Focus Group – Agricultural, Commercial, Industrial, Institutional Sector

December 7th, 2022 | 6:00 – 8:00 PM EST

CIMA+ L'humain au centre de l'ingénierie

1

Agenda

- CIMA+
- Introduction to climate change and its impacts
- The GHG emissions to consider in a municipality
- Preliminary results from Mapleton
- A focus on Agricultural, Commercial, Industrial, Institutional emissions
- Carbon footprint reduction measures
- Group discussions

2

2

| Meet the team

Julie Hardy, LEED AP BD+C, WELL AP, ENV SP
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Sustainable Development Professional

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Sustainable Development Professional

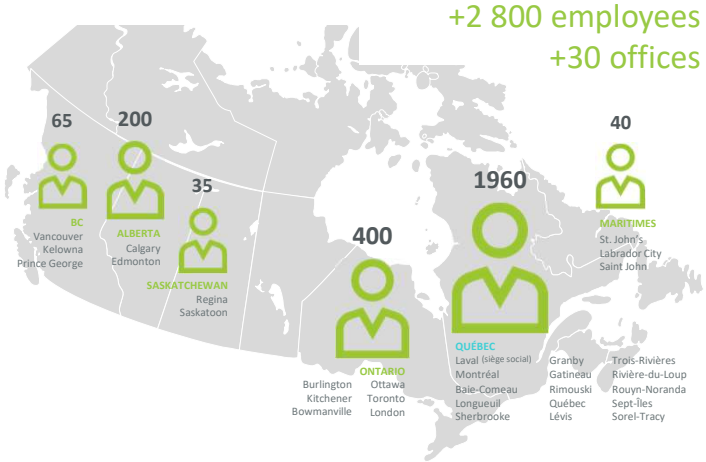
3

Sectors of activity

- Energy & Resources
- Transportation
- Building
- Infrastructure
- Communication systems
- Project Management
- Environment

Coast to coast

+2 800 employees
+30 offices



KINCENTRIC Best Employer CANADA 2019

Canadian Council for ABORIGINAL BUSINESS

ISO 9001

Key facts

Founded in 1990, among the largest private consulting engineering firms in the country

Sales of $360M in 2020, 11% annual growth since 2016 (average)

Robust HSE system

Sustainable development & responsible engineering

14 Grands Prix du génie-conseil Québécois

8 out of 10 employees with us for more than 5 years

Long-standing private and public clients across Canada

4

5

CIMA+'s Center of Excellence for Sustainability

1 Engineering for the next generations

2 Empowering our people and communities

3 Leading a responsible business

CIMA+

6

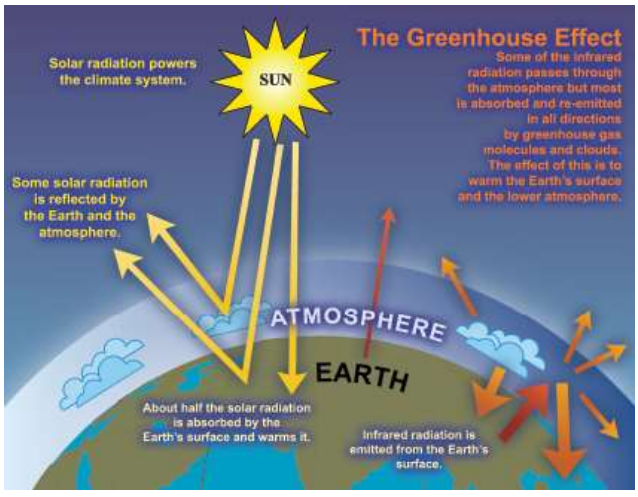
6

01 Climate change and its impacts on our world

7

Global Greenhouse Gas Emissions

- What is the Greenhouse Gas Effect?
- Less gas = less heat trapped in the atmosphere



Source: FAQ 1.3 - AR4 WGI Chapter 1: Historical Overview of Climate Change Science (ipcc.ch)

8

Global Greenhouse Gas Emissions

- What are the main Greenhouse Gases (GHG)?
  - **Carbon Dioxide** CO_2 (fossil fuels and human induced practices (i.e. deforestation))
  - **Methane** CH_4 (production of coal, natural gas, oil)
  - **Nitrous Oxide** N_2O (agricultural and soil management activities)
  - **Flourinated Synthetic** Gases (ex. Hydroflourocarbons HFC from cooling & refrigerants)
- Between preindustrial times and now, earth's avg. temperature has risen by 1.0°C

Source: IPCC — Intergovernmental Panel on Climate Change

9

Climate Change

- What does it mean?
  - The result of global warming, as global temperatures increase, climatic conditions change in various ways (David Suzuki Foundation, 2022).

Source: What is climate change? - David Suzuki Foundation

Causes:	Effects:
• Generating power • Manufacturing goods • Cutting down forests • Using transportation • Producing food • Powering buildings • Consuming too much	• Hotter temperatures • More severe storms • Increased drought • A warming, rising ocean • Loss of Species • Not enough food • More health risks • Poverty and displacement

Source: Causes and Effects of Climate Change | United Nations

10

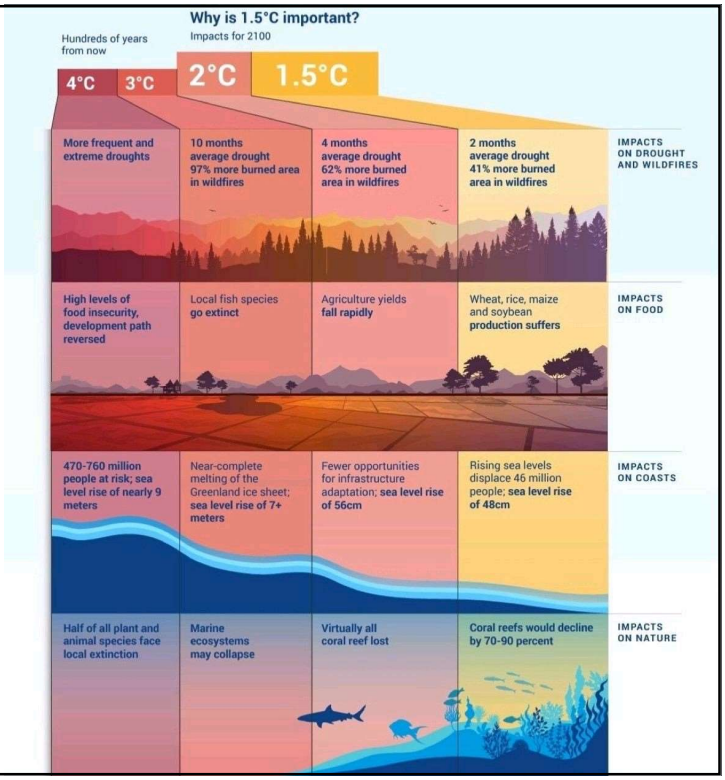
The Paris Agreement

- Developed on Dec. 12, 2015 at the UN Climate Change Conference (COP21) in Paris
- Who signed the Agreement?
  - To date, 193 countries and the EU, including Canada
  - The signees account for 98% of global GHG emissions
- Agreement Objectives:
  - Reduce GHGs to limit global temperature increase in this century to 2°C while aiming to limit increase even further to 1.5°C
  - Review of countries commitments every 5 years
  - Provide financing to the developing world to mitigate climate change, increase resiliency and adaptability

11

Impacts of 1.5°C vs. 2.0°C

- On a global scale:
  - Extreme heat
  - Rising sea levels
  - Declining biodiversity
  - Melting arctic sea ice
  - At-risk coral reefs
  - Declining global fisheries
  - Rising poverty
  - Health impacts
  - Food impacts

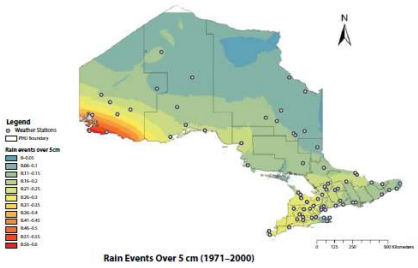


12

Impacts of 1.5°C vs. 2.0°C

By 2050, our average temperature is projected to rise by ~2.5 – 3.7 °C

Will lead to more drastic, frequent and impactful extreme weather patterns.



Source: Ontario Climate Change and Health Modelling Study Report, University of Toronto, 2016

Extreme weather

Climate change causes severe storms that damage our homes, crops, and cost more than hundreds of millions in insurance claims.

Food and drink

Climate change is already impacting Ontario's crop production and can significantly alter the types of crops grown in the future.

Lakes and rivers

Rising air temperatures and other climate changes are resulting in warmer waters and changes to water quality and balance.

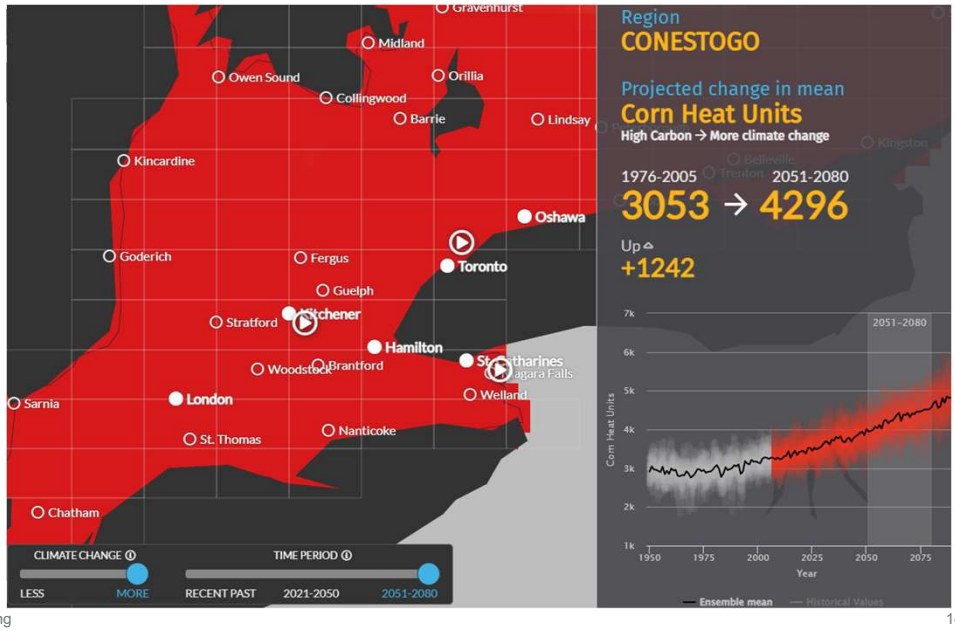
Rising temperatures

The rise in average temperatures leads to more widespread extreme weather events like severe storms, flooding and heat waves.

Source: Why we need to address climate change | ontario.ca

13

Climate Change in Ontario



14

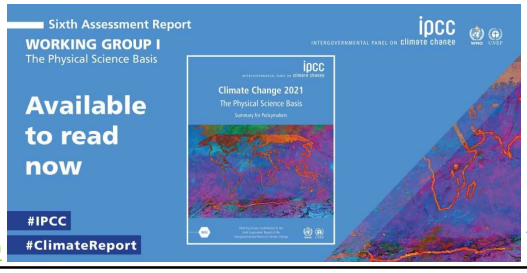
The Intergovernmental Panel on Climate Change (IPCC)

- United Nations body for assessing the science relate to climate change
- Produce reports (every 6-7 years) that outline:
  - State of climate change based on scientific, technical and socio-economic factors
  - Impacts and future risks of climate change
  - Options for reducing the rate of climate change
  - Methodologies for reporting and preparing GHG inventories

Example Equation from IPCC V.3 Ch. 4: Metal Industry Emissions

EQUATION 4.9
CO_2 EMISSIONS FROM IRON & STEEL PRODUCTION (TIER 2)

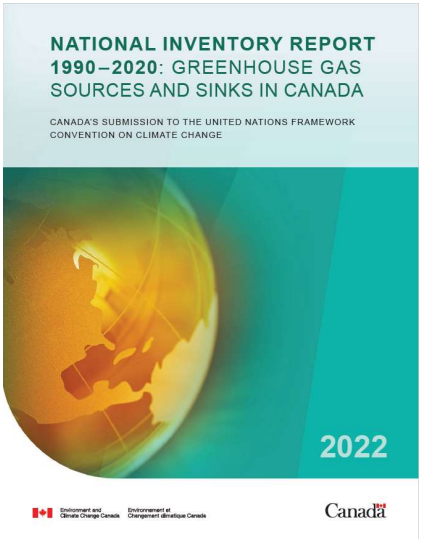
$$E_{CO2,non-energy} = \left[PC \bullet C_{PC} + \sum_a (COB_a \bullet C_a) + CI \bullet C_{CI} + L \bullet C_L + D \bullet C_D + CE \bullet C_{CE} + \sum_b (O_b \bullet C_b) + COG \bullet C_{COG} - S \bullet C_S - IP \bullet C_{IP} - BG \bullet C_{BG} \right] \bullet \frac{44}{12}$$



Source: Publications - IPCC-TFI (iges.or.jp)

Canada's 2022 National Inventory Report (NIR)

- Published April 2022
- Canada signed off on the United Nations Convention on Climate Change (UNFCCC) on Dec. 4 1992, that a national GHG inventory must be submitted by April 15th of each year
- NIR is developed using the IPCC Guidelines
- CIMA+ utilizes this report for inventories, studies, and reference



Source: Canada. 2022 National Inventory Report (NIR) | UNFCCC

Federal Targets

Government of Canada / Gouvernement du Canada

- Net Zero Emissions by 2050 – economy to either emit no GHG or offset emissions
- Roadmap to how Canada will meet the Paris Agreement's targets to reduce emissions by 40-45% from 2005 levels by 2030
- This will be possible with:
  - **Net-Zero Advisory Body** to support achieving Canada's net zero targets
  - **Net-Zero Accelerator Fund** to help large emitters reduce their emissions
  - **Net-Zero Challenge** to encourage businesses to develop their net-zero transition plan

Source: Net-Zero Emissions by 2050 - Canada.ca

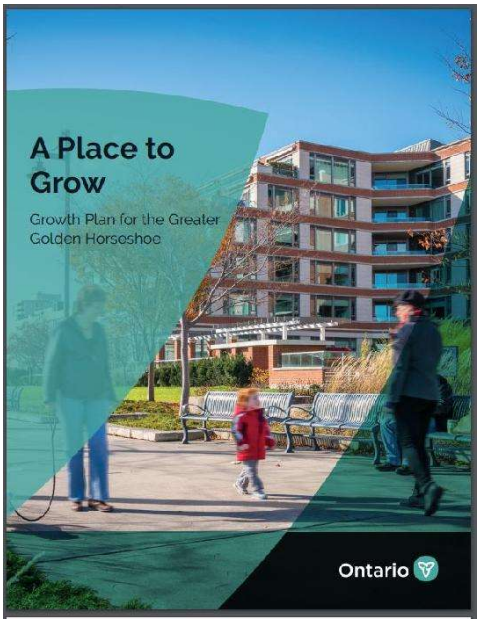
Provincial Targets – Made-in-Ontario

- 'Made in Ontario Environmental Plan' – reduce emissions to 30% below 2005 levels by 2030
  - Reducing qty. of waste to landfill
  - Clean and safe drinking water
  - Protecting air quality
  - Protecting natural spaces and species
  - Addressing climate change
  - Holding polluters accountable
  - Supporting infrastructure development while ensuring environmental protection
  - Broader government achievements

Source: A Made-in-Ontario Environment Plan | ontario.ca

Provincial Targets – A Place to Grow

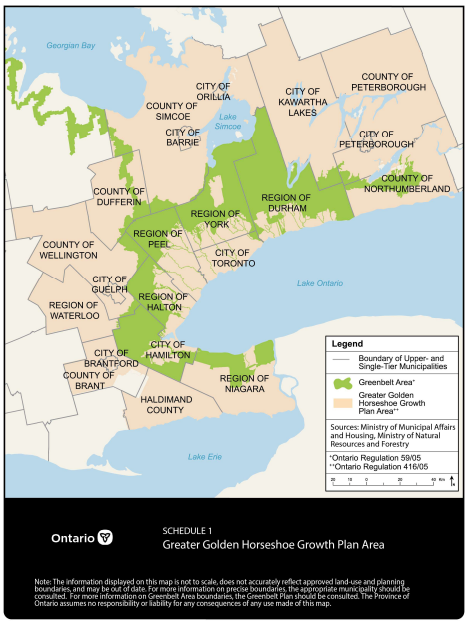
- 'A Place to Grow – Growth Plan for the Greater Golden Horseshoe"
  - Released and updated in August 2020 to replace the previous iteration from 2017
  - Supports the achievement of complete communities, a thriving economy, clean and health environment and social equality
  - The GGH generates 25% of Canada's GDP and includes productive farmland and significant land like the Oak Ridges Moraine, Niagara Escarpment, Greenbelt and many others
  - County of Wellington, and Mapleton are a part of the GGH



Source: A Place to Grow: Growth plan for the Greater Golden Horseshoe | ontario.ca

Provincial Targets – A Place to Grow

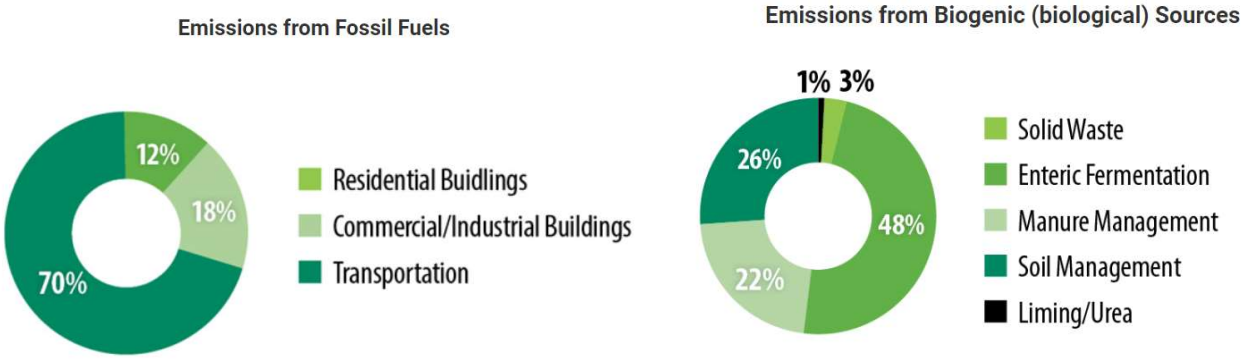
- develop strategies to **reduce GHG emissions** and **improve resilience** through the identification of vulnerabilities to climate change, land use planning, planning for infrastructure
- **develop GHG inventories** for transportation, buildings, waste management and municipal operations
- establish municipal interim and long-term **GHG emission reduction targets** that support provincial targets and reflect consideration of the goal of **low-carbon communities** and monitor and report on progress made towards the achievement of these targets.



Source: Schedules | A Place to Grow: Growth plan for the Greater Golden Horseshoe | ontario.ca

Future Focused Targets – County of Wellington

- County of Wellington produces approximately 1.2 million tonnes of CO_2e /yr. of GHG emissions from transportation, buildings, agriculture and solid waste

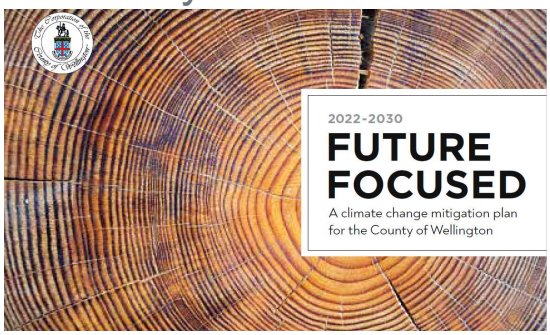


Source: Climate Change Mitigation Plan - Planning - Wellington County

21

Future Focused Targets – County of Wellington

- In 2009, it was estimated that 44% of Canada's greenhouse gas emissions were directly or indirectly controlled by municipalities.
- Future Focused aims to reduce Community greenhouse gas emissions by 6% from 2017 levels by 2030.
- Targets:
  - 6% reduction by 2030
  - 80% reduction by 2050
  - **Overall goal: Net Zero**



Source: Climate Change Mitigation Plan - Planning - Wellington County

22

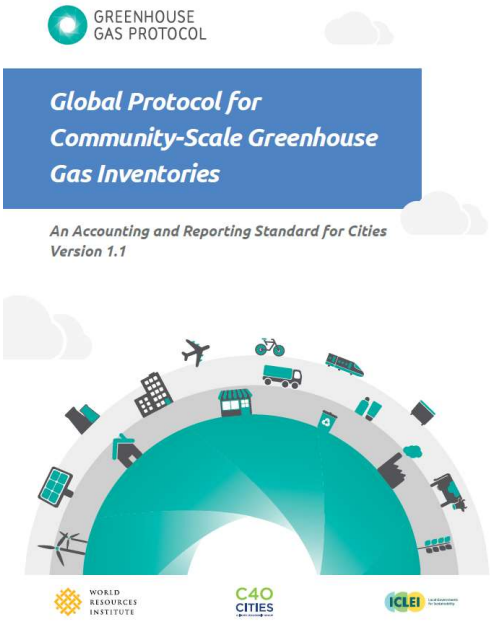
02 GHG emissions to consider in a municipality

23

Global Protocol for Community-Scale Greenhouse Gas Inventories (GPC)

Objectives:

- To better understand the emissions contributions of different activities,
- establish a base year GHG emissions inventory, set GHG reduction targets and track performance,
- ensure consistent and transparent measurement and reporting of GHG emissions,
- provide data for benchmarking purposes of comparable GHG data with other Canadian Municipalities and Cities.



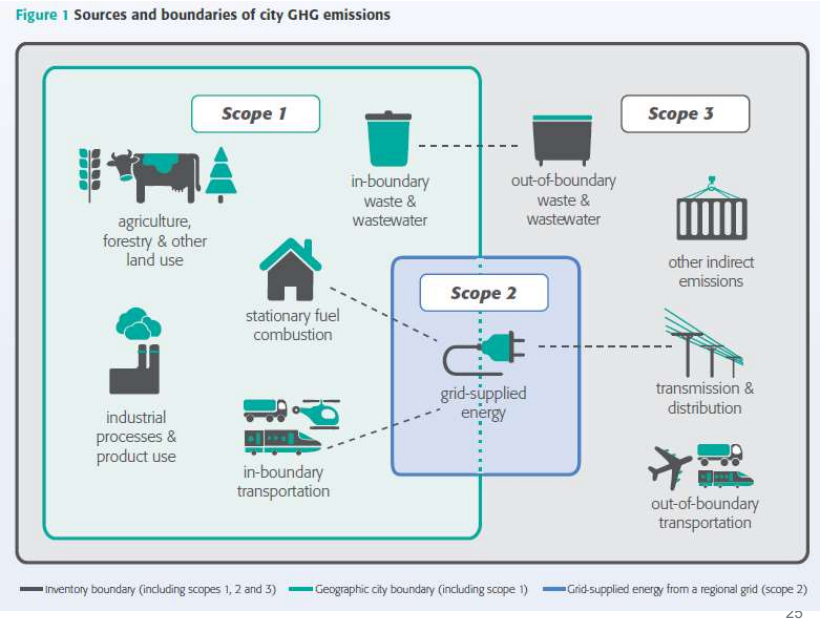
Source: GHG Protocol for Cities | Greenhouse Gas Protocol

24

GHG Inventory Sources and Boundaries of Emissions

- **Define sources and boundaries** for the Township of Mapleton.
- **Calculate GHG emissions** using a calculator developed in compliance with the GPC Protocol and including the emission factors and specific equations.

Figure 1 Sources and boundaries of city GHG emissions



Source: GHG Protocol for Cities | Greenhouse Gas Protocol

25

Sources of Emissions in Mapleton

Stationary Energy

Residential, Commercial & Inst., Manufacturing, Energy, Agri. Forestry & Fishing

Transportation

On-road transportation (public fleet use, private sector household use, heavy transportation, etc.

Waste

Solid, Biological, Wastewater Treatment

Agriculture, Forestry and Other Land Uses

Enteric Fermentation (Livestock belching), Manure Management, Liming/Urea and Fertilizer, Direct and Indirect Soil Management and Harvested Wood Products

26

03 Preliminary results from Mapleton's 2021 inventory

27

Results of Mapleton's 2021 Inventory

Sector	Category	Scope 1	Scope 2	Scope 3	Total CO_2e (t)
I - Stationary energy	Residential	7,801	1,459	146	9,406
	Commercial	11,423	1,269	59	12,751
	Manufacturing	14,586	957	46	15,558
	Energy	0	0	0	0
	Agri, Forestry & Fishing	13,536	0	0	13,536
					51,281
II - Transportation	On-road	44,289	0	0	**44,289**
III - Waste	Solid	0	0	983	983
	Biological	0	0	41	41
	Wastewater treatment and discharge	872	0	0	872
					1,896
V - Agriculture, forestry and other land use	Livestock	184,631	0	0	184,631
	Land	55,564	0	0	55,564
	Aggregate sources and non-CO2	1,016	0	0	1,016
					241,211
				Total 2021 Emissions	**338,677**

28

Results of Mapleton's 2021 Inventory

- Township's 2021 GHG Inventory totalled to 338,677 tonnes of CO_2e for a population size of 10,839 residents (Government of Canada, 2021).

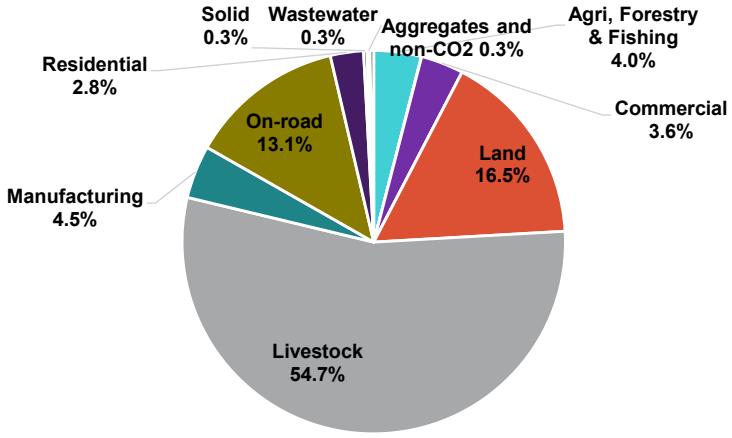
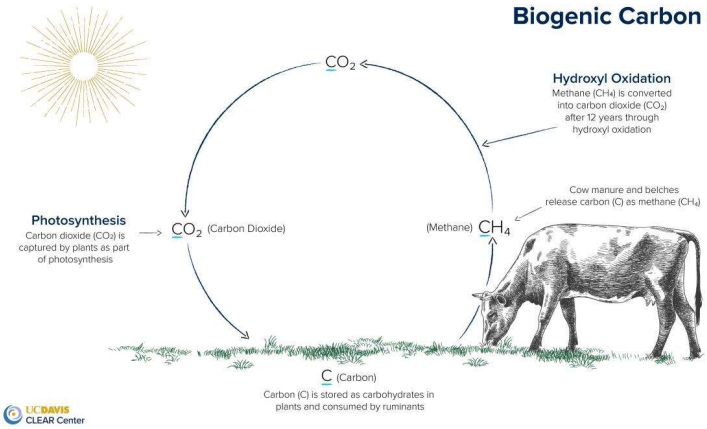


Figure 1. Township of Mapleton's 2021 GHG Emissions (t) CO2e

29

Biogenic Sources

- Biogenic sources are GHG emissions from natural sources like living organisms that eventually circle back into the atmosphere
- CH_4 and N_2O are still included in the emissions inventory as methane for example requires **12 years to transform** to carbon, but has a **high GWP** during that time



Source:
The Biogenic Carbon Cycle and Cattle | CLEAR Center (ucdavis.edu)

Informative Video:
https://youtu.be/UOPrF8oyDYw

30

Results of Mapleton's 2021 Inventory

- A more accurate depiction of the total profile of the Township's GHG Emissions for 2021 is shown below, excluding AFOLU sources

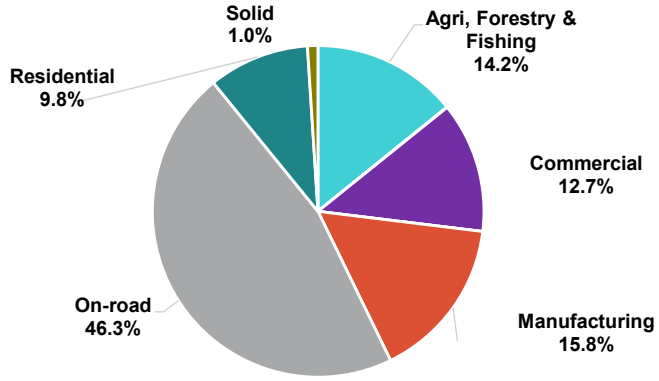


Figure 2. Township of Mapleton's 2021 GHG Emissions (t) CO2e – Excluding AFOLU

31

04 Review of agricultural, industrial, commercial and institutional emissions

32

Agriculture, Forestry and Other Land Uses (AFOLU)

- ~55% of the Township's overall GHG emissions
- 243,153 t CO_2e from AFOLU Sources

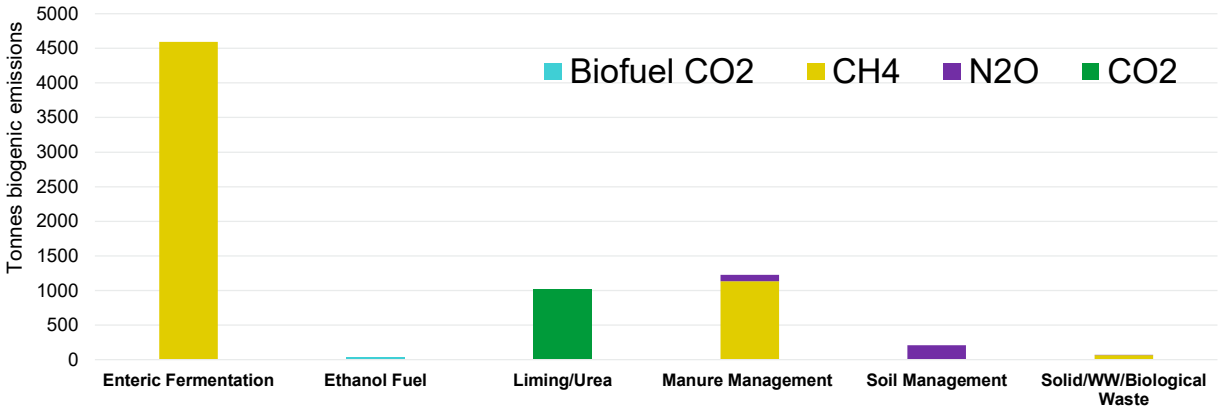


Figure 3. Total Emissions by Greenhouse Gas from AFOLU Sources

Manufacturing

- ~5% of the Township's overall GHG emissions
- Majority emissions derived from Scope 1 (off-road, natural gas, propane usage)

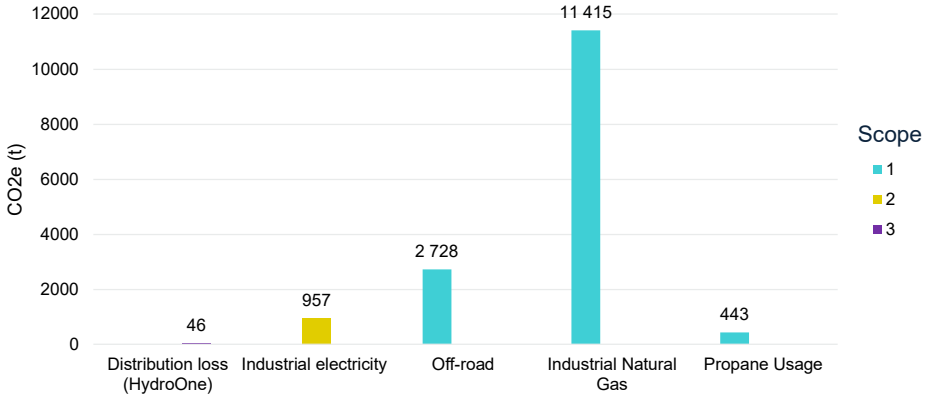


Figure 4. Total Manufacturing Emissions for Scopes 1,2, and 3

Commercial and Institutional

- ~4% of the Township's overall GHG emissions
- Corporate = municipal emissions

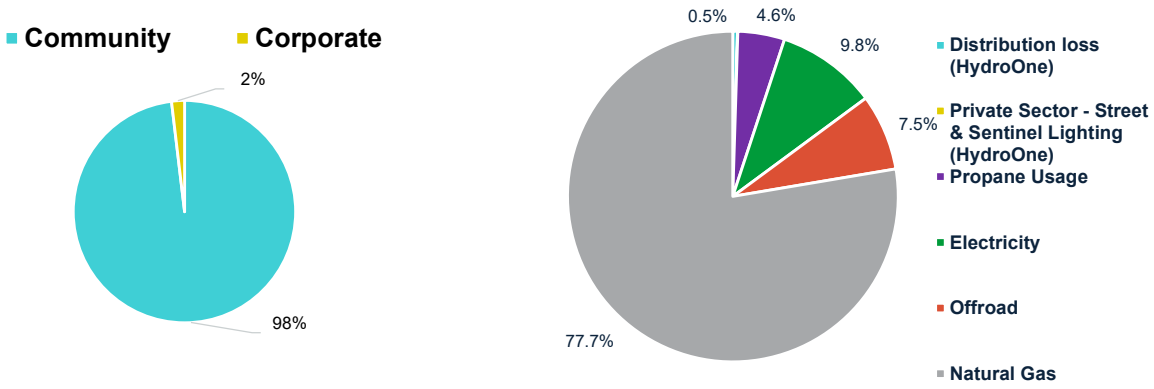


Figure 5. Total Public and Private Commercial and Industrial Building CO_2e Emissions (tonnes)

35

On Road Transportation

- ~46% of the Township's overall GHG emissions
- 2,049 t CO_2e from gas powered household vehicles

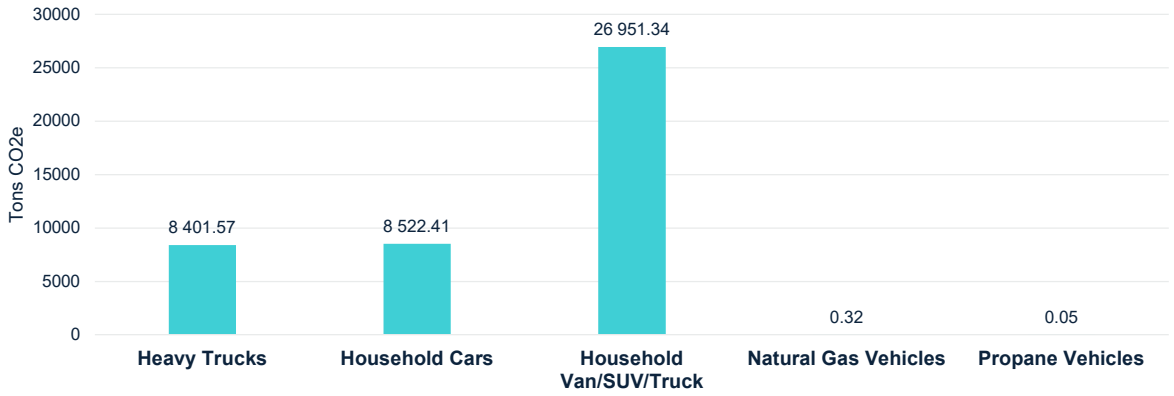


Figure 6. Total Tonnes CO_2e from Community Vehicle Use

36

Waste

- Accounting for < 2% of the Township's overall GHG emissions
- These emissions are also considered to be biogenic sources

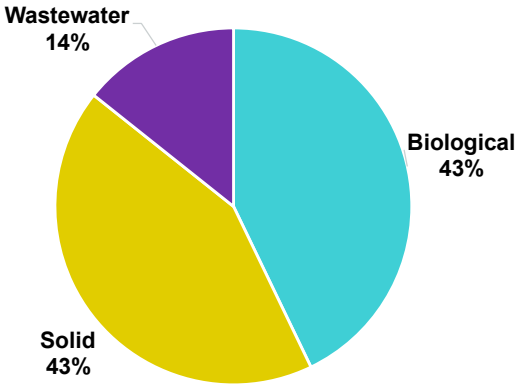


Figure 7. Total Tonnes of CO_2e from Waste Sector

37

05 What can we do on an individual level to create change?

38

Incentives and Funding Programs

Tools to search for applicable grants, rebate and incentive programs pertaining to your projects:

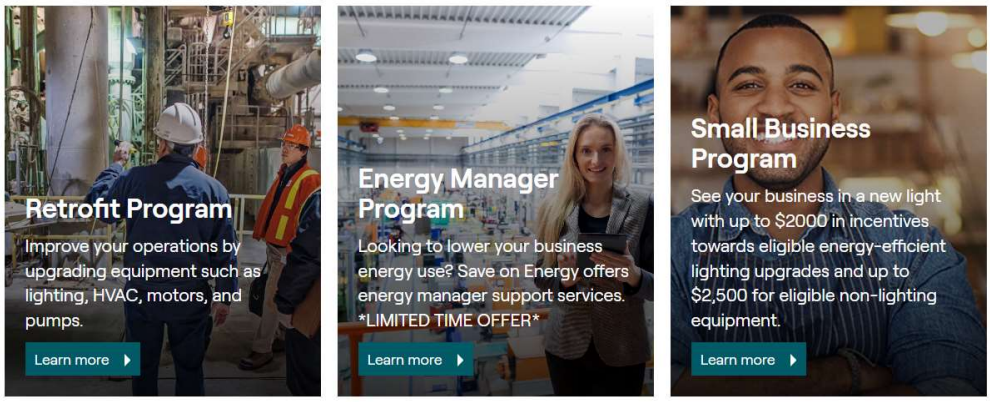
1. Government of Canada: *Financial incentives by province (nrcan.gc.ca)*
2. Federation of Canadian Municipalities (FCM): Green Municipal Fund
3. Environment and Climate Change Canada (ECCC): ECCC funding programs - Canada.ca
4. Infrastructure Canada: Funding Delivered under the Investing in Canada Plan
5. Transportation Canada: Incentives for purchasing zero-emission vehicles
6. Independent Electricity System Operator: i.e. Save on Energy: Energy Affordability Program
7. Enbridge: https://www.enbridgegas.com/sustainability/greening-industry
8. HydroOne: Ontario Electricity Rebate
9. Ontario Soil and Crop Improvement Association (including webinars): Programs | OSCIA
10. GRCA – Rural Water Quality Program: Wellington - Grand River Conservation Authority

39

Creating Change within the Commercial & Manufacturing Sector

HydroOne Programs and incentives for businesses

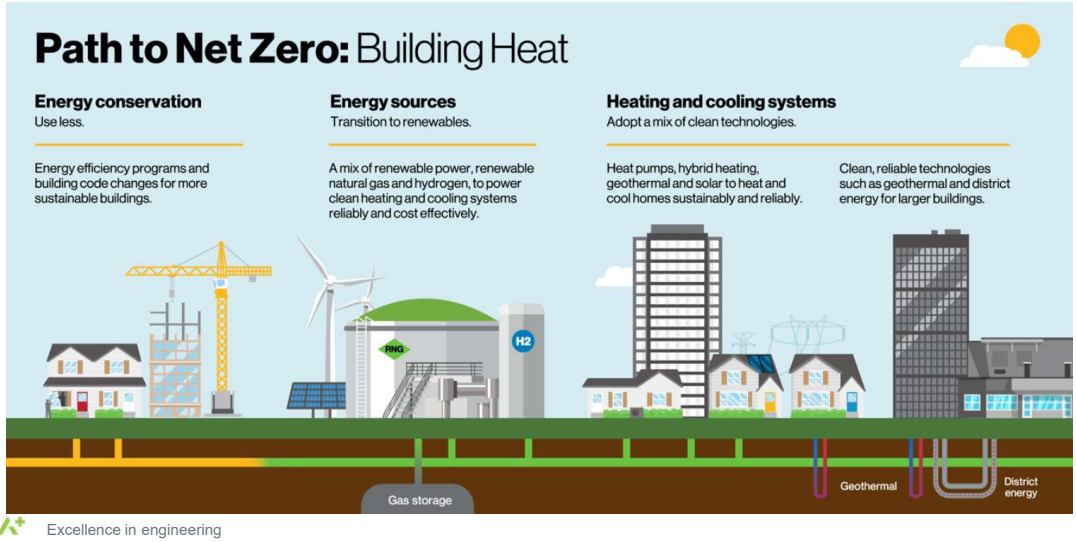
Discover energy efficiency savings through SAVE ON ENERGY programs



40

Creating Change within the Commercial & Manufacturing Sector

Enbridge program for commercial and industrial buildings



41

Creating Change within the AFOLU Sector

CANADIAN AGRICULTURAL PARTNERSHIP

- Ontario Ministry of Agricultural Food and Affairs partnered with the Canadian Agricultural Partnership to create a GHG tool to help farmers make decisions about measures that will reduce GHG emissions
- Tool provides support related to crop management, nutrient management and minimum distance separation

Welcome to the new AgriSuite

The Ontario government's free agricultural & environmental suite of decision support tools Related to crop management, nutrient management and minimum distance separation

Source: AgriSuite (gov.on.ca)

42

Creating Change within the AFOLU Sector

CANADIAN AGRICULTURAL PARTNERSHIP

GHG 1

Imperial

General info | Livestock | Fields | Buildings | Report | Resources

GHG Annual Emissions

	Enteric CH4 (ton CO2e)	Manure CH4 (ton CO2e)	Direct N2O (ton CO2e)	Indirect N2O (ton CO2e)	Land Use CO2 (ton CO2e)	Energy CO2 (ton CO2e)	Subtotal (ton CO2e)
Livestock	11.6	37.3	9.1	0	0	0.9	59
Field	0	0	2.6	0.2	-0.9	1.4	3.3
Buildings	0	0	0	0	0	0	0
Total emissions	11.6	37.3	11.7	0.2	-0.9	2.3	62.3
Emission reduction	0	0	0	0	0	0	0
Net emissions	11.6	37.3	11.7	0.2	-0.9	2.3	62.3

Global warming potentials of various greenhouse gases

	Description	Value
N2O	100-year Global Warming Potential of N2O (kg CO2e (kg N2O)-1)	265
CH4	100-year Global Warming Potential of CH4 (kg CO2e (kg CH4)-1)	28

Relative uncertainties for each emission category

Emission category	Relative uncertainty
Soil N2O - direct	High
Soil CO2	Medium

43

Ontario Environmental Farm Plan

Canada-Ontario Environmental Farm Plan (EFP)

Learn about this voluntary program to increase environmental education and awareness on the farm.

On this page

1. Overview
2. How to complete an EFP
3. Step 1 - attend an EFP workshop
4. Step 2 - submit your EFP for review
5. Step 3 - review your workbook and implement your action plan
6. Infosheets

44

06 Group discussions and future focused brainstorming

45

Creating Change within the Municipality

What impactful changes can the we implement on **a per sector level** to decrease our impact on the environment?

Mapleton

46

Creating Change within the Municipality

Q1: What are you currently doing to decrease your carbon footprint?

Q2: What do you plan to do to make a larger impact?

Q3: What challenges/barriers do you face in successfully implementing change?

47

Thank you / Merci

Any questions?

48