CORPORATE CLIMATE CHANGE ACTION PLAN (CCAP)

Prepared For: Town of Grimsby

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Acknowledgements

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In particular, the Town acknowledges the contributions of:

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- Sarah Sweeney, Director of Community Services
- Christina Davidson, Communications Lead

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The Town acknowledges the members of the Green Advisory Committee for their feedback, which helped inform and strengthen the Plan. The Town also acknowledges the residents who participated in the public survey hosted on the Let's Talk Grimsby platform, whose input provided valuable perspective on local climate impacts, risks, and priorities.

The collective contributions of all have been instrumental in advancing the Town of Grimsby's approach to climate action.

List of Acronyms

ASHP: Air-Source Heat Pump

BAU: Business-As-Usual

BAS: Building Automation System

BCA: Building Condition Assessment

BESS: Battery Energy Storage System

CCAP: Corporate Climate Change Action Plan

CPTED: Crime Prevention Through Environmental Design

CCRA: Climate Change Risk Assessment

CO_2e: Carbon Dioxide Equivalent

CRI: Climate Risk Institute

DHW: Domestic Hot Water

ECDMP: Energy Conservation and Demand Management Plan

ECM: Energy Conservation Measure

EMS: Energy Management System

EUI: Energy Use Intensity

EV: Electric Vehicle

EVAP: Electric Vehicle Affordability Program

ePTO: Electric Power Take-Off

FCM: Federation of Canadian Municipalities

GHG: Greenhouse Gas

GSHP: Ground-Source Heat Pump (Geoexchange)

HRV: Heat Recovery Ventilator

HVAC: Heating, Ventilation, and Air Conditioning

ICE: Internal Combustion Engine

ICLEI: International Council for Local Environmental Initiatives

IESO: Independent Electricity System Operator

IEAP: International Local Government Greenhouse Gas Emissions Analysis Protocol

KPI: Key Performance Indicator

LAM: Local Area Municipality

LED: Light-emitting diode

NIR: National Inventory Report

NRCan: Natural Resources Canada

O.Reg: Ontario Regulation

PCP: Partners for Climate Protection

PIEVC: Public Infrastructure Engineering Vulnerability Committee

PV: Photovoltaic

TAF: The Atmospheric Fund

tCO_2e: Tonnes of Carbon Dioxide Equivalent

V2B: Vehicle-to-Building

VFD: Variable Frequency Drive

VRF: Variable Refrigerant Flow

ZEV: Zero-Emission Vehicle

ZEVIP: Zero Emission Vehicle Infrastructure Program

Plan Context and Implementation Considerations

This CCAP is intended to provide a practical framework to guide the Town's approach to reducing greenhouse gas emissions from municipal operations. As with all long-term plans, its implementation will occur within the context of evolving conditions and competing priorities.

Several key variables that influence climate action are expected to change over time. These include the availability and cost of low-carbon technologies, access to external funding and incentives, energy prices, regulatory requirements, and broader economic conditions. As a result, the pathway to achieving the Town's emissions reduction target will not be static and will require ongoing evaluation and adjustment.

The emissions reduction target and associated actions outlined in this Plan are designed to be ambitious while remaining achievable within the Town's operational context. The approach is consistent with other municipal CCAPs across Ontario, particularly in its emphasis on aligning emissions reductions with asset replacement cycles and using life-cycle costing to inform decision-making.

At the same time, the achievability and pace of implementation will ultimately be influenced by Council priorities, available budgets, staff capacity, and the need to maintain service levels for residents. Climate action is one of several important considerations that must be balanced within municipal decision-making.

This Plan is therefore intended to guide the Town's actions within that broader context. It provides a structured and evidence-based approach to support informed decisions, while maintaining the flexibility needed to adapt to changing conditions over time.

Executive Summary

The Town of Grimsby's Corporate Climate Action Plan (CCAP) sets out a practical and evidence-based approach to reducing greenhouse gas emissions from municipal operations. The Plan supports Council's Strategic Priorities by promoting long-term financial sustainability, protecting municipal assets and services, and strengthening the Town's ability to respond to climate-related risks.

The CCAP aligns with federal and provincial climate policy, including Canada's national climate commitments and Ontario's energy and emissions frameworks. It also supports Grimsby's participation in the Partners for Climate Protection program and aligns with existing corporate policies, asset management planning, and financial planning processes. This alignment ensures that climate action is integrated into routine decision-making across the organization.

The Plan is informed by a Climate Risk Assessment and a Cleantech Sector Assessment. The Climate Risk Assessment evaluated how projected climate conditions may affect municipal infrastructure, operations, and service delivery. Priority risks include extreme heat, increased intensity of rainfall and flooding, and more frequent severe weather events. Community input gathered through a public survey supported many of these findings by identifying similar climate-related concerns. The Cleantech Sector Assessment identified commercially available low carbon technologies that are suitable for municipal use and informed the selection of feasible and implementable actions.

Grimsby has already made progress on climate action through the Partners for Climate Protection program. The Town completed Milestone 1 by developing a corporate greenhouse gas emissions inventory for the baseline year of 2023. Total corporate emissions in the baseline year were **1,057 tonnes of carbon dioxide equivalent (tCO_2e)**. Based on this inventory, the Town adopted a target to reduce corporate greenhouse gas emissions by **30 percent below 2023 levels by 2035**.

The CCAP identifies a set of actions designed to achieve the emissions reduction target. These actions focus on electrifying heating systems in municipal facilities, electrifying the municipal light-duty fleet, and improving energy efficiency. Where possible, actions are aligned with planned asset replacement schedules to maximize economic value.

The Plan estimates an incremental low carbon cost of **$2.19 million through to 2035**. This low carbon premium represents the additional cost of selecting low carbon solutions over business-as-usual replacements at the time of asset renewal. It is supported by recommended corporate policies intended to enable consistent and coordinated implementation.

Cost and implementation considerations are addressed to support effective delivery of the Plan. These include coordination with asset management and capital planning cycles, availability of funding and incentives, internal capacity and resourcing, and the need to balance emissions reductions with service levels and affordability. The CCAP

recognizes that actions will be implemented over time and emphasizes the importance of prioritization and flexibility as conditions and technologies evolve.

The Plan also provides recommendations for monitoring, reporting, and continuous improvement. Regular tracking of greenhouse gas emissions and progress on implementation will support accountability and allow the Town to adjust actions as needed. Reporting through the Partners for Climate Protection program and internal corporate processes will ensure transparency and support ongoing decision-making.

Overall, the CCAP provides Grimsby with a clear framework to reduce corporate emissions, manage climate-related risks, and integrate climate considerations into long-term planning and investment decisions. It builds on actions already underway and positions the Town to make informed, strategic choices that support its long-term objectives.

1. Introduction

Nestled between the Niagara Escarpment and Lake Ontario, the Town of Grimsby offers a scenic landscape of vineyards, orchards, and woodlands. Its compact, walkable downtown is the centre of community life, showcasing local businesses and a lively arts scene. Neighbourhoods are thoughtfully-designed around parks and schools, connected by trails that link the waterfront to the escarpment, giving Grimsby a unique identity within the Niagara corridor. The town depends on Ontario's electricity grid to support municipal services and primarily uses natural gas for heating.

Figure 1 - Aerial View of Grimsby Lakeside Neighbourhoods

As of 2021, Grimsby has an estimated population of about 28,900 residents[1], with an annual growth rate of approximately 1.2 percent. Covering 69 km^2, the town has a population density of roughly 420 residents per square kilometre. Grimsby features a mix of residential neighbourhoods, agricultural land, and commercial districts, all centred around a lively urban core.

The Town of Grimsby's municipal services are provided by roughly 160[2] dedicated employees across various departments including Public Works, Community Services, Fire Services, and Administration. This workforce is responsible for operating and maintaining buildings and infrastructure, managing programs and services, and supporting the daily operations essential to community life.

[1] Statistics Canada - 2021 Census Population of Grimsby, ON
[2] Town of Grimsby - 2025 Consolidated Budget

1.1 Alignment with Internal and External Legislation and Policy

The CCAP aligns with the Town of Grimsby's strategic vision and with broader provincial, federal, and international climate commitments. It provides a framework for coordinated municipal action that complements and reinforces policies and plans already adopted by the Town and its regional and national partners.

Figure 2 - CCAP Alignment[3,4,5]

Council's Strategic Priorities

The CCAP directly supports Council's vision of "*an innovative, vibrant community where people and the environment matter*". It advances the Responsible and Progressive Growth priority by fostering vibrant neighbourhoods while protecting and promoting the natural environment, and supports Collective Prosperity through sustainable, fiscally responsible asset management. Actions that improve energy efficiency, reduce emissions, and build climate resilience also enhance High Quality of Life by ensuring safe, healthy, and inclusive public spaces.

Energy Conservation and Demand Management Plan

The CCAP complements the Town's Energy Conservation and Demand Management Plan (ECDMP), which fulfills the requirements of Ontario Regulation (O.Reg) 25/23 and establishes energy-reduction targets and facility-level measures to reduce consumption and emissions. The ECDMP identifies municipal facilities such as the Major Refrigeration Peach King Centre and the Town Hall/Municipal Office as key opportunities for efficiency upgrades, aligning with the CCAP's broader mitigation and adaptation goals.

Asset Management Plan

The Town's Asset Management Plan integrates climate change considerations into infrastructure planning, recognizing energy efficiency, asset resilience, and emissions reduction as core components of responsible lifecycle management. The CCAP reinforces this approach by identifying decarbonization actions that sustain service levels and can reduce operational costs over time.

[3] Pan-Canadian Framework on Clean Growth and Climate Change
[4] Canadian Net-Zero Emissions Accountability Act
[5] Canada's Approach for Implementing the Paris Agreement

Official Plan

The Grimsby Official Plan commits to environmental stewardship through policies on Energy Conservation and Climate Change, encouraging sustainable building design, active transportation, and the protection of natural systems. The CCAP builds on these directives by providing measurable corporate actions and targets that advance the Plan's goal of maintaining a healthy, resilient community.

Regional Plans

The CCAP aligns with Niagara Region's ECDMP (2024–2028) and CCAP (2025), which set out a regional framework for achieving Net-Zero emissions by 2050 and strengthening corporate energy performance. Grimsby's CCAP aligns with and complements regional objectives by demonstrating local leadership, and investigating opportunities for collaboration.

Provincial and Federal Frameworks

Provincially, the CCAP supports O.Reg 25/23 and O.Reg 588/17 (Asset Management Planning), ensuring that energy and climate considerations are integrated into municipal operations and reporting. Nationally, it aligns with the Pan-Canadian Framework on Clean Growth and Climate Change and Canada's Net-Zero Emissions Accountability Act, both of which operationalize commitments under the Paris Agreement (2015) to limit global temperature rise to well below 2°C.

Together, these alignments ensure that the Town of Grimsby's CCAP functions as both a local implementation tool and a bridge to regional, provincial, and national climate objectives - positioning the Town as a proactive, collaborative partner in the transition to a low-carbon, climate-resilient future.

2. Background and Local Context

2.1 The Greenhouse Effect and What it Means for Grimsby

The greenhouse effect is the natural process that keeps our planet warm. Gases like carbon dioxide and methane trap some of the sun's heat in the atmosphere, much like a blanket around the Earth. Without this effect, the average global temperature would be about -18°C instead of the comfortable 15°C we experience today[6].

Human activities have increased the amount of these gases in the air. This extra buildup of heat-trapping gases is warming the planet and changing our climate. For Grimsby, these global changes show up locally as hotter summers, heavier rainfall, and more freeze–thaw cycles that wear down roads and buildings.

Appendix A of this CCAP, the Town's Climate Change Risk Assessment (CCRA), describes these impacts in more detail. This risk assessment uses regional, down-scaled climate projections from the Toronto and Region Conservation Authority (2022) to show that by the 2080s, Niagara's average temperature could rise by 3.6°C (compared to the 1971-2000 baseline), with nearly four times more very hot days and about 10 percent more annual rainfall.

In addition to the technical analysis, community perspectives gathered through an online public survey conducted as part of the CCAP development process support many of the CCRA's findings. As summarized in Appendix B, residents frequently identified extreme heat, flooding from heavy rainfall, and power outages during severe weather as key concerns, reinforcing the relevance of the priority risks identified through the assessment.

These changes will continue to affect local infrastructure, services, and community health if not addressed.

2.2 The Business Case for Climate Action

Taking action on climate change is not just good for the environment - it makes financial sense. Improving building insulation and controls, cutting back on fossil fuel use, and switching to electric vehicles can significantly lower the Town's energy and fuel bills. These upgrades also help avoid unexpected repair costs and extend the life of valuable assets.

Across Canada, energy efficiency is one of the fastest-growing job markets. The federal 2030 Emissions Reduction Plan highlights that cutting GHG emissions supports clean-technology growth and creates local employment opportunities[7]. By investing in low-

[6] What is the greenhouse effect? - NASA Science
[7] 2030 Emissions Reduction Plan: Clean Air, Strong Economy

carbon buildings and equipment, Grimsby can reduce its operating costs and help create skilled jobs in construction, retrofits, and clean-energy services within the region.

2.2.1 Healthier, Cleaner, and More Resilient Communities

Reducing emissions can also improve quality of life. Fewer fossil fuel systems mean less local air pollution and fewer heat-related health problems. Green infrastructure such as trees, rain gardens, and permeable pavement helps manage stormwater, improve water quality, and cool neighbourhoods during heatwaves.

In Grimsby, these benefits are especially valuable along the lakeshore and escarpment, where heavy rain and runoff already put pressure on drainage systems.

As the Climate Risk Assessment outlines, climate change will make these events more frequent. Investing in low-carbon and nature-based solutions today helps protect public health, maintain reliable services, and preserve the Town's natural character.

2.2.2 Synergies between Mitigation and Adaptation

Climate actions generally fall into two categories: mitigation and adaptation.

Mitigation focuses on reducing greenhouse gas emissions to limit the extent of future climate change. Examples include improving energy efficiency, electrifying heating systems and vehicles, and implementing renewable energy.

Adaptation focuses on preparing for and responding to the impacts of climate change to reduce risk and maintain service levels. Examples include upgrading stormwater infrastructure, enhancing building cooling systems, and improving backup power for critical facilities.

Many actions can deliver both mitigation and adaptation benefits:

- A deep energy retrofit can reduce GHGs while keeping buildings comfortable during heatwaves or power outages.
- Replacing gas vehicles with electric ones eliminates tailpipe emissions and reduces fuel costs/exposure to fuel price volatility.
- Expanding tree cover both captures carbon and shades streets, reducing local temperatures and stormwater runoff.

By combining mitigation and adaptation, the Town ensures investments deliver multiple outcomes: reduced emissions, lower long-term costs, stronger assets, and more reliable services. As highlighted in the Climate Risk Assessment, adaptation investments can also provide strong financial returns, with each dollar spent potentially avoiding 13 to 15 dollars in future disaster repair and recovery costs.

3. PCP Program and Completed Milestones

The Partners for Climate Protection (PCP) program, administered jointly by the Federation of Canadian Municipalities (FCM) and the International Council for Local Environmental Initiatives (ICLEI), provides a structured framework to help municipalities reduce GHG emissions and strengthen climate resilience.

The program supports local governments through a five-milestone approach (Figure 3), which includes creating a GHG emissions inventory and forecast, setting an emissions-reduction target, developing a local action plan, implementing that plan, and monitoring and reporting progress. These milestones form a practical roadmap for municipalities to integrate climate considerations into planning, budgeting, and service delivery.

Figure 3 - PCP Milestone Framework

The PCP program offers two participation streams:

1. **Corporate:** Focuses on municipal operations
2. **Community:** Addresses emissions from residents, businesses, and institutions

The Town of Grimsby is currently progressing through the Corporate stream, reinforcing its commitment to structured, evidence-based climate action.

The Town joined the PCP program in April of 2021 via Council resolution[8]. Since joining, the Town has steadily advanced through the PCP milestones.

As of July 2025, the Town has completed Milestones 1 and 2, which include establishing a Corporate GHG inventory and adopting a Corporate emissions reduction target. A summary of Milestones 1 and 2 can be found in Sections 3.1 and 3.2, respectively. The full report for Milestones 1 and 2 is included in Appendix C.

This CCAP meets the requirements for Milestone 3 and outlines a coordinated roadmap to achieve the target outlined in Milestone 2.

3.1 PCP Milestone 1 – GHG Inventory

Milestone 1 of the PCP program requires the development of a comprehensive Corporate GHG emissions inventory and a corresponding business-as-usual (BAU) forecast. The Town completed its Milestone 1 Corporate GHG Inventory in July 2025, using 2023 as the baseline year.

The original Milestone 1 and 2 report was subsequently updated through an amendment to reflect improved data completeness and updated assumptions. This amended inventory represents the Town's current and authoritative Corporate emissions baseline and forms the foundation for the reduction target in Milestone 2 and the actions outlined in this CCAP.

3.1.1 Inventory Methodology Overview

The Corporate GHG Inventory was developed in accordance with the PCP Protocol, which aligns with the International Local Government Greenhouse Gas Emissions Analysis Protocol (IEAP) and the World Resources Institute's (WRI) GHG accounting principles of relevance, completeness, consistency, transparency, and accuracy.

The inventory boundary is based on Operational Control and includes emissions from municipal operations over which the Town has direct authority. Emissions were quantified for four Corporate sectors:

- Facilities
- Transportation (on-road and off-road fleet)
- Waste
- Street Lighting

Facilities emissions were calculated using electricity and natural gas consumption data reported under O.Reg 25/23, with emissions factors drawn from Canada's National Inventory Report (NIR). Transportation emissions were estimated using vehicle and equipment inventories, fuel types, and activity data. Street lighting emissions were calculated using electricity consumption data provided by the local electricity

[8] Grimsby joins climate protection program - Niagara Info

distributor. Waste emissions were estimated using a waste audit and PCP-approved landfill methane modeling assumptions.

The amendment to the original inventory improved accuracy and completeness by adding several previously excluded facilities, updating the electricity emissions factor to reflect the most recent available NIR data, and adjusting fleet emissions so they reflect a single baseline year of activity. These updates did not change the overall methodology, but they did revise the baseline emission totals and the BAU forecast.

3.1.2 Baseline Corporate Emissions (2023)

3.1.2.1 Baseline Emissions by Sector

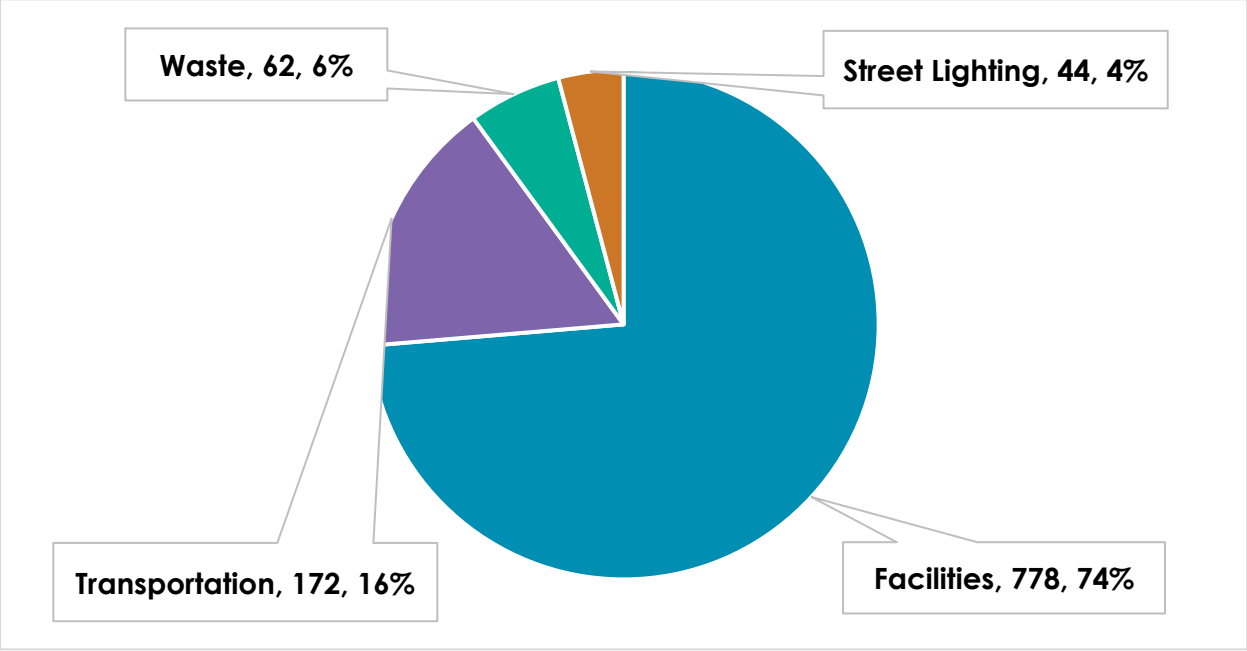
Total Corporate GHG emissions in the 2023 baseline year were **1,057 tCO_2e**.

Facilities were the largest source of emissions, followed by transportation, waste, and street lighting. Emissions by sector are summarized below in Table 1 and Figure 4.

Table 1 - 2023 Baseline Corporate Emissions by Sector

Emissions Sector	2023 Emissions (tCO_2e)	% of Total
Facilities	778	74%
Transportation	172	16%
Waste	62	6%
Street Lighting	44	4%
Totals	**1,057**	**100%**

Figure 4 - 2023 Baseline Corporate Emissions by Sector



This sectoral profile indicates that buildings and fleet operations account for approximately 90 percent of Corporate emissions and therefore represent the primary focus areas for reduction actions in this CCAP.

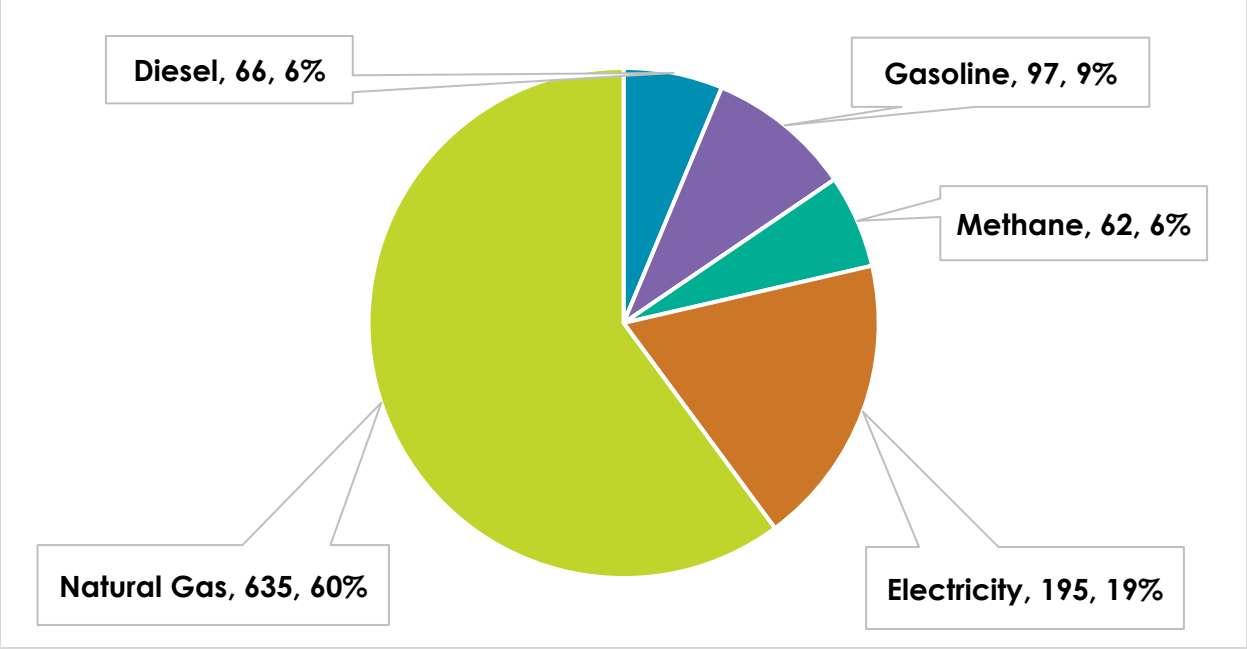
3.1.2.2 Baseline Emissions by Source

When grouped by energy or emissions source, natural gas consumption was the dominant contributor to Corporate emissions, followed by electricity use and transportation fuels. Emissions by source are summarized in Table 2 and Figure 5.

Table 2 - 2023 Baseline Corporate Emissions by Source

Emissions Source	2023 Emissions (tCO_2e)	% of Total
Diesel	66	6%
Gasoline	97	9%
Methane	62	6%
Electricity	195	19%
Natural Gas	635	60%
Totals	**1,057**	**100%**

Figure 5 - 2023 Baseline Corporate Emissions by Source



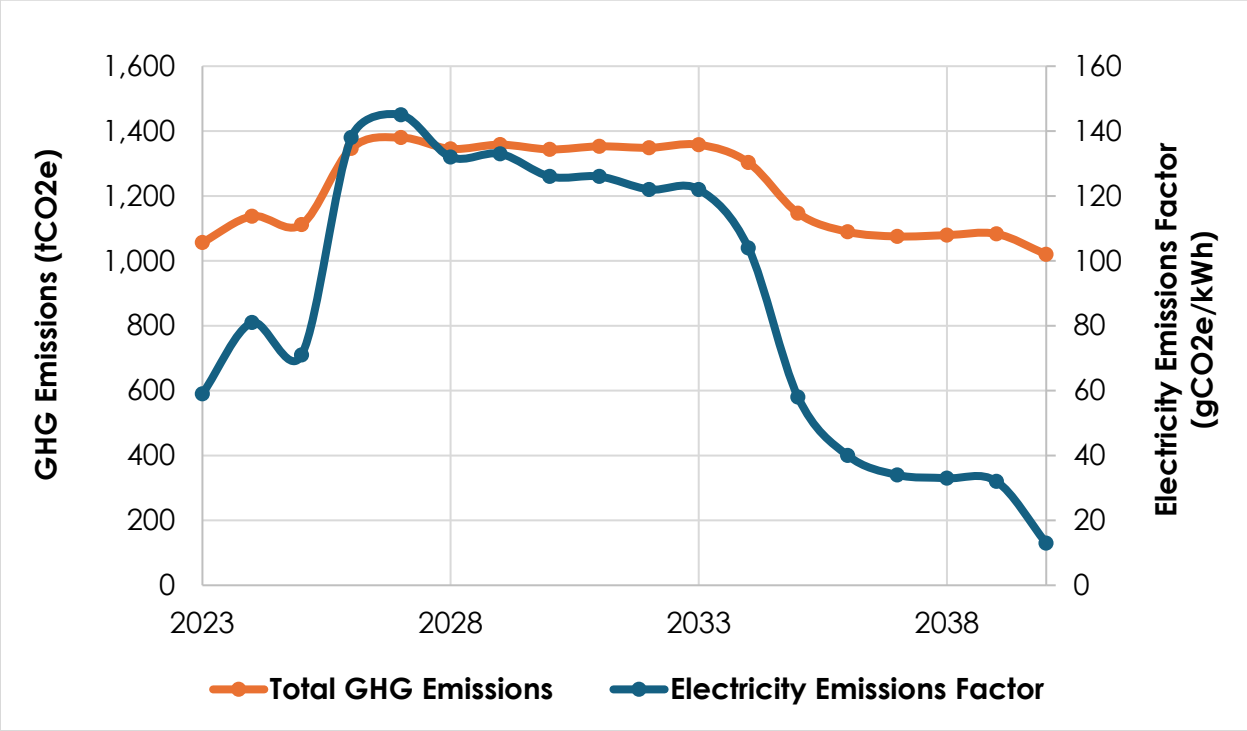
This breakdown highlights the importance of reducing natural gas use in facilities and transitioning heating systems toward low-carbon alternatives, alongside continued efficiency improvements and fleet electrification.

3.1.2.3 Business-As-Usual (BAU) Forecast (2023-2040)

A BAU forecast estimates how Corporate GHG emissions are expected to change over time if no new mitigation actions are implemented beyond those already in place. The BAU forecast provides a reference case against which future reductions can be measured and helps contextualize the scale of action required to meet the Town's emissions reduction target.

The BAU forecast in Figure 6 projects the Town's Corporate emissions from the 2023 baseline year through to 2040.

Figure 6 - 2023-2040 BAU Forecast



The BAU forecast reflects expected growth in municipal service demand alongside projected changes in Ontario's electricity emissions factor. This electricity emissions factor is projected to increase in the near term and decline over the longer term as the grid evolves. The forecast assumes no new mitigation actions beyond those already implemented, making it a conservative reference case.

The Peach King Centre expansion was not explicitly included in the BAU forecast data due to limited information to reliably estimate energy impacts. This expansion replaces older gas-fired rooftop units with heat pumps, which is expected to reduce overall emissions. As a result, excluding it is considered conservative, and actual future emissions may be lower than projected.

Further details on the BAU forecast can be found in Appendix C.

What the Forecast Shows

The BAU forecast shows that Corporate GHG emissions vary over time rather than following a steady trend, driven primarily by changes in Ontario's electricity emissions factor rather than by significant shifts in municipal energy demand. Periods of higher grid carbon intensity result in higher reported emissions, while cleaner grid conditions lead to lower emissions even without operational changes.

This dynamic is especially important in the context of the Town's 2035 reduction target. While Grimsby can directly influence energy efficiency, fuel use, and asset replacement decisions, the electricity emissions factor in 2035 will play a critical role in determining whether the target is achieved, particularly as operations become more electrified.

3.2 PCP Milestone 2 – GHG Reduction Target

The Town's Corporate GHG target is a 30 percent reduction below 2023 levels by 2035.

This target was set in April of 2025 following completion of the Town's Corporate GHG inventory (Milestone 1). The target was selected to be achievable within current budgets, staffing, and asset renewal cycles while remaining consistent with regional and federal trajectories, with periodic reviews to adjust as technologies and funding evolve.

3.3 Progress Since the Milestone 1 Baseline Year (2023)

Although the 2023 GHG inventory serves as the Milestone 1 baseline for this CCAP, the Town has already undertaken several energy efficiency and decarbonization projects since that time. These projects, completed across buildings, parks, operational facilities and vehicle fleet, demonstrate the Town's ongoing commitment to reducing energy use and modernizing infrastructure even before formal development of this CCAP.

Table 3 - Projects Completed since Milestone 1 Baseline Year (2023)

Asset	Project	Specifics
Fleet	Fleet Decarbonization	• Replaced 3 fossil-fuel, mid-sized pickup trucks with hybrid models • Replaced 1 fossil-fuel, mid-sized SUV with an electric model • Added a new hybrid, mid-sized SUV
Town Hall	LED Lighting	Complete retrofit/replacement
Museum	LED Lighting	Complete retrofit/replacement
Library	LED Lighting	Complete retrofit/replacement
Operations Centre	LED Lighting	Complete retrofit/replacement

Asset	Project	Specifics
Fire Station 1	LED Lighting	Complete retrofit/replacement
Pump House	LED Lighting	Complete retrofit/replacement
Operations Centre	HVAC replacement	Complete replacement to high efficiency unit
Pump House	HVAC replacement	Complete replacement to high efficiency unit
Peach King Centre	HVAC	Old facility section removed, replaced with new addition (50,000 sq ft). HVAC retrofit from older rooftop units to new heat pumps with electric backup
Park properties - various sites	Lighting changed to LED	Various parks have switched from incandescent to LED
Oakes Road Baseball Field	Field lighting	Playing field lighting switch from HID to LED

Collectively, these projects reduce electricity and natural gas consumption, lower maintenance requirements, and better prepare facilities for future electrification initiatives outlined in this CCAP. Their measured impacts will be captured in the Town's next GHG inventory/CCAP update and will support ongoing progress toward the 2035 reduction target.

4. CCAP Development Process

The CCAP was developed through a structured, evidence-based process that combined technical analysis, internal engagement, and public consultation. The approach was designed to ensure that the Plan is grounded in Grimsby's operational realities, aligned with existing municipal plans, and informed by community priorities related to climate risks and climate action.

Technical Review and Baseline Development

The CCAP builds directly on the Town's Corporate GHG Inventory completed under PCP Milestone 1. As part of the CCAP development process, the inventory data and supporting assumptions were reviewed and updated to reflect improved data completeness and current emissions factors.

In parallel, relevant background documents were reviewed to understand existing conditions, constraints, and opportunities across Town operations. These included facility building condition assessments, asset registries, energy audits, the Town's Asset Management Plan and ECDMP. This review helped ensure that proposed climate actions are realistic, aligned with planned capital renewal, and integrated with broader asset and financial planning processes.

Cleantech Sector Assessment and Climate Risk Assessment

Two targeted technical assessments were completed to inform the CCAP's direction and priorities.

A Cleantech Sector Assessment was undertaken to identify commercially available low- and zero-carbon technologies applicable to Grimsby's facilities and fleet. The assessment evaluated technologies such as building electrification, smart controls, renewable energy, energy storage, and fleet electrification based on emissions reduction potential, operational fit, cost considerations, and market readiness. The findings were used to inform the identification and prioritization of decarbonization pathways within the CCAP, particularly for facilities and transportation, which represent the majority of Corporate emissions.

A Climate Change Risk Assessment was also completed to identify climate-related risks to municipal assets, services, and operations. Using regional climate projections, asset information, and best-practice risk assessment frameworks, the assessment examined hazards such as extreme heat, intense rainfall and flooding, winter storms, and shoreline impacts. This work helped ensure that the CCAP considers not only emissions reduction, but also the need to strengthen resilience and protect critical infrastructure as the climate changes. Together, these assessments support a balanced approach to mitigation and adaptation within the Plan.

Internal Engagement with Town Staff

Internal engagement with Town staff was a key component of the CCAP development process. Grimsby staff were consulted to validate data, identify operational opportunities and constraints, and discuss practical considerations related to implementing decarbonization and resilience measures. This internal input was critical in shaping actions that are achievable within the Town's operational context.

Public Consultation

Public engagement was undertaken to better understand community perspectives on climate change, local climate risks, and the role of the Town in responding to these issues. Engagement included an online public survey hosted on the Town's Let's Talk Grimsby platform.

The survey was designed to gather input on residents' awareness of climate change impacts, personal experience with extreme weather events, perceived climate risks facing Grimsby, and priorities for municipal climate action. Questions also explored resident views on community resilience, the importance of transparency and communication, and general support for climate-related investments.

The survey results are intended to inform how Grimsby's Corporate climate actions align with community concerns and expectations, particularly in relation to risk management and resilience. A summary of public consultation results is provided in Appendix B.

Integration and Plan Development

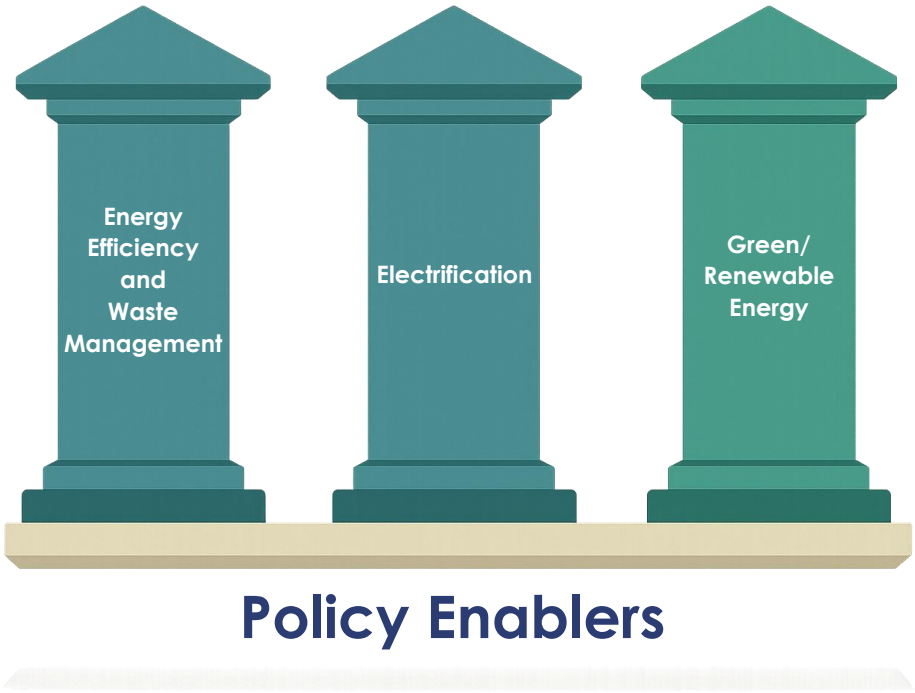
Findings from the technical analyses, internal engagement, and public consultation were integrated to develop the CCAP's targets, actions, and implementation considerations. The resulting Plan reflects a synthesis of quantitative emissions data, operational insight, and community input. This integrated approach ensures that the CCAP is not a standalone document, but one that complements existing municipal plans and provides a clear, informed pathway for reducing Corporate emissions while strengthening resilience over time.

5. The Action Plan

5.1 Guiding Pillars of Decarbonization

Grimsby's pathway to achieving the CCAP's goal is guided by three interconnected Pillars of Decarbonization. These pillars are all supported by a foundational base of Policy Enablers. Together, these elements create a practical framework that aligns technology, operations, and policy to drive measurable, lasting emissions reductions.

Figure 7 - Guiding Pillars of Decarbonization



These pillars are not stand-alone initiatives. Each one supports and builds on the progress of the others. Improving energy efficiency reduces overall demand and operating costs, creating the capacity needed for electrification. In turn, electrification allows municipal operations to transition away from fossil fuels, enabling renewable energy systems such as solar photovoltaics (PV) or battery storage to be right-sized and more effective. The base of Policy Enablers ensures that these technical measures are reinforced through clear governance, integrated planning, and access to external funding and partnerships.

The Cleantech Sector Assessment (Appendix D) supports this framework by identifying specific clean technologies that can be deployed within each pillar. This includes heat pumps, advanced building controls, solar PV, and light-duty fleet electrification. The assessment also benchmarks leading practices from other Ontario municipalities,

providing evidence-based insights that inform the key recommended actions within this CCAP.

5.1.1 Pillar 1 – Energy Efficiency and Waste Management

Energy efficiency represents the first and most cost-effective step in decarbonization. By optimizing how energy is used in facilities and by equipment, the Town can reduce consumption, operating costs, and emissions without compromising service delivery. Typical measures include upgrading HVAC controls, retrofitting to LED lighting, improving building automation, and enhancing insulation and air sealing.

Waste management complements efficiency by addressing emissions from material use and disposal. Implementing waste diversion, recycling, and composting programs minimizes methane generation from landfills and encourages a culture of resource conservation across departments.

Together, these measures lower baseline energy use, reduce operational waste, and prepare buildings and systems for subsequent electrification or renewable integration.

5.1.2 Pillar 2 – Electrification

Electrification involves transitioning heating (space and water) systems and vehicles from fossil fuel-based sources to Ontario's largely low-carbon electricity grid. This pillar includes adopting heat pumps in buildings, transitioning fleet vehicles to hybrid or electric models, and preparing infrastructure for electric equipment and charging networks.

As efficiency improvements reduce total energy demand, electrification becomes more achievable. Additional capacity becomes available to reduce potential electrical service or equipment upgrade costs. Electrification also enhances operational reliability, as electric technologies generally require less maintenance and are insulated from fuel-price volatility.

The Cleantech Sector Assessment highlights several technologies supporting this pillar, including air- and ground-source heat pumps and fleet electrification paired with EV charging infrastructure.

While electrification offers clear environmental benefits, there are also practical considerations that influence implementation. For example, electric vehicles currently carry a higher upfront capital cost compared to fossil-fuel vehicles. Their overall return on investment may vary depending on usage patterns, fuel prices, and available incentives. There are also operational considerations, including potential battery degradation over time, costs associated with battery replacement outside of warranty, and the potential for more frequent vehicle turnover. Although electric vehicles typically require less routine maintenance, the Town does not currently have in-house capacity to service these vehicles. This maintenance will then require outsourcing or additional investment in staff training and equipment. These challenges are expected

to improve over time as battery technologies advance, costs decline, and industry support infrastructure continues to mature.

5.1.3 Pillar 3 – Green/Renewable Energy

Once efficiency and electrification measures are in place, renewable and green energy systems can further reduce reliance on external energy sources. Technologies such as rooftop solar PV, battery energy storage, and future microgrid or vehicle-to-building (V2B) applications can supply clean electricity and improve resilience during outages.

Renewable energy initiatives not only contribute to GHG reduction but also demonstrate visible leadership and community engagement. As identified in Appendix D, municipalities across Ontario have successfully implemented rooftop solar and battery systems at sites such as recreation centres, arenas, and administrative buildings, creating replicable models for Grimsby.

In some cases, it may make sense to pursue renewable energy projects in parallel with, or even before, efficiency and electrification measures. This can occur when suitable funding programs become available or when a site offers strong technical potential, such as a recent roof replacement or high solar exposure. Taking advantage of these opportunities can help the Town reduce emissions and operating costs sooner while preparing facilities for future deep decarbonization.

5.1.4 Base – Policy Enablers

The effectiveness of all three pillars depends on a solid foundation of policy and organizational support. This base of Policy Enablers ensures that decarbonization efforts are embedded into the Town's long-term governance, budgeting, and asset management processes. Key enablers include:

- Integrating climate considerations (i.e. a "Climate Lens") into capital planning, procurement policies, and asset renewal cycles.
- Aligning the CCAP with the Town's Asset Management Plan, Energy Conservation and Demand Management Plan, and Official Plan.
- Building staff capacity through training, data management, and performance tracking.
- Leveraging external partnerships and funding opportunities, such as the FCM's Green Municipal Fund, to implement projects identified under each pillar.

These enablers create a policy environment where technical measures are sustainable and scalable, ensuring that decarbonization is not a one-time initiative but an ongoing, integrated component of corporate decision-making.

5.2 Key Recommended Actions

In order to achieve the Milestone 2 target, and in alignment with the Guiding Pillars of Decarbonization, a focused set of Corporate actions is required. These actions address the Town's most significant emission sources and operational decision points, and together form a practical roadmap for implementing the CCAP. Table 4 summarizes the key recommended actions, their intended purpose, and the policy or operational changes required to support meaningful progress.

In addition to Town-led capital and operational actions, some infrastructure and asset improvements are delivered through the development process. Through site plan approval, subdivision agreements, and parkland or cash-in-lieu contributions, new development can result in upgrades to municipal assets, including municipal infrastructure and streetscape improvements, stormwater infrastructure, and urban greening. While these improvements can support broader climate objectives, they are primarily related to climate adaptation and resilience rather than direct GHG reduction. As such, they represent a supporting mechanism for elements of the CCAP but are not relied upon to achieve the Town's corporate emissions reduction target.

Table 4 - Key Recommended Actions (Detailed)

ID	Action	Priority	GHG Reduction Potential[9]	Action Description
P-1	Procurement Bylaw policy updates	HIGH	N/A - Policy	**Purpose:** Modernize the Procurement Bylaw so all departments consistently evaluate low-carbon options using standardized processes. **Recommendation(s):** Strengthen Procurement Bylaw language so that low-carbon and high-efficiency options are treated as required considerations. • For all purchases above a defined capital threshold (e.g. vehicles, HVAC equipment), require evaluation of at least one high-efficiency and/or low-carbon alternative (e.g. heat pump vs. gas boiler, EV vs. ICE vehicle) where operationally feasible. • Mandate life-cycle costing (capital, fuel, maintenance, expected asset life, carbon price exposure as applicable) as the default decision tool for major procurements. • Require business cases for major projects to include GHG impacts (tCO_2e over asset life) alongside financial metrics, using the CCAP target of 30% below 2023 by 2035 as a screening lens. • Consider provincial guidance (e.g. Auditor General of Ontario[10]) on low-carbon procurement and social cost of carbon when developing evaluation criteria. Integrate these requirements into templates, RFP scoring matrices, and Council reports so that climate and life-cycle impacts are consistently factored into purchasing decisions.
P-2	New climate lens/fossil fuel transition policy	HIGH	N/A - Policy	**Purpose:** Establish a corporate-wide decision lens that governs how the Town approaches fossil-fuel-using assets, replacement cycles, and climate-aligned budgeting.

[9] Percent of total inventory emissions.
[10] From Plan to Progress (Appendix F) - Auditor General of Ontario

ID	Action	Priority	GHG Reduction Potential[9]	Action Description
				Recommendation(s): • Apply a formal "climate lens" to all relevant capital and major operating decisions, requiring staff reports to summarize GHG impacts, resilience implications, and alignment with the CCAP pillars and target - all as applicable. • Consider establishing an internal "cost of carbon", in alignment with the Niagara Region's CCAP, to be used in life-cycle costing so that higher-emitting options face a notional carbon cost over their service life. • Implement a fossil fuel transition policy: o **Option 1** – More aggressive transition policy: ▪ Implement a moratorium on like-for-like fossil fuel replacements for building heating and light-duty fleet where a technically feasible low-carbon alternative exists (e.g. heat pumps, battery-electric vehicles). ▪ Extend this policy to all newly constructed municipal buildings to ensure they are designed as low-carbon from the outset. This prevents the Town from locking in new facilities with natural gas-fired heating systems that carry 20-year (or longer) useful lives and would require costly future retrofits to align with decarbonization goals. ▪ Require any requested exception to be justified through a documented technical or service-level constraint, approved at Director or Council level. o **Option 2** – Less aggressive: ▪ Require that any proposed fossil-fuel replacement demonstrate clear advantages even after low-carbon

ID	Action	Priority	GHG Reduction Potential[9]	Action Description
				alternatives are fully evaluated and/or the internal carbon cost is applied. ▪ Prioritize low-carbon options in tie-break situations where financial metrics are similar. • Embed the climate lens into asset management, budget, and procurement processes so they become standard practice rather than a stand-alone climate action exercise.
F-1	Implement strategic energy audit recommendations	MED	2-4%	**Purpose:** Reduce facility energy use and operating costs by implementing the most cost-effective Energy Conservation Measures (ECMs) identified through recent audits. **Recommendation(s):** Implement ECMs[11] from recent Level 1, Level 2, and informal audits for Town facilities, prioritized by the fastest-payback measures. These include: • Interior and exterior LED lighting retrofits and controls. • HVAC schedule optimization, setpoint adjustments, occupancy-based controls and review of space heater use to identify and reduce unnecessary consumption. • Building automation improvements and low-cost envelope improvements (e.g. weather-stripping, simple air-sealing). Bundle medium-payback ECMs (e.g. advanced controls, variable speed drives, minor equipment upgrades) into multi-year capital programs to reduce transaction costs and coordinate with planned renewals.

[11] A full list of ECMs are provided in Appendix E.

ID	Action	Priority	GHG Reduction Potential[9]	Action Description
F-2	Electrify facility DHW and space heating systems upon replacement	HIGH	25-35%	**Purpose:** Transition facility heating systems from natural gas to low-carbon alternatives during planned renewal cycles to capture the best economics and long-term GHG reductions. **Recommendation(s):** Electrify natural gas domestic hot water (DHW) and space heating systems upon replacement. • Building Condition Assessments (BCAs) identified that ~70% of natural gas assets are due for end-of-life replacement within the CCAP timeframe (i.e. prior to 2035). This represents ~60% of natural gas energy consumption. • For each scheduled renewal, require that low-carbon options (air-source heat pumps, heat pump DHW, geothermal, or hybrid systems) be evaluated as the default replacement, with right-sizing based on efficiency and envelope improvements. • Conduct GHG reduction pathway feasibility studies at high-impact facilities (e.g. Major Refrigeration Peach King Centre, Town Hall/Municipal Office) to investigate the most suitable electrified options. • Address electrical capacity constraints (panel/service) early by engaging internal/contracted electrical staff as well as Grimsby Power. • Develop standard technical guidelines for low-carbon replacements (technologies, efficiency targets, temperature setpoints, back-up strategies) to streamline design and procurement across facilities.
T-1	Electrify light-duty fleet vehicles upon replacement	HIGH	3-5%	**Purpose:** Decarbonize the Town's light-duty fleet by replacing vehicles with zero-emission options as they reach end of life, while preparing for broader fleet transitions in future CCAP cycles. **Recommendation(s):** Electrify light-duty fleet vehicles upon replacement. • Vehicle inventories identified that ~70% of light-duty vehicles (approx. 35-40 vehicles) are due for end-of-life replacement within the CCAP

ID	Action	Priority	GHG Reduction Potential[9]	Action Description
				timeframe, based on their estimated service lives per the Town's Asset Management Plan. • Adopt a "ZEV-first" (zero-emissions vehicle first) principle for light-duty replacements: battery-electric (or plug-in hybrid where necessary) as the default, with documented justification required for any new internal combustion engine (ICE) purchase. • Prioritize electrification of high-usage vehicles (i.e. those with higher annual kilometres and fuel consumption), as these vehicles generate the greatest GHG reductions and operational cost savings. These savings can offset the vehicles' incremental (over fossil fuel options) capital cost. • Install Level 2 EV chargers at priority locations (e.g. Town Hall/Municipal Office, Peach King Centre, Public Works Operations Centre) sized for current and expected future fleet. • Begin planning for medium- and heavy-duty fleet decarbonization in the next CCAP update. ○ Investigate options such as electric power-take-off (ePTO) systems for hydraulic equipment and emerging zero-emission trucks, recognizing current cost and technology limitations. Monitor and leverage available incentives (see Appendix F) to offset upfront capital costs, noting that program caps and declining incentive levels may limit long-term availability.
W-1	Develop and Implement Corporate Waste Management Plan	MED	2-4%	**Purpose:** Reduce corporate waste-related emissions by minimizing waste generation and improving waste diversion practices, while aligning Town operations with regional and provincial circular-economy objectives. **Recommendation(s):** Develop a Corporate Waste Management Plan that seeks to align with Niagara Region's Waste Management Strategy and the provincial

ID	Action	Priority	GHG Reduction Potential[9]	Action Description
				"Waste-Free Ontario: Building the Circular Economy" goals (50% diversion rate by 2030, 80% by 2050)[12]. • Establish reasonable policies and guidelines to reduce waste generation at source, including procurement and operational practices that limit single-use materials, reduce packaging, and prioritize reusable or lower-waste alternatives where feasible. • Set a Town-specific diversion target for Corporate operations (e.g. ≥50% diversion of operational waste by 2035) that supports regional circular-economy and GHG objectives. • Conduct standardized waste audits at key facilities every 3–5 years (or more frequently at large sites) to quantify waste streams and diversion opportunities. • Expand or refine on-site programs for organics, recyclables, and specialty streams (e.g. electronics, construction materials) as applicable. Work with Niagara Region to harmonize signage, collection procedures, and reporting so Town facilities support regional goals and benefit from shared education materials and contracts.
S-1	Implement an adaptive dimming pilot for streetlighting[13]	LOW	0-0.3%	**Purpose:** Lower streetlighting energy use and operating costs by introducing adaptive lighting controls in locations where safety and operational performance can be maintained. **Recommendation(s):** Investigate the feasibility of adaptive dimming controls for Town-owned streetlighting and implement a strategic pilot where feasible.

[12] Strategy for a Waste-Free Ontario: Building the Circular Economy | ontario.ca
[13] Because Grimsby's streetlights are unmetered (billed on fixed wattage and operating hours), the Town must formally communicate any control implementation to Grimsby Power to ensure that the utility adjusts the billing methodology to credit the reduced usage. Otherwise, energy savings will not translate to cost savings on electricity bills.

ID	Action	Priority	GHG Reduction Potential[9]	Action Description

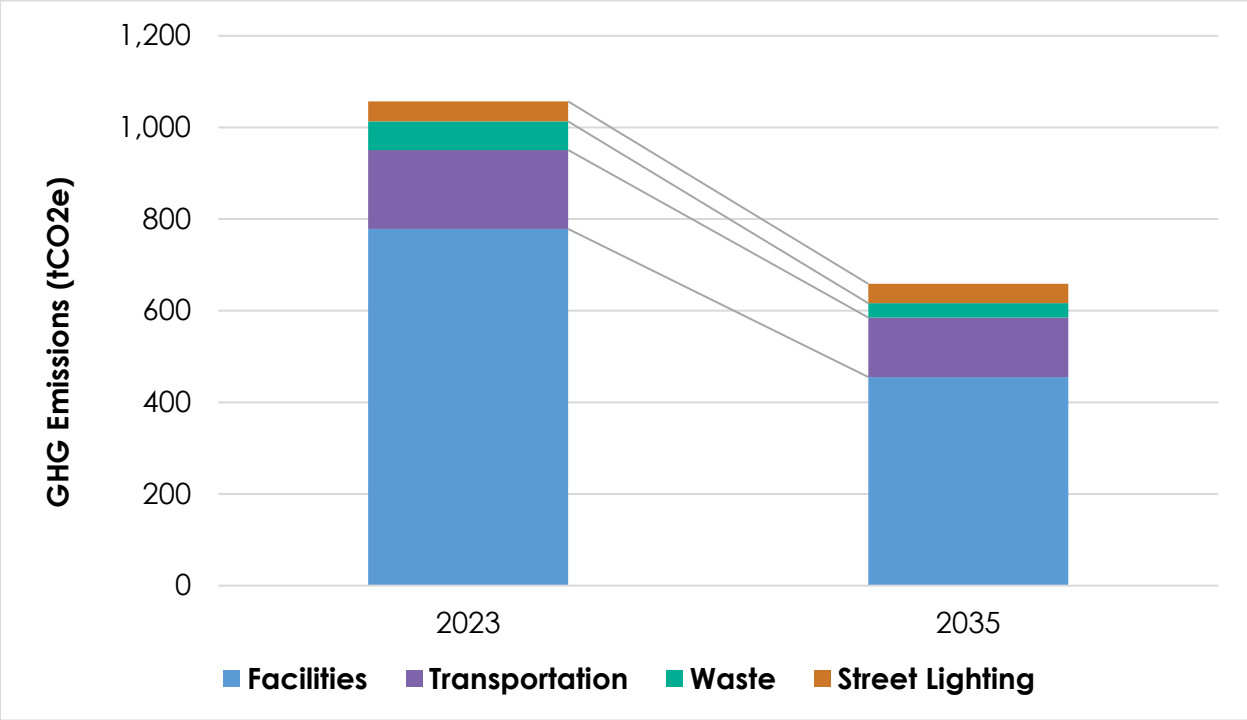
				• Document existing streetlight inventory, current LED conversion status, and control systems for all owned streetlights.
				• Evaluate adaptive dimming or motion/presence-based controls (e.g. time-of-night dimming, sensor-triggered brightness) in low-traffic corridors or municipal lots where nighttime activity is minimal. Ensure lighting levels remain consistent with Crime Prevention Through Environmental Design (CPTED) principles and do not compromise public safety.
				• Implement a pilot (≈10% of fixtures) for adaptive dimming on select streetlighting:
				  ○ Prioritize pilot locations where safety risk is minimal (e.g. residential streets, pathways, municipal lots) and avoid high-traffic or safety-sensitive areas until pilot outcomes confirm suitability.
				  ○ During the pilot, monitor and assess performance by tracking energy use, maintenance/outage frequency, and gathering community feedback on visibility and perceived safety.
				  ○ Use the results of the pilot to refine dimming parameters (brightness levels, timing, sensor thresholds) and determine where broader implementation is appropriate.
				Leverage the Lightsavers Canada "Adaptive Controls for Roadway and Parking Lighting" primer[14] as a foundation for system design and implementation (controls types, procurement specs, commissioning considerations, and business-case development) to guide the pilot and future rollout.
				Municipal Example: The City of Ottawa installed networked adaptive-dimming controls as part of its LED streetlight project[15]. The overall project has led to a

[14] Adaptive Controls for Roadway and Parking Lighting: A Lightsavers Primer
[15] Lighting up our city for energy efficiency | Hydro Ottawa

ID	Action	Priority	GHG Reduction Potential[9]	Action Description
				66% reduction in streetlighting energy consumption, significantly cut operating and maintenance costs, and reduced GHG emissions by approximately 1,261tCO_2e annually.

If all the actions in Table 4 are completed, an estimated 30-40% reduction in Corporate GHG emissions by 2035 can be achieved. Figure 8 below provides an indicative visual of the impact of these actions.

Figure 8 - Impact of Implementing Key Actions (2035 vs 2023 Baseline)



5.3 Funding and Implementing the CCAP's Actions

The implementation of the CCAP requires a clear understanding of both the capital and operating cost implications of recommended actions. Decarbonization measures often carry higher upfront capital costs relative to like-for-like fossil-fuel replacements, while operational cost impacts depend on the action type.

The following subsections outline estimated incremental costs for key CCAP actions and describe a strategy for managing these costs through external funding and internal budgeting practices. It also provides high-level resource considerations to implement the CCAP's actions.

5.3.1 Cost Considerations for CCAP Actions

Table 5 summarizes the estimated capital costs for each action described in this CCAP. It compares a BAU scenario, where fossil-fuel equipment or internal combustion vehicles are replaced like-for-like, to a low-carbon alternative scenario aligned with the CCAP's goals. The "Cost Premium" represents the incremental capital investment required to implement a low-carbon alternative for end-of-life replacements.

Table 5 - Estimated Costs of CCAP Actions

ID	Action	BAU Cost	Low-Carbon Cost	Cost Premium
P-1	Procurement Bylaw policy updates	N/A	N/A	N/A
P-2	New climate lens/fossil fuel transition policy	N/A	N/A	N/A
F-1	Implement strategic energy audit recommendations	$0	$0.10M[16]	$0.10M
F-2	Electrify facility DHW and space heating systems upon replacement	$0.77M	$1.94M[17]	$1.17M
T-1	Electrify light-duty fleet vehicles upon replacement	$1.76M	$2.34M[18]	$0.59M
W-1	Develop and Implement Corporate Waste Management Plan	$0	$0.20M[19]	$0.20M
S-1	Implement an adaptive dimming pilot for streetlighting	$0	$0.13M[20]	$0.13M
	TOTALS	**$2.53M**	**$4.71M**	**$2.19M**

[16] Based on the combined costs of fast (<5 yr) payback audit ECMs in Appendix E.
[17] Based on the BAU costs compiled from BCAs plus estimated premiums for electrified options.
[18] Based on incremental battery electric vehicle costs from Vincentric's 2023 Canadian EV Cost of Ownership Analysis and estimated Level 2 EVSE costs. Excludes electrical capacity upgrades and relevant incentives.
[19] Includes estimates for consultant support to develop the plan, waste audits for facilities through 2035, initial bin/signage upgrades, ongoing education and minor upkeep costs.
[20] Includes estimates for consultant support to design the pilot, retrofit costs for 280 existing LED streetlights with adaptive dimming controls, installation and commissioning, and setup of a central control and monitoring system.

Among the CCAP actions, action F-2 (electrifying facility DHW and space heating systems upon replacement) represents the largest total capital requirement. It also enables the most significant long-term GHG reductions.

The low-carbon capital cost estimate for this action assumes that the majority of electrified solutions are air-source heat pump (ASHP) based with electric resistance elements as backup. However, other low-carbon alternatives exist with significantly different capital and operational cost implications:

- Fully electric-resistance systems typically have a lower capital premium than air source heat pumps but materially higher operating costs.
- Ground-source (geothermal) heat pump systems have a much higher capital premium but deliver lower operating costs and improved long-term performance.

To refine cost estimates and identify optimal electrification pathways specific to a facility, GHG reduction pathway feasibility studies (noted under action F-2) are recommended for high-impact sites such as the Peach King Centre and the Town Hall/Municipal Office.

5.3.2 Funding and Implementing the CCAP's Actions

5.3.2.1 External Funding Opportunities

Funding concerns are consistently identified by municipalities across Canada as the primary barrier to implementing climate action and decarbonization initiatives. Recent national surveys from the FCM highlight that while municipalities influence over half of Canada's infrastructure, they collect less than 10 percent of national tax revenue[21]. This makes external funding essential for climate-aligned capital renewal. For this reason, all CCAP actions should be evaluated for eligibility under federal, provincial, and utility funding programs.

Appendix F provides a list of available grants, incentives, and financing mechanisms directly linked to each of the CCAP actions they can support. These include programs from FCM, the IESO's Save on Energy programs[22] and Enbridge's natural gas efficiency programs. Importantly, this list also includes the new federal Electric Vehicle Affordability Program, which provides purchase incentives for light-duty zero-emission fleet vehicles.

This list should be consulted and updated on a regular basis as funding opportunities evolve.

[21] Invest in infrastructure renewal - Stronger Together | Federation of Canadian Municipalities
[22] The IESO's Save on Energy Retrofit program has identified Grimsby as an electricity-constrained area. As a result, incentives for most non-lighting Custom stream projects are currently doubled (capped at 50% of the eligible project costs).

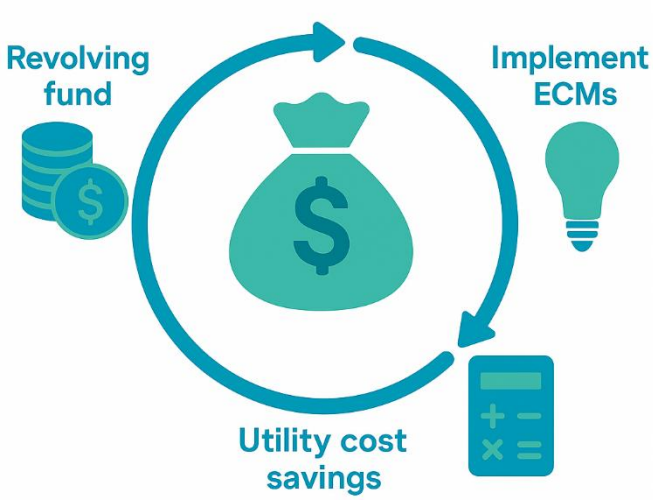
5.3.2.2 *Revolving Energy Fund Approach*

Additional to external funding opportunities, the Town is recommended to establish a Revolving Energy Fund (Figure 9). Under this approach, verified operational savings from early-stage, cost-effective measures such as:

- energy efficiency improvements under action F-1
- fuel/maintenance savings from light-duty fleet electrification under action T-1

are reinvested to offset future capital-intensive decarbonization projects such as building electrification under action F-2.

Figure 9 - Revolving Energy Fund Concept



This model creates a self-sustaining funding mechanism that grows over time and reduces dependence on external grants or annual budget cycles. Revolving funds are used successfully in many Canadian municipalities to accelerate progress on energy and climate goals.

For example, the Town of Caledon established a Corporate Energy Revolving Fund using revenue from municipally-owned solar projects and repurposed energy funds[23],[24]. The fund finances efficiency upgrades and is replenished by savings from reduced utility costs and incentive programs. This approach has enabled Caledon to continuously reinvest in additional energy projects while improving financial and environmental performance.

[23] Town to complete eco-friendly projects thanks to Energy Revolving Fund | Caledon Citizen
[24] Caledon's Corporate Energy Revolving Fund is sustaining itself

5.3.2.3 Operational Cost Impacts

The operational cost impacts of the CCAP actions will depend on technology selection, sequencing of measures, and future electricity and natural gas prices. In general, however, different actions have distinct and predictable cost trends.

- **Energy efficiency (F-1)** reduces electricity and natural gas consumption, lowering annual utility costs. These savings are immediate, measurable, and typically persist for the life of the upgraded equipment.
- **Fleet electrification (T-1)** decreases annual fuel and maintenance costs because electric vehicles have higher drivetrain efficiency, fewer mechanical components, and generally lower maintenance requirements.
- **Electrified heating (F-2)** is expected to increase operating costs for most facilities. Although heat pumps consume less total energy than gas-fired equipment, heating with electricity is currently more expensive than heating with natural gas in Ontario. As a result, the Town should anticipate higher annual operating costs for building heating after electrification, even when high-efficiency air-source heat pumps are used.

The magnitude of overall operational cost impacts will vary, but the combined operational savings from actions F-1 (energy efficiency) and T-1 (fleet electrification) can roughly offset the operating cost increases anticipated under F-2. This helps improve the overall financial balance of the CCAP.

Life-cycle costing remains the most appropriate method for evaluating options, as it can account for long-term energy costs, equipment life, resilience benefits, and exposure to future carbon pricing. Integrating life-cycle costing into procurement, budgeting, and asset management processes (as established under Policy actions P-1 and P-2) will help ensure that low-carbon options are evaluated consistently and transparently.

5.3.2.4 Staffing and Implementation Capacity

Successful implementation of the CCAP requires dedicated staff capacity, clear roles, and coordinated processes across departments. The actions proposed in this Plan introduce additional responsibilities related to decarbonization project planning, funding applications, data tracking, procurement, and long-term monitoring.

To manage these effectively, the Town should establish a defined Lead ➔ Support staffing structure that supports consistent implementation, especially during capital-intensive years.

1. Climate/Sustainability (Lead) Role

If not already established, it is recommended that the Town designate a Climate/Sustainability Lead. This role would coordinate all CCAP implementation

activities and serve as the central point of contact for internal departments, external partners, and funding agencies. Key responsibilities include:

- Overseeing annual implementation planning for all CCAP actions
- Coordinating feasibility studies and capital project scoping (e.g. for action F-2)
- Managing grant applications, reporting, and compliance requirements
- Maintaining the corporate GHG inventory and KPI dashboard
- Facilitating interdepartmental coordination and communication
- Supporting updates to procurement templates, asset plans, and policies
- Leading public or Council reporting on CCAP progress

This role ensures accountability, consistency, and continuity as actions evolve over time.

2. Departmental Implementation (Support) Roles

The Climate/Sustainability Lead should be supported by existing departments that own specific action areas. A coordinated structure avoids duplication and ensures that operational expertise drives decision-making.

Table 6 - Departmental CCAP Implementation Responsibilities

Department/Role	Primary CCAP Implementation Responsibilities
Climate/Sustainability Lead	Overall CCAP coordination, grant management, GHG inventory, KPI dashboard, policy integration, Council reporting
Community Services/Public Works	Lead implementation of actions F-1 and F-2, manage building audits, scoping, procurement, contractor oversight, coordinate with Grimsby Power on electrification capacity
Community Services/Public Works	Implement action T-1, manage EV procurement, charger siting needs, and operational integration
Finance	Integrate life-cycle costing into budget processes, manage revolving energy fund, support grant claim processes
Procurement	Apply updated climate lens and low-carbon evaluation requirements under P-1 and P-2
IT/Data Management	Support KPI dashboard, data access, cybersecurity for controls systems

Department/Role	Primary CCAP Implementation Responsibilities
Communications/HR	Support internal staff engagement, training, and public-facing updates
Senior Leadership Team	Provide oversight, ensure alignment with asset management, budgeting cycles, and corporate priorities

The Town can also consider leveraging external consultants to provide specialized technical expertise and assist in preventing implementation bottlenecks during periods of high project activity. External support can be particularly valuable for engineering design, commissioning, project management, and securing grants for major low carbon projects. During peak capital renewal periods, the Town may supplement internal capacity through time limited positions or by allocating a portion of operational savings from actions such as F-1 and T-1 to help sustain implementation and coordination efforts.

Overall, a clear staffing plan built around a Climate and Sustainability Lead and supported by structured departmental roles will provide the organizational foundation needed to deliver the CCAP efficiently. This approach integrates climate action into routine municipal processes, ensures consistent project delivery, and helps maintain momentum as the Town advances toward its GHG reduction target.

5.3.2.5 Collaboration with Niagara Region

The most significant opportunity for cost-savings and increased capacity lies in collaborating with the Region. Niagara Region already maintains a regional Climate Change Action Plan and a municipal "Community of Practice" through which local area municipalities (LAMs), including Grimsby, can coordinate climate-change efforts.

Figure 10 - Collaboration with Niagara Region

Why this matters for Grimsby

- Niagara Region's coordination covers climate resilience, energy management, emissions tracking, and green-infrastructure planning. By aligning with the Region's efforts, Grimsby can avoid duplicating work and benefit from shared technical and administrative capacity.
- Joint procurement, shared project scopes, or combined grant applications under a regional framework tend to attract more competitive contractor bids, drive down per-unit costs, and improve eligibility for external funding.
- Shared staffing or consultant resources through the Region (for tasks such as energy audits, feasibility studies, grant writing, data management) would relieve pressure on Grimsby's own capacities while ensuring consistent, professional delivery across all municipalities.

What collaboration could look like

- Grimsby and the Region coordinate capital projects (e.g. building retrofits, fleet electrification, waste-management initiatives) under a unified procurement plan.
- The Region hosts or shares specialized climate-action personnel or consultants accessible to Grimsby, rather than each municipality hiring separately.
- The Town partners with Niagara Region on grant applications, leveraging the larger project scale to improve competitiveness.

Expected Benefits

- Lower capital and operational costs through shared procurement and expertise.
- Reduced workload for Grimsby staff, lowering risk of bottlenecks during implementation.
- Higher likelihood of successful external funding applications, because larger-scale or multi-municipality projects often meet grant criteria more readily.
- Stronger regional coordination - aligning infrastructure, policies, and climate-action priorities across municipal boundaries.

By making collaboration with Niagara Region a central element of the CCAP's funding and implementation strategy, Grimsby can reduce costs, build internal capacity, and enhance the feasibility and impact of climate-action investments. This approach strengthens the Town's ability to meet the CCAP goals while maintaining fiscal prudence and operational efficiency.

6. Monitoring and Reporting Recommendations

Establishing clear, measurable indicators and a repeatable evaluation process is essential to track progress toward the Milestone 2 reduction target. This section outlines a practical framework for performance monitoring that can be applied across departments to support continuous improvement and accountability.

6.1 Key Performance Indicators

The Town should adopt a set of accessible, verifiable Key Performance Indicators (KPIs) to measure both Corporate energy and emissions performance as well as the effectiveness of individual GHG reduction projects or actions. These KPIs should be updated annually where possible and reviewed comprehensively at each Corporate GHG Inventory update (see Section 6.2).

Table 7 - Key Performance Indicators

Action Area	Key Performance Indicators (KPIs)	Data Source(s)	Departmental Responsibility
Buildings and Facilities	• Total annual electricity and natural gas consumption (ekWh) • Total GHG emissions (tCO_2e) • Energy use intensity ($ekWh/m^2$)	• Utility bills • Billing portals • ECDMP data • Energy Star Portfolio Manager	Community Services / Finance
Fleet Operations	• Annual fuel use by type (L gasoline / diesel) • GHG emissions (tCO_2e) • % of fleet transitioned to hybrid / electric	• Fuel purchase records • Telematics/ odometer readings	Public Works
Street Lighting	• Electricity use (kWh) • GHG emissions (tCO_2e)	• Utility bills • Lighting inventories/ schedules	Public Works
Operational Waste	• Tonnes of waste generated and diverted • GHG emissions from waste (tCO_2e)	• Waste audits • Contractor reports	Public Works/Community Services

These indicators can be adapted as new technologies emerge and data systems improve, ensuring ongoing relevance and transparency.

6.2 Monitoring Framework

The Town should implement a two-tiered monitoring approach:

1. **Annual Departmental Reviews** – Each department should complete an annual summary of energy use, fuel consumption, and waste generation using a standardized template coordinated by the Climate/Sustainability Lead. Reviews should update KPIs, track changes from the 2023 baseline, and note key trends or issues affecting performance.
2. **Five-Year Corporate GHG Inventory Updates** – Every five years, a full Corporate GHG Inventory should be completed following the PCP protocol. This comprehensive review will verify emissions data, measure progress toward the 2035 target, and inform updates to KPIs and the CCAP based on new data, technologies, and regulations.

The roles, responsibilities, and timing of these activities are summarized in Table 8, which outlines the Town's proposed monitoring framework.

Table 8 - Monitoring Framework

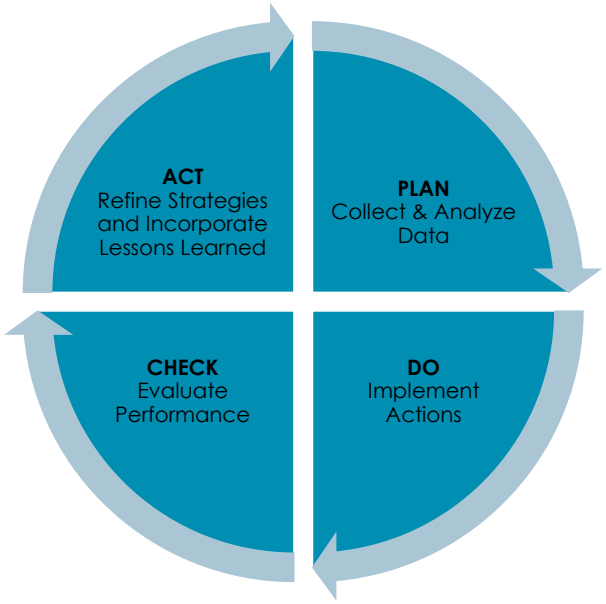
Action	Process/Outcome	Frequency	Lead Responsibility
Annual Departmental Review	Compile departmental energy, fuel, and waste data. Generate annual summary comparing results to 2023 baseline and interim targets.	Annually	All Departments / Coordinated by Climate/Sustainability Lead
GHG Inventory Update	Formal recalculation of emissions in alignment with PCP protocol. Identify updated emission trends and progress toward 2035 target.	Every 5 years	Climate/Sustainability Lead
KPI Dashboard Maintenance	Maintain central reporting dashboard (e.g. Power BI or Excel) with automatic data inputs where possible.	Ongoing	Climate/Sustainability Lead / IT
Council and Public Reporting	Prepare short annual summaries to Council highlighting performance, key achievements, and next steps.	Annually	Climate/Sustainability Lead

6.3 Evaluation and Continuous Improvement

Beyond tracking data, the monitoring process should actively inform decision-making and continuous improvement. Annual and five-year reviews should be used to identify underperforming actions, highlight successful initiatives, and guide resource allocation toward measures with the greatest impact. By embedding this feedback loop into capital planning and budget processes, Grimsby can ensure that climate action remains adaptive, evidence-based, and aligned with operational priorities.

This continuous improvement process aligns with the Deming Cycle (Plan–Do–Check–Act).

Figure 11 - CCAP Continuous Improvement Process (Plan-Do-Check-Act)



6.4 Adaptive Management and CCAP Updates

The CCAP should be treated as a living document, evolving alongside new data, technologies, and regulatory requirements. To maintain its relevance and effectiveness, it is recommended that the CCAP be formally reviewed and updated every five years, coinciding with the proposed Corporate GHG Inventory updates in Section 6.2.

This regular review cycle will ensure that progress toward the 2035 emissions reduction target is accurately assessed and that new insights, funding opportunities, or policy changes are integrated into future iterations of the Plan. Aligning CCAP updates with GHG inventory reviews will strengthen continuity, enhance data reliability, and support informed, evidence-based decision-making as Grimsby advances its long-term decarbonization objectives.

Conclusion

This CCAP provides the Town of Grimsby with a clear and practical framework to reduce corporate greenhouse gas emissions while strengthening resilience to climate-related risks. It translates climate objectives into implementable actions that align with the Town's Strategic Priorities, asset management practices, and long-term financial planning.

The CCAP is grounded in a strong evidence base, including a corporate greenhouse gas inventory, a Climate Change Risk Assessment, and a Cleantech Sector Assessment. Together, these inputs ensure that recommended actions respond to Grimsby's highest sources of emissions and most significant climate risks, while remaining feasible within municipal operating and capital planning constraints.

A key strength of the Plan is its alignment with planned asset replacement cycles. By prioritizing low-carbon solutions at natural points of renewal, the Town can reduce emissions while maximizing economic value and avoiding unnecessary retrofit costs. The focus on incremental low-carbon costs, rather than total capital spending, supports informed and transparent decision-making.

The CCAP recognizes that successful implementation will require coordination across departments, access to external funding, and sustained staff capacity. Clear roles, policy enablers, and monitoring processes are identified to support consistent delivery and accountability over time. The recommended monitoring and reporting framework ensures that progress toward the 2035 reduction target can be tracked, evaluated, and adjusted as conditions evolve.

This Plan is intended to be a living document. As technologies mature, funding programs change, and new data becomes available, the CCAP should be reviewed and updated to remain relevant and effective. By embedding climate considerations into routine municipal decision-making, Grimsby can steadily reduce emissions, manage climate risks, and protect the services and assets residents rely on.

Overall, the CCAP positions the Town to act deliberately and responsibly on climate change. It provides a clear path forward that balances environmental responsibility, fiscal prudence, and operational practicality, while supporting a resilient and sustainable future for Grimsby.

Glossary

Adaptation

Actions taken to reduce the negative impacts of climate change or to take advantage of potential benefits. In this CCAP, adaptation focuses on increasing the resilience of municipal assets, services, and operations to climate-related risks such as extreme heat, flooding, and storms.

Asset Management Plan

A strategic document that guides how municipal assets are operated, maintained, renewed, and replaced over their lifecycle to provide reliable services in a cost-effective manner.

Baseline Year

The reference year against which future greenhouse gas emissions and reductions are measured. For this CCAP, the baseline year is 2023.

Business-As-Usual (BAU)

A projected scenario that estimates future greenhouse gas emissions assuming no additional climate mitigation actions beyond those already in place.

Carbon Dioxide Equivalent (CO2e)

A standardized unit that expresses the global warming impact of different greenhouse gases relative to carbon dioxide, allowing emissions from multiple gases to be compared and aggregated.

Climate Change

Long-term changes in average weather patterns, including temperature, precipitation, and extreme weather events, driven primarily by increased greenhouse gas concentrations from human activities.

Climate Lens

A decision-making framework that requires consideration of greenhouse gas impacts, climate risks, and long-term resilience when evaluating policies, capital projects, and procurement decisions.

Corporate Emissions

Greenhouse gas emissions resulting from municipal operations that the Town directly controls, such as buildings, fleet vehicles, street lighting, and waste.

Electricity Emissions Intensity

The estimated GHG emissions per unit of electricity generated or consumed. Ontario's intensity varies over time and strongly influences Corporate GHG totals.

Electrification

The replacement of fossil fuel-based equipment and vehicles with systems powered by electricity, such as heat pumps and electric vehicles, typically resulting in lower emissions when supplied by a low-carbon grid.

Energy Conservation Measure (ECM)

A specific action or upgrade that reduces energy consumption or improves efficiency, such as LED lighting, advanced controls, or equipment upgrades.

Greenhouse Gas (GHG)

Gases that trap heat in the atmosphere and contribute to climate change, including carbon dioxide, methane, and nitrous oxide.

Green / Renewable Energy

Energy generated from sources that are naturally replenished and produce little to no greenhouse gas emissions, such as solar photovoltaic systems.

Life-Cycle Costing

An evaluation method that considers total costs over an asset's full life, including capital, operating, maintenance, energy, and end-of-life costs, rather than just upfront purchase price.

Mitigation

Actions taken to reduce greenhouse gas emissions or enhance carbon sinks in order to limit the magnitude of future climate change.

Operational Control

An emissions accounting approach that includes sources over which the Town has the authority to implement operating policies, regardless of ownership.

Photovoltaic (PV)

A technology that converts sunlight directly into electricity using solar panels.

Resilience

The ability of systems, assets, and services to anticipate, withstand, respond to, and recover from climate-related disruptions while maintaining essential functions.

Revolving Energy Fund

A self-sustaining funding mechanism where utility savings from energy efficiency projects are reinvested into future energy improvements.

Scope (GHG Emissions)

A classification system used to group emissions sources. In this CCAP, emissions are primarily categorized by municipal sectors such as facilities, transportation, waste, and street lighting.

Appendices

Appendix A – Climate Change Risk Assessment (CCRA)

Introduction

Climate change presents a growing risk to the Town of Grimsby's infrastructure, municipal services, and the broader community. The Niagara Region's climate is projected to become warmer and wetter, with more frequent extreme weather events like intense rainfall and heat waves[25]. In fact, by the 2080s, the Region may experience roughly 3.6°C higher average temperatures relative to the 1971-2000 baseline. The Region may also experience nearly quadruple the number of very hot days above 30°C, along with about 10% more annual precipitation[25].

These shifts are not distant forecasts - Grimsby is already witnessing climate impacts, including record-setting high Lake Ontario water levels, shoreline erosion in coastal areas, and more frequent extreme storms, such as the July 2021 event that resulted in 75 mm of rain in a few hours and caused localized flooding[26,27]. Such events can damage property, disrupt services, and pose a threat to health, particularly for vulnerable residents.

This CCRA was undertaken to systematically evaluate these risks and identify priority actions to increase the Town's resilience. It aligns with provincial and regional adaptation directives. The Niagara Region's Official Plan calls for developing adaptation strategies to reduce vulnerabilities and improve resilience to extreme weather. Similarly, Grimsby's own strategic plans recognize the need to safeguard infrastructure and services as the climate changes. This appendix explains how climate change may impact Grimsby and contemplates proactive actions to address it.

Note that this CCRA offers a high-level evaluation designed to inform the CCAP. It should be complemented by, not substituted for, detailed engineering-level assessments where required.

Research Steps Taken

To support the development of the CCRA, a structured and evidence-based approach was undertaken. The following steps outline the key research and analytical activities completed to identify, assess, and prioritize climate-related risks to municipal assets and services in Grimsby.

- **Policy & Plan Review:** Gathered local and regional policy documents to understand established climate goals, projections, and relevant directives, with

[25] TRCA - Climate Projections for Niagara Region (2022)
[26] Town of Grimsby - Asset Management Plan (2025)
[27] St. Catharines, Niagara Falls, Grimsby and Welland under heavy rainfall warning (2021)

greater weighting given to local plans for implementation relevance and to regional plans for broader policy alignment. These documents included Town of Grimsby Strategic Priorities 2023–2026, Grimsby's Official Plan, Grimsby's 2025 Asset Management Plan, Niagara Region Official Plan 2024, Niagara Region Corporate Climate Change Action Plan 2025 and Energy Conservation and Demand Management Plan 2024–2028.

- **Data Collection:** Compiled regionally downscaled climate projection data for the Niagara Region and recent climate hazard observations. This climate projection data was applied to Grimsby for consistency with the Niagara Region's CCAP. Reviewed Town asset management reports, official plans, and building condition assessments to catalogue critical assets and any noted climate vulnerabilities.
- **Framework Selection:** Identified suitable risk assessment frameworks used in Ontario, including the Public Infrastructure Engineering Vulnerability Committee (PIEVC) Protocol, guidance from the Climate Risk Institute (CRI - formerly the Ontario Centre for Climate Impacts and Adaptation Resources), and Local Governments for Sustainability (ICLEI) Canada's Building Adaptive and Resilient Communities (BARC) methodology for municipal adaptation planning. These informed the risk evaluation approach and scoring criteria.
- **Asset & Hazard Identification:** Developed a high-level inventory of key municipal assets and services and likely climate change exposures for each. This included fire stations, community centres, the municipal office, roads, stormwater system, flood-prone neighbourhoods. Key climate hazards examined include extreme rainfall/flooding, extreme heat, winter storms/ice, high winds, and shoreline hazards along Lake Ontario.
- **Risk Analysis & Prioritization:** Assessed each asset/hazard pair for *likelihood* of occurrence and *consequence* of impacts, using a standardized risk matrix. Scores were assigned following best practices adapted from PIEVC/ICLEI guidance to determine overall risk levels. The highest risks were flagged for priority action.

Methodology

Approach Overview

The CCRA followed a structured process consistent with industry best practices and Ontario-specific frameworks. The figure below describes this process - beginning with establishing context, identifying hazards, evaluating risks, and, finally, identification of adaptation actions[28]. This approach is systematic and grounded in established methods, ensuring that the results are credible and comparable to those of other communities.

[28] Where local or sector-specific data was limited, analogous information from similar Ontario municipalities and national best-practice guidance was used, as noted in the Data Gaps section.

Frameworks and Tools

As described, the CCRA drew on several established frameworks to guide the assessment. The PIEVC Protocol provided a five-step methodology for evaluating infrastructure vulnerability under future climate conditions. This protocol, widely used across Canada, ensured consistent consideration of the nature, likelihood, and severity of future climate hazards for each asset. Elements of ICLEI Canada's BARC program were also incorporated, which has been applied by over 70 municipalities nationwide. Guidance and resources from the CRI were also consulted to ensure alignment with provincial risk assessment norms.

Data Sources

Regionally downscaled climate projection data prepared by the Toronto & Region Conservation Authority (TRCA)[25] for the Niagara Region was used for this assessment. These projections are broadly representative of conditions in Grimsby and ensure consistency with the broader Niagara Region's planning framework.

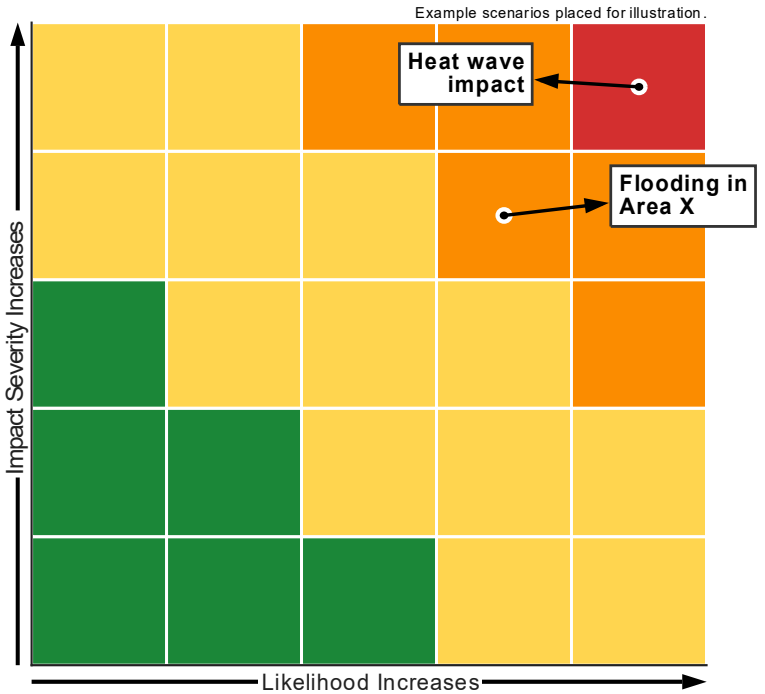
This TRCA study provided a set of climate projections (temperature, precipitation, extreme weather indices) from the baseline (1971-2000) until 2080 under a high-emissions (Representative Concentration Pathway or RCP 8.5) scenario, with projections also available for a moderate (RCP 4.5) pathway. For near-term conditions, historical weather trends and recent local events were reviewed. This included flooding incidents and heatwaves in the past decade.

On the exposure side, a high-level inventory of Town-owned assets was compiled from Grimsby's latest Asset Management Plan and building condition assessments. Critical infrastructure and facilities were highlighted, including Fire Stations, the Major Refrigeration Peach King Centre, Town Hall and Municipal Offices, the Operations Centre/yard, the Museum, Library/Art Gallery, stormwater management systems, and key transportation routes.

Risk Scoring Method

Each identified climate hazard–asset pair was evaluated for:

- **Likelihood** – the probability of the climate hazard occurring or worsening to a problematic level over the 2050s horizon (mid-century), with some considerations of trends toward the 2080s; and
- **Consequence** – the severity of impact if that hazard affects the asset/service, considering factors like public safety, service disruption, financial cost, and environmental damage.



A qualitative five-point scale was used for each, where Likelihood ranged from Rare (1 – very unlikely under future climate) to Almost Certain (5 – expected to happen often), and Consequence ranged from Insignificant (1 – negligible impact) to Severe (5 – catastrophic impact or total loss of service).

These ratings were informed by projected changes in event frequency. For example, a historical 1-in-100-year storm now occurring every 20 years increases the likelihood rating. A simple risk matrix (see figure example) was then applied to combine likelihood and consequence into an overall risk level. Risk level describes how serious and how likely an event is to happen. A low risk means it's minor and unlikely to cause real problems; a medium risk needs attention; a high risk could cause major issues; and an extreme risk is both serious and likely to require immediate action.

This matrix approach aligns with standard municipal risk assessment practices and ISO 31000 principles[29], making the results easy to communicate and understand.

Prioritization

After scoring, the list of risks were sorted by level, and, in cases of ties, by urgency and timing. The focus was on identifying "high" and "extreme" risks (i.e. those that scored in the upper categories) as priorities for adaptation measures. Moderate risks were also noted for longer-term attention. The outcome is a robust yet accessible risk profile to guide Grimsby's climate adaptation efforts.

[29] ISO 31000:2018 Risk management — Guidelines

Risk Assessment Process

Hazard Identification

The first step was identifying which climate change hazards are relevant to Grimsby. Based on scientific projections and local experience, the assessment focused on the below climate hazards. Community input from the public survey supported this approach, with most respondents reporting direct experience with climate-related events and identifying extreme heat, flooding, and power outages as key concerns.

- **Extreme precipitation and flooding:** Short-duration, high-intensity rainfalls and prolonged wet periods that can overwhelm storm sewers, raise creek levels, and cause urban, riverine, or lakeshore flooding and erosion.
- **Extreme heat:** Extended heat waves and humidity that can affect vulnerable populations, cooling systems in Town facilities, and infrastructure materials.
- **Winter storm (snow and ice):** Heavy snowfall, blizzards, and freezing rain events that damage power lines, trees, and road networks.
- **Windstorms:** Severe thunderstorms, wind gusts, or rare tornadoes/microbursts that may damage roofs, trees, and power infrastructure.
- **Lake-related hazards:** Flooding and erosion from high Lake Ontario water levels and storm surges.

The TRCA climate modelling[25] predicts more frequent extreme heat days, meaning heat-related hazards will likely intensify. It also projects an increase in annual precipitation.

Climate Parameter	Baseline (1971-2000)	Short Term (2021-2050)	Long Term (2051-2080)	% Difference (Baseline vs. Long-Term)
Mean Annual Temperature (˚C)	8.7	10.7	12.3	41%
Annual Average Number of Days above 30˚C	10.4	23.9	39.4	378%
Total Average Annual Precipitation (mm)	1080.6	1135.0	1192.0	10%

Overall, Niagara's trend toward warmer, wetter conditions with more frequent extremes provided the context for hazard identification[25].

Exposure and Vulnerability

The assessment then examined what elements within the Town are at risk from identified hazards. This includes both the Town's exposure, meaning the presence of people, assets, or systems in locations that could be adversely affected by climate hazards (e.g.

buildings in floodplains), and vulnerability, meaning the degree to which those assets or systems are susceptible to damage due to their condition, design, or criticality. For municipal operations and infrastructure, the assessment considered major asset classes including critical facilities (e.g. fire stations, operations centres), stormwater and water infrastructure, transportation networks, and community hubs. These were drawn from the Town's Asset Management Plan (2025) and Official Plan[26,30].

Buildings & Facilities

Key municipal facilities were reviewed for their exposure and vulnerability to climate-related hazards, with particular focus on their role in maintaining essential community services. These include:

- Fire Stations (1 and 2) which must remain fully operational during emergencies
- The Major Refrigeration Peach King Centre and other community centres that may serve as emergency or cooling shelters
- Town Hall and Municipal Offices which house critical administrative functions and records
- The Operations Centre which supports public works and storm response
- The Museum and Library/Art Gallery which serve as important community and cultural assets

The assessment considered high-level factors such as building age and general condition, the presence of known backup power and cooling systems, and other site characteristics (e.g. floodplain location or exposure to extreme heat). For example, Fire Station No. 1 on Ontario Street is a critical emergency facility with very low tolerance for downtime, meaning that even a moderate flood or power outage at this site could have significant operational consequences.

Stormwater & Drainage Infrastructure

Many municipal assets across Grimsby and the broader Niagara Region were designed and constructed under historical climate conditions that differ from today's and those projected for the future. As a result, some infrastructure may have been built to past design standards that did not fully account for current or emerging climate risks such as extreme precipitation, heat, and freeze–thaw cycles.

Stormwater and drainage systems are also closely integrated with transportation infrastructure (e.g. roads, culverts, and ditches), meaning these vulnerabilities often affect multiple asset classes simultaneously. These conditions highlight the need for adaptive planning, proactive renewal, climate-resilient retrofits, and increased monitoring and maintenance to ensure infrastructure remains reliable under changing conditions.

[30] Town of Grimsby Official Plan (2025)

Roads and Transportation

Key road corridors and bridges, especially those in low-lying areas or along steep grades, were considered. Grimsby's geography presents unique challenges for stormwater management. The Town is a relatively dense urban area located between the Niagara Escarpment and Lake Ontario, with major transportation corridors such as the QEW and CN rail running through it. These constraints can limit how stormwater is conveyed and increase the potential for localized flooding. Flooded or iced-over roads can impede emergency response and daily travel.

While widespread network disruption has not been observed, localized nuisance flooding and property impacts have occurred in certain areas, including underpasses and locations near watercourses. Roads such as escarpment access routes and rural roads adjacent to drainage channels and the Forty Mile Creek system may be at increased risk under future climate conditions. In addition, more frequent freeze thaw cycles are expected to accelerate road degradation and increase maintenance requirements.

Water/Wastewater Systems

While water supply and wastewater treatment are primarily managed at the regional level in Niagara, the Town is responsible for local water distribution and wastewater collection systems. These systems are vulnerable to climate-related stressors.

For drinking water infrastructure, extreme cold, fluctuating temperatures, and more frequent freeze–thaw cycles can increase the risk of pipe breaks and leaks. Periods of extreme heat or drought may also increase system demand.

For wastewater systems, increased precipitation and more frequent extreme rainfall events can lead to higher inflow and infiltration, which may result in system capacity issues, localized backups, or increased treatment requirements at the regional level.

In addition, widespread power outages caused by storms may disrupt system operations where backup power is not available.

Parks, Trees & Natural Areas

Finally, the Town's parks, urban forest, and natural areas were also considered. Extreme wind or ice can cause significant tree damage – falling limbs pose safety hazards and can knock out power. Prolonged heat and drought can stress park vegetation and trees, potentially leading to tree loss. This can cause reduced shade and further heat impacts in a vicious cycle. Shoreline parks like Whittaker Park were noted for erosion risk, as shoreline damage there has already necessitated repairs[26].

Community-Level Exposure

For community-level exposures, the assessment was broadened to consider potential impacts on residents, businesses, and the environment in Grimsby:

- **Residential areas:** Residential areas, especially older neighbourhoods, lack modern insulation or air conditioning, making heat waves dangerous for residents. They may also be located in low-lying areas where flooding could affect homes and basements. Much of Grimsby's underground infrastructure dates to the 1970s–1980s[26], when design criteria for 100-year storms were less stringent, suggesting that portions of the town may be vulnerable to future extreme rainfall events.
- **Vulnerable populations:** Vulnerable populations, including seniors, young children, low-income households and those with health issues are more susceptible to heat stress, poor air quality (e.g. wildfire smoke episodes), and displacement from extreme events. Critical institutions, such as nursing homes and schools, were evaluated based on whether they have cooling and backup power.
- **Local economy and services:** The local economy and municipal services may be affected by climate events through impacts on local businesses and disruptions to services such as healthcare or tourism. Grimsby's agricultural surroundings (e.g. vineyards and orchards) may also face climate-related challenges, including extreme heat, drought and new pests - though these are largely addressed at the regional level.
- **Natural ecosystems:** Natural ecosystems, while not the focus of this Corporate plan, provide important services like stormwater absorption and cooling, and may be adversely affected by climate change through impacts such as erosion or habitat damage caused by intense storms.

By mapping the exposures and vulnerabilities described in this section, an effective inventory of "risk scenarios" was created. Each risk scenario was then analyzed for likelihood and consequence.

Data Gaps and Substitutions

During the risk assessment, several data gaps were identified. In the spirit of transparency, these are outlined below along with the substitutions or assumptions made to complete the evaluation. As previously noted, this CCRA is a high-level screening intended to inform the CCAP and should not be viewed as a substitute for a detailed, standalone, engineering-level assessment.

- **Flood Mapping and Stormwater Data:** Detailed floodplain mapping for smaller creeks in Grimsby and capacity analysis of every storm sewer line were outside the scope of this CCRA. Instead, available indicators from the Asset Management Plan[26] were used to infer flood exposure, such as the percentage of properties and stormwater infrastructure meeting design storm criteria. This information was supplemented with anecdotal evidence of known past flooding trouble spots. It is assumed that areas with older infrastructure are more at risk of drainage issues. It is recommended that the Town improve data in this area by, for example, undertaking a stormwater master plan update or flood risk study.
- **Asset Resilience Features:** The building condition reports and Asset Management Plan did not always specify whether facilities have climate-resilience features

such as backup generators or window glazing for extreme heat. Where unknown, conservative assumptions were applied. For example, it was assumed that most older facilities do not yet have dedicated backup power or specialized floodproofing, unless recent upgrades are known. This gap is identified, and it is recommended that the Town conduct a facility climate resilience audit to obtain more detailed information on each critical building's preparedness.

- **Social Vulnerability Data:** Detailed social vulnerability mapping was not available for the assessment. Understanding how factors like age, income, housing quality, and access to cooling influence climate risk is recognized as crucial for equitable adaptation planning. Developing a socio-climate vulnerability index for Grimsby's neighbourhoods is recommended, as it would help identify areas most at risk during extreme events and guide targeted outreach and resilience programs.
- **Cost Impact Quantification:** The assessment qualitatively rated financial consequences (low to severe) but did not produce dollar-value estimates of climate damage for each scenario. Such an economic analysis would require detailed engineering studies and probabilistic modelling. In the absence of that, consequence scoring was grounded in orders of magnitude. For example, "Major" if impacts could reasonably exceed $1 million in damages or disrupt a service for weeks. The assessment also referenced other municipalities' experiences for additional insight - for instance, recognizing that a single severe flood event can cost tens of millions in recovery. As climate data and modelling improve, it is recommended that the Town consider a more quantitative climate risk assessment in the future.

These uncertainties are clearly communicated to ensure decision-makers remain informed. None of the gaps identified are considered to invalidate the overall conclusions. In each case, conservative assumptions were applied, or widely accepted best practices were used to address data limitations. Importantly, the identified high-priority risks are expected to remain high priority even with more precise data, given the consistent direction of climate trends and known vulnerabilities.

Findings: Key Climate Risks for Grimsby

The following table summarizes key climate risks identified for the Town of Grimsby, combining municipal and community perspectives. Each risk is characterized by the primary hazard, the affected asset or service, the assessed likelihood and consequence, and an overall risk rating.

Climate Hazard	Risk Scenario (Asset/Service at Risk)	Likelihood	Consequence	Risk Level
Extreme Rainfall/Flood	Flooding of low-lying urban neighborhoods and roads	Likely (in coming decades)	Major (property damage, safety risks, high response costs)	**High**
Extreme Rainfall/Flood	Flood inundation at critical facilities (e.g. one of the Fire Stations or Operations Centre)	Unlikely currently but Possible by 2050 (no reported drainage issues),	Severe (emergency response impaired, facility damage)	**High**
Extreme Rainfall/Flood	Shoreline flooding/erosion impacting lakeside assets, beach and parks	Likely (during Lake level peaks or storm surges)	Major (infrastructure damage, park/coastal property loss)	**High**
Extreme Heat	Prolonged heat wave impacting vulnerable populations and straining community centres/cooling facilities	Almost Certain (by 2050 summers)	Major (heat-related illness, high demand on facilities and electricity)	**High**
Extreme Heat	Overheating of municipal buildings leading to unsafe indoor conditions or equipment stress	Likely (more hot days)	Moderate (disruption of services, comfort issues)	**Medium**
Extreme Heat + Outage	Concurrent heat wave and power outage – no A/C or cooling for homes, cooling centres overwhelmed	Possible (some chance with severe weather)	Severe (high risk of heat stroke/fatalities, community emergency)	**High**
Winter Storm (Ice)	Ice storm causing extended power outages and tree damage town-wide	Possible (ice storms still possible in warming climate)	Severe (days-long outages, road blockages, costly cleanup)	**High**

Climate Hazard	Risk Scenario (Asset/Service at Risk)	Likelihood	Consequence	Risk Level
Winter Storm (Snow)	Major blizzard/heavy snow overwhelming snow clearing operations	Possible	Moderate (short-term mobility & cost impacts, generally manageable)	**Medium**
Windstorm	Severe wind or microburst causing roof/building damage and downed trees	Unlikely (severe intensity)	Major (if it occurs – structural damage, park/tree losses)	**Medium**
Drought/ Water constraints	Summer drought affecting municipal parks & urban trees	Possible (hot dry summers more likely)	Moderate (gradual impacts on greenery, increased maintenance)	**Medium**
Wildfire and Wildfire Smoke (air quality)	Periodic smoke haze from distant wildfires and potential localized wildfire risk along the Escarpment, impacting air quality, outdoor activities, and access to services	Likely (summers now see some events)	Moderate (air quality advisories, need to modify activities, impacts to outdoor services and work, and potential localized access disruptions in the event of an Escarpment wildfire)	**Medium**
Invasive species/pests	Climate-driven spread of pests affecting public health and trees	Likely (warming enables more pests)	Minor (manageable through public health measures and tree management)	**Medium**

Discussion of High Risks

To better understand what these high-priority risks mean for Grimsby, several descriptive scenarios are outlined below:

- **Urban Flooding in Older Areas:** Heavy rainstorms can overwhelm storm drains, especially in neighbourhoods built decades ago with smaller pipes. In these areas, water can pond on streets, flow into yards and basements, and make some roads temporarily impassable. Homeowners may experience flooded basements, and Town crews may operate at maximum capacity responding to calls. As storms get more intense, this type of flooding, once rare, is expected to occur much more frequently. It is considered high-risk because it can cause significant damage and distress, though it is also an issue that can be mitigated through improved drainage infrastructure and enhanced flood preparedness.
- **Fire Hall / Critical Facility Flooding:** While most of Grimsby's critical facilities are located outside major floodplains, even a minor flood at a fire station or operations centre would have significant impacts. For instance, if water flooded the garage bays at a fire station during a storm, trucks and equipment could be damaged and/or emergency response operations could be disrupted. Given some past regional flooding events, this scenario was considered "possible". It receives a high-risk rating due to the severe consequence, as an uninterrupted emergency service is essential for community safety.
- **Shoreline Flooding & Erosion:** Grimsby's Lake Ontario shoreline is generally stable but not immune to high lake levels and wave action. In 2017 and 2019, record lake levels caused flooding/erosion in many Lake Ontario communities[31]. The Town has implemented shoreline protection works, such as armour-stone revetments[26], to help safeguard nearby infrastructure and properties. Still, a future combination of spring melt and a windstorm could overtop existing defenses and cause localized flooding. This risk is rated high due to the potential infrastructure and property damage if a severe lake flood occurs, even though it is not an annual event. Ongoing shoreline protection and monitoring of lake trends are recommended key actions.
- **Extreme Heat Impacting Health & Services:** Heat waves are projected to become longer and more severe. By mid-century, Grimsby could experience sustained periods of 30°C+ days in a row, with both average summer highs and nighttime minimums increasing[25]. Those without air conditioning or who work outdoors will face heightened risks of heat exhaustion or illness. The Town's community centres and libraries may serve as cooling or refuge centres and could experience higher demand. If a heat wave coincides with a power failure, sometimes caused when the grid is strained or storms knock out electricity, the situation could become dangerous very quickly (e.g. loss of fans/AC, food spoilage). Heat risks are rated high to extreme, particularly for the combined heat and outage scenario, because lives could be at stake. This highlights the need for robust cooling options and backup power systems at critical facilities.
- **Ice Storm and Power Loss:** Although winters are projected to become milder, freezing rain events may become more frequent in place of snow during some storms. Such ice events can bring down power lines and trees, causing multi-day

[31] Ontario's Special Advisor on Flooding Report to Government -- An Independent Review of the 2019 Flood Events

outages, as seen during the 2013 southern Ontario ice storm[32]. For Grimsby, a similar event could leave many households without power and obstruct key roads with debris. Given recent regional occurrences, this is rated high risk: consequences are severe (town-wide disruption) even though likelihood is moderate or "possible" (not every winter). This supports continued investment in winter emergency preparedness and grid resiliency.

Other risks listed in the assessment, while not all classified as "high," still warrant attention. For instance, windstorm damage, such as from a microburst capable of downing trees or damaging roofs, can be costly, though often localized and rare, and therefore rated medium risk. Drought conditions affecting park landscapes primarily pose aesthetic and maintenance challenges, categorized as medium risk, but can be mitigated through appropriate irrigation practices and climate-resilient plantings. Wildfire smoke, increasingly common in the region, is largely beyond local control, but developing contingency plans for outdoor events and issuing health advisories during poor air quality days are recommended.

In summary, Grimsby faces significant climate risks primarily from water- and heat-related hazards. Proactive adaptation measures are therefore strongly recommended.

[32] CityNews: 2013 Ice Storm in Southern Ontario

Recommendations

Based on the above risk findings, a set of adaptation actions is recommended to help the Town reduce climate risks and strengthen community resilience. It is recognized that some of these actions are likely already being implemented, in whole or in part, through existing Town initiatives. For example, the Town has undertaken a Shoreline Inventory and Assessment that was recently completed in 2025.

The Town is also currently advancing several related plans and studies, including updates to the Official Plan and Transportation Master Plan. Where possible, these initiatives are being developed in parallel and shared as they are finalized to support alignment and consistency across Town planning efforts.

Future efforts should continue to align with Grimsby's asset management and capital planning cycles to ensure that adaptation measures are effectively integrated into regular maintenance, renewal, and budgeting processes. For clarity, the high-level recommendations are grouped by theme in the tables below.

Infrastructure Upgrades and Asset Management

Recommendation: Enhance Stormwater Management
Description: Review and update the Town's Stormwater Master Plan and associated stormwater management policies to ensure they adequately address current and future climate conditions. This should include assessing whether existing infrastructure design standards, capacity assumptions, and drainage approaches reflect projected increases in rainfall intensity and frequency. Based on this review, identify priority infrastructure upgrades such as upsizing old undersized storm sewers, adding or enlarging stormwater retention capacity, and implementing green infrastructure (like bio-swales, rain gardens) to manage runoff.
Alignment: Incorporate identified measures into the capital works schedule. For example, whenever a road in an older neighborhood is due for renewal, evaluate and upgrade the drainage at the same time. Leverage the Town's Asset Management Plan data to prioritize areas with the largest "capacity gap" for storm events. Over time, design standards should be updated to reflect future rainfall intensities (not just historical data). These efforts directly address the high flooding risk identified.
Recommendation: Shoreline Protection
Description: Continue and expand shoreline erosion control projects. The recent works through Lake Ontario shoreline revetment to protect infrastructure from erosion and high-water levels[26] at Grimsby Beach and planned improvements at Whittaker Park are positive steps. Ensure these projects remain funded and on track. Monitor Lake

Ontario levels and shore conditions annually; be prepared with contingency plans (e.g. sandbags, temporary pumps) for extreme lake level years. Consider natural shoreline buffers (where possible) like wetlands or vegetative strips to reduce wave energy.
Alignment: Tie these projects into parks upgrades and waterfront development plans, scheduling major works in conjunction with park redevelopments (as is being done with Whittaker Park).
Recommendation: Roads and Bridges Resilience
Description: Identify key transport routes that would cause major disruption if flooded or damaged. For those, ensure alternative detour routes are available or plan engineering solutions (e.g. raising a low-lying section of road, increasing bridge/culvert capacity). When rehabilitating bridges and culverts, design for climate-adjusted flow volumes.
Alignment: Integrate this into the regular bridge inspection and replacement program by adding a climate lens – for example, when a bridge comes due for rehab, verify if its flood capacity will handle projected flows for the next 50+ years.
Recommendation: Facility Retrofits for Climate Control
Description: Many Town buildings will need retrofits to cope with more heat and severe weather: 1. **Cooling and Ventilation:** Install or upgrade air conditioning systems in community centres, libraries, and other public facilities that might serve as cooling centers. Ensure they have adequate capacity for higher peak temperatures. Consider adding window shading, insulation, or reflective roofing during roof replacements to improve passive cooling. 2. **Back-up Power:** Provide emergency generators or battery backup systems at critical facilities, especially Fire Stations, the Operations Centre, any designated emergency shelter sites. During budget planning, allocate funds to maintain or expand coverage (for example, targeting full redundancy across critical infrastructure by 2030). Where possible, explore provincial or federal grants for critical-infrastructure protection. This directly mitigates the high-risk scenario of power outages during extreme events. 3. **Flood Protection:** For facilities identified near flood zones, implement floodproofing measures. This could include installing backflow preventers on drainage lines, raising electrical panels or furnaces from basements, and having deployable flood barriers/sandbags ready. The Fire Station for instance could benefit from a simple perimeter drain check and sump pump installation if not already in place. 4. **Structural Hardening:** Ensure roofs can handle heavier rain or snow loads. When re-roofing, check the roof drainage systems (e.g. interior drains, eavestroughs) to make sure extreme downpours can be effectively drained. Secure or upgrade roof fastenings to better resist high winds.

Alignment: All these building measures should be folded into the Town's facilities maintenance schedule and Capital Budget. For example, when the Major Refrigeration Peach King Centre is slated for HVAC replacement, choose higher-efficiency units considering 2050 climate. Leverage Building Condition Assessments to integrate resilience features where possible.

Planning and Policy Measures

Recommendation: Land Use Planning for Resilience
Description: Use the Official Plan and development approvals process to reduce future risk. Avoid approving sensitive developments in hazard areas such as floodplains or erosion-prone shorelines or require robust mitigation. Update zoning/site plan guidelines to mandate stormwater management for larger storms, tree planting for shade, and permeable surfaces. Niagara Region's Official Plan directs incorporating climate projections into planning; Grimsby can operationalize this by reviewing standards for new developments.
Alignment: Integrate updated climate considerations into Grimsby's Official Plan and zoning by-laws. Ensure development review processes embed climate-resilient design standards for stormwater, shading, and permeability.
Recommendation: Emergency Response Planning
Description: Ensure the Town's emergency management plan explicitly accounts for climate-related scenarios such as extreme heat events, wide-area flooding, or multi-day power outages. Develop specific response protocols: e.g. establish cooling centers with backup power that can open on short notice, create flood emergency response kits for Public Works with portable pumps and road closure barricades, and ensure the Community Emergency Management Coordinator (CEMC) has access to real-time weather forecast tools. Conduct drills or tabletop exercises for a climate emergency to identify gaps. Strengthening these plans will reduce the impact when events occur.
Alignment: Align with the Town's Emergency Management and Business Continuity frameworks. Ensure the CEMC integrates climate hazard scenarios into exercises, response kits, and mutual-aid planning with Niagara Region.
Recommendation: Public Education and Early Warning
Description: Educate residents and businesses about climate risks and how to prepare. For flooding, promote review of downspout drainage, backflow valve installation, and proper lot grading for homes. For heat, communicate the importance of hydration, checking on vulnerable neighbors, and places to go to cool down. Leverage the Town's website, social media, and community guide to share seasonal preparedness tips. Also improve early warning

systems: ensure weather alert messages (e.g. for storms, heat alerts) are promptly disseminated through all channels. Consider automated phone or text alert systems for extreme events. An aware and prepared public can significantly reduce harm.
Alignment: Incorporate seasonal climate risk awareness campaigns into the Town's communications strategy. Use municipal newsletters, the Let's Talk Grimsby engagement platform, website banners, and social media to disseminate early warnings and preparedness tips. Coordinate messaging with Niagara Region Public Health and Emergency Services.
Recommendation: Tree Canopy and Green Infrastructure
Description: Enhance the urban tree canopy as a long-term adaptation strategy. Trees provide cooling shade, reduce stormwater runoff and have carbon sequestration benefits. Develop and fund an urban forestry program that not only replaces removed trees but expands overall tree planting, prioritizing areas with low canopy cover. Protect existing mature trees on municipal lands wherever feasible, recognizing their significantly higher carbon storage and broader environmental benefits. Choose climate-resilient species likely to thrive in a warmer climate and resist pests. Similarly, integrate green infrastructure in public spaces such as rain gardens or permeable pavements in parking lots. These measures provide small-scale flood mitigation and cooling benefits. They can often be implemented during routine park upgrades or as part of a Climate Adaptation Strategy. Opportunities to support tree planting and green infrastructure on private property should also be considered through programs, incentives, or development requirements, recognizing that a significant portion of land is privately owned.
Alignment: Integrate with Parks Master Plan and Public Works capital programs. Align tree planting and green infrastructure initiatives with asset renewal projects to maximize co-benefits for cooling and stormwater reduction. Where appropriate, coordinate with planning and development processes or community programs to support implementation on private lands.
Recommendation: Cross-Jurisdictional Collaboration
Description: Work with Niagara Region and neighboring municipalities on joint resilience initiatives. Most climate impacts (e.g. heat waves or widespread power grid issues) cross municipal boundaries. Grimsby should coordinate with Niagara Region's climate change staff and emergency management officials to ensure actions complement regional plans (e.g. the Region's Climate Change Action Plan and pending Adaptation Strategy). Pursue partnerships for studies or projects – for example a regional flood risk mapping project or a joint purchase of emergency equipment that could be shared. This should include collaboration with organizations such as the

Niagara Peninsula Conservation Authority (NPCA) to support joint environmental monitoring initiatives (e.g. watershed conditions, flooding, and natural system health). The Niagara Region Energy Conservation and Demand Management Plan (2024–2028) and other regional strategies can also support local resilience through energy efficiency and reducing strain on the grid. This alignment makes for efficient use of resources and advocacy, such as lobbying for provincial funding for climate adaptation in the Grimsby area.
Alignment: Coordinate with Niagara Region's Climate Change Action Plan and Adaptation Strategy. Seek co-funding opportunities under federal and provincial adaptation programs. Participate in regional working groups to share resources and best practices.

Monitoring, Evaluation, and Continuous Improvement

Recommendation: Establish Key Performance Indicators (KPIs)
Description: To track progress on adaptation, set some measurable indicators. These could include: number of critical facilities with backup power installed, percentage of stormwater system upgraded to new standard, tree canopy percentage in urban areas, number of residents using cooling centres in heat emergencies, etc. Monitoring these will be useful for adjusting the plan over time. It also aligns with recommendations from Niagara Region's CCAP and provincial guidance to set corporate climate resiliency metrics as part of municipal performance management.
Alignment: Integrate KPIs into the Town's annual reporting and performance management framework. Assign responsibility to departments for data collection and incorporate metrics into the CCAP progress updates.
Recommendation: Regularly Update the Risk Assessment
Description: Climate science is evolving, and so are development patterns in town. This risk assessment should be revisited on a regular basis (e.g. every 5 years) to update the projections, re-evaluate risks, and measure progress on risk reduction. Future iterations should build toward a full, detailed CCRA that incorporates quantitative modelling and site-specific asset analysis. Treat it as a living appendix to the CCAP. Niagara Region has committed to maintaining updated climate projections and doing adaptation planning[25]; Grimsby can plug into that cycle, updating the local assessment when new regional data or strategies come out.

Alignment: Schedule updates alongside Niagara Region's climate data refresh cycles. Incorporate new downscaled projections, asset-level vulnerability data, and lessons learned from recent extreme weather events. Where appropriate, align update cycles with Official Plan policy direction related to climate change and adaptation.
Recommendation: Document and Learn from Events
Description: When extreme weather does hit, conduct post-event debriefs. For example, after a major flood, gather the data: which locations flooded, what damages occurred, what worked and what didn't in the response. This real-world information is invaluable to refine the understanding of risk. It can also sometimes reveal a previously unknown vulnerable spot or conversely show that some defenses were effective. Create a simple internal reporting system for such events that feeds into future planning.
Alignment: Align post-event reporting with the Town's asset management and emergency management systems. Ensure outcomes inform updates to the CCAP, Asset Management Plan, and risk registry. In addition to internal reporting, Grimsby can tap into broader adaptation knowledge networks. For example, the Ontario Resource Centre for Climate Adaptation (ORCCA) is a provincial pilot initiative led by ICLEI Canada that provides resources, case studies, and shared insights on climate adaptation practice for Great Lakes and Ontario communities[33]. Aligning post-event debriefs with ORCCA's resources and community of practice can help ensure that local lessons learned contribute to, and benefit from, wider municipal experience and best practices.

Financial Planning and Funding

Recommendation: Integrating a "Climate Lens" into Capital Budgeting
Description: As noted, add a "climate lens" to capital projects. Whenever a capital request comes forward (e.g. for a new facility roof, a road rebuild, or a fleet purchase), ask how climate change might affect this project and whether additional investment now could prevent future losses. Many actions, such as upsizing a culvert or adding backup power, can be folded into projects at marginal incremental cost.
Alignment: Embed climate-resilience criteria into the capital budgeting process. Require departments to complete a brief climate impact check when submitting new capital requests.
Recommendation: Asset Management & Reserve Funds

[33] Home - ORCCA - CRACO Canada

Description: Use the asset management planning process to schedule and justify adaptation investments. For instance, if an asset's risk profile indicates likely failure under climate stress before its normal lifespan ends, it may justify earlier replacement or a major retrofit, which should be reflected in lifecycle costing. Ensure that the Town's long-term financial plan or reserves consider climate adaptation needs. Just as the Town plans for infrastructure replacement, it should also plan for resilience measures.
Alignment: Integrate adaptation priorities into the Town's Asset Management Plan and long-term financial strategy. Allocate reserve funds to support resilience-focused renewals.
Recommendation: Leverage External Funding and Grants
Description: Keep an eye on provincial and federal funding programs for climate adaptation. There are often grants for green infrastructure, disaster mitigation, and energy resiliency projects (e.g. backup power, microgrids and distributed energy systems). Grimsby should be ready with "shovel-worthy" adaptation projects (identified through assessments of this nature) to apply when opportunities arise. Partnering with the Niagara Region or Conservation Authority could also strengthen grant applications.
Alignment: Maintain a standing list of priority adaptation projects ready for funding calls. Collaborate with regional partners to co-apply for grants. Appendix F provides a link to the FCM's Green Municipal Fund programs which offer funding streams for climate adaptation planning and implementation that may be relevant.

In implementing these recommendations, prioritize actions that address the highest risks first and those that deliver multiple co-benefits. For example, enhancing stormwater management not only reduces flood risk (adaptation) but also improves water quality and reduces erosion (environmental co-benefits). Similarly, urban tree planting provides cooling benefits (adaptation) while absorbing carbon (mitigation). This is a clear win-win that supports the Town's greenhouse gas reduction goals.

To ensure cost-effectiveness, many actions are timed to coincide with regular asset renewal or capital projects. Incorporating resilience features during scheduled upgrades avoids the higher costs associated with future retrofits. It is important to note that adaptation measures can also have a return on investment. In fact, studies show that every dollar spent on adaptation can save $13-$15 in disaster recovery costs[34].

[34] Canadian Climate Institute — Damage Control: Reducing the Costs of Climate Impacts in Canada

The Town's Strategic Priorities[35], among other existing plans, already emphasize maintaining infrastructure and enhancing quality of life. Climate adaptation should therefore be viewed as an integral part of that mandate - not an additional task. By embedding these measures into everyday decision-making, Grimsby can steadily and cost-effectively strengthen its resilience to climate impact.

[35] Town of Grimsby — 2023-2026 Strategic Priorities

Conclusion

This CCRA provides a clear outlook on how climate change could impact Grimsby's operations and community and offers recommended actions to navigate those challenges. The findings reaffirm that climate conditions are shifting and that preparation is essential. This assessment identified the most pressing risks – from flooding to dangerous heat waves – and confirms that proactive steps taken today will pay off in safety, savings, and service reliability tomorrow.

Encouragingly, Grimsby is not starting from scratch. The Town has already acknowledged climate risks in its planning documents and has initiated measures such as shoreline protection works and sewer system improvements. Future actions should continue to build on these foundations in line with the findings of this assessment. By integrating the recommended adaptation actions into the CCAP, capital budgets, and departmental work plans, the Town can ensure that resilience-building is part of everyday business.

It bears emphasizing that adaptation is an ongoing process. Climate science will continue to evolve, and unexpected events may occur. Building a culture of resilience is therefore essential - one that engages Town staff, elected officials, community partners, and residents. Simple local actions such as improving lot drainage, using rain barrels, or planting shade trees can collectively make a meaningful difference. On a larger scale, decisions about infrastructure and land use will shape how well the community withstands extreme weather in the decades ahead. With this risk assessment as a guide, Grimsby is positioning itself to make informed, forward-looking decisions.

In conclusion, the risks from climate change, while significant, are manageable if action is taken. Incorporating this CCRA into the CCAP ensures that, alongside efforts to reduce greenhouse gas emissions (mitigation), efforts to adapt and protect the community are equally championed. This balanced approach, mitigating what can be mitigated and adapting to what cannot be avoided, will help safeguard Grimsby's people, economy, and natural heritage for the long term.

By taking the recommended steps, the Town of Grimsby will not only reduce its vulnerability to climate hazards but also demonstrate leadership in sustainability and resilience within the Niagara Region.

Appendix B – Public Consultation Summary

Purpose of the Public Survey

As part of the development of the CCAP, the Town conducted an online public survey through the Let's Talk Grimsby platform. The purpose of the survey was to understand community awareness of climate change impacts, identify key climate-related concerns, and gather input on priorities for municipal action. The results helped confirm risks identified through the Climate Change Risk Assessment and provided insight into community expectations related to resilience, service delivery, and transparency.

While the sample size was small with 15 respondents, the findings still offer useful insight into local perspectives and helped support alignment between corporate climate actions and community priorities.

Summary of Key Findings and Themes

The survey responses highlighted a strong awareness of climate-related impacts in Grimsby and broad support for proactive municipal action. Common themes and insights from the responses are summarized in the table below:

Topic	Response Summary
Awareness of climate impacts	The majority of respondents indicated they are very or somewhat aware of climate-related impacts already affecting Grimsby. Few respondents reported low awareness, suggesting climate change is a familiar and visible issue within the community.
Personal experience with climate-related events	Most respondents reported direct experience with climate-related events. Commonly noted experiences included extreme heat, periods of extremely dry weather, poor air quality, and power outages/brown outs caused by storms. This indicates that climate impacts are not viewed as future risks, but as current conditions affecting daily life.
Most concerning climate risks	Respondents identified extreme heat, power outages during extreme weather and flooding from heavy rainfall as the most concerning risks over the next several decades.
Areas perceived as most vulnerable	Respondents noted that climate risks affect the entire town, with particular concern for lakeshore areas, low-lying neighbourhoods, areas below the escarpment, agricultural lands, and locations with critical infrastructure. Several responses emphasized that all neighbourhoods and residents are vulnerable to some degree.
Importance of municipal climate action	The majority of respondents indicated that it is very important or important for the Town to prioritize action on climate change. This reflects strong community support for the Town taking an active role in addressing climate risks and reducing emissions.

Topic	Response Summary
Priority actions for the Town	When asked to rank climate actions, respondents placed the highest importance on integrating climate considerations into municipal planning and development, and on prioritizing infrastructure and asset repairs in areas most vulnerable to climate impacts.
Transparency and communication	Most respondents indicated that it is very important or important for the Town to share information openly and transparently about climate risks and climate-related actions. Responses suggest a desire for clear communication, regular updates, and accessible information.
Critical municipal services	Respondents consistently identified water services, roads, and emergency services as the most important local services at risk from climate change. Many responses emphasized the need to maintain reliable access to these services during extreme weather events, including heat waves, flooding, and power outages.
Characteristics of a climate-resilient community	Respondents described a climate-resilient community as one that plans ahead, protects vulnerable residents, maintains reliable infrastructure, and invests in green infrastructure such as tree canopy and natural areas. Preparedness, proactive investment, strong emergency response, and long-term planning were recurring themes.
Willingness to support funding for resilience	A clear majority of respondents, within the small sample size, indicated support for small increases to the local tax structure to proactively address climate change-related risks, particularly where investments reduce future repair costs and protect essential services. Responses emphasized the importance of affordability, clear justification, and demonstrating value for money. Among those who supported an increase, the most common range suggested was approximately 1 to 5 percent, with most of those responses falling between 3 and 5 percent.

Overall, the survey results indicate strong community awareness of climate risks, broad support for proactive municipal action, and clear expectations that the Town prioritize infrastructure resilience, protect vulnerable populations, and communicate transparently about climate-related decisions. These findings helped reinforce the focus areas and guiding principles of the CCAP.

Appendix C – Full GHG Inventory (Milestone 1) and Reduction Target (Milestone 2)

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TOWN OF GRIMSBY

Town of Grimsby - Corporate Greenhouse Gas Emissions Management Plan

July 30, 2025

TREE HOUSE
ENERGY SERVICES

Acknowledgments

The writing of this management plan engaged the Town of Grimsby's staff to provide institutional history with associated data and subject matter expertise. Tree House Energy Services would like to thank plan contributors:

Jillian Booth, Parks and Open Space Coordinator
Mike Graybiel, Manager Parks and Facilities
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Sarah Sweeney, Director of Community Services

Special thanks to Jillian who acted as the primary contact.

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Executive Summary

The Town of Grimsby is located between the south shores of Lake Ontario and the Niagara Escarpment with a growing population of over 28,883. The Town provides a number of municipal services to its community including public works and recreation that produce greenhouse gas (GHG) emissions. To track and reduce corporate emissions the Town has created a greenhouse gas inventory including facilities, fleet, waste, and street lighting. emissions were categorized by sector and scope to better understand operational control. This report will analyze greenhouse gas (GHG) emissions across municipal operations and outline strategic measures to achieve a 30% reduction by 2035 relative to a 2023 base year. The emissions inventory indicates that Facilities produce 66% of the total corporate emissions, Transportation produces 26%, Waste produces 6% and Street Lighting produces 2%. Thus, sectors that offer the highest reduction potential are Facilities and Transportation that emit 692 and 274 tonnes of CO_{2e} (carbon dioxide equivalent) respectively. Waste and street lighting contribute 62 and 26 t CO_{2e}, respectively, and are also considered in the reduction strategies. With the reporting of this inventory and setting a 30% target, the Town has complied with Milestones 1 and 2 of the PCP program. Regarding the target, it is recommended that measures are monitored and completed to ensure scheduled reductions are being met or that reductions are adjusted on an annual or bi-annual basis to meet the 10 year target of 30% reduction.

For facilities, it is recommended to implement near or net-zero emission strategies for key buildings, including Town Hall, Library/Art Gallery, and the Operations Centre that could utilize electrification and renewable technologies. Over the next decade, its recommended the Town fleet be transitioned to electric vehicles, utilizing telematics technology and fuel-efficient driving techniques to track fuel consumption more granularly, optimize fuel efficiency, and reduce idling. There is also an opportunity to integrate adaptive dimming into street lighting to reduce electricity and the associated emissions and operational costs. As waste management is under the control of the Region, it's recommended to continue to support the Niagara Region's Waste Management Strategic Plan to achieve a 50% waste diversion target by 2030.

As a next step, it's recommended that these reduction strategies are further developed into an action plan that is (Milestone 3 of the PCP program) integrated into the Town's Asset Management Plans as well as a third party external funding plan. Ensuring plan implementation is integrated into municipal planning processes to secure internal and external funding along with the establishment of monitoring frameworks are keys to target achievement by 2035.

1 Overview

The Town of Grimsby is located between the south shores of Lake Ontario and the Niagara Escarpment. With a population of over 28,883, Grimsby is a growing municipality in the Niagara Region. The Town provides a number of municipal services and amenities to its community including public works and recreation that also produce greenhouse gas (GHG) emissions. In an effort to reduce the Town's corporate emissions, Grimsby has elected to participate in the Partners in Climate Protection (PCP) Program, a five-step Milestone framework that guides municipalities in setting reduction targets.

This Corporate Greenhouse Gas Emissions Management Plan builds on the Energy Conservation and Demand Management (CDM) Plan that the Town completed in 2024 to meet O. Reg. 25/23 which requires municipalities to report their energy use and GHG emissions. This Plan will also help promote transparency, accountability, immediate and ambitious action in relation to achieving targets, that support reaching net-zero emissions in Canada by 2050 as outlined in the federal government's Net Zero Pathways Accountability Act. The purpose of this Act requires the setting of national targets for the reduction of greenhouse gas emissions based on the best scientific information available. The Town's participation in the PCP program also aligns with their Official Plan under Policy Direction Report 4 which proposes: "Promoting energy efficient and sustainable building through the development process" and "Requiring and incentivizing developments to follow green building standards or implementing electric vehicle charging stations.".

This Plan will report on Milestone 1: creating a GHG emission inventory including a forecast based in part on population growth; and Milestone 2: setting an emission reduction target for the Town of Grimsby.

1.1 About ICLEI and PCP

The Partners for Climate Protection (PCP) program, funded by ICLEI—Local Governments for Sustainability (ICLEI Canada) and the Federation of Canadian Municipalities (FCM), supports municipalities in taking climate action. The program consists of a five-step Milestone Framework that guides members through the process of reducing corporate and/or community emissions.

1.2 Milestone Framework and PCP Protocol

The PCP protocol was developed to act as the Canadian Supplement to the International Emissions Analysis Protocol (IEAP) to support municipal practitioners working through the milestones of the PCP program. It is essential to completing the **first PCP milestone, a GHG emissions inventory**, and important when aligning milestones two through five. The PCP

Protocol is technical in nature, containing many complex formulas and calculations. Ideal users will have some technical background in engineering, math and science and should be comfortable learning new methodological concepts. The PCP Protocol aligns with the online PCP Milestone Tool, making it easy for users to record and analyze the GHG inventory results.

The Partners for Climate Protection five-step milestone framework includes:

1. Baseline emissions inventory and forecast;
2. Set an emission reduction target;
3. Develop action plan;
4. Implement plan; and
5. Monitor progress and report results.

The GHG inventory will be categorized into sectors of municipal operations including Facilities, Transportation, Waste, and Street lighting. The emissions of these four sectors will be quantified using the PCP Protocol as part of the information needed to fulfill to the requirements of the first milestone. Once Milestone 1 has been completed and sectorial emission estimates are established, Milestone 2 can be completed by setting a reduction target that aligns with the opportunities identified to have emission reduction potential.

1.3 PCP Protocol and Ontario Regulation

The PCP references Ontario Regulation 507/18 which has been revised to Regulation 25/23, Broader Public Sector: Energy Reporting and Conservation and Demand Management Plans. This Regulation requires reporting from the broader public sector on their facility operations. This reporting—typically called a CDM Plan--includes emissions for buildings and facilities: "A summary of annual greenhouse gas emissions for each of the public agency's prescribed operations, which shall be included in the summary of the public agency's annual energy consumption required under paragraph 1 of subsection 25.35.2 (3) of the Act."

2 Milestone 1: Corporate GHG Emission Inventory

2.1 Introduction

Milestone 1 of the PCP Framework focuses on creating a baseline emissions inventory to help track and anticipate emissions, energy use and spending. There are principles established by the World Resources (WRI) Institute that guide the accounting for a GHG

inventory. These principles are published in WRI's "The Greenhouse Gas Protocol" and this Protocol is referenced by the IEAP[1].

GHG Accounting and Reporting Principles:

Relevance: Ensure the GHG inventory appropriately reflects the GHG emissions of the company and serves the decision-making needs of users – both internal and external to the company.

Completeness: Account for and report on all GHG emission sources and activities within the chosen inventory boundary. Disclose and justify any specific exclusions.

Consistency: Use consistent methodologies to allow for meaningful comparisons of emissions over time. Transparently document any changes to the data, inventory boundary, methods, or any other relevant factors in the time series.

Transparency: Address all relevant issues in a factual and coherent manner, based on a clear audit trail. Disclose any relevant assumptions and make appropriate references to the accounting and calculation methodologies and data sources used.

Accuracy: Ensure that the quantification of GHG emissions is systematically neither over nor under actual emissions, as far as can be judged, and that uncertainties are reduced as far as practicable. Achieve sufficient accuracy to enable users to make decisions with reasonable assurance as to the integrity of the reported information.

These principles were used in conjunction with the PCP Protocol to underpin the methodology for Milestone 1 that is described in the following section.

2.2 Methodology

2.2.1 Geographical and Sectorial Boundaries

The first milestone in the PCP program focuses on creating a GHG inventory that includes the sources and activities that produce emissions within a geographical boundary. The sources and activities are the Town's operations categorized by their sectorial boundaries. For example, maintenance vehicles used by the Public Works department fall under the

[1] The IEAP states: "…the emissions inventory requirements do not differ significantly from those presented in the GHG Protocol Initiative Corporate Accounting and Reporting Standard (The GHG Protocol") developed by the World Resources Institute (WRI) and World Business Council for Sustainable Development (WBCSD)…"

Transportation category for emissions. 2023 is used as the base year for the inventory as this was the most recent year of complete data for all sectors.

Sectorial Categories for Municipalities:

- Facilities
- Transportation
- Waste
- Street Lighting.

The PCP Protocol states that "…within the context of the PCP program, the boundary of the corporate inventory is determined using an approach known as operational control, which requires the local government to report 100 per cent of the emissions from operations over which it has control."

The Protocol defines this control by one of the following characteristics:

- The local government wholly owns the operation, facility or source; or
- The local government has full authority to implement operational and health, safety and environmental policies (including both GHG- and non-GHG-related policies). In most cases, holding an operator's license is an indication of an organization's authority to implement operational and HSE policies

The aforementioned sectorial emissions: Facilities, Transportation, Waste, and Street Lighting—with the exception of waste--fall under the definition of operational control for the Town. To determine whether to report the GHG emissions from a contracted service, local governments are encouraged to follow the guidelines outlined in the International Local Government GHG Emissions Analysis Protocol (IEAP).

According to the IEAP, local governments must report the GHG emissions from a contracted service in cases where:

i. The service provided by the contractor is a service that is traditionally provided by local government;
ii. Emissions from the contracted service were reported in an earlier local government GHG inventory; and/or
iii. Emissions generated by the contractor are a source over which the local government exerts significant influence.

2.2.2 Sectorial Analysis

2.2.2.1 Facilities

The Ontario Regulation 25/23, Broader Public Sector: Energy Reporting and Conservation and Demand Management Plans, requires reporting from the broader public sector and their operations including emissions for buildings and facilities. The Town of Grimsby has published their 2019-2024 Energy Conservation and Demand Management Plan, which was used for the 2023 Facility emissions in the GHG inventory. The sources of these emissions can be classified by fuel type: natural gas and electricity. Emissions are calculated by Energy Star's Portfolio Manager that uses Ontario specific emission factors from Canada's National Inventory Report (NIR)[2] for both natural gas (1,945 g CO_{2e}/m^3) and the electricity grid (35 g CO_{2e}/kWh). The NIR is listed by the year published, however, the data within the report runs 2 years after its publication date (3 years for electricity emissions). For example, NIR 2025 includes reporting years up to and including 2023 for gas and 2022 for electricity. See Appendix A – GHG Inventory by Sector for a table of the facility emissions.

Refrigerants used in air conditioning systems, including those that contain chlorofluorocarbons (CFCs) and hydrofluorocarbons (HFCs), are greenhouse gases when released into the environment. The facility air conditioning systems that utilize these refrigerants have not been included because that would require the quantity of refrigerant used in new, existing, and retired equipment. While this analysis is possible, the aforementioned data is not likely available.

2.2.2.2 Transportation

The GHG emissions for the Transportation sector are comprised from Town owned and operated on-road service vehicles (also called rolling stock or fleet vehicles) and light to heavy duty equipment (i.e. tractors, backhoes, etc.). The data collected by the Public Works Department included the vehicle #, vehicle duty class, fuel type, year and name of manufacturer, and the odometer readings from January 1st, 2022, and December 31st, 2023.[3] Based on the provided data, the fuel economy for on-road vehicles was estimated[4] using emission factors that were determined by mapping the manufacture year of each vehicle to the emission regulations for that years model. A different approach was used to estimate the fuel economy of light and heavy-duty equipment by using manufacturers data and/or

[2] https://publications.gc.ca/collections/collection_2024/eccc/En81-4-2022-3-eng.pdf
[3] The form (provided by Tree House Energy Service) included fields for Vehicle Duty Class, Fuel Type, Manufacturer, Year of Manufacture, Odometer January 1, 2022, and Odometer December 31, 2023.
[4] Vehicle data provided on the form was mapped to Light Duty, Light Duty Truck and Heavy Duty Truck fuel economy rates from the PCP.

operating hours (L/hour). The populated form for both on and off-road vehicles is provided in Appendix A – GHG Inventory by Sector.

For plug-in electric or battery electric vehicles, it was assumed the vehicle charger is connected to municipal building, thus grid emissions are accounted for in the facilities sector.

2.2.2.3 Street Lighting

To estimate the emissions from the Town's Street Lighting, consumption data was obtained from Grimsby Power for the base year of 2023. Additional data was also downloaded from the Ontario Energy Board's website.[5] The data was filtered for "Grimsby" and "Street Lighting Connections" which provided aggregate consumption (as well as demand) figures. The consumption figure for 2023 was multiplied by the grid emissions factor—the same factor that was used for facilities.

2.2.2.4 Waste

The GHG emissions from the waste sector are mainly from methane (CH_4) and nitrous oxide (CO_2). When solid waste is landfilled, its organic components (e.g. paper, food and yard waste, etc.) are decomposed by bacteria in an anaerobic (oxygen poor) environment generating CH_4 and CO_2 emissions. The CO_2 emissions associated with the decomposition of the organic waste are considered to be of biogenic origin and are excluded from the GHG inventory.

Landfill emissions are unique in that the disposed solid waste generates emissions over many years. When solid waste is incinerated, both its organic and non-organic (e.g. plastic, metal, etc.) components generate CH_4, N_2O, and CO_2 emissions when combusted. The CO_2 emissions released from the combustion of the organic waste are considered to be of biogenic origin and are excluded from the GHG inventory. However, the non-biogenic CO_2 emissions associated with combustion of non-organic waste must be accounted for.

The Town has a number of waste bins located throughout their properties. An audit of these bins was conducted on August 27, 2024, as this was the day before waste collection and would provide the most representative collection sample. Staff at the waste bin sites were requested to provide the volume of waste or bags collected each week. The PCP Protocol provides a formula to estimate solid waste, based on the size of garbage bins used, average fullness, and frequency of pickup. The formula below was used for each garbage bin:

[5] https://www.oeb.ca/open-data/electricity-reporting-record-keeping-requirements-rrr-section-2154-demand-and-revenue

$M = B \bullet F \bullet P \bullet 0.178 \bullet 12$

Description Value

M = Annual quantity of solid waste generated at a building or facility (t) - Computed

B = Garbage bin capacity (m3) - User input

F = How full the bin is at pickup (%) - User input

P = Frequency of pickup (times/month) - User input

The emissions calculation depends on if the landfill captures gas. Grimsby's waste is handled by the Niagara Region and is hauled to a site that does not capture landfill gas which means this gas is being released to the atmosphere by the landfill.[6] In this scenario, the PCP Protocol uses a Methane Commitment Model that:

1. Determines the quantity (mass) of solid waste landfilled during the inventory year
2. Determines the composition of the waste stream (defaults provided).
3. Calculates the degradable organic carbon (DOC) content of the waste stream (formula provided).
4. Calculates the methane generation potential of the landfilled waste (formula provided).
5. Calculates emissions of $CO2_e$ using the information determined in steps 1-4.

Photos of the waste bins and their contents are in Appendix B - Waste Audit.

2.2.3. Limitations and Exclusions

The GHG emission inventory should be considered as an approximation as it requires access to data that is not likely available in many corporations. For these reasons, standards for developing these GHG inventories typically outline a minimum reporting threshold based on a set of common and generally well-understood activities, such as energy consumption in buildings, on-road transportation and generation of solid waste. As access to data and quantification methodologies improve over time, minimum reporting requirements will likely expand to include more complex emission sources previously considered to be optional. This process of continual improvement can be seen in the recent Global Protocol for Community-Scale GHG Emissions (GPC), which challenges local governments to expand the scope of their GHG reporting to include additional community emission sources, such as industrial processes and off-road transportation (see Relationship to Global Protocol for Community-Scale GHG Emissions). In the case that data may not be available, that source

[6] https://www.niagararegion.ca/projects/waste-management-strategic-plan/pdf/current-state-report.pdf

or activity should be excluded and identified as a limitation. An assessment of sectorial boundaries and exclusions are outlined on a sector-by-sector basis.

2.2.4 Business-As-Usual (BAU) Forecast

Having a forecast allows the Town to project future corporate emissions based on assumptions regarding population, economic growth, fuel mix, and technological change. The 10-year BAU forecast was completed using the PCP tool which projects emissions based on population growth percentage; a percentage of 1.20% compounded annually (2016-2041) was used from Niagara 2041's "How We Grow" document.[7]

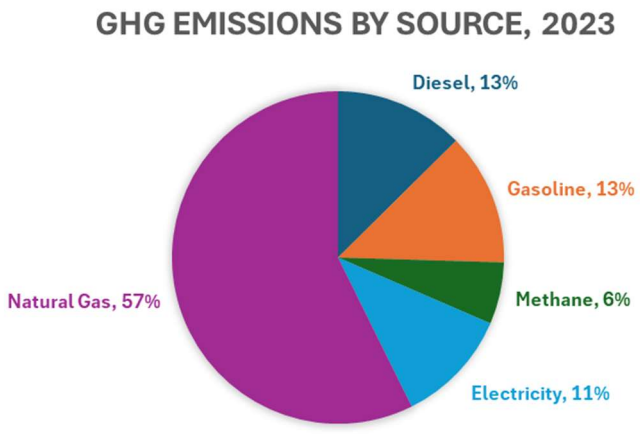
2.3 Corporate Emissions

The table and chart below show the estimated emissions from each source (fuel type)

Table 1 - GHG Emissions by Source (tCO_{2e}), 2023

Fuel Type	GHG emissions (tCO2e)	Percent of Total Source Emissions
Diesel	132	13%
Gasoline	135	13%
Methane	63	6%
Electricity	117	11%
Natural Gas	601	57%
Total	**1,048**	**100%**

Figure 1 – GHG Emissions by Source, 2023



[7] https://www.niagararegion.ca/2041/pdf/mcr-pic3-boards.pdf

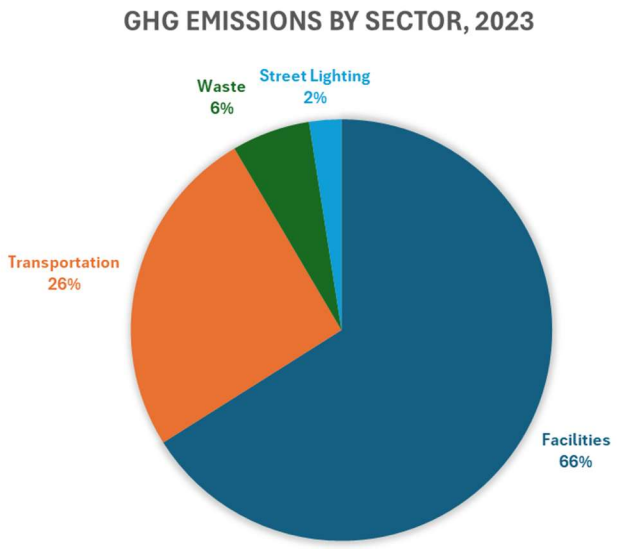
The table and chart below show the estimated emissions from each sector. The Facilities sector has the highest potential for reduction at 692 CO_{2e} tonnes per year; Transportation has the second most at 267 tonnes per year; Waste and Street Lighting are at 62 CO_{2e} and 26 CO_{2e} respectively. Thus, the Facilities and Transportation sectors will be the focus for target setting and reduction strategies (Milestone 3).

Regarding Facilities emissions, the PCP tool uses different emission factors than compared to the emission factors used in Energy Star's Portfolio Manager (PM), thus Facilities emissions are different in the PCP tool (713) compared to PM (692). Since CDM Plans--referenced in Section 1.3--use PM factors, it was decided to use the emissions calculated by PM for this Plan.

Table 2 - GHG Emissions by Sector (tCO2e), 2023

Sector	GHG emissions (tCO2e)	Percent of Total Corporate Emissions
Facilities	692	66%
Transportation	267	25%
Waste	63	6%
Street Lighting	26	2%
Total	**1,048**	**100%**

Figure 2 - GHG Emissions by Sector, 2023



2.4 Baseline and Forecast Emissions

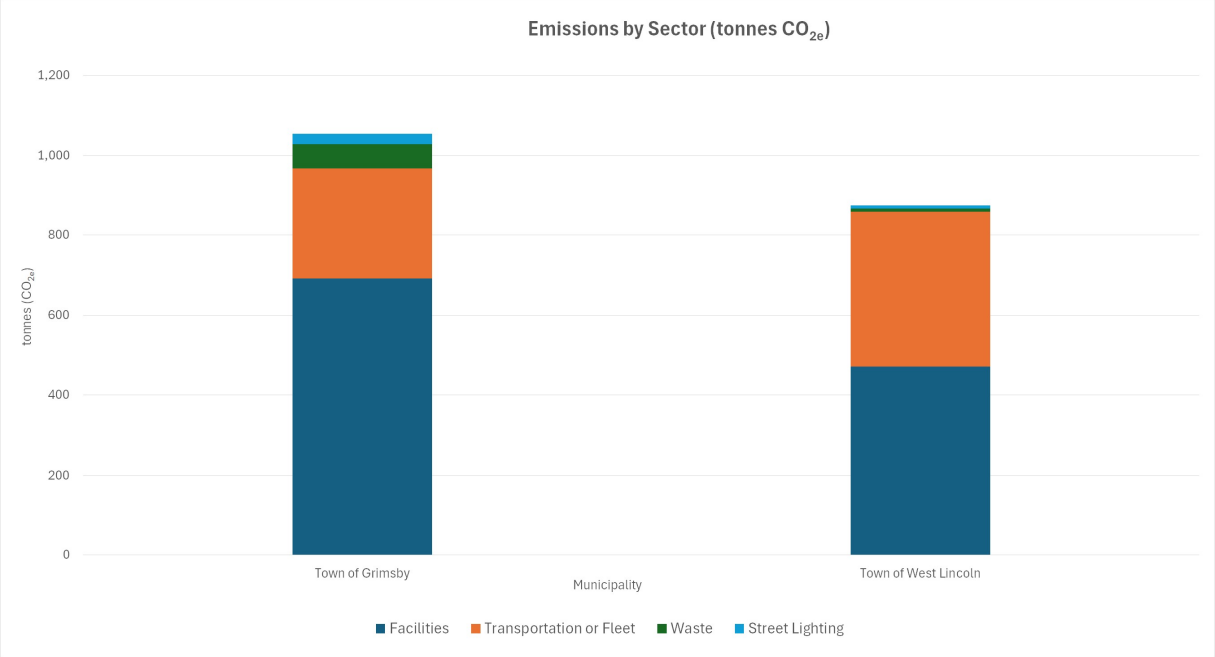
Based on the 1.20% percentage for all sectors as calculated by the PCP program, the Town's emissions are forecasted to be 1218 tCO_{2e} by 2035.

2.5 Benchmarking Emissions

The charts below benchmark another nearby municipal GHG inventory with the Town's inventory. Note that the Town of Grimsby's inventory uses 2023 data, and the Town of West Lincoln's uses 2019 data which is their most current publicly available inventory.

Table 3 - Benchmarking Charts: Emissions by Sector, tonnes CO_{2e}

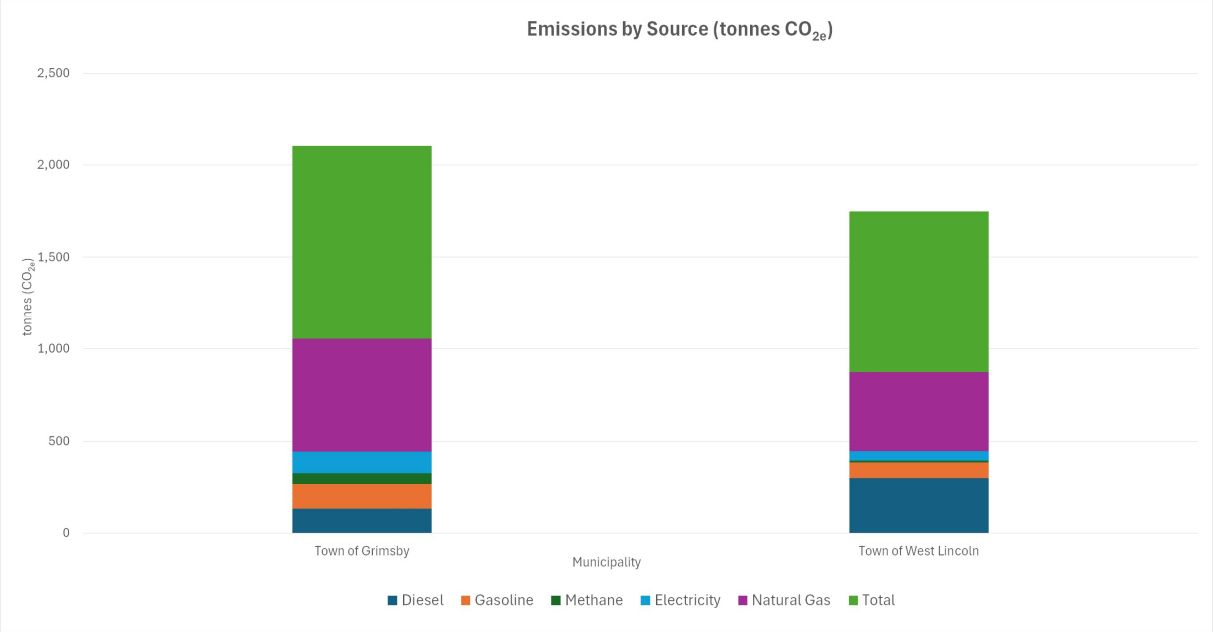
	Facilities	Transportation or Fleet	Waste	Street Lighting	Total
Town of Grimsby	692	267	63	26	1,048
Town of West Lincoln	470	388	8	8	874



While the Town of Grimsby's corporate emissions are about 20% more West Lincoln's corporate emissions, it serves population of 28,883 which is almost twice than West Lincoln's population of 14,500.

Table 4 – Benchmarking Charts: Emissions by Source, tonnes CO_{2e}

	Diesel	Gasoline	Methane	Electricity	Natural Gas	Total
Town of Grimsby	131	135	63	117	601	1,048
Town of West Lincoln	298	90	8	53	425	874



3 Milestone 2: Reduction Targets

Target setting for emissions is based on a 10-year "Business-As-Usual (BAU) Forecast" which projects future emissions using factors like future building projects/expansions, changes in standards (i.e. streetlights), population growth, and current practices. This forecast can be aligned with the Town's Asset Management Plans to account for the additional capacity required in terms of budget and resources

3.1 Target Setting

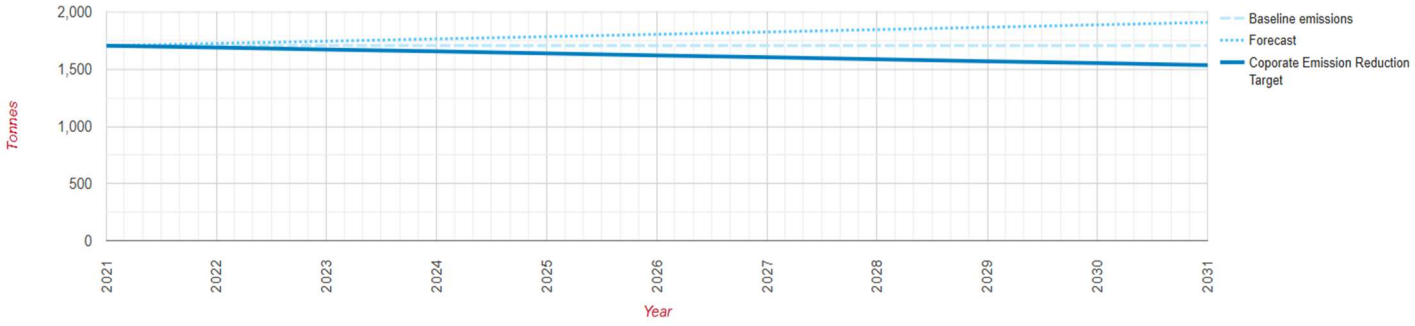
The Town of Grimsby is aiming to achieve a 30% reduction in its GHG emissions from the 2023 baseline by 2035. This target does not include the changes that are currently being made to the Peach King Centre, that percentage reduction will have to be relatively considered. A 30% emissions reduction was set based on an analysis of sectorial emissions which is discussed in more detail in the next section. This target aligns with the reduction targets set by other government agencies while considering the Town's limited resources, capacity and funding.

The following list identifies the reduction targets set by other government agencies:

- Canada's commitment to achieve net-zero emissions by 2050.
- Ontario's reduction target of 30% below 1990 levels by 2030
- Niagara Region's goal of net-zero corporate greenhouse emissions by 2050.

Baseline emissions, the 2035 forecast, and the 30% reduction target are charted below to illustrate the yearly changes.

Figure 3 – Baseline Emissions with 2035 Forecast and 50% Target Reduction, (tCO2e)



3.2 Target Summary

A summary table of estimated emission reductions is presented for each sector based on 2023 emissions from assets identified in Facilities, Transportation and Street Lighting. For Waste, the estimated reduction is based on the Region meeting a 30% target as also stated in this section.

For the following table, four facilities were targeted for emissions reductions based on the recommendations of the CDM Plan (referenced in Section 1.1 – Overview). The emissions for these four facilities are individually stated in the table. The emissions for the other three sectors are listed as a total.

Figure 4 - Table of Sectorial Emission Reduction Targets

Facilities	2023 Emission Baseline (tCO_{2e})	Emission Target (tCO_{2e})	Percent Reduction
Town Hall	103	93	
Library and Art Gallery	63	57	
Operations Centre	46	12	
Peach King Centre	196	49	
Subtotal for Above Facilities	408	210	30%
Total for all Facilities	692		
Transportation	267	81	30%
Waste	63	19	30%
Street Lighting	4	1	30%
Totals	1,048	311	30%

4 Emission Reduction Strategies

In general, emission reduction strategies can be categorized into conservation or capital measures. An example of a conservation measure--which tend to be lower cost--would be fuel efficient driving techniques for fleet vehicles. A capital measure could be a retrofit of a building with electric heat pumps to replace natural gas rooftop units.

To help identify where the Town has direct control over reductions and where collaboration with regional entities is required, the reduction strategies have been categorized based on the scope of emissions; Scope 1 (direct emissions from municipal facilities and fleet vehicles), Scope 2 (indirect emissions from purchased electricity), and Scope 3 (other indirect emissions, such as those from waste management).

4.1 Scope 1 - Fossil Fuel Emissions: Management Strategies

Scope 1 includes GHG emissions generated directly by sources owned or operated by the corporation. Within the context of a municipal operations inventory, the most common sources of scope 1 emissions are the combustion of natural gas or fuel oil at municipal facilities, use of gasoline or diesel fuel in municipal fleet vehicles, and methane generation at municipally owned landfill sites. Thus, on and off-road fleet vehicles (with the exception of electric vehicles) and facilities that burn fossil fuel (typically for heating) fall into Scope 1 emissions.

4.1.1 Facilities

As recommended in the CDM Plan, a cost and benefit study would provide a road map for implementation of emission reduction strategies. As well as energy cost recovery pending investigation of FCM funding under the Community Buildings Retrofit stream for facilities including Town Hall, Library/Art Gallery and Public Works Operations. Examples of retrofit measures that could be implemented at these facilities include but are not limited to electric heat pumps to decarbonize heating systems and renewable technology such as solar PV to mitigate electricity use. Since the Peach King Centre is under construction, it's suggested to be included using a longer implementation horizon.

Example Costs from Projects and Studies

The cost per tonne CO_{2e} to reduce emissions can vary significantly depending on the project building, its typology and on the retrofit measures that are implemented. See table below for examples.

Table 5 - Example Costs from Projects and Studies

Location	Project Name	Project Details	Total Cost	GHG Emission Reduction (tonnes CO_{2e})	$/tonnes CO_{2e}
City of Markham	Mount Joy Community Centre - Roadmap to Net Zero	Retrofit of the Mount Joy Community Centre, a sports and recreation facility in Markham, ON. This project includes low-cost operational changes, building envelope improvements, replacing equipment that has reached the end of its usable life, and maximizing energy efficiency through the addition of heat recovery systems. The upgrades will help to reduce fuel consumption by 75.7% and greenhouse gas emissions by 130 tonnes annually.	3,259,500	130	25,073
City of Brampton	Susan Fennel Sportsplex	Retofit of the Susan Fennel Sportsplex in Brampton, ON The project includes: LED retrofits; lighting controls; ground source heat loop; replacement of ice rink refrigeration plants; solar thermal system for pool heating; roof-top solar panels (Photovoltaic system); heating, ventilation, and air conditioning (HVAC) upgrades; artificial intelligence (JCI Open Blue Technology);	25,700,000	1,100	23,364
Town of Oakville	Oakville Trafalgar Community Centre	With an installation of more than 1,300 solar panels, the project is expected to generate at least 660 megawatt-hours per year. These improvements are expected to reduce the facility's energy consumption by an estimated 43 per cent and greenhouse gas emissions by 19.9 tonnes annually.	1,600,000	19.9	80,402
City of Brampton	City Hall - West Tower	The study includes a measure to retrofit the building's HVAC systems with central ground-source heat pumps	15,656,000	175.5	89,208
Town of Grimsby	Peach King Centre	The primary strategies of the design are the use of a high-performance envelope, controlled and thoughtful use of glazing, shading strategies, low carbon material selection, integrated energy efficient mechanical and electrical building systems, using electrical fed equipment rather than natural gas (fossil fuel) along with a geothermal field, responding to solar orientation and a photovoltaic	57,274,789	327	175,152

In the above tabled community centres, project costs (except for Peach King which was a study) can range from about $25,000[8] to $89,200[9] per tonne CO_{2e}. For City Halls[10], the study tabled above indicated about $23,400 per tonne CO_{2e}.

4.1.2 Transportation

Emission reduction strategies that are recommended for implementation within the Town's Transportation sector include fuel efficient driving techniques and transitioning the Town's

[8] https://www.canada.ca/en/housing-infrastructure-communities/news/2024/02/backgrounder-federal-government-and-the-city-of-markham-invest-in-improvements-to-community-and-recreation-centres.html

[9] https://www.brampton.ca/EN/residents/Recreation/Revitalized/Pages/Recreation-Revitalized-Susan-Fennell-Sportsplex-Zero-Net-Carbon-Retrofit-.aspx

[10] See page 65, City Hall West Tower Central Ground Source heat pumps https://www.brampton.ca/EN/residents/GrowGreen/Documents/2024-2029_Brampton_CECDM_Plan.pdf#:~:text=As%20part%20of%20the%202019%20CDM%2C%20the,zero%20retrofit%20studies%20for%20the%20following%20facili%2D&text=%E2%80%93%20City%20Hall%20West%20Tower.

fleet from gasoline to electric vehicles. Driving techniques could also include the utilization of telematics technology on Town vehicles to provide tracking data to drivers with the following potential benefits:

1. Improved vehicle utilization;
2. Better fuel efficiency; and
3. Reduced idling

The emission reductions for these techniques can vary depending on the current operation of the vehicle however they generally lowered emissions, improved safety, and decreased operational costs. Typically, when these techniques are implemented, they can reduce fuel consumption by up to 25%.[11] It is also recommended that the Town start to track fuel volumes more granularly using digital tools instead of manual data entry to more accurately measure transportation emissions over a defined time interval such as monthly or annually.

It was determined from the fleet data provided that 22 gasoline powered vehicles have model years of 2016 or older. These light duty vehicles are typically near the end of their useful life between 10 to 13 years based on a Canadian Vehicle Survey by NRCan where a majority of light duty vehicles were reported to be 13 years in age or less.[12] The same study evaluated the annual average kilometres travelled throughout the vehicle's lifespan, pickup trucks and cars reported to have travelled an average annual distance of 16,500 and 14,500 km respectively. While this report was released in 2009, it has been assumed that current trends are similar. Thus, the gasoline powered vehicles with model years of 2016 or older could be considered for replacement with electric vehicles that do not emit GHG except indirectly through the electrical grid when their batteries are being recharged. To achieve this, a number of new electric vehicle (EV) chargers will need to be installed where Town vehicles are normally parked. Typically, EV charging stations are dual wand, thus one station could serve two vehicles. There is an opportunity for some capital cost savings, if the chargers are added when decarbonizing the Operations Centre. It is recommended that this potential savings be investigated in the proposed Net Zero Study. The Town currently has a battery electric vehicle used as a light duty vehicle which costed about $47,000 (HST excluded) with maintenance costa to date being about $1250.00 (labour excluded) that could provide a benchmark for future budgets once adjusted for current costs of electric vehicles.

[11] https://natural-resources.canada.ca/energy-efficiency/transportation-energy-efficiency/personal-vehicles/fuel-efficient-driving-techniques

[12] Figure 25 — Number of light vehicles by vehicle age, 2005 and 2009, https://oee.rncan.gc.ca/publications/statistics/cvs/2009/pdf/cvs09.pdf

4.2 Scope 2 – Electricity Grid Emissions: Management Strategies

Scope 2 exclusively refers to 'indirect' sources of emissions associated with the purchase of grid electricity or district energy. Unlike stationary fuel combustion, which generates GHG emissions directly at the point of energy consumption, emissions associated with the use of grid electricity are produced off-site at a location owned or controlled by another entity. For this reason, the use of grid electricity is always reported as an indirect (Scope 2) source of emissions, regardless of where the generation occurs. Electricity consumption by the Town's facilities falls into Scope 2 emissions.

4.2.1 Street Lighting

Although, the lowest emitter within the Town's inventory, Street Lighting is a unique opportunity in that reduction technologies may be simpler to scale and rollout because of the homogenous nature of this asset when compared to other sectorial assets. These reductions are dependent on grid emission factors that will likely change as proposed electricity generation plants are brought online.

It is recommended to add adaptive dimming capabilities to the Town's street lighting to reduce energy consumption and the associated emissions while meeting safety and accessibility requirements. This approach has been used by the City of Ottawa, who have been converting their street lighting to LED with adaptive lighting controls since 2016: "Ottawa's LED streetlight project, with its adaptive dimming and networked lighting control system, has decreased the City's carbon dioxide emissions by a remarkable 1,261 metric tonnes every year, and translates into a cumulative 66 per cent reduction in energy consumption; equivalent to 113,600,000 kWh and $5 million in annual savings".[13]

4.2.2 Facilities

As referenced in 4.1.1. one example of reducing emissions from the combustion of natural gas is an electric heat pump retrofit. Thus, electricity use would increase and there would be associated emissions from the province's electricity grid. These grid emissions can be reduced with carbon offsets. A typical definition of a carbon offset according to the Government of Canada is a credit representing the reduction, avoidance, or removal of one metric tonne of carbon dioxide (CO_2) or an equivalent amount of other greenhouse gases (GHGs) from the atmosphere, which is used to compensate for emissions made elsewhere.

[13] https://hydroottawa.com/en/blog/lighting-our-city-energy-efficiency

4.3 Scope 3 – Indirect Emissions: Management Strategies

Scope 3 is applied to all other "indirect" sources of GHG emissions that can be linked to an organization's operations but are owned or controlled by another organization. Sources of scope 3 emissions at the local government level include but are not limited to emissions from employee commuting and staff business travel, upstream and embodied emissions associated with the production of purchased fuel or products, and emissions from contracted services. The Niagara Region is responsible for waste management for the Town and thus, these emissions would fall under Scope 3 for the Town since the source, which is the Niagara Road 12 Landfill, is controlled by the Region. The Region published a Waste Management Strategic Plan in 2024, and their Plan targets are referenced in the next section. Another example of Scope 3 emissions would be water and wastewater which is also managed and controlled by the Region.

4.3.1 Waste

Emissions from the Waste sector are primarily from methane produced by landfill waste; Methane is estimated to have a global warming potential (GWP) of 27 to 30 over 100 years relative to carbon dioxide. The Methane emitted today lasts approximately a decade, a lot less time than CO_2. However, CH_4 also absorbs much more energy than CO_2. The net effect of the shorter lifetime and higher energy absorption is reflected in the GWP.

It is recommended that the Town continues to support the Region and their goal of net-zero GHG emissions by 2050. One of the main drivers of this goal is the *2016 Waste Free Ontario Act* and its Strategy. The strategy focuses on achieving net-zero waste and greenhouse gas emissions from the waste sector; with interim targets of 30 per cent diversion by 2020; 50 per cent diversion by 2030; and 80 per cent diversion by 2050. Thus, it has been assumed that the Region will likely plan for 50 per cent waste diversion by 2030 to align with the provincial Act and this will "trickle down" to the Town regarding their 2035 planned reduction target.

5 Next Steps

5.1 Recommendations for Future Action Plan

The emission reduction strategies described in the previous section provide a pathway for a 30% GHG emission reduction by 2035. The strategies need to be developed further into an action plan that details costs, benefits, and outlines an implementation plan with completion milestones. This plan needs to be integrated into the Town's Asset Management Plans to ensure that the associated costs are included in the capital and operating budgets. Integration into these budgets should include the net fuel and energy costs required, as the primary mechanism to reduce emissions is the electrification of facilities and transportation.

5.2 Tracking, Monitoring, Analysis and Reporting

To ensure the action plan stays updated, it is recommended that a tool is utilized for tracking, monitoring, analysis and reporting of the plan. This tool could start in the form of a custom spreadsheet developed based on the current information systems used for the Town's Asset Management Plans to ensure ease of integration. A cloud-based dashboard could also be developed to provide rolled up reports using data mined from this tool. It is recommended that reporting is completed at regular intervals so that measures are monitored and completed to ensure scheduled reductions are being met or that reductions on an annual or bi-annual basis are adjusted accordingly to meet the 10 year target of 30% reduction.

5.3 Implementation Costs

Implementation costs can be incremental in nature due to replacement and/or upgrade budgets that may already exist in Asset Management Plans. The capital costs of reduction strategies, especially in the Facilities and Transportation sectors, are significant; thus, it is recommended that third party funding be investigated to subsidize these costs. Apart from these "hard costs", there also will be "soft costs" in terms of external advisory services, internal staff resourcing and the aforementioned project tool. As a next step, a scoping and decisioning making session with Town staff is recommended to determine what strategies to implement to ensure the 30% target can be realistically met over 10 years.

TOWN OF GRIMSBY

Appendix A – GHG Inventory by Sector

Facilities

Property Name	Year Ending	Address 1	Postal Code	Property GFA - Self-Reported (ft^2)	Electricity Use - Grid Purchase (kWh)	Natural Gas Use (therms)	Site Energy Use (kBtu)	Total (Location-Based) GHG Emissions (Metric Tons CO2e)
Alway Community Centre	2023-12-31	494 Ridge Road West	L3M 4E7	2,594	22,567	N/A	76,999	0.8
GFD Station 1	2023-12-31	261 Ontario Street	L3M 5J2	7,674	53,704	4,871	670,311	27.8
GFD Station 2	2023-12-31	167 Mountain Street	L3M 4E7	1,593	63,474	4,150	631,598	24.3
Lions Pool	2023-12-31	1 Elm Street	L3M 1H1	4,047	45,472	4,064	561,545	23.2
Livingston Activity Centre	2023-12-31	18 Livingston Ave	L3M 1K7	9,439	60,644	5,557	762,654	31.6
Peach King Centre Shed	2023-12-31	162 D Livingston	L3M 1L6	4,994	63,474	3,106	527,168	18.8
Southward Park	2023-12-31	84 Mud Street W	L0R 1M0	6,673	109,708	299	404,264	5.5
Town Hall	2023-12-31	160 Livingston Ave	L3M 4G3	23,314	516,459	15,935	3,355,606	103.1
Grimsby Museum	2023-12-31	6 Murray Street	L3M 4G5	4,090	14,710	919	142,053	5.4
Grimsby Public Library & Art Gallery	2023-12-31	18 Carnegie Lane	L3M 1Y1	21,000	274,020	9,954	1,930,344	62.6

Property Name	Year Ending	Address 1	Postal Code	Property GFA - Self-Reported (ft^2)	Electricity Use - Grid Purchase (kWh)	Natural Gas Use (therms)	Site Energy Use (kBtu)	Total (Location-Based) GHG Emissions (Metric Tons CO2e)
Peach King Centre	2023-12-31	162 Livingston Ave	L3M 4G3	79,782	1,205,998	53,500	9,464,824	327.1
Pump House	2023-12-31	447 Elizabeth St.	L3M 3K9	2,368	8,455	1,557	184,527	8.6
PW Operations Centre	2023-12-31	2 Clark St	L3M 3K5	11,054	85,650	8,050	1,097,230	45.8
Carnegie Commons	2023-12-31	25 Adelaide St	L3M 1x2	2,217	16,918	1,260	183,681	7.3
Total								691.9

The Gross Floor Area (GFA) is the total property square footage, as measured between the outside surface of the exterior walls of the building(s). It is also acceptable to measure from the inside perimeter of the exterior walls if that is more readily available. This includes all areas inside the building(s) including supporting areas.

Transportation – On Road Vehicles

Unit #	Vehicle Duty Class	Fuel Type	Manufacturer	Year of Manufacture	Odometer 01-01-2022	Odometer 12-31-2023	Kilometers Travelled	Emissions Fuel Eco (L/100km)	Fuel Consumed (litres)	Emissions (kg CO2e)
152	Light Duty	BEV	Hyundai	2021	4,308	20,277	15,969			-
530	Heavy Duty	Diesel	Spartan	1993	5,563	5,699	136	22.5	31	83
510	Heavy Duty	Diesel	Freightliner	1994	60,568	60,594	26	22.5	6	16
513	Heavy Duty	Diesel	Spartan	2000	2,892	6,717	3,825	22.5	861	2,331
515	Heavy Duty	Diesel	Spartan	2003	52,314	56,836	4,522	22.5	1,017	2,756
517	Heavy Duty	Diesel	KME	2007	49,914	52,410	2,496	22.5	562	1,532
185	Medium Duty	Diesel	Sterling	2008	104,977	119,814	14,837	4.4	653	1,768
189	Heavy Duty	Diesel	GMC	2009	33,378	41,693	8,315	22.5	1,871	5,104
157	Heavy Duty	Diesel	International	2009	76,167	79,815	3,648	22.5	821	2,239
190	Heavy Duty	Diesel	Freightliner	2010	62,060	64,104	2,044	22.5	460	1,255
520	Heavy Duty	Diesel	Freightliner	2011	20,690	24,133	3,443	22.5	775	2,114
199	Heavy Duty	Diesel	Freightliner	2013	58,687	64,622	5,935	22.5	1,335	3,643
151	Heavy Duty	Diesel	International	2013	42,275	47,347	5,072	22.5	1,141	3,113
149	Heavy Duty	Diesel	International	2014	51,066	59,235	8,169	22.5	1,838	5,015

Unit #	Vehicle Duty Class	Fuel Type	Manufacturer	Year of Manufacture	Odometer 01-01-2022	Odometer 12-31-2023	Kilometers Travelled	Emissions Fuel Eco (L/100km)	Fuel Consumed (litres)	Emissions (kg CO2e)
146	Heavy Duty	Diesel	International	2015	38,369	45,953	7,584	22.5	1,706	4,655
523	Heavy Duty	Diesel	Freightliner	2017	9,665	11,625	1,960	22.5	441	1,203
524	Heavy Duty	Diesel	Spartan	2017	1,201	23,404	22,203	22.5	4,996	13,629
141	Heavy Duty	Diesel	International	2017	25,988	33,907	7,919	22.5	1,782	4,861
140	Heavy Duty	Diesel	International	2017	26,609	35,372	8,763	22.5	1,972	5,379
134	Heavy Duty	Diesel	Freightliner	2018	14,556	20,824	6,268	22.5	1,410	3,848
162	Heavy Duty	Diesel	International	2020	3,540	11,082	7,542	22.5	1,697	4,630
161	Heavy Duty	Diesel	International	2020	6,555	15,240	8,685	22.5	1,954	5,331
182	Heavy Duty	Diesel	Freightliner	2022	1,671	6,867	5,196	22.5	1,169	3,190
181	Heavy Duty	Diesel	Freightliner	2022	1,671	9,219	7,548	22.5	1,698	4,633
180	Light Duty	Gasoline	Ford	2005	166,932	173,155	6,223	7.9	492	1,139
137	Light Duty	Gasoline	Chevrolet	2007	128,206	149,757	21,551	7.9	1,703	3,945
183	Light Duty	Gasoline	Dodge	2007	179,966	187,941	7,975	7.9	630	1,460
186	Light Duty	Gasoline	Chevrolet	2009	132,972	141,946	8,974	7.9	709	1,643
518	Light Duty	Gasoline	Ford	2009	102,184	110,645	8,461	7.9	668	1,549

Unit #	Vehicle Duty Class	Fuel Type	Manufacturer	Year of Manufacture	Odometer 01-01-2022	Odometer 12-31-2023	Kilometers Travelled	Emissions Fuel Eco (L/100km)	Fuel Consumed (litres)	Emissions (kg CO2e)
128	Light Duty	Gasoline	Pontiac	2010	188,218	204,453	16,235	7.9	1,283	2,972
191	Light Duty	Gasoline	Ford	2010	98,610	114,864	16,254	7.9	1,284	2,976
193	Medium Duty	Gasoline	Ford	2011	131,858	155,286	23,428	10.7	2,507	5,809
195	Light Duty	Gasoline	Dodge	2012	157,454	191,236	33,782	7.9	2,669	6,185
196	Medium Duty	Gasoline	Ford	2012	138,425	168,493	30,068	10.7	3,217	7,456
197	Light Duty	Gasoline	Dodge	2012	147,492	185,230	37,738	7.9	2,981	6,909
198	Medium Duty	Gasoline	Ford	2012	81,714	96,730	15,016	10.7	1,607	3,723
150	Light Duty	Gasoline	Ford	2013	69,721	86,062	16,341	7.9	1,291	2,992
521	Light Duty	Gasoline	Ford	2013	156,268	162,163	5,895	7.9	466	1,079
145	Light Duty	Gasoline	Ford	2014	84,976	109,361	24,385	7.9	1,926	4,464
147	Light Duty	Gasoline	Ford	2014	96,026	117,102	21,076	7.9	1,665	3,858
148	Medium Duty	Gasoline	Ford	2014	134,025	167,883	33,858	10.7	3,623	8,395
143	Light Duty	Gasoline	Hyundai	2015	117,696	123,949	6,253	7.9	494	1,145
144	Light Duty	Gasoline	GMC	2015	85,308	119,073	33,765	7.9	2,667	6,181
158	Light Duty	Gasoline	Nissan	2015	82,629	105,403	22,774	7.9	1,799	4,169

Unit #	Vehicle Duty Class	Fuel Type	Manufacturer	Year of Manufacture	Odometer 01-01-2022	Odometer 12-31-2023	Kilometers Travelled	Emissions Fuel Eco (L/100km)	Fuel Consumed (litres)	Emissions (kg CO2e)
522	Light Duty	Gasoline	Ford	2015	17,097	21,581	4,484	7.9	354	821
142	Medium Duty	Gasoline	GMC	2016	37,972	44,370	6,398	10.7	685	1,583
135	Medium Duty	Gasoline	Ford	2017	55,085	83,283	28,198	10.7	3,017	6,976
136	Light Duty	Gasoline	Nissan	2017	54,395	70,114	15,719	7.9	1,242	2,871
138	Light Duty	Gasoline	Ford	2017	39,641	49,860	10,219	7.9	807	1,867
139	Light Duty	Gasoline	GMC	2017	55,003	80,237	25,234	7.9	1,993	4,609
125	Light Duty	Gasoline	Kia	2018	51,345	58,767	7,422	7.9	586	1,356
126	Light Duty	Gasoline	Nissan	2018	33,616	35,625	2,009	7.9	159	367
130	Light Duty	Gasoline	Ford	2018	44,832	76,068	31,236	7.9	2,468	5,706
131	Light Duty	Gasoline	Ford	2018	37,988	52,835	14,847	7.9	1,173	2,712
132	Light Duty	Gasoline	Nissan	2018	49,790	70,973	21,183	7.9	1,673	3,869
133	Light Duty	Gasoline	Nissan	2018	23,013	35,226	12,213	7.9	965	2,231
525	Light Duty	Gasoline	Ford	2018	18,722	29,315	10,593	7.9	837	1,935
127	Light Duty	Gasoline	Nissan	2019	28,120	30,613	2,493	7.9	197	455
527	Light Duty	Gasoline	Ford	2019	8,727	14,703	5,976	7.9	472	1,092

Unit #	Vehicle Duty Class	Fuel Type	Manufacturer	Year of Manufacture	Odometer 01-01-2022	Odometer 12-31-2023	Kilometers Travelled	Emissions Fuel Eco (L/100km)	Fuel Consumed (litres)	Emissions (kg CO2e)
528	Light Duty	Gasoline	Ford	2019	11,119	20,813	9,694	7.9	766	1,771
129	Light Duty	Gasoline	Dodge	2021	7,144	31,382	24,238	7.9	1,915	4,427
529	Light Duty	Gasoline	Ford	2021	10,209	42,803	32,594	7.9	2,575	5,954
123	Medium Duty	Gasoline	Ford	2023	52	52	-	10.7	-	-
163	Light Duty	Gasoline	Ford	2023	55	5,916	5,861	7.9	463	1,071
164	Light Duty	Gasoline	Ford	2023	67	5,860	5,793	7.9	458	1,058
165	Light Duty	Gasoline	Ford	2023	76	2,598	2,522	7.9	199	461
166	Light Duty	Gasoline	Ford	2023	112	9,932	9,820	7.9	776	1,794
167	Light Duty	Gasoline	Ford	2023	50	9,843	9,793	7.9	774	1,789
172	Medium Duty	Gasoline	Ford	2023	5	39	34	10.7	4	8
174	Medium Duty	Gasoline	Ford	2023	40	54	14	10.7	1	3
531	Light Duty	Gasoline	Ford	2023	10	30	20	7.9	2	4
Total										**217,167**

Transportation – Off Road Vehicles

Equipment Type	Fuel Type	Manufacturer	Model#	Year of Manufacture	Hours 01-01-2022	Hours 12-31-2023	Average Annual Hours	Fuel Economy (L/h or ft^3/h for CNG)	Average Consumption (litres or ft^3 nat. gas)	Emissions (kg CO2e)
Tractor	Diesel	John Deere	4052R	2021	290	777	244	12.0	2,928	7,872
Tractor	Diesel	John Deere	6330	2012	2,840	3,403	282	17.1	4,824	12,972
Tractor	Diesel	John Deere	4300	1999	377	426	25	6.4	156	420
Tractor	Diesel	New Holland	TN 75DA	2005	3,366	3,550	92	13.5	1,238	3,328
Loader	Diesel	John Deere	4310 4WD	2003	2,065	2,400	168	6.37	1,068	2,870
Tractor	Diesel	John Deere	2150	1983	8,970	9,084	57	9.48	540	1,453
Ice Resurfacer	NG	Olympia	Millenium (4.8L)	2012	3,188	3,772	292	196.0	57,232	3,466
Loader	Diesel	Bobcat	753 Loader	1992	3,060	3,162	51	6.57	335	901
Backhoe	Diesel	Case	580 SN	2021	242	929	344	16.7	5,725	15,394
Backhoe	Diesel	John Deere	410L	2021	251	419	84	13.4	1,126	3,028
Loader	Diesel	John Deere	524L	2020	504	530	13	24.0	312	839
Ice Resurfacer	NG	Olympia	H Series	2020	620	1,263	322	196.0	63,014	3,816
Total										**56,359**

Waste

Name of Property	Percent Filled (%)	Solid Waste (annum)	CH4 Generation Potential (L_o)	CO_{2e} (tonnes)
Always Community Centre	25%	0.33	0.072	0.53
GFD Station 2	12%	2.10	0.072	3.41
Grimsby Museum	100%	0.66	0.072	1.06
Grimsby Lions Pool	100%	1.40	0.072	2.27
PW Operations Centre	100%	2.80	0.072	4.54
GFD Station 1	25%	0.56	0.072	0.90
Carnegie Building	0%	0.00	0.072	0.00
Grimsby Public Art Gallery and Library	80%	5.97	0.072	9.68
Pump House	0%	0.00	0.072	0.00
Grand Avenue Beach Hall	25%	0.24	0.072	0.38
Queens Lawn Cemetery Portable Office	10%	0.09	0.072	0.15
Queens Lawn Cemetery Steel Building	0%	0.00	0.072	0.00
Livingston Activity Centre	25%	4.59	0.072	7.44
Grimsby Tennis Building	0%	0.00	0.072	0.00
Town Hall	50%	4.20	0.072	6.82
Peach King Centre	0%	0.00	0.072	0.00
Peach King Centre Shed	0%	0.00	0.072	0.00
Oakes Road Park Baseball Building	75%	0.98	0.072	1.59
Oakes Road Park Scoring Building	0%	0.00	0.072	0.00
Queens Lawn Cemetery Brick Building	0%	0.00	0.072	0.00
Southward Park	100%	14.48	0.072	23.49
Southward Park Shed	10%	0.08	0.072	0.13
Total		38.5		63.0

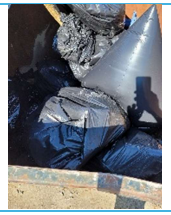
Street Lighting

Company_Name	Year	Customer_or_Connections	Rate_Class_-_Generic	Annual_Billings USoA_4080_-_Dollars	Metered_Consumption_in_kWh	Demand_in_kW
Grimsby Power Incorporated	2023	Connections	Street Lighting Connections	96,759	739,281	2056

Appendix B - Waste Audit

Name of Property	Photos	
Always Community Centre		
GFD Station 2		
Grimsby Museum		
Grimsby Lions Pool		
PW Operations Centre		
GFD Station 1		
Carnegie Building		

Name of Property	Photos	
Grimsby Public Art Gallery and Library		
Pump House		
Grand Avenue Beach Hall		
Queens Lawn Cemetery Portable Office		
Queens Lawn Cemetery Steel Building		
Livingston Activity Centre		
Grimsby Tennis Building		
Town Hall		
Peach King Centre	Under Construction	
Peach King Centre Shed		
Oakes Road Park Baseball Building		

Name of Property	Photos
Oakes Road Park Scoring Building	 
Queens Lawn Cemetery Brick Building	N/A
Southward Park	
Southward Park Shed	 

Appendix C - Milestone 1 and 2 Report Amendment

This appendix summarizes updates made to the Town of Grimsby's Milestone 1 and 2 Report to ensure the GHG Inventory and supporting analyses are complete and aligned with the most current data sources. These updates strengthen the foundation for Milestone 2 target setting and the Milestone 3 CCAP.

Updates to the Corporate GHG Inventory

Three adjustments were made to improve the GHG Inventory's completeness and accuracy:

1. Addition of Facilities

The following facilities were added to the GHG Inventory after confirming that they contributed to municipal energy consumption in 2023:

- Grand Avenue Hall at 10 Grand Avenue
- Oakes Road Baseball Building at 10 Oakes Road North
- Oakes Road Soccer Building at 10 Oakes Road North
- Tennis Building at 20 Livingston Avenue
- Winston Storage Shed at 644 Winston Road

These additions ensure that the inventory reflects all relevant Corporate operations.

2. Update to 2023 Electricity Emissions Factor

The 2023 electricity emissions factor was updated from 35 gCO_2e per kWh to 59 gCO_2e per kWh to align with the most recent value published in Canada's National Inventory Report (NIR). This correction provides emission estimates that better reflect current grid performance.

3. Update to Transportation Emissions

An adjustment was made to fleet emissions to align with the 2023 baseline year. Review of the inventory fleet data showed that the odometer readings represented approximately two years of vehicle activity (2022–2023). To improve accuracy, fleet data specific to the 2023 reporting year was used instead.

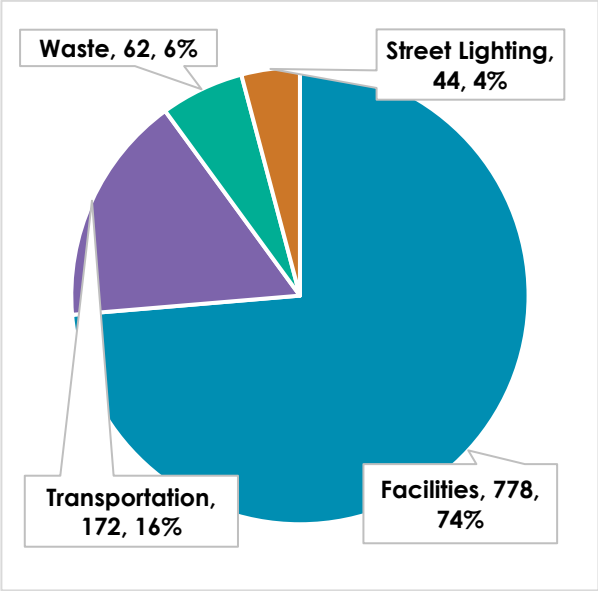
This update ensures that transportation emissions reflect typical annual fleet activity and are methodologically consistent with the rest of the Corporate GHG Inventory.

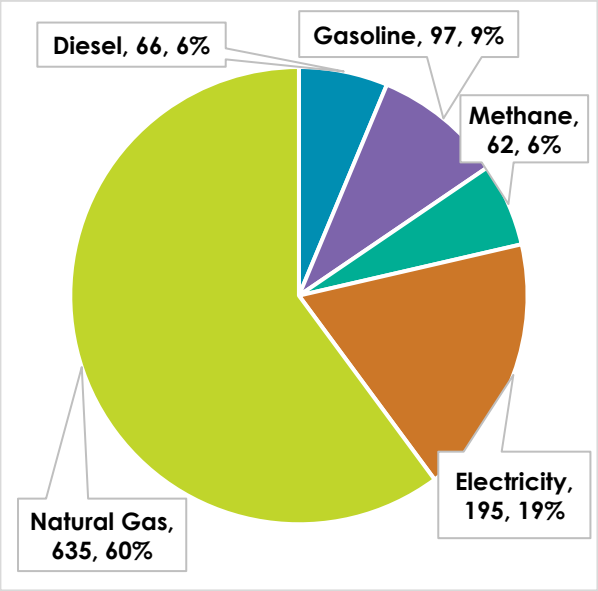
Updated Emissions Inventory Results

Revised totals for 2023 GHG Emissions by source and sector are provided in the tables and figures below.

Emissions Sector	2023 Emissions (tCO_2e)	% of Total
Facilities	778	74%
Transportation	172	16%
Waste	62	6%
Street Lighting	44	4%
Totals	**1,057**	**100%**

Emissions Source	2023 Emissions (tCO_2e)	% of Total
Diesel	66	6%
Gasoline	97	9%
Methane	62	6%
Electricity	195	19%
Natural Gas	635	60%
Totals	**1,057**	**100%**

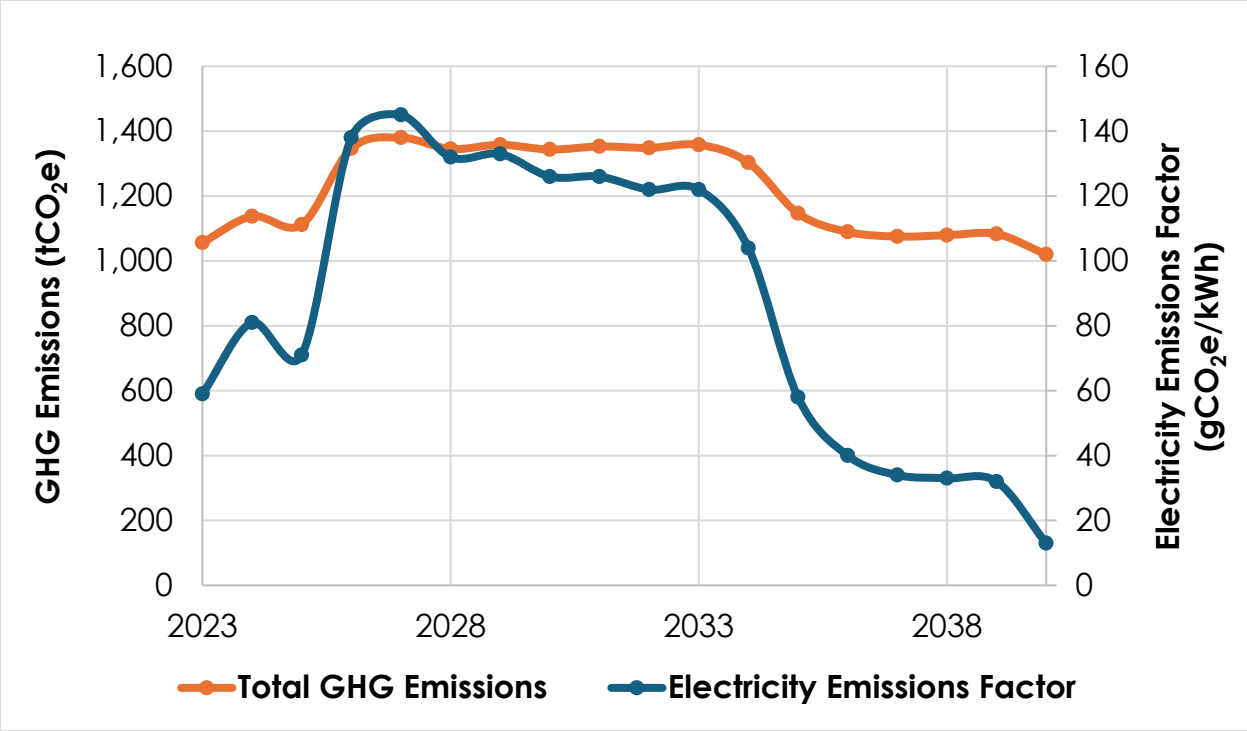




These values supersede those presented in the original Milestone 1 and 2 report, including any detailed breakdowns in its appendices.

Updated Business As Usual Forecast

The BAU emissions forecast (below) has been recalculated to reflect the revised 2023 baseline and to provide a current view of future emissions in the absence of new mitigation measures.



The updated BAU curve incorporates the following drivers and assumptions:

1. **Population Growth and Corporate Service Demand**

   Growth in Grimsby's population is expected to increase demand for municipal services such as recreation, transportation, parks operations, and facility use. As service levels expand, corresponding increases in building energy consumption, fleet activity, and corporate waste generation are projected. These increases are incorporated proportionally into the BAU model.

2. **Forecasted Ontario Grid Electricity Emissions Factors**

   Ontario's grid electricity emissions factor changes over time based on the province's power supply mix, which shifts in response to electricity demand, available generation capacity, refurbishment schedules, and the relative use of natural gas, nuclear, hydro, and renewables. Multiple provincial and third-party projections for this factor are available. While they differ in detail, most projections indicate an increase in the emissions factor in the near term due to higher reliance on natural gas generation, followed by longer term decreases as new clean electricity resources come online.

For this amendment, The Atmospheric Fund's (TAF) electricity emissions factor forecast was applied through to 2040. This forecast provides annual values that reflect expected changes in grid carbon intensity and is well aligned with publicly available planning data. These factors affect all electricity consuming Corporate facilities as well as streetlighting and are a significant determinant of the long-term emissions trajectory.

3. **Peach King Centre Expansion Impacts**

   The expansion of the Peach King Centre was considered but not explicitly included in the BAU emissions forecast due to limited information available to reliably estimate energy impacts. As part of the expansion, older gas-fired rooftop units were replaced with heat pump systems with electric backup. This change is expected to increase electricity consumption while reducing natural gas use.

   Because natural gas has a higher emissions intensity than electricity, the reduction in gas consumption is expected to result in a net decrease in GHG emissions. As a result, assuming no net impact from the expansion is considered conservative, and actual future emissions may be lower than those projected in the BAU forecast.

Together, these inputs provide an updated projection of Corporate emissions through the CCAP planning horizon (2035) and beyond. They replace the BAU forecast presented in the original Milestone 1 and 2 report.

Final Notes

All detailed inventory values and calculations presented in the original Milestone 1 and 2 report, including appendix-level tables, should be considered outdated. The values in this appendix represent the current and authoritative inventory for the purpose of Milestone 2 target setting and Milestone 3 CCAP development.

This amendment ensures that planning decisions in the CCAP are based on a complete and current emissions profile.

Appendix D – Cleantech Sector Assessment

Introduction/Executive Summary

The Cleantech Sector Assessment identifies and evaluates clean technologies that can help Grimsby reduce GHG emissions from its operations. "Cleantech" refers to practical, commercially available solutions (such as heat pumps, smart building systems, solar PV, battery storage, and fleet electrification) that lower energy use, cut emissions, and improve operational resilience.

This high-level assessment considers how these technologies can be applied across Grimsby's municipal facilities and fleet, outlining their functionality, GHG reduction potential, costs, and readiness for implementation. A feasibility matrix compares the technologies to highlight those offering the greatest near-term impact, while a municipal benchmarking review summarizes lessons from peer communities that have already adopted similar measures.

Together, these findings provide a foundation for prioritizing decarbonization actions within the CCAP, particularly in the areas of facility upgrades and transportation electrification.

Cost categories presented in this Appendix are intended to provide a relative comparison across technologies rather than precise estimates.

In general:

- "Low" capital costs reflect minimal incremental investment or use of existing systems, estimated in the range of $0-20k
- "Medium" reflects moderate upgrades or equipment replacements, with costs estimated in the range of $20k-50k
- "High" reflects significant capital investment or system-level changes, with costs estimated in the range of $50-100k
- "Very High" indicates major infrastructure or site-specific requirements, with costs estimated above $100k

An operating cost category of "Low" reflects reduced or minimal ongoing costs, and "Medium" to "High" reflects increasing energy, maintenance, or lifecycle cost impacts depending on the technology.

Technology Overview & Feasibility Assessment

Grimsby's cleantech opportunities span multiple sectors of municipal operations. The following priority technology categories have been identified based on the Town's key emission sources and leading practices in comparable Ontario communities. Each summary describes the technology's function, its greenhouse-gas (GHG) reduction potential, operational and cost considerations, and current level of market maturity. It also provides examples of these technologies deployed in municipal operations.

Clean Technologies

Air-Source Heat Pumps (ASHP, cold-climate)

Description: Electric heat pumps that move heat between indoor and outdoor air to provide space heating, cooling, and domestic hot water. Modern "cold climate" units perform adequately in Canadian winters, maintaining functional capacity at sub-zero temperatures when correctly sized and controlled (defrost cycles, setpoints, staging). Core design steps include load calculations, equipment selection, integration with existing distribution (air/water), and planning for auxiliary/backup heat for rare extreme-cold events.

GHG Reduction Potential: High - ASHPs replace fossil-fuel heating with electricity on Ontario's low-carbon grid, enabling significant reductions where heating loads are substantial.

Operational Compatibility: High - Works across most municipal building types. Typical considerations include verifying electrical system capacity, ensuring the heat pump integrates properly with existing distribution systems (such as low-temperature hydronic loops), and coordinating controls to maintain occupant comfort during colder outdoor conditions.

Costs:

- Medium (capital) - Reflecting the incremental costs of heat pump equipment relative to natural gas options, potential electrical or distribution system upgrades, and integration with controls.
- Medium-High (operating) - Heat pumps operate efficiently, but electricity pricing can result in similar or slightly higher costs compared to fossil fuel systems.

Maturity: Standard (widely commercial in Ontario).

Other Notes and Considerations: Pair with basic envelope improvements and intelligent controls to prevent oversizing and maintain optimal performance over time.

Examples of Municipal Implementation: The City of Ottawa, through Envari Energy Solutions, retrofitted a community centre with cold-climate air-source heat pumps and electric backup to ensure comfort during extreme cold[36]. The project showcases a practical municipal pathway for phasing out fossil heating through proper sizing, integrated controls, and reliable year-round performance.

Ground-Source Heat Pumps (GSHP/Geoexchange)

Description: Ground-source heat pumps use a network of underground loops to exchange heat with the stable temperatures of the earth, providing efficient heating and cooling for buildings. These systems achieve higher seasonal efficiencies than air-source systems, especially in colder climates, as they draw thermal energy from the ground rather than outdoor air. Key design considerations include available land area,

[36] City of Ottawa - Transitioning from fossil fuels with a sustainable energy solution for all seasons

geological conditions, borehole spacing, and pump sizing, as well as integration with low-temperature hydronic distribution systems.

GHG Reduction Potential: High – GSHPs eliminate on-site fossil fuel combustion for heating and hot water, offering significant GHG reductions when powered by Ontario's low-carbon electricity grid.

Operational Compatibility: Medium – Suitable for most municipal buildings; however, installation feasibility depends on site conditions, including available ground space, access for drilling, and soil composition. Downtown or space-constrained sites may face higher costs or require hybrid systems.

Costs:

- High-Very High (capital) – Reflecting drilling, loop installation, and integration costs.
- Low (operating) – Due to stable ground-source efficiency and predictable electricity costs.

Maturity: Scaling – Commercially proven and expanding in municipal retrofits, though implementation complexity varies by site.

Other Notes and Considerations: Feasibility studies and ground assessments are essential early steps. GSHPs pair well with electrification roadmaps and can be developed as shared "district geoexchange" systems for clustered facilities.

Examples of Municipal Implementation: The City of Ottawa's Richcraft Recreation Complex in Kanata (RRCK) uses a ground-source heat pump with a geoexchange field located under the outdoor soccer fields to provide heating and cooling for the facility[37].

Smart Building Systems & Advanced Controls (BAS/EMS/IoT)

Description: Smart building systems and advanced controls connect HVAC, lighting, and other mechanical systems through automated platforms that optimize performance in real time. By using occupancy sensors, scheduling, and data analytics, these systems reduce wasted energy while maintaining comfort. Newer "internet-of-things" (IoT) devices enable deeper energy insight, remote diagnostics, and predictive maintenance that lower both operating costs and GHG emissions.

GHG Reduction Potential: Low–Medium – Typically, 10 – 15% energy savings are achieved across retrofitted facilities, resulting in reduced emissions of both electricity and heating-related emissions over time.

Operational Compatibility: High – Integrates with most existing building automation systems or can be deployed modularly in older facilities. It requires staff training and regular commissioning to maintain performance.

Costs:

[37] City of Ottawa - Richcraft Recreation Complex (RRCK)

- Low-Medium (capital) – Generally lower upfront cost than mechanical retrofits.
- Low (operating) – Strong return on investment through reduced energy waste.

Maturity: Standard – Mature, widely used technology with reliable vendors and service networks across Ontario.

Other Notes and Considerations: Implementing a Building Automation System (BAS) is a strong first step for municipalities that are beginning to manage their energy portfolios, and it also enables participation in demand response programs.

Examples of Municipal Implementation: The County of Wellington employs an advanced Energy Management System to track and optimize energy performance across its facilities, using automated validation, reporting, and benchmarking tools. It also integrates BAS with programmable temperature setbacks and recommissioning strategies to enhance building efficiency and reduce emissions, driving measurable conservation outcomes[38].

Rooftop Solar Photovoltaics (PV)

Description: Solar photovoltaic systems convert sunlight directly into electricity using rooftop-mounted panels. For municipalities, these systems can offset a portion of annual grid electricity use, providing both cost stability and public visibility. They require structurally sound roofs with minimal shading and can be paired with energy storage or net-metering to enhance resilience and savings.

GHG Reduction Potential: Moderate – While Ontario's grid is already low-carbon, solar PV supports peak reduction, energy diversification, and future grid-interactive capabilities.

Operational Compatibility: Medium – Ideal for buildings with large, flat, or gently sloped roofs. Downtown or heritage buildings may face challenges related to shading or permitting.

Costs:

- Medium-High (capital) – Cost scales with system size and structural reinforcement needs.
- Low (operating) – Minimal maintenance and no fuel cost.

Maturity: Standard – Proven and commercially widespread in the municipal sector.

Other Notes and Considerations: Align installation with roof replacement cycles to maximize efficiency. PV systems also enhance public engagement by visibly showcasing climate leadership.

Examples of Municipal Implementation: The City of Brockville installed rooftop solar PV at the Memorial Centre arena to reduce operational costs and emissions, serving as a

[38] County of Wellington - Energy Conservation Management Plan (2024-2029)

visible example of local renewable energy leadership[39].

Battery Energy Storage Systems (BESS)

Description: Battery energy storage systems store electricity during off-peak or low-cost periods for later use during high-demand times or outages. These systems enhance energy resilience, minimize peak demand charges, and facilitate the integration of microgrids and renewable energy sources. Typical municipal installations use lithium-ion technology housed in safe, enclosed systems with integrated fire suppression and energy management controls.

GHG Reduction Potential: Low – Indirect reductions by shifting load away from high-carbon peak hours and reducing reliance on diesel backup systems.

Operational Compatibility: Medium – Suitable for facilities with available space and consistent electrical loads. Downtown areas may require compact containerized systems or indoor units to fit within space constraints.

Costs:

- High-Very High (capital) – Driven by storage capacity, safety systems, and controls.
- Low (operating) – Maintenance is minimal, with long battery lifespans.

Maturity: Scaling – Rapidly commercializing in Canada with growing vendor expertise.

Other Notes and Considerations: Municipal BESS systems typically range from 50 to 500 kW, offering 1–4 hours of storage. Integrating BESS with solar PV can enhance grid independence and emergency response capacity.

Examples of Municipal Implementation: The City of Sault Ste. Marie incorporated BESS as part of its Smart Grid project[40], demonstrating how storage can reduce grid peaks and improve reliability in northern municipalities.

Fleet Electrification: Light-Duty Vehicles

Description: Light-duty battery-electric vehicles (BEVs) replace conventional gasoline or diesel-powered sedans, SUVs, and small pickups used for municipal operations. Charged primarily on Level 2 infrastructure, these vehicles suit predictable local routes such as inspections, parking enforcement, and administrative travel.

GHG Reduction Potential: High – Each vehicle conversion can reduce annual emissions by 60–90%, depending on use and charging mix.

Operational Compatibility: High – Simple integration with existing operations. Charging schedules and range planning ensure reliable daily performance.

Costs:

[39] City of Brockville Adds Solar Roof to Memorial Centre Arena with Green Municipal Fund and Federal Gas Tax Fund Support
[40] Sault Ste. Marie - BESS, Canada

- Medium (capital) – Small incremental purchase cost to fossil fuel counterparts, often offset by rebates.
- Low (operating) – Reduced fuel and maintenance expenses.

Maturity: Standard – Broad model availability and proven municipal performance.

Other Notes and Considerations: Use telematics to track mileage and plan charger installations strategically. Early adoption strengthens municipal visibility in fleet decarbonization.

Examples of Municipal Implementation: The City of Kingston integrated electric vehicles into its corporate fleet as part of its municipal fleet electrification initiative[41], achieving operational savings and positive feedback from staff on performance.

Fleet Electrification: Medium-Duty (Class 3–6) Vehicles

Description: Medium-duty electric trucks and buses serve delivery, maintenance, or shuttle functions for municipalities. They are best suited to fixed, predictable routes and can charge at depots using a mix of Level 2 and Level 3 (DC fast) chargers. These vehicles have lower noise levels, reduced maintenance requirements, and can be integrated into broader fleet transition plans.

GHG Reduction Potential: Medium–High – Offers significant per-vehicle reductions, particularly for daily-use routes.

Operational Compatibility: Medium – Requires route assessment, payload validation, and yard infrastructure planning. Limited model availability can extend procurement timelines.

Costs:

- High (capital) – Vehicle purchase price meaningfully higher than gasoline/diesel counterparts. Charging infrastructure often higher capacity and more expensive than those used for light-duty vehicles.
- Low (operating) – Fuel and maintenance savings improve total cost of ownership over time.

Maturity: Scaling – Commercially available and expanding in the municipal sector.

Other Notes and Considerations: Piloting a small number of vehicles helps validate real-world performance and informs scaling decisions.

Examples of Municipal Implementation: The City of Toronto piloted electric refuse and service trucks through its Green Fleet Plan[42], gathering data on performance and lifecycle costs to support broader adoption within the municipal sector.

Fleet Electrification: Heavy-Duty/Specialty Vehicles

[41] Kingston Electric Vehicle Strategy
[42] Sustainable City of Toronto Fleets Plan

Description: Heavy and specialty electric vehicles include large electric buses, dump trucks, and other equipment that traditionally rely on diesel engines. Technology pathways include large-battery BEVs and emerging hydrogen fuel-cell vehicles for longer-range or high-power applications. These technologies are advancing rapidly but remain in the pilot phase for most municipalities.

GHG Reduction Potential: Medium – Strong emissions benefits where applicable, particularly for high-use or high-idle vehicles.

Operational Compatibility: Low – Model availability is limited, and there is a strong need for charging infrastructure, limiting its current applications.

Costs:

- Very High (capital) – Early-market pricing and specialized infrastructure.
- Low (operating) – Reduced fuel use and maintenance over time.

Maturity: Pilot – Early commercial stage; deployment requires strong vendor and funding partnerships.

Other Notes and Considerations: Municipalities can begin planning now for long-term heavy/specialty fleet electrification by incorporating electrical upgrades and flexible depot designs that can accommodate future technologies.

Examples of Municipal Implementation: The City of Brampton established a partnership with Zenobē Energy Ltd. to fully electrify its transit fleet[43]. Over the next ten years, the program aims to replace up to 1,000 diesel buses with battery-electric models, significantly reducing transit-related GHG emissions.

Demand Response (HVAC/load flexibility)

Description: Demand response (DR) allows municipal buildings to temporarily reduce or shift electricity use during peak demand periods by adjusting HVAC setpoints, lighting, or other controllable loads. These actions lower grid strain and reduce operating costs through incentive payments or time-of-use savings. Integration typically occurs through building automation systems or networked thermostats.

GHG Reduction Potential: Low – Direct impact is modest but contributes to system-wide emissions reductions by avoiding peak fossil generation.

Operational Compatibility: High – Easily implemented through BAS upgrades and operational procedures with minimal disruption.

Costs:

- Low (capital) – Often uses existing systems and controls.
- Low (operating) – Incentive-based savings and avoided demand charges.

Maturity: Standard – Widely adopted with utility-supported programs.

[43] City of Brampton News Release – Zenobē Partnership

Other Notes and Considerations: This provides a low-cost entry into grid-interactive energy management and complements other clean technologies, such as heat pumps, photovoltaics and BESS.

Examples of Municipal Implementation: The City of Summerside, PEI, municipally owned Summerside Electric runs a smart-grid DR program that controls domestic hot-water and space-heating loads across the city[44]. Integration at its facilities use advanced controls to shift load during peak periods, thereby reducing grid strain and operating costs.

Microgrids & V2B/V2G

Description: Microgrids integrate distributed energy resources, such as solar PV, battery storage, and smart controls, to operate connected to or independent from the main grid during outages. Vehicle-to-Building/Grid (V2B/V2G) systems enable bi-directional energy flow from electric vehicles to buildings or the grid, providing backup power or grid services. These technologies enhance municipal resilience and energy autonomy.

GHG Reduction Potential: Low–Moderate – Indirectly reduces emissions by increasing renewable utilization and displacing fossil-fueled backup systems.

Operational Compatibility: Low – Requires careful design, utility coordination, and the implementation of appropriate control systems. V2G applications depend on compatible vehicles and chargers.

Costs:

- High-Very High (capital) – Complex electrical and control infrastructure requirements.
- Low (operating) – Long-term benefits through resilience and avoided downtime.

Maturity: Scaling (microgrids) / Pilot (V2B/V2G) – Demonstrated through pilot projects and emerging standards in Canada.

Other Notes and Considerations: Ideal for critical municipal facilities such as emergency operations centres. Designing new electrification or charging projects to be "microgrid-ready" can reduce future upgrade costs.

Examples of Municipal Implementation: North Bay Hydro built a utility-scale microgrid serving the YMCA Aquatic Centre and Memorial Gardens arena, integrating solar PV, battery storage, cogeneration, smart controls, and EV charging[45]. The system can operate independently during outages to keep these critical municipal facilities powered.

Feasibility Summary/Matrix

The following feasibility matrix consolidates the technology assessments into a comparative overview, highlighting which options present the greatest near-term potential for Grimsby. It evaluates each technology across five key dimensions (GHG

[44] City of Summerside — MyPowerNet Demand Response
[45] City of North Bay (Community Energy Park Microgrid)

reduction potential, operational compatibility, capital and operating costs, and market maturity) to help identify where implementation is most practical and impactful. This summary supports prioritization of pilot projects and investment planning by illustrating both readiness and relative cost-benefit for municipal deployment.

Technology	GHG Reduction Potential	Operational Compatibility	Cost - Capital	Cost - Operational	Deployment Maturity
Air-Source Heat Pumps	High	High	Medium	Medium-High	Standard
Ground-Source Heat Pumps	High	Medium	High-Very High	Low-Medium	Scaling
Smart Building Systems & Advanced Controls	Low–Medium	High	Low-Medium	Low	Standard
Rooftop Solar PV	Moderate	Medium	Medium -High	Low	Standard
Battery Energy Storage Systems (BESS)	Low	Medium	High-Very High	Low	Scaling
Fleet Electrification: Light-Duty Vehicles	High	High	Medium	Low	Standard
Fleet Electrification: Medium-Duty (Class 3–6) Vehicles	Medium–High	Medium	High	Low	Scaling
Fleet Electrification: Heavy-Duty/Specialty Vehicles	Medium	Low	Very High	Low	Pilot
Demand Response	Low	High	Low	Low	Standard
Microgrids & V2B/V2G	Low	Medium	High-Very High	Low	Scaling / Pilot

Municipal Benchmarking of Cleantech Initiatives

The clean technologies outlined in the previous section are already being implemented by municipalities across Ontario. The table below highlights selected examples where

similar cleantech solutions have been deployed, demonstrating practical pathways for decarbonization and operational improvement. These examples emphasize measurable results and implementation lessons that can inform Grimsby's own approach to clean technology adoption.

Municipality	Key Cleantech Actions	Transferable Lessons for Grimsby
Collingwood	Completed an FCM Green Municipal Fund study (2023)[46] assessing retrofit options for 42 municipal facilities, including electrification and on-site renewables.	Use GMF or similar funding to develop a facility-by-facility decarbonization roadmap
Halton Hills	Installed geothermal heating and rooftop solar PV at civic buildings; applied a carbon-lens filter for capital projects[47].	Combine visible renewables and geoexchange retrofits with lifecycle planning to integrate emissions criteria into asset management.
Sault Ste. Marie	Deployed Canada's first community-wide smart-grid integrating solar, storage, and EV assets (2023)[40].	Demonstrates municipal-scale grid-interactive capability that can inform Grimsby's long-term microgrid readiness.
North Bay	Built a utility-scale microgrid at the Community Energy Park (solar + battery + CHP + controls) powering arena and recreation facilities during outages[45].	Proof of concept for municipal microgrids enhancing energy resilience at critical sites.
Ottawa	Operates geoexchange at the Richcraft Recreation Complex – Kanata and several high-performance civic buildings with advanced BAS/EMS[37].	Geoexchange and BAS integration deliver strong energy savings.
Brockville	Installed 1,066 rooftop solar panels at Memorial Centre Arena through FCM and federal gas-tax funding (2013)[39].	Mature, small-city example of solar generation on existing infrastructure; aligns with Grimsby's PV feasibility context.
Brampton	Implementing large-scale bus-fleet electrification with battery-electric	Demonstrates structured fleet-electrification rollout and public–

[46] Collingwood Receives $200,000 to Support GHG Reduction in Municipal Facilities
[47] Town of Halton Hills - Corporate Energy Plan (2020-2025)

Municipality	Key Cleantech Actions	Transferable Lessons for Grimsby
	vehicles and high-capacity depot chargers (2025 partnership with Zenobē Energy)[43].	private financing model adaptable for smaller fleets.

Key Insights

Ontario municipalities are advancing cleantech through focused, sector-specific initiatives that align with local capacity and priorities. The most successful efforts begin with controllable assets, integrate smart systems to improve performance, and scale toward more complex energy solutions over time. Several key insights are summarized below:

- **Targeted implementation:** Municipalities are prioritizing technologies that fit their core operations - ranging from building retrofits and renewable installations to transit electrification and microgrids. Projects in Collingwood, Halton Hills, Brampton, and Ottawa show how diverse applications can collectively drive emissions reductions and operational resilience.
- **Systems integration:** Advanced controls and data-driven management platforms turn retrofits into adaptive systems that maintain performance and support participation in demand-response and smart-grid programs.
- **Resilience and reliability:** Pairing renewables with storage, as seen in North Bay, strengthens energy security while reducing operating costs.
- **Leveraging partnerships:** Many municipalities access external expertise and funding, such as GMF or provincial programs, to pilot emerging technologies and reduce financial risk.

Conclusion

This assessment informs the CCAP by identifying technologies and approaches most suitable for Grimsby's facilities and fleet, supporting targeted, phased decarbonization. Near-term implications include prioritizing building electrification where feasible (paired with advanced controls), expanding data-driven energy management to sustain savings, and preparing sites for renewable and storage integration. For transportation, the findings support continued adoption of light-duty EVs, pilots for select medium-duty vehicles, and staged electrical/charging upgrades that preserve future flexibility. The feasibility matrix helps align investments with impact and readiness, while the benchmarking examples point to funding, partnerships, and delivery models that can de-risk early projects.

These insights guide the CCAP's recommended actions, timelines, and enabling steps (e.g. studies, design standards, and procurement language) to achieve measurable GHG reductions, operational resilience, and cost control across Grimsby's corporate portfolio.

Appendix E – Summarized List of Audit ECMs

Level 2 Audits

Facility Name	ECM Type	ECM Description	Natural Gas Savings (m^3)	Electricity Savings (kWh)	GHG Reduction (tCO_2e)	Total Cost Savings ($)	Project Implementation Cost ($)	Simple Payback (years)
Fire Station 1	Lighting	Building Interior Lighting Conversion	-560	5,384	-0.93	$798	$20,000	25
Fire Station 1	Controls	Install Low-cost Centralized HVAC and Lighting Control System	2,237	4,038	4.37	$642	$15,000	23.4
Fire Station 1	Renewable Energy	Renewable Energy – Solar Photovoltaics System Installation	0	42,740	1.07	$6,411	$120,000	18.7
Fire Station 2	Controls	Install Low-cost Centralized HVAC and Lighting Control System	467	26,844	1.56	$4,035	$10,500	2.6
Fire Station 2	Renewable Energy	Renewable Energy – Solar Photovoltaics System Installation	0	82,405	2.06	$12,361	$230,880	18.7
Operations Centre	HVAC	Replace Rooftop Unit #1	946	2,767	1.88	$431	$10,500	24.3
Operations Centre	Electrification	Replace Gas-fired Domestic Hot Water Heater Tanks with Electric	2,854	-19,040	6.47	-$2,811	$12,689	-4.5
Library/Art Gallery	Lighting	Interior and Exterior Lighting Conversion	-48	34,820	0.78	$6,267	$77,140	12.6
Library/Art Gallery	Controls	Building Interior and Exterior Lighting Control Automation	0	15,794	0.39	$2,843	$35,000	12.3
Library/Art Gallery	HVAC	Upgrade Heating Water Boilers #1 and #2	10,712	0	20.46	$171	$25,000	146.2
Library/Art Gallery	Cooling	Replace Dx Fluid Chiller TCM-1	0	8,331	0.21	$1,500	$20,000	13.3
Library/Art Gallery	Controls	Install VFDs on AHU-1 Fans (Supply and Return)	0	9,492	0.24	$1,709	$20,000	11.7
Library/Art Gallery	Renewable Energy	Renewable Energy – Solar Photovoltaics System Installation	0	275,040	2.05	$14,724	$275,040	18.7
Municipal Offices	HVAC	Convert Existing Unitary Rooftop Units to Variable Refrigerant Flow (VRF) Fan Coil System	46,709	97,893	91.64	$16,142	$419,634	26

Facility Name	ECM Type	ECM Description	Natural Gas Savings (m^3)	Electricity Savings (kWh)	GHG Reduction (tCO_2e)	Total Cost Savings ($)	Project Implementation Cost ($)	Simple Payback (years)
Municipal Offices	Lighting	Building Interior Lighting Conversion to LED	-2,919	58,736	-4.11	$9,368	$116,565	12.4
Municipal Offices	Controls	Building Interior Lighting Control Automation	0	35,242	0.88	$5,639	$15,000	2.7
Municipal Offices	Renewable Energy	Renewable Energy – Solar Photovoltaics System Installation	0	97,169	2.43	$15,547	$290,400	18.7
Museum	HVAC	Install New and Upgrade Existing Gas-Fired Furnace System	217	582	0.43	$105	$10,000	95.4
Museum	Lighting	Building Interior T8 Light Fixtures Conversion	-87	3,968	-0.07	$672	$15,000	22.3
Museum	Controls	Install Programmable HVAC Control and Extended Lighting Occupancy Sensors	137	1,052	0.29	$183	$3,500	19.2
Peach King Centre	HVAC (Heat Pump)	Convert East and West Conventional Arena Ice Rink Refrigeration Plants to Geothermal Heat Pump System	0.00	196,941	4.92	$35,449	$720,000	20.3
Peach King Centre	HVAC	Replace/Upgrade Existing 1984 and 2004 Makeup Air Units to High-Efficiency Units (with HRV Option)	9,483	10,370	18.11	$1,975	$30,000	15.2
Peach King Centre	HVAC	Convert Existing Unitary Rooftop Units to Variable Refrigerant Flow (VRF) Fan Coil System	47,415	24,302	91.15	$4,915	$198,216	40.3
Peach King Centre	Electrification	Convert Gas-fired DHW Tanks/Heater to Electric Hot Water System	24,673	-5,607	46.98	-$728	$35,000	-48.1
Peach King Centre	Controls	Install Building Automation System (Integrated HVAC and Lighting System Control)	7,650	54,005	15.96	$9,808	$40,000	4.1
Peach King Centre	Electrification	Replace Existing Gas-fired Infrared Radiant Tubes with Electric Units	3,824	-1,100	7.27	-$154	$30,000	-194.3
Peach King Centre	Controls	Variable Frequency Drives (VFDs) Retrofit on Existing Ice Plant Condenser Fans	0.00	21,602	0.54	$3,888	$21,000	5.4
Peach King Centre	Renewable Energy	Renewable Energy – Solar Photovoltaics System Installation	0.00	360,700	9.02	$64,926	$1,263,250	19.5

Level 1 Audits

Facility Name	ECM Type	ECM Description	Total Cost Savings ($)	Project Implementation Cost ($)	Simple Payback (years)
Elizabeth Street Pumphouse	HVAC	Replace Fan Coil Unit	5-10%	$5000 per unit	Over 20 years
Elizabeth Street Pumphouse	Controls	Install Timer or Occupancy Sensor Control on Infrared Heaters	Varies (likely <1 year)	$150–$200	<1 year
Elizabeth Street Pumphouse	Controls	Lighting Control/Scheduling	5% of lighting energy	$1.00–$2.50 per sq.ft.	>20 years
Elizabeth Street Pumphouse	Renewable Energy	Solar Panels – Renewable Energy	$204/kW installed	$2.50–$3.00 per Watt	15–20 years (with grants)
Grand Avenue Hall	Envelope	Building Envelope Repairs and Weatherstripping	Up to 5% of heating energy	$7,500.00	15–20 years
Grand Avenue Hall	HVAC	Replace Single-Stage Gas-fired Furnace	Up to 10% of heating energy	$10,000 per unit	20–40 years
Grand Avenue Hall	Controls	Replace/Reinstall and Optimize Setup and Setback Thermostats	Varies (likely <1 year)	$450.00	<1 year
Grand Avenue Hall	Lighting	Replace or Retrofit Existing T8 and CFL Light Fixtures to LEDs	Up to 20% of lighting energy	$150–$200 per fixture (full retrofit)	10–15 years
Grand Avenue Hall	Controls	Lighting Control/Scheduling	5% of lighting energy	$1.00–$2.50 per sq.ft.	>20 years
Grand Avenue Hall	Renewable Energy	Solar Panels – Renewable Energy	$204/kW of PV installed	$2.50–$3.00 per Watt	15–20 years (with grants)
Grimsby Lions Community Pool	HVAC	Replace the 2005 Pool Hot Water Boiler	5–10% savings	$7,500–$15,000 per unit	Over 25 years
Grimsby Lions Community Pool	Controls	Replace/Reinstall and Optimize Setup and Setback Thermostats	Varies (likely <1 year)	$450.00	<1 year
Grimsby Lions Community Pool	Heat Recovery	Install Heat Recovery Unit	5–10% savings	$2,500–$5,000 per unit	10–15 years
Grimsby Lions Community Pool	Lighting	Replace or Retrofit Existing T8 and CFL Light Fixtures to LEDs	Up to 20% of lighting energy	$150–$200 per fixture (full retrofit)	10–15 years
Grimsby Lions Community Pool	Controls	Lighting Control/Scheduling	5% of lighting energy	$1.00–$2.50 per sq.ft.	>20 years
Grimsby Lions Community Pool	Envelope	Install Swimming Pool Cover	Up to 5% savings	$5,200–$15,400 per unit	10–15 years

Facility Name	ECM Type	ECM Description	Total Cost Savings ($)	Project Implementation Cost ($)	Simple Payback (years)
Grimsby Lions Community Pool	Renewable Energy	Solar Pool Heating System (Pool Water and Building)	$204/kW of PV installed	$2.50–$5.00 per Watt	15–20 years (with grants)
Livingston Activity Centre	HVAC	Replace 2002 Rooftop Units	5–10% savings	$25,000–$75,000 per unit	Over 50 years
Livingston Activity Centre	Controls	Install Demand-Controlled Ventilation System	Up to 10% savings	$5,000–$7,500 per unit	10–15 years
Livingston Activity Centre	Controls	Replace/Reinstall and Optimize Setup and Setback Thermostats	Varies (likely <1 year)	$450 per thermostat	<1 year
Livingston Activity Centre	Lighting	Replace or Retrofit Existing T8 and CFL Light Fixtures to LEDs	Up to 20% of lighting energy	$150–$200 per fixture (full retrofit)	10–15 years
Livingston Activity Centre	Water Heating	Replace 2004 DHW Tank	Up to 10% savings	$1,200–$3,400 per unit	10–15 years
Livingston Activity Centre	Controls	Lighting Control/Scheduling	5% of lighting energy	$1.00–$2.50 per sq.ft.	>20 years
Livingston Activity Centre	Renewable Energy	Solar Panels – Renewable Energy	$204/kW of PV installed	$2.50–$3.00 per Watt	15–20 years (with grants)
Southward Community Sport Park	Controls	Lighting Control/Scheduling	5% of lighting energy	$1.00–$2.50 per sq.ft.	>20 years
Southward Community Sport Park	Renewable Energy	Solar Panels – Renewable Energy	$204/kW of PV installed	$2.50–$3.00 per Watt	15–20 years (with grants)
Elizabeth Street Pumphouse	HVAC	Replace Fan Coil Unit	5-10%	$5000 per unit	Over 20 years

Informal Audits

Facility Name	ECM Type	ECM Description	Total Cost Savings ($)	Project Implementation Cost ($)	Simple Payback (years)
Alway Community Centre	Lighting	Replace or Retrofit Existing T12 Interior and MH Exterior Light Fixtures	15–30%	$150–200 per fixture	10–15 years
Alway Community Centre	Envelope	Building Envelope Repair and Weatherstripping	Up to 5% of envelope heating energy	$25,000	>20 years
Alway Community Centre	HVAC	Replace 2003 Gas-fired Forced Air Furnace	5–10%	$7,500–15,000 per unit	>20 years
Tennis Building	Lighting	Replace or Retrofit Existing T12 Interior and MH Exterior Light Fixtures	15–30%	$150–$200 per fixture	10–15 years
Tennis Building	Water Heating	Replace Domestic Hot Water (DHW) Heater	5–10%	$2,500 per unit	1–2 years
Tennis Building	Envelope	Building Envelope Repair and Weatherstripping	Up to 5% of heating energy	$25,000.00	>20 years
Tennis Building	HVAC	Replace Electric Baseboard Heater	2–5%	$300 per unit	2–5 years
Oakes Road Baseball Building	Lighting	Replace or Retrofit Existing T12 Interior and MH Exterior Light Fixtures	15–30%	$150–$200 per fixture	10–15 years
Oakes Road Baseball Building	Water Heating	Replace Domestic Hot Water (DHW) Heater	5–10%	$1,500 per unit	1–2 years
Oakes Road Baseball Building	Envelope	Building Envelope Repair and Weatherstripping	Up to 5% of heating energy	$15,000.00	>20 years
Oakes Road Baseball Scoring Building	Lighting	Replace or Retrofit Existing T12 Interior and MH Exterior Light Fixtures	15–30%	$150–$200 per fixture	10–15 years
Oakes Road Baseball Scoring Building	Envelope	Building Envelope Repair and Weatherstripping	Up to 5% of heating energy	$15,000.00	>20 years
Oakes Road Soccer Building	Lighting	Replace or Retrofit Existing T12 Interior and MH Exterior Light Fixtures	15–30%	$150–$200 per fixture	10–15 years
Oakes Road Soccer Building	HVAC	Replace 2005 Gas-fired Forced Air Furnace	5–10%	$7,500–$15,000 per unit	>20 years
Oakes Road Soccer Building	Envelope	Building Envelope Repair and Weatherstripping	Up to 5% of heating energy	$15,000.00	>20 years
Salt Dome	Lighting	Replace or Retrofit Existing T8 Interior Light Fixtures	15–30%	$150–$200 per fixture	10–15 years
Skateboard Park	Lighting	Replace or Retrofit Existing HPS Park Light Fixtures	15–30%	$3,500–$4,500 per fixture	10–15 years

Facility Name	ECM Type	ECM Description	Total Cost Savings ($)	Project Implementation Cost ($)	Simple Payback (years)
Storage Shed	Lighting	Replace or Retrofit Existing T8 Interior Light Fixtures	15–30%	$150–$200 per fixture	10–15 years
Storage Shed	Envelope	Building Envelope Repair and Weatherstripping	Up to 5% of envelope heating energy	$15,000.00	>20 years
Alway Community Centre	Lighting	Replace or Retrofit Existing T12 Interior and MH Exterior Light Fixtures	15–30%	$150–200 per fixture	10–15 years

Appendix F – Potential Grants and Funding Opportunities

Funding Source/Program Name	Funding Entity	Program Description	Funding Amount	Applicable to CCAP Action
Green Municipal Fund	Federation of Canadian Municipalities (FCM)	Offers grants and low-interest loans to support municipal sustainability projects (e.g. energy efficiency, transportation, waste, water) that improve air, land, or water quality and reduce GHG emissions. Multiple municipal funding streams covering GHG reduction pathway studies, retrofits for existing buildings, fleet electrification and more. Funding also available for climate adaptation planning and implementation.	Both loans and grant funding that vary based on project.	F-2 T-1 W-1 Adaptation
Save On Energy - Instant Discounts Program	IESO	Instant, point-of-sale discounts are available for existing commercial, agricultural, industrial, institutional and multi-unit residential buildings and facilities in Ontario that purchase eligible lighting products from participating distributors/dealers.	Ranges from $2/unit for T8 LED tubes to $140/unit for high-lumen LED high-bay fixtures.	F-1
Save On Energy - Retrofit Program	IESO	Provides prescriptive and custom (based on energy and demand savings) incentives for a variety of electricity reduction measures such as HVAC, motors, compressed air measures as well as variable frequency drives.	Custom incentives are the higher of $1,800/kW or $0.20/kWh of savings. Prescriptive incentives vary based on measure type, size, application. Both typically capped at 50% of eligible project costs. Bonus incentives for projects in electricity-constrained areas are available.	F-1 S-1
Enbridge Natural Gas Efficiency Programs	Enbridge	A range of prescriptive and custom programs providing incentives to offset costs of upgrading to energy-efficient natural gas equipment (or other equipment affecting natural gas consumption). Measures include: • Boilers • Condensing make-up air units	Range based on equipment type, size and application. Enbridge Energy Solutions Advisors consult with program participants to match potential	F-1

Funding Source/Program Name	Funding Entity	Program Description	Funding Amount	Applicable to CCAP Action
		• Air curtains/door dock seals • Destratification fans • Demand-controlled ventilation • Heat and energy recovery ventilators Funding also available for on-site energy assessments in some circumstances.	natural gas reduction projects with the proper funding stream.	
Electric Vehicle Affordability Program (EVAP)	Transport Canada	Provides point-of-sale incentives to reduce the upfront cost of purchasing or leasing eligible zero-emission vehicles (ZEVs), including light-duty fleet vehicles used in municipal operations. For municipal fleets, a strict program cap applies: provincial, territorial, and municipal governments can receive incentives for a maximum of 10 vehicles over the full 5-year program duration. This cap applies at the level of government (i.e. the municipality as a whole), not per department or organization.	Incentives start at: • up to $5,000 for battery-electric and fuel cell electric vehicles • up to $2,500 for plug-in hybrid vehicles Incentive levels will decline over time as ZEV adoption increases and vehicle costs decrease. Early adoption is therefore advantageous, as future funding levels may be reduced or phased out.	T-1
Zero Emissions Vehicle Infrastructure Program (ZEVIP)	Natural Resources Canada (NRCan)	The Zero Emission Vehicle Infrastructure Program (ZEVIP) provides funding towards the deployment of public EV chargers and hydrogen refuelling stations across Canada. It operates on an annual calendar of application windows with differing intake goals. The current intake is a pilot Call for Proposals focused on transportation-corridor public fast charging in high-priority areas identified on NRCan's Electric Vehicle Charging Planning Map. Projects must include at least one public EV fast charger of 100 kW, co-located with additional chargers to	Up to 50% of total project costs, with other tiered caps based on charging output.	T-1

Funding Source/Program Name	Funding Entity	Program Description	Funding Amount	Applicable to CCAP Action
		achieve a minimum total site output of 150 kW. It must be located within 1.6 km of mapped priority roads (priority ranks 4 or 5). All chargers must be publicly accessible 24/7, networked, new, permanently installed, and certified for use in Canada.		