



# CITY OF CAMBRIDGE GHG Reduction Feasibility Study

## SUMMARY

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# Project Summary

## Overview

- WalterFedy was engaged by the City of Cambridge to complete GHG Reduction Feasibility Studies at ten (10) of the City's facilities, compliant with the **FCM Community Buildings Retrofit** initiative
- **Objectives:** Conduct site surveys and create calibrated energy models with end-use profiles for each facility. Identify and analyze measures that reduce utility use, greenhouse gas (GHG) emissions and utility costs.
- The analysis evaluated multiple GHG reduction pathways, ultimately recommending the **FCM Minimum Performance Roadmap** as the preferred pathway.
- **The FCM Minimum Performance Roadmap** seeks to achieve a **50%** reduction in operational GHG emissions within **10 years**, and **80%** within **20 years** of the analysis baseline.

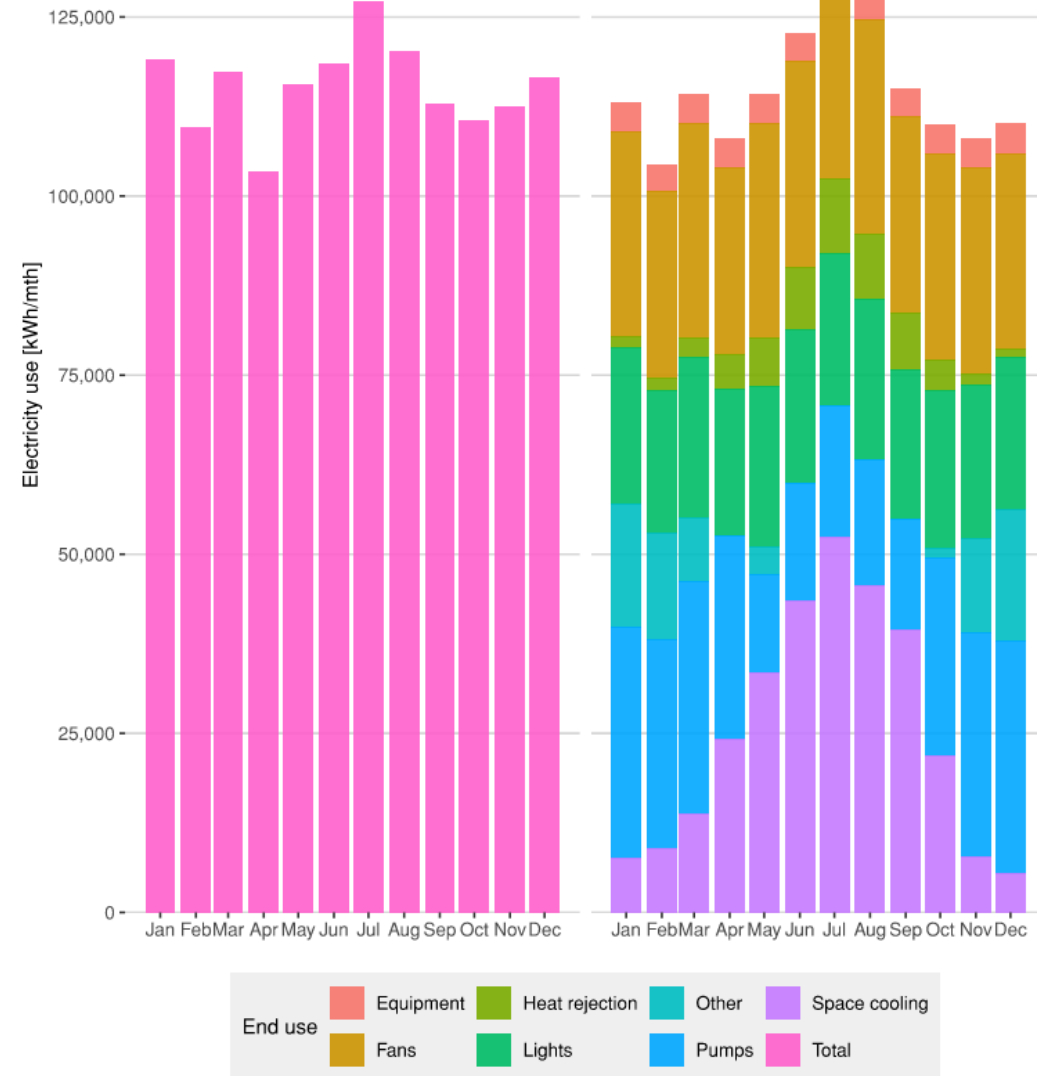
## Facilities

- Bishop Operations Centre
- Cambridge City Hall
- David Durward Centre and Cambridge Centre for the Arts
- Dickson Centre Arena
- Duncan McIntosh Arena
- Allan Reuter Centre and Fire Station 3
- Galt Arena Gardens
- Hespeler Memorial Arena
- Queens Square Library
- WG Johnson Centre

# Energy Modelling

## Considerations:

- Existing equipment
- Existing building drawings
- Metered utility data
- Air tightness testing
- Engineering calculations



# Recommended Measures

## Fuel Switching

- HVAC low GHG alternatives

## Renewable energy

- Adding on-site renewable energy generation sources (Solar PV)

## Envelope upgrades

- Replacement of roofs, walls, windows and doors with high performing
- Air sealing

## Refrigeration

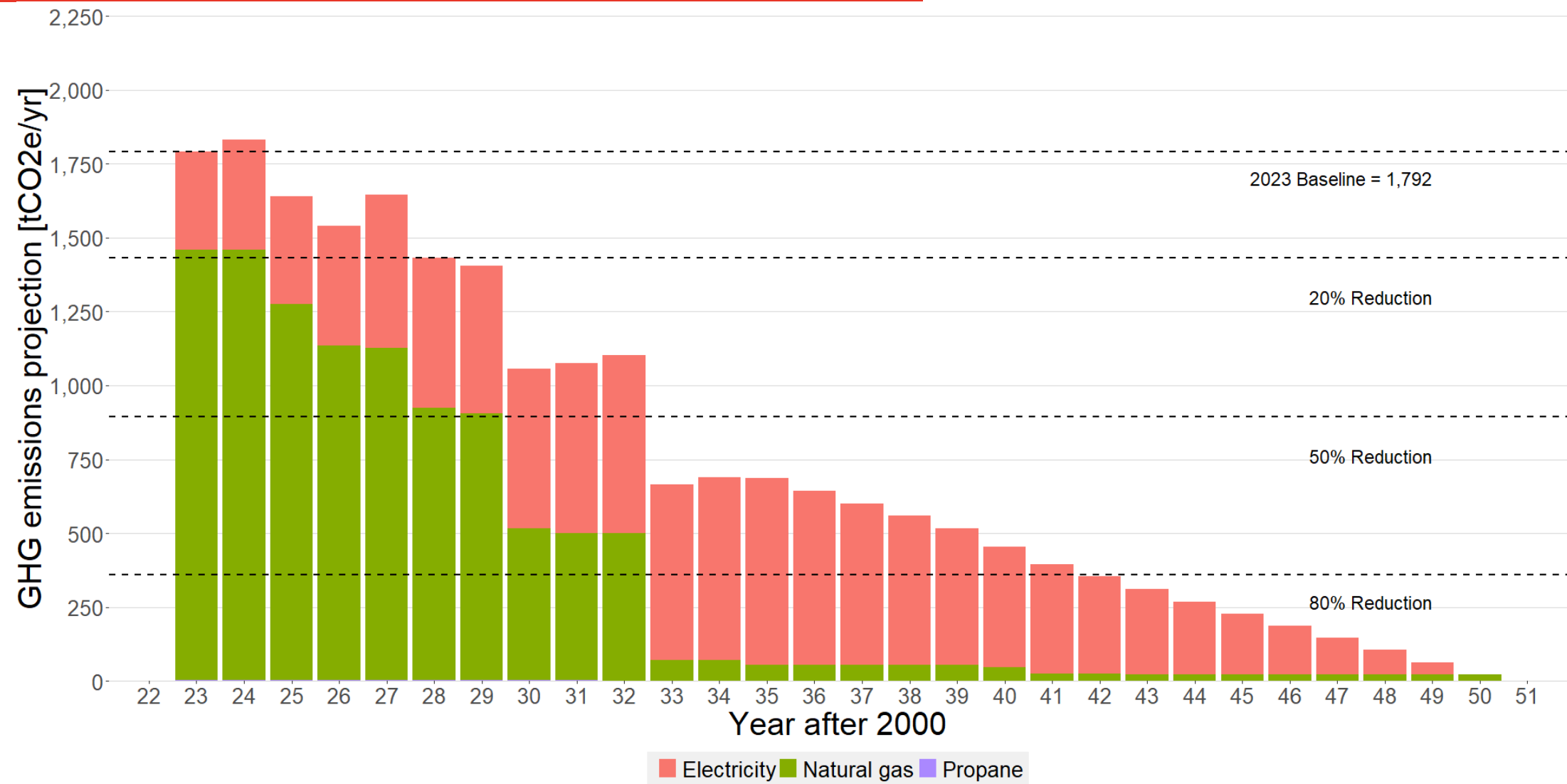
- Cold water flooding
- Compressor upgrades
- Dehumidification upgrades

## Optimization

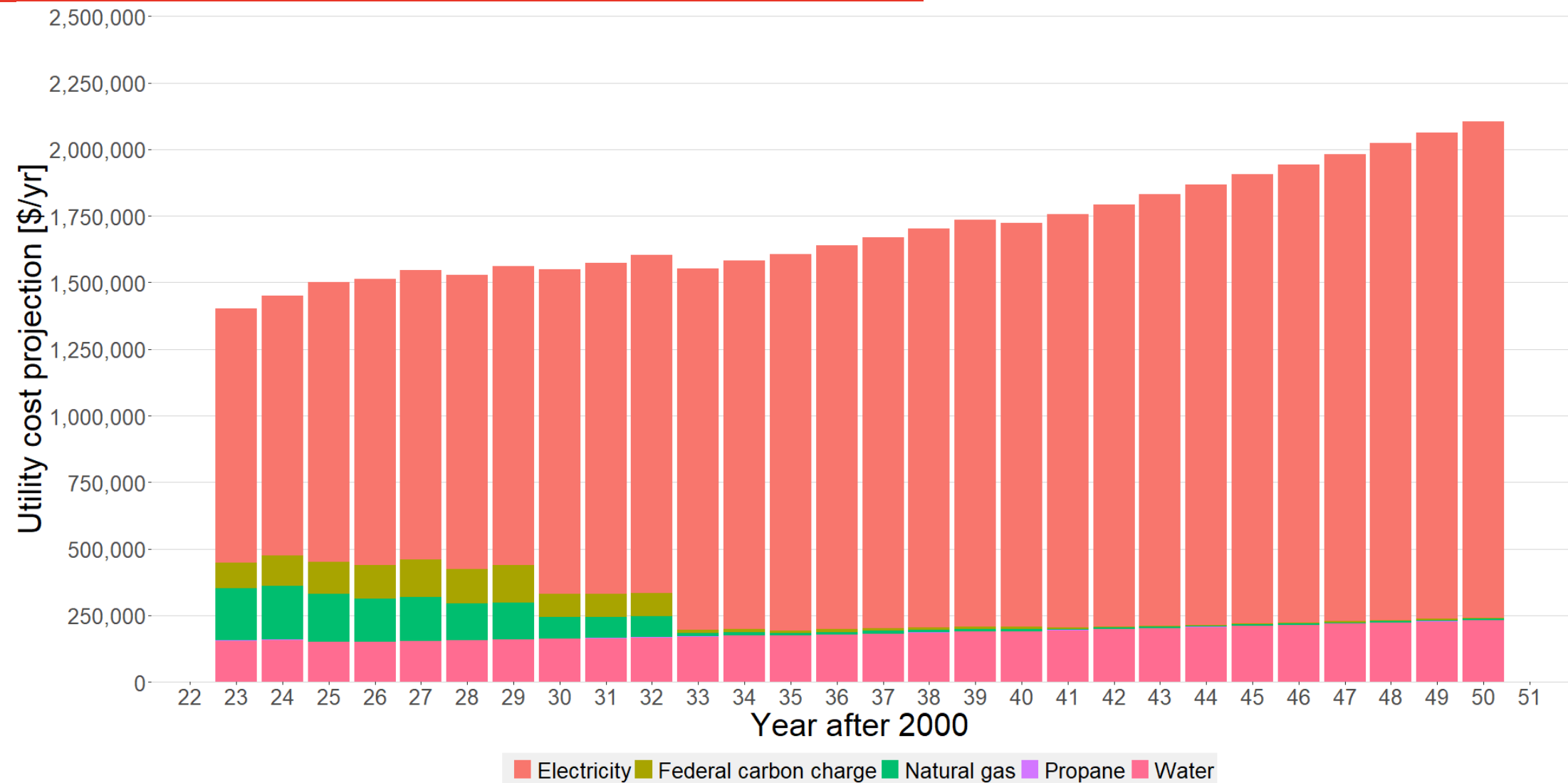
- Recommissioning of existing systems
- Energy recovery
- Installation of VFDs
- LED lighting and enhanced controls
- Low-flow water fixtures



# Portfolio Projections: GHGs and utility cost



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# Results

Section	Description	Unit	Business as usual	FCM minimum performance	Reduction
2050 GHG emissions	Total GHGs	[tCO <sub>2</sub> e/yr]	1,459	22.4	1,436
2050 utility costs	Total utility cost	[\$/yr]	2,478,282	2,105,160	373,123
GHG emissions cumulative	Total GHGs	[tCO <sub>2</sub> e]	50,838	21,530	29,308
Financial cumulative	Life cycle cost	[\$]	36,643,910	50,744,938	-14,101,028

# Conclusion

## Summary:

- **Utility use:** The FCM Minimum Performance Roadmap will result in higher electricity usage but a substantial reduction in natural gas consumption (remaining natural gas use is due to backup heat)
- **Utility costs:** Despite an increase in electricity consumption, the FCM Minimum Performance Roadmap leverages higher efficiencies in conjunction with reduced natural gas use which results in reduced total annual utility costs.
- **GHG emissions:** The FCM Minimum Performance Roadmap reduces emissions according to the requirements of the application. Lifetimes of existing equipment were considered wherever possible.
- **Financial impact:** The life cycle costs for the FCM Minimum Performance roadmap are \$14 million more than the “Business as usual” (BAU) case. BAU represents like-for-like replacements as indicated by the City’s capital management plan.
- **Next steps:** The completion of this feasibility study enables the City to apply for further FCM funding for retrofit project implementation through the Community Buildings Retrofit initiative.