



Town Of Concord, MA 2022 Greenhouse Gas (GHG) Emissions Report

Methodology: Global Protocol for Cities
Tool: MAPC's Greenhouse Gas Inventory Tool, Version 4.1
Completed: June 2024
Boundary: Town of Concord, MA

This report summarizes the fourth GHG Emissions inventory for the Town of Concord following the *Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC)* completed by Courtney Eaton and Brad Hubbard-Nelson (Climate Action Committee) and Eric Simms (Sustainability Director) in June 2024 using MAPC's Greenhouse Gas Inventory Tool. GHG inventories for 2008 (baseline) and 2016 were developed by Kim Lundgren Associates (KLA) in January 2019, and the 2019 inventory by Kate Hanley in 2021. Previous inventory reports and addenda, as well as other sustainability and GHG reports, are available at concordma.gov/sustainability.

Introduction

Background

In 2024, Concord has updated its emission reduction goals to be consistent with the Commonwealth of MA goals: 85% reduction in community-wide GHG emissions by 2050, with interim goals of 50% reduction by 2030 and 75% by 2040. The baseline year is 2008. To measure progress, Concord follows the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC) to complete community-wide greenhouse gas inventories.

2022 GHG Inventory

The 2022 Concord community greenhouse gas (GHG) inventory was analyzed by Courtney Eaton from the CAC using MAPC’s tool following the Global Protocol for Community-Scale Greenhouse Gas Emissions Inventories (GPC). The GPC is adopted by communities around the world to ensure that GHG reports are relevant, complete, consistent, transparent, and accurate. The GPC provides guidance on what activities need to be included in the inventory and a framework for how to calculate the GHG emissions associated with various activities.

Table 1: Community-wide Emissions Summary by Sector & Scope (2022)				
Sector	Total Emissions (MT CO2e)	Scope 1 Emissions (MT CO2e)	Scope 2 Emissions (MT CO2e)	Scope 3 Emissions (MT CO2e)
Stationary Energy	96,593	94,313	2,168	112
Transportation	49,797	49,767	16	14
Waste	8,099	-	-	8,099
All	154,488	144,081	2,184	8,224

Methodology and Data Sources

The annual GHG inventory is based on a combination of direct data and estimates for data that cannot be obtained directly. Data sources include town records, utility reports, information from state and federal agencies.

GHG emissions are calculated by scopes. Scope 1 emissions physically occur within the geographic boundary, scope 2 emissions occur as a result of grid-supplied electricity used within the boundary, and scope 3 emissions occur outside of the geographic boundary but are driven by activities within the boundary.

What’s included?

- Energy used by buildings; fugitive emissions from natural gas distribution
- Fuel used by vehicles registered in Concord and public transportation trips within the town limits
- Emissions generated by solid waste disposal and wastewater treatment

What’s not included?

- Emissions generated outside of the town boundaries to produce goods or services
- Carbon sequestration

Community-wide Emissions by Sector (MT CO2e)

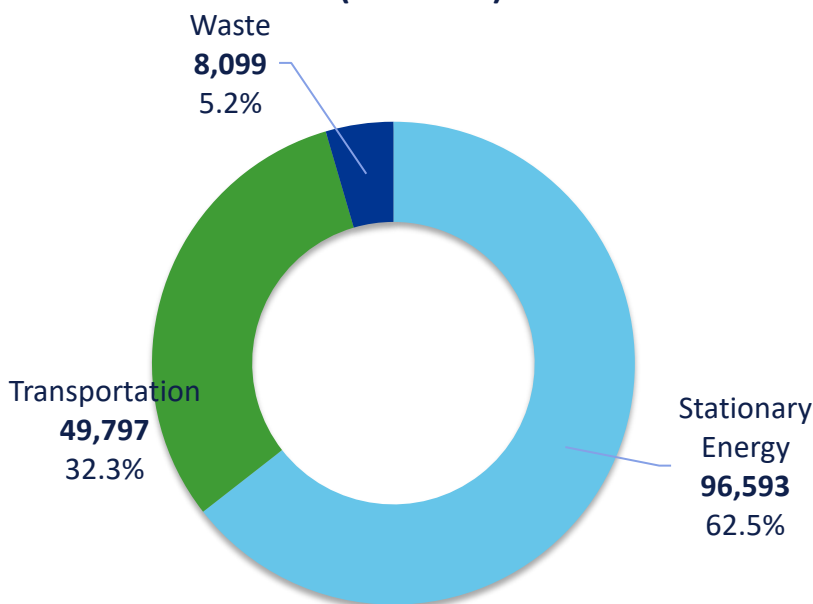


Figure 1: Community-wide Emissions (MT CO2e) by Sector

2022 Emissions

In 2022, the Concord community emitted 154,488 Metric Tons (MT) CO₂-equivalent (CO2e) of greenhouse gases (GHG). Energy used in buildings contributed 62.5% of total emissions, fuel used in transportation accounted for 32.3%. Emissions generated by solid waste disposal and wastewater treatment accounted for 5.2% of total emissions, and are entirely Scope 3. Emissions in the other sectors were nearly entirely Scope 1. With that in mind, further discussion will ignore emissions scope.

2022 Emissions compared to 2008 baseline, 2016 and 2019

Table 2: Community-wide Emissions Summary by Sector & Year: 2008 - 2022

Sector	2008 Total Emissions (MT CO2e)	2016 Total Emissions (MT CO2e)	2019 Total Emissions (MT CO2e)	2022 Total Emissions (MT CO2e)	Change from 2008 -> 2019
Stationary Energy	159,779	140,072	123,680	96,593	-40%
Transportation	80,100	63,829	59,527	49,797	-38%
Waste	7,011	8,126	8,685	8,099	+15%
All	246,890	212,027	191,892	154,488	-38%

Table 2 summarizes the emission reduction progress since 2008. For more details on how emissions have changed, see the 2022 Community GHG Emissions Progress Report (in preparation). The 2022 emission values show a reduction of 20% since the previous report from 2019, and 38% below the baseline year 2007.

2022 Emissions by Sector and Subsector

Table 3: Community-wide Emissions Summary by Sector, Subsector, & Year (2022 vs 2019)					
Sector	Subsector	2008 BL Emissions (MT CO2e)	2019 Emissions (MT CO2e)	2022 Emissions (MT CO2e)	Change 2019->2022
Stationary Energy	Residential Buildings	82,592	62,648	50,472	-20%
	Commercial & Industrial Buildings & Facilities	70,382	57,921	43,231	-25%
	Municipal Buildings	6,815	3,111	2,890	-7%
	Construction	Not included	Not included	Not included	-
Transportation	Passenger Vehicles	78,842	51,736	42,648	-18%
	Commercial Vehicles		3,609	3,427	-5%
	Municipal Vehicles	1,258	1,625	1,164	-29%
	Railways	Not included	2,557	2,557	-
Waste	Solid Waste Disposal	5,399	6,595	6,145	-7%
	Biological Treatment of Waste	N/A	N/A	N/A	-
	Incineration/Open Burning	N/A	N/A	N/A	-
	Wastewater Treatment and Discharge	1,882	2,090	1,953	-7%
All Sectors & Subsectors		246,890	191,982	154,488	

Table 3 and Figure 3 show 2022 community-wide emissions by sector, subsector. Residential buildings, commercial buildings, and on-road transportation each contribute around 30% of community-wide emissions. Municipal operations including wastewater treatment contributed 4%, and solid waste disposal also contributed 4%

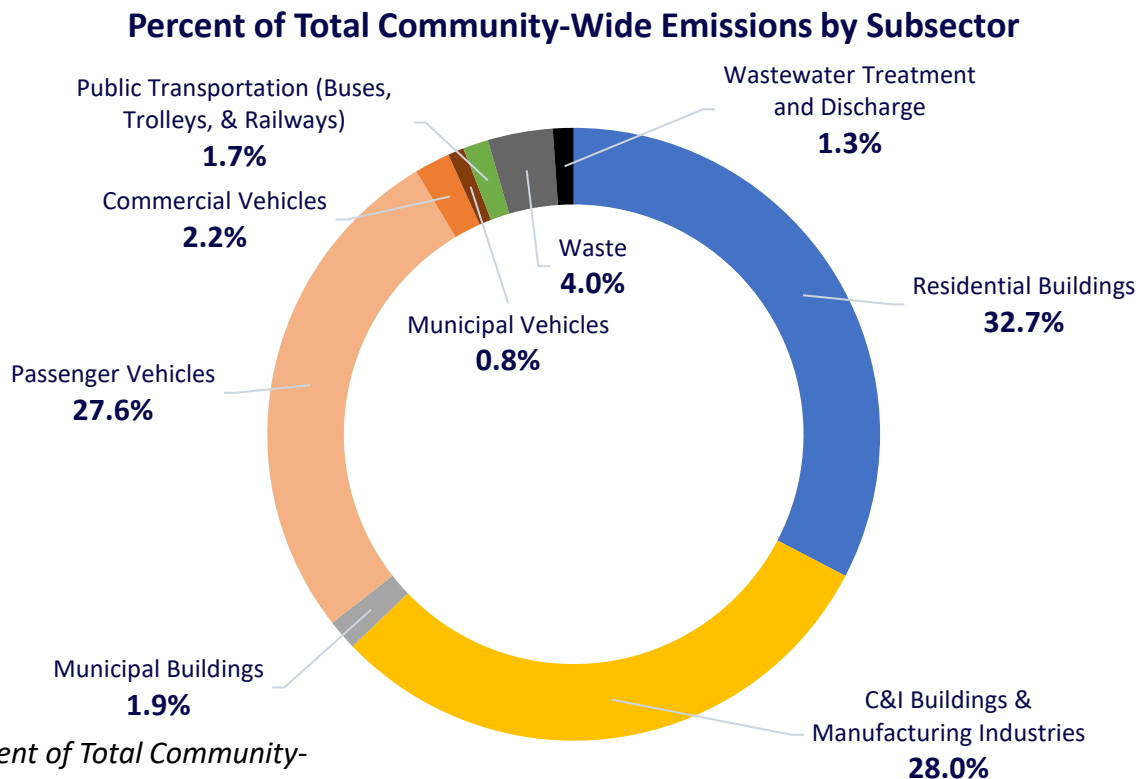


Figure 3: Percent of Total Community-Wide Emissions by Subsector

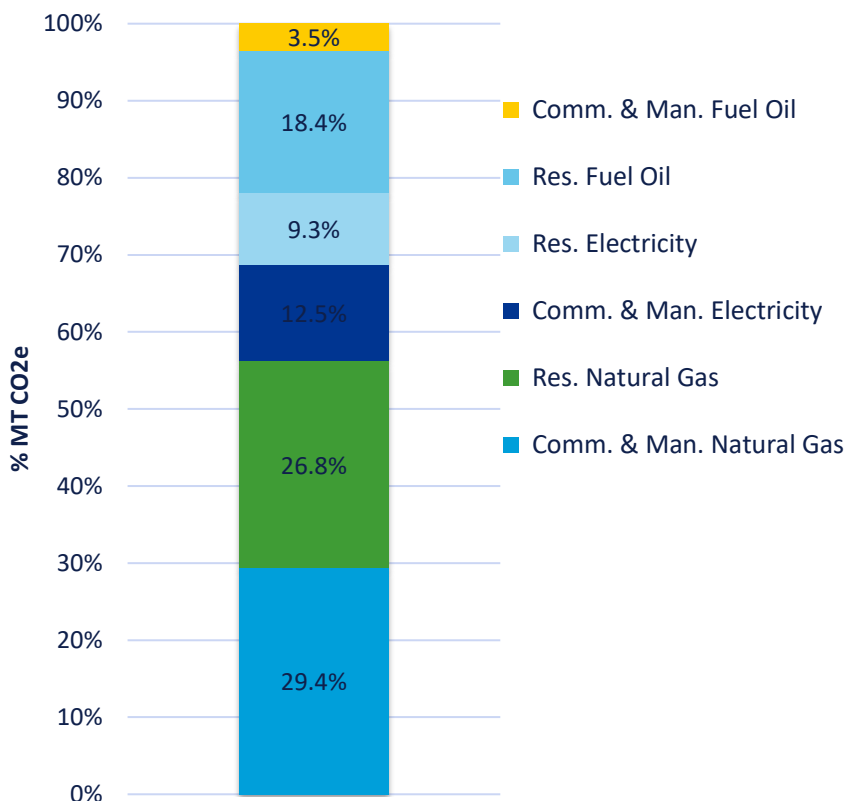
Energy and Emissions from Buildings

Table 6: Community-wide Summary of Building Energy Use and Emissions by Sector and Source (2019)

Subsector	Source	Consumption (mmBtu)	Emissions (MTCO ₂ e)	% of Total Energy Emissions
Residential Buildings	Res. Electricity	243,385	9,383	9.3%
	Res. Natural Gas	508,554	26,984	26.8%
	Res. Fuel Oil	249,101	18,484	18.4%
Commercial & Institutional Buildings and Facilities + Manufacturing Industries*	Comm. & Man. Electricity	326,956	12,605	12.5%
	Comm. & Man. Natural Gas	556,232	29,514	29.4%
	Comm. & Man. Fuel Oil	47,990	3,561	3.5%
All Buildings	Electricity	570,341	21,987	21.9%
	Natural Gas	1,064,787	56,498	56.2%
	Fuel Oil	297,091	22,045	21.9%

Energy used in buildings is the largest contributor to community-wide GHG emissions, making up over 60% of total emissions in 2019. Table 6 and Figures 3 and 4 show the energy consumed in buildings and the associated GHG emissions by sector and fuel. Natural gas is responsible for 56% of building emissions, while electricity and fuel oil each make up 22%.

Percent of Total Building Energy Emissions by Customer Type and Fuel



Percentage of Building Energy Emissions by Source Energy

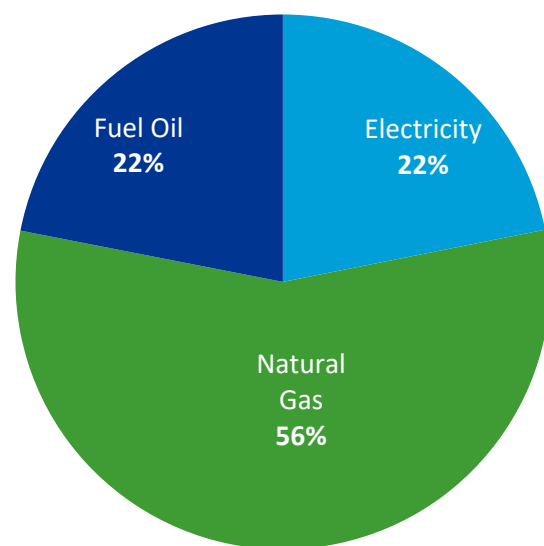


Figure 4: Percentage of Building Energy Emissions by Source Energy

Figure 3: Percent of Total Building Energy Emissions by Customer Type and Fuel