Climate aligned growth

Region of Waterloo Corporate

Climate Action Plan

Region of Waterloo

Land Acknowledgement

The Region of Waterloo honours and recognizes the local Indigenous Peoples who have cared for these lands for many generations before the three cities and four townships came into existence. The current boundaries of Waterloo Region are located on the traditional territories of Haudenosaunee, Chonnonton, Attawandaron, and Anishnaabe peoples. Waterloo Region is part of the Haldimand Tract, which encompasses six miles on either side of the Grand River from the mouth near Dundalk to where it empties into Lake Erie at Port Maitland also referred to as the One Dish / One Spoon Treaty territory. Regional staff acknowledge the enduring presence and traditional knowledge of these Indigenous Peoples with whom we share this land.

Waterloo Region is part of the Dish with One Spoon wampum, which means that we recognize our shared humanity and land. This agreement requires that we only take what we need, leave some for others, and help keep the dish clean. This commitment is the foundation for our corporate vision, mission, and core values that guide our decision-making. Regional staff provide essential services that support quality of life for each and every person in Waterloo Region and we are striving to “Grow with Care” by helping to build a community that cares for all people, and cares for the land in a sustainable way for future generations.

This acknowledgement is offered to bring awareness and understanding of the legacy of Indigenous Peoples with whom we share this land. This acknowledgement is an invitation to rethink the relationships between the region, the land, and the environment. This plan has been prepared to guide meaningful actions to achieve our vision of becoming net-zero by 2050, so that future generations can live a good life on this shared land.

Message from the Regional Chair: *Charting a Bold Path to Net-Zero*

The Region of Waterloo's Climate Action Plan is a roadmap towards sustainability that reflects our commitment to addressing climate change and creating a low carbon community that is equitable, resilient and prosperous for generations to come. In recognizing the interconnectedness of our actions and our impact on the environment, we embrace the opportunity to effect positive change, starting from within.

Aligned with our Growing with Care Strategic Plan, this plan outlines the steps we're taking to integrate climate considerations into every facet of our operations. Through a series of targeted initiatives and practices, we aim to reduce our carbon footprint, enhance resilience, and foster a culture of sustainability that permeates throughout our organization.

This Corporate Climate Action Plan is not merely a reflection of our internal aspirations but also a testament to our commitment to work hand in hand with our municipal counterparts, community partners, and stakeholders across the region. We're not alone in this undertaking. Across Waterloo Region, the community has demonstrated the importance of collaboration and shared responsibility in climate action.

We acknowledge that the journey towards sustainability is not without its challenges. Yet, it is through collective action and a shared sense of purpose that we can overcome these challenges and pave the way for a brighter, more sustainable future for all. Through this Corporate Climate Action Plan, we reaffirm our commitment to stewardship, innovation, and the well-being of both our organization and the community we proudly serve.

Sincerely,

Karen Redman

Karen Redman,
Regional Chair

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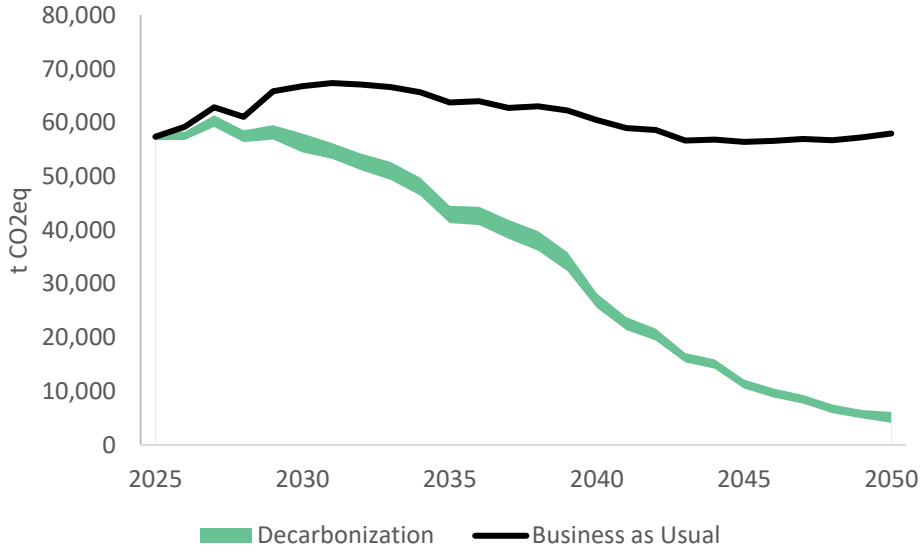
Executive Summary

The climate is changing due to the burning of fossil fuels and other human activities. To avoid the worst impacts of a changing climate, we must limit global temperature warming to 1.5°C. In Canada, we are already seeing warming at twice the global rate. More locally, climate models for Waterloo Region show that our climate system will see an increase in temperature, altered precipitation patterns and an increase in the frequency, intensity and duration of extreme weather events over the next 50 years.

The Region of Waterloo has a direct role in addressing the climate emergency, through investments in corporate assets, and policies regarding corporate emissions, and in programs and infrastructure to support community emissions reductions. The Region has a longstanding commitment to address a changing climate, most notably through the endorsement of TransformWR, our community climate change action plan, which calls for a 50% reduction in GHG emissions by 2030 and an 80% reduction by 2050 (below 2010 levels).

This Corporate Climate Action Plan (CorCAP) further strengthens the Region's commitment to addressing the climate emergency by identifying actions we will take over the next 5 years (2025-2030) to reduce corporate emissions.



Business-As-Usual (black): Outlines the Region's corporate emissions trajectory to 2050, if no further action is taken to reduce emissions.

Decarbonization Scenario (green): Outlines the emissions trajectory if the Region takes actions that align with our long-term emissions reduction target.

Figure 1 Business as usual and decarbonization GHG emissions scenarios

This Plan establishes a long-term target to achieve net zero emissions from energy sources by 2050.

To support the development of the CorCAP, GHG emissions models have been developed for four service areas within the Region: Transit (GRT), Corporate Fleet, Buildings, and Water Services (Figure 1). Landfill emissions were omitted from the modelling because the Region currently employs available best practices and technologies to mitigate the release of fugitive methane resulting from waste breakdown in landfills. However, the CorCAP outlines actions to explore enhanced diversion programs, emerging technologies and approaches to mitigate landfill methane emissions. The modelling exercise estimates a carbon liability gap of 6,000 tonnes by 2050. This gap represents the difference between the Region's decarbonization scenario and our 2050 target. This gap will be addressed in future iterations of the CorCAP as technologies advance and the Region develops a carbon offsetting policy.

Phases of Work

Corporate climate change mitigation planning and action will be organized into three phases, as outlined below.

Table 1 Corporate Climate Change Mitigation Phases of Work

1. Strengthening our Foundation (2025-2030)	This phase will focus on establishing net zero standards and policies for new asset procurement and retrofit and creating a Regional climate data system to ensure transparency in progress reporting.
2. Rapid Decarbonization	This phase will focus on rapid decarbonization of Regional infrastructure and will be guided by the next 5-year iteration of the CorCAP.
3. Offset What We Cannot Reduce	This final phase will offset corporate emissions that we are unable to eliminate through the purchase of high quality carbon credits.

Goal Areas

The 2025-2030 CorCAP is organized into four goal areas:

Table 2 CorCAP Goal Areas

Theme Area	Goal Statement
Buildings	✓ Achieve net-zero energy emissions in Region-owned facilities by 2050
Waste, Water and Wastewater	✓ Mitigate the release of fugitive methane and adopt innovative approaches to reduce operational emissions.
Fleet, GRT and Transportation	✓ Procure only low carbon fleet and transit vehicles by 2050, and invest in infrastructure, programs, and services to support sustainable transportation choices.
Capacity Building	✓ Build climate change action into the decision-making fabric of the Region.

Aligned with the objectives of Phase One, this CorCAP includes actions that:

- ✓ Establish corporate policies to guide the low carbon procurement and construction of new assets (e.g. Green Fleet Policy, Net Zero Standard for New Buildings);
- ✓ Enhance corporate climate change literacy;
- ✓ Pursue partnerships to address emission sources where solutions are unavailable or not well

understood; and

- ✓ Develop a Climate Accountability Framework that utilizes data-driven metrics to evaluate progress and enable informed decisions that fully account for the implications of projects and programs on corporate climate goals.

The Region will update the CorCAP every five years to integrate lessons learned, refined decarbonization modelling, and account for new and innovative technologies.

"Avoiding climate breakdown will require cathedral thinking. We must lay the foundation while we may not exactly know how to build the ceiling" - Greta Thunberg

2023-2027 Strategic Plan: Growing With Care

As Waterloo Region's population approaches one million people in the coming decades, the Region of Waterloo's 2023-2027 Strategic Plan, *Growing with Care*, envisions a compassionate community that cares for all people, stewards the land for future generations, and ensures that everyone has the opportunity to live a good life. The Region of Waterloo's Corporate Climate Action Plan (CorCAP) directly supports the Strategic Plan's pillar of "Climate-Aligned Growth," a crucial theme that reflects our commitment to sustainable development as we grow.

The Region recognizes that as our community expands, we must remain focused on fostering a healthy natural environment where communities can thrive. This CorCAP helps achieve this goal by outlining the steps necessary to reduce the carbon footprint of the Region's operations and services. This plan acts as a framework to guide the transformation of our organization, ensuring that climate action is at the core of our growth strategies.

By aligning our climate action efforts with the Strategic Plan's vision, we are working to ensure climate-aligned growth within our own operations to create a future-ready organization that contributes to the overall resilience of our region.

Introduction

The climate is changing, and we must act now.

The science is clear – our climate is warming due to the burning of fossil fuels and other human activities. Overwhelming evidence indicates that no part of the world has been untouched by the impacts of climate change. For the first time ever, the average global surface temperature exceeded 1.5 degree Celsius above pre-industrial levels for a 12-month period between 2023 and 2024. Crossing this warming threshold is a sign that we are dangerously close to exceeding the long-term warming limit established by the Paris Agreement and serves as a clear call for increasing ambition and accelerating action at all levels of government. There is general scientific consensus that global temperature increases of any magnitude will have significant impacts including:

- Displacement of communities from sea level rise,
- Water shortages in every continent,
- Severe droughts and increased food insecurity from climate impacts to agricultural production; and
- Potential mass extinction of plants and animals and irreversible damage to ecosystems.

Why does 1.5°C matter?

Limiting global warming to below 1.5°C will significantly reduce the risks, adverse impacts, and related losses and damages from climate change. Failing to do so will lead to increasingly frequent and dangerous extreme weather events including heatwaves, droughts, wildfires, and heavy precipitation and flooding (IPCC). Exceeding 1.5°C could trigger multiple climate tipping points, such as breakdowns of major ocean circulation systems, abrupt thawing of boreal permafrost, and collapse of tropical coral reef systems — with irreversible, and dangerous impacts for humanity (Science).

In Canada, we are already warming at twice the global rate.[1] In 2024 alone, this accelerated warming trend has led to over $8.5 billion in insured losses, attributed to severe climate related natural disasters, shattering the previous 2023 record of $3 billion[2]. In Waterloo Region, climate models show that our local climate system will see an increase in temperature, altered precipitation patterns and an increase in the frequency, intensity and duration of extreme weather events over the next 50 years. In response to these projections, public policy and community objectives must include efforts to:

- Rapidly transition away from fossil fuels to low carbon alternatives;
- Reduce climate-related health risks, impacts, and inequities[3],
- Build climate resilience considerations into new infrastructure[4]; and,
- Mitigate economic risks associated with climate change[5].

[1] Government of Canada. 2019. About — Canada's Changing Climate Report
[2] Insurance Bureau of Canada. 2024. 2024 shatters record for costliest year for severe weather-related losses in Canadian history at $8.5 billion
[3] Region of Waterloo. 2022. Climate Science Report and Climate Change and Health Vulnerability Assessment Report.
[4] Financial Accountability Office of Ontario. 2022. https://fao-on.org/en/Blog/Publications/cipi-transportation
[5] Canadian Climate Institute. September 2022. https://climateinstitute.ca/wp-content/uploads/2022/09/Damage-Control_-EN_0927.pdf

While current and future climate trends are alarming, there is reason for hope. In many cases, the knowledge, skills, and technological solutions to undertake the energy transition already exists and many actions are already underway.

Key Climate Action Milestones at the Region of Waterloo

Region of Waterloo Council has a long-standing commitment to environmental sustainability. In 2010, the Region formally committed to reducing greenhouse gas (GHG) emissions through its participation in the Federation of Canadian Municipalities Partners for Climate Protection program. This led to the collaborative development of the community's first climate mitigation plan in 2013. In 2019, Regional Council declared a climate emergency in recognition of the urgency of this local and global crisis. In 2021, TransformWR, the updated community climate mitigation plan, was unanimously endorsed by all eight municipal Councils in Waterloo Region. A more detailed timeline of the Region's climate change related commitments is outlined in Figure 2 below.

In April 2022, Region of Waterloo Public Health released a Climate Change and Health Vulnerability Assessment. This work included a Climate Science Report and serves as a valuable tool for Waterloo Region to take action based on climate change evidence and future climate scenarios. Check it out

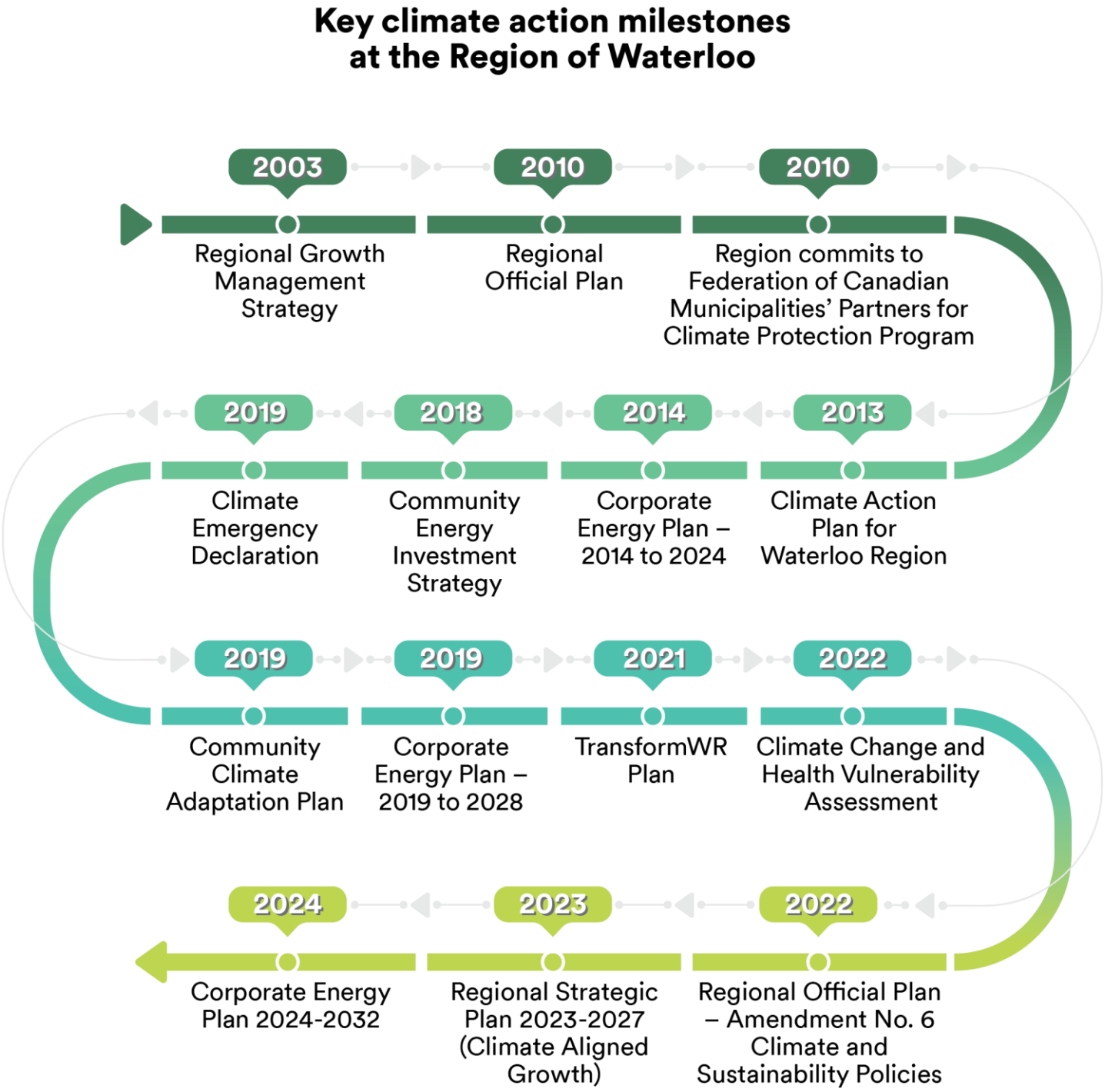


Figure 2 Region of Waterloo Climate Action Milestone Timeline

The Role of Municipalities

Municipalities play a significant role in reducing GHG emissions and preparing communities for a changing climate. The Federation of Canadian Municipalities estimates that municipalities have influence over approximately 50 percent of total GHG emissions in Canada and own approximately 60 percent of the public infrastructure that supports our economy and quality of life.

While the Region holds significant influence, our ability to address the climate change emergency is greatly enhanced through collaboration with upper levels of government, community stakeholders, and other partners. By working together, we can unlock opportunities for progress by securing funding, advocating for policy and legislative changes, and encouraging personal and collective actions (more details in Appendix E).

Figure 3 Role of Municipalities in Climate Change

TransformWR: Our Collective Community Climate Action Plan

TransformWR is a climate action strategy developed to guide the Waterloo Region community in significantly reducing GHG emissions and build a more equitable, prosperous, and resilient low carbon community. It was created through a collaborative effort led by ClimateActionWR—a partnership between Reep Green Solutions, Sustainable Waterloo Region, the Region of Waterloo, area municipalities, and local environmental organizations.

The TransformWR strategy outlines the transformative actions that can be undertaken across the Region to achieve an interim GHG emissions reduction target of 50% by 2030, and long-term target of 80% by 2050 (from 2010 levels).[6] The Region plays a key role in advancing actions within TransformWR. With its unique capacity, the Region can lead the development of policies and programs to reduce emissions from residential and commercial buildings and make strategic investments in sustainable transportation systems such as Grand River Transit (GRT) and active transportation options. This positions the Region as a driving force in creating a low-carbon, resilient future.

As of 2022, community GHG emissions had decreased by 12% below the 2010 baseline (Figure 2), falling short of the interim reduction target. To achieve this interim target, **we must take bold, coordinated action across the Region**, alongside ClimateActionWR partners and the community to accelerate efforts to reduce emissions in buildings and transportation systems through innovative policies, investments, and collective action.

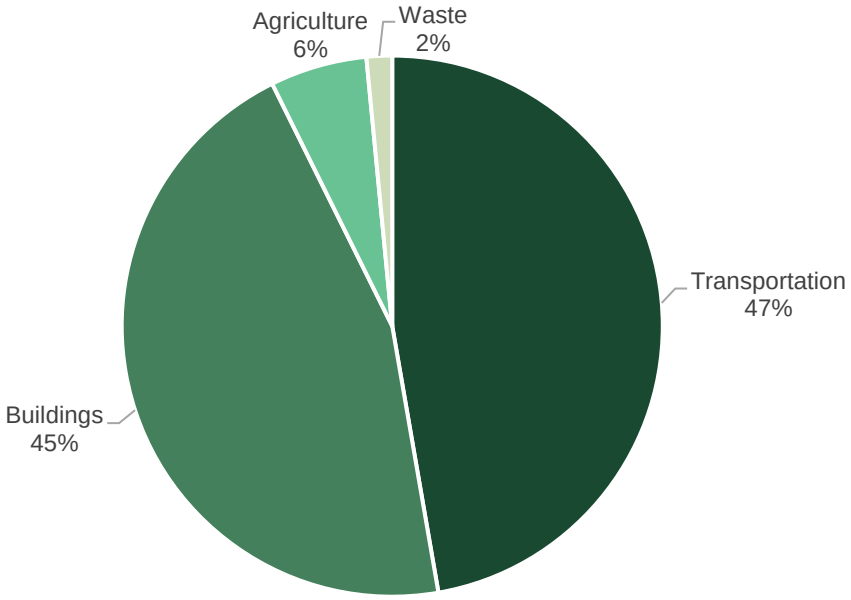


Figure 4 Community GHG Emissions Inventory

[6] Climate Action WR. 2022. TransformWR – Waterloo Region's Transition to an Equitable, Prosperous, Resilient Low Carbon Community. https://climateactionwr.ca/transformwr/wp-content/uploads/2022/08/CA-80by50-TransformWR-Community-Climate-Action-Strategy-_FINAL-22-06-22.pdf

The Region of Waterloo's Corporate Climate Action Plan

This Corporate Climate Action Plan (CorCAP) identifies how the organization will respond to the global climate change emergency. The CorCAP outlines the actions the Region will take in 2025 through 2030 to reduce corporate emissions and demonstrate leadership that will help catalyze climate action across the community. This first iteration of the CorCAP is situated as part of a phased approach to climate action (Table 1). During Phase 1, we will continue to complete foundational work through the development of critical enabling policies and standards. As we approach 2030 and move toward Phase 2, we will prepare a new 5-year action plan to be well positioned to accelerate decarbonization such that we see a rapid decline in our corporate emissions between 2030 and 2040.

These phases do not follow a strictly linear path, as work from future phases will happen alongside ongoing efforts, as the Region continues to implement projects to decarbonize our operations (Phase 2).

Table 3 Region of Waterloo's Phased Approach for Climate Action

Phase	Description
Phase 1: Strengthening our foundation	2025-2030 CorCAP actions will focus on establishing net zero standards and policies for new asset procurement and retrofit and developing the climate data system (i.e. targets and KPIs) to ensure transparency in progress reporting.
Phase 2: Rapid decarbonization	This phase of work will focus on rapid decarbonization of Regional services and infrastructure (e.g. building and fleet electrification).
Phase 3: Offset what we cannot reduce	This final phase will offset corporate emissions that we are unable to eliminate by purchasing high-quality carbon credits that result in the permanent removal of carbon from the atmosphere.

Scope

The CorCAP is mitigation focussed, outlining actions across the organization designed to reduce GHG emissions. A plan to address climate change adaptation and preparedness will be developed to complement this work.[7] There is a strong commitment corporately to consider the co-benefits of climate change mitigation and adaptation strategies as projects advance to enhance impact and long-term success.

Figure 5 Climate Change Action – Mitigation Versus Adaptation

While the CorCAP primarily targets reducing emissions from corporate assets such as buildings, vehicles, and waste operations, it also considers key areas where the Region can influence community-wide emissions. This includes investments in transit and active transportation systems. Appendix D provides a summary of how the CorCAP aligns with actions from the TransformWR strategy. Table 4 outlines the scope of the CorCAP.

[7] Regional staff continue to collaborate inter-departmentally and with community organizations and area municipalities to manage the impacts of climate change, as identified in the 2019 Community Climate Adaptation Plan.

Table 4 Corporate Climate Action Plan – In Scope and Out of Scope

In Scope	Out of Scope
• Climate change mitigation actions from Regional owned assets • Corporate conversion of fleet vehicles and operations • Integrating low carbon fuels and technology into corporate facilities, including community housing • Low carbon corporate and community energy sources from corporate assets (e.g. district energy opportunities from wastewater treatment plant outfall and rooftop solar) • Regional investments in transportation infrastructure, programs, and services to improve sustainable community mobility • Improving waste diversion programs to reduce fugitive methane at landfills	• Climate change adaptation actions • Community conversion of fleet vehicles and operations • Integrating low carbon fuels and technology into community facilities • Community renewable energy with sources independent of corporate assets • Non-Region owned housing electrification.

CorCAP Guiding Principles

The implementation of the CorCAP is guided by the following principles:

- **Demonstrate leadership**: Take meaningful steps to fulfill our commitment to sustainability by fostering collaboration and innovation aimed at Regional assets, programs, and services to significantly reduce or eliminate emissions while ensuring high-quality service delivery.
- **Collaborative implementation**: Work together across all departments to deliver innovative projects and programs to achieve our goals and targets.
- **Alignment with Regional priorities**: Deliver climate change actions that directly support Regional priorities identified in the "Growing with Care" Strategic Plan; Climate Aligned Growth, Homes for All; Equitable Services and Opportunities and Resilient and Future Ready Organization.
- **Adaptive management**: Integrate new technologies and respond to emerging science while remaining flexible, to respond to robust monitoring and continuous learning.
- **Focus on short-term actions that support long-term success**: Tackle immediate priorities and achievable advancements over the next 5 years using the policy tools and technology now available, while building a strong foundation for achieving our 2050 corporate and community targets.
- **Equity:** Take steps to ensure that benefits from implementing this plan are shared equitably and negative impacts to residents are mitigated, with a particular focus on equity-seeking groups and vulnerable community members.

Understanding Our Corporate GHG Emissions

The Region has been tracking direct emissions from owned or controlled sources (Scope 1 and 2 emissions) since 2010. The most recent inventory indicates that the Region's GHG emissions were approximately 114,287 tonnes of carbon dioxide equivalent (CO2e), representing a 25% decrease below the 2010 baseline.

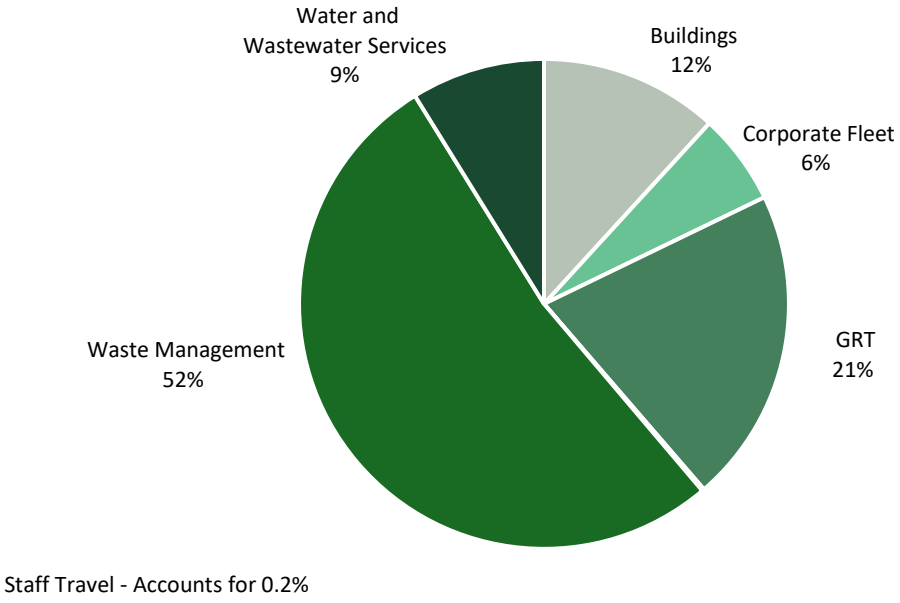


Figure 6 Region of Waterloo Corporate Emissions Inventory (2022)

Regional landfills and GRT represent the largest portion of corporate emissions, generating 52% (primarily from fugitive methane), and 21% of total emissions, respectively. Since 2010, emissions associated with corporate natural gas use have increased by 17 percent (driven by an increase in buildings) while a steady decline in emissions associated with electricity consumption, corporate fleet / GRT, and wastewater treatment has been observed.

GHG Emissions Modelling

A modeling exercise was undertaken (Figure 7) to understand how corporate emissions will change over time with the adoption of decarbonization technology, and to support target setting. This modelling accounted for growth and anticipated service expansion across four service areas: Corporate Fleet, Transit, Buildings, and Water and Wastewater Treatment. Two emissions pathway models were developed (further outlined in Appendix C):

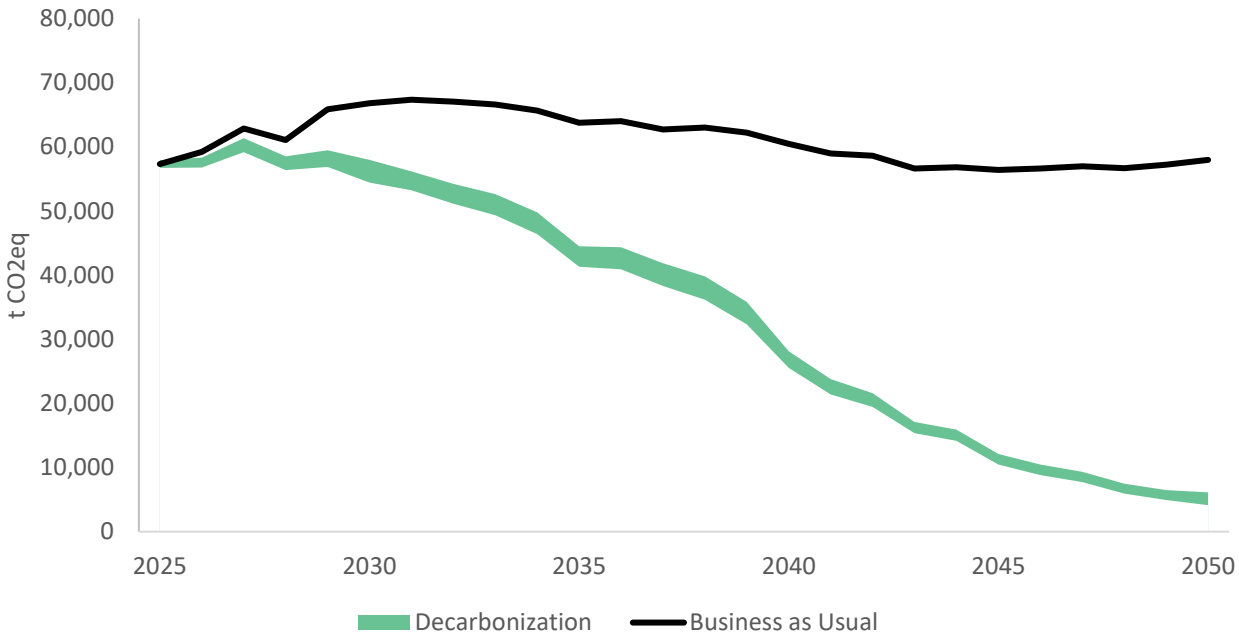


Figure 7 Regional Corporate Business-As-Usual and Decarbonization GHG Emissions Scenarios

- **Business-As-Usual (black):** This scenario looked at an emissions trajectory if no further efforts were made by the Region to decarbonize operations. Decarbonization measures that are already in progress or dictated by legislation were included. The model showed that emissions increased in the short term driven by growth, levelling off to around 5% above current (2022) emissions levels. The total of emissions from 2025 to 2050 is estimated to be 1.6 million tonnes CO2e, and 58 thousand tonnes annually in 2050.
- **Decarbonization Scenario (green):** This scenario, represented as a band, outlines the pathway towards meeting the 2050 target. This scenario considers short-term planned actions, followed by accelerated decarbonization actions. This scenario is presented in a band to reflect the range of emissions impact resulting from anticipated population and asset growth, and the scale of GRT service expansion (to offset community emissions). This scenario also considers the time needed to prepare organizational assets for electrification, which defers the ability to adopt electric vehicles due to a lack of charging infrastructure. Total emissions from 2025 to 2050 are 927 thousand tonnes CO2e and 6000 annually in 2050, known as the carbon liability gap.

This carbon liability gap, which is the difference between the decarbonization scenario and the net zero emissions from energy sources target, is common in municipal climate action plans. This is because technologies for some emissions sources are still being developed. In the Region's case, residual emissions are mainly from treatment of water and wastewater, and remaining carbon from the electrical grid. This gap will

be addressed in subsequent CorCAP updates to reflect technology advancements and will be addressed as part of a future GHG emissions offsetting strategy.

Corporate GHG Emissions Targets

The Region is one of the fastest growing communities in Canada, with expectations that our community's population could reach one million residents by 2050. This will lead to increased demand for services and supporting infrastructure. Responding to the climate emergency declaration by rapidly reducing emissions within a growing community will continue to require exceptional leadership, prudent investments, and thoughtful decision-making.

The Region of Waterloo has set an ambitious corporate target of net zero emissions from energy sources by 2050.[8] This target focuses primarily on energy related emissions.

What Does "Net Zero" Mean?

This means that no GHG emissions can be added to the atmosphere than is taken out. There may be some service areas that are unable to achieve net zero emissions by 2050 due to technological limitations (e.g. fugitive methane from landfills). This can be counterbalanced by a strong carbon offset policy, which will be established as part of this Plan.

Lastly, landfill emissions, which constitute 53% of our corporate emissions portfolio, are unlikely to change in the short term. Landfills generate methane gas, which is the result of waste breakdown. The Region is a leader in methane mitigation (e.g. methane gas capture, energy generation and landfill cover), however methane still bypasses these systems, known as fugitive methane. Technology advancements are needed to address these emissions in the medium term. However, efforts to better control and drive technological transformation in methane management and reduce future fugitive methane emissions are addressed within this Plan.

[8] Net zero emissions means achieving a balance between GHGs put into the atmosphere and those taken out through carbon sequestration or carbon offsetting. This state is also referred to as carbon neutrality.

CorCAP Goal Areas

Table 5 CorCAP Goal Areas

Theme Area	Goal Statement
 **Buildings**	✓ Achieve net-zero energy emissions in Region-owned facilities by 2050
 **Waste, Water and Wastewater**	✓ Mitigate the release of fugitive methane and adopt innovative approaches to reduce operational emissions.
 **Fleet, GRT and Transportation**	✓ Procure only low carbon fleet and transit vehicles by 2050, and invest in infrastructure, programs, and services to support a community modal shift.
 **Capacity Building**	✓ Build climate change action into the decision-making fabric of the Region.

Understanding the Action Tables

Each of the goal areas contain action tables, which are characterized by the following components:

- Action Category: To provide clarity on whether an action is a research study, policy development, or implementation.
- Action: Provides a description of the action to be undertaken.
- Responsibility / Lead: Outlines which department(s), division(s), or team(s) are responsible for implementing and completing this action.
- Alignment with Existing Strategies: Highlights which existing strategies, plans, policies, or activities are in place that align with the action.
- Start Year: Outlines when the action is intended to be initiated within the next 5 years.
- Investment: High level estimation of the Investment required for an action, organized as **low** (under $500K), **medium** ($500K to $1million), or **high** ($1 million or higher) cost. Actions which have yet to be accounted in the 10-year Capital Plan have been denoted with an asterix (*). All actions, including those not yet considered through the capital planning process, will be subject to annual budget approvals.

Goal 1: Buildings

Achieve net-zero energy emissions in Region owned facilities by 2050.

Goal 1: Buildings

Achieve net-zero energy emissions in Region owned facilities by 2050.

Why This Matters

The Region owns and operates a diverse building portfolio (e.g. residential, office, water and wastewater treatment facilities, GRT maintenance buildings, airport hangars and passenger waiting areas, etc.) that is responsible for 12% of corporate GHG emissions. These emissions are primarily driven by natural gas, which is used for space and water heating. By transitioning towards more energy-efficient, low carbon energy systems, and more climate resilient materials in new and existing buildings, GHG emissions can be reduced or eliminated over time.

What We're Doing

The Region has a history of strong energy management since 2007 when the Energy Conservation Office (ECO) was established. ECO is responsible for implementing energy conservation and GHG emissions reduction projects in facilities, manages procurement strategies for natural gas and electricity, and tracks energy costs and savings. Examples of successful buildings projects include:

The latest Corporate Energy Plan resulted in the successful implementation of 210 energy conservation measures, $1 million in operating savings and an annual reduction of 1,450 tonnes of GHG emissions, annually.

- ✓ Successful implementation of three Corporate Energy Management Plans;
- ✓ Construction of new Waterloo Region Housing residential buildings to net zero carbon standards;
- ✓ Installation of 19 rooftop solar projects generating a total of 2,000 MW;
- ✓ Installation of low carbon thermal systems at the Library Headquarters and Sunnyside Supportive Housing;
- ✓ Ongoing integration of energy conservation measures and low carbon retrofits into the facilities asset management planning process; and
- ✓ Partnership development with private sector companies to trial innovative technologies and programs, such as Alert Labs Water Usage and Leak Detection program.

Where We're Going

Table 6 outlines how the Region plans to reduce greenhouse gas emissions from buildings over the next five year.

Action Category	Action	Lead	Start Year	Investment
Study	Develop departmental action plans for existing buildings to enable deep energy retrofits to achieve net-zero emission targets.	Facilities	Ongoing	Medium
Study	Develop a building electrification strategy to identify opportunities to decarbonize heating and cooling systems.	Facilities	2025	Low
Implementation	Recommission buildings that coincide with major building changes (e.g. retrofits) to optimize Building Automated Systems and ensure systems are operating at optimal performance. *Additional funding required	Facilities	Ongoing	Medium
Policy	Establish a corporate policy for all new buildings and major retrofits that establishes net zero standards and broader sustainability objectives.	Facilities	2025	Low
Policy	Develop a refrigerant management policy to reduce GHG emissions from the use and procurement of new refrigerants.	Climate and Sustainability Services, Facilities, Operations	2025	Low
Study	Explore opportunities to develop more stringent low carbon requirements (i.e. CMHC Guidelines for energy efficiency) as part of grants and land sale/lease RFPs to facilitate affordable housing.	Facilities, Climate and Sustainability Services, Housing and Development Services	2027	Low
Implementation	Implement projects that enhance water leak detection and reduce water consumption at Regional buildings. *Additional funding required	Facilities	Ongoing	Medium
Implementation	Continue to implement the Corporate Energy Plan. *Additional funding required	Facilities	Ongoing	High
Implementation	Install low carbon energy systems (e.g. solar, geothermal) at existing assets at time of retrofit (end of life) and on new assets at time of construction. *Additional funding required	Facilities	Ongoing	High

Study	Explore partnerships to pilot and deploy clean energy technologies at corporate buildings.	Innovation and Economic Development, Facilities	Ongoing	Low
Implementation	Undertake a corporate space optimization to delay the need for additional space and new Regional facilities. *Additional funding required	Facilities	Ongoing	High
Implementation	Undertake operator training to support the maintenance and operations of renewable energy and low carbon technology. *Additional funding required	Facilities	Ongoing	Low

Table 6 Buildings Actions

Goal 2: Waste, water, and wastewater

Mitigate the release of fugitive methane and adopt innovative approaches to reduce operational emissions.

Goal 2: Waste, water, and wastewater

Mitigate the release of fugitive methane and adopt innovative approaches to reduce operational emissons.

Why This Matters

The Region owns and operates infrastructure required for the supply and treatment of water and wastewater, as well as the management of household and commercial waste. Water and Wastewater processes accounts for 9% and waste management 52% of corporate GHG emissions. Emissions from water supply and treatment are largely driven by energy intensive process to achieve water quality targets (treatment), and to power pumps to distribute water throughout the community (supply). Emissions from wastewater are largely driven by the treatment process and disposal of biosolids. Overall, as the Region grows, it is likely that more energy intensive water supply and treatment processes will be used, to meet regulatory requirements. Waste emissions represent the largest source of corporate emissions; however, this is mostly attributed to the release of fugitive methane gas produced by decomposing waste in landfills.

As our population continues to grow, we will need to identify and adopt innovative approaches for mitigating emissions associated with waste management, drinking water supply, and wastewater treatment while encouraging all community members to conserve resources and make sustainable choices.

What We're Doing

Waste

Waste management has demonstrated leadership in the reduction of GHG emissions by:

- ✓ Implementing a world-class waste diversion program that diverts approximately 63 percent of residential waste from our landfills;
- ✓ Installing advanced methane collection and utilization systems;
- ✓ Developing partnerships to reuse methane to produce electricity, equivalent to power required for 4,000-6,000 homes annually; and
- ✓ Adopting 'circular economy' principles to place a stronger focus on product longevity, renewability, reuse and repair as well as resource recovery.

What is a Circular Economy?

The goal of a circular economy is a system where materials never become waste. This is achieved by keeping materials in circulation (i.e. through recycling, remanufacturing etc) and the design of materials that are less resource intensive. This is *essential* for tackling climate change, because material extraction is estimated to be responsible for 70% of global GHG emissions.

Water Supply

Waterloo Region relies on groundwater as our primary source of drinking water. To ensure that we have a sustainable drinking water supply:

- ✓ The Region offers a comprehensive water conservation program to homeowners (i.e. free home water reviews and water softener rebate), multi residential property owners (i.e. incentives for water audits and retrofits), and ICI property owners (i.e. water conservation funding and award programs) that reduces energy associated with water pumping and treatment; and
- ✓ Optimize the sizing and operation of equipment to reduce energy use.

Wastewater

Region of Waterloo wastewater plants treat approximately 180 million litres of sewage or wastewater every day. The Region's award-winning treatment initiatives include:

- ✓ Installation of state-of-the-art co-generation technology in treatment plants to capture and reuse GHG emissions associated with heating and cooling, reducing annual emissions by approximately 1,900 tonnes;
- ✓ Diversion of biosolids from landfills to agricultural lands and old mining sites to support rehabilitation and reduce landfill fugitive methane; and
- ✓ First wastewater treatment plant in North America to install membrane aerated biological reactor (MABR)[9], a novel technology that allows for increased wastewater biological treatment capacity, while reducing energy use.

N20 Emissions and Wastewater Treatment

Nitrous Oxide (N20) emissions are a significant and historically underestimated source of GHG emissions from wastewater facilities. N20 has a global warming potential 273 times higher than Carbon Dioxide (C02) over a 100-year time horizon. The Region and its consultant Jacobs have been awarded funding from The Water Research Foundation in 2023 to better understand N20 emissions, not currently captured in our corporate inventory, and inform future mitigation approaches.

Where We're Going

Table 7 outlines the actions the Region will take to reduce GHG emissions that result from water treatment and supply and waste management over the next five years.

[9] Cambridge's Hespeler WWTP adopts membrane aerated biofilm reactor technology

Action Category	Action	Lead	Start Year	Investment
Study	Explore the feasibility of using source separated organics to produce biogas.	Waste Management	2027	Low
Implementation	Optimize the use of biogas produced from wastewater sludge to offset (and potentially replace) natural gas use at wastewater treatment facilities.	Water and Wastewater Services	Ongoing	Low
Study	Advance understanding of mitigation opportunities for N2O emissions through the wastewater treatment process through a funded partnership with the Water Research Foundation.	Water and Wastewater Services	Ongoing	Low
Study	Explore waste heat thermal energy opportunities at Region sites and support the development of a Region-Wide Thermal Utility.	Climate and Sustainability Services, Strategic Initiatives and Asset Management	2025	Low
Implementation	Continue to advance academic partnerships on methane mitigation and monitoring technology to reduce fugitive methane emissions from landfills.	Waste Management	Ongoing	Low
Study	Based on waste audits and/or the findings from the Long-Term Waste Management Strategic Plan, consider enhanced diversion practices for residential and commercial buildings (e.g. bans, higher fees) to prevent organics and recyclable materials from entering our landfill.	Waste Management	2026	Medium
Implementation	Continue to implement water conservation measures throughout the community.	Water and Wastewater Services	Ongoing	Medium
Study/ Policy	Incorporate opportunities to reduce GHG emissions into all waste, water and wastewater masterplans and Strategic Plans.	Waste management, Water and Wastewater Services	Ongoing	High
Study/ Implementation	Establish a strategy to reduce energy emissions in water and wastewater treatment facilities and processes, to optimize pumping stations and improve energy efficiency. *Additional funding required	Climate and Sustainability Services; Water and Wastewater Services	Ongoing	Medium-High

Study	Participate in the Canadian Water Network's community of practice to identify opportunities and best practices to accelerate net zero actions in water and wastewater.	Water and Wastewater Services	2025-2027	Low
Implementation	Develop and implement a recycling and compost program for businesses within the BIAs across the Region.	Waste Management	2026	High

Table 7 Waste, Water and Wastewater GHG Emissions Reduction Actions

Goal 3: Fleet and transportation

Procure only low carbon fleet and transit vehicles by 2050, and invest in infrastructure, programs and services to support sustainable transportation choices.

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Why This Matters

Region-owned fleet and transportation vehicles include police, GRT buses, ambulances, light-duty vehicles, snowplows and other heavy-duty equipment and vehicles. GRT represents 21% of corporate emissions, with the remainder of the corporate fleet accounting for 6% of corporate emissions. Shifting annual fleet procurement to low and zero carbon vehicles will reduce transportation-related emissions significantly. Investment in supportive low-carbon fleet infrastructure (e.g. charging stations) and training programs will also be essential to ensure that levels of service are maintained during this transition.

ION Rapid Transit

The Region of Waterloo's decision to build a light rail transit system (LRT) has had a transformative impact on the community. The ION creates more sustainable transportation choices, eases traffic congestion, limits urban sprawl, and moves people more efficiently while reducing GHG emissions.

As Waterloo Region grows, we are committed to expanding transit options for the community and investing in infrastructure that supports the shift from personal vehicles to public transit. This investment will directly support efforts to achieve our *community* GHG emission reduction target outlined in TransformWR. GRT service expansion to facilitate these community emissions reductions will likely result in a short-term increase in *corporate* emissions as we maximize the use of our existing diesel and invest and expand the low-carbon hybrid bus fleet until electric and other zero-emission bus technologies mature. However, GRT remains committed to fleet decarbonization with proven technology in alignment with our 2050 goals.

What We're Doing

The Region continues to adopt new low carbon vehicle technology across our fleet, transit, and transportation business units while also investing in active transportation infrastructure. For example, the Region is:

- ✓ Connecting multi-use and shared-use trails to LRT stations and other major transit stops and stations;
- ✓ Implementing separated cycling lanes along several Regional roads;
- ✓ Completing active transportation projects across the Region including the Victoria Street and Lackner Boulevard multi-use trails,
- ✓ Increasing the frequency of zero emission ION light rail and GRT bus services to improve connections across communities in the Region;
- ✓ Expanding GRT's low carbon hybrid bus fleet;
- ✓ Integrating 11 new fully electric buses into the GRT network;
- ✓ Installing EV charging infrastructure at Regional buildings and facilities; and
- ✓ Right-sizing vehicle assessments to ensure vehicles are suitable to realize operational efficiencies.

Where We're Going

Table 8 outlines the actions the Region will undertake by 2030 to reduce emissions from its fleet and facilitate broader community emissions reduction from transportation.

Action Category	Action	Lead	Start Year	Investment
Study	Develop an electrification strategy for corporate fleet to build a comprehensive vehicle charging network that considers workforce needs and building electrical capacity.	Facilities, Fleet, GRT	2025	Low
Study	Conduct a comprehensive cost-benefit analysis of viable options for the GRT bus fleet (e.g., battery-electric, hydrogen, trolley network candidates) to inform an accelerated transition to net zero emissions.	Facilities, GRT	2029	Low
Policy	Develop a green fleet policy that establishes a path to net zero fleet emissions through adoption of alternative technologies (e.g. electricity, hydrogen), fuel switching (e.g. biodiesel), and vehicle right sizing that can be incorporated into asset management and capital plans.	Climate and Sustainability Services, Fleet	2025	Low
Study/ Implementation	Explore opportunities to embed low carbon technology/fuel requirements in contracted vehicle services. *Additional funding required	Waste Management, Water and Wastewater Services, GRT, Purchasing	Ongoing	High
Implementation	Host a low-carbon fleet technology and fuel exhibition.	Climate and Sustainability Services, Fleet, GRT, Facilities	2026, 2028	Low
Implementation	Provide regular electric vehicle maintenance training and service planning for staff. *Additional funding required	Fleet, GRT	Ongoing	Low
Study/ Implementation	Explore opportunities for low carbon fleet pilot projects across all Regional vehicle types. *Additional funding required	Fleet	Ongoing	Low
Policy	Develop a corporate anti-idling policy for the use of Regional Fleet vehicles.	Climate and Sustainability Services, Fleet	2027	Low
Policy	Develop an Electric Vehicle Charging Station checklist or policy, user guideline and support model.	Facilities, Fleet, GRT, ITS, Finance	2026	Low
Policy	Develop an Integrated Mobility Plan to enhance and prioritize Regional investment in sustainable transportation alternatives (e.g. micromobility, active transportation, and transit) to improve low-carbon community mobility.	Transportation, GRT	Ongoing	Medium
Study	Develop a preliminary design business case for Stage 2 ION extension from Kitchener to	Rapid Transit	2028	Low

	Cambridge in support of a broader community modal shift.			
Implementation	Complete and implement the GRT business plan to set the path for achieving the TransformWR community transportation and transit ridership targets. *Additional funding required	GRT	Ongoing	High
Study/ Implementation	Track and report on the benefit of "working from home" for eligible staff, and support and incentivize other sustainable transportation modes (e.g. TravelWise) for staff travel. *Additional funding required	GRT, Climate and Sustainability Services	2026	Low
Policy	Update Corridor Design Guidelines and engineering designs to better serve sustainable transportation modes.	Transportation	Ongoing	Low
Study	Explore opportunities to leverage technology and innovation to deliver more Regional services virtually, enhancing accessibility while minimizing the need for unnecessary travel.	All Departments, Corporate Strategy and Performance	Ongoing	Low

Table 8 Fleet, GRT and Transportation GHG Emissions Reduction Actions

Goal 4: Capacity building

Build climate change action into the decision making fabric of the Region.

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Build climate change action into the decision making fabric of the Region.

Why this Matters

To achieve the ambitious emissions reduction targets outlined in the Paris Agreement, we must rapidly transition from fossil fuel-supported service delivery to emerging low-carbon alternatives. This significant challenge must be met through bold action, with a focus on creating the systems needed to sustain our work.

The success of this plan depends on our ability to collectively drive substantial emissions reductions across all areas of the organization while also transforming community systems. Achieving this will require ongoing staff engagement and empowerment, increased climate literacy, and a unified understanding of how to implement low-carbon service delivery effectively.

What We've Done

Region of Waterloo staff collaborate across the organization to continuously build the capacity required to deliver on Council's climate change commitments. Ongoing initiatives that support this include:

- ✓ Creation of a climate change governance structure comprised of senior leaders from across all divisions;
- ✓ Expansion of climate-focussed staff complement;
- ✓ Integration of climate change considerations into service area master plans (e.g. GRT, water supply and treatment, Waterloo Region Housing);
- ✓ Establishment of a Climate Aligned Growth priority area as part of the Regional Strategic Plan, *Growing with Care*; and
- ✓ Collaboration with external agencies and institutions regarding best practices, tools and opportunities to deepen our climate change action (i.e. ClimateActionWR, colleges and universities, local utility companies, WR Community Energy, Clean Air Partnership)

Where We're Going

Outlined in table 9 are actions the Region of Waterloo will undertake to build internal capacity to reduce corporate greenhouse gas emissions.

Action Category	Action	Lead	Start Year	Cost
Implementation	Develop a climate accountability framework to facilitate decision making that incorporates climate considerations into budgeting and capital plans.	Climate and Sustainability Services	Ongoing	Low
Implementation	Develop a tool that quantifies the impact of Regional decisions on corporate and community GHG emissions.	Climate and Sustainability Services	2027	Low
Implementation	Incorporate a "Climate Change Impact" section in all Council Reports.	Climate and Sustainability Services, Corporate Strategy and Performance	2027	Low
Implementation	Develop a corporate climate change training program for new and existing staff.	Climate and Sustainability Services	2025	Low
Study	Develop a strategy for financing the climate and energy transition.	Climate and Sustainability Services, Finance	2026	High
Implementation	Establish government relations priorities (for Federal and Provincial Governments) that align with Regional climate change objectives.	Corporate Strategy and Performance, CAO's Office	2025	Low
Policy	Develop a Green Procurement Policy to guide sustainable purchasing.	Procurement, Climate and Sustainability Services	2026	Low
Implementation	Report annually on the Regional corporate GHG emissions and implementation of the Corporate Climate Action Plan.	Climate and Sustainability Services	Ongoing	Low
Study	Continue to refine GHG emissions quantification for water, wastewater and waste to ensure best practice and reflects Regional conditions.	Climate and Sustainability Services, Water Services, Waste Management	Ongoing	Low
Implementation	Establish an internal dashboard to continuously track and monitor corporate climate action performance.	Climate and Sustainability Services	2025	Low
Study	Investigate the feasibility of adopting the Task Force on Climate-Related Financial Disclosure framework at the Region to enhance preparedness for financial and physical risks associated with climate change.	Climate and Sustainability Services Finance	2028	Low

Study	Hire a third party to undertake an independent review of the progress of the Corporate Climate Action Plan.	Climate and Sustainability Services	2029	Low
Study	Evaluate the staff complement required to achieve the goals of the Corporate Climate Action Plan.	Climate and Sustainability Services, All Departments	2025	Low
Policy	Develop and implement a carbon offsetting and credit policy.	Climate and Sustainability Services, All Departments	2026	Low
Study	Explore opportunities to enhance Regional capacity in collaboration with ClimateActionWR to deliver community focused programs to reduce greenhouse gas emissions.	Climate and Sustainability Services	2025	Medium
Study	Explore the development of a sustainability framework for Regional infrastructure such as the Envision Standard. *Additional funding required	Climate and Sustainability Services, Design and Construction, Asset Management & Strategic Initiatives	2028	Low
Implementation	Implement the Region of Waterloo International Airport Decarbonisation Action Plan *Additional funding required	Airport, Facilities, Climate and Sustainability Services, Economic Development,	2025-2030	High

Table 9 Capacity Building GHG Emissions Reduction Actions

Implementation Approach

The Region is committed to achieving its vision of a low-carbon and resilient community by implementing the actions outlined in this plan over the next 5 years. At its core, the CorCAP establishes the policy direction required for ROW Service Areas to build emissions reduction considerations into capital and business planning efforts. It is also well understood that the Region cannot achieve these targets alone. This will require bold collaboration and commitments from upper levels of government, and industry as outlined in Appendix E. The following section will outline the framework the Region will establish to ensure the success of the CorCAP.

Climate Accountability Framework

To ensure that we are successful in implementing this Plan, efforts will be aligned with the Climate Accountability Framework developed by the Canadian Climate Institute. A summary of the components of a Climate Accountability Framework is provided in Table 10:

Table 10 Climate Accountability Framework

Element	Best Practice	Regional Progress
Formalize Climate Governance Structures and Processes	Establish a governance structure and process for setting, meeting and monitoring progress against emissions reduction targets. This includes formalizing emissions reduction targets through a resolution of Council.	• Climate Change Emergency Declaration • Existing Climate and Energy Transition Governance Structure (see section below).
Clearly Define Roles and Responsibilities	Outline roles and responsibilities for various service areas, as they relate to achieving long term targets. This includes: • Building a third-party evaluation framework that ensures the Region's climate efforts are evidence-based; • Distributing the responsibility of climate action across the organization.	• Actions outlined in the CorCAP identify a lead, responsible for advancing and completing an action. • Climate and Sustainability Team established to manage the implementation of the CorCAP.
Establish Interim Emissions Reduction Milestones and a carbon budget	Set interim emissions reduction targets to guide a path toward long-term targets. These targets should informed by: • Emissions reduction modelling to outline a potential pathway to achieve targets; • Implementation of a carbon budget to define emission reduction milestones and measure the jurisdiction's contribution to global mitigation efforts.	• Long-term emissions reduction targets are established as part of the CorCAP. • Climate pathway modelling undertaken as part of the CorCAP development • Development of framework to incorporate emissions reduction into the annual budget process is underway

Produce Action Plans to Meet Milestones	Develop action plans, in collaboration with experts, to outline the policies, programs and projects to achieve interim targets. • When targets and milestones are not achieved, publish results and plans to address excess emissions. • Link progress on milestone commitments to policy course corrections	• Region's CorCAP is a 5-year framework that will be reviewed and updated in 2030, at which point new milestones and actions will be established. As part of the monitoring and evaluation process, the Region will build flexibility into plan implementation to ensure the ability to course correct 'actual' emissions reduction pathways.
Require Monitoring and Reporting	Create formal requirements for transparent reporting on government plans and progress.	• Staff will report annually to Council on the progress and outcomes of the CorCAP (See Reporting and Monitoring section below). • As part of the 5-year planning process, the Region will seek third party advice on policy tools and action to ensure targets are achieved.
Broaden the Scope Beyond Reducing Emissions	Ensure climate action planning extends beyond reducing emissions to address climate change adaptation, and the broader social, economic and cultural impacts of climate policy.	• Regional Council has approved a Community Climate Adaptation Strategy • Development of Corporate Climate Adaptation Strategy is underway • Climate adaptation considerations will be built into a broader carbon budget that aims to incorporate climate change considerations are integrated into the budget process.

Governance Structure

The Region will continue to advance the Governance Structure established to enhance corporate capacity to address climate change. This structure consists of two groups:

- **Climate and Energy Transition Working Group:** This group consists of Managers and Operational Staff. The main function of the group is to work inter-departmentally to implement corporate wide initiatives, integrate climate change considerations into ongoing work, provide technical insights into the ongoing implementation of climate action strategies, and provide updates and recommendations to the Climate and Energy Transition Steering Committee.
- **Climate and Energy Transition Steering Committee:** The Steering Committee consists of Senior Leadership Staff from across the Region. Key responsibilities and functions include providing executive oversite, guidance and approval of climate change related projects, initiatives and workplans; provides joint recommendations to Council where needed; and provide interdepartmental leadership and accountability informed by ongoing monitoring of KPIs, provided in partnership with the working group.

Reporting and Monitoring

Staff will provide an annual status update on the progress of the CorCAP that will consist of:

- An annual inventory of corporate GHG emissions that includes an assessment of how the Region is tracking towards its targets;
- Ongoing status updates of the various actions outlined in the four goal areas;
- Reporting on key performance indicators as outlined in table 11 below; and
- At the end of the 5-year planning cycle, an updated 5-year Plan for 2030-2035 informed by successes and challenges associated with the previous iteration and inclusive of new technologies and best practice standards.

Table 11 CorCAP Key Performance Indicators

Theme Goals	Draft Key Performance Indicators
Buildings	• Building emissions reduction (%) • Energy efficiency investments annually ($) • Number of projects implemented • Annual cost avoidance
Waste, Water, and Wastewater	• Energy Use Intensity (EUI) of wastewater treatment operations • EUI of water distribution operations • GHGI of wastewater treatment operations • GHGI of water distribution operations • Thermal efficiency of WWTP combined heat and power systems • Residential waste landfill (tonnage) per capita • Residential organics waste diversion (tonnage) and avoided GHG emissions per capita.

	• Residential yard waste diversion (tonnage) and avoided GHG emissions per capita.
Fleet, GRT & Transportation	• Transit ridership (%) • GRT bus emissions per passenger km • % of EVs and low emission vehicles for Transit Services • % of eligible fleet upgraded to EV's and low emission vehicles for Fleet Services
Capacity Building.	• Reporting on progress of actions in the CorCAP • KPI's related to the integration of a carbon budget/climate decision matrix • Number of staff engaged across the Region

Appendix A- Glossary

Climate Change: Climate change refers to the long-term changes in weather patterns. These can be driven by natural changes (such as the sun's activity or volcanic eruptions), or human induced (which is predominately driving changes in our climate system currently), through the burning of fossil fuels.

Climate Change Adaptation: Climate change adaptation refers to process, practices and/or structures designed to intervene/moderate potential damages associated from extreme weather. These efforts generally focus on protecting grey infrastructure, natural systems and people.

Carbon Budget: A carbon budget is a tool that governments use to track and reduce greenhouse gas emissions by setting a limit on the amount of emissions that can be produced over a period of time. This is achieved by setting annual emissions reduction targets, and reporting progress as part of major decision-making process.

Carbon Dioxide Equivalent: This is a standard unit of measurement used to describe the impact of different greenhouse gasses (i.e. methane, nitrous oxide).

Climate Change Mitigation: Climate change mitigation refers to efforts to reduce heat trapping greenhouse gas emissions in the atmosphere. This can be achieved through building retrofits, electric vehicle conversion, and any other effort that prioritizes the reduction in fossil fuel consumption.

Energy Use Intensity: This is a unit of measure to express the annual energy consumed per square foot. In the case of a building, this is calculated by dividing the total energy use (i.e. electricity and natural gas) consumed by a building and dividing this by the total square footage.

Greenhouse Gas Emissions: Greenhouse gas emissions are gasses in the atmosphere that absorb the sun's heat that radiates to the earth, preventing it from escaping back into space; known as the greenhouse effect. As humans burn fossil fuels, more greenhouse gasses are trapped in the atmosphere, preventing heat from escaping the earths system, causing warming temperatures.

Greenhouse Gas Intensity: This is a unit of measure to express the annual greenhouse gas emissions generated per square foot of a building/operation. This is calculated by dividing the total greenhouse gas emissions for a building and dividing this by the total square footage

Landfill and Wastewater Fugitive Methane: Methane is emitted from both landfills and the wastewater treatment process resulting from the breakdown of organic matter in the absence of oxygen. Fugitive methane is the result of uncontrolled or unintended release of methane. [10] For example, in the case of landfills, fugitive methane is result of methane that bypasses the Region's comprehensive methane capture and utilization systems (i.e. landfill cover, and methane used for electricity generation).

[10] Environmental Protection Agency 2024. Fact sheet: fugitive methane

Net Zero Emissions: Net zero emissions refer to a state where the amount of greenhouse gas emissions released into the atmosphere are balanced by the removal of greenhouse gas emissions from the atmosphere, known as carbon offsets (i.e. carbon removals, forests).

Paris Agreement: The Paris Agreement is an international treaty negotiated by 196 parties to strengthen the global response to limit warming below 2 degrees (while pursuing efforts to limit the increase to 1.5 degrees). The treaty also includes provisions for preparing for the impacts of a changing climate (adaptation) and establish a financial system to support developing countries to reduce emissions and prepare for extreme weather. [11]

TransformWR: TransformWR is a long-term community climate change strategy for the region of Waterloo. This plan outlines a path to achieve 80% emissions reduction in greenhouse gas emissions by 2050. This Plan is facilitated by ClimateActionWR, a collaboration between local organizations, community members and regional and area municipal governments. [12]

[11] United Nations Climate Change The Paris Agreement | UNFCCC
[12] ClimateAction Waterloo Region 2024. Our Team - ClimateActionWR

Appendix B- Corporate Engagement Summary

Extensive staff engagement was undertaken as part of the development of the CorCAP, which is detailed in the below engagement summary table.

Table 12 CorCAP Key Performance Indicators

Engagement Type	Description	Key Metrics	Timeline
Project Launch Staff Workshops	Launch the CorCAP project and receive initial feedback from Staff on the Plan scope and project management approach.	13 meetings held	October to December 2023
Action Feedback Workshops	Seek feedback on the CorCAP draft actions and theme areas.	5, 90-minute workshops held	January to March 2024
Corporate Emissions Decarbonization Modelling Workshops	Workshops held with different service areas to outline actions and determine assumptions to support the development of a decarbonization model for the Region, outlining a potential pathway to achieve net zero emissions from energy sources by 2050.	10 workshops held	May to August 2024
Implementation Planning Workshops	Discussions to finalize the draft CorCAP actions and determine the timeline (between 2025-2030) for when actions will be implemented and embedded within various departmental workplans.	6, 1-hour workshops held	June – July 2024
Action Refinement Meetings	Working with staff to update the plan's action timelines and budget considerations, based on the 2025 budget discussions.	6 meetings with Staff	January 2025
Senior Leadership Presentations	Presentations to both the Commissioners and Directors from the Engineering and Environmental Services and Transportation Services Department to provide an overview of staff consultation of the CorCAP, review draft actions and ensure understanding of project next steps. These two departments were targeted because most actions impact these service areas.	2, 45-minute meetings held with Senior Leadership from Engineering and Environmental Services and Transportation Departments.	August – September 2024
Climate and Energy Transition Working Group and Steering Committee Meetings	Various presentations held as part of the ongoing Climate and Energy Transition Governance meetings. Discussions were held to receive endorsement of the CorCAP theme areas, proposed targets and actions, and to receive insights on overall project direction and Council communications.	5 Climate and Energy Transition Working Group, and 4 Climate and Energy Transition Steering Committee Meetings held.	Throughout 2024
Council Engagement	Two Information Staff Reports and Presentations to Council were completed to (1) share an update on the proposed target for the CorCAP and (2) provide a project update, inviting Council to provide feedback on draft CorCAP theme areas and draft actions.	2 Staff Reports and presentations to Council providing updates on the CorCAP	June 2024 and November 2024

Appendix C – Technical Summary of GHG Emissions Reduction Pathways

Modeling was conducted to investigate potential pathways to meet future decarbonization targets. This modeling focused on Regional assets and operations (including expansion) and applied current or near market technologies to investigate how and when emissions could be reduced. Scope 1 and 2 emissions were included, scope 3 emissions and embodied carbon were not included.

Regional assets and operations were split into four sectors: fleet, transit, buildings and water/wastewater (Table 13). Waste emissions and renewable energy from waste were not included in the model due to the high uncertainty in emission values and limited decarbonization options. Renewable energy from waste could be a significant source of carbon offsets and should be explored further in future modeling.

Table 13 GHG Emissions Modelling Scope

Sector	Included	Not included
Fleet	Corporate Fleet WRPS Fleet	GRT vehicles Contracted transportation services (i.e. residential waste collection)
Transit	Conventional and Mobility Buses ION (Light rail transit) Maintenance/supervisor vehicles	Transit Buildings
Buildings	Corporate buildings including WRPS and GRT Community housing	Buildings specific to water and wastewater treatment
Water/ Wastewater	Water/wastewater specific buildings Some contracted transportation Wastewater Biosolids	Contracted wastewater operator (OCWA) vehicles

Two future scenarios (Table 14) were modeled: Business as Usual and Decarbonization. The decarbonization scenario is presented in a band to reflect the scale and pace of emissions impact of anticipated population and asset growth, and the scale of GRT service expansion (to offset community emissions). Detailed assumptions for each sector are included in the model documentation and summarized at the end of the appendix under Modeling Assumptions.

Table 14 Business-As-Usual and Decarbonization GHG Emissions Modelling Description

Scenario	Description
BAU (Business as Usual)	no further efforts are not made to decarbonize operations
Decarbonization	a pathway towards meeting the 2050 target based on plans that are anticipated in the short-term followed by accelerated decarbonation actions

The results of the modeling are shown in Figure 8 and summarised in Table 15. The Decarbonization scenario (dark solid line) shows that a pathway towards net zero is possible, but anticipated growth and delays to adopting new technology means that emissions will increase over the next 10 years. The Business-As-Usual scenario (green band) looks at the Region's emissions trajectory if no further efforts were made to decarbonize operations.

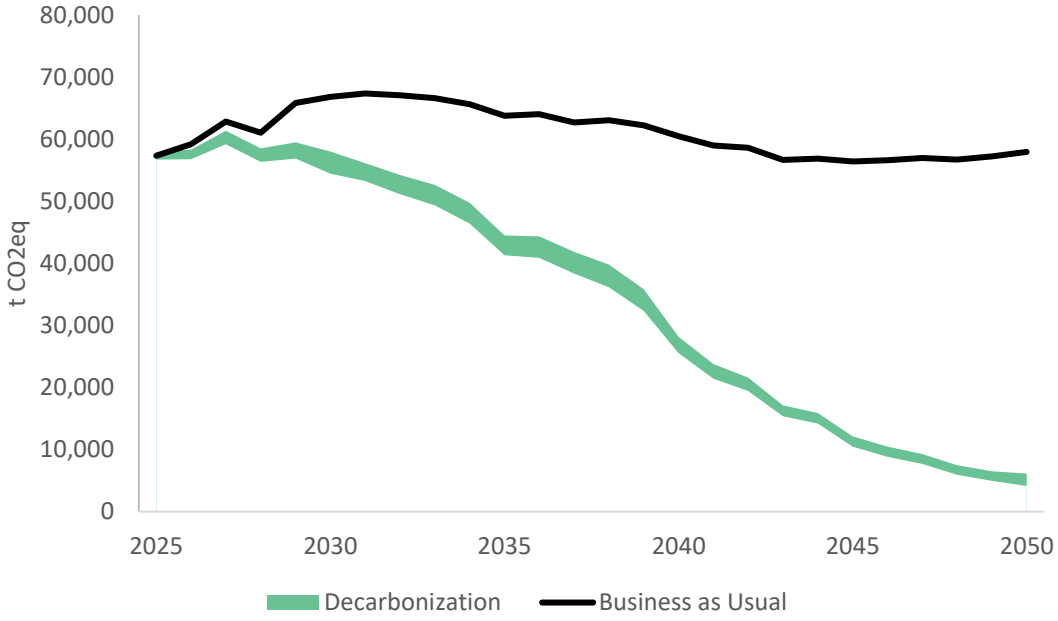

Figure 8 Business-As-Usual and Decarbonization Scenario Modelling

In this scenario, Future emissions increased in the short term driven by growth, levelling off to around 5% above current (2022) emissions levels. The total of emissions from 2025 to 2050 was 1.6 million tonnes CO2e.

Table 15 GHG Emissions Modelling Scenario Results

Scenario	2050 Emissions	Total Emissions (2025 to 2050)
BAU	58,000	1,588,600
Decarbonization	6,100	927,400

None of the modeled scenarios fully achieve the final target of net-zero by 2050. The inability to fully decarbonize corporate activities is primarily attributed to the projected limitations of grid decarbonization and the regulatory challenges in transitioning water and wastewater processes to low-carbon alternatives. This gap will be the focus of subsequent plan updates as technologies develop and as part of a future carbon offsetting strategy.

Modeling Assumptions

The following tables provide a high-level summary of the assumptions used in the pathways modeling exercise. More detail is available in the model documentation.

Table 16 GHG Emissions Scenario Modelling Assumptions-Emissions Factors

Assumption	Description
Fuels and Natural Gas	Equal to today with no change over time
Electrical Grid	Changes over time following grid emissions predictions from the Independent Electricity System Operator (IESO)
Biosolids from wastewater treatment	Based on current calculation methods and wastewater biosolids handling and disposal unless otherwise noted

Table 17 GHG Emissions Scenario Modelling Assumptions – Growth

Assumption	Description
Corporate Fleet	Based on information provided by staff to estimate growth in service areas over time. Conversion to EVs follows Federal Ban in 2035.
Transit	Based on information provided by staff to estimate growth in service area and fleet size over time
Buildings	Assumed all new buildings are net zero and therefore no growth in emissions
Water and Wastewater**	Increases in energy use for treatment and biosolids emissions were based on population increases using official plan projections. No new facilities were modeled, but energy use per treated unit was increased based on anticipated challenges with regulatory changes and increased supply/demand.

**The increase in anticipated energy requirements for water and wastewater treatment is significant and represents an area of risk to meeting future targets.

Table 18 GHG Emissions Scenario Modelling Assumptions - Decarbonization Scenario

Assumption	Description
Light Duty Vehicles	EV replacement starting at 5% in 2025 and reaching 100% by 2035.
Specialized Light Duty Vehicles	Same as for light duty vehicles, but delayed by 5 years to allow for technological development for specialized vehicles
Medium Heavy Vehicles including EMS and GRT mobility buses	Most medium and some heavy vehicles: Replacement with EVs starting in 2030 at 5% and reaching 100% by 2040. Remaining heavy vehicles replacement with hydrogen starting in 2031 with 1% and increasing to 12% by 2050.
Fleet Optimization	Fleet optimization results in a 5% reduction in emissions in 2026 and it carries through to 2050.
Conventional Buses	To 2031 e-bus fleet expands to maximum of 30 and other new buses are hybrid. From 2031 to 2036, half of new buses are e-bus and half are hybrid. From 2036 to 2050, all new buses are zero emission.

Heating conversion from natural gas	For Buildings this assumption is part of building retrofits. For Water/Wastewater buildings an 80% reduction in natural gas use for heating is scheduled over 24 years by conversion to electric heat pumps.
Building Retrofits	Buildings were separated by type of building and retrofits applied based on a series of studies for building decarbonization to reach an 80% or greater reduction in emissions.
Elmira Biosolids Disposal	Switch disposal of Elmira Biosolids from landfill to land application in 2035.
Cogeneration Unit optimization	Optimization of the cogeneration system will take place gradually between 2026 and 2050.
Water/Wastewater energy optimization	Increase energy efficiency of pumping by 15% over 5 years. Increase the energy efficiency of treatment systems to align with high energy use standards over 24 years.

Appendix D- TransformWR Alignment

The Region of Waterloo plays a critical leading or partnership role in advancing the 20 strategies outlined in the TransformWR Plan. The below table outlines the alignment of the CorCAP actions, by theme area with the Strategies in TransformWR. Overall, the CorCAP aligns with 14 of the 20 strategies included in TransformWR. It is important to highlight that the CorCAP will not result in the completion of all of the actions outlined in the below strategy areas, rather this demonstrates the effort to ensure Regional alignment in our approach to reducing corporate emissions.

Table 19 CorCAP Alignment with TransformWR

Themes	TransformWR Strategies Descriptions
Buildings: Achieve net-zero emissions in Region owned facilities by 2050	3.1 - Decarbonize building heating and cooling, and water heating, by replacing furnaces with hot water heaters with highly energy efficient and low carbon equipment or fuel sources; 3.2 - Build new buildings to be net-zero carbon, or build to transition to net-zero carbon
Waste and Wastewater: Mitigate the release of fugitive methane and adopt innovative approaches to reduce operational emissions	4.1 - Optimize the use of existing waste management infrastructure, including expanding diversion programs and energy capture from waste; 4.2 - Use less, and use it again 6.3 - Ramp up local renewable energy generation
Fleet & Transportation: Procure only low carbon fleet and transit vehicles by 2050 and invest in infrastructure programs and services to support a community modal shift.	1.1 - Redesign, rebuild, and maintain our transportation system to prioritize active transportation 1.2 - Continue to build a robust and accessible public transit system that conveniently and safely serves people across the community; 1.3 - Support people to walk, cycle, or roll, and build a culture of active transportation and public transit ridership; 2.1 - Switch personal and commercial vehicles to zero emission vehicles; 2.2 - Build a network of charging/refuelling infrastructure to support the shift to zero emission vehicles;
Capacity Building: Build climate change action into the decision-making fabric of the Region.	6.1 - Prioritize increasing equity throughout GHG reduction planning 6.2 - Position Waterloo Region as a hub of clean tech, sustainability, renewable energy, and retrofits 6.4 - Support GHG reduction transition planning in all organizations and households 6.5 - Coordinate advocacy to senior levels of government

There are six TransformWR strategies that fall out of scope of the CorCAP, however the Region remains committed to advancing these strategies and their associated actions in partnership with Climate Action Waterloo Region:

- 1.4 Transition to Low energy movement of commercial goods
- 1.5 Build compact urban and settlement areas that are efficient for energy, services, infrastructure and transportation, and make existing and new communities “complete communities”
- 5.1 Protect agricultural land the local agricultural system
- 5.2 Diversify and strengthen the local agri-food sector with a focus on serving local food needs
- 5.3 Support leadership in farming communities to plan and lead GHG reduction efforts, such as improving livestock production efficiency, reducing and replacing fossil fuels, and sequestering carbon
- 5.4 Adopt low GHG emission diets

Appendix E: Enabling Conditions for Success to Achieve Our Climate Targets

Table 20 Enabling Conditions to Achieve Regional Climate Commitments

Enabling Condition	Regional Advocacy	Regional Action
Financial Resources: Significant investments and access to innovative financial tools from upper levels of government are required. Additionally, the Region may consider establishing additional financing mechanisms, outside of the tax-base, such as a Climate Reserve or Revolving Fund, dedicated to covering the premium costs of the transition.	X	X
Staff Investments: Considerations may be given to staff capacity to support actions outlined in the CorCAP, which will be brought forward through future budget cycles.		X
Carbon Offsets: A comprehensive carbon offsets strategy is needed to explore innovative opportunities for offsetting emissions where there are no market viable solutions. Essential to this strategy will ensure that the offsets are locally based and/or support broader community goals.		X
Technology Advancements: Technological advancements are essential, particularly for emissions sources where viable solutions do not yet exist (i.e. low carbon heavy-duty vehicles and enhanced fugitive methane control).	X	
Education and Awareness: Education and awareness efforts must be undertaken across the organization to ensure a baseline understanding of the scale and level of ambition required across all service areas.		X
Stronger Upper-Level Government Policy: Bold action is needed from upper levels of government, particularly the province, to implement supportive policies. For example, achieving a corporate target of net zero heavily depends on electrification of fleet and buildings. This is challenged by Provincial investments that result in increasing emissions from the electric grid. Additionally, ongoing advocacy is needed to upper levels of government to communicate the resources and policies needed to meet these scientific climate commitments.	X	