



CITY COUNCIL WORK SESSION
Wednesday, May 17, 2023 at 6:00 p.m.

CITY HALL
6200 MARTWAY

Meeting In Person and Virtually via Zoom

This meeting will be held in person at the time and date shown above. The meeting will also be available virtually via Zoom. Information will be posted, prior to the meeting, on how to join at www.missionks.org/calendar.

If you require any accommodations (i.e. qualified interpreter, large print, reader, hearing assistance) in order to attend this meeting, please notify the Administrative Office at 913-676-8350 no later than 24 hours prior to the beginning of the meeting.

AGENDA

1. Greenhouse Gas Inventory Update Preview – Lotus Engineering and Sustainability and Emily Randel ([page 2](#))

Representatives from Lotus Engineering and Sustainability will present the findings of greenhouse gas inventories for the Mission community and for local government operations. The inventories use data from 2022 and update the City's last inventory which was published in 2008. The contract with Lotus goes through the end of May. Additional deliverables available later this month will include a full report and interactive story map. The results will inform future recommendations for climate action to further reduce emissions.

City of Mission	Item Number:	1.
INFORMATIONAL ITEM	Date:	May 17, 2023
ADMINISTRATION	From:	Emily Randel

Informational items are intended to provide updates on items where limited or no discussion is anticipated by the Committee.

RE: Greenhouse Gas Inventory Update Preview

DETAILS: Representatives from Lotus Engineering and Sustainability will present the findings of greenhouse gas inventories for the Mission community and for local government operations. The inventories use data from 2022 and update the City’s last inventories which were published in 2008. A full report and interactive story map will be available and promoted to the public in June, supplementing this worksession presentation and a community open house scheduled for May 18.

Following this work session and the release of the full report, staff will reconvene the Climate Action Plan Task Force in June to work with ICLEI – Local Governments for Sustainability to examine the inventory data and adapt it to different scenarios for emissions reduction. The results of that work will be shared again with the Governing Body to strategize about longer term goals in addition to the initial recommendations made in 2022.

A key component to the Lotus proposal was their methods of facilitating future updates to the inventories. Staff will have access to worksheets and all the assumptions included in the inventories. This enables staff to make updates in future years with much less effort than in the past so that the data can stay relevant as inputs change over time.

CFAA CONSIDERATIONS/IMPACTS: Climate change affects vulnerable populations first and most acutely. Actions taken to reduce emissions often improve resident’s quality of life and cost of living through weatherization and reducing utility costs, adding mobility options to reduce transportation costs, improving air quality, reducing the heat island effect in the community and more.

Related Statute/City Ordinance:	NA
Line Item Code/Description:	N/A
Available Budget:	N/A

 **MEMO**

TO: City of Mission, Kansas City Council

FROM: Lotus Engineering & Sustainability, LLC

DATE: May 8th, 2023

SUBJECT: Community and LGO Greenhouse Gas Emissions Inventory Summary

Project Overview

The Lotus team, with data and support from Emily Randel and city staff, completed a 2022 greenhouse gas (GHG) emissions inventory for both the Mission, KS community (Community) and the local government operations (LGO). In addition, the Lotus team reviewed prior inventories conducted in 2008 with data from the years 2005, 2006, and 2007. The inventory was conducted to update and understand GHG emissions, track progress towards goals, and provide a baseline for modeling emission-reducing strategies.

Climate Change and Projected Impacts

Kansas is in a unique location; it sits in a transition zone between semi-arid western states and humid eastern states. This creates unpredictable weather that will become more variable as the climate changes. Temperatures in Kansas are expected to increase, with four times as many days over 100°F probable by 2050. Rainstorms will happen less often, but when it does rain, it will fall in extreme amounts. This means that drought is probable, as is flooding due to severe storms intensifying. Tornadoes may increase in intensity as well; scientists are seeing more days with more than one tornado and a longer tornado season. Greenhouse gases, building up in the atmosphere due to global emissions from human activities, are causing this climate warming. Tracking emissions is vital so that communities like Mission can reduce their contribution to global emissions and mitigate the effects of climate change.

GHG Inventories: The Why & The How

GHG inventories are an essential exercise of a local government's process to reduce

climate-altering GHG emissions as well as provide a baseline for and monitoring of community emissions on a regular basis. Cities account for only 3 percent of the global land area yet are responsible for more than 70% of global emissions. Additionally, more than 50% of the global population resides in cities. Cities have control or influence over many of the highest emissions-generating activities like home and building energy use, transportation planning, and waste. Conducting regular GHG inventories allows cities to understand where they are, where they need to be in the context of global emissions targets, and how to measure the impacts of GHG reduction strategies.

While LGO emissions are typically only a fraction of the larger community emissions, it is also important for the Local Government to have its own inventory. In order to lead by example, LGO inventories allow for the same understanding of emissions but are specific to LGO actions.

Modern community-wide GHG inventories have been conducted for more than 20 years by cities across the globe. However, it was not until 2012 and 2014 that protocols, or “rulebooks” for how to complete community-wide GHG emission inventories were published for US and global communities, respectively. Data availability and accuracy have also improved in the last decade, with actual measurements of activity replacing assumptions, e.g., metered electricity data as opposed to average electricity use per unit. These protocols allow for the comparison of inventories across both spatial and temporal scales. Mission’s community-wide inventory was calculated using the global protocol for community-scale greenhouse gas emissions inventories, or the [GPC Protocol](#). The local government operations inventory followed the [Local Government Operations Protocol](#).

Key Takeaways – 2022 Community-wide Inventory

In 2022, Mission’s community-wide GHG emissions totaled 173,390 metric tons of carbon dioxide equivalent (mt CO₂e). The largest sectors of emissions in Mission are energy use in commercial and industrial buildings, transportation, and residential buildings (Figure 1). Since the 2007 inventory, emissions have decreased by 58%. In order for Mission to achieve the goal of net zero emissions by 2050, community-wide emissions will need to decrease by nearly 4% annually, or just shy of 6,200 mt CO₂e per year.

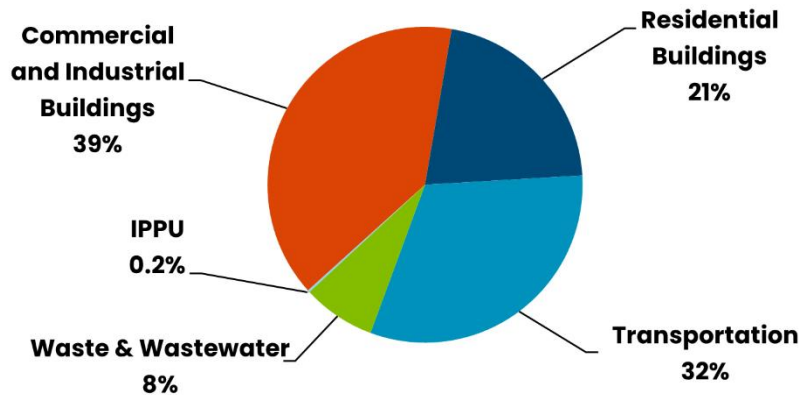


Figure 1. Mission community-wide GHG emissions by sector.

STATIONARY ENERGY

Stationary energy, or building energy use, comprises a total of 59% of emissions. Fifteen percent of total emissions are from the combustion of natural gas and 44% are from grid-supplied electricity use. The remaining stationary energy emissions are from propane and diesel used in backup generators; these make up less than 0.1% of all emissions (Figure 2). Energy sources like electricity and heating fuels require distribution throughout the community. These systems contribute to emissions in the form of fugitive emissions of methane from the natural gas distribution system and transmission & distribution losses from the electrical grid. In order for Mission to achieve the goal of net zero emissions from homes and buildings in the community by 2035, emissions will need to decrease about 8% annually, or 8,100 mt CO₂e emissions per year.

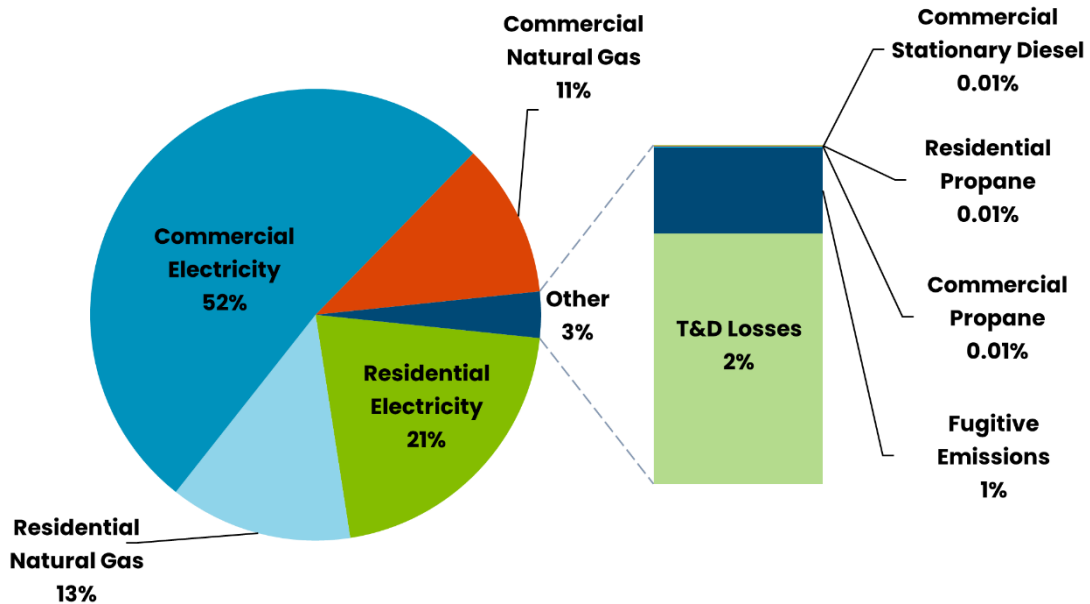


Figure 2. Stationary energy GHG emissions.

Opportunities to Reduce Emissions:

With recent federal legislation, the electrical power generating sector is projected to decrease grid carbon emissions 68%–78% below 2005 levels by 2030.¹ Evergy’s electric emissions factor has also decreased by 43% since 2007 and Evergy has a goal of achieving net zero carbon emissions by 2045.² The decarbonization of the electrical grid presents multiple opportunities for low to no carbon electrification of heating homes and businesses. Heat pump technology allows for efficient heating and cooling, while receiving power from the electrical grid, getting cleaner each year of operation.

TRANSPORTATION ENERGY

On-road transportation energy is the second largest sector of emissions within the community. Accounting for 31% of total emissions, transportation emissions are largely from internal combustion engines, with a very small percentage from electric vehicles. Emissions from transit vehicles account for less than 0.1% of transportation emissions (Figure 3).

¹ <https://www.energy.gov/eere/articles/nrel-study-identifies-opportunities-and-challenges-achieving-us-transformational-goal>

² See: <https://investors.evergy.com/TCFD>.

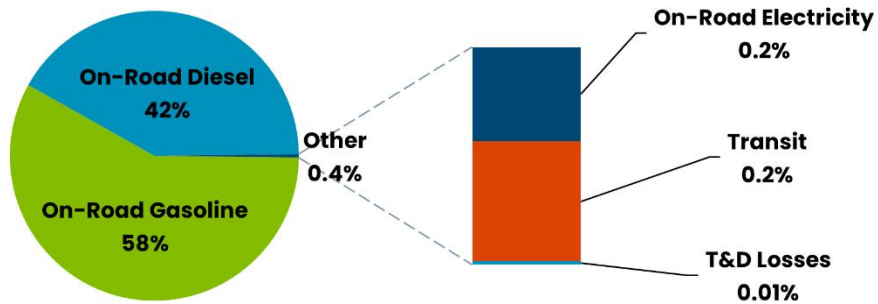


Figure 3. Transportation sector GHG emissions.

Opportunities to Reduce Emissions:

One option is to encourage alternative forms of transportation within the community; this can lessen the number of vehicle miles traveled. Additionally, expanding infrastructure and/or incentivize electric vehicles (EVs) and EV charging within the community can help to both reduce emissions and improve air quality locally.

WASTE & WASTEWATER

Emissions related to waste and wastewater account for 7% and 1% of total emissions, respectively. Waste that is generated from the community is disposed of outside of the community and through the decomposition of organic waste contributes to methane and CO₂ emissions.

Opportunities to Reduce Emissions:

Increase the diversion of recyclable waste and organic waste to reduce the quantity of waste sent to the landfill.

Key Takeaways – 2022 LGO Inventory

In 2022, Mission’s local government operations created 18,819 mt CO₂e emissions. The majority of these emissions are created by consumption-based sources and building energy use. (Figure 4). Emissions from local government operations in Mission have decreased 42% since the 2007 inventory. In order for Mission to achieve its goal of net zero emissions from local government operations by 2025, emissions will need to decrease 33% annually. This is equivalent to 1,225 mt CO₂e per year without consumption-based sources and 6,273 mt CO₂e per year with consumption-based sources.

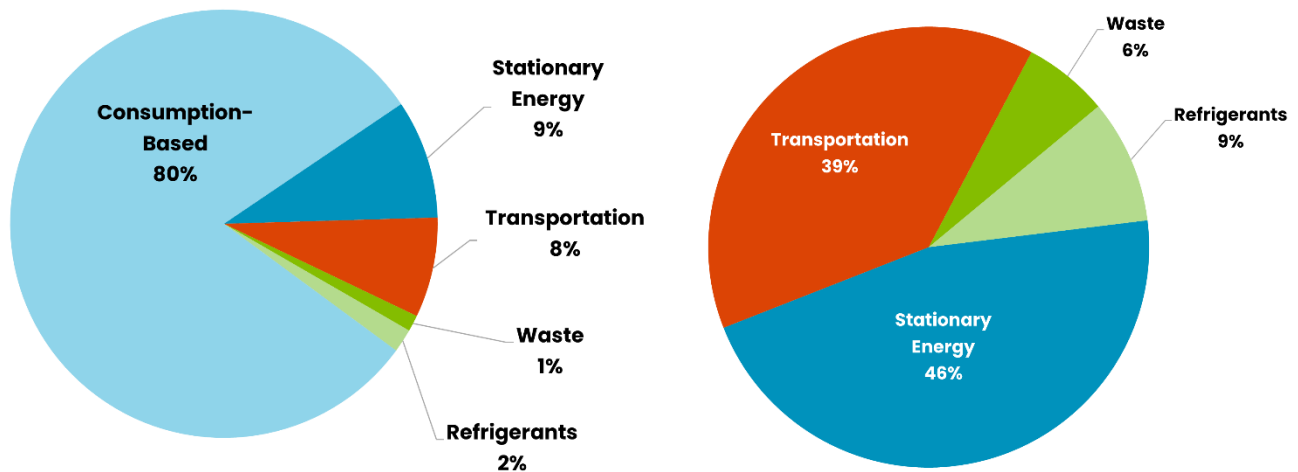


Figure 4. Local government operations GHG emissions by sector with (left) and without (right) consumption-based emissions sources.

CONSUMPTION-BASED EMISSIONS

Local governments have traditional direct emissions from buildings and vehicles, but also can cause indirect emissions. Emissions are also produced through the procurement and consumption of office goods such as paper and computers, and from building materials like cement and asphalt. Goods and services are often aggregated under “consumption-based emissions” (CBE) and can be useful in understanding the upstream and downstream emissions of the Local Government’s activities. These emissions can be included in the total GHG inventory and/or considered separately. When including CBE in Mission’s full inventory, CBE account for 80% of total emissions, with the largest contributor being the purchase of cement (78% of total emissions).

Opportunities to Reduce Emissions:

The production of cement causes GHG emissions both from the combustion of fuels as well as the decomposition of limestone. Blended cement and substitutes for limestone-based substances like fly ash can decrease the number of carbon emissions per ton of

cement purchased. Additionally, some applications of cement in horizontal projects can be replaced with aggregate or porous pavers that have additional stormwater benefits. Other new technologies for green cement continue to show promise in some applications but are still a way off from large-scale applications. Additionally, local governments can pursue green procurement practices to ensure sustainable products are prioritized.

STATIONARY ENERGY

Stationary energy use, or building energy use, accounts for 9% of total emissions when CBE are included, but 45% of emissions when CBE are not included. Electricity accounts for 33% of non-CBE emissions, natural gas accounts for 12%, and stationary diesel from backup generators accounts for less than 1%.

Opportunities to Reduce Emissions:

Like the community-wide opportunities above, the decarbonization of the electrical grid presents multiple opportunities for low to no carbon electrification of heating government buildings. Heat pump technology allows for efficient heating and cooling while receiving power from the electrical grid, which gets cleaner each year of operation. Energy efficiency opportunities can conserve energy as well as decrease expenses. Mission's retrofitting of streetlights and traffic signals is a perfect example of how efficiency can lower emissions and financial costs.

TRANSPORTATION ENERGY

Mission's transportation-related emissions are a combination of fleet vehicles owned or operated by Mission, employee commuting, and business travel. Collectively, these transportation-based activities account for 39% of emissions not including CBE. Employee commuting accounts for 32%, the vehicle fleet accounts for 7%, and business travel accounts for less than 1%.

Opportunities to Reduce Emissions:

Incentivizing alternative commuting options for employees, including telecommuting and public transit, helps limit the amount of vehicle miles traveled. Expanding infrastructure to support electric vehicles helps to limit the amount of carbon emitted per vehicle mile traveled; it also contributes to better air quality. In some cases, local governments have supported these opportunities with other options such as reimbursing emergency rides home or allowing goods and services to be delivered to employee workplaces.

WASTE

The solid waste generated from within Mission's buildings accounts for 6% of total emissions when not considering CBE. As public buildings, not all the waste is necessarily generated by Mission employees but is still considered part of the LGO inventory.

Opportunities to Reduce Emissions:

Increase the diversion of recyclable waste and organic waste. As noted above, public buildings also present an opportunity to educate the public about waste diversion options in public spaces and at home.

INDUSTRIAL PROCESSES & PRODUCT USE

Refrigerants used in commercial building cooling equipment can leak when serviced or through normal use of the equipment. Refrigerants from within Mission's government-owned/operated buildings account for 9% of emissions not considering CBE.

Opportunities to Reduce Emissions:

Mission can continue to look at phasing out refrigerants with high global warming potentials. More efficient technology, and in some cases technology shifts like heat pump systems, can also offer improved cooling with less energy.



2022 Greenhouse Gas Emissions

City of Mission, Kansas

**Rachel Meier | Senior Associate, Team Lead on
Public Sector GHG Inventories**

**Emily Randel | Deputy City Administrator, City of
Mission**

Presentation Overview

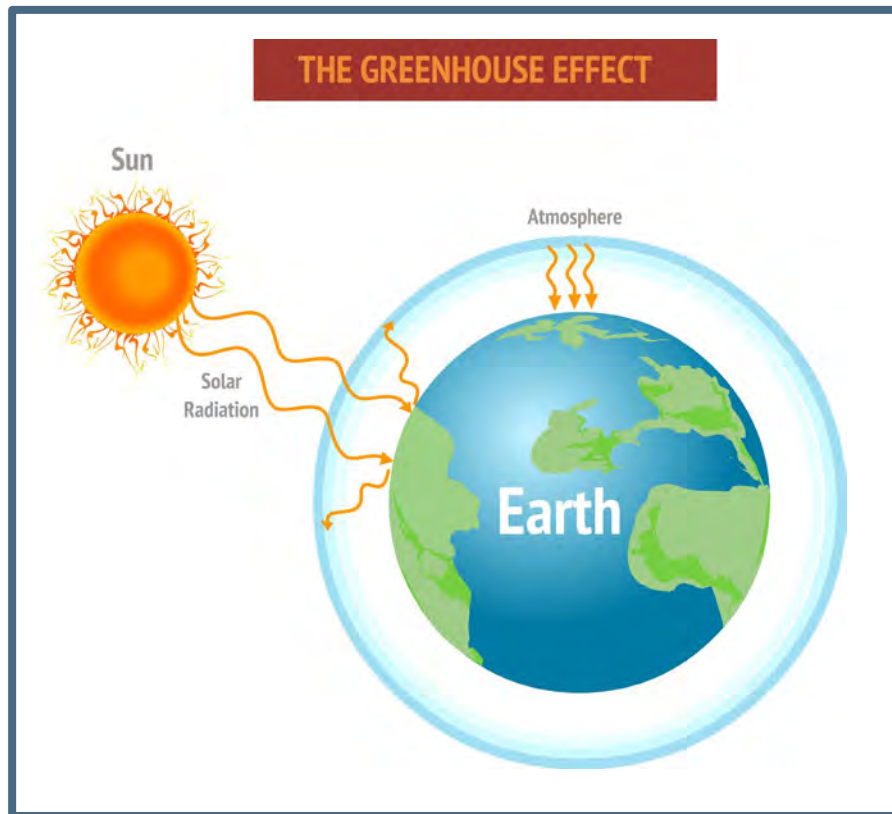
- **Introduction to Greenhouse Gas (GHG) Inventories**
 - GHGs and climate change
 - What are GHG inventories?
- **2022 Community Emissions**
 - Total 2022 emissions overview
 - Sector breakdown
 - Source breakdowns
 - Year-over-Year comparison
- **2022 Municipal Emissions**
 - Total 2022 emissions overview
 - Sector breakdown
 - Source breakdowns





Introduction to GHG Inventories

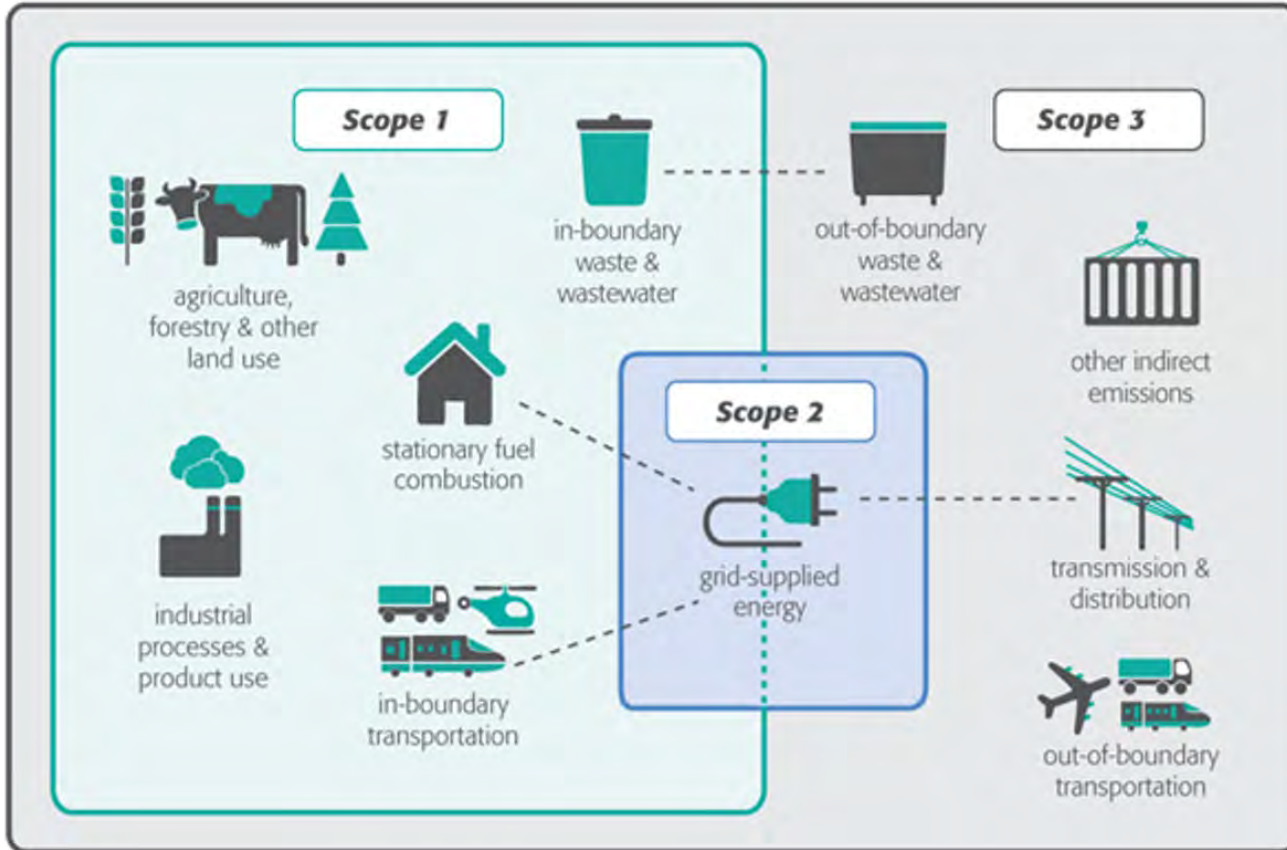
GHGs and Climate Change



- GHGs create a buffer in Earth's atmosphere.
- More GHGs in the atmosphere = more heat trapped in the atmosphere.
- This can lead to increased temperatures and drought year-round, flash floods in the rainy season, and more intense tornados.
- Decreasing emissions can help mediate these environmental changes.



What are GHG Inventories?

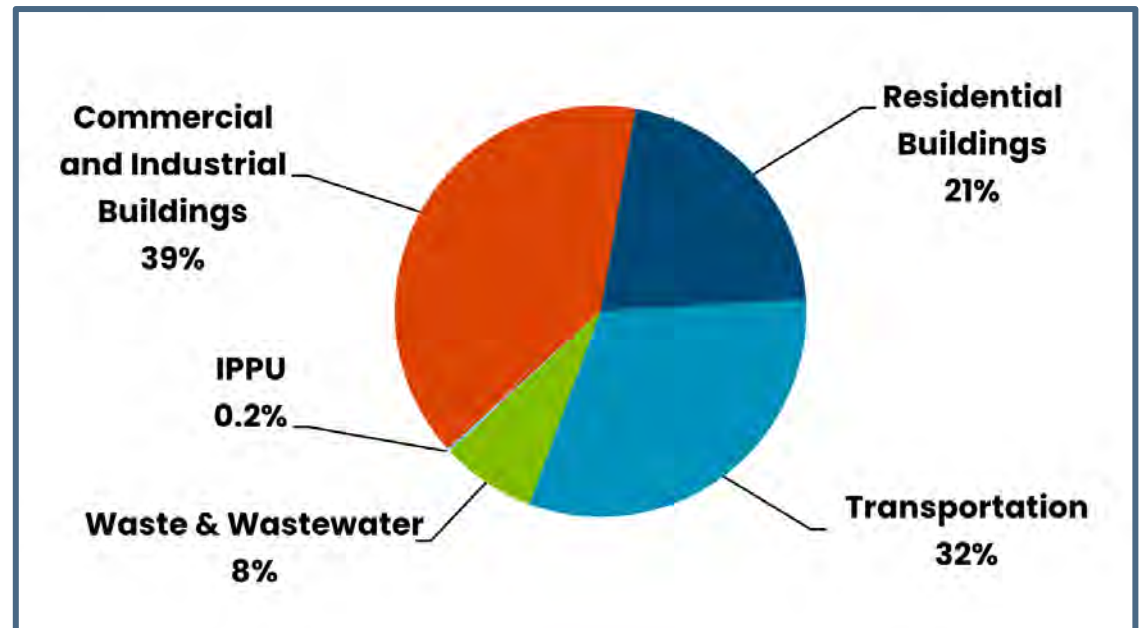




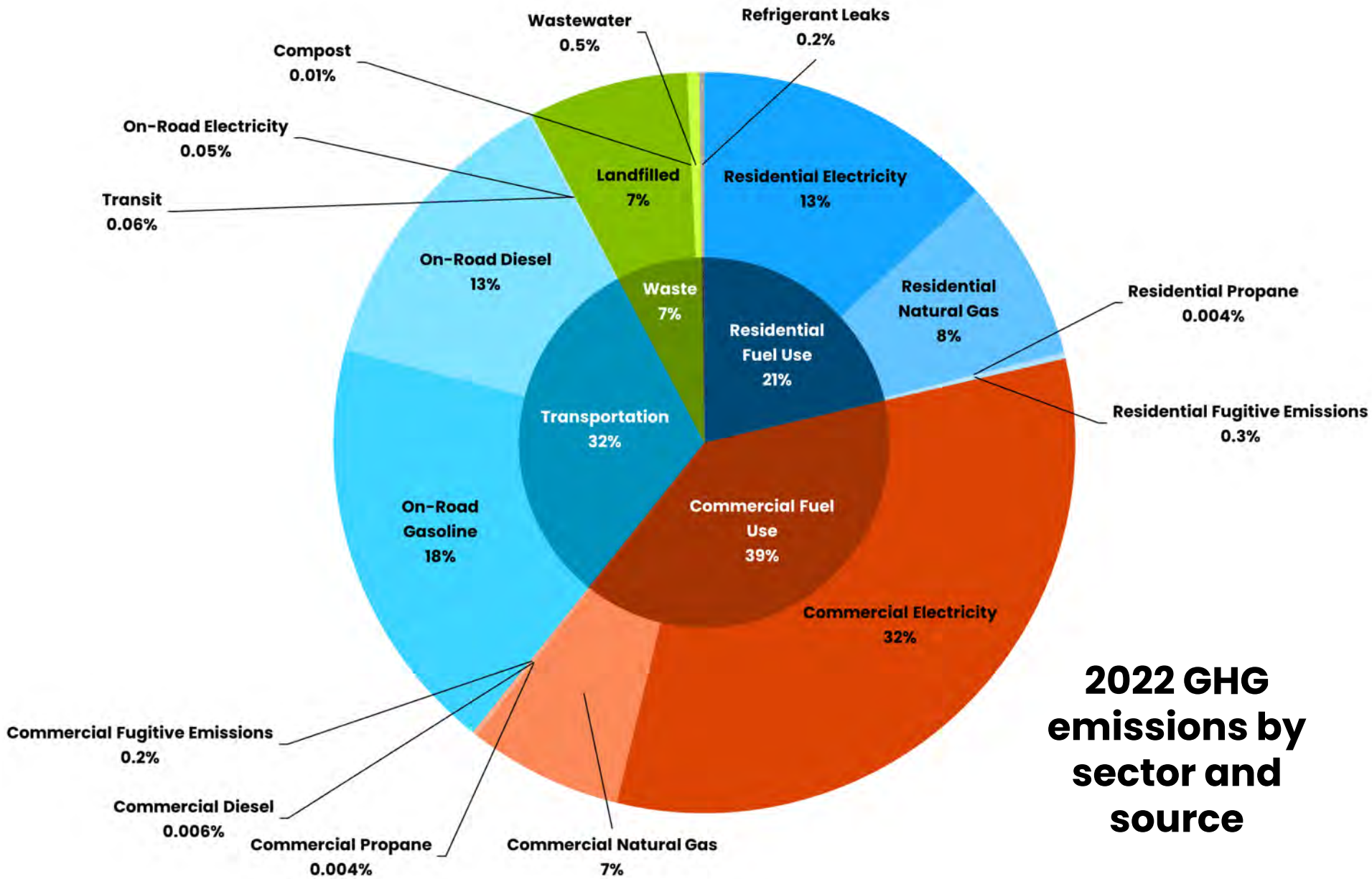
2022 Community Emissions Overview

Total 2022 Community GHG Emissions

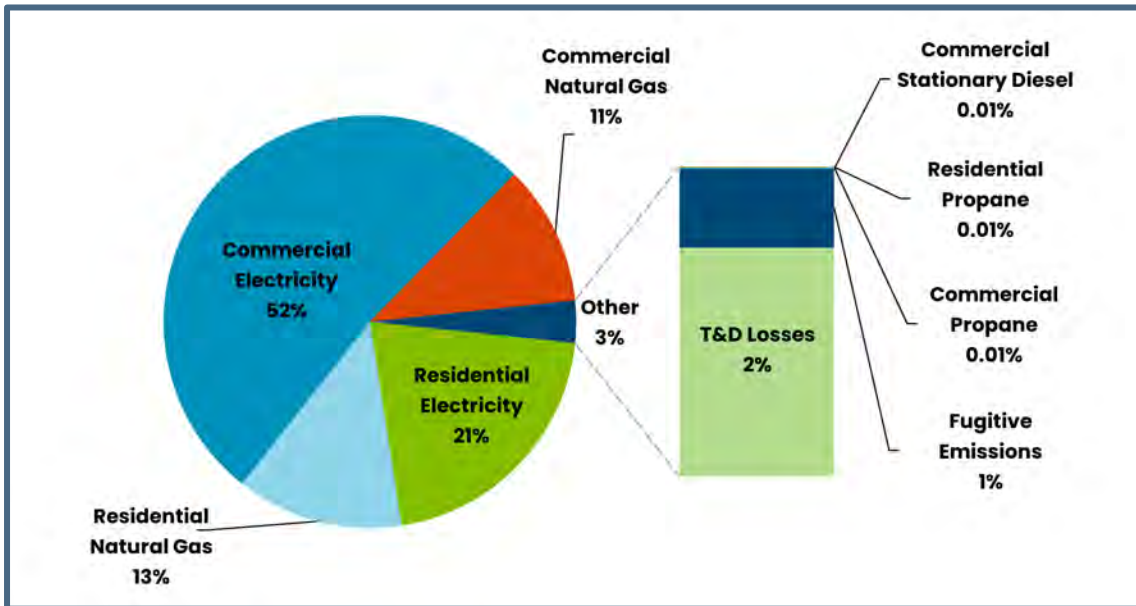
173,390
mt CO₂e



2022 GHG emissions by sector and source



Stationary Energy Sources

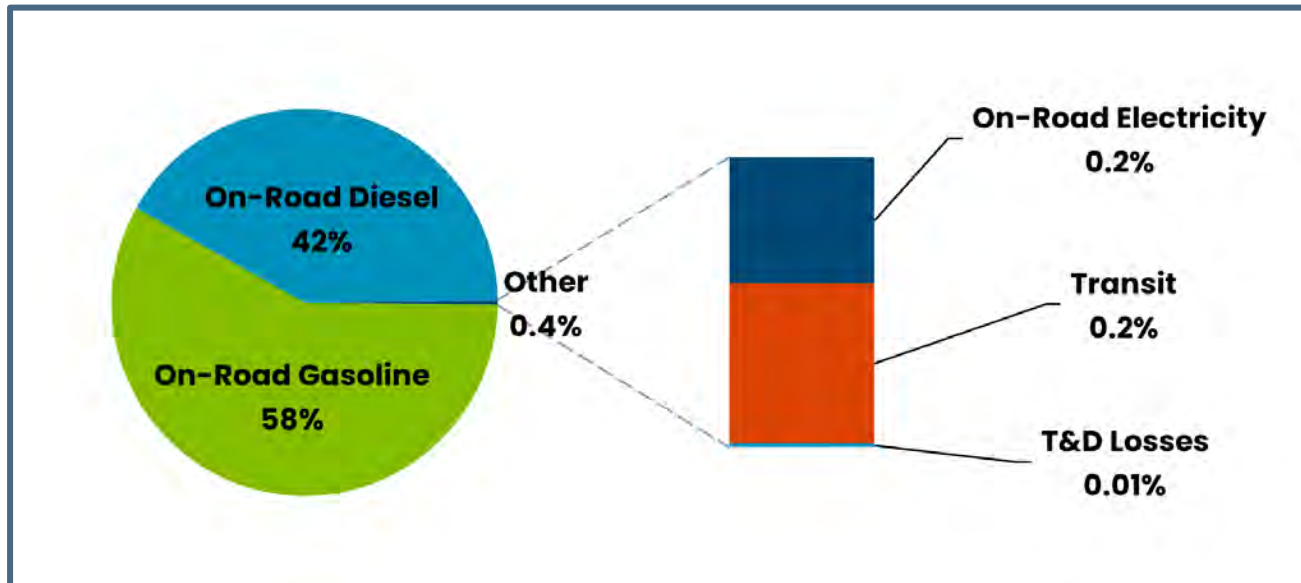


Notable Trends

- More emissions come from electricity than natural gas.
- Commercial buildings generate more emissions than residential buildings.
- Commercial energy emissions decreased 39% from 2007.
- Residential energy emissions decreased 37% from 2007.



Transportation Sources

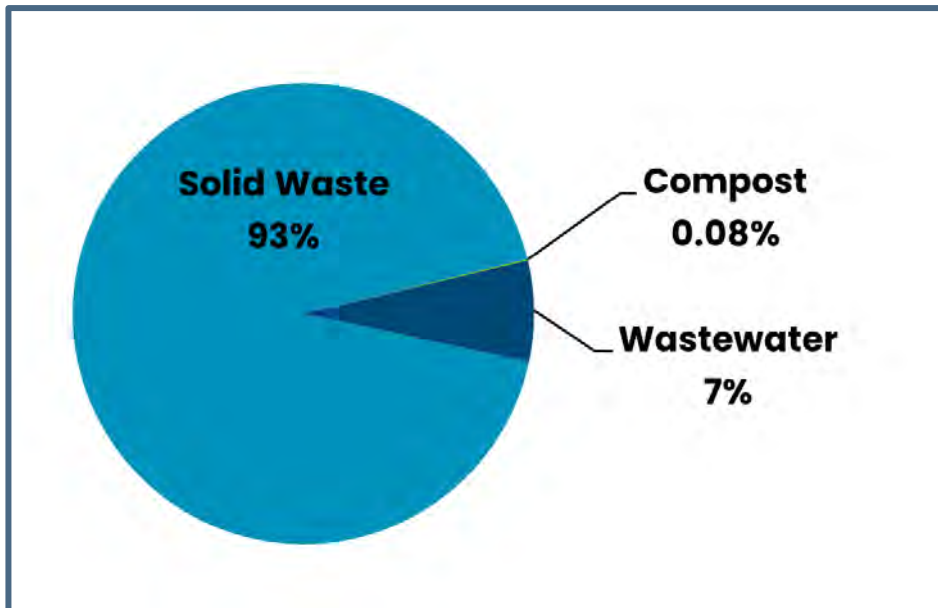


Notable Trends

- Transportation emissions decreased 77% from 2007.
- Largest source of transportation emissions is gasoline vehicles.
- Nearly all emissions are from gasoline and diesel vehicles – huge opportunity to encourage electric vehicle adoption or multi-modal transportation options.



Waste & Wastewater Sources

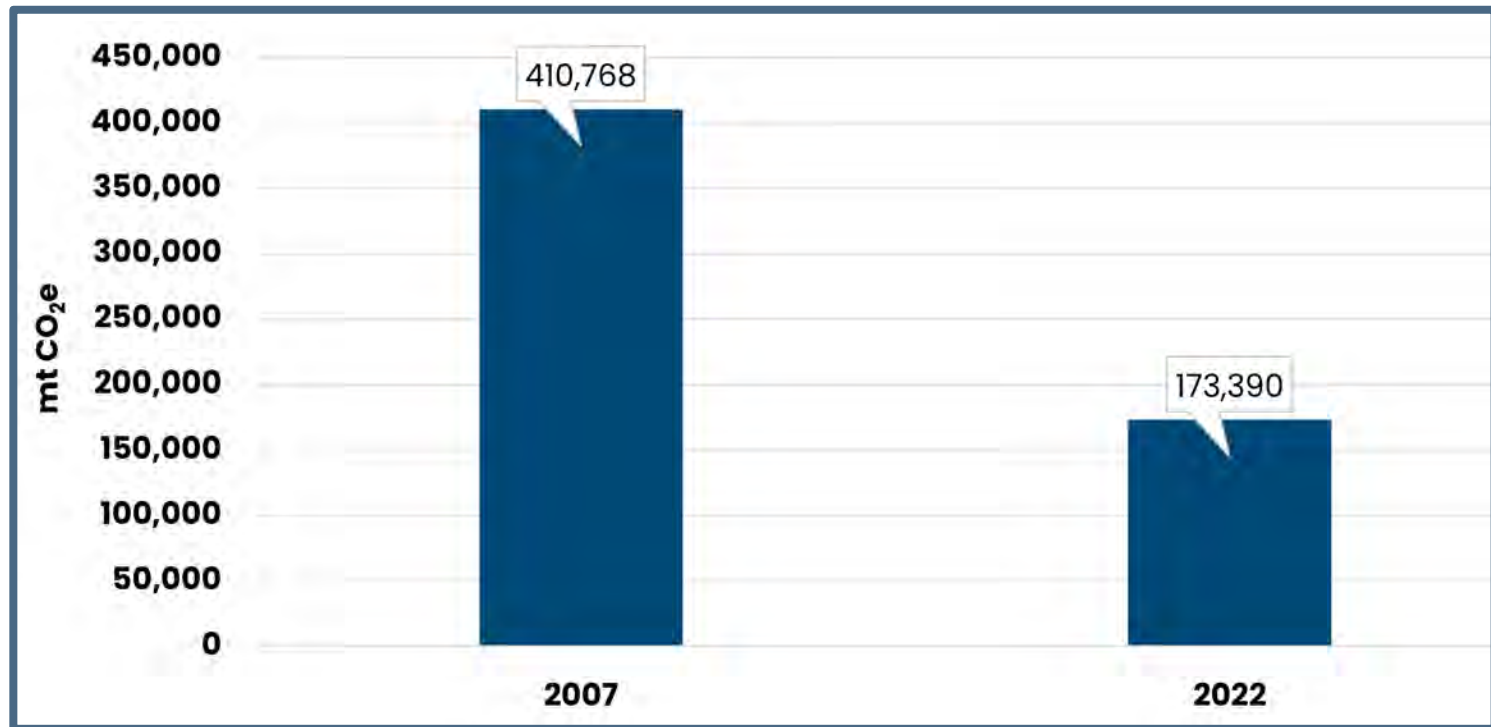


Notable Trends

- Solid/landfilled waste is the main contributor to waste emissions.
- Compost and wastewater emissions are negligible.
- Waste emissions calculations from 2007 determined to be invalid, will use 2022 as a baseline going forward.



Year-over-Year Comparison



Emissions decreased 58% between 2007 and 2022.





2022 Municipal Emissions Overview

Total 2022 Municipal GHG Emissions



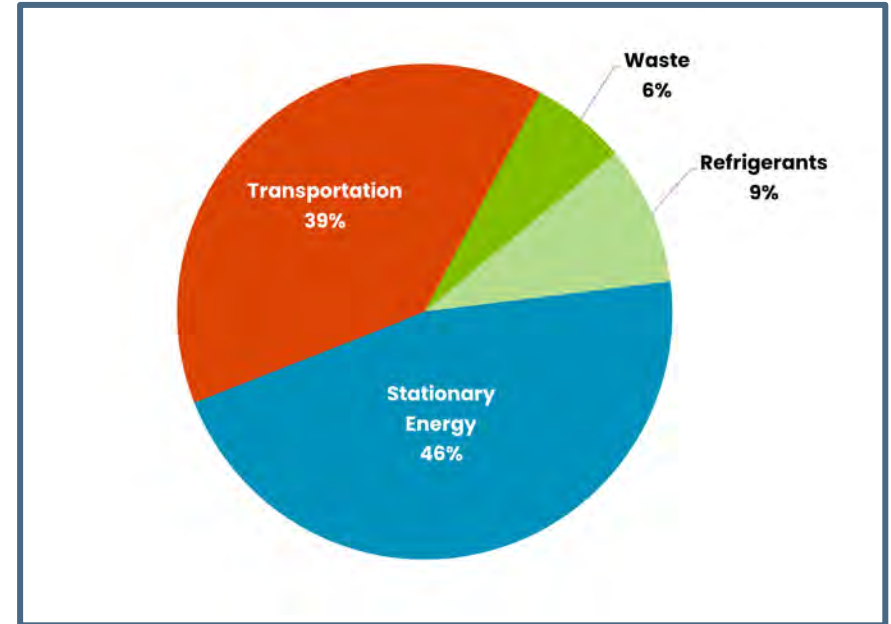
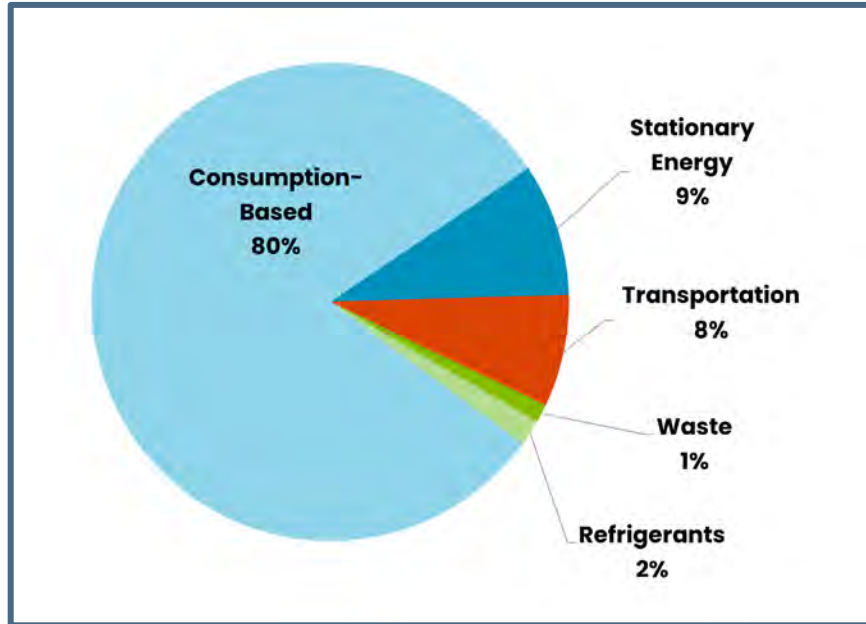
Municipal Emissions



Community Emissions



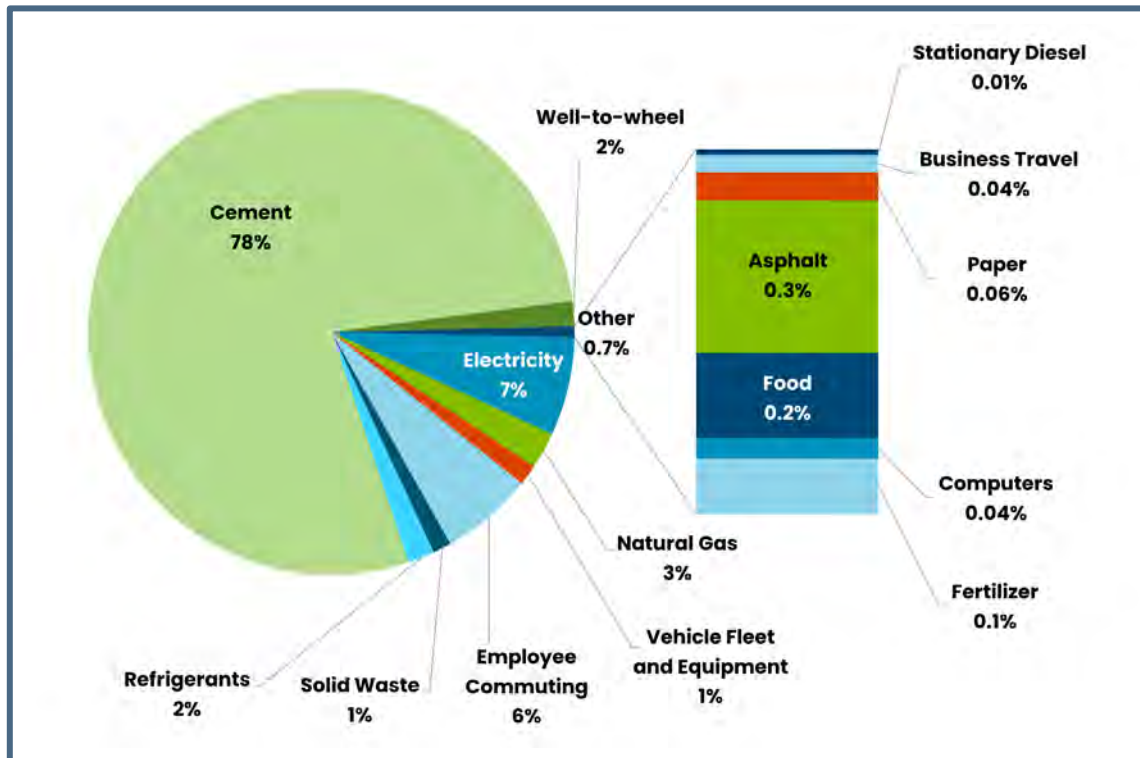
Emissions by Sector



- Consumption-based sources created the most emissions in 2022.
- With consumption-based sources excluded, stationary energy was the largest source of emissions in 2022.
- Comparable emissions have reduced 42% between 2007 and 2022.



Emissions by Source: All Sources

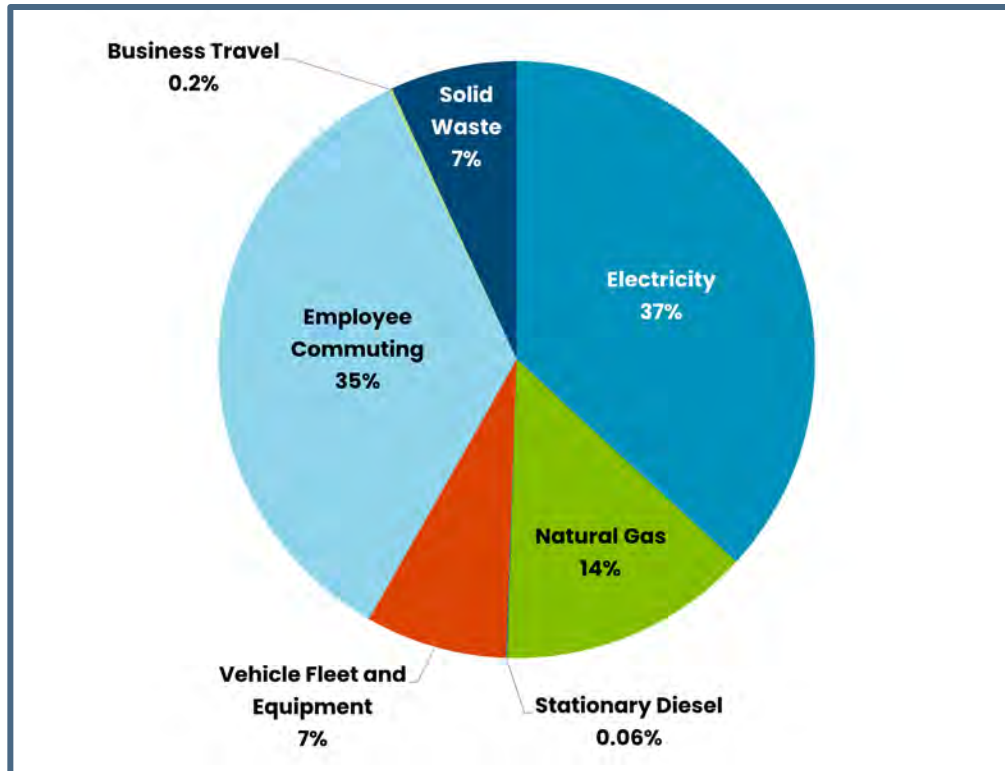


Notable Trends

- Cement creates the most municipal emissions.
- The next three-largest sources of emissions are electricity usage, employee commuting, and natural gas usage.



Emissions by Source: without Consumption-Based



Notable Trends

- Excluding consumption-based sources, electricity is the largest source of municipal emissions.
- Employee commuting creates the second-largest source of emissions, followed by natural gas usage.





Questions?

Rachel Meier

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