Municipality of Mississippi Mills

Climate Action Plan

Report – Part A

April 2026

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PART A – BASELINE AND ANALYSIS

1. Introduction

Climate change is a pressing challenge being faced across the world, and The Municipality of Mississippi Mills is taking action. This Climate Action Plan (Plan) shall provide a roadmap for reducing greenhouse gas emissions (GHG), improving operational resilience, and supporting sustainable growth of the municipality. The Plan aligns with the Partners for Climate Protection (PCP) framework for development of a Climate Action Plan. Additionally, in a partnership with Quest Canada, Mississippi Mills is participating in the Ontario Net-Zero Communities Accelerator (NCA) program to develop a Community Energy Emissions Plan which will inform Part B of the Plan.

Partners for Climate Protection

The Partners for Climate Protection program is a national initiative led by the Federation of Canadian Municipalities and ICLEI – Local Governments for Sustainability. This framework is a five-milestone approach for municipalities to create Plans that reduce greenhouse gas (GHG) emissions and take climate action systematically. In 2024, the Municipality of Mississippi Mills Council passed a resolution to join the PCP program, and to use the program's framework to develop a Climate Action Plan. In 2023, Lanark County finalized and adopted their Climate Action Plan which also followed the PCP framework.

Net-Zero Communities Accelerator Program

The Net-Zero Communities Accelerator program operated by Quest Canada (a not-for-profit organization) helps municipalities develop and implement Community Energy and Emissions Plans (CEEP) by providing technical support, data analysis, and strategic guidance. The NCA program has been operated in Atlantic and prairie provinces successfully and Mississippi Mills has joined the first intake for the Ontario NCA group. The NCA program's goal is to accelerate local climate action and energy transition through collaboration, capacity building, and practical tools for achieving net-zero targets.

1.1 Plan Goals

The goal of the Plan is to provide a clear, structured roadmap to reduce greenhouse gas (GHG) emissions, improve municipal and community resilience to climate change, and support the long-term sustainable growth of the municipality. The Plan is provided in two Parts – Part A and B – as described below.

The Plan establishes a foundation for informed climate action by:

- Quantifying corporate and community-wide GHG emissions (Part A);

- Presenting historical climate conditions and projected future climate impacts (Part A);
- Identifying priority areas for emissions reduction and climate resilience (Part A);
- Seeking and incorporating results of public engagement and feedback (Part B), and
- Defining targets, strategies, and actions to guide implementation (Part B).

The Climate Action Plan is developed in alignment with the Partners for Climate Protection (PCP) framework which follows a Plan-Do-Check cycle to monitor progress and provide accountability. The Plan will satisfy the third milestone of the PCP framework - Develop a Local Action Plan. In partnership with Quest Canada through the Ontario Net-Zero Communities Accelerator (NCA) program, the Plan also incorporates the development of a Community Energy and Emissions Plan to inform actions and targets, particularly within the implementation phase.

Part A **Baseline and Analysis**	o Results of GHG emissions inventory (Corporate and Community) o Review historical climate data o Explore future climate projections o Identify categories for improvement o Develop rating matrix for prioritization
Part B **Targets and Actions**	o Engage with public o Set GHG reduction targets o Develop strategies to meet targets o Create implementation roadmap o Integrate climate lens into municipal decision making o Align with PCP milestones and Lanark County plan

2. Greenhouse Gas Inventory

Establishing a greenhouse gas emissions inventory is essential to the development of a Climate Action Plan. The inventory provides insight into the sources of emissions by various sectors based on the energy type. In 2023 the Municipality retained a consultant – Greenscale Inc.[1], to complete the GHG inventory for the corporation as well as

[1] Mississippi Mills Community GHG Inventory Report – 2023, Greenscale Inc. Prepared by Nathan C. Manion, January 10, 2025.

community emissions which assessed the 2022 and 2023 emissions. The GHG inventory assessed the energy consumption for several sectors (such as residential, transportation, municipal facilities, etc.) and calculated the GHG emissions for each sector based on the energy source. Different energy sources will have different emissions associated with them, for example natural gas will have a higher emissions factor as an energy source when compared to electricity when used for heating. The data provided within this section was prepared by Greenscale Inc. as provided in the Community and Corporate GHG Inventory reports.

In Ontario, electricity is generated by four main sources: nuclear, hydroelectric, natural gas, and wind. During the GHG inventory period (2022 – 2023) the mix for electrical generation sources shifted to a higher percentage of natural gas generation[2]. This shift was due to reduced nuclear generation as a result of facility refurbishments and lower than normal hydroelectric generation in 2023, resulting in natural gas having to take a larger share of baseload electrical supply. As a result, the emissions factor for electricity increased from 2022 to 2023. The emissions factor for electricity is expected to decrease over time as nuclear refurbishments are completed throughout the province.

The GHG emissions inventory is a way that the municipality can measure energy usage and emissions over time to assess the effectiveness of new policies, programs, and capital projects that are aimed at reducing GHG emissions.

Note on units: Energy use is measured in gigajoules (GJ) to allow consistent comparison across energy sources. Greenhouse gas emissions are expressed as tonnes of carbon dioxide equivalent (t CO_2e), a standard metric that accounts for the combined climate impact of all greenhouse gasses on a common basis.

2.1 Corporate Emissions

Within the municipality there are several sectors which consume energy. These sectors were the basis for the analysis of emissions. The energy sources for each sector are also listed.

- Facilities
  (electricity and natural gas)
- Transportation
  (gasoline and diesel)
- Street Lights
  (electricity)
- Wastewater
  (electricity and natural gas)
- Water
  (electricity)

Mississippi Mills Corporate GHG Inventory Report – 2023, Greenscale Inc. Prepared by Nathan C. Manion, January 10, 2025.

[2] Ontario Energy Board: Ontario's System-Wide Electricity Supply Mix: 2022 Data, 2023 Data

The total energy consumption for all sectors in 2023 was 28,568 giga-joules (GJ). Figure 1 below shows the consumption across each sector – most energy consumption is from municipal facilities and wastewater treatment.

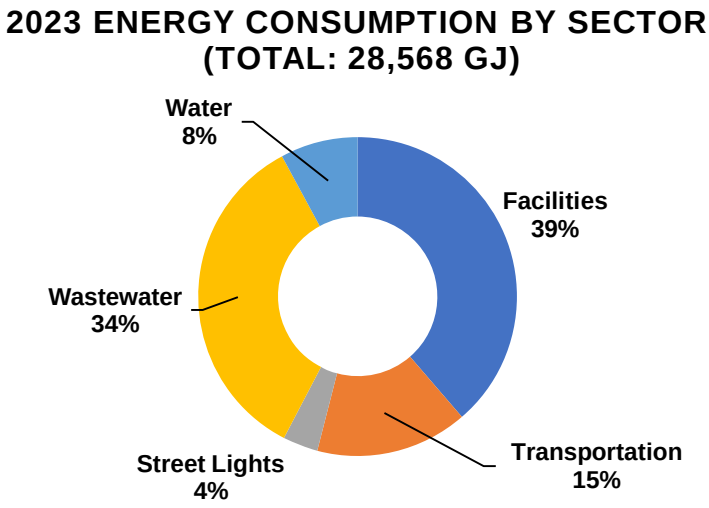


Figure 1: Corporate energy consumption by sector (2023)

For all sectors, the energy sources reviewed in the inventory were electricity, natural gas, gasoline, and diesel. Figure 2 below shows the energy source mix for all corporate emissions. Electricity is the main component of energy consumption, primarily due to electrical heating and industrial processes for wastewater treatment/pumping and potable water treatment. Natural gas is used solely for space heating and water heating for municipal facilities.

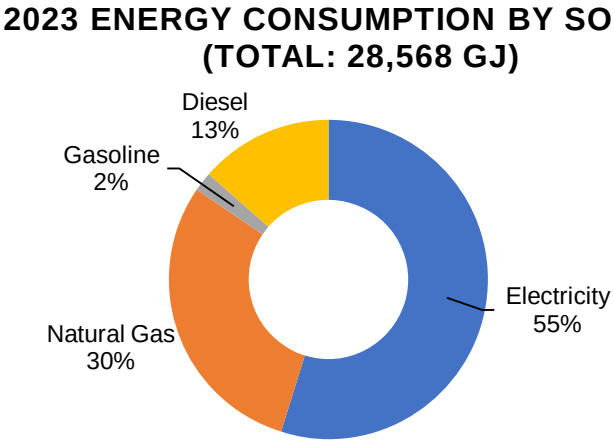


Figure 2: Corporate energy consumption by source (2023)

2.2 Community Emissions

Community based emissions are those which are generated inside the municipality from the following sectors:

- Residential
- Industrial, commercial and institutional
- Solid waste
- Transportation
- Wastewater
- Agricultural and forests

The types of energy used within the community varies, primary being electricity, natural gas, and gasoline. However, there are other energy sources that represent a smaller share of energy use including diesel, propane, and heating oil. Figure 3 below depicts the sources of GHG emissions within the community. Primary sources are transportation, agriculture, and residential sectors. The total GHG emissions for all sectors is 69,786 t CO_2e – however, this is reduced due to the significant amount of forested areas in Mississippi Mills which offsets these emissions (carbon sequestering) by approximately 29,000 tonnes CO_2e. The emissions of the agricultural and forestry sector (combined) is a net reduction of emissions by 12,692 tonnes CO_2e.

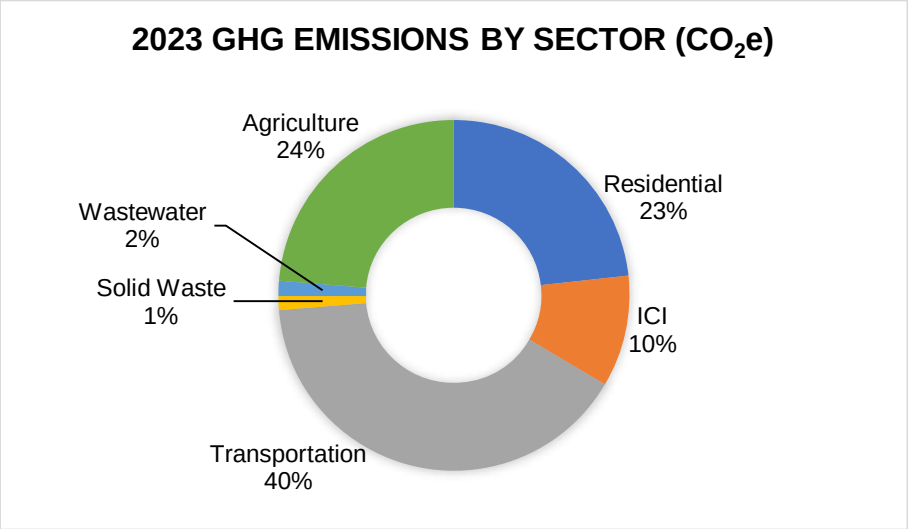


Figure 3: Community GHG Emissions by Sector (2023)

As the majority of emissions are from the transportation sector, it is consistent that gasoline is the largest source of energy use by type as shown in Figure 4 below. This chart provides a comparison of the total share for both energy consumption by source as well as percentage of GHG emissions by source. The chart provides a comparison for emissions intensity for the various energy types. Heating oil and propane represent a small share of total energy, but these energy sources are carbon intensive. The total emissions generated from electricity usage is only slightly greater than the combined emissions from propane and heating oil use. Electricity use in the community is the lowest GHG emitting energy source. Consideration must be applied to these energy sources as they likely are the main energy source for home heating in rural areas where alternatives such as natural gas are under-serviced.

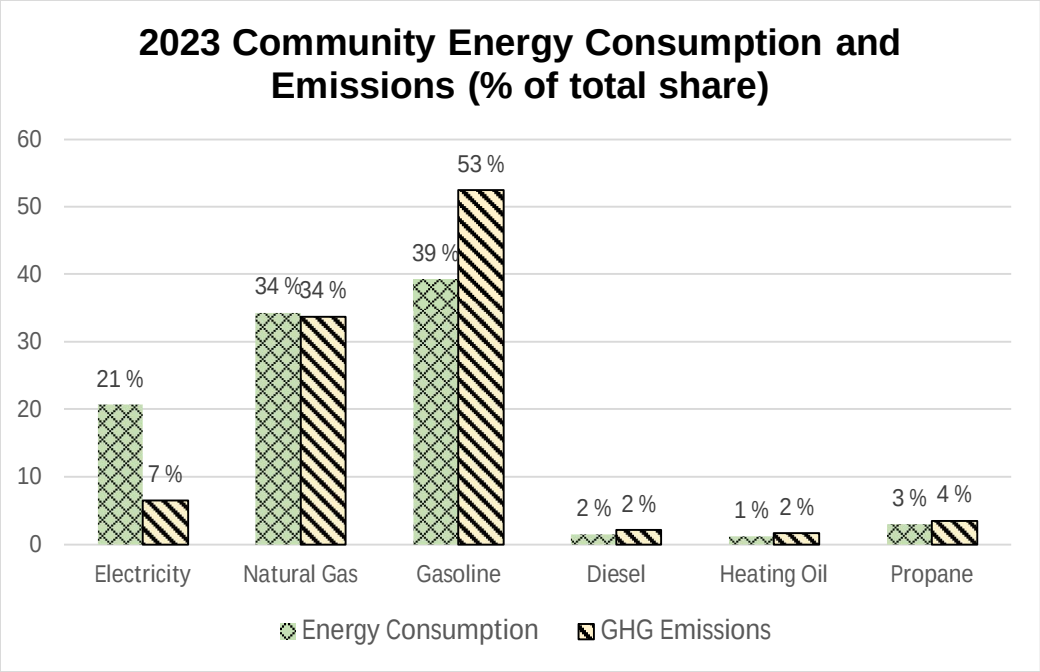


Figure 4: Community Energy Consumption and Emissions (2023)

3. Our Local Climate

Mississippi Mills is located in eastern Ontario and experiences a true four-season climate, characterized by warm/hot summers and cold, snowy winters. The local climate influences many aspects of corporate operations and planning as well as community life including living and doing business. The impacts range from energy use and infrastructure management to impacts on the natural environment and agriculture. This section provides an overview of the local climate in Mississippi Mills by assessing the historical climate data over the baseline period (1991-2020) providing data on variables related to temperature, precipitation, and agricultural activity. Looking beyond the baseline period, future climate projections are included as a comparison for mid-century and late-century timeframes to draw a picture of how our local conditions may change over time.

3.1 Baseline Climate Data (1991-2020)

The historical climate conditions for Mississippi Mills have been assessed using a baseline period of 1991 to 2020 which represents the most recent 30-year climate normal period. This baseline provides a clear picture of current local conditions and the regular variability of our climate. Using this data to compare against future projections allows for a deeper understanding of the information when relating to potential future climate impacts effecting living and doing business in Mississippi Mills.

3.2 Future Climate Projections

Climate projections included in this section are derived from advanced climate modelling which simulates future climate conditions based on atmospheric conditions, oceans, and relevant land information. The data source is from nationally recognized Canadian sources and are based on the SSP2-4.5 emissions scenario (CMIP6 model)[3] accessed from the ClimateData.ca dataset. This scenario simulates a middle of the road future where development patterns continue and follows a pathway of balanced energy development. Other models may provide a more sustainable outlook on the future or may differentiate between focusing on mitigation or adaptation which has effects on the socio-economic effects in the future that impact the climate differently. This scenario allows the comparison to be made for "continuing with status quo" as much as possible which includes routes towards sustainable development and emissions reduction. An important note is that any projection involves a level of uncertainty – the models use the best available information and science to assess trends. Considering that however, the information presented by the model is widely used by municipalities in long-term planning efforts.

We wish to thank ClimateData.ca for providing the climate information used in this Plan. ClimateData.ca was created through a collaboration between the Pacific Climate Impacts Consortium (PCIC), Ouranos Inc., the Prairie Climate Centre (PCC), Environment and Climate Change Canada (ECCC) and Centre de Recherche Informatique de Montréal (CRIM).

3.3 Mississippi Mills – Baseline and Beyond

What is changing? This section provides insight into what the local climate in Mississippi Mills may look like based on data provided by ClimateData.ca.

<u>Please note that this data is provided for informational purposes only.</u>

Table 1: Key Changes in Climate

Hottest Day			**Frost Days**			**Growing Season (# of days > 5°C)**		
34°C		38°C	152		121	244		267
Baseline 1991-2020		Late-Century 2071-2100	Baseline 1991-2020		Late-Century 2071-2100	Baseline 1991-2020		Late-Century 2071-2100

[3] Sobie, S. R., Ouali, D., Curry, C. L. et Zwiers, F. W. (2024). Multivariate Canadian Downscaled Climate Scenarios for CMIP6 (CanDCS-M6). Geoscience Data Journal 11: 806-824. https://doi.org/10.1002/gdj3.257

The table above (Table 1) shows the key items which are impacted from the baseline period to the late century period – ending in year 2100. Median data is presented (i.e., 50th percentile)– however, climatic conditions do have natural variations year by year and season by season, so climate projections are accompanied by upper and lower range for percentiles. An example of this would be the 10th percentile for first fall frost would represent an early frost, whereas the 90th percentile would represent a late frost, and the 50th percentile would represent a typical frost.

Looking ahead 80 years beyond the baseline period, the average hottest day is projected to be approximately 38°C with the number of frost days decreasing. The number of frost days is decreasing at a faster rate when compared to the increase of the 'hottest day' over the same period. Related to the projected decrease in frost days, the growing season – defined as number of days in a year where the daily temperature is greater than 5°C – is increasing as well, however the rate of increase is not as great as the decrease in frost days.

Table 2: Changes in Frost Timing

	Baseline (1991-2020)	**Mid-Century (2031-2060)**	**Late-Century (2071-2100)**
First Fall Frost	October 2nd	October 12th	October 20th
	⬇	⬇	⬇
Last Spring Frost	May 5th	April 27th	April 19th

When frost occurs and ceases to occur ranges year to year, early frost vs late frosts are typically within a 14-day span. Table 2 above shows the average frost-free date ranges for the three periods. The data shows that the first fall frost shifts from early October during the baseline to the second or third week of October for the late-century projection – demonstrating a decrease in frost days as identified above. Last spring frost similarly recedes earlier into the year, with projections showing the last spring frost occurring mid to late-April by the end of the century.

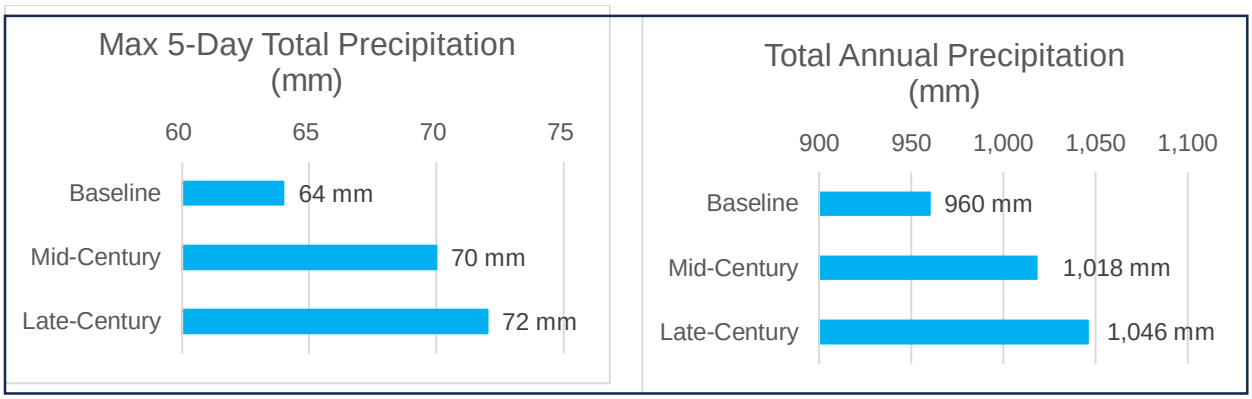


Figure 5: Precipitation Projections

Precipitation is presented above in Figure 5 as the maximum 5-day total precipitation which may represent a significant weather event over the course of 5 days and the total annual precipitation – a note that precipitation includes all types such as rain, snow, hail, etc. The data presented as the maximum 5-day precipitation indicates an increase in precipitation event intensity – meaning that precipitation events are projected to be more intense (with some increase in total precipitation annually) which may have risks for drainage/stormwater management, as operations due to snowfall frequency/intensity.

4. NCA Program Benchmark Assessment

The NCA Benchmark Assessment is a qualitative benchmarking tool prepared by QUEST Canada as part of the Net-Zero Communities Accelerator (NCA) program through the development of the Community Energy Emissions Plan. It measures where a community stands relative to Canadian best practices for net-zero, helping identify where progress is being made and where opportunities remain. The resulting scores establish a foundational baseline for tracking progress over time and informing strategic planning—these scores are not to be looked at individually as an evaluation of past performance, but a forward-looking tool to guide improvement and prioritization.

Overall, the benchmark assessment found that Mississippi Mills is demonstrating early to moderate progress towards energy and emissions planning. The assessment reveals strong data collection fundaments and transportation planning but identified areas for improvement (or gaps) in governance, climate risk planning, and energy modelling categories.

4.1 Initial Findings

Benchmark Category (Indicator)	Rating	Notes
Governance	29%	Some initiatives are in place within the governance category such as development of a CAP and alignment with utilities on initiatives, however the overall governance capacity remains limited. The score represents opportunities to create formalized leadership structures, develop cross-departmental coordination framework, and clearly define roles and responsibilities that are required to guide and implement climate initiatives.
Staff	45%	Staffing exists in a moderate capacity with some municipal staff involved in climate initiatives, supported by Lanark County and utility staff where feasible. There is limited staffing capacity available in the organization to consistently administer and monitor climate programs - dedicated position(s) or shared accountability structures are needed to consistently lead and scale climate programs and initiatives within the municipality.
Data	61%	Strengths include the completed corporate and community GHG emissions inventories as well as a publicly shared Energy Management Plan (2019). The municipality has methods to retrieve data from electric and natural gas utilities which benefit the ability for future analysis. Establishing renewal timelines for GHG inventories and establishing GHG reduction targets would benefit the municipality in this category to support the commitment to energy planning.
Financials	67%	Mississippi Mills has a relatively strong financial capacity to support climate and community energy initiatives. This score reflects the use of ad-hoc capital budget allocations and available grants to fund projects. Maintenance of critical infrastructure such as water/wastewater systems and facilities support energy efficiency and risk reduction. Within the community there are financing programs available (through Lanark County and utilities) to support energy efficiency and affordability. Improvements include formalizing long-term funding mechanisms and expanding equity focused financial tools/programs.
Strategy	19%	The strategic framework is in the early stages, however progress is being made in developing a CAP. Strategy will be strengthened by acceptance of the CAP and creation of an associated implementation strategy that includes goals, progress metrics, and timelines to guide and track energy and emissions initiatives.

Benchmark Category (Indicator)	Rating	Notes
Land Use	42%	Municipal land-use planning has moderate integration with energy and climate considerations. There are strengths that encourage compact, mixed-use development, support local and renewable energy, and protect natural/environmental assets. The Official Plan and Zoning By-Law are means to support and guide land-use priorities. Land-use policies can be improved by embedding climate risk assessments, energy performance requirements, and further considering energy and emissions into the land-use decision-making process.
Energy Networks	67%	Energy utilities work with the municipality on efficiency projects through funding opportunities as well as individually by providing programs that service the community. Energy efficiency is considered in the development process of new and retrofit of municipal facilities. Additional focus can be directed to expand load-management programs and equity-driven distributed energy systems/programs.
Waste & Water	55%	A good foundation exists through existing solid waste and water programs relating to conservation and efficiency. The municipality implements waste diversion and recycling programs alongside public education on the topic of waste and a circular economy. Water conservation and efficiency programs along with infrastructure maintenance programs contribute to conservation and energy reduction. Expanding energy and material recovery would benefit energy efficiency and emissions reduction. Solid waste, water, and stormwater systems can be integrated deeply into energy and emissions planning.
Transportation	60%	Existing transportation demand management and planning through the Transportation Master Plan (2024) and Active Transportation Plan (2015) provide a framework for the municipality. Integrating active transportation into planning documents provides a framework to be implemented. Additional efforts can reduce emissions including expanding public transit services, adopting anti-idling policies, and advancing fleet "greening" through alternative fuel initiatives.
Buildings	35%	There is some public education on building energy use and some retrofit programs are in place (Better Homes Lanark), the overall implementation is limited. Public sectors could lead by example, by adopting high-performance and resilient building practices and incorporating energy benchmarking on a facility level.

4.2 Key Takeaways

The overall benchmarking score of Mississippi Mills through the NCA Benchmarking Assessment performed by QUEST Canada is 49%. The assessment identifies clear strengths that the municipality can build upon to continue momentum as well as areas where focused action and integration of the corporation and/or community partners can deliver an impact moving forward.

5. Categories for Improvement

As a result of the information gathered within the corporate and community GHG emissions inventories as well as information presented in the NCA Benchmark Assessment, this section identifies areas where improvement is possible. The categories are organized by source (corporate or community) and then the system.

5.1 Corporate Emissions

This section identifies where the municipality can reduce GHG emissions through system and operational changes as a corporation.

5.1.1 Municipal Facilities and Buildings

Municipal facilities and buildings represent a significant portion of corporate energy consumption which generates GHG emissions. Energy use for these facilities is primarily driven by space heating and cooling, lighting, and building equipment (electronics, appliances, etc.). The sources of energy are electricity and natural gas with limited PV which serves to offset electricity usage.

Opportunities for improvement in this category largely focus on reducing the overall energy demand. Areas that can have an impact on reducing energy demand include:

- Improve energy efficiency of facilities to reduce energy demand
- Optimize building operations to align with known usage patterns
- Transition high-demand systems to low carbon alternatives where possible

Policies or guidance for replacements of elements of a building (i.e., windows, HVAC systems, lighting) to ensure that procurement considers emissions reductions as a factor.

Changes implemented within municipal buildings and facilities can be tracked through energy audits and emissions inventories and evaluated against previous years to assess effectiveness.

5.1.2 Municipal Fleet and Transportation

GHG emissions from the municipal fleet and transportation related sources are measured through the consumption of gasoline and diesel fuels used by municipal vehicles and equipment. Included in this category is municipal service vehicles, heavy duty and light duty equipment, and machinery.

Opportunities for improvement in this category seek to reduce consumption and emissions intensity by optimizing the fleet and operational practices. Areas include:

- Procurement of new or replacement vehicles and equipment should consider lower emissions alternatives such as hybrids or zero emissions options. Considerations should include a lifecycle analysis to inform the decision.
- Perform review of routing to assess for efficiencies that reduce mileage and vehicle usage.
- Implement policies to reduce idling.
- Investigate policies which assess emissions resulting from personnel travel such as travel method.

This category can be monitored directly by assessing fuel use and the related emissions during future inventories. Fuel use can be reviewed regularly and normalized against previous years to assess the effectiveness of improvements. Any improvement should not be measured solely by the direct fuel related impacts, but also assess the performance and reliability of the asset. Careful consideration must be made when implementing improvements within this category to ensure that service delivery can be maintained or effectively supplemented without burden.

5.1.3 Water and Wastewater Operations

A notable share of municipal energy consumption is accounted for by the water and wastewater operations category. Energy use is from treatment processes, pumping, and distribution - primarily by electrical sources, but natural gas is used at times for facility heating and cooling.

Water and wastewater operations may have opportunities to increase operational efficiency to reduce energy demand. Areas that this may be achieved are:

- Implement energy monitoring to understand energy use on a process level.
- Review treatment processes for operational efficiencies.
- Procurement of new or replacement equipment should consider energy efficient options where possible or usage of lower carbon energy sources.
- Conduct system reviews to reduce water loss.

Given how continuous water and wastewater operations are, measurement of the effectiveness of improvements made can be assessed through energy usage and water treatment throughput and water supply metrics.

5.1.4 Streetlighting and Infrastructure

Streetlighting and related municipal infrastructure contribute to corporate emissions through electricity consumption. While it is a small portion of the overall emissions, targeted improvements could reduce the impact from this category.

Although the category covers a limited range of infrastructure types, the physical area which is relevant is widespread. Improvements include reduce electrical demand through more efficient technologies and improved system controls.

As these systems are consistent, monitoring can be done easily to measure performance and effectiveness of any improvements.

5.2 Community Emissions

Community emissions represent GHG emissions across the broad community through categories including building energy use, transportation, and waste disposal. Some areas for reducing GHG emissions have direct municipal influence while some improvements will require promotion, education and community buy-in.

5.2.1 Residential Buildings

Residential buildings are a large source of community GHG emissions. Energy use of electricity and natural gas sources in this category represent 23% of total community emissions. In a residential setting, energy use is primarily home heating and cooling, as well as water heating and appliance use. It should be added that data on EV adoption in the area is not available, so data may be skewed from the transportation category towards the residential category for those who charge electrical vehicles at home.

Focusing on reducing energy demand and increasing building efficiency in existing homes provides a significant opportunity to improve the emissions in this category. In addition, policy can aid in new development adopting energy efficiency targets that surpass minimum requirements. Some areas include:

- Increase energy efficiency in existing residential homes through retrofit programs and education.
- Support the transition to low carbon energy sources in existing residential homes through retrofit programs and education.

- Develop policy to incentivize development to exceed minimum requirements for energy efficiency and provide options for alternative energy sources, including low carbon or renewable options.
- Assess land-use policy opportunities to guide development towards net-zero and low-impact development.

Since residential energy use can be measured through future GHG inventories, the effectiveness can be assessed over time. Additionally, land-use policies and their effects can be measured on a more regular basis as development progresses.

5.2.2 Commercial, Industrial, and Institutional (IC&I) Buildings

The Industrial, Commercial, and Institutional (IC&I) Buildings category represents the fourth most significant contributor of GHG emissions, accounting for approximately 10% of all community-based emissions. The IC&I sector typically utilizes natural gas and electricity for building operations and processes.

Opportunities for improvement within this sector are linked to reducing energy demand, increasing building performance, as well as transitioning to low carbon energy sources where available. Areas which GHG emissions from IC&I buildings can be reduced include:

- Assess land-use policy opportunities to incentivize development of commercial spaces which are net zero or utilize low carbon energy sources.
- Develop, promote, or partner with other organizations on programs for increasing energy efficiency in existing buildings through retrofits or equipment upgrades.
- Educate IC&I industry on energy efficiency and usage as it relates to GHG emissions.
- Partner with utility organizations to implement energy audit programs to provide insight for private energy usage.

Energy usage and GHG emissions within the IC&I sector can be measured through regular GHG inventories. Achieving progress in this category presents challenges and meaningful outcomes will require dedicated actions by IC&I business owners.

5.2.3 Transportation

Transportation represents the largest source of community-wide GHG emissions in Mississippi Mills at 40% of overall emissions originating from this sector. Emissions are heavily from gasoline consumption, with diesel contributing a smaller share.

The rural and vast nature of Mississippi Mills is highlighted by the transportation category representing the largest amount of GHG emissions - demonstrating the reliance on personal vehicles for day to day travel. As this category is rather streamlined, reducing

GHG emissions for transportation concentrates on reducing fuel usage and transitioning to low carbon transportation methods. Options to reduce GHG emissions in this category include:

- Promote the reduction of single-person/vehicle trips.
- Support and develop active transportation and public transportation options locally.
- Strengthen the EV charging network to support adoption within the community and for visitors.
- Investigate land-use policies which may increase investment into EV charging infrastructure for private development.
- Support local employment to reduce the need for vehicular travel.

Since transportation emissions are measured directly by fuel usage, this can be assessed over time through future GHG inventories, as well as by measured involvement in any programs led by or associated with the municipality.

5.2.4 Solid Waste

Solid waste (garbage and landfills) contributes a small portion of the community GHG emissions. Representing approximately 1% of total emissions within the community, the primary source is a result of methane generation within waste disposal (landfilling).

The main focus to reducing GHG emissions associated with solid waste relate to the overall reduction of waste that is generated and disposed. Opportunities include:

- Establishing and/or promoting community re-use of materials such as appliances, building materials, furniture, etc., which are not at the end of life.
- Routinely assessing through waste audits the composition of waste to inform future programs.
- Develop diversion programs based on results of waste audits for key waste streams which contribute the highest portion of GHG production during the landfilling process.
- Support waste reduction through promotion and educational programs.

Solid waste is managed by the municipality for residential sources primarily, with some IC&I businesses managing waste through external service providers. As a result, the municipality can measure the success and progress of initiatives through disposal rate assessments and waste composition audits. GHG emissions would be assessed during routine inventories.

5.3 Key Takeaways

Together, the corporate and community inventories as well as the NCA benchmark assessment provide insight into where Mississippi Mills stands now, with opportunities in each category for areas to achieve results in GHG emissions reduction through future implementation. Corporate categories reflect areas with direct municipal control that can achieve results within the organisation through operational changes and policy development. Leadership in the community as a municipality can promote community involvement in areas that affect community emissions.

6. Prioritization Framework

The previous section described categories for improvement, and Part B (to be completed) outlines the action pathways to achieve the targets for GHG reduction. To guide the development of action pathways, a prioritization framework is recommended.

This will be based on the SMART decision-making framework to ensure that action pathways are selected in an intentional manner. Each potential action is assessed against five initial criteria:

Specific
Measurable
Achievable
Relevant
Time-bound

In addition, recommendations must also consider additional items that will complement the SMART framework. The complete framework is below:

Table 3: Prioritization Framework

Criteria	**Note**
Specific	Recommendations or actions must be specific so the outcome is clearly communicated.
Measurable	The progress as a result can be measured through either GHG emissions reductions or other metrics.
Achievable	The recommendation must be realistic given staff capacity, expertise, resources, and funding.
Relevant	The actions must be relevant to the overall goal for reducing GHG emissions. Actions must also be

	relevant to asset management best management practices and best operating practices.
Time-bound	The recommendation or action must have be accompanied by a timeline for implementation.
Alignment with Municipal Strategic Planning	Any action or recommendation must align with the latest municipal Strategic Plan.
Alignment with existing plans	Existing plans must be considered to ensure recommendations are consistent with strategies identified in the near, mid, and long-term timelines.
Cost and funding availability	Available funding through internal and external sources must be considered in the planning process and should inform the “Achievable” criteria.

PART B: TARGETS AND ACTIONS

Next Steps

Part B focuses on targets and actions. It will serve present the results of the next phase of the Climate Action Plan. Key steps that will follow include:

Step 1. Develop GHG emissions reduction targets

Step 2. Undertake community consultation to present results of GHG emissions inventory and categories for improvement.

- Generate feedback and insight on action pathways for community and corporate categories.

Step 3. Develop recommended action pathways for each community and corporate category, integrating the prioritization framework.

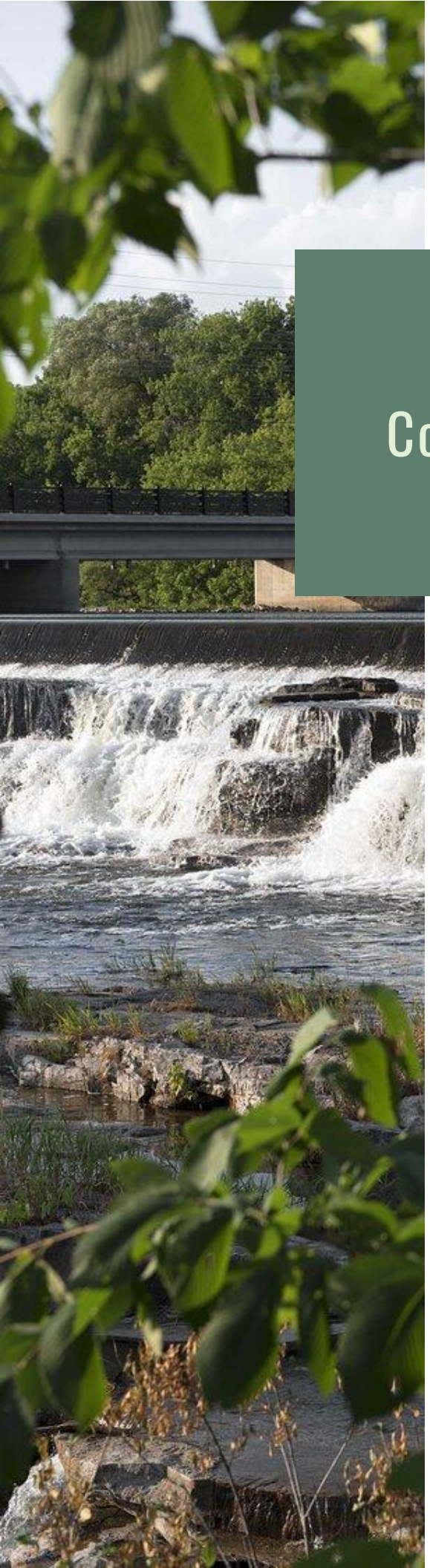
- Initiate consultant peer review of draft recommended actions and implementation plan.

Step 4. Create implementation framework for action pathways, including roles and responsibilities, scheduling, budgets and funding opportunities.

Table 4: Part B Workplan

Step	Budget	Timeline	Deliverable
1.	Internal staff effort	August 2026	Staff Report to Council requesting approval of targets
2.	Internal staff effort	June – August 2026	Informs final Plan
3.	Minor (<$2,500) • covered by grant funding	June – August 2026	Informs final Plan
4.	Internal staff effort	September 2026	Final Climate Action Plan

Appendix A
Greenhouse Gas Emissions Inventory Corporate Emissions



Mississippi Mills Corporate GHG Inventory Report – 2023

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January 10, 2025

Mississippi Mills

Executive Summary

This report provides an overview of the Municipality of Mississippi Mills' corporate greenhouse gas (GHG) emissions inventory for 2023, covering key operational sectors: facilities, transportation, streetlights, wastewater, and water services. Emissions are quantified using total energy consumption (GJ) and total GHG emissions (t CO_2e), providing insights into the municipality's carbon footprint and energy use patterns.

In 2023, Mississippi Mills' corporate operations generated 1,010 tonnes of CO_2e, reflecting a 7% decrease from 2022 levels. Total energy consumption declined by 1,375 GJ, driven largely by reductions in transportation-related energy use. Electricity and natural gas remained the primary energy sources for corporate operations, contributing to the majority of GHG emissions. Transportation, while showing significant reductions in energy use and emissions, still accounted for a large share of the overall footprint.

This inventory highlights opportunities for further emissions reductions through initiatives targeting building energy efficiency, renewable energy integration, and continued improvements in fleet fuel efficiency and replacement. These efforts will help Mississippi Mills meet its corporate sustainability goals while demonstrating leadership in climate action.

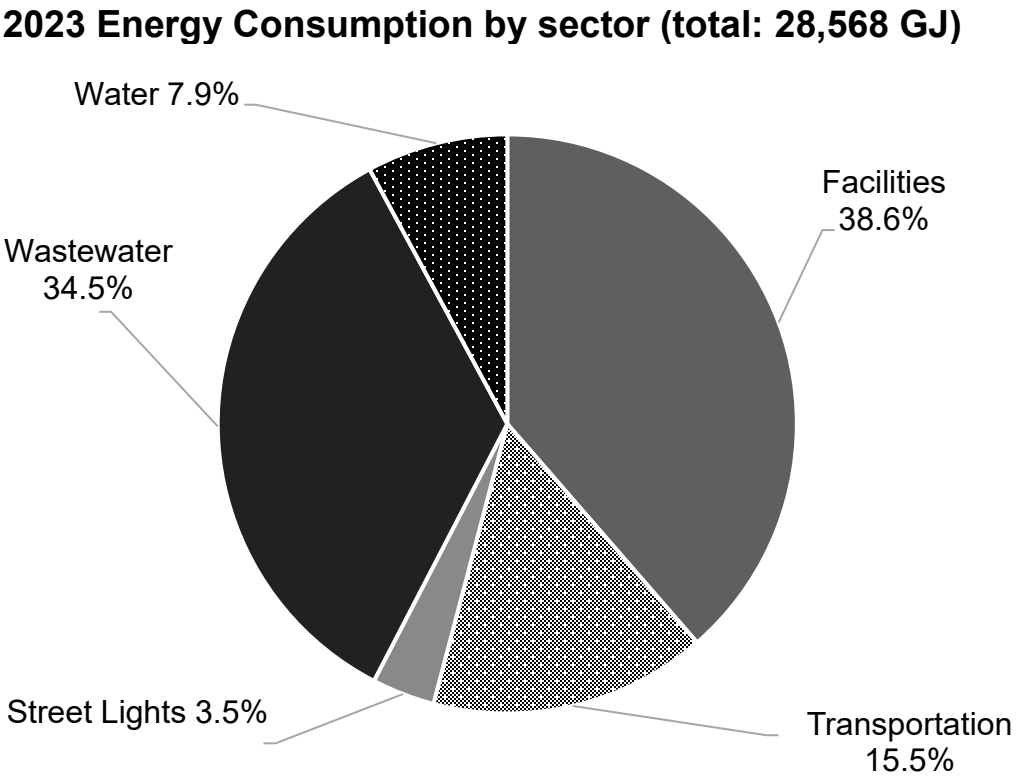
Summary of Results

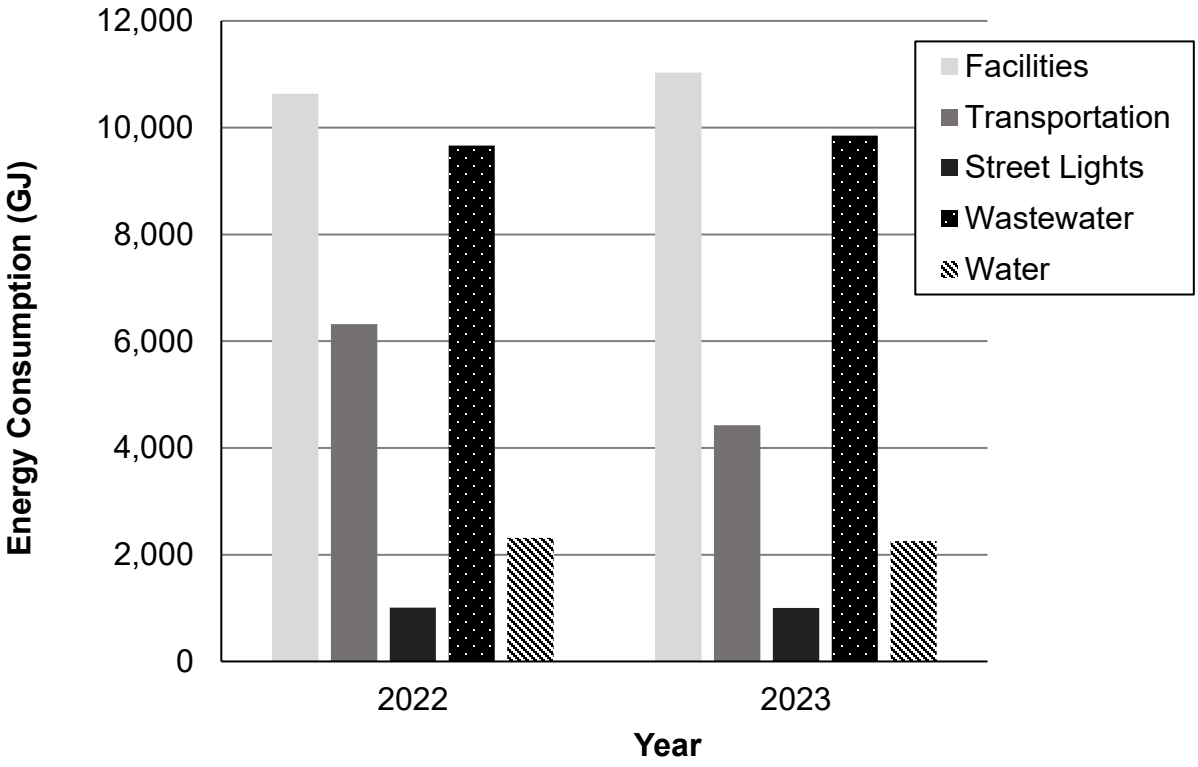
1. Corporate GHG emissions in 2023 totaled 1,010 tonnes CO_2e, a 7% reduction (76 tonnes) compared to 2022.

2. Transportation-related emissions decreased by 30% (132.9 tonnes CO_2e), driven by a 30% reduction in energy use (1,897 GJ).

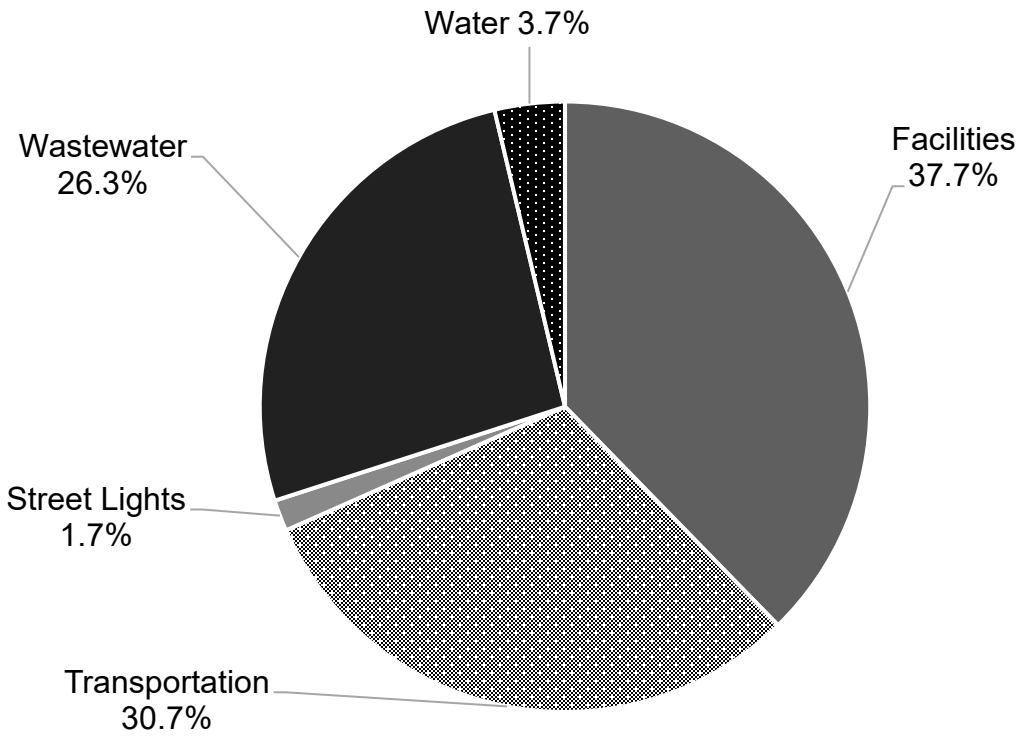
3. Electricity-related emissions increased by 20% (42.6 tonnes CO_2e), despite only a 1.6% increase in electricity use (242 GJ). This demonstrates that the higher emission factor for Ontario's grid played a significant role in the emissions increase.

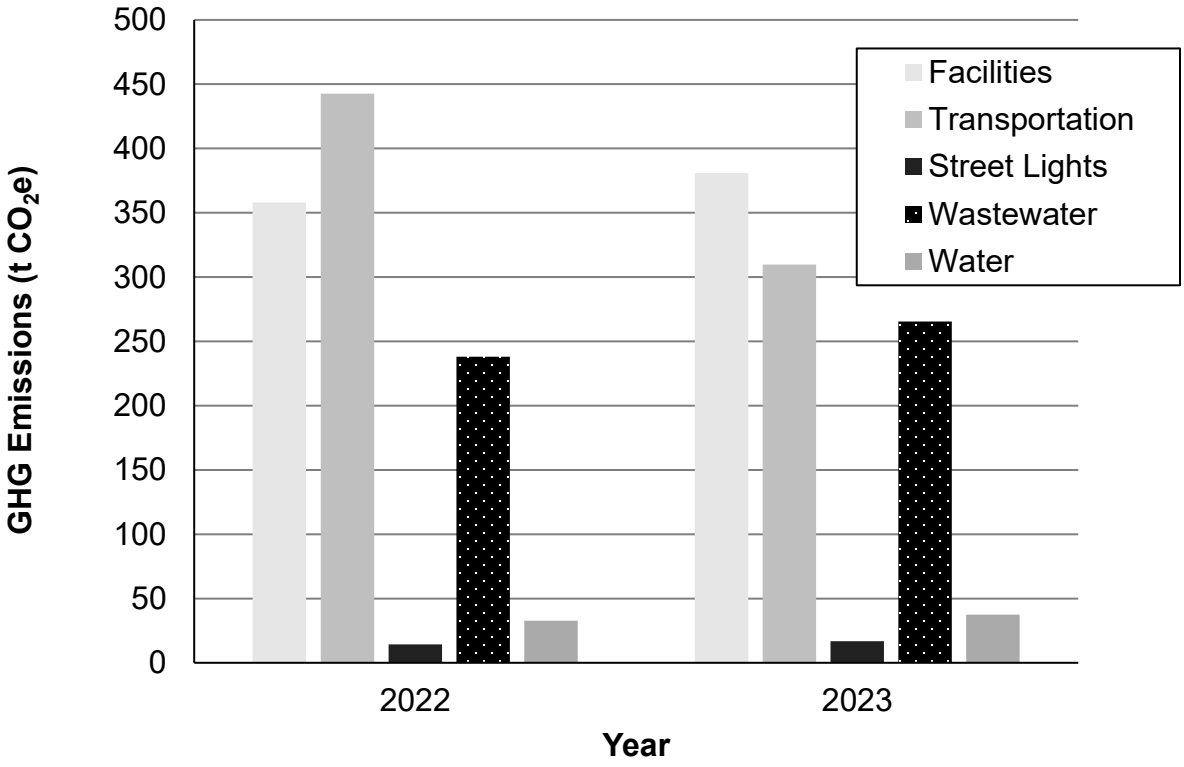
4. Emissions from facilities increased by 6% (22.8 tonnes CO_2e), while energy consumption only rose by 3.8% (399 GJ), indicating a portion of the emissions increase was due to Ontario's higher electricity emission factor.


2023 Energy Consumption by sector (total: 28,568 GJ)
Water 7.9%
Facilities 38.6%
Wastewater 34.5%
Street Lights 3.5%
Transportation 15.5%

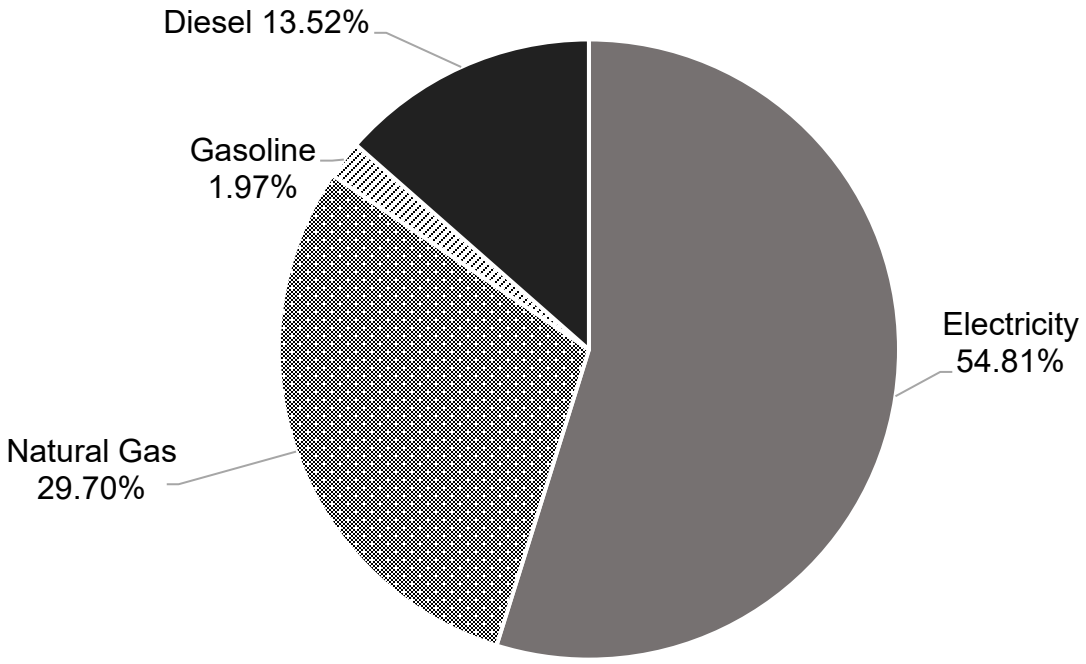

12,000
10,000
8,000
6,000
4,000
2,000
0
Energy Consumption (GJ)
2022
2023
Year
Facilities
Transportation
Street Lights
Wastewater
Water

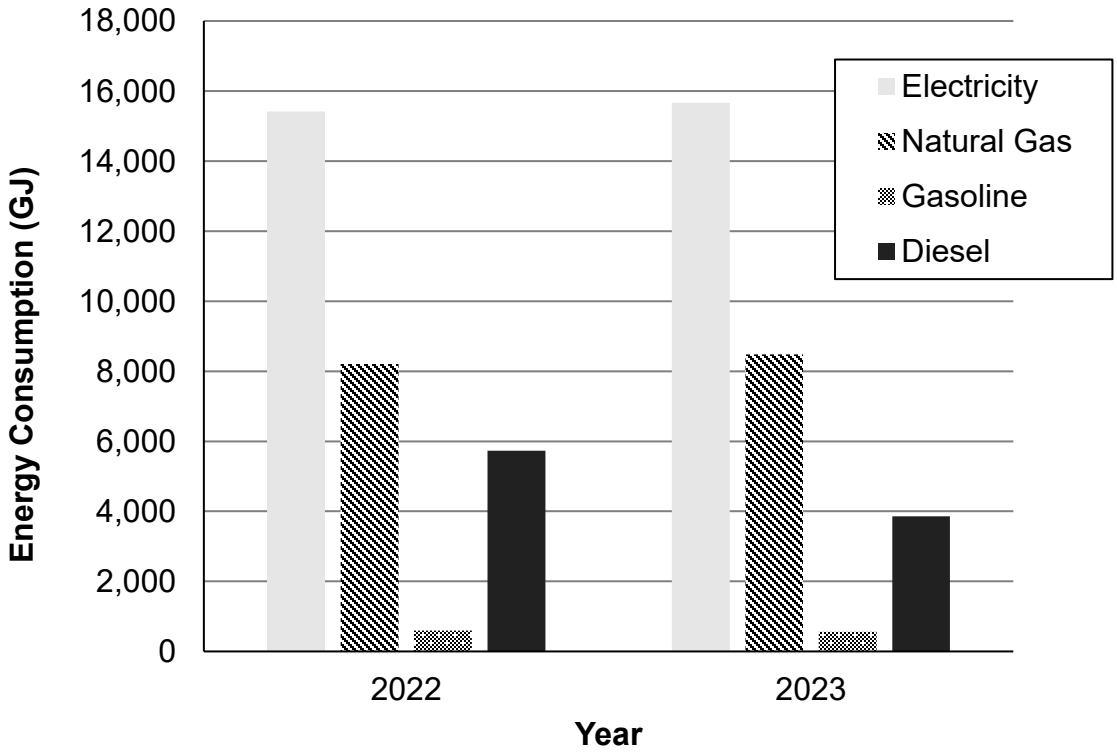
2023 GHG Emissions by sector (total: 1,010 tonnes CO_2e)



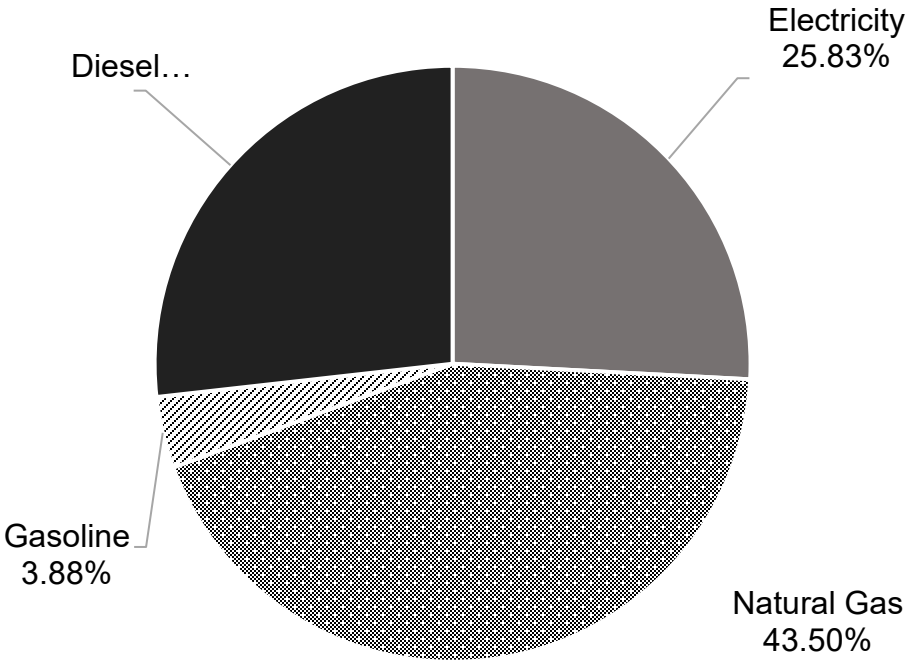


2023 Energy Consumption by energy source (total: 28,568 GJ)





2023 GHG Emissions by energy source (total: 1,010 tonnes CO_2e)



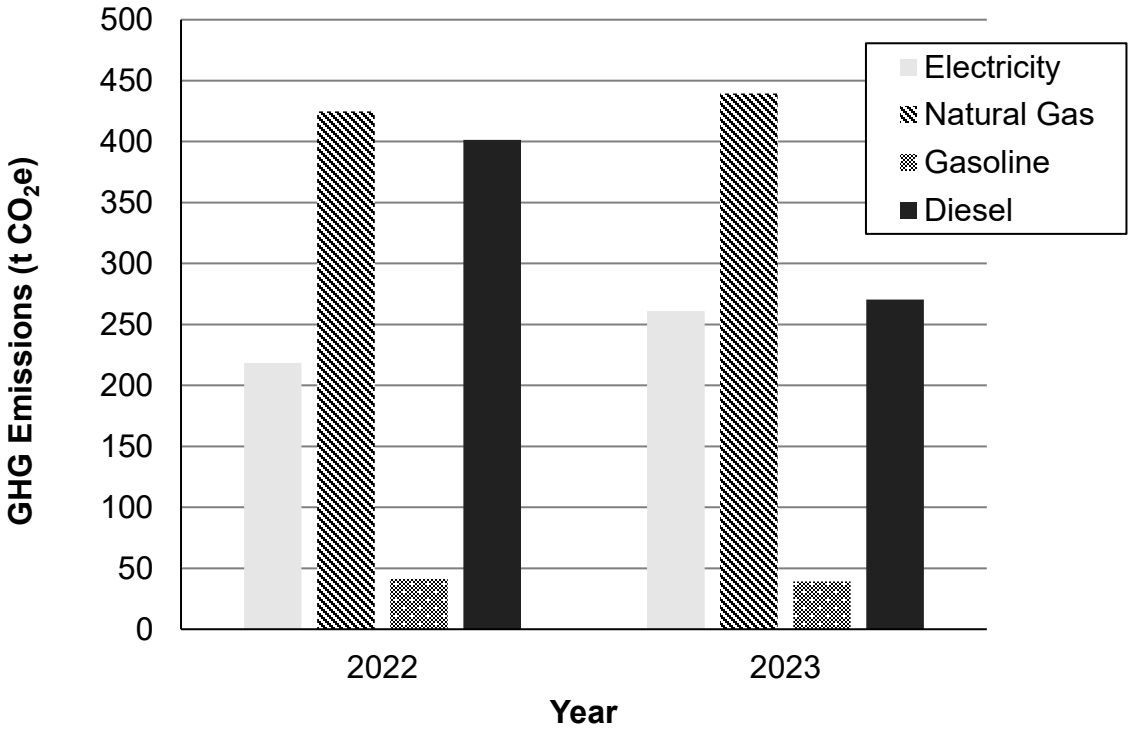


Table 1. Summary of total energy consumption (GJ) and GHG emissions (tonnes CO_2e) for 2023 across all sectors.

	2022		2023			
Sector	**Energy Consumption (GJ)**	**GHG Emissions (tonnes CO_2e)**	**Energy Consumption (GJ)**	**GHG Emissions (tonnes CO_2e)**	**Energy Use Change**	**GHG Emissions Change**
Facilities	10,634	358	11,033	381	399	22.8
Transportation	6,322	443	4,425	310	-1,897	-132.9
Street Lights	1,007	14	1,003	17	-4	2.5
Wastewater	9,667	238	9,854	265	187	27.2
Water	2,314	33	2,254	38	-60	4.8
TOTAL	29,943	1,086	28,568	1,010	-1,375	-76

Table 2. Summary of total energy consumption (GJ) and GHG emissions (tonnes CO_2e) for 2023 for all energy sources.

	2022		2023			
Sector	**Energy Consumption (GJ)**	**GHG Emissions (tonnes CO_2e)**	**Energy Consumption (GJ)**	**GHG Emissions (tonnes CO_2e)**	**Energy Use Change**	**GHG Emissions Change**
Electricity	15,417	218	15,659	261	242	42.6
Natural Gas	8,205	425	8,484	440	279	14.7
Gasoline	593	41	563	39	-31	-2.1
Diesel	5,728	401	3,862	271	-1,866	-130.8
TOTAL	29,943	1,086	28,568	1,010	-1,375	-76

2. Community GHG Inventory Results Overview

Corporate GHG Inventory Results Overview (2023)

In 2023, total corporate GHG emissions for the Municipality of Mississippi Mills were 1,010 tonnes CO_2e, representing a 7% decrease (76 tonnes) from 2022 (Table 1). Total energy consumption also declined by 1,375 GJ, driven primarily by reductions in the transportation sector. While some sectors experienced increases in energy use and emissions, the overall reduction demonstrates progress in managing energy use and emissions in corporate operations.

a) Facilities

GHG emissions from facilities increased by 6% (22.8 tonnes CO_2e) between 2022 and 2023, while energy consumption rose by 3.8% (399 GJ). The increase in emissions was amplified by the higher carbon intensity of Ontario's electricity grid in 2023, which impacted the overall footprint. Upgrading insulation, optimizing HVAC systems, and integrating renewable energy sources like solar panels could mitigate future emissions increases. Comparing the GHG emissions on a per ft2 metric would also enable Mississippi Mills to understand the impacts of adding new facilities managed spaces.

b) Transportation

Transportation emissions experienced the most significant decline, falling by 30% (132.9 tonnes CO_2e) from 2022 levels. This reduction corresponds to a 30% decrease in energy consumption (1,897 GJ), primarily due to reduced diesel use. Additionally, information from where the diesel use changes could help determine what the variation is between years. For example, the reduction could be due to improvements in fleet age or engine efficiencies, but could also be due to environmental changes such as reduced snow fall requiring snow management, or summer weather that requires more frequent landscaping activities such as lawnmowing, irrigation, plant removals, or maintenance. Investments in electric or hybrid fleet options could sustain these downward trends while supporting operational efficiency.

c) Wastewater and Water Services

Emissions from wastewater operations increased by 11% (27.2 tonnes CO_2e), driven by a 11% rise in energy use (187 GJ). Similarly, water services emissions rose by 4.8 tonnes CO_2e, reflecting a slight increase in energy use. These sectors reflect the operational demands of critical municipal services, where emissions are closely tied to both energy consumption and environmental conditions. Opportunities to reduce emissions could include energy-efficient upgrades to pumping systems and treatment facilities, exploring renewable energy sources to offset electricity use, investment in upgraded wastewater infrastructures, or investment in green infrastructure such as permeable pavements that can reduce stormwater loads and operating costs.

d) Electricity Emission Factor Changes

Electricity-related emissions increased by **20%** (42.6 tonnes CO_2e) in 2023, even though electricity consumption rose by just **1.6%** (242 GJ). This disproportionate increase is due to Ontario's electricity grid emission factor, which increased from 2022. This highlights the challenge that Ontario's increasing grid carbon intensity will place on carbon reduction strategies, where carbon benefits will be slower to realize than expected. This underscores the importance of both reducing electricity use and incorporating local renewable energy sources, such as solar installations, to mitigate the effects of grid variability.

3. Takeaways & Summary

This report provides an overview of the Municipality of Mississippi Mills' corporate GHG emissions for 2023, highlighting areas of progress and opportunities for further reductions. Based on the findings, the following takeaways and recommendations are identified. This report highlights the Municipality of Mississippi Mills' progress in managing corporate energy use and GHG emissions, as well as areas for continued improvement. The following takeaways summarize key findings and provide actionable insights:

i. Addressing Facility Emissions in the Context of Growth

Although facilities emissions increased by **6%** in 2023, this reflects both rising energy use and the higher carbon intensity of Ontario's electricity grid. As the municipality continues to manage its facilities, incorporating energy efficiency measures, renewable energy, and emissions tracking on a per square foot basis will help ensure that emissions reductions can be achieved even as operational needs grow. These steps will also support long-term cost savings while improving the municipality's resilience to fluctuating grid emissions.

ii. Wastewater Energy Demands and Infrastructure Challenges

The **11% rise in emissions** from wastewater operations highlights the energy demands of critical municipal services. This trend is likely to persist without targeted investments in energy-efficient technologies and infrastructure upgrades. Exploring green infrastructure solutions, such as permeable pavements and bioswales, could reduce stormwater treatment loads and operating costs, while modernizing wastewater systems will help stabilize emissions despite increasing service demands.

iii. Mitigating the Impact of Electricity Grid Variability

The increase in electricity-related emissions by **20%** despite minimal growth in consumption underscores the influence of Ontario's electricity grid on corporate emissions. This variability challenges municipal emissions reduction efforts, as progress in efficiency is offset by grid-level changes. Mississippi Mills can mitigate this challenge by investing in local renewable energy sources, such as rooftop solar installations, to reduce reliance on grid electricity and support consistent progress toward emission reduction goals.

Summary

Mississippi Mills has made progress in reducing overall corporate emissions, particularly through transportation-related reductions, but challenges remain in addressing facility and wastewater emissions, as well as electricity grid impacts. By implementing energy efficiency measures, upgrading infrastructure, and exploring renewable energy opportunities, the municipality can strengthen its corporate climate action strategies and achieve more sustainable operations over time.

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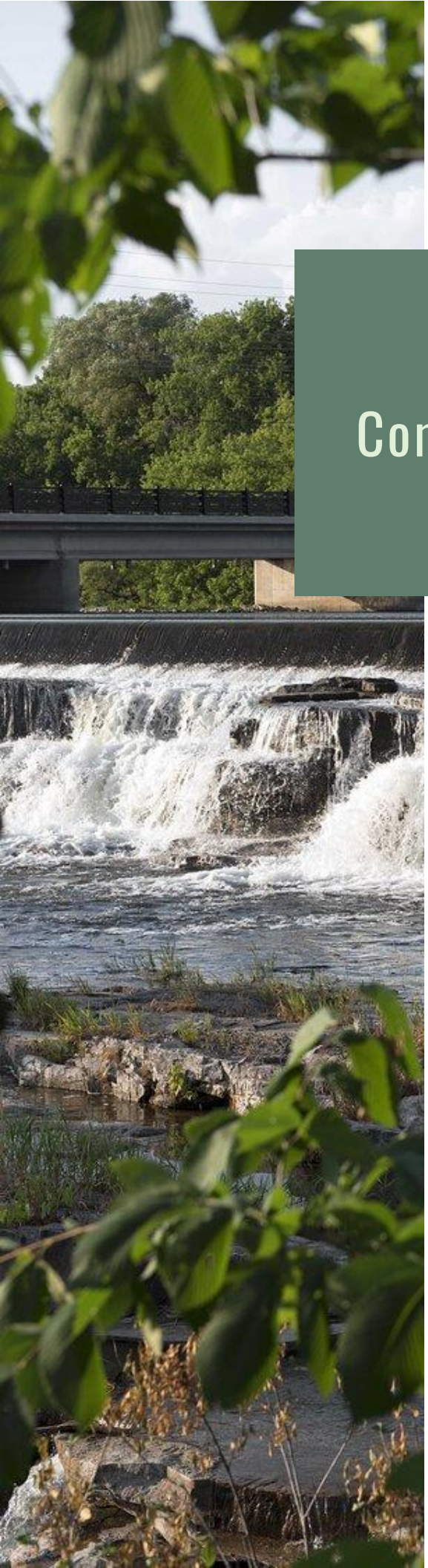
Appendix B
Greenhouse Gas Emissions Inventory – Community Emissions



Mississippi Mills Community GHG Inventory Report – 2023

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Nathan C. Manion

Prepared For:

Mississippi Mills

Zack Moshonas, Environmental Compliance Coordinator

January 10, 2025

Mississippi Mills

Executive Summary

This report presents a greenhouse gas (GHG) emissions inventory for the Municipality of Mississippi Mills for the year 2023, covering community sectors such as residential, industrial, commercial, and institutional (ICI) energy consumption, transportation, wastewater, solid waste, and agricultural activities. Emissions are reported in terms of total energy consumption (GJ) and total GHG emissions (t CO_2e).

The 2023 analysis uses updated emission factors (EFs) for Ontario's electricity grid, applying data from federal sources and independent projections such as The Atmospheric Fund (TAF) and Environment and Climate Change Canada (ECCC). This approach incorporates the carbon intensity linked to natural gas generation and considers variations in electricity demand (TAF, 2024; Environment and Climate Change Canada, 2024).

This inventory will support ongoing climate action planning in Mississippi Mills by illustrating key sources of emissions and energy use across community sectors. The findings may inform local initiatives and strategies aimed at reducing overall GHG emissions and enhancing sustainability

Summary of Results

1. In 2023, the Municipality of Mississippi Mills' overall annual net GHG emissions totaled 40,570 tonnes CO_2e.

2. The largest source of emissions originates from the transportation sector, which accounts for 69.1% of the total community emissions.

3. Among energy sources, gasoline is the largest contributor, responsible for 52.5% of total emissions, followed by natural gas at 33.7%.

4. The emissions profile reflects Mississippi Mills' predominantly rural and residential character. Agricultural activities also contribute notably, adding 16,524 t CO2e emissions from livestock emissions, but forests are estimated to sequester more than 29,000 tonnes annually.

Table 1. Summary of total energy consumption (GJ) and GHG emissions (tonnes CO_2e) for 2023 across all sectors.

Sector	Energy Consumption (GJ)	% of total GJ	GHG Emissions (t CO_2e)	% of total t CO_2e
Residential	417,055	42.7%	16,183	39.9%
ICI	160,285	16.4%	7,172	17.7%
Transportation	398,425	40.8%	28,035	69.1%
Solid Waste	0	0.0%	882	2.2%
Wastewater	0	0.0%	990	2.4%
Agriculture & Forests	0	0.0%	-12,692	-31.3%
TOTAL	975,765		40,570	

Table 2. Summary of total energy consumption (GJ) and GHG emissions (tonnes CO_2e) for 2023 for all energy sources.

Source	Energy Consumption (GJ)	% of total GJ	GHG Emissions (tonnes CO_2e)	% of total t CO_2e
Electricity	201,667	20.7%	3,361	6.5%
Natural Gas	334,362	34.3%	17,322	33.7%
Gasoline	383,340	39.3%	26,967	52.5%
Diesel	15,085	1.5%	1,068	2.1%
Heating Oil	11,911	1.2%	894	1.7%
Propane	29,400	3.0%	1,778	3.5%
TOTAL	975,765		51,390	

2. Community GHG Inventory Results Overview

In 2023, community-wide GHG emissions for the Municipality of Mississippi Mills totaled 40,570 tonnes CO_2e (Table 1). Transportation accounted for the largest share of emissions at 69.1%, followed by the residential sector at 39.9%. ICI energy use contributed 17.7%, while smaller contributions came from solid waste and wastewater treatment. Agricultural and forestry activities had a net-negative impact on emissions, sequestering 12,692 tonnes CO_2e, equivalent to 31.3% of total emissions.

a) Residential and ICI Sectors

The residential sector consumed 417,055 GJ, resulting in 16,183 tonnes CO_2e, which represents 39.9% of the community's emissions. Emissions were primarily driven by the use of natural gas and electricity. The ICI (Industrial, Commercial, and Institutional) sector contributed 7,172 tonnes CO_2e from 160,285 GJ of energy use, accounting for 17.7% of total emissions. Both sectors offer opportunities for emission reductions through energy efficiency retrofits, renewable energy integration, and improved building standards.

b) Transportation Emissions

Transportation was the largest contributor to GHG emissions, producing 28,035 tonnes CO_2e, or 69.1% of the total. Gasoline consumption accounted for the majority, at 26,967 tonnes CO_2e (52.5% of total emissions), while diesel added 1,068 tonnes CO_2e. The prominence of transportation emissions reflects the rural nature of Mississippi Mills, where reliance on private vehicles is a necessity. Future strategies could focus on increasing the adoption of electric vehicles, improving public and active transportation infrastructure, and enhancing fuel efficiency for existing fleets.

c) Solid Waste and Wastewater

Solid waste generated 882 tonnes CO_2e, and wastewater treatment contributed 990 tonnes CO_2e, together representing a small portion of total emissions (2.2% and 2.4%, respectively). These emissions highlight the potential for programs aimed at waste diversion, composting, and energy-efficient wastewater treatment to make small but meaningful contributions to reducing the community's overall emissions.

d) Agricultural and Forestry Contributions

Agricultural and forestry activities had a net-negative impact on emissions in 2023, sequestering 12,692 tonnes CO_2e. This is reflective of Mississippi Mills' rural landscape and significant green spaces. Supporting sustainable farming practices and enhancing forest management can further leverage the land's potential as a carbon sink.

e) Electricity Emission Factors
Electricity consumption accounted for 201,667 GJ of energy use and 3,361 tonnes CO_2e in emissions. Ontario's electricity grid, with an emission factor of 60 g CO_2e/kWh, played a critical role in maintaining relatively low emissions compared to fossil fuel-based energy sources. However, the increased reliance on natural gas in the grid poses challenges to achieving consistent emission reductions from electricity use. Local renewable energy projects could mitigate the impact of grid fluctuations and enhance the community's energy resilience.

3. Takeaways & Summary

The 2023 community GHG inventory for Mississippi Mills provides an overview of emissions across multiple sectors. Below are key takeaways that highlight opportunities for action and areas of focus:

i. Transportation as the Largest Emissions Source
Transportation accounted for 69.1% of total GHG emissions, driven by the rural community's reliance on private vehicles. Gasoline use alone contributed over half of total emissions. Future actions should focus on expanding access to electric vehicles, carpooling programs, and active transportation infrastructure to address this substantial source.

ii. Opportunities in Residential and ICI Sectors

The residential sector contributed 39.9% of total emissions, with natural gas and electricity as the primary drivers. The ICI sector, responsible for 17.7%, also relied heavily on fossil fuels. Expanding energy efficiency retrofits, renewable energy projects, and promoting energy-efficient building codes can help lower emissions in these sectors while reducing energy costs for residents and businesses.

iii. Agricultural and Forestry as Net Sinks

Agricultural and forestry activities reduced overall emissions by 12,692 tonnes CO_2e in 2023, highlighting their potential as natural carbon sinks. Continued investment in sustainable land management and farming practices can enhance this sector's ability to offset emissions while supporting the local agricultural economy.

iv. Managing Electricity Grid Variability

Electricity emissions, while modest at 6.5% of total emissions, are influenced by Ontario's grid. Fluctuations in grid carbon intensity due to natural gas reliance underscore the importance of integrating local renewable energy sources. Solar installations, microgrids, or other clean energy projects can reduce dependence on the provincial grid and stabilize local emissions in the future.

Summary

The 2023 GHG inventory demonstrates that transportation and residential energy use remain the largest sources of emissions in Mississippi Mills. By addressing transportation and building-related emissions, while leveraging the community's natural carbon sinks and supporting local renewable energy, Mississippi Mills can take meaningful steps toward reducing its overall GHG footprint. Strategic planning and community-driven programs will be essential to achieving sustained progress in future inventories.

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