CREATING A HEALTHY ENVIRONMENT

Greenhouse Gas Reduction Plan

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This plan is intended to be a starting point in local climate action.

This is a living document and should be reviewed and updated regularly to prioritize local goals and needs.

This plan will require collaborative efforts to see successful implementation, and should be viewed as a guide.

August 2021

Executive Summary

Purpose of the Plan

Climate is something that impacts our day to day lives. Locally, each municipality has faced the impacts of severe weather, flooding, and increased hot and cold days. The world is on its way to reaching and surpassing the 1.5°C threshold that has been identified as the upper limit of global temperature increase to keep us within a safe range of climate change impacts[1]. The world has to stay below this threshold and lower emissions 40% to 50% by 2030, or effects will be long lasting or irreversible[1].

Perth County, North Perth, Perth East, Perth South, West Perth, and Stratford and St. Marys decided to partner together to address the risks and take action on climate change within the communities There is a mutual understanding that each municipal action impacts one another, so it is important to work together to address the greater impacts that climate change will bring. This plan identifies various actions and strategies to move forward on increasing adaptability and reducing greenhouse gas emissions within the community.

This is a community plan, therefore it requires teamwork and action from everyone and every sector. Everyone plays a role in supporting the community and creating a healthier environment.

Development of the Plan

This plan is unique in that it converges the needs of diverse economies and municipalities. This plan addresses the distinct rural needs of the agricultural communities of Perth County, while also speaking to the unique priorities of the urban communities of Stratford and St. Marys, who more heavily rely on their tourism and industrial sectors to support their economies.

The Plan was developed over two years under the guidance of the Climate Change Coordinator who was hired through funding from the Federation of Canadian Municipalities (FCM) Municipalities for Climate Innovation Program (MCIP). The mitigation planning followed the guidelines from the FCM Partners for Climate Protection's (PCP) five-milestone framework. This plan was developed with the input and contributions of many community members and groups, such as representatives from the Maitland Valley Conservation Authority, the Upper Thames Conservation Authority, the Perth County Federation of Agriculture, Climate Momentum, and various other municipal environmental groups and individual community members.

[1]IPCC (2018) Global Warming of 1.5°C. Retrieved from https://www.ipcc.ch/sr15/

Community Emissions

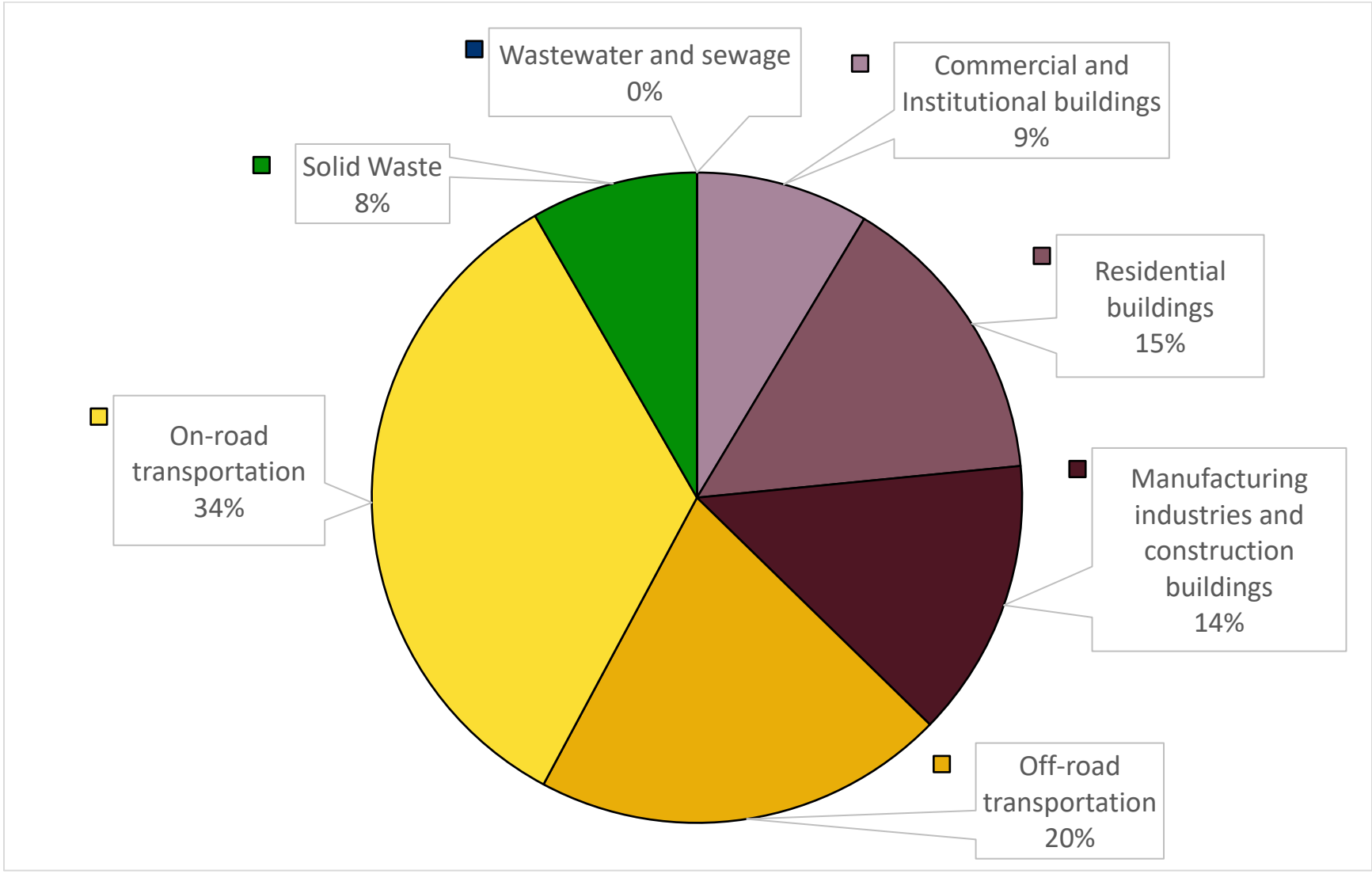


Figure 1 Emission Snapshot

Community Emissions

Figure 1 shows the total combined contribution of each sector. This graph represents all municipalities' emissions, which includes North Perth, Perth East, Perth South, West Perth, St. Marys and Stratford.

The greatest contribution to local emissions is a combination of all transportation. This includes on-road transportation (i.e. Personal vehicles) and off-road vehicles (i.e. Tractors, and other agriculture-related vehicles). This makes up approximately 54% of the total emissions.

The second largest contributor in the area is the buildings sector. This makes up approximately 38% of the total emissions. Majority of emissions from this source come from the natural gas, propane and fuel oil which is consumed to heat buildings. A small portion of emissions from buildings comes from electricity, as Ontario's electricity grid is considered quite clean because most electricity production has been transitioned away from coal burning to nuclear and hydroelectricity.

The third contributor of emissions is from solid waste. Solid waste emissions in the area are produced generally by the more urban municipalities, as the rural towns tend to not send as much tonnes of waste to the landfill. Regardless, biodegradable materials constitutes approximately 40% of residential waste[2]. Therefore, communities must establish effective waste management solutions for both urban and rural areas within the communities.

[2] Environment Canada (2013) Technical Documentation on Municipal Solid Waste Organics Processing. Retrieved from https://www.ec.gc.ca/gdd-mw/3E8CF6C7-F214-4BA2-A1A3-163978EE9D6E/13-047-ID-458-PDF_accessible_ANG_R2-reduced%20size.pdf

Vision, Goals and Actions

Vision:

We will mitigate climate change risks by ambitiously reducing local greenhouse gas emissions, and will ensure a more resilient and healthy future for our communities.

The vision will be supported through the proposed goals and strategies for action throughout this plan. The goals and strategies are supported through this plan with education, financing and partnership opportunities and suggestions, while also explaining the potential greenhouse gas reduction or social impacts of each goal and strategy. Next steps will be to solidify the suggested partnerships for action.

The vision will aim to work towards achieving the United Nations Sustainable Development Goals (SDGs). These will help to focus climate actions in a more holistic approach, and will encourage Council, staff, and the community to consider all aspects and impacts related to climate change, ensuring a fair and just approach to implementation on climate action.

Sustainable Development Goals

In order to ensure that this greenhouse gas reduction plan is also addressing social and economic issues, it will consider how each action meets a sustainable development goal. There are 17 sustainable development goals that this plan will be aiming to target in one form or another, so that each municipality can be part of the advancement of the UN SDGs and help in transforming our world.

The sustainable development goals were developed by the United Nations to develop a "universal call to action to end poverty, protect the planet and improve the lives and prospects of everyone, everywhere."[3] These were developed and adopted by UN Member States in 2015, and are intended to be achieved by the year 2030.

Figure 2 UN SDGs (2015) Retrieved from: https://www.un.org/sustainabledevelopment/blog/2015/12/sustainable-development-goals-kick-off-with-start-of-new-year

[3] United Nations (2020) The Sustainable Development Agenda. Retrieved from: https://www.un.org/sustainabledevelopment/development-agenda/

Table 1 Themes, Goals and Actions

Theme	Goals	Actions
Government	• Embed climate change actions and considerations into all plans and polices • Support and educate the local economy and citizens in their transition to a sustainable and climate-ready future • Ensure health, and well-being of the community through the preparation of climate change related health concerns and impacts	• Create a corporate-level climate change plan • Provide financing options/support (homes, agricultural project support) • Embed climate considerations into inspections, maintenance and designs of municipal assets (roads, bridges, culverts, buildings, etc.) • Develop education and awareness programs and strategies • Support businesses and tourism in their adaptation to climate impacts • Hire climate change team to focus on implementation and continued development • Adopt the use of a climate lens • Actively work with the Huron Perth Public Health Unit to create strategies for mitigating climate risks and protect residents and vulnerable populations
Buildings and Land Use	• Increase energy efficient new builds and sustainable neighbourhoods • Create neighbourhoods that discourage urban sprawl and create greater connectivity • Increase green infrastructure and reduce hardscapes	• Develop a sustainable building standard for residential/commercial/industrial new builds to encourage energy efficiency and climate resiliency • Offer LIC or PACE financing to assist in retrofits in communities to increase efficiency and climate resiliency in existing buildings • Land-use policies should promote compact neighbourhoods that integrate residential, office, retail developments and promote transit use and active transportation options
Businesses	• Increase and support sustainability practices in local businesses	• Start/support/join a local Green Business Hub • Develop a small/local business sustainability toolkit with BIA

Theme	Goals	Actions
Agriculture	• Increase local resiliency to sustain long-term food security • Enhance agricultural best management practices • Increase capacity for energy production	• Create a Perth County Clean Water Project to improve efficiency and resiliency, which will also assist in removal and storage of GHG emissions in soils • Explore feasibility and programs to support biogas implementation in local grid
Natural Environment	• Look after and improve natural environment assets and ecosystems	• Decrease lawn cutting and maintenance by increasing naturalization projects and planting projects on public and private spaces • Partner on a tree management and resilience plan to increase canopy coverage • Increase urban forestry projects • Develop more Low Impact Developments (LIDs) throughout municipalities and on municipal property • Protect local woodlots
Transportation	• Support the use of sustainable and low-carbon transportation options • Reduce the risk of transportation interruptions caused by severe weather events	• Implement a Transportation Master Plan • Develop better interconnectivity by improving walkability of neighbourhoods • Support the interest and purchasing of electric/low-emission vehicles through installation of charging stations • Promote and support the use of public transportation • Work collaboratively on active transportation strategies
Waste	• Increase waste diversion from the landfill • Become a Zero Waste Community	• Develop a Waste Management Master plan to set yearly targets and goals and long term goals • Implement organics/green bin program to further reduce GHG producing waste going to landfill

Achieving the Sustainable Development Goals

Table 2 Sustainable Development Goals

Sustainable Development Goal (SDG)	Actions that Meets SDG
Goal 1: No Poverty	• Ensuring affordable, low-energy homes are built • Encouraging less urban sprawl for those who cannot afford vehicles and increasing accessibility through other means of transportation • Creating jobs through deep retrofit programs • Increasing local food resiliency and supporting farming community/agri-business • Supporting local businesses in resiliency and sustainability
Goal 2: Zero Hunger	• Supporting local food resiliency and food security through the Clean Water Project • Supporting access to food through community gardens
Goal 3: Good Health and Well-being	• Working with Huron Perth Public Health unit to address climate-related health concerns • Create more walkable communities through reduction of urban sprawl • Affordable housing that is retrofitted for energy efficiency means better air quality in the home • Encouraging uptake of electric vehicles improves local air quality • Increasing green spaces/naturalization projects and planting projects brings community together
Goal 4: Quality Education	• Creating a page on official websites to promote climate actions and provide climate education • Create a public forum for climate conversations to continue so new ideas and knowledge can be shared • Develop a community stakeholder group to share ideas and create collaborative relationships
Goal 5: Gender Equality	• Identify and remove barriers to ensure participation of all people as projects continue to develop • Ensure a diverse stakeholder group is established

Sustainable Development Goal (SDG)	Actions that Meets SDG
	• When possible, host town halls and in-person consultation events along with online events
Goal 6: Clean water and Sanitation	• Expanding green infrastructure to reduce flood risk • Continue partnership for drinking water source protection • Implementing a Clean Water Project to support the Agriculture community
Goal 7: Affordable and Clean Energy	• Offering financing options for retrofits to ensure affordability • Encouraging new builds to be energy efficient • Develop a sustainable building standard
Goal 8: Decent work and Economic Growth	• Encouraging sustainable builds and deep retrofit programs offers new job opportunities • Increasing number of charging stations requires new forms of maintenance • Partnering with surrounding counties and municipalities to create a rural EV network to bring in greater tourism • Supporting local agricultural sector to ensure long-term resiliency
Goal 9: Industry, Innovation and Infrastructure	• Embedding climate considerations for municipal/county inspections, maintenance and designs of municipal assets using the climate lens • Help local industry to adapt to and mitigate climate change impacts by expanding membership of Carbon Footprint Initiative or joining and starting a local Green Economy Canada Hub • Help local business to learn of funding opportunities to assist in R&D for sustainable projects
Goal 10: Reduced Inequalities	• Implementing a bus system to reduce the need for vehicle ownership • Creating affordable houses that are energy efficient to reduce energy bills • Creating better connected neighbourhoods to allow for walkable and accessible communities
Goal 11: Sustainable Cities and Communities	• Connecting communities with sustainable transportation options (buses, walking, electric vehicles, biking infrastructure, etc.)

Sustainable Development Goal (SDG)	Actions that Meets SDG
	• Improve low income housing options through energy efficient new builds
Goal 12: Responsible Consumption and Production	• Moving to a zero waste community • Implementing a circular economy • Implementing a Clean Water Project to help with more sustainable food production and assist in cleaner water • Work with local manufacturers to implement more sustainable/low emitting tactics
Goal 13: Climate Action	• Developing the greenhouse gas reduction plan and implementing meaningful actions • Establishing a corporate-level climate plan
Goal 14: Life below Water	• Reducing CO_2 emissions helps to reduce the threat of ocean acidification (Act Local, Think Global) • Reducing waste production will help in ensuring less waste travels outside the country • Moving to zero waste means less plastic pollution that is often disposed in our local lakes
Goal 15: Life on Land	• Improving naturalization throughout each municipality • Increase canopy coverage and reforesting to increase biodiversity • Develop LIDs to create more habitat for local wildlife
Goal 16: Peace, Justice and Strong Institutions	• Identify and collaborate with all institutions to ensure an inclusive approach to climate change • Development of collaborative relationships with stakeholders
Goal 17: Partnerships for the Goals	• Collaborating with local stakeholder groups to ensure successful implementation

Implementation

The plan has effective steps to take to implement the actions within the plan. This will help to ensure that the outcomes are realized, and will be widely supported by all key stakeholders and the community.

The plan is community-wide and will need coordination and collaboration of everyone, including staff, local organizations and individuals throughout each community. The plan explains the tactics that will need to be used to allow all stakeholders to work together successfully to implement the various projects and strategies. By working together, successful implementation will be possible, and impressive reductions in greenhouse gas emissions will be inevitable. Successful implementation will ensure that communities will decrease their contributions to the changing climate.

What is Climate Change?

The Earth's climate has fluctuated naturally for centuries, however, the world is experiencing a rate of global changes to the climate that it has never experienced before due to human activities. These have caused changes to the natural environment, with the reduction of natural carbon absorbers like forests and wetlands and the increased concentration of greenhouse gases (GHGs) from burning fossil fuels like gasoline, natural gas, coal, oil and propane.

As carbon dioxide concentrations continue to rise in the atmosphere, the world is seeing a substantial increase in the global average temperature. The increase in average temperature has been and continues to lead to major global impacts, some of which include: extreme rain and snow, changes to precipitation patterns, increased temperatures and greater number of heat waves, which ultimately have led to droughts and wildfires, less snow and ice, thawing of permafrost, sea level rise, warming oceans, changes to plant life cycle, changes to animal migration patterns and more vector borne diseases.

Canadians continue to emit greenhouse gas emissions on a daily basis through burning fossil fuels to heat, cool and power homes, businesses and vehicles; Vehicles that transport not only ourselves but the goods that we consume. The Earth's atmosphere traps these greenhouse gases, which increases the Earth's temperature, which is referred to as the greenhouse effect. The primary greenhouse gas emissions that cause the greatest impacts include Carbon Dioxide (CO_2), Methane (CH_4), and Nitrous Oxide (NO_2). To accurately compare these emissions, they are converted to their global warming potential (GWP), which converts them to what their value would be as carbon dioxide emissions (Table 3).

Table 3 Global Warming Potential

Primary GHG Emissions	Global Warming Potential (GWP)
Carbon Dioxide	1
Methane	25
Nitrous Oxide	298

While this table shows that methane and nitrous oxide are both far more powerful in their global warming potential, it is important to note that these greenhouse gases have a shorter lifespan in the atmosphere than carbon dioxide. This means that carbon dioxide has the greatest long term impact on the climate and causes the atmosphere to warm for a longer period than methane and nitrous oxide. Methane and nitrous oxide add fuel to the ever burning fire that carbon dioxide keeps burning in the atmosphere, compounding the concerning issues that come along with climate change.

The last five years have been the hottest on record, and global average temperatures are only expected to increase with the

given rate of global emissions[4]. While climate change is often thought to be a problem of the future, it is becoming more obvious that increased major climate events are happening now.

[4] World Meteorological Organization. (2020) New climate predictions assess global temperatures in coming five years. Retrieved from: https://public.wmo.int/en/media/press-release/new-climate-predictions-assess-global-temperatures-coming-five-years

Climate Change Mitigation

Climate change mitigation focuses on the minimization or prevention of climate change and its impacts. It means actions must be taken to reduce the sources of climate change impacts, therefore decreasing GHG emissions. Mitigation of climate change can be realized by reducing the burning of fossil fuels that are currently used to heat buildings or to run gas or diesel fueled vehicles and equipment. Preserving, planting and restoring natural carbon sinks, such as wetlands, forests, trees and soil, will also help to remove excess emissions from the atmosphere.

The County and each municipality have made the decision to focus, initially, on climate change mitigation actions. The focus of this plan will be to assist in mitigating or reducing climate change impacts through the reduction of greenhouse gases.

Mitigation is an important action to take, as it will help limit and reduce the carbon dioxide and other heat-trapping greenhouse gases being released into the atmosphere. These gases are playing the biggest roles in the climatic changes that are currently being witnessed. While it is crucial that greenhouse gases are reduced significantly over the next ten years, it is equally as important to ensure that citizens are prepared for the impacts that can no longer be reversed by addressing the need for adaptation actions.

Climate Change Adaptation

Climate change adaptation is acknowledging that climate change is happening, and that certain impacts are inevitable or likely to become worse, and there is a need to adjust the way people perform their everyday activities. Adaptation is planning and preparing for climate change impacts. These actions include responses to protect homes from things like flooding, improving emergency response, and upgrading infrastructure so that it can handle future projected climate impacts.

While this plan's focus is on mitigation actions, there are often actions that combine the benefits of both approaches to climate change, and create shared value. Some proposed actions in this plan will overlap and ensure that resilience of the community is achievable, while also reducing climate impacts.

Future planning will include more adaptation projects to protect the local communities from experiencing major disruptions due to climate change. It is necessary moving forward to begin planning adaptation actions to ensure the protection and well-being of the community.

Intergovernmental Panel on Climate Change (IPCC) Report

In 2018, the United Nation's IPCC report stated that global warming must be limited to a 1.5°C limit, opposed to the previously stated limit of 2°C[1]. The 1.5°C limit would ensure that society is more sustainable and equitable for all. Currently, we are seeing negative impacts due to a 1°C increase in global average temperature in the forms of increased extreme weather events, rising sea level and decreasing sea ice, just to name a few[1]. The IPCC states that limiting warming to 1.5°C versus the 2°C would help in avoiding major climatic impacts[1]. An example of the difference between the 0.5°C temperature changes, is that the coral reefs are likely to decline by 70% to 90% with global warming at 1.5°C, where under a 2°C increase in global average temperatures, virtually all coral reefs will be lost[1].

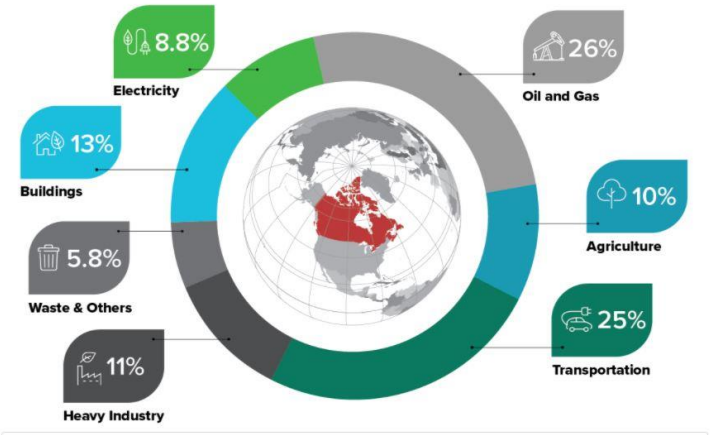
The IPCC has stated that by 2030, emissions must be reduced by nearly 50% from 2010 levels, then by 2050 the world must reach net-zero emissions[5]. Net-zero emissions means that any emissions that are being released from human-sources are being balanced out by the process of removing carbon dioxide from the atmosphere[6]. The important first step, however, is to remove as much of our emission sources as possible, which means moving away from burning and using fossil fuels. It was recorded during the pandemic emissions decreased around the world, but this was only temporary. Emissions continued to be emitted through the lockdown period because industry continued to burn fossil fuels to generate power and create products. Now is the time to re-establish priorities on the environment and make choices for a better and more resilient future.

[5]IPCC (2018) Summary for Policymakers of IPCC Special Report on Global Warming of 1.5°C approved by governments. https://www.ipcc.ch/2018/10/08/summary-for-policymakers-of-ipcc-special-report-on-global-warming-of-1-5c-approved-by-governments/IP

[6] Oxford English Language (2021) Net Zero. *Google Dictionary.*

Federal Climate Change Approaches

Canada's emissions are categorized into seven separate categories. Emissions in Canada come from Electricity, Oil & Gas, Buildings, Waste & Others, Heavy Industry and Agriculture. A breakdown of the emissions are as follows: Electricity emits about 8.8% of total emissions, Transportation contributes 25% of emissions, Buildings contribute 13%, Oil & Gas emit 26% of the total, Waste & Others emit 5.8%, Heavy Industry emits approximately 11% and Agriculture emits a total of 10% of the total Canadian emissions[7]. Currently, the Federal government is taking climate action in these various sectors to reduce Canadian's emissions, and adapt effectively to the inevitable changes in climate.



The Federal government is making plans to help in the reduction of emissions from homes through various approaches. These will include things such as: supporting home and building retrofit programs across Canada, investing in energy efficient social housing, developing model codes for new and existing buildings to improve energy efficiency, there has been more development in energy efficient appliance standards and programs, and a focus has been made on supporting Indigenous communities and governments to help improve energy efficiency of homes and buildings[7]. Another support that is being provided to aid in efficiency in homes is the phasing out of hydrofluorocarbons that are currently used in refrigerators and air conditioning units, which have been previously linked to the hole in the ozone layer.

The federal government is putting an emphasis on transportation emissions with the release of funding for Zero Emission Vehicle Infrastructure to further the feasibility of

[7] Government of Canada. (2019a) Departmental Results Report 2018 to 2019: Department of Environment, chapter 3. Retrieved from: https://www.canada.ca/en/environment-climate-change/corporate/transparency/priorities-management/departmental-results-report/2018-2019/results.html

communities transitioning to electric vehicles[8]. The federal government is committing to more investments in public transit, as well as creating more stringent standards for vehicle emissions so that they can support the development of cleaner fueled vehicles.

With Industries being the backbone of Canada's economy, it also is a major contributor the most to Canada's emissions. The federal government is assisting in the reduction of industry emissions by investing further into clean technology and business solutions, pricing industrial emissions, pushing for a reduction in methane in the oil and gas sector by 40-45%, implementing a Clean Fuel Standard, as well as improving energy efficiency[9].

The forestry, agriculture and waste sector are also a focus of reduction. Assistance for reduction will be in the form of support for renewable fuels and bio products, developing cleaner innovative agriculture practices, such as zero till agriculture, climate resilient crops, or precision agriculture[10].

There will be support in conserving more nature for carbon sequestration, reforestation and reducing waste which most recently will be targeting plastic pollutions.

Canada is going to reduce emissions from electricity by phasing out the pollution from coal-fired electricity, investing more into renewable energy, investing more into transmission lines and smart grids, and finally, supporting rural and remote communities so reliance on diesel is reduced[11]. The goal for Canada is to have 90% of electricity coming from non-emitting sources[11].

Canada's reduction target is set to reduce emissions by 30% below 2005 levels by the year 2030, and have set the target to become a Net Zero country by the year 2050[12].

[8] Government of Canada (2019b) Zero Emission Vehicle Infrastructure Program. Retrieved from: https://www.nrcan.gc.ca/energy-efficiency/energy-efficiency-transportation/zero-emission-vehicle-infrastructure-program/21876

[9] Government of Canada (2019c) Clean Fuel Standard. Retrieved from: https://www.canada.ca/en/environment-climate-change/services/managing-pollution/energy-production/fuel-regulations/clean-fuel-standard.html

[10] Government of Canada (2020) Agriculture Clean Technology Program. Retrieved from: https://www.canada.ca/en/agriculture-agri-food/news/2020/10/agricultural-clean-technology-program.htmlG

[11] Government of Canada (2018) Canada's coal power phase-out reaches another milestone. Retrieved from: https://www.canada.ca/en/environment-climate-change/news/2018/12/canadas-coal-power-phase-out-reaches-another-milestone.html

[12] Government of Canada (2020b) Progress towards Canada's greenhouse gas emissions reduction target. Retrieved from: https://www.canada.ca/en/environment-climate-change/services/environmental-indicators/progress-towards-canada-greenhouse-gas-emissions-reduction-target.html

Provincial Climate Change Approaches

The Ministry of the Environment, Conservation and Parks has released their Ontario Environment Plan to tackle the climate change issue[13]. The new Made in Ontario Environment Plan addresses both the importance of mitigation and adaptation approaches to ensure cost savings for Ontarians, the protection of natural resources and the well-being of Ontario's population. The Provincial government has set out various priorities which involve ensuring clean air and clean water for the province. The priorities will be targeted through actions such as reducing emissions from heavy-duty vehicles, strengthening collaboration to reduce air pollution that comes from outside of Ontario, continuing to restore and protect the Great Lakes, and helping people to conserve water to reduce their costs and even helping to improve municipal wastewater and stormwater management and reporting methodology[13]. Ontario is still on target to achieve the Paris Agreement Target, which was set to reduce Ontario's emissions by 30% below 2005 levels by the year 2030. The closure of coal plants within Ontario has helped substantially to reduce emissions, and with the continued actions being proposed, such as low carbon vehicles, clean fuels, natural gas conservation, and the promotion of innovation within Ontario, this target can be easily achievable.

Source: Adapted from Coalition for Green Capital, Growing Clean Energy Markets with Green Bank Financing: White Paper, page 2, http://coalitionforgreencapital.com/wp-content/uploads/2015/08/CGC-Green-Bank-White-Paper.pdf.

Ontario has set plans to make polluters accountable, which is particularly important because the industrial sector accounted for nearly 30% of Ontario's emissions in 2016[13]. The Province will hold industry accountable for their emissions through an emission performance standard, which will ensure that they achieve a greenhouse gas reduction through demonstrated compliance on a regular basis[13]. This proposed program will likely also include compliance flexibility, which could include offset credits or payment of an amount to achieve compliance.

The provincial government has set out a plan to activate the private sector to encourage more innovative clean-tech to help in the transition to a low-carbon economy. They will also strive to enable consistent disclosures about financial risks associated

[13]Government of Ontario (2018) Made in Ontario Environment Plan. Retrieved from: https://prod-environmental-registry.s3.amazonaws.com/2018-11/EnvironmentPlan.pdf

with climate change. There are also plans to launch an emission reduction fund called The Ontario Carbon Trust, which will implement a reverse auction to encourage the investment in clean technology solutions[13].

Another major area that the province is focusing their resources on is to address the solid waste issues that are occurring across the province. The goal is to develop a specific day where schools, businesses and the general public go out and clean up and reduce the litter in parks and other public spaces in the hopes to raise awareness of the littering issues and the major environmental impacts that littering has[13]. The Province has stated that they will make producers responsible for their products and the disposal of their products, which will further reduce unnecessary resource use, and reduce the issues that Ontario is facing in disposing waste. Recently, the Ontario government has announced that they will be implementing a consistent recycling program across the province, as well. The logical next step is to ensure that Ontario is keeping their recycling inside of the province, which ensures a consistent market and ability to implement a stable recycling program across the province. The province is also encouraging that the Federal government create a consistent program across the country, because currently 89% of Canadian plastics put in the recycling bin are being sent to the landfill[14].

[14] Recycling Council of Ontario. (2019) https://rco.on.ca/canada-recycles-just-9-per-cent-of-its-plastics/

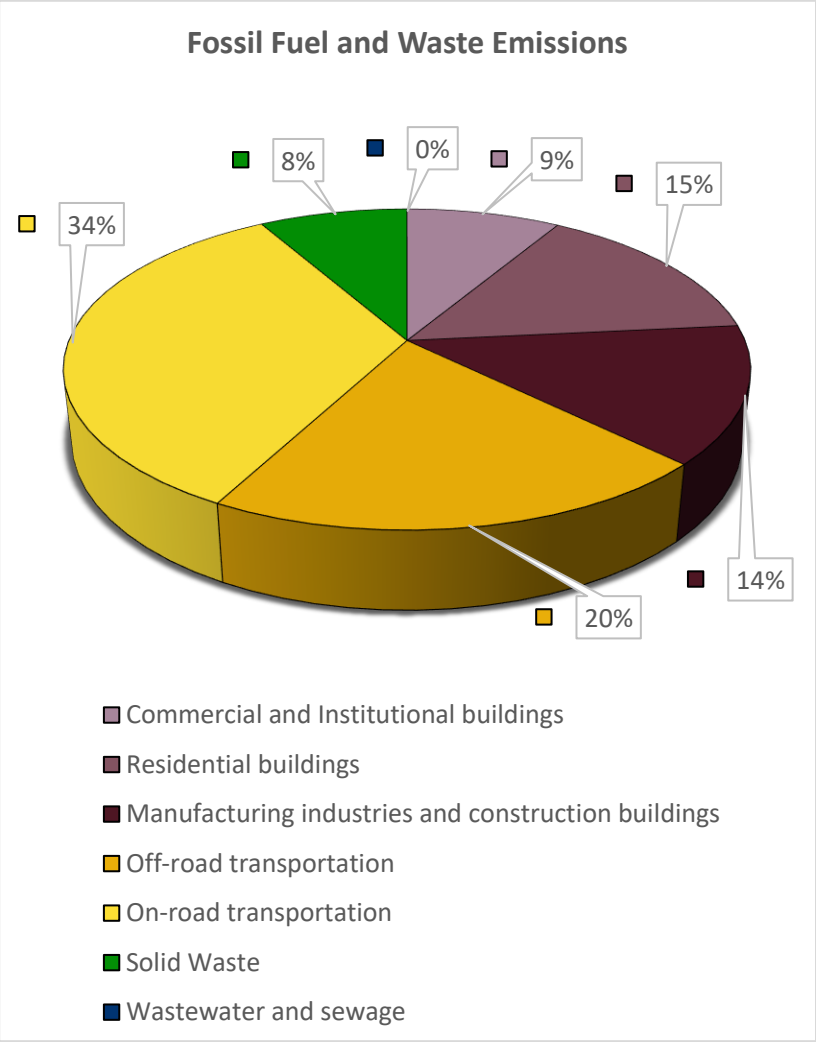
Current Climate and Future Projections

The inventory for each municipality was completed for the year 2017. In 2017, the municipalities within the county emitted approximately 706,000 tonnes of greenhouse gases. In 2017, there were approximately 76,796 residents within the geographic boundary of Perth County, Stratford and St. Marys included. This means that each resident emitted approximately 9.19 tonnes of CO_2e each in 2017. This total includes emissions from electricity and fuel consumption of buildings and transportation, and waste generated within the municipal boundaries.

The population is growing across the County which means that there is likely going to be an increase in emissions due to new builds, more single-occupancy vehicles and more waste production. While it is important to address the initial baseline emissions, it is also important to put in place actions that will prevent emissions from increasing due to this projected growth.

The agricultural emissions will be reviewed later in this document. This sector is an important part of the local economy and will be a major part of sequestering and reducing emissions across the County.

It is becoming increasingly important for all municipalities across Canada to start taking meaningful actions to reduce emissions. Canada has set a target to be Net Zero for 2050, and in order for the country to achieve this target, municipalities need to be the leaders. Without the help of local governments, the provinces and the country will continue to see an increase in emissions and negative impacts of climate change.

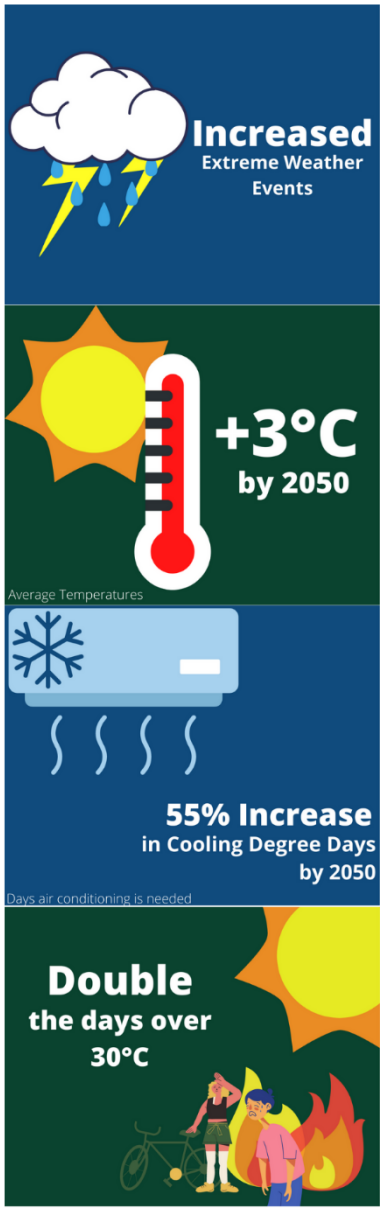


If the local municipalities do not take action to reduce their greenhouse gas emissions and set significant reduction targets, substantial changes in the local climate are expected. The projections for future climate changes for the year 2050, if no action is taken to reduce local emissions are:

- Increasing temperatures
- Temperature extremes, both hot and cold
- Increased invasive species, diseases and viruses
- Frequent and intense rainfall
- Extreme weather events (heat days, freezing rain, ice storms, etc.)
- Increased growing season and stress on water supplies

These changes in the climate will ultimately impact all areas of the municipality's economy, recreation and tourism industries and result in the following:

- Lower crop yields
- Damage to infrastructure like roads, culverts or bridges
- Damage to power lines, or other power system failures
- Public building and facility closures
- Runoff from agricultural land, increasing nutrient, sediment and contaminant loads in the rivers and lakes
- Increased need for salting, leading to increased wear on infrastructure
- Loss of outdoor winter recreation activities



Introduction

Climate change impacts are becoming more apparent around the world, across Canada, throughout Ontario and within Perth County. The time for action and avoiding serious climate impacts is narrowing, the effects are already being seen with increased droughts, heat waves, flooding, severe storms, and widespread loss of plant species and animals. Canada has been increasing in temperature twice as fast as the rest of the world, and the urgency for action is greater than ever before[15]. To stay below the 1.5°C threshold that scientists and the United Nations deem to be the 'safe' upper limit for global warming, emissions must peak and decline within the next 10 years, globally[1].

This plan is intended to assist the municipalities and the County in doing their part in ensuring that emissions are reduced, and that all residents are able to live in a healthy and thriving environment for many years to come.

Commitment

The municipalities within the county have all joined the Partners for Climate Protection (PCP), and have committed to reducing their emissions by following along with the PCP Milestones.

Figure 3 Partners for Climate Protection Milestones

There are five milestones that need to be completed within the next 10 years. Each municipality and the County have completed the first three Milestones through the PCP Milestone program, and are well on their way to completing Milestone 4 and 5.

The municipalities and the County partnered together to hire their first Climate Change Coordinator through funding from the Municipal Climate Innovation Program (MCIP) provided by the Federation of Canadian Municipalities (FCM). In April 2019, the municipalities joined the commitment to develop their greenhouse gas reduction plans through the PCP Program.

[15] Government of Canada (2019) Canada's climate is warming twice as fast as global average. Retrieved from: https://www.canada.ca/en/environment-climate-change/news/2019/04/canadas-climate-is-warming-twice-as-fast-as-global-average.html

Goals, Actions and Targets

Government

In order for this plan to be successfully implemented, it will need the support and assistance from the local governments. Each municipality and the County have committed to addressing climate change, and will play a critical part in the success of the climate change plan.

It is well-known that local governments will be the biggest change makers when it comes to implementing climate actions. They are the front line workers and are responsible for a wide array of decisions that impact provincial, national and even international strategies on climate action. The UNDP estimates that more than 70% of climate mitigation and up to 90% of adaptation measures are taken at the local level of government[16]. It is important that municipal and local governments are the ones assisting in implementation as they have an understanding of the local concerns, limitations and abilities, so solutions can be better tailored for effective results.

Municipal and County governments are also capable of effectively engaging the local community on climate change, local action and resiliency projects. The local government can properly engage the community so that they are able to make real change and be part of the decision making within their community. Often, at international climate conferences, local communities are not able to be actively involved or considered, so allowing them to have a voice on actions that immediately affect them at the municipal level will be more impactful. The local government can be the missing link between those international conversations and the community, ensuring priorities are set to succeed through broader, international and national support. If local governments receive national and international support, especially financially, this can make projects easier to develop and implement. Projects like green infrastructure or green energy developments can require substantial financial investments, but they also help to reduce local emissions and create more jobs, creating a stronger and more diverse economy, and with funding or grants from upper level governments, it makes ambitious and necessary projects more feasible on the local level, where the real changes happen.

There are many goals that the local governments need to support within the community, and should also implement within their own priorities and plans as well.

[16] The Guardian (2015) Local authorities are the real trailblazers in the fight against climate change. Retrieved from: https://www.theguardian.com/public-leaders-network/2015/dec/10/local-authorities-climate-change-fight-paris-agreement

Action 1: Adopt the use of a climate lens tool

A climate lens tool is designed to assess municipal decisions and how they impact the climate and if the decision will be affected by climate change (ie. Increased temperatures or extreme weather events). The Clean Air Partnership has developed a climate lens tool that allows all staff to be able to assess their decisions, even if they do not have expertise in climate change. This tool provides resources to ensure proper considerations are made to assess all climate impacts associated with decisions[17]. The tool is important to use if the municipalities and the County are planning to continue to prioritize climate change. This does not provide a detailed qualitative analysis, but provides a high-level probability evaluation of the decision that is being made, and encourages discussions between departments so climate change is considered throughout the organization[17]. This will also allow senior staff and management to review decisions so that they can implement climate related decisions that align best with their departmental priorities. It will also be important to assess the positions within each department and evaluate how the work will impact the climate and how their work will be impacted by climate change.

Action 2: Develop an education and awareness page and program for the community

A simple but effective way to get more education out and to continue to garner support from the community is through the creation of a climate change page on the official municipal and county websites. This page should communicate climate change actions, the progress that is going on surrounding the climate change plan, and should provide education, suggestions and resources for actions. This page should provide easy tips for residents to get started on their climate action journey, and should provide insight on how this will help them and their community and to reach the reduction target. This page should communicate the successes the municipality and the County are experiencing with implementation of the climate change plan, and how it has helped reduce emissions, reduced costs and has pushed them forward to reaching or even surpassing their GHG reduction target. The page should also provide links to programs that the municipality and County are offering to help support local businesses, community members and the agri-business sector. There should be resources available on this page for all members of the community to explore to learn of funding opportunities for home upgrades, vehicle upgrades, any webinars or new resources, from the local government, provincial government or the federal government. Another key feature of this page should be a carbon footprint calculator. This will allow individuals to keep track of their own actions and how they contribute to their local emission count.

Action 3: Develop a corporate-level climate change plan

With municipalities being leaders in climate action, it is also important to develop a focus on corporate actions to combat climate change and increase local resiliency. Municipal services will all be impacted by climate change, and have the potential to also

[17] Clean Air Partnership (2020) Municipal Climate Lens Tool. Retrieved from: https://www.cleanairpartnership.org/projects/climatelens/

contribute to local emissions, therefore making a corporate climate change plan a priority moving forward. All levels of staff need to be engaged on this topic, and an understanding of climate impacts should be well integrated into each department. This corporate climate change plan should focus on mitigation and adaptation to prepare the municipalities and County for reducing their own emissions while also ensuring they are considering actions to protect their assets and assess areas of vulnerability within their work and services. This will also allow the municipalities to gain a greater understanding of their own climate change impacts and how their services can better support the implementation of the community climate change plan.

Action 4: Develop a community adaptation plan

The initial focus of this plan is to speak to greenhouse gas reduction opportunities, and did not explore a vulnerability assessment to see the areas of major concern across the county. Developing or adding to this plan to put more focus on adaptation and the vulnerabilities across the county is an important step when dealing with climate change. This will ensure that actions and considerations are taken to reduce the risks that are going to be associated with climate change. Due to the emissions that have been released over the past decade, there are impacts that are going to be inevitable, and it is crucial that the municipalities and the County be prepared and prepare their citizens for those inevitable impacts. Ensuring that all vulnerabilities are being assessed and actions to protect citizens are successfully implemented, Perth County and the municipalities within the boundaries of the county can be more resilient to climate impacts long term.

Goal: Embed climate considerations into all municipalities and provide educational resources

Action	Timeline	Cost	Indicators of Success
Adopt Climate Lens	Ongoing	No cost	• Considering climate change while making municipal/county decisions
Develop an education and awareness page and campaign	Ongoing	Low cost	• Increased numbers of online traffic to webpage • Increased uptake of sustainable and climate change actions • Public use of the online GHG Calculator
Develop a corporate-level climate change plan	Short term to ongoing	No/Low cost	• Adoption of climate plan • Implementation of internal climate strategies
Develop a climate change adaptation plan	Short term to ongoing	No/Low cost	• Adoption of climate plan • Implementation of adaptive strategies to increase adaptive capacity • Decrease in vulnerability

Buildings and Land Use

As local populations continue to grow in municipalities across the county, new homes will continue to be built. It is the role of the municipalities to ensure compliance with the Ontario Building Code (OBC) while these new homes are being built, but imagine if they took it a step further and made even better, more sustainable, more energy efficient homes. Over the years, the OBC has updated their requirements for energy efficiency, through actions such as an increase of 15% efficiency, and rough-ins for electric vehicle stations in new homes and non-residential buildings, but much of the OBC is still considered as the minimum effort in regards to energy efficiency[18]. This sector emitted a total of approximately 262,800 tonnes of greenhouse gas emissions.

Residential Buildings

In 2016, there were a total of 38,350 single family homes and about 9,585 attached dwellings (townhouses, apartments, etc.)[19]. Residential buildings emitted approximately 104,600 tonnes of CO_2e in 2017, about 100,600 tonnes of those came from single-detached homes, while the other approximately 4,000 was emitted from the attached dwellings. There are opportunities to reduce energy consumption from residential buildings through small fixes, and through larger investments. Approximately 40% of emissions from buildings come from the residential sector, mainly from the natural gas, propane and fuel oil consumption across the county. Electricity production in Ontario is known to be clean, therefore emissions associated with this source of energy are low.

Improvements that provide the biggest reductions typically come with a higher cost, but also provide greater savings. Projects such as replacing the siding on your home and adding more insulation in the walls prior to recladding help significantly to reduce your need for heating and cooling. If you combine this with a new heating system, like ground-sourced heat pumps, air-sourced heat pumps or a high efficiency furnace, this helps to nearly eliminate emissions from heating.

Commercial/Institutional Buildings

The community attracts over a million visitors every year, which contributes greatly to the local economy. The arts and tourism sectors represent around 4,000 jobs. This sector of buildings includes the associated tourism-related infrastructure, the University of Waterloo's campus, local schools, and other shopping centres like grocery stores and small businesses.

[18] Ministry of Municipal Affairs and Housing (2016) Supplementary Standard SB-12 "Energy Efficiency for Housing" Amended on July 7, 2016. Retrieved from: http://www.mah.gov.on.ca/Page15256.aspx

[19] Statistics Canada (2020) Census Profile, 2016 Census. Retrieved from: https://www12.statcan.gc.ca/census-recensement/2016/dp-pd/prof/details/page.cfm?Lang=E&Geo1=CD&Code1=3531&Geo2=PR&Code2=35&SearchText=Perth&SearchType=Begins&SearchPR=01&B1=All&GeoLevel=PR&GeoCode=3531&TABID=1&type=0

The commercial and institutional emissions generated within this sector totaled approximately 60,600 tonnes of greenhouse gases, which is approximately 23% of the total building emissions, and 7% of the total emissions. Similar to the residential sector, there is an opportunity for retrofits and upgrades to take place, whether they are small projects or something more major.

Industrial/Manufacturing buildings

There is a unique set of manufacturers within the area, these include automotive equipment, feed and animal pharmaceuticals, architectural and structural metals, concrete, metal fabrication, engineering and machining, green products and technology, Agri-food products and textiles[20]. Perth County also has a strong Agri-business sector where they have food processing and handling facilities, farm equipment and part manufacturing, green energy and bio-crops, bio-based materials and product manufacturing and genetics and research facilities.

The industrial and manufacturing sector emitted approximately 67,600 tonnes of greenhouse gases, which represents 37% of the total emissions from buildings, and about 12% of total emissions within the county.

Energy efficiency for the industrial sector is known to improve by 1 to 2% in Canada per year because of continued education and training programs, networking programs, and capacity-building opportunities. It will be important for the community to ensure that industrial and manufacturing companies are being held accountable, and are being open and honest about their emissions and are actively reporting and working towards lowering their emissions to help with community reduction targets. It is strongly recommended that a relationship be established with industrial, manufacturing and commercial industries in the municipalities to keep an open relationship on sustainability efforts and greenhouse gas reduction strategies.

[20] Perth County (2017) Community Profile. Retrieved from: https://www.perthcounty.ca/en/doing-business/resources/files/Accessibility-Update---Edited-PDFS/Business/Perth-County-Community-Profile---accessibility.pdf

Emissions from Buildings

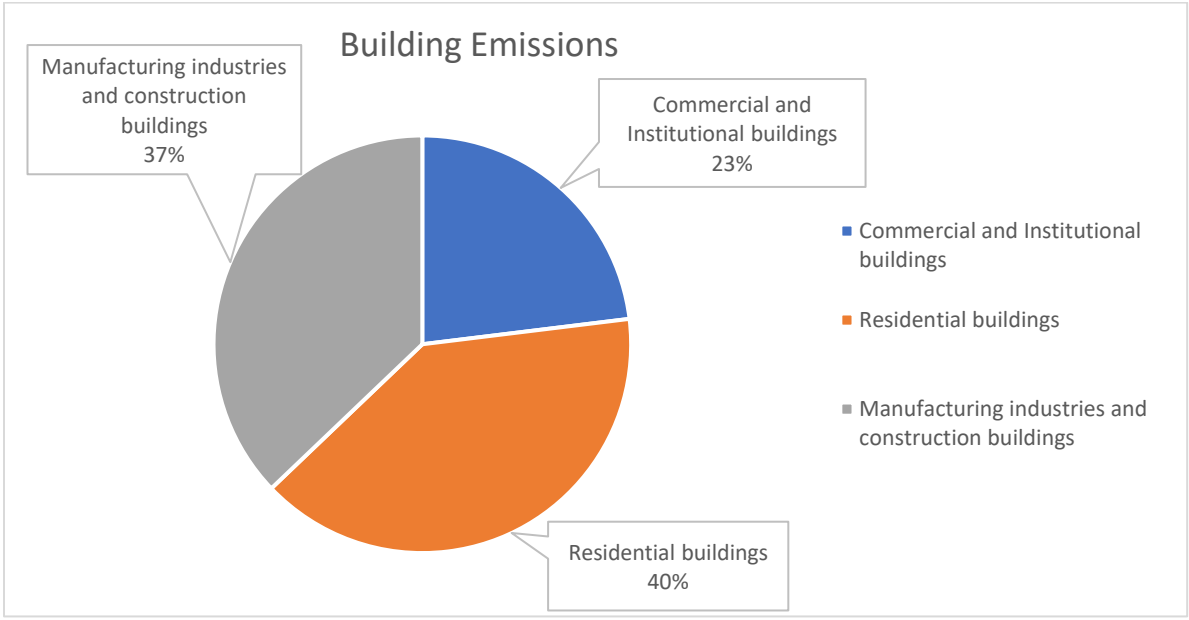


Figure 4 Building Emissions

In the community, building emissions make up approximately 32% of the total emissions. These building emissions include the residential, commercial, institutional and industrial buildings. However, it is important to note that some consumption data is missing for the emissions, as propane, fuel oil and other types of fuels apart from natural gas and electricity do not provide overall consumption data for municipalities. Therefore this sector likely emits more emissions than this initial calculation. Future exploration will need to be done to establish more accurate emissions counts.

As mentioned previously, the residential buildings across this community make up approximately 40% of the emissions from buildings, and 14% of the total emissions. Small improvements such as sealing or caulking areas of leakage which are typically found around windows will substantially reduce heat loss, adding insulation to your attic, or an unfinished basement will also reduce heat loss. These small improvements are known to not only reduce emissions, but also reduce your energy consumption and therefore your bills. Old gas hot water heaters are also known to consume a substantial amount of energy within the home. There are new and efficient alternatives to heating hot water, things that include solar hot water heaters which preheat the water while using your electric or gas hot water heater, which results in greenhouse gas reductions as well.

Action 1: Sustainable Building Standard

As populations continue to increase within the municipal boundaries, housing development continues to rise. Across Ontario, housing has been proceeding at increased rates, sprawling communities continue to sprout up all across Southern Ontario, and increased need for a vehicle continues to climb.

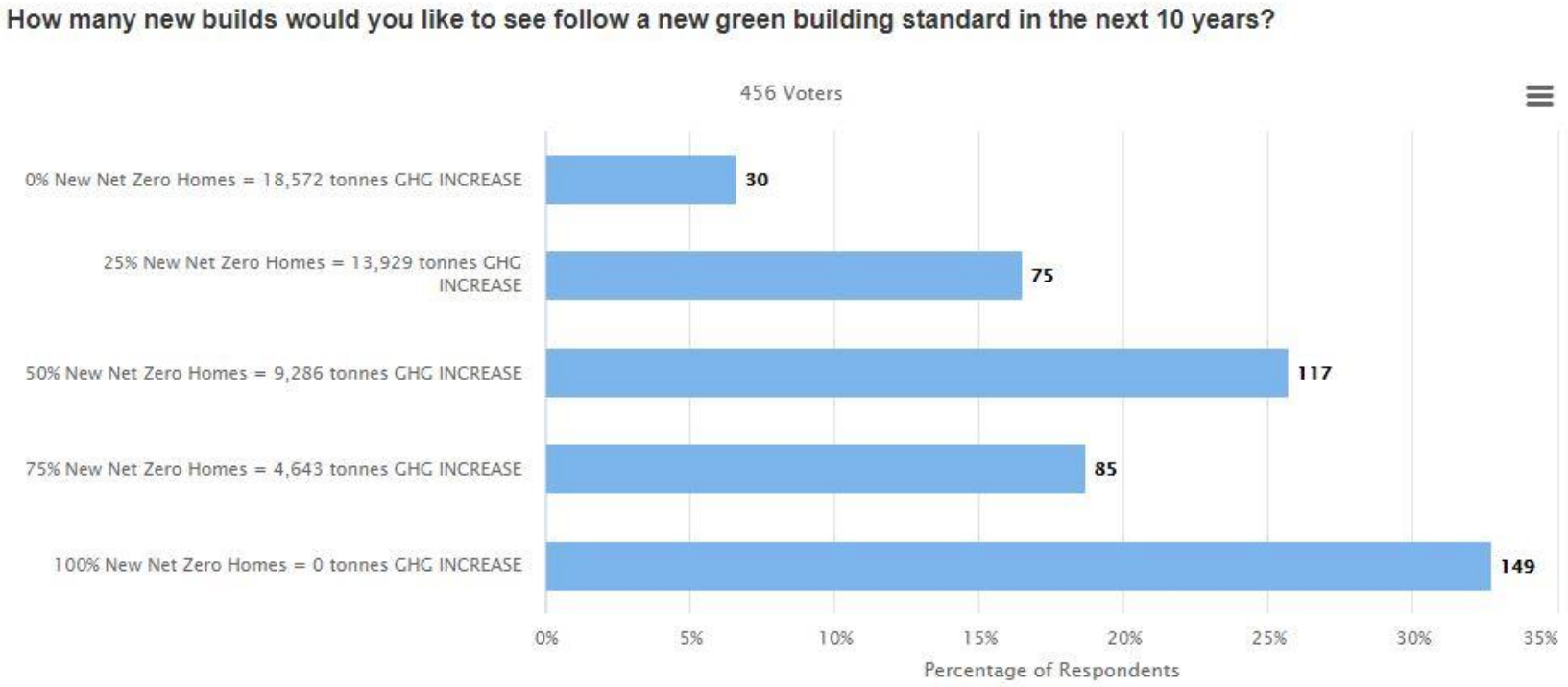
These new homes have impacts on more than just local land use, they consume energy and water and generate waste, pollutants and greenhouse gases, and also increase stresses on the local municipal energy infrastructure. Knowing that new homes contribute to the climate challenge but are often not thought about or considered, it is important for local municipalities to address this area of future emissions. New builds create the best opportunity to address future emissions. Often the focus is on how emissions can be lowered through retrofits, rather than building energy efficient homes and buildings in the first place. As building stocks increase, many without zero or low carbon performances, the municipality will have to invest more into these homes to retrofit them in the future, which is more costly and difficult.

A Green Building Standard creates the opportunity to guide developers in creating homes that are more efficient than those that strictly follow the Ontario Building Code. The ability for municipalities to use their guidance in local economic development provides them the means to have authority over local planning decisions, making them a key leader in this action. A Green Building Standard not only helps to boost the local economy, but also addresses the priorities that have been set through the development of this plan: air quality, energy efficiency, water quality and solid waste. The development standard usually promotes adaptive measures that ensure long term infrastructure resiliency, increases the number of energy efficient homes, promotes building smart, dense and mixed-use neighbourhoods to reduce urban sprawl reducing the need for vehicles, and helps increase green infrastructure and reduces hardscapes, which not only improves stormwater management but also reduces the impacts of the heat island effect. The heat island effect is caused by large surfaces of concrete that hold heat and release it in local neighbourhoods, which leads to increases in local temperatures.

As the community continues to grow, it is important to consider more than the typical considerations of new development, it is necessary to be considering public health, climate change, energy consumption and consumption of resources. The Clean Air Partnership has developed a tool that helps municipalities develop their own Green Development Standard.[21] This tool was created

[21] Clean Air Partnership (2020) Why Standards for Green Development Should be a Standard Part of Municipal Climate Action. Retrieved from: https://www.cleanairpartnership.org/why-standards-for-green-development-should-be-a-standard-part-of-municipal-climate-action/

to push the considerations around growing a healthy, well-designed community that is well integrated with greenspaces, pedestrian and transit networks, while also providing a variety of housing options, transportation, services and employment options[21]. The tool will remove pressures from population growth and urbanization by ensuring resource efficiency[21].



Action 2: Develop a Deep Retrofit Program/Guidelines

~~The~~ residential, commercial and institutional buildings have an opportunity to improve their efficiencies through a voluntary retrofit program. A program that allows the building owners to decrease energy consumption and associated emissions with financial assistance. These programs are appealing to those that are looking to reduce energy costs and improve property value while also increasing their energy efficiency. The program is what is referred to as a deep retrofit program, which assesses the energy performance of the entire home/building versus addressing incremental changes, which leads to significant energy savings. Improvements that this program usually targets focus on heating, cooling, insulation and water heating.

A deep retrofit program can help in managing heat loss in homes and businesses and, reduce energy consumption and help integrate automated controls. It also explores the opportunity to consider elements such as solar PV/thermal, ground source heating, and other features like this to reduce traditional energy usage. This would also help to supplement the local energy supply to not overload the current system with increased electricity consumption. Adding renewables or biofuels will help to transition the community to a more resilient and low emitting community. There is increasing information surrounding biofuels as a great alternative for energy production for rural communities, through burning of wood pellets and other wood or sawdust developed products. Biofuels are a great low-cost alternative, as switching to electricity without renewable supplementation is a costly decision to make in Ontario, currently.

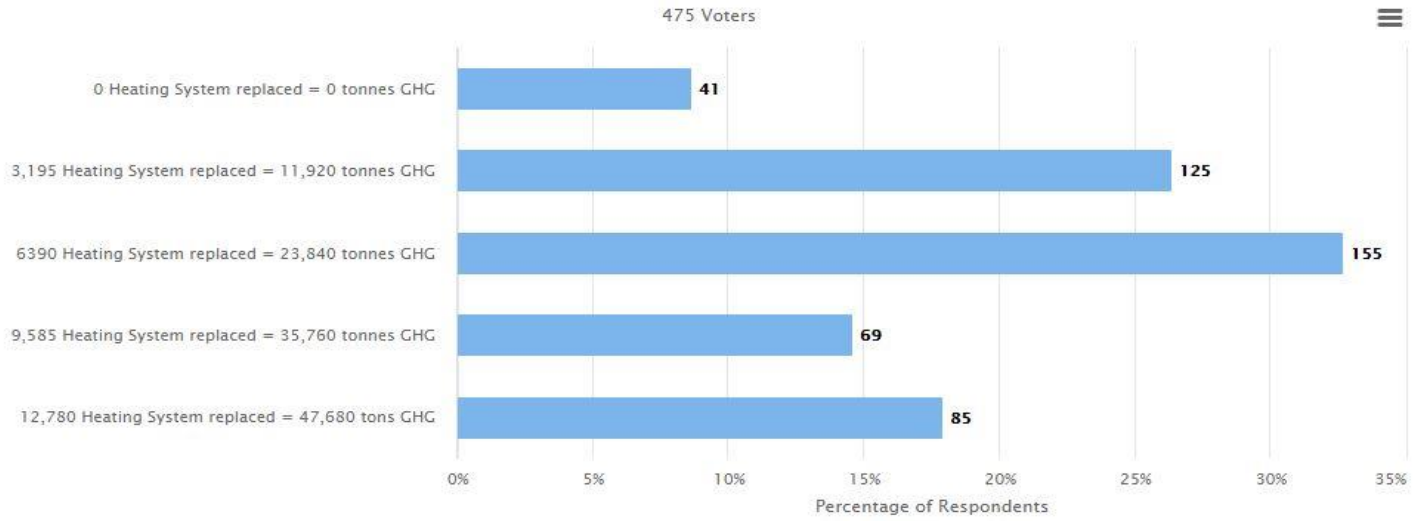
A deep retrofit program will also improve the resiliency of the community, and help reduce urban heat island effect and reduce flood risk by reducing runoff. These programs have included projects like rain gardens, backwater valves, sump pumps, downspout disconnect, regrading or even permeable pavements, which further help with sequestration and adaptation.

The program should also include an energy performance label to showcase the success of this project. This also allows homeowners or those selling property an opportunity to showcase the efforts they put in to increase the efficiency of the home, justifying higher property values.

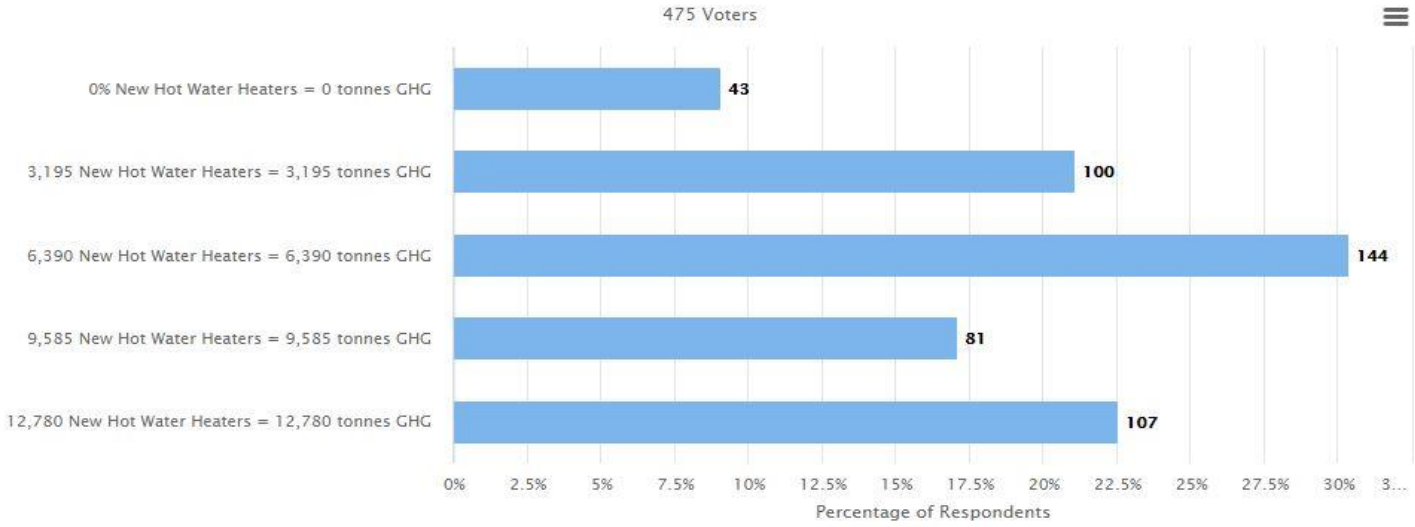
Developing a program like this, allows local contractors, home and business owners the opportunity to explore areas that will not only help them reduce their energy consumption but will also improve the local community and their well-being.

There should also be an assessment of local knowledge on these programs and upgrades so that contractors can implement these more technical renovations. By doing this, it also offers the opportunity for job creation and ultimately feeding more into the local economy.

How many single family homes do you think the residents of Perth County can and should plan to retrofit?



How many single family homes do you think we should or could retrofit with new electric or solar hot water heaters in the next ten years?



Action 3: Offer LIC or PACE financing to assist in deep retrofits

The municipalities have an opportunity to explore the feasibility of implementing a program that helps residents perform the deep retrofits that will help to significantly reduce local emissions. Reducing emissions from homes through retrofits is difficult and can be expensive, and it also requires a large number of participants to see a significant impact.

Many municipalities and regional governments are offering what is called a Local Improvement Charge (LIC), or Property-Assessed Clean Energy (PACE) financing program. These are a temporary charge that is typically added to the homeowners property tax bill so that they may pay for the improvements that benefit the property owner. This means that the municipality helps in paying for the energy retrofit upfront, and the homeowner pays for it over the time of the loan period, therefore operating at no net cost to the municipality while also not using taxpayer money to provide the program. These loans are typically tied to the property, but there are other options that the municipalities can explore as they assess the feasibility of implementing this kind of program.

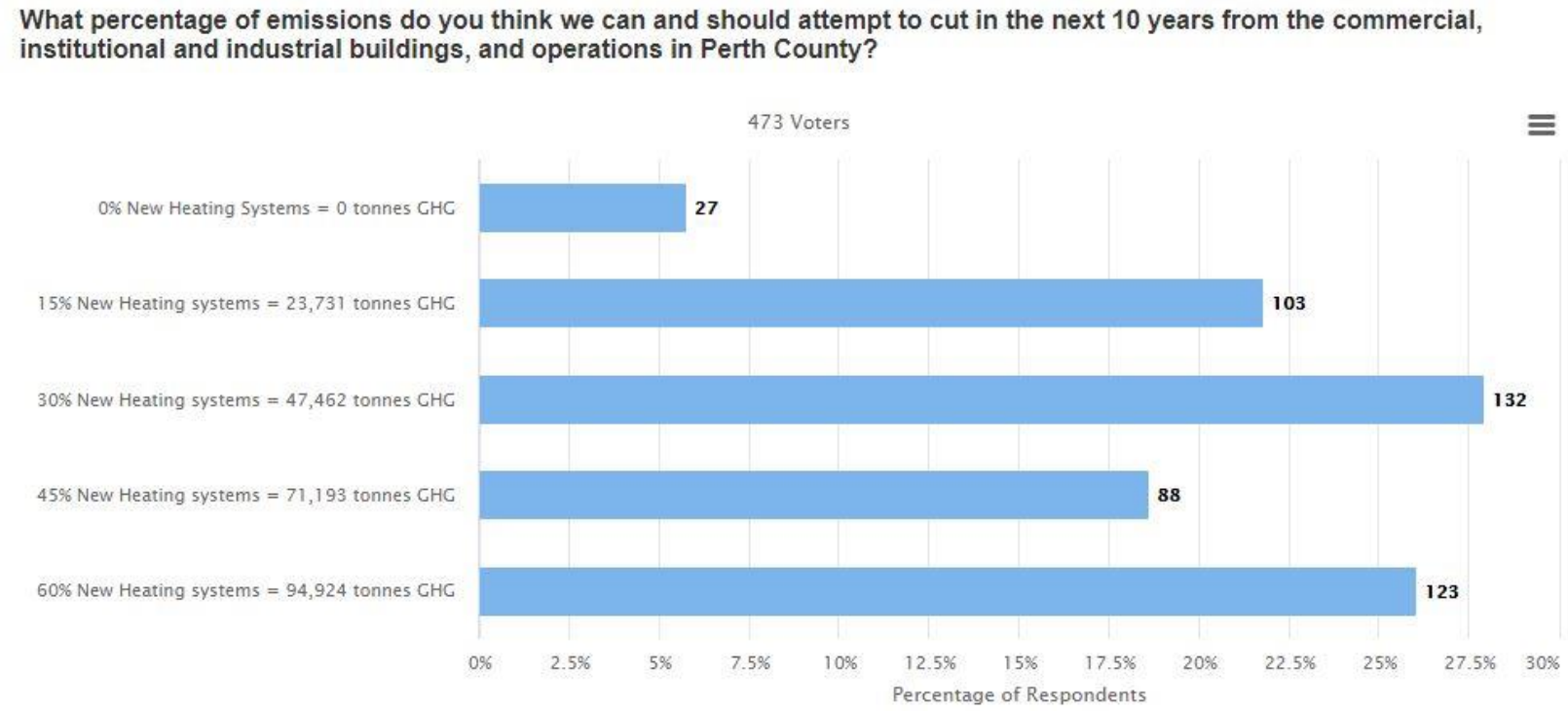
Municipalities are being offered assistance to implement this program that helps their local communities to complete the deep retrofits that are necessary to achieve ambitious reduction targets. The Clean Air Partnership partnered with the Federation of Canadian Municipalities to provide a toolkit and funding to assist in the development and implementation of this type of program.[22] The current toolkit and funding focuses on residential buildings and how municipalities can implement a program that assists homeowners to improve the efficiency of their home.

Offering this program will ensure that homeowners are resilient to the upcoming and inevitable climate change impacts, while also bringing older homes up to current Building Codes, reducing energy bills and helping to improve property value and quality of life. These improvements also encourage residents to stay within the community due to the affordability of owning their updated homes. The retrofit projects are typically designed to match loan payments with savings on energy bills, which means it is typical to see no increase in monthly bills, meaning it is more accessible to those living with lower incomes. It also helps to provide increased comfort in the home and living space, which leads to healthier and happier residents.

[22] FCM (2020) Learn how to reduce greenhouse gas emissions through energy efficiency retrofit programs. Retrieved from: https://fcm.ca/en/case-study/mcip/tool-and-case-study-climate-resilient-home-adaption-toolkit

The exploration of this program is necessary to ensure residents are capable of making impactful changes. Performing a feasibility study is the first step in assessing how this program can be successfully implemented in a low-risk manner. Partnerships should be explored for successful development and implementation of the program.

Future exploration in offering this program to commercial buildings through a C-PACE program should be reviewed. As more national targets are set, it is likely that more grant and funding opportunities will arise to help municipalities implement other ambitious projects like a C-PACE program.



Goal: Create greener, more sustainable, accessible and energy efficient neighbourhoods

Action	Timeline	Cost	Indicators of Success
Sustainable Building Standard	Ongoing	No cost	• Integrate adaptive measures into construction of new buildings, retrofits, and the maintenance of existing infrastructure • Increase the number of new construction and existing infrastructure that are highly energy efficient • Smart, dense, mixed-use growth to reduce sprawl • Increase green infrastructure and reduce hardscaping to improve stormwater management, and reduce the heat island effect • Lower to no new residential emissions
Develop a Deep Retrofit Program	Ongoing	High cost (grants available)	• Decrease in residential emissions from current housing stock
Offer LIC or PACE financing to assist in deep retrofits	Ongoing	High cost (grants available)	• Community use and buy-in • Lower residential emissions

Businesses/Industry

Businesses are known to contribute a substantial amount of emissions throughout their supply chains, and more pressure is being put on them to improve their sustainability initiatives. Locally, the buildings owned by businesses contribute 19% of total emissions, but are about 60% of emissions associated with buildings across the county. These emissions do not include emissions associated with their manufacturing processes, the vehicles they use for shipping or any other emissions associated with their supply chains. It is the responsibility of local businesses to assess their emissions and to consider sustainable business actions where possible. It is known that implementing sustainable actions into businesses improves business, improves efficiency and reduces costs overall. Of course examples of sustainability initiatives can be seen across the County with sustainability related positions who track and report and engage staff and internal practices, and those who have joined groups such as the Carbon Footprint Initiative, which is a local group of businesses looking to improve their sustainability and measure and reduce their personal impacts.

As mentioned previously, industry/manufacturing is known to be the largest contributor to Canadian emissions. Across the County there are many industrial/manufacturing organizations who contribute to emissions locally and nationally. For emissions to downtrend, it will be important for industrial/manufacturing facilities to work to reduce their emissions throughout their facilities and to keep track and report on their emissions. With the new Federal targets being set, industrial and manufacturing facilities will need to be ambitious and actively work towards reducing and offsetting their emissions. Typically, the Federal government provides training and resources to manufacturing and industrial organizations to assist in reducing emissions, but it is crucial for them to also take the necessary steps in taking their own actions to reduce these emissions in the most impactful manner.

Action 1: Start/join/support a local Green Business Hub

Within the Maitland Watershed there is currently a group of local organizations that have joined together under the guidance and leadership within the Maitland Valley Conservation Authority, to create the Carbon Footprint Initiative. This group is open to all types of organizations, like businesses, companies and municipalities within the Maitland watershed[23]. In order to join, the organization must prepare a carbon footprint strategy and provide updates on their continued progress towards their targets. The organization must also participate in sequestration activities like planting projects and restoration projects.

In surrounding communities there are similar groups to the Carbon Footprint Initiative. These have been started through the organization Green Economy Canada[24]. There are many hubs across Ontario and Canada that are working with local businesses to reduce their carbon footprints and reduce their environmental impacts. Green Economy Canada works with local organizations to launch their own hubs to help support local businesses become more sustainable, they will provide resources and tools for measuring impacts and work to create a larger sustainable community. In London and in Waterloo Region, hubs already exist to help support their businesses transition to sustainable practices. These hubs exist only because of local interest and support, so if there is a desire within the municipalities across the county to improve business practices, there is opportunity to join this growing group of hubs, and to act as leaders not only in Ontario but across the country. Collectively the hubs have helped businesses to reduce about 200,000 tonnes of greenhouse gases and helped them to see the co-benefits of integrating sustainability[24]. This also offers the opportunity for local industrial/manufacturing organizations to join, assess and work towards reducing their greenhouse gases and environmental impacts in a more holistic manner, considering the social, environmental and economic impacts of sustainability integration.

[23] Maitland Valley Conservation Authority (2020) The Carbon Footprint Initiative Story. Retrieved from: http://www.mvca.on.ca/stewardship-programs/carbon-footprint-initiative/#:~:text=The%20Carbon%20Footprint%20Initiative%20is,towards%20reducing%20their%20carbon%20footprint.

[24] Green Economy Canada (2020) Green Economy Canada. Retrieved from: https://greeneconomy.ca/

Action 2: Sustainability toolkit for small/local businesses

The municipalities can help to support their local businesses by working with them and the BIA to develop a toolkit on sustainability. It will allow conversations to flourish around what partnerships and support can be developed to improve access to sustainability initiatives that fit within the unique approaches of each organization. Across the county there are many different types of small and local businesses that need to start considering sustainable actions to help in reducing their environmental impacts, reduce operation costs and ensure a continued social license to operate. The municipality and businesses can work together to create a toolkit to support the transition to sustainable business operations for all. This toolkit can help local businesses to implement projects to improve their sustainability initiatives and provide them with resources and links to funding and grants. A sustainability toolkit can also offer solutions for adaptation to businesses, so that they are less vulnerable to climate change impacts; this involves assessing the supply chains and the structures in which businesses are running. A toolkit like this offers a transition for many businesses to start the conversation, where they can then assess if joining a local green business hub would offer that extra help in involving their business in more sustainable opportunities.

An example of a sustainability or climate change toolkit can be found through the Sustainable Hamilton Burlington's website, where they showcase their Business Climate Action Toolkit[25]. This toolkit lays out the steps to assess the businesses' climate impacts and ways to move forward in addressing those. Following a similar path for local businesses in Perth County will hold the various organizations accountable for their local impacts. It will be crucial for local businesses to be part of the development of this toolkit so that it can be tailored to the abilities and various types of businesses across the county and in individual municipalities.

[25] https://businessclimateactiontoolkit.ca/

Goal: Support sustainability and climate action in local businesses

Action	Timeline	Cost	Indicators of Success
Start/Support/Join a local Green Business Hub	Short term	No cost to Low cost	• Increased membership in Carbon Footprint Initiative • Development of other Green Business Hubs • Increased sustainable business
Develop a small/local business toolkit	Ongoing	No cost	• Completion of toolkit • Increased sustainable business practices (reduced emissions and environmental impacts)

Transportation

Transportation is one of the largest contributors to local greenhouse gas emissions. There is an opportunity to push the reduction of this sector of emissions through supportive actions and policy implementation.

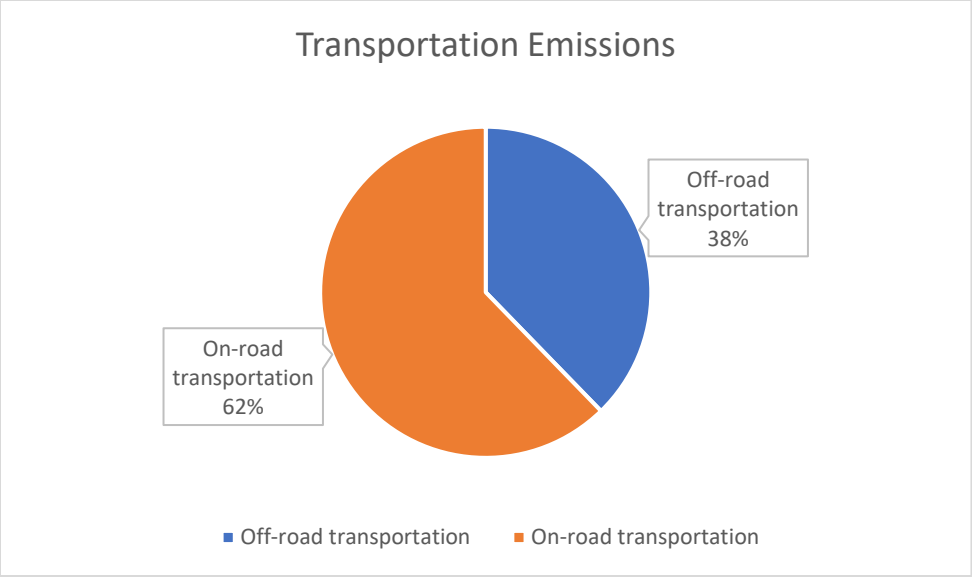
Recently, the County partnered with other municipalities to develop a new transit system called Perth County Connect (PC Connect)[26]. In November of 2020, PC Connect launched to better connect residents within Perth County, Stratford and St. Marys with each other and surrounding Southwestern Ontario municipalities. The launch offered five fixed routes, with one bus servicing each route. Prior to this launch, Perth County's transit system was non-existent and created issues for residents and those trying to commute throughout the County and outside of it. The Greyhound stopped operating within Perth County, and Via Rail services became limited, therefore the County, Stratford and St. Marys realized the importance of providing transit services for improving local economic development. The City of Stratford already had bus services available within the City limits, which allowed for those living within Stratford to move more easily within the City limits. The City has also made the move to implement On-Demand Transit for Sundays, which allows residents more flexibility and will help to meet the transit demands in a more accessible manner[27]. Transit is one of those key features within communities that is known to reduce local greenhouse gas emissions, increase movement and accessibility within the community and help in the investment of local businesses.

Perth County, Stratford and St. Marys need to prioritize encouraging residents to take advantage of this new transit system to help reduce local transportation emissions. Another area that needs prioritizing is active transportation; active transportation includes walking, biking, wheeling, in-line skating, skateboarding, and skating in any form. This can be encouraged through better connectivity throughout the municipalities and interconnecting between municipalities.

Encouraging the purchase of electric vehicles is also an opportunity for significant GHG reduction. The common fear when thinking of purchasing an EV is range anxiety and lack of charging infrastructure. This presents an opportunity for the municipalities to invest in infrastructure. Increased accessibility for charging stations will not only ease the range anxiety for residents, but will also encourage tourists to come and explore your local municipality. This is an economic development strategy that is worth exploring.

[26]Perth County (2020) PC Connect – Your Community Transit System. Retrieved from: https://www.perthcounty.ca/en/living-here/community-transportation---perth-county-and-stratford.aspx

[27] https://www.stratford.ca/en/live-here/transit.aspx



Transportation in Perth County, Stratford and St. Marys makes up approximately 61% of the local fossil-fuel and waste-related emissions. About 62% of that comes from personal-vehicles across the County, and 38% of that from off-road vehicles such as combines and tractors.

As mentioned previously, there are many opportunities to reduce emissions from the transportation sector. As residents continue to upgrade their vehicles over the coming years, it will be important to transition to low emitters like Hybrid/Hybrid Electric and Electric Vehicles (EVs). Over the next few years, it is anticipated that the prices of electric vehicles will continue to lower, the number of electric vehicles and used electric vehicles are expected to increase, and to add to that there are many manufacturers who have committed to phasing out internal combustion vehicles in their line of vehicles. Municipalities have limited control over what their residents will purchase in the future, but they are set to provide support in a few different ways. The County and the municipalities will have to play a major role in reducing the number and length of single-occupancy vehicle trips through a transit system, supporting and encouraging carpooling, and ensuring the active transportation options are safe and convenient. This ultimately will lead to better air quality, less congestion and an overall better quality of life for residents.

Action 1: Implement a Transportation Master Plan

All residents need to get around the county and municipalities, and it is the job of the municipality and the County to make sure that the necessary local travel is as simple and safe as possible. A transportation master plan is intended to guide work and direction on how local travel options can be improved by focusing on pedestrian, cycling, and transit and roadway infrastructure. This plan will help prepare the community for a well integrated system that includes the various travel options available across the county. The goal of a Transportation Master Plan is to reduce emissions, improve local air quality, increase alternative travel/commute choices, lower the cost and energy consumption of personal transportation options, improve the community's health, and to reduce the need to unsustainably expand roadway infrastructure. This plan can also help address any needs related to parking infrastructure due to increased levels of tourism.

The Transportation Master Plan will help the County and municipalities know when and how to invest in the proper infrastructure to ensure traveling throughout the County and municipalities is as smooth as possible. This ensures that the demands for travel now is being met, while also preparing for future demands. Having a set plan also ensures that trends within transportation are being assessed and new technologies can be considered where feasible and reasonable.

Mobility is something that impacts everyone, residents, businesses and visitors, this is why a plan around transportation is crucial for the well-being and economic success of the County and municipalities. This will allow for each municipality to begin focusing on sustainable development within their boundaries, and will support sustainable growth in the rural and urban areas of the County, Stratford and St. Marys. The plan should also include a risk assessment to transportation infrastructure so that the municipalities and the County can work to reduce the increasing threat of transportation related interruptions due to climate change and the associated severe weather events. More resilient infrastructure can be explored and smarter and climate-ready investments can therefore be made.

Typically these include a plan for changes over the next few decades, which should encourage ambitious targets and changes to the local transportation options, and will showcase to the community that municipalities and the County are ready to support ambitious and meaningful climate change actions.

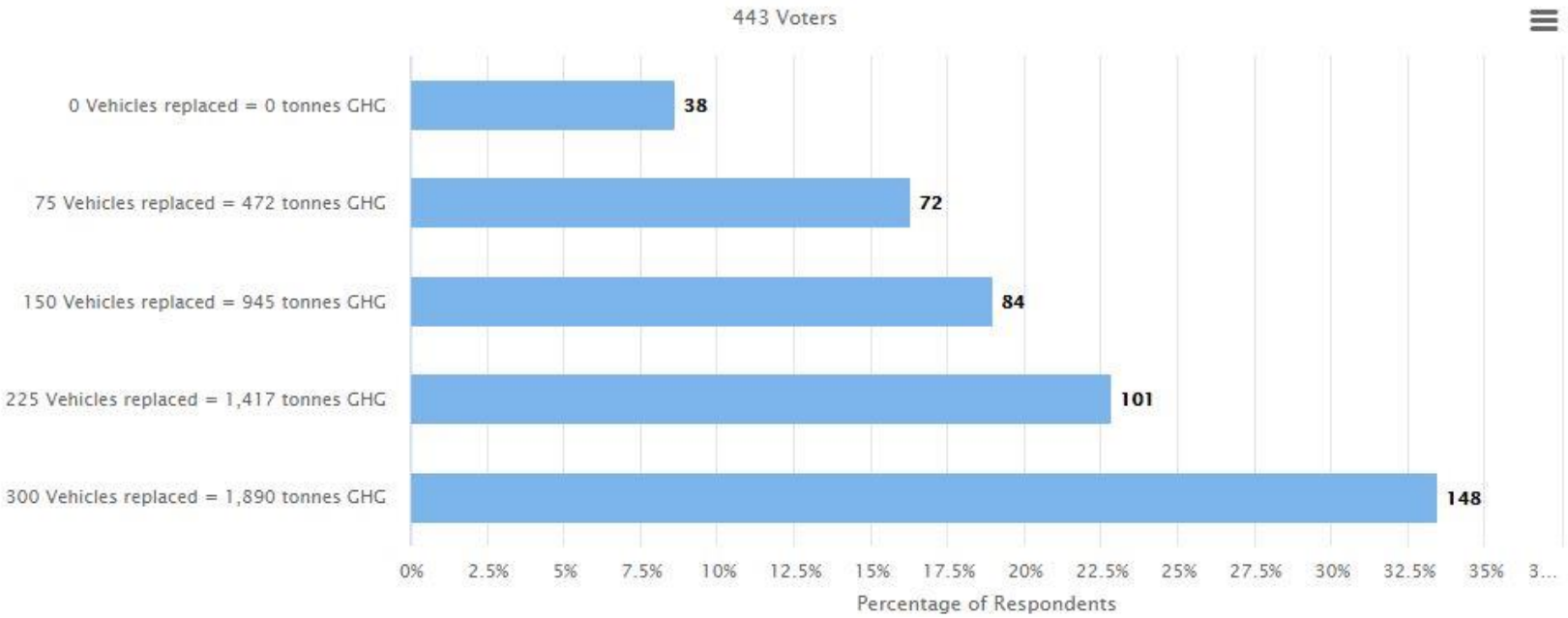
Action 2: Develop better connectivity and promote active transportation

Encouraging the uptake of cycling, walking, or any other form of active transportation will be a necessary step in reducing local greenhouse gas emissions. By promoting neighbourhoods to be built with sidewalks and bike lanes that connect to the inner city areas and main city centres, and connecting to parks and other outdoor destinations will allow for local residents to safely walk/cycle/etc. throughout the municipalities and county. The implementation of bike lanes between the municipalities and within the municipal boundaries also presents an opportunity to explore more businesses and attractions. There are many cyclists in each municipality and if residents do not need a vehicle to explore surrounding areas, it will help to promote the use of active transportation options.

This action will not only help to reduce local emission sources, but will also help to improve local air quality, and improve the health and well-being of the local community. A priority within the Perth Huron Health Unit is to encourage the uptake of active transportation and working to make this safer and a more viable option. The Health Unit, the municipalities and County should work together to encourage active transportation, and develop a strategy for successful implementation. Active transportation is not only good for the local environment, it is also good for local health and wellness, and it encourages an active lifestyle for families, and encourages residents to explore alternative means of transportation. As work is done to encourage active transportation options, a more in-depth exploration is needed to ensure it is inclusive to all residents to ensure there are no barriers for anyone to participate.

During the pandemic, record bike sales were recorded. Community members were choosing to bike to work, avoiding transit systems and were overall looking for an opportunity to spend time outdoors in an entertaining and healthy way. If the community continues to invest in ways that better connect their residents to one another, it will also encourage the uptake of cycling throughout the county and can encourage growth in the cycling movement. This is not only a positive experience for those living within the municipalities, but it will also encourage greater numbers of tourists and cyclists to travel throughout the community. Knowing there are safe routes connecting cyclists and other active transportation users to various destinations makes those trips much more desirable and well known within the cycling and active transportation groups.

How much do you think we should increase cycling infrastructure?



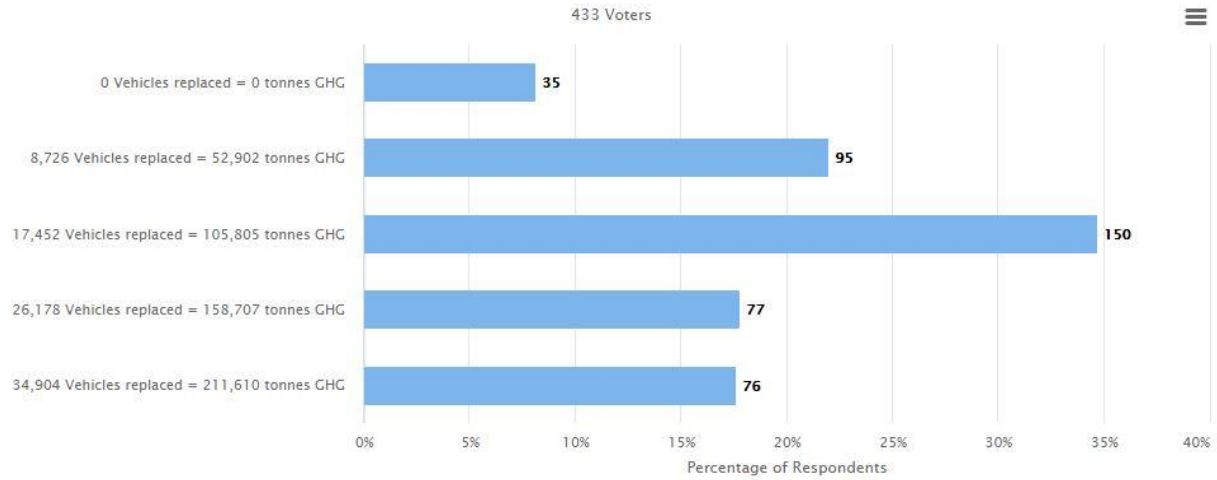
Action 3: Install charging stations

In order for the municipalities and the County to support an uptake in electric vehicle use, there is a need to increase investment in electric vehicle charging stations. A common fear amongst those who do not have EVs is the issue of range anxiety and the lack of charging infrastructure in their communities and places of work. An easy way to solve this is through the investment of charging stations, and there are many opportunities for municipalities to increase their charging capacity.

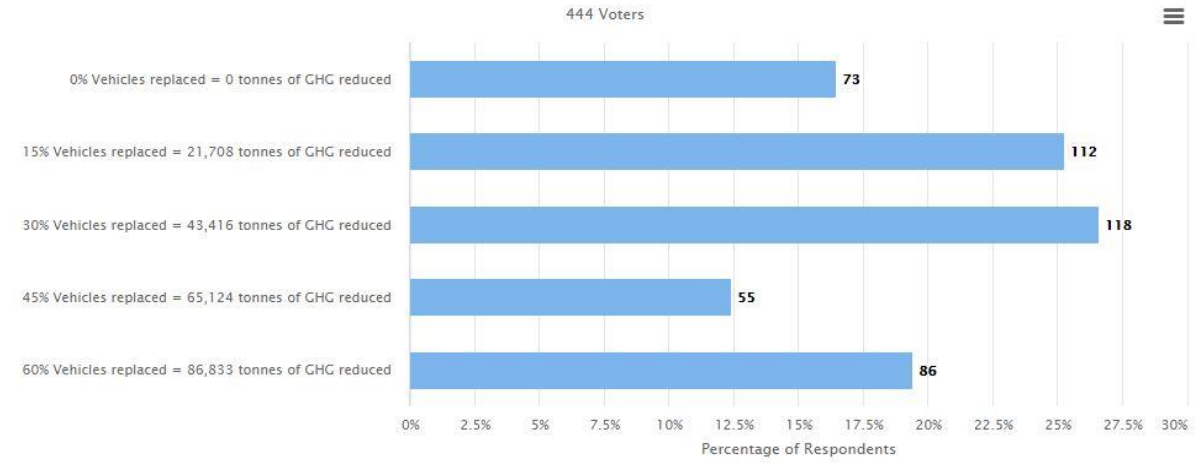
There are countless benefits that come along with public charging stations in municipalities. The increase in tourism and economic development is the first and most important municipal benefit. With the installation of Level 2 and fast/Level 3 charging stations, these often require EV owners to stop by and charge for an hour or so, and sometimes just to top up on their trips, but these encourage the municipality to be a destination choice for EV owners. This allows those who need to charge their vehicles the opportunity to explore the municipality, whether it be for a quick shopping trip or a bite to eat, it all helps to invest in the local economy and the small local businesses. This is a particularly interesting idea for more urban centres where tourists can walk freely, or in areas where there are parks and walking trails. Currently, there is an opportunity to partner with some surrounding municipalities and Counties, to work towards developing a rural EV corridor for improvements to tourism. This will also offer the opportunity to lower the overall cost of implementation of EV charging stations, while also increasing the desirability for tourism. There is a gap in southern Ontario in EV charging stations, and this results in being a deterrent for tourists with EVs to drive through the local municipalities. Taking the opportunity to explore a regional network and working collectively on this corridor will not only increase tourism, but will significantly reduce emissions. This opportunity will also explore opportunities for collaboration with Conservation Authorities, and the local utility companies, and other private industries for economic support. The utility companies should be consulted in the manner of what is the local energy capacity, answering questions like how much capacity can the local grid hold for charging station installation, are there any areas that should be avoided when installing chargers due to cost, and how do we increase local capacity in a sustainable manner, just to name a few considerations.

When choosing the locations of the charging stations, it will be important to speak to the public about the best and most desirable locations as well. If the expectation is for community members to transition to EV's, then it is important to consult with them to understand the places they feel would be most beneficial to have charging stations to reduce any range anxiety or fear of not being able to charge when they need to. This will ensure that all areas that are possible for charging stations can be considered fairly.

How many vehicles should and could we switch to electric within the next 10 years?

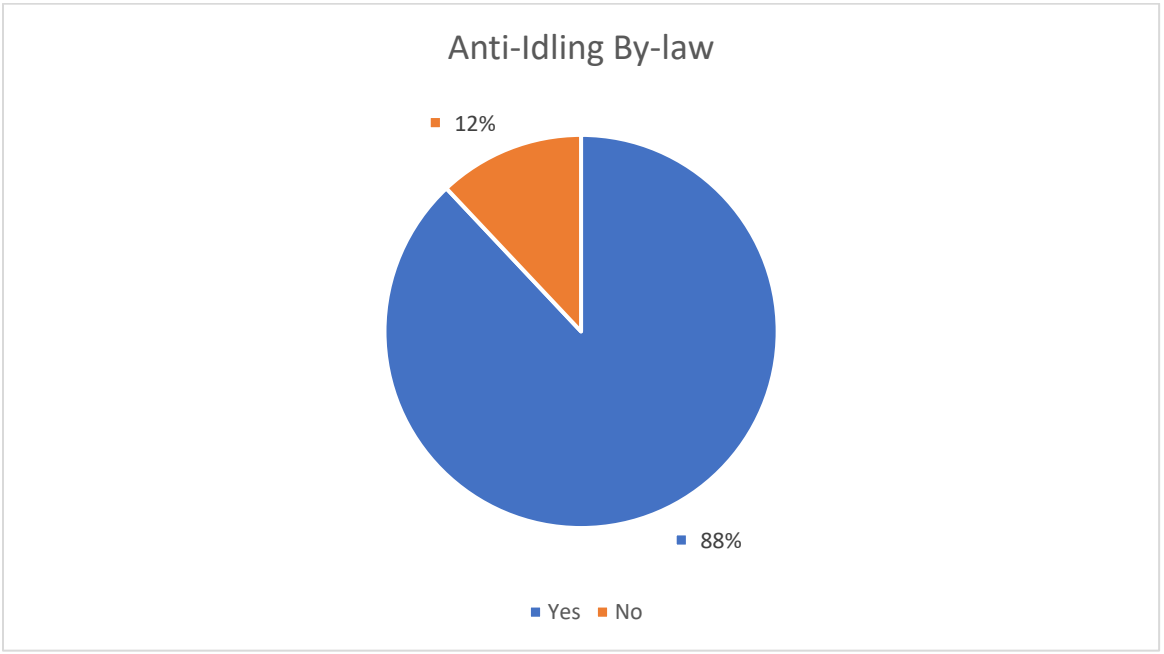


How much do you think we could and should decrease emissions from farm vehicles?



Action 4: Implement an anti-idling by-law

Idling contributes substantially to emissions across Canada and in the local community. It substantially contributes to lowering the local air quality as well. Natural Resources Canada has stated that if Canadians avoided idling for only three minutes everyday for one year, it would reduce national emissions by nearly 1.4 million tonnes of CO_2. Most commonly, idling is seen on school properties as parents drop off or pick up their children. The local Health Unit has expressed how this could cause concern for children and their health and well-being. Air pollution is known to cause many health-related issues, particularly in the most vulnerable age groups, such as youth and the elderly. It has been attributed to headaches and anxiety, impacting the central nervous system, irritation to the nose, eyes and throat, it leads to breathing problems, cardiovascular issues, it has even led to issues with the spleen, kidneys, blood and the reproductive system.[28] There are many serious impacts related to not only the health and wellness of the community but also related to the natural environment and habitats. It is well known that the burning of fossil fuels adds to environmental impacts and increases climate change impacts, therefore lowering the possibility for more fossil fuels to burn is a key step in combatting climate change. Implementing an anti-idling by-law is a quick and easy way to discourage residents from leaving their cars running unnecessarily.



[28] https://www.mfe.govt.nz/more/environmental-reporting/air/air-domain-report-2014/why-good-air-quality-important

Goal: Support and plan for future transportation changes, needs and priorities

Action	Timeline	Cost	Indicators of Success
Develop and Implement a Transportation Master Plan	Ongoing	Low	• Implementation and support of plan • Regular updates based on shifting priorities
Develop better interconnectivity and promote active transportation	Long term	Mid to high	• Increased uptake of active transportation • Increased connection between homes and major local destinations
Install charging stations	Medium to long term	Mid to high (grants, funding and partnerships available)	• Increased charging stations • Increased use of charging infrastructure • Increased number of tourists
Implement an anti-idling bylaw	Short term	Low	• Reduced idling, particularly in areas like school zones

Waste

Waste emissions across the county make up approximately 7% of the total emissions. Emissions from waste are generated by sending organic materials to the landfill. Landfills are anaerobic, meaning there is no oxygen in them, and so when organic material breaks down in the landfill, it does so through an anaerobic process which is what creates methane and the smell. It also takes a long time for organic material to break down in a landfill because of the lack of oxygen, which shortens the lifespan of the landfill as it fills quicker. The process of closing and opening a new landfill is incredibly difficult and creates a lot of environmental and economic issues. Locating a new space, digging a new landfill and closing an old landfill is an incredibly costly thing for municipalities to do, and is also incredibly damaging to the local ecology. Landfills are very large and require a lot of space around them, therefore locating a new space for the landfill removes quality ecosystems, and often pushes municipalities to the edge of their boundaries to find the appropriate location. Landfills cannot be too close to residential buildings due to the risk of leaking leachate, the smell and the noise associated with the work.

Over the past couple of years, Canada's recycling issues have come to light, with other countries closing their borders to plastic waste. This heightened issues with local recycling programs as it limited the types of plastics that could be accepted in recycling programs. Ultimately the ideal solution in this scenario is creating local markets, or moving to a zero waste community and supporting a transition to a circular economy. Municipalities are not able to deal with their plastic waste and often it is sent to the landfill because there is no other way to deal with the waste that is currently building up across Canada. With work, the community can support the move to zero waste, while also considering the needs of those who require tools like plastic straws or other typically disposable items.

Producer responsibility will help with the recycling-related issues but this does not address food waste or organics going to the landfill and producing methane emissions. It's important to realize that as more people move into the community, the more waste is expected to increase. This creates an opportunity for municipalities to develop new and innovative programs that help divert waste from landfills.

Action 1: Implement a Waste Management Master Plan

The development and implementation of a Waste Management Master Plan will specifically help to target and plan for waste related changes and projects into the coming years in each municipality. This plan helps to set targets for waste diversion and waste reduction, which are both crucial in reducing the waste that goes into the landfill. Landfills are known to emit greenhouse gases due to the organic waste (food, leaf and yard waste) that is often sent to the landfill where it breaks down and releases methane. The ideal goal of the waste management plan should be to focus on ways that the municipalities can reach zero waste and implement a circular economy.

By reviewing this document every year, the municipalities can explore opportunities to assist residents in reducing their waste, therefore reducing emissions associated with this sector. By committing to review resources and opportunities every year, it will allow the community to be leaders in ambitious and innovative approaches to waste management and reduction. Priorities within the Province and the Country are changing and targets for waste minimization are increasing in their ambition, therefore municipalities need to be ready for the upcoming changes.

As the community continues to grow, and more variations of multi-residential buildings are put up, it will be important to ensure that those living in multi-residential buildings have the opportunity to participate in the waste diversion programs. This will also offer the opportunity to explore options for those living in multi-residential buildings, who often are left out of conversations surrounding organics programs. Often, this is an area where many have to throw their food waste into the garbage and send it to the local landfill, but if there is an alternative composting option that works for small units, then this should be explored. Multi-residential buildings are known to often be excluded from municipal waste diversion programs due to the difficulty of monitoring and implementation, and how contracts work on private properties. This plan will need to ensure inclusive and comprehensive education is offered to all residents.

This plan should also focus on how to support producer responsibility to ensure that all waste entering the municipality is properly disposed of and not simply sent to the landfill. The municipalities and County can advocate for broad implementation of a producer responsibility program, which will ensure local residents have the opportunity to buy better made or packaged products that are less wasteful.

Action 2: Implement an Organics Program

An organics program can look different for every municipality. Knowing that the City of Stratford has implemented a new green bin program and watching the success of diversion, and ultimately lowering the emissions associated with their landfilled waste, it only makes sense for those municipalities still sending organics to their landfill to implement solutions that their residents can easily use. Landfills release emissions due to organic materials being sent to the landfill by residents. Therefore it is important for each municipality to encourage and measure the success of their diversion programs, like an organics program.

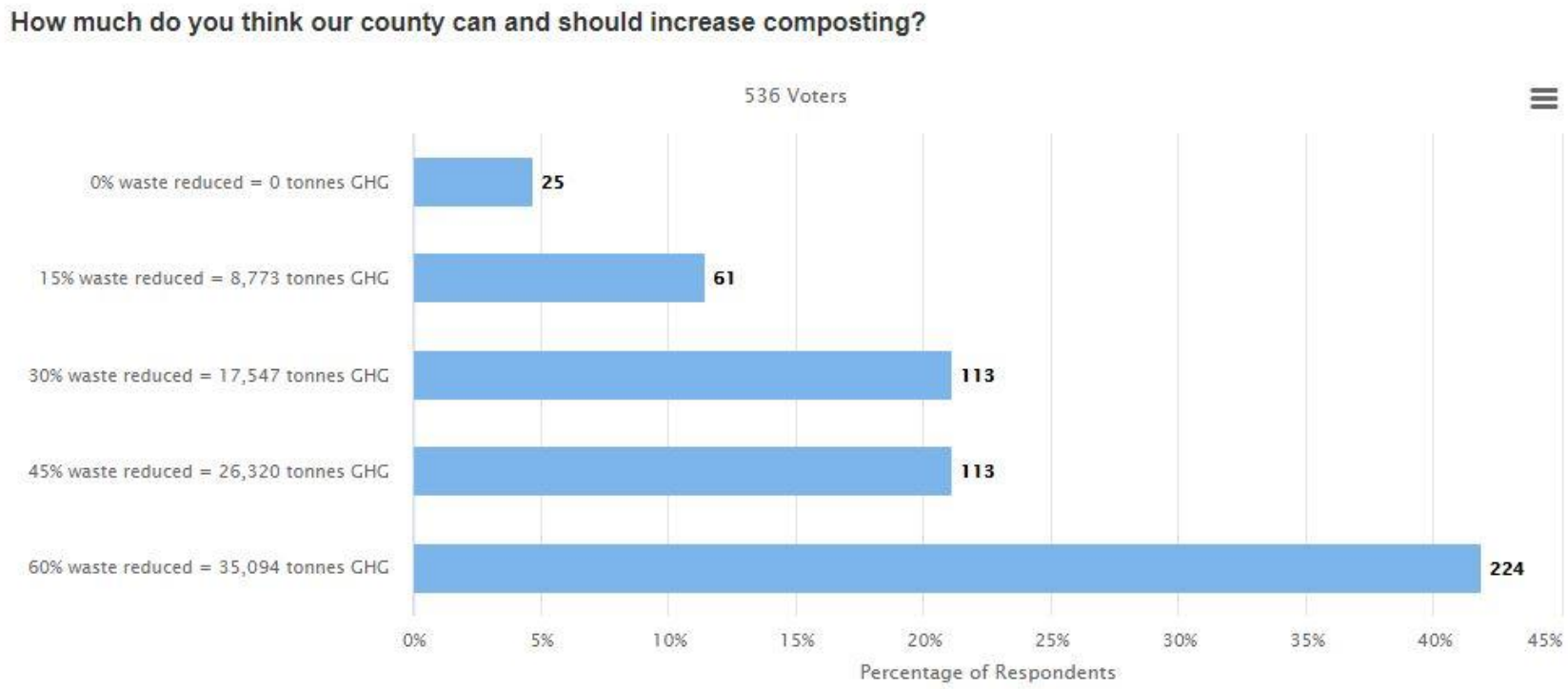
The City of Stratford implemented a new organics green bin program in early 2020, with the plan to move forward on the development of a renewable natural gas facility. Regular monitoring in Stratford is being done on the diversion of organic waste, which will significantly reduce greenhouse gas emissions coming from Stratford's landfill long term. It is expected that through Stratford's implementation of an organics program that emissions related to waste will decrease substantially, moving closer to the reduction target.

As new residents continue moving into the county, expectations for organics programs continue to mount. There has been an increase in residents moving from larger surrounding cities that already have organics programs implemented, and they look for that continued program in their new home, as there is an understanding of the benefits and they have chosen to make it part of their everyday habits. The implementation of a program like this will also help the community move towards a goal of becoming zero waste. As organics programs become more and more popular, there are many more options available to tailor to the diverse needs within each municipality.

This can either be a county-wide initiative, where municipalities work together to implement a successful organics program, or the municipalities can independently assess the feasibility of an organics program within their own municipal boundaries. If a county-wide approach is taken, a larger organics facility could be explored, where organic material collected throughout the County is taken to a local facility, and compost could be created through this process and given back to residents and the local farmers to encourage a cyclical approach to local waste disposal. Further exploration of this type of facility is needed, and a feasibility study can be completed to assess the effectiveness of this type of program. Individual municipal options vary greatly, and can still offer the same cyclical understanding of food waste. There are new technology options available that allow individuals to create their own nutrient-rich soil

amendments that they can use at their own homes, in their own gardens, or this at home product can be picked up or dropped off at a facility for bulk processing[29].

Another opportunity is to explore partnerships with local farmers who already use their own organic waste on their own property. This could be another opportunity to produce biogas at a local level, developing a cleaner grid and also supporting the development of the local economy. Mixing manure and food waste in a co-digester is known to increase the production of methane, and be a more stable process than using just food waste in a digester to create bio-gas[30]. This is known to be a more efficient method and should be further explored with the local agriculture community to further gauge possible partnerships and interest in this type of project.



[29] Food Cycler (2021) Food Cycler. Retrieved from: https://www.foodcycler.com/
[30] https://www.nature.com/articles/s41598-017-15784-w

Goal: Reduce waste going to landfill to become a Zero Waste community

Action	Timeline	Cost	Indicators of Success
Develop and Implement a Waste Management Master Plan	Ongoing	Low	• Implementation and support of plan • Regular updates based on shifting priorities and goals
Implement an Organics Program	Medium-term	Mid to high (grants, funding and partnerships available)	• Reducing the organics going to landfill

Natural Environment

While it is first and foremost important to reduce the emissions by ending the burning of fossil fuels, it will also be important to sequester the emissions already released in the community and work to sequester emissions that just cannot be stopped yet. The environment and the biodiversity within the County is important to preserve, and also to restore. It is common practice for people to remove the naturally growing native species of plants to put in lawns, or more traditional flower gardens, however, these native species are meant to grow in our local climates, they are meant to be resilient and ensure strong biodiversity across the county. Society needs to learn to listen to the Earth and understand what it needs to prosper. Taking on a more holistic lens will be important moving forward on climate actions.

There are many projects that could be implemented across the region to increase naturalization and sequestration opportunities. Planting and re-naturalizing have many co-benefits. For example, when planting next to rivers and lakes, this helps to stop the banks from eroding as the soil quality improves in those areas due to a strong root system, this also helps reduce nutrient runoff from agricultural lands which are known to add high levels of phosphorus and metals, which can sometimes lead to water contamination issues. This will also help to keep rivers and lakes cool, which also leads to increased dissolved oxygen levels in the water which is important for aquatic animals and habitats to thrive. Naturalizing is also an effective way to implement flood risk management, with increased root systems throughout the municipalities, this significantly reduces the risks associated with flooding. Not only that, but naturalizing parks and municipally owned properties also leads to reduced lawn maintenance. That leads to less mowing, which means less fossil fuel burning equipment for municipalities.

Other opportunities for planting projects could be related to community gardens. A community garden is a great way to not only help in sequestering emissions, but also a great way to build community, improve access to food, improve local intake of fruits and vegetables, and reduces health risks through increased activities and access to fresh produce. This is a great opportunity to allow those who are lower income to have improved access to fresh produce. There are so many more benefits related to how the community feels as well, it helps to improve mental health and promotes relaxation in caring for this space. This type of project also encourages useful ways to fill vacant land in the municipality.

The local Conservation Authorities advocate for another type of natural or green infrastructure, which is a Low Impact Development (LID). These are defined as being systems or practices that tend to mimic natural processes and lead to infiltration, or evapotranspiration. They can also use stormwater, which assists in protecting water quality and the aquatic habitat. There are a few LIDs around the municipalities, typically seen in the form of stormwater ponds. Examples of LIDs that can be put on private property

or in parks around the municipality could be in forms of rain gardens, permeable pavement or rainwater catchment systems. LIDs are known to help increase property value, and are known to lower costs associated with government clean-ups after flood events.

Not only will this help to reduce the cost of clean up, increase property value, but it also helps to improve mental health and wellness. Increasing the number of plants throughout the community helps them to be more beautiful and appealing to live in, which also encourages an increase in local property value. Increasing naturalization across the county will benefit everyone, the environment, and native species.

Action 1: Decrease lawn cutting and maintenance by increasing naturalization projects and planting projects on public and private spaces

In parks across the county, the main form of vegetation is grass. Grass requires a lot of maintenance like mowing, which burns a substantial amount of fossil fuels per year. A quick way to reduce the lawn maintenance is to move towards implementing naturalization projects in public parks. This would help municipalities reduce their costs associated with lawn maintenance practices and begin to put a focus on ways to continue to beautify and naturalize more of the municipality. It allows opportunity for education as well, as it showcases what kind of plants and species are native to the local area, and can showcase biodiversity and natural ecosystems. Naturalization projects can often be assisted by local schools to encourage a deeper connection to the environment and allows an opportunity to teach about biodiversity and land use. The naturalization of spaces is important as it allows for the natural and native biodiversity and ecosystems in the community to return and thrive. Ecosystems and biodiversity are incredibly important and have intrinsic value, as they provide ecological life support, provide clean air and water and many other ecosystem services. Biodiversity also provides local resiliency and allows for quick recovery in cases of a variety of disasters, such as flooding for example.

Action 2: Partner on a tree management and resilience plan to increase canopy coverage

Canopy coverage across the county is known to be low. This raises concerns for municipalities because of the many issues with low levels of green space and trees and the associated socioeconomic and environmental impacts that come along with a lack of natural space. The natural habitat of southern Ontario is a more naturalized, wooded, swamp/marshland, so increasing canopy coverage and protecting naturalized land is very important for local biodiversity and ecosystems. Trees help to improve local air quality by removing carbon, they improve soil quality by adding nutrients into the ground, they help in replenishing groundwater, they provide natural fertilizer and habitat through the loss of their leaves and needles, and improve the well-being of the local community.

The municipalities have their own tree planting programs, but forested areas have not been actively protected, and canopy coverage has not grown. Priorities should be on preservation of forested land and protecting trees and growth throughout the municipalities, while also continuing to plant new but native species of trees. Municipalities should partner together to create an overarching goal of canopy coverage, and work together on developing bylaws for protecting trees. Exploration of a local private tree by-law should also be done to protect native species on private land.

This program needs to ensure that native species are only considered for planting, and there is a management program for trees that are diseased. This should be consistent across the county.

Action 3: Develop more LIDs throughout municipalities and on municipal property

A way for municipalities and the county to increase local resiliency and sequestration is through the development of more low impact development (LID) projects. LIDs can vary greatly in project types, but are known to be a land use planning and engineered design to manage storm water runoff. LIDs can be small projects that residents can have on their properties, or can be larger projects that the municipalities or the County can invest in. Working with the local Conservation Authorities on locations and best practices for increased LID projects is a crucial partnership to maintain. LIDs not only help to increase the local community's resiliency to climate change impacts by reducing risks associated with flooding, they usually help to increase sequestration, particularly when implementing LIDs like rain gardens, but they also help to benefit the municipality and county in other ways as well. Other benefits from LIDs are things like infrastructure savings, improved tourism and recreation opportunities, reduced heat-island effect, and increased public health, livability and walkable communities[31]. In the neighbouring Region of Waterloo, an organization called Reep Green Solutions, which is an environmental not-for-profit, helps local residents put rain gardens on their properties to increase local resiliency and beautify neighbourhoods.

[31] City of Hamilton (2017) Low Impact Development (LID) – Stormwater Management. Retrieved from: https://www.hamilton.ca/home-property-and-development/water-sewer/low-impact-development-lid-stormwater-management

Goal: Preserve and improve natural ecosystems and assets

Action	Timeline	Cost	Indicators of Success
Increase naturalization projects	Ongoing	Mid	• Increased naturalized spaces • Increased number of native species
Increase canopy coverage	Ongoing	Mid	• Higher percentage of canopy coverage across the county
Develop more LIDs	Ongoing	Mid	• Increased number of LIDs

Agriculture

Agriculture is a large part of the local economy and culture of the county. In 2016, there were approximately 2,231 farms with a total of approximately 518,023 acres, this sector produced over $838 million in cash farm receipts.[32] Agricultural land has decreased across the province due to increased urbanization, which continues to increase this sector's vulnerability.

Farmers are known to be environmental stewards because of their reliance on the environment and climate for success of their business. The agri-business sector has had to adapt and change their practices to be more resilient to adjust to the changing climate. Technology associated with this sector has also seen substantial improvements which has also led to a reduction in emissions.

Climate change creates not only risks for the agricultural community, but also opportunities. It is well-known that increasing temperatures means a longer growing period, however this also leads to risks of water stress due to increased risk of flooding and drought. Increased temperatures may lead to longer growing seasons, but this can also mean problems for those who have livestock. Livestock, such as chickens and cattle can be very sensitive to temperature changes, which ultimately can impact the bottom line of many farmers, and risk the well-being of the livestock. The agri-business sector in Perth County will have to explore more adaptive measures to ensure their resiliency. Adaptive measures that are currently in place, are things such as crop selection, and soil and water management, all of which have helped many farms in the area in the past. However, more measures will need to be explored as the climate continues to change. The agricultural community has continued to adapt their best management practices and will need to do so to promote enhanced production, resiliency and efficient use of their resources.

This community will be an imperative part in the fight against climate change. Farmers are already taking action through best management practices like reduced tillage, expanding their crop rotations, planting cover crops and reintegrating livestock into crop production systems. These and many other best management practices, currently being done across the county, are known to reduce emissions associated with agriculture practices that burn fossil fuels, but also help to improve soil health, and increase the ability to grow food locally into the future. These practices also help to sequester emissions from other industries as well. It is important for the municipalities and the County to gain a better understanding of the current efforts going on within the county so that measurements on sequestration can be done.

[32] Perth County (2017) Perth County Community Profile. Retrieved from: https://www.perthcounty.ca/en/doing-business/resources/files/Accessibility-Update---Edited-PDFS/Business/Perth-County-Community-Profile---accessibility.pdf

Another opportunity that the agriculture community presents is the increasing feasibility and ease of using methane capture systems and using the biogas to generate energy and electricity. Currently, across the US, there are many farmers who utilize methane capture systems, such as digesters, and it is widely recognized as efficient, effective and even revenue-generating for farmers. With the right partnerships, the agricultural sector can more easily explore digester usage as a feasible option. Digesters are known to be costly, but there are many businesses in the US that partner with farmers to assist them with projects like this. They help supplement the upfront costs and find funding opportunities for farmers to have greater access to implementing these types of emission reducing and energy producing projects. This creates an opportunity within the county to utilize the strong livestock sectors to generate electricity in a way that is considered to not have emissions associated with it, referred to as a biogas. Biogas is considered to be a carbon-neutral gas, but only if it is captured and used for energy sources.

Over the coming years, more funding opportunities will arise as Canada's ambitions to become Net Zero continue. It is expected that an increase in resources and funding will be available to help support the agriculture community continue to be leaders in climate change actions.

It is important to note that agriculture emissions and the calculations associated with them have high levels of uncertainty, as there are many variables to consider, for example, how livestock plays a role in the natural carbon cycle, if a farm tills or does not, the type of crops that are grown or if cover crops are used, and the list goes on. Continued research on the differences between biogenic methane and fossil fuel produced methane is being done, and how biogenic methane is viewed as cyclical, while fossil fuel methane is a one way trip to increased emissions and climate impacts[33]. This is why the emission total is not included in the main inventory. More data collection on the local level needs to be done to understand the level of sequestration the farming community already does. It is also crucial that the focus be on the fossil fuel consumption of the community first and foremost, while supporting the agriculture community in assisting with sequestration efforts.

This community has shown that they are capable of making the necessary changes to increase resiliency while ensuring the viability of their business. However, it is important to offer further support if they are also expected to take on more action across the county to help with increased sequestration. These actions will help the agricultural community reduce their emissions related to fossil fuel burning, while also increasing their capacity in sequestering emissions from other sectors' fossil fuel burning sources.

[33]AgriLand (2020) Latest science on methane emissions 'ignored' by media – Dr. Mitloehner. Retrieved from: https://www.agriland.ie/farming-news/latest-science-on-methane-emissions-ignored-by-media-dr-mitloehner/

Action 1: Develop a Perth County Clean Water Project

Currently, across Ontario there are a number of programs in place to ensure the farming community has access to funding and resources to implement resiliency projects, projects that reduce runoff and in turn improve local water quality. These programs are offered through partnerships with the local Conservation Authorities and the municipalities or the County. There is currently a clean water program that is strictly offered by the local conservation authorities in Perth County, but there is an opportunity for the County and municipalities to take action and help to offer greater support to this sector.

The neighbouring Counties of Huron, Wellington and Dufferin, have developed and successfully implemented their own Clean Water Projects in partnership with their local Conservation Authorities. They have seen many successful projects, such as tree planting programs, windbreaks, upgraded wells, decommissioning of unused wells, decommissioning of liquid manure storage, erosion control projects, Forest Management Plans, livestock restriction fences around streams, and cover crop plantings. These programs offers financial and technical assistance to implement successful projects.

Projects that are being considered in Perth County should be reviewed and assessed with the local Conservation Authorities, and the farmers living within the County. These projects will not only ensure long term resiliency of the agricultural community within Perth, but will also help to remove greenhouse gases and improve the agri-business community, economically. These projects also help to ensure that the community will have long term food-security.

This is a program that is reliant on farmers to move forward and implement on their properties, so collaboration and consultation will be necessary for effective development and implementation. Developing a stakeholder group on how this could be successfully developed and implemented will be necessary to meet the needs of local farmers.

The Clean Water Project will work with the Conservation Authorities and the local farming community to maximize the local best management practices to implement successful sequestration and resiliency projects. The local Conservation Authorities have many resources and knowledge to share to support these agriculture best management practices, and the local farming community also has the resources and knowledge to put these practices into action in the most impactful manner.

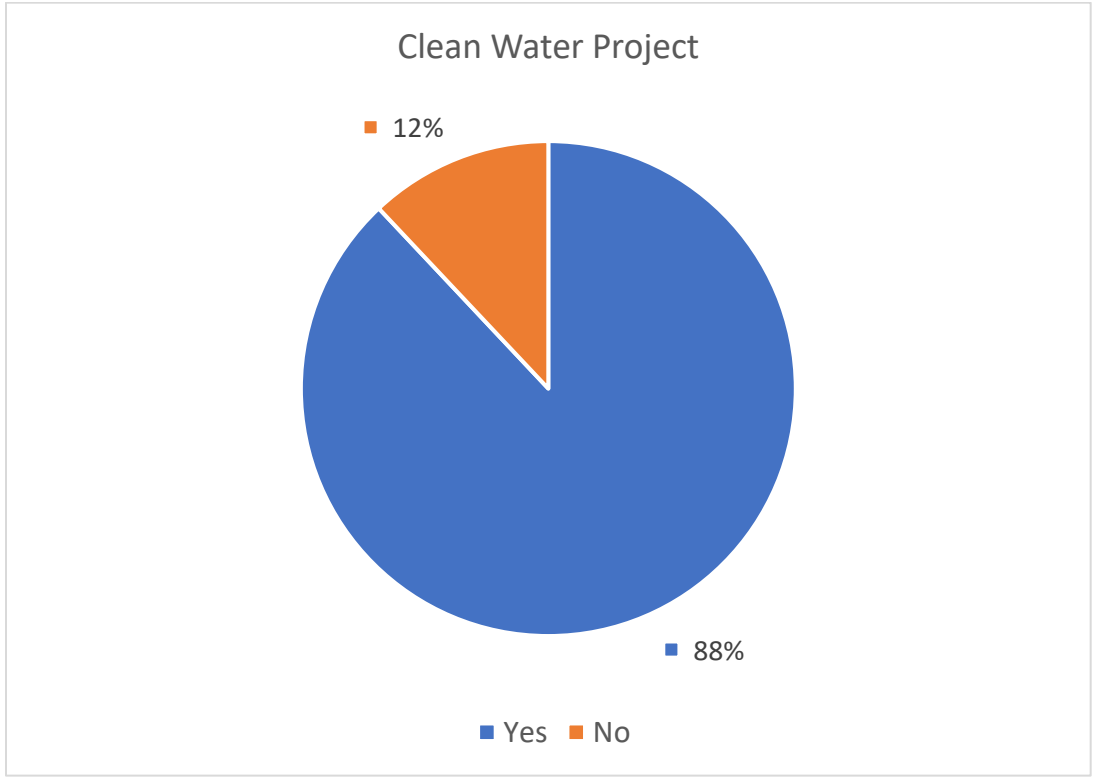


Figure 5 Survey responses for the development of the Perth County Clean Water Project

Action 2: Form an Agriculture Committee

To ensure the successful development and progression of the Clean Water Project, and any future agriculture-related programs or policies, it is important to develop an agriculture committee. There are many benefits associated with the development of this committee. Benefits include an increase in information and data sharing to better understand the work already being done within the agriculture community to sequester emissions, an increase in programs and policies to support this part of the local economy, an increase in the number of farms being able to participate in best management practices that increase carbon sequestration and improve soil health, providing resiliency to the farming community against climate change impacts, and an increased likelihood of government support and funding. Understanding the local needs of the agricultural community will ensure long term food security, long term economic success and improved relationships and partnerships. There is a vast wealth of knowledge of environmental best practices that the farming community has, and allowing the opportunity to use that knowledge and support its successful implementation will not only help the local economy, but will also help in ensuring resiliency of this important local sector. Perth County relies on the success of their farmers, and involving them in this type of work within the community is incredibly critical to long term success and economic stability. The agricultural community is part of the solution, and should be actively involved and consulted.

Goal: Support local Agriculture resiliency and mitigation projects

Action	Timeline	Cost	Indicators of Success
Develop a Perth County Clean Water Project	Ongoing	Mid to high Assess and split between municipalities, County and Conservation Authorities *Assess yearly*	• Buy-in from local farmers • Use of the program
Form an Agricultural Committee	Ongoing	No cost	• Local farmers joining • Shared data and information on local best practices • Increased resiliency and lowering risk to local farmers

Reduction Target

The minimum reduction target that should be achieved by 2030, is 10% below the 2017 baseline year. This reduction target was set in consideration of the Paris Agreement targets and goals.

Based on the results of the survey, the community is supportive of a 30% reduction target for 2030 (based on the 2017 baseline emissions). This is an ambitious target, and will require strong community involvement and support from community leaders if the community plans to actively work to achieve this target by 2030.

Long term targets need to be assessed and set as progress is made towards the initial greenhouse gas reduction target.

The ideal long term target is to reach Net Zero by or before 2050, to help in ensuring the global target of not surpassing 1.5°C.

Exploration of developing a Carbon Budget would be a good next step to assess the rate at which the partners should be reducing their emissions to the 2050 target, with interim targets set between. This will ensure an equitable approach to reducing emissions across the county.

Implementation Strategies

This greenhouse gas reduction plan was created to guide each municipality and the County, as well as their communities to reduce their greenhouse gas emissions and create a healthier and prosperous place to live. There are many steps involved with successful implementation of this plan, and will need strong collaborative relationships in order to be successful.

Governance

This plan is intended to be a support for the community to lead in climate action, and led by the municipalities. This implementation strategy will allow the municipalities and the County to be leaders in the climate actions, while also allowing for shared responsibility of implementation. It will be important to leverage the capacity, knowledge and capital of the community for any strategies that are beyond what the municipality or the County can be responsible for.

Council

Council is responsible for the approval and adoption the plan. Council will also be responsible for approval of future annual work plans as they are developed. Members of Council should also be included in the review of future work plans to provide feedback based on local needs and priorities.

External Working Group

A working group should be formed to assist in the continued implementation of projects and goals. This group should include individuals from those that will play key roles in implementation of the plan's strategies. These could include members from staff, conservation authorities, utility companies, members from the school board, members from any municipal environmental committees, members from the OFA, OMAFRA and the Perth County Federation of Agriculture, Builders Associations, Rotary Clubs and many other local stakeholder organizations, and should also welcome those members of the general public who are interested in local climate change action. The working group should be facilitated by the climate change staff to ensure realistic and achievable work plans are formulated, and actions for the year work synergistically. The climate change staff will also have a better understanding of funding availability and can therefore assist further in the implementation.

This group should meet periodically throughout the year to develop their work plan for the year and to report on the progress that they are making. It is anticipated that at minimum, this group should meet twice a year, however to start the steps towards successful implementation, meetings should be more frequent to establish clear goals and a work plan for the coming year.

It will also be important to form working groups for many of the separate actions throughout the plan, because implementation will be made easier with groups of relevant stakeholders for those actions. As implementation moves forward, this can be assessed on an action by action basis depending on the needs associated with it. This decision to form smaller and separate working groups should be collaboratively decided based on the actions being implemented year by year by the working group.

Internal Working Group

Each municipality and the county should organize an internal working group. People in this group should be from the Public Works, Finance and Asset Management, Parks and Recreation, Building and Planning, and Transit/Transportation departments, or any other individuals within the municipality that are interested in working on ways to reduce municipal and county energy consumption and reduce GHG emissions. This group should be working to be champions for the Conservation and Demand Management plans, and should work on reducing municipal energy consumption. The CAO should also be a member in this group, and should champion the movement to reduce corporate energy and emissions.

Climate Change Staff

To ensure success in the implementation of the plan and ensure future iterations of the climate change plan, it is recommended that new climate focused positions be put in place across the partners. It is recommended that three new positions be created to maintain and ensure climate actions are continuing into the future across the county. The scope of the work across the municipalities is large, and will therefore need resources to ensure success. The extra staff members may not be necessary for the first few years of implementation, but will be necessary for long term success and commitment in ensuring a climate-ready community. Performing a cost-benefit analysis as the plan moves forward into implementation will be necessary to evaluate when to bring in a larger team, and developing a business plan and case around these roles should be developed. These roles can and should be shared amongst the partnering communities to ensure broad and successful implementation while keeping costs at a manageable and low level.

Climate Change Coordinator

The Climate Change Coordinator will be the lead staff member on climate change projects. They will ensure that the Engagement Coordinator and the Energy Manager are moving forward in their actions and projects, and will be in charge of setting scope and goals for each municipality and the County. This role will also be the collaborative point of contact between the Engagement Coordinator and Energy Manager, and will ensure corporate and community plans are organized and completed in a comprehensive and interconnected manner. This position will be in charge of the main interactions with decision makers and presenting plans and updates to Council, to ensure that progress is continuing.

The Climate Change Coordinator will be in charge of completing the community greenhouse gas inventories, and collecting data and submitting progress through the PCP Tool. They will be the lead on updating future iterations of the greenhouse gas reduction plan, and will also begin the process of developing an adaptation plan for each of the communities, and assess their vulnerability and each municipality and their assets with collaboration within each municipal department.

The Climate Change Coordinator will also be in charge of identifying funding opportunities for projects and plans to increase the likelihood of successful implementation. This role will also be required to work with the working groups and committees to communicate priorities, and provide updates on progress, and will be the key communicator for all climate work.

Engagement Coordinator

The Engagement Coordinator is crucial for community and corporate plan development and implementation. Having a role to focus on engaging staff and community members in climate actions will ensure that climate change considerations are embedded and

considered in everyone's decisions and actions. This role will help to keep climate change action at the top of mind and will focus on ensuring equitable involvement for the community.

The Engagement Coordinator will be in charge of facilitating and leading working group meetings. This role will act as the main liaison between the general public and the climate change staff team. This position will also be in charge of developing outreach and education content with the public and staff to ensure thorough engagement and input is completed.

Energy Manager

The Energy Manager position is an important role for ensuring the assessment and completion of a corporate climate change plan. This role will assist in the integration of climate action into processes within the municipalities and the county.

The Energy Manager will focus on corporate emissions and assist in corporate decisions to reduce emissions in buildings and fleet. This position will be in charge of keeping track of the municipal and county corporate emissions, and completing the emissions inventories for each municipality and the County. The person in this role will be in charge of assessing corporate owned buildings and their efficiencies, and will provide recommendations on ways to decrease energy consumption and increase sustainability.

This role will have a strong understanding of building science and how energy systems work within buildings, to assist further in yearly reporting and internal energy saving and emission reducing actions.

Importance of Partnerships

With this greenhouse gas reduction plan having a focus on the community, it is important that the municipalities and the County rely on the expertise of external organizations to partner with to ensure successful implementation. Not every action relies solely on the role of the municipality, so it's important to identify key players that could take on lead roles in particular actions.

A list of partners should be thoroughly developed when moving forward on implementing actions. These partners could and should include:

- Conservation Authorities
- Enbridge
- HydroOne
- Festival Hydro

- Erth
- IESO
- Perth County Federation of Agriculture
- Ministry of Agriculture, Food and Rural Affairs
- Ontario Soil and Crop Association
- Conestoga College
- University of Waterloo
- The Huron Perth Public Health Unit
- Environment and Energy Committee
- Trails, Forestry and Environment Committee
- Green Committee, etc.
- Building associations

Integrating with Business Plans and Budgets

Climate change impacts the way governing bodies can deliver services. Understanding that it takes time to integrate these strategies into the municipal and county plans and budgets, it will be important to identify those first few steps that can be implemented at no or low-cost, so implementation can begin right away. It is also important to identify those actions that need more budgeting so they can be prioritized to include in the upcoming budget cycles. It will be up to the municipalities, the County and other lead partners to identify the cost of strategies and actions proposed in this plan, as there may be funding and partnership opportunities to assist in implementation in the coming years.

Integrating Municipality, City & Township Plans and Policies

Municipal and County staff should take this opportunity to identify strategies on how to integrate this plan into their own plans, policies and initiatives. This could be seen in many facets:

- Reassessing procurement processes to understand GHG emissions and the climate risks associated with particular products, services and vendors, so that supply chains support the climate change objectives
- Adding low carbon, climate resiliency considerations and plans for any expansion of EV charging infrastructure development and development applications into Official Plans

- Integrate ecosystems and green infrastructure into Asset Management Plans
- Integrate climate risks and strategies into Emergency plans and procedures
- Incorporating climate change projections and any flood risks in the Stormwater Management planning
- Train staff on climate change and how it impacts their jobs and community

Potential Funding Avenues

Federation of Canadian Municipalities (Green Municipal Fund)

Canada Revenue Agency tax incentive for industrial investments in energy conservation and clean energy generation

Infrastructure Canada

IESO (Conservation Fund)

Ontario Ministry of Agriculture, Food and Rural Affairs

The Federal Canadian Industry Program for Energy Conservation

Federal Governments Climate Action Fund

EcoAction Community Funding Program (to partner with community groups/not-for-profits)

Ministry of Environment and Climate Change Funding Programs

Communication and Education

In order to ensure successful implementation occurs, it will be important to engage the communities (community groups, residents, visitors, staff members) in the climate change conversation, and how reducing impacts will help in improving their own and their community's well-being. Effectively communicating the benefits of climate action will ensure long-term success of implementation of projects and other future actions. It is important to continue to educate both the community and staff on how to decrease their impacts on the environment, and what kinds of risks will be associated with the changing climate.

The community should be actively involved in the conversation of this plan and the yearly planning goals for the continued implementation process of the plan. It is important to let the community know what kind of progress is being made on this plan and where targets will be set for future years.

Reporting and Renewal

There will always be changes to governments, population growth projections and technological advances, so it is important to continue to update this plan to change with those variations. The plan should be renewed the year following a municipal election to ensure that new targets and actions can be developed for the following four years.

The plan's progress should be reported to Council by the External Working Group and their reporting process that they will have established. This progress report should indicate what has been done, and how these actions have assisted in GHG reductions, and what next steps will be taken to further reduce emissions.

The municipalities and the County should hold a yearly event surrounding the accomplished climate actions, and to celebrate the continued progress of the municipality/county and its community members. This would also offer opportunity for public input on future goals and actions for the following years.

All municipalities and the County should work together to make this a large community event to ensure everyone is included in celebrating progress and supporting future climate change actions. It is important to showcase how the communities are all connected and working together to create a healthier and more prosperous future. Individual municipalities may also host their own events to celebrate actions and to gather information directly related to their municipalities and their goals for reducing emissions and increasing resiliency.

Municipal and County Emission Breakdown

Geographic Perth County

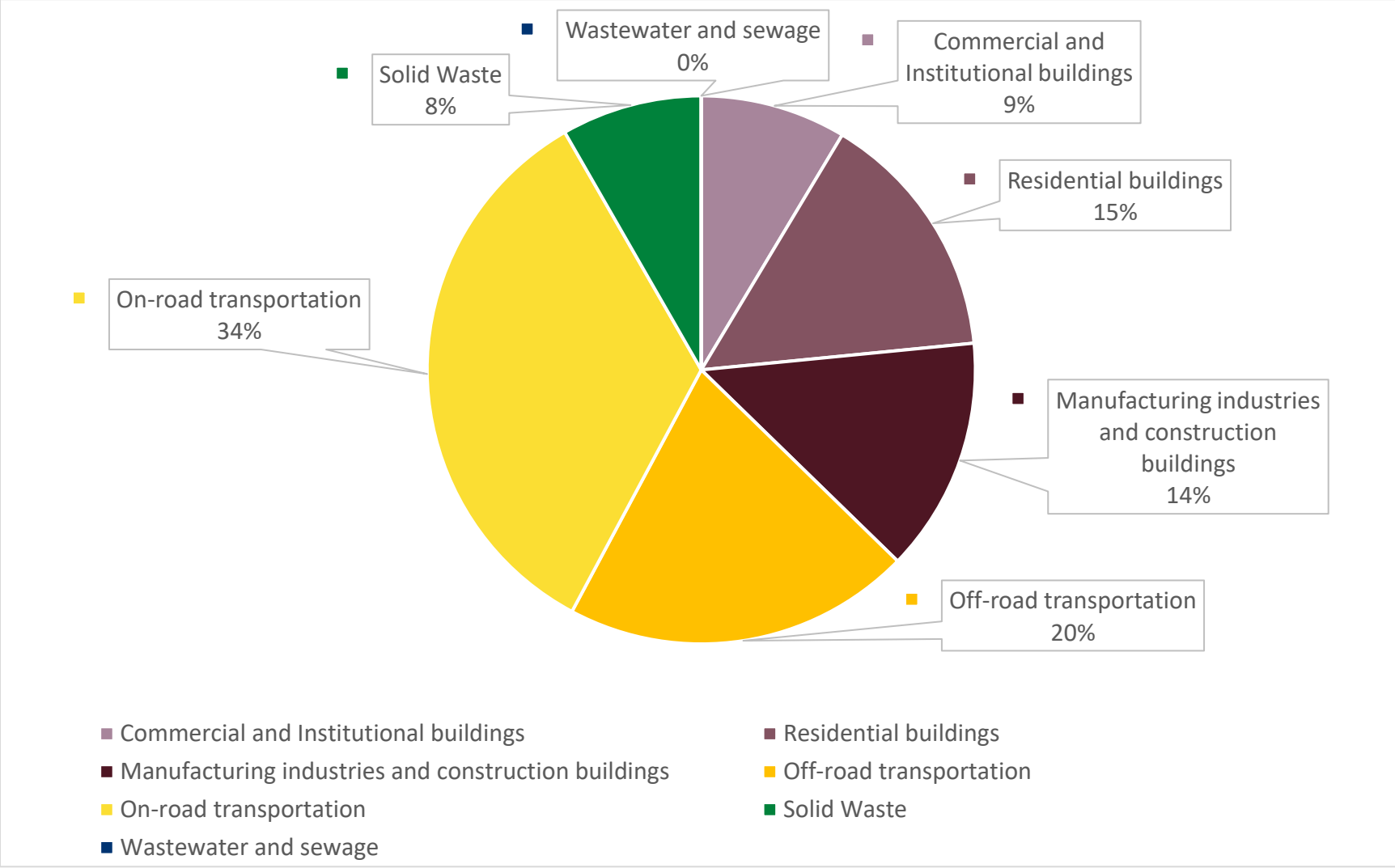
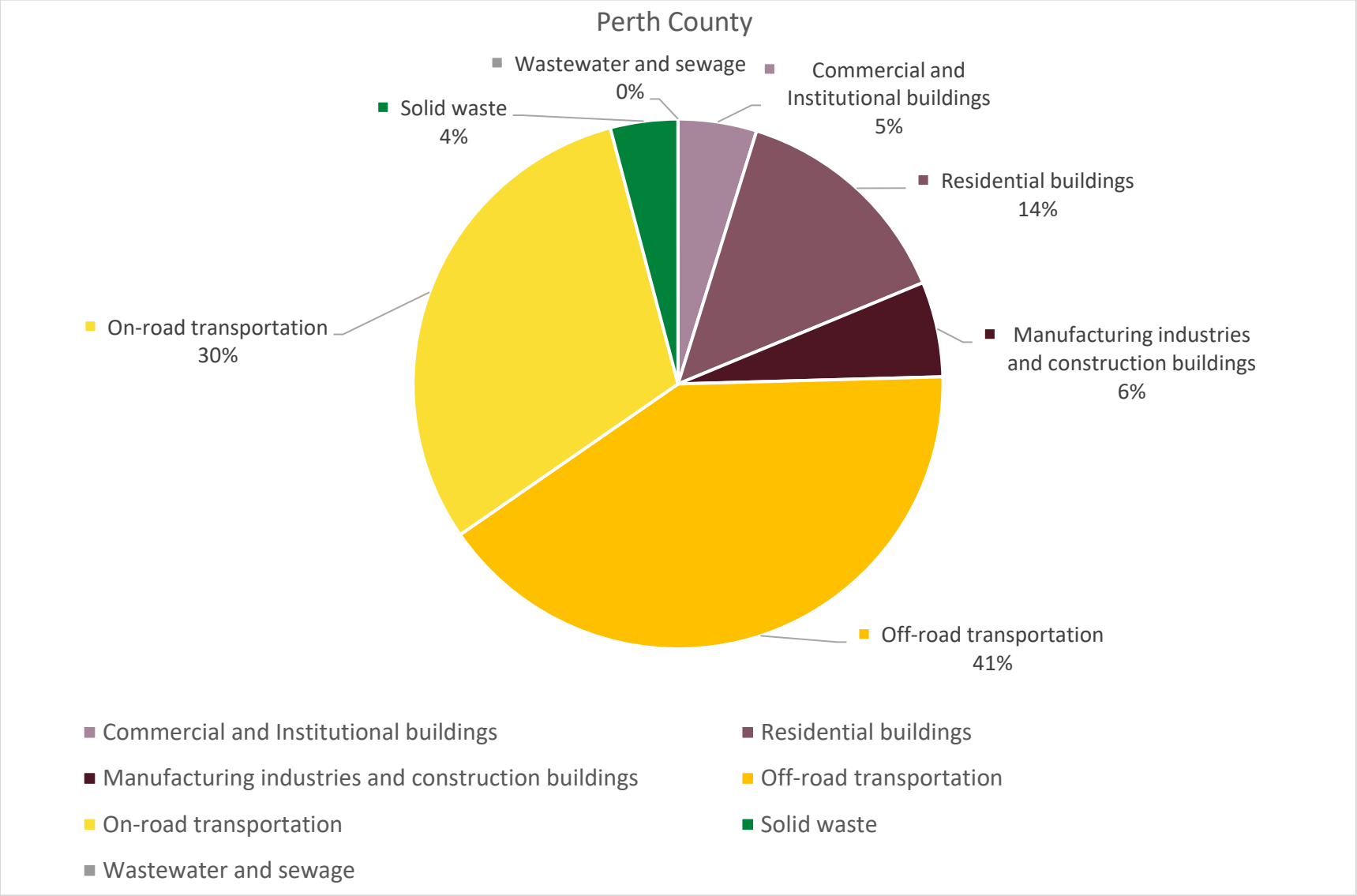
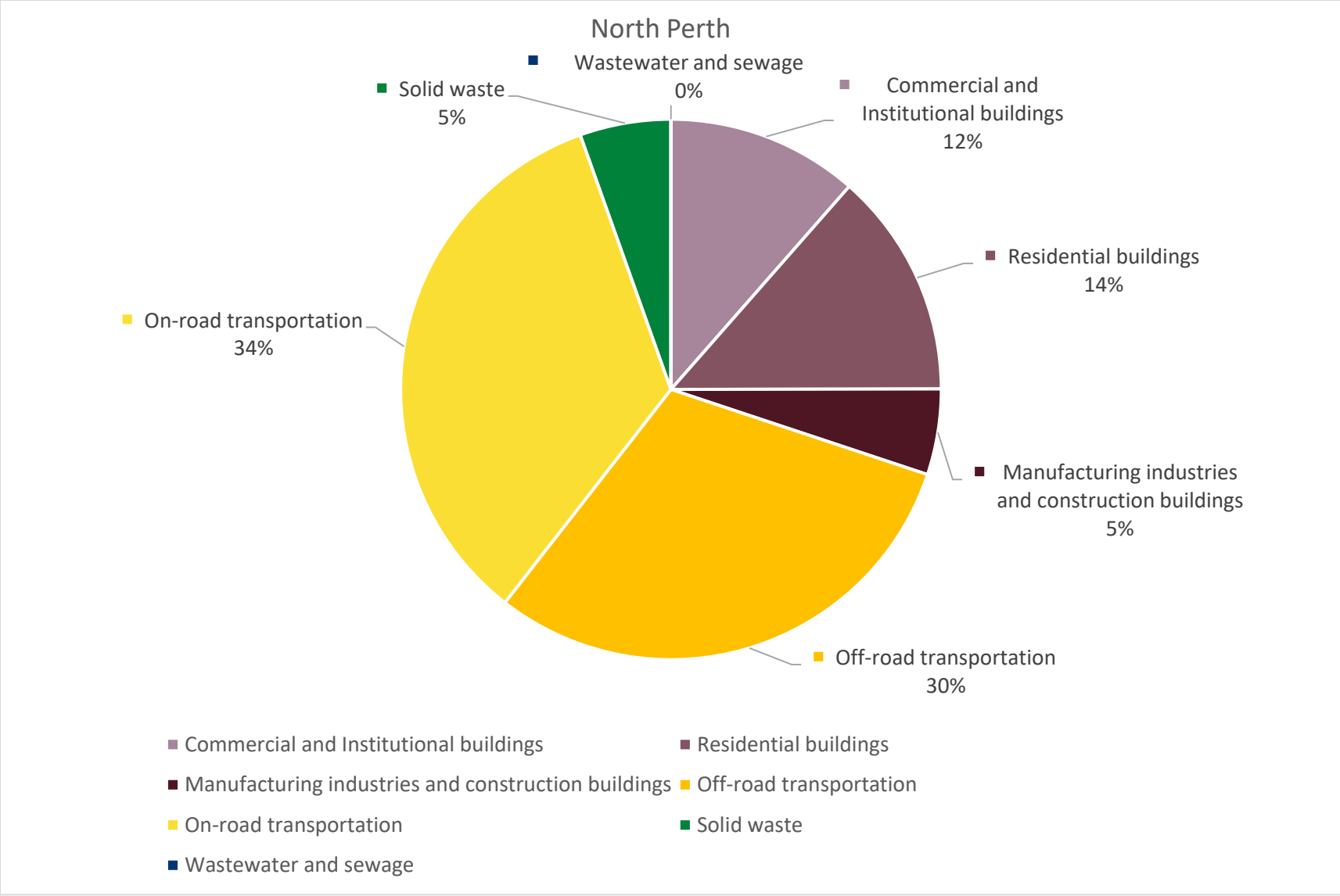


Figure 6 Regional Emission Contributions

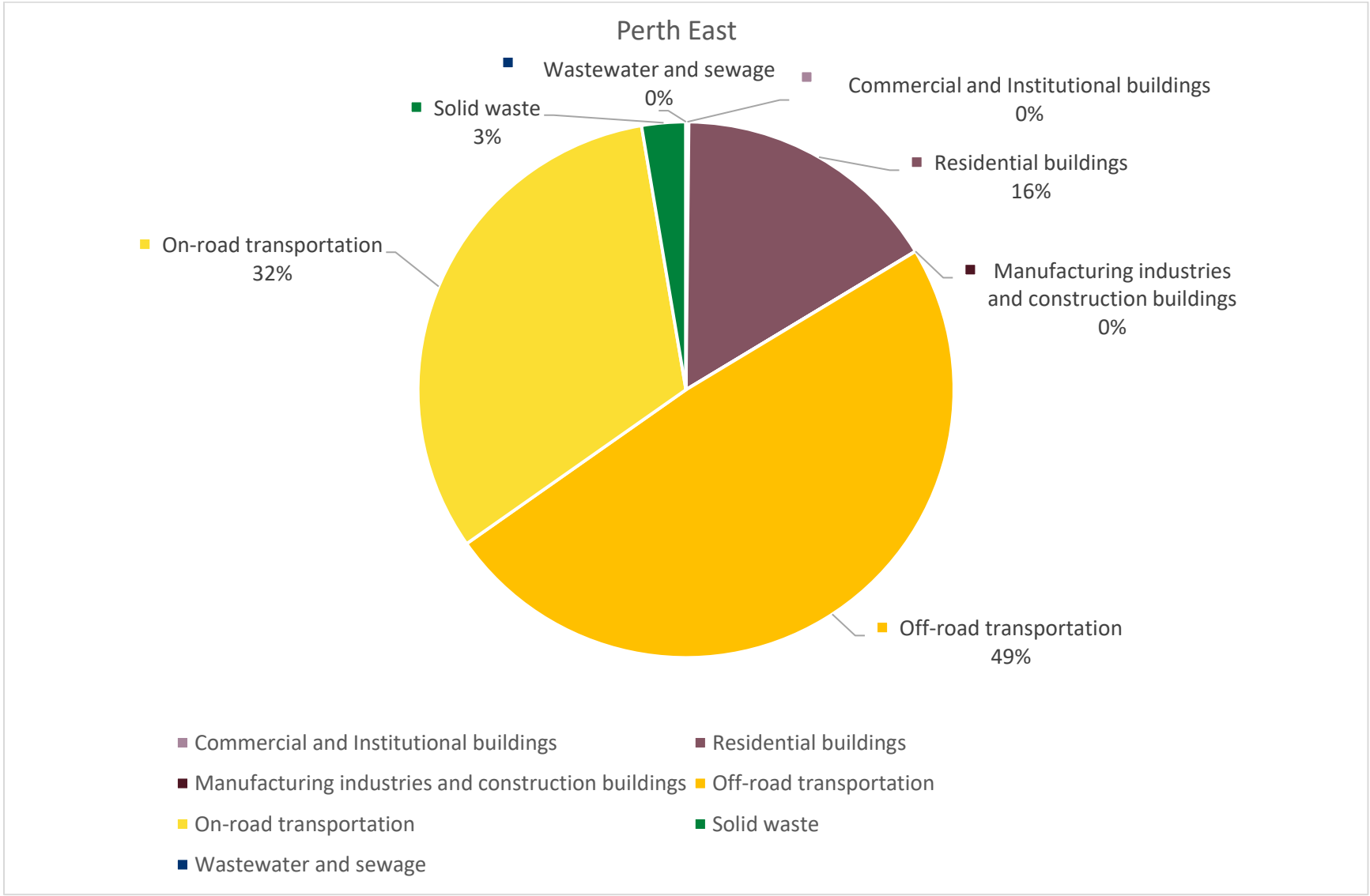
Perth County



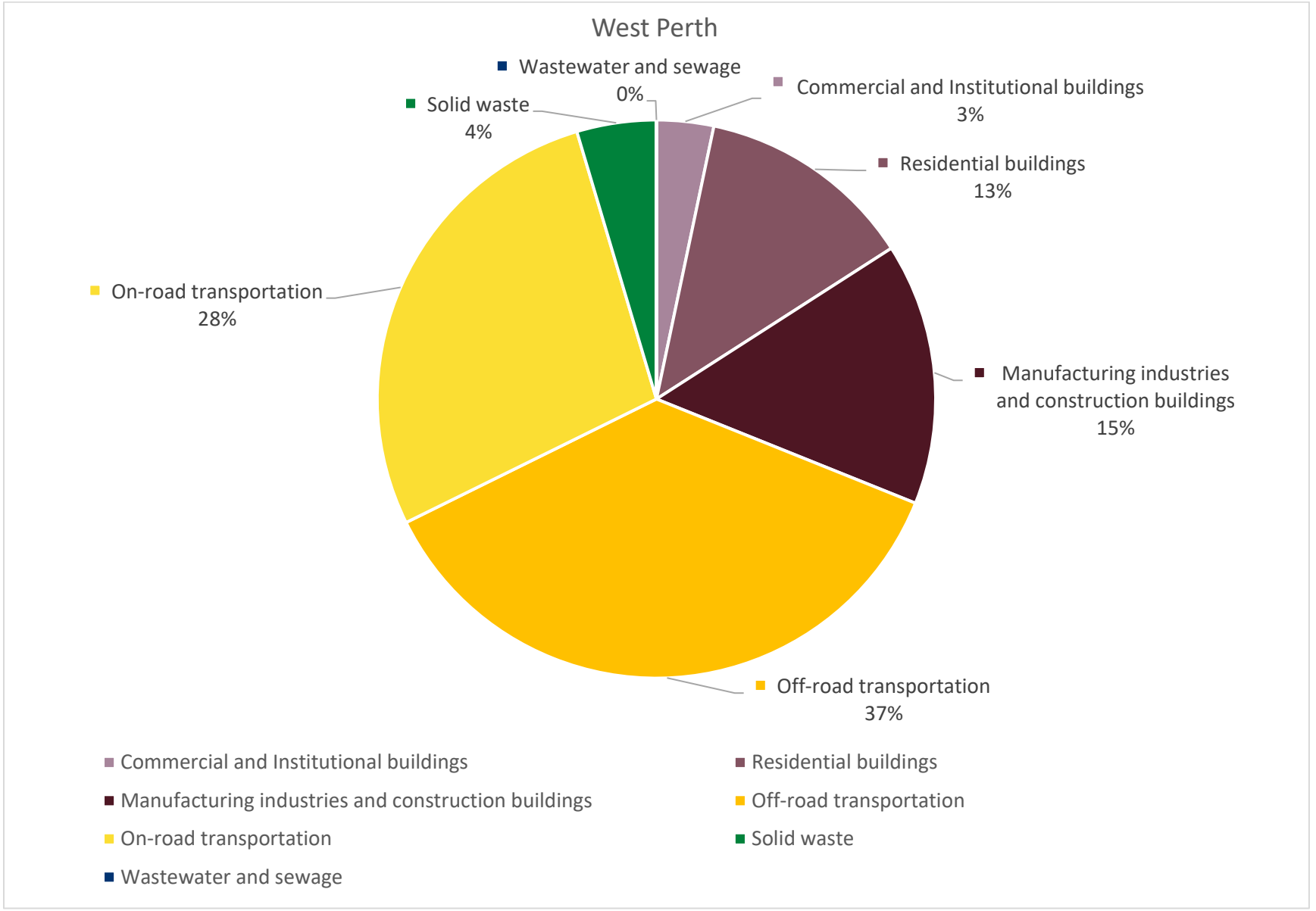
North Perth


North Perth
Wastewater and sewage
0%
Solid waste
5%
Commercial and
Institutional buildings
12%
Residential buildings
14%
On-road transportation
34%
Manufacturing industries
and construction buildings
5%
Off-road transportation
30%
Commercial and Institutional buildings
Residential buildings
Manufacturing industries and construction buildings
Off-road transportation
On-road transportation
Solid waste
Wastewater and sewage

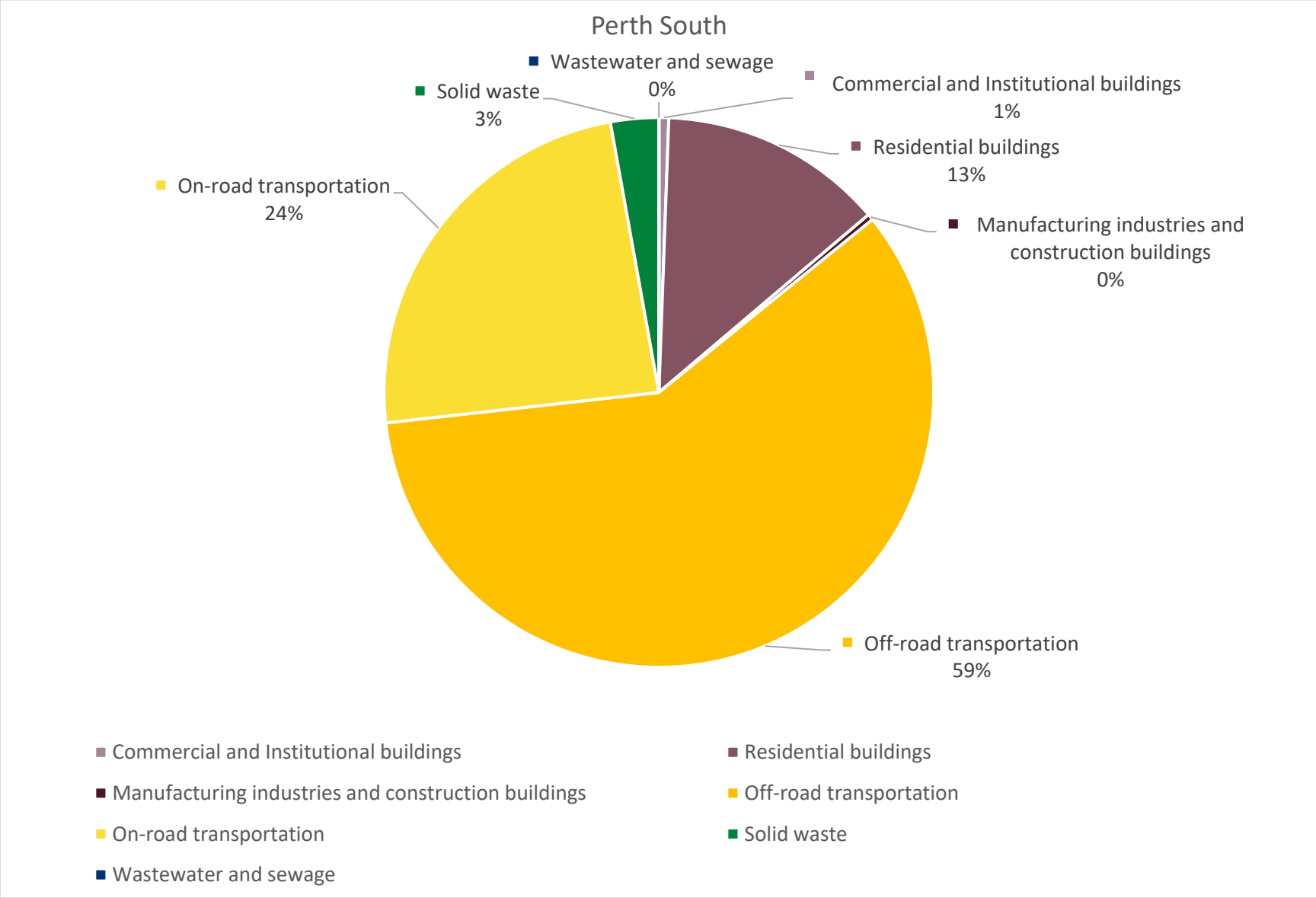
Perth East


Perth East
Wastewater and sewage
0%
Commercial and Institutional buildings
0%
Solid waste
3%
Residential buildings
16%
On-road transportation
32%
Manufacturing industries and construction buildings
0%
Off-road transportation
49%
Commercial and Institutional buildings
Residential buildings
Manufacturing industries and construction buildings
Off-road transportation
On-road transportation
Solid waste
Wastewater and sewage

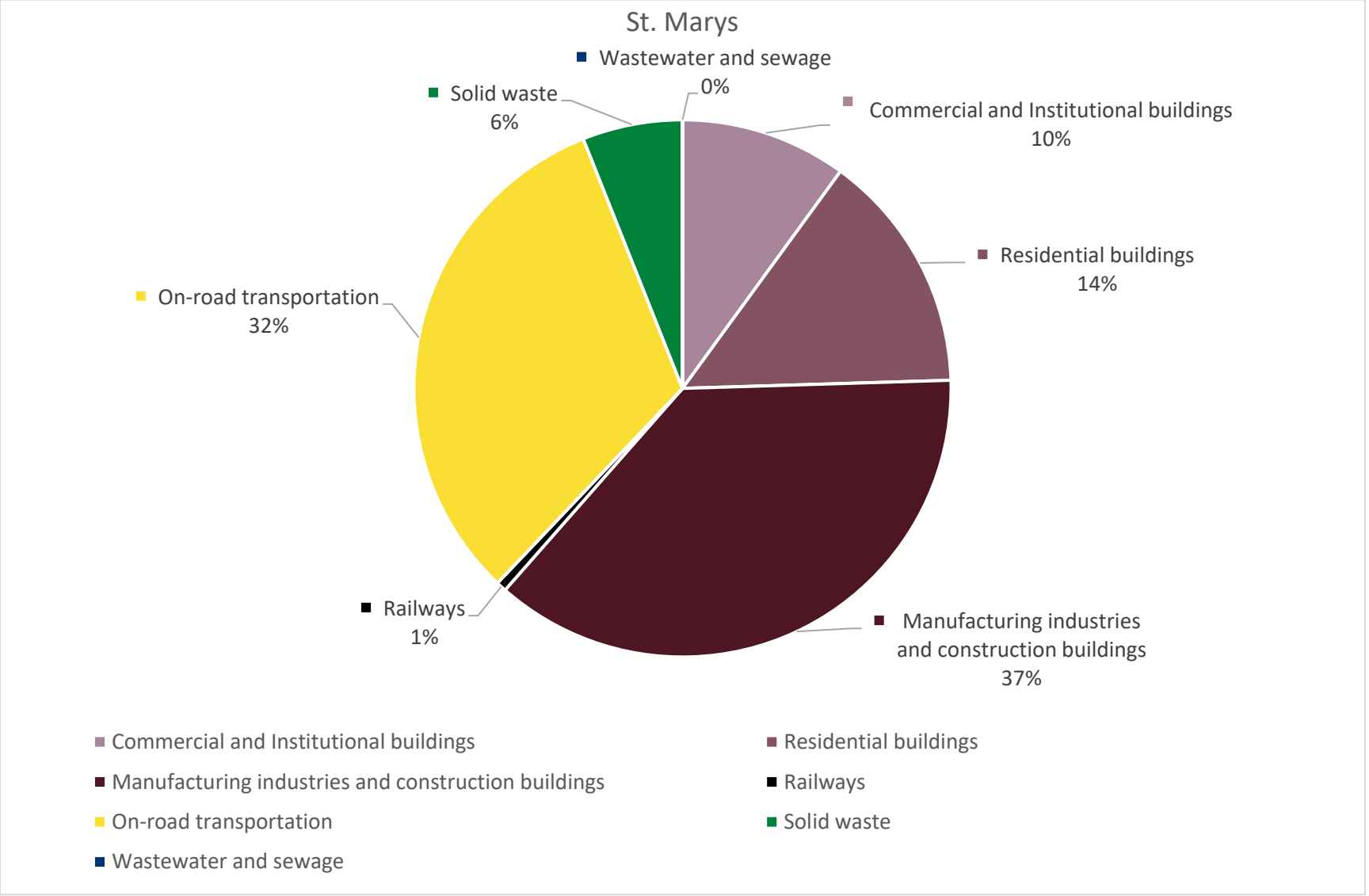
West Perth


West Perth
Wastewater and sewage
0%
Commercial and Institutional buildings
3%
Solid waste
4%
Residential buildings
13%
On-road transportation
28%
Manufacturing industries and construction buildings
15%
Off-road transportation
37%
Commercial and Institutional buildings
Residential buildings
Manufacturing industries and construction buildings
Off-road transportation
On-road transportation
Solid waste
Wastewater and sewage

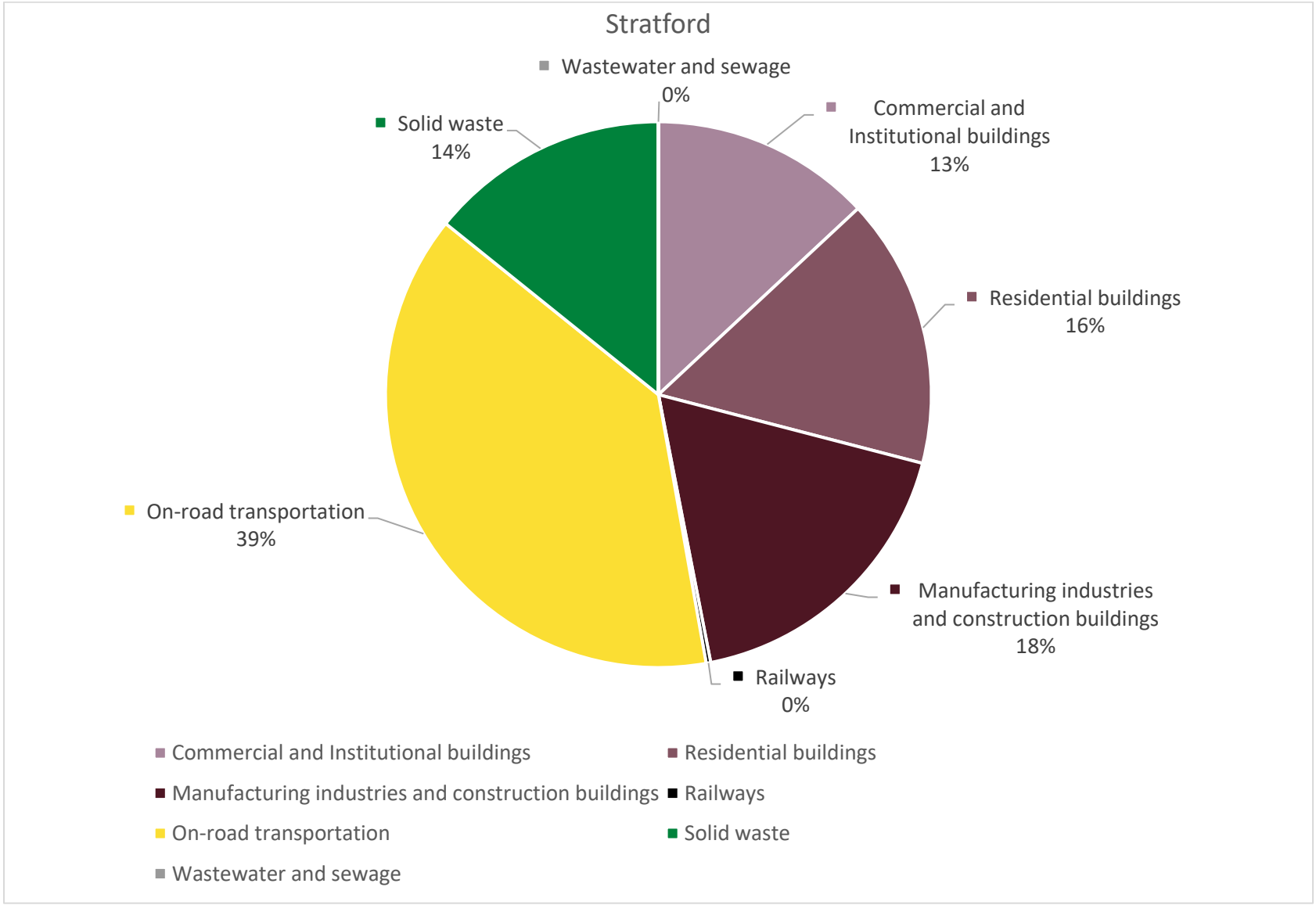
Perth South


Perth South
Wastewater and sewage
0%
Commercial and Institutional buildings
1%
Solid waste
3%
Residential buildings
13%
On-road transportation
24%
Manufacturing industries and construction buildings
0%
Off-road transportation
59%
Commercial and Institutional buildings
Residential buildings
Manufacturing industries and construction buildings
Off-road transportation
On-road transportation
Solid waste
Wastewater and sewage

St. Marys


St. Marys
Wastewater and sewage
0%
Solid waste
6%
Commercial and Institutional buildings
10%
Residential buildings
14%
On-road transportation
32%
Railways
1%
Manufacturing industries and construction buildings
37%
Commercial and Institutional buildings
Residential buildings
Manufacturing industries and construction buildings
Railways
On-road transportation
Solid waste
Wastewater and sewage

Stratford


Stratford
Wastewater and sewage
0%
Commercial and Institutional buildings
13%
Residential buildings
16%
Manufacturing industries and construction buildings
18%
Railways
0%
On-road transportation
39%
Solid waste
14%
Commercial and Institutional buildings
Residential buildings
Manufacturing industries and construction buildings
Railways
On-road transportation
Solid waste
Wastewater and sewage