



Community Energy Strategy
Community Driven Energy Solutions for Oakville

Home Energy Retrofit Feasibility Study

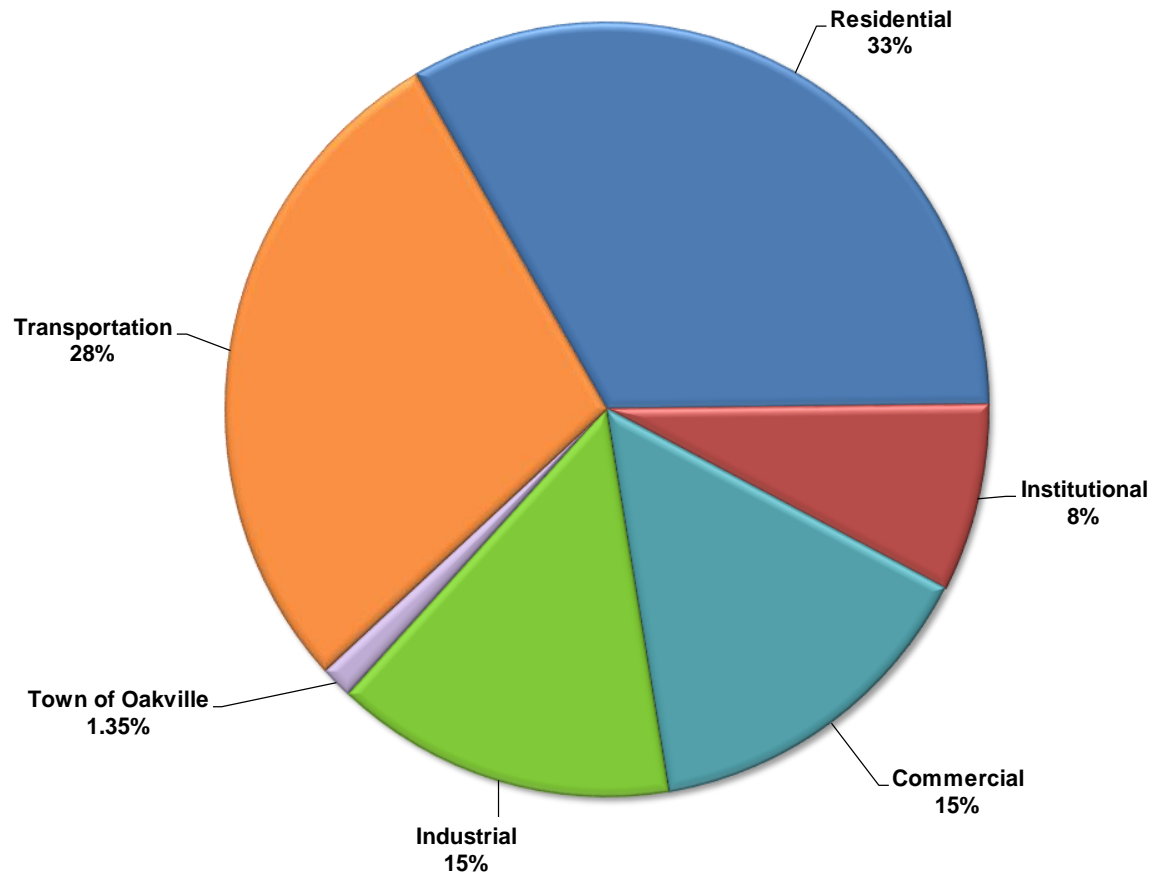
Documentation Version: Appendix F

Oakville Community Energy Strategy (CES) Summary

Oakville CES 2016 Baseline

Customer Energy Use – 37M GJ

CES Oakville - Source Energy Usage - by Sector 2016



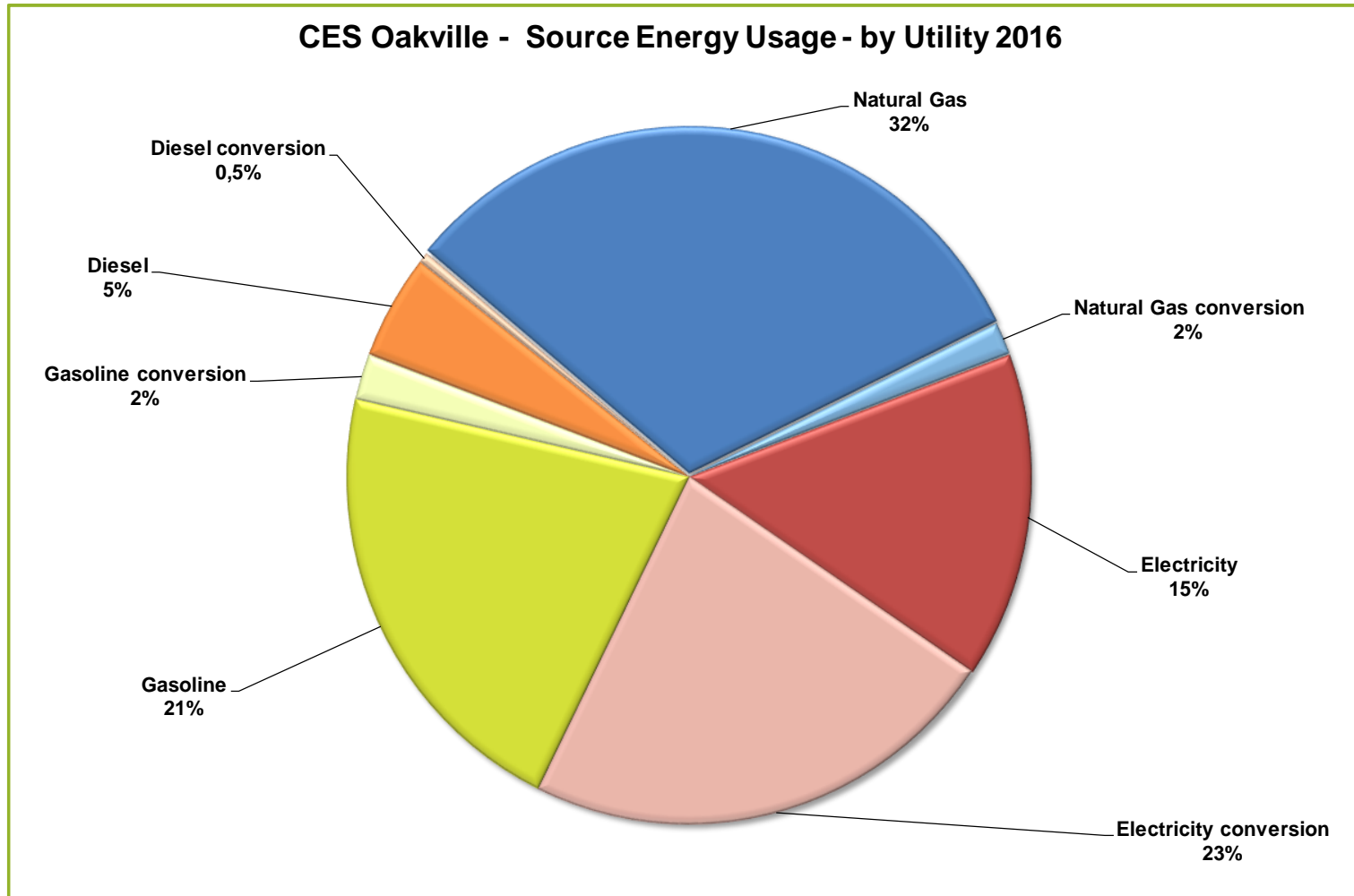
Report Notes

- From Oakville Community Energy Strategy
- This is the total source energy used by the Town in 2016.
- It includes the conversion and transmissions losses to deliver the energy to the end-user.
- **Focus of “Home Retrofit Feasibility Study” is increasing efficiency of Residential sector.**

27% Conversion Loss

Oakville CES 2016 Baseline

Utility Energy Use – 37M GJ



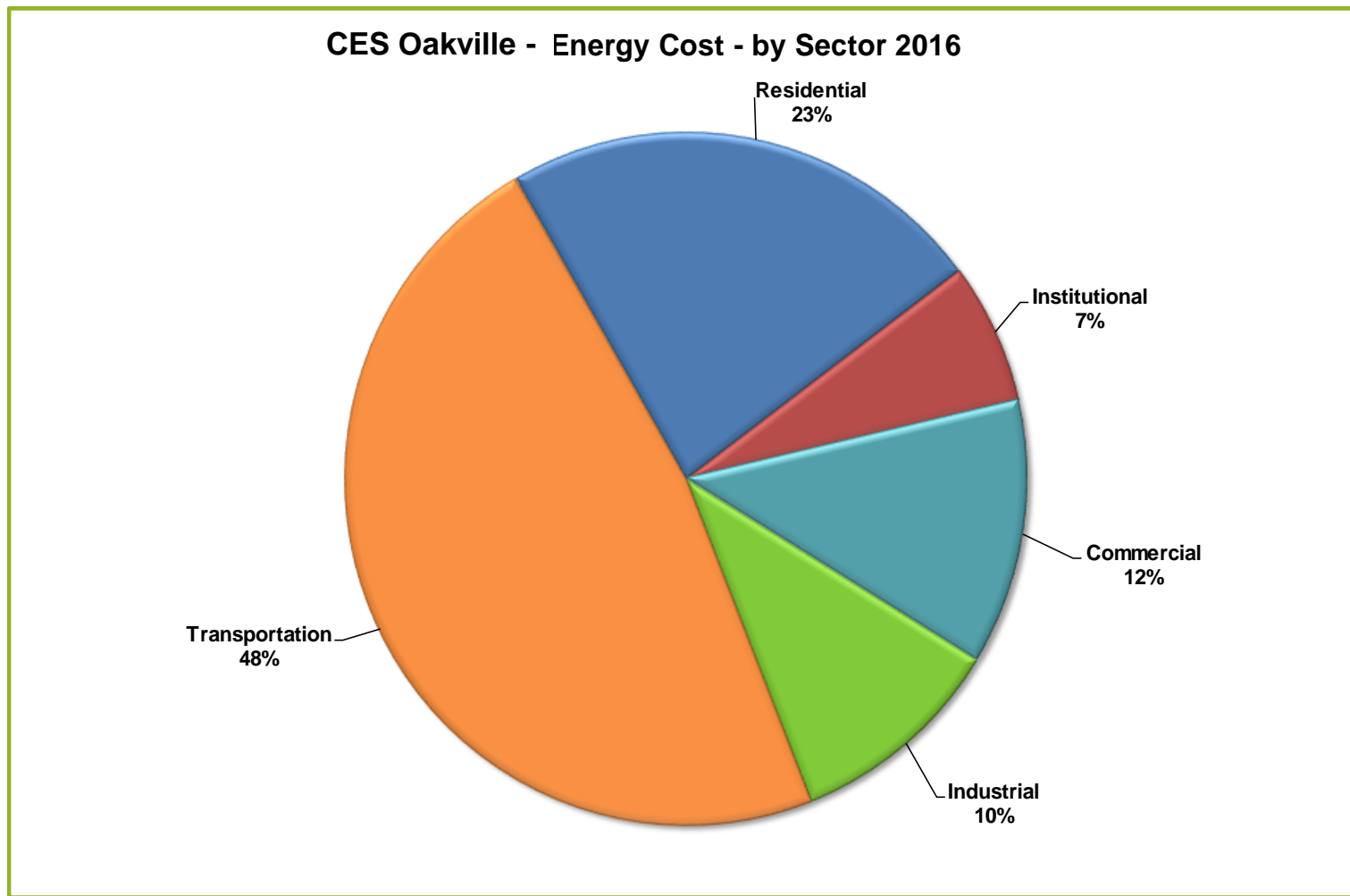
27% Conversion Loss

Report Notes

- From Oakville Community Energy Strategy
- Darker colour is energy delivered to the end user, lighter colour is conversion loss.
- Electricity carries the bulk of the conversion and distribution losses. Most electricity conversion loss comes from thermal power generation using natural gas and nuclear.
- Note: Natural gas end-use is more than twice electricity end-use.

Oakville CES 2016 Baseline

Utility Cost by Sector – \$ 620M



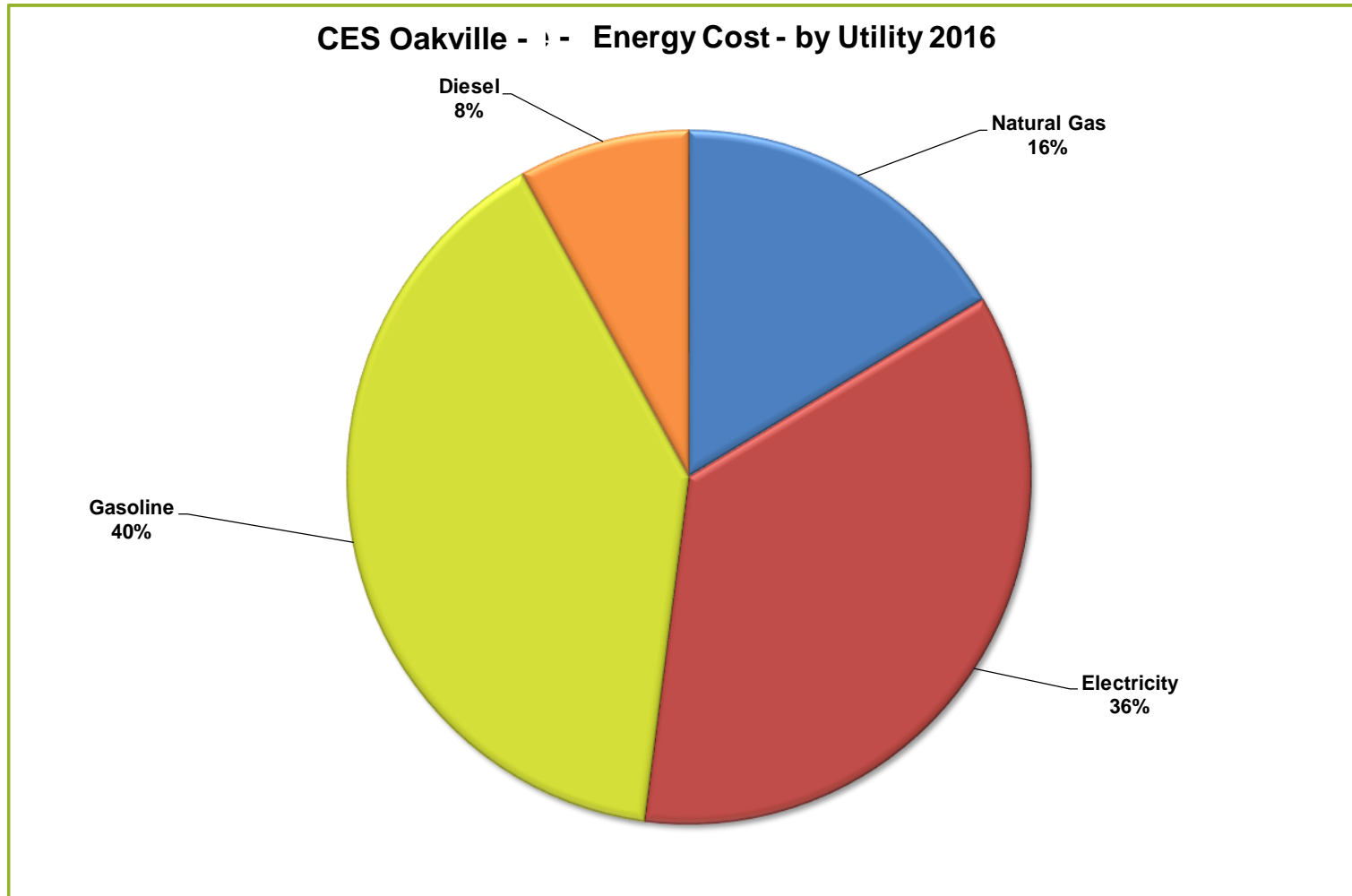
Report Notes

- From Oakville Community Energy Strategy
- These are the total energy costs by end-user sector in the Town in 2016.
- Transportation costs are for gasoline, diesel, and electricity for Evs.
- Remaining sectors are costs for natural gas and electricity.
- The vast majority of the end-user payment does not contribute to local economic activity.
- ***Focus of “Home Retrofit Feasibility Study” is reduction of costs from Residential sector.***

At Least \$490M Leaves Town

Oakville CES 2016 Baseline

Energy Cost by Utility – \$ 620M

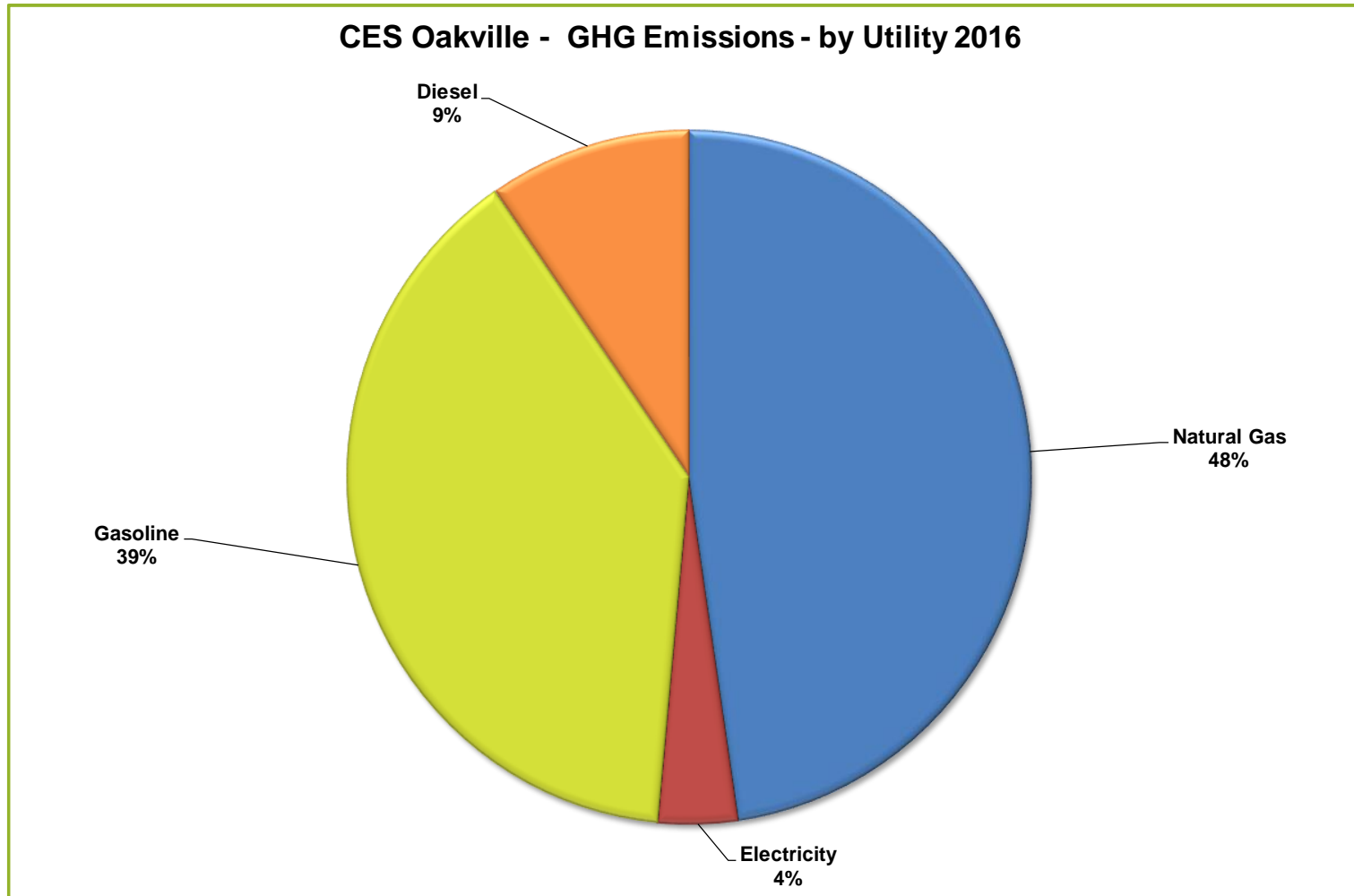


Report Notes

- From Oakville Community Energy Strategy
- These are the total energy costs by utility for all end-uses in the Town in 2016.
- Note: Natural gas costs are less than half of electricity costs.

Oakville CES 2016 Baseline

GHG Emissions by Utility – 1.3M Tonnes

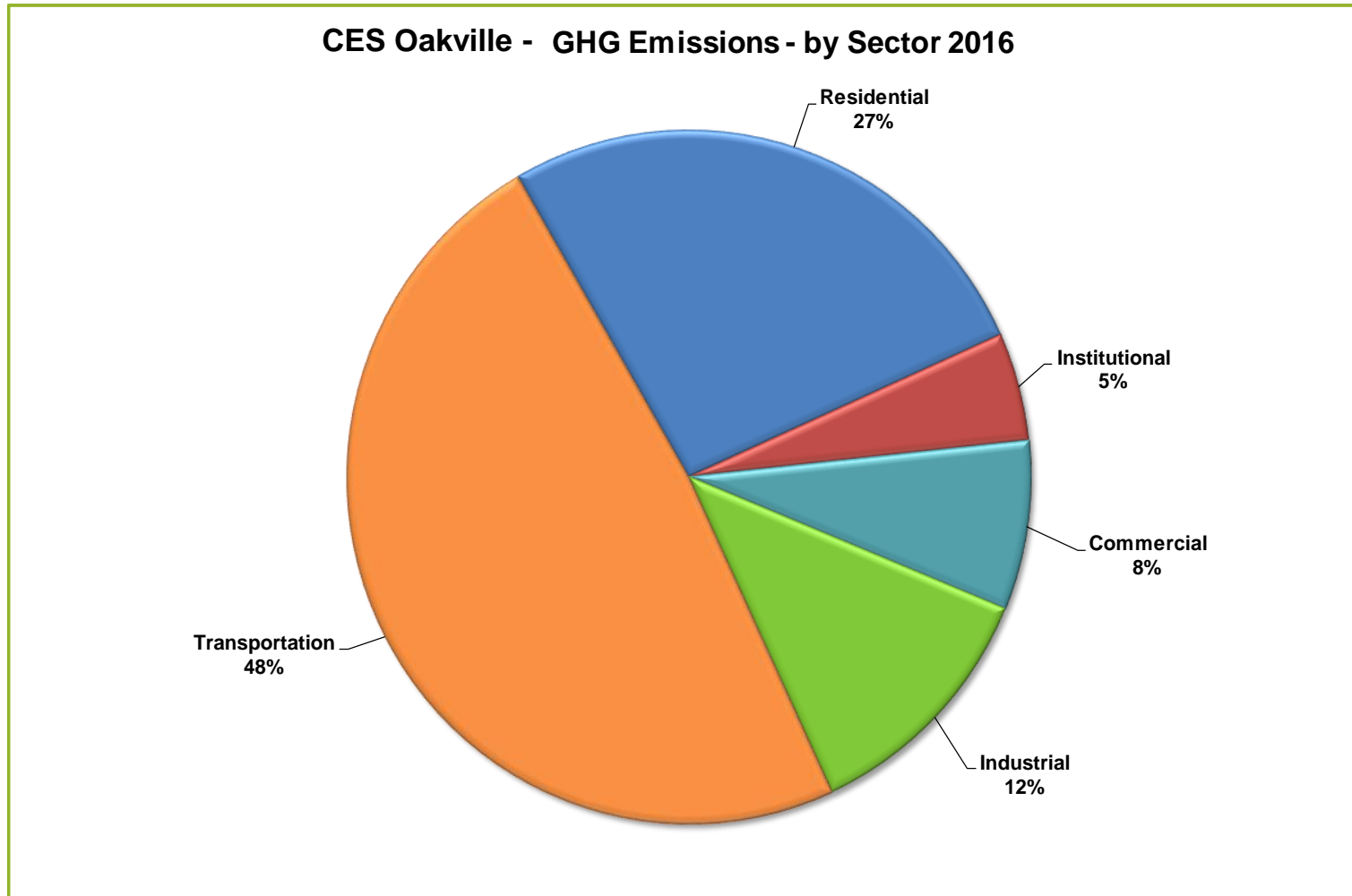


Report Notes

- From Oakville Community Energy Strategy
- These are the total energy-related GHG emissions by utility for all end-uses in the Town in 2016.
- Note: Electricity causes less than one-twentieth of GHG emissions.

Oakville CES Baseline

GHG Emissions by Sector – 1.3M Tonnes



Report Notes

- From Oakville Community Energy Strategy
- These are the total energy-related GHG emissions by end-user group in the Town in 2016.
- Note: Transportation including personal vehicles is half of all emissions.
- Emissions for all other sectors are from natural gas and electricity.
- **Focus of “Home Retrofit Feasibility Study” is reduction of GHG emissions from Residential sector.**

Oakville CES

Existing Homes & Buildings Strategy



■ CES Targets

- *Retrofit 80% of Homes*
- *Retrofit 60% of Buildings*
- *Efficiency gain ~30% / retrofit*

■ Recommendation

- *Create new Efficiency Retrofit Entity*
- *Offer standard retrofits by property type*
- *Deliver via quality-controlled contractors*
- *Payment using property tax increment using LIC mechanism – or similar*
- *Third-party financing*
- *EPLs available when rented or sold*
- *Sheridan to develop work-force programs*

■ Benefits

- *Increased property value*
- *Reduced energy costs*
- *Higher contractor margins*
- *Increased local employment*
- *Business opportunity in other communities*

Report Notes

- From Oakville Community Energy Strategy approved in 2020 by Oakville Council
- FEO/OETF sub-committees classified planning and launching home and building retrofits following this strategic guidance as 2 of 17 high Priority Projects.
- **Focus of “Home Retrofit Feasibility Study” is the first of these Priority Projects – Retrofitting existing Homes.**

Oakville Home Energy Retrofit Feasibility Study

Project Working Team

Oakville Home Energy Retrofit Feasibility Study

Project Working Team (PWT)

- Rija Rasul
 - *Senior Climate Officer, Town of Oakville*
- Chris Tyrrell
 - *Senior Advisor, Oakville Hydro (Oakville Enterprise Corp.)*
- Robert Kerr
 - *Project Manager, Engagement Lead, Garforth International Canada Inc.*
- Peter Garforth
 - *Business Strategy, Garforth International Canada Inc.*
- Gerd Fleischhammer
 - *Energy, GHG, Economic Integration, Garforth International Canada Inc.*
- Ajit Naik
 - *Energy & Building Systems Engineer, Garforth International Canada Inc.*
- Cindy Palmatier
 - *Project Coordinator/Administration, Garforth International Canada Inc.*

Oakville Home Energy Retrofit Feasibility Study

Community Leads / Sponsors

- Oakville Energy Task Force
 - *Harry Shea – Co-chair*
 - *Michelle McCollum – Co-Chair*
- Future Energy Oakville
 - *John Matthiesen – Chairman*
 - *Wayne Steffler – Board Member*
 - *Lisa Kohler – Board Member*
 - *Zaheer Muhammad – Board Member*
 - *Executive Director (open position)*
- Town of Oakville
 - *Councillor Peter Longo*
- OEC
 - **TBD**

Oakville Home Energy Retrofit Feasibility Study

Feasibility Study Scope

Oakville Home Energy Retrofit Feasibility Study

Contribution to CES Targets

- Meet performance levels to support CES 2041 Targets
- By 2051 existing homes sector will be:
 - *60% less carbon intensive*
 - *35% more source energy efficient*
 - *20% more water efficient*
- Homeowners' utility savings more than retrofit cost
- Investors & Lenders receive attractive returns
 - *Lenders – Provincial 20-year bond + 1%*
 - *Investors – Similar to other municipal utilities (TBD in detailed BP Phase)*
- Contractors gain volume and margins
- Town Corporation exposed to no unacceptable financial risks

Report Notes

- Study goals aligned at Feasibility Study Kick-off.
- CES used 2016 as baseline year. Study used 2019 as baseline year.
- Note: Water efficiency is included in Study.
- Note: Goals address the residential sector as a whole, not individual retrofits.
- Study does not allocate retained earnings. Investors returns would be an agreed share of these.
- Study leaves open Town's appetite for financial risk. Study assumes near-zero risk for the Town with other options possible.

Oakville Home Energy Retrofit Feasibility Study

Preliminary Scope

- Town / Community
 - *Utility savings – cost and usage*
 - *GHG savings*
 - *Local employment*
 - *Alignment with CES*
- Typical Homeowners
 - *Utility cost and usage savings*
 - *Net cost savings*
- Program Entity
 - *Business structure*
 - *Profit & Loss / Balance Sheet items*
- Typical Contractor Partner
 - *Enhanced revenues and margins*
- Investors & Lenders
 - *Interest and potential dividends*

Oakville Home Energy Retrofit Feasibility Study

Overall Scope / Targets

- **Properties**
 - *Oakville's 81,000 existing homes in 2019*
 - *Energy & Water Use in 2019*
- **Timeframe**
 - *Operational Start – July 2022 (CES 2020)*
 - *Target Achievement – 2051 (CES 2041)*
 - *Financial horizon – 2051 plus 10 (CES N/A)*
- **Returns**
 - *Lenders – Ontario 20-year bond + 1% (~ 4.25%)*
 - *Equity Partners - TBD*
 - *Town – Dividend - TBD*
 - *Homeowner – Total payments < Utility Cost Saving*
- **Non-residential Energy Retrofits**
 - *Tools structured for Non-Residential (NR-OEER) Feasibility Study*
- **Beyond Oakville**
 - *Other communities (outside of initial scope)*

Report Notes

- Study scope aligned at Feasibility Study Kick-off
- Note: First retrofits are assumed in 2023, 3 years later than the original CES assumptions.
- Financial horizon to 2061 to complete later retrofits.
- Note: Study analytical tools and approaches are prepared for the second FEO Retrofit Priority Project addressing commercial and institutional buildings.
- Investor returns and Town dividends will be allocated in subsequent planning.

Oakville Home Energy Retrofit Feasibility Study

Level of Detail

- General
 - *Feasibility Study supports Go/No-Go Decision to start detailed Business Plan*
- Level of Detail
 - *Targeted home categories and penetration rate and profile*
 - *Recommended packages and pricing*
 - *Utility cost savings and homeowner payments*
 - *Program Entity*
 - *Marketing & Sales Plan*
 - *Investments*
 - *Operating costs and structure*
 - *Contracting and Materials Partners*
 - *Ownership options*
 - *Investors*
 - *Available Cash Flow for Dividends*
 - *Operating capital and interest*
 - *Engagement & Awareness Indicators for Community and Stakeholders*
 - *GHG reductions*
 - *Governance and Policy*

Oakville Home Energy Retrofit Feasibility Study

Multiple Perspectives

- Program Entity
 - *Profit & Loss*
 - *Balance Sheet*
 - *Cash flow*
- Typical Homeowners
 - *Utility savings – cost and usage*
 - *Net cost savings*
- Typical Contractor & Material Partner
 - *Enhanced revenues and associated costs*
- Investors & Lenders
 - *Interest and potential Dividends*
- Town / Community
 - *Utility savings – cost and usage*
 - *GHG savings*
 - *Local employment*

Report Notes

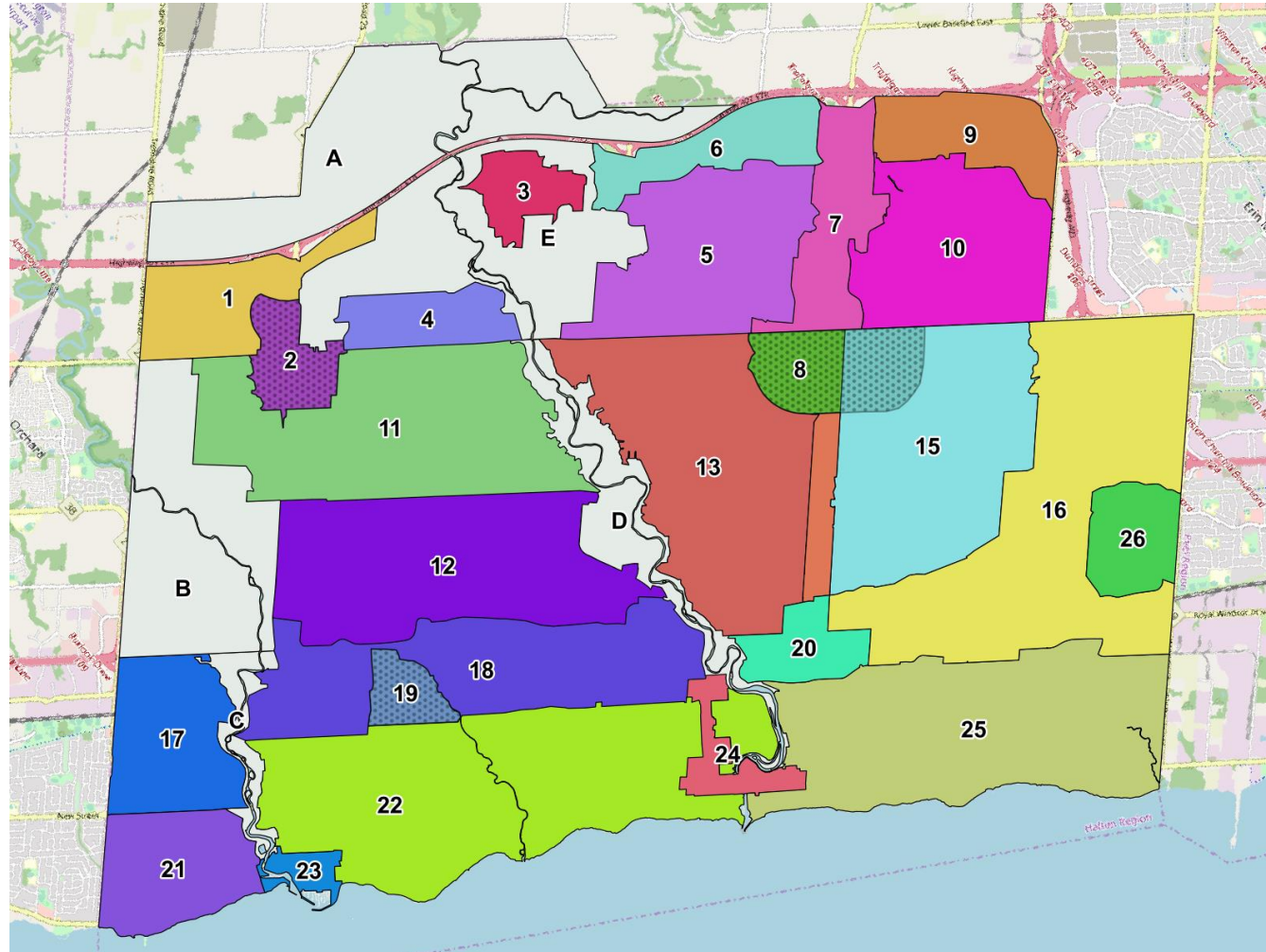
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Oakville Home Energy Retrofit Feasibility Study

Energy Planning Districts

Community Energy Strategy

Energy Planning Districts



Report Notes

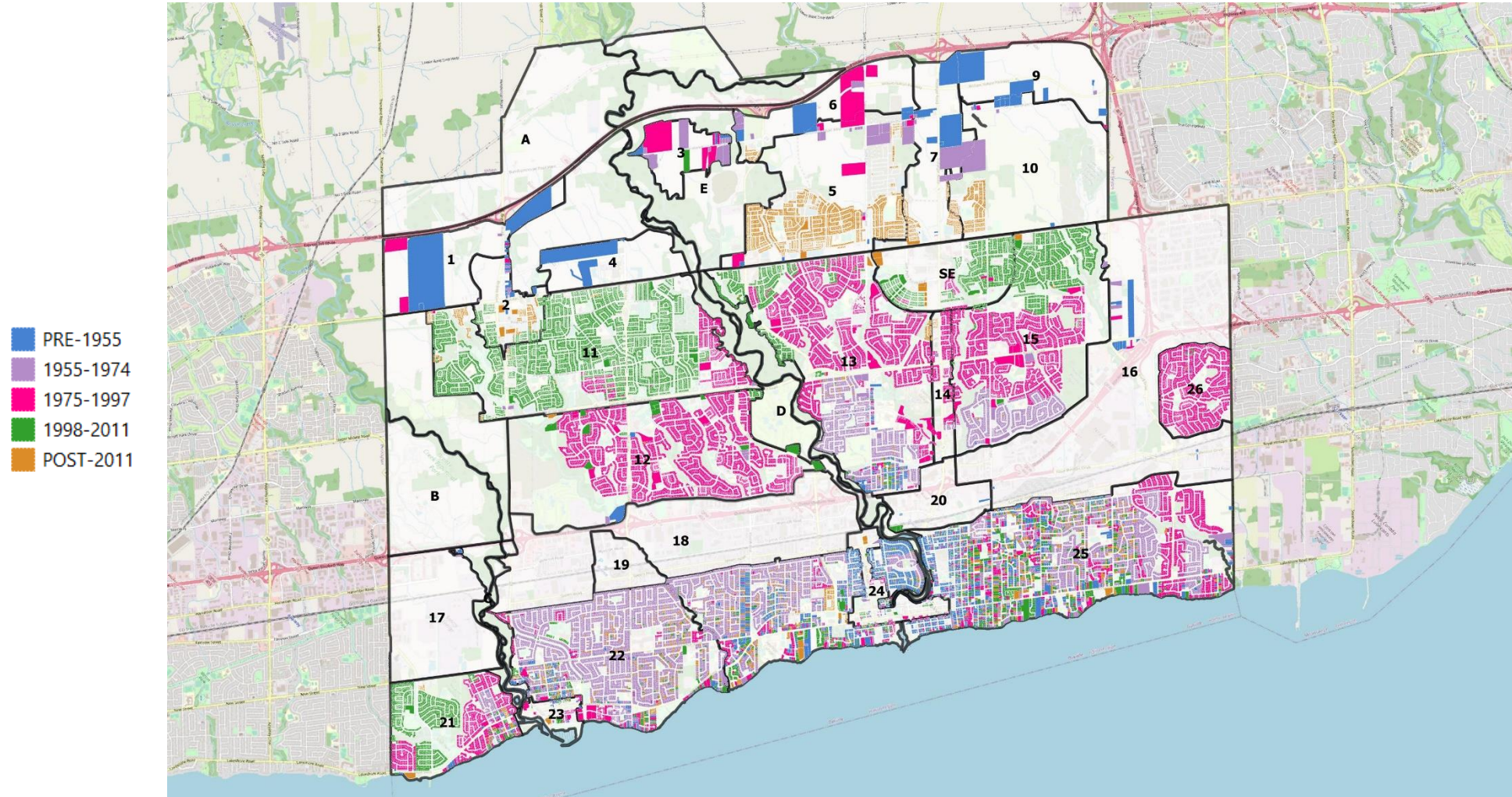
- From Oakville Community Energy Strategy
- These were aligned with the Town planning staff based on the best available land-use and employment planning outlooks.
- Study mapped property and 2019 baseline to these same EPDs.
- Study assessed retrofit efficiency outcomes for Town as a whole.

Oakville Home Energy Retrofit Feasibility Study

2019 Baseline Maps (Examples)

Oakville Home Energy Retrofit Feasibility Study

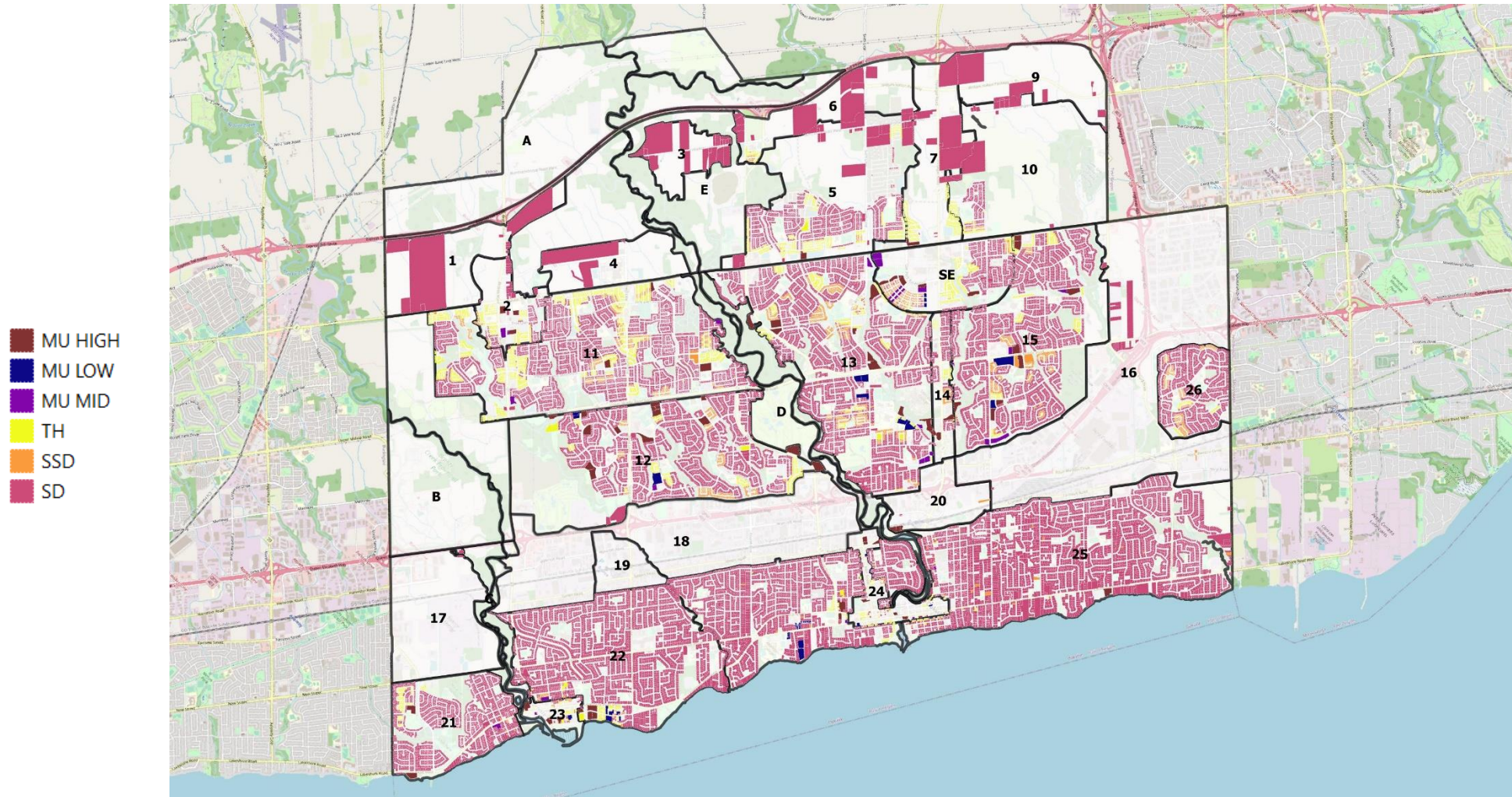
Residential Mapping – 2019 Parcels with Homes by Age



Example of Many Possible Maps

Oakville Home Energy Retrofit Feasibility Study

Residential Mapping – 2019 Parcels with Homes by Type



Oakville Home Energy Retrofit Feasibility Study

Target Markets & Penetration

Oakville Home Energy Retrofit Feasibility Study

Target Markets

- Potential
 - *All 81,000 existing Homes in 2019*
- Prioritization - Type
 - *Single Family - Highest*
 - *Single Family semi-detached - High*
 - *Single-Family Townhomes - Medium*
 - *Other - Lower*
- Prioritization – Age
 - *Older to newer*
- Prioritization – Ownership
 - *Owner occupied – Highest – median income or above*
 - *Owner occupied – High – below median income*
 - *Housing Associations – High*
 - *Landlords - Lower*

Oakville Home Energy Retrofit Feasibility Study

2019 Baseline Archetypes

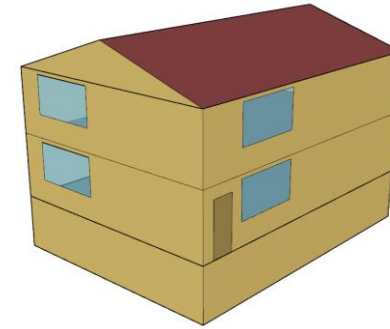
Oakville Home Energy Retrofit Feasibility Study

Baseline Archetypes - Background

- Home archetypes created
 - *MPAC 2019 data sorted by 6 types of home*
 - *Each type sorted by 5 age bands aligned with Ontario Building Code*
 - *MPAC area data used to estimate number of homes*
 - *Spatial mapping by home type / age / location / EPD*
- Utility Baseline Modelling
 - *RETScreen modelled for each archetype*
 - *RETScreen modelled for 4 age bands (pre-74 & pre-55 combined)*
 - *Calibrated by senior energy building and community energy modelers*
 - *End-use and utility demand indexes derived for each archetypes*
 - *Aggregated use matched to 2019 water, gas, electricity metered data*

Single (Detached, Semi, Town) Archetype Characteristics – 2019 Baseline

Type: Single-family home with, attic roof, wood-frame walls, slab-on-grade foundation, and metal-frame windows. Served by furnace and split AC units.
Floors: 2
Area: 223 SM
Window-to-Wall Ratio: 15%



	Pre 1975	1975-1997	1998-2011	Post-2011
Window Properties	U-3.52 [SI]	U-2.96 [SI]	U-1.99 [SI]	U-1.40 [SI]
Wall Properties	R-1.06 [SI]	R-1.49 [SI]	R-3.03 [SI]	R-4.24[SI]
Roof Properties	R-1.04 [SI]	R-2.01 [SI]	R-5.24 [SI]	R-6.15 [SI]
Heating Efficiency	78%	78%	80%	84%
Cooling Efficiency	3.13 COP	3.13 COP	3.97 COP	4.10 COP
Lighting Power Density	3.88 W/SM	3.88 W/SM	2.57 W/SM	2.57 W/SM
Equipment Power Density	6.53 W/SM	6.53 W/SM	4.74 W/SM	3.97 W/SM
Infiltration	6.5 ACH50	5.0 ACH50	4.0 ACH50	3.5 ACH50

Multi-Unit Low-Rise Apartment Archetype Characteristics - Baseline

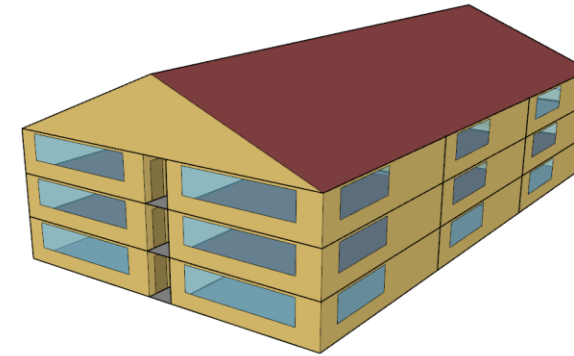
Type: 18-unit apartment with attic roof, , steel frame walls, slab-on-grade foundation, and metal-frame windows. Served by furnace and split AC units.

Floors: 3

Area: 2,007 SM

Window-to-Wall Ratio: 16%

	Pre 1975	1975-1997	1998-2011	Post-2011
Window Properties	U-3.52 [SI]	U-2.96 [SI]	U-1.99 [SI]	U-1.40 [SI]
Wall Properties	R-1.06 [SI]	R-1.49 [SI]	R-3.03 [SI]	R-4.24 [SI]
Roof Properties	R-1.04 [SI]	R-2.01 [SI]	R-5.87 [SI]	R-7.33 [SI]
Heating Efficiency	78%	78%	80%	84%
Cooling Efficiency	3.13 COP	3.13 COP	3.97 COP	4.10 COP
Lighting Power Density	3.88 W/SM	3.88 W/SM	1.55 W/SM	1.55 W/SM
Equipment Power Density	12.68 W/SM	12.68 W/SM	9.76 W/SM	6.69 W/SM
Infiltration	6.5 ACH50	5.0 ACH50	4.0 ACH50	3.5 ACH50



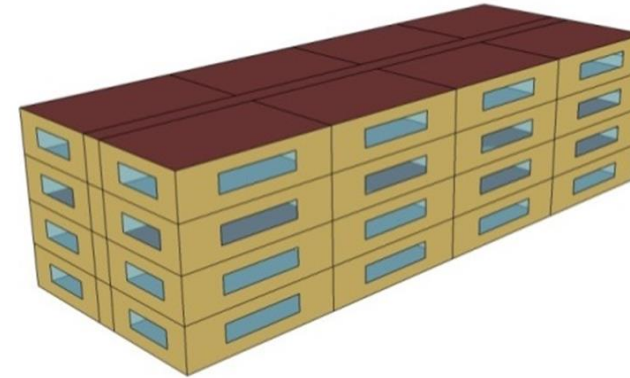
Multi-Unit Mid-Rise Apartment Archetype Characteristics - Baseline

Type: 31-unit apartment building with built-up roof, steel frame walls, slab-on-grade foundation, and metal-frame windows. Served furnaces and split AC units.

Floors: 4

Area: 2,823 SM

Window-to-Wall Ratio: 20%



	Pre 1975	1975-1997	1998-2011	Post-2011
Window Properties	U-3.52 [SI]	U-3.00 [SI]	U-2.51 [SI]	U-1.40 [SI]
Wall Properties	R-1.06 [SI]	R-1.49 [SI]	R-3.03 [SI]	R-4.24 [SI]
Roof Properties	R-2.80 [SI]	R-2.80 [SI]	R-5.05 [SI]	R-6.17 [SI]
Heating Efficiency	78%	78%	80%	84%
Cooling Efficiency	3.13 COP	3.13 COP	3.69 COP	3.78 COP
Lighting Power Density	5.79 W/SM	5.79 W/SM	5.23 W/SM	4.07W/SM
Equipment Power Density	12.68 W/SM	12.68 W/SM	5.00 W/SM	3.34 W/SM
Infiltration	6.5 ACH50	5.0 ACH50	4.0 ACH50	3.5 ACH50



Oakville Home Energy Retrofit Feasibility Study

Retrofitted Archetypes

Oakville Home Energy Retrofit Feasibility Study

Retrofitted Archetypes - Background

- Retrofitted Archetypes – Energy Use
 - *Standardized retrofit applied to each of 24 archetypes*
 - *Performance modelled for each archetype*
 - *Calibrated by senior energy building and community energy modelers*
 - *End-use and utility demand indexes derived for each archetypes*
- Retrofitted Archetypes – Current Cost
 - *Retrofit cost estimated using 2021 industry data for GTA*
 - *Current GTA Cost Index derived for each archetype*
- Oakville Home Energy Retrofit Project – Cost Productivity
 - *Scale cost productivity gains estimated relative to current market*
 - *Applied to aggregated flow of retrofits*

Oakville Home Energy Retrofit Feasibility Study

Background - Estimating Current Costs

- Installation & Material
 - *GTA RS Means where available*
 - *Market estimates where RS Means unavailable*
 - *Adjustment for clear market mismatch*
- Engineering & Contingencies included
 - *RS Means Recommendations for*
 - *Engineering*
 - *Contingency*
 - *Architectural for “Greening of Building”*
- Harmonized Sales Tax
 - *Applied on all costs*

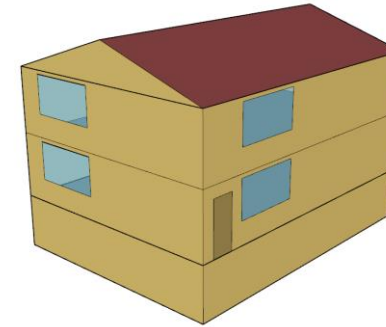
Single (Detached, Semi, Town) Archetype Characteristics - Retrofitted

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Area: 223 SM

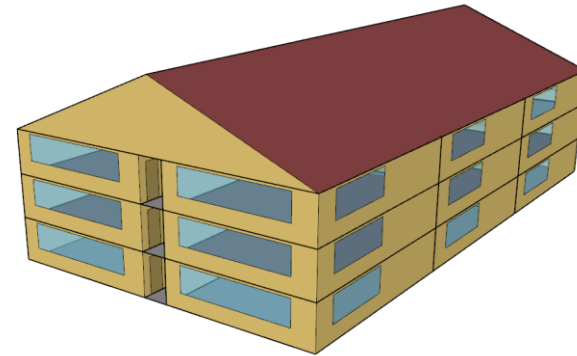
Window-to-Wall Ratio: 15%



	Pre 1975	1975-1997	1998-2011	Post-2011
Window Properties	U-1.0 [SI]	U-1.0 [SI]	U-1.0 [SI]	U-1.0 [SI]
Wall Properties	R-1.06 [SI]	R-1.49 [SI]	R-3.03 [SI]	R-4.24[SI]
Roof Properties	R-6.10 [SI]	R-6.10 [SI]	R-6.10 [SI]	R-6.15 [SI]
Heating Efficiency	96%	96%	96%	96%
Cooling Efficiency	4.10 COP	4.10 COP	4.10 COP	4.10 COP
Lighting Power Density	1.5 W/SM	1.5 W/SM	1.5 W/SM	1.5 W/SM
Equipment Power Density	4.97 W/SM	4.97 W/SM	3.97 W/SM	3.05 W/SM
Infiltration	4.6 ACH50	3.5 ACH50	2.8 ACH50	2.5 ACH50
Retrofit Cost Index	\$252/m2	\$239/m2	\$207/m2	\$149/m2

Multi-Unit Low-Rise Apartment Archetype Characteristics - Retrofitted

Type: 18-unit apartment with attic roof, , steel frame walls, slab-on-grade foundation, and metal-frame windows. Served by furnace and split AC units.
Floors: 3
Area: 2,007 SM
Window-to-Wall Ratio: 16%



	Pre 1975	1975-1997	1998-2011	Post-2011
Window Properties	U-1.0 [SI]	U-1.0 [SI]	U-1.0 [SI]	U-1.0 [SI]
Wall Properties	R-1.06 [SI]	R-1.49 [SI]	R-3.03 [SI]	R-4.24 [SI]
Roof Properties	R-6.10 [SI]	R-6.10 [SI]	R-6.10 [SI]	R-7.33 [SI]
Heating Efficiency	96%	96%	96%	96%
Cooling Efficiency	4.10 COP	4.10 COP	4.10 COP	4.10 COP
Lighting Power Density	1.5 W/SM	1.5 W/SM	1.5 W/SM	1.5 W/SM
Equipment Power Density	9.51 W/SM	9.51 W/SM	7.40 W/SM	5.09 W/SM
Infiltration	4.6 ACH50	3.5 ACH50	2.8 ACH50	2.5 ACH50
Retrofit Cost Index	\$304/m2	\$295/m2	\$274/m2	\$199/m2

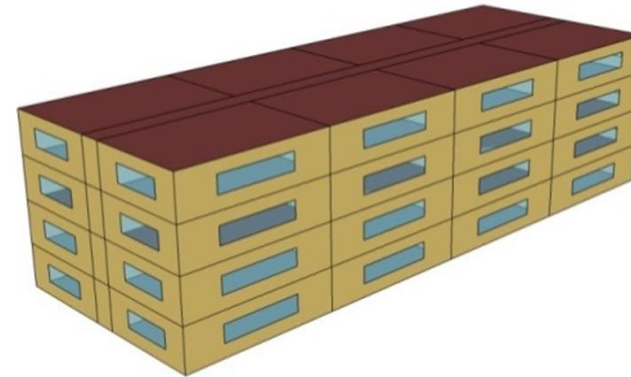
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Floors: 4

Area: 2,823 SM

Window-to-Wall Ratio: 20%



	Pre 1975	1975-1997	1998-2011	Post-2011
Window Properties	U-1.0 [SI]	U-1.0 [SI]	U-1.0 [SI]	U-1.0 [SI]
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Roof Properties	R-6.10 [SI]	R-6.10 [SI]	R-6.10 [SI]	R-6.17 [SI]
Heating Efficiency	96%	96%	96%	96%
Cooling Efficiency	4.10 COP	4.10 COP	4.10 COP	4.10 COP
Lighting Power Density	1.5 W/SM	1.5 W/SM	1.5 W/SM	1.5 W/SM
Equipment Power Density	9.51 W/SM	9.51 W/SM	3.75 W/SM	2.50 W/SM
Infiltration	4.6 ACH50	3.5 ACH50	2.8 ACH50	2.5 ACH50
Retrofit Cost Index	\$267/m2	\$261/m2	\$246/m2	\$152/m2

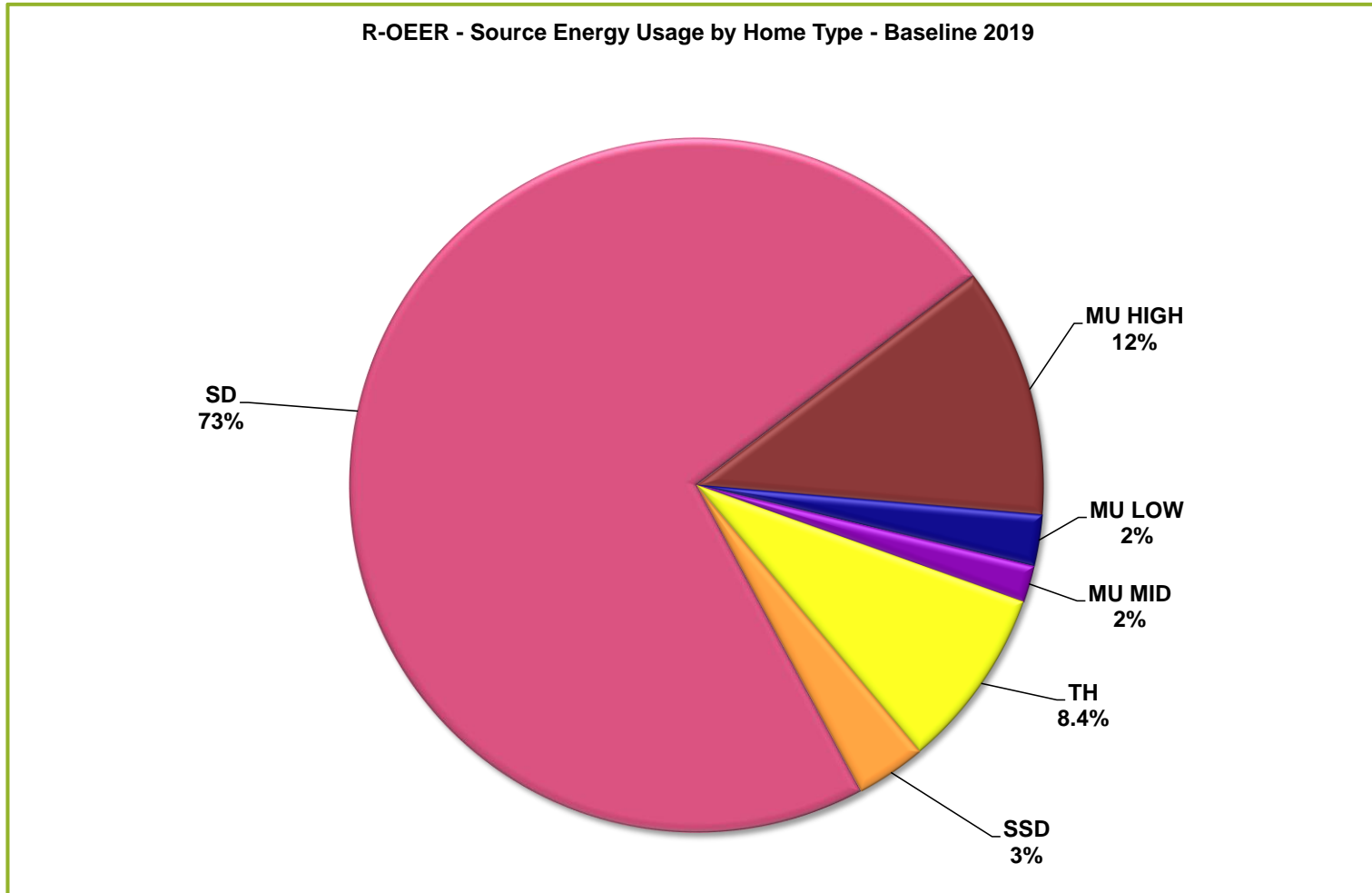


Oakville Home Energy Retrofit Feasibility Study

2019 Residential Energy Use Baseline

Oakville Home Energy Retrofit Feasibility Study

Source Energy Usage by Home Type - Baseline 2019

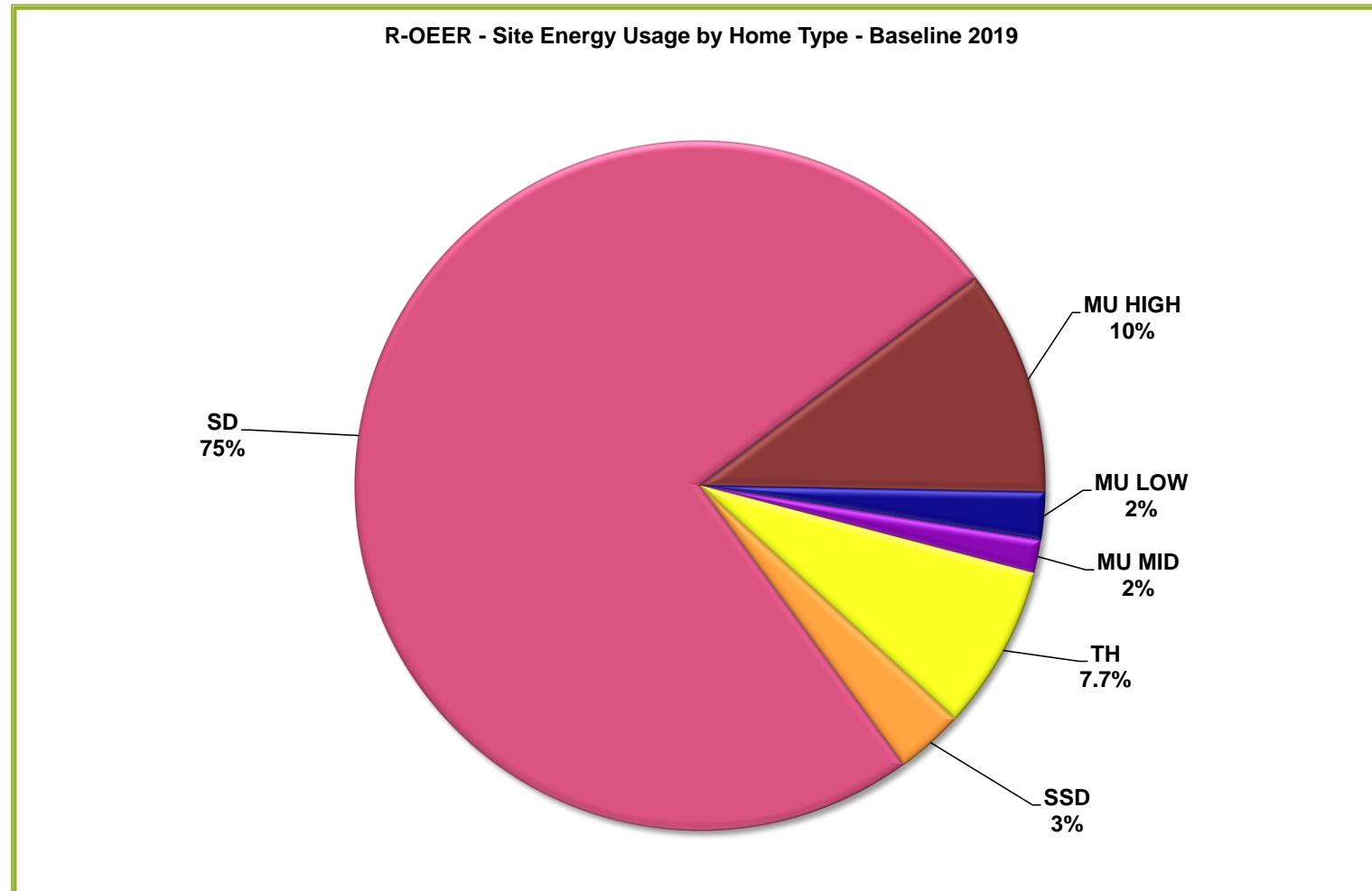


Report Notes

- From Home Retrofit Feasibility Study
- This shows source energy use for each of the 6 home types.
- This includes conversion and transmission losses.
- Note: Single and semi-detached homes make up three-quarters of the energy use.

Oakville Home Energy Retrofit Feasibility Study

Site Energy Usage by Home Type - Baseline 2019

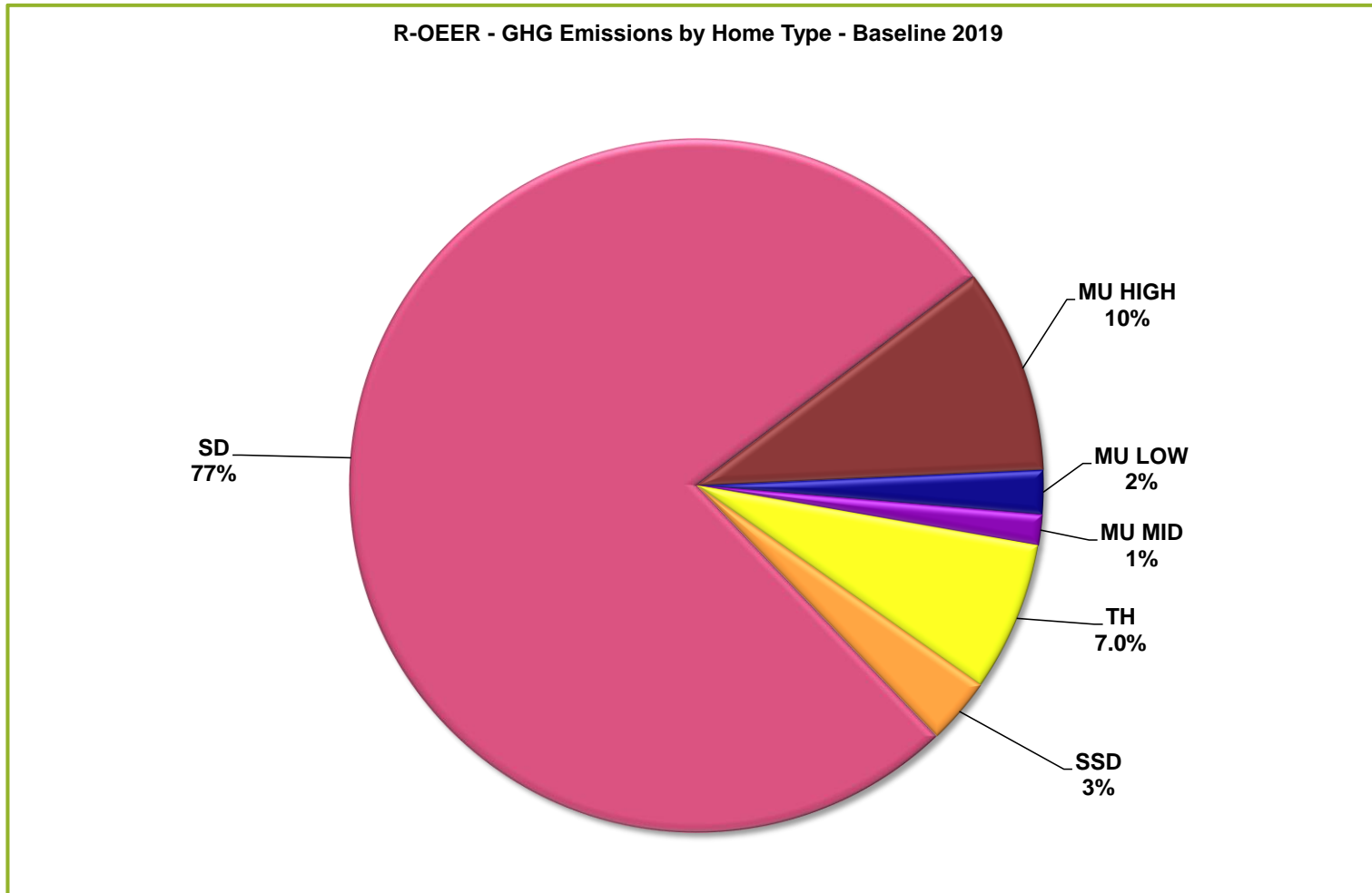


Report Notes

- From Home Retrofit Feasibility Study
- This shows site, or metered, energy use for each of the 6 home types.
- Note: Single and semi-detached homes are now four-fifths the energy use
- Note: There is nearly a third of conversion losses.

Oakville Home Energy Retrofit Feasibility Study

GHG Emissions by Home Type - Baseline 2019



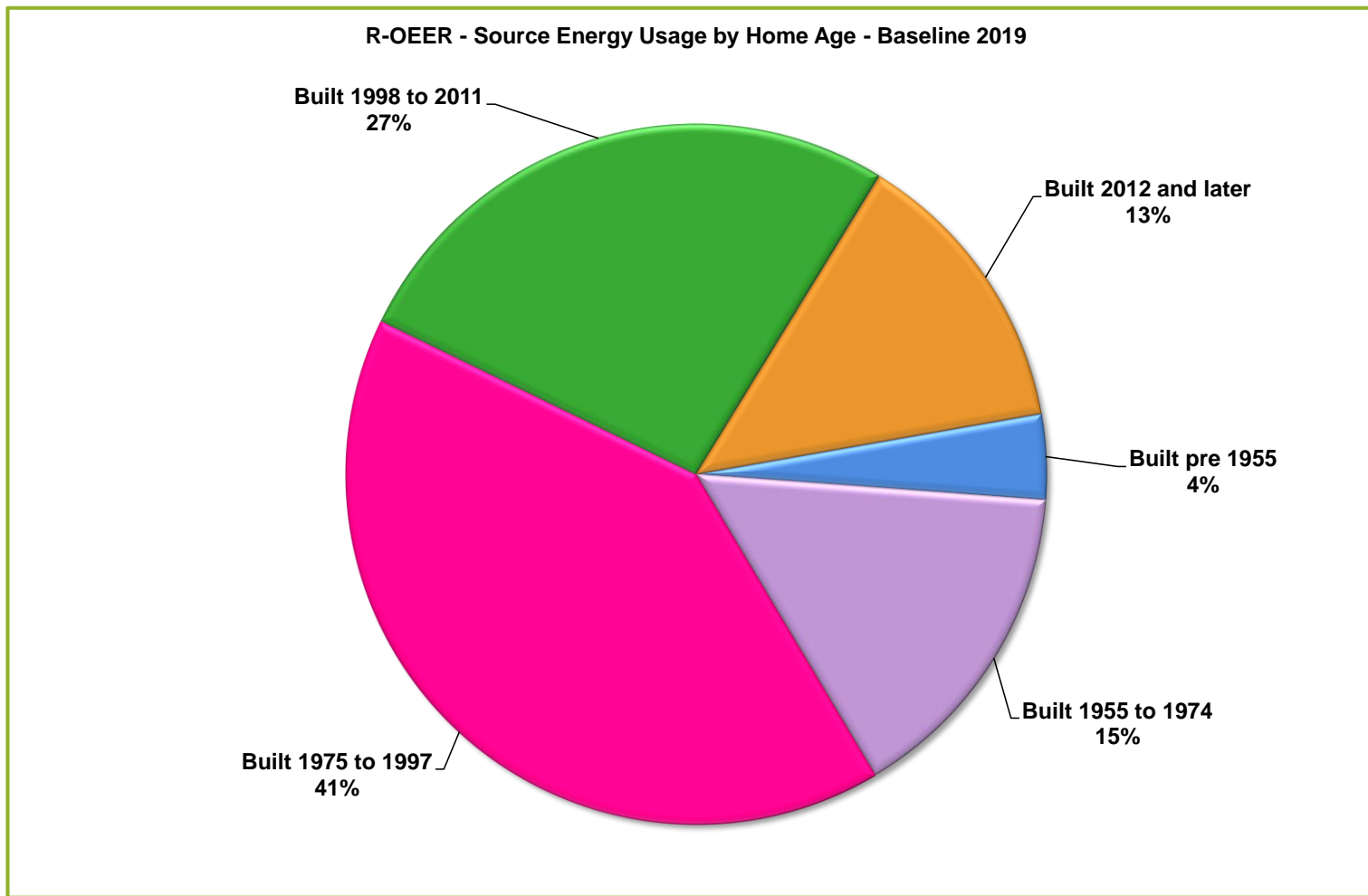
Report Notes

- From Home Retrofit Feasibility Study
- This shows the GHG emissions caused by each of the 6 home types.
- These emissions are caused by the use of natural gas and electricity.
- Note: Single and semi-detached homes cause four-fifths of the emissions.

402,000 mt per year and 1.9 mt/cap in 2019

Oakville Home Energy Retrofit Feasibility Study

Source Energy Usage by Home Age - Baseline 2019

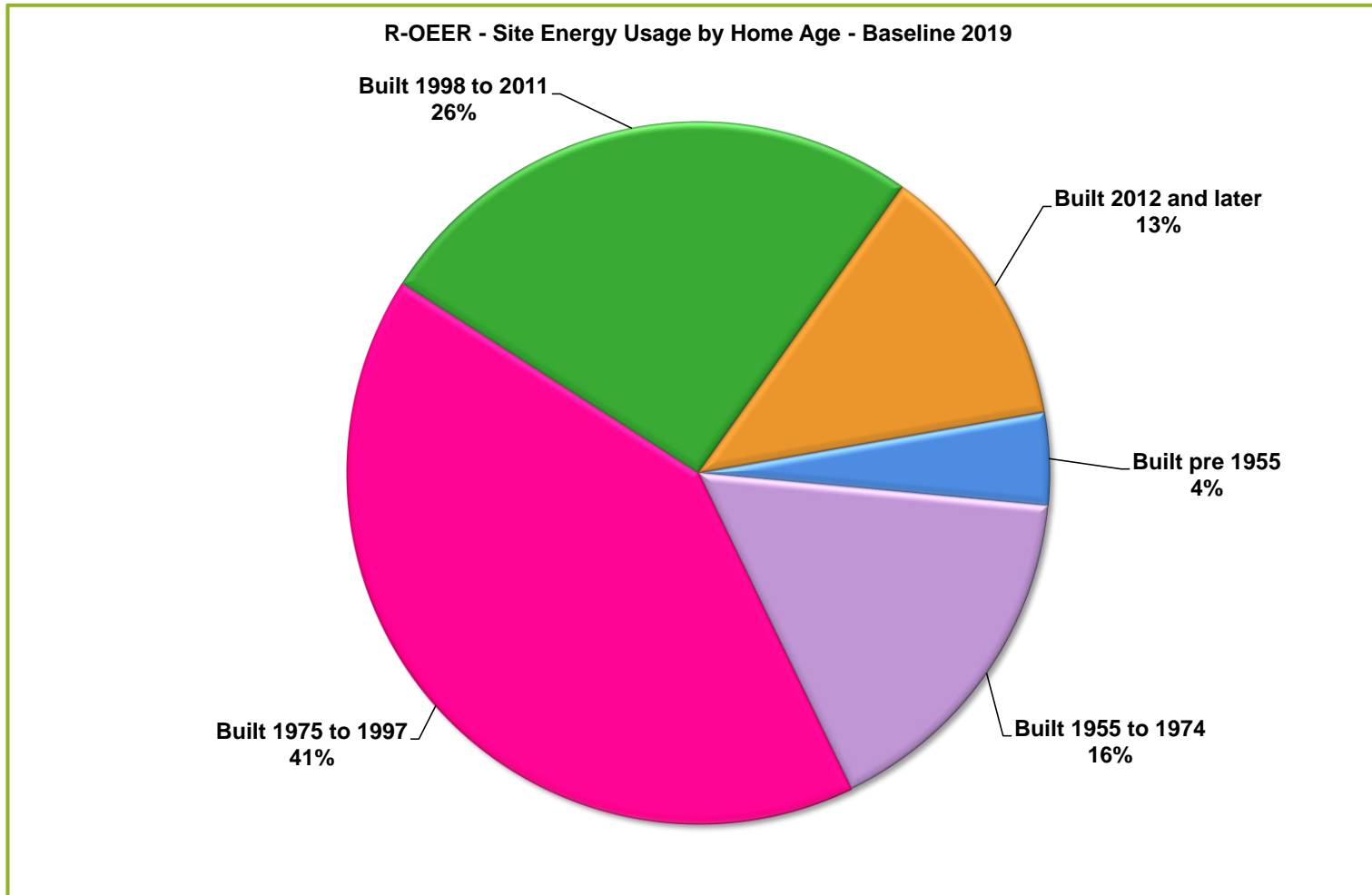


Report Notes

- From Home Retrofit Feasibility Study
- This shows source energy use for each of the 5 age groupings.
- This includes conversion and transmission losses.
- Note: Homes over about 25 years old are well over half the energy use.

Oakville Home Energy Retrofit Feasibility Study

Site Energy Usage by Home Age - Baseline 2019

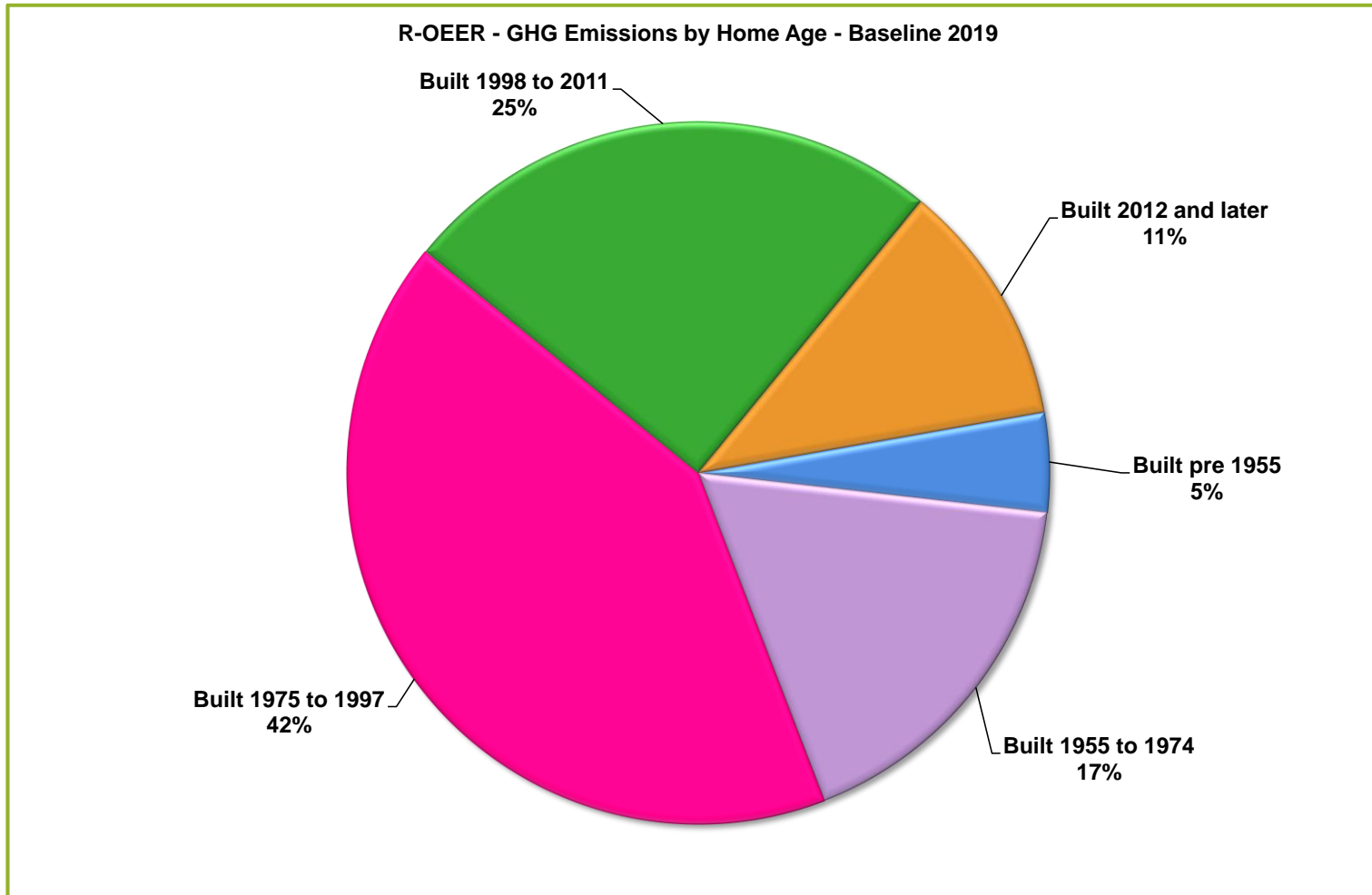


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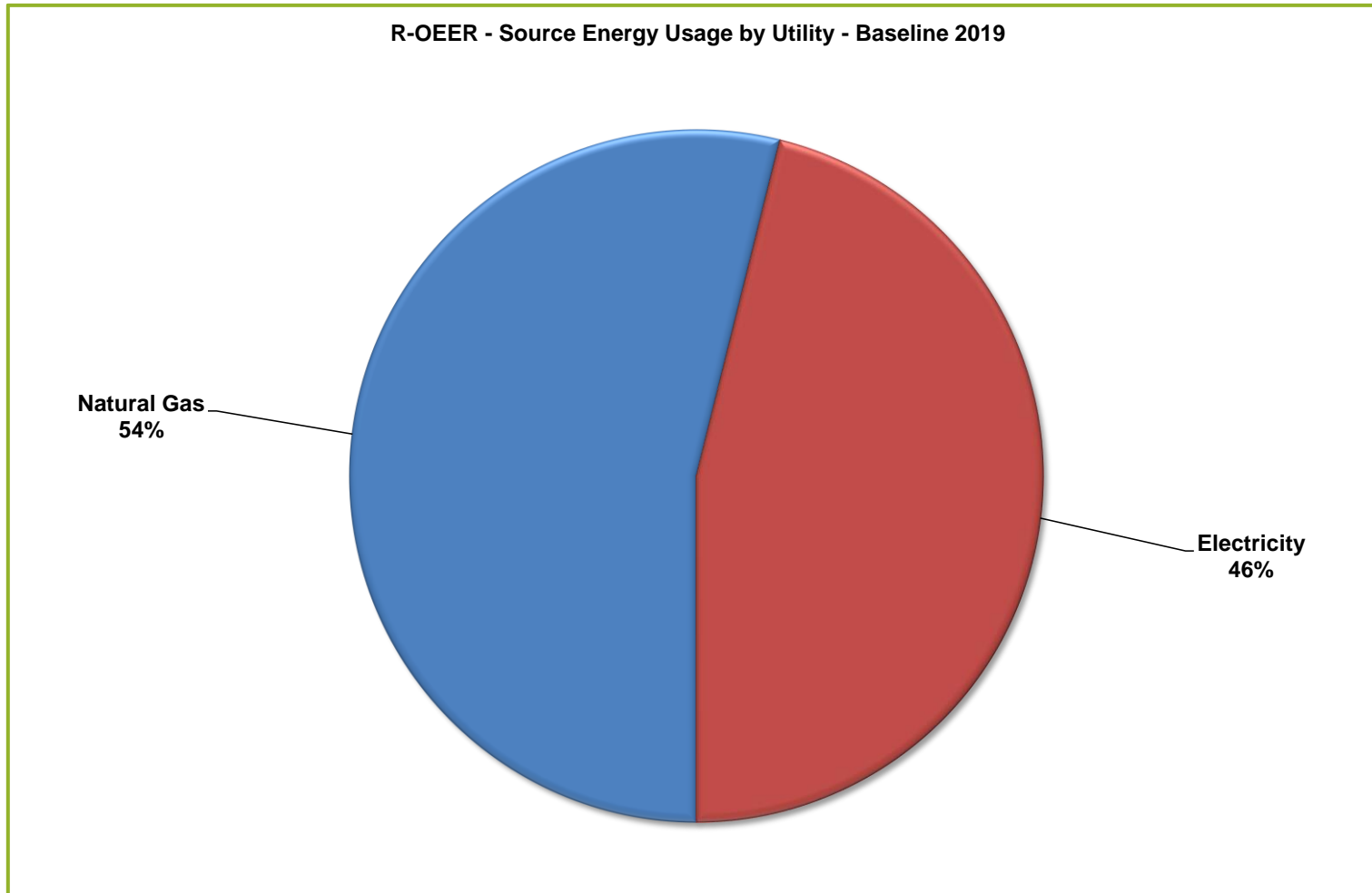


Report Notes

- From Home Retrofit Feasibility Study
- This shows energy-related GHG emissions caused by each of the 5 age groups.
- Note: Homes over about 25 years old account for nearly two-thirds of the GHG emissions.

Oakville Home Energy Retrofit Feasibility Study

Source Energy Usage by Utility - Baseline 2019

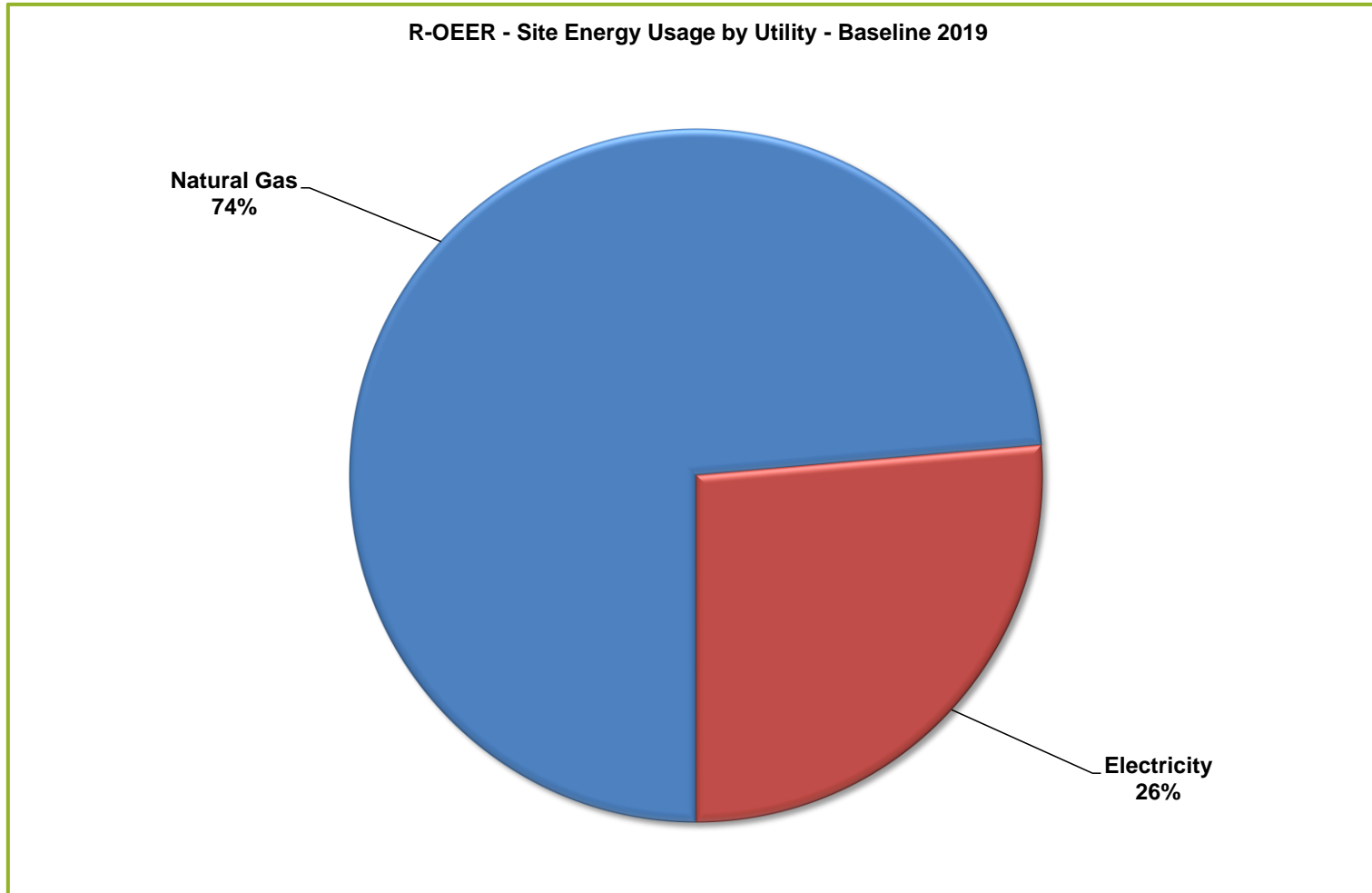


Report Notes

- From Home Retrofit Feasibility Study
- This shows the source energy use by utility type of the Town's homes in 2019.
- This includes conversion and distribution losses.
- Note: Source energy demand for natural gas is about half the total.

Oakville Home Energy Retrofit Feasibility Study

Site Energy Usage by Utility - Baseline 2019

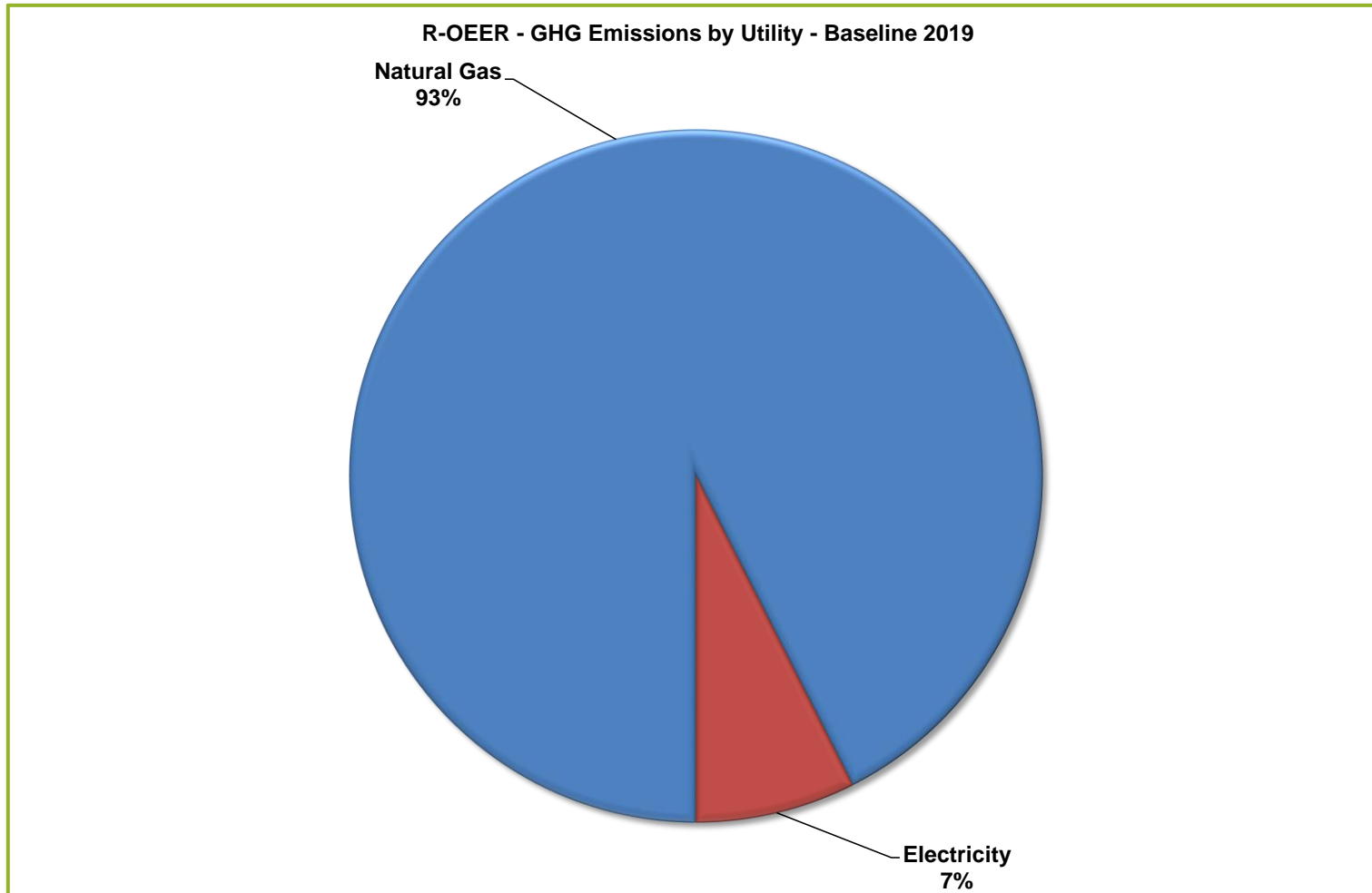


Report Notes

- From Home Retrofit Feasibility Study
- This shows the site, or metered energy uses by utility type of the Town's homes in 2019.
- Note: Site energy demand for natural gas is now nearly three-quarters of the total.

Oakville Home Energy Retrofit Feasibility Study

GHG Emissions by Utility - Baseline 2019



Report Notes

- From Home Retrofit Feasibility Study
- This shows the energy-related GHG emissions caused by the Town's homes in 2019.
- Note: The GHG emission caused by natural gas is well over 90% of the total.
- Note: Personal vehicles, the other major GHG emissions source for households, is not included in the scope of the Feasibility Study.

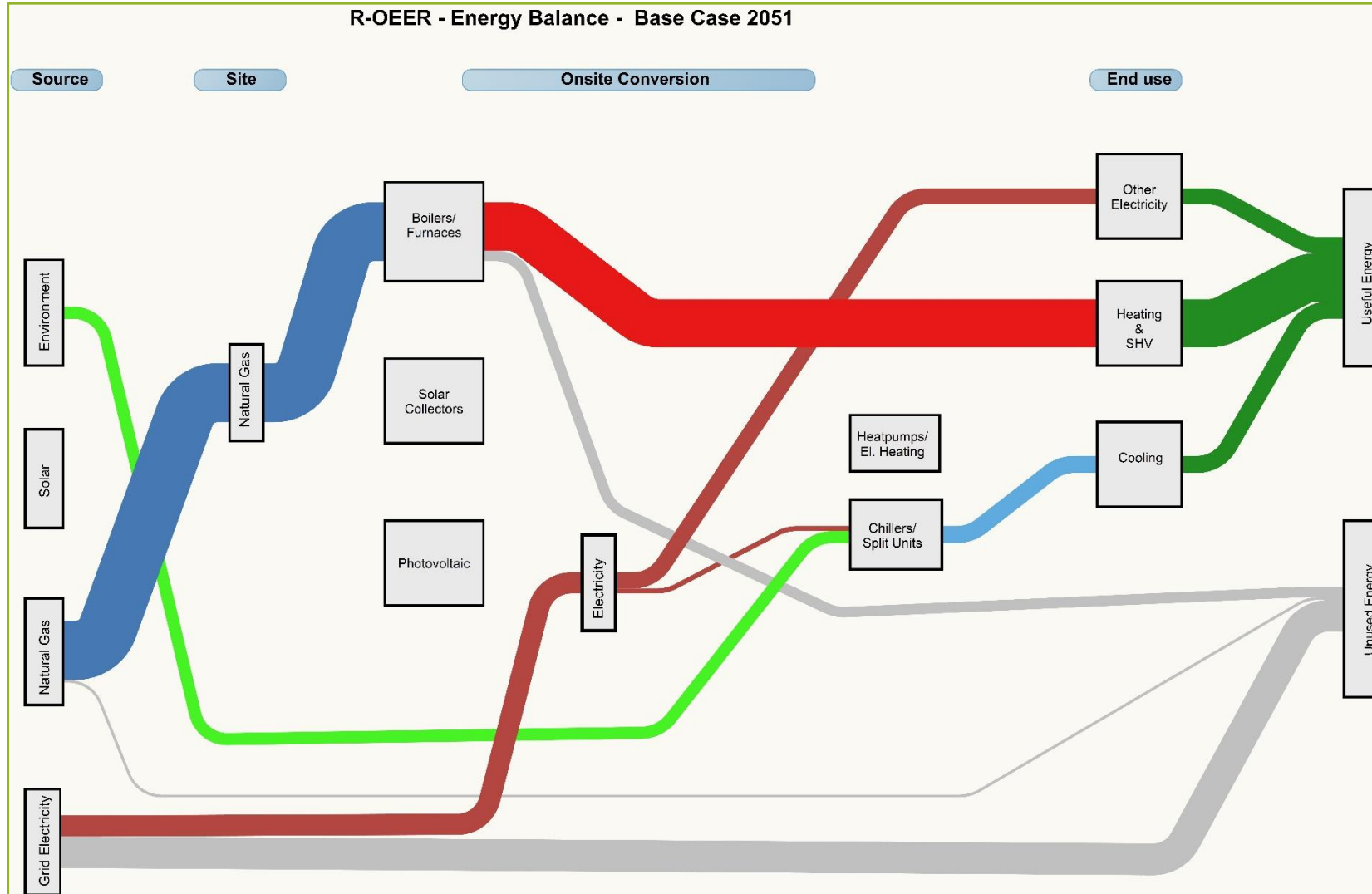
402,000 mt per year and 1.9 mt/cap in 2019

Oakville Home Energy Retrofit Feasibility Study

2019 to 2051 Residential Energy Use Baseline / Base Case & Efficient Case

Oakville Home Energy Retrofit Feasibility Study

Energy Balance - Total 13 M GJ

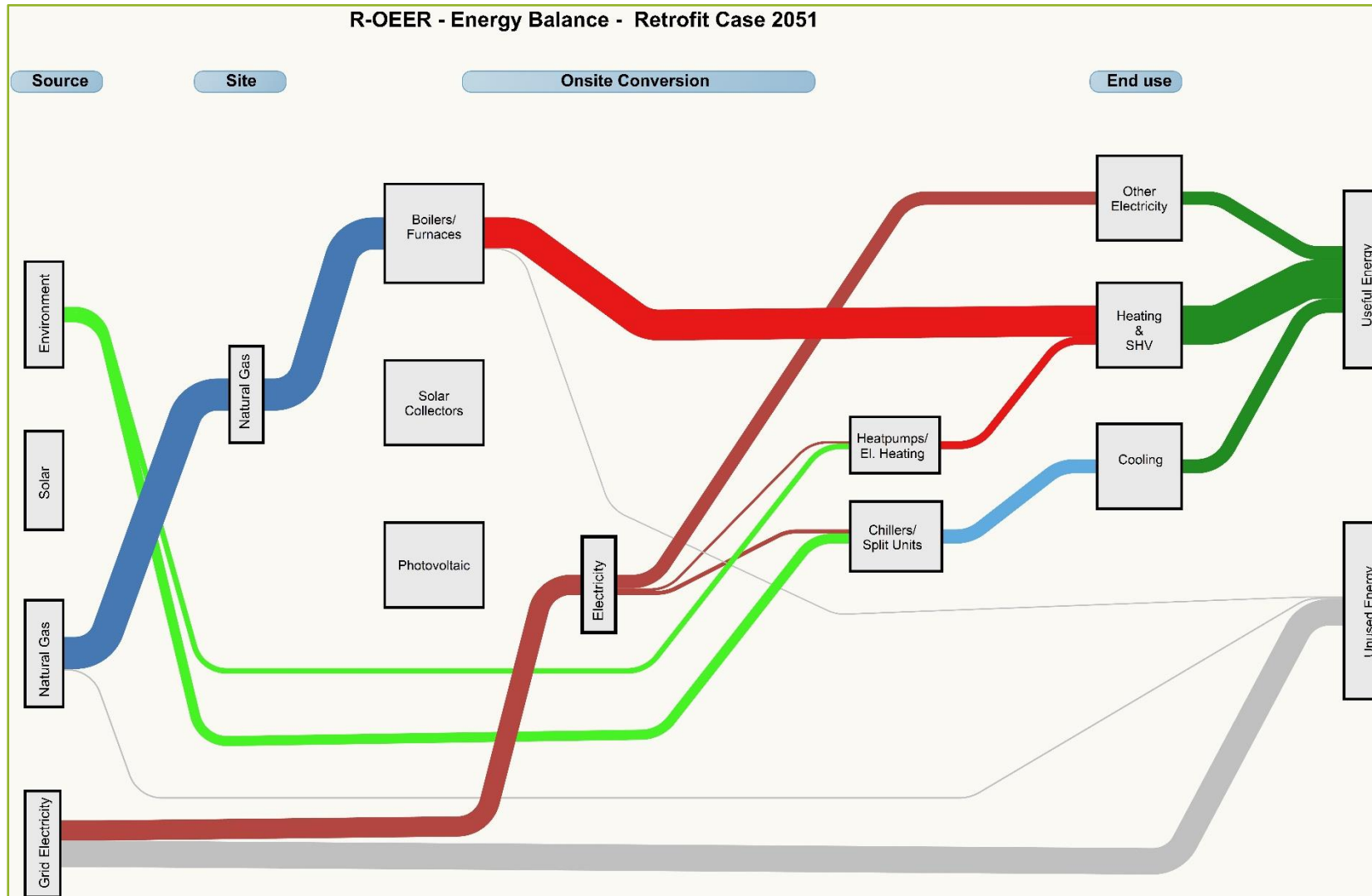


Report Notes

- From Home Retrofit Feasibility Study
- This energy flow picture is called a “Sankey Diagram”
- On the left are the sources of energy to provide the heating, cooling, lighting and other uses in the Town’s existing homes in 2051 assuming no retrofits
- Note: The Environment source is energy extracted from the air or ground. In the Base Case it is air extraction by AC units.
- Note: The “gray” flows are conversion and distribution losses.

Oakville Home Energy Retrofit Feasibility Study

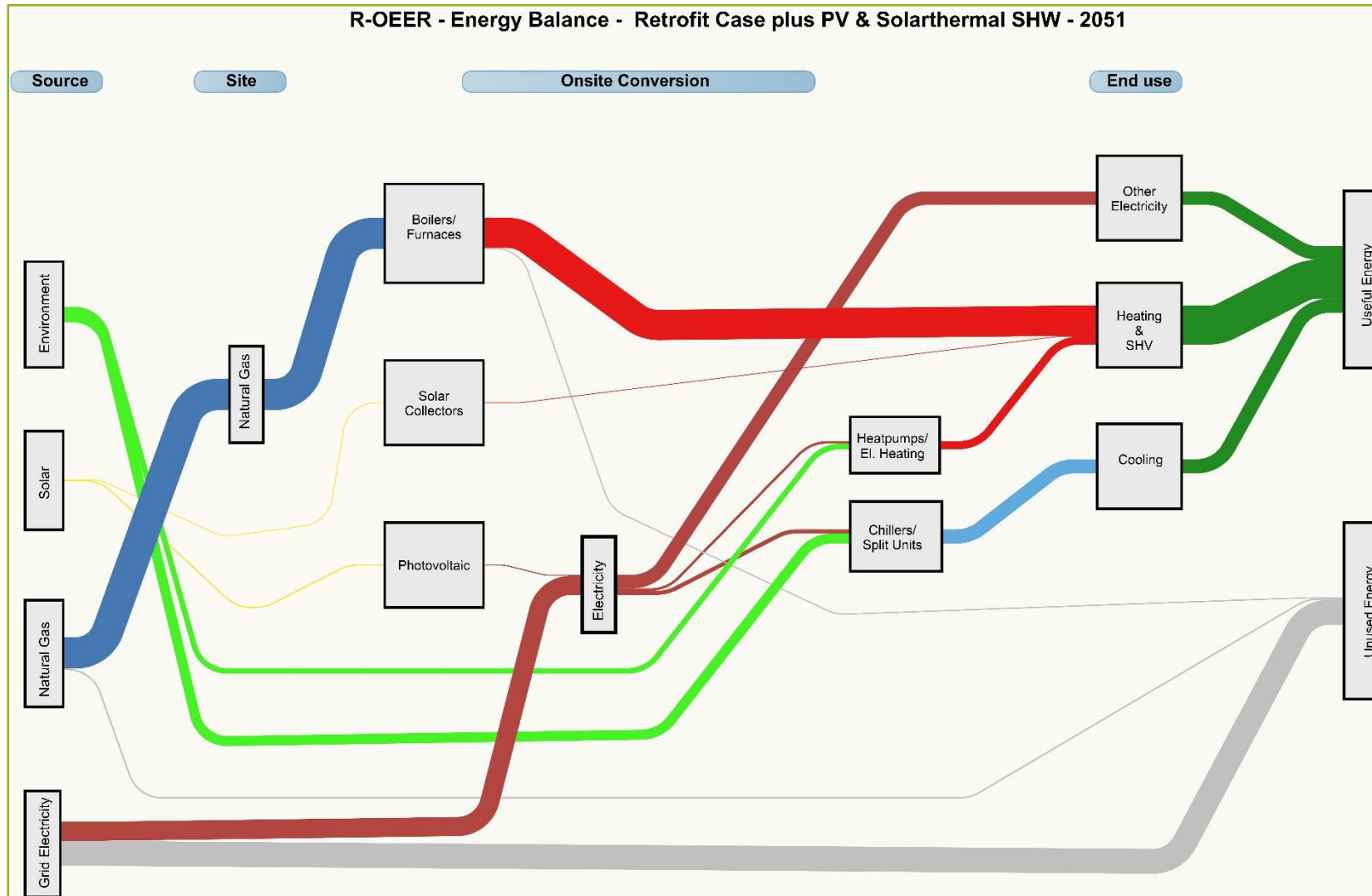
Energy Balance - Total 8.8 M GJ



Report Notes

- From Home Retrofit Feasibility Study
- This energy flow picture is called a “Sankey Diagram”
- On the left are the sources of energy to provide the heating, cooling, lighting and other uses in the Town’s existing homes in 2051 assuming most are retrofitted.
- Note: The Environment source is energy extracted from the air or ground. In this case it is air extraction by both AC units and heat pumps.
- Note: The “gray” flows are a smaller share of the total.

2051 Residential Retrofit Case plus PV & Solar Thermal Energy Balance - Total 8.4 M GJ



Report Notes

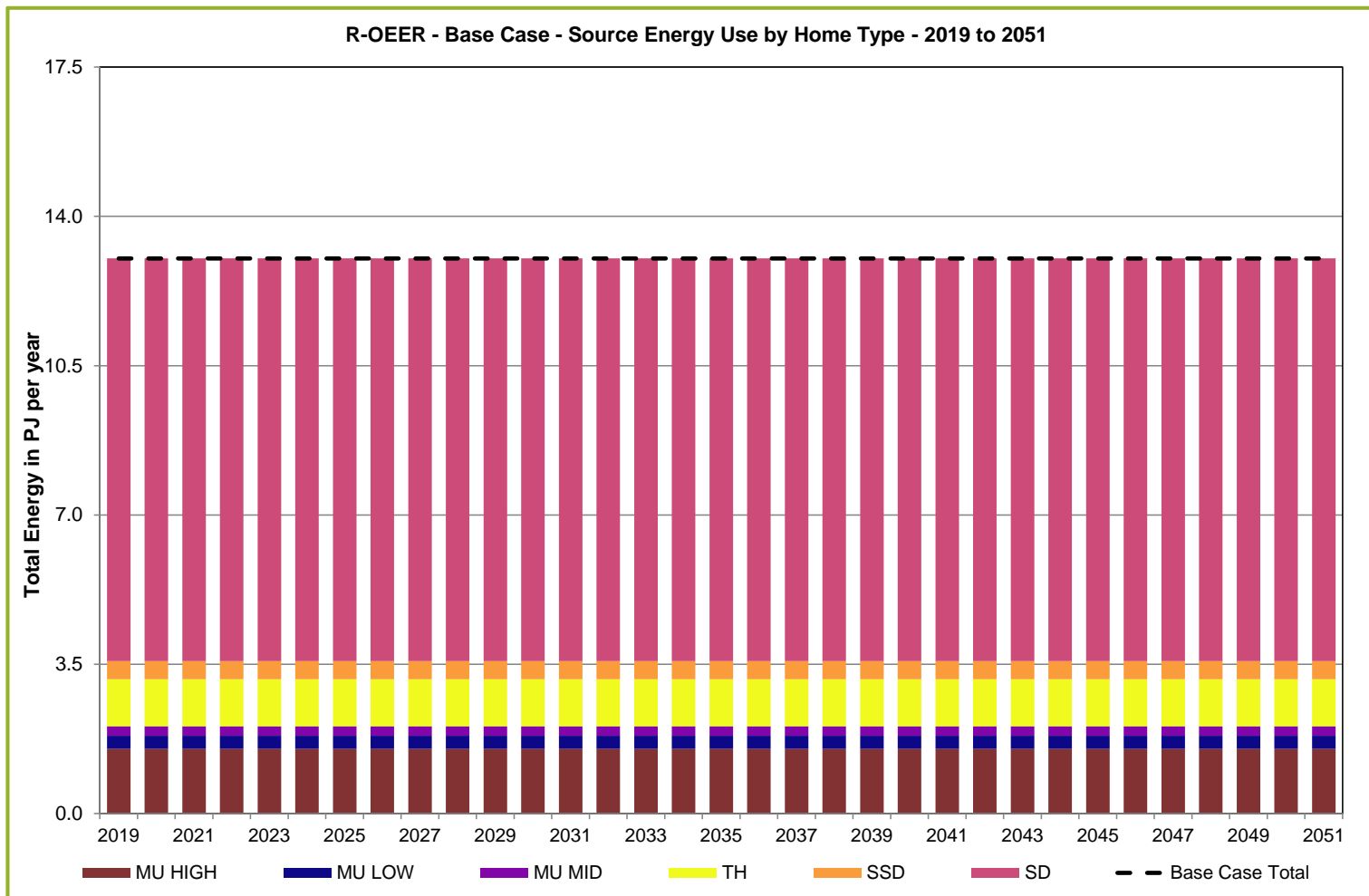
- From Home Retrofit Feasibility Study
- This energy flow picture is called a “Sankey Diagram”
- On the left are the sources of energy to provide the heating, cooling, lighting and other uses in the Town’s existing homes in 2051 assuming most are retrofitted **and** assumes a reasonable uptake of PV and solar thermal options.
- Note: The Environment source is energy extracted from the air or ground. In this case it is air extraction by both AC units and heat pumps.
- Note: The “gray” flows are a smaller share of the total.

Oakville Home Energy Retrofit Feasibility Study

2019-2051 Base Case Energy Use & Emissions

Oakville Home Energy Retrofit Feasibility Study

Source Energy Use by Home Type - 2019 to 2051

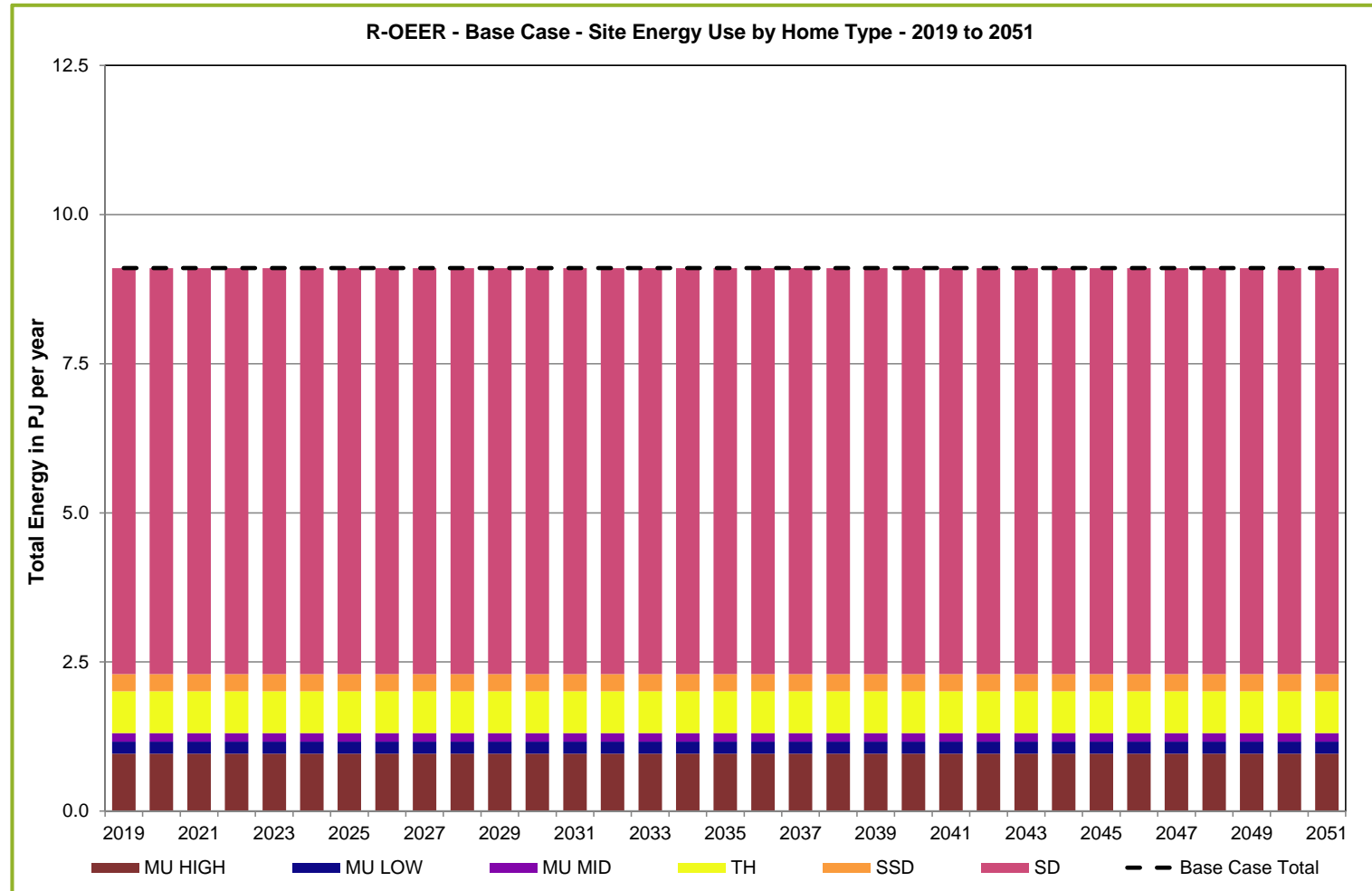


Report Notes

- From Home Retrofit Feasibility Study
- This shows the annual source energy use from 2019 to 2051 by the 6 home types.
- Note: The Base Case assumed the average efficiency of the Town's home in 2019 remains unchanged through 2051.

Oakville Home Energy Retrofit Feasibility Study

Site Energy Use by Home Type - 2019 to 2051

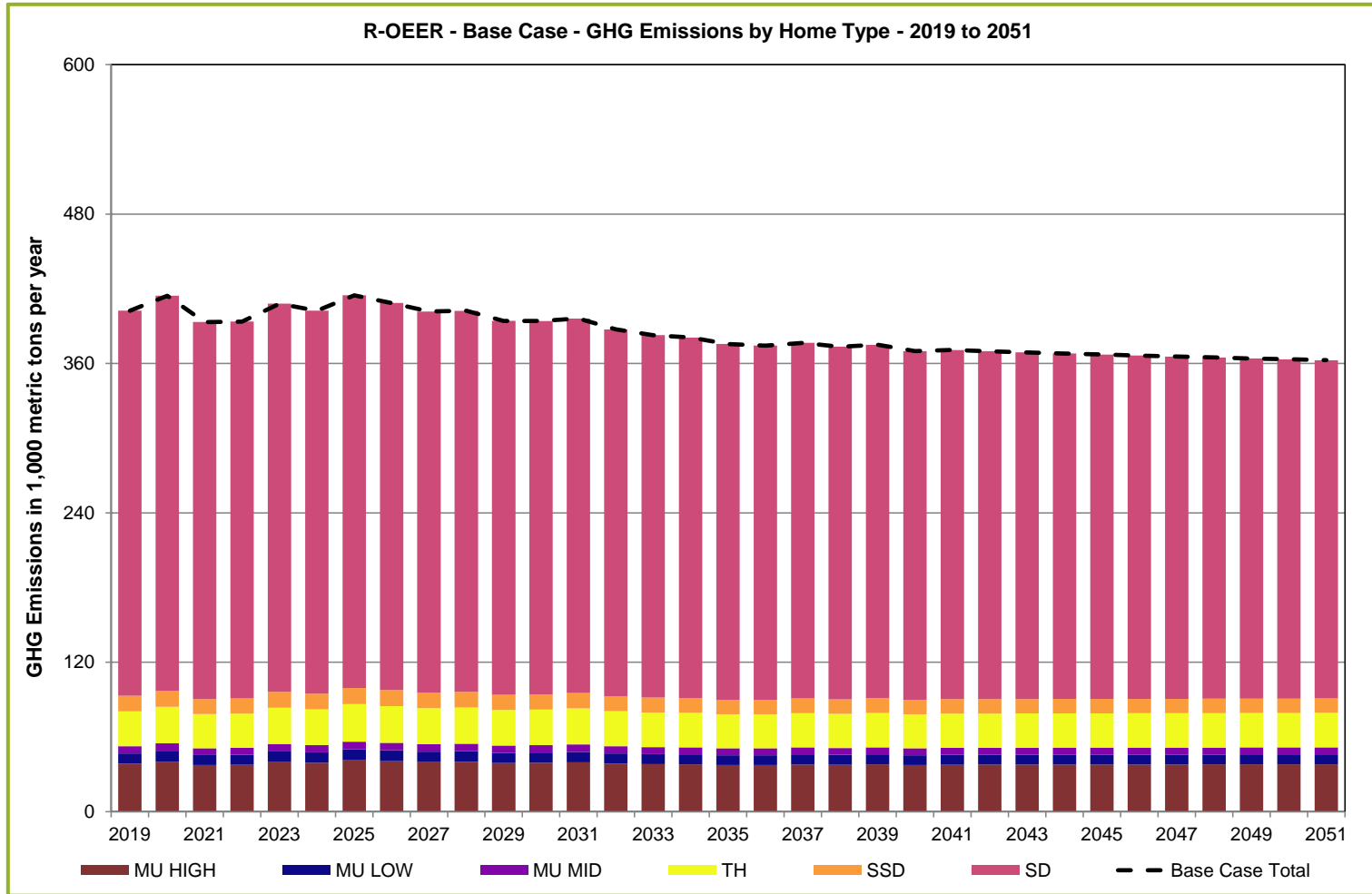


Report Notes

- From Home Retrofit Feasibility Study
- This shows the annual site energy use from 2019 to 2051 by the 6 home types.
- Note: The Base Case assumed the average efficiency of the Town's home in 2019 remains unchanged through 2051.

Oakville Home Energy Retrofit Feasibility Study

GHG Emissions by Home Type - 2019 to 2051

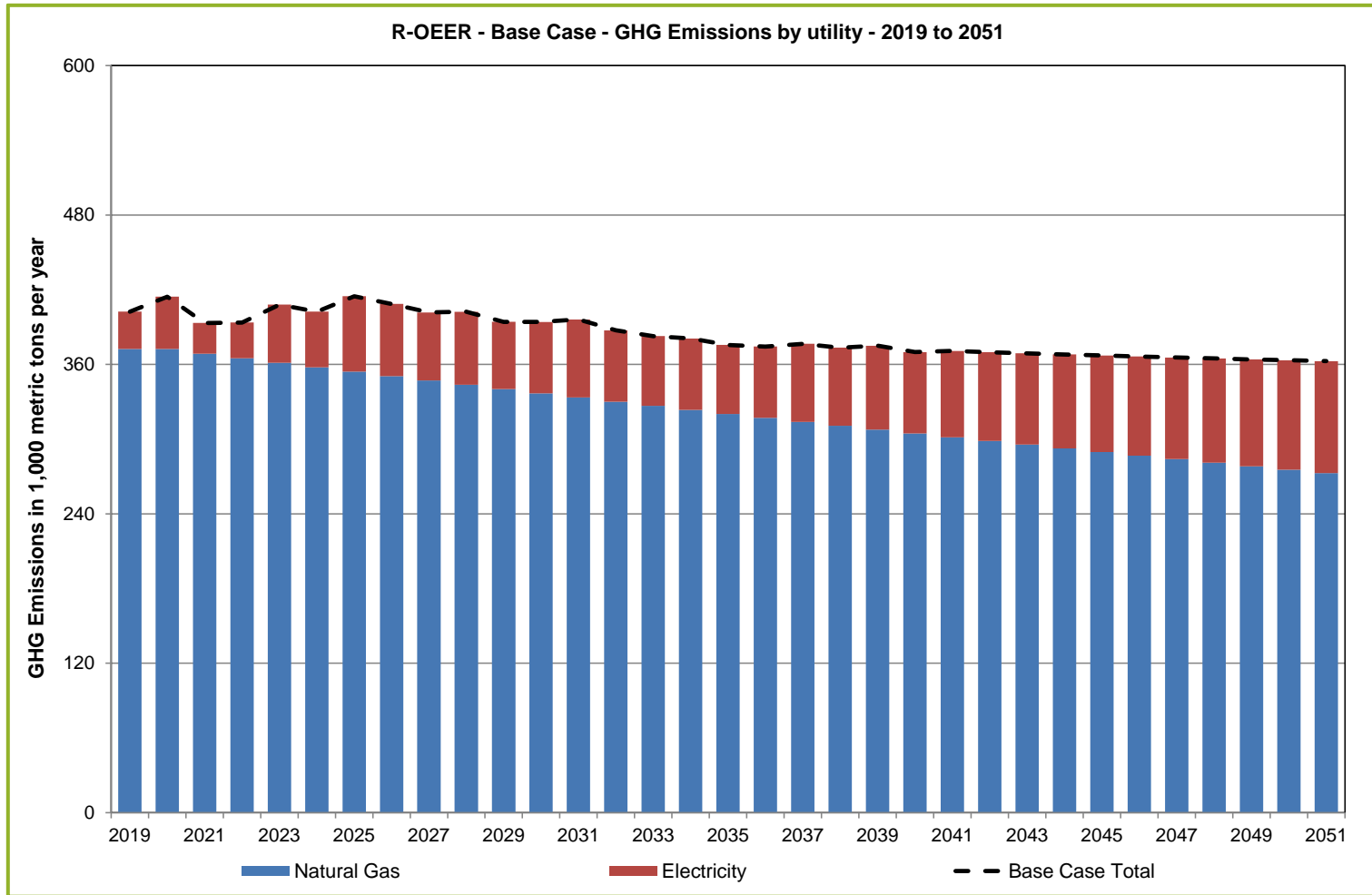


Report Notes

- From Home Retrofit Feasibility Study
- This shows the annual site energy-related GHG emissions from 2019 to 2051 by the 6 home types.
- Note: The Base Case assumed the average efficiency of the Town's home in 2019 remains unchanged through 2051.
- The overall emissions profile is based on changes in GHG content of network gas and grid electricity as estimated by Enbridge and TAF.

Oakville Home Energy Retrofit Feasibility Study

GHG Emissions by Utility - 2019 to 2051



Report Notes

- From Home Retrofit Feasibility Study
- This shows the annual site energy-related GHG emissions from 2019 to 2051 from the utility uses by the Town's homes existing in 2019.
- GHG content of network gas is expected to reduce as biogas and Hydrogen is added to the network.
- GHG content of grid electricity is expected to increase as more marginal natural gas generation is required.
- Note: The Base Case assumed the average efficiency of the Town's home in 2019 remains unchanged through 2051.

Oakville Home Energy Retrofit Feasibility Study

2019-2051 Base Case Pricing Outlooks

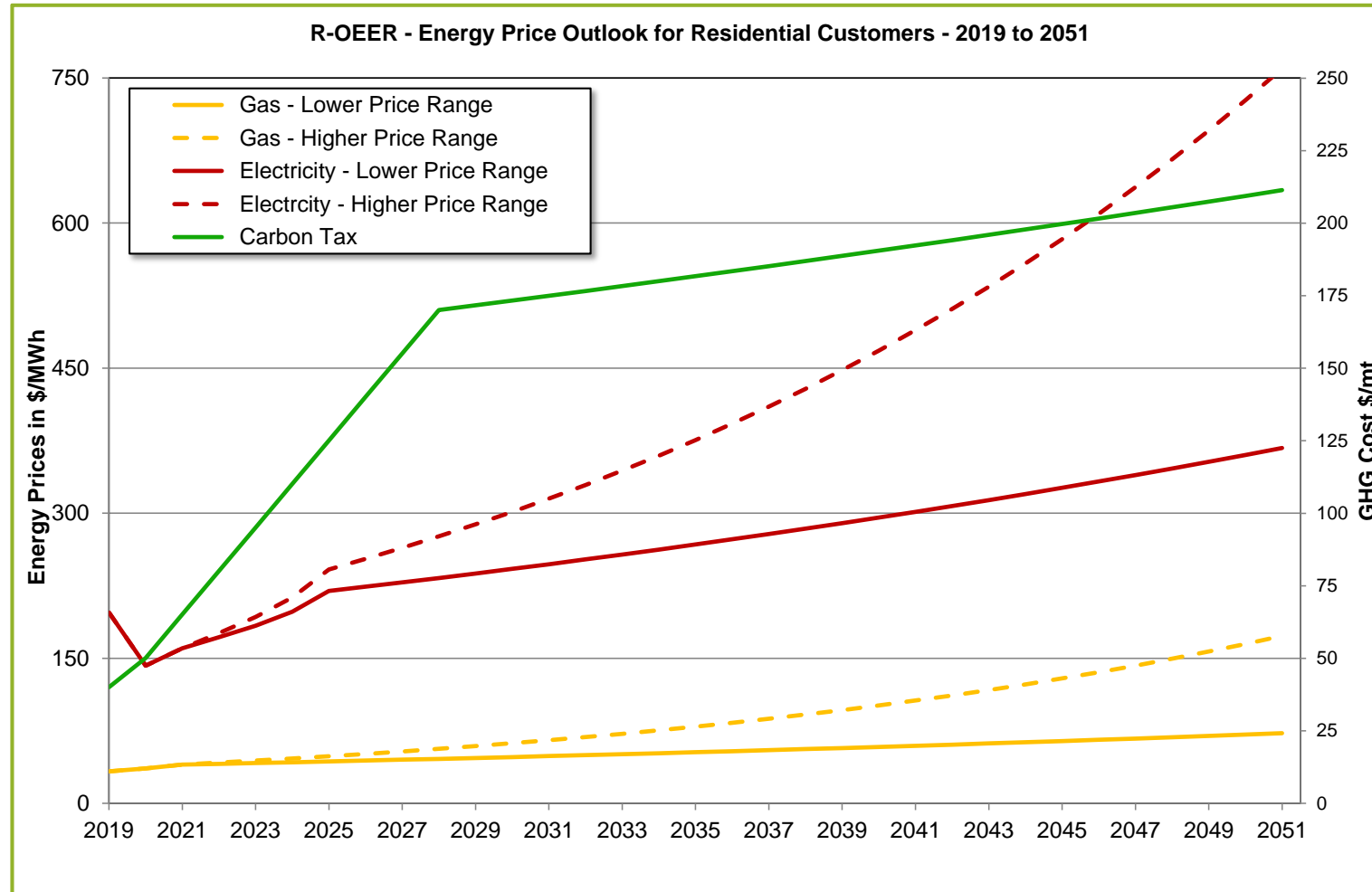
Oakville Home Energy Retrofit Feasibility Study

Residential Utility & Carbon Pricing - General

- Future utilities' prices drive homeowner cost benefit
- Feasibility Study includes Lower & Higher Price Outlooks for natural gas, water & electricity from 2019 to 2051
- Estimates based on multiple sources/projects
- Carbon (GHG) cost is assumed to be a “tax” following Federal forecast
- Confidence levels in current outlook are medium to high
- Invasion of Ukraine could put upward pressure on gas and electricity prices
- Upward pressure makes retrofits more attractive

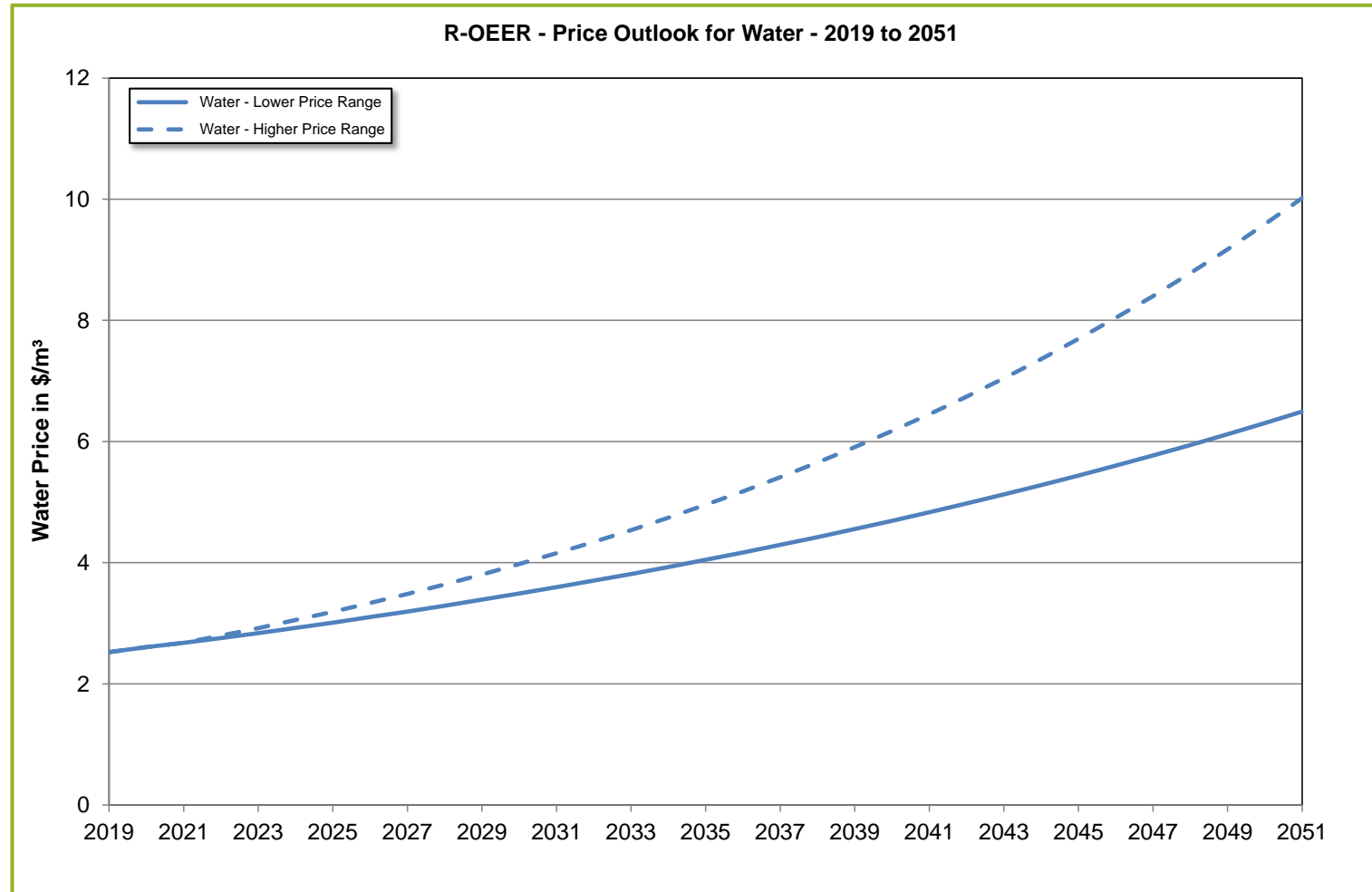
Oakville Home Energy Retrofit Feasibility Study

Residential - Higher & Lower Outlook



Oakville Home Energy Retrofit Feasibility Study

Residential - Higher & Lower Outlook

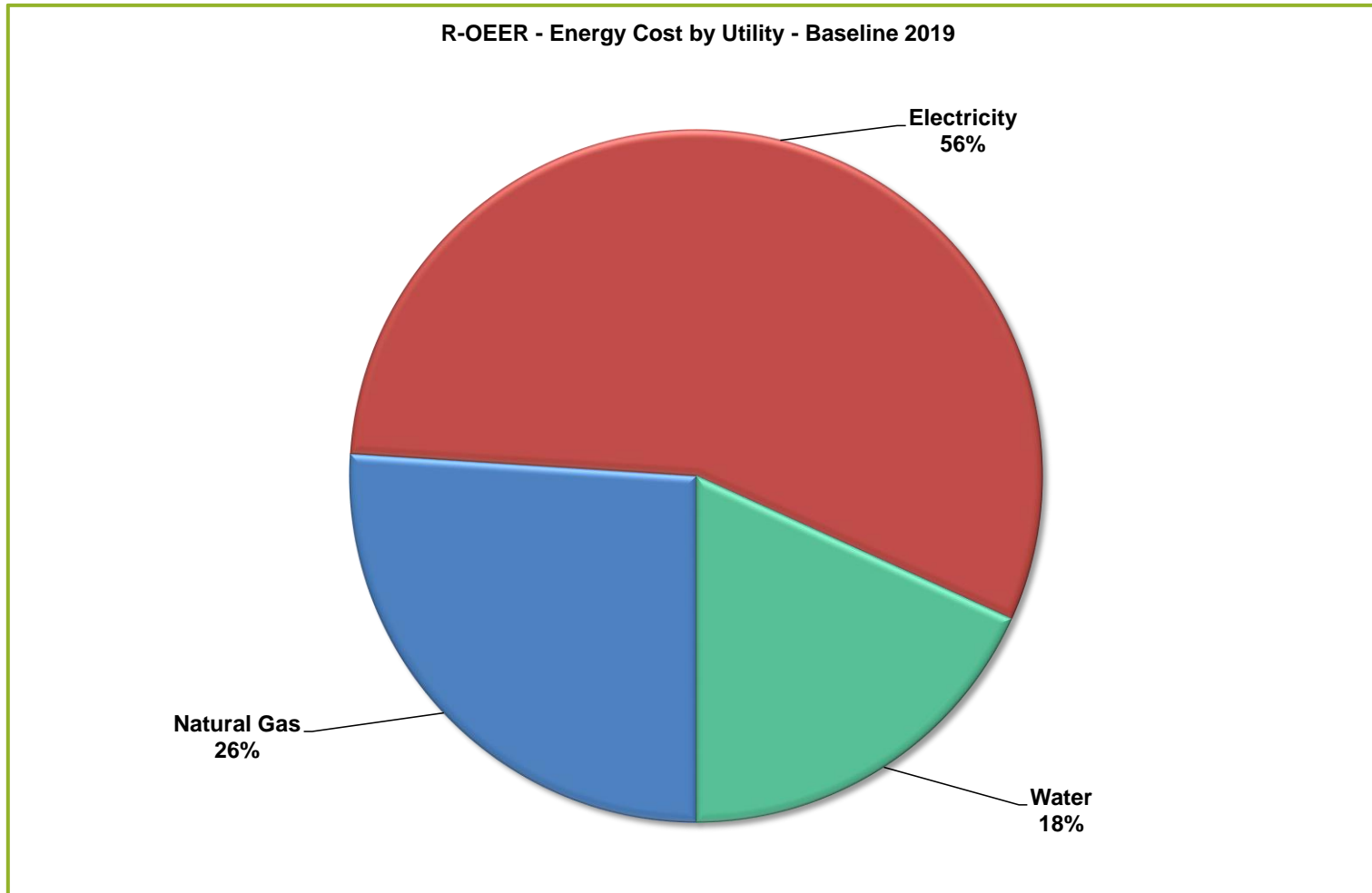


Oakville Home Energy Retrofit Feasibility Study

2019-2051 Baseline & Base Case Costs

Oakville Home Energy Retrofit Feasibility Study

Energy Cost by Utility - Baseline 2019

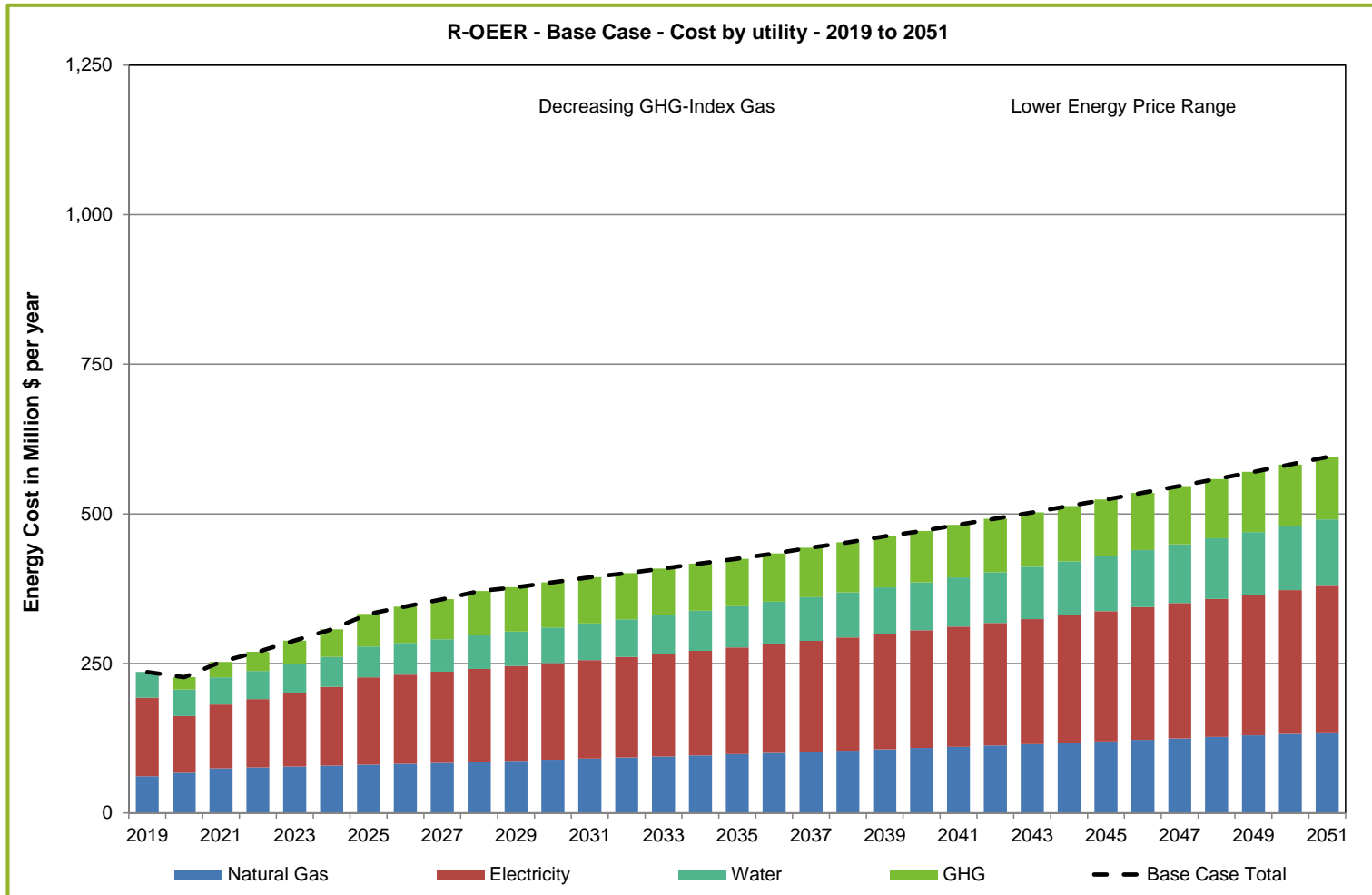


Report Notes

- From Home Retrofit Feasibility Study
- This shows the utility costs for all the Town's homes in 2019.
- Note that water is included in this picture as part of the Study's agreed scope.
- Note that natural gas is about a quarter of the total cost, while being three-quarters of the site energy use, and over 90% of the GHG emissions.

Oakville Home Energy Retrofit Feasibility Study

Cost by Utility - 2019 to 2051

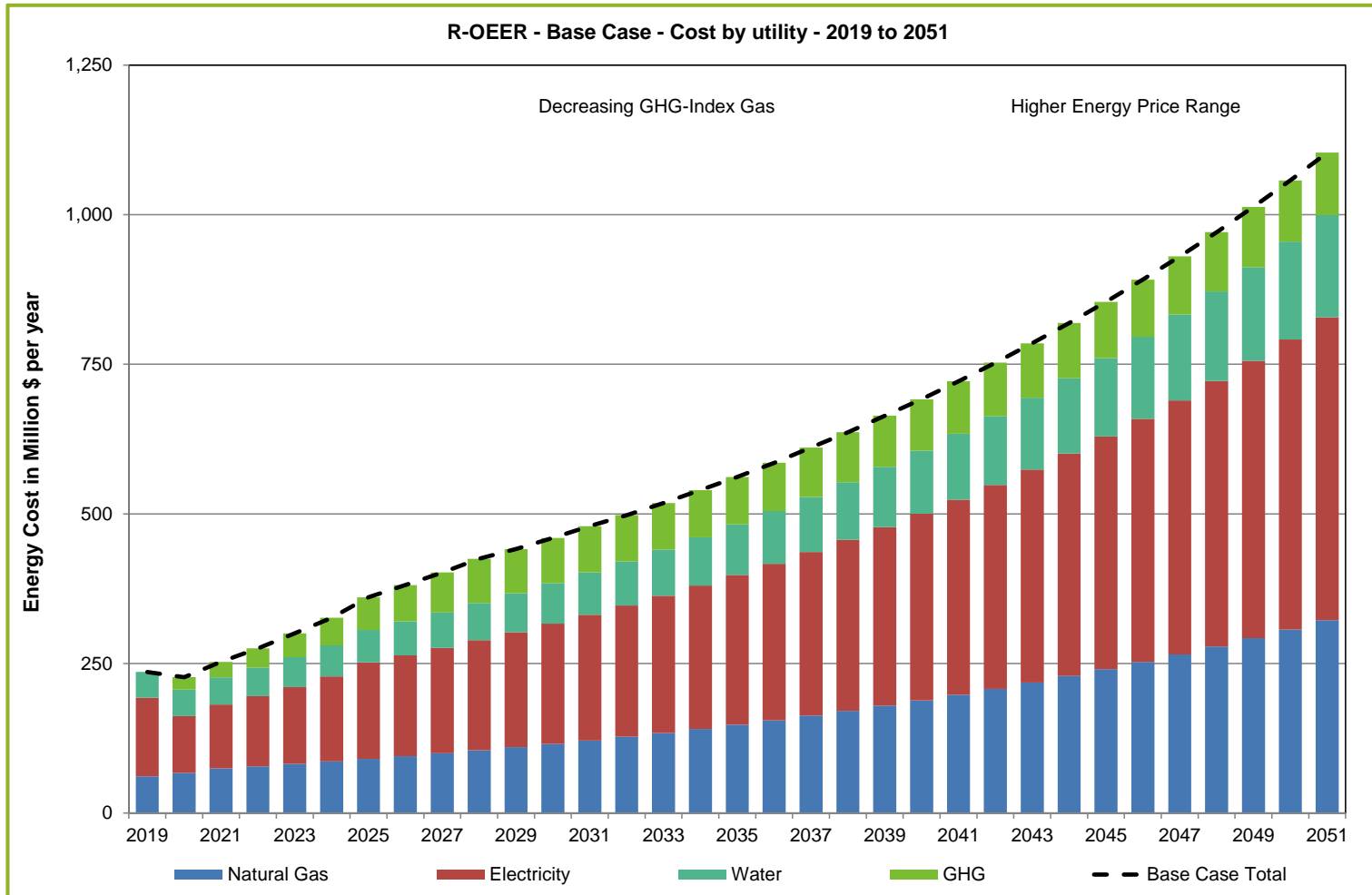


Report Notes

- From Home Retrofit Feasibility Study
- This shows the lower expected utility and GHG costs for all the Town's homes existing in 2019 from 2019 to 2051 assuming no change in average efficiency.
- Note this is more than doubling for the approximately 81,000 homes.

Oakville Home Energy Retrofit Feasibility Study

Cost by Utility - 2019 to 2051

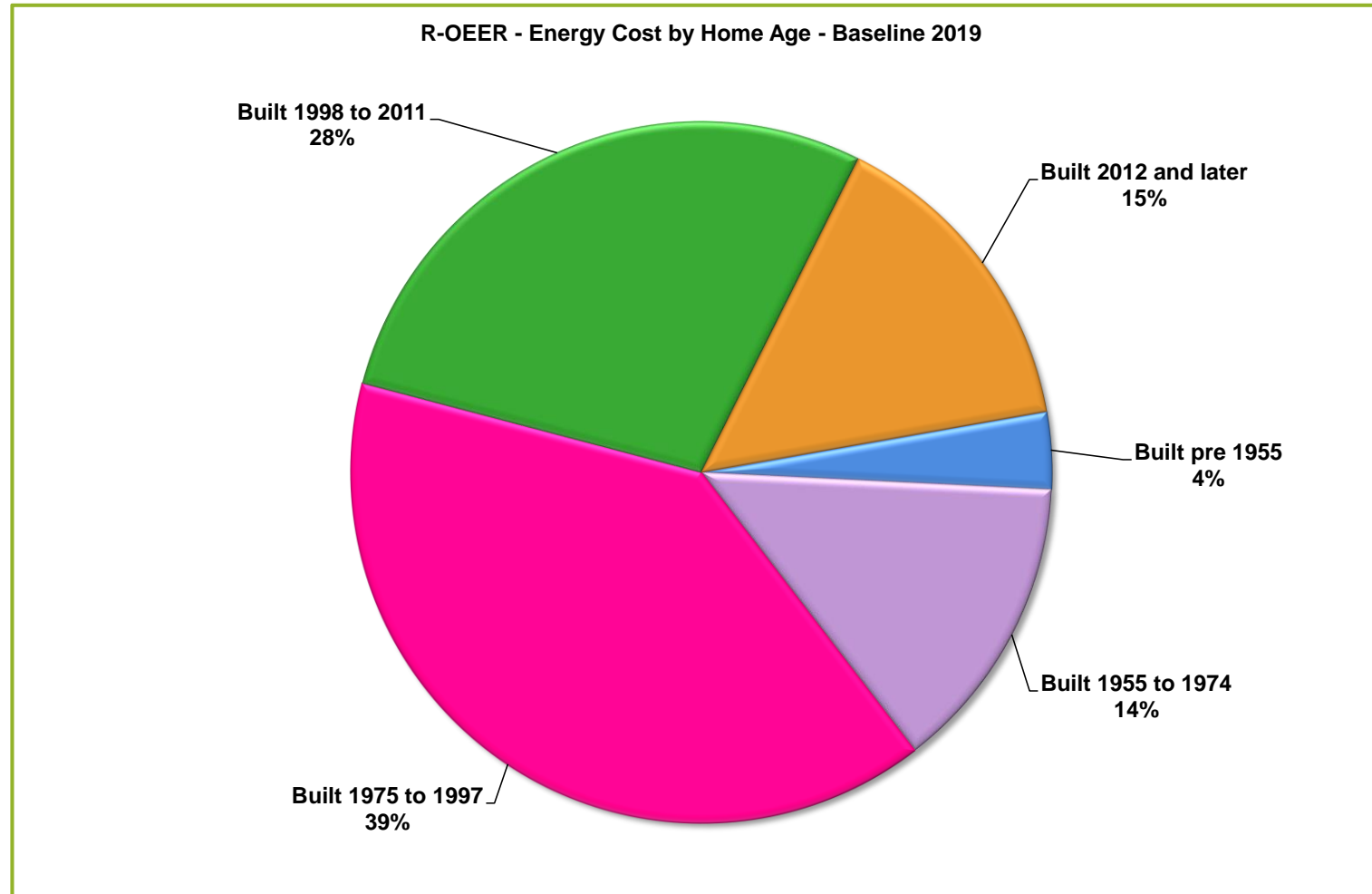


Report Notes

- From Home Retrofit Feasibility Study
- This shows the higher expected utility and GHG costs for all the Town's homes existing in 2019 from 2019 to 2051 assuming no change in average efficiency.
- Note this is more than a fourfold increase for the approximately 81,000 homes.

Oakville Home Energy Retrofit Feasibility Study

Energy Cost by Home Age - Baseline 2019

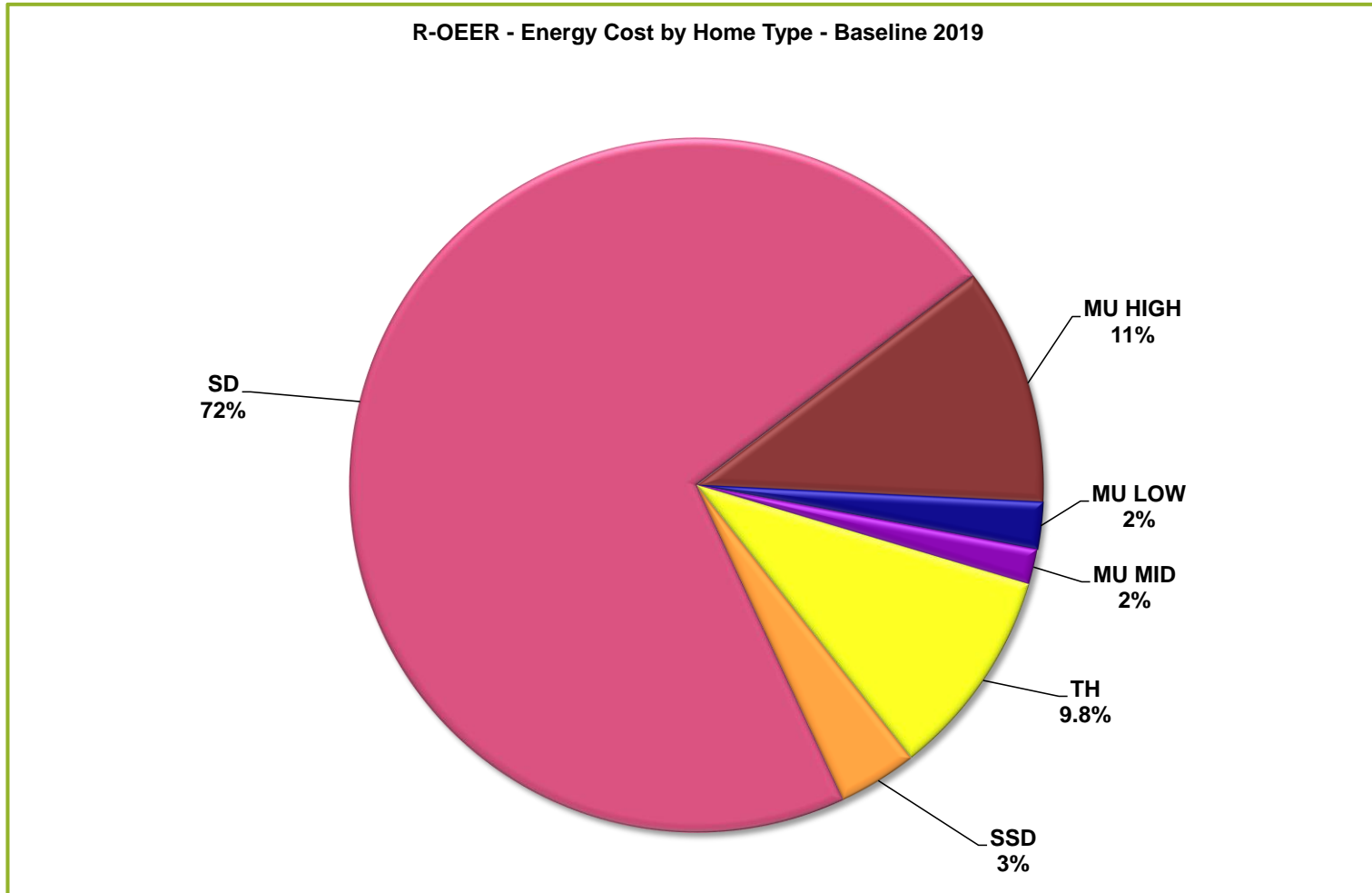


Report Notes

- From Home Retrofit Feasibility Study
- This shows the utility costs for all the Town's homes existing in 2019 by the 5 age groups.
- Note: Homes over 25 years old make up over half of the current costs.

Oakville Home Energy Retrofit Feasibility Study

Energy Cost by Home Type - Baseline 2019



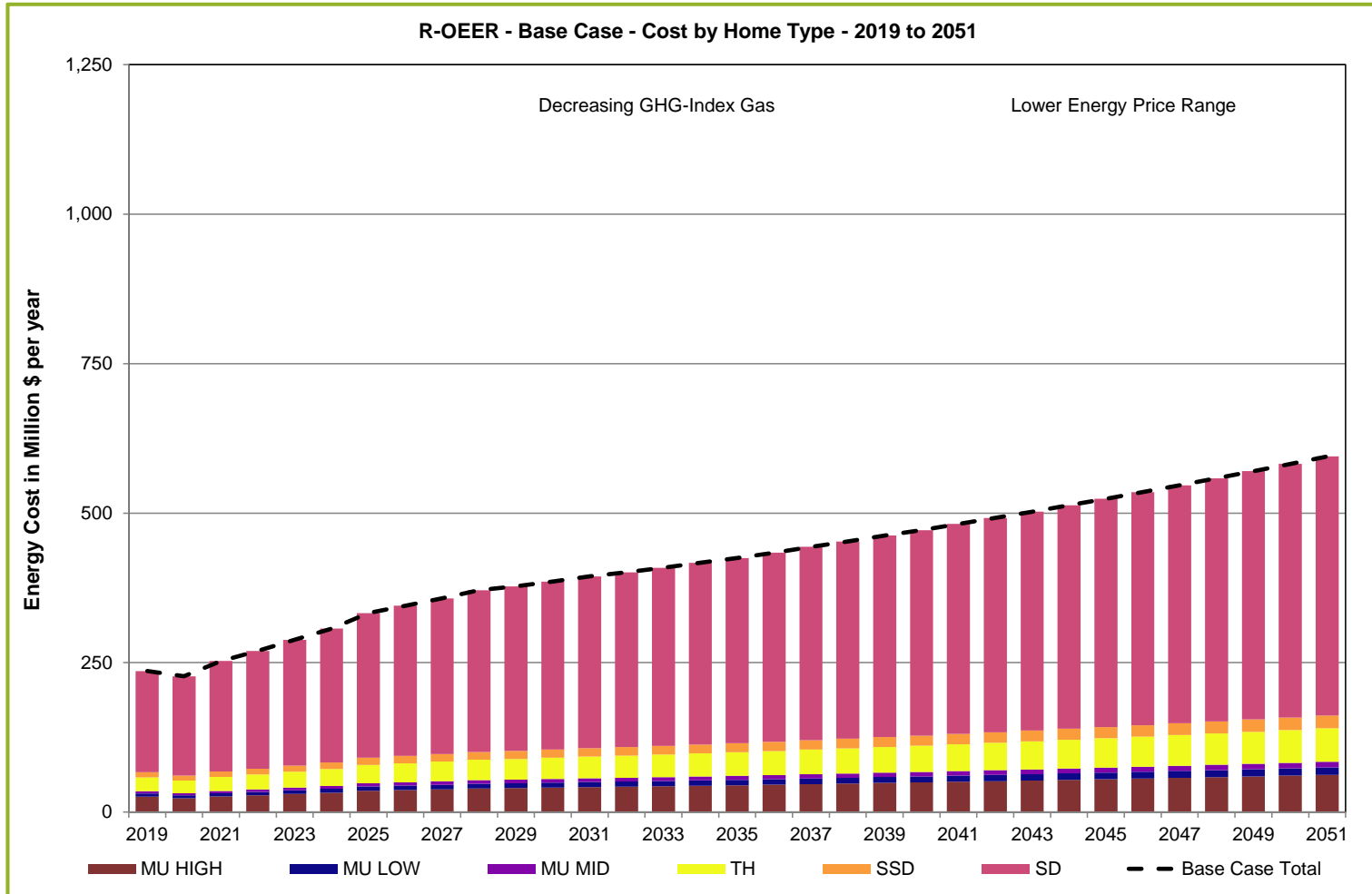
Report Notes

- From Home Retrofit Feasibility Study
- This shows the utility costs for all the Town's homes existing in 2019 by the 6 types.
- Note: Single and semi-detached homes are three-quarters if the current utility cost.

\$240M and \$1,110/cap in 2019

Oakville Home Energy Retrofit Feasibility Study

Cost by Home Type - 2019 to 2051

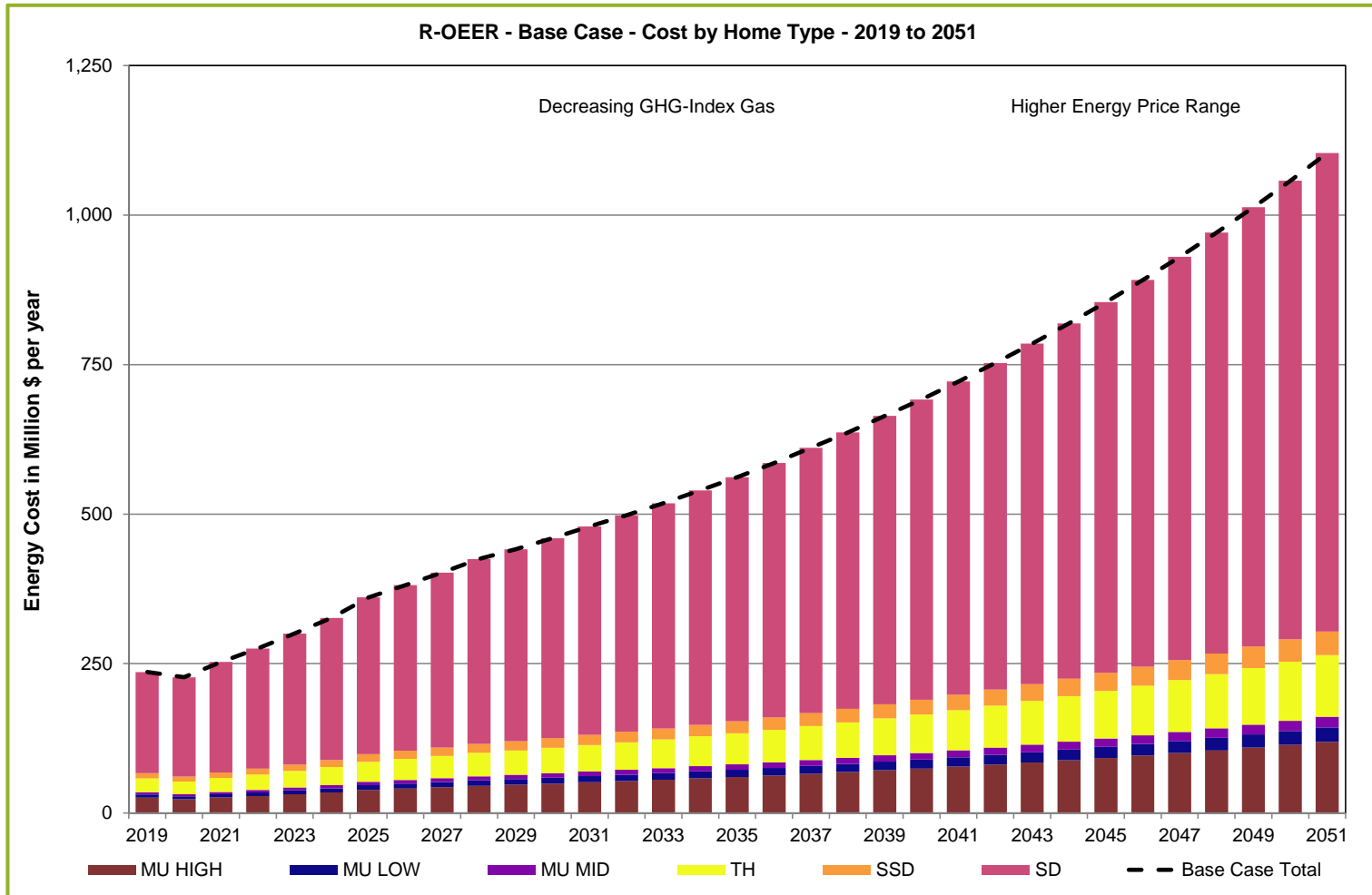


Report Notes

- From Home Retrofit Feasibility Study
- This shows the expected lower annual utility and carbon (GHG) costs from 2019 to 2051 for all the Town's homes existing in 2019 by the 6 types.
- Note: This is more than doubling for the approximately 81,000 homes.

Oakville Home Energy Retrofit Feasibility Study

Cost by Home Type - 2019 to 2051



Report Notes

- From Home Retrofit Feasibility Study
- This shows the expected higher annual utility and carbon (GHG) costs from 2019 to 2051 for all the Town's homes existing in 2019 by the 6 types.
- Note: This is more than a fourfold increase for the approximately 81,000 homes.

Oakville Home Energy Retrofit Feasibility Study

Standardized Retrofit Package

Oakville Home Energy Retrofit Feasibility Study

Retrofit Background

■ Principal

- *Entity offers comprehensive package with attractive bundled price*
- *Customer pricing is based on age, type and size of house*
- *Entity and contactor manage variance risks*
- *Audits only done on exception basis*
- *Customer has limited flexibility to customize package*
- *Prior work may be credited if it meets suitable specifications*

■ Package alternatives

- *Package with more efficient natural gas and AC replacement*
- *Package with heat-pump replacement for current format and AC*

■ Package add-ons

- *Added over-time – installed “while crew on site for retrofit”*
- *High probability early – Solar PV, Solar Thermal, EV charger*
- *Feasibility Study does not include add-ons in financial assessments*
- *Study Tool can simulate PV and solar thermal uptake in overall energy and emissions balances.*

Oakville Home Energy Retrofit Feasibility Study

Core Package - Version A or B



Measures	A	B	Comment
Windows	Green	Green	Replace to global best Code Practice
Weatherizing	Green	Green	Weatherstrip all doors and other openings
Insulate attic	Green	Green	Upgrade to target U-value
Insulate other	Green	Green	Allocation for high-impact measures
Upgrade AC	Green	Red	Type replacement of AC unit
Upgrade gas furnace	Green	Red	Type replacement of natural gas furnace
New air-heat pump	Red	Green	Replace AC/Furnace with air-based heat pump
Replace water heater	Green	Green	Type replacement of natural gas or electric water heater
LED lighting	Green	Green	100% bulb replacements
Smart strips	Green	Green	Allocation for high-usage device area
Occupancy sensors	Green	Green	Allocation for low-usage areas
Lo-flow faucets/showers	Green	Green	“Water Sense” performance
WC flow regulator	Green	Green	“Water Sense” performance where possible
Smart thermostat	Green	Green	

Oakville Home Energy Retrofit Feasibility Study

Retrofit Pricing & Managing Pricing Risks

Oakville Home Energy Retrofit Feasibility Study

Minimize Transaction Cost & Complexity

■ Pricing Approach

- *Package defined by type and age of home*
- *Current market cost estimated in \$/m²*
- *Retrofit Project scale productivity factor applied*
- *Entity cost coverage added to index*
- *Price calculated based on home area*

■ Benefits

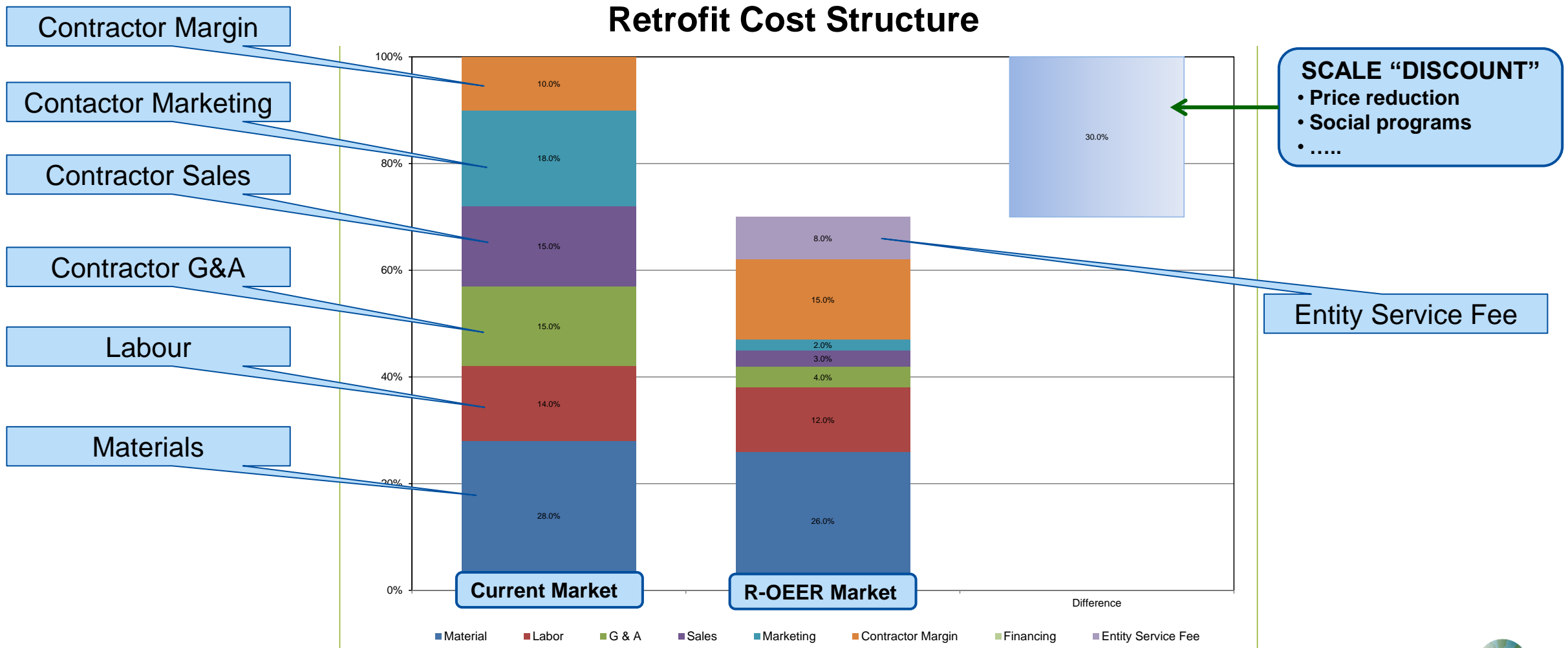
- *Easy to buy*
- *Drives high volumes*
- *Easy to sell by community groups, contractors, other stakeholders.....*
- *Avoids site evaluation costs/activity prior to sale*

■ Risks

- *Gap between assumed installation effort and actuals*
- *Conditions to give allowances for prior work*
- *Inequitable impact on Property Taxes*
- *Achieving benefits of scale*

Oakville Home Energy Retrofit Feasibility Study

Market Transformation through Scale



About \$35,000 for 170m² SFH (No Incentives)

Oakville Home Energy Retrofit Feasibility Study

Impact of Scale on Retrofit Costs

Item	Market Norm	OEER gain	OEER	Comments
Materials	28%	10%	26%	<ul style="list-style-type: none"> • Volume prices for higher-performance materials (<i>"Better stuff – Better price!"</i>) • Negotiating "carrot" includes potential program proliferation to other markets • Preference for material partners' commitment to establish local facilities
Labour	14%	15%	12%	<ul style="list-style-type: none"> • Multiple retrofits on similar homes - geographically clustered • Minimized teams down time • Complete skills structures & minimal sub-contracting & higher % of apprentices
Contractor G&A	15%	75%	4%	<ul style="list-style-type: none"> • Simplified transaction ordering and billing through standardization • Single ordering/payment Entity • Simplified personnel management
Contractor Selling Expense	15%	80%	3%	<ul style="list-style-type: none"> • Detailed proposals eliminated through standardization • Entity handles necessary permitting • Contractor promotes program
Contractor Marketing Expense	18%	90%	2%	<ul style="list-style-type: none"> • Entity responsible to promote program • Marketing to Community and to Entity to maintain "approved contractor" status
Contractor Profit	10%	50%	15%	<ul style="list-style-type: none"> • Improved margin for Entity "approved contractors"
G&A	0%	NA	5%	<ul style="list-style-type: none"> • Based estimates of entity mature organization structure
Sales & Marketing	0%	NA	3%	<ul style="list-style-type: none"> • Assumes mature selling expense of less than \$1000 per retrofit • Standardized retrofit and pricing greatly simplifies selling and closing process • Marketing simplified using existing Town and other information platforms
Retrofit Price	100%	30%	70%	<ul style="list-style-type: none"> • Price before financing

Oakville Home Energy Retrofit Feasibility Study

Managing Transaction Risks

- Gap between estimates and actuals
 - *Regular monitoring of completed projects*
 - *Adjust pricing gap or deviant costs*
- Specific exclusions for prior work
 - *Allow exclusion if work meets OEER requirements*
 - *Standard index reduction for measure*
- Achieving benefits of scale
 - *Commit to robust Entity Organization from the start*
 - *Negotiated conditions with contractors*
 - *Negotiated material contracts with key suppliers*
- Inequitable impact on Property Taxes
 - *Accept as reality of market and reserve funds for possible mitigation*
 - *Study did not assess needs-driven aspects –tools can simulate these*

Oakville Home Energy Retrofit Feasibility Study

Regulatory Framework

Oakville Home Energy Retrofit Feasibility Study

Background - Local Improvement Charge

■ Feasibility Principle

- *Entity operates within current Ontario Regulation*

■ Role of Local Improvement Charge (LIC)

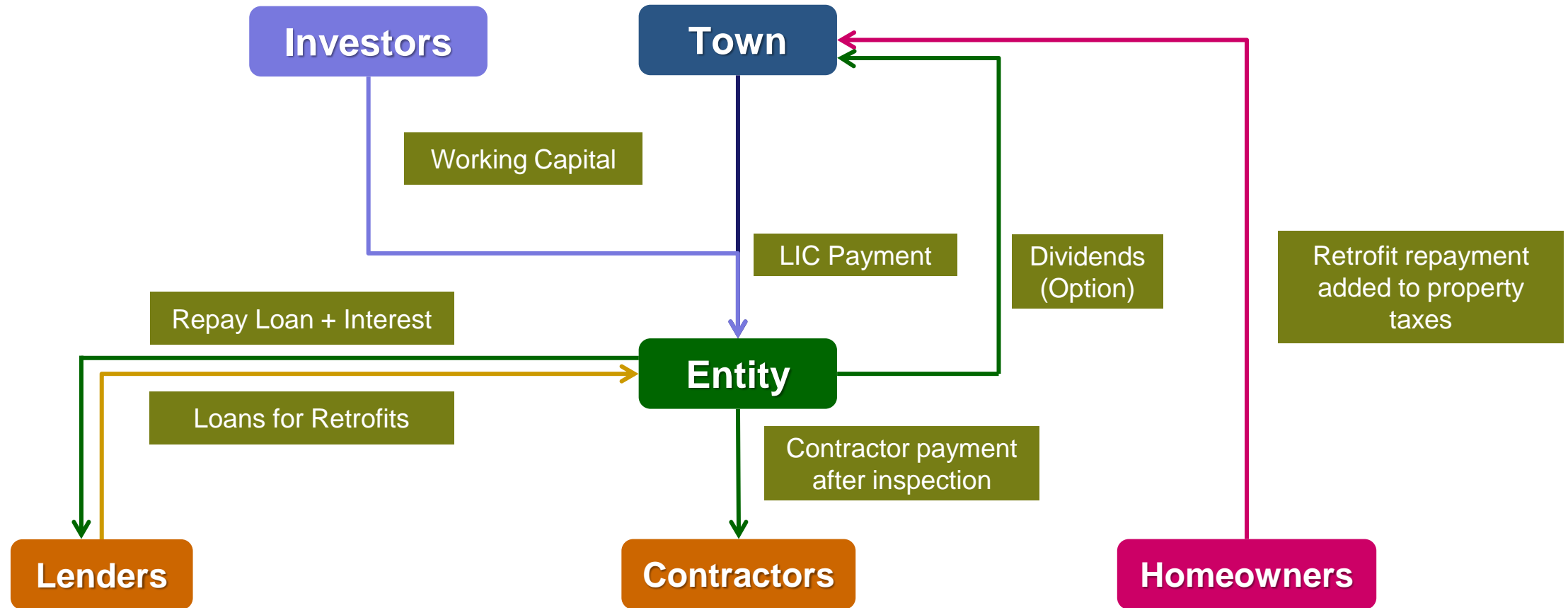
- *Ontario Municipal Act 2001 allows improvement financing via LIC*
- *LIC is collected via a Property Tax Assessment*
- *Ontario Regulation 586/06 extends LIC to energy conservation, renewable energy and water conservation projects on private residential or non-residential property*
- *Entity-led retrofits will be funded using LIC mechanism*
- *Retrofit added to property valuation increases property taxes through 20-year financing of retrofit*
- *Town collection rights as senior creditor minimize lender risks*

Oakville Home Energy Retrofit Feasibility Study

Financing & Funds Flow

Oakville Home Energy Retrofit Feasibility Study

Entity Funds Flow (LIC Model)



Oakville Home Energy Retrofit Feasibility Study

Sources & Uses of Funds

■ Sources of Funds

- *Loans from Lender Partners*
- *Customer payments via property taxes*
- *Interest on unused loans*
- *Initial working capital to form Entity*
- *Public incentives (assumed zero in Feasibility Study)*

■ Uses of Funds

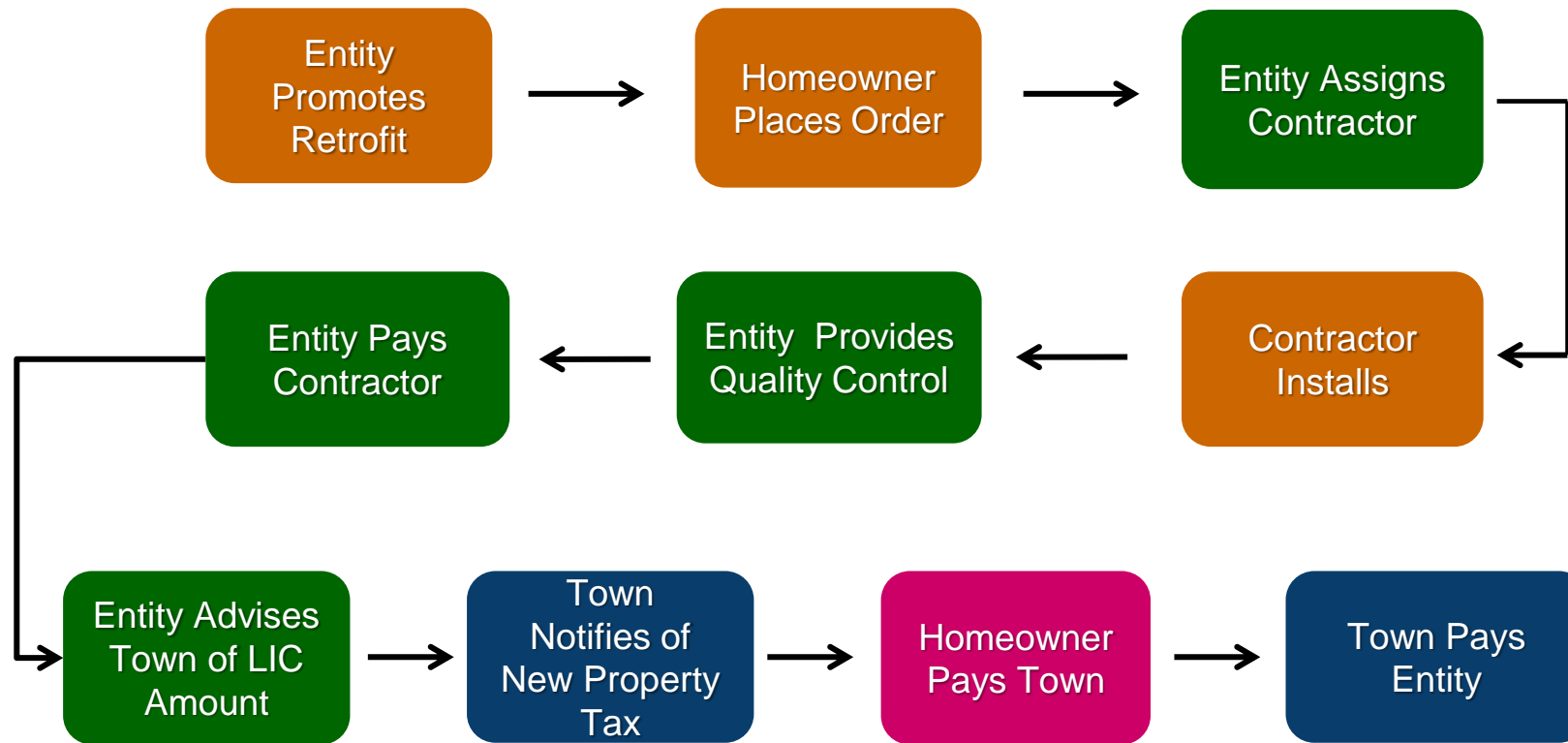
- *Lender interest payments*
- *Lender capital repayments*
- *Contractor payments*
- *Entity operational expenses*
- *Community Groups or similar sponsorship*
- *Contribution to FEO running costs*

Oakville Home Energy Retrofit Feasibility Study

Transaction Flow

Oakville Home Energy Retrofit Feasibility Study

Process Flow



Oakville Home Energy Retrofit Feasibility Study

Retrofit Transaction Summary

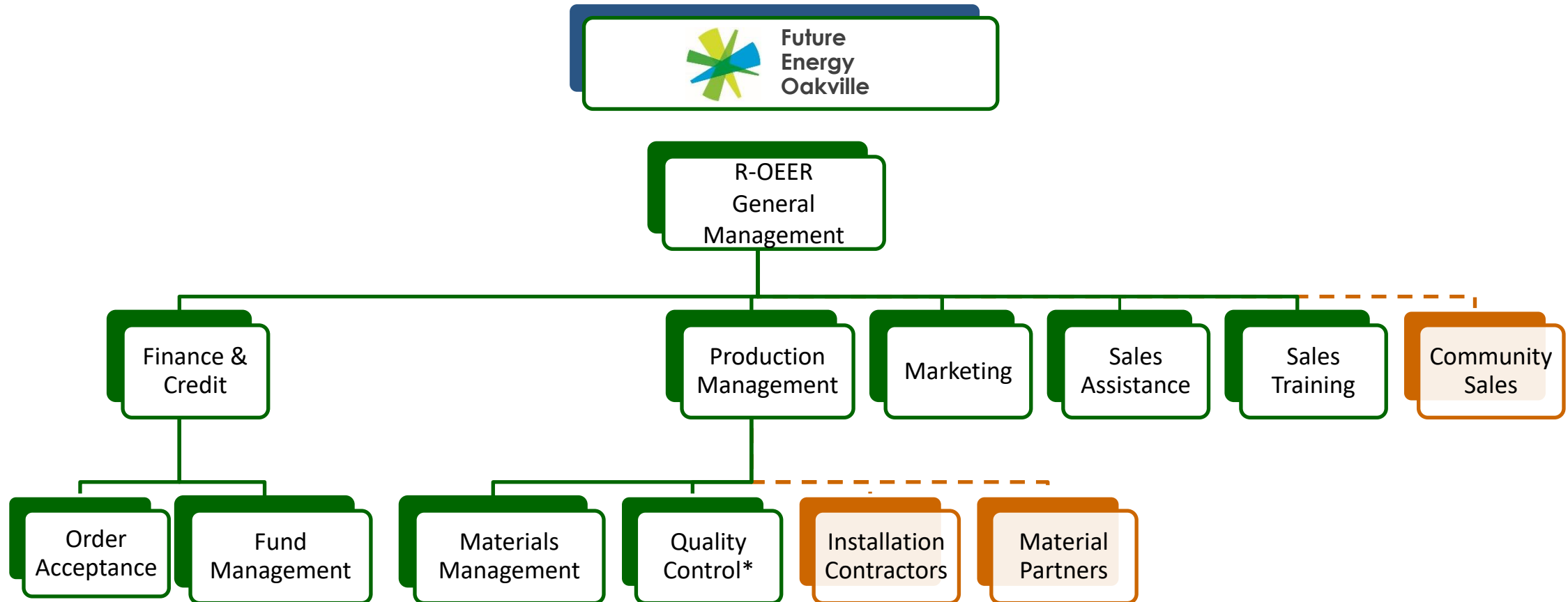
- Pre-condition: Retrofits qualify for LIC treatment (ToO By-law)
- ↓ Entity promotes retrofit to homeowners
- ↓ Homeowner orders retrofit from Entity
- ↓ Entity assigns retrofit to partner contractor
- ↓ Contractor installs retrofit
- ↓ Entity approves installation quality
- ↓ Entity pays contractor
- ↓ Entity finances retrofit at small premium to 20-yr bond rate
- ↓ Homeowner pays LIC increment to Town for 20 years
- ↓ Town transfers retrofit portion of property tax to Entity
- Retrofit obligation remains with property

Oakville Home Energy Retrofit Feasibility Study

Organization Structure & Costs

Oakville Home Energy Retrofit Feasibility Study

Entity Organization



Oakville Home Energy Retrofit Feasibility Study

Payroll Costs and Timing

Function	Headcount	Salary etc.
General Manager	1	\$160K + 12% bonus
GM Assistant	1	\$60K + 4%
Finance Manager	1	\$115K + 12%
Finance Specialist	1 to 2	\$75K + 6%; phased by retrofit volume
Sales Training	1	\$50K + 5%; focus on Community Group training
Sales Assistance	1	\$55K + 15%; focus on HP sales targets
Marketing Specialist	1	\$80K + 6%
Production Manager	1	\$125K + 12%; focus on contractors and QC
QC/Training Specialist	1 to 2	\$55K +3%; phased by retrofit volume
Material Manager	1	\$105K + 6%; focus on strategic selected suppliers

Oakville Home Energy Retrofit Feasibility Study

Other Costs, Indexes and Timing

Item	Assumption	
Legal costs	\$50/sale	Costs associated with homeowner and contractor contracts
Marketing & Sponsorship Costs	\$100/sale	Publicity and Sales Partner Organization support costs (not salaries)
Rents	\$20,000/year	"Oakville Energy Efficiency Centre" (Bottrop Benchmark)
Travel & Miscellaneous	5%/payroll	Office supplies, utilities, travel etc.
Other Costs Increase	1.0% / year	
Salary Increase	1.0% / Year	
Social Security Overhead	26%/payroll	Average used for all salary ranges

Oakville Home Energy Retrofit Feasibility Study

Entity Organizational Costs from 2022 to 2031

Category			2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Position	Base	Bonus										
General Manager	\$ 140,000	12%	\$ 80,000	\$ 161,600	\$ 163,200	\$ 164,800	\$ 166,400	\$ 168,100	\$ 169,800	\$ 171,500	\$ 173,200	\$ 174,900
GM Assistant/Office Mgr	\$ 57,000	4%	\$ 30,200	\$ 61,100	\$ 61,700	\$ 62,300	\$ 62,900	\$ 63,600	\$ 64,200	\$ 64,800	\$ 65,500	\$ 66,100
Finance Mananager	\$ 110,000	12%	\$ 62,800	\$ 126,900	\$ 128,200	\$ 129,500	\$ 130,800	\$ 132,100	\$ 133,400	\$ 134,700	\$ 136,100	\$ 137,500
Finance Specialist1	\$ 70,000	6%	\$ 37,800	\$ 76,400	\$ 77,200	\$ 78,000	\$ 78,800	\$ 79,600	\$ 80,300	\$ 81,200	\$ 82,000	\$ 82,800
Finance Specialist 2	\$ 70,000	6%	\$ -	\$ -	\$ -	\$ 78,000	\$ 78,800	\$ 79,600	\$ 80,300	\$ 81,200	\$ 82,000	\$ 82,800
EER Sales Training 1	\$ 47,000	5%	\$ 25,200	\$ 50,800	\$ 51,400	\$ 51,900	\$ 52,400	\$ 52,900	\$ 53,400	\$ 54,000	\$ 54,500	\$ 55,100
EER Sales Training 2	\$ 47,000	5%	\$ -	\$ -	\$ -	\$ 51,900	\$ 52,400	\$ 52,900	\$ 53,400	\$ 54,000	\$ 54,500	\$ 55,100
EER Sales Training 3	\$ 47,000	5%	\$ -	\$ -	\$ -	\$ -	\$ 52,400	\$ 52,900	\$ 53,400	\$ 54,000	\$ 54,500	\$ 55,100
EER Sales Assist	\$ 47,000	15%	\$ 27,600	\$ 55,700	\$ 56,200	\$ 56,800	\$ 57,400	\$ 57,900	\$ 58,500	\$ 59,100	\$ 59,700	\$ 60,300
Marketing	\$ 75,000	6%	\$ 40,500	\$ 81,900	\$ 82,700	\$ 83,600	\$ 84,400	\$ 85,200	\$ 86,100	\$ 86,900	\$ 87,800	\$ 88,700
Production Manager	\$ 110,000	12%	\$ 62,800	\$ 126,900	\$ 128,200	\$ 129,500	\$ 130,800	\$ 132,100	\$ 133,400	\$ 134,700	\$ 136,100	\$ 137,500
QC Specialist 1	\$ 55,000	3%	\$ 28,900	\$ 58,400	\$ 59,000	\$ 59,500	\$ 60,100	\$ 60,700	\$ 61,300	\$ 62,000	\$ 62,600	\$ 63,200
QC Specialist 2	\$ 55,000	3%	\$ -	\$ -	\$ -	\$ 59,500	\$ 60,100	\$ 60,700	\$ 61,300	\$ 62,000	\$ 62,600	\$ 63,200
QC Specialist 3	\$ 55,000	3%	\$ -	\$ -	\$ -	\$ -	\$ 60,100	\$ 60,700	\$ 61,300	\$ 62,000	\$ 62,600	\$ 63,200
Material Manager	\$ 95,000	6%	\$ 51,400	\$ 103,800	\$ 104,800	\$ 105,800	\$ 106,900	\$ 108,000	\$ 109,000	\$ 110,100	\$ 111,200	\$ 112,300
Total Payroll (Net)			\$ 447,200	\$ 903,500	\$ 912,600	\$ 1,111,100	\$ 1,234,700	\$ 1,247,000	\$ 1,259,100	\$ 1,272,200	\$ 1,284,900	\$ 1,297,800
Social Security etc			\$ 116,300	\$ 234,900	\$ 237,300	\$ 288,900	\$ 321,000	\$ 324,200	\$ 327,400	\$ 330,800	\$ 334,100	\$ 337,400
Total Payroll (Gross)			\$ 563,500	\$ 1,138,400	\$ 1,149,900	\$ 1,400,000	\$ 1,555,700	\$ 1,571,200	\$ 1,586,500	\$ 1,603,000	\$ 1,619,000	\$ 1,635,200
Other Costs												
Legal Cost/ sale	\$ 50		\$ -	\$ 1,000	\$ 11,000	\$ 54,500	\$ 117,500	\$ 118,000	\$ 122,500	\$ 124,500	\$ 145,000	\$ 145,000
Travel/Misc as % payroll	5.00%		\$ 28,200	\$ 56,900	\$ 57,500	\$ 70,000	\$ 77,800	\$ 78,600	\$ 79,300	\$ 80,200	\$ 81,000	\$ 81,800
Marketing Costs/sale	\$ 100		\$ -	\$ 2,000	\$ 22,000	\$ 109,000	\$ 235,000	\$ 236,000	\$ 245,000	\$ 249,000	\$ 290,000	\$ 290,000
Rents	\$ 20,000		\$ 20,400	\$ 20,600	\$ 20,800	\$ 21,000	\$ 21,200	\$ 21,400	\$ 21,700	\$ 21,900	\$ 22,100	\$ 22,300
Low income Subsidy	Placeholder		\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Total Other Costs			\$ 48,600	\$ 80,500	\$ 111,300	\$ 254,500	\$ 451,500	\$ 454,000	\$ 468,500	\$ 475,600	\$ 538,100	\$ 539,100
Entity Total			\$ 612,100	\$ 1,218,900	\$ 1,261,200	\$ 1,654,500	\$ 2,007,200	\$ 2,025,200	\$ 2,055,000	\$ 2,078,600	\$ 2,157,100	\$ 2,174,300

Report Notes

- From Home Retrofit Feasibility Study
- Note: Does not include FEO Sponsorship payments by entity starting in 2025 – these are included in P&L

Oakville Home Energy Retrofit Feasibility Study

Promotion & Sales

- Facilitated by simplified Package and Pricing
- Community groups, contractors, material suppliers, other stakeholders and engagement act as main sales channels
- Entity provides support with training and sales material
- Small amount of sponsorship funding is budgeted
- Outreach centre in high traffic location (Bottrop benchmark)
- Responsible to receipt of an *unscreened* order placed with the Entity

Oakville Home Energy Retrofit Feasibility Study

Homeowner Order to Retrofit Delivery

- Entity Order Handling
 - *Confirm homeowner credit risk*
 - *Conclude homeowner contract*
 - *Issue Baseline Energy Performance Label*
 - *Transfer Order to Production*
 - *Pay contractors*
- Entity Production Management
 - *Contractor Management*
 - *Contact advice resource*
 - *Contractor order confirmation and scheduling*
 - *QC and final acceptance against standardized criteria*
 - *Material Management*
 - *Conclude agreements with partners for core material categories*
 - *Contractor Partners*
 - *Conclude agreements with 2 to 3 partner contractors*
- Contractor Partner Tasks
 - *Apply for any permits (optional: Entity)*
 - *Material procurement (optional: Entity)*
 - *Retrofit installation*

Oakville Home Energy Retrofit Feasibility Study

Retrofit Operational Targets

Oakville Home Energy Retrofit Feasibility Study

Market Penetration Targets

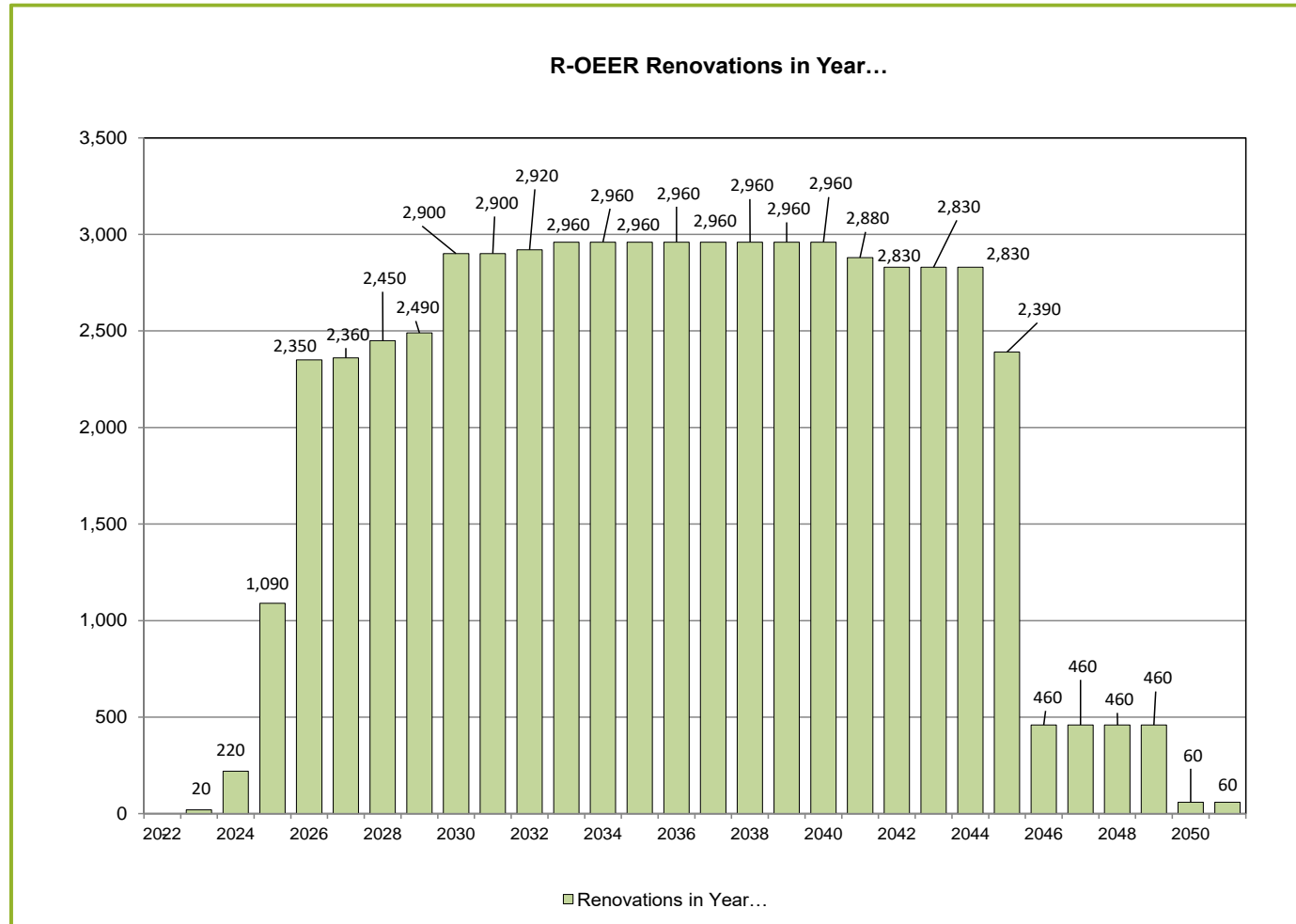
Home Archetype	Start Year	Annual Rate	End Share
Pre-1955 MU HIGH	2026	2.0%	25%
Pre-1955 MU LOW	2023	2.0%	80%
Pre-1955 MU MID	2025	2.0%	60%
Pre-1955 TH	2023	4.0%	80%
Pre-1955 SSD	2023	4.0%	80%
Pre-1955 SD	2023	4.0%	80%
1955-1974 MU HIGH	2027	2.0%	25%
1955-1974 MU LOW	2024	2.0%	80%
1955-1974 MU MID	2026	2.0%	60%
1955-1974 TH	2024	4.0%	80%
1955-1974 SSD	2024	4.0%	80%
1955-1974 SD	2024	4.0%	80%
1975-1997 MU HIGH	2028	2.0%	25%
1975-1997 MU LOW	2025	2.0%	80%
1975-1997 MU MID	2027	2.0%	60%
1975-1997 TH	2025	4.0%	80%
1975-1997 SSD	2025	4.0%	80%
1975-1997 SD	2025	4.0%	80%
1998-2011 MU HIGH	2029	2.0%	25%
1998-2011 MU LOW	2026	2.0%	80%
1998-2011 MU MID	2028	2.0%	60%
1998-2011 TH	2026	4.0%	80%
1998-2011 SSD	2026	4.0%	80%
1998-2011 SD	2026	4.0%	80%
POST-2011 MU HIGH	2033	2.0%	25%
POST-2011 MU LOW	2030	2.0%	80%
POST-2011 MU MID	2032	2.0%	60%
POST-2011 TH	2030	4.0%	80%
POST-2011 SSD	2030	4.0%	80%
POST-2011 SD	2030	4.0%	80%

Report Notes

- From Home Retrofit Feasibility Study
- This shows the priority targeting of the Entity starting in 2023.
- Oldest properties are targeted first, being the least efficient.
- In each age group, Detached, Semi-Detached and Town Homes are the first group to be targeted, followed two years later by low-multi-unit, with mid- and high rise coming one to two years later.
- Each home type and age has an annual penetration target. This is higher for SD, SSD & TH categories as these are generally simpler transactions.
- The programme has a targeted end share of the relevant homes existing in 2019 that will be comprehensively retrofitted. This again is higher for the SD, SSD and TH categories.
- Note: The technical and ownership complexity of the high-rise category has been recognized through later starts, lowered penetration rates, and lower end-share. If this category were ultimately seen as operationally unattractive, the effect on the overall programme performance would be minimal.
- Note: The 2012 OBC represented a major step-change in required energy efficiency. This became one of the most efficient codes in North America. For this reason, the start year of this category has been set to 2030 in the Study.
- Note: This set of targets results in 73% of all homes being retrofitted by the standardized approach of the Project. The remaining 27% will be either unretrofitted homes, or homes that have had customized retrofits managed by the individual homeowner. No analytical assumption of this latter category has been included in the Study and represents community upside against CES targets.
- Note: All data in the highlighted boxes are analytical variables and can be adjusted to different assumption in assessments following the Study completion.

Oakville Home Energy Retrofit Feasibility Study

Quantity of Retrofits Delivered 2023 to 2051



Report Notes

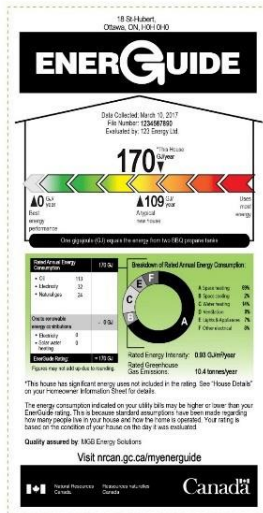
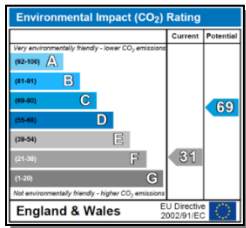
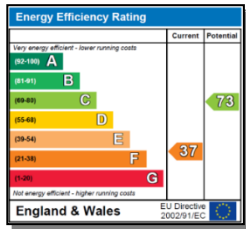
- From Home Retrofit Feasibility Study
- This shows the numbers of retrofits delivered annually from 2023 to 2051.
- The Project takes 4 years to reach the mature run-rate.
- A year-on-year learning curve of 25% / 50% / 75% / 100% is assumed as the success rate on the targeted penetration between 2023 and 2026.
- The total of 59,100 retrofits is 73% of the Town total of 81,000 homes.

Oakville Home Energy Retrofit Feasibility Study

Retrofit Performance Validation & Managing Risks

Oakville Home Energy Retrofit Feasibility Study

Baseline Energy Performance Labeling



- EPL is a low-cost performance validation tool
- Utility data release required from customer
- Baseline EPL issued by Entity from utility data
- Entity offer full audit for supplemental fee
- Format likely some adaptation of NRCan Energuide
- EPL supports sale or rental value
- Engage Real-Estate agents in accelerating the process using the EPL as the “hook”

Oakville Home Energy Retrofit Feasibility Study

Performance Risk Management

■ Background

- *Entity promotes average efficiency gain for home of same type*
- *Assumes efficiency gain is \pm one sigma (1σ / standard deviation) from median*
- *Estimated homeowner cost savings based on average*
- *Entity has no routine audit and M&V*
- *A few customers will fall outside $\pm 1\sigma$*

■ Managing Atypical Performance

- *Manage atypical results as exceptions*
- *Maintains simplicity and low transaction costs*
- *Track deviations year on year to adjust sales arguments based on actual results in Oakville*
- *Maintain transparency - Report programme performance to Town, Lenders and Community*

Oakville Home Energy Retrofit Feasibility Study

Managing Deviations

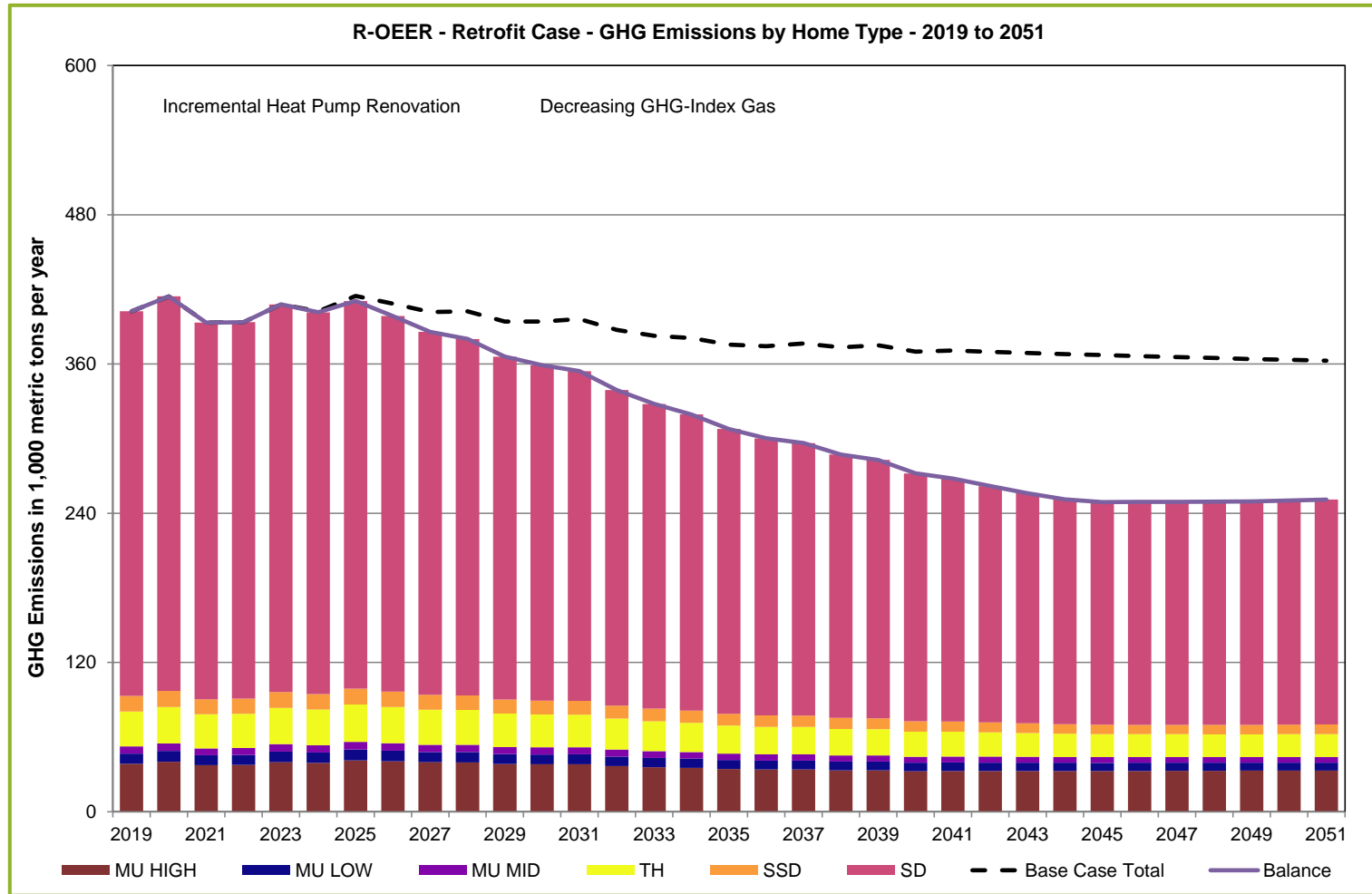
- Required utility data release gives Entity access to actual performance
- Below Average
 - *Individual on-site visit to clarify issue*
 - *Counseling on energy use habits and practices*
 - *Keep provision account to rectify or enhance solution*
 - *Offer extended paid services in some circumstances*
 - *Standardized community communications process with explanations and examples of constructive follow up*
- Above Average
 - *Standardized community communications process with explanations and examples of higher performance*
 - *Avoid conflicts with clients who fall in the average range*

Oakville Home Energy Retrofit Feasibility Study

Feasibility Study Results Energy & Emissions Balances

R-OEER - Residential Retrofit Case

GHG Emissions by Home Type - 2019 to 2051

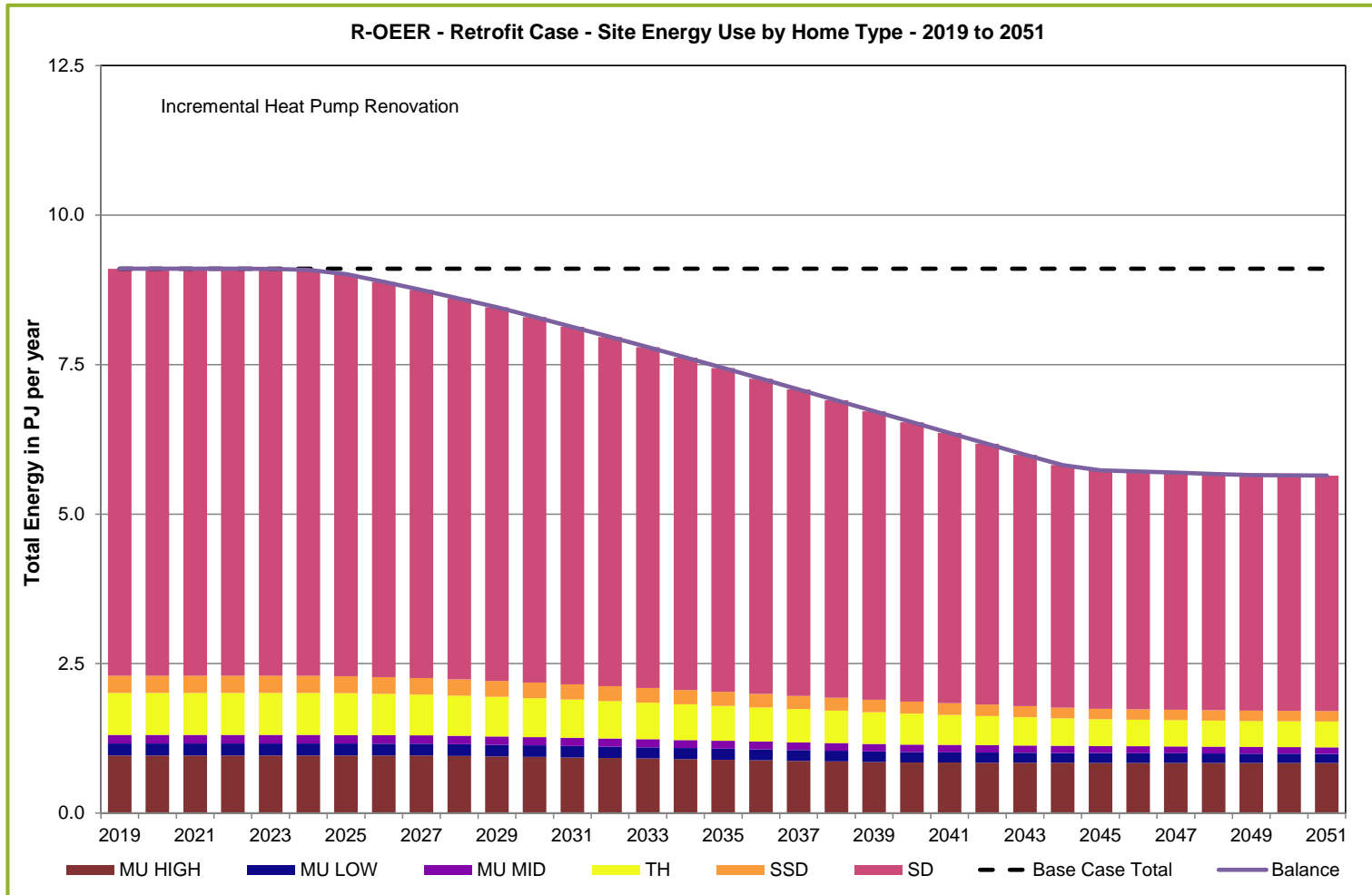


Report Notes

- From Home Retrofit Feasibility Study
- This shows annual energy-related GHG emissions through 2051 caused by all the Town's homes existing in 2019 by home type.
- The dotted line is with no home retrofits. The continuous line is the result of the OEER retrofit project.
- Note: This is 40% GHG reduction versus a Study framing target of 60%.

Oakville Home Energy Retrofit Feasibility Study

Site Energy Use by Home Type - 2019 to 2051

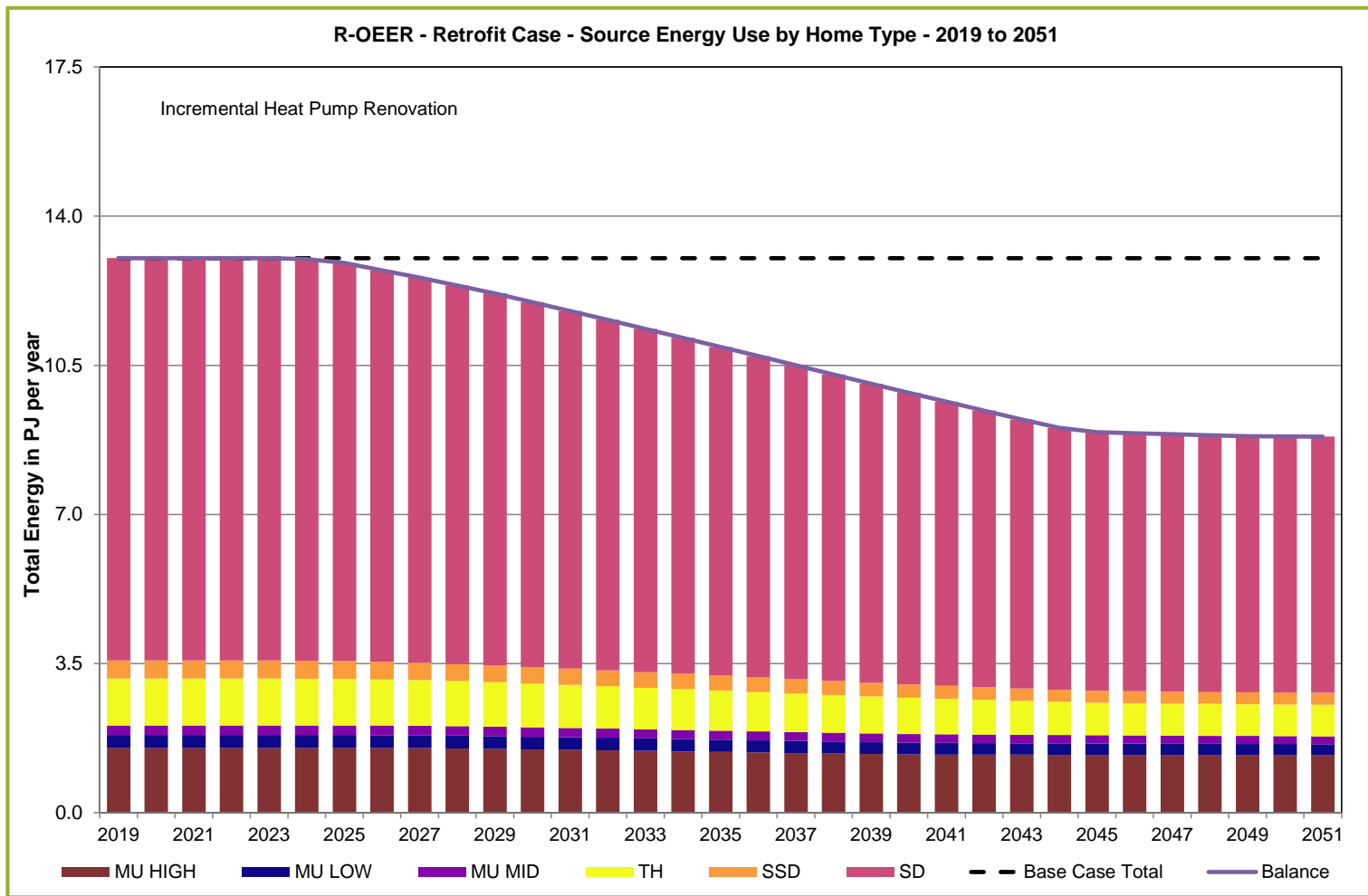


Report Notes

- From Home Retrofit Feasibility Study
- This shows annual site (metered) energy use through 2051 used by all the Town's homes existing in 2019 by home type.
- The dotted line is with no home retrofits. The continuous line is the result of the OEER retrofit project.
- Note: This is 33% site efficiency gain. Study had no site energy efficiency framing target.

Oakville Home Energy Retrofit Feasibility Study

Source Energy Use by Home Type - 2019 to 2051

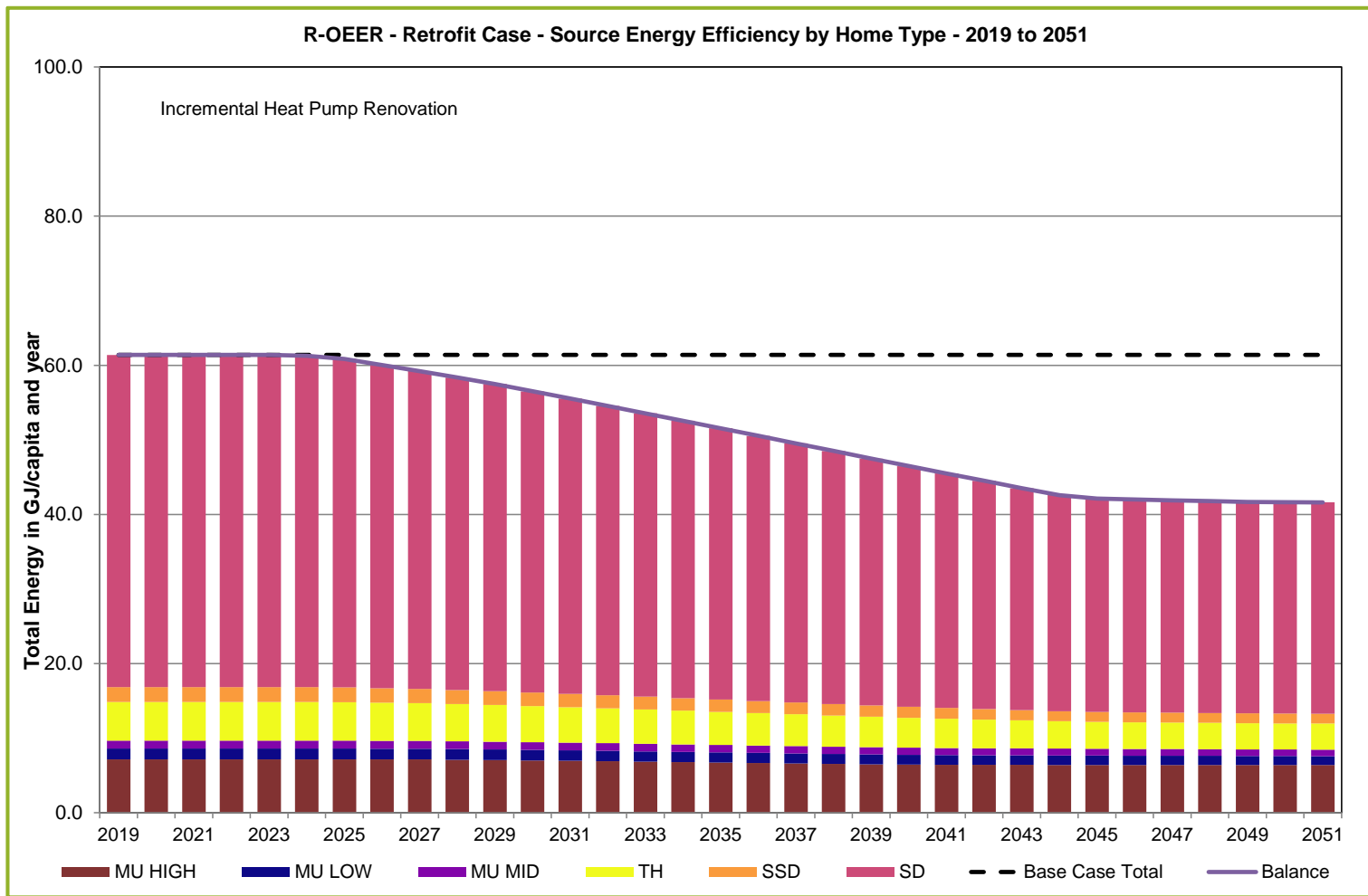


Report Notes

- From Home Retrofit Feasibility Study
- This shows annual source energy use through 2051 used by all the Town's homes existing in 2019 by home type.
- The dotted line is with no home retrofits. The continuous line is the result of the OEER retrofit project.
- Note: This is 31% source efficiency gain versus a Study framing target of 35%.

Oakville Home Energy Retrofit Feasibility Study

Source Energy Efficiency by Home Type - 2019 to 2051



Report Notes

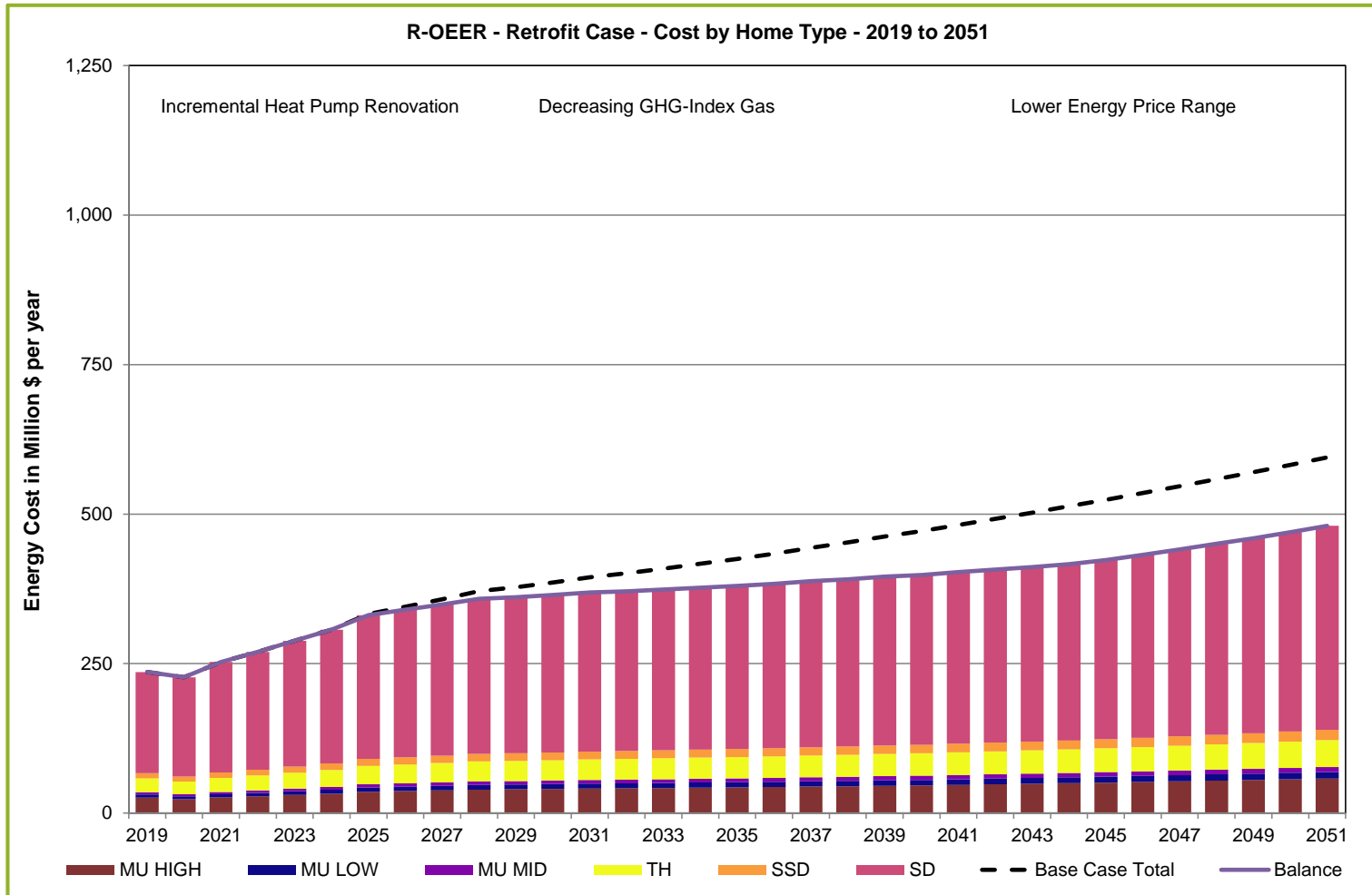
- From Home Retrofit Feasibility Study
- This shows annual source energy efficiency on a per capita basis through 2051 used by all the Town's homes existing in 2019 by home type.
- The dotted line is with no home retrofits. The continuous line is the result of the OEER retrofit project.
- Note: This is 31% source efficiency gain versus a Study framing target of 35%.

Oakville Home Energy Retrofit Feasibility Study

Feasibility Study Results Cash Flows

Oakville Home Energy Retrofit Feasibility Study

Cost by Home Type - 2019 to 2051

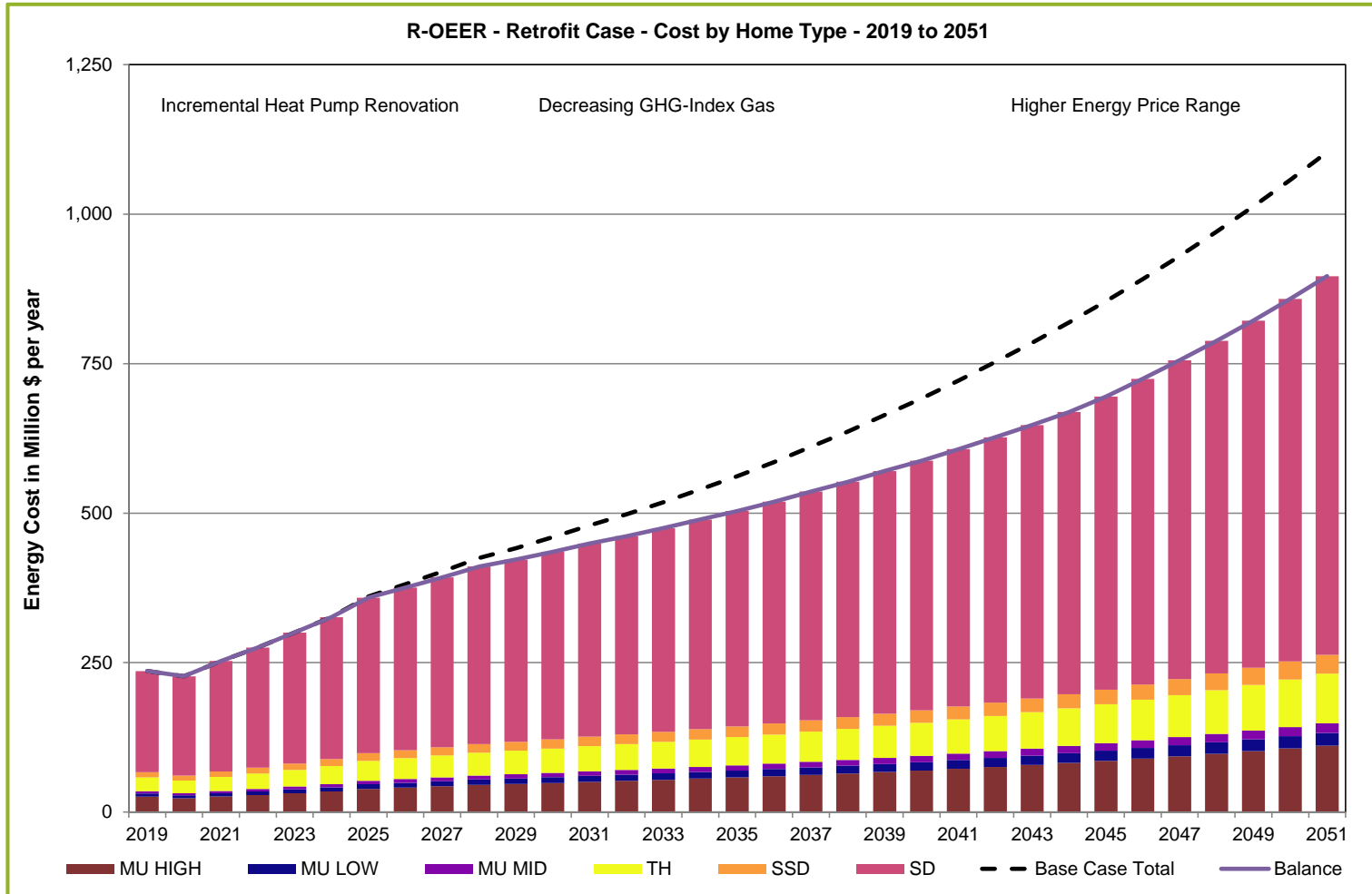


Report Notes

- From Home Retrofit Feasibility Study
- This shows expected lower annual cost through 2051 for utilities used in all the Town's homes existing in 2019 by home type.
- The dotted line is with no home retrofits. The continuous line is the result of the OEER retrofit project.
- Note: The Retrofit Project avoids about \$1.7Bn of utility costs over its lifetime.

Oakville Home Energy Retrofit Feasibility Study

Cost by Home Type - 2019 to 2051

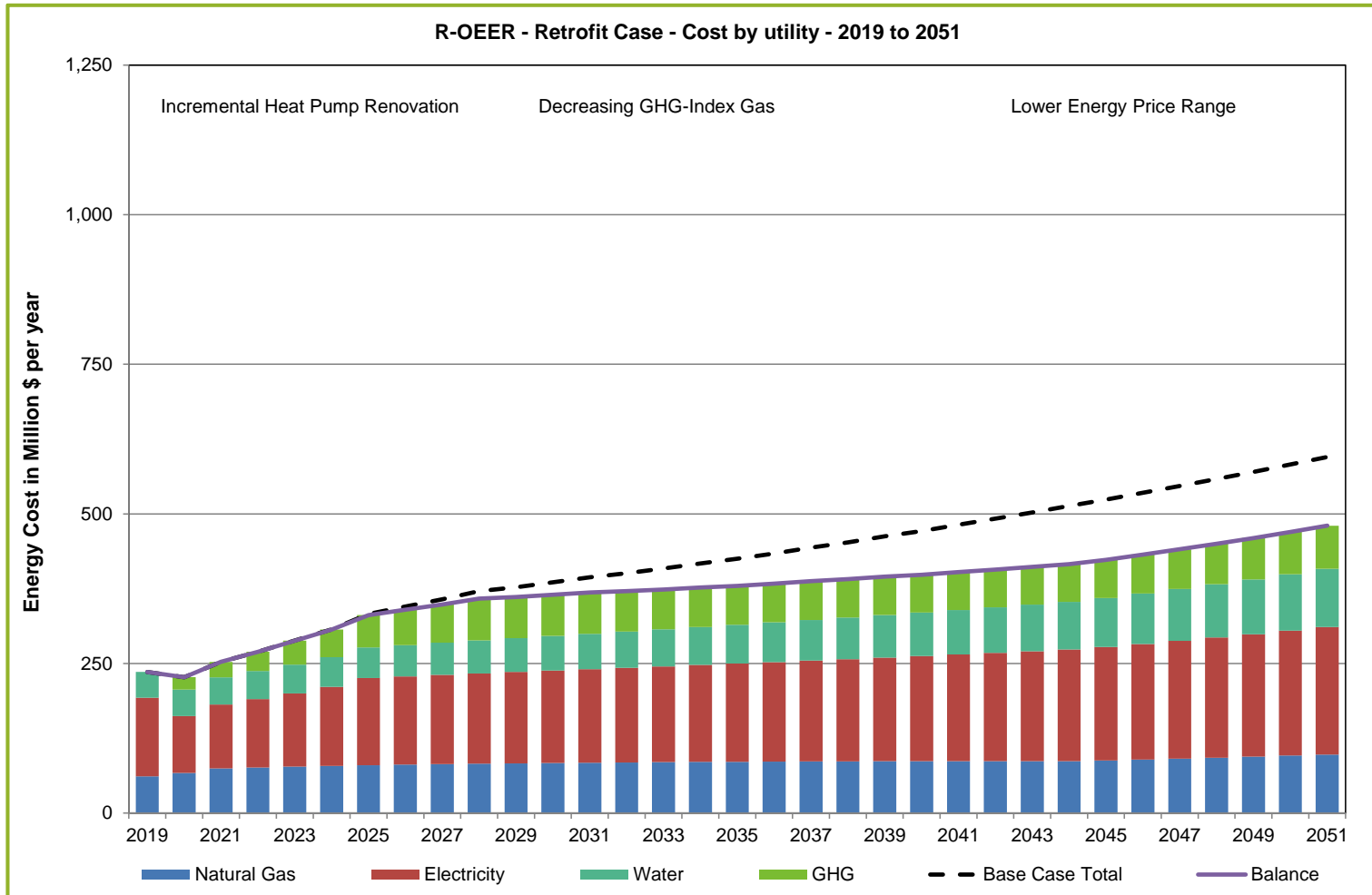


Report Notes

- From Home Retrofit Feasibility Study
- This shows expected higher annual cost through 2051 for utilities used in all the Town's homes existing in 2019 by home type.
- The dotted line is with no home retrofits. The continuous line is the result of the OEER retrofit project.
- Note: The Retrofit Project avoids about \$2.5Bn of utility costs over its lifetime.

Oakville Home Energy Retrofit Feasibility Study

Cost by Utility - 2019 to 2051

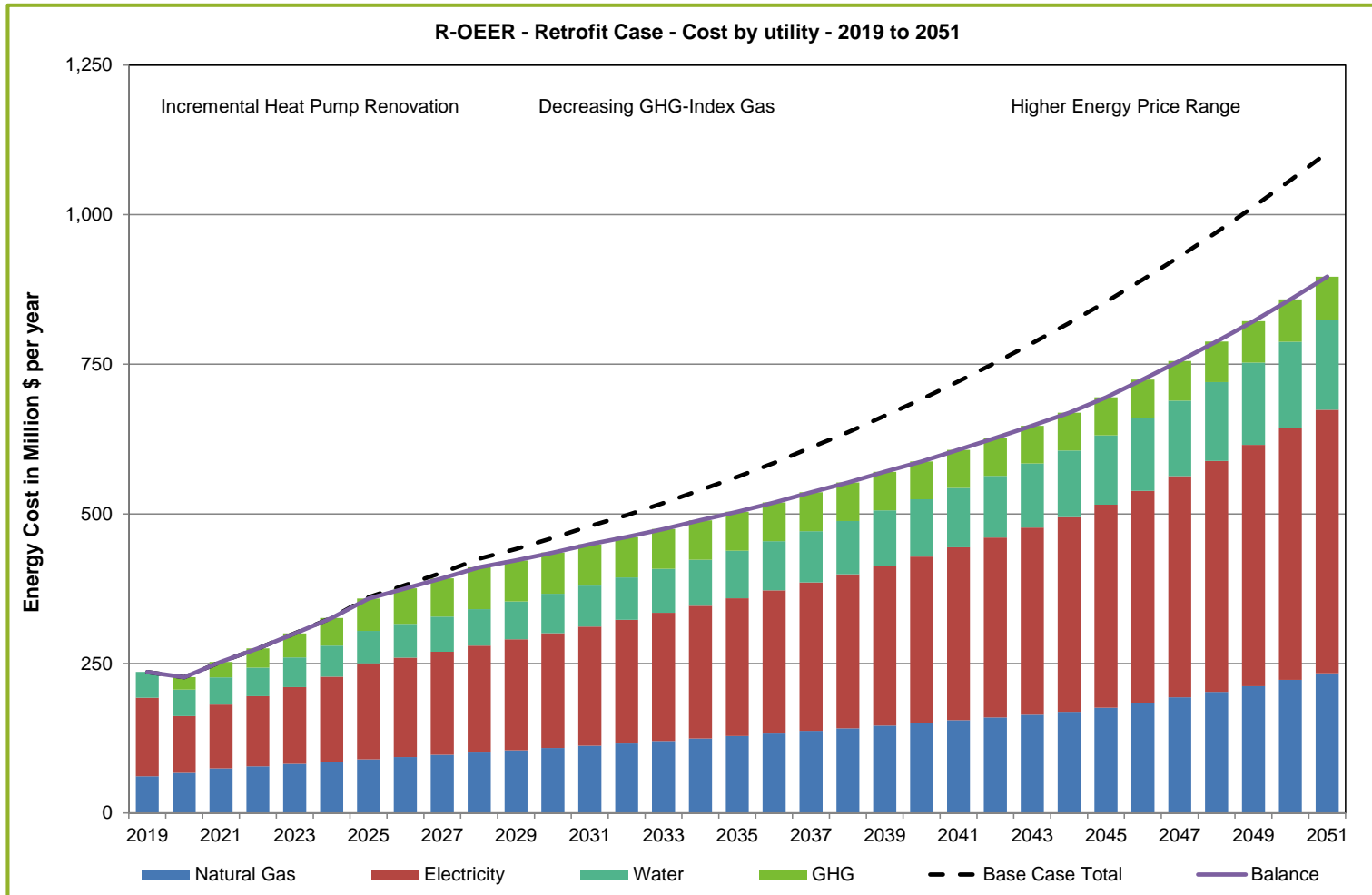


Report Notes

- From Home Retrofit Feasibility Study
- This shows expected lower annual cost through 2051 for utilities used in all the Town's homes existing in 2019 by utility type and GHG taxes.
- The dotted line is with no home retrofits. The continuous line is the result of the OEER retrofit project.
- Note: The Retrofit Project avoids about \$1.7Bn of utility costs over its lifetime.

Oakville Home Energy Retrofit Feasibility Study

Cost by Utility - 2019 to 2051

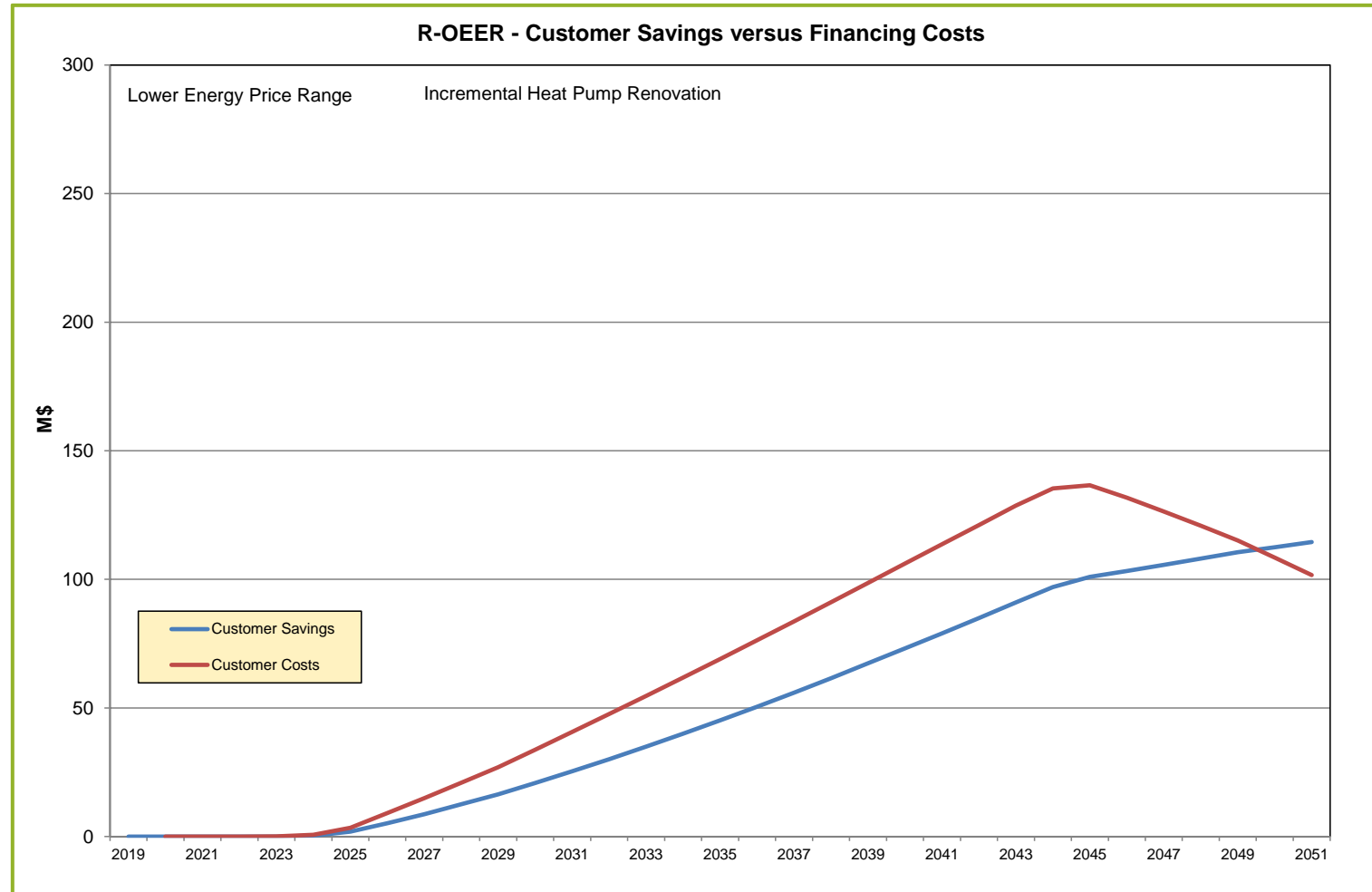


Report Notes

- From Home Retrofit Feasibility Study
- This shows expected higher annual cost through 2051 for utilities used in all the Town's homes existing in 2019 by utility type and GHG taxes.
- The dotted line is with no home retrofits. The continuous line is the result of the OEER retrofit project.
- Note: The Retrofit Project avoids about \$2.5Bn of utility costs over its lifetime.

Oakville Home Energy Retrofit Feasibility Study

Incremental Heat Pump Renovation – Lower Prices

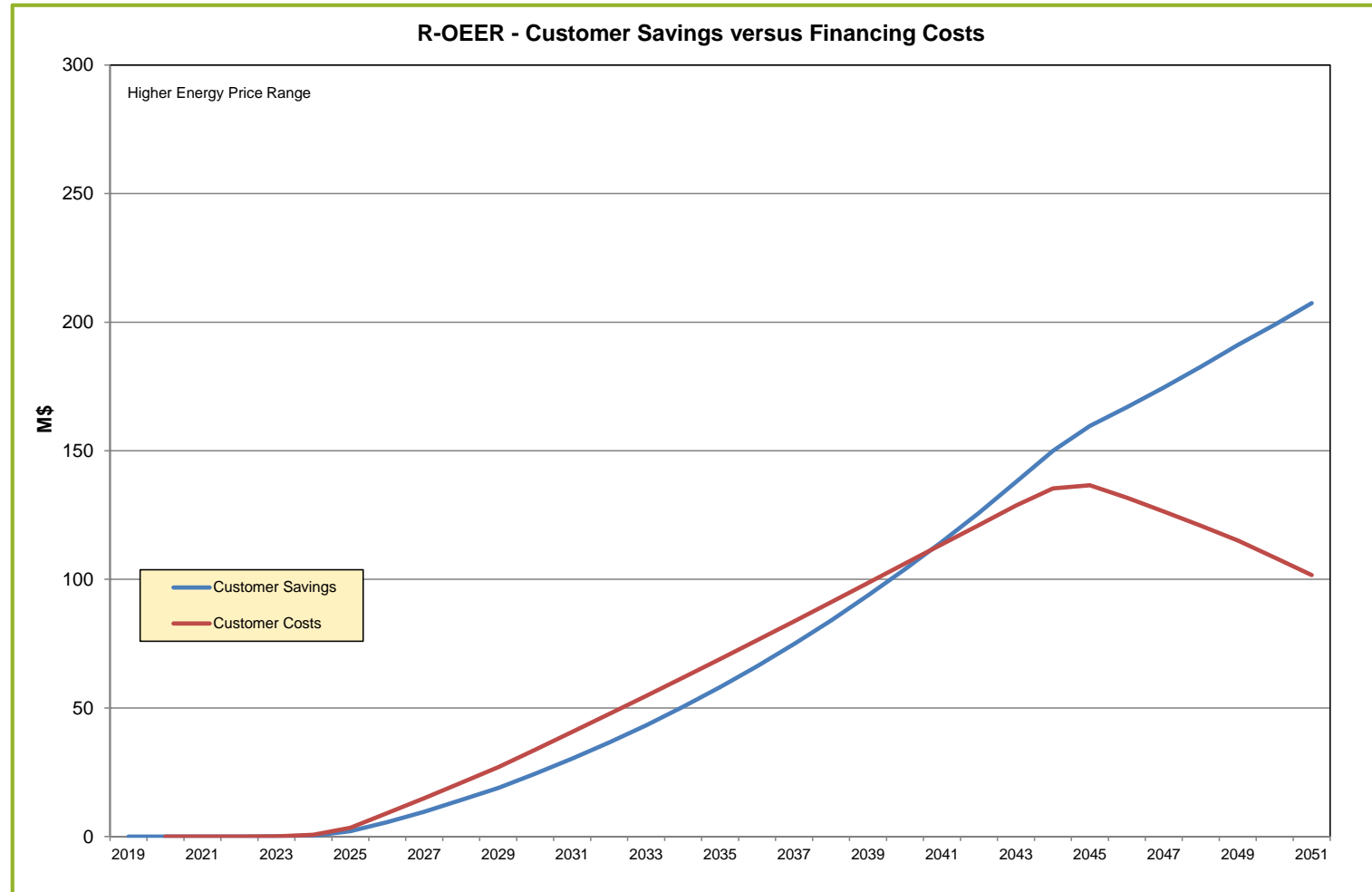


Report Notes

- From Home Retrofit Feasibility Study
- The red line shows the annual total payments by all participants in the retrofit project through 2051.
- The blue line shows the expected lower annual avoided utility and GHG costs for all participants in the retrofit project.
- Note: This is for a flow of retrofits with a mix of efficient gas and heat pump alternative retrofits.
- Note: This is year-on-year total project view not the view from a single homeowner's perspective.

Oakville Home Energy Retrofit Feasibility Study

Incremental Heat Pump Renovation – Higher Prices

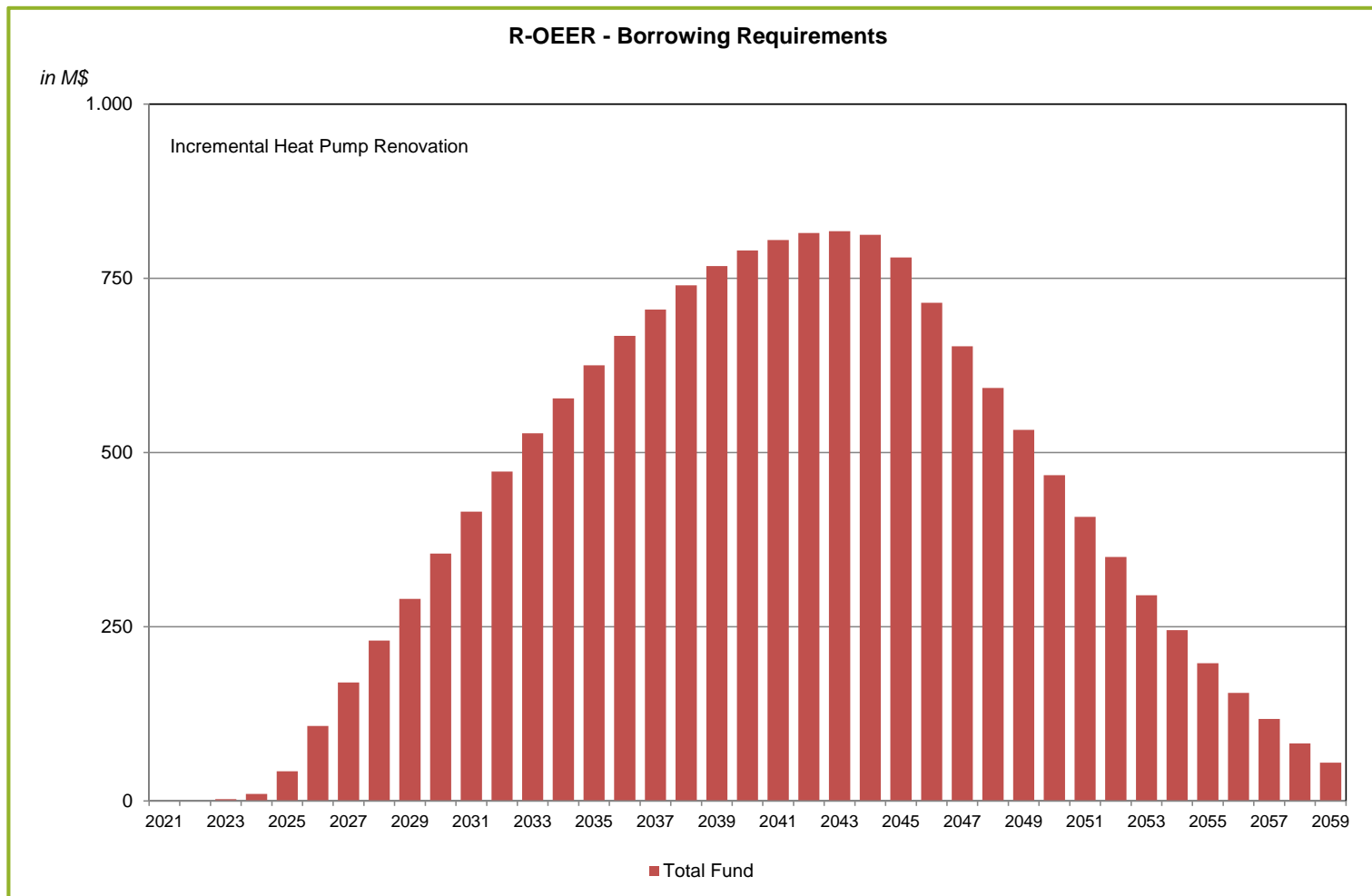


Report Notes

- From Home Retrofit Feasibility Study
- The red line shows the annual total payments by all participants in the retrofit project through 2051.
- The blue line shows the expected higher annual avoided utility and GHG costs for all participants in the retrofit project.
- Note: This is for a flow of retrofits with a mix of efficient gas and heat pump alternative retrofits.
- Note: This is year-on-year total project view not the view from a single homeowner's perspective.

Oakville Home Energy Retrofit Feasibility Study

Net Borrowing Requirements



Report Notes

- From Home Retrofit Feasibility Study
- This shows the annual net-borrowing requirements of the Entity to finance the flow of retrofits.
- Net-borrowing is the net of all loans to the Entity to finance retrofits minus loan repayments.
- Note: The Study assumed 20-year terms to both lender and borrower with interest paid annually and the face value repaid at the end of term. Loan tranches are \$2.5M.
- Borrowing is secured against home values via the LIC mechanism.

Entity Financial Summary

P&L – 2022 to 2031

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
<i>Net interest income</i>	<i>0</i>	<i>40,000</i>	<i>260,000</i>	<i>1,500,000</i>	<i>3,280,000</i>	<i>3,730,000</i>	<i>4,150,000</i>	<i>4,630,000</i>	<i>5,390,000</i>	<i>5,930,000</i>
Fees & commission income	0	0	0	0	0	0	0	0	0	0
Fees & commission expenses										
<i>Net fee and commission income</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
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
<i>Total operating income</i>	<i>0</i>	<i>140,000</i>	<i>1,150,000</i>	<i>5,730,000</i>	<i>11,960,000</i>	<i>12,520,000</i>	<i>13,210,000</i>	<i>13,870,000</i>	<i>15,750,000</i>	<i>16,390,000</i>
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

Entity Financial Summary

P&L – 2032 to 2041

R-OEER Entity P&L Item	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041
Interest from customers	23,900,000	26,890,000	29,740,000	32,450,000	35,010,000	37,410,000	39,640,000	41,690,000	43,510,000	45,090,000
Interest paid to lenders	17,430,000	19,870,000	22,210,000	24,330,000	26,240,000	28,050,000	29,640,000	31,030,000	32,190,000	33,150,000
<i>Net interest income</i>	<i>6,470,000</i>	<i>7,020,000</i>	<i>7,530,000</i>	<i>8,120,000</i>	<i>8,770,000</i>	<i>9,360,000</i>	<i>10,000,000</i>	<i>10,660,000</i>	<i>11,320,000</i>	<i>11,940,000</i>
Fees & commission income	0	0	0	0	0	0	0	0	0	0
Fees & commission expenses										
<i>Net fee and commission income</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
Net gain (loss) on financial assets & liabilities	10,580,000	10,740,000	10,850,000	10,960,000	11,070,000	11,170,000	11,290,000	11,390,000	11,410,000	11,390,000
Other operating income - Options & Services	0	0	0	0	0	0	0	0	0	0
<i>Total operating income</i>	<i>17,050,000</i>	<i>17,760,000</i>	<i>18,380,000</i>	<i>19,080,000</i>	<i>19,840,000</i>	<i>20,530,000</i>	<i>21,290,000</i>	<i>22,050,000</i>	<i>22,730,000</i>	<i>23,330,000</i>
Credit loss expense										
Impairment loss on financial investments										
Net Operating Income	17,050,000	17,760,000	18,380,000	19,080,000	19,840,000	20,530,000	21,290,000	22,050,000	22,730,000	23,330,000
S, G & A	2,190,000	2,220,000	2,240,000	2,250,000	2,270,000	2,290,000	2,310,000	2,330,000	2,350,000	2,350,000
Community sales sponsorship	290,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	290,000
FEO Sponsorship	300,000	300,000	300,000	300,000	300,000	200,000	200,000	200,000	200,000	200,000
Depreciation of property & equipment										
Amortisation of intangible assets										
Other operating expenses										
Total operating expenses	2,780,000	2,820,000	2,840,000	2,850,000	2,870,000	2,790,000	2,810,000	2,830,000	2,850,000	2,840,000
Profit before tax	14,270,000	14,940,000	15,540,000	16,230,000	16,970,000	17,740,000	18,480,000	19,220,000	19,880,000	20,490,000
Income tax expenses	3,780,000	3,960,000	4,120,000	4,300,000	4,500,000	4,700,000	4,900,000	5,090,000	5,270,000	5,430,000
Profit after tax	10,490,000	10,980,000	11,420,000	11,930,000	12,470,000	13,040,000	13,580,000	14,130,000	14,610,000	15,060,000
Investor Dividends	0	0	0	0	0	0	0	0	0	0
Retained Earnings in the year	60,960,000	71,940,000	83,360,000	95,290,000	107,760,000	120,800,000	134,380,000	148,510,000	163,120,000	178,180,000

Entity Financial Summary

P&L – 2042 to 2051

R-OEER Entity P&L Item	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051
Interest from customers	45,110,000	47,550,000	48,480,000	35,430,000	43,440,000	39,670,000	36,200,000	32,270,000	28,860,000	25,480,000
Interest paid to lenders	33,790,000	34,110,000	34,210,000	33,890,000	32,510,000	29,860,000	27,200,000	24,650,000	22,100,000	19,440,000
<i>Net interest income</i>	<i>11,320,000</i>	<i>13,440,000</i>	<i>14,270,000</i>	<i>1,540,000</i>	<i>10,930,000</i>	<i>9,810,000</i>	<i>9,000,000</i>	<i>7,620,000</i>	<i>6,760,000</i>	<i>6,040,000</i>
Fees & commission income	0	0	0	0	0	0	0	0	0	0
Fees & commission expenses										
<i>Net fee and commission income</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
Net gain (loss) on financial assets & liabilities	11,450,000	11,570,000	11,010,000	6,090,000	1,330,000	1,340,000	1,360,000	1,370,000	160,000	160,000
Other operating income - Options & Services	0	0	0	0	0	0	0	0	0	0
<i>Total operating income</i>	<i>22,770,000</i>	<i>25,010,000</i>	<i>25,280,000</i>	<i>7,630,000</i>	<i>12,260,000</i>	<i>11,150,000</i>	<i>10,360,000</i>	<i>8,990,000</i>	<i>6,920,000</i>	<i>6,200,000</i>
Credit loss expense										
Impairment loss on financial investments										
Net Operating Income	22,770,000	25,010,000	25,280,000	7,630,000	12,260,000	11,150,000	10,360,000	8,990,000	6,920,000	6,200,000
S, G & A	2,360,000	2,380,000	2,400,000	2,360,000	400,000	400,000	400,000	410,000	350,000	350,000
Community sales sponsorship	280,000	280,000	280,000	240,000	50,000	50,000	50,000	50,000	10,000	10,000
FEO Sponsorship	200,000	200,000	200,000	100,000	100,000	100,000	50,000	50,000	50,000	50,000
Depreciation of property & equipment										
Amortisation of intangible assets										
Other operating expenses										
Total operating expenses	2,840,000	2,860,000	2,880,000	2,700,000	550,000	550,000	500,000	510,000	410,000	410,000
Profit before tax	19,930,000	22,150,000	22,400,000	4,930,000	11,710,000	10,600,000	9,860,000	8,480,000	6,510,000	5,790,000
Income tax expenses	5,280,000	5,870,000	5,940,000	1,310,000	3,100,000	2,810,000	2,610,000	2,250,000	1,730,000	1,530,000
Profit after tax	14,650,000	16,280,000	16,460,000	3,620,000	8,610,000	7,790,000	7,250,000	6,230,000	4,780,000	4,260,000
Investor Dividends	0	0	0	0	0	0	0	0	0	0
Retained Earnings in the year	192,830,000	209,110,000	225,570,000	229,190,000	237,800,000	245,590,000	252,840,000	259,070,000	263,850,000	268,110,000

Entity Financial Summary

P&L – 2052 to 2061

R-OEER Entity P&L Item	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061
Interest from customers	22,510,000	19,560,000	16,500,000	13,730,000	11,700,000	9,230,000	7,330,000	5,380,000	3,770,000	2,680,000
Interest paid to lenders	16,890,000	14,450,000	12,110,000	9,990,000	8,080,000	6,270,000	4,680,000	3,290,000	2,130,000	1,170,000
<i>Net interest income</i>	<i>5,620,000</i>	<i>5,110,000</i>	<i>4,390,000</i>	<i>3,740,000</i>	<i>3,620,000</i>	<i>2,960,000</i>	<i>2,650,000</i>	<i>2,090,000</i>	<i>1,640,000</i>	<i>1,510,000</i>
Fees & commission income	0	0	0	0	0	0	0	0	0	0
Fees & commission expenses										
<i>Net fee and commission income</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
Net gain (loss) on financial assets & liabilities	160,000	160,000	160,000	170,000	150,000	130,000	110,000	120,000	120,000	120,000
Other operating income - Options & Services	0	0	0	0	0	0	0	0	0	0
<i>Total operating income</i>	<i>5,780,000</i>	<i>5,270,000</i>	<i>4,550,000</i>	<i>3,910,000</i>	<i>3,770,000</i>	<i>3,090,000</i>	<i>2,760,000</i>	<i>2,210,000</i>	<i>1,760,000</i>	<i>1,630,000</i>
Credit loss expense										
Impairment loss on financial investments										
Net Operating Income	5,780,000	5,270,000	4,550,000	3,910,000	3,770,000	3,090,000	2,760,000	2,210,000	1,760,000	1,630,000
S, G & A	360,000	360,000	360,000	370,000	370,000	370,000	370,000	380,000	380,000	390,000
Community sales sponsorship	10,000	10,000	10,000	10,000	10,000	10,000	0	0	0	0
FEO Sponsorship	50,000	50,000	50,000	50,000	50,000	0	0	0	0	0
Depreciation of property & equipment										
Amortisation of intangible assets										
Other operating expenses										
Total operating expenses	420,000	420,000	420,000	430,000	430,000	380,000	370,000	380,000	380,000	390,000
Profit before tax	5,360,000	4,850,000	4,130,000	3,480,000	3,340,000	2,710,000	2,390,000	1,830,000	1,380,000	1,240,000
Income tax expenses	1,420,000	1,290,000	1,090,000	920,000	890,000	720,000	630,000	480,000	370,000	330,000
Profit after tax	3,940,000	3,560,000	3,040,000	2,560,000	2,450,000	1,990,000	1,760,000	1,350,000	1,010,000	910,000
Investor Dividends	0	0	0	0	0	0	0	0	0	0
Retained Earnings in the year	272,050,000	275,610,000	278,650,000	281,210,000	283,660,000	285,650,000	287,410,000	288,760,000	289,770,000	290,680,000

Oakville Home Energy Retrofit Feasibility Study Community Summary – Higher Prices

		2051	2061
Higher Energy Price Range	Units	R-OEER Plan Horizon	Financing Complete
Electricity saved	MWh/yr	390,000	390,000
Gas saved	MWh/yr	3,070,000	3,100,000
Total Energy saved	MWh/yr	3,460,000	3,490,000
GHG avoided	mt CO _{2e} /yr	150,000	140,000
Water saved	m ³ /yr	2,060,000	2,070,000
Electricity cost reduction	\$	817,000,000	1,668,000,000
Gas cost reduction	\$	972,000,000	2,148,000,000
GHG cost reduction	\$	500,000,000	832,000,000
Energy cost reduction	\$	2,289,000,000	4,648,000,000
Water Cost reduction	\$	237,000,000	503,000,000
Homeowner payments	\$	2,185,000,000	2,826,000,000
Net savings	\$	341,000,000	2,325,000,000

Oakville Home Energy Retrofit Feasibility Study

Community Summary – Lower Prices

Lower Energy Price Range	Units	2051 R-OEER Plan Horizon	2061 Financing Complete
Electricity saved	MWh/yr	390,000	390,000
Gas saved	MWh/yr	3,070,000	3,100,000
Total Energy Saved	MWh/yr	3,460,000	3,490,000
GHG avoided	mt CO _{2e} /yr	150,000	140,000
Water saved	m ³ /yr	2,060,000	2,070,000
Electricity cost reduction	\$	482,000,000	840,000,000
Gas cost reduction	\$	505,000,000	922,000,000
GHG cost reduction	\$	500,000,000	832,000,000
Energy cost reduction	\$	1,487,000,000	2,594,000,000
Water Cost reduction	\$	171,000,000	329,000,000
Homeowner payments	\$	2,185,000,000	2,826,000,000
Net savings	\$	(527,000,000)	97,000,000

Oakville Home Energy Retrofit Feasibility Study

Results – Typical Homeowner – SD Pre 1975

Oakville Home Energy Retrofit Feasibility Study

Homeowner's Perspective – Higher Utility Prices

- Home
 - *Single Home dating from 1970*
 - *Finished area of 170 square meters*
- Retrofit Costs
 - *\$35,500 (priced at \$203 / m²)*
 - *4.25% interest rate*
- Standard Retrofit Content
 - *Weather-stripping, windows, AC, furnace and water heater, attic insulation, LED Lighting, Smart Thermostat, Smart power strips*
- Repayments & Savings
 - *LIC payment \$2,670 per year for 20 years*
 - *Total payments \$53,400*
 - *Total 20-year savings at least \$71,200*

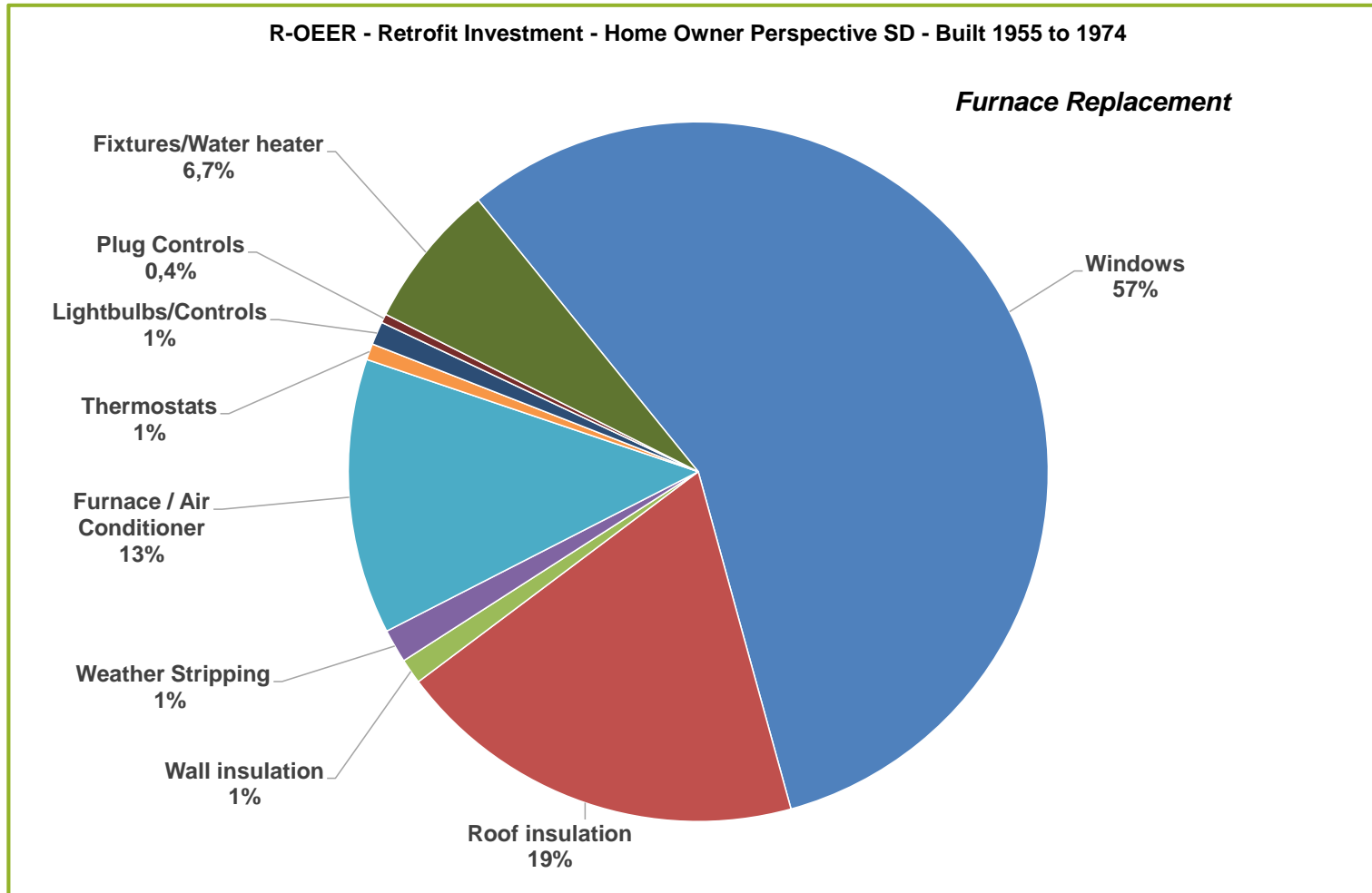
Oakville Home Energy Retrofit Feasibility Study

Homeowner's Perspective – Lower Utility Prices

- Home
 - *Single Home dating from 1970*
 - *Finished area of 170 square meters*
- Retrofit Costs
 - *\$35,500 (priced at \$203 / m²)*
 - *4.25% interest rate*
- Standard Retrofit Content
 - *Weather-stripping, windows, AC, furnace and water heater, attic insulation, LED Lighting, Smart Thermostat, Smart power strips*
- Repayments & Savings
 - *LIC payment \$2,670 per year for 20 years*
 - *Total payments \$53,400*
 - *Total 20-year savings at least \$56,900*

Oakville Home Energy Retrofit Feasibility Study

Retrofit - Content and Cost - Homeowner's Perspective



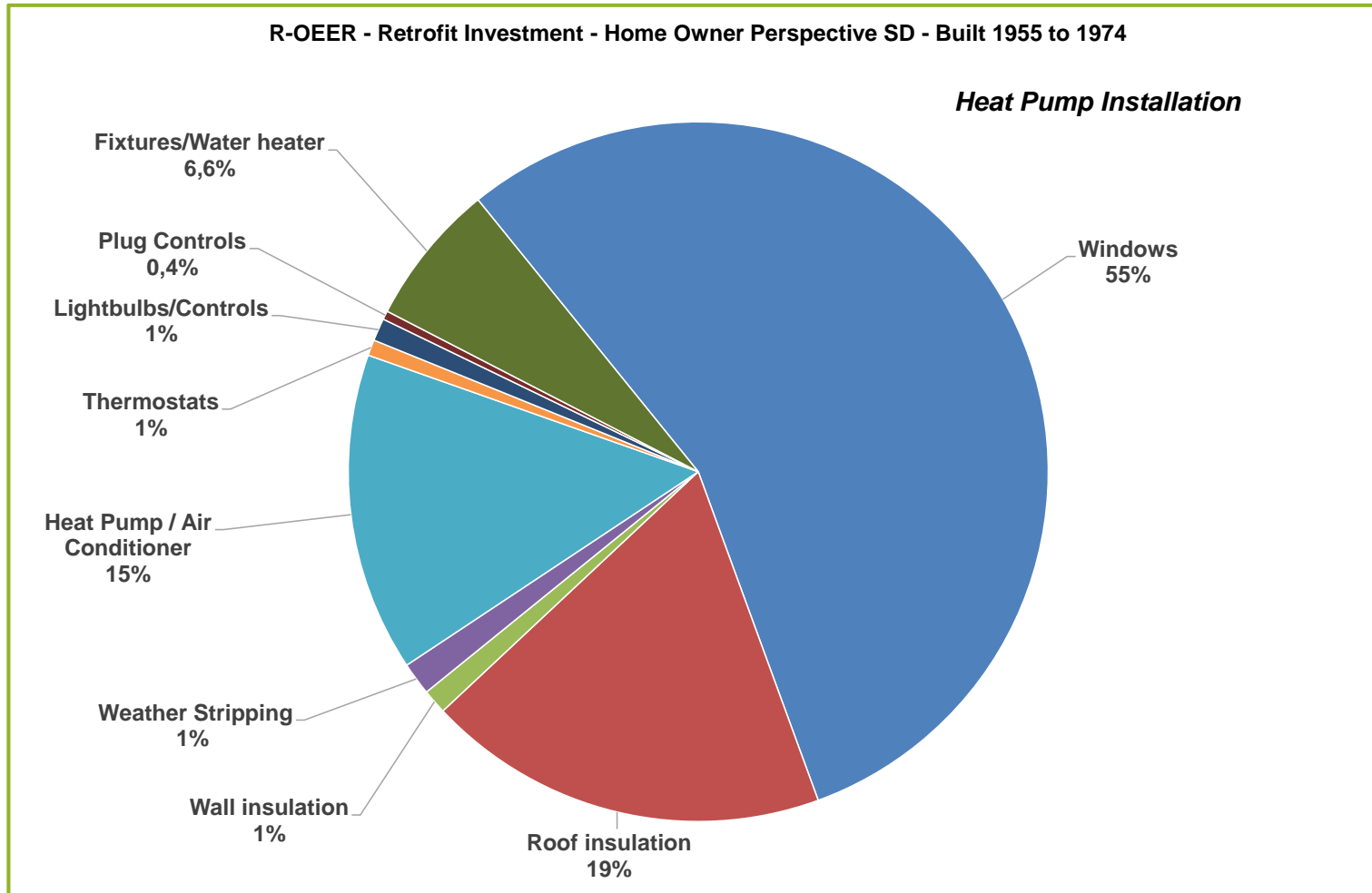
Report Notes

- From Home Retrofit Feasibility Study
- This shows the cost breakdown by installed measures of the Core Retrofit package with the more efficient type replacement of the gas heater and AC.
- Note the windows have a UI value less than 1.0. The volume effect has the potential to bring these costs closer to the lower global benchmarks.

Comprehensive Energy Retrofit for \$35.5k

Oakville Home Energy Retrofit Feasibility Study

Retrofit - Content and Cost - Homeowner's Perspective

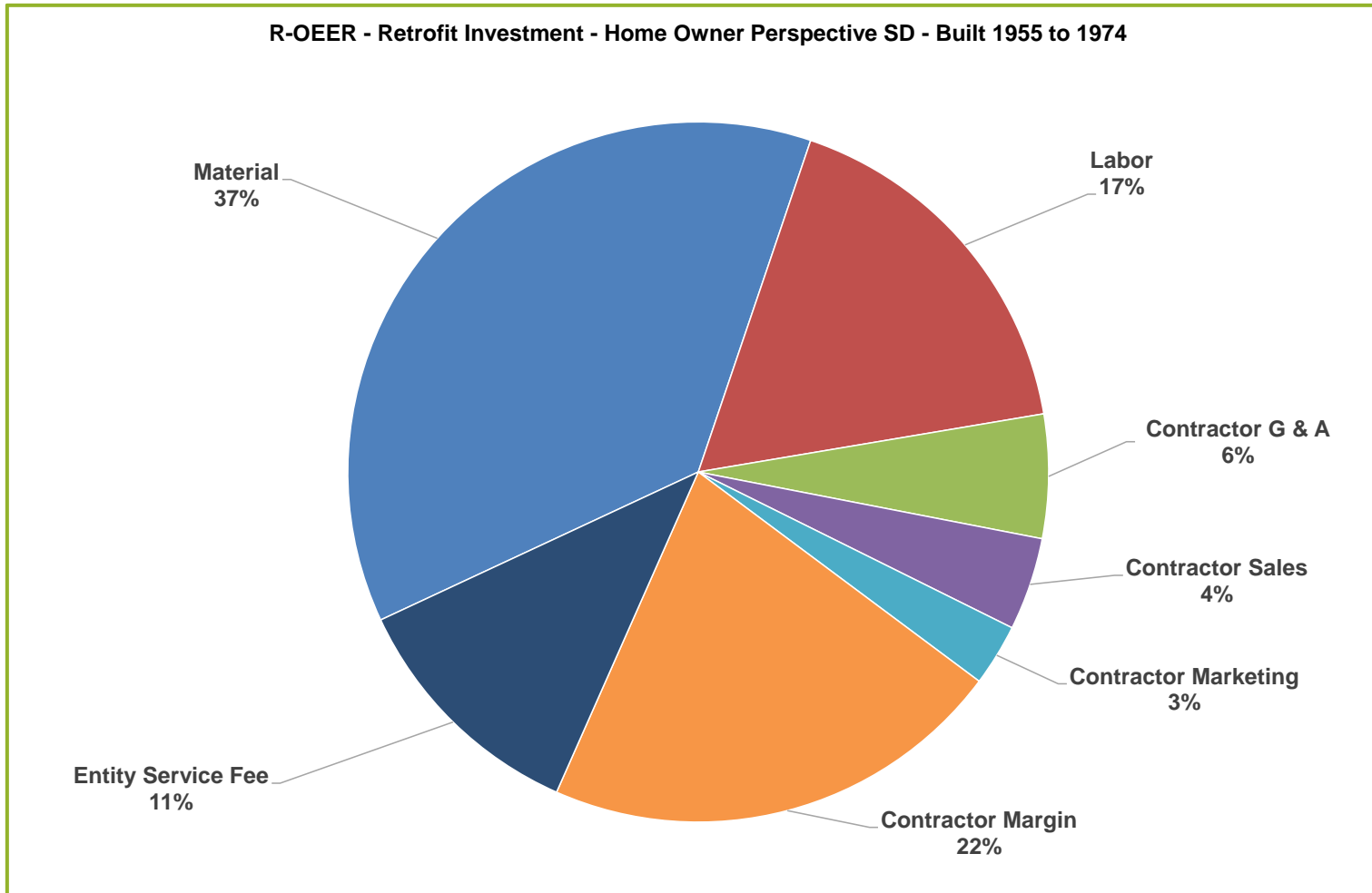


Report Notes

- From Home Retrofit Feasibility Study
- This shows the cost breakdown by installed measures of the Core Retrofit package with a heat pump replacing the furnace and AC.
- Note the windows have a UI value less than 1.0. The volume effect has the potential to bring these costs closer to the lower global benchmarks.

Oakville Home Energy Retrofit Feasibility Study

Retrofit – Use of Funds - Homeowner's Perspective



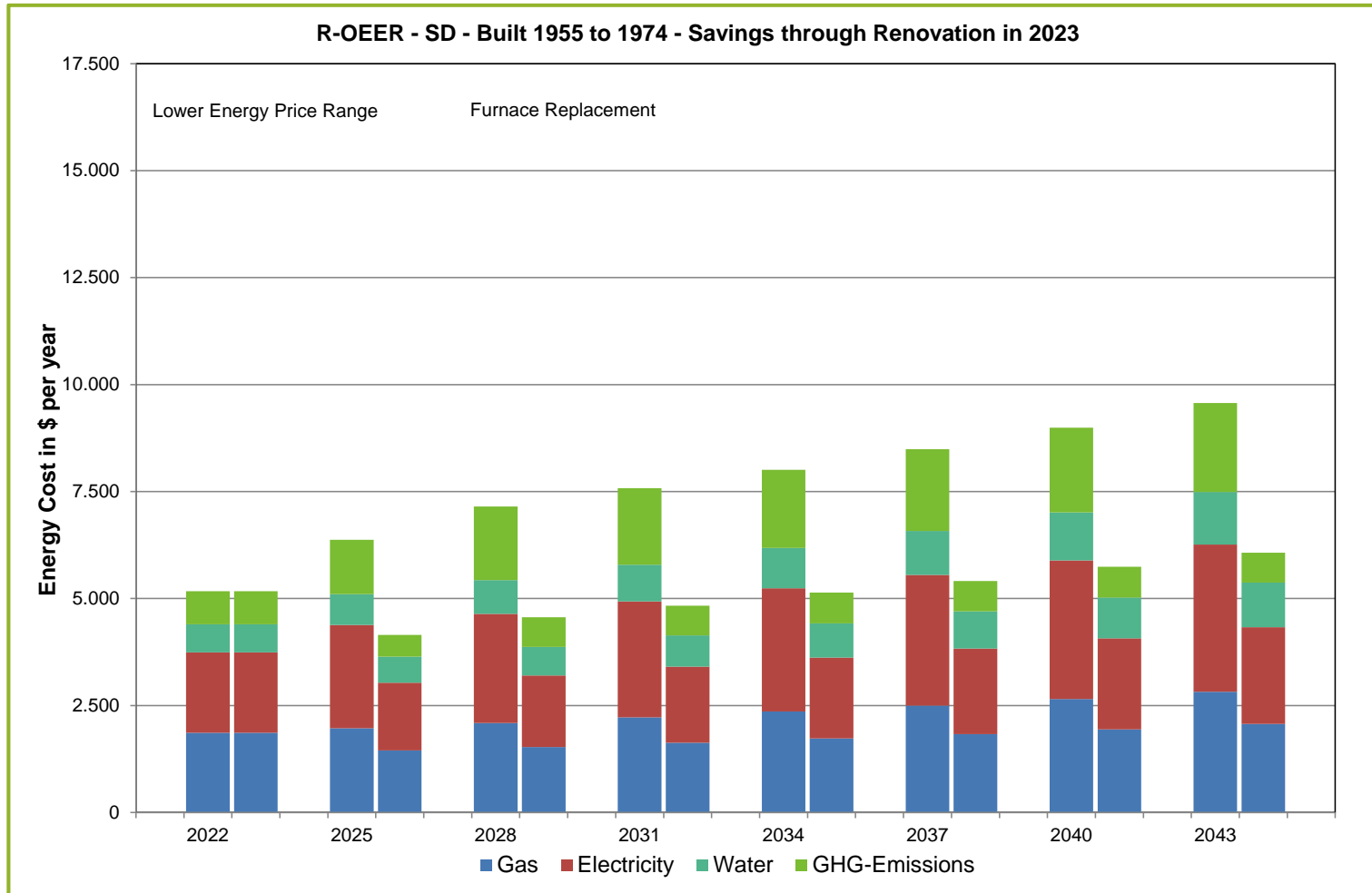
Report Notes

- From Home Retrofit Feasibility Study
- This shows the cost breakdown by functional purpose of the Core Retrofit package with the more efficient type replacement of the gas heater and AC.
- Note: The service fee is the primary revenue for the Entity that covers all its operating cost and investor returns.

Comprehensive Energy Retrofit for \$36.4k

Oakville Home Energy Retrofit Feasibility Study

Retrofit – Before & After (Furnace Replacement)

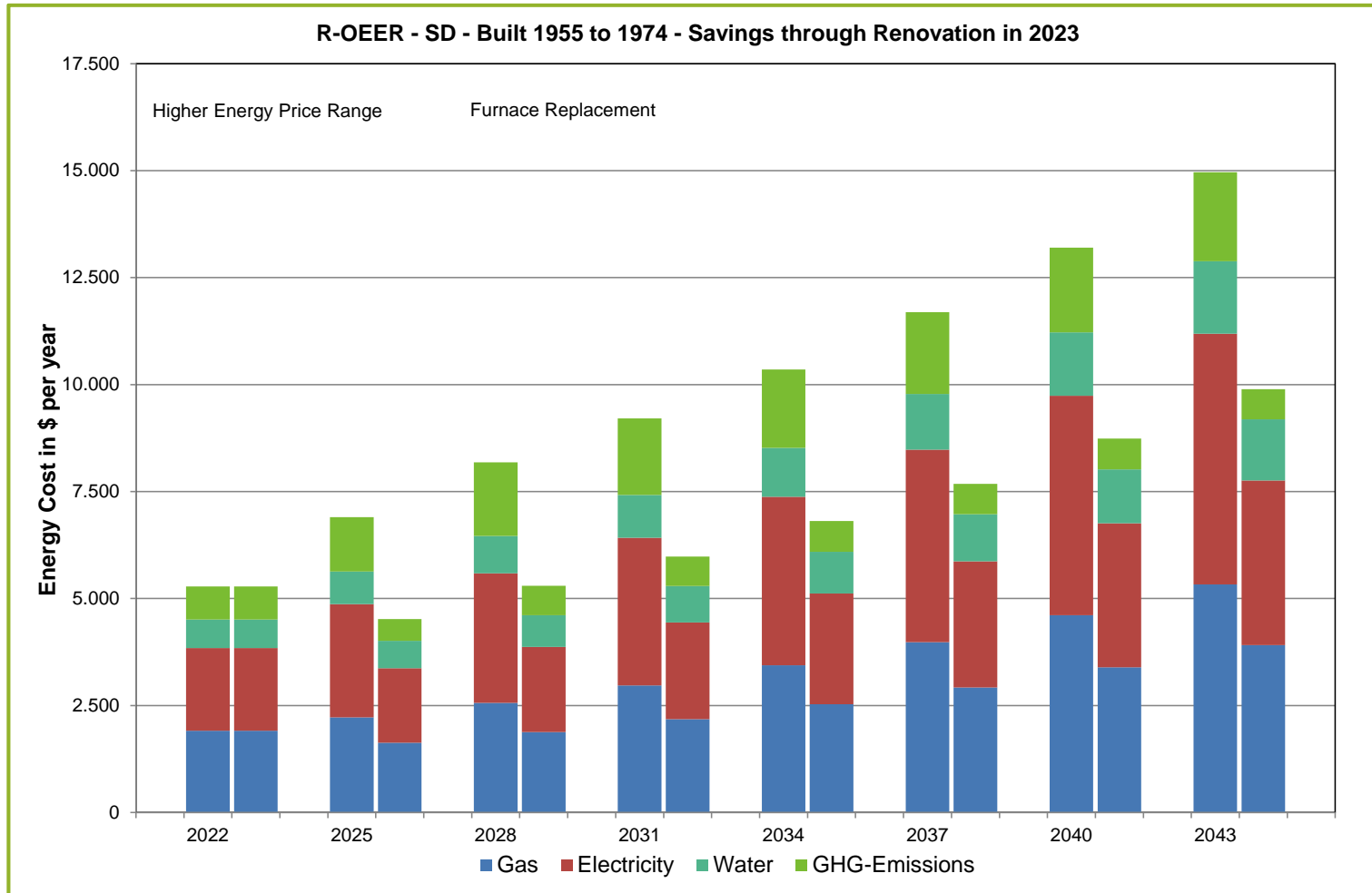


Report Notes

- From Home Retrofit Feasibility Study
- This shows the expected lower homeowner's yearly utility and GHG costs over the 20-year term of the Retrofit loan for an older detached home.
- The left-hand columns are the costs without the retrofit, the right-hand columns are with the retrofit.
- Note: This is for a retrofit with more efficient type replacements for furnace and AC.

Oakville Home Energy Retrofit Feasibility Study

Retrofit – Before & After (Furnace Replacement)

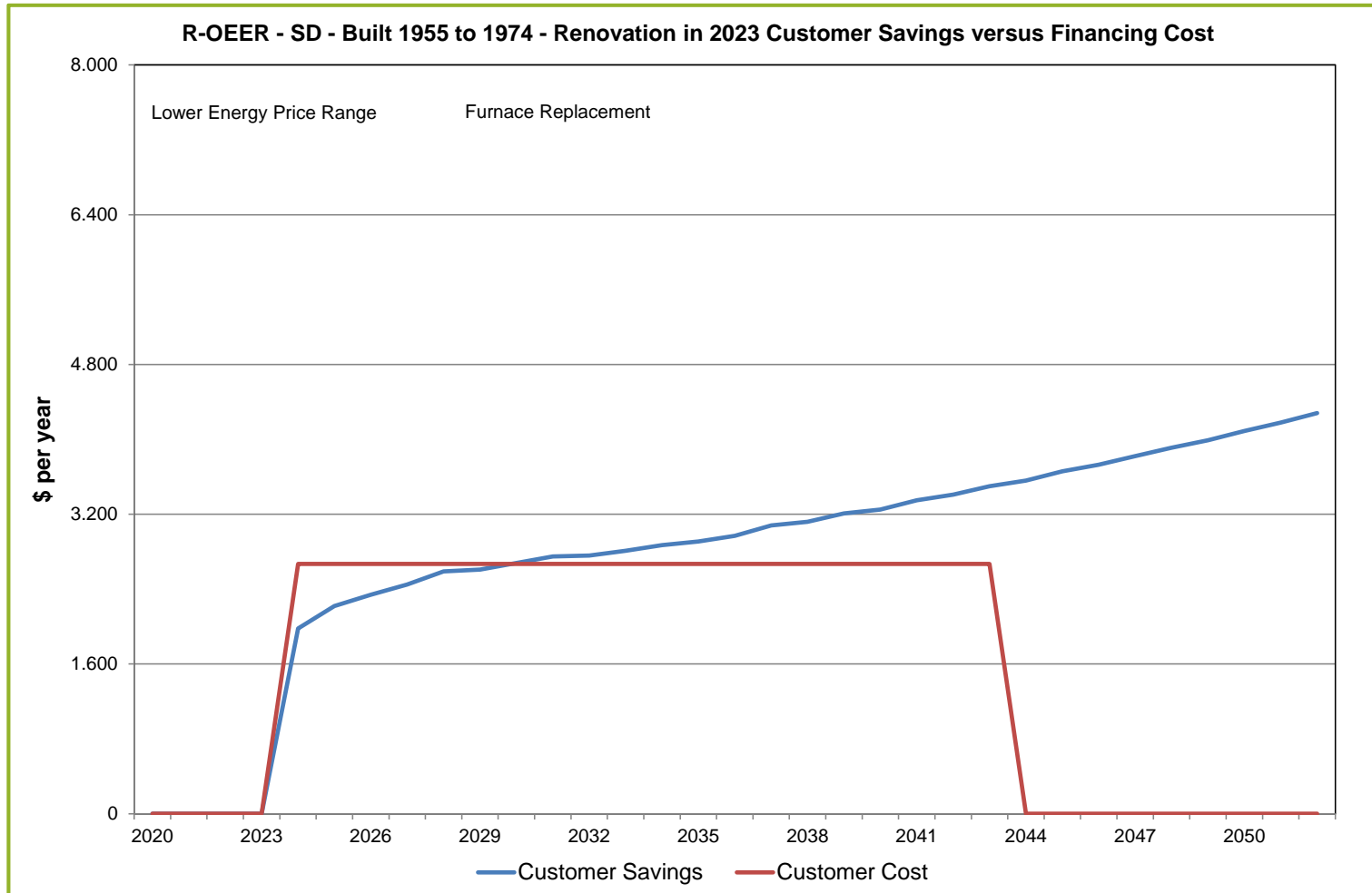


Report Notes

- From Home Retrofit Feasibility Study
- This shows the expected higher price outlook for homeowner's yearly utility and GHG costs over the 20-year term of the Retrofit loan for an older detached home.
- The left-hand columns are the costs without the retrofit, the right-hand columns are with the retrofit.
- Note: This is for the retrofit with more efficient type replacements for furnace and AC.

Oakville Home Energy Retrofit Feasibility Study

Retrofit – Before & After (Furnace Replacement)

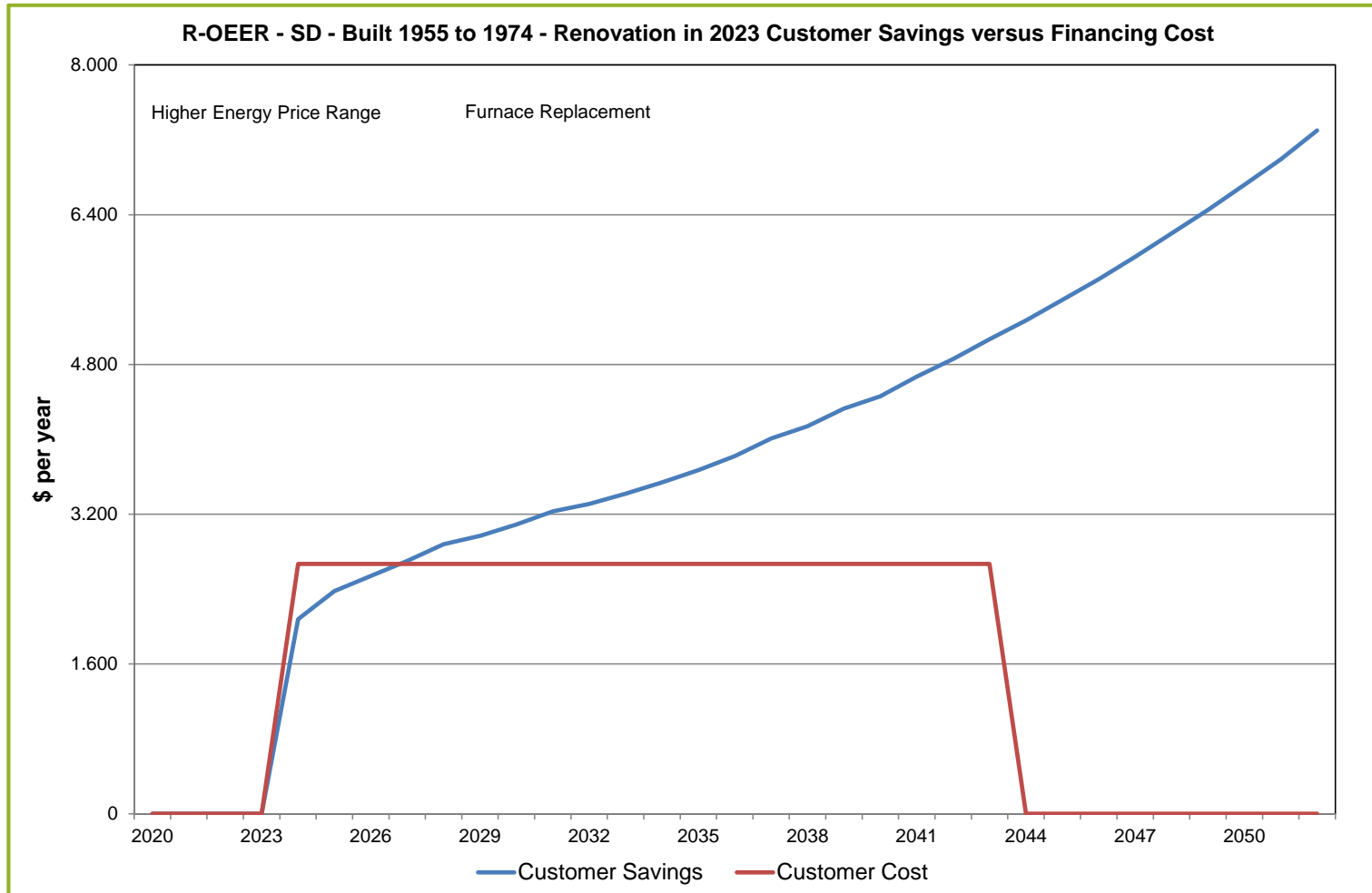


Report Notes

- From Home Retrofit Feasibility Study
- The red line shows the homeowner's annual payment over 20 years for the retrofit including interest charges.
- The blue line shows the annual expected utility and GHG cost avoidance at the lower price profile.
- Note: This is for a retrofit with more efficient type replacements for furnace and AC.

Oakville Home Energy Retrofit Feasibility Study

Retrofit – Before & After (Furnace Replacement)

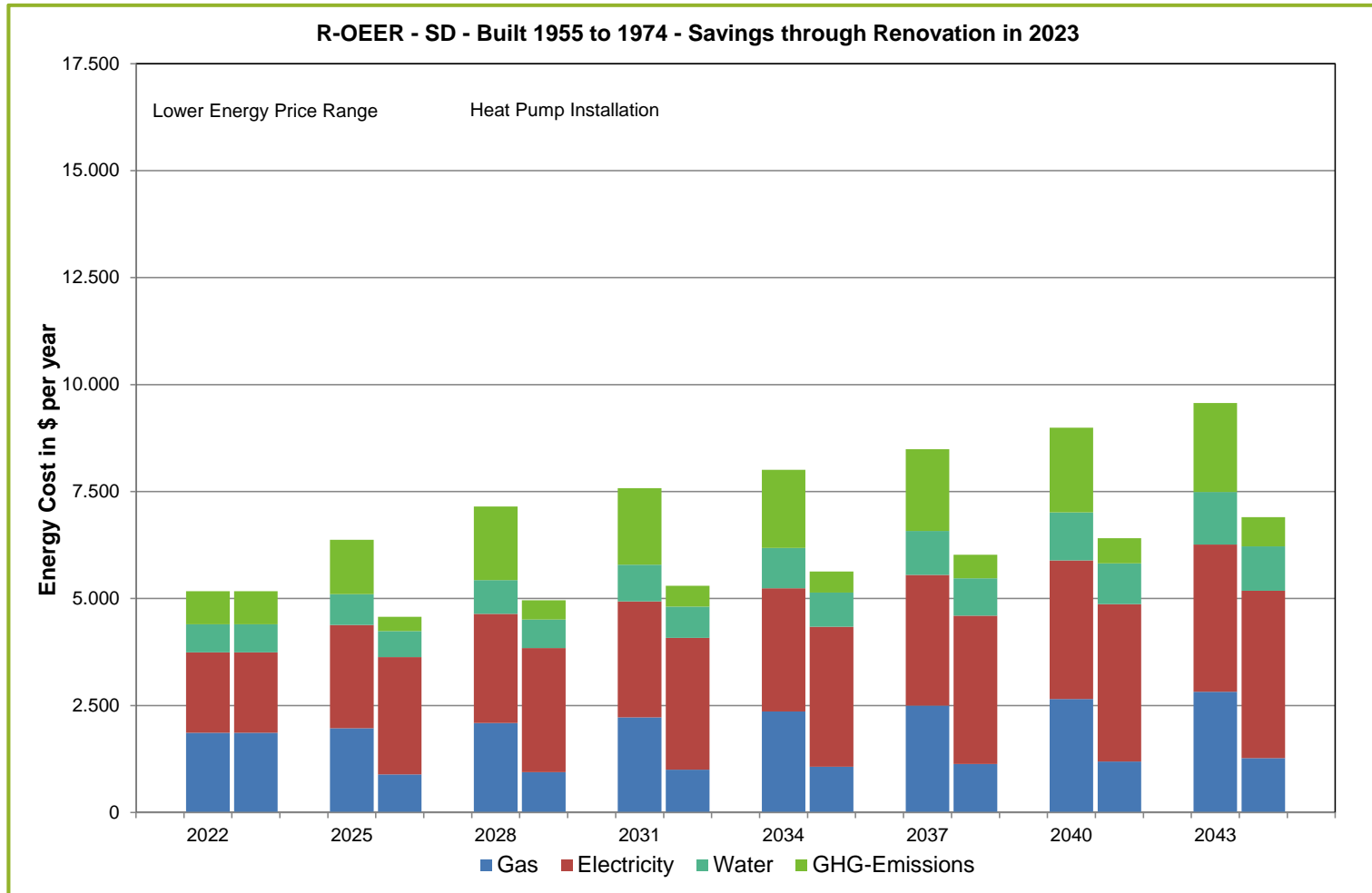


Report Notes

- From Home Retrofit Feasibility Study
- The red line shows the homeowner's annual payment over 20 years for the retrofit including interest charges.
- The blue line shows the annual expected utility and GHG cost avoidance at the higher price profile.
- Note: This is for a retrofit with more efficient type replacements for furnace and AC.

Oakville Home Energy Retrofit Feasibility Study

Retrofit – Before & After (Heat Pump Installation)



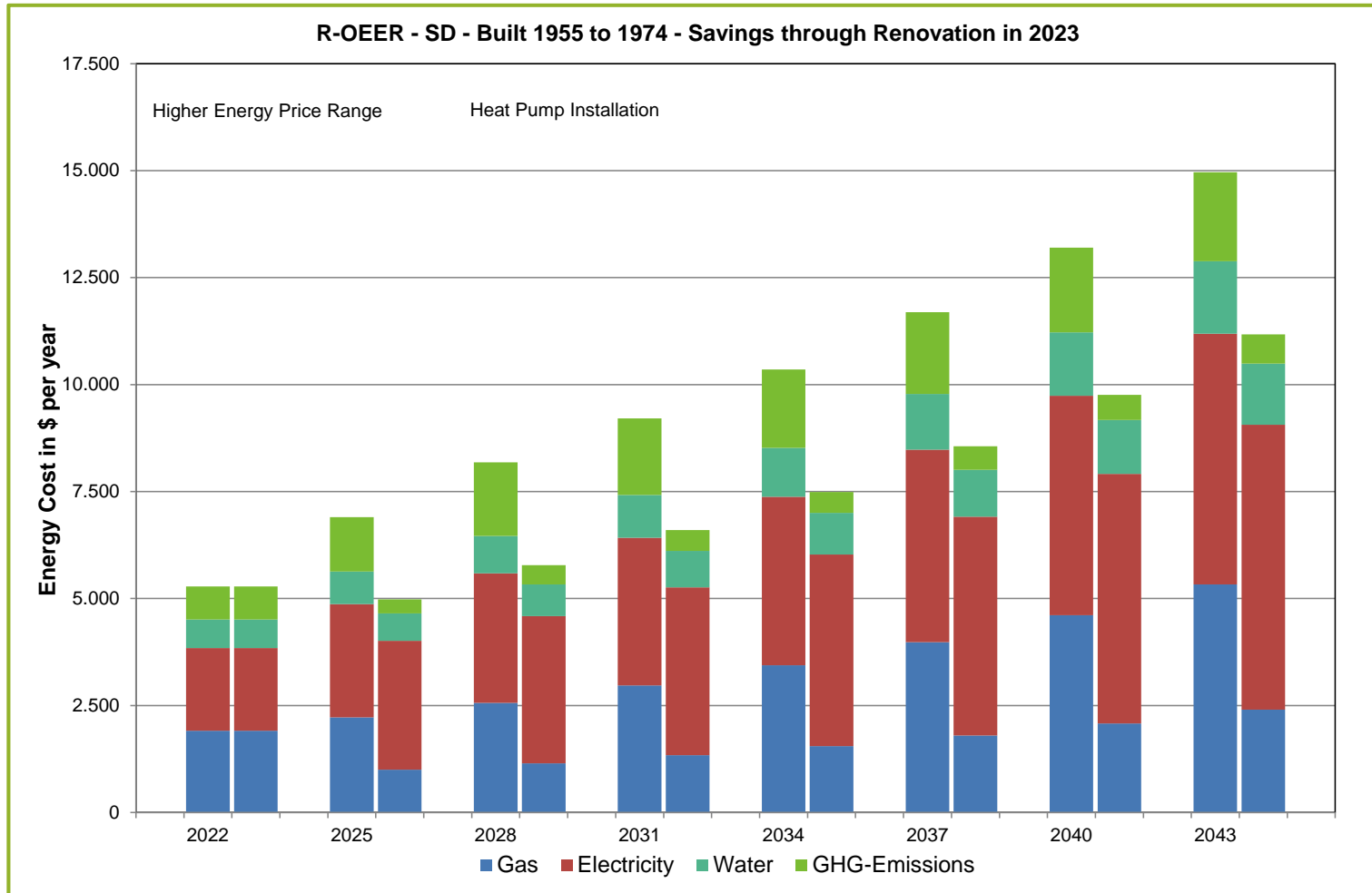
Report Notes

- From Home Retrofit Feasibility Study
- This shows the expected lower price profile for homeowner's yearly utility and GHG costs over the 20-year term of the Retrofit loan for an older detached home.
- The left-hand columns are the costs without the retrofit. The right-hand columns are with the retrofit.
- Note: This is for the retrofit with a heat pump replacement for the furnace and AC.

Oakville Home Energy Retrofit Feasibility Study

Retrofit – Before & After (Heat Pump Installation)

Single
Detached
1955 - 1974



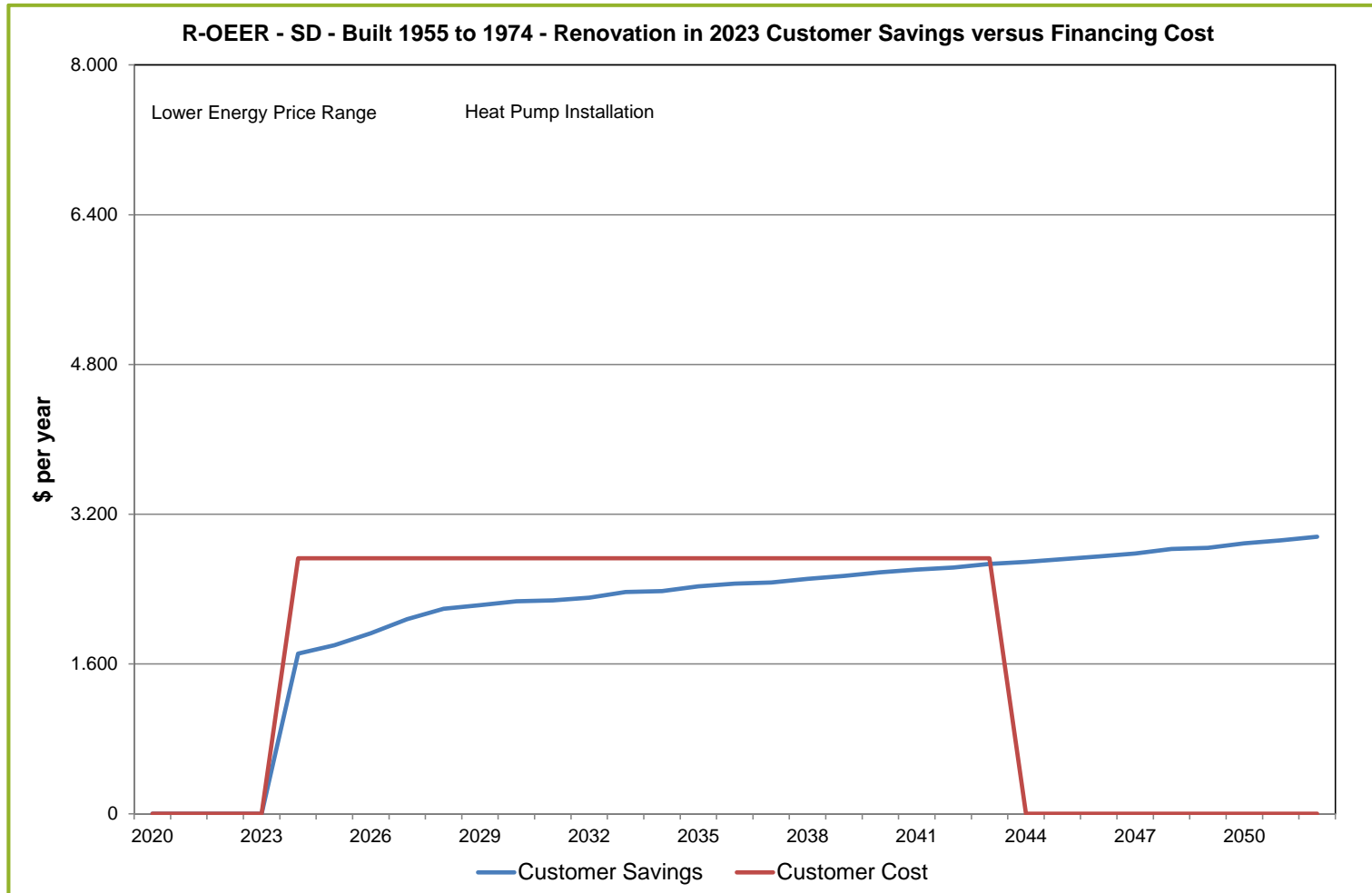
Report Notes

- From Home Retrofit Feasibility Study
- This shows the expected higher price profile for homeowner's yearly utility and GHG costs over the 20-year term of the Retrofit loan for an older detached home.
- The left-hand columns are the costs without the retrofit. The right-hand columns are with the retrofit.
- Note: This is for a retrofit with a heat pump replacement for the furnace and AC.

Oakville Home Energy Retrofit Feasibility Study

Retrofit – Before & After (Heat Pump Installation)

Single
Detached
1955 - 1974

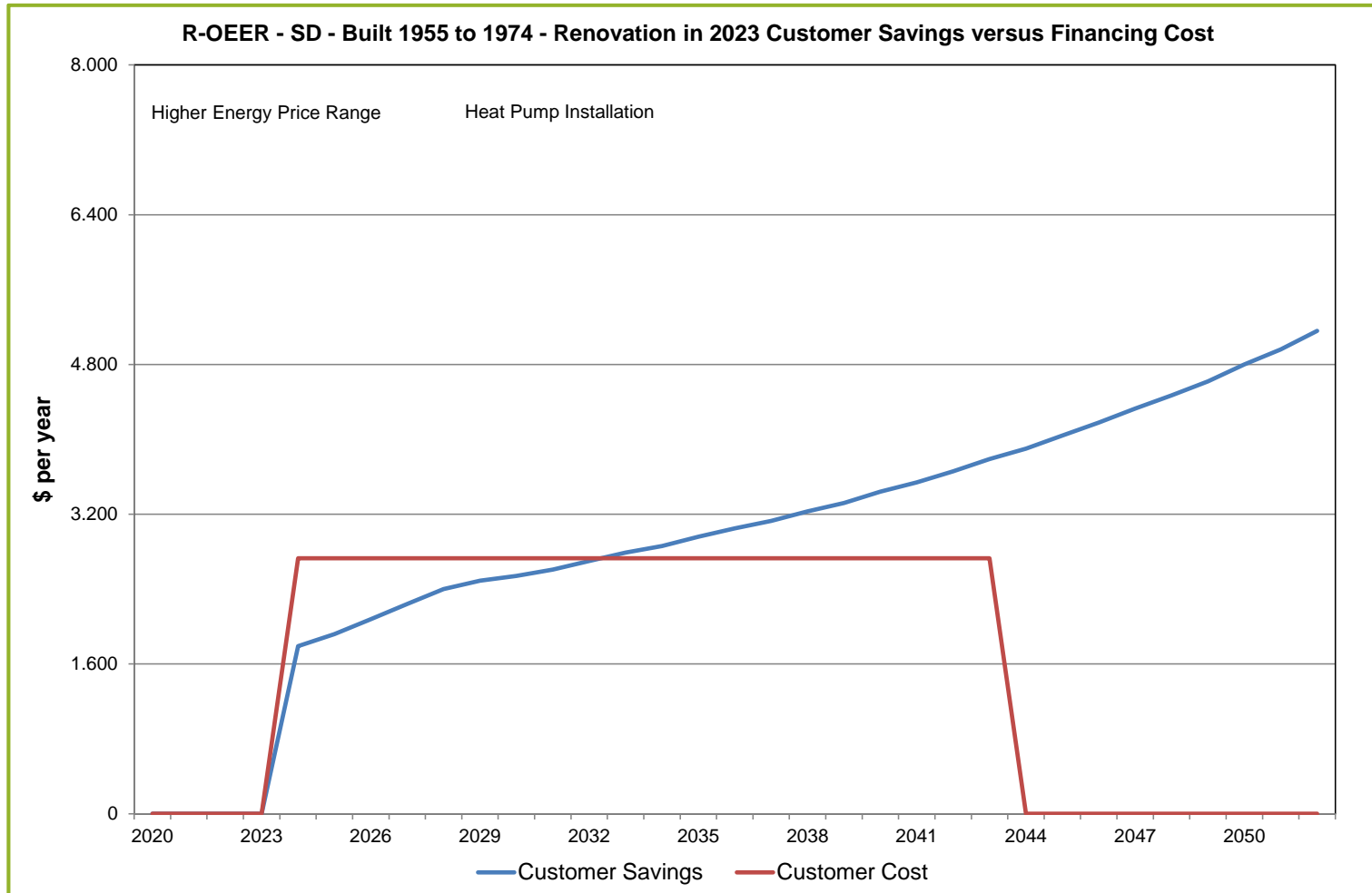


Report Notes

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- The blue line shows the annual expected utility and GHG cost avoidance at the lower price profile.
- Note: This is for the retrofit with a heat pump replacement for the furnace and AC.

Oakville Home Energy Retrofit Feasibility Study

Retrofit – Before & After (Heat Pump Installation)



Report Notes

- From Home Retrofit Feasibility Study
- The red line shows the homeowner's annual payment over 20 years for the retrofit including interest charges.
- The blue line shows the annual expected utility and GHG cost avoidance at the higher price profile.
- Note: This is for a retrofit with a heat pump replacement for the furnace and AC.

Oakville Home Energy Retrofit Feasibility Study

Results – Typical Homeowner – SD 1975-1997

Oakville Home Energy Retrofit Feasibility Study

Homeowner's Perspective – Higher Utility Prices

- Home
 - *Single Home dating from 1985*
 - *Finished area of 170 square meters*
- Retrofit Costs
 - *\$34,500 (priced at \$203 / m²)*
 - *4.25% interest rate*
- Standard Retrofit Content
 - *Weather-stripping, windows, AC, furnace and water heater, attic insulation, LED Lighting, Smart Thermostat, Smart power strips*
- Repayments & Savings
 - *LIC payment \$2,600 per year for 20 years*
 - *Total payments \$52,000*
 - *Total 20 year saving at least \$68,900*

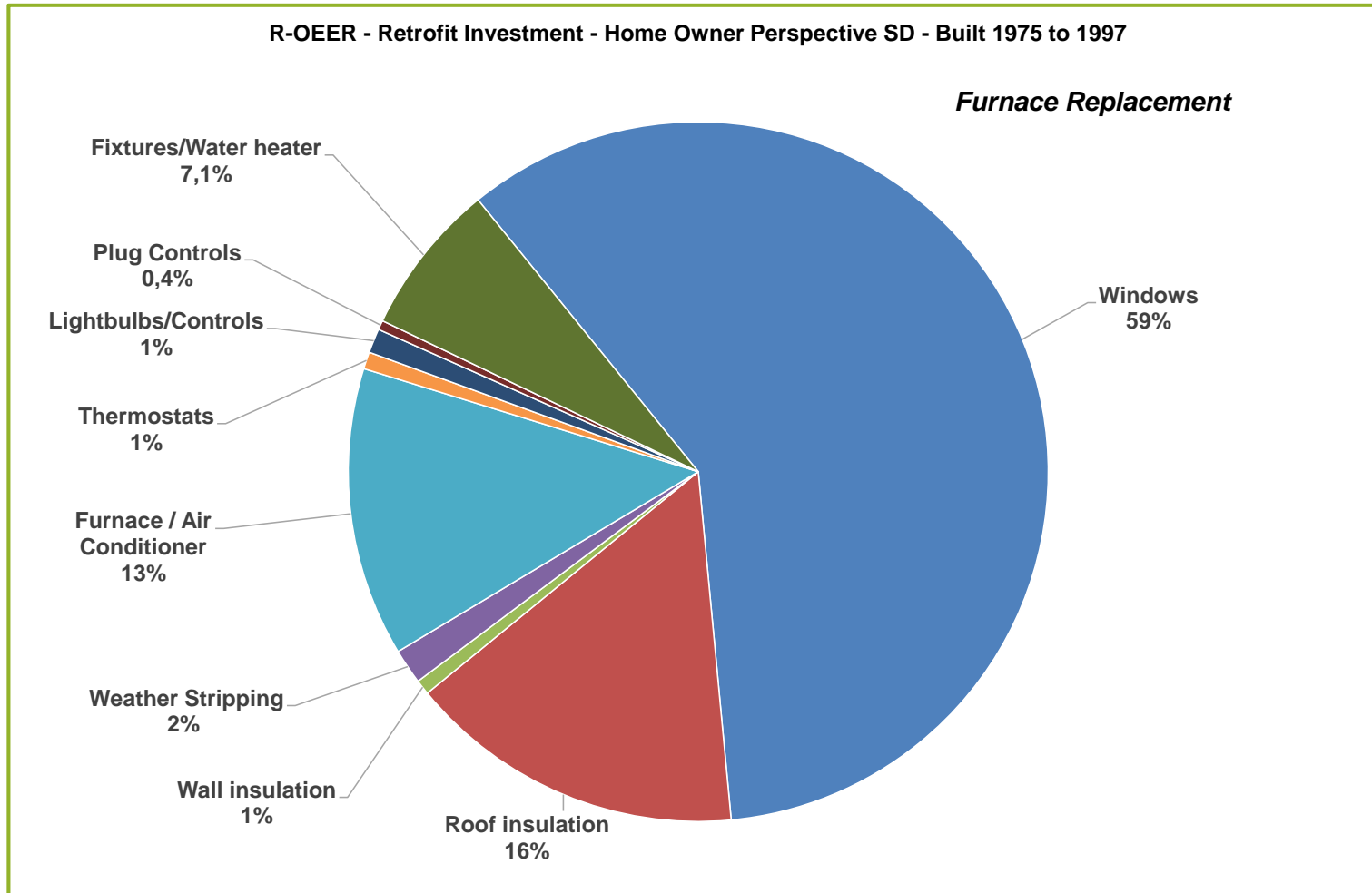
Oakville Home Energy Retrofit Feasibility Study

Homeowner's Perspective – Lower Utility Prices

- Home
 - *Single Home dating from 1985*
 - *Finished area of 170 square meters*
- Retrofit Costs
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- Standard Retrofit Content
 - *Weather-stripping, windows, AC, furnace and water heater, attic insulation, LED Lighting, Smart Thermostat, Smart power strips*
- Repayments & Savings
 - *LIC payment \$2,600 per year for 20 years*
 - *Total payments \$52,000*
 - *Total 20-year savings at least \$53,100*

Oakville Home Energy Retrofit Feasibility Study

Retrofit - Content and Cost - Furnace Replacement

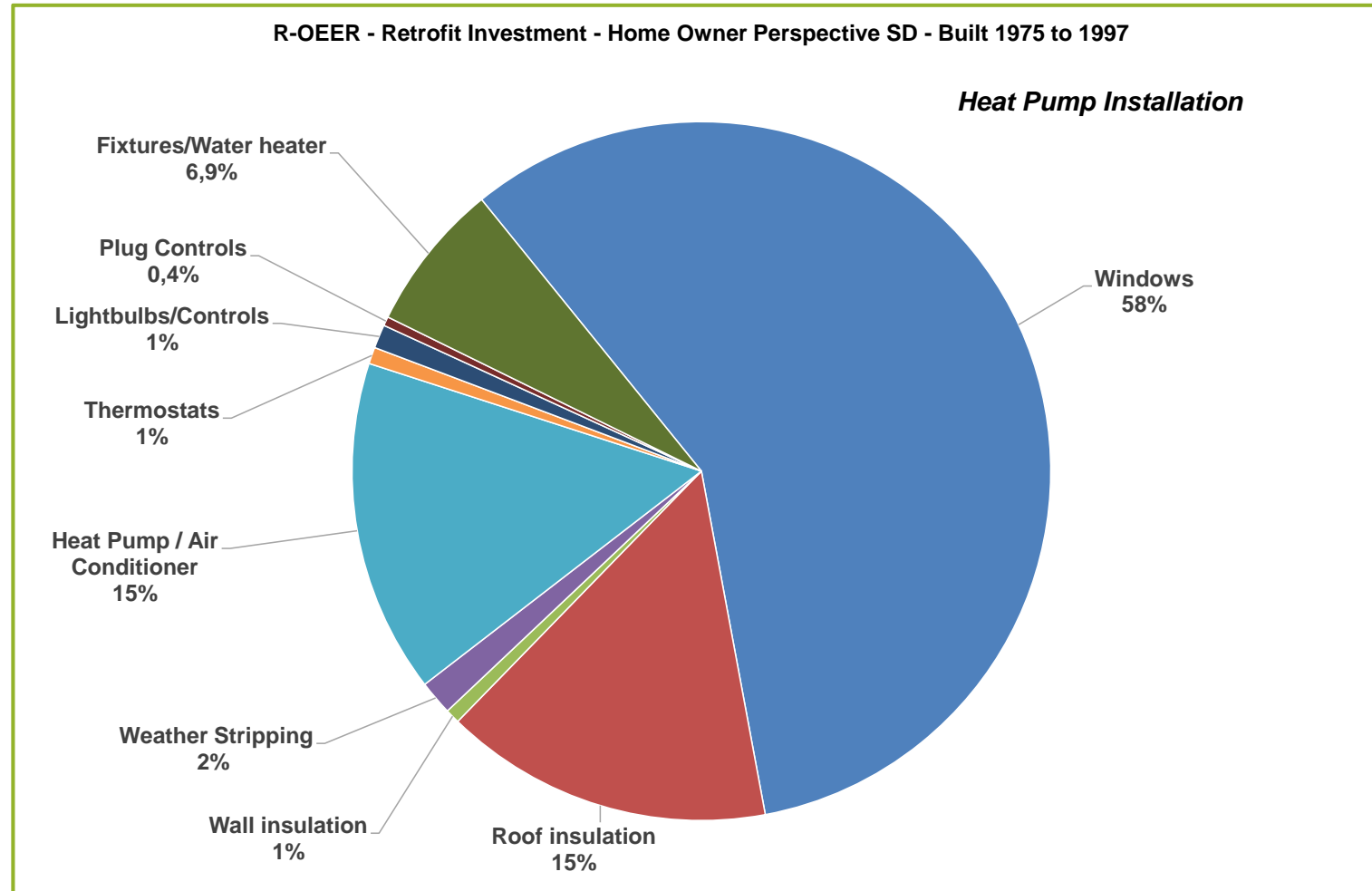


Report Notes

- From Home Retrofit Feasibility Study
- This shows the cost breakdown by installed measures of the Core Retrofit package with the more efficient type replacement of the gas heater and AC.
- Note the windows have a UI value less than 1.0. The volume effect has the potential to bring these costs closer to the lower global benchmarks.

Oakville Home Energy Retrofit Feasibility Study

Retrofit - Content and Cost - Heat Pump Installation

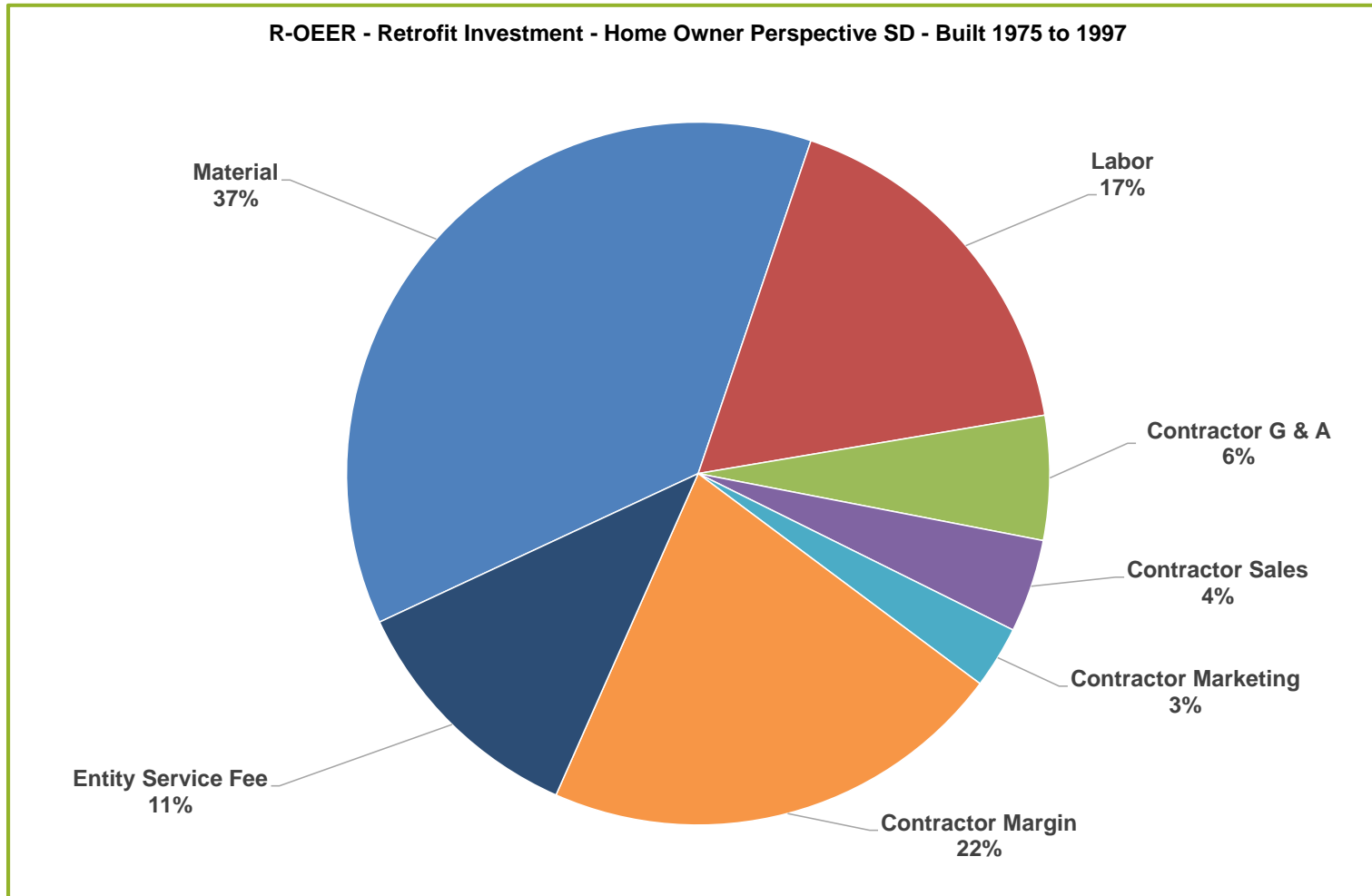


Report Notes

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- This shows the cost breakdown by installed measures of the Core Retrofit package with a heat pump replacing the furnace and AC.
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Oakville Home Energy Retrofit Feasibility Study

Retrofit – Use of Funds

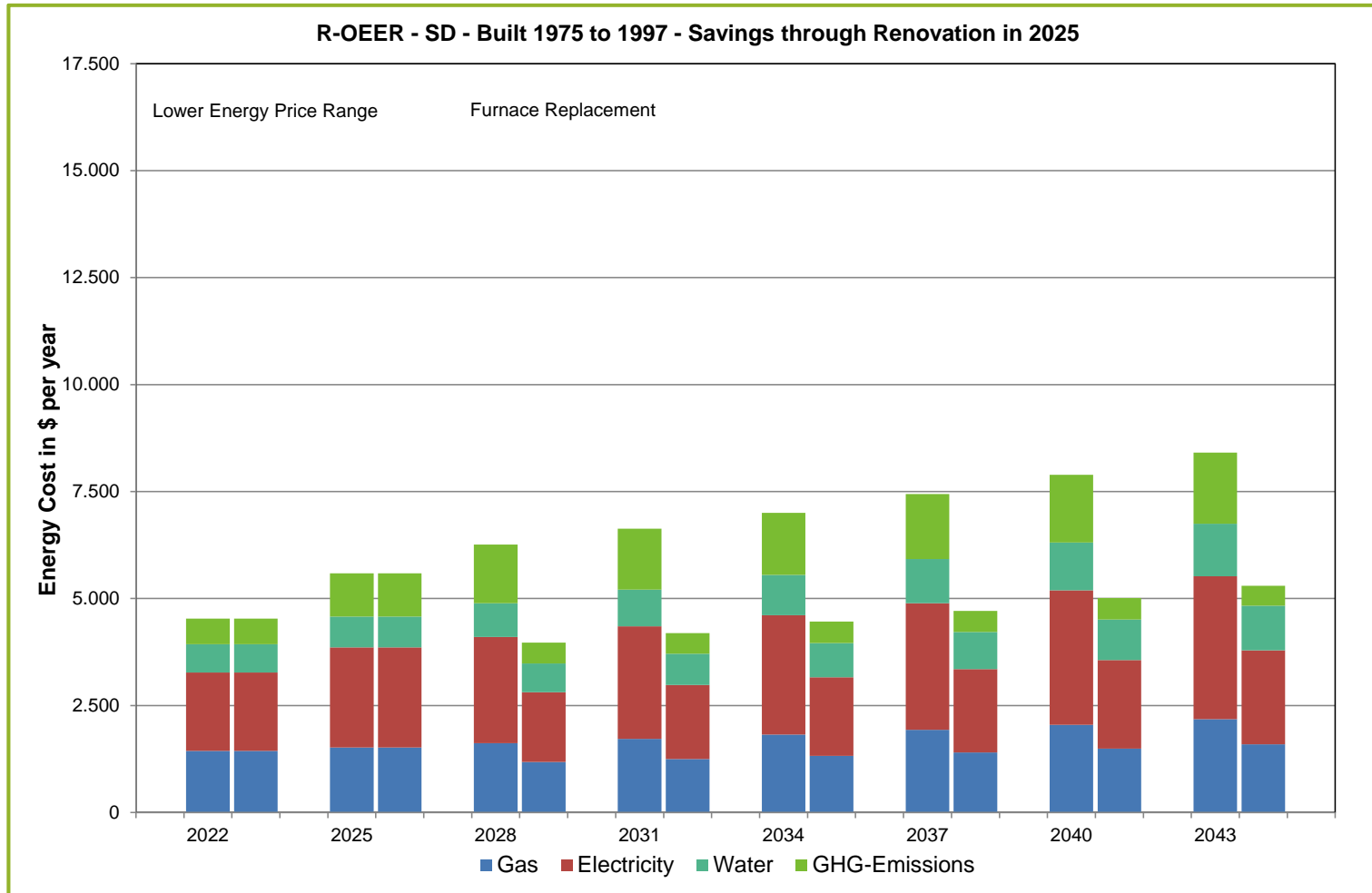


Report Notes

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- Note: The service fee is the primary revenue for the Entity that covers all its operating cost and investor returns.

Oakville Home Energy Retrofit Feasibility Study

Retrofit – Before & After (Furnace Replacement)

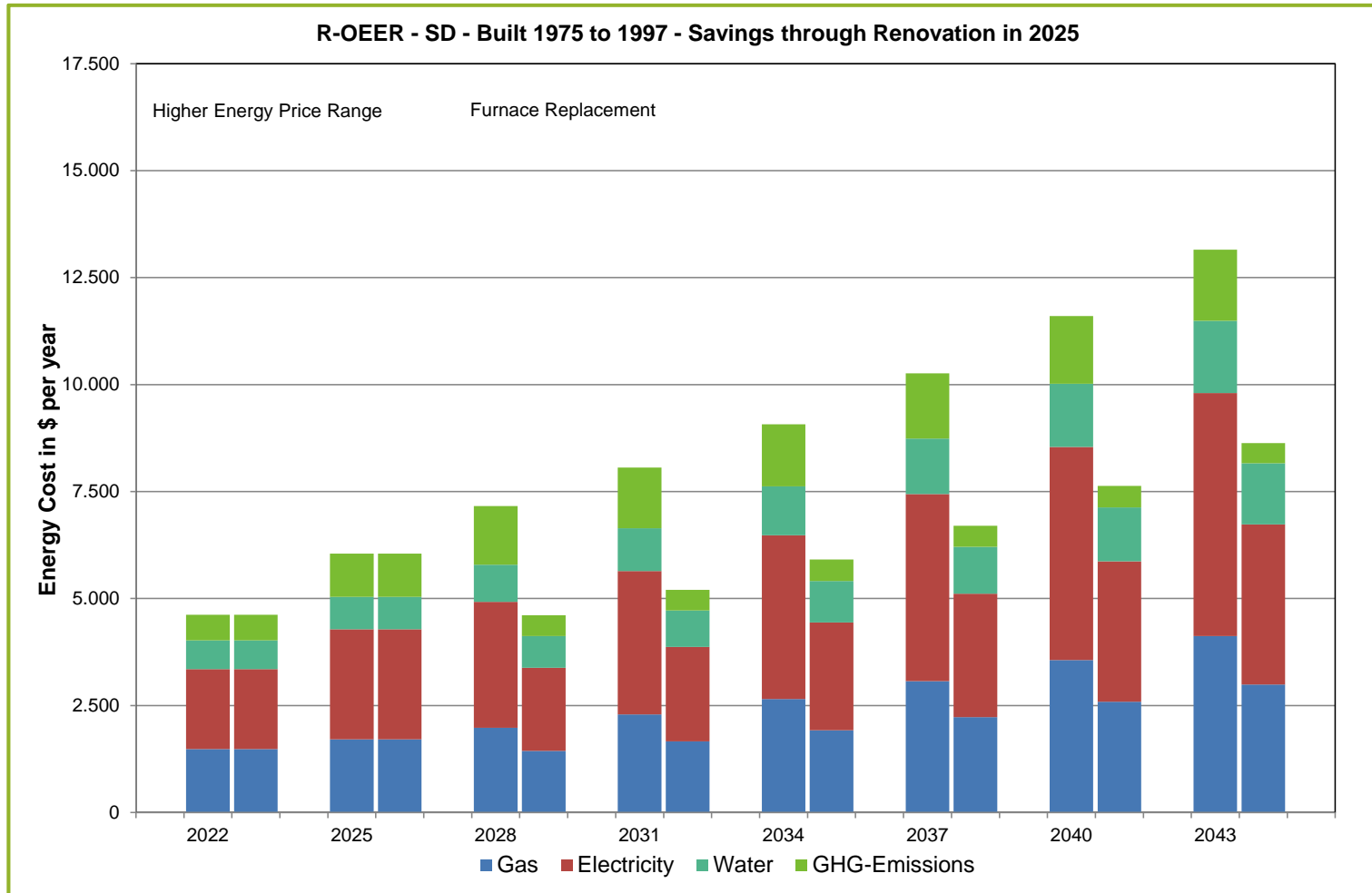


Report Notes

- From Home Retrofit Feasibility Study
- This shows the expected lower price profile for homeowner's yearly utility and GHG costs over the 20-year term of the Retrofit loan for a newer detached home.
- The left-hand columns are the costs without the retrofit. The right-hand columns are with the retrofit.
- Note: This is for the retrofit with more efficient type replacements for furnace and AC.

Oakville Home Energy Retrofit Feasibility Study

Retrofit – Before & After (Furnace Replacement)

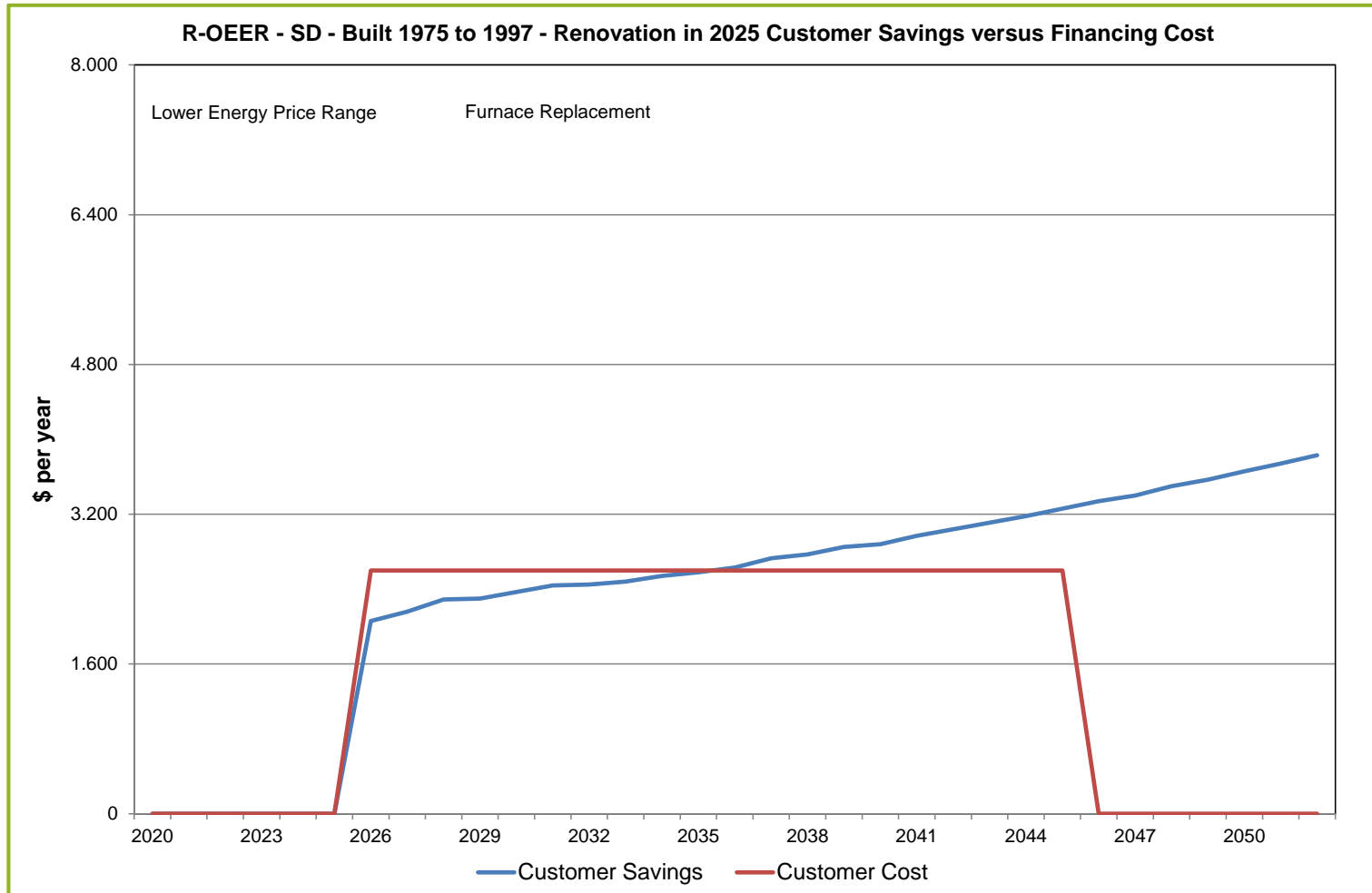


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Oakville Home Energy Retrofit Feasibility Study

Retrofit – Before & After (Furnace Replacement)

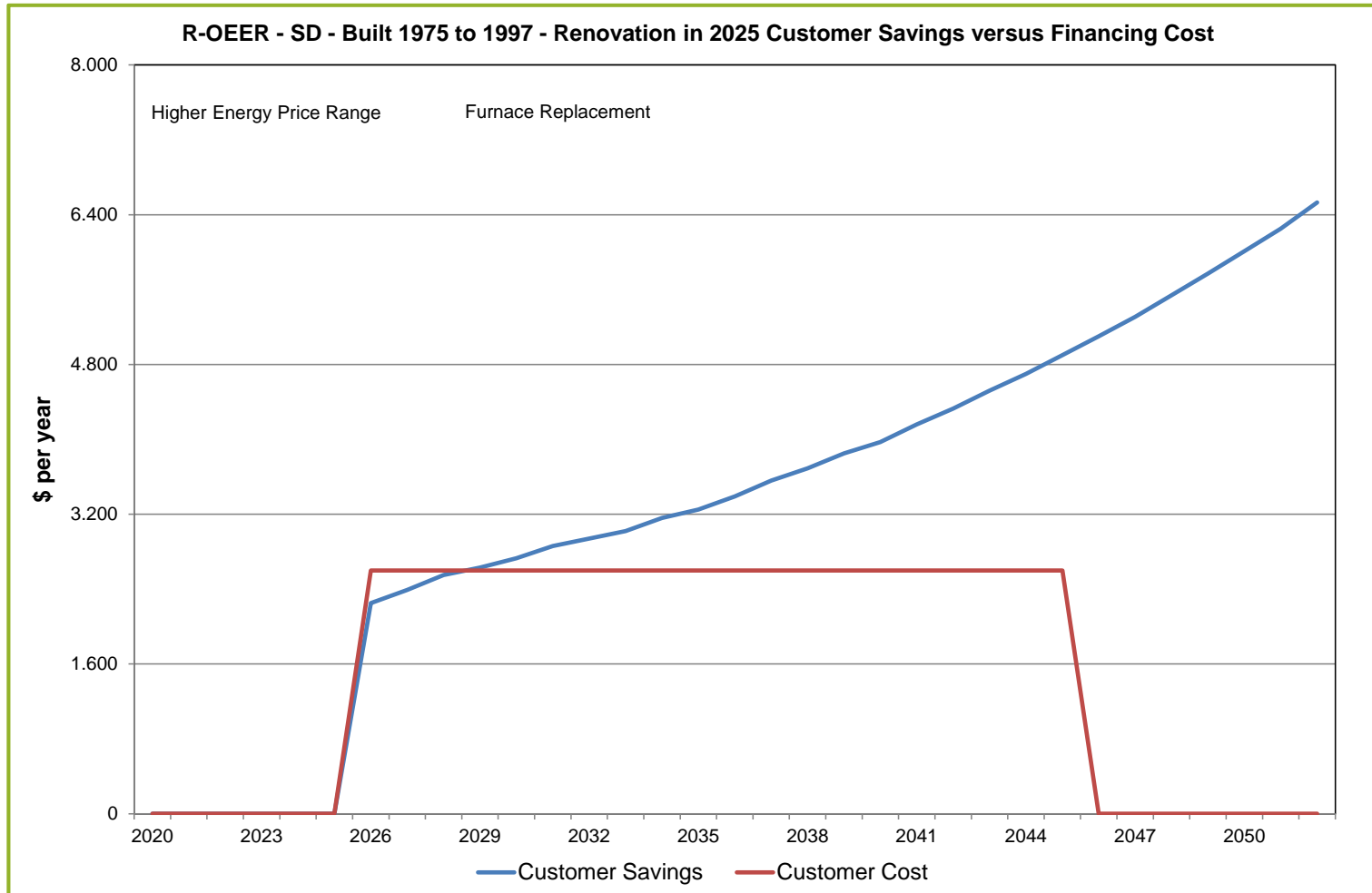


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Oakville Home Energy Retrofit Feasibility Study

Retrofit – Before & After (Furnace Replacement)

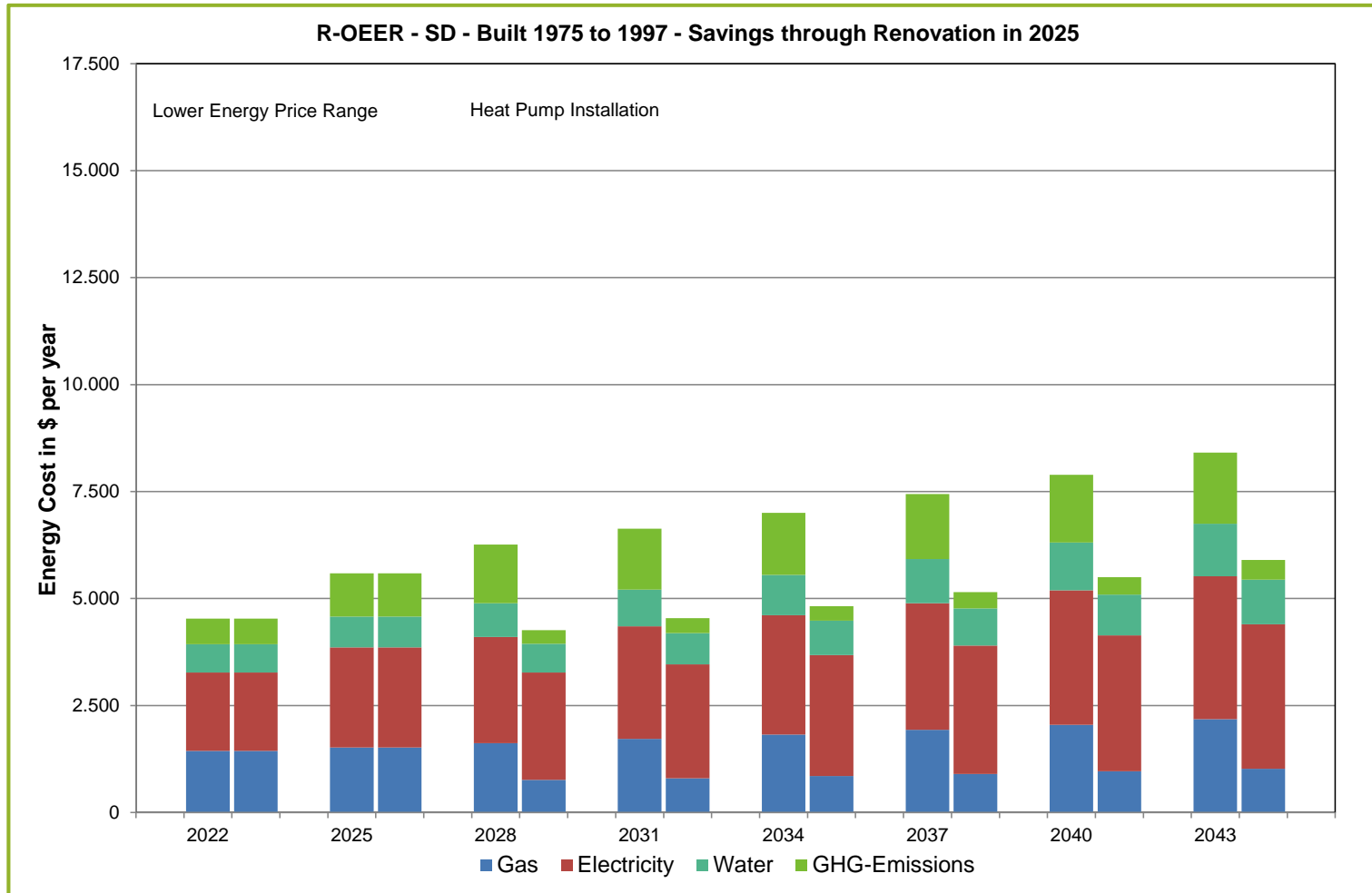


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Oakville Home Energy Retrofit Feasibility Study

Retrofit – Before & After (Heat Pump Installation)

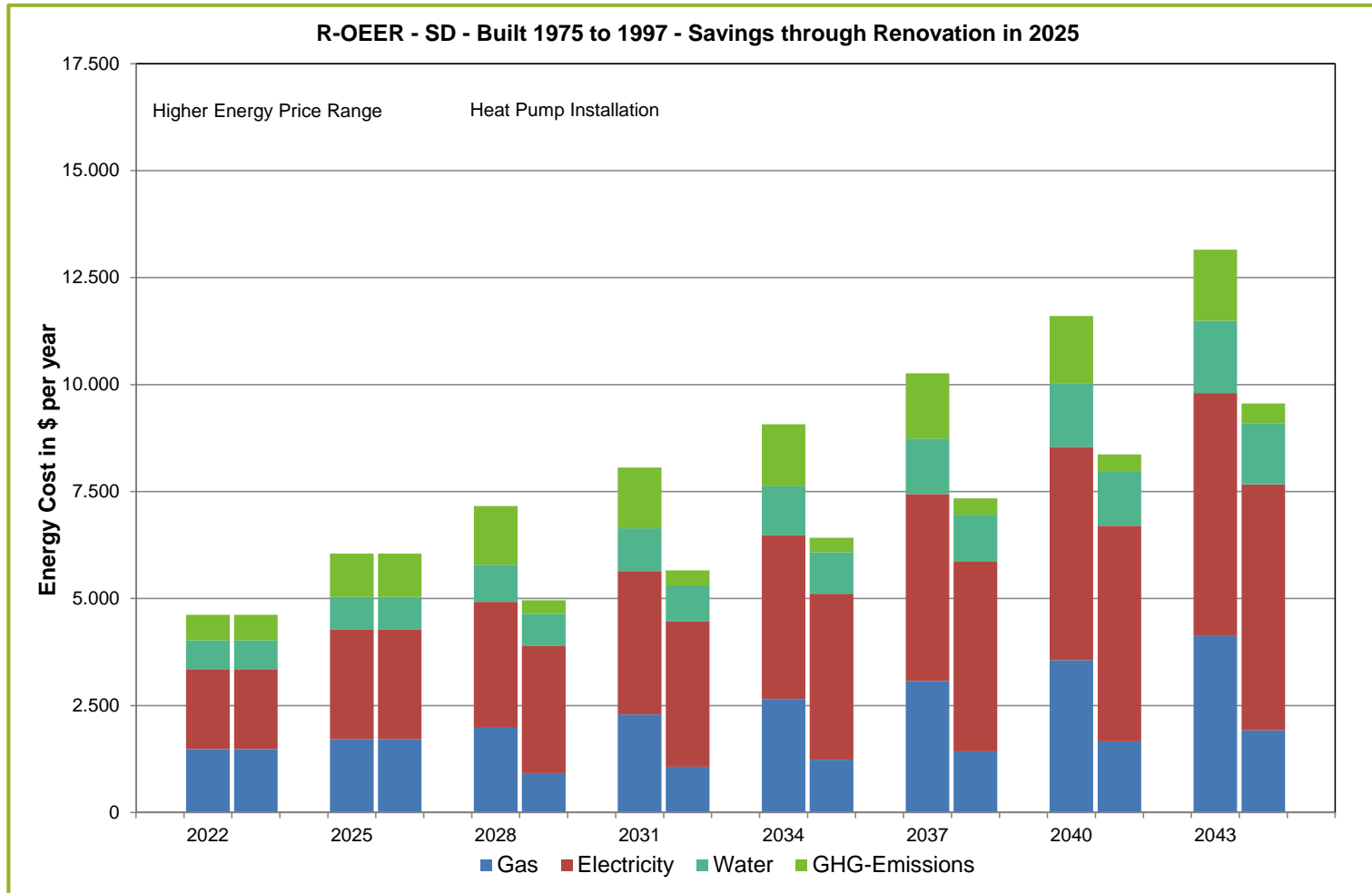


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- Note: This is for a retrofit with a heat pump replacement for the furnace and AC.

Oakville Home Energy Retrofit Feasibility Study

Retrofit – Before & After (Heat Pump Installation)

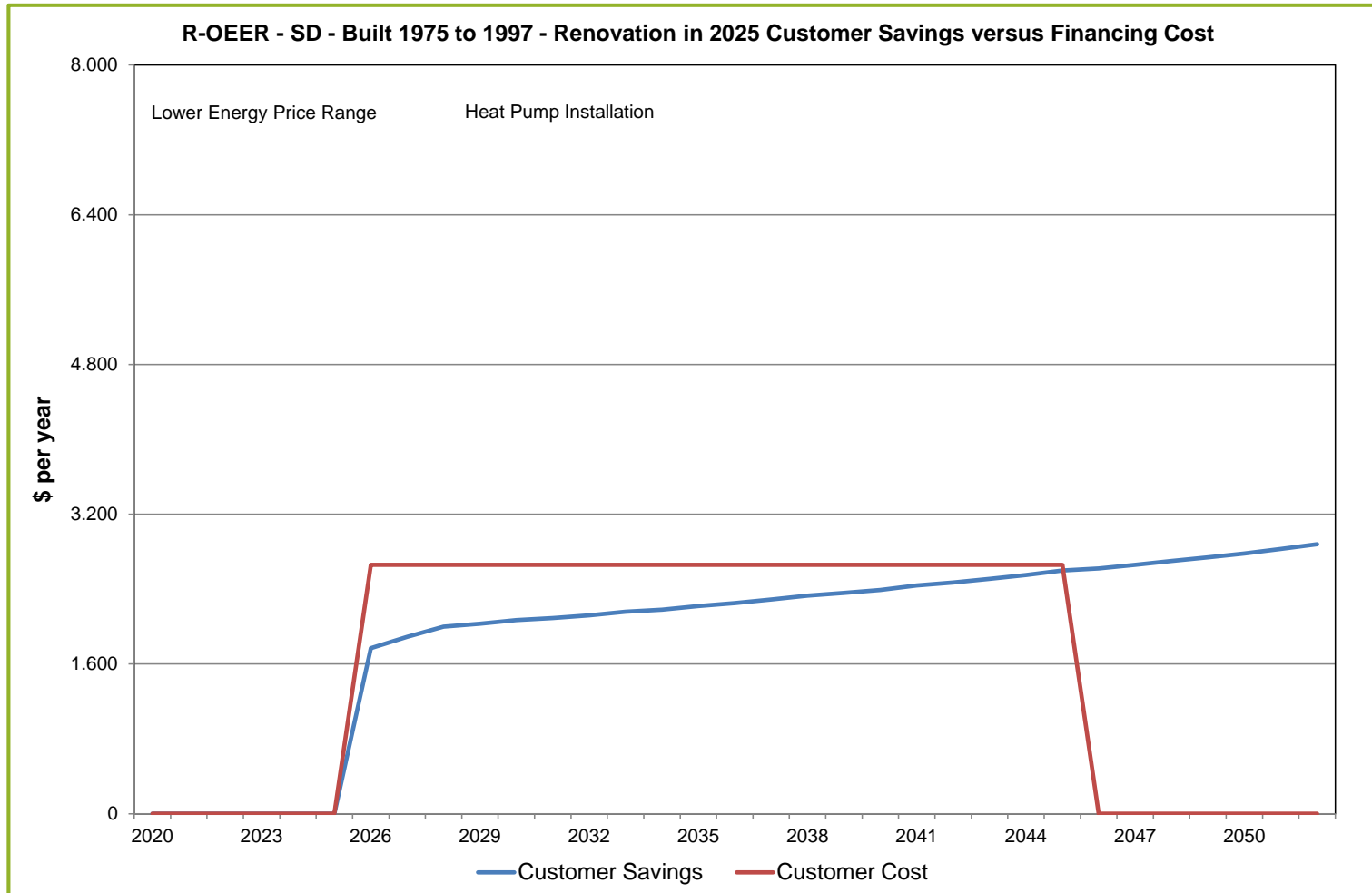


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Oakville Home Energy Retrofit Feasibility Study

Retrofit – Before & After (Heat Pump Installation)

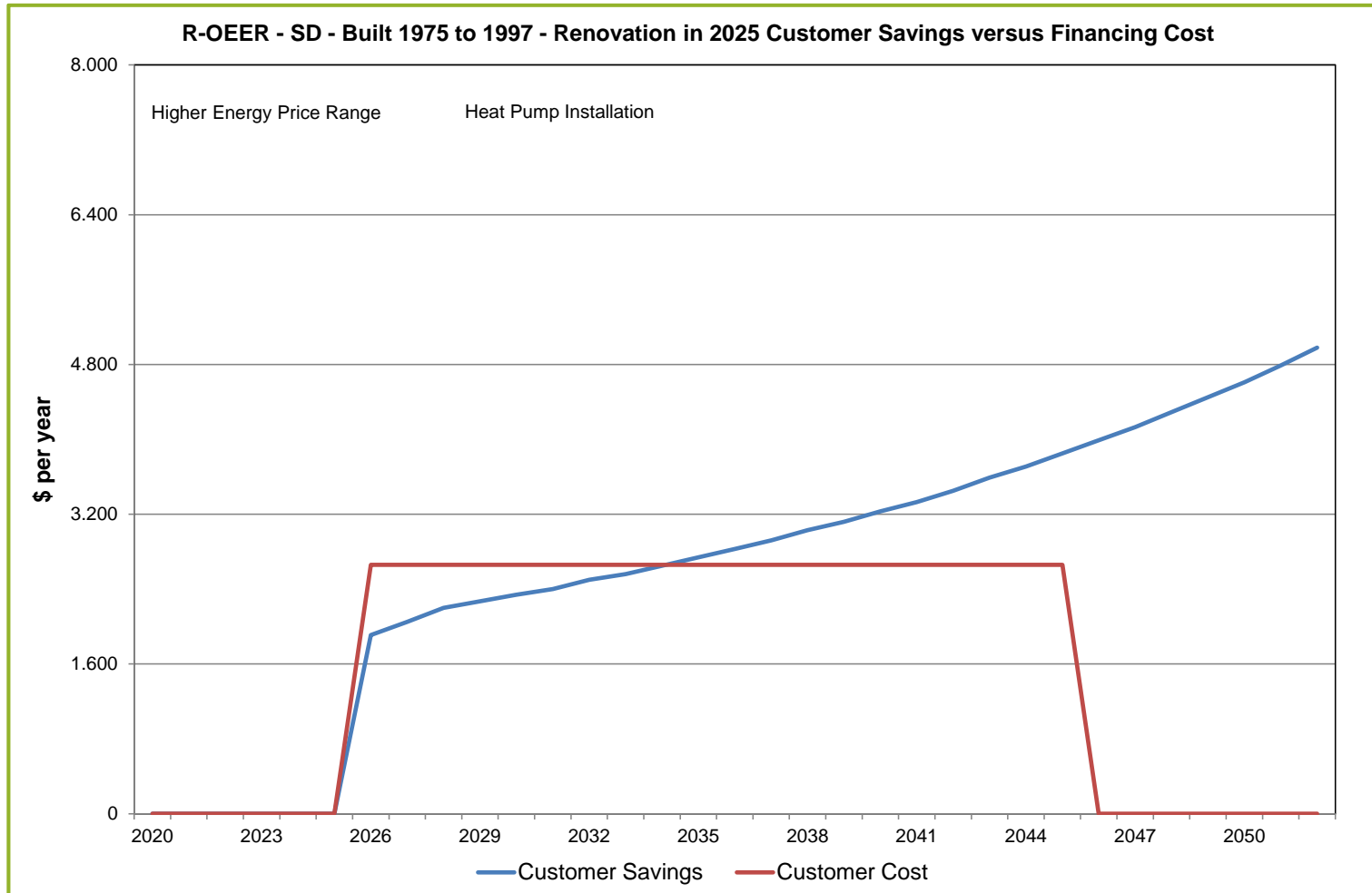


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Oakville Home Energy Retrofit Feasibility Study

Retrofit – Before & After (Heat Pump Installation)



Report Notes

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- Note: This is for a retrofit with a heat pump replacement for the furnace and AC.

THANK YOU