Public Report

To:	Economic and Development Services Committee
From:	Anthony Ambra, P.Eng, Commissioner, Economic and Development Services Department
Report Number:	ED-25-115
Date of Report:	November 26, 2025
Date of Meeting:	December 1, 2025
Subject:	Community Greenhouse Gas Reduction Plan - 5 Year Update
Ward:	All Wards
File:	12-05 3555

1.0 Purpose

The purpose of this Report is to provide Council with an update on the first five years of progress towards the initiatives/reduction targets established in the Community Greenhouse Gas Reduction Plan (the "Community Plan") previously approved by Council through Report DS-20-130 in November, 2020, and to seek authorization to submit the 2024 Greenhouse Gas Emissions Inventory (the "G.H.G. Inventory") to the Federation of Canadian Municipalities ("F.C.M.") together with a copy of this Report, to satisfy Milestones 4 and 5 for the Partners for Climate Protection ("P.C.P.") Program.

Attachment 1 is a copy of the Community Plan. Owing to its size, a copy of the Community Plan can be viewed using the following link: https://app.oshawa.ca/agendas/Development_Services/2020/11-09/REPORT_DS-20-130.pdf.

Attachment 2 is a copy of the G.H.G. Inventory dated November 2025, prepared by Ontario Tech University's Faculty of Engineering and Applied Science, in partnership with the City of Oshawa through the Teaching Cities initiative.

2.0 Recommendation

That the Economic and Development Services Committee recommend to City Council:

1. That, based on Report ED-25-115 dated November 26, 2025, City Council endorse the 2024 Greenhouse Gas Emissions Inventory as part of the first five year update to the Council-approved Community Greenhouse Gas Reduction Plan and authorize staff to provide a copy of the 2024 Greenhouse Gas Emissions Inventory, together with a copy of said Report, to the Federation of Canadian Municipalities for approval, to satisfy Milestones 4 and 5 of the Partners for Climate Change program.

2. That a copy of Report ED-25-115 dated November 26, 2025 be sent to the Association of Municipalities of Ontario, the Region of Durham, Durham area municipalities, Oshawa Power and Utilities Corporation, and the Central Lake Ontario Conservation Authority.

3.0 Input From Other Sources

The following have been consulted in the preparation of this Report:

- Chief Administrative Officer
- Commissioner, Community and Operations Services Department
- Commissioner, Corporate and Finance Services Department
- Commissioner, Safety and Facilities Services Department
- Ontario Tech University

4.0 Analysis

4.1 Region of Durham 2024 Greenhouse Gas Emissions Inventory

The Region of Durham reports annually on their G.H.G. Inventory as well as their progress towards achieving the net-zero climate targets established in, and as part of the Durham Community Energy Plan ("D.C.E.P."). These reports help monitor and track the Region's overall progress in reducing G.H.G. emissions.

For more information on the 2024 Regional G.H.G. inventory please visit the following link: https://shared.ontariotechu.ca/shared/department/research/brilliant-energy-institute-website/durhamclimateroundtable/durhamzero-jan-20251.pdf?__hstc=264899472.ce27554b2fdd290ead7cb2bae0aab723.1761568607135.1761568607135.1

A link to the D.C.E.P. can be found here: https://www.durham.ca/en/living-here/low-carbon-pathway.aspx#Community-Energy-Plan.

It is important to note that both the City and the Region are committed to the same Community G.H.G. reduction targets listed below:

- 5% reduction from 2007 levels by 2015;
- 20% reduction from 2007 levels by 2020; and,
- 80% reduction from 2007 levels by 2050.

4.2 City of Oshawa Policies

4.2.1 2024 to 2027 Oshawa Strategic Plan

On June 24, 2024, City Council considered Report CNCL-24-71, dated June 19, 2024, and approved the Oshawa Strategic Plan ("O.S.P.") 2024-2027: Innovate. Belong. Care. Lead.

The O.S.P. serves as the City's highest level policy document. The O.S.P. identifies a vision for the long-term future, refines the City's corporate mission and identifies a series of

priority areas, goals and actions to move toward the vision. A key component of the O.S.P. is the establishment of performance metrics, to measure the City's progress in implementing the O.S.P. The O.S.P. includes four priority areas and/or initiatives that are identified below:

- Innovate: Vibrant Culture and Economy
- Belong: Inclusive and Healthy Community
- Care: Safe and Sustainable Environment
- Lead: Governance and Service Excellence

The G.H.G. Inventory as contained in Attachment 2 aligns with the metrics, goals and actions brought forward in the Care: Safe and Sustainable Environment, section of the O.S.P.

4.2.2 Oshawa Official Plan

The Oshawa Official Plan ("O.O.P.") sets out the land use policy directions for long-term growth and development in the City. The O.O.P. includes policies related to environmental management, conservation and long-term sustainability. Policy 5.1.11 of the O.O.P. states, in part, that "The City supports incremental reduction of overall greenhouse gas emissions and other air pollutants generated by the municipality's own corporate activities and functions."

4.2.3 Integrated Transportation Master Plan and Active Transportation Mater Plan

The City's Integrated Transportation Master Plan ("I.T.M.P.") is a planning document designed to define the policies, programs and infrastructure changes required to meet future transportation needs. The I.T.M.P. seeks to encourage sustainability and reduce G.H.G. emissions by providing residents with viable multi-modal transportation options that include alternatives to gas-powered automobiles.

In February of 2025, the City initiated an update to the existing I.T.M.P. and the Active Transportation Master Plan ("A.T.M.P.") to help shape how people and goods move around the City over the next 25 years. The plans will consist of the following measures:

- Consider all ways of getting around – walking, cycling, public transit, driving, recreational trails, and goods movement.

- Consider safety, accessibility, and connectivity for everyone.

- Support the City's environmental, economic, and social goals, as well as goals and objectives outlined in the O.S.P.

The new I.T.M.P. and A.T.M.P. will build on Oshawa's existing transportation network and provide a roadmap to guide transportation investment and decision-making. The anticipated completion date for these updates is late 2026.

4.3 Partners for Climate Change Program

The P.C.P. Program is voluntary and was established by F.C.M. in 1994. It was created to help municipalities take action against climate change through the following five-milestone framework:

- Milestone 1: create a baseline emissions inventory and forecast;
- Milestone 2: set emissions reduction targets;
- Milestone 3: develop a local action plan;
- Milestone 4: implement the local action plan; and,
- Milestone 5: monitor progress and report results.

The P.C.P. Program also provides project funding through the Green Municipal Fund for the development of community and corporate plans.

4.3.1 Community Milestones 1 to 3

On March 9, 2009, City Council considered Report DS-09-74 dated February 25, 2009, and adopted a recommendation to participate in the P.C.P. Program and committed to achieving the milestones set out in the P.C.P. five-milestone framework.

On September 7, 2010, City Council considered Report DS-10-217 dated August 25, 2010, and adopted the following recommendation:

"1. That Report DS-10-217 dated August 25, 2010 and its attached inventories be submitted to the Federation of Canadian Municipalities Partners for Climate Protection Program in partial satisfaction of Milestone 1 of the Program; and,

2. That Milestone 1 of the Program be finally completed by adopting 2007 as the City's benchmark or baseline year for the purposes of monitoring and measuring the City's future performance in achieving its Greenhouse Gas reduction targets and that the Partners for Climate Protection Program be so advised; and

3. That the following community and corporate Greenhouse Gas emission targets be adopted as provisional targets until a local action plan is developed at which time the targets may be further refined:

    - 5% reduction by 2015 from 2007 baseline;
    - 20% reduction by 2020 from 2007 baseline;
    - 80% reduction by 2050 from 2007 baseline; and,

4. That the City apply to the Federation of Canadian Municipalities Green Municipal Fund for funding to complete Milestone 3 (preparation of a Local Action Plan/Integrated Community Sustainability Plan for reducing Greenhouse Gas Emissions) and that any additional City funding required be referred to the 2011 budget for consideration for funding from the Gas Tax."

The G.H.G. emission reduction targets identified in the above Council resolution are consistent with the Region of Durham's G.H.G. emission reduction targets identified in the D.C.E.P.

On January 28, 2013, City Council considered Report DS-13-10 dated January 9, 2013, concerning the Environmental Commissioner of Ontario's Annual G.H.G. Progress Report 2012, and adopted the following recommendation:

> "That Report DS-13-10 dated January 9, 2013, regarding the Environmental Commissioner of Ontario's Annual Greenhouse Gas Progress Report 2012 – A Question of Commitment, be received for information and that staff proceed with Milestone 3 of the Federation of Canadian Municipalities Partners for Climate Protection plan, which requires the development and implementation of corporate and community greenhouse gas emission reduction plans to achieve the Milestone 2 targets previously established and approved by Council."

On November 9, 2020, City Council considered Report DS-20-130 dated November 4, 2020, and adopted the following recommendations:

> "1. That, pursuant to Report DS-20-130 dated November 4, 2020, City Council endorse the City's Partners for Climate Protection Milestone 3 City of Oshawa Community Greenhouse Gas Reduction Plan dated November 2020 (Attachment 1 to said Report) as a guideline to reduce energy costs, energy consumption and greenhouse gas emissions, to be sent to the Federation of Canadian Municipalities for review and approval.
>
> 2. That, a copy of Report DS-20-130 dated November 4, 2020 and the related Council resolution be sent to the Association of Municipalities of Ontario, the Region of Durham, Durham area municipalities, Oshawa Power and Utilities Corporation, the Central Lake Ontario Conservation Authority, and the City's Building Industry Liaison Team which includes representatives of the Durham Chapter of the Building Industry and Land Development Association and the Durham Region Home Builders' Association."

The Community Plan, as shown in Attachment 1, satisfied the Milestone 3 requirement for the P.C.P. program and it is the intent of this Report, together with Attachment 2 (the G.H.G. Inventory), to satisfy Milestones 4 and 5 of the P.C.P program.

4.3.2 Corporate Greenhouse Gas Reduction

On February 22, 2016, City Council considered Report DS-16-25 dated February 3, 2016 concerning the P.C.P. Program Milestone 3 Corporate Plan Submission, and adopted the following recommendation:

> "That, pursuant to Report DS-16-25 dated February 3, 2016, City Council endorse the City's Partners for Climate Protection Milestone 3 Corporate Plan as a guideline to reduce energy costs, energy consumption and greenhouse gas emissions and that staff be authorized to submit it to the Federation of Canadian Municipalities for review and approval."

As a result of completing the Milestone 3 submission of the Corporate Plan, the City received acknowledgement from F.C.M. on March 8, 2016 that it had achieved Milestones 3, 4, and 5 for the Corporate Plan.

To date, the City has, and continues to, complete many of the actions identified in the Corporate Plan to help reduce the G.H.G. emissions from corporate sources.

Key actions that have been advanced by the City include, but are not limited to, the following:

- The installation of solar-powered parking meters in the downtown;
- The construction of the Oshawa City Hall Revitalization Project which was built to the Leadership in Energy and Environmental Design ("L.E.E.D.") Silver Standard;
- The provision of training for program and operational staff at City recreational facilities and fire halls to reduce electricity and gas consumption;
- The delivery of various Net-Zero Retrofit Strategy Feasibility Studies, which began in 2024 for Delpark Homes Centre, Civic Recreation Centre and City Hall;
- The establishment of the Corporate Facilities Energy Audit Program with F.M.S., which is now preparing to enter the third annual cycle in 2026;
- The certification of ongoing construction of the Rotary Park Redevelopment to meet the Zero Carbon Building (Z.C.B.) Standard;
- The advancement of City fleet electrification which currently totals 32 Electric Vehicles in use, and the installation of 35 Electric Vehicle Charging Stations; and,
- Collaboration with local post-secondary institutions through three Teaching City projects. These projects supported the Corporate Net-Zero Emissions Feasibility Studies, the development of an Oshawa Facilities Corporate Green Building Standard and the Community G.H.G. Inventory Report.

In addition to the City's voluntary efforts to reduce its carbon footprint, the City is mandated by O. Reg. 507/18 under the Energy Act, 1998, to prepare a Corporate Facilities Energy Management Plan ("C.F.E.M.P.") and update it every five years.

4.3.2.1 Corporate Energy Management Plan 2024 to 2028

The City of Oshawa established the first Corporate Facilities Energy Management Plan ("C.F.E.M.P.") in 2014, with the mission of outlining facility-based actions for energy conservation and greenhouse gas reduction. On June 24, 2019, City Council considered Report CORP-19-62 dated June 12, 2019 concerning an update to the C.F.E.M.P., and adopted the following recommendation:

> "That the Corporate Facilities Energy Management Plan 2019 – 2023, dated June 12, 2019, as set out in Attachment 1 to Report CORP-19-62, be endorsed."

The C.F.E.M.P. supports the goals and targets set out in the City's Corporate Plan.

The Corporate Plan was established in 2016 to satisfy Milestone 3 of the F.C.M.'s Partners for Climate Protection Program. This Corporate Plan outlined contributions for greenhouse gas reductions corporately.

In 2023, City Council considered Report SF-23-20 dated May 10, 2023, and adopted the 2024-2028 Corporate Energy Management Plan ("C.E.M.P."). The C.E.M.P. has amalgamated the C.F.E.M.P. and the Corporate Plan, marrying the corporate efforts towards decarbonization with the goal of accountability and meaningful forward action.

The targets and measures defined in the C.E.M.P. bring the City of Oshawa into compliance with the Electricity Act, 1998, and Ontario Regulation 25/23, and fulfills the F.C.M.'s Partners for Climate Protection Program's commitment for a corporate action plan to reduce greenhouse gas emissions.

The C.E.M.P. can be found at the following link:
https://www.oshawa.ca/media/vssn1v2z/environment-sf-23-20-2024-2028-cemp-attachment-1_final.pdf.

4.4 2024 Greenhouse Gas Emissions Inventory

4.4.1 Introduction

Oshawa's G.H.G. reduction targets are consistent with net-zero emission targets that other municipalities, institutions (e.g., Ontario Tech University and Ontario Power Generation), the Province of Ontario and the Federal Government of Canada have declared, as a result of the Canadian Net-Zero Emissions Accountability Act of 2021, which is an Act that legally binds the Federal Government of Canada to reduce G.H.G. emissions to net-zero levels by 2050.

In 2010, City Council endorsed the following Community and Corporate greenhouse gas emission reduction targets (based on a 2007 baseline):

- 5% reduction by 2015;
- 20% by 2020;
- 30% by 2030; and,
- 80% by 2050.

The targets listed above were endorsed by City Council at the community level on November 9, 2020 through the adoption of the Community Plan as contained in Attachment 1. As part of the Community Plan the City is required to monitor and measure progress on a five (5) year cycle and report back to Council to track the community's progression towards these reduction targets.

Given this requirement the City of Oshawa, through the Teaching Cities program, partnered with Ontario Tech University's Dr. Daniel Hoornweg, Associate Professor in the Faculty of Engineering and Applied Science, and David Wotten, Sustainable Development

Consultant, as well as students working alongside Dr. Hoornweg, to compile the 2024 Community G.H.G. Inventory update on behalf of the City of Oshawa.

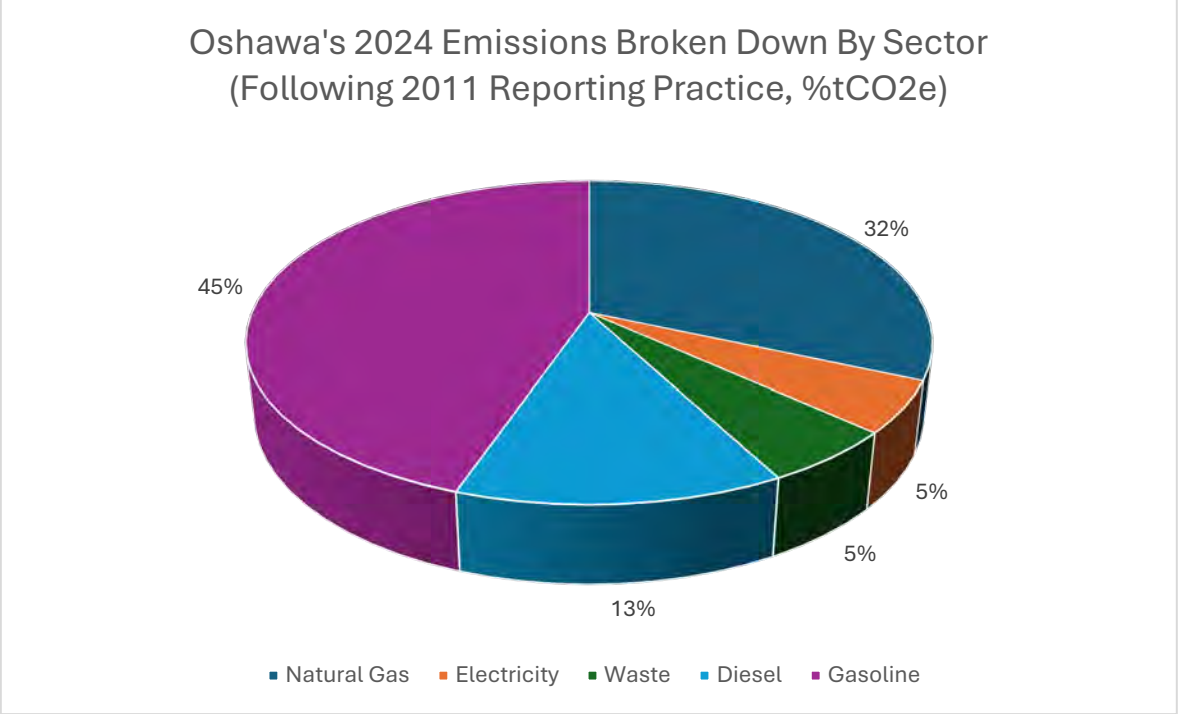
4.4.2 Inventory Results

The 2007 baseline used by Oshawa (and other communities) is a Scope 1 and 2 (partial) territorial assessment, including emissions that occur within Oshawa's city-limits (plus imported electricity, including vehicles fueled in Oshawa and driven elsewhere). To contribute to global G.H.G. emissions reductions, the inventory suggests that a whole-of-community inventory is needed (Scopes 1, 2 and 3), and emissions that are generated upstream and downstream from activities that take place in Oshawa should also be considered. This is especially important in Canadian communities and institutions, as Canada's global G.H.G. emissions (all Scopes) are among the highest in the world. Reducing G.H.G. emissions requires a planetary effort as atmospheric contributions and impacts do not recognize political borders.

The G.H.G. Inventory includes Scope 3, and defines it as embodied carbon emissions in and from imported food, building materials, emissions generated from invested capital and international travel, among other things. Scope 3 is essentially all avenues in which we produce and contribute to G.H.G. emissions in our communities (see Attachment 2, Table 2.1 for a full breakdown). Scope 3 emissions for Oshawa in 2024 were 19,826,558 tonnes, 16-times more than the combined emissions of Scopes 1 and 2. However, many aspects of Scope 3 are beyond Oshawa's ability to regulate/control. If Oshawa was to shift focus away from Scopes 1 and 2 and focus primarily on Scope 3 in an effort to achieve major reductions, substantial support from the Provincial and Federal government would be required. The robustness of this support is not clear, which leaves Oshawa and other municipalities to focus on Scopes 1 and 2.

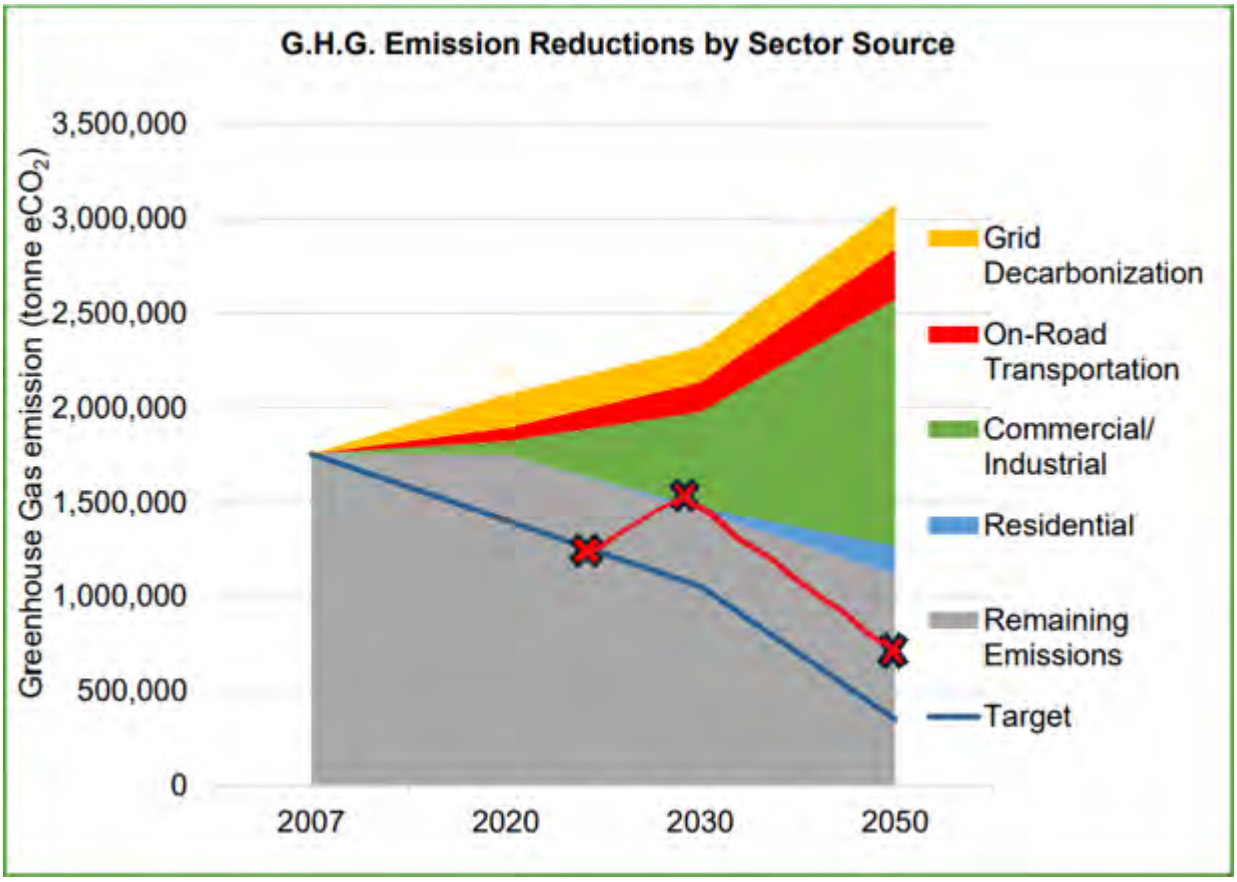
In 2024, Oshawa's total G.H.G. emissions under Scopes 1 and 2 was 1,275,674 tonnes. This represents a 30% reduction from the 2007 baseline, despite a 30% increase in population. According to the G.H.G. Inventory, per capita emissions dropped from 11.8 tonnes in 2007 to 6.4 tonnes in 2024. For a detailed breakdown of Oshawa's emissions under Scopes 1 and 2, please refer to the Sankey Diagram shown in Figure 2 in Attachment 2.

The following graph also shows the 2024 emissions by sector (or source) in Oshawa. (Figure 3 in Attachment 2):



When looking at Scopes 1 and 2, the G.H.G. Inventory credits Oshawa for the 30% reduction from the 2007 baseline. However, despite this impressive effort, the City's overall progress towards the established reduction targets is not anticipated to stay on track, although Oshawa is not alone in this regard. Like most larger communities and institutions in Canada, Oshawa will likely miss the 2030 and 2050 targets given the sheer scale and overall buy-in required from governments, residents and businesses alike, to reduce their overall emissions.

The following chart, Figure 5 in Attachment 2, shows Oshawa's revised trajectory based on the current statistics and future assumptions. The red X and line represent the City's anticipated trajectory towards the 2050 target.



To summarize, the G.H.G. Inventory provides the following rationale with respect to Figure 5 and the revised trajectory for Oshawa:

"Oshawa's territorial (Scopes 1 & 2) G.H.G. emission reduction target was on track from 2014 to 2020 (Fig 5 target line) and remains relatively well-positioned based on projections outlined in Annex 2 (Appendix 2). These emission reductions are largely attributed to decarbonizing electricity (especially in the ICI buildings sector) and significant changes in industrial processes (Table 2.1). However, while emissions from 'Building energy ICI' and 'Industrial processes' declined by more than 75% between 2007 and 2024, 'Land transportation' emissions more than tripled. Between 2024 and 2030 all categories of territorial G.H.G. emissions are expected to increase."

While this chart highlights the impressive efforts to date from the City of Oshawa as its efforts are clearly tracking on the established target line for 2024, it also highlights the importance of efforts over the next five years to try and stay as close as possible to the original established target line. The G.H.G. Inventory suggests that the following initiatives be undertaken to assist with meeting the next reporting target:

- Phasing out natural gas for heating of buildings and hot water;

- Decarbonizing the transportation sector (including manufactured vehicles and low-carbon aircraft and maritime shipping fuel);
- Decarbonizing (global) electricity generation, i.e., less than 30 gCO_2e/kWh;
- Decarbonizing food production (and transportation, and organic waste management);
- Decarbonizing (global) industrial processes such as cement and steel manufacturing; and,
- Ensuring that invested capital, e.g., Canadian Pension Plan, is low-carbon emitting, i.e., below $tCO_2e/\$M$.[5] (amount of CO2 generated from invested capital per year).

Many, if not all, of these initiatives are beyond the scope and/or control of the City. However, Oshawa can engage in conversations and use this Report as a tool to educate the public, stakeholders and even other levels of government.

It is worth noting that the G.H.G. Inventory also indicates that the City of Oshawa's corporate emissions continue to be less than 1% of the Oshawa's overall emissions.

4.5 2020 Community Greenhouse Gas Reduction Plan Update - Actions and Opportunities

The Community Plan included seven (7) specific actions and opportunities that the City could undertake, assist and/or promote. The following table summarizes the City's progress to date (from 2020-2024) on these actions, as outlined in the G.H.G. Inventory.

Action	GHG Avoidance Potential (t = Tonnes)	Other benefits	Progress (2020-2024)	Anticipated Progress (2024-2030)
1. Increase renewable electricity generation from renewable sources in residential buildings	1,882 t by 2030; 4,741 t by 2050	Improve energy resilience, reduce energy costs, improve air quality, reduce urban heat island	No Change	Decline
2. Improve energy performance in residential buildings	20,213 t by 2030; 151,810 t by 2050	Reduce energy costs, improve climate resilience, increase home values, improve air quality, reduce urban heat island	About 10% decline	Target can be met

Action	GHG Avoidance Potential (t = Tonnes)	Other benefits	Progress (2020-2024)	Anticipated Progress (2024-2030)
3. Increase renewable electricity generation from renewable sources in commercial buildings	1,090 t by 2030; 3,431 t by 2050	Improve energy resilience, reduce energy costs, improve air quality, reduce urban heat island.	No change	Decline
4. Improve energy performance in commercial buildings	505,267 t by 2030; 1,300,928 t by 2050	Reduce operational costs of commercial buildings, improve climate resilience, improve air quality, reduce urban heat island	About 10% decline	Target can be met, priority is to shift away from natural gas heating
5. Promote low carbon or no carbon vehicles	103,853 t by 2030; 235,772 t by 2050	Improve air quality, reduce travel costs, reduce urban heat island	631 electric vehicles registered in Oshawa in 2022, increased to 2,313 in 2025	To meet 2030 targets more than half the vehicles in Oshawa would need to be electric vehicles. 2050 target still possible but requires federal and provincial leadership. Efforts need to be developed within a broader mobility campaign.
6. Increase and Improve cycling and walking infrastructure to encourage active forms	28,913 t by 2030; 14,017 t by 2050	Improve air quality, increase physical activity, reduce travel costs	Mixed, e-scooter pilot extended, bike use relatively unchanged	2030 and 2050 targets can still be met, but efforts need to be developed within a broader

Action	GHG Avoidance Potential (t = Tonnes)	Other benefits	Progress (2020-2024)	Anticipated Progress (2024-2030)
of transportation				mobility campaign
7. Coordinate land-use policies to establish a built form that promotes sustainable growth	26,254 t by 2030; 20,507 t by 2050	Improve air quality, more efficient use of land, increase physical activity, shorter commute times, local economic development	Mixed, built form still highly auto-dependent, most new homes still heated with natural gas	GHG avoidance targets can still be achieved. "Sustainable growth" may need to be defined as 'sustainability' or steady state before 2050 as Canada's population influenced by a global peak population (and decline thereafter) post-2075. Best supported through a broader sustainability transition

It is also important to highlight the following actions and initiatives undertaken by the City that have or are anticipated to have impacts on the reduction of community G.H.G. emissions:

- Implementation of the C.E.M.P.;
- Approval of supportive Official Plan and Zoning By-law amendments, including for the Downtown Oshawa Urban Growth Centre, Protected Major Transit Station Areas and the Bond/Simcoe corridor through the Downtown Main Central Area, and planning for increased "as of right" density and more compact, pedestrian-oriented and transit-supportive built form, together with ongoing work on the Oshawa Official Plan Review;
- Updates to the I.T.M.P./A.T.M.P. (currently underway);
- Development of a Forestry Master Plan (currently underway);
- Building awareness through the Oshawa Environmental Advisory Committee;

- Promoting the Durham Greener Homes and Retrofit programs; and,

- Installing electric vehicle charging infrastructure at City facilities, in support of Action Number 5 of the Community Plan.

4.6 Conclusions and Next Steps

In summary, according to the G.H.G. Inventory results and the established targets in the Community Plan, Oshawa is currently on track towards achieving the 2030 emission reduction target under community Scopes 1 and 2. However the G.H.G. Inventory predicts that within the next five years, as shown in the revised trajectory graph in Section 4.4.2 of this Report, the City will be challenged in the years ahead to maintain low or on track community emissions. Leading by example, the City will continue to implement the initiatives set forth in the C.E.M.P., raise awareness through education, and seek out partnerships with other levels of government and relevant stakeholders to support the reduction of G.H.G. emissions.

Through the Community Plan the City has committed to providing Council with an update every five years to monitor and track community G.H.G. emissions. The next report will be in 2030.

5.0 Financial Implications

There are no financial implications associated with the recommendation in this Report.

The G.H.G. Inventory prepared by Ontario Tech University in partnership with the City of Oshawa was a collaboration funded through the City of Oshawa's Teaching Cities Program.

6.0 Relationship to the Oshawa Strategic Plan

This Report responds to the Oshawa Strategic Plan Priority Area:

"Care: Safe and Sustainable Environment" with the goal to reduce the City's carbon footprint and greenhouse gas emissions.

Tom Goodeve, M.Sc.Pl., MCIP, RPP, Director,
Planning Services

Anthony Ambra, P.Eng, Commissioner,
Economic and Development Services Department

City of Oshawa

An inventory of greenhouse gas emissions and assessment of reduction efforts.

Ontario Tech University

Faculty of Engineering and Applied Science

Brilliant Energy Institute

November 2025

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Tables and Figures

1. Summary

In 2010 Oshawa City Council endorsed the following Community and Corporate greenhouse gas (GHG) emission reduction targets (based on a 2007 baseline):

- 5% reduction by 2015;
- 20% by 2020;
- 30% by 2030; and,
- 80% by 2050.

This target was endorsed again at the November 9, 2020, Council Meeting where the City of Oshawa Community Greenhouse Gas Reduction Plan (November 2020) was accepted. This plan also responded to the Climate Emergency Declaration (FIN-19-107) adopted by City Council December 16, 2019.

Oshawa's GHG reduction targets are consistent with 'net-zero' emissions targets that other municipalities, and institutions such as Ontario Tech University and Ontario Power Generation, the Province of Ontario, and the Government of Canada have declared, e.g., the Canadian Net-Zero Emissions Accountability Act of 2021 legally binds the Government of Canada to a target of achieving net-zero greenhouse gas (GHG) emissions by 2050.

In 2024 Oshawa's GHG emissions were 1,275,674 tonnes (consistent categories – Table 2.1 highlighted cells). This is a 30% decline from 2007, despite a 30% increase in population. Per capita emissions dropped from 11.8t in 2007 to 6.4t in 2024.

Despite this impressive effort, progress toward emission reduction targets is **not** on track and Oshawa, like most communities and institutions in Canada, will probably miss the 2050 target (as well as 2030). This shortcoming is even larger than suggested in previous Council Reports, as this review argues that communities like Oshawa should be monitoring a whole-of-community emissions inventory. When all emissions associated with lifestyle, institutional, and business practices in Oshawa are considered, the 6.4 tonnes CO_2 per person increases to over 100 tonnes per person.

There is much that can be done to reduce emissions. The 2020 Community Greenhouse Gas Reduction Plane provides a credible path forward. The challenge for the City of Oshawa is that major reductions require direct support from the Province of Ontario, Government of Canada, actions of residents, and the efforts of local institutions and businesses. The robustness of this support is not clear. Currently it is inadequate to meet declared targets. "Opportunity 3" of the 2020 Community Plan, calls to "Strengthen the City's capacity to be a leader in sustainability." This report endorses that recommendations and suggests a possible way forward.

2. Background[1]

In 2024 humans were responsible for releasing more than 58 billion tonnes of CO_2e[2] into the atmosphere. This is the highest level ever, adding another 3.5 parts per million[3] (ppm) to atmospheric concentrations, forcing levels above 430 ppm.

The world is on track to see global temperature increase by more than 2.8°C this century. Impacts will be staggering. Per person, the people of Oshawa, Ontario and Canada contributed to this increase as much as anyone.

The remaining global carbon budget to limit global temperature increases to the 2°C target of the Paris Agreement, is about 912 Gt (billion tonnes) of CO_2. This is less than 20 years at current emission levels[4].

Recognizing the need to reduce greenhouse gas (GHG) emissions, the City of Oshawa in 2010 set reduction targets for community and corporate emissions. These reduction targets are largely consistent with the 'net zero by 2050' carbon target. Ontario Tech University (Faculty of Engineering and Applied Science) was retained by the City of Oshawa to evaluate progress toward these targets. The November 2020 *City of Oshawa Community Greenhouse Gas Reduction Plan* and update of the October 2014 Sustainability *Oshawa Community Greenhouse Gas Emissions Inventory* provide the target metrics.

The City of Oshawa has made considerable progress in meeting its emission reduction targets. Reduction targets are set against the 2007 baseline year (1,761,835 tonnes): 5% reduction by 2015; 20% reduction by 2020; 80% reduction by 2050.

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[1] This inventory is prepared by Adam Ristau, Ontario Tech University Energy Engineering student, with input (on OTU) from George Mensah, OTU student, and David Wotten, consultant, and supervision and report writing by Daniel Hoornweg, Associate Professor, Faculty of Engineering and Applied Science City of Oshawa staff provided ongoing support and assistance in data collection.

[2] The most authoritative estimate of global GHG emissions (all anthropogenic sources except forest fires, some refrigerants, and other fugitive emissions) are provided by the United Nations Environment Program, UNEP, it its annual 'Gap Report' issued for the previous year in late October. The 2023 estimate was 57.1 Gt (billion tonnes). 2024 emissions are expected to be 2-3% higher.

[3] Atmospheric levels of CO_2 were about 278 parts per million (ppm) for the last several thousand years. This is the average concentration of CO_2, and other GHGs like methane, that provided the Goldilocks-like balance to enable human civilization to flourish. When the Industrial Revolution with its dependence on fossil fuels started around the 1760s, CO_2 levels were about 278 ppm. 'Safe levels', that would limit global temperature increase to 1.5°C are around 350 ppm. A 2.0°C temperature increase is expected to occur with an increase to 450 ppm. CO_2 levels in 2025 are about 430 ppm, increasing by about 2.6 ppm per year, suggesting a global temperature increase of more than 2.7°C above pre-Industrial times (with expected massive planetary impacts).

[4] See: https://www.pik-potsdam.de/en/institute/departments/climate-economics-and-policy/carbon-clock

The 2007 baseline used by Oshawa (and other communities) is typically a Scope 1 and 2 (partial) territorial assessment, that includes specific GHG emissions that occur within Oshawa city-limits (plus imported electricity, including vehicles fueled in Oshawa and driven elsewhere). This is mostly a measure of the fossil fuels burned within the City's territorial boundaries. Territorial emissions (Scope 1 and 2) tend to be more effective for country-wide emissions. For example, the territorial emissions of the 196 countries that committed to the Paris Agreement, plus international aviation and shipping emissions, add up the total GHG emissions in the world (i.e., 57.7 Bn tonnes CO_2e in 2024).

Cities and businesses have more comprehensive GHG inventories as they are more concerned with activities that take place at their behest outside of their direct influence (political border – see Section 3). To contribute to global GHG emissions reductions, a whole-of-community inventory is needed, and emissions that are generated upstream and downstream from activities that take place in Oshawa should also be considered. These emissions that take place outside of Oshawa's political border (territory) are categorized as Scope 3 emissions (or global). These embodied emissions are especially important in Canadian communities and institutions, as Canada's global GHG emissions (all Scopes) are among the highest in the world. Reducing GHG emissions requires a planetary effort as atmospheric contributions and impacts do not recognize political borders.

Oshawa's 2024 GHG inventory highlights the need to assess the whole-of-community contribution. Territorial emissions (all Scope 1+2) were 1,275,674 tonnes, while global emissions (Scope 3) were 19,826,558 tonnes (16-times more). In Oshawa, global emissions are higher than most communities as downstream emissions (Scope 3) from manufactured vehicles contribute about three-quarters of the value. However, even without including manufactured products, the overall GHG emissions from a resident of Oshawa generated outside of Oshawa (global, Scope 3, *e.g.,* embodied in imported food and building materials, emissions generated from invested capital, international travel) are higher than the emissions generated within Oshawa (Scopes 1+2, *e.g.,* natural gas heating, gasoline and diesel fuel, electricity used).

The City of Oshawa deserves credit for declaring an ambitious emissions reduction target. As outlined in the 2020 Council Report, the City of Oshawa's corporate emissions continue to be less than 1% of overall emissions. Reductions in overall community emissions, especially a whole-of-community, is key. This requires a broader, more durable partnership. The City of Oshawa can promote this partnership, but to approach net-zero emissions targets, other key stakeholders need to provide robust support.

Getting to net-zero by 2050 (*i.e.,* less than 2 tonnes per person, all scopes) is possible, but with just 24 years, and the need for a global effort, the task is Herculean. Fortunately, a path, where key initiatives can provide more than 80% of the global reductions needed, is available.

These initiatives include: Phasing out natural gas for heating of buildings and hot water; Decarbonizing the transportation sector (including manufactured vehicles and low-carbon aircraft and maritime shipping fuel); Decarbonizing (global) electricity generation, *i.e.,* less than 30 gCO_2e/kWh; Decarbonizing food production (and transportation, and organic waste management); Decarbonizing (global) industrial processes such as cement and steel manufacturing; Ensuring that invested capital, *e.g.,* Canada Pension Plan, is low-carbon emitting, *i.e.,* below 40 tCO_2e/$M.[5]

Despite having considerable certainty on the path needed to get to net-zero, progress since the 2020 Council Report is backtracking. Oshawa's territorial GHG emissions (Scope 1+2 only) have doubled since 2015 (mostly from increased traffic volumes, more buildings, and higher carbon intensity of electricity). Public commitment to carbon mitigation across Canada appears to be waning, as highlighted by the 2025 elimination of the carbon tax and relaxing EV targets. In 2024 the Province of Ontario's overrode the Ontario Energy Board's recommendation to not amortise natural gas infrastructure beyond net-zero target dates. The re-election of Donald Trump, and the US withdrawal from the Paris Accord is also a significant impediment to GHG mitigation, *e.g.,* cancelling Inflation Reduction Act initiatives.

The road to net-zero is fraught with detours, delays and challenges. The challenge is even more acute as it requires a whole-of-community (global) approach. Fortunately, the route is reasonably clear, however, everyone needs to get out and push. This report outlines how we can push and pull together in the right direction, if we are willing. Like how climate scientists are fearful of future tipping points, where increasing GHGs may bring about relatively rapid shifts in stable earth systems, *e.g.,* permafrost melting, shifting ocean circulation, climate policy advisers are hopeful that a phase-shift in public attitudes will emerge, with governments and communities enacting substantive mitigation measures.

3. **The Path Forward**

Chinese and African proverbs suggest that a journey of a thousand miles begins with a single step, and that if you want to go fast, go alone; if you want to go far, go together. Recognizing the scale and complexity of weaning ourselves off fossil fuels, 194 countries, including Canada, took the first step and signed the Paris Agreement (to limit global temperature increases to 2°C). More than 500 local governments in Canada, and more than half the larger businesses announced a net-zero target and/or have declared a climate emergency.

[5] Average carbon intensity of dollar invested in Canada (institutional portfolios): ~114 tCO2e/M$ CAD. Average global carbon intensity of portfolios or investments: Low – below 40 tCO2e/M$; Medium – between 40 and 80 tCO2e/M$; High - above 80 tCO2e/M$ invested. [See PSP Investments, 2025 CFD Report.

For local governments, like Oshawa, that have taken that first step of declaring climate mitigation targets, the path forward is harder to discern and seems increasingly lonely. Since the last 2020 Council update on Oshawa's climate mitigation progress, several large-scale changes occurred. In January 2025, President Trump, signed again, an Executive Order to withdraw the US from the Paris Climate Agreement. On March 14, 2025, Prime Minister Carney signed a directive to eliminate the national consumer carbon tax and in September 2025 he relaxed EV sales targets.

On February 22, 2024, through Bill 165 the Province of Ontario overrode the Ontario Energy Board (OEB) natural gas directive and reinstated a 40-year amortization period for new gas connections (well beyond the province's own 2050 net-zero target). In 2022 the Province of Ontario removed tolls on Highways 412 and 418 and in 2025 tolls on the provincially owned section of the 407 were also removed (traffic volume increases of up to 40% are expected).

Broadly, there are two approaches to GHG emission inventories: territorial and comprehensive. Territorial emissions emerged from the United Nations framework convention on climate change (UNFCCC) adopted in 1992 (Canada joined that same year). The IPCC (intergovernmental panel for climate change) was established under the Convention to provide consolidated scientific reports. The Convention called for an annual 'conference of the parties' (COP) to take stock on mitigation efforts and, where necessary, increase mitigation ambitions to keep global temperature increases below 2^{o}C.

The COP meets annually, with COP30 taking place in Brazil later this year. The UN Environment Program provides an annual global inventory of GHG emissions (released the month before COP; 2023 emissions estimated at 57.1 Gt CO_2e, representing a 1.9% increase from 2022, and a projected 2.5-2.9^{o}C temperature rise above pre-industrial levels before 2100). The total emission value (57.1 Gt CO_2e in 2023) is mostly a compilation of each 'party', i.e., country, plus aviation and maritime emissions. Detailed accounting directives exist for countries to inventorize their territorial GHG emissions (a task that falls to Statistics Canada and published by the Ministry of Environment and Climate Change in Canada).

Although there are some delays with migration of gases to the atmosphere, and ancillary impacts from things like black carbon (soot) and land use changes (e.g., forest fires), the global emissions value is represented in readily measured carbon dioxide and methane levels in the atmosphere (*i.e.,* CO_2 has increased from 280 parts per million, ppm, at the start of the Industrial Revolution in the mid-1700s to 420 ppm today, while methane increased from about 750 parts per billion, ppb, to 1940 ppb today).

Comprehensive emission inventories are slightly more complicated than territorial inventories as they capture an entity's total emissions regardless of where they occur, possibly outside their 'territory', or internationally. A methodology was first developed in 2006 (ISO 14064) to provide a GHG emissions accounting framework for businesses that wanted to measure all GHG emissions across their entire scope of operations. An agreed-to methodology was required to reduce double-counting, e.g., when a company's emissions are attributed to them even if they take place in another country. This methodology (with Scopes 1, 2 and 3) was adapted to communities and the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC) was published December 2014.

The inventory in this report follows GPC methodology and is one of the world's most comprehensive accountings of a community's overall GHG emissions. The inventory is prepared consistently for the City of Oshawa, Ontario Tech University, Region of Durham, and (still in draft) greater Toronto area (combined census metropolitan areas of Oshawa and Toronto).

How we address climate change varies considerably depending on the scale of the community that responds to the challenge. At an individual, or household level, assuming we have adequate information, we can quickly assess trade-offs and decide what we are willing to do to reduce greenhouse gas emissions. We estimate impact, fairness and ability, and personally we commit to act, or not.

Many actions to mitigate GHG emissions might even save us money, while making our homes more comfortable and safer. Somewhere between knowing that a journey of a thousand miles begins with a single step and knowing that reducing fossil fuels and other GHGs is a collective (global) problem.

The scale of the challenge is so enormous that what we do individually, or as a community, or even as a country, is not nearly enough. This is a collective problem. We alone cannot solve the problem. So, our actions need to do two things: help reduce GHG emissions, and signal to others that we are willing to work together to address this shared challenge.

In public polling of Canadians those personally caring most about Environment/Climate Change has dropped from 42% in December 2019 to 16% in June 2025[6].

The waning interest in climate change is exacerbated by the last mover advantage. If you make money selling fossil fuels, and there remains demand for those fossil fuels, you do not want to be the first to stop selling them. This sequencing problem is even more difficult in Canada where oil and gas are distributed regionally. Alberta and Saskatchewan want to sell their oil and gas, while other regions, that receive less benefit are less inclined. Alberta is more willing to forgo trading

[6] https://angusreid.org/environment-climate-change/

with by Europe for example, if it requires participation in their carbon border adjustment mechanisms (CBAM).[7]

This same regional reticence for emission reductions is evident in southern Ontario where vehicles manufactured (and largely exported to the US) have very high GHG emissions (Scope 3 downstream emissions generated over the operating life of the vehicle). There is enormous pressure across Canada to maintain a high energy, high material economy, as many jobs and current lifestyles depend on this. The new economy, post transition, does not yet have as much support.

4. New approaches

The scale of the challenge we face is enormous. In less time than most people pay off their mortgage (if they can get one) the way buildings are heated and cooled, the way we move around and through the city, where and how we fly and spend our leisure time, is supposed to change. Intuitively we see this as far-fetched. The task is too big, too expensive, and we have urgent conflicting priorities today. We have a weakening economy, and we can barely afford what is needed today.

Net zero efforts, or lack-thereof, have the potential both to bring communities together, and to push them apart. Climate change requires a global response; however, like most grand global ambitions, meaningful reductions of GHG emissions will grow from the ground up. Cities are where civilization first emerges, and the complexities of meeting myriad conflicting demands and priorities begins.

Canada's cities are more fractured and have less autonomy than most of the world's other cities. Municipal boundaries can be transient, and in the Greater Toronto Area these boundaries are even more ephemeral (see Box 1). Metropolitan areas make it more difficult for residents and businesses to pursue local government, regional government, urban region, provincial or even federal objectives, especially when objectives are not consistent. Or in the case of climate mitigation, when the largest challenge facing Ontario municipal targets are the practices of residents and the policies from the provincial and federal government – both of which municipal staff and politicians have minimal control over.

The fractured nature of local government in Canada (especially regional Toronto, or the Golden Horseshoe) serves to emphasize municipal corporate emissions, which is the one area that the municipality has full agency. However, these emissions typically represent less than 1% of the

[7] Europe established a carbon border adjustment mechanism that requires the businesses of countries that export to Europe to inventories GHG emissions and pay a tariff for excess CO_2 emissions.

community's Scope 1 and 2 territorial emissions (and a small fraction of that for Scope 3 global emissions). Net-zero aspirations require communities to work together and to focus on as big a picture as possible. Climate change is a system problem, a whole-of-community, all of humanity challenge.

Table 1: Overview. Oshawa 2024 GHG emissions inventory
(Scope 1, 2 and 3; GPC methodology)

NAME OF CITY: City of Oshawa, Ontario

INVENTORY YEAR: 2024

POPULATION: 194,635

LAND AREA (km2): 143

tCO2/Capita Scope 1 1,240,042

tCO2/Capita Scope 1,2,3 21,169,491

GHG Emissions Source (By Sector)		Total GHGs (metric tonnes CO2e)						
		Scope 1	Scope 2	Scope 3 included in Basic/Basic+	Other Scope3	BASIC	BASIC+	BASIC+ S3 +7
STATIONARY ENERGY	Energy use (all emissions except I.4.4)	387,209	62,883	265,155		450,092	715,247	715,247
	Energy generation supplied to the grid (I.4.4)							
TRANSPORTATION	(all II emissions)	739,521	183	536,617		739,704	1,276,322	1,276,322
WASTE	Waste generated in the city (III.X.1 and III.X.2)	17,729		49,583		67,312	67,312	67,312
	Waste generated outside city (III.X.3)							
IPPU	(all IV emissions)	93,474			15,285,455		93,474	15,378,929
AFOLU	(all V emissions)	2,109			9,377		2,109	11,485
OTHER SCOPE 3	(all VI emissions)				3,720,196			3,720,196
TOTAL		**1,240,042**	63,066	851,356	19,015,028	**1,257,108**	**2,154,464**	**21,169,491**

\+

Sources required for BASIC reporting

Sources required for BASIC + reporting

Sources included in Other Scope 3

Sources required for territorial total but not for BASIC/BASIC+ reporting (italics)

Non-Applicable emissions

GPC ref No.	GHG Emissions Source (By Sector and Sub-sector)	Total GHGs (metric tonnes CO2e)			
		Scope 1	Scope 2	Scope 3	Total
I	STATIONARY ENERGY				
I.1	Residential buildings	195,554	20,081	129,709	345,343
I.2	Commercial and institutional buildings and facilities	85,145	24,040	61,982	171,166
I.3	Manufacturing industries and construction	79,075	18,763	56,281	154,118
I.4.1/2/3	Energy industries				
I.4.4	*Energy generation supplied to the grid*				
I.5	Agriculture, forestry and fishing activities				
I.6	Non-specified sources	27,436		17,184	44,619
I.7	Fugitive emissions from mining, processing, storage, and transportation of coal				
I.8	Fugitive emissions from oil and natural gas systems				
SUB-TOTAL		**387,209**	**62,883**	**265,155**	**715,247**
II	TRANSPORTATION				
II.1	On-road transportation	676,388	183	294,516	971,087
II.2	Railways	30,999		14,880	45,879
II.3	Waterborne navigation	21,909		25,782	47,691
II.4	Aviation	10,225		201,439	211,664
II.5	Off-road transportation				
SUB-TOTAL		**739,521**	**183**	**536,617**	**1,276,322**
III	WASTE				
III.1.1/2	Solid waste generated in the region	6,597			6,597
III.1.3	*Solid waste generated outside the region*				
III.2.1/2	Biological waste generated in the region	5,431			5,431
III.2.3	*Biological waste generated outside the region*				
III.3.1/2	Incinerated and burned waste generated in the region			49,583	49,583
III.3.3	*Incinerated and burned waste generated outside region*				
III.4.1/2	Wastewater generated in the region	5,701			5,701
III.4.3	*Wastewater generated outside the region*				
SUB-TOTAL		**17,729**		**49,583**	**67,312**

IV	**INDUSTRIAL PROCESSES and PRODUCT USES**				
IV.1	**Emissions from industrial processes occurring in the region boundary**	93,474			93,474
IV.2	**Emissions from product use occurring within the region boundary**			15,285,455	15,285,455
SUB-TOTAL		**93,474**		**15,285,455**	**15,378,929**
V	**AGRICULTURE, FORESTRY and OTHER LAND USE**				
V.1	**Emissions from livestock**	1,406		6,251	7,657
V.2	**Emissions from land**	703		3,126	3,829
V.3	**Emissions from aggregate sources and non-CO2 emission sources on land**				
SUB-TOTAL		**2,109**		**9377**	**11,486**
VI	**OTHER SCOPE 3**				
VI.1	**Energy not included In I.7 & I.8**				
VI.2	**Building Material**			169,409	169,409
VI.3	**Food not included in V**				
VI.4	**Transportation not included in II.5**				
VI.5	**Water**				
VI.6	**Waste/Sewage Management not included in III**				
VI.7	**Key Infrastructure**				
VI.8	**Emissions From Invested Capital**			3,097,754	3,097,754
VI.9	**Other Scope 3**			453,033	453,033
SUB-TOTAL				**3,720,196**	**3,720,196**
TOTAL	**Territorial**	**1,240,042**	**63,066**	**19,866,383**	**21,169,491**
Total	**Scope 1 and 2 Basic+ Reporting**	**1,240,042**	**63,066**		**1,303,108**

Table 2.1 2024 GHG Emissions Compared to 2007 Baseline (tCO_2e)

Highlighted cells Durham Sustainability, 2014

Year	2007 (Territorial)	2007 (Global)	2024 (Territorial)	2024 (Global)	2030 (Territorial)	2030 (Global)	2050 (Territorial)	2050 (Global)
Building Energy Residential	265,883	151,019	215,635	122,479	407,751	111,719	182,443	32,316
Building Energy ICI	894,705	444,511	207,023	102,854	267,223	214,414	211,303	29,331
Land Transportation	163,784	71,616	707,570	309,392	714,390	312,670	176,430	78,672
Air and Water Transportation	23,376	218,912	32,134	227,222	34,588	280,653	26,087	268,821
Waste	33,490	18,732	17,729	49,583	17,034	44,651	18,494	16,346
Industrial Processes and Product Uses	403,973	44,921,942	93,474	15,285,455	101,887	6,708,433	104,691	750,491
Agriculture, Forestry, & Other Land Use	1,534	6,821	2,109	9,377	2,299	9,283	2,362	5,814
Other Global		2,706,309		3,720,196		4,055,013		3,794,600
Total	1,786,746	48,539,863	1,275,674	19,826,558	1,545,171	11,736,837	721,811	4,976,391

Table 2.2 2024 GHG Emissions Per Capita (tCO_2e/Capita)

Year	2007 (Territorial)	2007 (Global)	2024 (Territorial)	2024 (Global)	2030 (Territorial)	2030 (Global)	2050 (Territorial)	2050 (Global)
Building Energy Residential	1.8778	1.0666	1.1079	0.6293	1.9261	0.5277	0.8357	0.1480
Building Energy ICI	6.3190	3.1394	1.0636	0.5284	1.2623	1.0128	0.9679	0.1344
Land Transportation	1.1567	0.5058	3.6354	1.5896	3.3745	1.4769	0.8082	0.3604
Air and Water Transportation	0.1651	1.5461	0.1651	1.1674	0.1634	1.3257	0.1195	1.2314
Waste	0.2365	0.1323	0.0911	0.2547	0.0805	0.2109	0.0847	0.0749
Industrial Processes and Product Uses	2.8531	317.2678	0.4803	78.5339	0.4813	31.6884	0.4796	3.4379
Agriculture, Forestry, & Other Land Use	0.0108	0.0482	0.0108	0.0482	0.0109	0.0439	0.0108	0.0266
Other Global		19.1137		19.1137		19.1545		17.3825
Total	12.62	342.82	6.55	101.87	7.30	55.44	3.31	22.80

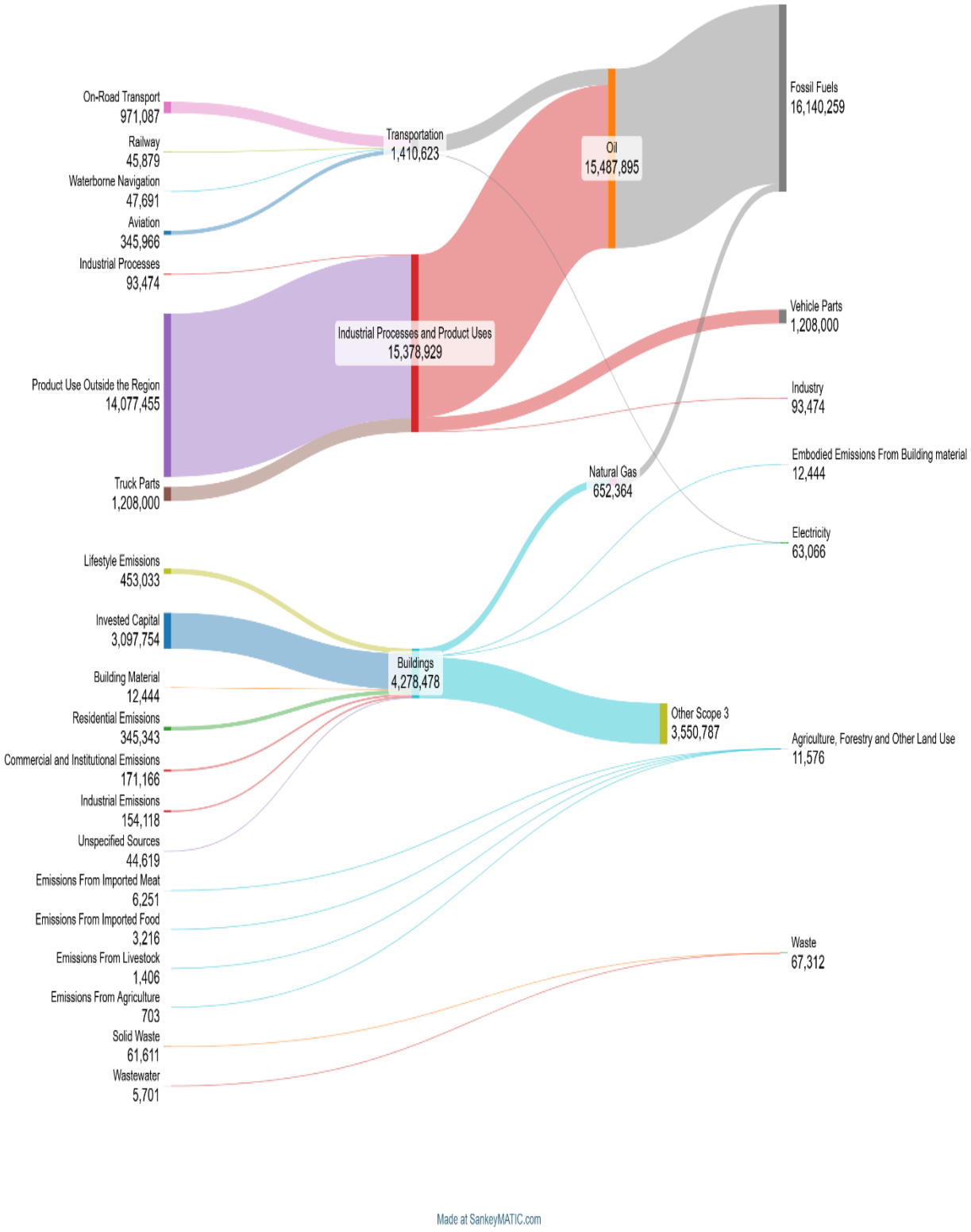

Figure 1: Oshawa Emissions (Scope 1, 2 and 3) tCO_2e in 2024

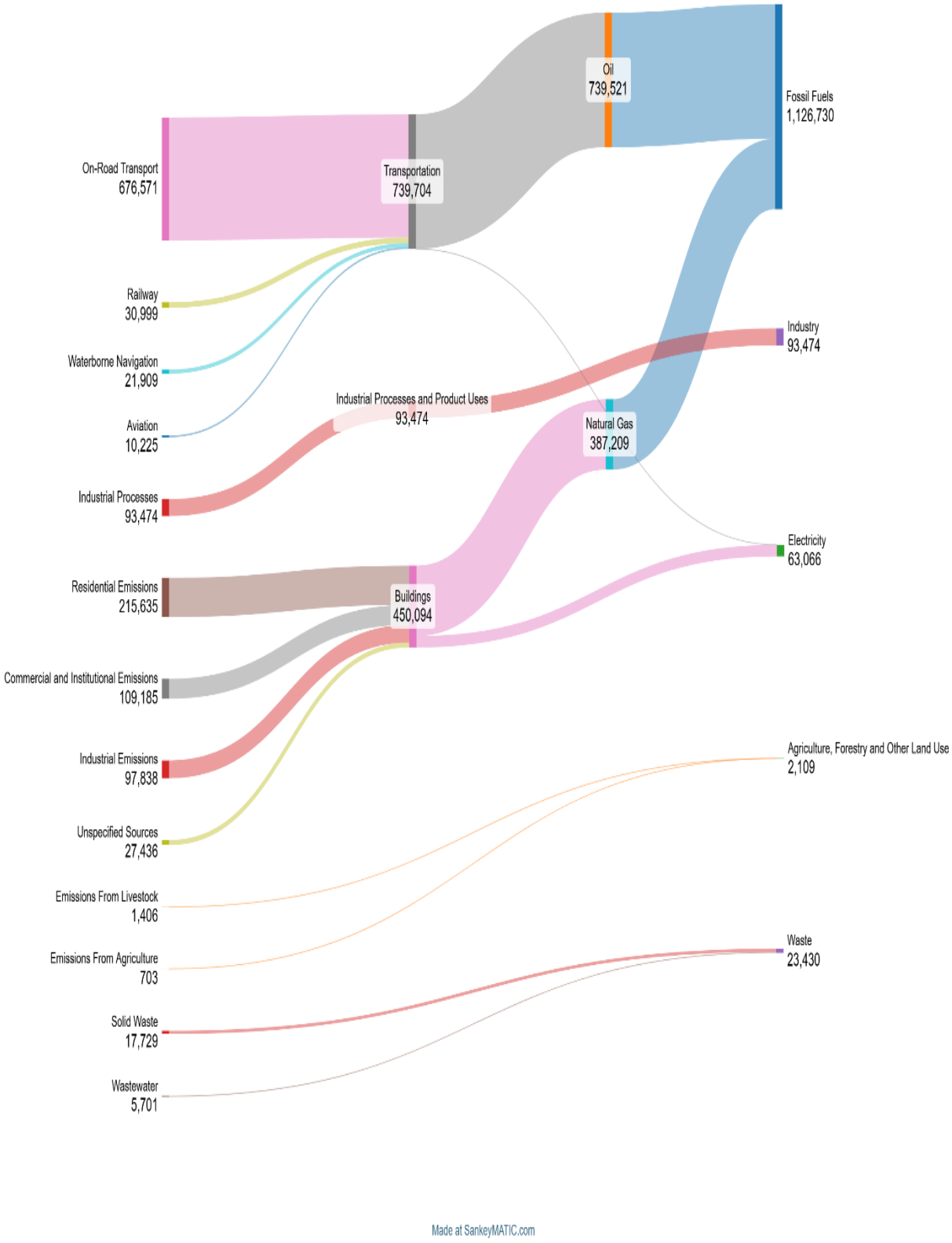

Figure 2: Oshawa Emissions (Scope 1 & 2 only) tCO_2e in 2024

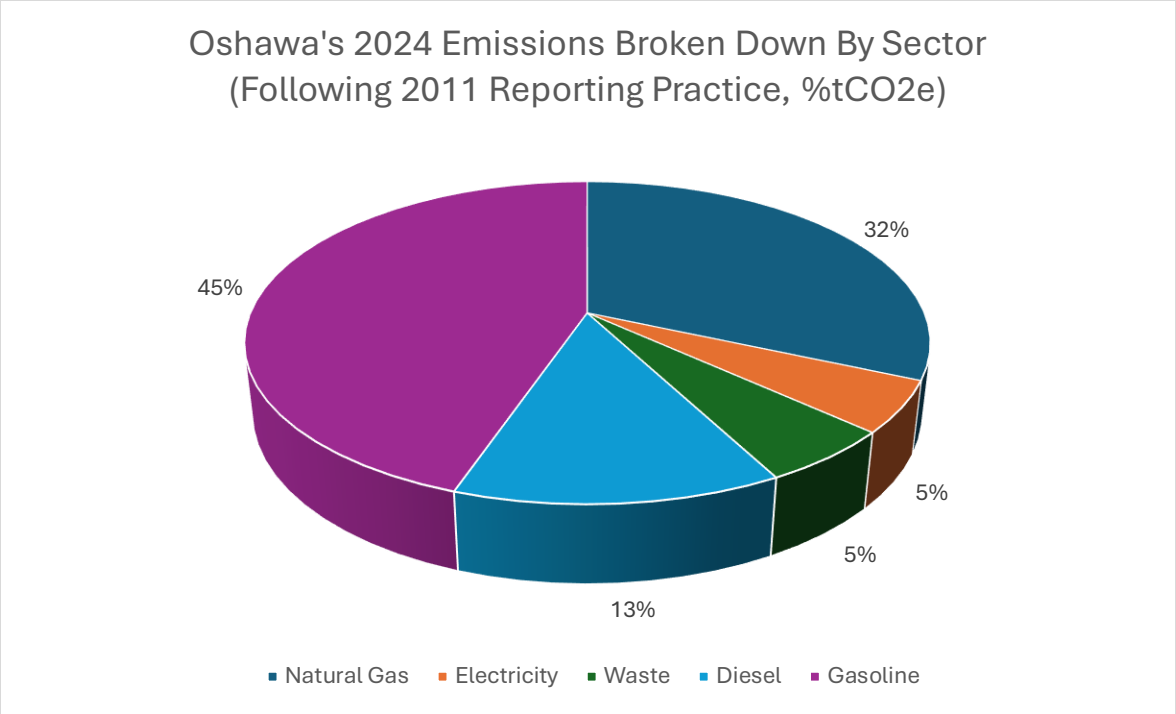

Figure 3: 2024 Emissions by Sector in Oshawa Following 2011 Reporting Practice

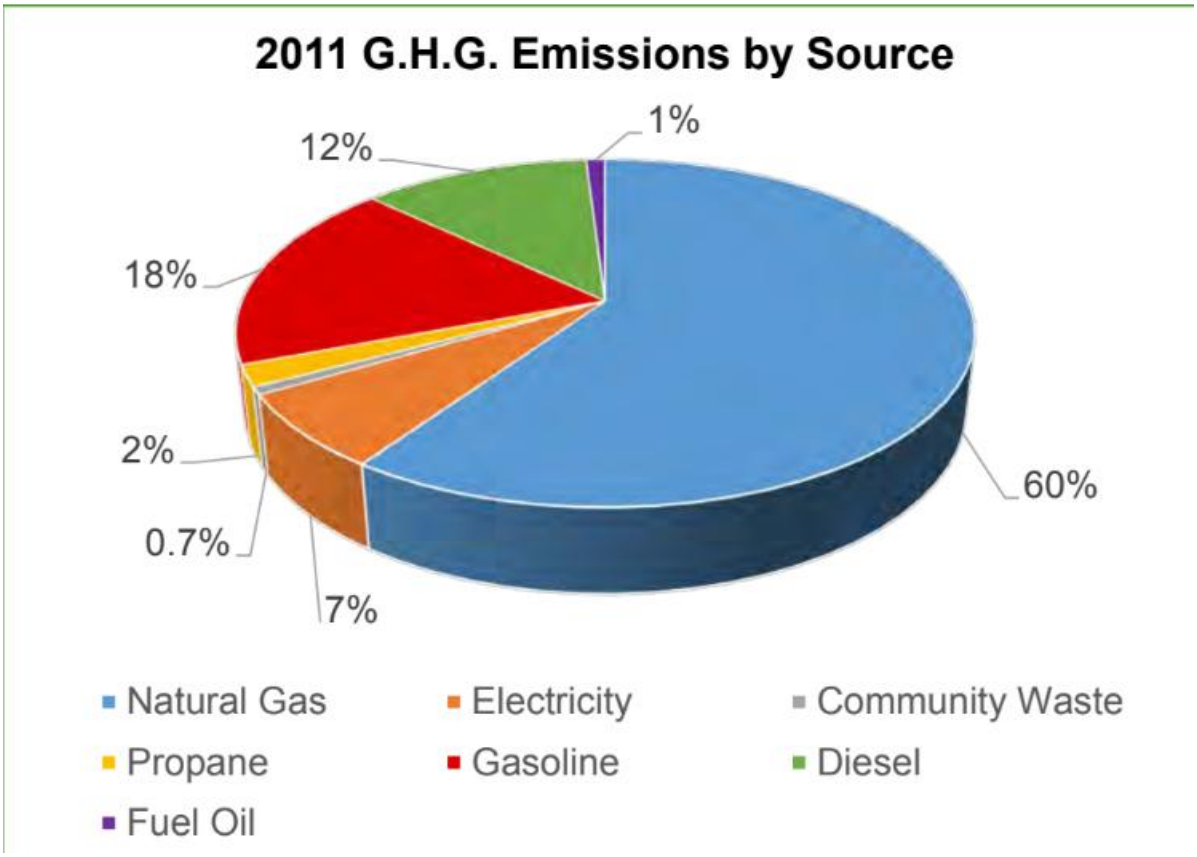

Figure 4: Emissions by Sector in Oshawa (2011, City of Oshawa)

5. Changing the Narrative

Climate change mitigation is now largely positioned as a transition requiring sacrifice. Less meat, less driving, less flying, fewer cruises and smaller cars. The transition suggests economic and lifestyle changes. Few people welcome change, and existing stakeholders that are likely to face impacts, will often argue against the need to change.

In communities like Oshawa, with automotive and other manufacturing facilities, the sacrifices are even more tangible. For example, the vehicles manufactured in Oshawa in 2024 will likely burn 6 billion litres of fuel over their lifetimes resulting in about 14 million tonnes of CO_2. These same 144,000 vehicles supported about 3,000 direct jobs and an additional 1,500 supply chain jobs. These Scope 3 downstream emissions are added to Oshawa's relatively high Scopes 1 and 2 (territorial) emissions, mainly from transportation (cars and trucks) and buildings (natural gas heating). When taking a whole-of-community global emissions approach, few cities have a larger task in delivering GHG emission reductions than Oshawa.

Oshawa's overall GHG emissions (Scopes 1, 2 and 3) are consistent and inextricably linked with Canada's (and the world's) overall mitigation progress. The Canadian Climate Institute, an independent advisory group that tracks Canada's progress toward net-zero targets, publishes an annual Early Estimate of National Emissions (EENE). The 2024 inventory (released September 18, 2025) highlights that emissions are flatlining (694 million tonnes (Mt CO2e) in 2024), and that Canada's climate progress is fragile and slipping[8] (Figure 6).

The lack of progress is significant (emissions were just 8.5% below 2005 levels, leaving Canada's 2030 target gap unchanged – still requiring an additional 40 to 45% reduction from 2005 levels). Progress is largely stalled with setbacks such as rescinding the consumer carbon tax, eliminating electric vehicle (EV) targets, and relaxing provincial mitigation efforts. Achieving Canada's 2030 target would require year-over-year reductions equal to 40 Mt—far beyond the ambition of current policy (Canadian Climate Institute).

When assessing Canada's limited progress on climate mitigation the disproportionate impact of oil and gas development, especially from the oil sands, it is quickly apparent (Figure 6). This highlights the importance of a whole-of-community inventory approach used in this report (all Scopes). In Canada's national GHG inventory as reviewed by the Canadian Climate Institute, the downstream impact of products manufactured in Canada are not considered. The emissions associated with producing oil and gas are included in Canada's inventory, but the emissions associated with the use of that oil and gas, when exported are not included (more than 3-times the amount of emissions from production). Similarly, the emissions associated with vehicles manufactured in Canada, and exported to the US, where they are likely to combust Canadian produced petroleum, are not included. These Scope 3 downstream emissions for vehicles

[8] https://climateinstitute.ca/news/2024-emissions-estimate-shows-progress-stalled/

manufactured in Oshawa are about 15 Mt in 2024. Scope 3 CO_2 emissions from vehicles manufactured in Ontario and exported are greater than all oil and gas development emissions in Canada. Although these emissions are well-known, they are not typically included in the national climate mitigation dialogue.

Another Scope 3 global emission that remains largely unaccounted is emissions associated with invested capital. Canada's five largest banks have about $3.25 trillion under management. Using a conservative estimate of $75 tonnes CO_2e per $1 million invested, this capital generates about 200 million t of CO_2e per year. The capital of Oshawa residents, institutions and businesses is estimated to have generated more than 3 million tonnes of CO_2e in 2024.

GHG emissions from buildings are on track to increase from about 425,000 t in 2024 to 675,000 t in 2030 (about 10% increase per year). More than two-thirds of these emissions are from natural gas use in the building. These are Scope 1 and 2 emissions only. The value is about 50% higher when Scope 3 (global) emissions are included (mainly from production and transmission to building). Emissions from electricity are set to more than double from 2017.

The last coal electricity plant in Ontario closed in April 2014. Ontario has touted its phase out of coal as one of North America's largest climate mitigation actions. In 2017 the carbon intensity of Ontario's electricity was a low ~20 g CO_2e/kWh. As electricity demand increased, renewables (hydro, wind and solar) and nuclear could not meet demand. The shortfall was supplied through natural gas. In 2024 the average carbon intensity of Ontario's electricity (grid supplied) had climbed to 73 g CO_2e/kWh. This is expected to increase to as high as 130 g CO_2e/kWh by 2035 as more gas is burned for generation (before increased nuclear and renewables are brought online).[9] This is expected to add about 100,000 tonnes CO_2e to Oshawa's annual GHG emissions.

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Insects, disease, air pollution, the flow of water, and increasingly droughts, fires, commuters and economic trends do not respect boundaries and borders. As a global challenge and local threat, Oshawa's response to climate change similarly needs to work across boundaries and borders. A net zero strategy must accomplish two things. First, the government, institution or business must take tangible, verifiable steps toward reducing GHG emissions. Second, by moving toward net zero practices, communities like Oshawa and Ontario will signal to others that they too need to reduce GHG emissions.

The path to net zero is fraught with delays. Groups will argue that Oshawa should not move more quickly than others, that it is unaffordable at this time, or that the proposed mitigation targets are unfair, too much burden is placed on Oshawa relative to some other jurisdictions.

[9] Typical averages for carbon intensity by electricity generation type: coal 970 g; gas 440 g; solar 53; hydro 24; wind 11; nuclear 6 g CO_2e/kWh. (life cycle of plant, from Our World in Data 2020).

These opinions should be anticipated and even embraced. Climate mitigation is one of the most difficult tasks ever. No one should expect it to be easy.

A few salient facts remain. Oshawa can not meet net zero targets without significant support from the Province of Ontario and Government of Canada. As governments represent the people of the community, the onus rests with them.

There is little impact if the City of Oshawa reduces GHG emissions within territorial limits, if the rest of Canada and the world do not follow. GHG emissions from the residents of Oshawa need to decline both locally and globally.

6. City of Oshawa Community Greenhouse Gas Reduction Plan

Progress on Council's Endorsement (Nov 9, 2020, Report DS-20-130)

As part of the community GHG reduction plan and in consultation with ICLEI and using the Scenario Builder tool from Federation of Canadian Municipalities (FCM), City of Oshawa staff modelled GHG emission reductions within the November 2020 Climate Plan (Figure 5; 20% by 2020, 30% by 2030, and 80% by 2050).

Figure 5 includes estimated equivalent GHG emissions value for 2024, 2030 and 2050 (red 'x', from Table 2.1). The value for 2024 is derived from actual data. Values for 2030 and 2050 are based on projections outlined in Annex 2. Of particular importance for this reduction trajectory is decarbonizing Ontario's electricity grid (after the current increase is over) and moving away from internal combustion engine vehicles (registered in Oshawa) and natural gas heating.

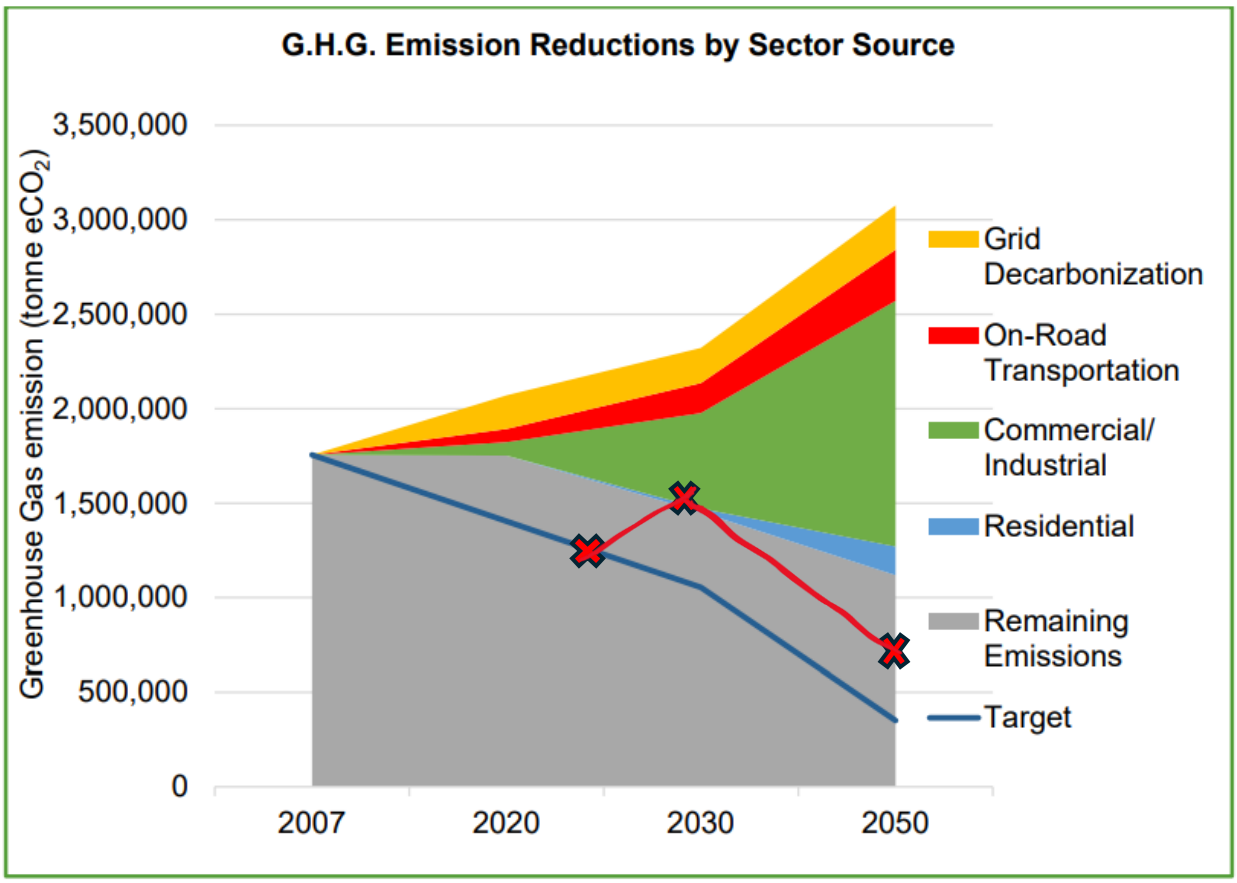


Figure 5, City of Oshawa Community GHG Reduction Plan, November 2020.
2024, 2030 and 2050 'x' from Table 2.1 (revised trajectory ----)

Oshawa's territorial (Scopes 1 & 2) GHG emission reduction target was on track from 2014 to about 2020 (Fig 5 target line) and remains relatively well-positioned based on projections outlined in Annex 2. These emission reductions are largely attributed to decarbonizing electricity (especially in the ICI buildings sector) and significant declines in industrial processes (Table 2.1). However, while emissions from 'Building energy ICI' and 'Industrial processes' declined by more than 75% between 2007 and 2024, 'Land transportation' emissions more than tripled. Between 2024 and 2030 all categories of territorial GHG emissions are expected to increase.

The November 2020 GHG Reduction Plan included 7 specific actions and 3 opportunities.

The seven specific Actions and relative progress are as follows.

<u>Action 1: Increase renewable electricity generation from renewable sources in residential buildings.</u>
GHG Avoidance potential (1,882 t by 2030; 4,741 t by 2050)

Other benefits: improve energy resilience, reduce energy costs, improve air quality, reduce urban heat island
Progress 2020-2024 (no change)
Likely Progress 2024-2030 (decline)

Action 2: Improve energy performance in residential buildings.
GHG Avoidance potential (20,213 t by 2030; 151,810 t by 2050)
Other benefits: reduce energy costs, improve climate resilience, increase home values, improve air quality, reduce urban heat island
Progress 2020-2024 (about 10% decline)
Likely Progress 2024-2030 (target can be met)

Action 3: Increase renewable electricity generation from renewable sources in commercial buildings.
GHG Avoidance potential (1,090 t by 2030; 3,431 t by 2050)
Other benefits: improve energy resilience, reduce energy costs, improve air quality, reduce urban heat island.
Progress 2020-2024 (no change)
Likely Progress 2024-2030 (decline)

Action 4: Improve energy performance in commercial buildings
GHG Avoidance potential (505,267 t by 2030; 1,300,928 t by 2050)
Other benefits: reduce operational costs of commercial buildings, improve climate resilience, improve air quality, reduce urban heat island
Progress 2020-2024 (about 10% decline)
Likely Progress 2024-2030 (target can be met, priority is to shift away from natural gas heating)

Action 5: Promote low carbon or no carbon vehicles
GHG Avoidance potential (103,853 t by 2030; 235,772 t by 2050)
Other benefits: improve air quality, reduce travel costs, reduce urban heat island
Progress 2020-2024 (631 EVs registered in Oshawa in 2022, increased to 2,313 in 2025)[10]
Likely Progress 2024-2030 (to meet 2030 targets more than half the vehicles would need to be EVs. This does not appear to be on track. 2050 target still possible but requires federal and provincial leadership. Efforts need to be developed within a broader mobility campaign.)

Action 6: Increase/Improve cycling and walking infrastructure to encourage active forms of transportation
GHG Avoidance potential (28,913 t by 2030; 14,017 t by 2050)
Other benefits: improve air quality, increase physical activity, reduce travel costs

[10] Oshawa Power, 2025

Progress 2020-2024 (mixed, e-scooter pilot extended, bike use relatively unchanged).
Likely Progress 2024-2030 (2030 and 2050 targets can still be met, need to be developed within a broader mobility campaign).

Action 7: Coordinate land-use policies to establish a built form that promotes sustainable growth
GHG Avoidance potential (26,254 t by 2030; 20,507 t by 2050)
Other benefits: improve air quality, more efficient use of land, increase physical activity, shorter commute times, local economic development
Progress 2020-2024 (mixed, built form still highly auto-dependent, most new homes still heated with natural gas).
Likely Progress 2024-2030 (GHG avoidance targets can still be achieved. "Sustainable growth" may need to be defined as 'sustainability' or steady state before 2050 as Canada's population influenced by a global peak population (and decline thereafter) post-2075. Best supported through a broader sustainability transition.

As outlined in this report, while these 7 actions are important, their progress would have little impact on Oshawa's overall contribution to GHG emissions (Scopes 1, 2 and 3, where Scope 3 global emissions are 15-times larger than Scope 1 & 2 territorial emissions). Also, the progress of these 7 actions, and reduction of Oshawa's territorial (Scope 1&2) emissions, is now largely out of the City of Oshawa's ability to directly influence. The three most important actions to reduce Oshawa's GHG territorial emissions – burning less natural gas (especially for space heating), less gasoline and diesel combusted in vehicles, and low carbon electricity – are mainly the purview of the Government of Canada and Province of Ontario (both governments have recently backtracked on climate mitigation targets).

Perhaps presciently, the 2020 City of Oshawa Community GHG Reduction Plan also included 'Additional Opportunities'.

Opportunity 1: Promote energy efficient business operations
Opportunity 2: Promote sustainable practices through strategic outreach and education
Opportunity 3: Strengthen the City's capacity to be a leader in sustainability and implement the actions in this Plan.

These opportunities were not quantified for potential avoided GHG emissions. However, other benefits were identified and included increased awareness and engagement, educed energy and water use, and lower costs.

Emphasis on the overarching Opportunity 3 "Strengthen the City's capacity to be a leader in sustainability and implement the actions in this Plan" is warranted. Bringing down Oshawa's GHG emissions needs to proceed in lockstep with other jurisdictions. This would suggest that the

share of emissions reductions is not necessarily the same for every community, or 'common but differentiated responsibilities' as first suggested at the 1992 Rio de Janeiro Environment and Development Conference. Those who generate more: should do more to mitigate, but everyone needs to be pulling in the same direction.

Opportunity 3: Strengthen the City's capacity to be a leader in sustainability and implement the actions in this Plan.

The Oshawa Strategic Plan identifies environmental responsibility as a strategic goal, including the following themes:

- Proactive environmental management and combat climate change;
- Cleaner air, land and water;
- Resilient local food system; and,
- Less waste generation.

The City can explore ways to demonstrate its commitment to environmental responsibility and be a leader in reducing G.H.G. emissions. As suggested in the 2020 Council Report (DS-20-130), strengthening the City's capacity to be a leader in sustainability and implementation of the actions in this Plan will be advanced by:

- Exploring opportunities to develop a climate lens in decision making that will integrate climate change considerations into the planning and development of staff and Council decisions by considering the environmental impacts, G.H.G. emissions and climate resilience of projects;
- Exploring opportunities to encourage tree-planting initiatives both on City-owned and privately-owned land; and,
- Exploring opportunities to partner with C.L.O.C.A. to support reforestation/ afforestation projects in rural areas.

7. Strengthening Oshawa's capacity to be a leader in sustainability

Sustainability and its subset, sustainable development, require both local initiatives and an appreciation for global impacts, trends, and interconnectedness. Climate change highlights this better than almost any other issue facing humanity. Oshawa is part of the Greater Toronto Area, Ontario, Canada and the global family of communities. Sustainability requires a balance between 'fair' effort and genuine capacity.

Oshawa residents are likely not willing to face greater financial hardships in the sustainability transition than other communities in Canada. However, Oshawa has significant capacity to catalyze and lead the shift to greater sustainability.

Of the Durham Region's seven priority neighbourhoods, five are in Oshawa[11]. Oshawa is steeped in automotive history, with the McLaughlin Carriage Company moving to Oshawa in 1867. Sam McLaughlin convinced his father, and the McLaughlin-Buick began production in 1908. The company became part of General Motors in 1918. The Silverado currently built in Oshawa is one of North America's most fuel intensive vehicles (gasoline and diesel).

A trend that will significantly impact Oshawa over the next 75 years is a change in international relations and the likely erosion of national (global) sovereignty with the emergence of regional pragmatism and influence, *i.e.,* "ecological realism". This will develop through issues such as pandemics and solar geoengineering (a probable outcome of the global collective inadequacy in limiting GHG emissions).[12] Cities and their urban neighbors are driving climate change. They will be key in driving mitigation. For example, the Toronto Region alone makes up over a third of Canada's GDP, and in 2024 contributed more than 500 million tonnes CO_2e (Scope 3, global emissions; about 1% of the world's total).

Oshawa remains well positioned to be a leader in sustainability (Opportunity 3, which encompasses Opportunities 1 and 2). The City is an integral part of Durham Region, the Greater Toronto Area (and Golden Horseshoe), Ontario and Canada. The City will be a key community in the sustainability transition, requiring a path that is locally acceptable, regionally integrated, and globally relevant.

Key community attributes and targets to anchor this opportunity include:

i. Phase out fossil fuel combustion by 2050, with a focus on space heating (natural gas) and internal combustion engine vehicles (petroleum).
ii. Ensure that air pollution (PM 2.5) levels remain below 25 ug/m^3
iii. Request that Ontario (IESO) maintain a reliable electricity grid where carbon intensity (CO_2e) is below 35 g/kWh (about 75 g/kWh in 2024 and rising).
iv. Request that the federal government and province of Ontario ensure that all vehicles sold in Canada post 2040 are low carbon or no carbon emitting.
v. Request that post-2035 all vehicles driven on Ontario roads are charged per distance travelled.

[11] Oshawa's median household income in 2025 was $86,000. In comparison the Greater Toronto Area (GTA) median household income is around $101,000 (a 15% variance).
[12] Elizabeth Chalecki (2025) – "Solar Geoengineering, Sovereignty, and the Case for Ecological Realism" [Perspective]. Published online at SRM360.org. Retrieved from: https://srm360.org/perspective/sovereignty-ecological-realism/

vi. Develop complete streets and communities (inter-connectivity, system mobility, walkable neighborhoods).
vii. Ensure that household global (Scopes 1, 2 and 3) carbon budgets, including food, global travel, invested capital are below 5 tonnes CO_2e per person (by 2040).
viii. Ensure that all residents of Oshawa have access to health care, education, and housing.
ix. Ensure that all residents of Oshawa have access to basic information on local and global progress toward sustainability (and their personal and community contributions).
x. Ensure the provision of basic services for all residents, including economic/employment opportunities, water, food, and shelter.
xi. Provide the community with sufficient civility, understanding and means of public input for individual and collective flourishing, i.e., sustainability (this is an aspirational target but represents the basis of 2050 and 2100 sustainable development targets).
xii. Attitudes and actions need to reflect that the City of Oshawa is an integral part of Oshawa CMA, Region of Durham, GTA and GTOHA, Toronto Region, Ontario, Canada and the world.

8. Recommendations

Actions in the City of Oshawa 2020 Community Greenhouse Gas Reduction Plan remain relevant and practical. These require continued support of: the Oshawa Strategic Plan; the Durham Community Energy Plan; the Durham Home Energy Savings Program (and similar initiatives); the Durham Deep Retrofit Program; increased availability of EV charging facilities; expand the City's Active and Integrated Transportation Master Plans (A.T.M.P. and I.T.M.P.); adherence to the Central Lake Ontario Conservation Authority (CLOCA) Watershed Plans; high-density mixed-use development and walkable communities; work from home options through service delivery upgrades, and; encourage 'green jobs' and energy efficiency in local businesses.

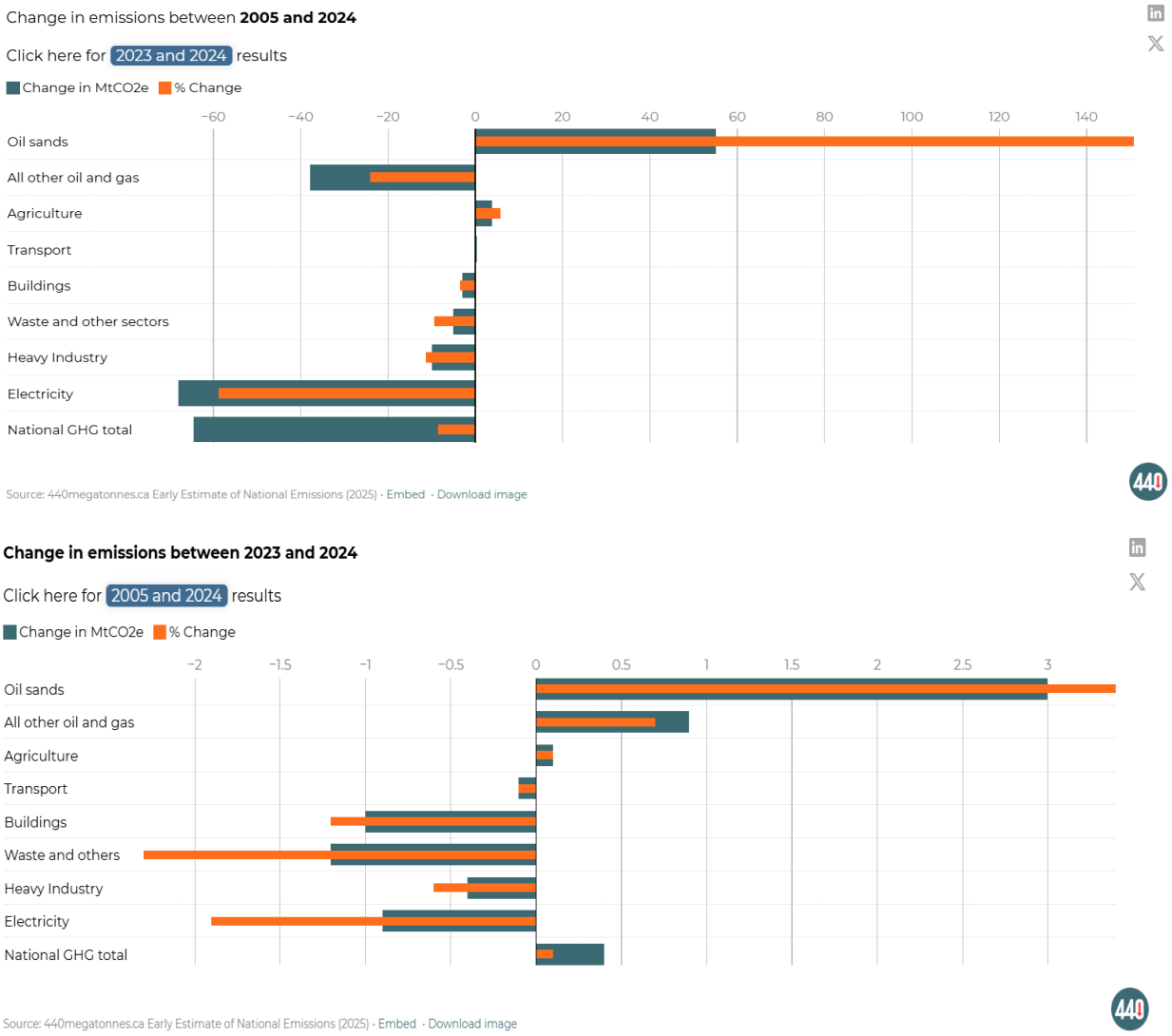
Actions 1-4 of the Community Greenhouse Gas Reduction Plan can be combined for all buildings. The priority for existing and especially new buildings, is to rapidly shift away from natural gas heating (space and hot water). Energy efficiency in buildings is also a priority. To assess GHG emissions from electricity, the carbon intensity of Ontario's electricity grid should be monitored. Ideally carbon intensity should remain below 30 g CO_2e/kWh. Renewables and nuclear generation provide this low carbon source. Solar systems, often behind the grid, provide a way to reduce demand, especially at peak carbon intensity times, *e.g.,* hot summer days.

With a local and global lens on GHG emissions the City of Oshawa should signal to senior levels of government and the community that the City remains committed to the 2010 Community GHG emission reduction targets. However, this requires collaboration and clear messaging that before 2050 (for territorial Scope 1 and 2) the community should have transitioned away from fossil fuels in transportation, space and water heating, and electricity generation. For global

Scope 3 emissions, residents, businesses and institutions in Oshawa should have transitioned to all transportation (including aviation) being carbon neutral, and invested capital to have emissions less than 40 tCO_2e/$M. The City of Oshawa should inform the community on annual progress toward these targets (annual reporting on website, with continued updating to Council every 5 years).

The City of Oshawa should "strengthen the City's capacity to be a leader in sustainability" by encouraging the establishment and actively participating in a sustainability transition plan for the Toronto Region.

Figure 6: Change in Emissions Canada, 2005-2024, and 2023-2024



From: Canadian Climate Institute, September 2025

Box 1: City of Oshawa and the Toronto Region

On January 12, 1954, in discussing the built-up area around Toronto, the term 'Golden Horseshoe' was first used by Westinghouse Electric Corporation president Herbert Rogge:

"Hamilton in 50 years will be the forward cleat in a 'golden horseshoe' of industrial development from Oshawa to the Niagara River".

Orchestrating consensus in Toronto is challenged by the advantages of acting as a 'Toronto Region' versus the natural desire for independence by local governments and smaller communities. Where borders are drawn is difficult. Clarington, and maybe Port Hope, for example, might argue that industrial development should extend eastward beyond Oshawa, and Kitchener-Waterloo is now as substantive a cleat as Hamilton.

Coordination within Canada's urban regions is difficult, but arguably even more important than removing inter-provincial barriers. Canada's constitution, that gives inordinate power to the provinces (at the expense of municipalities), also exacerbates the challenge of coordination. The federal government's ability to help coordinate further weakened as their contribution to urban infrastructure steadily declined from providing more than a third of capital costs in the 1950s to less than 10 percent today.

The Greater Toronto Area (GTA, or GTOHA) is the minimum urban agglomeration that should be considered when planning service delivery, especially services like transportation, waste disposal, water supply, economic development, and social assistance.[13] Despite the increasing need, the 30 mayors and chairs of the GTOHA, and their respective municipal staff, businesses, and residents, rarely agree, and when they do, it may well be the province or federal government deciding on the issue – often at odds with the local governments.

The Toronto Region (comprised of the CMAs of Toronto, Oshawa, Hamilton, Peterborough, St. Catherines, Kitchener, Brantford, Guelph, and Barrie) urban agglomeration has more than 34 transit agencies, 17 electricity distributors, 25 school boards, eight health networks, 25 publicly funded colleges and universities with more than 40 campuses, along with 21 upper- and separate-tier municipalities, and 89 lower-tier municipalities.

In the four regions of Durham, Halton, Peel, and York, the 322 municipal council seats have considerable overlap. The area is also overseen by 28 Chief Administrative Officers, and similar numbers of chief planners, heads of public works, public websites, and municipal headquarters. Each local government has its own Economic Development office with several staff whose performance is measured on progress within their own municipality, often at the expense of a neighboring community.

[13] Population by Census Metropolitan Area (CMA) of the GTHA (or GTOHA) in 2021: Toronto 6,202,225; Hamilton 785,184; Oshawa 415,311. Toronto Region inner-ring population 7.4 million. Outer-ring 2.8 million. Total area 31,562 km^2

A preliminary analysis of the Toronto Region suggests that over the next 20 years, if the region were to act more collaboratively, taking advantage of urban scaling attributes for service efficiencies and economic growth, a minimum economic boost of $3 billion - $4 billion per year is possible.[14] This collaboration is not only critical for the economy but underpins sustainability.

[14] Canada's cities in a changing world 1920-2120: The halftime report. Hoornweg, 2025.

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Table A1: Ontario Tech University GHG Emissions Inventory 2024

GHG Emissions Source (By Sector)		Total GHGs (metric tonnes CO2e)						
		Scope 1	Scope 2	Scope 3 included in Basic/Basic+	Other Scope3	BASIC	BASIC+	BASIC+ S3 +7
STATIONARY ENERGY	Energy use (all emissions except I.4.4)	1,212	1,775	994	33,001	2,988	3,981	36,982
	Energy generation supplied to the grid (I.4.4)	0						
TRANSPORTATION	(all II emissions)	227	0	18,828	0	227	19,054	19,054
WASTE	Waste generated in the city (III.X.1 and III.X.2)	373		373	860	745	745	1,605
	Waste generated outside city (III.X.3)	0						
IPPU	(all IV emissions)	0			0		0	0
AFOLU	(all V emissions)	0			0		0	0
OTHER SCOPE 3	(all VI emissions)				38,612			38,612
TOTAL		**1,812**	1,775	20,194	72,473	**3,960**	**23,781**	**96,254**

					Total
		Scope 1	Scope 2	Scope 3	
I	STATIONARY ENERGY				
I.1	Residential buildings				
I.2	Commercial and institutional buildings and facilities	1,212	1,775	994	3981
I.3	Manufacturing industries and construction	0	0	0	0
I.4.1/2/3	Energy industries	0	0	0	0
I.4.4	*Energy generation supplied to the grid*	0	0	0	0
I.5	Agriculture, forestry and fishing activities	0	0	0	0
I.6	Non-specified sources	0	0	0	0
I.7	Fugitive emissions from mining, processing, storage, and transportation of coal	0	0	0	0
I.8	Fugitive emissions from oil and natural gas systems	0	0	0	0
Sub-Total		**1,212**	**1,775**	**994**	**3,981**
II	TRANSPORTATION				
II.1	**On-road transportation**		227	17814	17,814
II.2	**Railways**	0	0	465	465
II.3	**Waterborne navigation**	0	0	0	0
II.4	**Aviation**	0	0	549	549
II.5	**Off-road transportation**	0	0	0	0
Sub-Total			227	18828	19054
III	WASTE				
III.1.1/2	**Solid waste generated in the region**	0	0	190	190
III.1.3	*Solid waste generated outside the region*	0	0	0	0
III.2.1/2	**Biological waste generated in the region**	0	0	20	20
III.2.3	*Biological waste generated outside the region*	0	0	0	0
III.3.1/2	**Incinerated and burned waste generated in the region**	0	0	163	163
III.3.3	*Incinerated and burned waste generated outside region*	0	0	0	0
III.4.1/2	**Wastewater generated in the region**	0	0	0	0
III.4.3	*Wastewater generated outside the region*	0	0	0	0
Sub-Total				373	373
IV	INDUSTRIAL PROCESSES and PRODUCT USES				
IV.1	Emissions from industrial processes occurring in the region boundary	0	0	0	0
IV.2	Emissions from product use occurring within the region boundary	0	0	0	0
Sub-Total		0		0	0

V	**AGRICULTURE, FORESTRY and OTHER LAND USE**				
V.1	**Emissions from livestock**	0	0	0	0
V.2	**Emissions from land**	0	0	0	0
V.3	**Emissions from aggregate sources and non-CO2 emission sources on land**	0	0	0	0
Sub-Total		0		0	0
VI	**OTHER SCOPE 3**				
VI.1	**Energy not included In I.7 & I.8**				0
VI.2	**Building Material**	0	0	962	962
VI.3	**Food not included in V**	0	0	0	0
VI.4	**Transportation not included in II.5**	0	0	0	0
VI.5	**Water**	0	0	0	0
VI.6	**Data Systems Management**	0		860	860
VI.7	**Key Infrastructure**	0	0	0	0
VI.7	**Invested Capital**	0	0	3,790	3,790
VI.8	**Other Scope 3**	0	0	33,001	33,001
SUB-TOTAL				38,612	38,612
TOTAL	Territorial			**58,806**	**62,020**
TOTAL	Scope 1 and 2 Basic+ Reporting	**1212**	**2002**		**3214**

Table 2.1 2024 GHG Emissions Projected to 2030 and 2050 (tCO2e)

	2007 (Territorial)	2007 (Global)	2024 (Territorial)	2024 (Global)	2030 (Territorial)	2030 (Global)	2050 (Territorial)	2050 (Global)
Building Energy Residential	-	-	0	0	0	0	0	0
Building Energy ICI	-	-	2,988	994	5250	1978	804	668
Land Transportation	-	-	227	18279	454	16380	48	3981
Air and Water Transportation	-	-	549	-	617	-	22	-
Waste	-	-	-	190	-	121	-	58
Industrial Processes and Product Uses	-	-	-	-	-	-	-	-
Agriculture, Forestry, & Other Land Use	-	-	-	-	-	-	-	-
Other Global	-	-	-	40066	-	64258	-	26981
Total	-	-	3763	59528	6321	82736	874	31687

Table 2.2 2024 GHG Emissions Projected to 2030 and 2050 (tCO2e/Student)

	2007 (Territorial)	2007 (Global)	2024 (Territorial)	2024 (Global)	2030 (Territorial)	2030 (Global)	2050 (Territorial)	2050 (Global)
Building Energy Residential	-	-	0.000	0.000	0.000	0.000	0.000	0.000
Building Energy ICI	-	-	0.256	0.085	0.292	0.110	0.032	0.027
Land Transportation	-	-	0.019	1.565	0.025	0.910	0.002	0.159
Air and Water Transportation	-	-	0.047	0.000	0.034	0.000	0.001	0.000
Waste	-	-	0.000	0.016	0.000	0.007	0.000	0.002
Industrial Processes and Product Uses	-	-	0.000	0.000	0.000	0.000	0.000	0.000
Agriculture, Forestry, & Other Land Use	-	-	0.000	0.000	0.000	0.000	0.000	0.000
Other Global	-	-	0.000	3.431	0.000	3.570	0.000	1.079
Total	-	-	0.322	5.097	0.351	4.596	0.035	1.267