Focus Group – Residential Sector

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

CIMA+ L'humain au centre de l'ingénierie

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Agenda

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

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| Meet the team

Julie Hardy, LEED AP BD+C, WELL AP, ENV SP
Associate partner, Project Manager, Sustainability

Christophe Jenkins, LEED AP BD+C, M. Sc.
Sustainable Development Professional

Aleksandra Lazarevic, MES, LEED GA
Sustainable Development Professional

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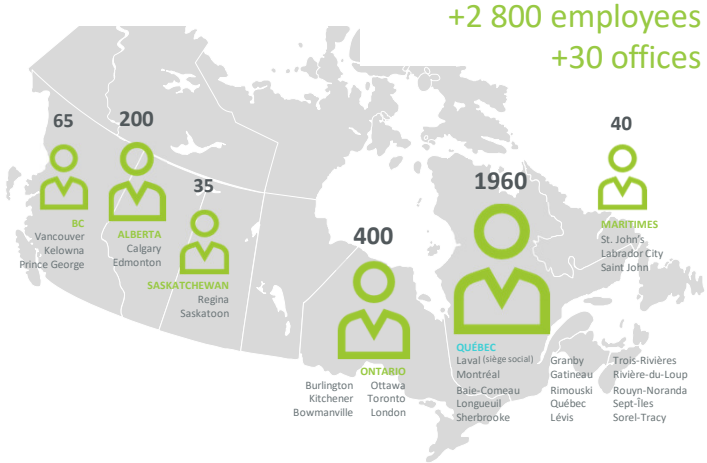
Sectors of activity

- 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

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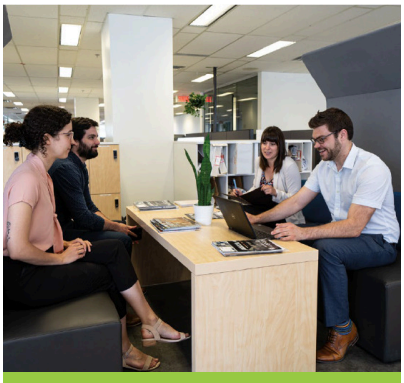
CIMA+'s Center of Excellence for Sustainability

1 Engineering for the next generations

2 Empowering our people and communities



3 Leading a responsible business

CIMA+

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01 Climate change and its impacts on our world

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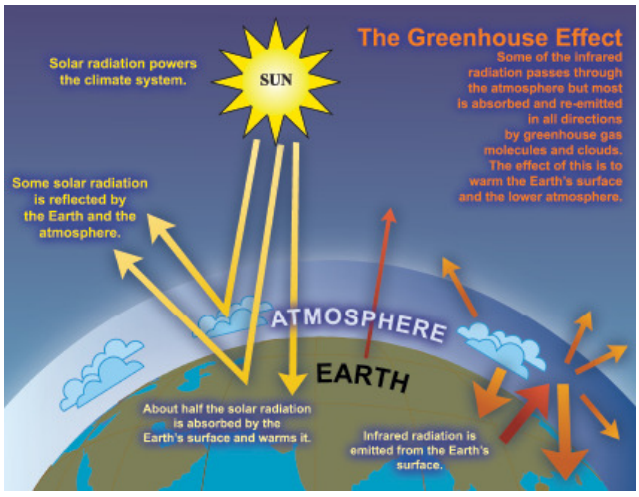
Global Greenhouse Gas Emissions

- What is the Greenhouse Gas Effect?
- More gas = more heat trapped in the atmosphere



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

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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: https://www.ipcc.ch/report/ar6/wg1/

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

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

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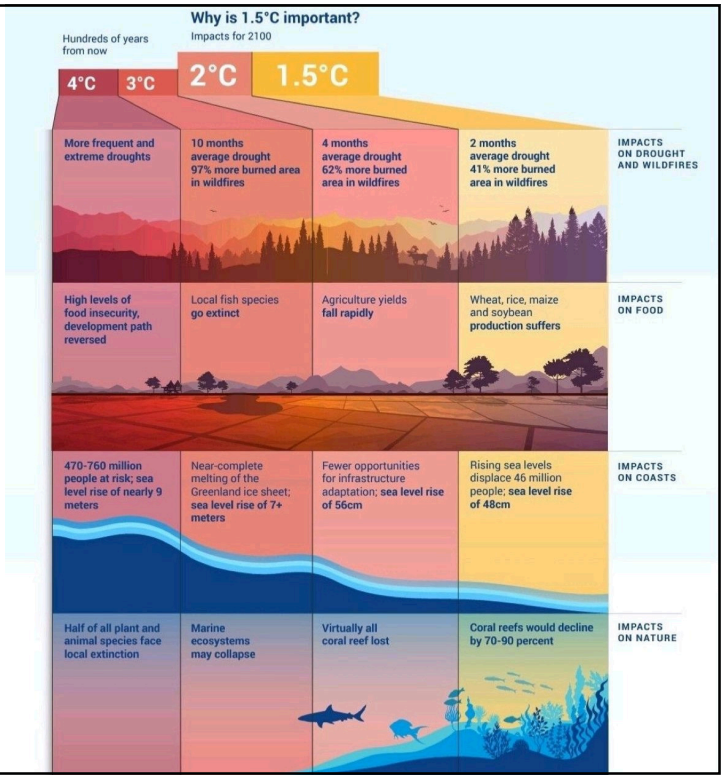
Impacts of 1.5°C vs. 2.0°C

- 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



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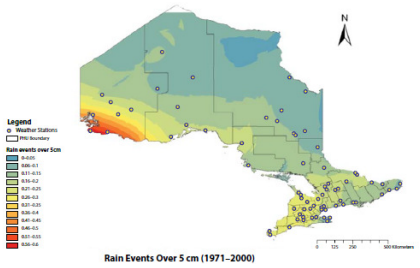
Impacts of 1.5°C vs. 2.0°C

- On Ontario:

  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

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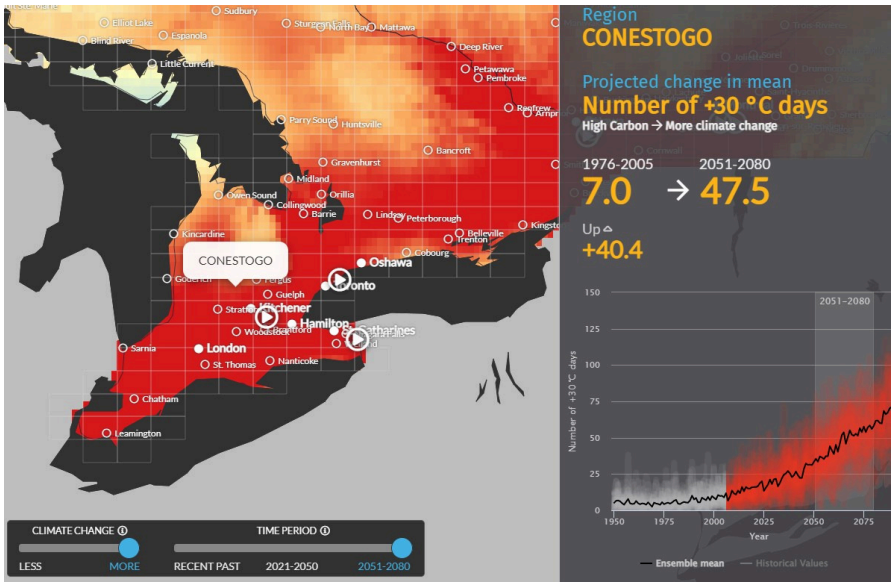
Climate Change in Ontario



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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

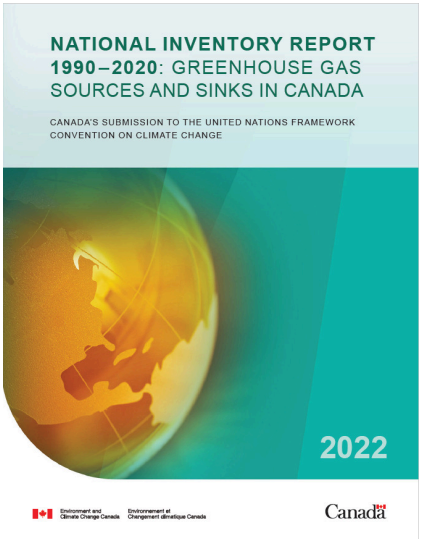
EQUATION 4.9
CO_2 EMISSIONS FROM IRON & STEEL PRODUCTION (TIER 2)

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

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

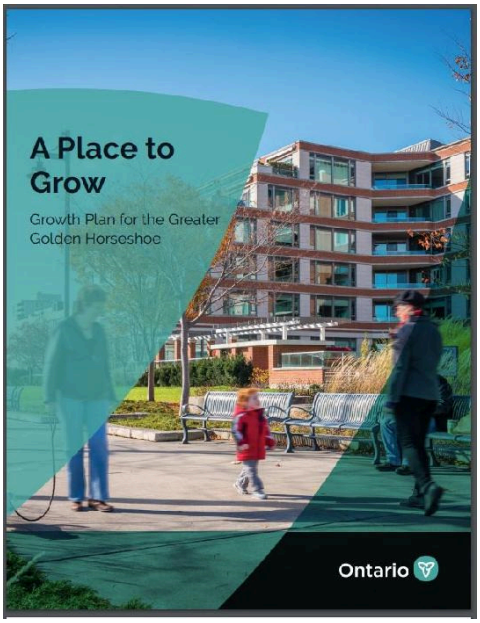
Provincial Targets – Made-in-Ontario

- '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

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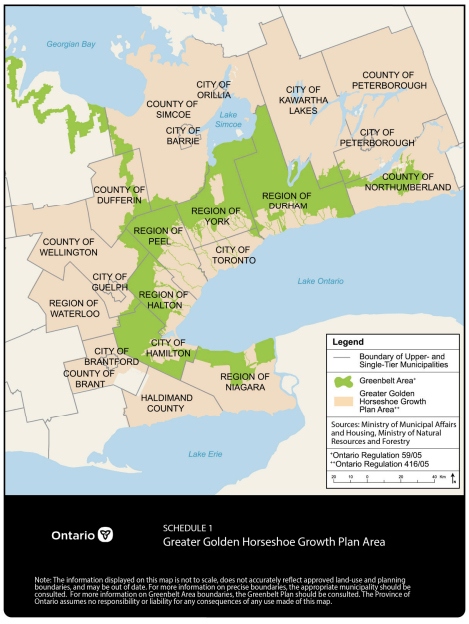
Provincial Targets – A Place to Grow

- 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

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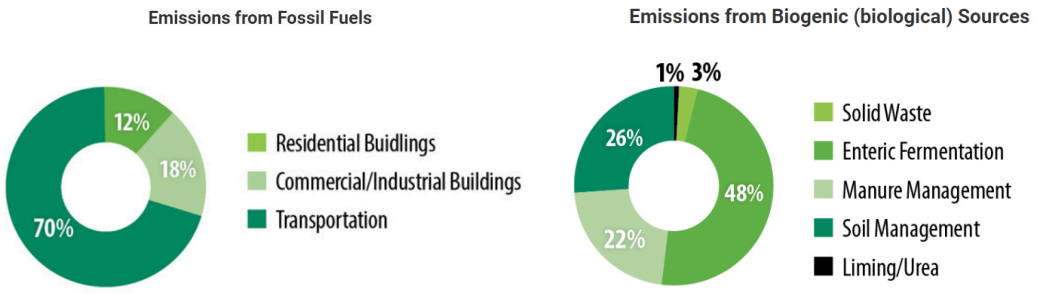
Future Focused Targets – County of Wellington

- 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

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

02 GHG emissions to consider in a municipality

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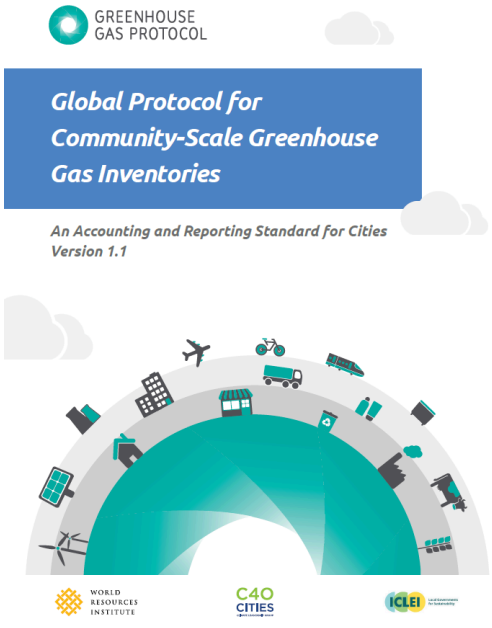
Global Protocol for Community-Scale Greenhouse Gas Inventories (GPC)

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

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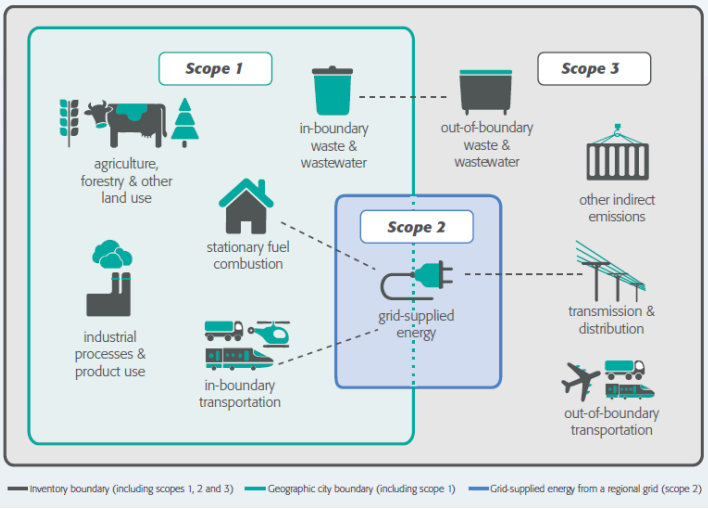
GHG Inventory Sources and Boundaries of Emissions

- **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

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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

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03 Preliminary results from Mapleton's 2021 inventory

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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**

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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).
- Stationary – residential, Waste, and On-road transportation (private households) account for 48% of the overall inventory, being 46,596 t of CO_2e

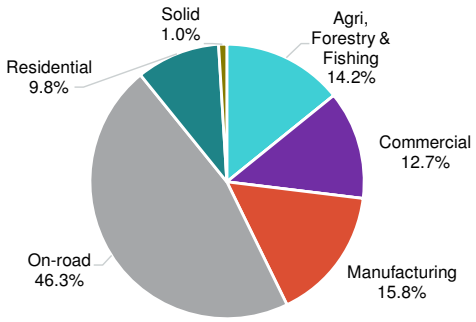

Figure 1. Township of Mapleton's 2021 GHG Emissions (t) CO2e – excluding AFOLU sources

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04 Residential emissions

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On Road Transportation

- ~46% of the Township's overall GHG emissions

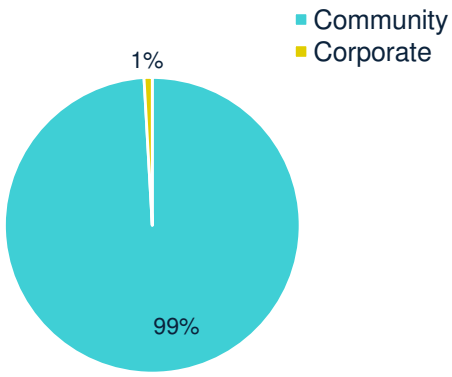

Figure 2. Total Tonnes CO_2e from On-road Transportation

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On Road Transportation

- 33,245 t CO_2e from gas powered household vehicles
- 2,049 t CO_2e from diesel powered household vehicles

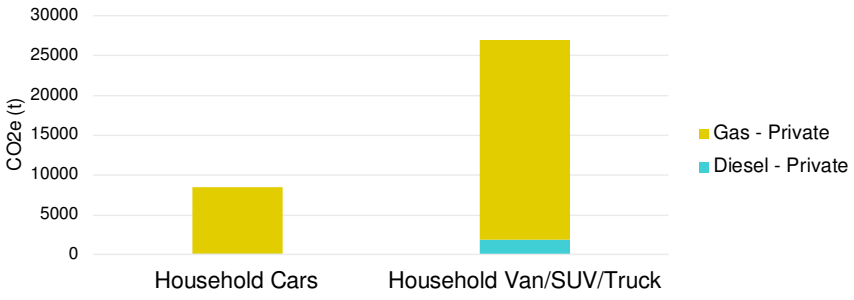

Figure 3. Total Tonnes CO_2e from Residential Household Vehicle Use

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Stationary - Residential

- ~10% of the Township's overall GHG emissions
- Majority emissions are derived from Natural Gas usage in homes, followed by Electricity

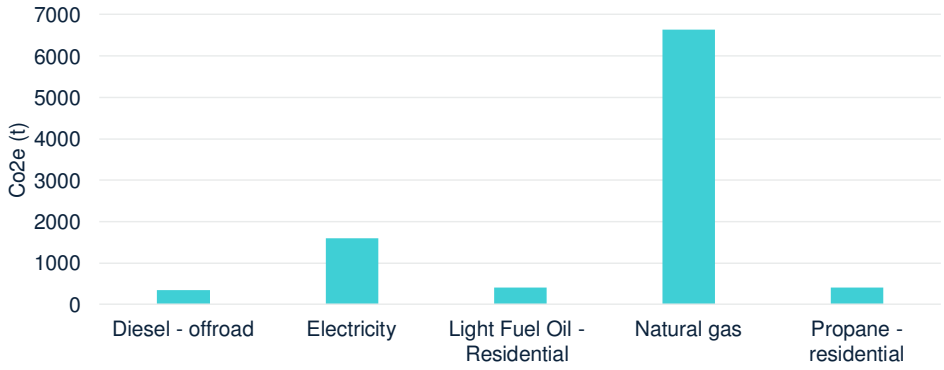

Figure 4. Stationary Residential CO_2e (tonnes) Emissions by Energy Type

Waste

- Accounting for < 2% of the Township's overall GHG emissions

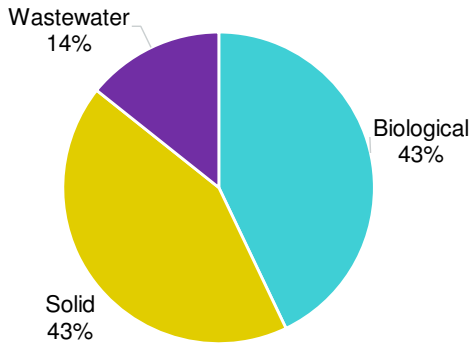

Figure 5. Total Tonnes of CO_2e from Waste Sector

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

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Creating Change on an Individual Level

- 2/3 of our global GHG emissions are linked to private households

Source: Act Now | United Nations

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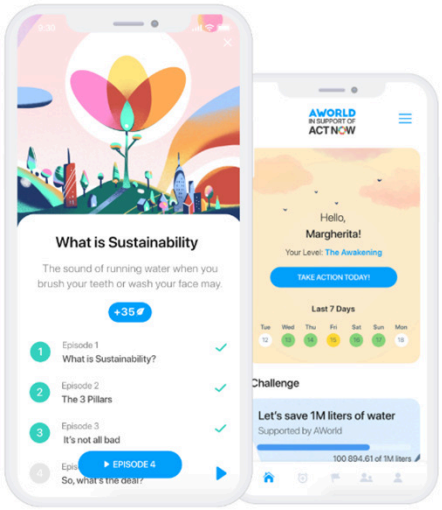
Creating Change on an Individual Level

- United Nations Created an App “AWorld” in support of ACTNOW, the UN campaign for individual action on climate change and sustainability
  - Provides tips on Sustainability
  - Events and series
  - Calculating your carbon footprint
  - Track and quantify your individual impact



Source & APP Download: AWorld in Support of ActNow

Creating Change in the County of Wellington

- Gaining a better understanding of household energy use
  - Dunsky Energy and Mainstreet Research conducting online and phone surveys from Nov. 16 to Dec. 16
  - Gaining insight into
    - Homeowner current energy use
    - Energy efficiency efforts owners are interested in pursuing
    - Major barriers
    - Ways to aid homeowners in benefitting from energy efficiency

    Source: Wellington County will be Conducting Online and Phone Surveys Regarding Home Retrofits - Wellington County

“‘Many of the actions homeowners and landlords take to reduce emissions also contribute to improved home comfort, health, and durability. We want to understand what tools our community needs to invest in their homes to meet these goals, and what the municipality’s role is in supporting them.”

- Karen Chisholme, Climate Change and Sustainability Manager at the County of Wellington

Incentives and Funding Programs

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

1. Government of Canada: Canada Greener Homes Grant (nrcan.gc.ca)
2. Save on Energy: Energy Efficiency For Your Home | Save on Energy
3. Save on Energy: Energy Affordability Program
4. Transportation Canada: Incentives for purchasing zero-emission vehicles
5. Independent Electricity System Operator: i.e. Enbridge: Home Efficiency Rebate
6. HydroOne: Ontario Electricity Rebate

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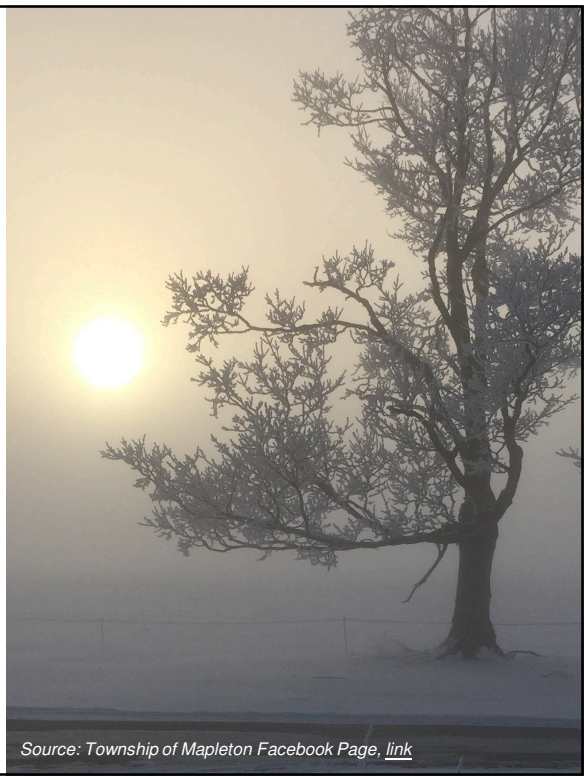
Break

5 minutes



Source: Township of Mapleton Facebook Page, link

CIMA+ Excellence in engineering

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06 Group discussions and future focused brainstorming

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Creating Change within the Municipality

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

Open discussion on your thoughts and ideas for collaborative and concerted actions for Mapleton.

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Creating Change within the Municipality

For the following three (3) categories:

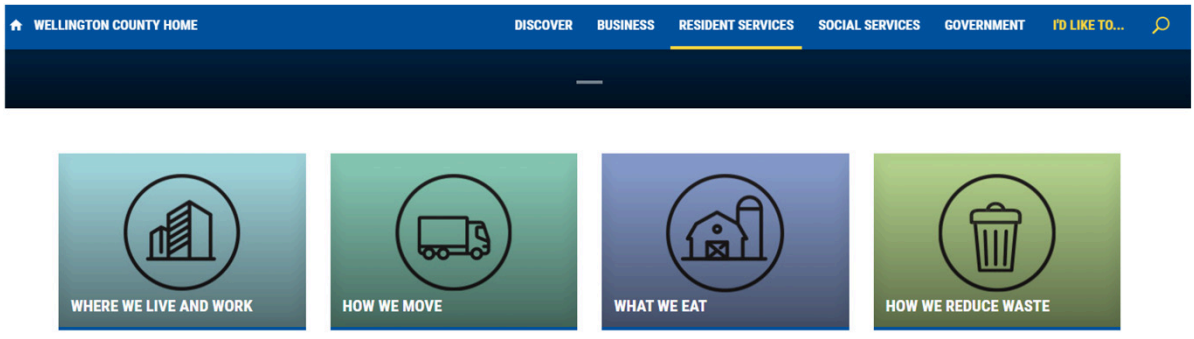
1. Home Energy Use/Efficiency
2. Transportation & Vehicle Use
3. Waste

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?

Creating Change within the County



Improving comfort and health through energy efficiency actions

- Home electrification
- Electric appliances (dryer, stove, fireplace)

Walking away from fossil fuels

- Electric Vehicles
- Pedestrian/bike paths

Supporting farmers in their ongoing stewardship of land and water

- Improve soil health
- Manure management

Using waste as a resource

- Diverting food waste (composting)
- Recycling

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