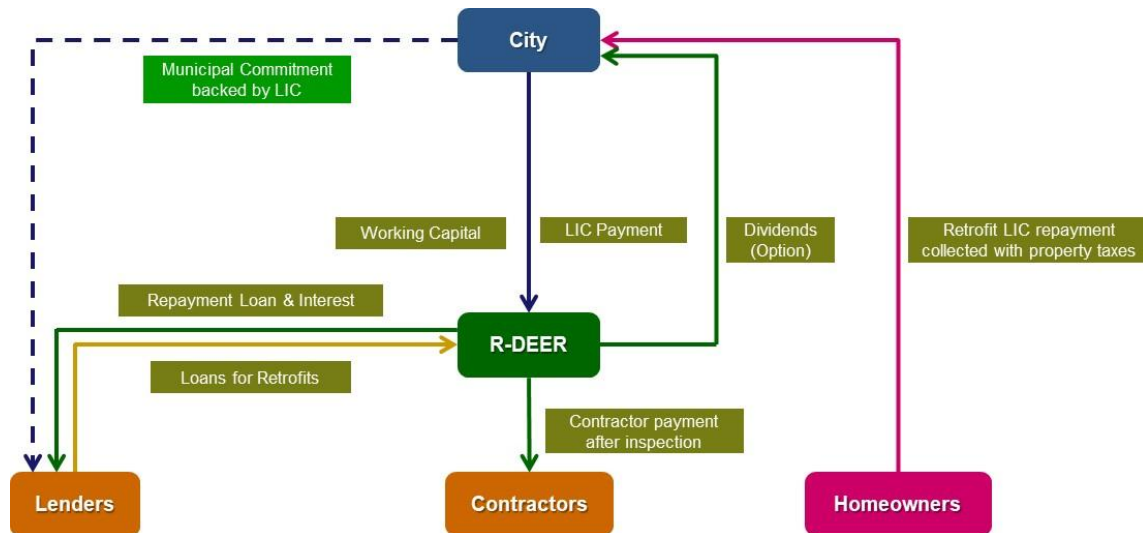


Figure 2: R-DEER Funding Process

### 3.1.4 Credit Enhancement

Loan Loss Reserves (LLR) have been successful in other jurisdictions to manage mortgage lender and investor concerns regarding homeowner default on the LIC payment. During the announcement of the FCM Community Eco-Efficiency Acceleration program, the potential to support a municipality to establish an LLR for a retrofit program was noted.

### 3.1.5 Existing Incentives

The R-DEER Business Case did not include public incentives and/or grants (except for a rebate for thermostats) for two primary reasons:

1. To demonstrate the viability of the market-based business model; and
2. These programs are unpredictable

It would make sense for the Entity to promote any available government and utility programs to homeowners and, where appropriate, integrate them into the standardized retrofit package to offer one-stop-shopping for homeowners, as well as a more attractive retrofit price and return on investment.

The Business Case calls on the Entity to address the accessibility of the program for harder to serve segments of the residential sector (e.g. seniors on fixed incomes) as part of the final Program Design. This could include using retained earnings to offer further subsidies to low income/fixed income homeowners.

## 3.2 Program Scope

### 3.2.1 Property Eligibility

#### 3.2.1.1 Sector

The R-DEER Business Case assumed the program would be developed for residential properties aligned with the first strategy proposed in the CEP (Strategy 1a). A commercial and institutional offering aligned with second CEP strategy (Strategy 1b) could be contemplated in the future. The PWT recognised this possibility and ensured the Entity structure was capable of expansion.

#### 3.2.1.2 Housing Type

The R-DEER Business Case assumed standardized retrofit packages would be offered to single-detached, semi-detached, townhouses and multi-unit properties. Initially, the program will

target single family homes that are 20 years or older. Marketing to semi-detached, townhouses and multi-unit homeowners would be introduced after the second year of operation, again primarily targeting homes 20 years or older.

The rationale for this “go-to-market” strategy includes:

- optimizing achieving the CEP goals for energy and emissions reduction in this sector;
- 55% of Windsor’s residential sector are single-detached homes, approximately 30,770 homes;
- single-detached homes over 20 years old account for 78% of the sector’s energy costs, emissions and use;
- this market segment is half as energy efficient than global best practice and below the provincial average, 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 build in energy efficiency improvement in the work undertaken; and
- 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.

### 3.2.2 Homeowner Eligibility

Participation will 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 final program design to balance risk with accessibility. Provision of utility data to support measurement, evaluation and ongoing verification would also be required (see Section 3.3.2).

#### 3.2.2.1 CMHC-Insured Mortgages

Currently, mortgages insured by the Canadian Mortgage and Housing Corporation (CMHC) would not be eligible for LIC financing, regardless of the strength of the business case to reduce the operating costs of the home. 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.<sup>4</sup> It should be noted the number of homeowners with CMHC mortgage insurance in Windsor is low and only represents 7% of mortgages in Ontario. More detail on this matter is found in *Appendix G – Municipal LIC Risk Assessment*.

### 3.2.3 Project Eligibility

#### 3.2.3.1 Standardized Deep Retrofits

Standardized retrofit packages will be designed by the Entity to deliver annual energy savings of 30 to 50%, and 20% water saving to homeowners. Modelling for the R-DEER Business Case demonstrated these savings will be achieved with existing technologies. The package cost would be dependent on home size, age and type. Using pricing based on a fixed index per

---

<sup>4</sup> Source: <https://www.canada.ca/en/environment-climate-change/services/climate-change/expert-panel-sustainable-finance.html>

specific area (\$ per m<sup>2</sup>) depending on home category, minimizes transaction costs and complexity.

The delivery of standardized retrofits at high volumes to Windsor homeowners is an essential feature of the Business Case and has been designed to drive market transformation. The business model reduces the cost of the average retrofit by 33%. This is achieved through efficiencies in:

- reduced selling costs through standardized offerings and pricing;
- elimination of contractors' costs to promote and prepare customized proposals;
- increased contractor labour productivity;
- volume pricing for key material categories; and
- lower cost financing through consolidation.

As the market transforms and the experience of the program administrator grows, it is anticipated that greater program flexibility may be possible without undermining the core business model. In the beginning, certain exemptions may be tolerated by the business model. For example, if the homeowner has recently replaced their furnace with one that meets the energy performance standards of the program, this investment could be recognized as a credit to the standard retrofit price.

#### 3.2.3.2 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 PWT explored several marketing approaches:

- mapping of homes by type and age (*Appendix E*);
- mapping of residential energy consumption, emissions, cost and demographics (e.g., household income) by energy planning district (EPD) (*Appendix E*);
- home energy modelling by type and age (*Appendix E*);
- homeowner personas (*Appendix H*);
- homeowner surveys (*Appendix I*); and
- homeowner focus group (*Appendix C*).

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 by the Entity to support the development of the Business Plan and a successful program launch.

#### 3.2.4 Project Measures

The R-DEER Business Case assumed that the Entity's early offering would be comprised of energy and water efficiency measures. A review of the measures assumed in the Business Case would minimize any impact on Building Department workflows (*Appendix J – Energy Efficiency Retrofits & the Ontario Building Code*). Over time, and in consultation with municipal stakeholders, it is expected the Entity would consider offering other energy-related retrofit options (e.g., solar power, solar hot water, vehicle charging stations, air and ground source heat pumps). It is recognized that the R-DEER Entity could serve as an effective platform from which to promote other CEP strategies (e.g., the promotion of solar PV) as well as other complementary government, regulator and utility programs.

### 3.3. Program Impact

#### 3.3.1 Estimating Impact

The R-DEER Business Case estimated significant electricity, gas and water savings and GHG reduction are achieved (*Appendix E – Full Business Case*). In 2041, annual total residential cost savings are estimated to be between \$100M to \$180M.

Estimates of job creation are approximately 30 person-years per \$1M of spending.<sup>5</sup>

#### 3.3.2 Documentation (Evaluation, Measurement & Verification)

The R-DEER Business Case assumed that homeowners would provide access to annual utility bills to evaluate, measure and verify the performance of the program rather than adding the expense and inconvenience of pre- and post-energy audits to homeowner costs.

---

<sup>5</sup> Dunksy Energy Consulting (2018). The Economic Impact of Improved Energy Efficiency in Canada. Prepared for Clean Energy Canada. Source: [https://cleanenergycanada.org/wp-content/uploads/2018/04/TechnicalReport\\_EnergyEfficiency\\_20180403\\_FINAL.pdf](https://cleanenergycanada.org/wp-content/uploads/2018/04/TechnicalReport_EnergyEfficiency_20180403_FINAL.pdf)

## 4. Program Launch

The Entity, as Program Administrator, would be responsible for the development of a viable Business Plan, based on the Business Case, that included additional market research and risk assessment, prior to program launch.

### 4.1 Business Plan

To develop a strong business case, elements of a business plan were considered. The Entity would require reasonable resources to complete its due diligence, including supplemental market testing and program risk assessment, to finalize a R-DEER Business Plan for the approval of its Board of Directors.

Several key aspects of the R-DEER program will be further refined during the development of the final Business Plan including:

- Conduct additional market research (e.g., the impact of age and income) to refine the size of the market for standardized deep energy retrofits.
- Identify strategies to grow a new market for standardized deep energy retrofits through targeted community engagement.
- Continue to learn from the experience (e.g., data and tools) of previous energy conservation programs in Ontario and other jurisdictions in Canada and Europe, recognizing “business as usual practices” are part of the market problem to be solved<sup>6</sup>.
- Detail how to promote or integrate other government and utility energy conservation or fuel switching programs (power/water/waste) on an ongoing basis.
- Address the accessibility of the program for harder to serve segments of the residential sector (e.g. low-income homeowners and seniors on fixed incomes).
- Address how a changing regulatory environment and technical advances will be incorporated over time into the standardized package to optimize energy savings, emission reductions and residential savings.
- Gain further stakeholder input in the development of the detailed Business Plan with a specific focus on the real estate sector to both identify homeowners planning extensive renovations and benefit from enhanced property values
- Confirm and adjust financial assumptions recognizing these would also be updated in annual business plans.
- Address how capacity and expertise can be developed within the City to meet the goals of the plan.
- Refine the education and awareness approaches that will be part of the home energy retrofit program, recognising behavioural shifts will be necessary to ensure energy savings are maintained.

#### 4.1.1 Program Set-Up Costs

The R-DEER Business Case estimated initial net start-up and working capital, defined as maximum negative cash flow, will be about \$580K. In 2020, there are 6 months of organisation costs with no countervailing retrofit revenues. In 2021 the retrofit activity supports about half of the organisation costs, and by 2022 organisation costs are fully covered. In subsequent years, the Entity generates profit. A faster start up would reduce the net start-up working capital required.

---

<sup>6</sup> Enbridge and Enwin have collected considerable current-market data from the residential sector through Conservation and Demand Management programs and energy retrofits which would be a valuable input to the final R-DEER Business Plan.



### 4.1.2 Ongoing Operation Tasks

The R-DEER Business Case identified five core business functions: General Administration, Finance and Credit (including order acceptance and fund management), Marketing, Sales, Retrofit Management (including quality control and materials management). Retrofit installation would be in partnership with local contractors.

#### 4.1.2.1 How would it work for a homeowner?



*John and Emily moved to Windsor 6 years ago buying their first home. They could only afford a fixer upper. Their plan was to renovate and sell at a profit to be able to afford a larger home to raise a family.*

*However, with two young children, Brittany and Lucas, and a third child on the way, life soon got in the way. Most of their free time and discretionary funding now goes to their growing family. While they love developing their DIY skills, they simply don't have the time anymore.*

*They would be happy to borrow money in the short term to finance home improvements but any investment they make must increase the resale value of their home. Their pain points are professionals that don't turn up on time, work that takes longer than promised and having to spend time getting quotes or finding professionals to do the work right. With a young family, too much disruption of their daily routine is also a worry.*

*One day their neighbour mentioned a new energy retrofit program being offered for detached homes twenty years or older. They went online and liked what they saw being offered in the standard package. They knew they needed new windows and a furnace. So, they signed up to see the price being offered for their home. It looked good. They asked their neighbour, a local homebuilder, for his opinion. He confirmed they would not be able to match it on their own, so they signed up. When they learned which contractor had been assigned to them, they were thrilled because the company had a great reputation in the community.*

*Much to their delight, the job was done in four days - as promised. They took advantage of the 20-year financing plan offered through a partnership with the municipality. Since their goal was to move within a few years, they liked the assurance their investment would be passed on to the next owner, in case they wanted to use more of their profits for their next home. They tracked their savings carefully for the first year and were delighted to see they more than covered the additional monthly payment on their tax bill. Now, understanding the resale value of their energy retrofit, they were excited to get their first home energy label.*

#### 4.1.2.2 How would it work for the contractor?



*Bob Carter had been renovating homes for over twenty-five years. He had seen his fair share of energy retrofit programs come and go. So, he was naturally sceptical when he heard of a yet another one. Though, what piqued his interest in the new program was its commitment to delivering a quality, deep-energy standardized retrofit. Mostly, he stayed away from home energy retrofits*

*because there were too many unrecovered costs to make it worth his while.*

*As a building professional, he knew the potential to increase the energy performance of the homes in his community. So, he signed up, to check out the new program.*

*Today, he keeps two crews busy with the weekly work orders he receives. His margin on energy retrofits projects has doubled. His reputation for quality installation and the favourable pricing on high-efficiency windows has made him more competitive in the marketplace for more customized work. He is proud of the role his business is playing in reducing the community's emissions while helping to save his customers money.*

#### **4.1.2.3 How would it work for the investor?**



*For many years, Impact Investing Inc. had been looking for a partner to aggregate the residential energy retrofit market. Now, they cannot keep up with demand for their new investment offering. They can offer a slightly more attractive rate than Provincial 20-year Bonds to clients. The number of impact investors - looking for a reasonable return on their capital while making a difference on climate change - continues to grow. The insurance industry was the first to knock on their door but now pension funds are getting into the market.*

#### **4.1.3 Ongoing Operating Costs**

The R-DEER Business Case included estimates for ongoing operating costs for the program (*Appendix E – Full Business Case*). These costs would be refined during the development of the Business Plan.

### **4.2 Pre-Launch**

During the pre-launch period, the Entity would pursue market leads to support a successful program launch. In addition to traditional marketing approaches, the R-DEER Business Case contemplates providing funding (\$100/retrofit) to community organizations to promote homeowner participation and community-led social change. Partnership with community groups, will be essential to build community awareness and buy-in to participate in the program.

### **4.3 Launch**

Program launch is proposed to take place in the next few years (ideally by 2021) to provide reasonable time to:

1. Establish the Entity (including hiring at least a General Manager);
2. Apply for FCM funding;
3. Develop and approve a Business Plan;
4. Enact an LIC By-law;
5. Execute a City-Entity agreement; and
6. Prepare for Program Launch.

## 5. Conclusion & Recommendations

A business case is an assessment of a business opportunity that culminates in a Go/No-Go decision on whether a company should attempt to solve a market problem by producing a product – in this case, standardized energy retrofits – that will successfully compete with other products in the market. In the absence of a “company”, the City of Windsor has stepped up to consider the following market problem and solution.

### 5.1 The Market Problem

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. Low volumes and the fact that every project is specific to each household means that material costs are expensive and performance guarantees are risky. From the homeowner’s perspective, obtaining understandable bids from various contractors is burdensome. They are responsible for finding their own sources of funding based on their individual credit rating. Finally, the low volumes result in retrofit costs that typically exceed the value of the energy saving, even over many years.

### 5.2 The Product Solution

The proposed solution is to offer standardized energy retrofits to homeowners at high volumes. Contractors benefit from increased project predictability, improved margins and vastly higher project volumes. Homeowners benefit from a simplified transaction, guaranteed pricing, lower cost pre-financed retrofits and a simple billing and payment mechanism.

### 5.3 Conclusion

A business case is a description of how a business intends to generate revenues and earn a profit. The case models the revenue streams and costs the business will have. The case is based on reasonable assumptions made about consumer behaviour, the economy and the competitive environment. All business cases have an element of risk because sometimes the assumptions used turn out to be wrong.

Based on the analytical findings and stakeholder engagement, the PWT concludes there are reasonable grounds to fully implement the Residential Deep Energy Efficiency Retrofit Program. This conclusion is made with the understanding that the Entity established to administer the program would need to complete a final Business Plan and gain approval to proceed. However, without establishing an Entity with a mandate to deliver high quality, standardized residential energy efficiency retrofit packages to most Windsor homes, the City’s energy and efficiency goals, as approved in the CEP, are unlikely to be realized.

### 5.4 Recommendations

The PWT recommends that City Council:

1. Endorses the Final Report of the Project Working Team: Windsor’s Residential Deep Energy Efficiency Retrofit (R-DEER) Business Case.
2. Incorporates a Municipal Services Corporation to serve as the Program Administrator with a mandate to develop a R-DEER Business Plan.
3. Applies for grants including the FCM Community Eco-Efficiency Accelerator program funding to support program set-up and launch, including the development of a final R-DEER Business Plan.
4. At the appropriate time, enacts an LIC By-law and enters into an agreement with the Municipal Services Corporation, with appropriate terms and conditions, to make optional LIC financing available to homeowners participating in the program.

5. Encourages the Municipal Services Corporation to consider program accessibility during final program design and the potential to leverage retained earnings over time to address the needs of low-income residents and/or seniors on fixed incomes.

## List of Appendices

- Appendix A: Windsor Residential Energy and Emissions Profile
- Appendix B: Project Working Team (PWT)
- Appendix C: Stakeholder Engagement Summary – Focus Group
- Appendix D: Summary of Business Case Assumptions
- Appendix E: Full Business Case
- Appendix F: Stress Test - Potential Low Income Customers
- Appendix G: Municipal LIC Risk Assessment
- Appendix H: Homeowner Personas
- Appendix I: Homeowner Survey Report
- Appendix J: Energy Efficiency Retrofits and the Ontario Building Code