



Resilient



LOYALIST TOWNSHIP

Climate Action Plan



Table of Contents

- List of Figures..... iv
- Acknowledgementsv
 - Land Acknowledgement v
 - Climate Action Working Group v
 - Community Supporters..... v
 - Funding Partners..... v
- Mayor’s Foreword..... vii
- CAO’s Foreword..... viii
- Executive Summary..... ix
- PART I: CURRENT CONTEXT 1
 - A Climate Emergency 2
 - Impacts of Climate Change 3
 - Local Projections 4
 - Canada’s International Commitment..... 6
 - The Role of Municipalities 6
 - Climate Action Benefits 7
 - Loyalist Township 2016 Community Profile..... 8
 - Demographics 8
 - Energy Use 10
 - Baseline Emissions 12
 - Trends & Forecast..... 14
 - Loyalist Township – Summary..... 15
- PART II: VISION & GUIDING PRINCIPLES 17
 - An integrated approach to climate action 18
 - Community resilience..... 19
 - Building back better 20
 - An engaged and healthy community 21
 - Optimize, Enhance, Replace..... 22
- PART III: GOALS AND ACTIONS 23
 - Priority Sectors 24
 - Sustainable Land Use..... 25
 - Embracing the Power of Nature..... 26

- Supporting Local Agriculture..... 30
- Growing Sustainably 32
- Solid Waste..... 33
 - Diverting Residential Waste Away from Landfills 33
 - Reducing Commercial Waste 34
 - Turning Waste into a Resource 34
 - Existing Landfill Operations 35
- Transportation..... 36
 - Developing Effective Transit Systems 36
 - Getting People Moving through Active Transit..... 37
 - Promoting Low-Emissions Vehicles..... 38
 - Greening the Municipal Fleet..... 38
- Buildings 40
 - Retrofitting Residential Dwellings 41
 - Reducing Commercial Energy Usage..... 43
 - Developing Green Building Codes..... 43
 - Greening Municipal Facilities 45
- Water and Wastewater 47
 - Water Collection and Distribution 48
 - Water Conservation..... 49
 - Mechanical Systems 49
- Other..... 51
 - Leveraging Robust Procurement Practices..... 51
 - Greening Construction Practices 52
 - Leveraging Local Knowledge..... 53
 - Creating a Culture of Climate Action..... 54
- Summary 55
- Setting Local GHG Reduction Targets 58
- PART IV: THE PATH FORWARD..... 60
 - Discussion 61
 - Limitations of this Plan..... 61
 - Next Steps 62
 - Periodic updates..... 62
 - Funding Strategy 62
 - Maintaining Momentum 62

List of Figures

Figure 1 - GHG reduction potential of proposed initiatives, broken down by sector	x
Figure 2 - Historical and forecasted heating and cooling degree days in Loyalist Township between 1950 and 2050	5
Figure 3 - Projected change in population, households, and employment between 2016 and 2030 ⁷	8
Figure 4 - Origin and destination of commuters in and out of Loyalist Township.....	9
Figure 5 - Sankey diagram of energy flow from source to destination in baseline scenario.....	10
Figure 6 - Emissions intensity and Cost per GJ of energy consumed for various energy sources.....	11
Figure 7 - Sankey diagram of GHG emissions in Loyalist Township in 2016	13
Figure 8 - BAU Forecast for GHG emissions in the Loyalist Township boundary.....	14
Figure 9 - Line of Sight to Loyalist Township Documents	18
Figure 10 - Use of an “Optimize, Enhance, Replace” model to develop waste reduction strategies	22
Figure 11 - Predicted impact of the proposed actions presented in this Climate Action Plan, broken down by target area.....	58
Figure 12 - Projected GHG emissions in Loyalist Township under the proposed scenario between 2016 and 2030	59

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Climate Action Working Group

Jenna Campbell, P.Eng. – Engineering Manager
Claire Ellison, Engineering Intern
Bailey Labbett, C.Tech. – Engineering Technician
Dan Hendry, Climate Action Coordinator
Rami Maassarani, P.Eng. – Environmental Engineer
Marie-Josée (MJ) Merritt, P.Eng. – Director of Economic Growth and Community Development Services
David Thompson, P.Eng. – Chief Engineer
Nathan Townend – Councillor

Community Supporters

LaFarge Canada	L&A Stewardship Council
Bath Museum	Limestone District School Board
MacKinnon Brothers Brewing Co.	National Farms Union Local 316
Topsy Farms	Ontario Power Generation
Sustainable Kingston	Cataraqui Region Conservation Authority

Photographic Contributions

The photographs used throughout this document were provided by the following contributors:

Ryan Bennett	Rama Kemmerer	Loyalist Township Website
Donna Brown	Lafarge Website	LTES
Susan Corbett	Loyalist Township	Rami Maassarani
Spencer Gaudet		Cody Stafford
Dayle Gowan		Helen Trotter

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Mayor's Foreword

As a new term began in early 2019, Loyalist Council determined that it needed a new strategic plan. During those discussions a firm commitment was made to apply a climate and environmental lens to all of Loyalist's various strategies. As a result, we included environmental sustainability in our overall mission statement.

"To provide support and services that promote a prosperous quality of life for residents, the business community and visitors, through the effective delivery of services and governance, while maintaining economic and environmental sustainability."

Loyalist Township had already been actively involved in efforts to improve our local contribution to greenhouse gas reduction initiatives. We partnered with the Federation of Canadian Municipalities, and as a member of the Partners for Climate Protection (PCP) program, OUR Township has now made substantive emissions reduction targets: 49% below 2016 levels for corporate emissions, and a 25% reduction below 2017 levels for our local community. The ongoing program provides guidance, funding, networking, and training to help us achieve these ambitious goals. Additionally, Councilor Nathan Townend and myself have been afforded the opportunity to complete the Climate Leadership Course for elected officials, and will continue that education in January and February.

As a direct result of this commitment in the Strategic Plan, Loyalist Township has struck a Climate Action Committee that has been hard at work developing the plans to achieve our goals. The details of this undertaking are innovative and exciting. For instance, our plans include the potential installation of a heat exchange system within our recreation facilities, as well as electrifying our fleet. We are also exploring ways that we can encourage our residents and businesses in doing their part, such as making improvements to our transit systems, and initiating programs to incentivize energy efficiency.

We truly believe that if each of us does our part, small actions will add up across the county and across the world, to bring improvement to this ever-increasing challenge we all face.

Ric Bresee, Mayor

CAO's Foreword

This is an exciting time in Loyalist Township. It is wonderful to see the efforts of our team go from conceptual discussions to Council approved plans. Climate action is woven into our Strategic Plan 2019-2023, the Asset Management Plan 2021 update, the Service Delivery Review 2020, and of course the 2021 operating and capital budgets.

A primary objective of the Strategic Plan is to “be a municipal leader in climate action and environmental stewardship”. This will be achieved by reviewing maintenance plans to incorporate more environmentally sound practices; by including environmental responsibility in key decision making; and by integrating carbon reduction in everything we do, with a focus on clean energy.

Loyalist is well on its way to achieving these goals. Already the Township has revised the criteria for ranking capital projects, and now applies a climate lens to risk mitigation, maintenance cost savings, and improving efficiency. In addition, the Township’s recently completed Service Delivery Review proposes several opportunities to improve efficiency and effectiveness. For instance, regular maintenance programs for equipment can be updated to maximize equipment capabilities, lengthen their life span, and reduce carbon emissions.

The actions presented in this plan represent a systems approach to local climate action and are meant to complement or enhance a variety of strategic priorities and initiatives while focusing on sound decision-making processes. Our hope is that, by applying a climate lens to its operations and championing climate action in the community, Loyalist Township can build a clean and competitive economy that will enhance opportunities for smart growth and create local jobs.

Thank you to the residents of Loyalist Township who have taken the time to contribute to this Climate Action Plan. We will be seeking further public input as we embark on future initiatives.

Steven Silver, CAO

Executive Summary

At the October 23rd, 2017 session of Council, Loyalist Township enrolled into the Federation of Canadian Municipalities' (FCM) Partners for Climate Protection Program (PCP), joining over 350 municipalities across Canada have committed to undertaking local action on climate change. The ResiLienT Loyalist Township Climate Action Plan follows this commitment by setting goals for GHG emissions across various sectors while outlining the steps needed to achieve them.

These goals and actions presented in this plan stemmed from engaging with residents, stakeholders, and Township staff alike, and were developed with a commitment to respect taxpayer dollars while maintaining or exceeding existing levels of services. Results from the consultation process indicated a high level of support for initiatives pertaining to sustainable land use, waste reduction, and transportation. Furthermore, historical concerns around high utility costs raised by residents suggest that energy reduction and water conservation could be well received by the community if incorporated into this plan. This feedback, combined with research and technical analyses, was used to develop thirty-three goals and actions across six priority sectors. Some of the initiatives discussed in this plan will require a significant amount of public feedback and the development of robust funding strategies, while others rely technologies that are just starting to emerge on the market. As such, they will gradually be implemented over the 10-year period covered by this document, as appropriate.

Priority Sector	Goals
Sustainable Land Use	Meet the current and future needs of the Loyalist Community while incorporating practices that will protect the environment and support local agriculture.
Waste Reduction	Divert waste away from landfill and promote a circular economy
Transportation	Provide residents with enhanced transit services and promote the uptake of low-carbon fuels in vehicles, all while maintaining expected levels of service.
Buildings	Increase the energy efficiency of existing residential, commercial, and municipal buildings, and promote the construction of new buildings designed to exceed existing energy standards.
Water and Wastewater	Reduce residential water usage and the amount of energy required to treat, distribute, or collect water and wastewater.
Other	Undertake initiatives which may not have a direct and quantifiable impact on GHG emissions in Loyalist, but that will contribute to a culture of climate action while promoting community resiliency and financial sustainability.

The proposed initiatives have the potential to reduce emissions in the Waste, Buildings, Transportation, and Water and Wastewater sectors from a combined 102,127 to 86,210 tCO₂e between 2016 and 2030, as illustrated in Figure 1 below. The initiatives presented in the “Sustainable Land Use” and “Other” priority sectors are also expected to contribute to a reduction in GHG emissions in the community, however these were not quantified in this plan.

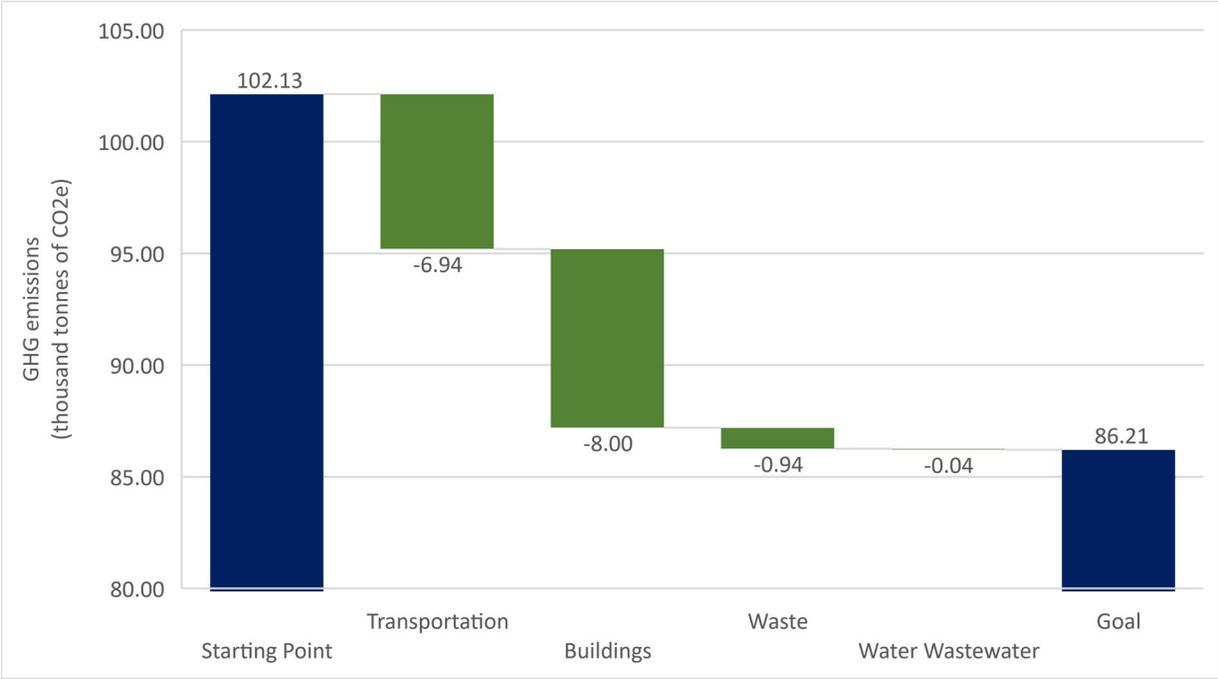


Figure 1 - GHG reduction potential of proposed initiatives, broken down by sector

The commitments of local manufacturing industries to reduce their emissions will further contribute to the projected overall reduction in greenhouse gases in Loyalist Township. When combined, the emissions across all sectors are expected to decrease by 25%, from 874,949 to 652,066 t CO₂e between 2016 and 2030.

Setting GHG reduction targets are an important component of climate action but these numbers and calculations are just one piece of the puzzle. Ultimately, goals, initiatives, and effective policy are what will be needed to implement meaningful change, stabilize the concentration of greenhouse gases in the atmosphere, and slow down global warming. However, it must be understood that meeting basic human requirements will almost always outweigh taking care of the environment. And yet, the two causes are not mutually exclusive. A climate conscious local government can build a cleaner, competitive economy while still being fiscally prudent and revenue generating. Furthermore, climate resilience not only saves money, but it also enhances opportunities for smart growth and the creation of sustainable jobs.

The proposed actions presented in this Climate Action Plan are what will allow Loyalist Township to achieve a 25% reduction in GHG emissions below 2016 levels by 2030, while contributing to improved local environmental, economic, and social outcomes. By championing climate action in the community and in leading by example, Loyalist Township as a municipality can encourage businesses and residents to challenge the status quo in search of solutions for a sustainable future.

By the Numbers

		% change over 2016
Population, 2016	17,390	
Population, 2031	20,430	+17%
Households, 2016	6,430	
Households, 2031	8,210	+28%
Total Emissions, 2016	874,949 t CO ₂ e	
Projected Total Emissions under Business-as-Usual Scenario, 2030	688,321 t CO ₂ e	-21%
Projected Total Emissions under Proposed Scenario, 2030	652,066 t CO ₂ e	-25%
Per Capita Emissions, 2016	50.3 t CO ₂ e	
Per Capita Emissions under Business- as-Usual Scenario, 2030	33.7 t CO ₂ e	-33%
Per Capita Emissions under Proposed Scenario, 2030	31.9 t CO ₂ e	-37%
Waste Sent to Landfill, 2016	117 kg/year	
Waste Sent to Landfill under proposed scenario, 2030	70 kg/year	-40%
Average daily potable water residential use per capita in serviced areas, 2016	275 Litres/day/capita	
Average daily potable water residential use per capita in serviced areas under proposed scenario, 2030	200 Litres/day/capita	-27%

PART I: CURRENT CONTEXT



Image Source: Susan Corbett



A Climate Emergency

Climate change has been defined as one of the great challenges of the 21st century. Global warming, driven by increases in human-generated greenhouse gas (GHG) emissions, has led to more frequent and extreme weather events, impacting both human and wildlife habitats¹.

The evidence linking human activity to global warming has been studied and clearly understood for over 30 years. Beginning with the United Nations Framework on Climate Change in 1992, governments from over 150 countries have been working together to address climate change. International agreements and treaties have been updated over time, the most recent iteration taking the form of the Paris Agreement in 2015. These agreements have one common goal: to stabilize greenhouse gas emissions in the atmosphere before they reach catastrophic levels. Countless models predict that, barring any major reductions in worldwide emissions, the impacts of climate change will continue to grow, before passing a point of no return².

Understanding how individuals respond to climate change has only recently become a field of study by social scientists. The invisible and slow-moving nature of climate change, combined with the magnitude of the effort needed to properly address it, are among the psychological barriers that minimize the general population's response to global warming. Studies have shown that climate action can be impeded by the belief that climate change is beyond personal control, leading to a perception of climate change helplessness³.

Competing priorities, including economic crises, job loss, or global conflicts, can detract from the response to climate change, even if the latter can be linked back to these crises, either directly or indirectly. Ultimately, it must be understood that meeting basic human requirements often outweigh taking care of the environment, even if the two causes are not mutually exclusive.

The ongoing coronavirus pandemic is an appropriate illustration of this hypothesis. COVID-19 dominated the headlines of 2020, displacing the youth-led climate movement that was gradually beginning to take shape. The consequences of the pandemic, and the economic crises that quickly followed, were immediately felt across the world, prompting unprecedented levels of action from governments, private corporations, and communities. The impacts of climate change have the potential to be just as devastating to human life and the global economy as COVID-19. However, the same sense of urgency and willingness to come together towards climate action is not always present.

¹ Government of Canada. (2020). *Canada.ca*. Retrieved from *Greenhouse gas emissions: drivers and impacts*

² Intergovernmental Panel on Climate Change - *Special Report Global Warming of 1.5 degrees celcius*

³ Salomon, E., Preston, J. L., & Tannenbaum, M. B. (2017). *Climate change helplessness and the (de)moralization of individual energy behavior*. *Journal of Experimental Psychology: Applied*, 23(1), 15–28.

The COVID-19 pandemic and climate change share several similarities. Both have led to preventable losses of life and both have disproportionately impacted our most vulnerable populations, highlighting social inequities that have been present for centuries. The responses required to successfully address these crises can be aligned, presenting an opportunity to create a more sustainable, equitable, and prosperous post-pandemic future that will protect the planet while improving the quality of life of its residents.

The ResiLienT Loyalist Township Climate Action Plan was developed with these values in mind. This made-in-Loyalist plan presents local solutions to a global problem and prioritizes opportunities that can be leveraged to improve economic, social, and environmental outcomes in the community. Many of the initiatives presented in this plan build on work that is already being done in Loyalist, with the community consultation process highlighting a multitude of local champions who are already doing their part in the fight against climate change. The shared stories, combined with the level of enthusiasm demonstrated by the community on this topic, are enough to make one hopeful that, together, we can build a more ResiLienT future in Loyalist Township.

The acronym GHG, greenhouse gas, will be frequently used throughout this document. It describes the different types of gases which, when released into the atmosphere, contribute to global warming. Gases like carbon dioxide, methane, or nitrous oxide all behave differently in the atmosphere and have different global warming potentials. They can be compared to each other by converting them to a common unit, commonly expressed in terms of tonnes of carbon dioxide equivalent (t CO₂e).

Impacts of Climate Change

Weather-related disasters in Canada are not a new concept. Extreme weather events have resulted in property damages in the past, however, changing climatic conditions have increased their frequency and severity. Insurance payout rates and disaster spending from various levels of government, when used as an indicator for the cost of weather-related events, demonstrate a significant rise in the number of annual catastrophic weather events, as well as their costs. The impact of extreme weather events brought on by climate change over the past decade were twice as high as those from all other decades on record put together, with insured losses totalling over \$18 billion between 2010 and 2019⁴.

The impacts of climate change go beyond economical consequences, frequently leading to damages which can not be quantified with a price tag. Extreme weather events can impact the livelihood of Canadians, causing harm to properties and homes alike through floods, fires, declines in water supplies, or reduced agricultural yields. More importantly, negative impacts on human health and quality of life have also been linked to climate change due to factors such as decreased air quality, higher frequencies of heat waves, or the increased transmission of vector-borne diseases, among others. These consequences are more likely to disproportionately affect vulnerable and marginalized populations such as children, seniors, people living in poverty, or indigenous peoples. This can be attributed to increased exposure and susceptibility of these groups to the impacts of climate change, along with a decrease in their ability to cope and recover from damages.

It should be noted that not all aspects of climate change are necessarily bad, nor that they will always result in economic losses. Longer growing seasons and a reduced need to heat buildings in the winter months

⁴ Canadian Institute for Climate Choices (2020). *Tip of the Iceberg: Navigating the Known and Unknown Costs of Climate Change for Canada*.

could provide a positive economic impact, however these will likely be offset by long term consequences. For example, longer growing seasons may be accompanied by increased floods or longer summer droughts, negating any impact which might be felt by the agricultural sector.

The examples listed above are only some of the predicted impacts that have already occurred due climate change, and that will likely continue over the next few decades. However, long-term societal, economical, and environmental effects are not yet known and will likely compound over time. As such, governments, policy makers, local leaders, and communities alike should adapt to a future that has already been shaped by climate change and should work together to find ways to address current impacts while becoming more resilient and preparing for future disruptions.

Local Projections

The Climate Atlas of Canada provides historical data and high-resolution models which can be used to illustrate how the climate of individual regions across the country has changed, while presenting likely outcomes for the future based on different scenarios. Table 1 below summarizes historical and projected data under a High Carbon Scenario which assumes that very large amounts of GHG emissions continue to be emitted. Historical mean values for data collected between 1976 and 2006 are compared to low, mean, and high projections for the next 30 years.

Table 1 - Historical and projected values for weather data in Loyalist Township - Climate Atlas of Canada

Variable	Period	1976-2006	2021-2050		
		Mean	Low	Mean	High
Precipitation (mm)	annual	875	779	934	1100
Mean Temperature (°C)	annual	6.7	7.5	8.9	10.2
Mean Temperature (°C)	spring	5.6	5.2	7.5	10
Mean Temperature (°C)	summer	19.2	19.9	21.3	22.8
Mean Temperature (°C)	fall	8.7	9.3	10.9	12.6
Mean Temperature (°C)	winter	-6.9	-7.4	-4.5	-1.6
Tropical Nights	annual	4	5	13	24
Very hot days (+30°C)	annual	9	10	26	42
Very cold days (-30°C)	annual	1	0	0	1
Last Spring Frost (date)	annual	May 1	Apr 6	Apr. 22	May 6
First Fall Frost (date)	annual	Oct 8	Oct 6	Oct 20	Nov 3
Frost-Free Season (days)	annual	156	156	178	203

As demonstrated by the above table, annual precipitation rates are projected to vary over the coming years increasing the likelihood of flooding or droughts. Mean temperatures are expected to increase, bringing with them the potential for prolonged heatwaves which could result in negative health outcomes.

A useful indicator to evaluate the impacts of climate change on local weather patterns is to track the number of heating and cooling degree days in a given year. A Heating Degree Day (HDD) is a term used to quantify the frequency and magnitude of days during which heating will be required in buildings, expressed as the number of degrees that a day's average temperature is below 18°C. Conversely, a Cooling Degree Day (CDD) describes the frequency and magnitude of days during which buildings will require cooling, expressed as the number of degrees that a day's average temperature is above 18°C. As demonstrated in

Figure 2, the number of HDD in Loyalist Township are projected to decrease over the next 30 years, while the number of CDD are projected to increase.

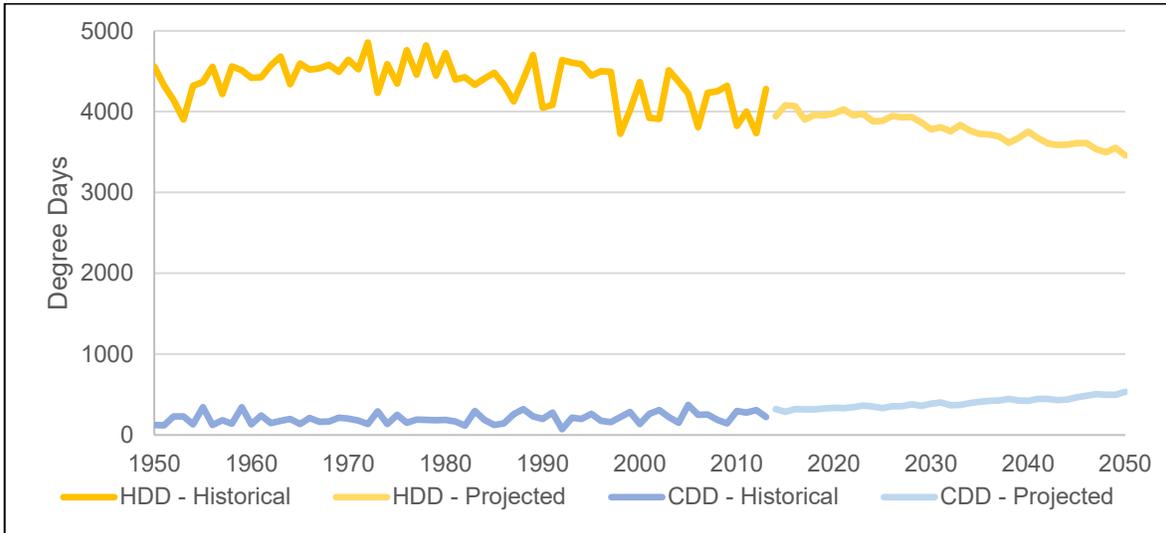


Figure 2 - Historical and forecasted heating and cooling degree days in Loyalist Township between 1950 and 2050

The models developed by the Climate Atlas of Canada demonstrate the impacts that climate change could have on local weather patterns. A gradual increase in temperature will reduce heating requirements in the winter and could lengthen agricultural growing seasons, however, these benefits will be significantly outweighed by the potential for floods, droughts, and periods of extreme heat.



Image Source: Spencer Gaudet

Canada's International Commitment

On December 12, 2015, Canada and 194 other countries developed the Paris Agreement. This legally binding treaty set a goal of limiting global warming to well below 2°C below pre-industrial levels, while pursuing efforts to limit the increase to 1.5°C.

The Paris Agreement represents a willingness for international cooperation between governments to mitigate the long-term impacts of climate change, while also recognizing the essential roles of local and regional governments, the private sector, and financial institutions. The rights of Indigenous peoples, local communities, human rights, and gender equality are also highlighted by the Agreement as factors that must be considered when taking action against climate change.

More recently, Environment and Climate Change Canada published an updated climate plan, titled: *“A Healthy Environment and a Healthy Economy – Canada’s strengthened climate plan to create jobs and support people, communities, and the planet”*. This document, which was released in December 2020, builds on the Pan-Canadian Framework on Clean Growth and Climate Change and explains the Federal Government’s strategy to achieve net-zero emissions by 2050 while building a healthy economy. The plan contains 64 new federal policies, programs, and investments which will be implemented in the near and long-term future. It also provides a commitment to engage with provinces, territories, and municipalities alike to advance regional priorities.

The ResiLienT Loyalist Township Climate Action Plan was developed with the intent of aligning with Canada’s priorities on Climate Action. The goals and initiatives outlined in this document represent the Township’s first steps towards acting on Climate Change while promoting a healthy local economy and respect for taxpayer dollars. Future iterations of this plan will build on previous efforts, with the eventual goal of contributing to the Federal Government’s target of net-zero emissions by 2050.

The Role of Municipalities

In Canada, over half of all GHG emissions are under the direct or indirect control of municipalities⁵. As such, local communities can play a key role in helping achieve the goals of the Paris Agreement, as well as Federal GHG reduction targets.

Municipal governments have closer relationships with residents, businesses, and institutions than their provincial or federal counterparts, making them well suited to facilitate change more rapidly. Furthermore, community based GHG reductions initiatives can be implemented at a relatively low cost, often resulting in neutral or even positive returns on investment, while simultaneously providing social and economical co-benefits⁶.

Over 350 municipalities across Canada have committed to undertaking local action on climate change through the Partners for Climate Protection program. Loyalist Township joined this network of Canadian municipalities October 2017 and has thenceforth been taking on climate action.

⁵ ICLEI - Local Governments for Sustainability and the Federation of Canadian Municipalities. (2018). Partners for Climate Protection - National Measures Report 2018

⁶ Federation of Canadian Municipalities. (2009). Act Locally - The Municipal Role in Fighting Climate Change. Ottawa.

Climate Action Benefits

Effective climate action typically requires the implementation of mitigation and adaptation initiatives at the local level. The effects of global warming can be mitigated by reducing emissions and stabilizing the concentration of greenhouse gases in the atmosphere, but communities will also need to adapt to the impacts of climate change currently being felt across the planet. However, with proper planning, climate action can also result in a wide range of environmental, economic, and social benefits.

Effective climate action can contribute to improved air and water quality, protect ecosystems, and preserve natural wildlife habitats. In addition to acting as a carbon sink, the natural environment can also contribute to climate adaptation. Nature is also a part of Canada's identity and is enjoyed by all, regardless of age or income level. This was especially true during the COVID-19 pandemic, when outdoor activity proved to be an invaluable source of mental, physical, and community health for Canadians.

From an economic perspective, investing in energy efficient buildings and infrastructure can lead to improved economic performance. Energy retrofits in buildings will result in operational savings, typically providing a relatively short return on investment and often resulting in the creation of local jobs. On a larger scale, climate change mitigation spending can be considered a sound investment when considering the cost of continuously repairing infrastructure damaged by extreme weather events.

Finally, the social benefits which can be derived from climate action should not be disregarded. Investments in public transit and active transportation networks would benefit commuters that do not have reliable access to a personal vehicle, while increasing interactions between members of the community and improving health outcomes. Equity-based climate action, such as the implementation of policies and initiatives designed to benefit everyone alike, can provide substantial benefits to a community.



Image Source: Loyalist Township



Loyalist Township 2016 Community Profile

Demographics

Loyalist Township is a growing community in Central Eastern Ontario and is one of four lower-tier municipalities that make up the County of Lennox & Addington. Formed on January 1, 1998 through the amalgamation of Amherst Island Township, Ernestown Township, and the Village of Bath, Loyalist Township is a blend of urban and rural areas that covers 340 square kilometers.

The Township is located on the northern shore of Lake Ontario and is connected to surrounding municipalities and the rest of the province by way of Highway 401. The City of Kingston to the east, and the Town of Greater Napanee to the west, exhibit strong economic ties to Loyalist Township. Residents benefit from employment opportunities in these neighbouring municipalities, just as residents from Kingston and Napanee are employed in the Township.

In 2016, Loyalist Township was home to 17,830 residents living in 6,430 households. The majority of this population, approximately 80%, was spread out over the Township's three main urban centres: Amherstview, Bath, and Odessa, with the balance residing on Amherst Island or in rural areas and hamlets⁷.

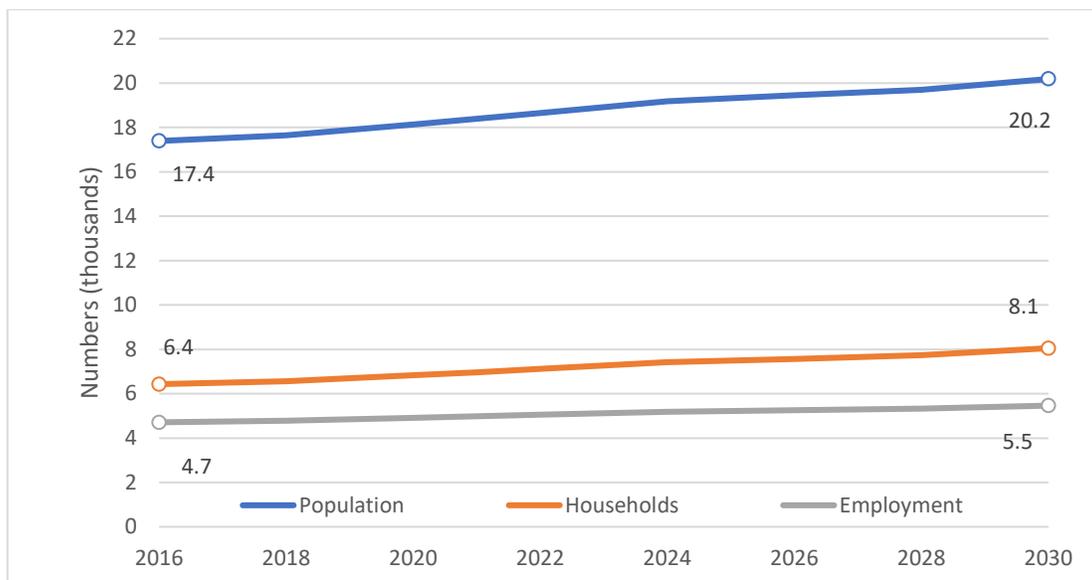


Figure 3 - Projected change in population, households, and employment between 2016 and 2030⁷

⁷ Hemson Consulting – Loyalist Township Population Housing and Employment Projections (2019)

A housing and employment projections study conducted by the Hemson Consulting Ltd. group in September 2018 found that Loyalist Township experienced moderate growth between 2001 and 2016, with housing growth outpacing population growth. The disparity between these growth rates can be attributed to a reduction in average household size, which is an indicator of an aging demographic. The study projects continued moderate growth between 2016 and 2046, with housing growth predicted to outpace population due to a continued anticipated decline in average household size. Modest employment growth is also expected over the same period, reflecting a continued shift towards service-based sectors and growth in traditional industries (Hemson Consulting Ltd., 2019). Figure 3 above illustrates the projected population, household, and employment growth rates in Loyalist Township over the period covered by the ResiLienT Loyalist Township Climate Action Plan.

A review of commuting flows in and out of Loyalist Township suggests that a large portion of Township residents are employed outside of the municipality, with the vast majority traveling to the City of Kingston for work. Commuters originating from surrounding municipalities also travel into Loyalist daily, however the overall net commuting flow indicates that more people leave the Township for work purposes than come into it, as illustrated in Figure 4.

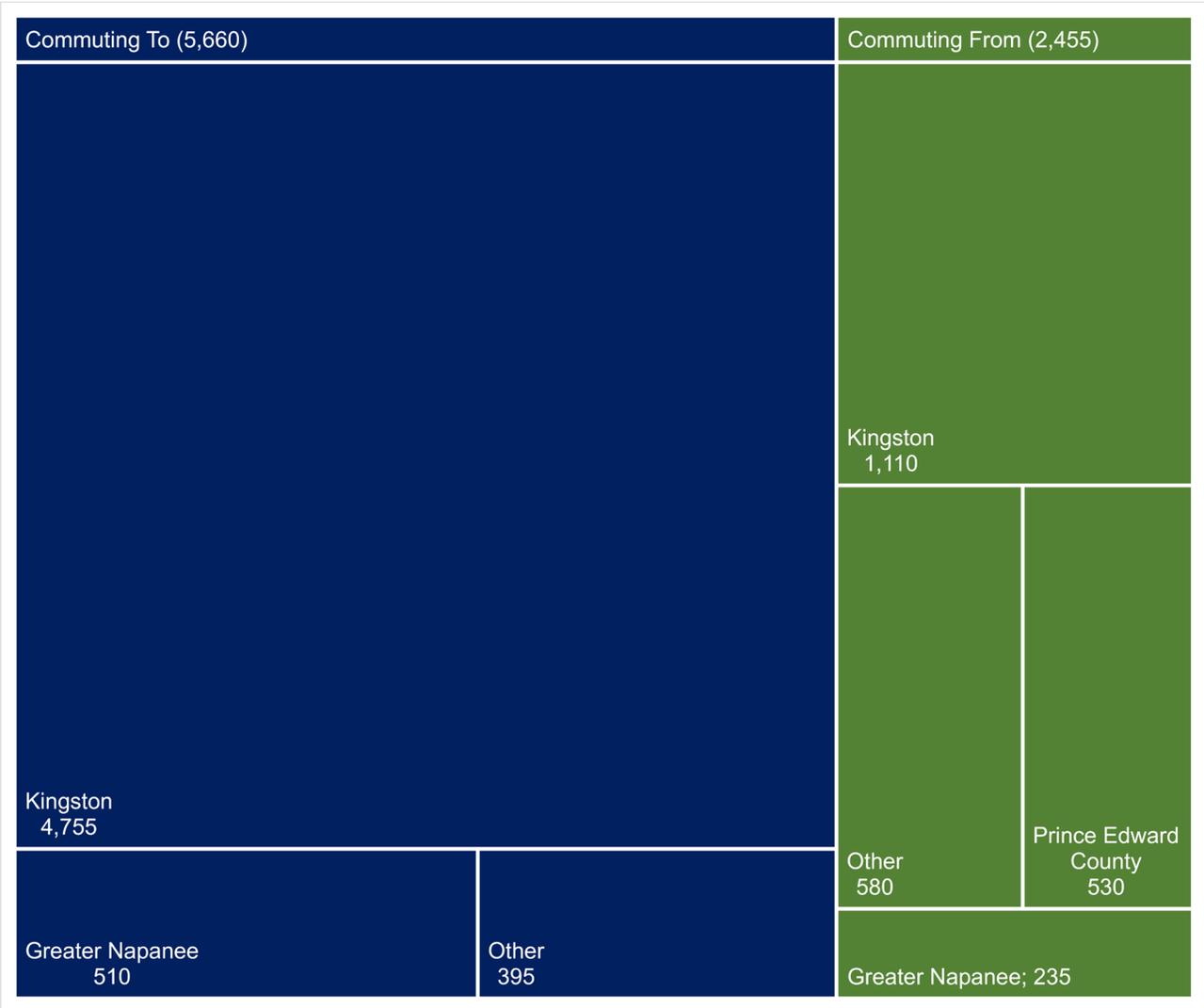


Figure 4 - Origin and destination of commuters in and out of Loyalist Township

Energy Use

Energy in the community comes from a variety of different sources and is used to operate buildings, infrastructure, and vehicles. The Sankey diagram in Figure 5 illustrates the flow of energy in Loyalist Township during the baseline period, from its source to its end use sector. The vertical bars in the diagram are proportional to the amount of energy produced or used in each category.

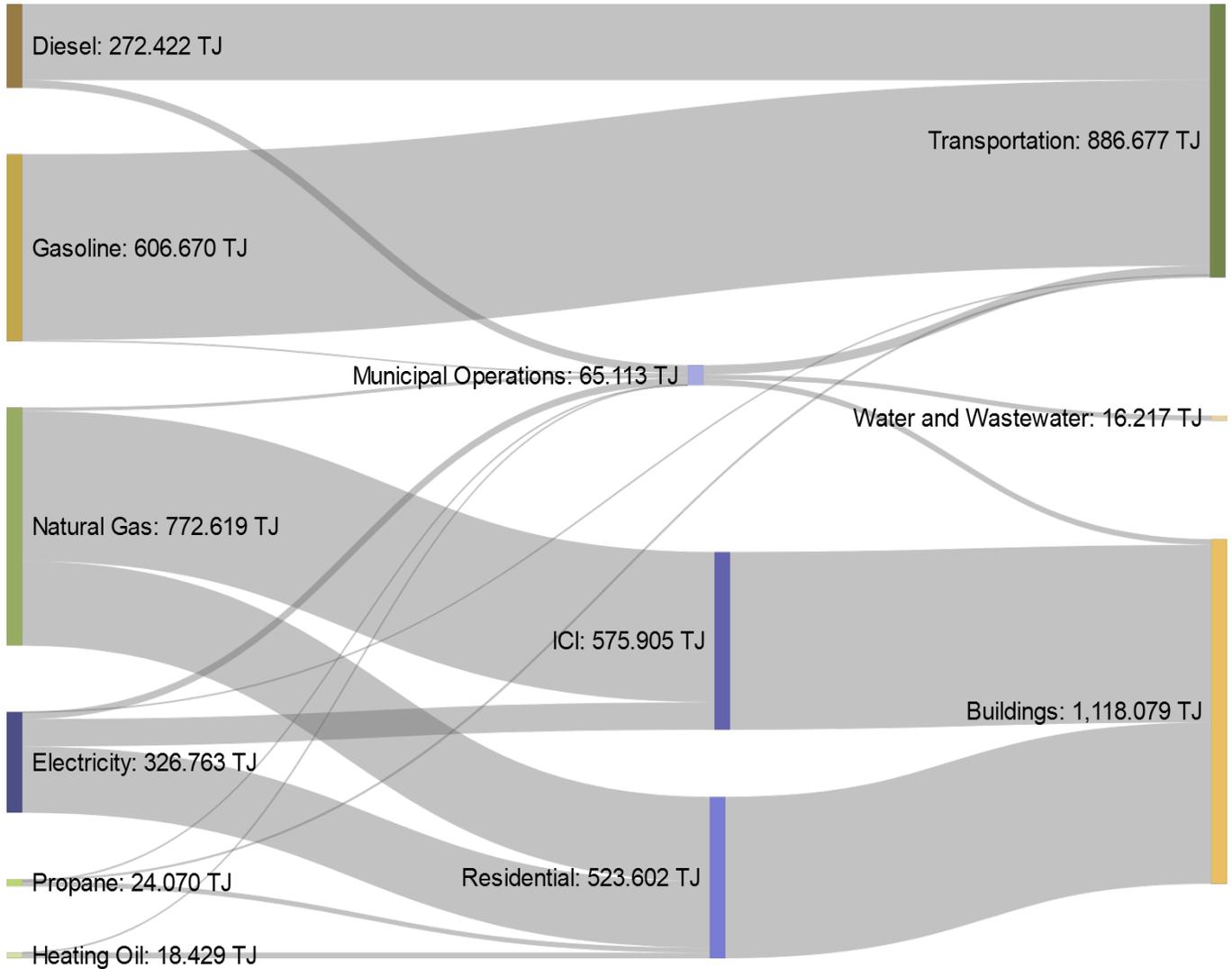


Figure 5 - Sankey diagram of energy flow from source to destination in baseline scenario

Approximately 100 GJ of energy, or 2,700 m³ of natural gas, is required to heat a new, average-sized single detached home in Canada for one year.

(source: Natural Resources Canada – Natural Gas: A Primer)

As noted in Figure 5, the main energy sources in Loyalist Township include diesel, gasoline, natural gas, and electricity, with propane and heating oil also being used, although at a much lower rate. These sources of energy can be evaluated based on their cost as well as by the amount of GHG emissions they produce. Figure 6 compares the price of, and the GHG emissions generated by, electricity, natural gas, gasoline, diesel, and heating oil per Gigajoule of energy consumed.

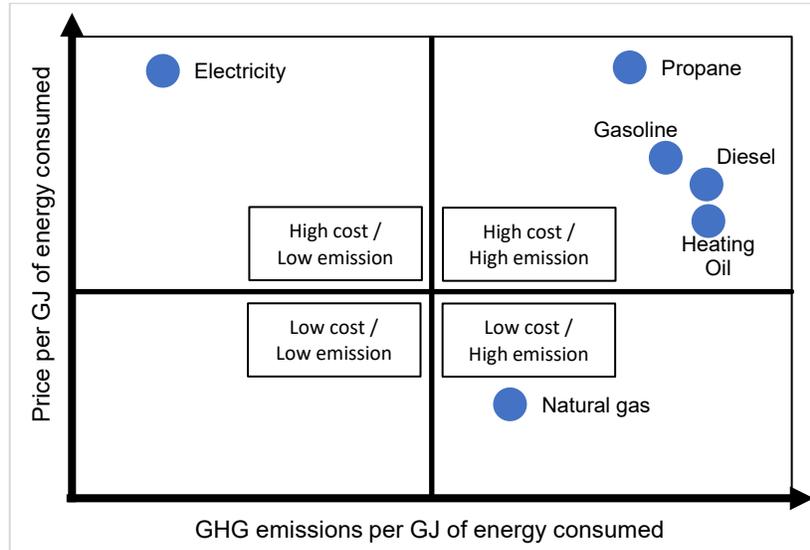


Figure 6 - Emissions intensity and Cost per GJ of energy consumed for various energy sources⁸

Approximately 96% of the electricity produced in Ontario originates from zero-carbon emitting sources⁹, resulting in an energy source with a very low carbon intensity. However, the cost of electricity is higher than almost any other source of energy, making it cost prohibitive for certain applications like space heating. Conversely, the recent increase in natural gas supply has made it one of the cheapest sources of energy available, however the emissions associated with its use are considerably higher than those of electricity. Gasoline, diesel, propane, and heating oil all fall in the High cost / High emissions category, making them relatively inefficient sources of energy both in terms of price and emissions intensity. Advances in technology have led to a significant increase in the affordability and deployment of renewable energy sources, such as wind, solar, and biogas. These systems are expected to become more available soon, resulting in additional low-carbon options to meet energy needs¹⁰.

The use of one energy source over another depends on a variety of factors, such as availability and affordability. For example, the lack of natural gas infrastructure combined with the high price of electricity in rural areas presents relatively few options for space heating in homes. As such, the use of high-emission heating fuels such as propane or heating oil in these dwellings may not necessarily be a choice, but rather a requirement. Presenting homeowners with clean and, more importantly, affordable alternatives to meet basic requirements such as space heating is therefore a necessity when looking to transition to clean energy.

⁸ Natural Resources Canada – Energy Sources, Average Retail Price

⁹ Canada Energy Regulator – Provincial and Territorial Energy Profiles

¹⁰ Canada Energy Regulator – Technology Case Results



Image Source: Susan Corbett

Baseline Emissions

The baseline emissions inventory for Loyalist Township, established in accordance with the Partner's for Climate Protection protocol, accounts for GHGs produced through transportation, residential, and Industrial/Commercial/Institutional (ICI) activities, as well as through municipal operations. The scope of this inventory covers the Waste, Transportation, Buildings, and Water and Wastewater sectors, as well as Manufacturing and Energy industries. The Sankey diagram in Figure 7 illustrates the flow of GHG emissions which occur within the boundaries of Loyalist Township, from their energy source to their eventual end use. The size of the vertical bars in the diagram is proportional to the mass of carbon dioxide emitted by each particular source.

Almost 875,000 tonnes of carbon dioxide equivalent (t CO₂e) emissions were produced within the Loyalist Township boundary in 2016, or approximately 50.2 t CO₂e per capita. This figure is over 2.5 times higher than the national average¹¹, however this can be explained by presence of the LaFargeHolcim Cement Plant in the Village of Bath, which accounts for 85% of the emissions in the Township's inventory.

¹¹ Government of Canada. (2020). *Greenhouse gas sources and sinks in Canada – executive summary 2020*

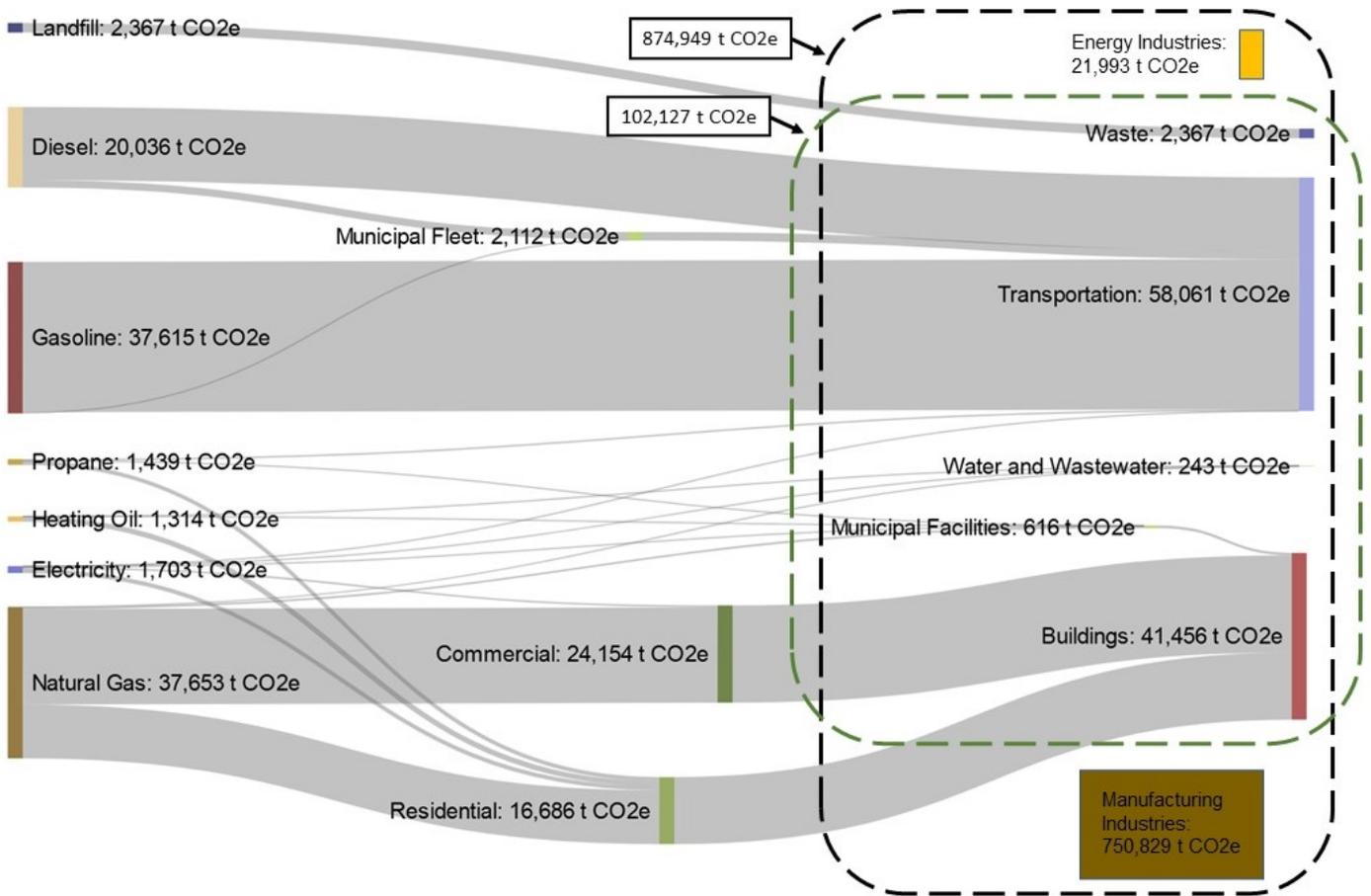


Figure 7 - Sankey diagram of GHG emissions in Loyalist Township in 2016

1,000 metric tonnes of CO₂e is the equivalent of 4,000,000 km in an average passenger vehicle and requires 1,300 acres (5.3 km²) of forest to be sequestered.

(source: US EPA – GHG Equivalences Calculator)

Due to the limited availability of reliable information when developing the baseline scenario, the emissions inventory included data from municipal operations that were collected in 2016, while the transportation, residential, and ICI sectors included data from 2017.

This report assumes that GHG emissions between these two years will not have changed substantially and that 2017 emissions data in the transportation, residential, and ICI sectors is applicable to 2016. As such, GHG inventories and forecasts included in this report will reference 2016 as a baseline year.

Trends & Forecast

Future GHG emissions in Loyalist Township can be estimated under a Business as Usual (BAU) forecast which assumes that no local climate action will be undertaken by the community. These forecasts consider several factors, such as emissions in a baseline year and predicted population growth rates.

Under Loyalist Township's BAU scenario, illustrated in Figure 8, emissions in the Waste, Buildings, Transportation, and Water and Wastewater sectors are predicted to increase by 20% between 2016 and 2030. Conversely, emissions in the Manufacturing and Energy Industries sector are projected to decrease by 26% over the same period. This reduction in emissions can be attributed to two factors:

- the Northland Power Kingston Generating Station, located in the Taylor Kidd Industrial Park was shut down in 2017, eliminating GHG emissions associated with this sector; and
- Emissions associated with the cement plant in the Village of Bath are projected to decrease as part of LaFargeHolcim's corporate Net Zero efforts, which include a 2030 interim target that is estimated to amount to a 25% reduction in emissions.

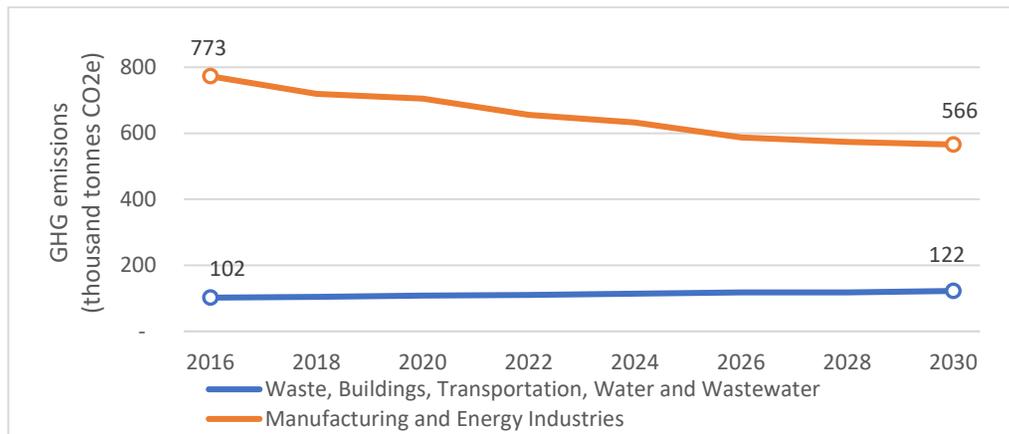
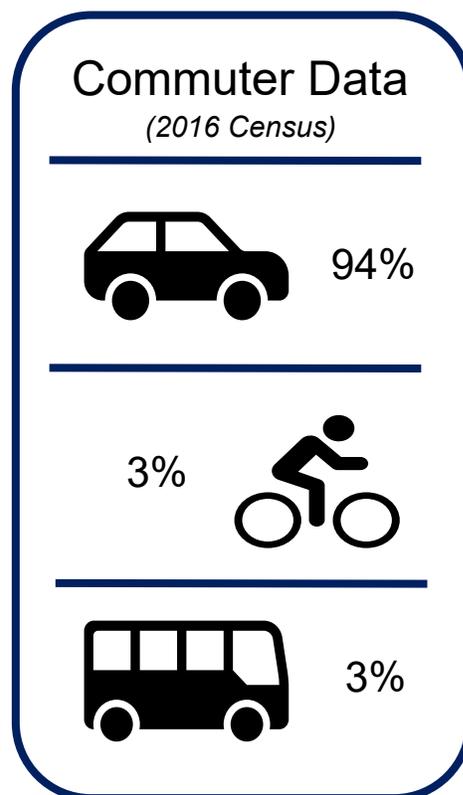
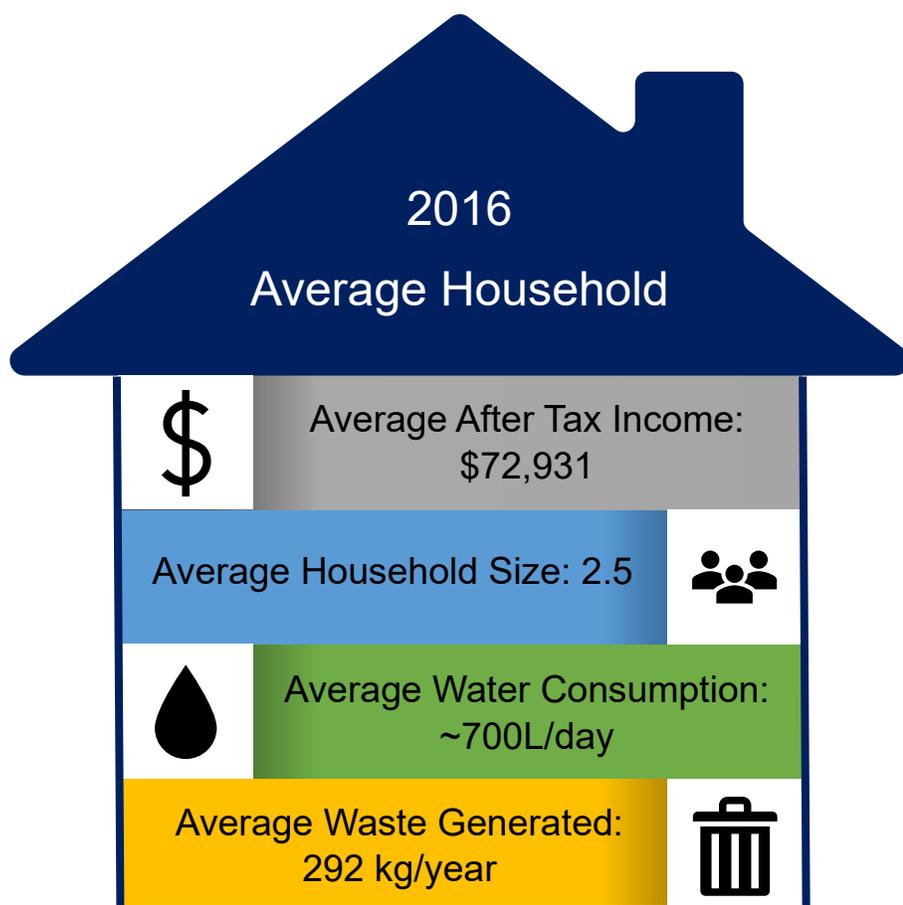


Figure 8 - BAU Forecast for GHG emissions in the Loyalist Township boundary

Total GHG emissions in Loyalist Township are projected to decrease from approximately 875,000 to 688,000 t CO₂e between 2016 and 2030. However, these figures are skewed by the global efforts of LaFargeHolcim which will occur irrespective of the Township's climate action efforts. The ResiLienT Loyalist Township Climate Action Plan will focus on actions that can be taken to reduce GHG emissions at the local level, specifically through the implementation of initiatives in the Waste, Buildings, Transportation, and Water and Wastewater sectors

Loyalist Township – Summary

	2016	2030 (projected)
Population	17,390	20,430
Households	6,430	8,210
Employment	4,710	5,530
Average Household Size	2.5	2.3
Total emissions ¹²	874,949 (102,127) t CO2e	688,321 (122,465) t CO2e
Emission per capita ¹³	50.3 (5.9) t CO2e	33.7 (6.0) t CO2e
Total Waste Generated	2,031 tonnes/year	2,390 tonnes/year



¹² Figures in bracket indicate emissions associated with the Waste, Buildings, Transportation, and Water and Wastewater sectors, separate from manufacturing and energy industries.

Climate Change Impacts Specific to Loyalist Township

Increased freeze-thaw cycles

Rising temperatures, heat waves and drought

Health Related (ticks, pandemics, other insect outbreaks)

Smog and acid rain

Stormwater system overload

Increased blackouts on the electricity grid

Extreme Weather (flooding, drought, heat, rain, increased fires, declining water supplies, reduced agricultural yields)

Abnormal weather patterns

High water levels

Loss of property or property damage from flooding

Increased wear and tear on roads caused by frequent freeze thaw cycles as well as flooding and road washouts

PART II: VISION & GUIDING PRINCIPLES



Image Source: Cody Stafford



An integrated approach to climate action

Addressing climate change will require significant and meaningful reductions in GHG emissions. Locally, this will necessitate transitioning to clean energy sources while simultaneously reimagining concepts like land use, urban development, transportation, infrastructure, and the economy. However, with proper planning and sufficient foresight, climate action can improve the quality of life of residents while creating new jobs and helping the environment.

The ResiLienT Loyalist Township Climate Action Plan is meant to undertake a systems approach to this complex problem, while enriching existing operations strategies and other corporate tools. This plan will support, enhance, and align with strategic goals and desired corporate outcomes that focus decision-making on sound policy decisions. The plan has line-of-sight to several Township documents, including but not limited to the following plans and strategic documents:

- The Strategic Plan, which outlines Council’s strategic objective of being “a municipal leader in climate action and environmental stewardship”.
- The Asset Management Plan, which focuses on the replacement and renewal of Township infrastructure
- The Official Plan, which is currently being updated to include goals, objectives, and policies focused on community resilience as well as climate change adaptation and mitigation.
- The Infrastructure Master Plan, which will be used to inform future growth decisions including infrastructure additions or interventions required due to growth pressures, remedial needs, regulatory requirements, technology improvements, or climate action.
- The Service Delivery Review which was conducted in 2020 and assessed and recommended opportunities to be more efficient and effective in the sustainable delivery of municipal services.



Figure 9 - Line of Sight to Loyalist Township Documents



Community resilience

Pandemics, floods, and forest fires are just some of the increasingly frequent and severe impacts of climate change that threaten local communities around the world. By anticipating and adapting to these events, communities can create a resilient network of infrastructure and systems that will improve their long term environmental, economic, and social outcomes.

A core characteristic of a resilient community is its adaptive capacity, which refers specifically to the social, human, institutional, and economic resources within a system that determine its ability to adapt to change. Furthermore, a recognition that human health and economic priorities must be balanced with their true cost or benefit to the natural world is also needed. To that end, an integrated approach should be taken when considering climate stressors, in both human and environmental terms.

At the local level, the resiliency of a community is best served by integrating human and ecological needs in both short term risk assessments and preparation measures, as well as through long term innovation and sustainability to aid in recovery and, optimally, improvement. To do this involves working closely with important partners, such as conservation authorities, to empower citizens, local leaders, and stakeholders to support sound, current, evidence-based decisions affecting the community and its future.

The role of natural systems, along with the ability of community members and governments to acknowledge the power of nature, are critical to the long-term health of communities in dealing with future challenges, including those associated with climate change. Communities that have supported natural assets through environmental conservation and stewardship will be more resilient and better able to adapt to future unknowns¹³. In addition, building resilience will reduce lost productivity and economic losses in the face of climate-related influences or disasters.

A comprehensive understanding of Loyalist's unique complexity is critical. Such an understanding involves looking at existing and potential vulnerabilities in our local economy and helping to encourage improvements that respect livelihoods while improving climate resiliency and adaptive capacity.



¹³ *Planning for Rural Resilience: Coping with Climate Change and Energy Futures*



Building back better

At the core of progressive climate action is a recognition that significant change is required in response to the serious and interconnected challenges faced by communities. Business as usual will not suffice, not least of all because many conventional systems are the direct cause of problems like climate change itself. Multiple critical lenses can be used to approach conventional problems in an unconventional manner, with the goal of building back better than before as part of resilience efforts.

As a product of climate change, a pandemic like COVID-19 provides a case study in the need to build back better. For example, COVID-19 has laid bare why a social justice lens is unquestionably vital to building better resiliency to climate related challenges. For instance, in Ontario, as in most other jurisdictions, the transmission of COVID-19 is largely workplace related, and persons with lower paying jobs with fewer supports such as paid sick leave, are at increased risk of infection. What is clear is that creating resilience involves protecting the most vulnerable in our society. Issues like equity and inclusivity are no longer simply political talking points, but instead represent important analytical tools that have practical impact in building a better, more resilient society. What is encouraging is that the pandemic has also shed light on the tremendous capacity for rapid response by the global community. The level of collaboration, compassion, and creativity in problem solving that have been demonstrated so far to address the pandemic will be needed to marshal a global response to address climate change and its ensuing challenges.

Here in Loyalist Township, the ideas and initiatives presented in this Climate Action Plan were developed by keeping two key guiding principles in mind: respecting taxpayer dollars and maintaining levels of service. A climate conscious local government can build a cleaner, competitive economy while still being fiscally prudent and revenue generating. Furthermore, climate resilience not only saves money, but it also enhances opportunities for smart growth and sustainable jobs. By championing climate action in the community and in leading by example, Loyalist Township as a municipality will be able to encourage businesses and residents to challenge the status quo in search of solutions for a better tomorrow.

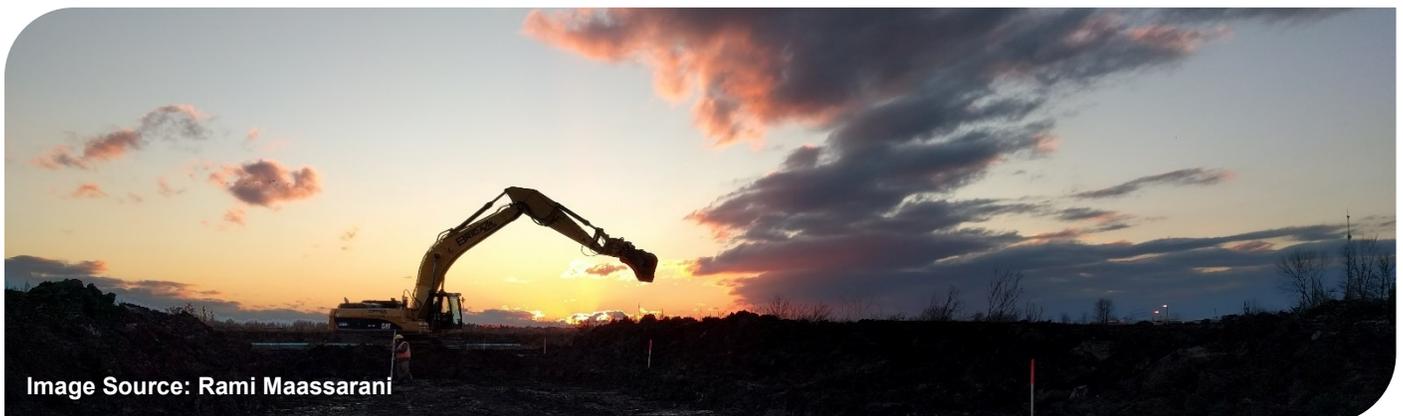


Image Source: Rami Maassarani



An engaged and healthy community

Initiatives as broad-reaching and, at times, abstract as climate action are especially dependant on community action and buy-in if they are to be successful. Effective public engagement allows residents and stakeholders to participate in problem-solving while having a say in decision-making processes, promoting buy-in and ownership over the initiative.

The concept of equity-centred, inclusive community engagement was, and will continue to be, central to the ResiLienT Loyalist Township Climate Action Plan. Special consideration must always be given to gathering input from a representative cross section of the population to create policies and undertake projects which will benefit every group, regardless of age, gender, ability, or background. As such, the ResiLienT Loyalist Township Climate Action Plan was developed in collaboration with the Loyalist Township community and considered input from residents, local businesses, and municipal staff alike.

The goals and actions presented in this plan were chosen not only based on their GHG reduction potential and perceived environmental, social, and economical benefits, but also because they received broad support from key stakeholders. Initiatives presented to the public were prioritized based on gathered feedback, and goals were created by considering comments and concerns from residents. Continued consultation and partnership with community members will be crucial to ensure that the initiatives presented in this plan are implemented to their full potential.

The Spectrum of Public Participation developed by the International Association for Public Participation, along with other best practices, will be used to promote meaningful community engagement. This will involve using the five different levels of engagement (Inform, Consult, Involve, Collaborate, and Empower) while also ensuring that the process is safe and inclusive to all.

Overall, effective engagement has the potential to empower the community to be the change they want to see, with local government providing support where appropriate. To that end, a main goal of the ResiLienT Loyalist Township Climate Action Plan is to create a movement of sustainability which will improve the environmental, economical, and social standing of the Township, while simultaneously creating an engaged, healthy community.



Optimize, Enhance, Replace

The ResiLienT Loyalist Township Climate Action Plan presents a wide variety of actions which can be undertaken in different sectors, all with the goal of reducing local GHG emissions and improving the Township’s social, economic, and environmental status. The proposals presented in this plan were developed with the understanding that meaningful and effective change does not occur overnight, and that existing systems and constraints need to be considered before implementing major initiatives.

As such, an “Optimize, Enhance, Replace” model was used as the basis for this plan. This approach prioritizes the optimization of existing systems ahead of medium and large-scale investments, effectively promoting financial sustainability while working towards lasting improvements of social and environmental services. For example, a reduction in energy usage through energy conservation and efficiency programs will decrease the amount of low carbon fuels needed to supply the remaining demand, reducing the need for retrofits and new infrastructure. Similarly, lowering residential water consumption will result in reduced utility bills for consumers while delaying the requirement for large-scale water treatment plant expansions needed to accommodate population growth requirements. Figure 10 below presents an example of actions which were developed following the Optimize, Enhance, Replace model.

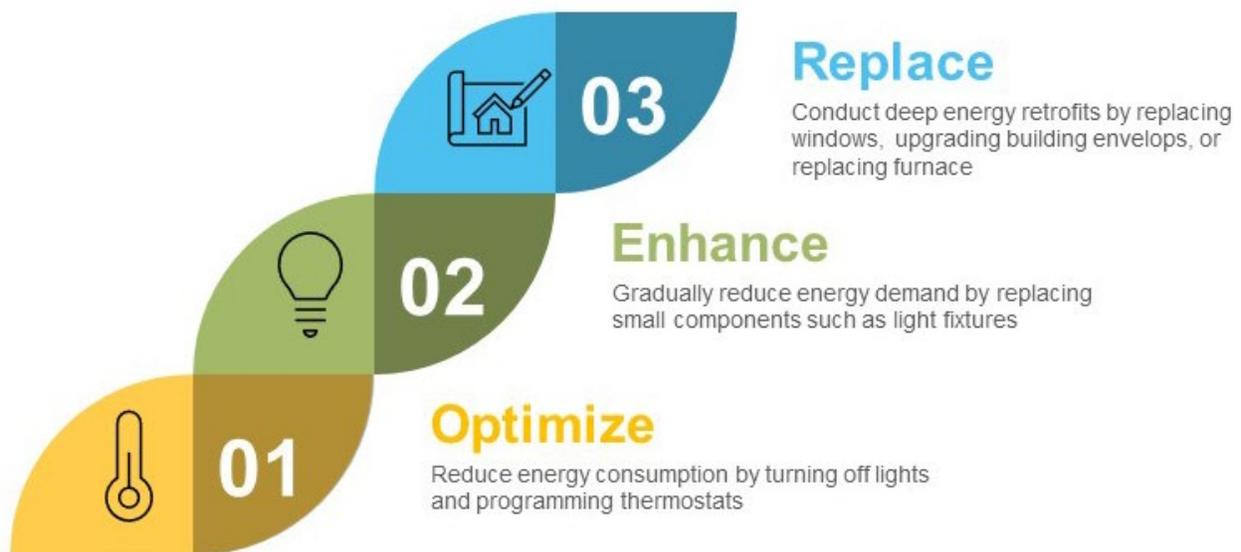


Figure 10 - Use of an “Optimize, Enhance, Replace” model to develop waste reduction strategies

This priority sequence of optimizing, followed by enhancing, and finally replacing will be a recurring theme through Section III of this plan, and will be an important component in ensuring its successful implementation and long-term viability.

PART III: GOALS AND ACTIONS



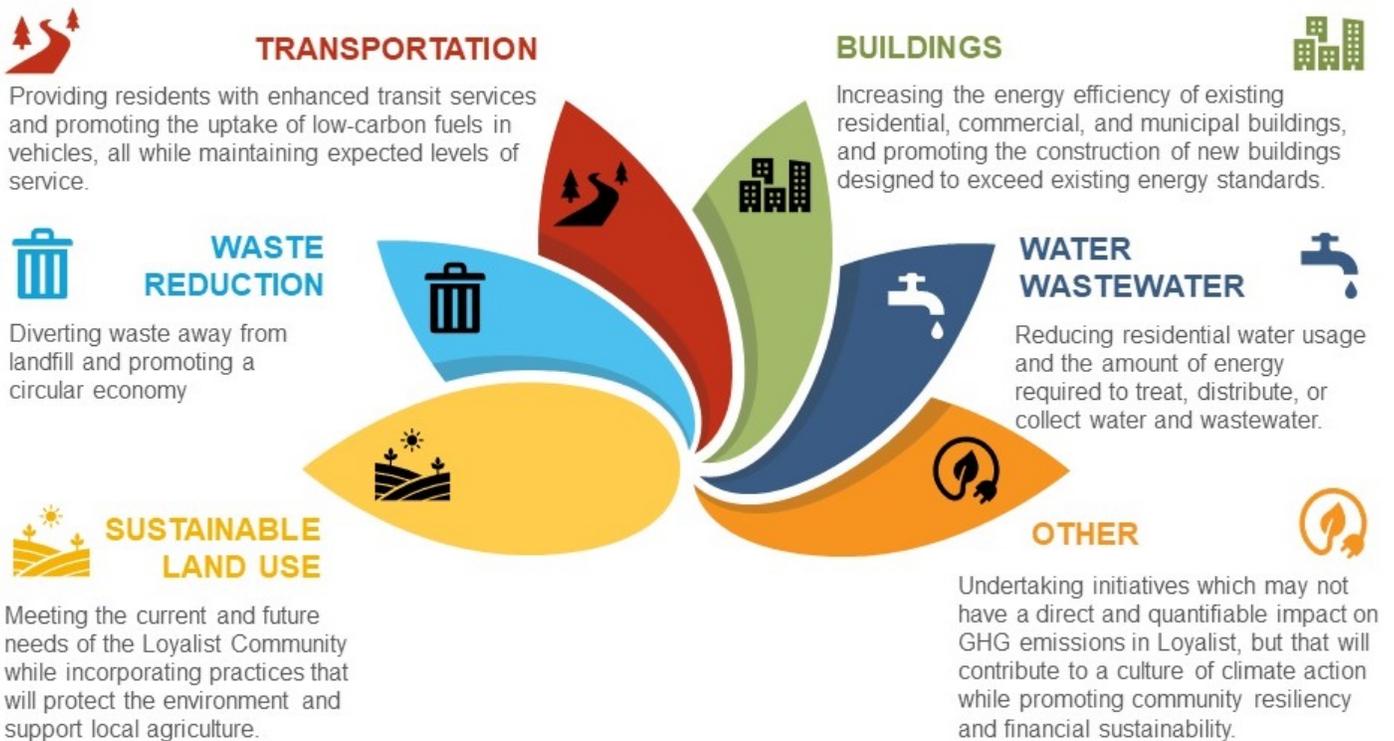
Image Source: Susan Corbett



Priority Sectors

The ResiLienT Loyalist Township Climate Action Plan was developed by engaging residents, stakeholders, and Township staff alike. Results from the consultation process indicated a high level of support for initiatives pertaining to sustainable land use, waste reduction, and transportation. Furthermore, historical concerns around high utility costs raised by residents suggest that opportunities for energy reduction and water conservation could be well received by the community.

This feedback, combined with research and technical analyses, was used to develop 33 goals which were grouped into six priority sectors.



The initiatives presented will vary in terms of scope, magnitude, and implementation timeline. Some will be led by the municipality, while others will rely on community groups. A number of goals could be achieved in the next year or two, while others will require the development of a robust implementation and funding strategy, thereby requiring more time. However, every initiative presented has common goal: reduce GHG emissions and promote improved environmental, economic, and social outcomes in Loyalist Township while respecting taxpayer dollars.



Sustainable Land Use

Any concept of sustainable land use presupposes that every square inch of land should be maximized in what it can do to support the important work of biodiversity and rewilding, carbon sequestration, food production, dwellings, and more. Ecosystems are being destroyed at alarming rates because human expansion continues apace without considering the costs of irreparable loss and damage in nature. Sustainable land use practices are thus about considering carefully how land is used and developed, always with an eye to maintaining and augmenting a critical mix and diversity of uses throughout the municipality. Of course, there are always pressures, such as the need for housing. Indeed, the conversion of vacant and agricultural lands into suburban lots is a typical product of the outward expansion of urban centres. However, the point is to not consider such proposals in a vacuum, or without taking account of how they propose to support more environmentally responsible practices in planning and construction. As well it is important to consider such residential development approvals within the matrix of other diverse land-based needs throughout the municipality.

Along those lines, adopting sustainable land use policies is one of the more cost-effective strategies that a municipality can take to reduce energy usage and GHG emissions within its boundaries. Densification, the development of more compact and complete communities, can reduce long commutes and facilitate access to effective transit systems. Equally as effective is the protection of existing green spaces, which can allow for the production of food and also enable residents to connect with nature, which has been recognized during the COVID-19 pandemic as vital to mental health. By responsibly managing growth, municipalities have an opportunity to reduce GHG emissions in the community while improving the wellbeing of residents and the local economy.

Here in Loyalist sustainable land use also involves meaningfully engaging with the agricultural sector, which is diverse. Food production for local markets often takes the form of smaller, artisanal farm businesses, and partnerships are often intuitive to the municipality's designs for a sustainable local economy, as one means of optimal land use. However, Loyalist is also home to larger producers in supply managed sectors, such as the dairy industry. These farms are heavily regulated by industry standards which are provincewide and nationwide. Therefore, it is important for the municipality to be conversant with the many innovative environmental policy trends within that wider milieu, such as no-till technology, and intensive cover crop strategies for nutrient replenishment, soil vibrancy, and reductions in chemical input. With that, it is also important to understand some of the unique pressures of commercial farm operations. Drainage is a common example of where farmer and municipality can come together to reach workable solutions that improve everyone's bottom line. As a municipality within the Cataraqui watershed, that also has one of the longest shorelines on Lake Ontario, Loyalist is very much invested in reducing chemical pollution and nutrient run-off in our natural watercourses. Working together with local farms to reduce these harmful factors is possible by providing solutions, incentives, and support to farmers trying to improve their land and its yield through water diversion and drainage measures.

Embracing the Power of Nature

Nature is deeply engrained in the identity of Canadians. Forests, rivers, wetlands, and oceans are a part of the fabric of society and provide a multitude of benefits to communities, protecting biodiversity while promoting human health and creating jobs. While under threat from increasingly frequent and severe droughts and forest fires brought on by climate change, nature can also play a role in the fight against it.

Nature-based solutions can mitigate global warming by sequestering carbon from the atmosphere while allowing communities to adapt to the impacts of extreme weather events caused by climate change. For example, wetlands have been shown to reduce climate-related flooding costs by almost 40%, helping contribute to more resilient communities¹⁴.

Through improved land management practices, communities can benefit from increased access to natural spaces, job creation, cleaner air and water, and improved health outcomes. A key component of the Federal Government's Climate Action involves investing over \$3 billion and working with communities to plant two billion trees over ten years. Locally, this goal could be supported by planting 20,000 trees over the same period, net of trees normally planted as part of regular Township activities. This would amount to approximately 1 tree per resident based on the projected 2030 population.

GOAL #1

Plant 20,000 Trees Over the Next 10 years

- Partner with local community organizations and residents to plant one tree per resident based on projected population figures for 2030.
- Organize education programs to teach proper planting techniques.



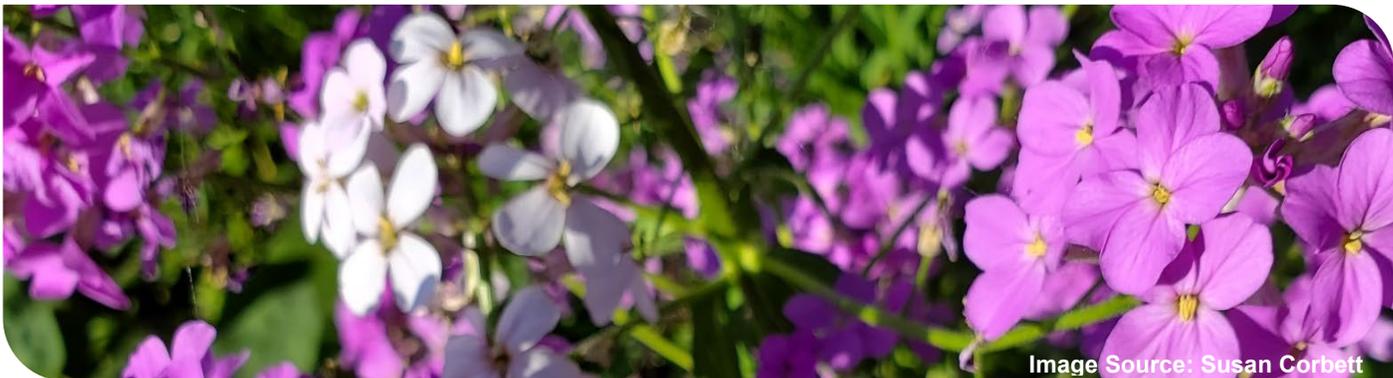
Image Source: Donna Brown

¹⁴ Environment and Climate Change Canada. (2020). *A Healthy Environment and A Healthy Economy*

Existing land management practices can also be altered to protect local biodiversity. For example, native plants can be used to replace mown turf within portions of parks, creating visually appealing landscapes while reducing maintenance costs associated with frequent lawnmowing. Similarly, the use of alternative seed mixes instead of grass in the municipal right of way can contribute to enhancing natural habitats and creating healthy ecosystems. This concept is even more appealing when considering the ability of certain plant species to remediate soils impacted by road salts applied as part of winter maintenance activities.

GOAL #2
Rewild Township-owned lands

- Undertake pilot projects to naturalize sections of municipal parks by replacing grass with native plants.
- Undertake pilot project to investigate the potential use of alternate seed mixes in the municipal right of way.



Stormwater management is another area in which the power of nature can be harnessed. Appropriate treatment of water runoff generated during rain and thaw events helps control flooding and erosion, while promoting water quality and ecological protection. Low Impact Development (LID) is a stormwater management practice that offers enhanced source controls and improved conveyance and storage options for stormwater runoff. It takes a more controlled approach to stormwater management and creates more possibilities for quality and volume control as well as hazard protection and flow maintenance. LID concepts include rooftop disconnections, vegetative swales, infiltration ditches, permeable pavement, rain gardens, green roofs, and bio-retention cells. The implementation of LIDs can be difficult in this area since rapid infiltration is not customary due to high bedrock and relatively little overburden in much of Loyalist Township. Still, it is important to consider and implement available concepts such as rain gardens, bioretention cells, and vegetative swales when possible.

GOAL #3
Incorporate Low Impact Development into Stormwater Management Practices

- Incorporate LID concepts into stormwater activities, where appropriate.



Image Source: Dayle Gowan

Healthy ecosystems are highly dependent on the presence and well being of pollinators. Bees, along with over 700 native pollinator species in Canada, contribute to maintaining healthy ecosystems and are vital to the agricultural sector. For example, pollination from honeybees alone has been estimated to contribute billions of dollars a year to the value of Canada’s agricultural crops. However, the declining health and population of bees and wild pollinators has become a cause for global concern and has been linked to disease, the use of pesticides, and climate change.

At the local level, the creation of habitats, such as outdoor spaces which incorporate native plants, can sustain and support native pollinator biodiversity. Although the implementation of a pollinator protection strategy may not directly result in substantial or quantifiable GHG reductions in the community, it would help create a robust and resilient ecosystem and enhance local biodiversity, thereby providing significant environmental benefits.

GOAL #4

Develop a Pollinator Protection Strategy

- Develop a pollinator protection strategy for the Township and review any by-laws which may be impacted by its implementation
- Partner with community organizations and local schoolboards to provide education sessions
- Create pollinator friendly areas throughout the Township, where appropriate

In addition to environmental benefits associated with nature-based solutions, access to nature can also provide substantial social benefits to communities, contributing to positive mental and physical health outcomes. Recent studies have shown that trails were commonly used by Canadians to improve their mental health through access to nature in their neighbourhoods and communities. By investing in nature conservancy, communities can protect ecosystems while simultaneously benefiting from improved health outcomes.

GOAL #5

Promote Access to Nature

- Expand the natural trail network in Loyalist Township.
- Acquire and repurpose land to create publicly accessible natural spaces, where appropriate



Image Source: Helen Trotter

Supporting Local Agriculture

Climate change could theoretically benefit the agriculture sector by providing longer growing seasons, however these would likely be accompanied by a number of threats. Significant increases in temperature, changes in precipitation patterns, and higher frequency of severe floods or droughts could all impact agricultural practices, likely resulting in farmers having to alter their operations.

The rural and urban make up of Loyalist Township presents a unique opportunity to leverage local agriculture networks to not only adapt to the impacts of climate change, but also mitigate its severity. By adopting sustainable agricultural practices, local farmers can help reduce GHG emissions through soil carbon sequestration. In addition to removing carbon dioxide from the atmosphere, carbon farming can also help create productive soils with high levels of organic matter, leading to healthier and more resilient crops. This practice can further help the environment by preventing erosion and protecting water resources.

Opportunities for economic and social benefits can also be leveraged through sustainable agricultural practices. For example, the diversification of crops can help reduce long-term financial risk while providing environmental benefits that would increase the value of the farm itself. Alternatively, incorporating agritourism into the operations of a farm can provide alternative sources of income for farmers and reduce GHG emissions related to food transportation, while increasing tourism dollars in the community.

GOAL #6 Support Local Agriculture

- Encourage and support local farmers to adopt sustainable land use practices.
- Work with local farmers to promote Loyalist Township as a destination for agritourism



Image Source: Spencer Gaudet



Image Source: Susan Corbett

Sustainable farming practices can also contribute to increased food security in communities. Recent estimates suggest that, each year, over half of Canada’s food supply is wasted through production, processing, distribution, and retail, resulting in approximately \$49.5 billion in avoidable losses¹⁵. By strengthening the local food supply chain, municipalities can reduce food losses and improve local health and economic outcomes.

Systems such as Community Supported Agriculture (CSAs) directly connect farmers with the community by allowing consumers to subscribe to the harvest of a local farm. In exchange, farmers can secure investments when they sell CSA shares at the start of the growing season, providing them with funds when they are needed the most. This arrangement distributes the risks associated with farming, effectively cultivating relationships, and strengthening a sense of community.

Local food production significantly reduces the costs and waste associated with transporting and processing food, and instead supports local economies by keeping profits in the community and creating jobs. Furthermore, increased access to healthy and nutritious produce can improve health outcomes in the community, further contributing to the social benefits associated with CSAs.

GOAL #7

Promote Local Foods

- Support local farmers looking to adopt Community Supported Agriculture (CSA) programs
- Encourage the development of community gardens by developing comprehensive policies and applications processes.

¹⁵ Environment and Climate Change Canada. (2020). *A Healthy Environment and A Healthy Economy*

Growing Sustainably

The efficient use of land is critical to the environmental, social, and financial health of the Township. As communities grow, so does the infrastructure required to service them, including the cost of maintaining and operating roads networks or water systems, as well as providing other municipal services such as transit, waste management and winter maintenance. Loyalist Township's land use planning tools include goals meant to enhance and protect the quality of the environment while improving community resilience, promoting climate change mitigation and adaptation, and providing for the changing needs of the population.

Appropriate land use planning principles and policies can be an extremely cost-effective tool to promote sustainability, resilience, and climate action in a municipality. Building more compact and complete communities can decrease transportation emissions per household by 24 to 50% compared to conventional suburban neighbourhoods.¹⁶ Low-carbon communities create lasting environmental, social, and economic value by promoting walkability, prioritizing access to transit, and providing a wide range of housing, workplaces, parks, amenities, shops, and services. In addition, complete neighbourhoods provide a high quality of life for residents and are incredibly resource efficient.

GOAL #8

Create Resilient, Low-Carbon Communities

- Encourage the development of complete communities through mixed land use and a diversity of residential types.
- Promote sustainable land use development practices and resilient infrastructure.
- Increase intensification and density in urban settlement areas.



Image Source: Loyalist Township

¹⁶ Clean Air Partnership – Building Resilient Communities and Low Carbon Communities in the Greater Golden Horseshoe



Solid Waste

The management of solid waste produced by a community typically falls within the portfolio of local governments, who are responsible to provide waste collection services and operate landfills. While effective solid waste practices keep cities clean, the decomposition of organic material accumulated in landfills is a significant source of methane, a potent greenhouse gas that can continue to be produced long after a landfill has been decommissioned.

A reduction in GHG emissions associated with solid waste can be achieved through effective waste diversion practices as well as through the capture and reuse of methane at landfills. By implementing these strategies, municipalities can reduce the emissions associated with landfill operations while extending their useful lives. This will result in significant long-term savings by delaying the expensive and time-consuming process of building a new landfill.

Diverting Residential Waste Away from Landfills

Loyalist Township employs a “pay as you throw” system for the collection and disposal of residential waste. However, options for waste diversion are limited to blue and grey bin collection or biannual brush and yard waste pick up, providing few alternatives for residents to reduce the amount of waste they send to the landfill.

Public consultation has indicated a significant interest for an green bin program in the community, but previous studies have suggested that traditional curbside-collection of green bins would be cost prohibitive for a municipality such as Loyalist Township. As such, innovative solutions or partnerships with neighbouring municipalities will likely be required to develop a cost-effective organic waste diversion program in the community.

The implementation of a waste diversion program could provide several benefits to Loyalist Township. The reduction of organic waste being sent to landfill daily will result in lower GHG emissions while conserving valuable space in the Township’s landfills, thereby expanding their lifespans.

GOAL #9

Divert Residential Waste Away from Landfills

- Develop and implement a suitable, cost-effective residential waste diversion program
- Achieve a 40% residential waste diversion rate by 2030

Reducing Commercial Waste

Small and Medium Enterprises (SMEs) are typically responsible for the disposal of waste generated as part of their operations. These services are usually contracted out to third-party service providers and can lead to significant costs.

Reducing commercial waste would rely on SMEs taking initiatives, however the Township could support this initiative by connecting businesses and encouraging collaborative efforts. For example, restaurants could take advantage of bulk pricing by placing joint orders on biodegradable takeout containers or cutlery that would otherwise be cost prohibitive to procure, leading to a reduction in single use plastics.

GOAL #10

Support SME Waste Reduction Efforts

- Encourage local businesses to adopt waste diversion practices
- Provide support and educational resources, where appropriate



Image Source: Loyalist Township Website

Turning Waste into a Resource

Existing and emerging technologies are creating opportunities to turn waste into a resource. For example, organic matter can be converted to compost, or, through the use of anaerobic digestion, a low emission energy source. By implementing opportunities such as these, municipalities can reduce GHG emissions while potentially generating new revenue streams rather than paying for the cost of managing solid waste.

GOAL #11

Turn Waste into a Resource

- Explore opportunities to enhance local or regional waste management infrastructure
- Seek out mutually beneficial partnerships with nearby municipalities

Existing Landfill Operations

In addition to trying to reduce the amount of waste being sent to landfills across Canada, the Federal Government's Climate Action Plan is also proposing to increase the number of landfills that collect and treat methane. Currently, landfill operations in Loyalist Township do not include methane management systems, creating an opportunity to significantly reduce emissions currently being produced by the degradation of organic matter.

GOAL #12

Reduce Methane Emissions

- Research opportunities for implementing methane management systems into existing landfills, as appropriate
- Seek funding opportunities from upper levels of government



Image Source: Loyalist Township



Transportation

Transportation networks are critical components of everyday life, allowing for the movement of people, goods, and services. Historically, communities have been built around the automobile, however, traditional internal combustion engine vehicles have been shown to contribute to air pollution¹⁷. Reductions in GHG emissions in the transportation sector can be achieved by reducing the use of personal vehicles or using low-carbon fuel sources.

Developing Effective Transit Systems

Improving the public transportation system was identified as a key objective of Council in the 2019 Strategic Plan. In addition to providing residents with alternate and reliable modes of travel, improvements to the Township's transit infrastructure would also contribute to reducing the number of vehicles on the road, leading to a reduction in fuel usage and, subsequently, GHG emissions. The net commuting flows within the municipal boundary indicates that a significant portion of Township residents work outside of the municipality, suggesting that an effective public transit system would be beneficial to commuters that do not have regular access to a vehicle. However, the rural/urban make-up of Loyalist Township presents a unique set of challenges. A significant portion of the population is spread out over a large area, while the remainder is in one of three urban centres. As such, conventional public transit systems or an active transportation network may not necessarily be appropriate for Loyalist Township.

Based on these constraints, Mobility as a Service (MaaS) solutions could be suitable to meet the needs of Township residents. This concept integrates community transportation options such as carpooling services, public transit, and scheduled micro transit with technology platforms so users can plan and manage their entire trip using an on-demand model. The benefits of MaaS can improve the economics of existing public transit services and increase access opportunities to these systems, while reducing the usage of single occupancy vehicles and encouraging the use of other active transportation options.

GOAL #13

Enhance Transit Services

- Engage with residents and stakeholders to develop and implement a transit plan which will meet the needs of urban and rural communities.
- Increase the percentage of commuters who use public transit from 3% in 2016 to 5% by 2030.

¹⁷ Environment and Climate Change Canada. (2020). *A Healthy Environment and A Healthy Economy*



Image Source: Ryan Bennett

Getting People Moving through Active Transportation

Active transportation can take many forms and has several direct and indirect benefits, of which the first and foremost is improving the health of the community. When engaging in more active modes of transportation, the population reduces health risks associated with a sedentary lifestyle. With improved community health a reduction of cost and strain on the public health system also occurs. Increased physical activity also improves mental health conditions. By introducing active transportation considerations in the early planning stages of projects, routes can be located such that they would be separated from traffic, making them much safer.

GOAL #14

Increase the Active Transportation Network in Loyalist Township

- Incorporate active transportation considerations into capital projects planning with the goal of increasing the active transportation network in Loyalist.
- Provide education sessions to the public
- Increase the percentage of commuters who use active transportation from 3% in 2016 to over 5% by 2030.

Promoting Low-Emissions Vehicles

The adoption of low emissions vehicles has been accelerating over the past few years, due to advances in technology and increased availability and choice. The Federal government has set targets for zero-emission vehicle sales to account 10% of light-duty vehicle sales by 2025, 30% by 2030, and 100% by 2040. Furthermore, the automotive industry is experiencing a significant shift towards the production of electric vehicles (EVs), with several major manufacturers making substantial investments to transition their plants towards the production of electric vehicles.

The Township could help promote the adoption of low emissions vehicles by increasing the availability of publicly available user-pay electric vehicle charging infrastructure within the municipality. It should be noted that this initiative was not particularly well received in the Community Initiatives Survey, however, a review of the comments indicated that education sessions on the topic could help overcome some of the perceived barriers associated with EVs.

GOAL #15

Facilitate the Adoption of EVs in the Community

- Increase the number of publicly available user-pay EV charging stations in Loyalist Township.
- Support policy updates to incentivize the installation of EV charging stations in new and existing dwellings
- Coordinate and promote EV subsidies
- Deliver sector-specific education

Greening the Municipal Fleet

The Township's Municipal Fleet is used for a variety of purposes, including plowing roads, firefighting, staff transportation, and groundskeeping activities such as lawn mowing in parks. The Amherst Island Ferry is also included as part of the Municipal Fleet, although this service is jointly run with the Ontario Ministry of Transportation.

These fleet vehicles are generally powered by fossil fuels such as gasoline and diesel. As such, the two major approaches which can be utilized to reduce energy usage and GHG emissions are to reduce fuel consumption and to transition to low carbon fuel sources. A reduction in fuel consumption could be achieved by limiting vehicle usage, however the essential nature of the services that these assets are used for presents limited opportunities to do so. Alternatively, eco-driving training, vehicle sharing, or other initiatives in fleet operations could be undertaken to increase fuel usage efficiency and reduce emissions.

GOAL #16

Optimize Use of Municipal Vehicles

- Investigate inter-departmental vehicle sharing opportunities.
- Install auxiliary power units in vehicles to reduce idling.
- Promote eco-driving techniques.

The global shift towards zero-emissions vehicles also presents an opportunity to reduce GHG emissions associated with the Municipal Fleet. Continuing innovations in this sector are reducing the costs associated with purchasing and operating these vehicles, making them more affordable over time. Replacing internal combustion engine vehicles with electric or other low-carbon alternatives represents the most effective method of reducing GHG emissions in this sector.

Overall, several actions to reduce fuel consumption and GHG emissions of the Township's Municipal Fleet could be implemented over the next decade. However, special consideration should be given to ensuring that crucial services such as snowplowing or firefighting are not negatively affected, and the levels of service are maintained.

GOAL #17

Electrify the Municipal Fleet

- Replace fossil-fuel powered vehicles and equipment with electric alternatives as part of lifecycle activities, where appropriate.
- Install charging infrastructure in municipal facilities
- Electrify 50% of light-duty cars and trucks by 2030

GOAL #18

Replace Heavy-Duty Vehicles with Zero Emissions Alternatives

- Replace heavy-duty vehicles such as plow trucks and firefighting vehicles with zero-emissions alternatives as the technology becomes available.



Image Source: Loyalist Township



Buildings

Homes, schools, offices, and community centres are essential to the fabric of a community and can be closely tied to its identity. However, these buildings all require various forms of energy to serve their primary functions, and, as such, contribute to a significant portion of global emissions. This is especially true in countries with northern climates such as Canada's, where the use of fossil fuels for space heating purposes account for the majority of GHG emissions in this sector.

Buildings today are being constructed to a much higher energy efficiency standard than they were at and prior to the turn of the century. Advances in technologies have resulted in lower energy requirements to power and heat modern day structures, and continuous updates to building codes have ensured that homes are built to be as energy efficient as technically and economically possible. However, to accomplish meaningful change in this sector, the existing building stock must also be addressed.

Retrofitting buildings presents the largest opportunity to reduce GHG emissions associated with residential and commercial buildings. Upgrades to the envelopes and mechanical components of existing structures can significantly improve their energy efficiency, lowering operating costs and improving occupant comfort. The actions and goals presented prioritize energy reduction over the production of renewable energy. Although both strategies have the potential to positively impact GHG emissions, improving the energy efficiency of a structure typically presents a higher return on investment.



Image Source: Donna Brown

donnabrown 2017

Retrofitting Residential Dwellings

Space heating and cooling, lighting, and powering appliances all contribute to energy usage in residential dwellings and can vary based on the size, age, or energy efficiency of a home. On average, a typical Canadian home built in or prior to 2005 requires approximately 20% more energy than an energy-efficient home built according to today's standards¹⁸. These high energy costs are typically borne by the people who can least afford it, making up a significant portion of their income and leading to energy poverty.

Increasing the energy efficiency of a home can lead to lower energy costs and improved occupant comfort, while simultaneously supporting long-term climate action by reducing the GHG emissions associated with energy usage. This strategy can be especially effective in older homes which were built according to outdated standards and that use inefficient heating and cooling systems.

Loyalist Township - Energy Poverty Data

- The home energy cost burden, which compares home energy costs relative to a household's income, can be used as a proxy for measuring energy poverty.
- Median home energy expenditure in Loyalist Township: **\$2,995**
- Homes experiencing a high home energy cost burden (>6% of household's net annual income spent on energy bills) in Loyalist Township: **1,840**
- Homes experiencing a very high home energy cost burden (>10% of household's net annual income spent on energy bills) in Loyalist Township: **745**
- Homes experiencing an extreme energy cost burden (>15% of household's net annual income spent on energy bills) in Loyalist Township: **285**
- Dwellings built before 1991: **3,765**

Several programs designed to reduce energy usage are currently available to residents through various energy utilities and the Federal government is expected to provide \$2.6 billion over seven years beginning in 2020-21 to help homeowners improve their home energy efficiency. This will be accomplished by providing grants which would allow homeowners to make energy-efficient improvements to their homes¹⁹. These programs may require municipalities to apply for, and administer, these programs on behalf of residents. For example, several municipalities in Canada currently administer programs which allow property owners to finance the up-front cost of eligible improvements to a building through a low-interest loan which would then be repaid through their property taxes. These types of programs eliminate the barriers associated with high initial costs, allowing all residents, particularly those with a high home energy cost burden, to benefit from home energy upgrades.

¹⁸ Federation of Canadian Municipalities (2020). *GMF Municipal Energy Roadmap*.

¹⁹ Environment and Climate Change Canada. (2020). *A Healthy Environment and A Healthy Economy*

By promoting home energy retrofits programs, the Township has an opportunity to support the most vulnerable members of the community while improving acting on climate change. The benefits of these programs extend beyond reducing energy poverty, since increased business in the construction industry will stimulate the local economy and create new jobs.

GOAL #19

Reduce Residential Energy Usage by Retrofitting Existing Homes

- Leverage existing and future funding opportunities to develop a home energy retrofit program in Loyalist Township.
- Prioritize homes with a very high or extreme energy cost burden.
- Reduce residential emissions by 10% below 2016 levels by 2031



Image Source: LTES

Reducing Commercial Energy Usage

Energy management can be an attractive investment for Small and Medium-sized Enterprises (SMEs) due to the potential for sustained returns in the form of lower operating costs. Energy retrofits can make commercial buildings more efficient, resulting in lower utility bills, while also creating more pleasant environments for occupants and increasing the value of the building itself. These retrofits can take many forms, ranging from minor upgrades such as upgrading light fixtures or building insulation, to deep retrofits such as HVAC upgrades.

High upfront costs are one of the main barriers preventing SMEs from undertaking energy retrofits. However, considering life-cycle costs can help an organization determine the return on investment of undertaking a project of this type. Furthermore, several incentives are available to help SMEs reduce their electricity or fuel usage, either through the implementation of energy conservation methods or through energy retrofits.

For example, the Ontario Minister of Energy, Northern Development and Mines recently directed the Independent Electricity System Operator (IESO), a Crown corporation responsible for operating the electricity market in Ontario, to implement a 2021-24 Conservation and Demand Management Framework. This new program, which launches in January 2021, will include incentive programs for commercial, industrial, and institutional electricity consumers to improve the overall efficiency of buildings and facilities to manage to energy costs. Similarly, Enbridge gas, the natural gas utility provider in Loyalist Township, also offers support and financial incentives to help commercial and industrial users reduce their natural gas usage and, subsequently, reduce their energy costs.

In addition to lower energy costs, a reduction in energy usage from commercial and institutional users would also lead to a reduction in GHG emissions. Local businesses would be responsible to apply for appropriate incentives, however the Township could contribute to program uptake by increasing awareness through education sessions and supporting businesses through the application process.

GOAL #20

Increase Commercial and Institutional Energy Efficiency

- Promote existing energy incentives to local businesses and provide assistance with the application process.
- Reduce commercial and institutional emissions by 25% below 2017 levels by 2031.

Developing Green Building Codes

In addition to undertaking deep energy retrofits to the existing building stock within the municipality, another solution to reduce GHG emissions in this sector would be to encourage the construction of new structures in a manner that would promote energy conservation. When compared to the amount of effort required to retrofit existing buildings, designing and constructing new structures to be highly energy-efficient is a relatively simpler endeavour. Energy intensity targets, or the amount of energy used per unit area of a

building over a year, can be established prior to construction and achieved through the use of efficient envelopes and mechanical systems. Several standards for highly energy efficient buildings, such as the Passive House standard, currently exist and result in structures which consume up to 90% less heating and cooling energy than their conventional counterparts.

It should be noted that municipalities do not have the authority to require new buildings to exceed the requirements of the Provincial Building Code. However, the development of voluntary Green Building Standards, combined with appropriate incentives, could encourage builders and developers to construct energy efficient buildings or subdivisions. These standards would outline a set of performance criteria designed to incrementally build on the energy efficiency requirements of the Building Code while focusing on the community as a whole.

Green Building Standards have been implemented in several municipalities with various levels of success and could be replicated in Loyalist Township. Consultation with the local development community would be required in order to develop suitable standards and incentives.

GOAL #21

Develop Green Building Standards for New Construction

- Work with local developers to develop green green building standards for new constructon.
- Incentivize net-zero, or high energy efficiency, developments.



Image Source: Loyalist Township Website

Greening Municipal Facilities

Reducing energy usage in municipal facilities, such as office buildings, garages, or fire halls, presents a significant opportunity to lower operating costs and save tax dollars. Community centres and recreation facilities, particularly those constructed several decades ago, typically account for a significant portion of the GHG emissions generated by municipal buildings. Heating water in pools or maintaining ice surfaces in arenas require an immense amount of energy, leading to high hydro or natural gas bills.

Several strategies can be implemented to reduce energy usage in municipal facilities by following the “Optimize, Enhance, Replace” model presented in this plan. For example, minor modifications to the day-to-day operations of a building, such as turning off lights when rooms are not in use or setting schedules on thermostats, can have an immediate impact that will compound over time. Similarly, small-scale investments such as replacing lighting and plumbing fixtures can also reduce the energy usage of a facility. These “low-hanging fruit” can be implemented in relatively short-order and quickly reduce energy usage across all facilities.

Larger-scale initiatives can also be undertaken and would have a larger impact on GHG emissions associated with municipal buildings, however, these would need to be conducted in accordance with lifecycle activities and planned out ahead of time. For example, waste heat generated by the ice-making process at the W.J. Henderson Recreation Centre’s arena could be used to heat the pool located in the building, significantly cutting back on natural gas requirements for the facility. Similarly, rainwater capture systems could be installed at Township facilities to collect and store rainwater runoff that would then be used for irrigation purposes, cutting back on water usage.

By analyzing and monitoring the performance of individual facilities through monthly energy usage data and an energy management software, initiatives with a high return on investment can be identified and implemented. Careful consideration should always be given to ensuring the accuracy of data used to inform the decision-making process, which could be accomplished through the installation of energy meters in Township-operated facilities.

GOAL #22

Reduce Energy Usage in Municipal Facilities

- Monitor energy and water usage in individual municipal facilities
- Optimize operations and develop energy intensity targets
- Capture and re-use waste energy where possible

Finally, the possibility of installing renewable energy systems at municipal facilities, such as solar panels or geothermal systems, can also be investigated, however this should not take precedence over reducing energy usage in the first place.

GOAL #23

Incorporate Renewable Energy Infrastructure in Municipal Facilities

- Develop an inventory of facilities which could accommodate renewable energy infrastructure.
- Incorporate the installation of renewable energy systems into the lifecycle activities of facilities.



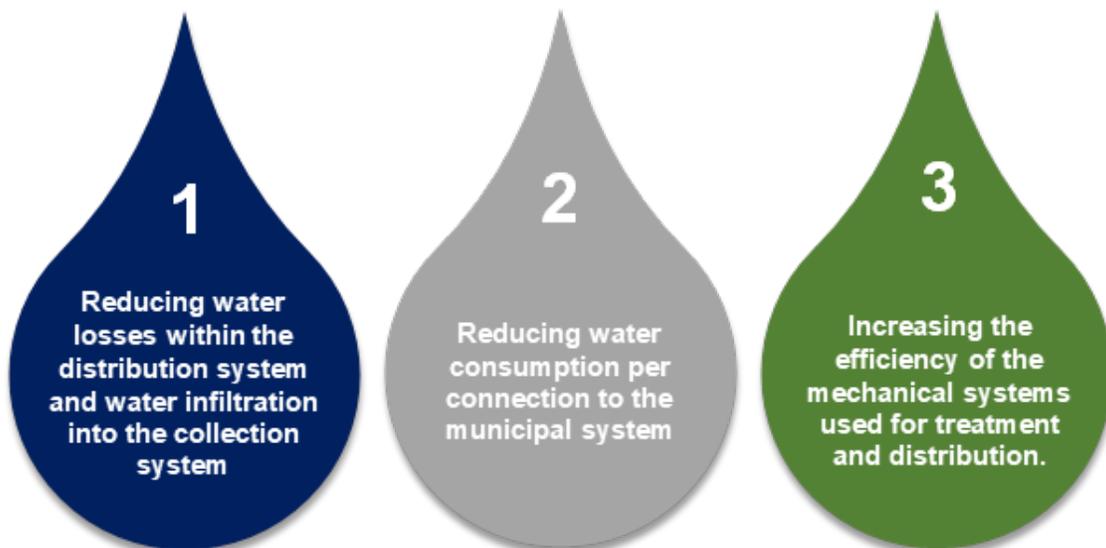
Image Source: Ryan Bennett



Water and Wastewater

Loyalist Township's water and wastewater systems service approximately 14,000 residents. These systems consistently provide residents with reliable and safe drinking water and treat sewage to meet regulatory requirements prior to its discharge into the receiving environment. The potable water system includes two water treatment plants - the Fairfield and Bath Water Treatment Plants, three water towers, and one booster station and water reservoir, as well as over 80 km of watermains. On the other hand, the wastewater system includes two wastewater plants - the Amherstview Water Pollution Control Plant and the Bath Sewage Treatment Plant, eight sewage pumping stations, and over 85 kms of sanitary sewers and forcemains.

Emissions associated with the water and wastewater sector are primarily related to the amount of energy required to move water, either within the plants as part of the treatment process, or within the collection and distribution system itself. Three major efforts can be used to reduce the amount of energy required to treat and distribute drinking water:



The goals presented in this category have the potential to significantly reduce the amount of energy required to operate water and wastewater treatment facilities and their respective collection and distribution systems while subsequently reducing costs and GHG emissions in this sector. Furthermore, a reduction in per capita water usage will also increase the reserve capacity of water and wastewater treatment plants, delaying the need for costly expansions that are required to accommodate population growth.

Water Collection and Distribution

A significant portion of the water produced by the Fairfield and Bath Water Treatment plants is unaccounted for, either through unbilled authorized usage, real water losses (watermain breaks or leaks), and apparent losses (unauthorized consumption or unknown usage). Unbilled authorized usage refers to water used inside treatment facilities or as part of distribution system flushing activities, as well as water used for construction or fire-fighting purposes. Real water losses is a term used to account for water lost as part of watermain break or leaks in the system, while apparent water losses refers to unauthorized consumption, theft, or unknown water usage.

GOAL #24

Reduce Water Losses in the Distribution System

- Identify and address sources of apparent water losses in the Fairfield and Bath water distribution systems.
- Reduce the apparent water losses in the Fairfield water distribution system to 25% or lower by 2031.
- Reduce the apparent water losses in the Bath water distribution system to 10% or lower by 2031.

Similarly, a significant portion of the wastewater collected and treated by the Loyalist East and Bath Sewage treatment systems can be attributed to sources other than residential dwellings and commercial buildings. As wastewater systems age or become damaged over time, they become susceptible to inflow and infiltration (I&I), a term used to describe ways that water other than sewage, such as groundwater or stormwater, can infiltrate collection and treatment systems. In addition to potentially damaging collection infrastructure by subjecting pipes to higher flows than they were designed to accommodate, I&I can also negatively impact processes at wastewater treatment facilities. Specifically, by diluting the concentration of sewage entering a plant, the efficiency of the system decreases, while operating costs increase proportionally to volume.

A strong correlation between peak flows and heavy precipitation or thaw events indicate that both the Loyalist East and Bath Sewage collection and treatment systems are susceptible to a significant amount of I&I. Identifying and addressing areas in the collection system that are prone to I&I would contribute to reducing the volume of non-sewage water making its way through a wastewater collection and treatment system, thereby reducing energy usage, GHG emissions, and costs.

GOAL #25

Reduce Inflow and Infiltration in the Collection System

- Identify and address areas in the Loyalist East and Bath Sewage collection systems that are prone to inflow and infiltration.
- Develop and implement an inflow and infiltration monitoring programs.

Water Conservation

Another strategy to reduce the amount of energy used in the water and wastewater sector is to reduce water usage. The average daily potable water residential use per capita in serviced areas, or the amount of water used by a resident at their place of residence on a given day, was approximately 275 litres per day in 2016. In comparison, the average per capita daily potable water residential use in Canada and Ontario during the same period was 234 and 201 liters per day, respectively²⁰ (Statistics Canada).

A reduction in daily drinking water usage could be achieved through education and incentive programs aimed at helping residents reduce water consumption in their homes. In addition to reducing energy costs and GHG emissions associated with the production and distribution of potable water to service areas, this initiative would also present the added benefit of reducing residential water bills. Furthermore, a reduction in drinking water consumption will inevitably lead to a reduction in the volume of wastewater generated by residential dwellings.

GOAL #26

Reduce per Capita Water Usage

- Implement community-wide incentive and education programs to promote water conservation in households.
- Decrease average daily residential water use by 27% to below 200 liters per day per capita by 2030.

Mechanical Systems

Energy usage in the water and wastewater sector can also be decreased by increasing the efficiency of the mechanical systems used to treat and move water across serviced areas. Replacing pumps, blowers, and other equipment with more energy efficient models would decrease the amount of energy required to treat and distribute/collect a unit of water. These replacements should be conducted according to the lifecycle of each asset, meaning that individual pieces of equipment would only be replaced with more efficient models at the end of their lifecycle.

GOAL #27

Increase the Efficiency of Mechanical Systems

- Replace mechanical systems, such as pumps or blowers, with more energy efficient models as part of lifecycle activities.
- Decrease GHG emissions associated with potable water treatment/distribution by 10% and sewage collection/treatment by 20% below 2016 levels by 2030.

²⁰ Statistics Canada. (n.d.). Table 38-10-0271-01 Potable water use by sector and average daily use. Retrieved from <https://www.statcan.gc.ca/>: <https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=3810027101>

In addition to increasing the efficiency of mechanical systems at plants and pumping stations, several opportunities to capture and re-use waste energy can also be leveraged. For example, heat embodied in residential sewage could be captured and used to heat indoor areas of plants such as offices or laboratories.

GOAL #28
Capture and Reuse
Waste Energy

- Incorporate energy capture systems at water and wastewater facilities, where appropriate.



Image Source: Rami Maassarani



Other

The goals and actions presented so far in this plan will all have a tangible impact on local GHG emissions. However, further initiatives can be undertaken to further contribute the culture of Climate Action in Loyalist Township, and, in doing so, result in positive economic and social outcomes. These can range from building on existing systems and practices to incorporate sustainability into municipal operations, to bringing the community together to discuss the benefits of climate action. A direct impact on local emissions or the economy may be difficult to quantify at first, however the cumulative, long-term effect of these actions will improve the lives of resident and community organizations alike.

Leveraging Robust Procurement Practices

Loyalist Township is a large public purchaser of goods and services, awarding contracts for the procurement of vehicles and equipment, professional services, and major construction projects. The Township's procurement process aims to provide open and effective competition to vendors, while providing the best value for money to taxpayers. Competitive bids are evaluated based on criteria, including, but not limited to, cost, suitability for the specific application, and overall quality of the product.

Several of the goals presented in the ResiLienT Loyalist Township Climate Action Plan involve transitioning municipal operations towards more sustainable alternatives. Several of these initiatives will involve purchasing goods which typically have higher upfront costs, but lower operating costs. For example, the fleet electrification initiative will require gradually replacing gasoline and diesel vehicles with electric ones over the next ten years. Although the price of electric vehicles continues to decrease due to advances in technology, they are, for the moment, still more expensive to purchase than their internal combustion counterparts. However, the operating costs of electric vehicles are considerably lower, potentially making them the cheaper alternative after several years of use under the right conditions. Assessing the costs of assets over their entire lifecycle, rather than simply evaluating their initial costs, can provide better value for money in the long run. Incorporating these principles into the procurement process will facilitate the adoption of clean technologies while providing better value for taxpayer dollars.

GOAL #29

Incorporate Sustainability into Corporate Procurement

- Include lifecycle assessments as part of the evaluation criteria for the procurement of goods and services.
- Incorporate environmental impact considerations into procurement competitions.

Furthermore, the Township could leverage its buying power to connect residents and local businesses with better pricing for goods and services which could be used to achieve the goals presented in this plan. For example, coordinating the purchase of a large number of rain barrels on behalf of local organizations could reduce costs by taking advantage of bulk pricing, making these systems more affordable and increasing uptake within the community.

GOAL #30

Coordinate the Purchase of Goods and Services with Local Organizations

- Leverage Township knowledge and buying power to provide local organizations with better pricing for goods and services that will contribute to climate action in the community.

Greening Construction Practices

In order to maintain local infrastructure in a state of repair which reflects the levels of service expected by residents, municipal assets must be renovated, upgraded, or replaced on a regular basis. Construction projects are a significant source of greenhouse gas emissions, primarily due to the amount of carbon embodied within building materials such as concrete or asphalt, as well as through the fuel and energy consumed by construction equipment.

Although these emissions are harder to accurately quantify, several practices can be implemented to reduce the emissions associated with the construction sector while still achieving, or even exceeding, the necessary levels of service. This can be achieved by prioritizing the use of recycled materials or products with a lower carbon intensity than their traditional counterparts, and by designing infrastructure based on desired performance outcomes rather than prescriptive standards. Special consideration must always be given to the financial implications of implementing more environmentally conscious alternatives, however, if properly designed, improved value over the entire lifecycle of an asset can be achieved.

GOAL #31

Incorporate Sustainable Practice into Construction Activities

- Update the Township construction design guidelines to promote sustainable construction practices.
- Prioritize the re-use of materials, such as asphalt or excess soils generated on a project site, where possible.
- Develop performance-based standards for infrastructure design which account for the entire lifecycle of an asset.

Leveraging Local Knowledge

Some of the technologies needed to keep global warming below 2°C are either just beginning to be deployed at scale or may even not yet be commercially available. As such, governments, private corporations, and communities alike will need to foster innovation to encourage a shift away from business-as-usual towards more sustainable practices.

By leveraging opportunities for collaboration with local academic institutions or industries that are at the cutting edge of their fields, Loyalist Township can contribute to scientific and technological advances while improving the efficiency of its operations. Partnerships with St Lawrence College and Queen's University, both located in close proximity to Loyalist, have been successfully undertaken in the past and have contributed to significant innovations in municipal operations. Similar opportunities for collaboration could be pursued with industries looking to pilot emerging technologies.

GOAL #32

Partner with Local Industries and Academic Institutions

- Continue to support local academic institutions and contribute to scientific advances.
- Partner with local industries to undertake pilot or demonstration projects for emerging technologies.



Image Source: Lafarge Bath Cement Plant

Creating a Culture of Climate Action

As is the case with any community initiative, the success of this Climate Action Plan is highly dependent on it receiving buy in from local residents and community organizations. Specifically, the proposed goals and actions have the potential to provide significant benefits to the Loyalist community, however these can only be achieved with relatively high uptake rates.

Through the implementation of robust public engagement practices, the municipality can encourage residents to participate in decision making processes while providing information about the importance or benefits of specific initiatives. This could be accomplished by hosting education sessions, partnering with local SMEs to promote their businesses in the community, or connecting residents with similar interests through volunteer opportunities.

By creating a culture of sustainability and civic engagement, the Township can empower and encourage residents or local businesses to participate in local governance while acting on climate change. This will inevitably lead to the development of made in Loyalist, for Loyalist, solutions that will have earned the support of the community and therefore be much more likely to contribute to effective change.

GOAL #33

Strengthen Community Relationships

- Host education sessions covering a variety of topics in partnership with community groups.
- Promote local businesses that have adopted sustainable practices.
- Start a climate action blog celebrating local champions and highlighting their achievements.

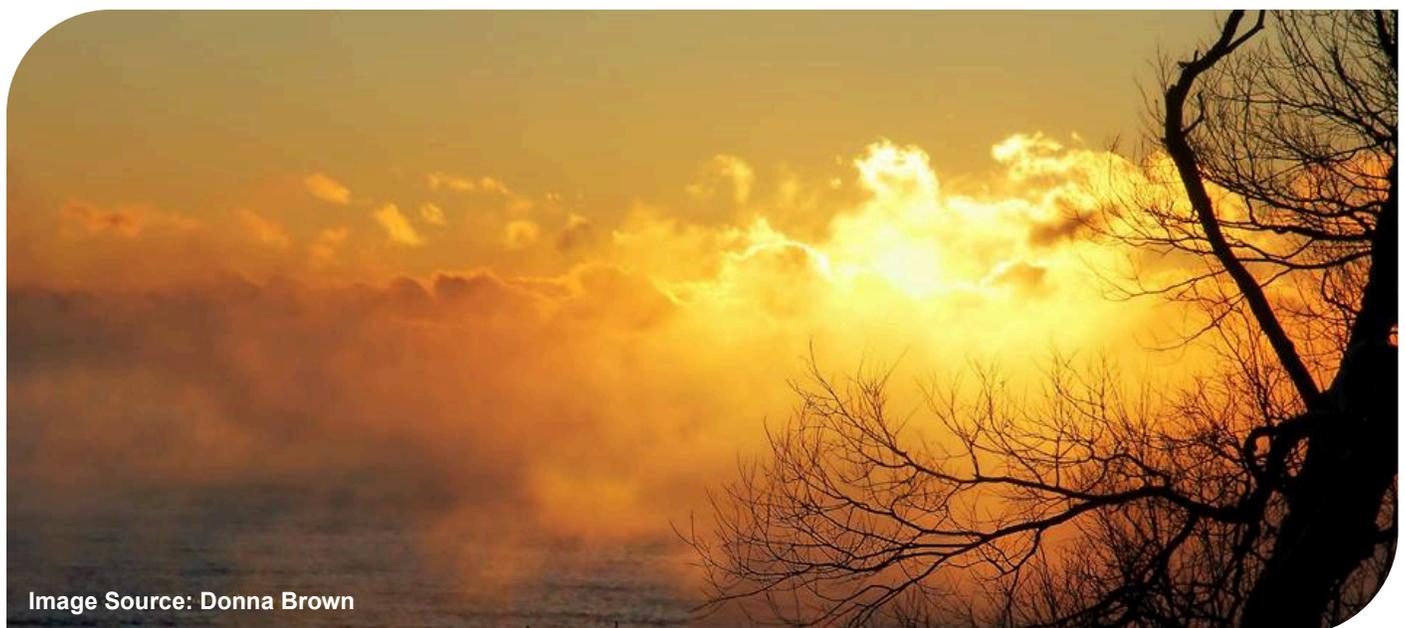


Image Source: Donna Brown



Summary

Goal #	Title	Proposed scenario
1	Plant 20,000 trees	20,000 additional trees planted by 2030
2	Rewild Township-owned land	Pilot projects to replace turf areas in municipal parks or right-of-way with native plants.
3	Incorporate LID into Stormwater Management Practices	Incorporate Low Impact Development concepts into stormwater management activities
4	Develop a pollinator protection strategy	Develop a pollinator protection strategy and create pollinator friendly areas across the Township.
5	Promote Access to Nature	Expand the natural trail network and acquire land to increase public access to nature.
6	Support Local Agriculture	Encourage and support local farmers to adopt sustainable land use practices and promote agritourism in Loyalist Township.
7	Promote Local Foods	Encourage Community Sustained Agriculture programs and facilitate the creation of community gardens.
8	Create Resilient, Low-Carbon Communities	Encourage the development of complete communities through mixed land use and a diversity of residential types.
9	Divert Residential Waste Away from Landfills	Implement a residential organic waste diversion program.
10	Support SME Waste Reduction Efforts	Support local businesses to reduce waste generated as part of their operations.
11	Turn Waste into a Resource	Convert solid waste and sewage biosolids into a resource.
12	Reduce Methane Emissions	Reduce methane emissions from landfills.

13	Enhance Transit Services	Develop and implement a suitable plan public transit plan.
14	Increase the Active Transportation Network	Enhance the active transit network within Loyalist Township.
15	Facilitate the adoption of EVs in the community	Encourage purchase of electric vehicles by installing public, pay-per-use charging infrastructure across Township
16	Optimize Use of Municipal Vehicles	Investigate inter-departmental vehicle sharing opportunities and promote eco-driving techniques.
17	Electrify the Municipal Fleet	Convert gasoline-powered vehicles and equipment to electric alternatives as part of lifecycle activities.
18	Replace Heavy-Duty Vehicles with Zero Emissions Alternatives	Convert heavy-duty vehicles to zero-emissions alternatives as technology becomes available.
19	Reduce Residential Energy Usage	Reduce residential energy usage by developing energy retrofit programs and promoting available incentives.
20	Increase Commercial and Institutional Energy Efficiency	Increase the energy efficiency of local business operations.
21	Develop Green Building Standards for New Construction	Partner with local developers to develop voluntary green building standards and incentivize their adoption.
22	Reduce Energy Usage in Municipal Facilities	Reduce the usage of energy in municipal facilities through changes in building operations and upgrades.
23	Incorporate Renewable Energy Infrastructure into Municipal Facilities	Incorporate renewable energy infrastructure into municipal facilities as part of lifecycle activities, where and when appropriate.
24	Reduce Water Losses in the Distribution System	Reduce the amount of water losses in the potable water distribution system.
25	Reduce I&I in the Collection System	Reduce the amount of inflow and infiltration in the sewer collection system.
26	Reduce per Capita Water Usage	Reduce per capita residential water usage rates in serviced areas to below 200 L / day
27	Increase the Efficiency of Mechanical Systems	Increase the efficiency of mechanical systems at water and sewer facilities as part of life cycle activities.
28	Capture and Reuse Waste Energy	Capture and reuse waste energy in sewage treatment facilities.

29	Incorporate Sustainability into Corporate Procurement	Incorporate sustainability into corporate procurement practices by evaluating the entire lifecycle costs of goods and services.
30	Coordinate the Purchase of Goods and Services with Local Organizations	Assist with the bulk purchase of sustainable goods and services to allow local organizations to benefit from bulk pricing.
31	Incorporate Sustainable Practices in Construction Activities	Update the Township construction design guidelines and encourage the reuse of materials generated on construction sites.
32	Partner with Local Industries and Academic Institutions	Partner with local industry and academic institutions to explore innovative ways of delivering services.
33	Strengthen Community Relationships	Create a culture of sustainability and civic engagement.



Image Source: Loyalist Township Website



Setting Local GHG Reduction Targets

The actions and goals proposed in this Climate Action Plan are anticipated to result in a reduction in GHG emissions across each of the six areas. Figure 11 below presents a summary of the expected reduction in emissions in each target area.

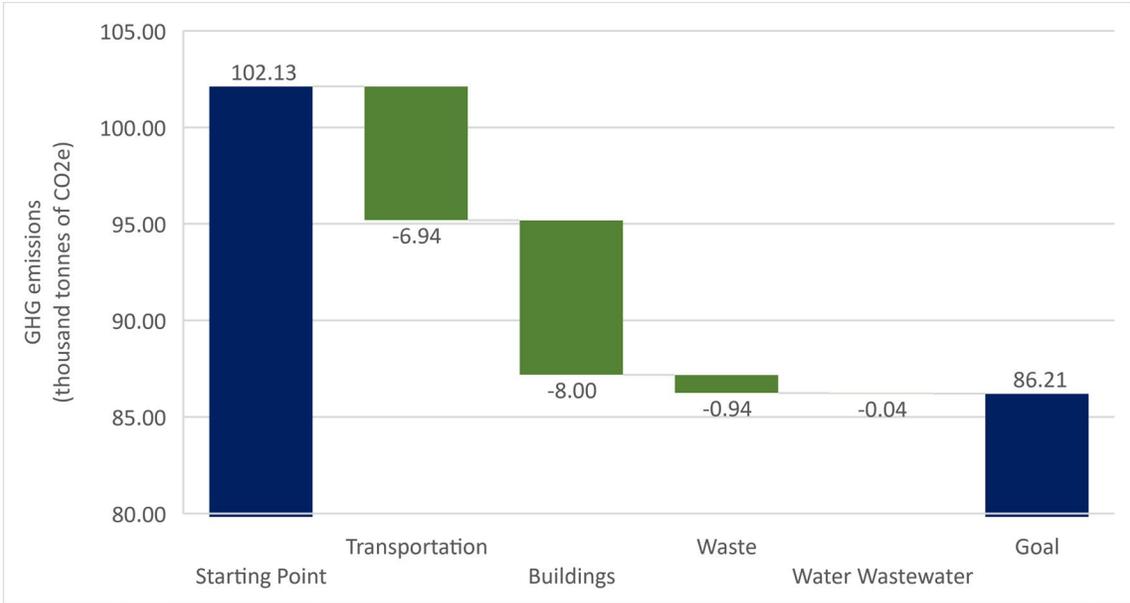


Figure 11 - Predicted impact of the proposed actions presented in this Climate Action Plan, broken down by target area

The initiatives presented in the “Sustainable Land Use” and “Other” focus areas are also expected to contribute to a reduction in GHG emissions in the community, however these are difficult to quantify at this time.

Overall, the emissions associated with the Waste, Buildings, Transportation, and Water and Wastewater sectors are anticipated to decrease from 102,127 to 86,210 tCO2e between 2016 and 2030, as illustrated in Figure 12 below, resulting in a 16% reduction in GHG emissions below 2016 levels.

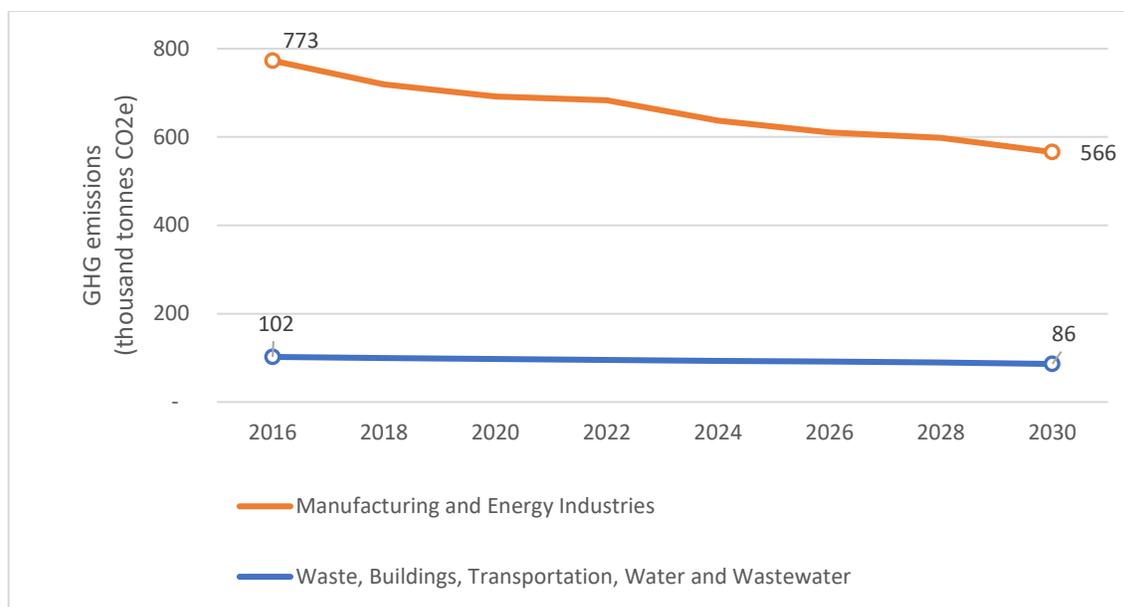


Figure 12 - Projected GHG emissions in Loyalist Township under the proposed scenario between 2016 and 2030

The commitments of local manufacturing industries to reduce their emissions will further contribute to the overall reduction in greenhouse gases in Loyalist Township. When combined, the emissions across all sectors included in the Township’s inventory are projected to decrease from 874,949 to 652,066 t CO2e between 2016 and 2030, or a 25% reduction.

Setting community GHG reduction targets are an important component of climate action, however these figures and calculations are just one piece of the puzzle. Ultimately, the goals, initiatives, and policies presented in this Climate Action Plan are what will allow Loyalist Township to achieve a 25% reduction in GHG emissions below 2016 levels by 2030, while contributing to improved local environmental, economic, and social outcomes.

	2016	2030 BAU Scenario	2030 Proposed Scenario
Total emissions²²	874,949 (102,127) t CO2e	688,321 (122,465) t CO2e	652,066 (86,210) t CO2e
Emission per capita²¹	50.3 (5.9) t CO2e	33.7 (6.0) t CO2e	31.9 (4.2) t CO2e
Waste Sent to Landfill (total)	2,031 tonnes	2,390 tonnes	1,430 tonnes
Waste Sent to Landfill (per Capita)	117 kg / year	117 kg / year	70 kg / year
Average daily residential potable water use in serviced areas (Per Capita)	275 Litres/day/capita	275 Litres/day/capita	200 Litres/day/capita

²¹ Figures in bracket indicate emissions associated with the Waste, Buildings, Transportation, and Water and Wastewater sectors, separate from manufacturing and energy industries.

PART IV: THE PATH FORWARD



Image Source: Rama Kemmerer



Discussion

Limitations of this Plan

A successful pathway to climate action requires embracing incomplete information. The figures presented in this plan are Loyalist Township's first attempt at quantifying local emissions and predicting their growth or decline under different scenarios. However, the data used to develop these inventories and projections are subject to their individual limitations depending on their source. For example, electricity and natural gas consumption figures for residential and commercial buildings were derived from data provided by the respective energy utilities, leading to a high confidence in their accuracy. Conversely, estimates for the number of households using alternative heating sources were derived from national and provincial averages, resulting in figures that may not be quite as accurate. The same can be said about GHG emissions forecasts in various sectors, which are reliant on population or job growth projections.

Although one could argue that the figures and calculations presented in this report relied on assumptions, projections, or incomplete data, the benefits of the actions presented in this plan can not be dismissed. As previously discussed, effective climate action goes beyond simply reducing GHG emissions in the community. Rather, it is about ensuring a better future for all through improved environmental, economic, and social outcomes.



Image Source: Loyalist Township Website



Next Steps

Periodic updates

The ResiLienT Loyalist Township Climate Action Plan represents the municipality's first steps towards local climate action. The target sectors and goals were developed based on feedback garnered throughout various engagement sessions and reflect corporate and community priorities.

If properly implemented, this plan will contribute to a culture of Climate Action in Loyalist and act as a steppingstone towards more ambitious targets in the future, especially when considering the federal target of Net-Zero emissions by 2050. To that end, this plan should be revisited on a periodic basis. Updates should focus on increasing the accuracy by prioritizing robust data collection practices, while accounting for any technological advances made in the field that could be incorporated into local practices. It is therefore recommended that this plan be updated every five years, with each update building upon the lessons learned from the previous iterations.

Funding Strategy

As previously stated, this plan was developed with a commitment to act on climate change while respecting tax dollars and maintaining the levels of service that the community has come to expect from municipal operations. To that end, the corporate initiatives identified in this plan will be evaluated based on their total lifecycle costs and incorporated into planned lifecycle activities, when appropriate. The operational savings generated through the implementation of these activities could also be used, in part, to fund future initiatives, effectively creating a self-funded climate action fund.

Larger initiatives will be contingent on the availability of funding from external sources, such as community partners or upper levels of government, or through the use of vibrancy funds, where permitted. . Many of the goals presented were designed to complement the priorities identified in the most recent Federal Climate Action plan, increasing the likelihood of successful applications to potential funding programs.

Maintaining Momentum

A high degree of collaboration between the municipality and the community was required to put this plan together. Its implementation, and eventual success, will be contingent on maintaining the momentum that has developed over the course of this project.

A high level of public engagement will be required to undertake many of the initiatives listed in this Climate Action Plan. Lessons learned throughout the consultation phase of this project will be used to develop a robust community engagement framework that will be applicable to other Township initiatives. The

formation of advisory groups for each of the areas identified in this plan is also recommended. These groups should include representation from all groups within the community, such as residents, local business owners, developers, community representatives, and Township staff.

Finally, the vast majority of the initiatives proposed in this plan will require assistance from the community. To that end, partnerships with local organizations should be sought after to develop a network of volunteers and helpers that will be able to champion climate action within the community.



Image Source: Loyalist Township Website