

2022-2030

FUTURE FOCUSED

A climate change mitigation plan
for the County of Wellington



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The preparation of this plan was carried out with assistance from the Government of Canada and the Federation of Canadian Municipalities. Notwithstanding this support, the views expressed are the personal views of the authors, and the Federation of Canadian Municipalities and the Government of Canada accept no responsibility for them.



(Above) Ontario warming stripes from 1901-2019 (source: Dr. Ed Hawkins, NCAS, university of Reading, <https://showyourstripes.info>). Each stripe represents the average temperature of a single year. The colour scale goes from -2.11°C (dark blue) to 2.8°C (dark red).



Message from The Warden

The County of Wellington has a lot to be proud of. On a backdrop of a picturesque landscape and dynamic urban centres, we have created a diverse agricultural sector, thriving industries and abundant tourist destinations. Wellington County is truly a place where we can live, work and play.

As a community we have tackled big issues, together. We have committed to conserving our natural heritage by supporting programmes such as the Green Legacy Tree Planting Programme and Rural Water Quality Programme, empowered businesses through programmes like the Community Improvement Plan and Emergency Business Sustainability Fund, and supported the community through delivering essential social services such as Ontario Works and Social Housing; among others. Climate Change is one issue we have faced – and continue to face.

As an intergenerational problem, it is not only a problem of the cost of action weighed against the potential of destruction, it is an ethical problem that needs to consider the value of quality of life for future generations.

Future Focused – A Climate Change Mitigation Plan for the County of Wellington, lays out a pathway to a more sustainable future by empowering our community to act on climate change now. We have the unique opportunity to lead climate action for rural communities through made-in-Wellington solutions that demonstrate the best of what we have to offer; innovation, collaboration and passion. Let's get started – together.

- Kelly Linton



Message from the CAO

County of Wellington Council and Staff pride ourselves on doing what is right by our community. Future Focused – A Climate Change Mitigation Plan for the County of Wellington joins a number of forward thinking actions the County has taken over the years to ensure we meet the needs of the environment, economy and community.

Municipalities are on the frontlines of change. As leaders in our community, the County of Wellington does not take lightly the role we play in demonstrating what is possible so that others may be empowered to take action. Future Focused will guide us to be intentional about our actions and decision-making to achieve greater gains in our continued commitment to reducing greenhouse gas emissions in our facilities, programmes and projects.

- Scott Wilson

Acknowledgements

The contents of this plan were developed through engagement with County staff, municipal partners, community representatives, local industry contributors and the broader community. The County appreciates the time these contributors dedicated to this project, their willingness to share their expertise and their thoughtful feedback.

Contributors are acknowledged in [Appendix A](#).

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List of abbreviations

CH ₄	– methane
CO ₂	– carbon dioxide
CO ₂ e	– carbon dioxide equivalent
FCM	– Federation of Canadian Municipalities
GHG	– Greenhouse Gas
kWh	– kilowatt hour
L	– litres
m ³	– metres cubed
N ₂ O	– nitrous oxide
PCP	– Partners for Climate Protection
t	– tonnes
vkt	– vehicle kilometres travelled



Executive Summary

The changes in climate that we are seeing today are a result of greenhouse gases (GHG) that have accumulated in the atmosphere for more than a century. So too will the effect of greenhouse gases emitted today be experienced over the proceeding century.

Greenhouse gases can be managed by reducing use of greenhouse gas supply (e.g. fossil fuels) and removing greenhouse gases from the atmosphere (i.e. sequestration). This plan presents recommendations to both reduce and remove greenhouse gases from the atmosphere.

It is projected that the County of Wellington will experience the following changes in climate over the next 80 years:

- Increase in average annual temperature.
- Increase in number of days annually above 30°C.
- Increase in average annual precipitation.
- Shorter return period of extreme events.
- Increase in storm intensity.
- Decrease in snow.
- Increase in ice storms.

Resulting in the following potential impacts:

- Road washout and erosion.
- Increased cost of insurance.
- Power outages and service disruption.
- Expanded range of invasive and non-native pests.
- Watermain breaks.
- Lower crop yield.
- Low water during summer drought.
- Increased erosion.
- Higher operating costs for ice rinks.
- Road closures.
- Increase in nutrients and sediment in waterways.
- Increase in algae.
- Decreased opportunity for outdoor skating, skiing, ice-fishing.
- Ice damage to trees.

Climate Change Mitigation

This plan focuses on climate change mitigation- the reduction of greenhouse gas emissions. The benefits of mitigating greenhouse gas emissions go beyond reducing the magnitude and rate of climate change.

Health and Wellness – improvement to the health and wellbeing of our community’s most vulnerable people by reducing pollution and improving access to food.

Affordability and Accessibility – addressing barriers to home efficiency improvement to lower energy bills.

Economic Development – increasing opportunity for job growth related to home energy efficiency retrofits and opportunities for new business ventures.

Local Environment – improving the resilience and sustainability of local natural systems through tree planting, restoration and impact abatement.

Study Process and Plan Organization

In 2019, with financial support from the Federation of Canadian Municipalities (FCM) and the Government of Canada, the County of Wellington embarked on a study to better understand the contribution of the Corporation and the Community to climate change. Through this plan, **the County of Wellington strives to integrate climate change into our decision-making by developing actions and policy to lead the community in the reduction of greenhouse gas emissions.** This will ensure the County of Wellington continues to deliver superior public service resulting in healthy and safe communities within resilient and sustainable ecosystems, now and in the future.

Municipalities are keenly positioned to play a pivotal role in greenhouse gas reductions as energy consumers, investors and influencers. In 2009, it was estimated that 44% of Canada’s greenhouse gas emissions were directly or indirectly controlled by municipalities.

The development of this plan followed the Partners for Climate Protection (PCP) Milestone Framework. The first three steps: emissions inventory and forecast, target setting, local action plan have been completed ([Figure ES1](#)).

Milestone 1: Create a Baseline Emissions Inventory and Forecast

Milestone 2: Set Emissions Reduction Targets

Milestone 3: Develop a Local Action Plan

Milestone 4: Implement the Local Action Plan

Milestone 5: Monitor Progress and Report Results

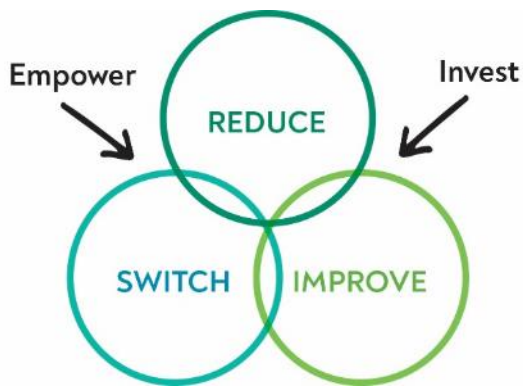


Figure ES1: Partners in Climate Protection Milestone Framework.

The year 2017 was chosen as the baseline year for the emissions inventory due to the completeness of the 2017 data set and compatibility with other larger scale studies and data sources (e.g. National Inventory Report 1990-2017: Greenhouse Gas Sources and Sinks in Canada, Statistics Canada 2016 Census).

Generally, development of the recommended actions in this plan considered the following framework ([Table ES1](#)), where the first three categories (reduce, improve, switch) drive emissions reductions and the latter two categories (invest, empower) drive implementation of the plan.

Table ES1: Framework to categorize recommendations to drive emissions reductions and implementation.



REDUCE	Decrease energy consumption.
IMPROVE	Refine or upgrade efficiency of equipment.
SWITCH	Change the type of energy used to lower carbon or renewable energy sources.
INVEST	Allocate funds or resources to incentivize or enable action.
EMPOWER	Equip the community with knowledge to make informed decisions.

Emissions of primary focus in this Plan are carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). In order to understand the relative influence of these greenhouse gas emissions in the atmosphere they are converted to CO₂e (carbon dioxide equivalent) using global warming potential (GWP) factors that compare the potential of each greenhouse gas to trap heat in the atmosphere relative to carbon dioxide. Hence, carbon dioxide has a GWP equal to 1, methane has 25 times the potential as carbon dioxide and nitrous oxide has 298 times the potential on a 100-year time horizon. Emissions values in this plan are presented in tonnes of carbon dioxide equivalent (t CO₂e).

Ontario's Energy Supply and Cost

Local emissions accounting is influenced by the emissions intensity¹ (i.e. the amount of emissions produced when the supplied energy is used) of the available energy sources. Currently, utility regulators and provincial governments control how energy is generated in the provincial energy supply (e.g. electricity grid, natural gas network). As energy users, we have the ability to alter our behaviours to reduce the amount and type of energy we use. Understanding the emissions intensity of Ontario's energy supply is helpful in choosing behaviours that reduce emissions.

Electricity

Ontario's electricity supply is among the cleanest in Canada. In 2017 (the baseline year for this study), Ontario's electricity mix consisted of nuclear (60.1%), water power (25.6%), alternative power sources (e.g. renewable sources such as solar photovoltaics, wind, biomass and waste) (9.8%), natural gas (4.0%), and other sources (0.3%).

Natural gas

In 2017, over 68% of residences in Ontario used natural gas as a heating source. The low cost of natural gas compared to other energy sources makes it appealing to homeowners. However, the emissions intensity of natural gas is much higher than electricity from Ontario's grid and renewable energy sources.

Other Heating Fuels (Fuel Oil, Propane, Coal)

In 2017, fuel oil was used as a heat source in 2.6% of Ontario homes and propane and coal were used in 3.1% of Ontario homes. These energy sources are typically used where natural gas is not available and have a higher emissions intensity.

Fuels (Gasoline, Diesel, Alternatives)

Transportation made up the second largest portion of Canada's greenhouse gas emissions at 28% in 2017. Gasoline comprised 72.4% of transportation fuel and 71.5% share of the emissions in Canada. Diesel use comprised 26.2% and emissions were 27.5% in 2017. Gasoline emissions intensity is lower than diesel. However, there are more gasoline-powered vehicles, which increases total emissions from gasoline over the

¹ Emissions intensity in this case refers to the amount of greenhouse gas produced per mega joule of energy produced.

more potent diesel. Biodiesel and other alternatives are slowly increasing their market share.

Future outlook

Canada Energy Regulator predicts a slow increase in energy use in Canada until 2040. Over the same timeframe, the markets will shift away from high emission intensity energy sources such as coal to lower intensity natural gas and renewable energy.

Energy cost in Ontario

The federal government introduced a levy on carbon in 2018. The levy is applied to generation and use of fossil fuels and is intended to push the markets away from fossil fuels by adding their environmental cost (e.g. greenhouse gas emissions) to the resource cost.

Community and Corporate Emissions Overview

Community and Corporate greenhouse gas emissions were calculated for the following sectors:

Sector	Community Inventory	Corporate Inventory
Buildings	✓	✓
Transportation and Streetlights	✓	✓
Solid Waste	✓	✓
Agriculture	✓	

Community Emissions

Community greenhouse gas emissions have been categorized by their supply; fossil fuels and biogenic (from living organisms). Burning of fossil fuels releases carbon dioxide and other greenhouse gases that were trapped in the earth for millions of years. Biogenic sources emit carbon dioxide that is already part of the natural carbon cycle. In total, Community greenhouse gas emissions in 2017 averaged 12.7 tonnes per capita for the County of Wellington. This is slightly above the provincial average of 12.6 tonnes per capita in 2013².

Emissions from Fossil Fuel Sources

Emissions from fossil fuels are found in:

- Buildings: electricity, natural gas, propane, fuel oil.
- Transportation: gasoline, diesel.

Transportation accounts for the largest portion (70%) of greenhouse gas emissions from fossil fuels in the community ([Figure ES2](#)). This is reflected in the combined emissions contribution from diesel and gasoline sources of 70% of Community emissions ([Figure ES2](#)). Gasoline is the largest single source contributor at 44% of Community emissions from fossil fuels.

² [The Conference Board of Canada](#)

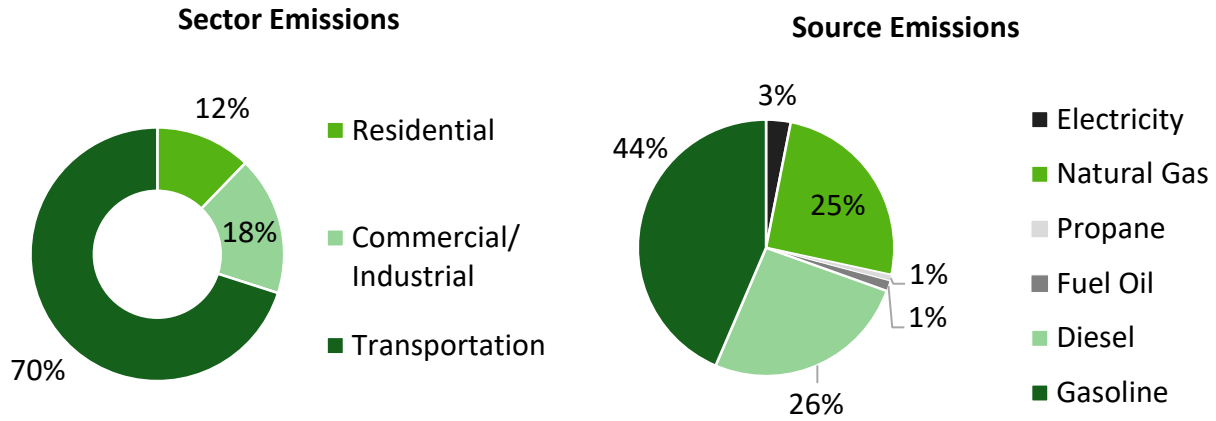


Figure ES2: Community greenhouse gas emissions from fossil fuels by sub-sector and source.

Emissions from Biogenic Sources

Biogenic sources of emissions in the County are from:

- Agriculture: enteric fermentation, manure management, soil management, liming/urea application.
- Solid waste.

Farmers in the County of Wellington feed Ontarians. Food production, both crops and livestock, have a heavy greenhouse gas cost that is borne by farmers. Greenhouse gas inventory calculations for agriculture are complex. Data to implement international protocol are incomplete on a local scale. Assumptions based on the advice of leading local practitioners and academics provide a best approximation of local agriculture emissions. Agriculture is the only sector in the scope of this project that also sequesters, or traps, carbon in soils and natural areas managed by farmers, which creates the ability to reduce net greenhouse gas emissions. Sequestration has not been included in the agriculture emissions calculations.

The largest share of Community biogenic-generated emissions is from enteric fermentation (48%) followed by soil management (26%) and manure management (22%) ([Figure ES3](#)). Biogenic methane is the largest emission from biogenic sources. Biogenic methane is produced by both agricultural processes and solid waste.

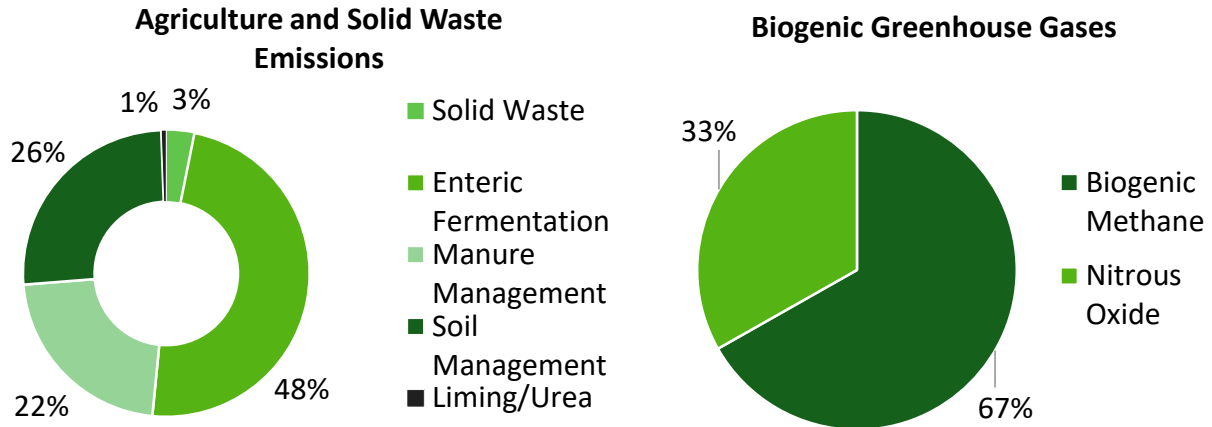


Figure ES3: Community greenhouse gas emissions from biogenic supply (Agriculture and Solid Waste) by sub-sector and greenhouse gas.

Corporate Emissions Overview

Corporate emissions are primarily from fossil fuels in Corporate transportation (fleet) and Buildings sectors (Figure ES4). The majority of emissions sources are diesel (42%) and natural gas (40%). Biogenic sources of emissions are from solid waste and constitute 7% of Corporate emissions.

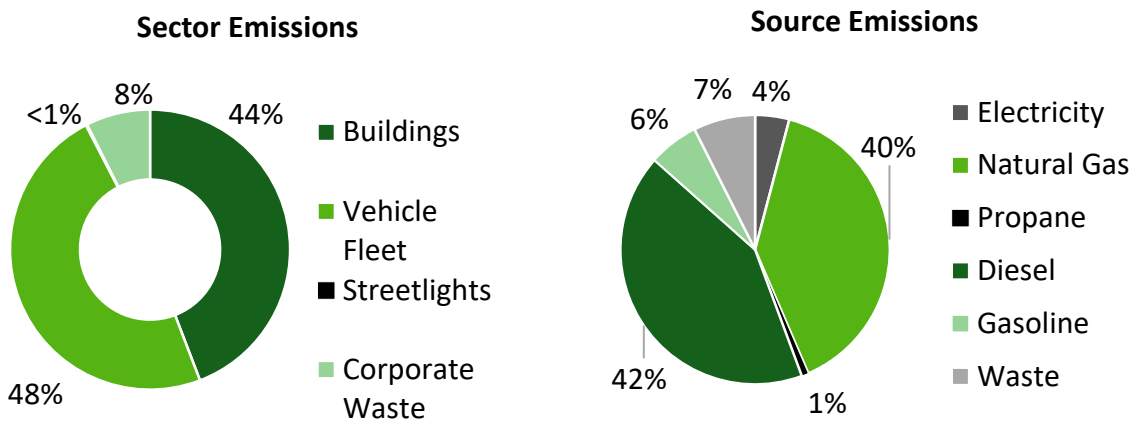


Figure ES4: Corporate greenhouse gas emissions by sector and source.

Projections and Targets

The County of Wellington Official Plan projects the County population to grow to 122,000, 132,000 and 140,000 people and employment to grow to 54,000, 57,000 and 61,000 jobs by 2031, 2036 and 2041, respectively. For employment, this forecast represents an increase of 52% between 2016 and 2041. Schedule 3 of A Place to Grow – Growth Plan for the Provincial Golden Horseshoe was recently amended in August 2020 to include minimum forecasts for a 2051 population of 160,000 and employment of 70,000. Under the current business-as-usual scenario (i.e. no climate change mitigation actions are implemented), increases in population and employment will result in increases in greenhouse gas emissions from homes, businesses, transportation and solid waste as more people use more resources. It is estimated that Community and Corporate greenhouse gas emissions will increase to 1,249,000 eCO₂e and 10,700 t CO₂e, respectively ([Figures ES5](#) and [ES6](#)) by 2030.

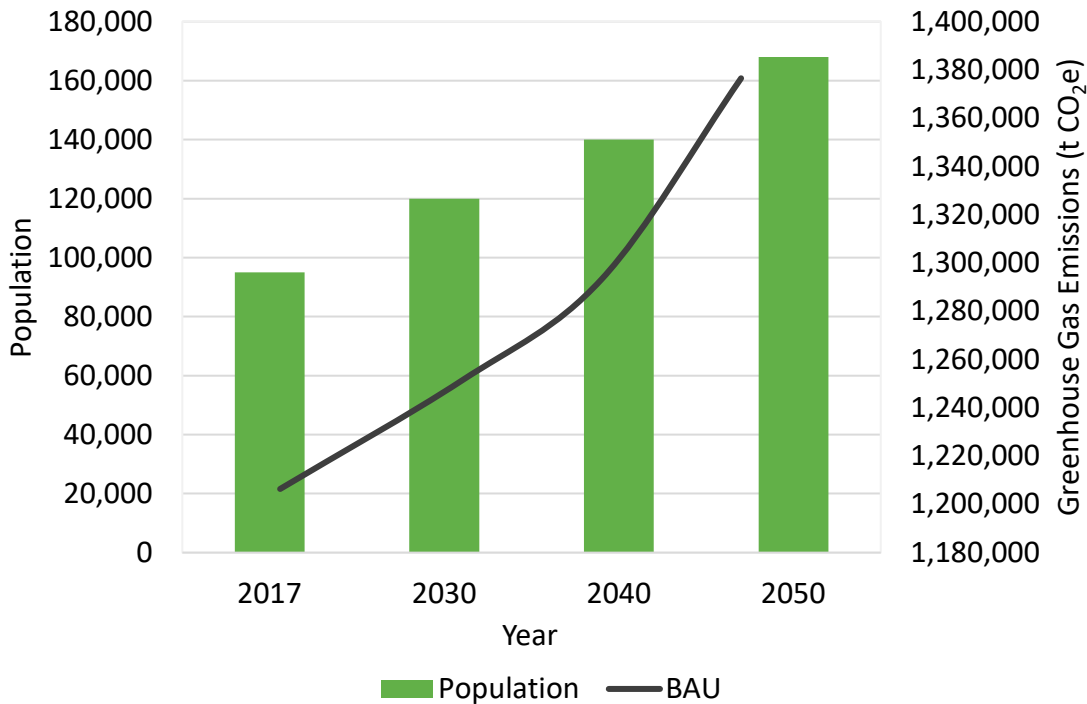


Figure ES5: Community emissions forecast to 2050 under business-as-usual (BAU) scenario.

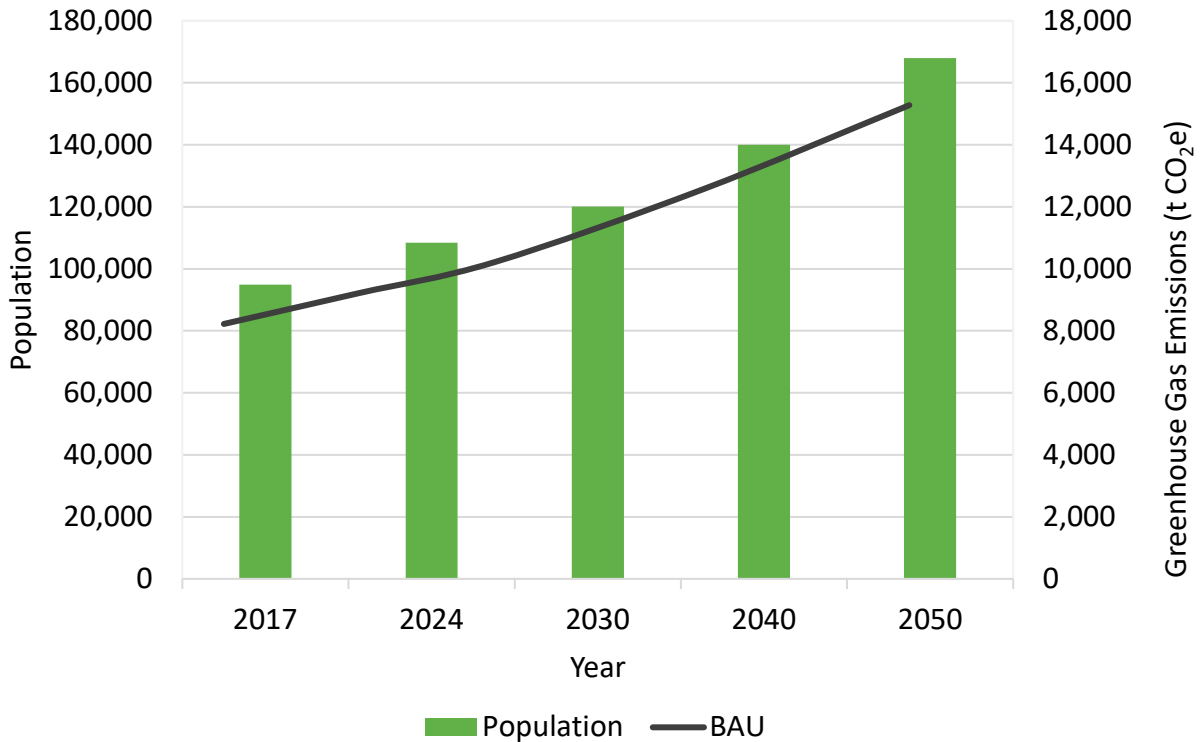


Figure ES6: Corporate emissions forecast to 2050 under business-as-usual (BAU) scenario.

Despite increasing resource usage and the resulting greenhouse gas emissions, commitments have been made to curtail emissions based on 2005 levels. In 2015, the Government of Canada committed to the Paris Agreement which aims to reduce GHG emissions by 30% below 2005 levels by 2030. The federal government has also announced that it will develop a plan to achieve net-zero emissions by 2050.

In the Made-in-Ontario Environment Plan, the Ontario Provincial Government confirmed its commitment to align provincial greenhouse gas targets with the 30% by 2030 target set by the federal government.

Partners in Climate Protection recommends a Community target of 6% and a Corporate target of 20% reduction in greenhouse emissions over 10 years.



Future Focused aims to reduce Community greenhouse gas emissions by 6% from 2017 levels by 2030 and reduce Corporate emissions by 10% over the same period.






Sector Emissions

This study focuses on four main sources of greenhouse gas emissions; Buildings, Transportation and Streetlights, Agriculture and Solid Waste. Both Corporate and Community emissions are presented, as appropriate. [Table ES2](#) summarizes the objectives for each sector. A complete list of recommendations is found in [Appendix D](#).

Table ES2: Objectives for reducing greenhouse gas emissions from Community and Corporate sources.

Sector		#	Objectives
 Buildings	Community	1	Develop strategies and associated policies in support of greenhouse gas reductions and energy conservation for existing buildings.
		2	Develop strategies and policies in support of greenhouse gas avoidance and energy conservation in planned buildings and developments.
		3	Develop strategies to build a culture of conservation in the community.
	Corporate	1	Develop strategies and policies to reduce greenhouse gas from existing buildings.
		2	Develop strategies and policies to transition all new buildings to be net zero/net zero-ready design.
 Transportation and Streetlights	Community	1	Develop strategies to transition light duty vehicles to electric.
		2	Develop strategies and policies to reduce dependency on the automobile.
		3	Develop strategies to support options for commuters to reduce greenhouse gases.
		4	Develop strategies to reduce emissions from heavy duty vehicles and equipment.
		5	Plan for future transportation needs.
	Corporate	1	Develop strategies and policies to transition light duty vehicles to electric.
		2	Develop strategies to reduce greenhouse gases from personal use vehicles.
		3	Develop strategies to reduce greenhouse gases from heavy duty vehicles and equipment.
		4	Plan for future transportation needs.
		5	Develop strategies to create a culture of conservation.
		6	Continue to reduce energy use in street and outdoor lighting.

Sector		#	Objectives
 Solid Waste	Community	1	Develop strategies to reduce solid waste generation.
		2	Develop strategies to increase diversion rates.
		3	Empower the community through programme development.
	Corporate	1	Develop strategies and policies to reduce solid waste generation from source.
		2	Develop strategies to increase diversion rates.
 Agriculture	Community	1	Develop strategies to empower farmers to reduce greenhouse gases on the farm.
		2	Develop innovative strategies to promote and improve access to local food.
		3	Build a culture of conservation in the community.
 Cross-Sectoral	Community	1	Develop strategies to support renewable energy in the community.
		2	Develop strategies to support partnership-building and engagement with the community.
	Corporate	1	Develop strategies and policies to support climate change action as common practice.
		2	Develop strategies and policies to improve energy data management tools and processes
		3	Advocate for Climate Change Action

Implementation

Climate change action is most successful when integrated across disciplines and organizational boundaries to leverage other actions, expertise and effort. The recommendations in this plan will require advocates to ensure the outcomes are delivered effectively and within the timelines of the plan.

The County of Wellington has a number of existing programmes, plans and policies already undertaking work that supports the recommendations in this plan including:

- Strategic Action Plan.
- Municipal Operational Service Efficiency Review.
- Conservation and Demand Management Plan.
- Purchasing Policy.
- Asset Management Programme and Policy.
- Smart Cities – Our Food Future.
- Taste Real.
- Fleet Inspection and Performance Programme.
- Ride Well.
- Green Legacy Building Guidelines.
- Green Legacy Programme.
- Housing and Homelessness Plan.
- Waste Management Fleet Conversion to Compressed Natural Gas.
- Solid Waste Services Strategy.
- Active Transportation Plan.
- County Trail System.
- Community Improvement Programme Fund.
- Wellington Rural Water Quality Programme.

Gaps in current service delivery to address the recommendations in this plan centre around technical expertise in energy management and community engagement and facilitation with a focus on energy efficiency. For the County of Wellington and the community to be successful in achieving greenhouse gas emissions reductions, climate change action must become common practice. It is important to have appropriate resources (e.g. staff, consultants, data management tools, funding, etc.) to ensure the plan is implemented and climate change mitigation remains on the minds of staff, decision-makers and the community.

Partnerships and Funding

There are a number of local, regional and national partners in public and private entities that will work together to achieve the objectives of this plan. Along with all levels of government, local partners work in the areas of building energy and efficiency, agriculture, utility services, transportation planning and services, alternative energy and fuels, climate change action, waste management and education and outreach.

Funding streams change regularly to align with the priorities of the sitting government and energy providers and regulators. The following funding programmes are available in 2021 and applicable to the recommendations contained within the plan.

- Federation of Canadian Municipalities: Green Municipal Fund, Municipal Asset Management Programmes, Community Energy Financing.
- Independent Electricity System Operator: Save on Energy, Aboriginal Community Energy Plan Programme, Education and Capacity Building Programme.

- Enbridge/Union Gas: Home Energy Upgrades, Home Efficiency Rebate, Industrial Custom Solutions and Incentives Programme, Commercial Custom Retrofit Programme, Comprehensive Energy Management Programme, Fixed Incentive Programme, RunitRight Programme, School Energy Challenge Programme, Commercial Savings by Design, Engineering Energy Efficiency Feasibility Study, and more.
- Federal Government: Natural Resources Canada, Environment and Climate Change Canada, Infrastructure Canada.
- Ontario Ministry of Economic Development, Job Creation and Trade: Southwestern Ontario Development Fund.
- Natural Resources Canada: Electric Vehicle Infrastructure Demonstration Programme.
- Transport Canada: Zero-Emissions Vehicle rebate programme.
- Infrastructure Canada: Green Infrastructure Fund.
- Plug 'n Drive: Used Electric Vehicle Incentive Programme.
- Ontario Ministry of Infrastructure: Improving Connectivity for Ontario.
- Ontario Soil and Crop Improvement Association and Ontario Ministry of Agriculture, Food and Rural Affairs grants.
- Wellington Rural Water Quality Programme.
- Smart Cities – Our Food Future.

Partnerships

The County of Wellington will forge meaningful relationships with organizations with the shared goal of reducing greenhouse gas emissions. Partnerships with other levels of government, member municipalities, academia, private sector organizations, school boards and other institutions will focus on positive solutions and transformative action to provide technical assistance, transfer knowledge and develop financial support within the community.

Emissions Reductions

Emissions reductions and avoidance can be estimated based on case studies that examine performance results of similar actions implemented elsewhere ([Tables ES3](#) and [ES4](#)). Targets for the degree to which actions are implemented over the set timeframe are noted. GHG reductions and avoidance are presented as annual estimates upon completion of the actions listed based on 2017 energy costs and energy supply emission intensity. Energy efficiency improvements as a result of new or advanced technologies have not been included.

These estimates achieve the target of 6% reduction for Community emissions and 10% reduction for Corporate emissions from the 2017 baseline.

Table ES3: Estimated Community emissions reductions based on recommendations.

Sector	Reduction Target to 2030	Total t CO ₂ e
Existing homes	Retrofit 20% of homes and businesses (efficiency improvement of 40%).	18,686
New homes and businesses	40% energy efficiency improvement over pre 2017 standards.	1,765
Transportation	20% adoption of cars to electric vehicles.	27,140
Agriculture	12% reduction in emissions from manure management and soil management.	30,970
Solid Waste	20% reduction in waste emissions.	3,400
TOTAL		81,960

Table ES4: Estimated Corporate emissions reductions based on recommendations.

Sector	Reduction Target to 2030	Total t CO ₂ e
Existing buildings	Retrofit 20% of social housing and administration buildings (efficiency improvement of 40%).	480
Transportation	15% efficiency improvement in curbside pickup, 5% reduction in emissions from other fleet sources.	300
Solid Waste	5% reduction in solid waste emissions.	30
TOTAL		870

Monitoring and Reporting

For some sectors, strictly conducting the same calculations completed in this plan may not provide the full picture of the changes being made to transition to a lower-emissions community. Community metrics, or key performance indicators, are suggested for each sector to track progress. Corporate emissions will be tracked using energy use data. Completion of specific tasks will also be tracked and reported in future plan updates.

Progress on the recommendations contained herein will be reported on annually through the budget process with major achievements presented to Council when appropriate. Annual reporting will include an assessment of the plan to determine if amendments are needed to consider new information, data, etc. which may impact the ability of the County to deliver the recommendations.

Prior to the conclusion of this plan in 2030, it is recommended the County consider the next 10 year forecast. A full review and update of the plan is recommended to re-establish the County's

commitment to emissions reductions, re-calibrate targets and set new recommendations to continue our pathway to meet Canada’s goal of net-zero by 2050.

Conclusion

Future Focused demonstrates the County’s commitment to lead the community on climate change action by integrating climate change into our decision-making to deliver superior public service for healthy and safe communities and resilient ecosystems.

Future Focused builds on established County programmes to expand or refocus efforts to reduce greenhouse gas emissions. The recommendations in this plan seek to support the community through the transition to net-zero in 2050 in alignment with the goals of the federal government. Short-term targets of reducing Community and Corporate emissions by 6% and 10%, respectively, from 2017 levels by 2030 have been established to set us on a pathway to achieve this longer-term goal, with monitoring and reporting to track our progress.





What Is Climate Change Mitigation?



The truth is: the natural world is changing. And we are totally dependent on the world. It provides our food, water and air. It is the most precious thing we have and we need to defend it.

– David Attenborough, Broadcaster and Natural Historian

What is Climate Change Mitigation?

Increased carbon dioxide and other greenhouse gases (GHG) from industrialization has accelerated the mean surface temperature of Earth. This accelerated warming has led to climate change trends that can be modelled and projected into the future. Our future climate reality is dependent on the actions taken, or not taken, to curb our dependence on fossil fuels and other sources of greenhouse gasses in order to reduce these emissions³.

Climate Change Mitigation

Climate change mitigation is the act of reducing the severity of global warming by reducing the use of greenhouse gas producers (e.g. fossil fuels) and removing greenhouse gases from the atmosphere (i.e. sequestration).

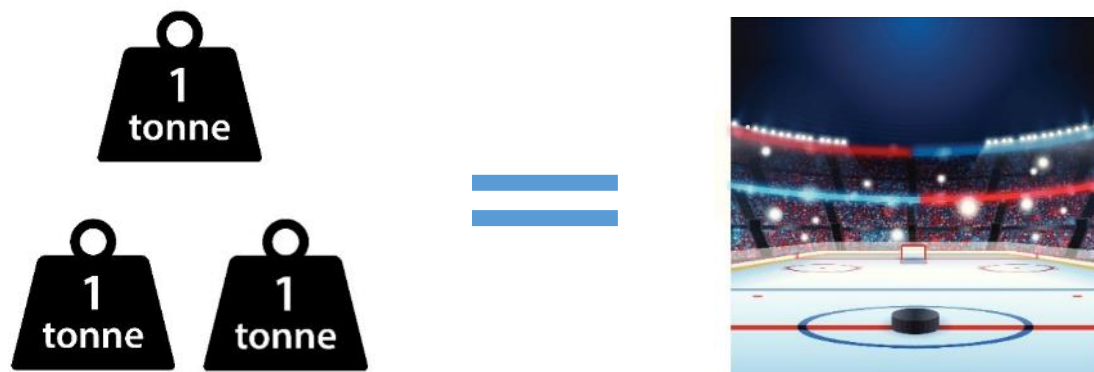
There are many greenhouse gases in the atmosphere. Those of primary focus in this plan are carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O).

In order to understand the comparative influence of these greenhouse gas emissions in the atmosphere they are converted to CO₂e (carbon dioxide equivalent) using global warming potential (GWP) factors. GWP factors compare the potential of each greenhouse gas to trap heat in the atmosphere relative to carbon dioxide. Hence, carbon dioxide has a GWP equal to 1, methane has 25 times the potential as carbon dioxide and nitrous oxide has 298 times the potential on a 100-year time horizon⁴. Although the GWP for carbon dioxide is low, carbon dioxide is the largest portion of greenhouse gas emissions in Canada. In 2017, carbon dioxide

³International Panel on Climate Change. 2018. [Summary for Policymakers of IPCC Special Report on Global warming of 1.5°C approved by governments.](#)

⁴ International Panel on Climate Change. 2006. [Guidelines for National Greenhouse Gas Inventories.](#)

made up 80% (or 571 mega tonnes of CO₂e) of the country's total emissions with methane and nitrous oxide constituting 13% and 5.3%, respectively⁵. Three tonnes of carbon dioxide is enough to fill a National Hockey League (NHL) hockey rink (56,610 ft³).



Nitrous oxide is the longest living greenhouse gas of the three on which this plan is focused. The lifetime of nitrous oxide in the atmosphere is estimated to be between 118 and 131 years⁶. Carbon dioxide is close behind at an estimated lifetime of 100 years. Methane has a much shorter turnover time of 12 years. It is the longer lifetimes of these greenhouse gases that exacerbate the effects of climate change⁷. The changes in climate that we are seeing today are the result of greenhouse gases that have accumulated in the atmosphere for more than a century. So too, will the effect of greenhouse gases emitted today, be experienced over the proceeding century⁸.

Climate Change in the County of Wellington

The future climate in Wellington County is projected to be warmer and wetter with both average annual temperature and average annual precipitation increasing over the next 80 years⁹ ([Figure 1](#)).

⁵ Environment and Climate Change Canada. 2019. [National Inventory Report 1990-2017: Greenhouse Gas Sources and Sinks in Canada](#).

⁶ International Panel on Climate Change. 2013. [Climate Change 2013 The Physical Science Basis](#).

⁷ Ricke, Katharine L. and Ken Caldeira. 2014. Maximum warming occurs about one decade after a carbon dioxide emission. *Environ. Res. Lett.* 9 124002

⁸ *ibid*

⁹ [Climatedata.ca](#). Accessed October 8, 2020.

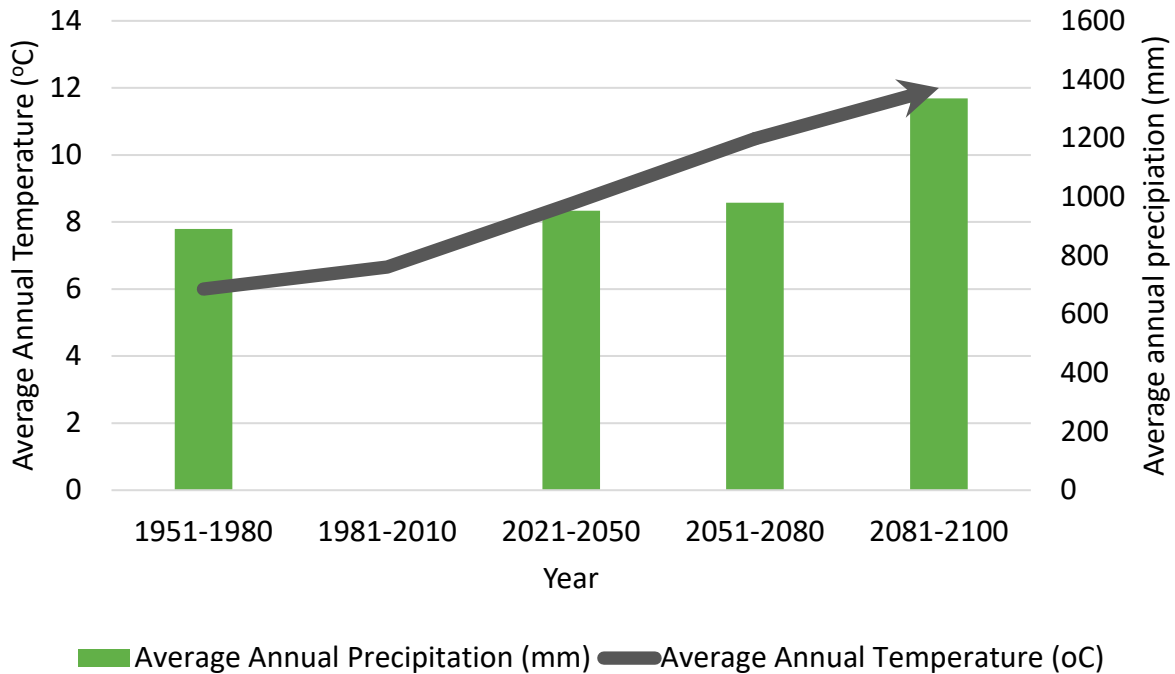


Figure 1: Predicted change in average annual temperature and average annual precipitation for the County of Wellington to 2100¹⁰.

The average number of days annually that will experience temperatures greater than 30°C will rise from 13 days in 2017 to 32 days by 2050 and 60 days by 2080 in the County of Wellington¹¹. In Canada, models show shorter return periods for extreme weather events, including ice and rain storms. It is anticipated that more intense rainfalls will occur in greater frequency, with more rain falling in shorter periods of time¹². While snow will decrease, conditions will favour ice storms which are expected to increase by about 35% in southern Ontario¹³.

While there are many effects of increased temperature and precipitation, of keen interest in the County of Wellington are the impacts to agriculture and vulnerable community members. Community members who are most vulnerable to the effects of a changing climate are outside workers, farmers and homeless and under-housed who are at greater risk of exposure to heat and precipitation.

Farmers have an increased risk due to being dependent on the land for their income. The unpredictability of climate change translates to unpredictable crop success and income. Warmer temperatures create habitats suitable for invasive species like ticks and forest and agricultural pests. Increases in temperature will also increase growing degree days in the

¹⁰ ibid

¹¹ ibid

¹² McBean & Henstra. 2009. Background Report. Climate Change and Extreme Weather: Designing Adaptation Policy.

¹³ ibid

County shortening dormancy windows. Increased intensity of rainfall increases runoff from hard surfaces (including frozen ground) and natural areas that cannot absorb higher water volumes quickly enough. Increased runoff can lead to soil and nutrient loss and places more pressure on stormwater management systems and natural water ways, in some cases beyond the capacity of these systems, leading to flooding.

Predicted increases in average temperature and increased frequency of extreme heat days puts vulnerable populations at greater risk of heat-related illnesses (e.g. heat stroke, respiratory issues, etc.). As heat rises, the demand for climate control (e.g. air conditioning) will also increase, as will the demand for electricity. Lower income earners, including elders who tend to live in less efficient homes and cannot afford the expense of air conditioning, are also at higher risk.

Some of the expected impacts of climate change that may be experienced in the County of Wellington are listed in [Table 1](#).

Table 1: Potential impacts of climate change to local infrastructure, agriculture, environment and recreation.

Infrastructure	Agriculture	Environment	Recreation
<ul style="list-style-type: none"> • Road washout and erosion. • Increased insurance cost. • Power outages and service disruptions. • Road closures. • Watermain breaks. 	<ul style="list-style-type: none"> • Expanded range of pests. • Lower crop yield. • Increased erosion. 	<ul style="list-style-type: none"> • Ice damage to trees. • Increase in invasive species. • Increased nutrients and sediment in water ways. • Increase in algae. 	<ul style="list-style-type: none"> • More expensive to operate ice rinks. • Decreased opportunity for outdoor skating, skiing, ice-fishing. • Low water during summer drought.

Co-benefits of Climate Change Mitigation

The benefits of mitigating greenhouse gas emissions go beyond reducing the magnitude and rate of climate change. Actions to reduce emissions also benefit health and wellness, affordability and accessibility, economic development, and the environment.

Health and Wellness

Environment Canada defines a heat wave as “three or more consecutive days in which the maximum temperature is greater than or equal to 32°C.” With an increase in annual daily temperatures greater than 30°C expected in the future, exposure to extreme heat events could increase heat related illness and deaths. Community members at greatest risk include older adults, young children and infants, those with chronic illness or

physical impairment, low income, homeless, living alone, new comers and transient (tourists), occupational groups, and those who are physically active.

Ontario Ministry of Health and Long-Term Care¹⁴ identified the following health concerns related to climate change:

- Temperature related death and illness.
- Respiratory and cardiovascular disease related to poor air quality.
- Mental health and stress-related issues.
- Effects of displacement and crowding in emergency shelters.
- Access to health care/interruption of health services.

Affordability and Accessibility

The ability to adapt and recover from these impacts is dependent on access to financial, material and social resources¹⁵. These tools are most often out of reach for community members who are socially marginalized and disadvantaged who will suffer the greatest from impacts of climate change. It is commonly agreed that wealthy countries are the largest contributors to climate change.

At a local scale, wealthy community members are not only bigger contributors to local emissions, but, financial and other resources are more accessible to them to prevent, protect and prepare for climate change. Energy poverty in Wellington County is estimated to be 25%¹⁶. That is, 25% of households spend 6% or more of after-tax income on home energy.

Affordability and Accessibility concerns related to climate change include:

- Increased demand on health care services.
- Disruption of social networks.
- Interference with livelihoods.
- Damage to, or unavailability (including affordability) of, housing or shelter.
- Damage to critical infrastructure, including transportation.

Economic Development

In 2017, in Ontario, the construction industry provided 10 jobs per million dollars of Gross Domestic Product, three and half times the number of jobs per millions dollars in the energy sector¹⁷. The same Investment dollars dedicated to building retrofits will create opportunities in the construction industry at a higher rate than the same investment in other industries. These investments will also indirectly create more jobs in supporting manufacturers and distributors of energy efficient construction materials

¹⁴ Ontario Ministry of Health and Long-Term Care. 2016. Ontario Climate Change and Health Toolkit.

¹⁵ [National Climate Change Adaptation Research Facility](#).

¹⁶ <https://energypoverty.ca/>

¹⁷ Statistics Canada. [Table 14-10-0023-01 Labour force characteristics by industry, annual \(x 1,000\)](#) . Statistics Canada. [Table 36-10-0402-01 Gross domestic product \(GDP\) at basic prices, by industry, provinces and territories \(x 1,000,000\)](#). Accessed October 8 2020

and technologies. Energy bill savings generated by energy efficiencies over the life of the investment can then be spent in the local economy.

Opportunities in the green economy are growing. In 2020, the federal and provincial governments committed to investing in the conversion of the Ford Motor Company plant in Oakville, Ontario to build electric cars. It is expected that this conversion will secure over 5,000 jobs across the supply chain¹⁸. Innovations in clean energy production and circular economies are creating opportunities in agriculture and solid waste management to create new green products from waste products. With investments to enable residents and businesses to undertake climate change actions, opportunities exist for non-governmental organizations and community groups to expand their service offerings to match funding and other resources to those who want to take action.

Local Environment

Think globally, act locally. We are subject to the global effort on climate change. However, there are local environmental benefits through local climate change actions. Actions such as tree planting, wetland restoration and stream naturalization improve the health and sustainability of our natural areas as well as their ability to take up carbon. Similarly, climate change sensitive farming practices can improve soil's ability to uptake carbon. These actions regulate water levels and flooding, improve infiltration, provide habitat for native species and support Species at Risk and contribute to our own health and wellness by cleaning the air and our drinking water.

Further, managing our energy demand can reduce the need for energy sprawl; the physical footprint of our energy systems and infrastructure. Wise energy choices can avoid the need to remove undeveloped agriculture and natural areas to create new energy infrastructure.

The interconnectedness of climate change actions is demonstrated in some of the examples noted above. Climate mitigation focuses first on methods to reduce greenhouse gas emissions and then more broadly at the systems which may also be impacted (both negatively and positively) by those methods. Ultimately climate mitigation is a system change to a more resilient and sustainable way of living. Linkages between the recommendations in this plan and the co-benefits described above are noted where applicable in [Section 6](#).

¹⁸ <https://www.thestar.com/business/2020/10/08/feds-ontario-ante-up-millions-to-produce-electric-vehicles-at-fords-oakville-plant.html>



Study Process and Plan Organization



Twenty-five years ago people could be excused for not knowing much, or doing much, about climate change. Today we have no excuse.

- Desmond Tutu, Former Archbishop of Cape Town

Study Process and Plan Organization

In 2019, with financial support from the Federation of Canadian Municipalities (FCM) and the Government of Canada, the County of Wellington embarked on a study to better understand the contribution of the Corporation and the Community to climate change.

Through this plan, the County of Wellington strives to integrate climate change into our decision-making by developing actions and policy to lead the community in the reduction of greenhouse gas emissions. This will ensure the County of Wellington continues to deliver superior public service resulting in healthy and safe communities within resilient and sustainable ecosystems, now and in the future.

This plan reflects the aspirational goals set out in the County of Wellington's Strategic Action Plan of having "the best people...the best processes...the best services...the best infrastructure...to meet the current and future needs of the community."¹⁹ Actions in this plan integrate and support four of the County's Top 5 Priorities:

- Implementation of Our Food Future initiative.
- Create Long-term Wellington County Financial Sustainability Plan.
- Create a Long-Term Asset Management Plan.
- Establishing the support (the 'why') for future initiatives.

Municipalities as Climate Change Action Leaders

Municipalities are keenly positioned to play a pivotal role in greenhouse gas reductions as energy consumers, investors and influencers. The importance of municipal leadership in Canada's quest to meet its commitments to greenhouse gas reductions cannot be overstated. In 2009, it was estimated that 44% of Canada's greenhouse gas emissions were directly or indirectly controlled by municipalities²⁰. By showing leadership in the spheres where they have control such as reducing Corporate emissions and providing financial support and innovative policies, municipalities can influence and empower residents, business owners and visitors to

¹⁹ McSweeney and Associates. 2019. Future Focused, People Invested. Strategic Action.

²⁰ EnviroEconomics, 2009. Act Locally. [The Municipal Role in Fighting Climate Change](#).

reduce greenhouse gases in their communities. The jurisdictional boundaries of the County, member municipalities, provincial and federal governments are described in [Figure 2](#).

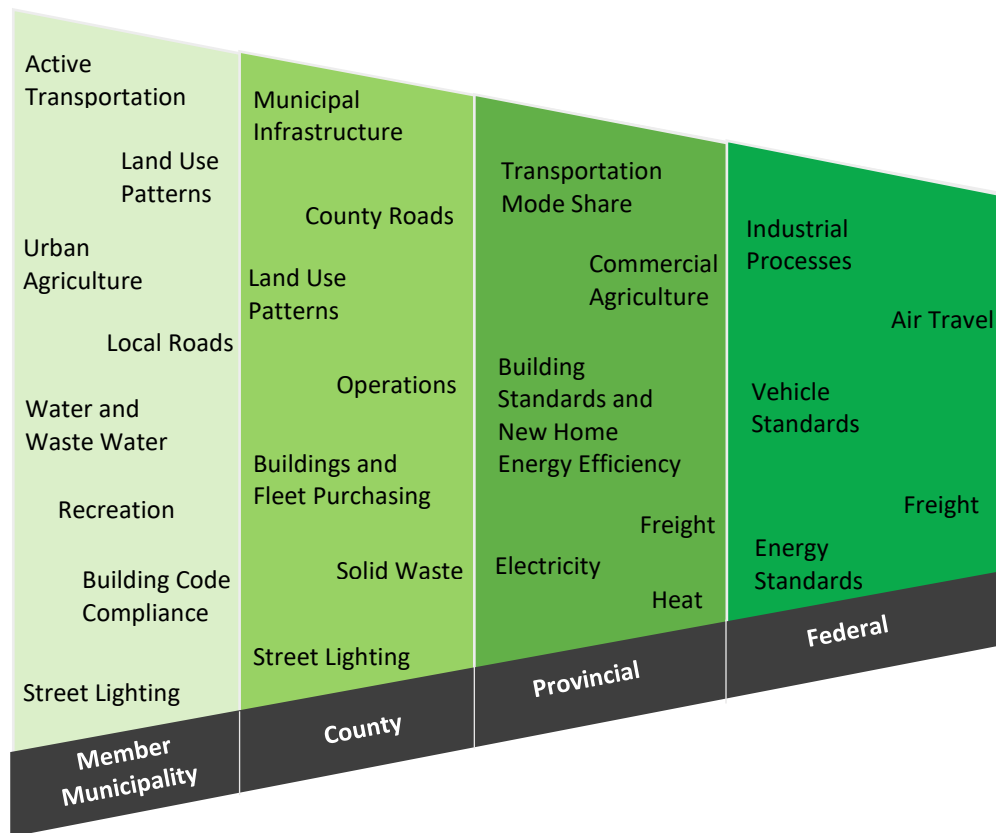


Figure 2: Spheres of control of government tiers reflective of the division of jurisdiction in the County of Wellington.

Legislatively, the Ontario government encourages municipalities to undertake greenhouse gas emissions inventories and strategies to reduce greenhouse gas emissions from transportation, buildings, waste management and municipal operations through A Place to Grow²¹. A Place to Grow also directs municipalities to develop policy to reduce greenhouse gases through planning complete communities, reducing dependency on the automobile, and promoting local food, food security and soil health, among other objectives. Beyond emissions reduction, A Place to Grow directs municipalities to develop policy and strategies to conserve energy in planned and existing developments (including municipal buildings), integrate active transportation into transportation planning and ensure transportation systems reduce greenhouse gases and support the use of zero- and low-emissions vehicles.

Similarly, the Energy Act requires broader public sectors to plan for lowering energy demand in municipal operations and report on energy consumption. Likewise the Ontario Policy

²¹ Government of Ontario. 2020. A Place to Grow. Growth Plan for the Greater Golden Horseshoe. Office Consolidation.

Statement: Service Manager Housing and Homelessness Plans²² directs municipalities to demonstrate commitment to improve energy efficiency in their social and affordable housing stock.

The Provincial Policy Statement²³ requires municipalities to address energy conservation and emissions reduction through land use and development patterns.

The County of Wellington is well on its way to addressing these requirements through Corporate strategies ([Figure 3](#)).

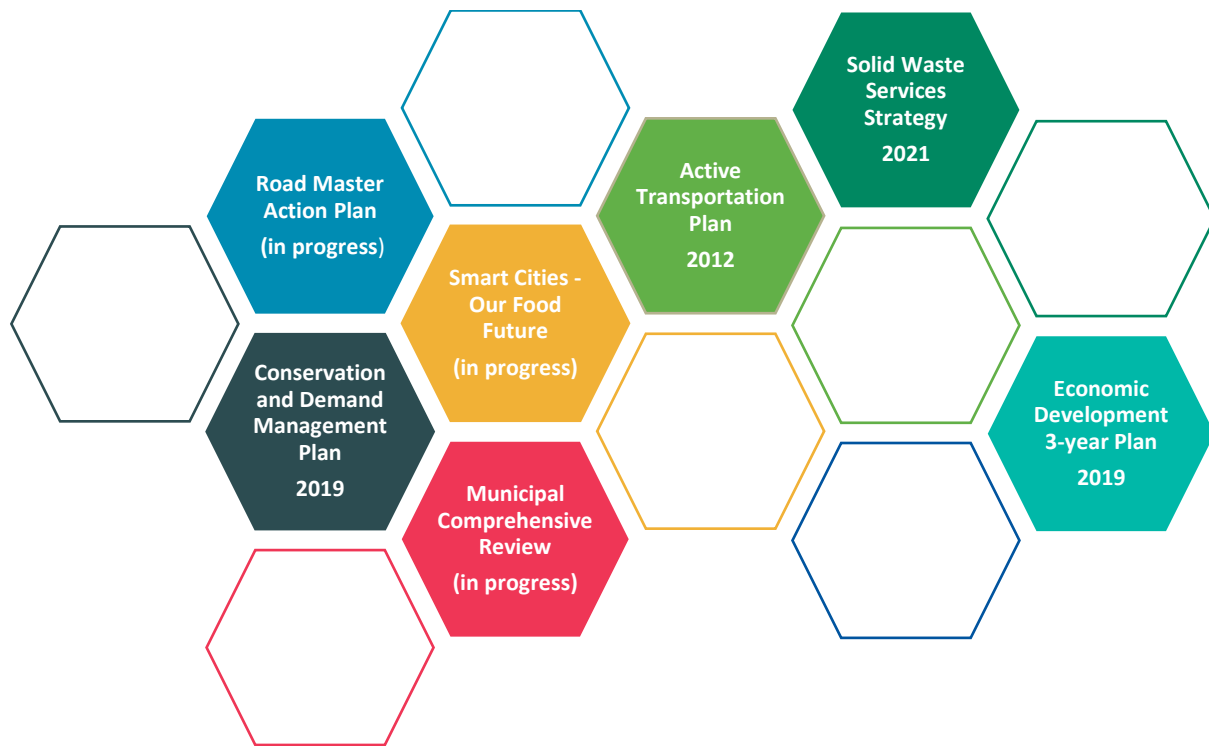


Figure 3: County of Wellington plans and strategies that take action on climate change.

The County of Wellington is a two-tier municipality with the County serving the higher tier function and seven member municipalities (Erin, Guelph-Eramosa, Fergus, Mapleton, Minto, Puslinch, Wellington North) as the lower tier, or local, function. The division of authority and jurisdiction between these tiers is outlined in the Municipal Act. The role of the County and the local municipalities in the implementation of this plan is described below.

Role of the County of Wellington

The County provides programmes and services that serve the needs of the broader community. County initiatives are typically not tailored to the needs of the local community. However, the County provides enabling policies and programmes to guide local municipalities to achieve broader community objectives in a manner that is suitable to local needs.

²² Government of Ontario. 2016. Ontario Policy Statement: Service Manager Housing and Homelessness Plan.

²³ Government of Ontario. 2020. Provincial Policy Statement, 2020. Under the Planning Act.

The County has sole responsibility for actions related to County infrastructure (streetlights, roads) assets (buildings, trails, natural spaces, etc.), policies (County Official Plan and associated by-laws), as well as County programmes that serve the community (Green Legacy, Rural Water Quality Programme, solid waste management, programmes to support economic development, etc.) and programmes delivered through the Museum, and libraries. On occasion the County leads or partners to deliver special programmes such as the initiatives through Smart Cities – Our Food Future (in partnership with the City of Guelph).

The County is well positioned to provide leadership by implementing pilot programmes and projects to improve our collective knowledge of new technology and processes. This has been demonstrated through projects such as Our Food Future and Ride Well.

Role of Local Municipalities

Local municipalities are responsible for programmes, services and policies to support the needs of the local community. With respect to this plan, member municipalities have direct control over actions related to the Ontario Building Code, local land use planning policies and by-laws, local trails. Member municipalities also have direct control over services not addressed in this plan such as water and waste water services and recreation.

Member municipalities play an integral role in implementing many of the actions in the plan. The jurisdictional split between the County and member municipalities requires that we work together to serve residents and businesses by solving big problems and enabling action. The recommendations in this plan serve to enable local municipalities to develop and partner on the development of local climate change action programmes and policies that suit local needs. The County will continue to work with member municipalities to create seamless processes and opportunities for residents and businesses to achieve their energy efficiency goals.

Study Approach

The development of this plan followed the FCM's Milestone Framework²⁴ delivered through Partners for Climate Protection (PCP) Programme. The Milestone Framework ([Figure 4](#)) consists of a series of five steps:

²⁴ Federation of Canadian Municipalities. 2008. [Five-Milestone Framework](#).

Milestone 1: Create a Baseline Emissions Inventory and Forecast

Milestone 2: Set Emissions Reduction Targets

Milestone 3: Develop a Local Action Plan

Milestone 4: Implement the Local Action Plan

Milestone 5: Monitor Progress and Report Results



Figure 4: Partners in Climate Protection Milestone Framework

Future Focused – a climate change mitigation plan for the County of Wellington marks the completion of the first three milestones; emissions inventory, target setting and local action plan development. The plan considers emissions from the Corporation of the County of Wellington (herein referred to as Corporate) and emissions from the broader community (herein referred to as Community).

The scope of work for this project focuses on Scope 1 emissions sources as defined by the International Panel on Climate Change²⁵; those emissions generated directly from sources owned or operated by a company or resident within the project area. Scope 1 emissions do not include indirect emissions from the generation of purchased energy (Scope 2) or indirect emissions that occur through their value chain (Scope 3).

The baseline year 2017 was chosen for the emissions inventory due to the completeness of the 2017 data set and compatibility with other larger scale studies and data sources (e.g. National Inventory Report (2019), Statistics Canada 2016 Census).

Emissions calculations were completed following the PCP Protocol: Canadian Supplement to the International Emissions Analysis Protocol (undated)²⁶, International Panel of Climate Change guidelines for National Greenhouse Gas inventories²⁷, and Canada’s National Inventory Report 2009-2017²⁸. The specific steps taken, rationale for inclusions and exclusions, data sources, etc.

²⁵ International Panel on Climate Change. 2006. [Guidelines for National Greenhouse Gas Inventories.](#)

²⁶ Federation of Canadian Municipalities. Undated. [PCP Protocol: Canadian Supplement to the International Emissions Analysis Protocol.](#)

²⁷ International Panel on Climate Change. 2006. [Guidelines for National Greenhouse Gas Inventories.](#)

²⁸ Environment and Climate Change Canada. 2019. [National Inventory Report 1990-2017: Greenhouse Gas Sources and Sinks in Canada.](#)

are documented in the County of Wellington’s Climate Change Mitigation Plan Emissions Inventory Methodology (under separate cover). Confidence in the data sources used to calculate the inventory is assessed in [Appendix B](#).

Development of the recommended actions in this plan considered the following framework ([Figure 5](#)), in which the first three categories (reduce, improve, switch) drive emissions reductions and the latter two categories (invest, empower) drive implementation of the plan.

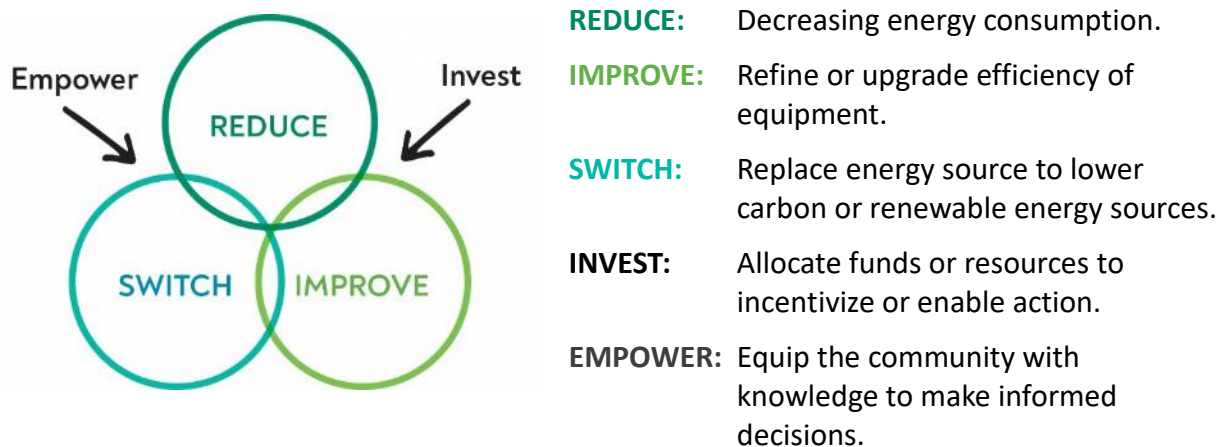


Figure 5: Recommendations Framework to address emissions reductions and action implementation.

How to Read This Plan

This plan is divided into sections to lead the reader through the steps taken to derive the final recommendations. First, emissions from each sector were coarsely estimated. These were used to generate discussion points with various stakeholders, local industry contributors and the community. Targets were determined through an iterative process based on proposed climate change actions, their resulting emissions reductions, and feasibility. Emissions calculations were then refined and proposed climate change actions were evaluated against desired outcomes.

Below is a description of the contents in each section of this plan.

Section 1 – Provides background on climate change and defines climate change mitigation.

Section 2 – Provide context and scope of work for this plan.

Section 3 – Summarizes the results of the Community and Corporate greenhouse gas inventories as well as background information on the energy supply and its emissions intensity in Ontario.

Section 4 – Presents the approaches to consultation and engagement for the Community and Corporate plans. This section provides a summary of the main messages heard through engagement activities.

Section 5 – Commitments by the federal and provincial governments to reduce greenhouse gas emissions are provided alongside the targets for this plan.

Section 6 – Analysis of emissions from each sector (Community and Corporate) are presented in this section with a discussion of recommended actions to reduce emissions. Cross-sectoral recommendations, those items that apply to more than one sector are also discussed.

Section 7 – Implementation tools and mechanisms are presented along with identified gaps.

Section 8 – Estimated emissions reductions are summarized.

Section 9 – Guidance for monitoring and reporting on the progress of plan implementation are provided.

Section 10 – Conclusion.



Greenhouse Gas Emissions Inventory and Forecast



Taking bold action on climate change simply makes good business sense. It's also the right thing to do for people and the planet. Setting a net-zero GHG emissions target by 2050 will drive innovation, grow jobs, build prosperity, and secure a better world for what will soon be 9 billion people.

- Richard Branson, Business Magnate, Investor, Author, Philanthropist

Greenhouse Gas Emissions Inventory and Forecast

Local emissions accounting is influenced by the emissions intensity (i.e. the amount of emissions produced when the supplied energy is used) of the available energy sources. Availability, reliability, cost and, as customers become more aware, environmental impact are all factors considered when purchasing energy.

Energy Supply and Cost in Ontario

Currently, utility regulators and provincial governments largely control how energy is generated in the provincial energy supply (e.g. electricity grid, natural gas network). As energy users, we have the ability to alter our behaviours to reduce the amount and type of energy we use. Understanding the emissions intensity of Ontario's energy supply is helpful in choosing behaviours that reduce emissions.

1.1.1. Electricity

Ontario's electricity supply is among the cleanest in Canada²⁹. With the decommissioning of the last coal generated plant in 2014, Ontario met its 2014 emissions reduction target of 6% below 1990 levels³⁰. In 2017 (the baseline year for this study) Ontario's electricity mix consisted of nuclear (60.1%), water power (25.6%), alternative power sources (e.g. renewable sources such as solar photovoltaics, wind, biomass and waste)

The carbon intensity (amount of carbon dioxide equivalent produced per kilowatt hour of electricity consumed) of Ontario's electricity grid is 20 g CO₂e/kWh. This is considered low (< 90 g CO₂e/kWh)

- Municipal Energy Road Map, 2020.

²⁹ Federation of Canadian Municipalities. 2020. Municipal Energy Road Map.

³⁰ <https://www.ontario.ca/page/end-coal>

(9.8%), natural gas (4.0%), and other sources (0.3%)³¹. The electricity mix has not changed substantially over the last three years with slightly lower contributions from nuclear and water and increases in natural gas and renewables³².

With the scheduled decommissioning of the Pickering Nuclear Generations Station 1, the Province of Ontario is considering natural gas generated electricity as a replacement. Natural gas generated electricity will increase the greenhouse gas emissions from the electrical grid³³.

Electricity in Ontario is regulated by the Ontario Energy Board. The Independent Electricity System Operator (IESO) is responsible for long-term system planning and pricing of electricity in the Province. Ontario Power Generation controls electricity generation on the provincial power grid and Hydro One Networks owns the majority of transmission lines in Ontario. Local Distribution Companies (LDC) provide conservation and demand side management programmes.

1.1.2. Natural gas

In 2017, over 68% of residences in Ontario used natural gas as a heating source³⁴. The low cost of natural gas compared to other energy sources (and availability) makes it appealing to homeowners. However, the emissions intensity of natural gas is much higher than other sources. Discussions between natural gas suppliers and the Ontario government regarding bringing natural gas produced from renewable sources (RNG) to market are ongoing. Renewable natural gas (natural gas produced from organic waste) production is growing across Ontario with Toronto, Hamilton and London among those municipalities contributing to the renewable natural gas supply. A market has not yet been established in Ontario, however demand and supply is growing. Currently producers use their renewable natural gas to produce heat or transportation fuel for their fleets. Some producers are able to sell excess renewable natural gas through direct negotiation.

Regulations and rates for natural gas are controlled by the Ontario Energy Board.

1.1.3. Other Heating Fuels (Fuel Oil, Propane, Coal)

In 2017, fuel oil was used as a heat source in 2.6% of Ontario homes and propane and coal were used in 3.1% of Ontario homes³⁵. These energy sources are typically used where natural gas is not available. Enbridge is working to bring natural gas to un-serviced areas of Ontario. Converting these heat sources to natural gas typically results in a reduction of greenhouse gas emissions.

1.1.4. Fuels (Gasoline, Diesel, Alternatives)

Transportation is the second largest portion of Canada's greenhouse gas emissions at 28% in 2017. Gasoline comprised a 72.4% share of transportation fuel and 71.5% share of the

³¹ Ontario Energy Board. 2017. [Ontario's System-wide Electricity Supply Mix: 2017 Data](#).

³² Ontario Energy Board. 2019. [Ontario's System-wide Electricity Supply Mix: 2019 Data](#).

³³ Independent Energy System Operator. 2020. Annual Planning Outlook. A view of Ontario's Electricity System Needs.

³⁴ [Natural Resources Canada, National Energy Use Database](#), accessed July 30 2020

³⁵ *ibid*

emissions in Canada³⁶. Diesel use comprised 26.2% and emissions were 27.5% in 2017³⁷. Biodiesel and other alternatives are slowly increasing their market share.

Recently, investments by the federal and provincial governments have provided funding for the conversion of transit buses to compressed natural gas and electricity in larger municipalities in order to reduce greenhouse gas emissions from the transportation sector.

Biodiesel and flex fuel are easily attainable, greener options, but come with disadvantages such as ambient temperature constraints and controversial sources (e.g. corn grown for ethanol driving demand and reducing availability of corn as a food source).

There was a 5% growth in Canadian market share by hydrogen fuel cells between 2017 and 2019 as governments and large companies are making hydrogen-fueled vehicles part of their fleet³⁸. More accessible hydrogen fuel is especially important for reducing emissions from larger heavy equipment where power content of traditional diesel needed to run these machines has not yet been matched in other clean fuel alternatives.

1.1.5. Future outlook

Canada Energy Regulator predicts a slow increase in energy use in Canada until 2040³⁹. Over the same timeframe, the markets will shift away from high carbon intensity energy sources such as coal to lower intensity natural gas and renewable energy. Market share of renewable (low carbon) energy sources will continue to grow. As policy is developed to reflect Canada's commitment to the Pan-Canadian Framework on Clean Growth and Climate Change it is assumed that growth will accelerate towards a low carbon energy future.

1.1.6. Energy Cost in Ontario

Under the Western Accord on Energy⁴⁰ (1985) crude oil and fuel prices are no longer regulated by the Canadian government. Prices are determined by competitive markets. The Constitution gives the Provinces the authority to regulate retail fuel prices. The Province of Ontario does not exercise this authority. However, in Ontario, fuel prices include both federal and provincial taxes and a federal fuel charge or carbon levy.

Gasoline prices in Ontario generally follow the national average. Between 2013 and 2019 prices (including tax) ranged between 89.70 cents/L to 142.90 cents/L with the prices dropping in early 2015 and early 2016 and reaching their peak in June of 2014⁴¹. Prices dropped again in 2020 during a global economic shutdown due to the COVID-19 pandemic. It is expected that crude oil and natural gas prices will slowly recover over several years as global economies start to open⁴².

**Estimated 2017
Community energy cost:**
Natural gas: \$15,138,000
Electricity: \$117,946,000

³⁶ [Natural Resources Canada, National Energy Use Database](#), accessed August 2020.

³⁷ *ibid*

³⁸ Natural Resources Canada. Undated. [Hydrogen and Fuel Cells Sector Status and Vehicle Use in Canada](#).

³⁹ Canada Energy Regulator. 2019. [Canada's Energy Future 2019. Energy Supply and Demand Projections to 2040](#).

⁴⁰ 1985. Western Accord on Energy.

⁴¹ Canada Energy Regulator. 2018. [Market Snapshot: Canadian gasoline prices rise to highest level in over 3 years](#).

⁴² Deloitte. 2020. Deloitte's oil and gas price forecast. Visited September 2020

The federal government introduced a levy on carbon in 2018. Where provincial carbon levies are not in place, like Ontario, the federal carbon levy applies. The levy is applied to generation and use of fossil fuels and is intended to push the markets away from fossil fuels by adding their environmental cost (e.g. greenhouse gas emissions) to the resource cost.

The carbon levy will increase annually from 2019 to 0.0979 \$/m³ for natural gas, 0.1105 \$/L for gasoline and 0.1341 \$/L for diesel (light fuel oil) in 2022⁴³. In December 2020, the federal government released its updated climate change plan: A Healthy Environment and A Healthy Economy in which they commit to increasing the carbon levy starting in 2023 to \$170/ t of CO₂e in 2030. As work on reducing greenhouse gas emissions proceeds it is important to consider the full cost of fossil fuels (i.e. direct cost plus carbon tax) and where these markets are heading in the future.

⁴³ Government of Canada. [Fuel Charge Rates](#). Visited September 25, 2020.

Community and Corporate Emissions Overview

Greenhouse gas emissions were calculated for the following sectors:

Sector	Community Inventory	Corporate Inventory
Buildings	✓	✓
Transportation and Streetlights	✓	✓
Solid Waste	✓	✓
Agriculture	✓	

Greenhouse gas emissions have been categorized by their supply; fossil fuels and biogenic (from living organisms). Burning of fossil fuels releases greenhouse gases that are trapped in the earth for millions of years. Biogenic supplies emit greenhouse gases that are already part of the natural carbon cycle. Biogenic supplies have the potential to be used as an energy resource (e.g. renewable natural gas).

1.1.7. Community Emissions

Community emissions inventory consist of 55% from fossil fuel supply and 45% from biogenic supply.

Emissions from Fossil Fuel Sources



Emissions from fossil fuels are found in buildings (primarily for heating) and transportation. Community fossil fuel emissions are predominantly from transportation (70%) which is reflective of the landscape of the County ([Figure 6](#)). With small towns and hamlets separated by vast agricultural fields, most amenities are accessed by vehicle. Low population density settlements lend themselves to the County's small town charm and supports tourism for city-dwellers looking for an escape to a slower pace with quaint shops and scenic landscapes. Low population density also means a reliance on personal vehicles for daily trips to run errands and commute to work, either in the County or to neighbouring municipalities.

Personal vehicles continue to be the highest source of transportation emissions provincially due to the increase in vehicle ownership and commuting. This is particularly true in the Greater Golden Horseshoe Area where increases in mileage driven is cited as one reason for over 4%

increase in transportation emissions between 2015 and 2017⁴⁴. Similarly, gasoline is the highest contributor to the County’s Community GHG emissions at 44% (Figure 6).

It is likely that emissions from propane (1%) and fuel oil (1%) are higher than indicated in Figure 6 as natural gas is not available in all areas of the County and most rural properties depend on propane, fuel oil or electricity for heat. Usage data for these energy sources is not publicly available and has been estimated for this exercise. Still, emissions from natural gas (25%) remain a concern. The affordability of natural gas compared to electricity combined with the high capital cost for onsite energy production (solar, wind, geothermal) are barriers to switching to cleaner energy sources in Ontario⁴⁵. However, there is a role for natural gas as an alternative energy source for higher emission sources (e.g. replacing diesel with compressed natural gas). Natural gas providers are also looking to increase the proportion of renewable or green natural gas in the supply which will reduce emissions.

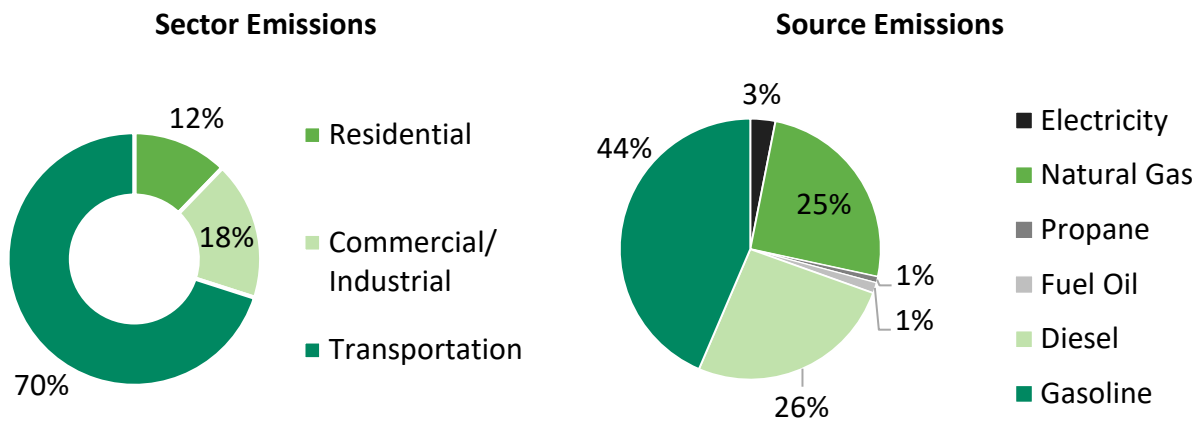


Figure 6: Community fossil fuel greenhouse gas emissions by sector and source.

⁴⁴ The Atmospheric Fund. 2019. Carbon Emissions Inventory for the GTHA. 2019 Edition: Three Years of Data and Regional Profiles.

⁴⁵ Federation of Canadian Municipalities. 2020. Municipal Energy Road Map.

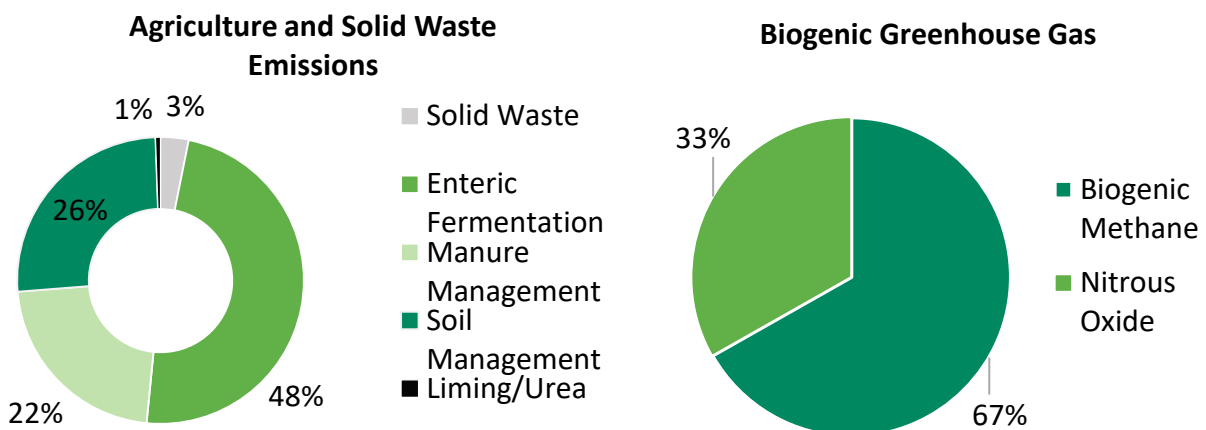
Emissions from Biogenic Sources



Biogenic sources of emissions in the County are primarily from agriculture (97%) with a small portion coming from solid waste (3%). Nationally, agriculture was 8% of Canada’s GHG emissions inventory in 2017⁴⁶.

Greenhouse gas emissions from agriculture are complex. Farmers in the County of Wellington feed Ontarians. Food production, both crops and livestock, have a heavy greenhouse gas cost that is borne by the Community’s emissions inventory. As farming practices evolve with new technology and increased understanding of natural processes and soils, County farmers are adjusting their methods to meet the challenges of climate change while increasing yield to meet demand. Farmers are also uniquely positioned to sequester carbon (i.e. pull carbon out of the air) from the atmosphere through soil management and stewardship of natural areas.

Enteric Fermentation, the by-product of livestock digestion, comprises the majority of emissions from the agriculture sector with 48% of emissions ([Figure 7](#)) followed by soil management (26%) and manure management (22%). Liming and urea application produces much lower emissions (1%). Crop residue burning has not been included in this inventory since the practice is not common in the County of Wellington and the estimates are not reflective of current practices.



⁴⁶ Environment and Climate Change Canada. 2019. National Inventory Report 1990-2017: Greenhouse Gas Sources and Sinks in Canada. <http://www.publications.gc.ca/site/eng/9.506002/publication.html>

Figure 7: Community greenhouse gas emissions from biogenic supply (Agriculture and Solid Waste) by sub-sector and greenhouse gas.

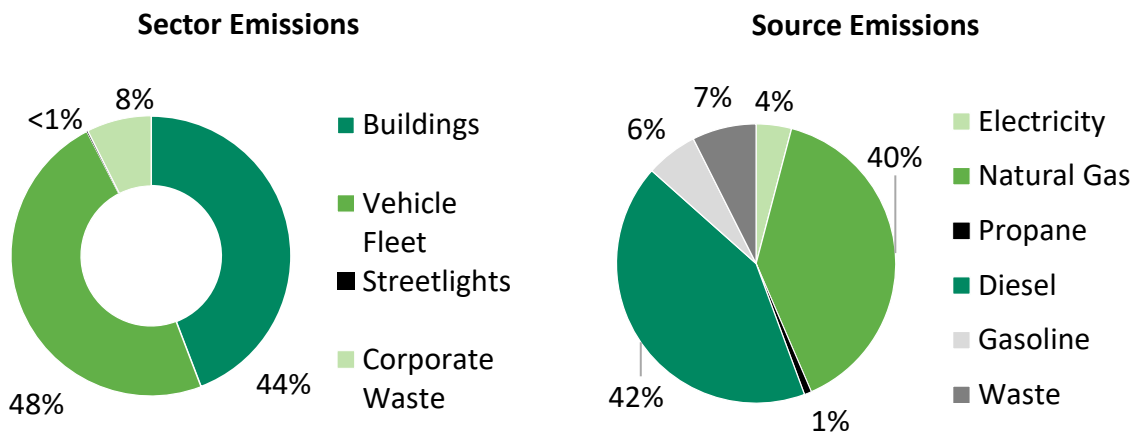
Biogenic solid waste emissions are primarily from food waste and paper. The community currently diverts upwards of 65% of paper products to recycling⁴⁷. The County’s new green bin organics diversion programme will assist in improving diversion rates and decreasing emissions from solid waste in the future.

1.1.8. Corporate Emissions

Corporate emissions are primarily from fossil fuels in Transportation (Fleet) and Building sectors (Figure 8) with the majority of emission sources from diesel and natural gas (Figure 8). Biogenic sources of emissions are from solid waste and constitute only 3% of Corporate emissions.

The County owns and operates 128 buildings, including social housing, administration buildings, garages, libraries, daycare centres, the County of Wellington Museum and Archives and Wellington Terrace Long Term Care Facility. Similar to the Community inventory, natural gas is a dominant source of emissions in the Corporate inventory. Natural gas is used through most of the County’s buildings as a heating source. Air temperature is regulated in the Wellington Terrace and some social housing buildings and a challenge to maintain in heritage buildings where energy efficiency retrofits are limited by the requirement to maintain the heritage value of the building.

The County’s fleet is largely comprised of heavy equipment that serve Roads and Solid Waste Services and are fueled by diesel. Lighter duty vehicles such as pickup trucks in Facility Maintenance, the Library delivery van, passenger vans at the Wellington Terrace and personal vehicles used for County business (e.g. travel to meetings, training and conferences) are fueled by gasoline and makeup a smaller portion of the fleet emissions.



⁴⁷ VanRooyan Waste Solutions Inc. 2017. 2017 Residential Self-haul & Curbside Waste Audit. Prepared for the County of Wellington.

Figure 8: Corporate fossil fuel and biogenic greenhouse gas emissions by sector and source.

Greenhouse Gas Emissions Forecast

The plan to reduce greenhouse gas emissions must consider growth and future energy demand. Watson and Associates⁴⁸ projects the County population will increase to 109,345 by 2027 and 134,475 by 2041. This is slightly lower than the projections from A Place to Grow⁴⁹ which identifies 122,000, 132,000 and 140,000 people in the County by 2031, 2036 and 2041, respectively. New projections in A Place to Grow will see an increase in the County's population to as much as 168,000 by 2051⁵⁰. With an increase in population, employment is also expected to increase. Watson and Associates⁵¹ projects an increase in employment of 51% between 2017 and 2041. Under the current business-as-usual scenario, increases in population and employment will result in increases in GHG emissions from homes, businesses, transportation, solid waste and agriculture as more people use more resources. Based on these projections and known energy efficiency commitments⁵², it is estimated that, under the business-as-usual scenario, Community emissions will increase to 1,249,000 t CO₂e by 2030 in the County of Wellington ([Figure 9](#)).

⁴⁸ Watson and Associates. 2017. County of Wellington Development Charge Background Study

⁴⁹ Government of Ontario. 2020. A Place to Grow. Growth Plan for the Greater Golden Horseshoe. Office Consolidation.

⁵⁰ Government of Ontario. 2020. A Place to Grow. Growth Plan for the Greater Golden Horseshoe. Office Consolidation. These numbers will be confirmed through the Municipal Comprehensive Review to be released in 2022.

⁵¹ Watson and Associates. 2017. County of Wellington Development Charge Background Study

⁵² Where appropriate, efficiency measures required through the 2018 Ontario Building Code have been considered. It is estimated that a 15% reduction in GHG will result from the application of the code on new builds. The County's investment in converting curbside solid waste pick-up trucks to compressed natural gas has also been included.

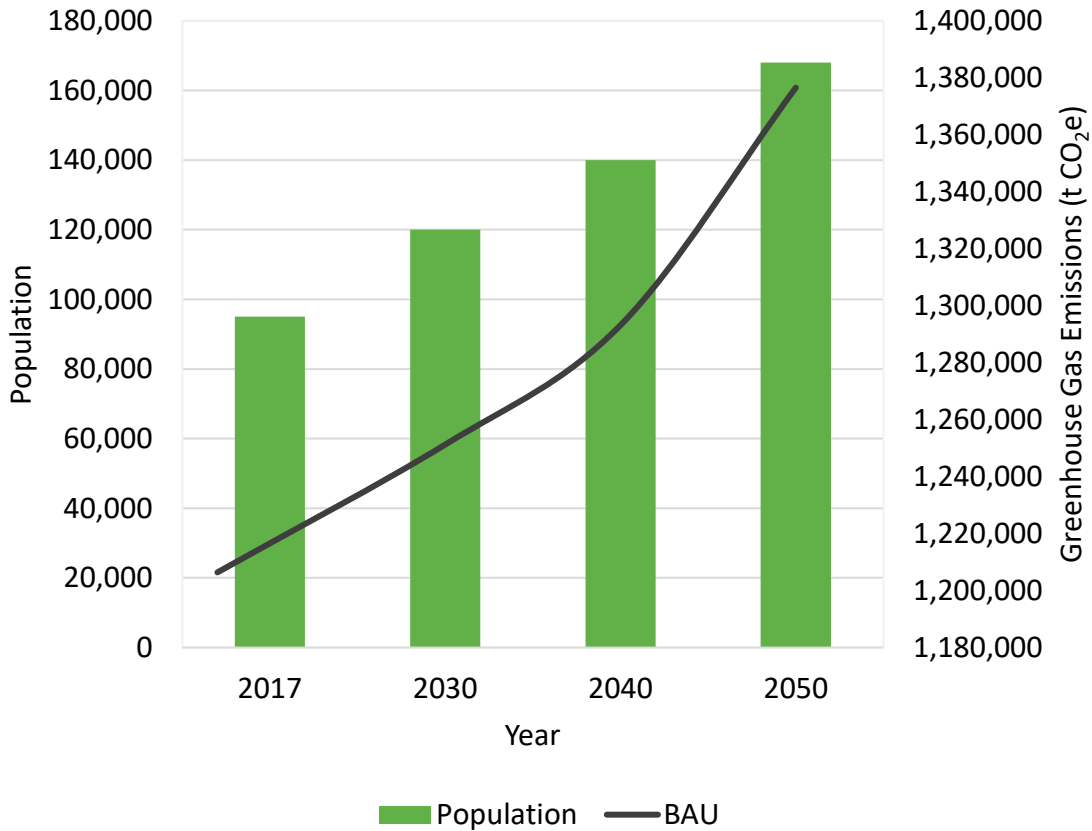


Figure 9: Community emissions forecast to 2030 under business-as-usual (BAU) scenario.

Similarly, Corporate emissions are expected to grow to just under 10,700 by 2030 under the business-as-usual scenario (Figure 10). These calculations consider investments the County has implemented since the baseline year (2017), including:

- Converting Waste Management curbside collection vehicles to compressed natural gas. Estimated GHG reductions = 15%
- Implementation of green bin (organic waste) diversion programme. Estimated weight of organic waste diverted: 2,400 t/year
- Actions included in the County’s Conservation and Demand Management Plan (2019 – 2024). Estimated GHG reductions = 83.52 t CO₂e.

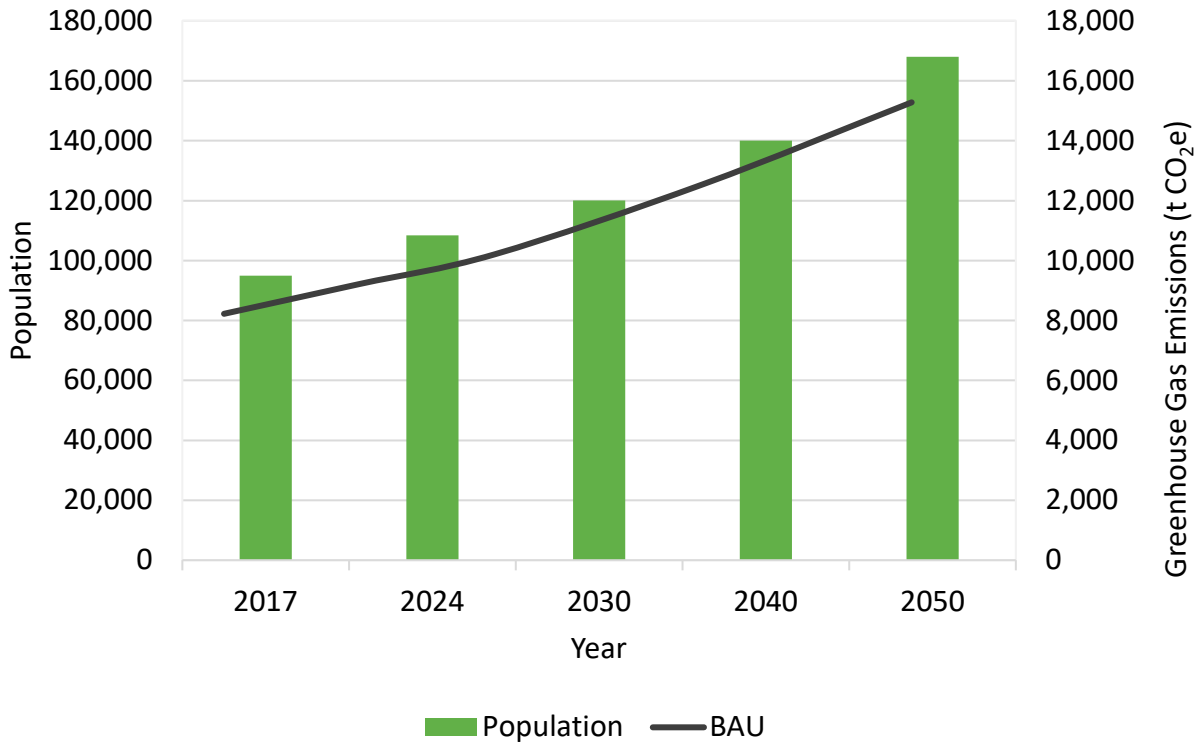


Figure 10: Corporate emissions forecast to 2030 under business-as-usual (BAU) scenario.



Consultation and Engagement



What you do makes a difference, and you have to decide what kind of difference you want to make.

- Dr. Jane Goodall, Primatologist and Activist

Consultation and Engagement

Engagement with stakeholders is key to the success of any plan. Both internal (Corporate) and external (Community) engagement were part of the development of this plan. However, direct public engagement opportunities were substantially reduced due to COVID-19 restrictions in place to protect the health and safety of staff and the community. A total of 479 people were engaged in the development of this plan. Participants are acknowledged in [Appendix A](#).

Internal Engagement and Consultation

Internal engagement activities generated opportunities to integrate and problem solve across departments and staffing levels. Beyond the formal activities listed below, one-on-one and smaller group meetings were held to more deeply explore opportunities and implementation mechanisms to ensure the recommendations put forward are pragmatic and feasible.

Project Team – The project team consisting of representatives from applicable County departments participated in a number of meetings and workshops to identify climate change mitigation opportunities within existing programmes and processes and explore new approaches and technologies to accelerate and support emissions reductions.

Planning Committee – Project Status Reports were presented to the Planning Committee to ensure Councillors were aware of project progress and changes (e.g. due to COVID-19) to better enable them to respond to constituent enquiries. These presentations granted Councillors an opportunity to ask questions and provide feedback throughout the plan development.

External Engagement and Consultation

The community was engaged through four avenues: a steering advisory group, community advisory group, local industry contributors and surveys focused on developing community emissions reduction actions.

Steering Advisory Group – A Steering Advisory Group (SAG) was formed with representatives from each of the County's member municipalities. The SAG provided feedback throughout the plan development as well as insight into local community concerns and opportunities, coordinated involvement of additional municipal staff where appropriate, and supported engagement with the broader community.

Community Advisory Group – A Community Advisory Group (CAG) was established to engage with members of the community with a keen interest in the scope of work for the plan. The CAG participated in various in-person and online meetings, discussions and workshops.

Local Industry Contributors Consultation – A number of local industry contributors were engaged to discuss approaches to reducing emissions in three areas: agriculture, buildings, and transportation.

Surveys – Surveys (one for farmers, one for business operators, and one for residents) were posted to solicit feedback from the broader community. The survey responses were examined to better understand what climate change actions participants have already undertaken, what barriers prevent them from taking other actions and their general areas of interest.

Core messages received during engagement activities are summarized in [Table 2](#).

Table 2: Main messages received through various internal and external engagement activities.

Buildings	Transportation	Agriculture	General
<ul style="list-style-type: none"> • Efforts should focus on deep energy retrofits. • Capital cost is a barrier to deep energy retrofits. • Energy labelling is a helpful tool when purchasing a new home. • Businesses/agriculture likely more interested in process efficiencies than building envelop upgrades. • Need to increase awareness of opportunities for efficiency savings. • Incentivize energy efficiency beyond building code. • Residents/businesses may be interested in renewable natural gas. 	<ul style="list-style-type: none"> • Mapleton and Erin do not currently have electric vehicle charging stations. • Electric vehicle charging stations could support tourism. • Purchase cost is a barrier to electric vehicle adoption. • Community wants safer cycling infrastructure • Rural areas are dependent on vehicles to access amenities. • Infrastructure location is a barrier to using active transportation. • Need to consider public transportation and links to regional transit. 	<ul style="list-style-type: none"> • Alternatives to propane for grain drying are needed. • Economic barriers restrict energy efficiency improvements on the farm. • Wellington Rural Water Quality provides a good starting point to achieve emissions reductions on the farm. • Emissions reduction actions have other benefits (e.g. increased yield, healthier soils) • Many farmers are implementing emissions reduction practices (e.g. no till, cover cropping, etc.) 	<ul style="list-style-type: none"> • There is interest in low interest rate loans to undertake energy efficiency actions. • Continue to plant more trees. • Partner with local groups including school boards. • Community gardens and food hubs to improve access to local food. • Equity needs to be part of implementation.



Target Setting



Our carbon emissions have to eventually go to zero. We have to. Otherwise we're never going to have a stable climate and that's what our goal is for human civilization to thrive, a stable climate.

- Dr. Katharine Hayhoe, Atmospheric Scientist, Professor, CAO of ATMOS Research and Consulting.

Target Setting

Targets guide where you are going and benchmark how far you have come. Setting targets leads to increased performance, higher understanding of priorities, greater exchange of information among contributors, and grounds for the development of new knowledge. In this plan we consider two types of targets:

1. Aspirational – these ambitious targets are set from the top-down by higher authorities, including upper levels of government.
2. Pragmatic – these targets are set from the bottom-up and are calibrated to the ability to carry through with associated actions considering staff capacity, costs and time.

Recommended Targets

In 2015, the Government of Canada committed to the Paris Agreement which aims to reduce GHG emissions by 30% below 2005 levels by 2030. The federal government has also announced that it will develop a plan to achieve net-zero emissions by 2050⁵³.

The Ontario Provincial Government confirmed its commitment to align provincial GHG targets with the 2030, 30% target, set by the federal government in the Made-in-Ontario Environment Plan, released in 2018⁵⁴.

Partners in Climate Protection recommends a target of 20% reduction in GHG emissions over 10 years for the municipality's Corporate plan and a Community target of 6%.

County of Wellington Community and Corporate Targets

Examining our understanding of our energy use, the carbon intensity of current energy sources, and technology available, among other influencing factors, it is prudent to consider pragmatic targets while maintaining aspiration targets as a guidepost.

⁵³ Government of Canada. 2020. [Progress towards Canada's Greenhouse Gas Emissions Reduction Target. Canadian Environmental Sustainability Indicators](#). Visited June 2 2020.

⁵⁴ Government of Ontario. 2018. [Made-In-Ontario Environment Plan](#).

The recommendations in this plan strive to achieve a reduction of Community emissions of 6% by 2030 and a reduction of 10% of Corporate emissions within the same timeframe ([Figure 11](#)). An estimated 80% reduction in emissions will be needed to achieve net zero emissions by 2050. Details linking the actions to estimated reductions for the 2030 timeline are provided in [Section 8](#).

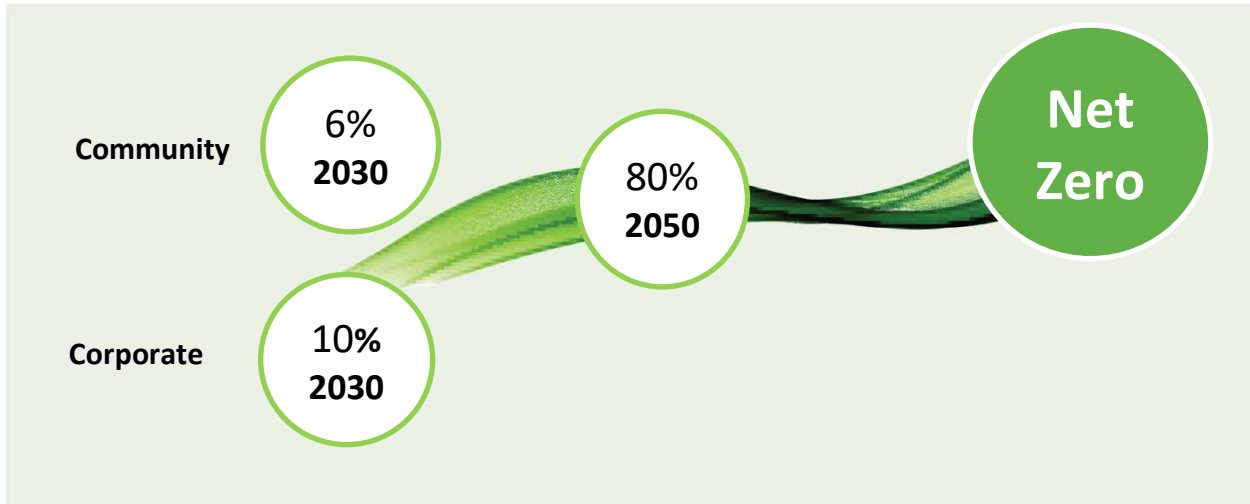


Figure 11: Community and Corporate greenhouse gas reduction targets on the pathway to net-zero.



Sector Emissions and Recommendations



We need to imagine the kind of world we want and then work to create it.

- Dr. David Suzuki, Academic, Broadcaster, Activist

Sector Emissions and Recommendations

This section provides a more focused analysis of the four sectors of greenhouse gas emissions in the Community and Corporate inventories; Buildings, Transportation and Streetlights, Agriculture and Solid Waste.

The following information is provided in the proceeding sections:

- Analysis of Community and Corporate greenhouse gas emissions within the sector.
- Discussion of objectives to reducing greenhouse gas emissions based on the inventory data.

A complete compilation of the recommendations to support the objectives discussed in this section is found in [Appendix D](#).

Buildings

Buildings constitute 30% and 44% of Community and Corporate fossil fuel emissions, respectively ([Figures 6](#) and [8](#)). Energy used in buildings is primarily from electricity, natural gas and heating fuels (propane, fuel oil). There are five Local Distribution Companies providing electricity to Wellington County (Wellington North Power, Westario Power, Centre Wellington Hydro, Alectra, Hydro One). Recent amalgamation between Union Gas and Enbridge (now under the name Enbridge) resulted in one provider of natural gas in the County. There are a number of propane and fuel oil providers that deliver these fuels within the County.

Greenhouse gas emissions inventory for Community buildings are categorized into three sub-sectors: Residential, Commercial and Industrial. In order to protect the privacy of utility customers, commercial and industrial energy use has been aggregated in the inventory.

Residential dwellings contribute 39% of greenhouse gas emissions from all buildings in the County ([Figure 12](#)). Most homes use natural gas as a heat source which contributes 77% of greenhouse gas emissions from all residential sources ([Figure 13](#)). Where natural gas is not available (e.g. rural areas, Town of Erin, and portions of other urban areas) electricity and high

emission heating fuels (propane, fuel oil) are used. In 2019, 2,622 homes in the County used electric heat⁵⁵ which is one of the cleaner sources of energy in Ontario. Alternative cleaner and renewable energy sources (e.g. geothermal) are being used in the County. However, these are not well documented.

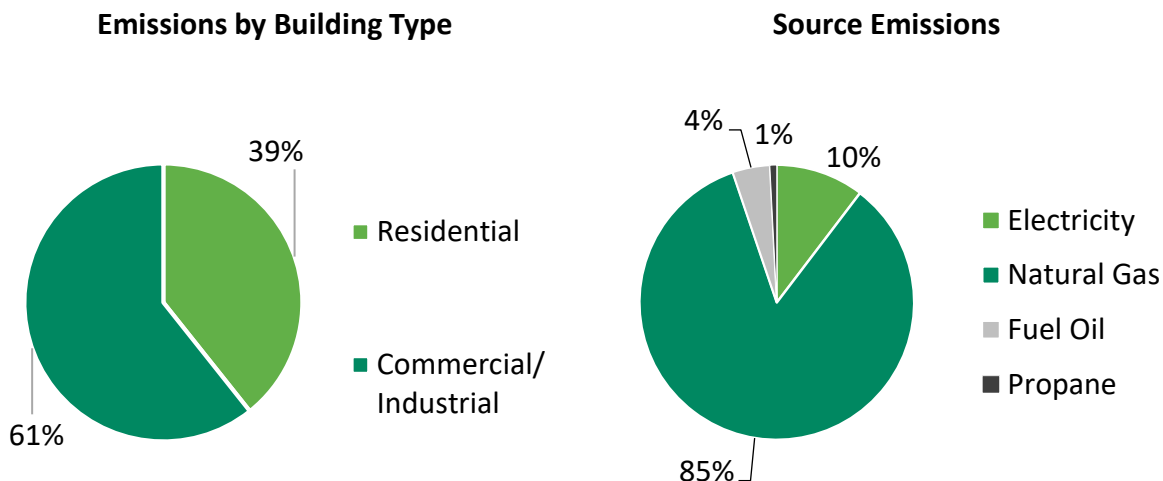


Figure 12: Community buildings greenhouse gas emissions by building usage type and by source.

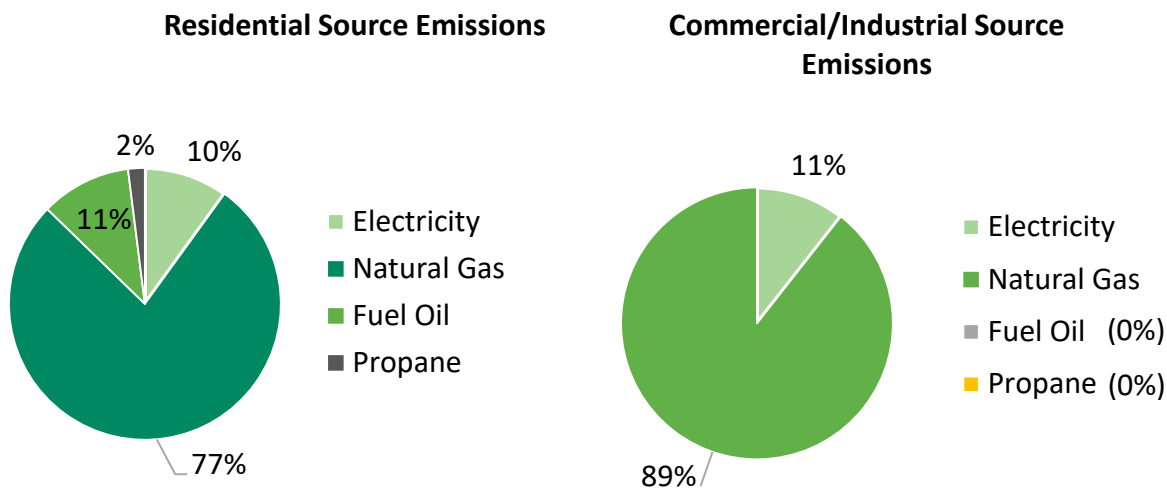


Figure 13: Community greenhouse gas emissions by source from all residential buildings, for all commercial and industrial buildings.

⁵⁵ Municipal Property Assessment Corporation. 2019. Data for County of Wellington.

Commercial and industrial sub-sectors contribute the largest portion of greenhouse gas emissions in the buildings sector ([Figure 12](#)). Again, natural gas is the largest contributing energy source at 89% of all commercial and industrial greenhouse gas emissions ([Figure 13\(b\)](#)).

Residential dwellings are predicted to increase from 33,334 units in 2017 to 39,308 units by 2027⁵⁶. This increase results in a potential rise in greenhouse gas emissions from residential dwellings to almost 100,000 t CO₂e invoking great need to curtail greenhouse gas emissions from new buildings. Similarly, industrial and commercial floor area is expected to grow by 67% and 130%⁵⁷, respectively with an estimated increase in greenhouse gas emissions to 209,340 t CO₂e by 2027. In 2017, there was estimated to be 2,457,000 and 556,500 square feet (gross) of industrial and commercial space, respectively, in the County⁵⁸.

The County operates over 120 buildings, including social housing residences (over 1000 units). Social housing is the largest (1,911 t CO₂e, 53%) contributor of greenhouse gases with administration offices and long term care facility the second largest contributors at 12% (421, 430 t CO₂e, respectively) each ([Figure 14](#)). Natural gas is the largest contributor to Corporate greenhouse gas emissions from buildings with 91% of greenhouse gases coming from natural gas ([Figure 15](#)).

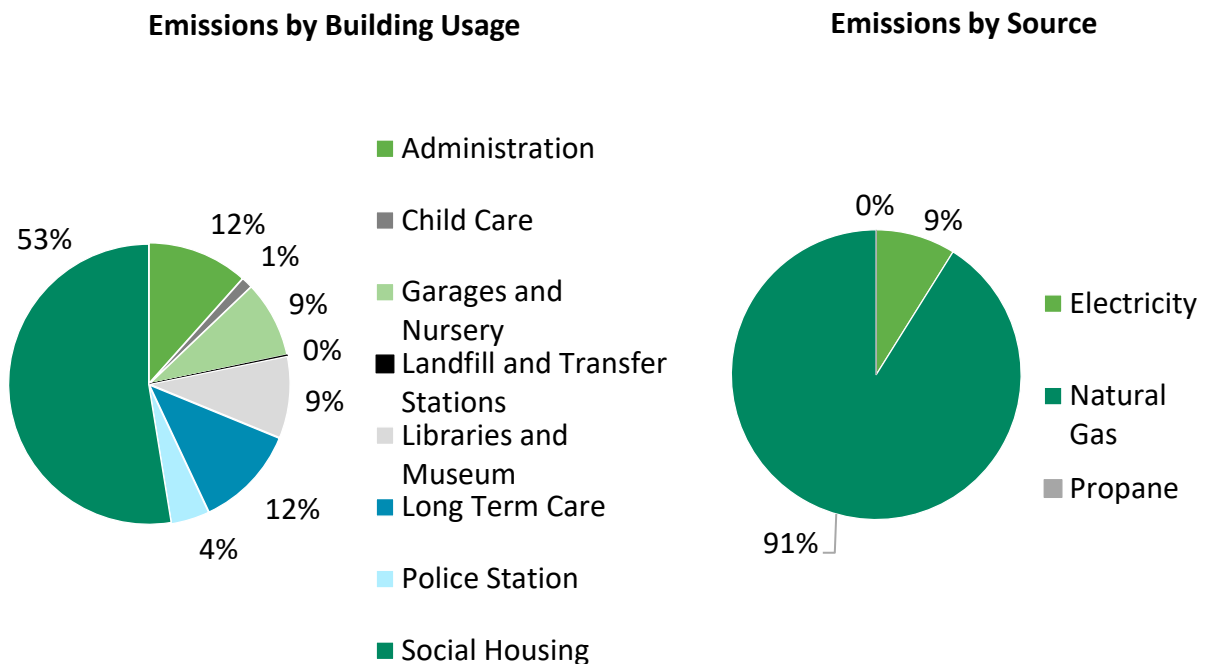


Figure 14: Corporate buildings greenhouse gas emissions by building usage type and source.

⁵⁶ Watson and Associates Economists Ltd. 2017. County of Wellington Development Charge Background Study.

⁵⁷ Municipal Property Assessment Corporation. 2019. Data for County of Wellington.

⁵⁸ Watson and Associates. 2017. County of Wellington Development Charge Background Study

1.1.9. Reducing GHG Emissions from Community Buildings

With natural gas being the main contributor to greenhouse gases from the building sector, it is imperative that actions focus on reducing its consumption. Although higher emission intensity energies (e.g. propane and fuel oil) constitute a smaller portion of Community Emissions, efforts should be made to switch to lower emissions intensity energies, preferably renewable.

Co-benefits of actions to reduce emissions from Community buildings are greatest when actions focus on addressing issues of housing access and affordability. Improving housing conditions for marginalized and low-income community members can improve their health by reducing exposure to extreme weather events and reducing energy expenses making available finances for other needs. Often, heating and cooling can be addressed at the same time, achieving improved seasonal comfort. Building owners will see reductions in energy expenses in many of the efficiency actions along with improvements in indoor comfort and health as air circulation and ventilation enhancements are made.

Community gains from energy efficient buildings include increases in local economy with a boost to the construction and building design sectors. The community will also benefit from reduced heat island effect caused by waste heat produced through leaky buildings and inefficient equipment

Existing Buildings

Over 88%⁵⁹ of homes in the County of Wellington are single detached dwellings which are less energy efficient than attached and multi-family dwellings. Attached and multi-family dwellings are typically more compact and have shared walls leading to lower heating demand and less heat loss⁶⁰. The vast majority (90%⁶¹) of the County's residential dwellings were built prior to energy efficiency requirements in the 2012 Ontario Building Code⁶² which requires reductions in energy demand of new buildings compared to a reference building.

Improving the ability of our buildings to retain heat in the winter is essential to reducing our need for natural gas. Deep energy retrofits on existing buildings can significantly reduce natural gas consumption. Deep retrofits take a whole systems approach and consist of building performance upgrades through renovations and technology to achieve 50% or more energy efficiency as well as other benefits (indoor air quality, durability, and thermal comfort) in residential buildings. Capital cost and displacement during construction are often cited as barriers to undertaking deep energy retrofits.

Building age is a major factor in the ability to reduce greenhouse gas emissions. Opportunities to adequately seal, insulate and heat historic and heritage buildings are limited by architectural trends and construction techniques used at the time. While energy efficiency measures should be undertaken first to the extent feasible, ultimately, switching to lower carbon energy sources will be key to reducing emissions from these older buildings.

Energy and emissions conservation can also come from improving equipment efficiency. This is particularly important in industries and businesses where building envelope efficiency upgrades are not feasible or practical. High efficiency furnaces, variable-speed fans, programmable and remote access energy management systems (e.g. thermostats) can all improve how well equipment uses energy resulting in lower energy demand. In homes, energy efficient equipment upgrades including energy efficiency heating/cooling, energy efficient doors/windows, ceiling fans, programmable ceiling fans, etc. can reduce energy use, greenhouse gas emissions and energy expenditures. Many of these actions are now supported through direct to consumer government grants.

Where possible, a switch to lower carbon energy sources should be implemented. The greatest challenges in switching energy is the capital cost of infrastructure as well as the higher cost of cleaner electricity over natural gas. Alternative energy that can be produced at source (e.g. solar photovoltaics) or energy that can use existing infrastructure (e.g. renewable natural gas) may be appropriate solutions in some cases. In Ontario, the return on investment for switching from natural gas to electric is not large, but the emissions savings can be. The Municipal Energy

⁵⁹ ibid

⁶⁰Jonathan Rose Companies for United States Environmental Protection Agency. 2011. [Location Efficiency and Housing Type. Boiling it Down to BTUs.](#)

⁶¹ Municipal Property Assessment Corporation. 2019. Data for County of Wellington.

⁶² Government of Ontario. 2020. Ontario Regulation 332/12: Ontario Building Code.

Roadmap⁶³ identifies electric heat pumps as a valuable tool in reducing greenhouse gas emissions by enabling a switch from oil or natural gas to electricity (switching from oil has the greatest return on investment). Other lower carbon energy switches include geothermal energy and wind generation.

New Buildings

The potential to lower energy demand starts in the siting of new buildings to take advantage of the local environment (e.g. increasing sun exposure in the winter, limiting wind exposure, etc.) and efficiencies in community infrastructure (e.g. district energy or heating) followed by energy efficient design of the building and its systems. The Ontario Building Code Regulations 88/19 requires energy efficiencies up to 15% higher than the previous 2012 Regulation⁶⁴. Historically, the Ontario Building Code has reflected the demand and interests of the building industry and is predicted, in time, to require net-zero⁶⁵ or near net-zero emissions standards for all new buildings.

Community and building design guidelines coupled with incentive programmes have proven successful approaches to transition the home building industry towards net-zero designs.

Culture of Conservation

Building a culture of conservation begins with understanding energy usage and our building operations and habits. Benchmarking, tracking energy use and building labeling work hand-in-hand to build the story of how and where energy is being used and how efficiencies are improved over time.

Many utility programmes that provide financial support for energy efficiency actions are under-subscribed. Further, the time required to research and evaluate new technologies and methods to improve efficiency are identified as barriers for business and residents. Sharing information about new technologies and approaches to reduce energy use, available funding and lessons learned can accelerate reduction of greenhouse gases and energy use by breaking down common barriers of knowledge and capital costs. Continued engagement and education initiatives further support the community to reduce greenhouse gas emissions.

What we heard

“I believe most people want to participate in green energy initiatives if they could either financially swing it or justify the expense.”

– Residents Survey
Respondent

1.1.10. Reducing GHG emissions from Corporate Buildings

Similar the Community objectives for reducing greenhouse gas emissions from buildings, Corporate efforts must also focus on reducing natural gas use.

⁶³ Federation of Canadian Municipalities. 2020. Green Municipal Fund Municipal Energy Roadmap.

⁶⁴ Government of Ontario. 2017. Ontario Regulation 88/19.

⁶⁵ Net-zero buildings produce as much energy as they consume.

Existing Buildings

Social Housing contributes over half the Corporate emissions in the buildings sector. Corporately, the County of Wellington can continue to lead by example and meet the vision of the Housing and Homelessness Plan (2018) of “everyone in Guelph-Wellington can find and maintain an appropriate, safe and affordable place to call home” by focusing first on increasing efforts to reduce greenhouse gas emissions from social housing units. As a building owner, the County can enable tenants to act on climate change by providing them the tools (e.g. high efficiency equipment) to reduce their energy use. This can be achieved by deep energy retrofits, whole building retrofits and investment in high efficiency equipment including heat pumps.

There are other buildings in the County’s stock that are performing below the provincial average for similar building types based on data collected through the Electricity Act⁶⁶. These high energy intensity buildings should be considered for energy audits to determine the sources of energy use and opportunities for improved energy efficiency.

Where feasible, green infrastructure⁶⁷ and strategic tree planting should be implemented to contribute to the reduction of heat island effect and strategically provide shade and wind protection to reduce energy demand throughout the year. Implementation of green infrastructure also provides an opportunity to demonstrate the value and importance of water conservation and can serve as demonstration projects to promote adoption throughout the community.

The County has invested in photovoltaic (solar) panels on many of its buildings. The County’s continued support for the transition to renewable energy is a powerful statement to the community about what our future energy systems will look like. Future investments should first consider replacing natural gas and propane where feasible to maximize the environmental benefit of this investment.

Corporate energy use should be tracked (monitored and benchmarked) to provide insight into how we use energy, where energy efficiency opportunities exist and to show outcomes of the investments made in building efficiency.

New Buildings

The County’s Green Legacy Building Guidelines should be updated to, at minimum, align with updates to the Ontario Building Code. Any new buildings built to a standard less than net-zero or net-zero ready will contribute to future needs to reduce greenhouse gas emissions on the pathway to net-zero by 2050. There may be opportunity to integrate an updated version of the Green Legacy Building Guidelines with the development of Community Green Design Guidelines noted in section 6.1.1.

⁶⁶ Province of Ontario. 2017. [Ontario data catalogue - Energy Use and Greenhouse Gas emissions for Broader Public Sector](#).

⁶⁷ Green infrastructure uses vegetation, soils, and other elements and practices to restore some of the natural processes required to manage water and create healthier urban environments.

New buildings should consider opportunities to integrate alternative energy sources in order to reduce greenhouse gas emissions and energy use. This may include solar, renewable natural gas, and larger systems such as shared heating and cooling or district energy and micro-grids.

Culture of Conservation

Corporate policies can help push habit change to reduce energy use and drive down greenhouse gas emissions. Consideration should be given to creating policy to standardize building climate conditions (e.g. a range within which building air temperature will be maintained). Associated actions may be identified to support staff in the adoption of new habits to help them meet new policies.

Similarly, residents of County housing play a role in reducing greenhouse gases. Energy efficiency education can help empower new residents to play an active role in addressing climate change. Engagement activities should complement building envelope and equipment upgrades to link operational habits with capital investments.

1.1.11. Recommendations

Recommended actions to achieve the objectives described in Section 6.1.1 and 6.1.2 are consolidated in [Appendix D](#).

Transportation and Streetlights

The road network in rural areas is a lifeline providing access to amenities like gas stations, grocery stores, community centres and support programmes not found in every small community as well as transportation routes to transport goods between communities. There are three levels of government responsible for roads in Wellington County; the local municipality, County of Wellington and Province of Ontario (Ministry of Transportation). Wellington County is responsible for over 700 km of roads and associated infrastructure such as culverts, bridges and lighting. There are six provincial highways in the County: MacDonal-Cartier Freeway (Highway 401), Highway 6, Highway 7, Highway 9, Highway 23 and Highway 89. These highways transition to the responsibility of the local municipality in some areas where the highways traverse urban areas.

Transportation is the largest contributor of greenhouse gases from fossil fuels supplies in the County at 70% ([Figure 6](#)). Sources of greenhouse gases in transportation include diesel, gasoline and propane. Greenhouse gases from the Community transportation inventory are categorized into five sub-sectors based on vehicle type; cars, light trucks, heavy trucks, buses and off-road agriculture ([Figure 15](#)).

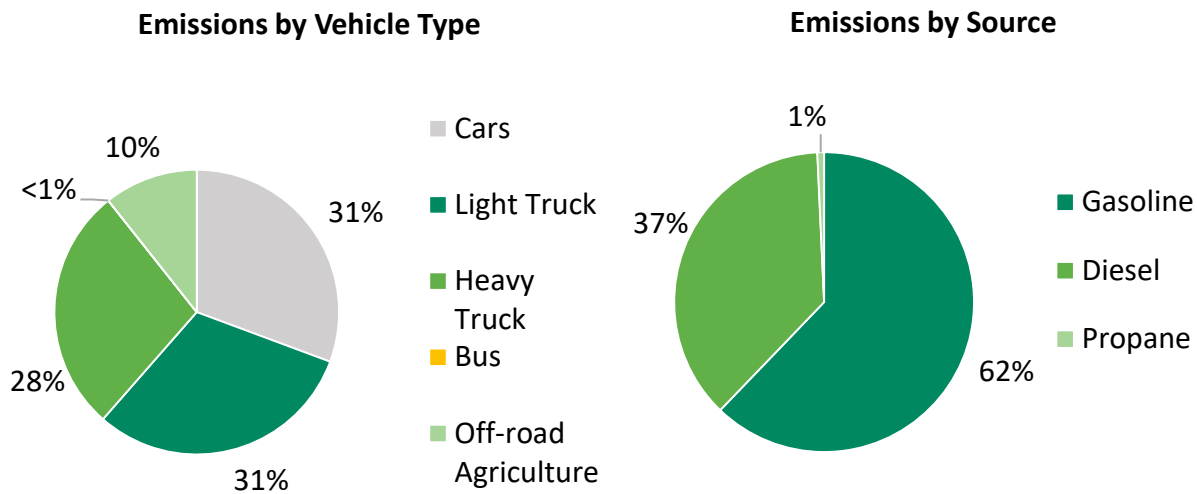


Figure 15: Community transportation greenhouse gas emissions by vehicle type and fuel type.

Car dependency in the County of Wellington is typical of rural areas in Canada. Data from the 2016 Transportation Tomorrow Survey⁶⁸ found the average number of cars per household in the County portions of their study area (Centre Wellington, Guelph-Eramosa Township, Erin, Puslinch) was 2.2 cars/household, higher than the Ontario average of 1.45 cars/household⁶⁹. Dillon Consulting forecasted future daily vehicle trips based on traffic volume analysis⁷⁰, the County’s population in 2016 and the predicted growth and development to 2041. It is forecast that most County residents will stay within their local communities for their daily vehicle trips (Table 3). Centre Wellington, with the highest population, has the highest total daily vehicle trips with 85,451 including 44,900 trips within Wellington County. Like many other County of Wellington residents, Centre Wellington residents travel to communities adjacent to Wellington County and into the Greater Toronto and Hamilton Area (GTHA). The City of Guelph receives 33,044 trips per day by County of Wellington residents, with the greatest numbers from Centre Wellington (22,054), Puslinch (4,438) and Guelph-Eramosa Township (2,805). Waterloo Region sees more visitors from northern Wellington County with 5,601 daily trips from Mapleton, 1,775 from Wellington North and 1,190 from Minto, along with 11,728 from Centre Wellington. County of Wellington drivers make 19,217 daily trips to the GTHA (York region, Toronto, Peel Region, Halton Region, and Hamilton).

⁶⁸ Transportation Information Steering Committee. 2016. Transportation Tomorrow Survey.

⁶⁹ Government of Canada. 2009. Vehicle Survey 2009.

⁷⁰ Dillon Consulting. 2011. Wellington County Development Charges Update - Roadway Improvement Requirements

Table 3: Summary of daily vehicle trips forecast for 2041 within each local community⁷¹

Municipality	Daily Vehicle Trips Within Local Community (percentage of total daily trips)
Centre Wellington	38,543 (45%)
Town of Erin	2,466 (18%)
Guelph-Eramosa Township	728 (11%)
Mapleton	3,828 (27%)
Minto	5,798 (38%)
Puslinch	1,206 (12%)
Wellington North	12,503 (57%)

Light duty vehicles (cars and trucks) contribute the majority (31%) of greenhouse gases from Community transportation sources ([Figure 15](#)). Gasoline is the dominant fuel source of greenhouse gases in the Community transportation sector ([Figure 15\(b\)](#)). While gasoline has a lower carbon intensity than diesel, the volume of gasoline vehicles drives greenhouse gas emissions above those from diesel.

In 2017, there were 857,115 new vehicle sales in Ontario⁷². Of those, 32% were passenger cars and 66% were light trucks (e.g. minivans, sport utility vehicles (SUVs), light trucks and vans). In Ontario, light trucks have seen an increase in new vehicles sales between 2015 and 2019⁷³, while passenger cars have generally experienced a decrease in sales over the same time period suggesting a switch in buyer preference. The 2009 Canadian Vehicle Survey Summary Report⁷⁴ identified 60% of light vehicles in Ontario were cars/station wagons. The remaining 40% were vans, SUVs and pickup trucks.

Diesel is the second largest greenhouse gas emissions contributor with 29% of transportation fuel emissions in the County of Wellington. It can be assumed that the majority of diesel emissions are from heavy vehicles including buses and transport trucks. Although some medium duty trucks use diesel, these are a small portion of the greenhouse gases from diesel⁷⁵. New heavy trucks (classes 4, 5, 6, 7, 8) sales in Ontario more than doubled between 2010 and 2019⁷⁶ and new heavy vehicles sales have averaged 17,000 over the period of 2015 to 2019.

⁷¹ *ibid*

⁷² Statistics Canada. [Table 20-10-0002-01 New motor vehicle sales, by type of vehicle](#)

⁷³ Statistics Canada, [Table 20-10-0002-01 New motor vehicle sales, by type of vehicle](#)

⁷⁴ Government of Canada. 2009. Vehicle Survey 2009.

⁷⁵ Natural Resources Canada. 2007. Canadian Vehicle Survey Summary Report.

⁷⁶ Statistics Canada. [Table 20-10-0002-01 New motor vehicle sales, by type of vehicle](#)

It is estimated that farms in the County have 2,160 tractors and 763 combines based on 2016 Statistics Canada data for Ontario. Assuming this equipment runs on diesel, emissions from off-road agriculture is estimated to contribute 10% of Community transportation emissions.

Although data is not available for Community off-road vehicles in construction and manufacturing, it is anticipated to dominate global heavy equipment markets to 2025. North America is the second leading market for heavy construction equipment in 2018 and is expected to grow considerably through 2025⁷⁷. Manufacturing and construction are leading sectors of local employment in Wellington County. The highest number agricultural building permits were issued in 2017, with \$81.3M in construction, double the previous year⁷⁸.

Greenhouse gas emissions from buses are negligible in Wellington County. There is currently no local transit service in Wellington County. Approximately 20 transportation services active in and adjacent to the County provide various transportation services including services for regional commuters and travelers, school buses, taxis, services for family and community health and medical needs as well as connecting to regional transit services (Guelph, Grand River, GO). Many local service providers operate by volunteers using drivers' personal vehicles making conversion to lower carbon fuel sources a personal choice. See [Appendix C](#) for current list of known transportation services.

Public transportation is a challenge for small and rural communities due to low ridership, limited municipal funding sources, and other constraints that limit leaner municipalities in the development of innovative transit solutions.

The County's Corporate transportation inventory is categorized based on vehicles in each department and streetlights operated by the County. The County operates 34 light duty and 84 heavy duty vehicles, not including contracted waste pick up services. The majority of heavy duty machinery is used in roads construction and maintenance. The County operates few streetlights, most located at intersections of rural roads. Most streetlights in the County are operated by local municipalities.

Heavy equipment in Roads and Solid Waste contribute 96% of the greenhouse gas emissions from transportation ([Figure 16](#)) with the majority of transportation emissions coming from diesel ([Figure 17](#)). Heavy equipment uses high carbon intensity diesel. Currently, heavy equipment fuel is switched to B5 (biodiesel) during warmer summer months. This marginally reduces greenhouse gas emissions however timing of fuel switch is important to ensure the fuel is removed before temperatures drop and the fuel becomes less viscous causing damage to the engine.

Emissions from streetlights is negligible (13 t CO₂e) with most streetlights converted to LED (low emitting diode) bulbs over the past five years ([Figure 17](#)).

⁷⁷ <https://www.globenewswire.com/news-release/2019/03/22/1759318/0/en/Global-Heavy-Construction-Equipment-Market-Will-Reach-USD-231-3-Billion-By-2025-Zion-Market-Research.html>

⁷⁸ County of Wellington. 2019. Wellington County Economic Development Three-year Plan 2019-2021.

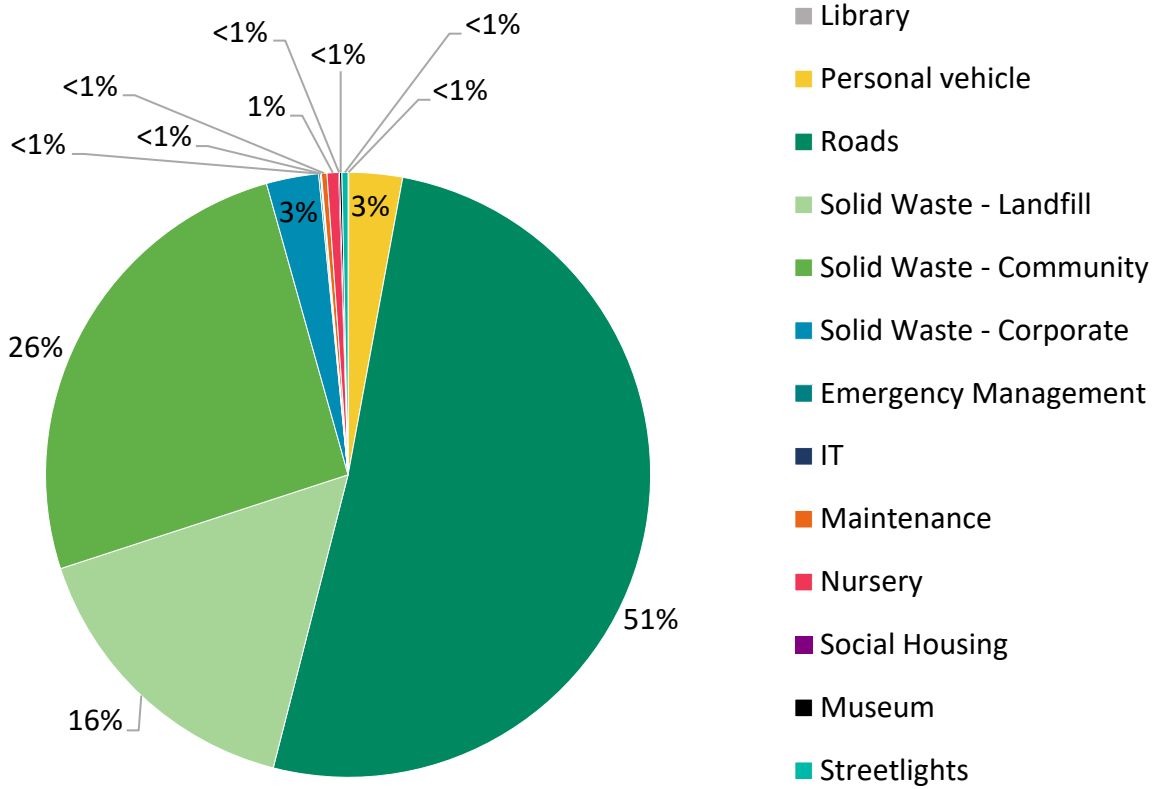


Figure 16: Corporate transportation greenhouse gas emissions by department.

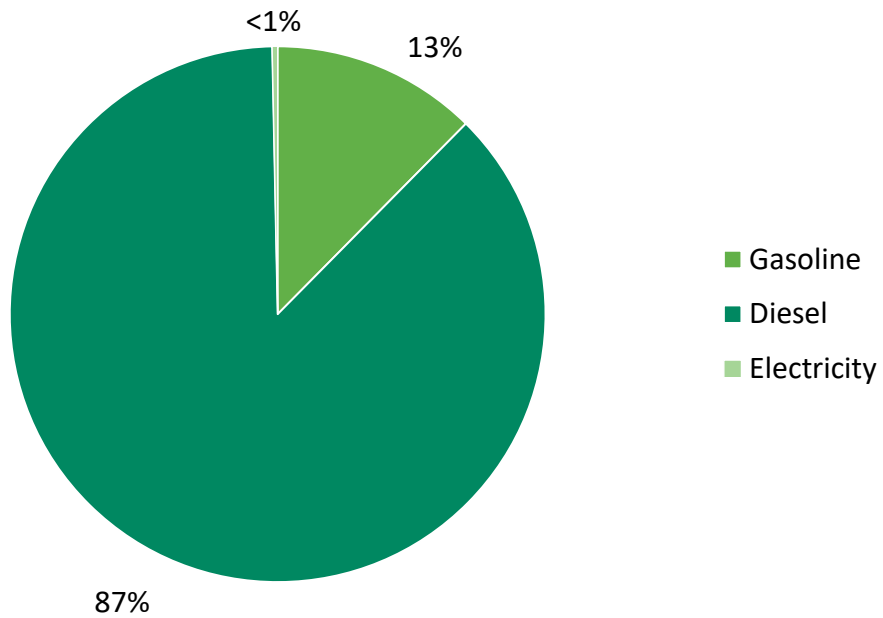


Figure 17: Corporate transportation greenhouse gas emissions by fuel type.

1.1.12. Reducing GHG Emissions from Community Transportation

Efforts to address gasoline usage currently offer the greatest opportunity to reduce greenhouse gas emissions from Community transportation, in part due to the readily available alternative modes of transportation and technologies. Advances to reduce GHG emissions from diesel, although limited at this time, should continue to be explored to the extent feasible (e.g. school buses).

Climate-friendly transportation actions such as designing “complete neighbourhoods”⁷⁹ address the need to connect residents, particularly those with lower income or are unable to drive, to essential services and accessible food sources through affordable transportation, safe pedestrian and cycling routes and shared transportation (e.g. ride-sharing and buses).

Reducing dependency on cars also increases opportunity for daily physical activity benefiting the health and wellness of users by lowering risks of diabetes, obesity and heart disease. Neighbourhoods designed with destinations including green spaces, meeting areas, shops and other amenities increase the opportunity to walk or cycle, reduces isolation and create closer community ties. Further, reducing use of internal combustion engine vehicles improves air quality by reducing airborne pollutants reducing risk of air-quality related illnesses such as asthma.

Light duty (gasoline) vehicles

Community emissions reflect provincial emissions; increasing numbers of personal vehicles are responsible for elevating emissions from gasoline over those of diesel. Due to the challenges in creating County-wide transit, conversion to electric vehicles for personal and business use needs to be part of the Community solution. Further, conversion to electric vehicles is in line with the federal goal of 100% of new vehicles to be zero-emission by 2040⁸⁰.

Electric vehicle technology has advanced to extend the kilometers travelled per charge, making these vehicles more suitable for distance driving needed in a rural setting. The charging infrastructure in the County has expanded over the last few years making charging stations available in most member municipalities. Perhaps more importantly, they are more common in adjacent communities where County residents travel on a daily basis. A charging network to connect surrounding rural communities and installation of charging stations in desirable locations to support visitors to the County should be considered to support the transition to electric vehicles locally as well as to attract economic development opportunities.

Reducing GHGs from light duty vehicles can also be achieved by increasing vehicle occupancy (number of occupants in a vehicle). The County continues to work with local employers to tackle our local labour shortage and bring employees to the County from surrounding areas. Shared transportation may be part of this solution.

⁷⁹ As defined in A Place to Grow 2020: Places such as mixed-use neighbourhoods or other areas that support opportunities for people of all ages and abilities to conveniently access most of the necessities for daily living.

⁸⁰ Minister of Environment and Climate Change, [Mandate Letter](#). 2019.

Like the road transportation network, internet connects communities and is a lifeline to information, programmes and services not available in all communities. Reliable access to internet is imperative to supporting local businesses' connections to broader markets. Further, access to internet allows businesses and employees to work remotely reducing emissions from transportation (primarily light duty vehicles) and, in some cases, reducing emissions from work spaces resulting from lower heat demand due to lower building occupancy. The County of Wellington has worked hard over the last several years to advocate to expand broadband coverage across the County. Residents and businesses between Ariss and Elora are the first customers to receive high speed internet through the federally, provincially and municipally funded Southwest Integrated Fibre Technology (SWIFT) project. The construction of the four SWIFT-funded infrastructure networks will be completed in 2021.

Active Transportation

Transportation mode shift can reduce emissions from transportation in urban areas.

In 2012, the County of Wellington, member municipalities, and Wellington-Dufferin-Guelph In Motion released an active transportation plan for the County to provide guidance as future infrastructure improvements are considered and contribute towards meeting the strategic goals of fostering a healthy and more sustainable community that will benefit all residents, local economy and environment⁸¹. The principles of the document were endorsed by Council. The associated budget was too high for complete implementation of the plan at the time. Grants of up to \$50,000 were available to each member municipality to undertake active transportation infrastructure improvements. All member municipalities participated in the grant programme.

Ultimately, active transportation should be considered through community design. In urban areas, consideration should be given to walkable and bikable access to amenities. Economic development and zoning regulations should come together to identify appropriate land uses to support live-work communities to reduce the need for residents to commute out of their local community. Connecting the active transportation network to regional transportation networks can provide seamless transportation options for commuters where necessary.

Heavy Duty Vehicles

Solutions for reducing emissions from heavy vehicles are currently limited. Fuel switching from diesel to compressed natural gas is a common tactic and can see up to 15% reduction in greenhouse gas emissions⁸². Infrastructure needed to support this fuel switch is expensive, even considering funding supports, which is a barrier for many operators. Electric, compressed natural gas and hydrogen energy for heavy machinery is advancing. Compressed natural gas for heavy machinery is in the testing stage in Canada. While the technologies are advancing, re-fueling and charging stations are not widely available for public use.

⁸¹ MMM Group, EcoPlans and Paradigm Transportation Solutions Limited. 2012. Wellington County Active Transportation Plan.

⁸² Enbridge

Advancements in these technologies should continue to be monitored. In the short-term, approaches to reduce heavy vehicle use, such as applying alternative winter road control to reduce salt application frequency, should be explored.

Future Transportation Needs

The County of Wellington is undertaking a Roads Master Action Plan (RMAP) which is expected to be completed in Fall 2021. The findings of this work will provide insight into transportation needs in the future. With a commitment to integrate a climate change lens into the assessment and recommendations, the plan is expected to identify opportunities to further address greenhouse gas reductions in the future.

What we heard

“...all planning policy related to transportation should include in every instance of a new construction or rehabilitation of an existing roadway, provision for the pedestrian and cyclist”

– Residents Survey
Respondent

1.1.13. Reducing GHG Emissions for Corporate Transportation

Corporate emissions reductions efforts should focus on diesel for the greatest reduction potential. Unfortunately, technologies and alternatives have not yet advanced for the heavy machinery operated by the County. Efforts to reduce greenhouse gas emissions from light duty vehicles should be pursued in the short-term while diesel replacement technology advances.

Light duty

The County operates very few light duty vehicles. Many of these vehicles are vans and pickup trucks. The technology for electric vans and pickup trucks is developing rapidly. Once available, pilot trials should be undertaken to determine if the technology will suit the County’s needs.

Personal Vehicles Usage

Without a light duty fleet County employees use their personal vehicles for business travel when necessary. Few options currently exist to transition employees away from using their personal vehicles without investing in a fleet. To that end, many employees travel from home or return directly to home from their work engagement making fleet vehicles for general staff use a poor investment. Encouraging carpooling and remote attendance are helpful solutions to reduce greenhouse gases from personal vehicle usage. Similarly, offering remote access to employees and external attendees to workshops and meetings further contribute to reducing the need to travel thereby reducing both Community and Corporate greenhouse gas emissions.

Heavy duty

Technology to move away from diesel fuel is still in development. Concerns have been raised regarding the power available from some sources to not only operate heavy equipment across a range of topography but also the ability to push heavy loads such as snow. Monitoring the advancement of new technologies will ensure the County is at the forefront of these developments and ready to adopt suitable technologies when available. Ultimately a Green Fleet Strategy will help inform the transition from diesel to new technologies.

Reducing diesel use in heavy equipment while new energies are being developed can occur through piloting auxiliary cab heater for defrosting and creating anti-idling policy to reduce equipment running time when not in use. Fleet performance with respect to greenhouse gas emissions is an additional criterion to consider in the evaluation of vehicle performance and efficiency audits currently undertaken.

Future needs

Developing expertise in alternative vehicle energy technologies and building skills to maintain and operate alternative energy vehicles will be essential as the County works towards transitioning to a low carbon fleet.

Culture of Conservation

As the County develops its conservation culture consideration must be afforded to empowering employees to use vehicles less. Creative solutions to support a transition to transit (where available), carpooling and active transportation will support community efforts to reduce greenhouse gas emissions from vehicles.

Lighting

Most streetlights operated by the County have been replaced with low energy demand light emitting diode (LED) bulbs. The transition away from traditional lighting has already started in other exterior lights. This work will continue until all exterior lightbulbs have been replaced.

1.1.14. Recommendations

Recommended Actions to achieve the objectives described in Action 6.2.1 and 6.2.2 are consolidated in [Appendix D](#).

Solid Waste

In 2017, 31%, by weight, ([Figure 18](#)) of Community waste was diverted from the landfill, a 6.1% increase from the previous year⁸³. In 2020, the County introduced green bin (organic waste) diversion programme in response to requests from residents to make diversion of food waste more convenient. It is estimated that the green bin programme will divert up to 2,400 tonnes of organic waste from the landfill initially, reducing greenhouse gas emissions and increasing the life span of the landfill. As the programme matures, the tonnage of organic waste diverted is expected to increase.

Community waste estimates include solid waste collected through curb-side pick-up and disposal at transfer stations and the landfill. In 2017, total waste disposed at the County's landfill weighed in at 24,178 tonnes, an increase of about four percent from the previous year. It is expected that the population in the County increases, so too, will solid waste disposal. Over time the County has invested in diversion programmes to reduce solid waste heading to the landfill. In 2017, over 11,000 tonnes of solid waste was diverted from the landfill.

⁸³ County of Wellington. 2017. County of Wellington Solid Waste Services Annual Report 2017

The Waste-Free Ontario Act, 2016 combined with the Resource Recovery and Circular Economy Act, 2016 and the Waste Diversion Transition Act, 2016, shifts the responsibility of printed and packaging diversion and reduction to producers and emphasizes opportunities to create circular economies through waste recovery, which lead to further local reductions in greenhouse gas emissions.

Solid waste from Community sources generated 17,012 t CO₂e in 2017 or 3% of the biogenic supply (Figure 7).

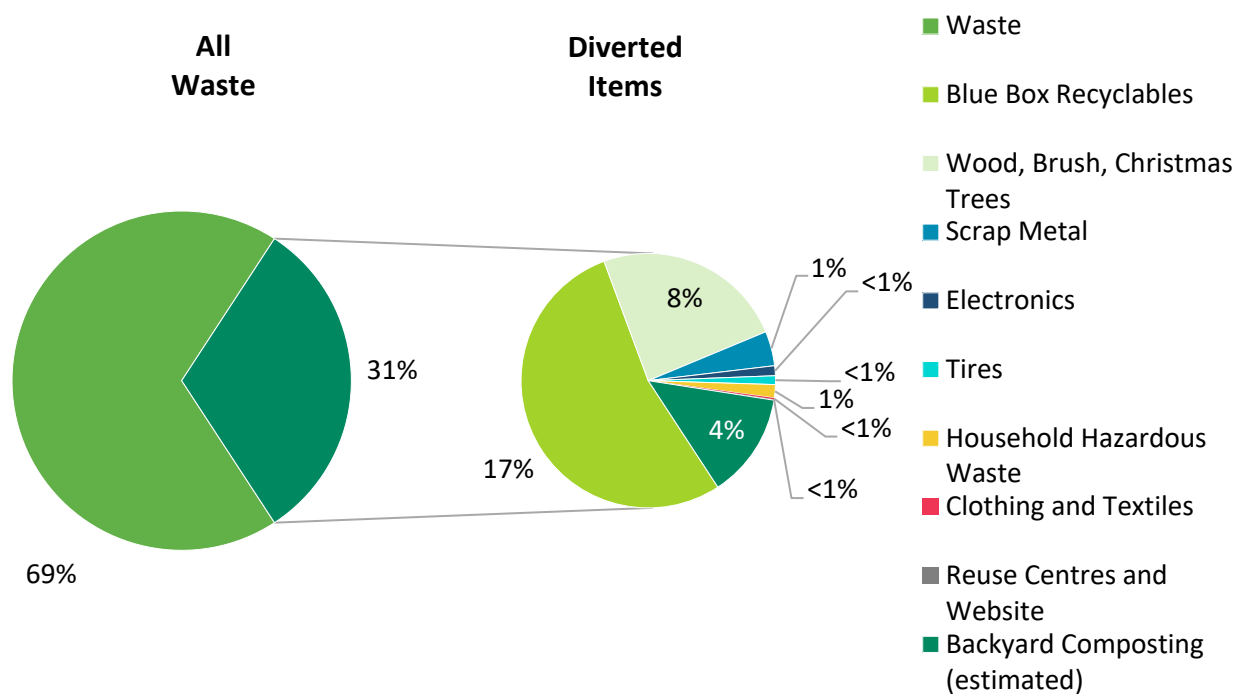


Figure 18: Percentage of solid waste disposed and diverted from Community sources (by weight, in tonnes)⁸⁴.

Corporate solid waste includes all waste disposal collected by contracted bin servicing at County buildings (Corporate buildings and some social housing buildings). Corporate solid waste pickup is serviced by contractors for some County-owned buildings located in the County and by City of Guelph for County-owned buildings located in the City. Estimates of solid waste collected from County buildings by City of Guelph have not been included in the emissions calculation. Waste collected by the City of Guelph would be accounted for in the City of Guelph

⁸⁴ County of Wellington Annual Report 2017. VanRooyan Waste Solutions Inc. 2017. 2017 Residential Self-haul & Curbside Waste Audit. Prepared for the County of Wellington.

emissions inventory. Currently, Corporate solid waste diversion programmes include recycling. Green waste diversion is offered in the City of Guelph. However, Corporately, the County does not currently participate. It is estimated that 1,268 tonnes of waste was collected from Corporate sources in 2017, producing 611 t CO₂e.

1.1.15. Reducing GHG Emissions from Community Solid Waste

Anecdotally, the County's contractors who deliver curb side pick-up services have acknowledged the County as one of their best clients for sorting waste and recyclables. This keeps costs down and provides a cleaner product to be sold to companies for recycling and re-use.

Methane is created through the decomposition of carbon in organic matter, specifically, food, garden waste and other plant debris, paper and wood. Of these, food constitutes over 50% of the County's Community organic waste. However, food waste has less degradable carbon than wood, paper or plant debris. The higher disposal of food into the landfill drives the emissions from food higher than the more potent sources of wood and plant debris.

Not enough organic waste is buried at the County's landfill to effectively create methane that can be used to power machinery or as a heat source. Organic waste is projected to decrease further in the future with the introduction of the green bin and County-wide leaf and yard waste diversion services in 2020. Further reductions of food waste are being examined through the Smart Cities Our Food Future project, currently being undertaken by the County of Wellington and City of Guelph.

Diversions such as recycling and the organic green bin programmes open opportunities to use solid waste as a resource to create circular economies. Local connections and partnerships are being forged to combine efforts to reduce waste and create innovative products.

1.1.16. Reducing GHG Emissions from Corporate Solid Waste

Greenhouse gas emissions from Corporate waste needs to focus on reducing waste from its sources then ensuring appropriate diversion programmes are easy for employees to use.

Continued effort to divert paper products and reduce food waste will continue to drive down emission from solid waste.

Reduce solid waste from source

The best way to reduce solid waste is to stop making it. County processes should be examined to identify sources of solid waste and methods to eliminate the waste first. Actions include expanding the County's paperless systems to include digital billing and Human Resources forms among others. Strong purchasing policies and event guidelines that nudge suppliers to reduce packaging, make packaging recyclable and promote re-usable packaging and products will also reduce the amount of solid waste from County operations.

Increase diversion

Buildings located in the City of Guelph can take more advantage of City diversion programmes, including green (organic) waste diversion. All social housing buildings, in the County and Guelph, should be outfitted with appropriate waste diversion bins and be provided supporting educational materials to help residents make the best choices when disposing of their solid waste.

1.1.17. Recommendations

Recommended actions to achieve the objectives described in Sections 6.3.1 and 6.3.2 are consolidated in [Appendix D](#).

Agriculture

Wellington County farmers feed Ontarians. County farmers produce a diverse range of foods and agricultural products that are shipped throughout Ontario, Canada and internationally. Agriculture is the third largest employment sector in the County of Wellington and identified as a key growth sector in Wellington County Economic Development Three Year Plan (2019-2021).

In 2017, there were approximately 2,350 farms in Wellington County covering about 466,400 acres⁸⁵. Since 1999, over 1000 farmers in Wellington County have completed more than 1,650 projects to improve or protect water quality in the streams, lakes and aquifers of Wellington County through the Wellington Rural Water Quality Programme⁸⁶. Many of these activities (manure storage, cover crops, nutrient management plans, etc.) have a co-benefit of reducing greenhouse gas emissions from agricultural sources.

Farmers are also land stewards, managing natural heritage features such as 31,331 ha of forest, 198 ha of wetland and kilometers of streams that provide clean air and water and contribute to the storage of carbon, reducing greenhouse gases. The sequestration of these natural areas and agricultural soils have not been included in this emissions inventory.

Wellington County farmers are already experiencing the effects of climate change. Perhaps most visible is the extended flooding period in the spring that prevents farmers from accessing their fields to plant crops and restricts livestock access to pasture lands. Other effects of climate change that will impact farmers include the expanded ranges of pests that infest crops, the increased intensity of storms through the growing season that damage crops with high winds and hail, and higher temperatures and long periods of drought that reduce crop yields and increase livestock mortality.

Emissions from enteric fermentation (a by-product of digestion in ruminant livestock, e.g. cattle), manure management, urea and liming application, and managed agricultural soils were considered in this inventory⁸⁷ ([Figure 19](#)). Greenhouse gas emissions from agriculture consist primarily of methane and nitrous oxide. The proportion of methane and nitrous oxide in the

⁸⁵ [Statistics Canada](#). Accessed November 2019.

⁸⁶ County of Wellington. 2020. Wellington Rural Water Quality Programme Annual Report.

⁸⁷ Local farming leaders advised that field burning is not common in the County of Wellington and should not be included in this inventory.

agricultural greenhouse gas emissions inventory is presented in [Figure 20](#). Methane contributes 66% of emissions in the inventory.

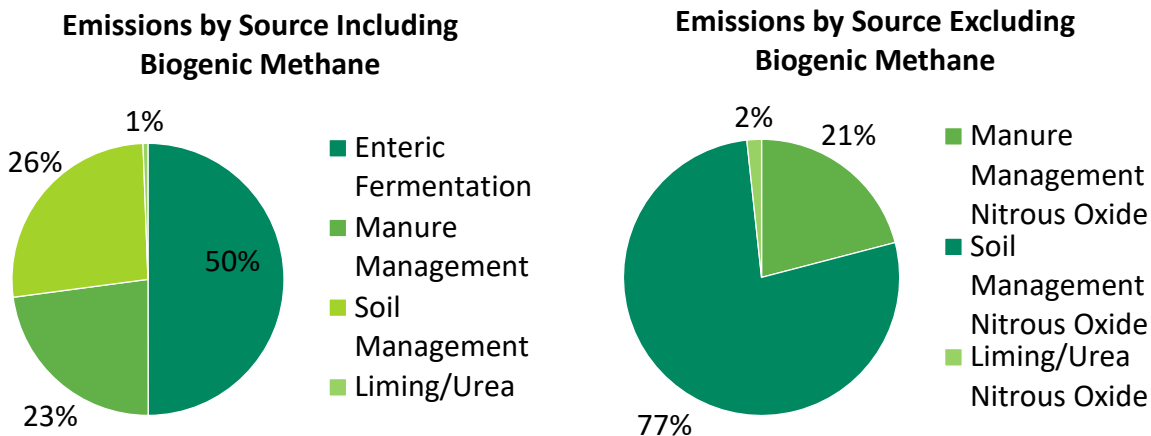


Figure 19: Agricultural greenhouse gas emission by source including biogenic methane and by source excluding biogenic methane.

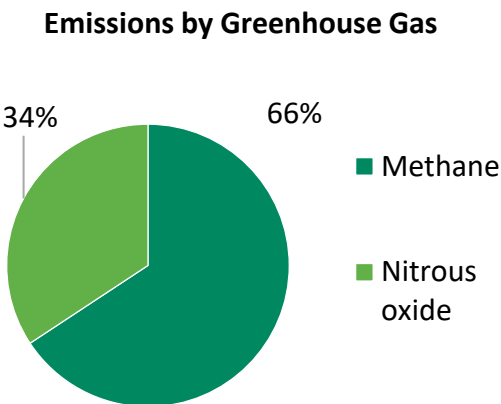


Figure 20: Proportion of greenhouse gas from agricultural sources.

Traditionally, agricultural emissions inventories include biogenic methane. There is a push to differentiate between biogenic methane (methane from ruminant animals and wetlands) and methane produced from fossil fuels⁸⁸. Biogenic methane is produced by recycling carbon already in the atmosphere, closing the carbon loop⁸⁹. Fossil fuel methane introduces new

⁸⁸ <https://clear.ucdavis.edu/explainers/why-methane-cattle-warms-climate-differently-co2-fossil-fuels>

⁸⁹ The biogenic cycle for methane begins when a ruminant livestock ingests plants and produces methane. Methane has a lifespan of approximately 12 years in the atmosphere at which point it is converted to carbon dioxide. Carbon dioxide is then taken up by plants through photosynthesis to make their food, which is then

methane to the atmosphere from buried sources. Further, biogenic methane can be captured and used as a resource to replace fossil fuel methane in some technologies. Half of all agricultural emissions are from enteric fermentation, which is entirely methane. The remaining emissions are from manure management and managed soils, in almost equal proportions, and a small contribution from liming and urea. When methane is excluded from the inventory, emissions are dominated (77%) by nitrous oxide from managed soils followed by nitrous oxide from manure management and a small contribution from liming/urea.

This inventory and recommendations include biogenic methane following current guidelines⁹⁰.

1.1.18. Reducing GHG Emissions from Agriculture.

Actions implemented on the farm must consider the farm as a system and not isolate the emission sources from other processes. By looking at the farm as a system, co-benefits can be found (e.g. managing manure to reduce methane production and providing needed nitrogen to crops).

Climate change actions that address greenhouse gases from our food system - including on-farm energy use, livestock and soil management and food waste reduction - can increase crop yields and cost savings, improve nutrition and create circular food system opportunities.

Enteric fermentation

Measures to reduce greenhouse gas emissions from enteric fermentation address sources of methane. Bacteria present in the digestive system work to ferment food consumed by ruminant livestock, releasing methane gas through this process. Solutions to reduce methane from enteric fermentation must work with the natural digestive processes of these animals. Advancements have been made in feeding strategies including increasing fat content, including feed additives (e.g. tannins, essential oils) and rumen modifiers (e.g. yeast) show promise in reducing methane production.

Manure Management

Methane and nitrous oxide from manure management is dependent on the type of livestock and methods of storing manure (liquid system, solid or dry system or other systems). Unsurprisingly, due to the higher headcount, cattle and swine are the largest contributors to emissions from manure management in the County.

Methods for reducing methane from manure comes down to reducing opportunity for bacteria to grow and produce methane. Approaches include spreading manure on fields as early in the fall as possible, thoroughly cleaning manure storage facilities, separating liquid manure from

ingested by livestock, closing the methane lifecycle loop. At this point, the methane cycle is in balance; the methane produced is in balance with the carbon in the plants ingested.

⁹⁰ International Panel on Climate Change. 2006. [Guidelines for National Greenhouse Gas Inventories](#).

solid manure and composting solid manure. Feed selection can also reduce methane and nitrous oxide from manure management.

Soil Management

All soils release nitrous oxide. However, agricultural soils often produce more due to the need to add nitrogen to soils where it has been removed through harvest. Nitrogen in the form of organic and inorganic fertilizers and manure is added to maintain crop yield. Nitrogen released from soils can be reduced through tailored approaches to fertilizer applications (e.g. conservative application based on crop needs, precision application to avoid over spraying, using slow release fertilizers and applying fertilizers several times through the year instead of all at once).

Similar to manure management and enteric fermentation, feed selection can also reduce nitrous oxide from soils by reducing nitrous oxide in manure applied to fields.

Other farming practices may also reduce nitrous oxide released from soils:

- Using legumes as a nitrogen source.
- Using cover crops to reduce excess nitrogen.
- Avoid leaving summer fields unplanted.
- Reduce tillage intensity (no-till practices can sometime reduce emissions).

Soil management practices also have the ability to take up carbon from the atmosphere. Soil management practices such as reducing tillage, restoring degraded lands, and using legumes in crop rotations can increase the soils ability to store carbon.

Wellington County is known for having some of the best soils in Ontario. Estimates suggest Wellington County agricultural soils trap more carbon that they release, year over year⁹¹. Soil management practices can also increase soil productivity.

What we heard

“This is a societal issue that requires both producers and consumers to work together.”

– Farmers’ Survey Respondent

1.1.19. Recommendations

Recommended actions to achieve the objectives described in Section 6.4.1 are consolidated n [Appendix D](#).

Cross-sectoral

Climate change action is most successful when integrated across disciplines and organizational boundaries to leverage other actions, expertise and effort. This section considers actions that fit under more than one sector or live in the space between existing jurisdictional and organizational boundaries.

⁹¹ County of Wellington unpublished data

1.1.20. Community Cross-sectoral Actions

Two opportunities have been identified that do not fit neatly in the sectors described in this plan; renewable energy planning and education and continued engagement efforts.

Renewable energy

Renewable energy ideally will replace much of the high emissions intensity energy currently in use. As energy demand increases, renewable energy will also be a more cost-effective way of meeting those needs and avoiding increases in greenhouse gas emissions. Approaches to increasing the local production of small and large scale renewable energy should be explored with local utility providers and other partners and promoted to the community.

Engagement

Limitations on face to face meetings and public gatherings due to COVID-19 health measures limited the engagements completed during the development of this plan. Going forward efforts need to be made to engage the community including youth, Indigenous communities, hard to reach communities, and academia, among others through web-based and in-person experiences, as health measures allow. The engagements should be focused on information sharing and education about greenhouse gas emissions, barriers to implementing climate-friendly initiatives, funding availability, etc. to gain community support and awareness and behavior change.

1.1.21. Corporate Cross-sectoral Actions

Corporate cross-sectoral actions will provide some of the structure from which the recommendations in this plan will be delivered, imbed climate change action in day-to-day Corporate activities and ensure progress continues to be supported by other levels of government.

Imbedding Climate Change Action in Corporate Operations

Action on climate change must become common practice to make the significant shift needed to avoid the worst impacts of climate change. Imbedding climate-friendly action into the way the County of Wellington operates achieves this objective. The greatest opportunities exist in purchasing and asset management, which could require all departments to address the impact of proposals and purchases on climate change.

Data Management

The County of Wellington is working to establish an asset management programme including an asset management database to store information about buildings, equipment and fleet. This presents an opportunity to integrate data management systems to improve data quality, consistency and completeness. Integration of data systems will require the establishment of supporting processes. This undertaking will involve multiple departments including (but not limited to) Treasury, Social Housing, Planning, Facilities, and Information Technology.

Other data management initiatives include creating a greenhouse gas emissions calculator to more efficiently track changes in Community and Corporate emissions over time and improved monitoring of energy use and production (e.g. solar photovoltaic).

Advocacy

Municipal governments only have control over the emissions they produce through operation. However, municipalities' influence is far-reaching and will be a powerful tool to bring about change at the local level. Advocating for climate change action to other levels of government that support the identified local needs can influence investments, priorities and spark new partnerships. Currently of particular interest are investments to support deep energy retrofits in social housing and Community residential buildings and maintaining a low carbon supply of electricity in Ontario.

1.1.22. Recommendations

Recommended cross-cutting actions to achieve the objectives of this plan are consolidated in [Appendix D](#).



Implementation



The greatest threat to our planet is the belief
that someone else will save it

- Robert Swan, Explorer, UN Goodwill Ambassador for
Youth, Special Envoy to the Director General of UNESCO.

Implementation

Implementing Future Focused will require collaborative efforts with existing programmes and partners, development of new partnerships and innovative funding approaches.

County Plans and Programmes

The County of Wellington has a number of existing programmes, plans and policies already undertaking work that supports recommendations in this plan, including:

- Strategic Action Plan.
- Municipal Operational Service Efficiency Review.
- Conservation and Demand Management Plan.
- Purchasing Policy.
- Asset Management Programme and Policy.
- Smart Cities – Our Food Future.
- Taste Real.
- Fleet Inspection and Performance Programme.
- Ride Well.
- Green Legacy Building Guidelines.
- Green Legacy Programme.
- Housing and Homelessness Plan.
- Waste Management Fleet Conversion to Compressed Natural Gas.
- Solid Waste Services Strategy.
- Active Transportation Plan
- County Trail System.
- Community Improvement Programme Fund.
- Wellington Rural Water Quality Programme.

These, along with programmes and expertise offered by member municipalities and the City of Guelph, will work together to drive down both Community and Corporate greenhouse gas emissions.

Gaps in current service delivery to address the recommendations in this plan center around technical expertise in energy management and community engagement and facilitation with a focus on energy efficiency. For the County of Wellington and the community to be successful in achieving greenhouse gas emissions reductions, climate change action must become common practice. Appropriate resources (e.g. staff, consultants, data management tools, funding, etc.)

are needed to ensure climate change plans are implemented and climate change mitigation remains on the minds of staff, decision-makers and the community.

Partnerships

The County of Wellington will forge meaningful relationships with organizations with the shared goal of reducing greenhouse gas emissions. Partnerships with other levels of government, member municipalities, academia, private sector organizations, school boards and other institutions will focus on positive solutions and transformative action to provide technical assistance, transfer knowledge and develop financial support within the community.

Funding

Funding streams change regularly to align with priorities of the sitting government and energy providers and regulators. Funding programmes need to be monitored in order for the County and community to take advantage of these changing opportunities. Below is a list of current funding and incentive programmes available to support the implementation of the recommendations in this plan.

- Federation of Canadian Municipalities: Green Municipal Fund, Municipal Asset Management Programmes, Community Energy Financing.
- Independent Electricity System Operator: Save on Energy, Aboriginal Community Energy Plan Programme, Education and Capacity Building Programme.
- Enbridge/Union Gas: Home Energy Upgrades, Home Efficiency Rebate, Industrial Custom Solutions and Incentives Programme, Commercial Custom Retrofit Programme, Comprehensive Energy Management Programme, Fixed Incentive Programme, RunitRight Programme, School Energy Challenge Programme, Commercial Savings by Design, Engineering Energy Efficiency Feasibility Study, and more.
- Federal Government: Natural Resources Canada, Environment and Climate Change Canada, Infrastructure Canada.
- Ontario Ministry of Economic Development, Job Creation and Trade: Southwestern Ontario Development Fund.
- Natural Resources Canada: Electric Vehicle Infrastructure Demonstration Programme.
- Transport Canada: Zero-Emissions Vehicle rebate programme.
- Infrastructure Canada: Green Infrastructure Fund.
- Plug 'n Drive: Used Electric Vehicle Incentive Programme.
- Ontario Ministry of Infrastructure: Improving Connectivity for Ontario.
- Smart Cities - Our Food Future.
- Ontario Soil and Crop Improvement Association and Ontario Ministry of Agriculture, Food and Rural Affairs grants.
- Wellington Rural Water Quality Programme.



Estimated Emissions Reductions



Many people say that Sweden is just a small country, and it doesn't matter what we do, but I have learned you are never too small to make a difference.

- Greta Thunberg, Environmental Advocate

Estimated Emissions Reductions

Emissions reductions can be estimated for major climate change actions by comparing existing greenhouse gas emissions to the GHG emissions of the future state.

Community GHG Reduction Estimates

A total of over 73,000 t CO₂e can be reduced or avoided with the implementation of the major actions recommended in this plan ([Table 4](#)). This figure does not include sequestration from soils and natural areas, incremental reductions through behavior and policy change or green improvements to Ontario's energy supply.

The largest reductions can be seen in Agriculture. This is in part attributed to the loss of total farm land over time. Continued effort to improve manure and soil management at an emission reduction of 1% per year make up the remaining portion of the reduction.

Emissions reductions in buildings are scalable to the effort and funding available to support deep energy retrofits. An average efficiency improvement of 40% (assumed based on literature review findings) and a target of 20% uptake in retrofits for existing homes and businesses would result in an annual reduction of 16,350 t CO₂e based on the carbon intensity of today's energy supply in Ontario. Emissions avoided in new buildings (due to more stringent energy efficiency requirements) are much lower than emission reductions of existing buildings due to the higher number of existing buildings compared to projected growth within the timeframe of this plan.

With manufacturing of electric vehicles coming to Ontario, the federal government's push to have all new vehicle sales to be electric by 2040 and the introduction of electric pickup trucks, it is anticipated that there will be growing interest in purchasing electric vehicles in the County. Emissions reductions of 27,140 t CO₂e are estimated to be achieved through a conversion of 20% of vehicles registered in the County.

Solid Waste is the smallest portion of the Community inventory. With many diversion programmes already in place, improvements to diversion rates become more challenging. With a focus on green bin and paper diversion it is estimated that 3,400 t CO₂e can be reduced.

Table 4: Estimated Community greenhouse gas emissions reductions.

Sector	Reduction Target to 2030	Total t CO ₂ e
Existing homes	Retrofit 20% of homes and businesses (efficiency improvement of 40%)	18,686
New homes and businesses	40% energy efficiency improvement over pre-2017 standards	1,765
Transportation	20% adoption of cars to electric vehicles	27,140
Agriculture	12% reduction in emissions from manure management and soil management	30,970
Solid Waste	20% reduction in waste emissions	3,400
TOTAL		81,960

It is expected that emission reductions will increase over time as partnerships are forged, programmes are developed and more broadly supported and funding support becomes available ([Figure 21](#)). Further, momentum gained through policy and programmes at other levels of government will transfer to local actions over time as we collectively strive to achieve net-zero by 2050.

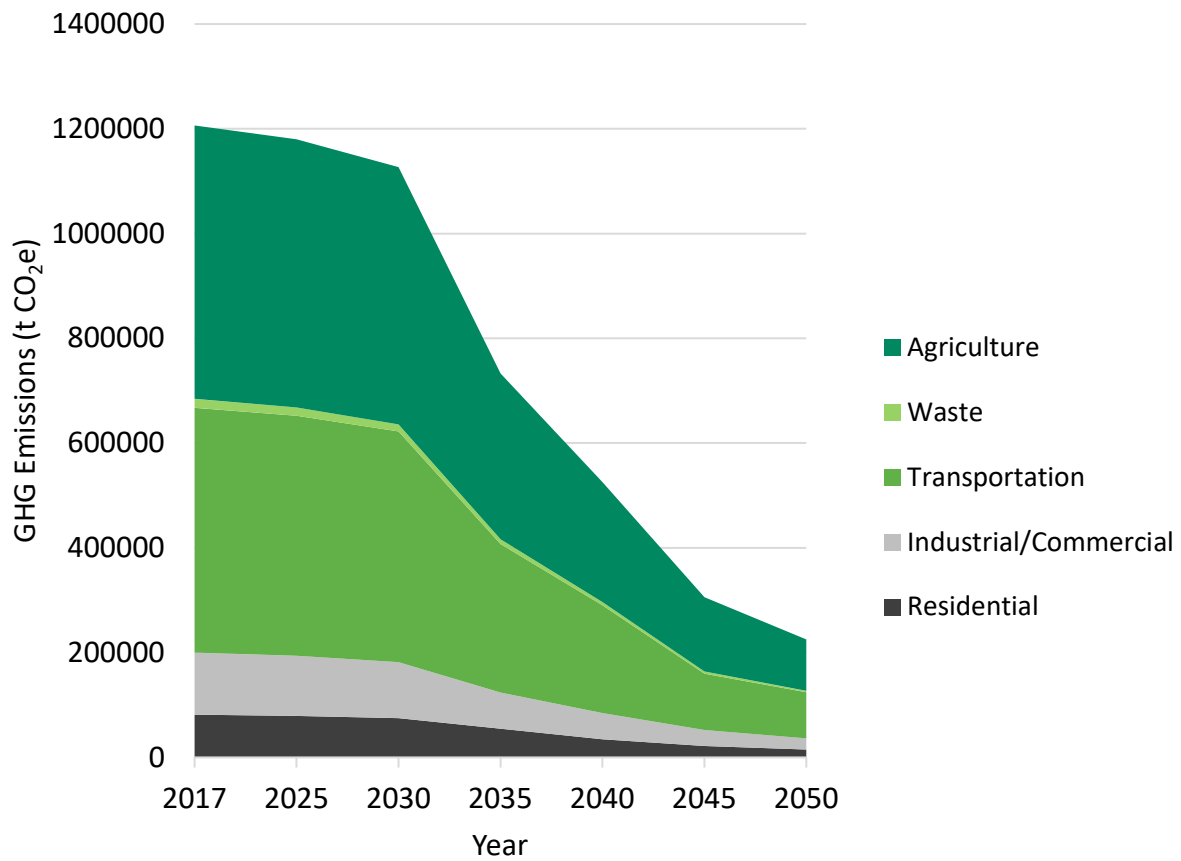


Figure 21: Projected reduction in Community emissions for each sector over time showing 6% reduction by 2030 and 80% reduction by 2050.

Corporate Greenhouse Gas Reduction Estimates

It is estimated that 10%, or 680 t CO₂e, of the County’s emissions from municipal operations can be reduced over the lifespan of this plan ([Table 5](#)). The focus of emissions reductions will be on existing buildings and greening the Corporate fleet. With the same reduction target as existing Community buildings (20% adoption with 40% efficiency improvement) the County will realize 350 t CO₂e reduced from total emissions. Efficiency improvements to curbside pickup vehicles and reduced emissions from light duty fleet vehicles will see an additional 300 t CO₂e reduced. Small reductions in emissions will be seen through improved solid waste diversion.

Table 5: Estimated Corporate Greenhouse gas emissions reductions.

Sector	Reduction Target to 2030	Annual Total t CO ₂ e
Existing Buildings	Retrofit 20% of social housing and administration buildings (efficiency improvement of 40%)	480
Transportation	15% efficiency improvement in curbside pickup, 5% reduction in emissions from other fleet sources	300
Solid Waste	5% reduction in waste emissions	30
TOTAL		870

As with the Community emissions reductions, it is expected that momentum for greenhouse gas reductions will increase overtime. (Figure 22) on the path to achieving net-zero by 2050.

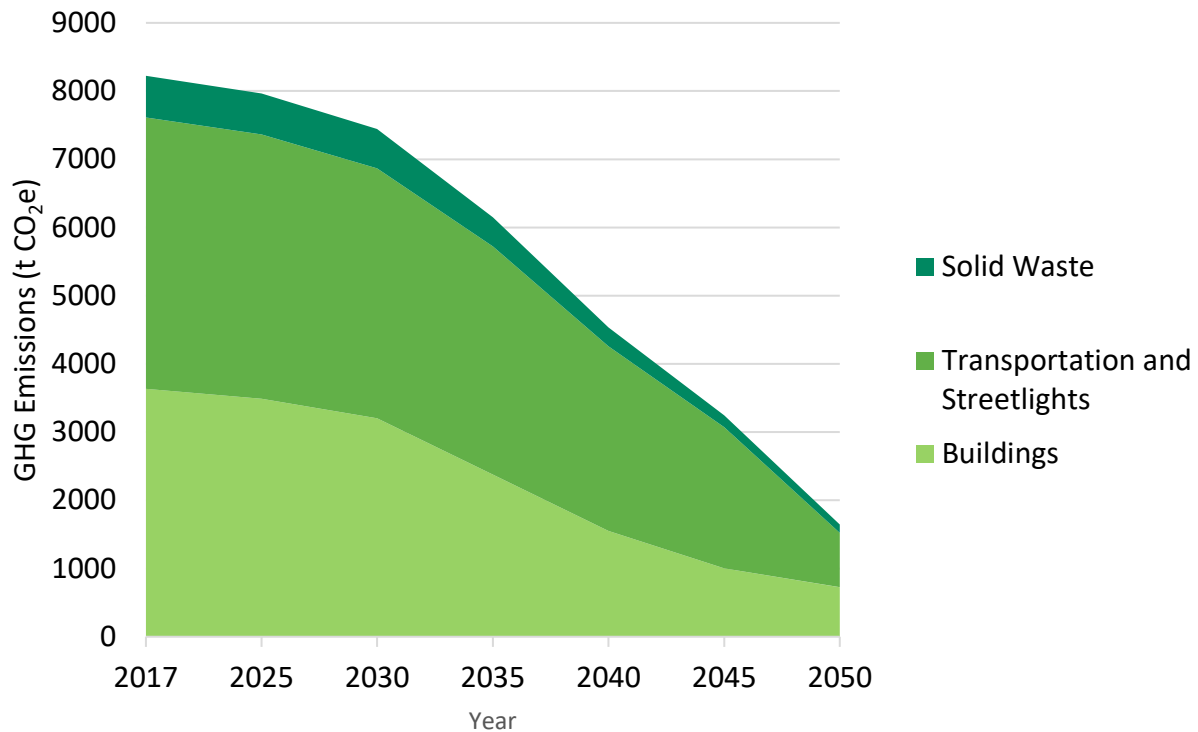


Figure 22: Projected reduction of Corporate emissions over time for each sector achieving 10% reduction by 2030 and 80% reduction by 2050.



Monitoring and Reporting



Climate change is the single greatest threat to a sustainable future but, at the same time, addressing the climate challenge presents a golden opportunity to promote prosperity, security and a brighter future for all.

- Ban Ki-Moon, Former Secretary-General of UN

Monitoring and Reporting

We can't manage what we don't measure. On-going monitoring and reporting of energy use and the resulting emissions and other metrics will help track the progress made on the recommendations provided herein.

Monitoring

For some sectors, strictly conducting the same calculations completed in this report may not provide the full picture of the changes being made to transition to a lower-emissions community. For instance, calculations for emissions from transportation do not account for the number of electric vehicles registered in the County. The transition to electric vehicles may not be seen for some time in the transportation emission calculations. In cases such as these, other metrics need to be tracked. [Table 6](#) summarizes recommended Community metrics, or key performance indicators, to be monitored for each sector. Additional metrics may be added as various climate change initiatives are undertaken. Corporate emissions will be tracked using energy use data. Completion of specific tasks will also be tracked and reported in future plan updates.

Table 6: Summary of Community metrics to be monitored to demonstrate transition to lower emissions over the lifespan of this plan.

Recommendation Objective	GHG Target	Key Performance Indicator(s)	Target
Buildings			
Reduce GH emissions from existing buildings.	20% adoption of 40% energy efficiency improvement	# buildings participating in emissions reduction and energy saving programmes	6600 buildings
Avoid greenhouse gas in planned buildings and development.	40% energy efficiency improvement over 2017 standards for all new buildings	# of buildings with energy efficiency greater than OBC	8800 buildings
Building a culture of conservation in the community.		# participants	200 participants annually
Transportation			
Transition light vehicles to electric.	20% conversion of registered vehicles to electric	# of electric vehicles registered within County of Wellington	14,600 vehicles
Reduce dependency of automobile.		# of low carbon and active transportation initiatives undertaken	15
Support options for commuters.		# people using carpooling/ride share services	3,000 rides/year + 20% annual growth ⁹²
		# communities connected to broadband	95% of population connected by 2025 ⁹³

⁹² Target established by Ride Well.

⁹³ Target established by SWIFT project proposal.

Reduce emissions from heavy duty vehicles.		# of heavy vehicle conversion initiatives	All home-to-school school buses, all regional transit buses
Solid Waste			
Increase diversion rates.	20% reduction in GHG emissions	Weight of waste diverted from landfill	3,000 tonnes
		New circular businesses practices	50 by 2025 ⁹⁴
		Circular economic values	Increased by 50% by 2025 ⁹⁵ .
Agriculture			
Reduce greenhouse gases on the farm.		# farms participating in manure management, soils management through local programmes	500 farms
Promote and improve access to local food.		Increase access to affordable nutritious food	50% by 2025
		Increase in new local food businesses participating in Taste Real	15/year ⁹⁶
Culture of conservation		# participants	500 participants

⁹⁴ Our Food Future target.

⁹⁵ ibid

⁹⁶ Taste Real target.

Reporting

Progress on the recommendations contained herein should be reported on annually, with major achievements presented to Council when appropriate. Annual reporting will include an assessment of the plan to determine if amendments are needed to consider new information, data, etc. which may impact the ability of the County to deliver the recommendations.

Prior to the conclusion of this plan in 2030, it is recommended the County consider the next 10-year forecast. A full review and update of the plan is recommended to re-establish the County's commitment to emissions reductions, re-calibrate targets and set new recommendations to continue our pathway to meet Canada's goal of net-zero by 2050.



Conclusion



I am certainly bolstered by the fact that we already have all the solutions we need. From renewable energy, to replanting ecosystems, to regenerative farming, to retrofitting buildings, to electrifying transportation, to reducing waste — we don't need to wait for new technologies, we just need to get to work... there is so much beautiful and creative work happening at local levels just waiting to be replicated and spread.

- Ayana Elizabeth Johnson, Marine Biologist, Founder Ocean Collective and Urban Ocean Lab

Conclusion

Following the Partners in Climate Protection Milestone Framework, the County of Wellington has acknowledged current energy uses and their emissions and charted a path to a low carbon future.

The Community and Corporate greenhouse gas inventories serve as a starting point to help focus efforts to the areas of greatest need and potential to reduce emissions:

- Efforts in the building sector will focus on the reduction of natural gas in heating and industrial processes. Natural gas is widely used in the County, is the dominant source of greenhouse gas emissions in the building sector and there are alternative energies and technologies available that produce lower emissions.
- In the short-term, transportation efforts will focus on transitioning from gasoline to electric. Actions to reduce the use of diesel will be developed as technologies advance.
- Emissions from agriculture will continue to be reduced through adoption of climate-friendly soil and manure management practices. Many of these actions are supported through the Wellington Rural Water Quality Programme.
- Continued diversion efforts through the implementation of the Solid Waste Services Strategy and Our Food Future programmes will support reduction of emissions from solid waste.

Recommended actions in this plan, developed in collaboration with community partners, seek to support the community through the transition to net-zero by 2050 in alignment with the goals of the federal government. Short-term targets of reducing 2017 levels of Community and Corporate emissions by 6% and 10%, respectively, by 2030 have been established to set us on a pathway to achieve this longer-term goal, with monitoring and reporting to track our progress.

Future Focused demonstrates the County's commitment to lead the community on climate change action by integrating climate change into our decision-making, in order to deliver superior public service for healthy and safe communities and resilient ecosystems.

Appendix A - Acknowledgements

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Appendix B – Emissions Values and Data Confidence

Table B1: Community Emissions Values by Sector (2017).

Sector	Energy (GJ)	Emissions (CO ₂ e (t))
Residential Buildings	2,908,176	81,549
Commercial/ Industrial Buildings	4,428,155	118,340
Transportation	-	467,413
Solid Waste	-	17,012
Agriculture	-	522,074
Total	7,346,763	1,206,380

Table B2: Community Emissions Values by Source (2017).

Source	Biogenic Greenhouse Gas	Emissions (CO ₂ e (t))
Enteric Fermentation	Biogenic Methane	260,938
Manure Management	Biogenic Methane	82,178
	Biogenic Nitrous Oxide	37,471
Soil Management	Biogenic Nitrous Oxide	138,432
Liming/Urea	Biogenic Nitrous Oxide	3,055
Electricity	-	20,720
Natural Gas	-	168,773
Propane	-	5,011
Fuel Oil	-	8,766
Diesel	-	173,344
Gasoline	-	290,680
Solid Waste	Biogenic Methane	17,012
Total		1,206,380

Table B3: Corporate Emissions Values by Sector (2017).

Sector	Energy (GJ)	Emissions (CO ₂ e (t))
Buildings Total	125,951	3,635
Administration		421
Child Care		47
Garages and Nursery		320
Landfill and Transfer Stations		4
Libraries and Museum		342
Long Term Care		430
Police Stations		160
Social Housing		1911
Transportation and Lighting	55,366	3,965
Streetlights	2,424	13
Solid Waste	-	611
Total	183,741	8,223

Table B4: Corporate Emissions Values by Source (2017).

Source	Biogenic Greenhouse Gas	Emissions (CO ₂ e (t))
Electricity	-	337
Natural Gas	-	3,242
Propane	-	69
Diesel	-	3,471
Gasoline	-	493
Solid Waste	Biogenic Methane	611
Total		8223

Table B5: Summary of Data Confidence.

Sector	Data	Data Source	Attribute						Confidence Level
			Consistency	Accuracy	Completeness	Auditability	Orderliness	Timeliness	
Community Emissions Data									
Buildings	Hydro	Local Distribution Companies – metered records	H	H	M	H	M	H	H
	Natural Gas	Enbridge – metered records	H	H	H	H	H	H	H
	Propane	Proportional based on Ontario usage data (source)	H	L	L	H	L	M	L-M
	Fuel Oil	Proportional based on Ontario usage data (source)	H	L	L	H	L	M	L-M
Transportation	Number of Households	Watson and Associates 2016	H	H	H	H	H	H	H
	Number of Vehicles per Household	Transportation Tomorrow Survey	H	M	L	H	H	M	M-H
	Vehicle Kilometers Travelled	2007 Vehicle Survey (Natural Resources Canada)	H	L-M	L	H	M	L	M
	Vehicle Efficiency	2011 Methodology for Reporting BC Public Sector Greenhouse Gas Emissions	H	M	M	H	H	L	M-H
Solid Waste	Curbside kg/hhld/yr	VanRooyan Waste Solutions Inc. 2017. 2017 Residential Self-haul & Curbside Waste Audit.	H	H	H	H	M	H	H
	Self-haul kh/hhld/yr	VanRooyan Waste Solutions Inc. 2017. 2017 Residential Self-haul & Curbside Waste Audit.	H	H	H	H	M	H	H
	Quantity of solid waste to landfill	County of Wellington disposal and diversion data (unpublished)	H	H	H	H	H	H	H

Agriculture	Heads of livestock	Statistics Canada	H	H	H	H	H	M	H
	% manure handle by management systems	National Inventory Report 1990-2017	H	M	H	H	H	M	H
	Excretion rates	National Inventory Report 1990-2017	H	M	H	H	H	M	H
	Emissions Factors by manure management system	National Inventory Report 1990-2017	H	M	H	H	H	M	H
	Use of Lime (acres)	Proportional based on Ontario use of lime (acres), Statistics Canada	H	L	L	H	H	M	M
	Nitrogen application on fields	Government of Manitoba	M	L	M	L	H	L	L-M
	Crops yields	Ontario Ministry of Agriculture, Food and Rural Affairs	H	H	M	H	H	H	H
	% acres tilled/not tilled	Local industry leaders	H	L-M	H	L	H	L-M	L-M
Corporate Emissions Data									
Buildings	Hydro	Local Distribution Companies - metered records	H	H	M	H	H	H	H
	Natural Gas	Enbridge - metered records	H	H	M	H	H	H	H
	Propane	Supplier invoices	H	M	M	H	H	H	H
	Fuel Oil	Supplier invoices	H	M	M	H	H	H	H
Transportation	Vehicles type - Corporate	Asset Management database	H	M	M	H	H	H	H
	Vehicle Fuel - Corporate	Asset Management database	H	M	M	H	H	H	H

	Vehicle Kilometers Driven - Corporate	Staff reported expense claims	H	M	M	H	H	H	H
	Vehicles type - contractor	Contractor records	H	H	H	H	H	H	H
	Vehicle Fuel - contractor	Contractor records	H	H	H	H	H	H	H
	Vehicle Kilometers Driven - contractor	Contractor records	H	H	M	H	H	M	H
Solid Waste	weight of waste landfilled (self-haul and curbside pickup)	VanRooyan Waste Solutions Inc. 2017. 2017 Residential Self-haul & Curbside Waste Audit.	H	H	H	H	H	H	H
	Disposal and diversion rate	County of Wellington unpublished data	H	H	H	M	H	H	H
Streetlights	Hydro	Local Distribution Companies – unmetered records	M	M	H	H	H	H	H
Consistency – consistency in use of data. Accuracy – data reflects reality. Completeness – all applicable data is included. Auditability – data is accessible and changes can be traced. Orderliness – data follows required format. Timeliness – data aligns with baseline year.			H - High confidence in the data source to meet the attribute criteria. M - Moderate confidence in the data source to meet the attribute criteria. L - Low confidence in the data to meet the attribute criteria						

Appendix C – Transportation providers in County of Wellington and connecting areas (2020)

- Ride Well
- Wellington Transportation operated by the Community Resource Centre of North & Centre Wellington
- Family & Children Services Guelph Wellington County & Centre Wellington Social Justice Group
- VON – Waterloo, Wellington, Dufferin
- East Wellington Community Services
- Guelph Transit
- Grand River Transit
- GO Transit
- Fergus-Elora Taxi services
- Dan’s Taxi
- Red Beard Rides
- Guelph Taxi Services (Red Top Taxi, Canadian Cab, Guelph Taxi)
- Red Car Service
- School bus operations
- Elliot Coach Lines Ltd.
- Denny Bus Lines Ltd.
- Kasper Transportation
- Owen Sound Bus Line to Guelph
- Rapid City Transport
- Driverseat Guelph

Appendix D – Consolidated list of Recommendations

Table D1: Community Recommendations

#	Category	Recommendation
Buildings		
		Objective 1: Develop strategies and associated policies in support of greenhouse gas reductions and energy conservation for existing buildings.
B1	Reduce	Promote voluntary deep energy retrofits for existing buildings with an objective of achieving net-zero or net-zero-ready.
B2		Encourage strategic plantings and other green infrastructure to cool buildings and reduce heat island effect in urban areas.
B3	Improve	Encourage industrial and agricultural greenhouse gas reductions through machine and equipment upgrades and system improvements.

#	Category	Recommendation
B4	Switch	Investigate potential areas for shared heating/district energy.
B5		Promote transition to green energy sources for historic/heritage buildings.
B6		Support the transition to renewable natural gas, when available.
B7	Invest	Investigate incentive mechanisms to encourage deep energy retrofits for existing buildings.
B8		Promote the use of Community Improvement Programme funding for energy efficiency improvements on existing industrial and commercial buildings.
B9		Promote funding from federal, provincial governments and utilities that support energy efficiency and GHG reductions.
B10	Empower	Explore energy performance labeling for existing buildings.
B11		Support and encourage energy benchmarking and energy management for existing industrial/commercial/agricultural buildings.
		Objective 2: Develop strategies and policies in support of greenhouse gas avoidance and energy conservation in planned buildings and developments.
B12	Reduce	Investigate green building standards/guidelines to achieve net-zero/net-zero-ready designs for all new buildings with specific consideration of attainable housing needs and update policies as appropriate.
B13		Investigate green development standards/guidelines to achieve net-zero/net-zero-ready designs for new neighbourhoods and subdivisions and update policies as appropriate.

#	Category	Recommendation
B14		Encourage strategic plantings to cool buildings and reduce heat island effect in urban areas.
B15	Switch	Explore potential areas for district energy/shared heating.
B16	Invest	Investigate incentive mechanisms to encourage adoption of net-zero/net-zero-ready design.
B17	Empower	Encourage adoption of energy performance labelling for new buildings.
B18		Encourage and promote adoption of benchmarking and other energy management tools for businesses and industries.
		Objective 3: Develop strategies to build a culture of conservation in the community.
B19	Empower	Support the establishment of communities of practice for business owners/operators and farmers to share knowledge and experiences with energy efficiency and learn from peers and industry leaders.
B20		Support sharing of resources and knowledge of energy efficiency methods and funding opportunities with landowners and businesses.
B21		Support the development of sustainability plans and reports for businesses and farmers.
B22		Support member municipalities in development of local Climate Change mitigation plans.
Transportation and Streetlights		
		Objective 1: Develop strategies to transition light duty vehicles to electric.

#	Category	Recommendation
TS1	Switch	Investigate the feasibility of a Regional Electric Vehicle Charging Network to support commuter traffic and tourism.
TS2		Investigate inclusion of electric vehicle-ready design in green building guidelines and new developments.
TS3		Continue purchasing partnership with member municipalities to transition to electric vehicles.
TS4	Empower	Encourage transition of transportation provider fleets to electric.
TS5		Encourage and support adoption/educate of electric vehicles and low emission vehicles by the community and company fleets.
		Objective 2: Develop strategies and policies to reduce dependency on the automobile.
TS6	Reduce	Investigate development of green development standards to include complete neighbourhoods prioritizing live-work and active transportation and update policies as appropriate.
TS7		Investigate guidelines and define “complete streets” and “complete communities” for rural communities and update policies as appropriate.
TS8	Empower	Support implementation of bicycle infrastructure and preferred parking for low-carbon transportation with all infrastructure designs and at private businesses.
TS9		Support connection of active transportation with Regional transportation networks.
TS10		Continue to support road closures where appropriate to promote shopping and restaurant and patio expansions.
TS11		Promote Active and Safe Walks to School and other safe walking programmes through local school boards.
TS12		Provide information sources to educate the community on active transportation options (e.g. cycling know-how).

#	Category	Recommendation
TS13		Promote the use of County and Municipal trail systems and municipal active transportation systems.
TS14		Re-visit the recommendations of the County's Active Transportation Plan.
TS15		Promote and support Bike to Work Day initiatives.
		Objective 3: Develop strategies to support options for commuters to reduce greenhouse gases.
TS16	Empower	Continue to support and encourage expansion of broadband throughout the County to encourage telecommuting.
TS17		Promote the use of Regional Transit and address climate change in future transit planning through RMAP and other plans.
TS18		Encourage carpooling and associated infrastructure.
TS19		Continue to coordinate shared transportation to bring employees to the County.
TS20		Encourage employers to promote carpooling.
		Objective 4: Develop strategies to reduce emissions from heavy duty vehicles and equipment.
TS21	Reduce	Support the use of alternative winter road control technologies to reduce salt application and required frequency of application.
TS22	Switch	Continue to track development of new technologies for lower carbon transportation.
TS23		Encourage utilities and provincial government to install alternative fuel stations (e.g. CNG, hydrogen) on major roadways.
TS24		Explore strategies with municipalities to implement alternative fuel fleets.
		Objective 5: Plan for future transportation needs.

#	Category	Recommendation
TS25	Reduce	Explore options with local municipalities regarding parking policies to support reduction of GHG emissions.
TS26		Investigate partnership opportunities with municipalities and businesses for pedestrian access measures to further support active transportation in urban areas.
TS27	Empower	Explore low carbon transportation actions through the County's Road Master Actions Plan.
Solid Waste		
		Objective 1: Develop strategies to reduce solid waste generation.
SW1	Reduce	Continue to implement initiatives with respect to food waste reduction through Our Food Future.
SW2	Empower	Promote food skills including food production, selection, storage, preparation and nutrition through Taste Real and Economic Development.
		Objective 2: Develop strategies to increase diversion rates.
SW3	Reduce	Continue to support installation of solid waste diversion bins in public spaces throughout the County.

#	Category	Recommendation
SW4		Explore partnership opportunities for alternative solid waste disposal methods.
SW5	Empower	Continue Community solid waste audits and tracking diversion rates.
SW6		Continue to encourage waste diversion through implementation of education and engagement activities.
SW7		Expand diversion programmes and services.
		Objective 3: Empower the community through programme development.
SW8	Empower	Continue to implement the County of Wellington Solid Waste Services Strategy.
Agriculture		
		Objective 1: Develop strategies to empower farmers to reduce greenhouse gases on the farm.
A1	Reduce	Continue to encourage manure and nutrient management best practices.
A2		Explore methods to track tree planting programmes throughout the County (e.g. Green Legacy Programme, Conservation Authorities, others) including planting locations, species, numbers and establishment to better inform future decisions and impact of the Green Legacy Programme and other programmes as a climate change action.

#	Category	Recommendation
A3		Continue to support restoration of natural areas (e.g. forests, wetlands, streams, grasslands) and soils to promote carbon sequestration.
A4	Invest	Investigate additional incentive programmes to support farmers' transition to climate-friendly best management farming practices and energy efficiency upgrades.
A5		Continue to invest in the Wellington Rural Water Quality Programme.
A6		Continue to invest in the Green Legacy Programme.
A7	Empower	Explore expansion of marketing for Green Legacy Programme to better explain how the programme works (including costs and landowner responsibility).
A8		Support farmers' transition to climate-friendly best management farming practices through partnerships with local agricultural organizations and continued delivery of the Wellington Rural Water Quality Programme.
A9		Continue to encourage preparation and implementation of Environmental Farm Plans.
A10		Promote the use of Halos GHG emissions modelling tool (Agri-food Canada).
A11		Review Rural Water Quality Programme to identify additional supported actions to address climate change action (e.g. soil management, naturalization, climate-friendly best management farming practices, etc.).
		Objective 2: Develop innovative strategies to promote and improve access to local food.
A12	Reduce	Continue to develop partnerships through Smart Cities which increase local food availability and access, circular food economy initiatives and the use of technology to improve soil management and increase yields.
A13		Continue to promote local food availability and access through Taste Real.

#	Category	Recommendation
A14		Investigate development of local food production, processing distribution and retailing businesses and facilities.
A15	Empower	Continue to promote and support the development of community gardens in urban areas.
Objective 3: Build a culture of conservation in the community.		
A16	Empower	Support the delivery of educational materials regarding reducing greenhouse gases on the farm.
A17		Support new and existing local networks for farmers to share knowledge and experience with efficiency improvements (e.g. buildings, machinery, equipment) and climate-friendly best management farming practices.
Cross-Sectoral		
Objective 1: Develop strategies to support renewable energy in the community.		
CS1	Switch	Investigate approaches to develop renewable energy initiatives.
CS2		Promote the benefits of alternative clean energy.
Objective 2: Develop strategies to support partnership-building and engagement with the community.		
CS3	Empower	Support development of an engagement strategy including engagement with youth, Indigenous communities, and hard to reach communities with partners (e.g. school boards, non-governmental organizations, etc.).
CS4		Leverage academic research to help inform implementation planning moving forward.

#	Category	Recommendation
CS5		Investigate development of a data management system to support energy use data for the community, track progress on climate change actions and inform future decision making.
CS6		Investigate learning programmes and supporting tools specific for residents through Wellington County Libraries and other County facilities.
CS7		Explore development of a web portal for the community to find resources and updates on County Mitigation Plan.
CS8		Promote and provide webinars and presentations, case studies, etc. to engage the community and share information.
CS9		Support other broader public sectors in planning and achieving their climate change action goals.

Table D2: Corporate Recommendations

Buildings		
		Objective 1: Develop strategies and policies to reduce greenhouse gas from existing buildings.
WB1	Reduce	Explore expansion of deep energy retrofits for social housing units (two units budgeted per year) and ensure flexibility in the budget for additional retrofit opportunities due to unexpected unit vacancies.
WB2		Explore opportunities for whole building retrofits for multi-unit residential buildings.
WB3		Develop whole-buildings approach to retrofit plans specific to each County-owned building based on results of energy efficiency assessments and health and wellness objectives.
WB4		Incorporate green infrastructure where feasible to reduce wind and heat exposure.
WB5		Develop Corporate policy regarding standardized climate conditions in county facilities.
WB6	Improve	Continue lifecycle replacement of heating, ventilation and air conditioning and other equipment with higher efficiency models, where greener energy sources are not available.
WB7	Switch	Investigate feasibility of district energy at Administration Centre in Guelph.
WB8		Replace gas powered grounds equipment with electric at end of life.
WB9		Explore opportunities to generate energy at point of use, through renewables, combined heat and power, district energy, etc.
WB10		Consider purchasing renewable natural gas when available.
WB11	Empower	Prepare and implement a schedule of energy efficiency assessments (e.g. walk-throughs, audits) to be completed each year. Prioritize buildings and facilities with the highest energy use per area.
WB12		Investigate implementation of energy management systems in all existing County-owned buildings to identify opportunities to manage energy efficiency at the site-level.
WB13		Implement benchmarking of energy use in existing buildings using NRCAN EnerGuide or similar.

WB14		Install sub-metering to better understand energy use in large and joint systems (e.g. Administration Centre, 129, 131 Wyndham and Gym facilities, etc.).
WB15		Support energy efficient habit adoption by social housing residents through educational programmes.
		Objective 2: Develop strategies and policies to transition all new buildings to be net-zero/net-zero-ready design.
WB16	Switch	Investigate feasibility of district energy at Wellington Place.
WB17	Empower	Update Green Legacy Building Guidelines for new buildings to be built to a high energy efficiency standard (e.g. 65% more efficient than 2012 Ontario Building Code). Require green infrastructure to be integrated (where feasible) in all new buildings.
WB18		Review and update Green Legacy Building Guidelines every five years (or as needed per Ontario Building Code updates).
WB19		Investigate efficiency labelling.
WB20		Continue energy efficient education for new intakes to social housing.
Transportation and Streetlight		
		Objective 1: Develop strategies and policies to transition light duty vehicles to electric.
WTS1	Reduce	Ensure vehicles are the right size for their intended purpose.
WTS2	Improve	Investigate efficient driver training for light duty vehicle operators.
WTS3	Switch	Pilot new technologies (e.g. electric light duty pickup trucks) as they become available.

		Objective 2: Develop strategies to reduce greenhouse gases from personal use vehicles.
WTS4	Empower	Invest in and promote the use of remote meeting technology.
WTS5		Explore a car share membership for employees to access hybrid and electric vehicles for occasional business use.
WTS6		Promote carpooling to meetings.
		Objective 3: Develop strategies to reduce greenhouse gases from heavy duty vehicles and equipment.
WTS7	Reduce	Initiate a pilot project to install auxiliary heaters to de-fog and de-frost cabs.
WTS8		Formalize anti-idling practice through policy and investigate technologies to reduce idling.
WTS9	Switch	Develop a Green Fleet strategy to transition fleet to lower carbon energy sources. Until green fleet strategy is complete, vehicles will be replaced considering the following: <ol style="list-style-type: none"> 1. Oldest (i.e. most inefficient) or highest use vehicles to be highest priority for replacement. 2. Light duty diesel vehicles to be replaced with gasoline or flex fuel. All vehicle types to be replaced with higher efficient models.
WTS19		Pilot new lower carbon technologies as they become available.
WTS20	Empower	Implement a fleet monitoring system to monitor and evaluate performance (benchmarking). Integrate with operation and maintenance programme (vehicle performance and efficiency audits).
		Objective 4: Plan for future transportation needs.
WTS21	Empower	Explore attaining North American Fleet Association NAFA sustainable fleet certificate and certified automotive fleet specialist.
WTS22		Monitor new and emerging technologies.
		Objective 5: Develop strategies to create a culture of conservation.

WTS23	Empower	Provide cycling infrastructure including safe bike storage, changing and showering facilities (for staff use), tune up station at County buildings and facilities, where feasible.
WTS24		Explore options for single day parking pass at Admin Centre to promote alternative transportation while providing flexibility for personal car use for work.
WTS25		Host cycle to work day/month for staff.
		Objective 6: Continue to reduce energy use in street and outdoor lighting.
WTS26	Reduce	Complete the retrofit of County-owned streetlights and outdoor lighting with LED lights.
Solid Waste		
		Objective 1: Develop strategies and policies to reduce solid waste generation from source.
WSW1	Reduce	Digitize billing, HR forms, etc. to reduce paper usage.
WSW2	Empower	Update purchasing policy to include requirements for reduced, reusable and recyclable packaging.
WSW3		Develop green event guidelines to guide County-hosted events to be lower carbon (lower greenhouse gases, reduce waste, etc.).
		Objective 2: Develop strategies to increase diversion rates.
WSW4	Reduce	Implement green waste programme at Corporate buildings.

WSW5	Empower	Support waste diversion in social housing with educational programmes.
Cross-Sectoral		
		Objective 1: Develop strategies and policies to support climate change action as common practice.
WCS1	Invest	Undertake Climate Change Adaptation Plan.
WCS2		Develop a five-year work plan and financial forecast for the implementation of this plan.
WCS3	Switch	Develop renewable energy feasibility plan for Corporate Facilities.
WCS4	Empower	Update investment policy to exclude direct investments in fossil fuels. Advocate and encourage pooled municipal investment funds (One Funds) to discontinue fossil fuel investment.
WCS5		Integrate climate change measures with asset management plan.
WCS6		Develop climate change assessment guidance document to guide inclusion of climate change assessment in new project proposal framework.
WCS7		Integrate climate change measures with purchasing requirements including accountability measures to apply a climate change lens to Requests For Proposals and purchase orders.
WCS8		Develop environmental standards for department supply purchases.
WCS9		Incorporate climate change into the County's Strategic Action Plan.
WCS10		Examine opportunities to reduce energy use through the Information Technology department (e.g. turn off computers at night).

WCS11		Continue to implement and report on Conservation and Demand Management Plan.
WCS12		Establish Green Team or Corporate Energy Task Force to initiate small green and energy saving projects and promote behavior change (e.g. green waste diversion at head office, cycle to work day, etc.).
WCS13		Reconcile the recommendations in this plan with policy to be provided in the County of Wellington's Official Plan review and municipal comprehensive review, as applicable.
WCS14		Continue re-investment of savings from energy efficiency initiatives to climate change actions and develop a formal process or guidance document for this process.
		Objective 2: Develop strategies and policies to improve energy data management tools and processes.
WCS15	Invest	Install net metering on existing and future solar photovoltaics.
WCS16		Develop emissions tracking and analysis tools and software.
WCS17		Investigate opportunities to improve data collection in agriculture and transportation.
		Objective 3: Advocate for Climate Change Action.
WCS18	Empower	Lobby provincial government to keep electricity grid clean, support green natural gas, reinstate electric vehicle incentive funding.
WCS19		Lobby federal and provincial governments for incentives for deep energy retrofits for municipal and community buildings.