

Community

CLIMATE

ACTION

PLAN

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Our Road to Net Zero – Mayor’s Foreword

The global climate emergency is a significant challenge that requires immediate attention and action at a local level. In 2020, Stratford joined several cities around the world in declaring a Climate Emergency and recognized that the impacts of a changing climate are already being felt in Canada, and across the world – and will continue to intensify, posing acute and lasting risks for communities, businesses, and natural ecosystems. It has prompted a concerted response locally with the development of implementation strategies for the City of Stratford, both as a corporate entity and as a community.

Our Community Climate Action Plan is the new community-wide energy and emissions reduction strategy that addresses mitigation at a city scale while retaining local energy dollars in the community – it is meant to serve as a roadmap that provides strategic direction for the city as we enable a shift to carbon neutrality by 2050.

The climate action goals in this plan are ambitious. As a community, we can collaboratively pave the way for an equitable transition to a low-carbon, healthy, and prosperous future.



Mayor Martin Ritsma



Contributors and Acknowledgements

The City of Stratford would like to recognize the invaluable contributions made to the Community Climate Action Plan by community members, participating industry partners and business representatives, Energy and Environment Advisory Committee, Active Transportation Advisory Committee, Mayor and City Council. Their contributions ensured that this Plan captures the climate action aspirations of the community.

We also want to thank all residents who shared their ideas with the City of Stratford through the online engagement opportunities on EngageStratford, along with everyone who participated in in-person engagement sessions, and workshops.

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Glossary

Adaptation: The process of adjusting to current or expected changes in climate and its effects. This involves making changes in practices, processes, structures, and policies to minimize damage, take advantage of opportunities, or cope with the consequences of climate change.

Alternative Fuels: Fuels other than conventional fossil fuels such as gasoline and propane. They generally have lower GHG emissions than fossil fuels and can include ethanol, biodiesel, propane, electricity, fuel cells and hydrogen.

Baseline: A scenario illustrating expected energy use and greenhouse gas emissions if no additional plans, policies, programs, and projects are implemented between the present and 2050.

Baseline year: The starting year for energy or emissions projections, from which monitoring and tracking activities can rely on.

Business As Usual (BAU): A scenario of the future that assumes that future developments will be similar to past trends and no new mitigation policies or actions are introduced. Comparing an energy and emissions forecast from implementing specific policies or actions against a BAU scenario reveals the full potential of those policies or actions to reduce energy and emissions.

Carbon Dioxide Equivalent (CO₂e): This term describes different greenhouse gases in a standardized unit. For any quantity and type of greenhouse gas, CO₂e signifies the amount of carbon dioxide (CO₂) which would have the equivalent global warming impact.

Corporate Energy and Emissions Plan (CEEP): A document developed as a net-zero strategy for the corporation to achieve climate emergency targets through operations.

Community Climate Action Plan (CCAP): A document for providing long-term direction and short-term actionable strategies for reducing energy consumption and emissions in the community.

Carbon Sequestration: The process of capturing and storing atmospheric carbon dioxide. It is one method of reducing the amount of carbon dioxide in the atmosphere with the goal of reducing global climate change.

Deep Retrofit: An extensive, holistic overhaul of a building's systems, utilizing best practices with the goal of significantly reducing energy consumption and GHG emissions.

District Energy System: Involves the production and supply of geothermal energy (i.e. heat and cooling) and can also provide electrical energy. Generally, a district energy system moves heat and/or cool energy from a centralized source through a network of pipes to buildings, neighbourhood or community.

Heat Pump: A device that transfers heat energy from a source of heat to a target area using mechanical energy.

Infill Development: Development that takes place on vacant or undeveloped land within an existing community where the existing land is mostly built out. Infill ‘fills in’ the gaps. Gentle infill can often increase density without changing neighbourhood character, such as allowing secondary suites.

Mitigation: The process of making the impacts of climate change less severe by preventing or reducing the emission of greenhouse gases into the atmosphere.

Greenhouse Gas (GHG): Greenhouse gases including carbon dioxide, methane and even water vapor that occur naturally in the atmosphere, maintaining a temperature through the natural greenhouse gas effect that has been conducive for ecosystems and human civilization to flourish for 10,000 years. Additional GHGs released from burning oil, coal and natural gas for energy and clearing forests for cities and agriculture has enhanced the greenhouse effect, leading to changes in climate.

Net-Zero Emissions: As defined in the Canadian Net-Zero Emissions Accountability Act: anthropogenic emissions of greenhouse gases into the atmosphere are balanced by anthropogenic removals of greenhouse gases from the atmosphere over a specified period.

Low-Carbon Energy System (LCES): Energy systems that provide heating, cooling, hot water, with reduced or limited GHG emissions, typically regulated through a maximum annual emissions per square meter basis.

Scope 1 Emissions: Direct greenhouse (GHG) emissions that occur from sources that are controlled or owned by an entity (e.g., emissions associated with fuel combustion in boilers, furnaces, vehicles).

Scope 2 Emissions: Indirect GHG emissions associated with the purchase of electricity, steam, heat, or cooling. Although scope 2 emissions physically occur at the facility where they are generated, they are accounted for in an entity’s GHG inventory because they are a result of the entity’s energy use.

Scope 3 Emissions: The result of activities from assets not owned or controlled by the reporting entity, but that the organization indirectly affects in its value chain. Scope 3 emissions include all sources not identified within an organization's scope 1 and 2 boundary.

Offsets: Greenhouse gas reductions that are used to counterbalance greenhouse gas emissions elsewhere. A carbon offset occurs when an individual or organization emits a given amount of GHG emissions but invests in measures that permanently and verifiably remove the equivalent amount of GHG emissions from the atmosphere.

Units

GHG emissions: 1 ktCO₂e = 1,000 tCO₂e

Energy: 1 GJ= 278 kWh, 1 MWh= 1,000 kWh

Executive Summary

This **Community Climate Action Plan** is Stratford's response to addressing the climate crisis, providing a path toward a low-carbon future for the community. Following the commitment established in Stratford's Climate Emergency Declaration, this plan provides a roadmap to achieve the ambitious target of 30% greenhouse gas (GHG) reduction (below 2017 levels) by 2030 and to become a net-zero city by 2050. This target reflects Canada's commitment to the Paris Agreement and the global effort to limit global average temperature from rising above 2°C and pursue efforts to limit the increase to 1.5°C. Meeting this goal is critical to avoid more catastrophic impacts of climate change.

This Plan has been developed as a mitigation strategy and lays out specific actions to reduce the community's greenhouse gas (GHG) emissions, accelerate the clean energy transition and seek economic development opportunities, with a focus on seven program areas: Efficient Homes and Buildings, Low-Carbon Neighbourhoods, Efficient Transportation, Efficient Industry, Energy Supply and Distribution, Towards Zero Waste and Governance. For each program area, a set of goals and actions are identified, with the aim to fulfill Stratford's climate action vision, enable its transition into a sustainable, low-carbon city, and ensure local energy dollars remain in the community.

Achieving this feat will involve significant investments in our buildings, transportation, and infrastructure. This plan will help guide community-driven action toward fostering environmental stewardship, building resilience, and achieving several other objectives concurrently.

Transitioning to a low-carbon city requires a tremendous effort that extends beyond the municipality, involving every resident, business, and organization in the community as crucial contributors to our city's envisioned future. Achieving our collective goals will also necessitate action from all levels of government. To increase the likelihood of achieving success together, the City must allocate dedicated resources toward plan implementation, ongoing support, and oversight.

The Community Climate Action Plan incorporates advocacy and partnerships as key components to support a collaborative approach, ensuring that we continue to live in a healthy and resilient community.

Section 1 Introduction

Following a community call for an urgent response to address climate change, the City of Stratford adopted greenhouse gas (GHG) emission reduction targets of 30% by 2030, 60% by 2040, and net-zero by 2050. The Community Climate Action Plan (CCAP) is the city's updated net-zero strategy that provides a roadmap for achieving these GHG emission reduction targets and is intended to empower the community to collectively take climate action.

Implementing the programs and initiatives outlined in the Community Climate Action Plan (the “Plan” or “CCAP”) will also enhance Stratford's resiliency to the impacts of a changing climate and support the City's overarching equity, affordability, and sustainability goals.

The Challenge

Human-induced climate change is exacerbating extreme weather conditions and contributing to long-term shifts in weather patterns across the globe¹, causing irreversible damage to the environment and ecosystems. In response, cities across the world are taking immediate action to aim for rapid and steep GHG emission reductions to limit global warming.

In 2018, the Intergovernmental Panel on Climate Change (IPCC), the world's leading scientific body on climate change, released a report that indicated that the risks of climate change can be substantially reduced by limiting warming to 1.5°C above pre-industrial levels. However, if current annual GHG emissions trends continue, we have a window of opportunity of less than 10 years for the planet to remain below 1.5 degrees of warming².

Canada's House of Commons declared a climate emergency in June 2019, joining several countries and cities around the world in recognizing the threat of the climate crisis and the urgent need to address its extreme impacts. Stratford has also recognized the urgency of responding to the climate crisis at a local level and has made a commitment to taking action.

¹ IPCC, 2021. Summary for Policymakers. In *Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*.

² The remaining global carbon budget for having a 66% chance of limiting warming to 1.5 degrees is 420 GtCO₂e. Global annual GHG emissions are approximately 42 MtCO₂e. (IPCC, 2018: Summary for Policymakers. In: *Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways.*)

We are now at a pivotal point in human history. The immediate actions we take during the present decade will be instrumental in determining whether or not our communities can successfully address the direst impacts of climate change.

The Opportunity

Climate change is accelerating fundamental shifts in every major sector of the economy, propelled by energy transition, away from fossil fuels towards low-carbon alternatives and renewable energy. This Plan positions Stratford to embrace emerging opportunities and innovation resulting from this energy transition and drive economic development in the community.

Governments are advancing their efforts to address climate change through national strategies and commitments to target net-zero emissions by 2050, that are rapidly being adopted by cities in their climate action planning. Recognizing that cities are in a unique position to respond to this crisis and drive action at a local level, there is innate opportunity to impact mitigation through holistic systems thinking.

The CCAP considers a rigorous analysis of GHG emissions, energy use, utility and fuel costs identified over the short, medium, and long term. Further, the Plan presents climate-related scenarios reflecting different futures, including a business-as-usual (BAU) scenario and a low-carbon or net-zero scenario based on rapid decarbonization. It also outlines immediate actions towards our climate emergency targets and provides recommendations on the most impactful opportunities to pursue.

Climate Change in Stratford



Figure 1 Significant Winter Event, December 2022

Climate modelling for Stratford predicts that, if current trends continue, the city can expect to experience the following impacts by 2050:

- An annual mean temperature that is approximately 2.2°C higher than current levels, bringing hotter summers and warmer winters.
- An extended growing season, as much as 30 days for both spring and fall.
- A 58mm (6%) increase in annual average rainfall, with more intense precipitation occurring in the winter months.
- More than three times as many days above 30°C (26 days a year, versus the current average of 9 days) and several days that exceed 40°C annually.
- More frequent heavy rainfall, hail, freezing rain, and snowstorms.
- A significant increase in the intensity of extreme weather events like storms.
- Frequent freeze-thaw cycles resulting in damaged infrastructure, and escalated costs of repair.

Climate change also poses considerable risk to the well-being, economic prosperity, and natural evolution of the community. Examples of physical risks from extreme weather events include the deterioration of public infrastructure, property damage, supply chain disruptions, health impacts and biodiversity loss.

No municipal government, or any single organization for that matter, can tackle climate change or lead emission reduction efforts in isolation. Effectively reducing global GHG emissions will stem from a combination of incremental actions and ambitious, large-scale initiatives and collaborations with the community and industry. Stratford recognizes the need to work with senior levels of government, the community, local businesses, and an

array of stakeholders to do our part in accelerating the clean energy transition while making impactful GHG emission reductions and driving economic growth.

Mitigation and Adaptation

Mitigation and adaptation are key approaches to addressing present and future challenges posed by climate change, each focusing on different aspects of this challenge.

Mitigation focuses on actions taken to reduce or eliminate GHG emissions into the atmosphere such as use of renewables instead of fossil fuels, energy efficiency and sustainable transportation. Adaptation focuses on actions taken to manage the risks of climate change impacts that are already occurring or are expected to occur, such as emergency management, infrastructure upgrades and protecting biodiversity and ecosystems. Figure 2 below provides examples of initiatives that contribute to mitigation (left), adaptation (right) and their intersectionality.

Mitigation
(Address the Cause)

Adaptation
(Address the Impacts)

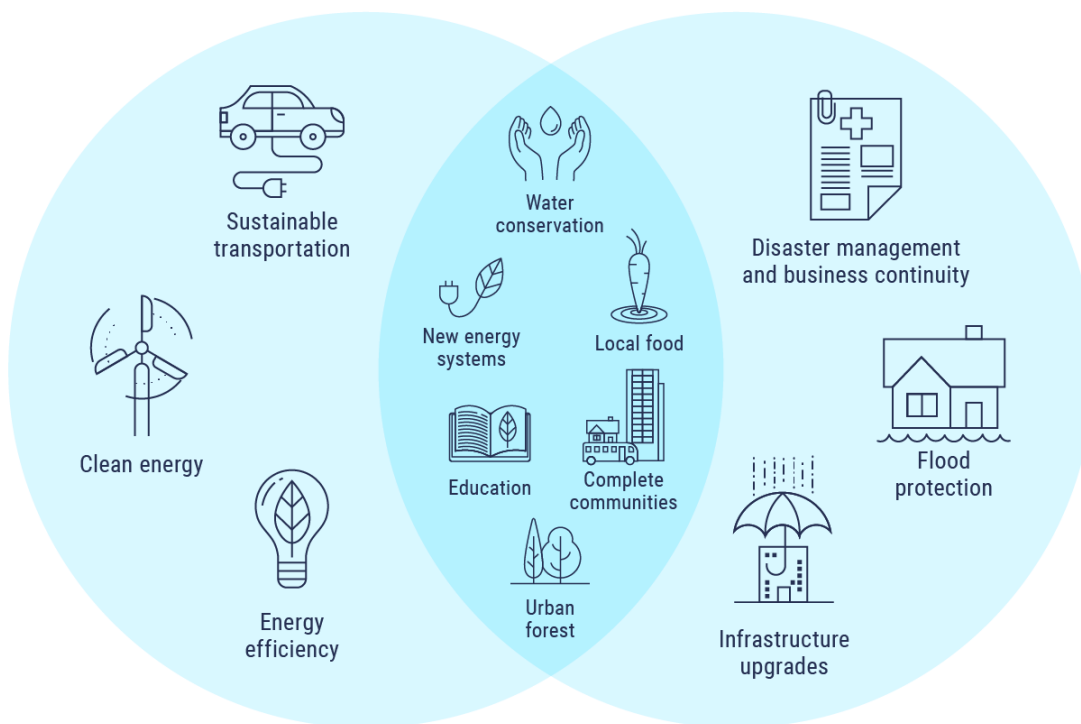


Figure 2 Considerations in building climate resilience in the City of Stratford (Source: City of Calgary)

We are already experiencing the effects of climate change in Stratford, such as a warmer winter leading to reduced snowpack season, severe storms, varying precipitation patterns, and increased frequency and intensity of heatwaves during summer. These

changes are having a profound impact on our population, especially those most vulnerable such as seniors, youth, children, and the unhoused. Recognizing these nuances in our approach toward building a community resilient to climate change, it is prudent that we focus on both aspects- lowering our emissions to limit future impacts of climate change (mitigation) and preparing for the changes to our climate that are already set in motion (adaptation).

Although this Plan has been designed to focus on mitigation elements, it is not intended to be a standalone document. Actions that enable and facilitate adaptation are being embedded into other municipal plans and policies. Coordination is needed amongst all long-term municipal plans so that the CCAP informs or influences numerous other City initiatives moving forward.

Municipal plans and policies are being updated with a **Climate Lens** that includes both mitigation and adaptation considerations. Some emission reduction measures also yield adaptation benefits thereby fostering community resilience. For instance, green infrastructure enhances stormwater management practices, which not only reduces emissions from stormwater handling but also promotes biodiversity and bolsters resilience against more intense rainfall occurrences.

Co-Benefits and Synergies

Synergies in mitigation and adaptation actions occur when efforts to reduce greenhouse gas emissions and efforts to cope with the impacts of climate change reinforce each other, leading to greater overall benefits. These co-benefits can enhance environmental, economic, and social well-being.

The Sankey diagram in Figure 3 illustrates examples of these synergies.

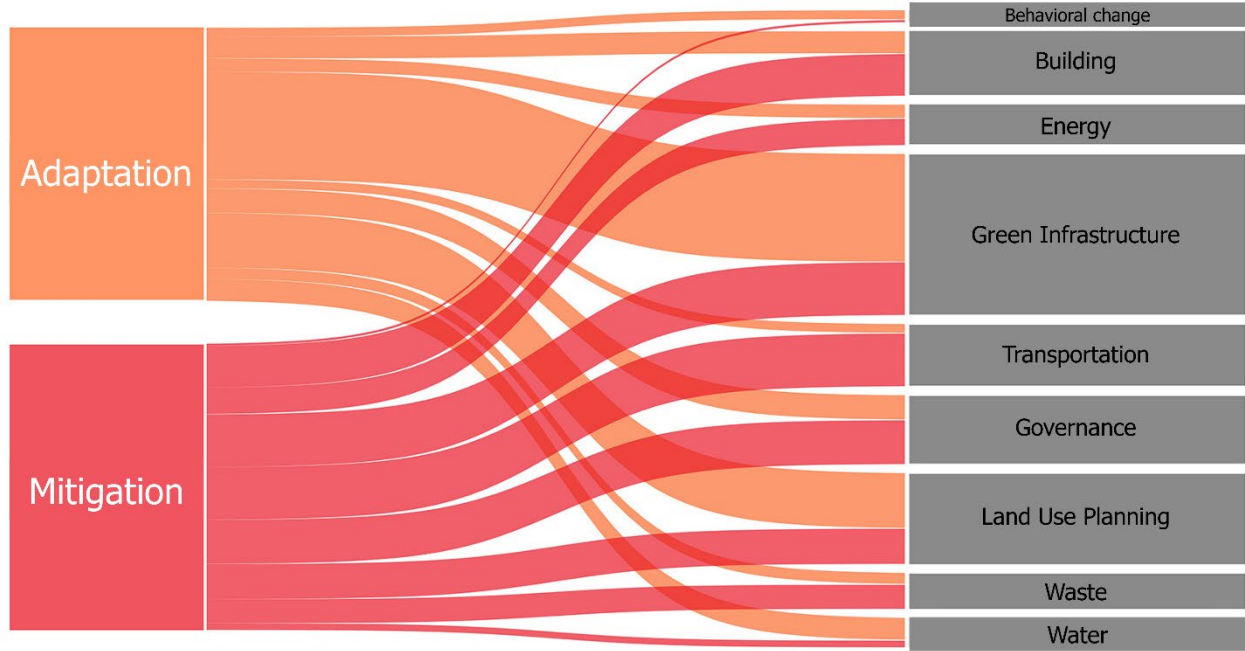


Figure 3 Examples of mitigation and adaptation that can help realize co-benefits

Section 2 Background and Policy Context

As a nation, the Canadian government introduced the ‘Pan-Canadian Framework on Clean Growth and Climate Change’ in 2016, followed by the ‘Federal Actions for a Clean Growth Economy’ in the same year, which implements the framework. The latter outlines measures to reduce carbon emissions across various sectors and includes a plan for adapting to the impacts of climate change.

On a provincial level, Ontario's climate action is guided by the ‘A Made-in-Ontario Environment Plan’ (2018). Relevant legislation includes the Electricity Act, which addresses energy consumption, greenhouse gas reporting, and conservation management planning, as well as the Strategy for a Waste-Free Ontario, which provides a roadmap towards a circular economy.

At the municipal level, local governments are leading climate action for their communities and play a significant role in developing infrastructure, shaping policies, implementing initiatives, and engaging residents to reduce GHG emissions, enhance sustainability, and build resilience.

Connection to Existing Municipal Plans

The City has a suite of overarching plans that are being updated to incorporate climate considerations. These plans help shape future growth, thereby supporting both emission reductions and managing the impacts of climate change.

The CCAP supports several key strategic plans and policies within the City, including:

- Strategic Priorities 2024-2027 – Council’s updated priorities emphasize on the importance of enhancing and investing in infrastructure to support the community’s overall well-being, and sustainability, while creating new neighbourhoods like the Grand Trunk development with an environmental lens.
- Official Plan 2024 (currently under review) – Stratford’s Official Plan (OP) was approved in 2016 and is the City’s overarching policy document that contains guiding principles, goals, objectives, and policies for land use. The OP acts as a roadmap for how our community will develop, where we should locate housing, build transportation networks, locate employment lands, and offer community facilities. The current review/update is an opportunity to embed intrinsic elements of climate change impacts including mitigation, adaptation, and resilience.
- Transportation Master Plan 2023 – The Transportation Master Plan (TMP) is a long-term planning document that identifies strategies and infrastructure solutions to guide planning, expansion, renewal, and management of the City’s multi-modal

transportation system. The TMP supports Stratford’s vision for the future and responds to projected needs with a focus on safety, complete streets, active transportation, and the environment.

- Urban Forestry Plan 2023 (updated) – The Urban Forestry Plan update focuses on environmental stewardship and outlines actions to protect the city’s urban forest and ecosystems by enhancing the tree canopy cover, improving tree management practices such as maintenance and removal, and facilitate the tree planting program.
- Corporate Energy and Emissions Plan 2023 – The Corporate Energy and Emissions Plan (CEEP) 2023 identifies priority areas and actions for the City of Stratford to accelerate decarbonization across key sectors including facilities, fleet, solid waste, and infrastructure (outdoor lighting, water, and wastewater) toward a carbon neutral corporation by 2050.

Perth County GHG Reduction Plan 2021 – Outlines high-level strategies that the region can take to address climate change mitigation.

Community Vision and Climate Action Plan Framework

The CCAP includes a framework (Figure 4) to guide programs and initiatives at the local level. At the highest level (goals), the community vision sets the direction for the ideal future for the City of Stratford regarding climate action. It is supported by a series of guiding principles that set direction for both the development of the CCAP and its implementation. The principles are supported by key program areas (Section 4) as shown below.

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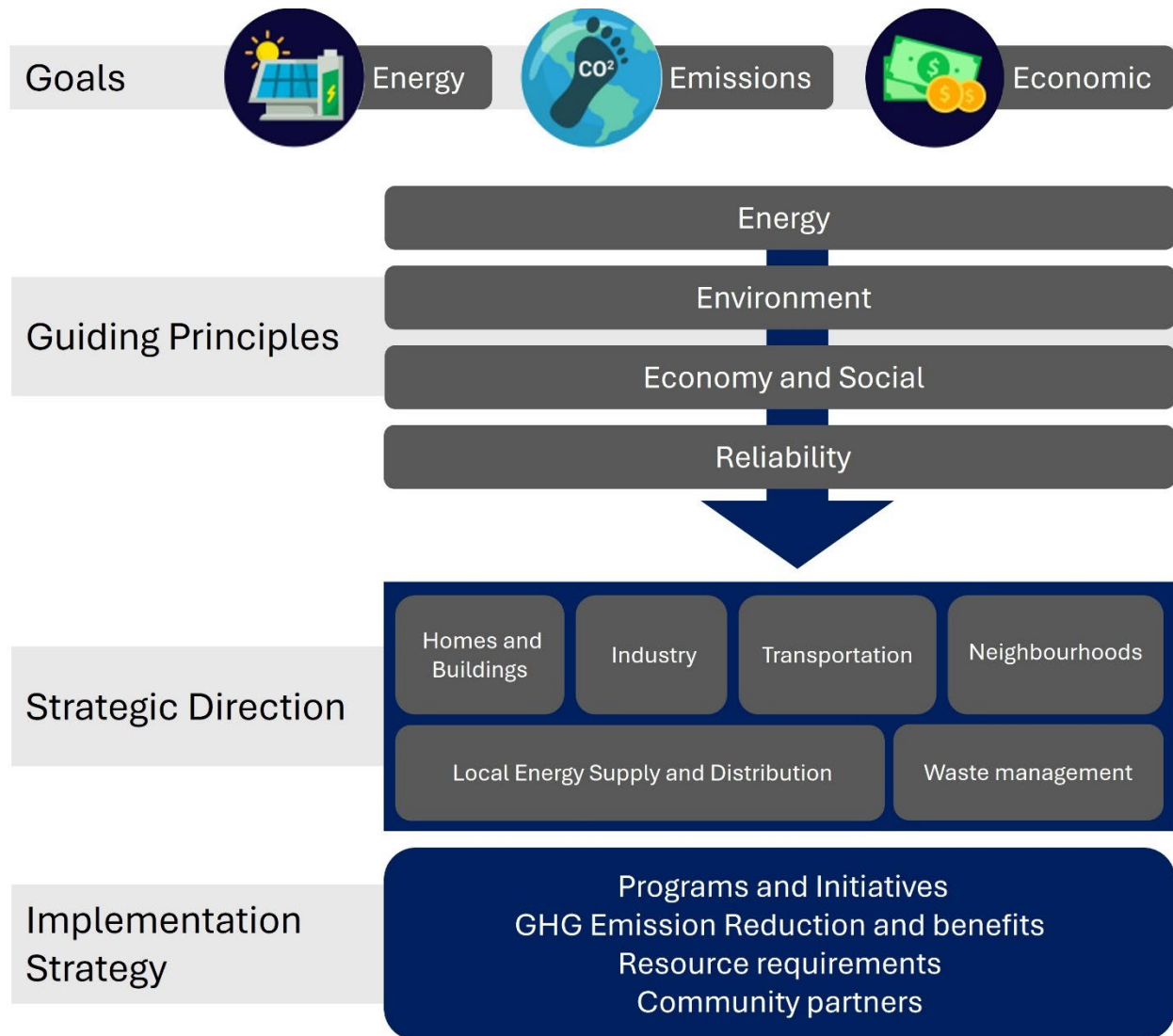


Figure 4 Community Climate Action Plan Framework

Community Vision

The Stratford community commits to reducing greenhouse gas emissions and building economic self-sufficiency and resiliency while enhancing the wellbeing of present and future generations.

Guiding Principles

A future-focused energy system looks to benefit the environment, economy, and society. Through stakeholder workshops, the following principles were identified to guide decision-making. They can be used by the City, community, and community partners to guide and inform actions on the ground that support the CCAP vision.

Environmental

- Develop a sustainable energy system that addresses present and future needs while considering environmental, economic, social, and cultural aspects.
- Steer efforts towards climate neutrality, or net-zero emissions.
- Design places and spaces that support human health.
- Evaluate program areas based on global energy efficiency and emission standards.
- Recognize the role natural assets play in carbon sequestration and storage.

Economic

- Ensure all energy investments offer acceptable risk-adjusted returns.
- Ensure consumers are not burdened by uncompetitive energy costs.
- Foster high-quality employment opportunities.
- Retain as much energy expenditures in the local economy as possible.
- Plan for reliable energy systems that are adaptable to user needs, climate variations, and technological advancements.
- Meet or surpass current system reliability.

Social

- Promote equitable energy solutions for all sectors and demographics.
- Advance climate mitigation solutions that have health and wellbeing benefits.
- Enable positive action amongst residents and local businesses.

What We Heard

This Plan has been developed through extensive research and consultation across City divisions and agencies, stakeholders, and the public. A range of community members including youth and industry representatives were engaged during the first round of public consultation (Figure 5) in Spring and Summer 2023 to provide input on climate action initiatives that would support the City's climate emergency targets.

Further consultation was facilitated in Spring 2024 in another round of engagement with key stakeholders and implementation partners to inform, solicit feedback on preliminary recommendations and discuss priorities, actions, and program areas for final plan development.

Engagement activities included:

- an online survey on Engage Stratford
- kitchen table kits
- in-person engagement
- online ideas board for youth

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- consultation with City Staff
- direct outreach with utility companies, Festival Hydro, and Enbridge Inc.
- key stakeholder workshops to inform, discuss and gather feedback on technical analysis, identify actions and establish a community vision for the plan. Stakeholders included members of Council, Energy and Environment Advisory Committee and Active Transportation Advisory Committee, industry representatives, Downtown BIA, Destination Stratford, Stratford Public Library, environmentalists, and other community members.



Figure 5 Public engagement for the Community Climate Action Plan, April 2023

During the various engagement activities, participants outlined their priorities for climate action and identified specific initiatives the community can take to address the climate emergency and support a low-carbon economy.

CCAP development involved gathering input from community members and industry representatives to inform the plan's **priorities and actions**, including discussions around which actions would be most likely to foster community uptake, which actions were most appropriate to Stratford context, and those that are likely to generate additional co-benefits like improved health and well-being. Further **collaboration and partnerships** will be critical for implementation.

Section 3 GHG Emissions and Climate Action Pathways

What GHG Emissions are Included?

The CCAP takes into account Scope 1 and Scope 2 greenhouse gas (GHG) emissions, along with some Scope 3 GHG emissions that are related to solid waste production and energy transmission (Figure 6).

Excluded are additional Scope 3 emissions, like transportation beyond operational boundaries, raw material sourcing, production of purchased inputs, product distribution, and other emissions that are not directly generated. The presumption is that most of these emissions are covered within the reported inventories of relevant jurisdictions or by reporting entities with the authority to regulate them.

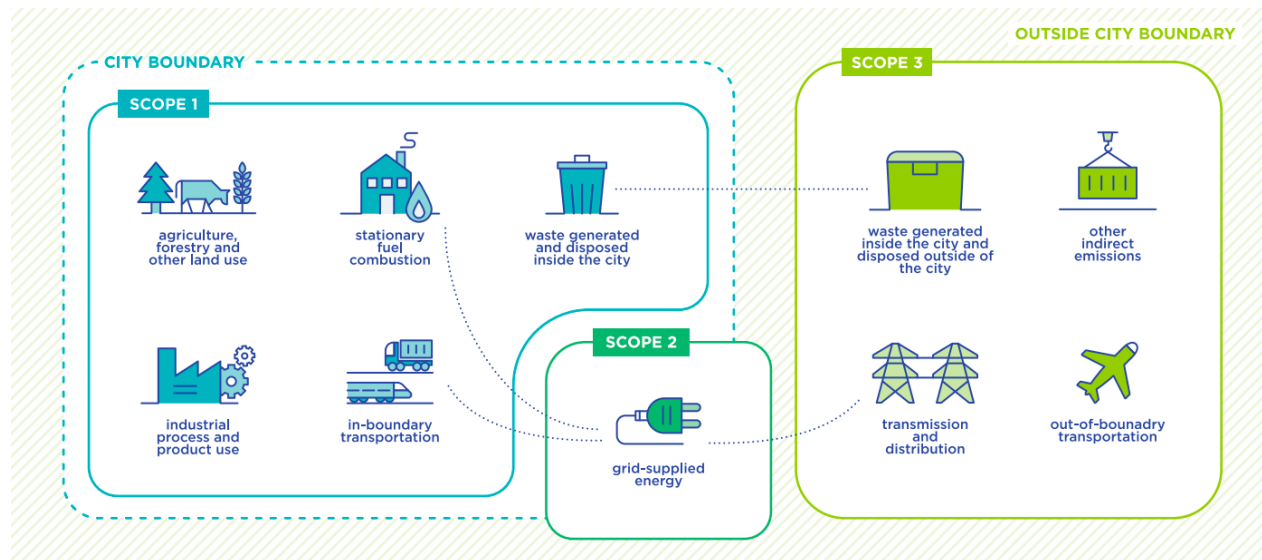


Figure 6 Emission scopes as they relate to geographic and inventory boundaries.

(Source: Consumption-Based Inventories of C40 Cities (<https://www.c40.org/researches/consumption-based-emissions>))

Emissions Trajectory

Stratford is a growing community, experiencing population increase in line with the provincial average. The most recent national census in 2021 recorded Stratford's population at approximately 33,232 residents. Projections suggest that by 2050, the population is estimated to grow to approximately 46,000 residents. This anticipated growth in population will translate to a continued increase in demand for infrastructure, housing, and economic development within the city, driving up corresponding energy consumption and GHG emissions.

Taking decisive steps to achieve net-zero emissions is critical. The timing and extent of our actions hold equal significance, the longer the delay, the higher the emissions and the more profound the consequences of climate change. Bold measures taken quickly are expected to translate to significant emission reductions and cost savings in the long term. Delay in our response will lead to greater cumulative emissions and significant energy cost burdens on the community.

Technical analysis of the CCAP comprised gathering baseline data on Stratford's energy consumption, utility costs and GHG emissions. Subsequently, assumptions about the city's future growth and mobility patterns were used to develop various future scenarios. Simulation was conducted for three analytical categories: GHG emissions (tCO₂e), energy use (GJ) and total energy costs to the community (\$), which helps to illustrate two comparable scenarios, Business-As-Usual and Low-Carbon Scenario (see Figure 7).

Greenhouse gases are measured in tonnes and converted into tonnes of carbon dioxide equivalent (tCO₂e) as a standard protocol for measurement and reporting. The conversion allows comparison of each gas' greenhouse gas effect—or **global warming potential (GWP)**—relative to one unit of carbon dioxide. For example, the global heating effect of one tonne of methane is 86 times that of one tonne of CO₂ over 20 years.

1. Business-As-Usual (BAU) trend line, depicted in red where minimal climate actions are implemented in the community. These will have negligible impact on our climate emergency targets and emissions trajectory.
2. Low-Carbon Scenario trend line, depicted in green demonstrating accelerated action through the implementation of recommended initiatives/programs in CCAP, in conjunction with other plans and policies through a Climate Lens. This line represents actions that would help steer the community toward the IPCC recommended 1.5° Celsius average global warming limit.

Note that some regulatory actions (depicted in yellow) that are currently underway may contribute toward 15-18% reduction in emissions, however, provide no discernable pathway to consistently impact the emissions trajectory.

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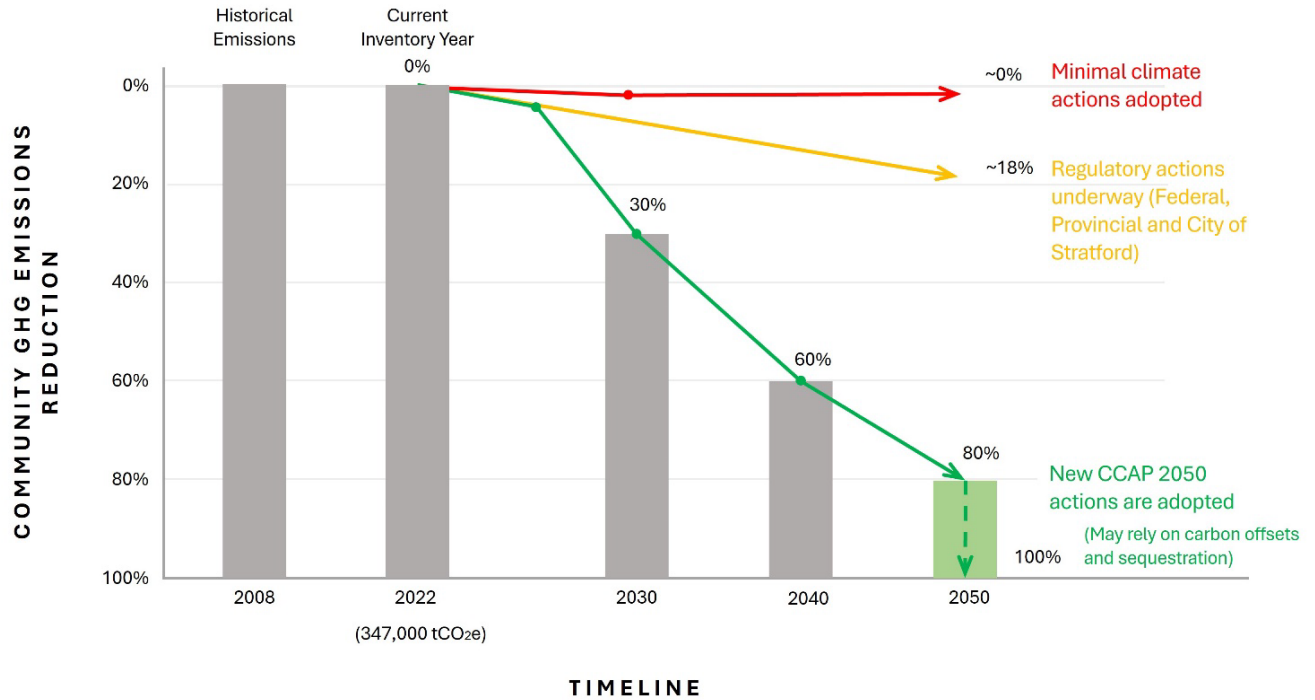


Figure 7 Community GHG Emission Reduction- BAU and Low-Carbon Scenario

Additional details pertaining to the City of Stratford’s corporate GHG reduction strategy and emissions profile are available in the [Corporate Energy and Emissions Plan \(2023\)](#) and supporting documents available on the City of Stratford’s Climate Change website.

2022 GHG Emissions Inventory

The emission inventory presents the most critical areas of action needed for significant impact over a short, medium, and long-term. Stratford's community GHG emissions in 2022 were measured at 347,000 tCO₂e for the entire community or 10 tCO₂e per capita. Transportation emissions were by far the biggest percentage of the total at approximately 43%, followed by the building sector including residential, commercial, and industrial, and waste. By utility, natural gas was the largest source of GHG emissions, followed by gasoline and diesel.

Figure 8 depicts a sectoral breakdown of Stratford's 2022 community GHG emissions.

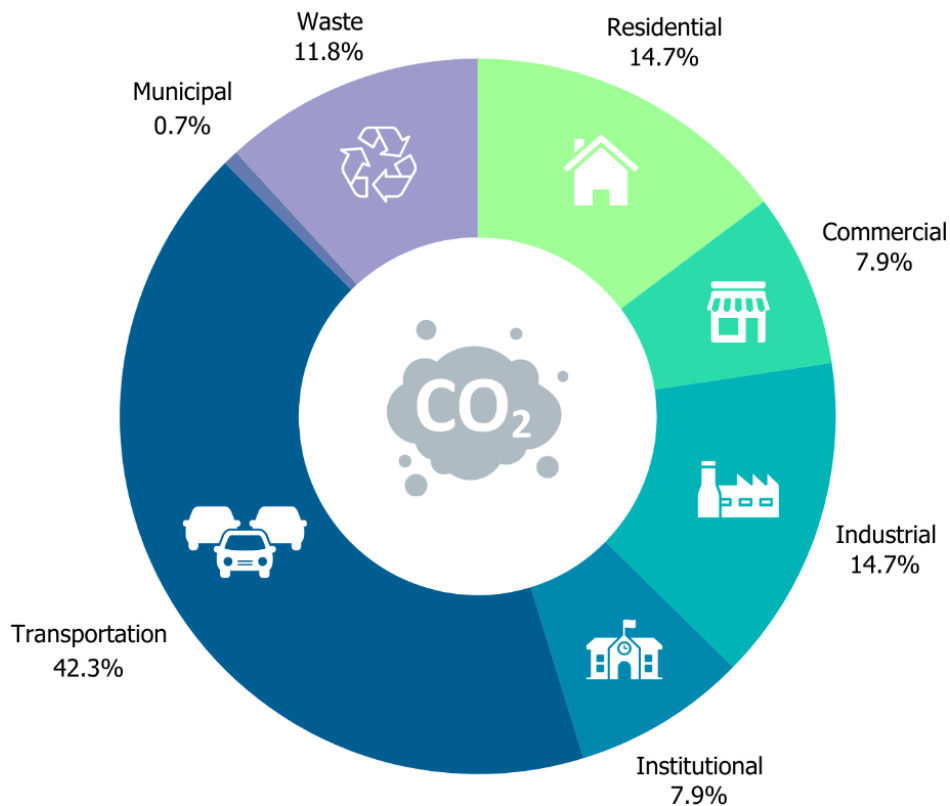


Figure 8 Community GHG Emissions by Sector

Figure 9 illustrates community-wide source energy use categorized by sector (L) and source energy use by utility (R). The total community-wide energy use is 9 terajoules or 257 gigajoules per capita, with electricity accounting for almost half, followed closely by natural gas, diesel, and gasoline.

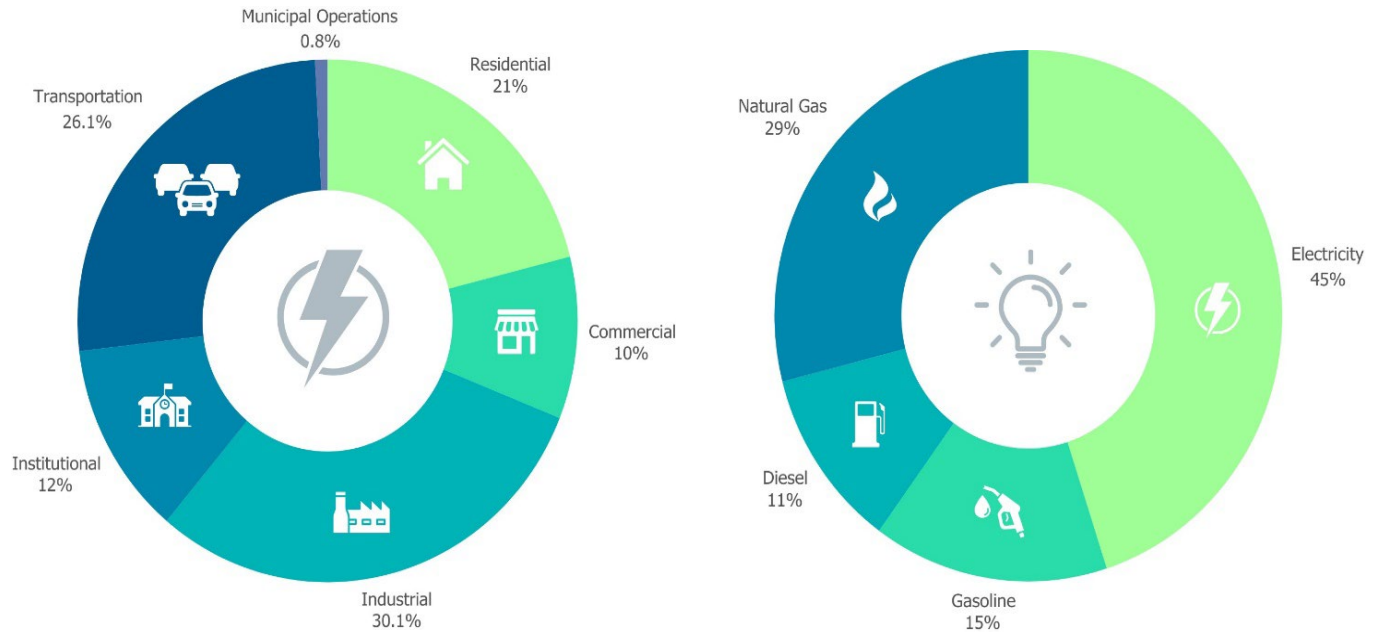


Figure 9 Source Energy Use by Sector (L) and by Utility (R), 2022

Business-as-Usual Scenario

The Business-as-Usual (BAU) Scenario forecasts energy consumption, energy costs and GHG emissions in the city if current practices continue unchanged. Figure 10 below illustrates the projected GHG emissions rise from 2022 to 2050, from 304,000 tCO₂e to 362,000 tCO₂e. Also indicated are the city’s climate action targets.

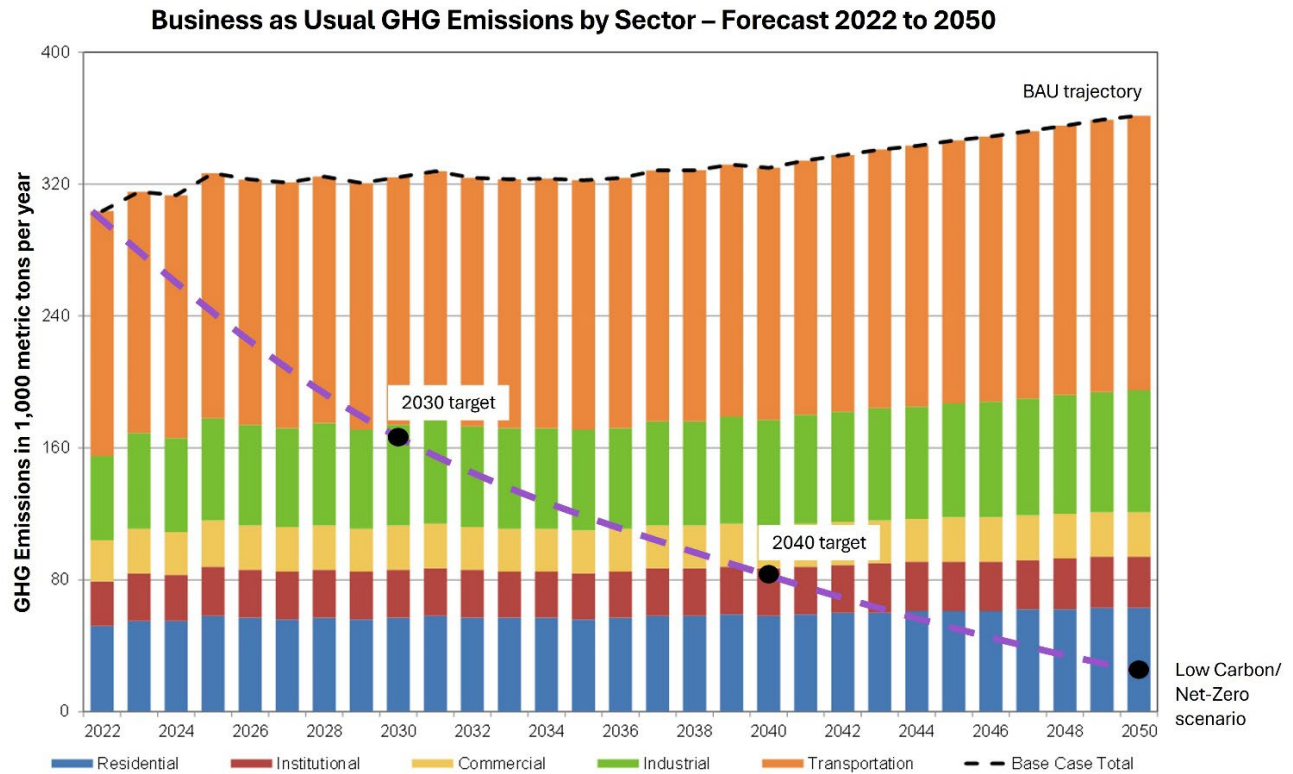


Figure 10 Business as Usual Forecast of GHG Emissions by Sector, 2022 to 2050

Under the BAU scenario, while energy consumption is projected to increase by 22%, GHG emissions are projected to rise by 20% by 2050.

The largest inflationary pressures are on energy expenditures for the entire community, including electricity, natural gas, transportation fuels. Total energy costs (2024-dollar value) are forecasted to increase from \$230M in 2022 (\$6,630 per capita, or \$26,520 for an average family of four) to more than \$700M in 2050 (\$15,218 per capita, or \$60,870 for an average family of four).

Consequently, under a BAU scenario, Stratford will be unable to meet any critical climate targets in the next 30 years.

Low-Carbon Scenario

The Low-Carbon Scenario forecasts energy consumption, energy costs and GHG emissions in the city if actions from the CCAP are implemented aggressively. Figure 11 below illustrates the projected GHG emissions decrease from 2022 to 2050, from 304,000 tCO₂e to 132,000 tCO₂e. Under this scenario, energy expenditures for the community, including electricity, natural gas, transportation fuels are projected to rise from \$230M to \$300M under a low energy price range, which translates to roughly \$6,520 per capita (\$26,080 for an average family of four). Under a high energy price range, energy expenditures will be around \$500M, which is \$10,870 per capita (\$43,478 for an average family of four). Cumulative savings for the community from the energy transition are estimated to be between \$5B to \$7.3B.

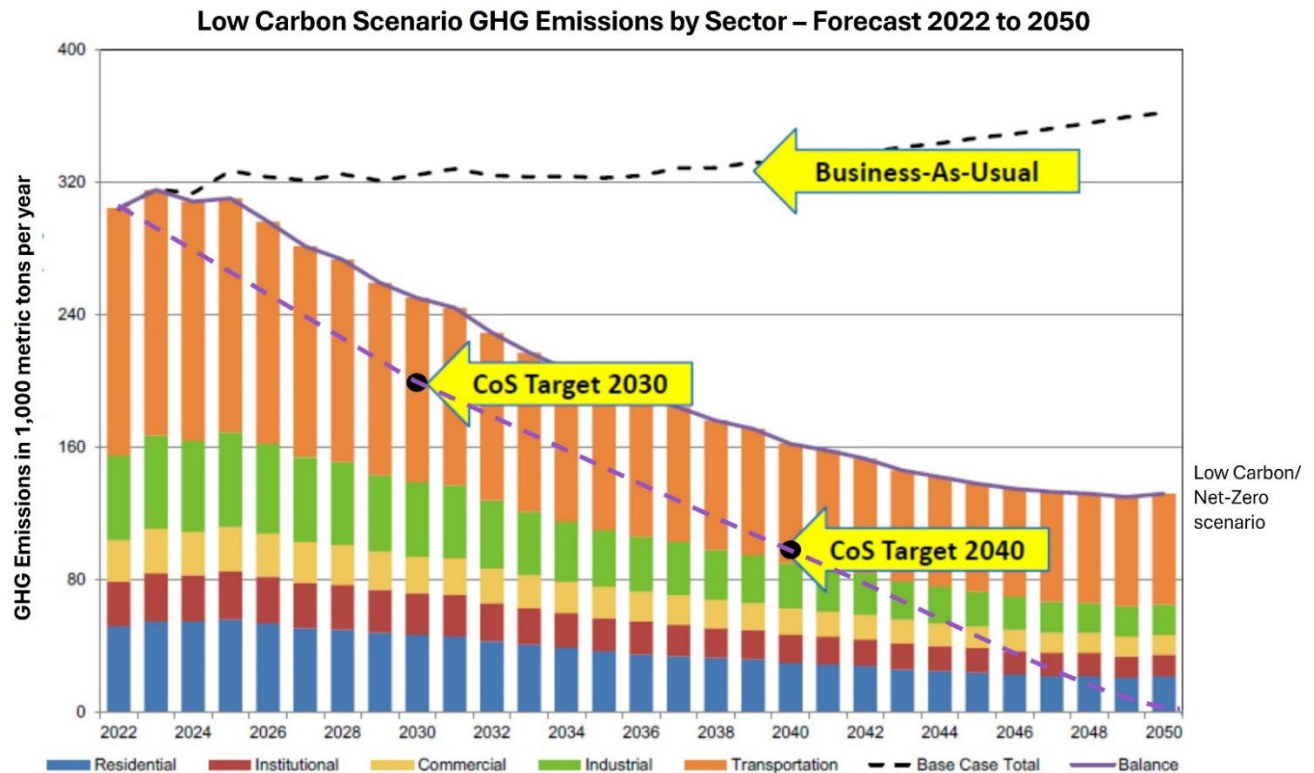


Figure 11 Low-Carbon or Net Zero Scenario of GHG Emissions by Sector, 2022 to 2050

The 2030 target for Stratford corresponds to an emissions cap of 242,900 tCO₂e. Even with the increased urgency to address climate change, we are not on track to achieve our existing climate targets which are set at achieving reductions of 30% by 2030. As we course correct in the near term, we will need to accelerate our efforts and create a pragmatic pathway to motivate action and increase accountability throughout the community.

Action at Municipal Level

Several municipalities in Ontario, including the City of Stratford, have enacted community climate action plans or community energy and emissions strategies, which outline tangible actions they can take, or are taking, to reduce carbon pollution. Local governments have varying degrees of influence over different sources of emissions within their boundaries, as shown below.

If local governments are to succeed, they will need leadership and/or support from senior levels of government, as well as commitments from residents and businesses.

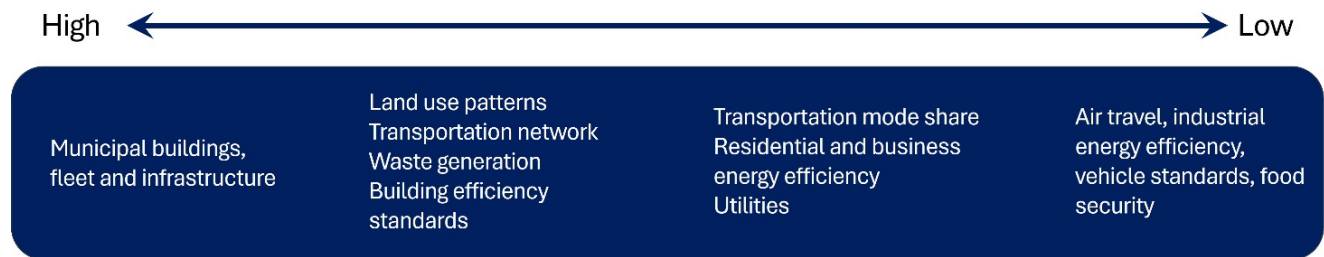


Figure 12 Local Government Relative Influence over GHG Emissions (derived from BC Municipal Climate Leadership Council)

Corporate-owned assets account for approximately 1% of total emissions generated in the community (Fig. 8). To demonstrate its leadership in climate action, the City of Stratford has developed its own net-zero strategy, the Corporate Energy and Emissions Plan (CEEP) 2023 as a roadmap to align operations with our collective goals. The CEEP describes priorities for the City to transform its own asset inventory, existing processes, and identifies projects and energy management measures to improve efficiency and reduce emissions for the next three decades. Aligning with the net-zero approach of CCAP, the City will strive to work toward transforming its asset inventory and processes well before 2050. Climate change and associated implications have been identified as a critical strategic priority and is embedded in corporate decision-making through the use of a stringent “Climate Lens”, one that is intended to be used to evaluate all City-led decisions on investments, replacement or upgrading assets, strategic growth, and policy development.

Plugging the Emissions Gap

The low-carbon scenario modelled for CCAP 2050 does depict a gap from achieving net-zero emissions. This is primarily due to the challenges associated with decarbonizing particular sectors due to lack of viable low-carbon alternatives and substantial upfront costs.

Remaining emissions come from:

- aviation sources and rail operations;
- some remaining natural gas use in homes and large industry; and
- gasoline and diesel in the few gas-powered cars and medium to heavy-duty fleet and equipment.

Currently many of these emissions are difficult to address and lack current policy and technological solutions and are anticipated to be addressed through federal and provincial policy tools, carbon sequestration and other emerging strategies such as carbon offsets, carbon capture, technology developments, among others.

Section 4 Program Areas

With the intent to guide the city in reducing energy and GHG emissions while retaining energy dollars in the local economy, this Plan includes the following key program areas for implementation. The program areas reflect community priorities and address the built environment, neighbourhoods, energy supply, transportation, and waste.

Each program area includes the following:

- The category for which the program area applies.
- The name of the program area.
- A brief overview of the program area and why it is an important part of the holistic approach to addressing climate mitigation in Stratford.
- A targeted participation rate indicates the scale of implementation needed. In all cases, program areas can be accelerated to deepen GHG emission reductions.
- The role of the municipality in implementing the program area.
- Enabling components.
- A relative scale cost for the municipal role in implementation.
- A list of available incentives or mechanisms to recover costs for the municipality.
- Benefits to the community from an environmental, social, and economic perspective.
- An indication of the potential GHG emission reductions identified per annum.

All program areas are underpinned by a foundational need for community engagement and an ongoing governance structure to support implementation, as defined in implementation strategy table in Appendix A.

Framing Goals and Targets

The CCAP provides a data-informed action plan to reduce emissions and accelerate economic growth in the city. The following goals and targets set the direction for programs and initiatives and mark the community's aspirations for emission reduction in the long term.

- Reduce absolute GHG emissions by 30% from 2017 level by 2030
- Reduce absolute GHG emissions by 60% from 2017 level by 2040
- Reduce absolute GHG emissions to net-zero by 2050
- Science-based to limit global temperature increase below 1.5°C
- Aligned with Canada's commitment to the Paris Climate Agreement

- The City of Stratford demonstrates leadership by adopting the community targets for corporate emissions

The following sections outline priority actions for each program area. The full list of programs and initiatives in each program area is provided in Appendix A.

Efficient Homes and Buildings

The operation of homes and buildings accounted for approximately 70% of total energy use and **52% of total GHG emissions** generation in Stratford in 2022. Emissions from natural gas heating and cooling account for nearly 95% of emissions from buildings. Transitioning to high performance standards in new and existing buildings is a critical part of our low-carbon pathway.

Stratford is a compact city, with a dense downtown core consisting of several heritage structures, public facilities, and a mix of building typologies. As such, working with existing buildings is a key strategy. Retrofitting existing buildings to reduce energy demand (e.g., adding insulation, draft sealing), improving efficiency (e.g., using efficient lighting and appliances), and switching fuel sources (e.g., from fossil fuel furnaces to efficient electric heat pumps), will result in more efficient use of energy and resources. Retrofits can also help improve the resilience and livability of homes, especially important in the context of increased frequency and severity of extreme weather events.

Achieving retrofit goals will require a solutions-based approach to retrofitting existing multi-unit residential buildings and homes, switching to low-carbon energy sources, and requiring fuel source switching where feasible. Seeking incentives from senior levels of government while inspiring residents and rental building owners to proactively invest to reduce emissions will be critical. Careful consideration to affordability impacts for owners and renters will be needed, as well as tenant protection.



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There is tremendous opportunity to construct high-performance buildings that incorporate eco-friendly practices in design, construction, and operation. With growth expected over the next 25 years, investing in resilient, energy-efficient buildings will be crucial for achieving significant emission reductions and unlocking considerable cost savings.

Table 1 Program Area 1: Efficient Homes and Buildings

Programs/ Initiatives	Recommended Approach	Estimated Cost to the Municipality	Potential GHG Reduction (tCO ₂ e)
Deep Retrofit Program for Existing Homes	A deep retrofit program aims to reduce energy consumption and GHG emissions in the residential sector. The program would standardize retrofits by property type and location, delivered via local partners.	\$80K to \$100K- Costs associated with detailed business plan development.	19,000 tCO ₂ e per annum
Deep Retrofit Program for Existing Non-Residential Buildings	A deep retrofit program aims to reduce energy consumption and GHG emissions in the commercial and institutional sectors. The program would standardize retrofits by property type and location, delivered via local partners.	Marginal additional costs to residential detailed business plan costs	25,000 tCO ₂ e per annum
Building Efficiency Program	The building efficiency program ensures all new construction fully meets or exceeds the anticipated Ontario Building Code (OBC). The program would aim to raise customer awareness and	Incremental	13,000 tCO ₂ e per annum

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	expectations through Energy Performance Labelling and Green Development Standards (GDS).		
Energy Performance Labelling (EPL) for Homes and Buildings	Energy Performance Labelling (EPL) programs such as EnerGuide for homes (or similar) create market transparency and increase end-use efficiency. The initiative encourages EPLs to be available on all properties when sold or rented.	Incremental	Supports all efficiency areas

Low-Carbon Neighbourhoods

Our built environment and public realm are a key part of how residents and visitors choose to get around the city. Research indicates that energy used for transportation increases as a community becomes more spread out and as housing, jobs, daily needs and recreation or community destinations become more dispersed. Complete communities and increased density allow new growth and development to enable low-carbon living.

As the city continues to grow, it is imperative that new neighbourhoods and sub-divisions are developed with a Climate Lens, and buildings constructed to the highest energy efficiency standards to enable adoption of new technologies as they develop, and regulated energy standards enhance. The City can explore opportunities to be bold and innovative in reducing emissions from the built environment in large scale developments within corporate-owned assets, such as the Grand Trunk Site, or its business parks.



Table 2 Program Area 2: Low-Carbon Neighbourhoods

Programs/ Initiatives	Recommended Approach	Estimated Cost to the Municipality	Potential GHG Reduction (tCO _{2e})
Net Zero Neighbourhoods	Low-Carbon, or Net Zero neighbourhoods provide an opportunity to show local application of energy best practices. This initiative aims to establish a net-zero neighbourhood as a model for sustainable urban living and transformative change.	May vary based on City allocated resources.	Low-carbon neighbourhoods have the potential to contribute to large-scale energy and emissions reductions, and achieve costs savings for residents
Green Development Guidelines (GDG) for new development	Recommend integration into the planning approvals process, where development applications are required to meet certain criteria in the GDG.	Resource may be needed to develop support guidelines (+/- \$50,000)	Supports efficient new property and low-carbon energy supply

Efficient Industry

Industry is responsible for roughly **one third of the energy** use in the city – roughly equal to the energy needs of the transportation sector. Proliferating energy efficiency in the industrial sector will involve a multi-faceted approach encompassing evolving policy incentives, technological advancements, and collaboration.

Stratford is home to a variety of local industries that are evolving operations with more cost-effective, efficient processes and constantly tap into transformative emerging technologies. There is immense potential to share best practices within the sector in order to advance steep emission reductions and steer the energy transformation industry-wide. Within the next decade, massive change is anticipated through large-scale investments, operational advances, developing recyclable components, and shifting to renewable or low-carbon power sources.



Table 3 Program Area 3: Efficient Industry

Program/ Initiative	Recommended Approach	Estimated Cost to the Municipality	Potential GHG Reduction (tCO ₂ e)
Industrial Energy and Climate Best Practice Network	An industry-focused best practice network ensures world-class continuous improvement in industrial energy efficiency. This initiative aims to encourage Perth County Industrial Best Practice Networks, host Global Best Practice events, and share industrial management expertise throughout the County.	Minimal	13,000 tCO ₂ e per annum

Efficient Transportation

Transportation accounted for nearly **26%** of the community's energy use in 2022 and was responsible for approximately **43% of the city's GHG emissions**. Gasoline-powered and diesel-powered vehicles and light duty trucks generated a majority of all transportation emissions. Many Stratford residents use personal vehicles to get around.

Being a compact city, Stratford is well-positioned to significantly reduce emissions from transportation. This objective is further reinforced by our focus to invest in a robust public transit system and create complete communities.

As outlined in the Transportation Master Plan (2023), the City's priority is to support more active modes of transportation such as walking, biking, transit use, and multi-occupant use of vehicles. These sustainable modes of transportation are low-carbon, equitable, affordable, and widely accessible – and support a broad range of community members, including those not using private vehicles. They also better support local businesses and can build a low-carbon core area.

Active transportation promotes health, reduces congestion, and makes efficient use of energy and resources. To facilitate this shift, walking and biking must be safe and comfortable for more users, transit must be reliable and convenient, and “last mile” challenges related to the last leg of journeys must be solved. eMicromobility options such as e-bikes and e-scooters can help with the last mile, and further the distance that can be comfortably travelled without a car.



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Electrification of vehicles—including transit, commercial and personal vehicles— will also reduce emissions and improve air quality. Adoption of electric vehicles (EVs) for trips that cannot be done by active transportation will provide significant gains. Vehicle electrification goals can be supported by providing charging options at home, work, and key destinations.

Table 4 Program Area 4: Efficient Transportation

Programs/ Initiatives	Recommended Approach	Estimated Cost to the Municipality	Potential GHG Reduction (tCO₂e)
Alignment with Transportation Master Plan initiatives to reduce average trip lengths	This program aims to reduce the time spent in Light-Duty Vehicles (LDV), such as cars, SUVs, and pick-ups. The recommended aligning the CCAP strategies with existing transportation plans	Marginal increase to existing internal costs	15,000 tCO ₂ e per annum
Alignment with Transportation Master Plan initiatives to increase trips by train, bus, bike and walking	This initiative aims to reduce the need for LDVs and promotes more low-carbon shares of passenger kilometres travelled (PKT). This initiative relies on aligning the CCAP targets with existing active transportation plans.	Marginal increase to existing internal costs.	17,000 tCO ₂ e per annum
Electric and Low- Emission Vehicle Support Program	Using vehicles with lower emissions will reduce the impact of the transportation sector's GHG emissions. This program aims to drive uptake through municipal actions and outreach. It includes a need for investment in electric	Costs for charging stations will vary based on selected unit, plus installation costs. Level 2 charging stations are approximately \$12,000 to \$15,000 per unit,	68,000 tCO ₂ e per annum

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	vehicle infrastructure, charging stations.	Level 3 charging stations may cost upward of \$50,000	
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Energy Supply and Distribution

Energy sources have substantial implications on GHG emissions and can drive our emissions trajectory well toward our targets. **Decarbonization** through expansive electrification presents a major opportunity to reduce emissions on a community scale.

CCAP prioritizes energy efficiency and further relies on fuel switching from gasoline, diesel, and other carbon intensive sources to low-carbon alternatives including electricity, thermal energy, and solar power to achieve carbon neutrality.

Continued growth and electrification can challenge current grid capacity and lead to supply constraints. Energy conservation and demand management are crucial strategies to avoid exhausting the grid electricity supply. These initiatives rely on minimizing energy use as well as managing energy usage through smart technologies, which can result in energy cost savings and reduced need for new electricity infrastructure. Stratford can also address increased grid demand through local renewable energy generation. As solar photovoltaics, solar thermal, renewable energy, battery storage, and other technologies evolve, there will be opportunities to create on-site and community-scale gardens to foster grid resilience.



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The actions in this section help to implement energy conservation and demand management initiatives, encourage local renewable energy systems, embrace emerging smart grid technologies, and expand connections to district energy systems. As a city with close partnership with Festival Hydro Inc., Stratford is ideally positioned to take bold action on energy.

Table 5 Program Area 5 Energy Supply and Distribution

Programs/ Initiatives	Recommended Approach	Estimated Cost to the Municipality	Potential GHG Reduction (tCO ₂ e)
District Energy Program	This initiative targets densification and new growth areas to provide efficient heating and cooling using high-quality, low-carbon thermal services. The program would create a District Energy entity to supply services and ensure future area-specific plans, including District Energy guidelines.	Development of a business case (+/1 \$100,000)	37,000 tCO ₂ e per annum
Heat Pump Program	Heat pumps provide high-quality, low-carbon heating and cooling options to areas not served by District Energy. This program aims to promote the use of heat pumps in low-density areas.	Some costs may be absorbed by existing City resources if being led by the municipality	Included in efficient new construction
Solar Hot Water Program	Solar hot water provides supplemental hot water and heating in homes not served by District Energy as a cost-effective zero-carbon hot water	Incremental	1,000 tCO ₂ e per annum

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	alternative. This program aims to raise customer awareness through comprehensive outreach and engage Enbridge, key builders, and realtors as champions.		
Solar Photovoltaic Program	Solar photovoltaics reduce the dependence on fossil fuels and uses solar power as a cost-effective zero-carbon electricity alternative. This program aims to raise customer awareness through comprehensive outreach and engage utilities, key builders, and realtors as champions.	Incremental	22,000 tCO ₂ e per annum

Towards Zero Waste

The waste sector relates to several environmental concerns, including emissions from the extraction of materials, manufacturing and production, and environmental degradation. Emissions from waste represented **12%** of total emissions generated in Stratford. Although this makes up a minor portion of the emissions profile, population growth is expected to increase the waste generated within the community, along with resultant emissions.

At a city-scale it is prudent to enhance waste management practices and awareness programs. The most effective way to reduce GHGs from waste is to reduce the waste generated in the first place, which also avoids the costs of landfilling and composting. Opportunities to reduce organic waste and resultant GHGs will mean scaling up current efforts. Strategies that maximize the diversion of waste from the landfill are critical, along with reusing resources, which not only reduces the raw materials used in their production, but also reduces emissions from the transportation of new and waste products.

Significant waste-related emission reductions can also be achieved through embracing a circular economy model, wherein, waste is “designed out”, as outputs from one process become inputs for another; instead of being extracted, used, and discarded, resources are potentially used indefinitely. Achieving this shift would require significant societal change, but the City can use regulations, policy, and advocacy to help build momentum within our local business and resident community.



Table 6 Program Area 6: Towards Zero Waste

Programs/ Initiatives	Recommended Approach	Estimated Cost to the Municipality	Potential GHG Reduction (tCO ₂ e)
Alignment with Existing Waste Management Activities to reduce compostable waste to landfill	Anaerobic methane from landfill contributes significantly to the community emissions profile. Methane is approximately 25 times more powerful than equivalent CO ₂ . This initiative aims to continue to scale up the existing green bin program.	Incremental	4,500 tCO ₂ e for every 1% increase in organic waste separation
Waste Reduction and Recycling	<ul style="list-style-type: none"> ▪ Support senior government action on reducing use of single time use plastics and packaging, and explore implementing changes locally ▪ Support and amplify waste reduction, recycling and diversion programs delivered by the City and other partners 	To be determined	Supports Ontario’s shift from linear to circular economy. GHG emissions and energy usage will vary per material, recycled input among other factors.

Governance

The City has demonstrated leadership in climate action through transformation of its own operational processes, and the application of a **Climate Lens** in municipal decision-making. There is potential to unlock impactful opportunities through collaborative efforts and partnerships between the City, local businesses, industries, institutions, and residents.

Municipal Leadership

The City has already taken on GHG reduction and energy savings measures for municipal operations through implementation of the CEEP which provides a roadmap for corporate-wide assets to decarbonize; tackling energy, costs and emission reductions strategically. This roadmap will drive the shift from the current corporate energy use and emissions trajectory to near-zero emissions by 2050. Under the CEEP, the City's capital inventory and investments will be transformed to a low-carbon emissions fleet and efficient municipal buildings, among other asset classes.

Climate considerations also shape municipal processes through the application of a "Climate Lens" which is embedded in the decision-making processes including budgets, infrastructure upgrades and replacements, growth and planning in alignment with GHG targets.



The City can take further its commitment toward equitable climate action in the community by adopting new technologies, making strategic investments, creating pilot programs for community uptake, supporting education and awareness programs and facilitating a 'Task Force', as detailed below.

Communication and Engagement

Convene and Support a Community Implementation Task Force

The implementation of this CCAP is a community-wide effort. Implementation will require ongoing oversight to ensure that planned objectives and program areas are advancing.

To support and guide the implementation of the CCAP, it is recommended that the City of Stratford facilitate a Community Implementation Task Force (CITF). This Task Force will directly facilitate the development of implementation partnerships, advance educational initiatives and report on overall progress to the community. Internal and external partners will be brought into the process. The CITF will act as champions for the CCAP implementation, promote and facilitate community actions to accelerate participation and collaborate with all community partners, including businesses, developers, utilities, governments, institutions, non-profits, investors, and homeowners. The initial step will be to create the implementation entity and establish implementation partnerships.

Community-led Action

As a community-wide plan, the CCAP will require the support of many community members. There is a role for anyone interested in advancing climate action in the community. Community members, in addition to the CITF, can help support plan implementation through:

- Sharing best practices, resources, and expertise.
- Building support for implementation within their sectors and amongst the public.
- Providing funding support for the implementation of program areas.
- Aligning the program areas identified with their organization's mandates, priorities, and targets.
- Assisting with the implementation, monitoring, and reporting of program areas.
- Participating in community engagement activities.

Several organizations with similar mandates can support implementation, as noted in the Implementation Strategy (Appendix A). The following are some stakeholders to kick-start the process. Each would need to confirm their participation:

- City of Stratford: To implement policies and programs that support CCAP framing goals.
- Community organizations: To advance and promote programs, inform the public about climate change impacts and opportunities to participate, advocate for change, and collaborate on program delivery and monitoring as appropriate.
- Local energy utilities: To provide expertise, support and funding opportunities for new and existing buildings, renewable energy solutions and ensure alignment with broader energy system planning.
- Business and industry organizations: To educate their customers and employees on the benefits of energy conservation and participate in relevant programs.
- Developers and builders: To provide the expertise and capacity to build and retrofit energy-efficient buildings.
- Schools and institutions: To inform members of the public on the benefits of energy conservation, leading by example.
- Members of the public: To participate in programs, activities, share climate knowledge and participate in engagement events.

Community Outreach

Education, communication, and outreach were identified as critical needs by participants in community workshops. Many, if not all, program areas require some aspect of public communication, outreach, engagement, or collaboration. Workshop participants further identified that most residents will be interested to learn about the need for climate action, see opportunities for action at the individual level, and understand how the CCAP informs decision-making. The City will continue its outreach and educational activities that support climate action efforts and seek opportunities to expand them where possible.

Section 5 Nature-based Solutions for Adaptation and Resilience

Stratford's natural heritage and greenspace are community assets that **improve livability**. Apart from benefits such as improved air quality and shading, it is a lifeline for local wildlife, water quality, and bolsters resident wellbeing and health. Continuing to protect and expand these natural areas is an important part of our net-zero pathway, as trees and healthy soil are an important source of **carbon sequestration**.

While the CCAP strongly focuses on mitigation strategies, it does recognize the importance of embedding a lens of adaptation and resilience that reduce the risks of climate change on Stratford's physical, economic, social and ecological systems.

Nature-based solutions such as those directly related to adaptation and resilience focus on preserving and expanding the city's tree canopy cover, which helps sequester carbon, while providing significant co-benefits such as providing shade, moderating microclimates, providing stormwater storage, improving air quality, and enhancing energy efficiency of buildings. The City has considerable influence over land use planning matters to help preserve the existing tree canopy cover and aim to enhance it through effective partnerships with the community, local Conservation Authorities, the private and not-for-profit sectors.



Table 7 Actions to Support Adaptation and Resilience

Priority Actions	Strategies	Co-Benefits
Urban Tree Canopy Cover	<ul style="list-style-type: none"> ▪ Monitor urban tree canopy cover and strive to maintain and enhance current canopy cover (30%) with an aim to attain best practice (40%) ▪ Routinely monitor health of existing trees and shrubs, and develop a resilience and maintenance plan to influence health longevity of new trees planted 	<ul style="list-style-type: none"> ▪ Adaptation ▪ Resilience ▪ Equity ▪ Biodiversity ▪ Carbon Sequestration potential
Naturalization and Native Plants	<ul style="list-style-type: none"> ▪ Encourage naturalized vegetation in public green areas and private lawns through planting of native trees and shrubs ▪ Bolster community efforts toward invasive species management 	<ul style="list-style-type: none"> ▪ Healthy ecosystems ▪ Biodiversity
Outreach	<ul style="list-style-type: none"> ▪ Explore opportunities and continue partnerships with community-led organizations to enhance naturalization and native and adaptive tree planting efforts city-wide 	<ul style="list-style-type: none"> ▪ Adaptation ▪ Equity ▪ Community Awareness
Bolster Local Economy	<ul style="list-style-type: none"> ▪ Explore opportunities to support sustainable local food systems, such as by encouraging communal gardens or roof gardens in homes and buildings ▪ Review regulations to remove barriers to urban farming ▪ Support local food procurement and farmers markets 	<ul style="list-style-type: none"> ▪ Resilience ▪ Food security ▪ Cost savings

Section 6 Implementation Strategy

The community will adopt several additional strategies to significantly reduce energy consumption and phase out fossil fuels. This section outlines these supporting strategies and emphasizes the importance of regular review and updates. The strategies are specifically designed for Stratford's building stock, transportation network, energy infrastructure, industry, and waste system. While the City is uniquely positioned to lead many of these initiatives, their implementation will require resources and partnerships with various stakeholders, including Enbridge Inc., Festival Hydro Inc., the provincial government, and the federal government.

Detailed Implementation Strategy for Program Areas is available in Appendix A.

Monitoring and Evaluation

Monitoring and evaluating progress toward the Vision to Action goals is crucial during the implementation phase to guide decision-making, facilitate continuous improvement, and ensure transparency. Consistent and reliable ongoing monitoring offers the community several key functions and benefits, including:

- Guiding decision-making across the community.
- Supporting annual planning and budgeting processes.
- Ensuring transparency and accountability to community stakeholders.
- Engaging businesses, residents, and visitors in the journey toward the vision by providing meaningful and timely information in an interactive manner.

It is recommended that monitoring progress, evaluating programs, and reporting should be performed on an annual basis, to enable course correction as necessary. The initial set of sustainability metrics (Table 8) provided is based on the type of data identified under each program area.

Some data can be obtained from Statistics Canada, Hydro One, Festival Hydro Inc., Enbridge Inc., Destination Stratford, the Community Energy and Emissions Inventory, and community surveys, which are a great way of collecting unique community-specific information. New data collection tools and sources may be utilized in the future and should be included in the monitoring system to make indicator results more robust and reliable.

Charting our Progress

Success can be measured in a variety of ways; the most relevant for the purposes of this Plan are the consistent reduction of overall annual GHG emissions, and the economic impact of clean energy in the community.

Periodic reporting such as annual/bi-annual reporting will focus on efforts and achievements towards the implementation of the program areas. In addition, the City can monitor the impacts of overall implementation by tracking specific metrics (or key performance indicators, KPIs), on an annual or bi-annual basis.

The following sustainability metrics have been identified for each program area to measure the progress of the CCAP toward our GHG reduction targets, energy use, waste diversion, and energy cost impacts on the community. These can be compared against the baseline and BAU to measure progress.

Table 8 Sustainability Metrics (KPIs) for CCAP Program Areas

GHG Emissions:

Sustainability Metrics (Key Performance Indicators)	Measure/Unit	Proposed tracking timeline
Total GHG emissions	tCO ₂ e	Annual
GHG emissions by sector	tCO ₂ e	Annual
GHG emissions by sector as percentage of total	%	Annual
GHG emissions by source	tCO ₂ e	Annual
GHG emissions by source as percentage of total	%	Annual
GHG emissions per capita	tCO ₂ e /capita	Annual
Percentage change in GHG emission per capita from baseline (2022)	%	Bi-annual

Energy:

Sustainability Metrics (Key Performance Indicators)	Measure/Unit	Tracking timeline
Total energy use	GJ	Annual
Total energy use per capita	GJ/capita	Annual
Percentage change in total energy use per capita from baseline	%	Annual
Total energy use by sector	GJ	Annual
Energy use by sector as percentage of total	%	Annual

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Total energy use by source	GJ	Annual
Energy use by source as percentage of total	%	Annual
Residential energy intensity	GJ/m ²	Annual
Non-residential energy intensity	GJ/m ²	Annual
Percentage change in energy use per capita from baseline (2022)	%	Bi-annual

Waste:

Sustainability Metrics (Key Performance Indicators)	Measure/Unit	Tracking timeline
Percentage compostable waste diverted from landfill	%	Annual

Economic:

Sustainability Metrics (Key Performance Indicators)	Measure/Unit	Tracking timeline
Total community energy costs	\$\$	Bi-Annual
Total energy costs per capita	\$\$/capita	Bi-Annual
Energy cost by sector	\$\$	Bi-Annual
Energy cost by source	\$\$	Bi-Annual

Community-Wide:

Sustainability Metrics (Key Performance Indicators)	Measure/Unit	Tracking timeline
Percentage change in energy cost per capita from baseline (2022)	%	5-year

Sustainability metrics outlined in this section will serve as essential tools to benchmark performance, track progress against our targets and monitor the effectiveness of initiatives underway. Timelines may be updated based on resource allocation and the availability of data.

Appendix A - Detailed Implementation Strategy for Program Areas

Program Area 1: Efficient Homes and Buildings

Program /Initiative	Recommended Approach	Participation Rate	Municipal Role	Enabling Components	Estimated Municipal Cost	Incentives, Municipal Cost Recovery	Potential Partners	Benefits	Potential GHG Reduction
Deep Retrofit Program for Existing Homes	A deep retrofit program aims to reduce energy consumption and GHG emissions in the residential sector. The program would standardize retrofits by property type and location, delivered via local partners.	80% of existing residential buildings (at 35% - 40% increased efficiency)	Initiate the development of a business case for a Deep Retrofit Program for Existing Homes	Develop Local Improvement Charge (LIC) policies and by-laws	\$80K to \$100K- Detailed business plan development costs	<ul style="list-style-type: none"> ▪ Potential Federation of Canadian Municipalities (FCM) funding for planning, feasibility assessment ▪ Potentially recoverable as administrative overhead in the functioning retrofit program 	<ul style="list-style-type: none"> ▪ Contractors ▪ Realtors ▪ Retrofit component suppliers ▪ Utilities 	<ul style="list-style-type: none"> ▪ Increased property value ▪ Reduced energy costs ▪ Higher contractor margins ▪ Local employment ~ 120 jobs total ▪ Efficient channel for adaptation measures and other program delivery 	<ul style="list-style-type: none"> ▪ 19,000 tCO₂e per annum ▪ Contribution to total: 8%
Deep Retrofit Program for Existing Non-Residential Buildings	A deep retrofit program aims to reduce energy consumption and GHG emissions in the commercial and institutional sectors. The program would standardize retrofits by property type and location, delivered via local partners.	60% of existing non-residential buildings (at 35% - 40% increased efficiency)	Initiate the development of a business case for Create a Deep Retrofit Program for Existing Non-Residential Buildings	Develop Local Improvement charge (LIC) policies and by-laws	Marginal additional costs to residential detailed business plan costs	<ul style="list-style-type: none"> ▪ Potential FCM funding for planning ▪ Recoverable as admin overhead in functioning retrofit program 	<ul style="list-style-type: none"> ▪ Contractors ▪ Realtors ▪ Retrofit component suppliers ▪ Utilities 	<ul style="list-style-type: none"> ▪ Increased property value ▪ Reduced energy costs ▪ Higher contractor margins ▪ Local employment ~ 60 jobs total ▪ Efficient channel for adaptation measures and other program delivery 	<ul style="list-style-type: none"> ▪ 25,000 tCO₂e per annum ▪ Contribution to total: 11%

Building Efficiency Program	<p>The building efficiency program ensures all new construction fully meets or exceeds the anticipated Ontario Building Code (OBC). The program would aim to raise customer awareness and expectations through Energy Performance Labelling and Green Development Standards (GDS).</p>	<p>30% above code for new residential and non-residential buildings</p>	<ul style="list-style-type: none"> ▪ Ensure compliance with the OBC for New Residential Development ▪ Encourage above-code design and construction via GDS (see Low Carbon Neighbourhoods below) 	<p>Maximizes energy performance of the community's new building stock</p>	<p>Incremental</p>	<p>N/A</p>	<ul style="list-style-type: none"> ▪ Developers/builders ▪ Contractors ▪ Efficient homes products and services supply chain ▪ Utilities 	<ul style="list-style-type: none"> ▪ Confirmed value for buyers ▪ Competitive edge for quality builders 	<ul style="list-style-type: none"> ▪ 13,000 tCO₂e per annum ▪ Contribution to total: 6%
Energy Performance Labelling (EPL) for Homes and Buildings	<p>Energy Performance Labelling (EPL) programs such as EnerGuide for homes (or similar) create market transparency and increase end-use efficiency. The initiative encourages EPLs to be available on all properties when sold or rented.</p>	<p>N/A. Designed to motivate increased energy efficiency in the residential and non-residential sector</p>	<p>Minimal costs associated with designing and rolling out the EPL plan</p>	<p>An EPL program drives market activity by adding value to homes through their energy efficiency rating</p>	<p>Incremental</p>	<p>N/A</p>	<ul style="list-style-type: none"> ▪ Developers ▪ Builders ▪ Realtors 	<ul style="list-style-type: none"> ▪ Confirmed value for buyers ▪ Competitive edge for quality builders and contractors 	<ul style="list-style-type: none"> ▪ Supports all efficiency areas

Program Area 2: Low-Carbon Neighbourhoods

Program /Initiative	Recommended Approach	Participation Rate	Municipal Role	Enabling Components	Estimated Municipal Cost	Incentives, Municipal Cost Recovery	Potential Partners	Benefits	Potential GHG Reduction
Net-Zero Neighbourhoods	Low-Carbon, or Net Zero neighbourhoods provide an opportunity to show local application of energy best practices. This initiative aims to establish a net-zero neighbourhood as a model for sustainable urban living and transformative change.	Inclusive of all participation rates indicated in other programs and initiatives	City staff to develop the general policy and planning guidelines for a "net-zero" neighbourhood	Enables integration of overall CCAP objectives into neighbourhood development and/or renewal	May vary based on City resources.	FCM Grants for urban renewal projects, brownfield development (e.g. for Grand Trunk development)	<ul style="list-style-type: none"> ▪ Developers ▪ Builders ▪ Festival Hydro ▪ Investors ▪ Other stakeholders 	<ul style="list-style-type: none"> ▪ Uses municipal infrastructure more efficiently ▪ Reducing Greenhouse Gas (GHG) emissions ▪ from new buildings and transportation ▪ Improving health and wellness for residents ▪ Cost savings 	Low carbon neighborhoods have the potential to contribute to large-scale energy and emissions reductions, and achieve costs savings for residents
Green Development Guidelines (GDG) for new development	Recommend integration into the planning approvals process, where development applications are required to meet certain criteria in the GDG.	Inclusive of all participation rates indicated in other program areas.	City staff to facilitate this program. May require external support.	Enables integration of overall CCAP objectives into neighborhood development and/or renewal	Resource may be needed to develop support guidelines (+/- \$50,000)	FCM Grants and other funding opportunities available to develop such guidelines	<ul style="list-style-type: none"> ▪ Developers ▪ Community at large 	<ul style="list-style-type: none"> ▪ Streamlined approach for new development 	Supports efficient new property and low carbon energy supply

Program Area 3: Efficient Industry

Program /Initiative	Recommended Approach	Participation Rate	Municipal Role	Enabling Components	Estimated Municipal Cost	Incentives, Municipal Cost Recovery	Potential Partners	Benefits	Potential GHG Reduction
Industrial Energy and Climate Best Practice Network	An industry-focused best practice network ensures world-class continuous improvement in industrial energy efficiency. This initiative aims to encourage Perth County Industrial Best Practice Networks, host Global Best Practice events, and share industrial management expertise throughout the County.	1.0% of local industry participation per year	Convene industrial best-practice networks	Proliferate low-carbon, high-efficiency practices in the industrial sector	Minimal	N/A	<ul style="list-style-type: none"> ▪ Local industry ▪ Invest Stratford 	<ul style="list-style-type: none"> ▪ Industrial competitiveness ▪ Sustained and new employment ▪ City reputation ▪ Inbound industrial investment 	<ul style="list-style-type: none"> ▪ 13,000 tCO₂e per annum ▪ Contribution to total: 6%

Program Area 4: Efficient Transportation

Program /Initiative	Recommended Approach	Participation Rate	Municipal Role	Enabling Components	Estimated Municipal Cost	Incentives, Municipal Cost Recovery	Potential Partners	Benefits	Potential GHG Reduction
Alignment with Transportation Master Plan initiatives to reduce average trip lengths	This program aims to reduce the time spent in Light-Duty Vehicles (LDV), such as cars, SUVs, and pick-ups. The recommended aligning the CCAP strategies with existing transportation plans	15% of trip lengths are reduced	<ul style="list-style-type: none"> Ensure Transportation/ Transit Plans & Secondary Plans include supportive measures, adopting mixed-use compact design, increasing local social destinations, encouraging shared vehicle services, and including impacts of home working. 	<ul style="list-style-type: none"> Transportation planning Secondary planning 	Marginal increase to existing internal costs	N/A	<ul style="list-style-type: none"> Destination Stratford Chamber of Commerce BIA Stratford Local Active Transportation Interests 	<ul style="list-style-type: none"> Increased local employment Attractive, livable neighbourhoods Decarbonizing transportation 	<ul style="list-style-type: none"> 15,000 tCO₂e per annum Contribution to total: 7%
Alignment with Transportation Master Plan initiatives to increase trips by train, bus, bike and walking	This initiative aims to reduce the need for LDVs and promotes more low-carbon shares of passenger kilometres travelled (PKT). This initiative relies on aligning the CCAP targets with existing active transportation plans.	<ul style="list-style-type: none"> 10% increase in active transportation activities 10% increase in local transit use 	<ul style="list-style-type: none"> Ensure the Transportation and Transit Plans include energy targets; supportive measures; multi-modal transport nodes, competitive transit services, and transit-oriented development in the City that are supplemented by bike, e-bike 	<ul style="list-style-type: none"> Transportation and Transit Plans include energy targets and supportive measures Ensure Secondary Plans include supportive measures 	Marginal increase to existing internal costs	N/A	<ul style="list-style-type: none"> Destination Stratford Chamber of Commerce BIA Stratford Local Active Transportation Interests 	<ul style="list-style-type: none"> Attractive, livable neighbourhoods Reduced driving stress Improved health Decarbonizing transportation 	<ul style="list-style-type: none"> 17,000 tCO₂e per annum Contribution to total: 7%

			and walking routes						
Electric and Low-Emission Vehicle Support Program	Using vehicles with lower emissions will reduce the impact of the transportation sector's GHG emissions. This program aims to drive uptake through municipal actions and outreach. It includes a need for investment in electric vehicle infrastructure, charging stations.	<ul style="list-style-type: none"> ▪ 80% of light-duty vehicles are low emission - including EV ▪ 80% of transit ▪ 10% of heavy-duty vehicles 	<ul style="list-style-type: none"> ▪ Encourage uptake through municipal outreach ▪ Planning policy - parking and charging guidelines ▪ Infrastructure – incorporate charging stations in public parking facilities 	<ul style="list-style-type: none"> ▪ Transportation and Transit Plans include energy targets and supportive measures ▪ Ensure Secondary Plans include supportive measures 	+/- \$12,000/charging station	<ul style="list-style-type: none"> ▪ Government incentives for consumers ▪ Government incentives for municipalities to install public charging infrastructure 	<ul style="list-style-type: none"> ▪ Business community with parking lots ▪ Local transportation interests ▪ Auto Dealers 	<ul style="list-style-type: none"> ▪ Individual access and parking privileges ▪ Reduce fuel operating costs ▪ Decarbonize transportation 	<ul style="list-style-type: none"> ▪ 68,000 tCO₂e per annum ▪ Contribution to total (EV): 17% ▪ Contribution to total Vehicle Efficiency): 13%

Program Area 5: Energy Supply and Distribution

Program /Initiative	Recommended Approach	Participation Rate	Municipal Role	Enabling Components	Estimated Municipal Cost	Incentives, Municipal Cost Recovery	Potential Partners	Benefits	Potential GHG Reduction
District Energy Program	This initiative targets densification and new growth areas to provide efficient heating and cooling using high-quality, low-carbon thermal services. The program would create a District Energy entity to supply services and ensure future area-specific plans, including District Energy guidelines.	<ul style="list-style-type: none"> 90% of new construction in areas targeted for intensification of new growth 70% of existing renovation in areas targeted for densification 	Initiate the development of the District Energy business plan	Serves to attract investors, funders and service providers to the opportunity	Development of a business case (+/1 \$100,000)	<ul style="list-style-type: none"> Potential FCM funding for planning. Recoverable as administrative overhead in functioning district energy company or utility 	<ul style="list-style-type: none"> Utilities Developers Builders 	<ul style="list-style-type: none"> Competitive, reliable, comfortable thermal services Local employment Municipal dividends and investor returns Pathway to further GHG reductions using bio-energy and other renewable heating & cooling sources Business opportunity in other communities 	<ul style="list-style-type: none"> 37,000 tCO₂e per annum Contribution to total: 16%
Heat Pump Program	Heat pumps provide high-quality, low-carbon heating and cooling options to areas not served by District Energy. This program aims to promote the use of heat pumps in low-density areas.	50% of new construction	Promote the use of heat pumps in low-density areas	Incorporate heat pumps into permitting processes	Some costs may be absorbed by existing City resources, while other costs may need to be accounted for	Government and utility incentives for consumers	<ul style="list-style-type: none"> Builders Contractors HVAC Suppliers Electrical Utility 	<ul style="list-style-type: none"> Low-carbon heating and cooling 	<ul style="list-style-type: none"> Included in efficient new construction
Solar Hot Water Program	Solar hot water provides supplemental hot water and heating	10% of heating and hot water use in all buildings	Include in policy and planning construction guidelines	<ul style="list-style-type: none"> Green Development Standards 	Incremental	N/A	<ul style="list-style-type: none"> Builders Contractors HVAC Suppliers 	<ul style="list-style-type: none"> Attractive investment for consumers 	<ul style="list-style-type: none"> 1,000 tCO₂e per annum Contribution to total: >1%

	in homes not served by District Energy as a cost-effective zero-carbon hot water alternative. This program aims to raise customer awareness through comprehensive outreach and engage Enbridge, key builders, and realtors as champions.			<ul style="list-style-type: none"> Streamline permitting for existing buildings 				<ul style="list-style-type: none"> New opportunity for contractors Predictable, proven technology Local employment Contribute to decarbonizing heating 	
Solar Photovoltaic Program	Solar photovoltaics reduce the dependence on fossil fuels and uses solar power as a cost-effective zero-carbon electricity alternative. This program aims to raise customer awareness through comprehensive outreach and engage utilities, key builders, and realtors as champions.	10% of all electricity needs in all buildings	Include in policy and planning construction guidelines	<ul style="list-style-type: none"> Green Development Standards Streamline permitting for existing buildings 	Incremental	Government and utility incentives for consumers	<ul style="list-style-type: none"> Utilities Builders Contractors Local Suppliers 	<ul style="list-style-type: none"> Attractive investment for consumers Avoided investment in power utility Extended opportunity for contractors Predictable, proven technology Local employment Contribute to decarbonizing electricity 	<ul style="list-style-type: none"> 22,000 tCO₂e per annum Contribution to total: 10%

Program Area 6: Towards Zero Waste

Program /Initiative	Recommended Approach	Participation Rate	Municipal Role	Enabling Components	Estimated Municipal Cost	Incentives, Municipal Cost Recovery	Potential Partners	Benefits	Potential GHG Reduction
Alignment with Existing Waste Management Activities to reduce compostable waste to landfill	Anaerobic methane from landfill contributes significantly to the community emissions profile. Methane is approximately 25 times more powerful than equivalent CO ₂ . This initiative aims to continue to scale up the existing green bin program.	N/A	<ul style="list-style-type: none"> Communicate to representatives of all compostable waste sources Service expansion to all organic waste sources 	Incorporate into existing waste management strategies	TBD	Incremental to current waste management costs	N/A	Reduce emissions from methane (25 times that of carbon dioxide emissions)	4,500 tCO ₂ e for every 1% increase in organic waste separation
Waste Reduction and Recycling	<ul style="list-style-type: none"> Support senior government action on reducing use of single time use plastics and packaging, and explore implementing changes locally Support and amplify waste reduction, recycling and diversion programs delivered by the City and other partners 	For provincial regulatory framework participation rate is expected to be significant by 2025.	<ul style="list-style-type: none"> The City's Blue Box program transition is underway. Blue Box producers will become fully accountable and financially responsible for collecting and recycling their materials when consumers discard them Enhance communication around the transition 	Blue Box Regulation under the RRCEA requires producers to establish and operate systems for the collection, recycling and reuse of blue box materials.	TBD	N/A	<ul style="list-style-type: none"> Compliance Equity Community Awareness 	Supports Ontario's shift from linear to circular economy. GHG emissions and energy usage will vary per material, recycled input among other factors.	