CLIMATE ACTION WR

2022 WATERLOO REGION COMMUNITY GREENHOUSE GAS INVENTORY REPORT

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EXECUTIVE SUMMARY

The ClimateActionWR collaborative is pleased to publish another community greenhouse gas (GHG) re-inventory report that helps us to understand the progress we have made towards our GHG emissions reduction targets.

We are now just 6 years away from our 2030 emissions target. Already, we are seeing the impacts of climate change on our community. Between now and 2030 is a crucial window of time to significantly reduce emissions and avoid the worst impacts of the climate crisis.

In 2022 we saw a **12% emissions reduction** (below 2010 levels). Although we are seeing some progress and sustained emissions reductions, **we are not on track** for our 50% emissions reduction target by 2030

(50by30). In order to reach the target, annual GHG emissions need to be reduced by approximately 1.72 million tonnes CO_2e. This is a reduction of an additional 215,000 tonnes CO_2e each year (approximate). For scale, 215,000 tonnes CO_2e is equivalent to 46,421 gasoline-powered passenger vehicles driven for 1 year.

Transportation emissions remain our highest emitting sector. Passenger vehicles represent the highest proportion of these emissions. Our buildings, both industrial, commercial, institutional (ICI) and residential are the second and third highest emitting contributors respectively. We have started to see the effects of increased efficiency in transportation and buildings, but significant efforts are still required to reduce emissions from gasoline and natural gas.
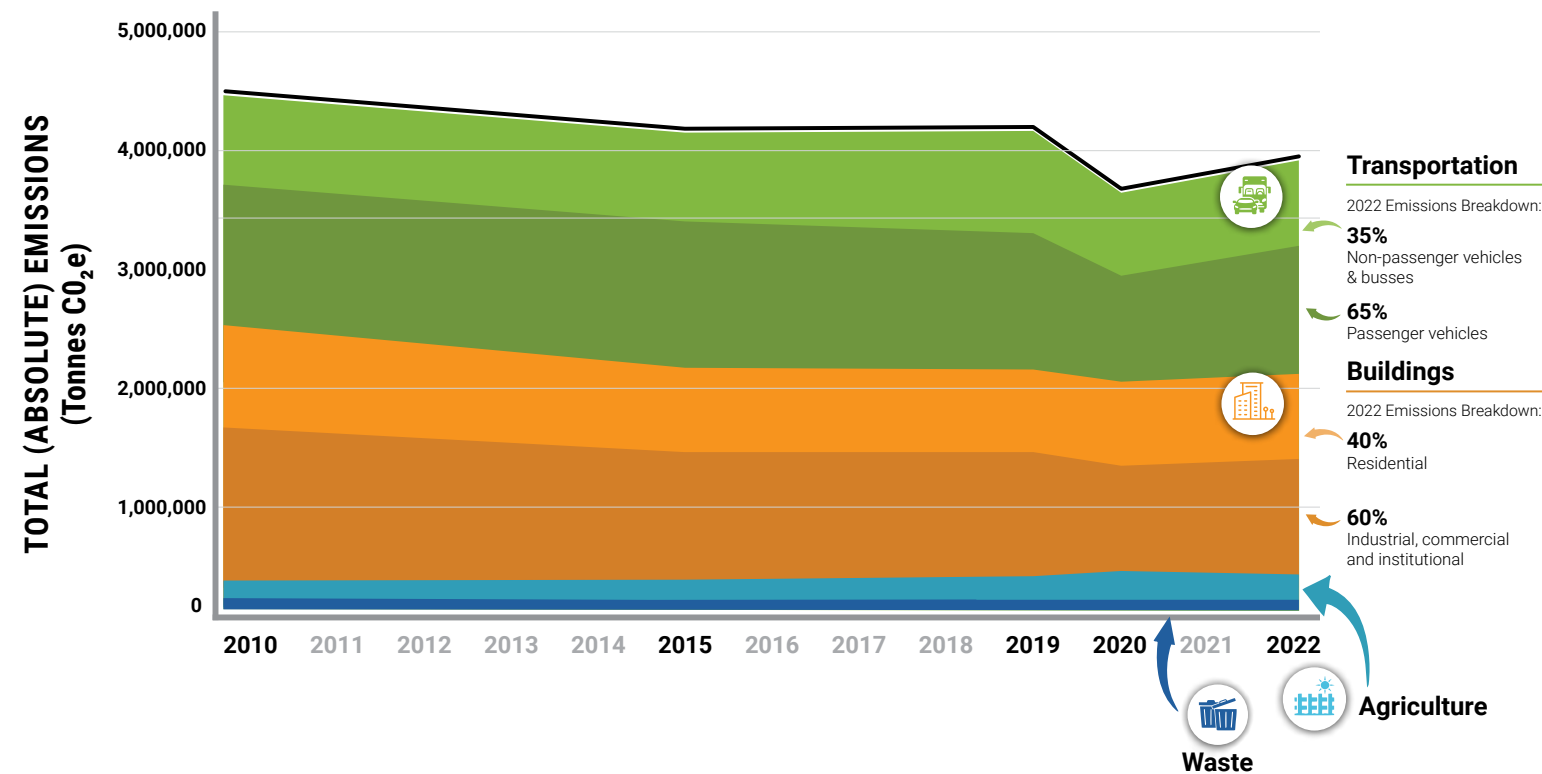
> **Our community GHG targets:**
> 80% emissions reduction (below 2010 baseline levels) by the year 2050, with an interim target of a 50% reduction by 2030.

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OUR COMMUNITY EMISSIONS

In 2022 we measured a 12% emissions reduction below 2010 levels, which is a reduction of approximately 525,700 tonnes CO_2e.

Transportation

2022 Emissions Breakdown:

35% Non-passenger vehicles & busses

65% Passenger vehicles

Buildings

2022 Emissions Breakdown:

40% Residential

60% Industrial, commercial and institutional

Waste

Agriculture

↑ **Change in baseline emissions**

The ClimateActionWR Collaborative is committing to more frequent greenhouse gas inventories that allow us to assess progress towards our near term 50by30 target and inform decision making. We continue to refine our methods to ensure we are using the best available data and analysis protocols. As a result the numbers we report will continue to shift.

All previous years have been adjusted to reflect the most recent methods and updated baseline emissions.

WHAT THE NUMBERS TELL US

In 2022 we saw a 12% emissions reduction (below 2010 levels). Although we are seeing some progress and sustained emissions reductions, we are not on track for our 50% emissions reduction target by 2030 (50by30). In order to reach the target, annual GHG emissions need to be reduced by approximately 1.72 million tonnes CO_2e. This is a reduction of an additional 215,000 tonnes CO_2e each year (approximate).

We have started to see the effects of increased efficiency in transportation and buildings, but significant efforts are still required to reduce emissions from gasoline and natural gas.

Throughout this report we will summarize the emissions by sector, fuel source and the trajectory to our 50by30 target.

For scale, 215,000 tonnes CO_2e is equivalent to 46,421 average gasoline-powered passenger vehicles driven for 1 year.

CALLS TO ACTION

TRANSPORTATION

1. Drive less with robust public transportation options and safe active transportation networks.

2. Electrification of passenger vehicles both at home and at work.

3. Electrification (where possible) in non-passenger fleet vehicles and equipment.
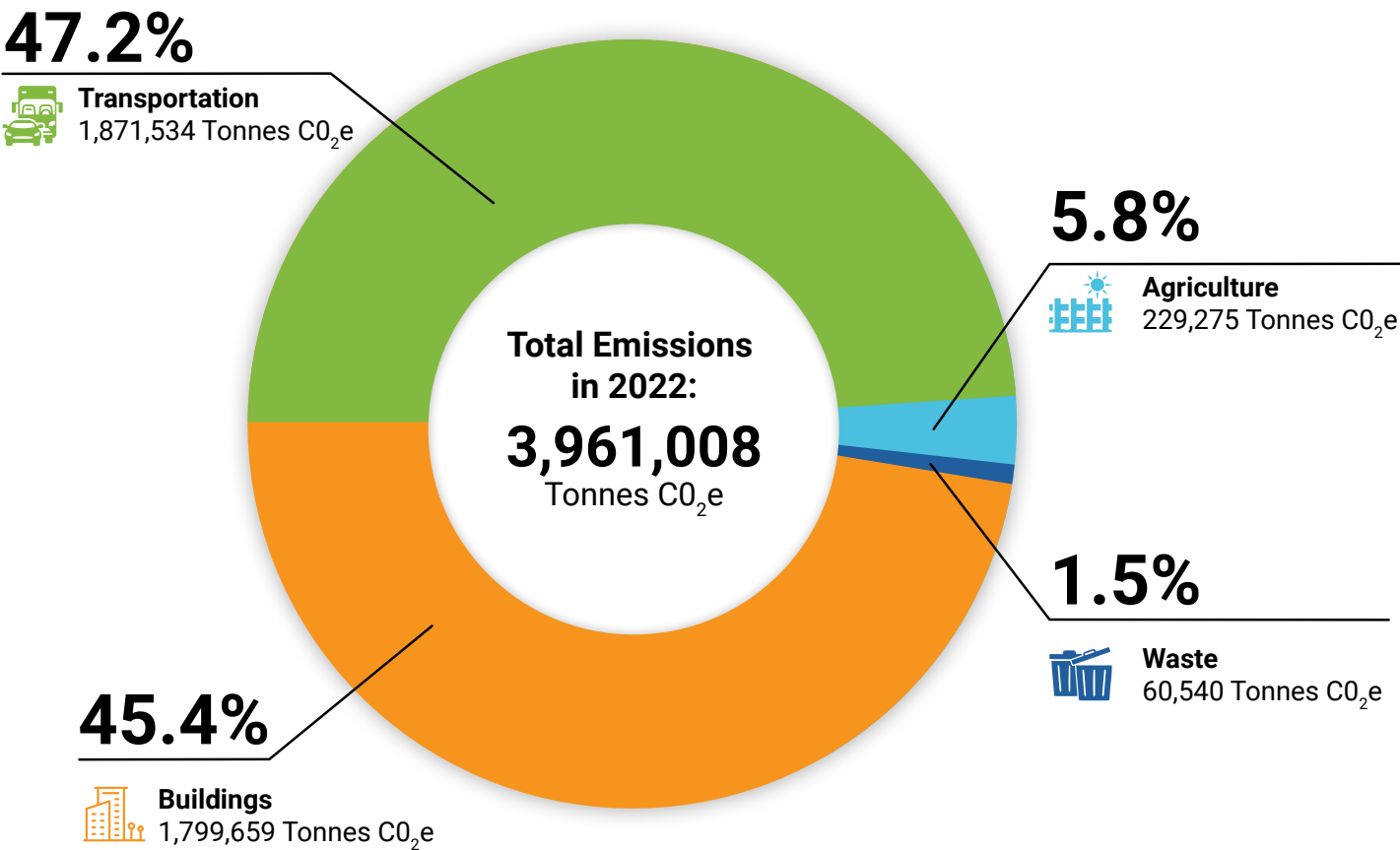
BUILDINGS

1. Use less energy by making improvements to building envelopes and use energy more efficiently by optimizing heating and cooling systems.

2. Adopt low carbon fuel switching technologies such as heat pumps for water and space heating (and cooling).

See further results of the GHG inventory on our TransformWR Progress Dashboard
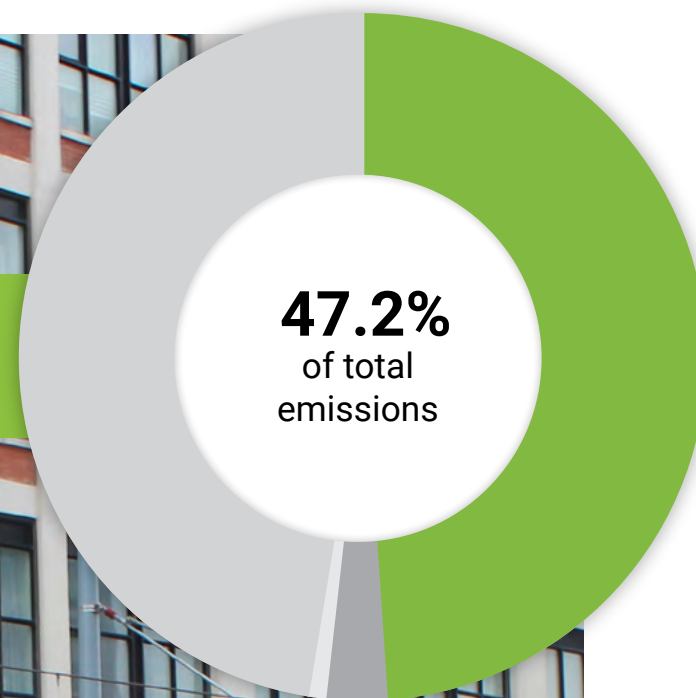
TOTAL COMMUNITY EMISSIONS BY SECTOR

Each sector will shed light on the specific sources of emissions, trends from the data and strategies to make significant progress towards achieving our 50by30 target.

47.2%
Transportation
1,871,534 Tonnes CO_2e

5.8%
Agriculture
229,275 Tonnes CO_2e

Total Emissions in 2022:
3,961,008
Tonnes CO_2e

1.5%
Waste
60,540 Tonnes CO_2e

45.4%
Buildings
1,799,659 Tonnes CO_2e
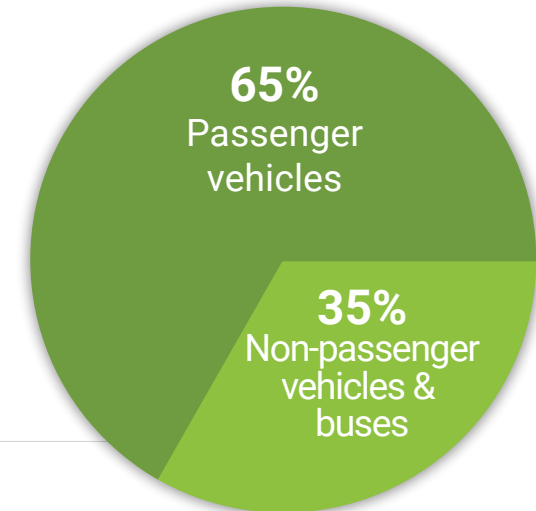
Transportation

47.2%
of total emissions

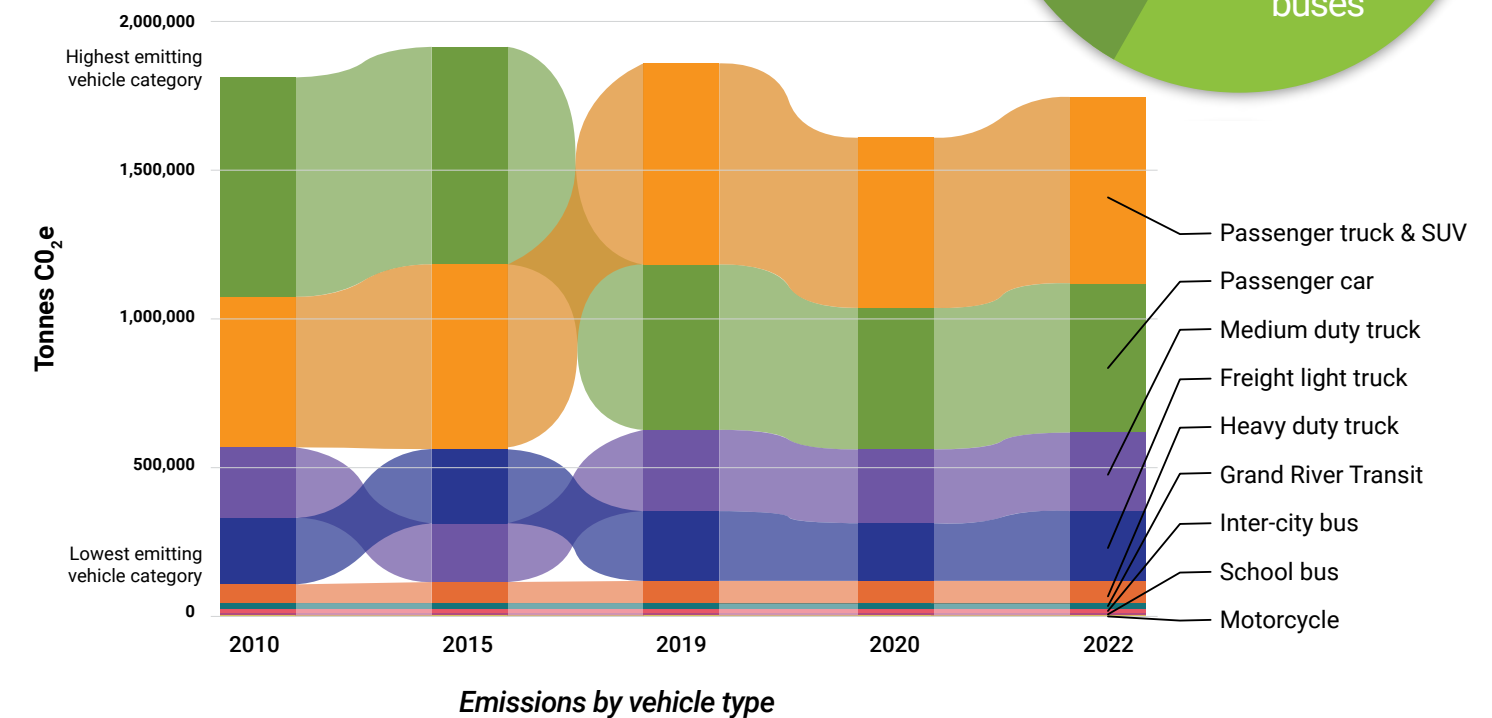## Total emissions from transportation in 2022 were approximately 1.87 million tonnes CO_2e.

Passenger vehicles contribute 65% of transportation emissions and approximately 31% of total GHG emissions.

Of the 1.87 millions tonnes CO_2e:
- ~1.22 million tonnes CO_2e attributed to passenger vehicles
- ~0.65 million tonnes CO_2e attributed to other vehicle types (including medium-heavy trucks and busses)

65%
Passenger vehicles

35%
Non-passenger vehicles & buses

Transportation emissions by percentage →

Tonnes CO_2e

2,000,000 — Highest emitting vehicle category

1,500,000

1,000,000

500,000

0 — Lowest emitting vehicle category

2010　2015　2019　2020　2022

- Passenger truck & SUV
- Passenger car
- Medium duty truck
- Freight light truck
- Heavy duty truck
- Grand River Transit
- Inter-city bus
- School bus
- Motorcycle

Emissions by vehicle type

TRENDS IN TRANSPORTATION EMISSIONS:

1. Distances passenger vehicles traveled in 2022 was about 9% less than 2019 resulting in 5.8% lower emissions.

2. At the moment cars, which contribute less GHG emissions, outnumber light trucks and SUV's. Advancements in higher fuel effieicies and reduced travel time have led to an overall decrease in emissions. However, there has been a trend towards an increased ownership of light passenger trucks and SUV's on the road which is reducing some of the progress.

3. To reduce transportation emissions, active and public transportation should be prioritized, along with an increased adoption of electric vehicles.

Buildings

45.4%
of total emissions

Total emissions from buildings in 2022 were approximately 1.80 million tonnes CO_2e.

This sector includes industrial, commercial, institutional and residential emissions and makes up 45.4% of total emsissions.

Of the 1.8 millions tonnes CO_2e:
- 1.06 million tonnes CO_2e attributed to the ICI sector
- 0.74 million tonnes CO_2e attributed to the residential sector

Building emissions by percentage →

60%
Industrial, commercial and institutional

40%
Residential
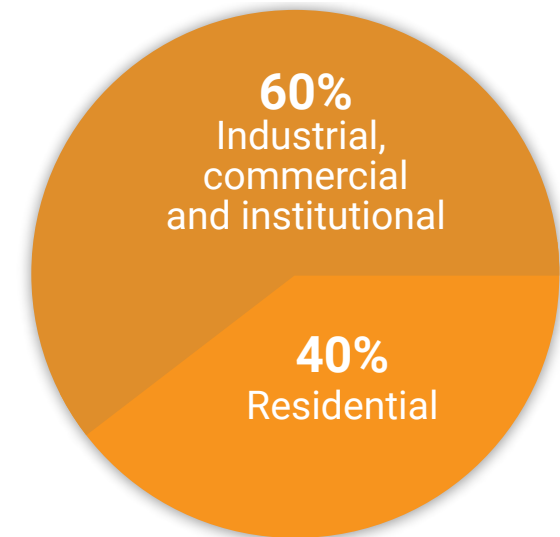
To reduce building emissions, reduce reliance on natural gas by:

1. Increase energy efficiency:
Through building envelope (i.e. insulation) improvements.

2. Fuel Switching:
Upgrading natural gas furnaces to heat pumps

3. High Efficiency New Buildings:
Construct new buildings that are designed to be energy efficient, and promote net zero carbon design standards.

Anticipated Fluctuations

Emissions from buildings will fluctuate year to year. This is because building emissions are heavily influenced by outside temperatures or degree days (heating and cooling). When temperatures fluctuate, so do our needs for heating and cooling. For example, in colder winters we use more natural gas to heat our homes to offset cooler outdoor temperatures.

TRENDS IN BUILDING EMISSIONS:

1. Building emissions are 9.3% lower in 2022 than in 2019.

2. Natural gas contributes 85% of all building emissions and almost 90% of all residential building emissions, primarily for space and water heating.

3. Our community continues to see a decrease in fuel oil use, which contributes to overall emissions reduction.
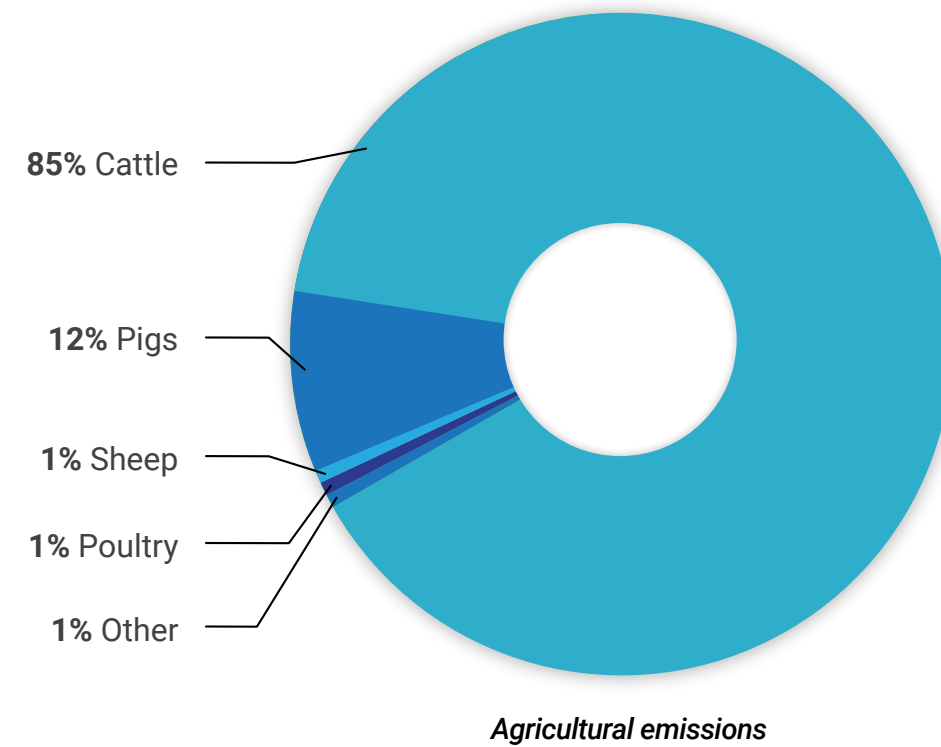
Agriculture

5.8%
of total emissions

Emissions from livestock in 2022 were approximately 229,000 tonnes CO_2e.

This sector is representative of 5.8% of our community emissions.

85% Cattle

12% Pigs

1% Sheep

1% Poultry

1% Other

Agricultural emissions

TRENDS IN AGRICULTURAL EMISSIONS:

1. Agriculture from livestock emissions are .2% higher in 2022 than in 2019

2. Cattle account for about 85% of emissions within agriculture.

3. Emissions reduction from livestock can be achieved by eating more plant based protein sources as an alternative to meat.
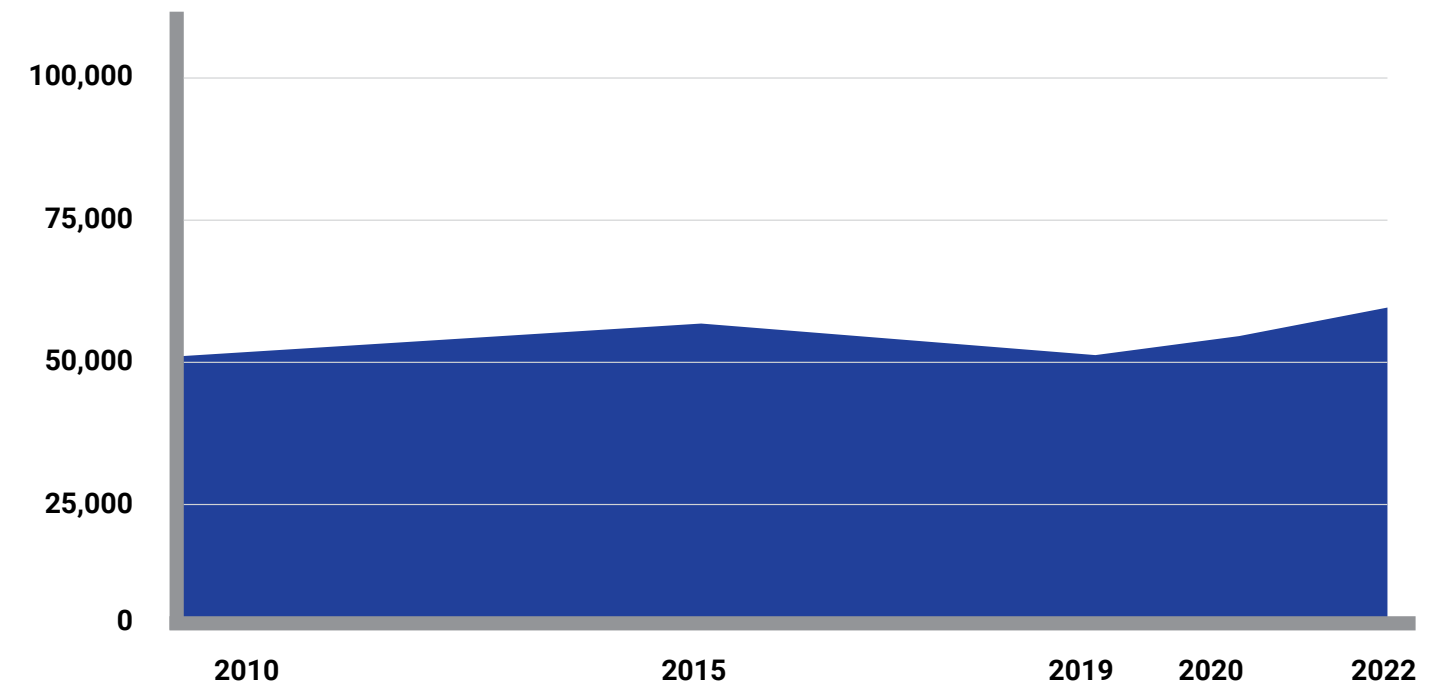
Waste

1.5% of total emissions

Emissions from waste in 2022 were approximately 60,000 tonnes CO$_2$e

Waste accounts for 1.5% of our total emissions.

Waste emissions includes emissions that are primarily from fugitive methane, which is the result of organics breakdown in the landfill. The Region uses state of the art technology and employs industry best practices to capture, control and reuse methane gas, however despite these efforts, fugitive methane is still released. The amount isn't expected to change significantly due to technology availability. However, enhanced residential diversion practices, such as curbside organics collection, will reduce future methane emissions. Waste generated in the industrial, commercial and industrial sectors, and disposed at the Region's landfill, will contribute to future greenhouse gas emissions.

Waste emissions over the years in Waterloo Region

TRENDS IN WASTE EMISSIONS:

1. Waste emissions are 19.2% higher in 2022 than in 2019.

2. It is expected that there will be a slight increase in emissions over time as more waste is added to the landfill.

3. Organic waste diversion and methane gas capture have been effective in reducing emissions from this sector.

EMISSIONS BY ENERGY SOURCE

We can see that natural gas is the largest source of emissions at 39% in 2022, followed closely by gasoline at 37%. These energy sources have a high emissions factor compared to electricity and are the highest contributions to our community emissions. Though we will need a combination of many energy sources to continue to meet our energy demands, we must as a community focus on reducing our GHG emissions from energy sources to see significant progress towards our climate targets.

THREE APPROACHES TO REDUCING GHGS FROM ENERGY:

1. Conserving energy by using less and using it more efficiently.
2. Fuel switching to use low carbon energy.
3. Energy generation using local renewable sources.
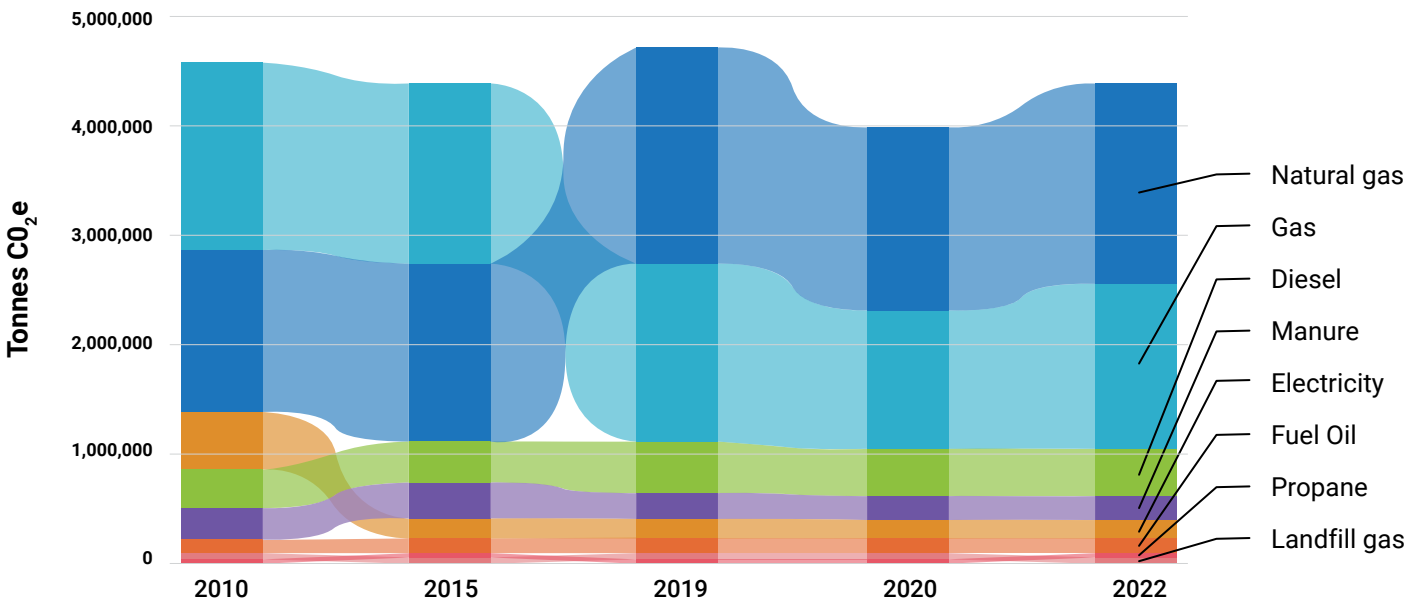
Fuel sources over time shows the flip to natural gas from gasoline as the most common energy source

What is CO₂e?

Carbon dioxide equivalent (CO2e) is a term used to describe different greenhouse gasses in a common unit. Greenhouse gasses, like methane (CH4) and nitrous oxide (N2O), each have different impacts on climate change. For example, 1 tonne of CH4 has the same impact on climate change as 25 tonnes of CO2, so it is expressed as 25 tonnes of CO2e. For data in this report, CO2e is used as the base unit.
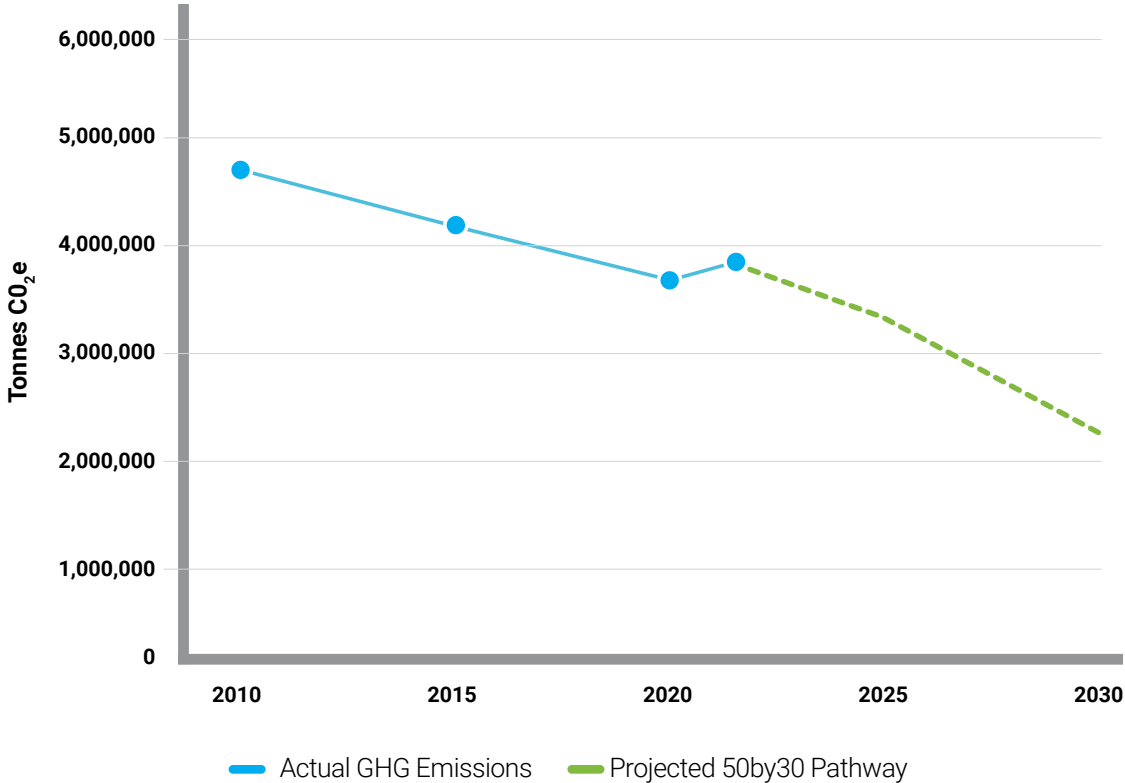
OUR PATH TO 50BY30

To reach this goal we need to achieve an additional 38% emissions reduction between now and 2030. This is equivalent to reductions of approximately 215,000 tonnes per year.

Our community climate action plan, [Trans-formWR](#), is a comprehensive community strategy for transforming our region over the next 30 years.

Waterloo Region's GHG Reduction Pathways to achieve an interim target of 50% GHG emission reduction by 2030 (based on 2010 levels).

Below are just a few of the areas where we need to enact supportive policies and initiate programs and incentives to accelerate decarbonization in our top emitting sectors.

TRANSPORTATION

1. Drive less with robust public transportation options and safe active transportation networks.

2. Electrification of passenger vehicles both at home and at work.

3. Electrification (where possible) in non-passenger fleet vehicles and equipment.

BUILDINGS

1. Use less energy by making improvements to building envelopes and use energy more efficiently by optimizing heating and cooling systems.

2. Promote widespread adoption of fuel switching technologies such as heat pumps for water and space heating (and cooling).

WHO WE ARE

CLIMATE ACTION WR

ClimateActionWR is a collaboration between local organizations, community members, and all eight municipalities in Waterloo Region. We focus on climate change mitigation in Waterloo Region by coordinating the activities of our community's climate action plans, measuring and monitoring progress on emissions reductions, and by engaging the community on climate action initiatives.

Together, our community is working to achieve Waterloo Region's long-term goal of an 80% greenhouse gas emission reduction (based on 2010 levels) by 2050 (80by50). In 2018, all area municipal and Region Councils approved the 80% by 2050 target. In 2021 all municipalities in Waterloo Region increased our interim target to 50% by 2030 and adopted TransformWR, a new transformational climate action plan to drive beyond incremental change towards significant emissions reductions.

Coordinate	Measure	Engage
Reep Green Solutions	CLIMATE ACTION WR	sustainable WATERLOO REGION

Region of Waterloo · CAMBRIDGE CANADA · KITCHENER · THE CITY OF Waterloo

The Township of NORTH DUMFRIES · Township of Wilmot · Township of WELLESLEY · WOOLWICH TOWNSHIP