



2019 MIAMI BEACH GREENHOUSE GAS EMISSIONS INVENTORY

Community-wide and
government operations

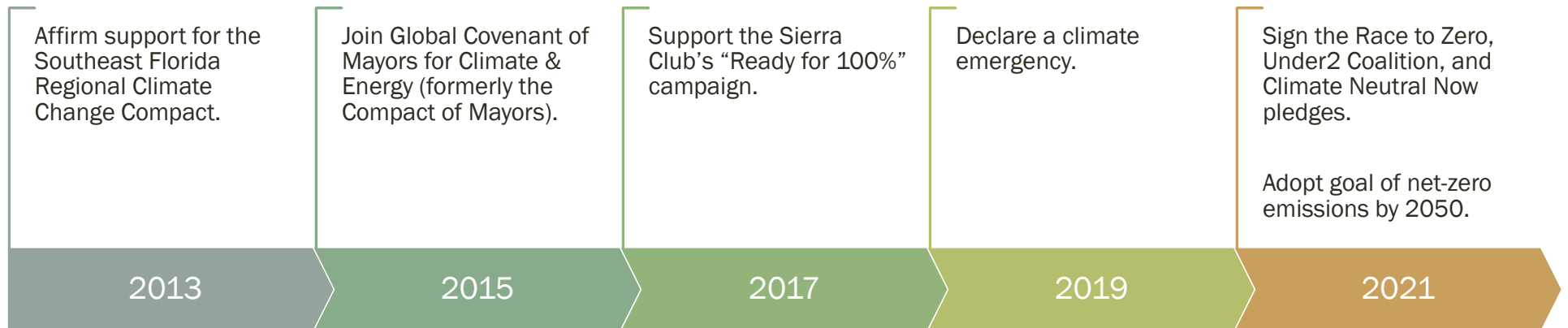
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INTRODUCTION

A greenhouse gas emissions (GHG) inventory is a method of tracking the amount and source of GHG emissions released during a certain time period.

- In 2015, Miami Beach joined Global Covenant of Mayors for Climate & Energy (formerly the Compact of Mayors).
- The first GHG inventory was compiled to comply with the Global Covenant of Mayors requirements.
- The 2014 GHG inventory is the baseline inventory.
- Each year, a GHG inventory is compiled for community wide emissions and emissions from government operations.

CLIMATE COMMITMENTS



EXECUTIVE SUMMARY

A greenhouse gas emissions (GHG) inventory is a compilation of the total GHG emissions released by an entity. The City of Miami Beach compiles an annual GHG emissions inventory at the community wide level and at the government operations level.

Community-wide Inventory



Energy consumption, including electricity and natural gas, accounted for 66% of emissions community-wide.



The gasoline and diesel fuel combustion from transportation accounted for 20% of emissions.



Solid waste accounted for 13% of emissions. This is based on estimates of solid waste generation in Miami Beach based on Miami-Dade County data.

Industrial energy and wastewater treatment accounted for less than 1% of emissions.

Government Operations Inventory



Electricity consumption in buildings and street lighting accounted for 76% of emissions.



Emissions from the municipal fleet and the trolley program accounted for 23% of emissions.



Natural gas use accounted for 1% of emissions.

The GHG Inventory for government operations does not include solid waste or wastewater treatment. This is due to a lack of available data. Data requests will be included in the next contract cycle for waste haulers.

HOW EMISSIONS ARE CATEGORIZED

Emissions are categorized into three scopes:

Scope 1: GHG emissions from sources, such as natural gas combustion, occurring within the city boundary

Scope 2: GHG emissions from grid-supplied electricity usage within the city but not created within the city boundary

Scope 3: all other GHG emissions that occur outside the city boundary due to a third-party service being provided to the city such as wastewater treatment

METHODOLOGY



The ClearPath platform is used to compile the GHG emissions inventory.

Data is collected from various City Departments and external agencies and organizations.

Factor sets* are created in ClearPath for Transportation, Waste Characterization and Grid Electricity using data from reports and research.

The gathered data is entered into ClearPath. There may be some initial calculations or estimates needed before entering data in ClearPath.

The factor sets convert the input data into the output of GHG emissions through various calculations performed by ClearPath.

Final results are obtained through ClearPath and input in a tailored excel workbook.

*A factor set is a conversion factor used to translate collected data into GHG emissions.

DATA GATHERED



RESIDENTIAL ENERGY

- Grid Electricity for Residential Use (kWh, FPL)
- Stationary Fuel Combustion for Residential Use (Therms, TECO)



COMMERCIAL ENERGY

- Grid Electricity for Commercial Use (kWh, FPL)
- Stationary Fuel Combustion for Commercial Use (Therms, TECO)
- Grid Electricity for Public Street & Highway Lighting (kWh, FPL)
- Grid Electricity from Other Sales (kWh, FPL)



INDUSTRIAL ENERGY*

- Grid Electricity for Industrial Use (kWh, FPL)

DATA GATHERED



TRANSPORTATION

- Total Miles Travelled Within City Boundary (VMT, FDOT)



WATER AND WASTEWATER

- Emissions from the Combustion of Digester Gas (MT CO₂e, population-based ICLEI calculator)
- Emissions for Process N₂O from Effluent Discharge (kg N/day, MDC WASD)



SOLID WASTE*

- Waste generation (tons, FDEP)

DATA SOURCES

FPL: aggregate annual electricity consumption categorized by sector

FDOT: annual report of Vehicle Miles Travelled (VMT) inside city limits

TECO: aggregate annual natural gas consumption categorized by sector

FDEP: annual report of Miami-Dade County solid waste and recycling

Miami-Dade County WASD: annual report of wastewater treated

City of Miami Beach Fleet Department: annual report of fuel consumption, active equipment list

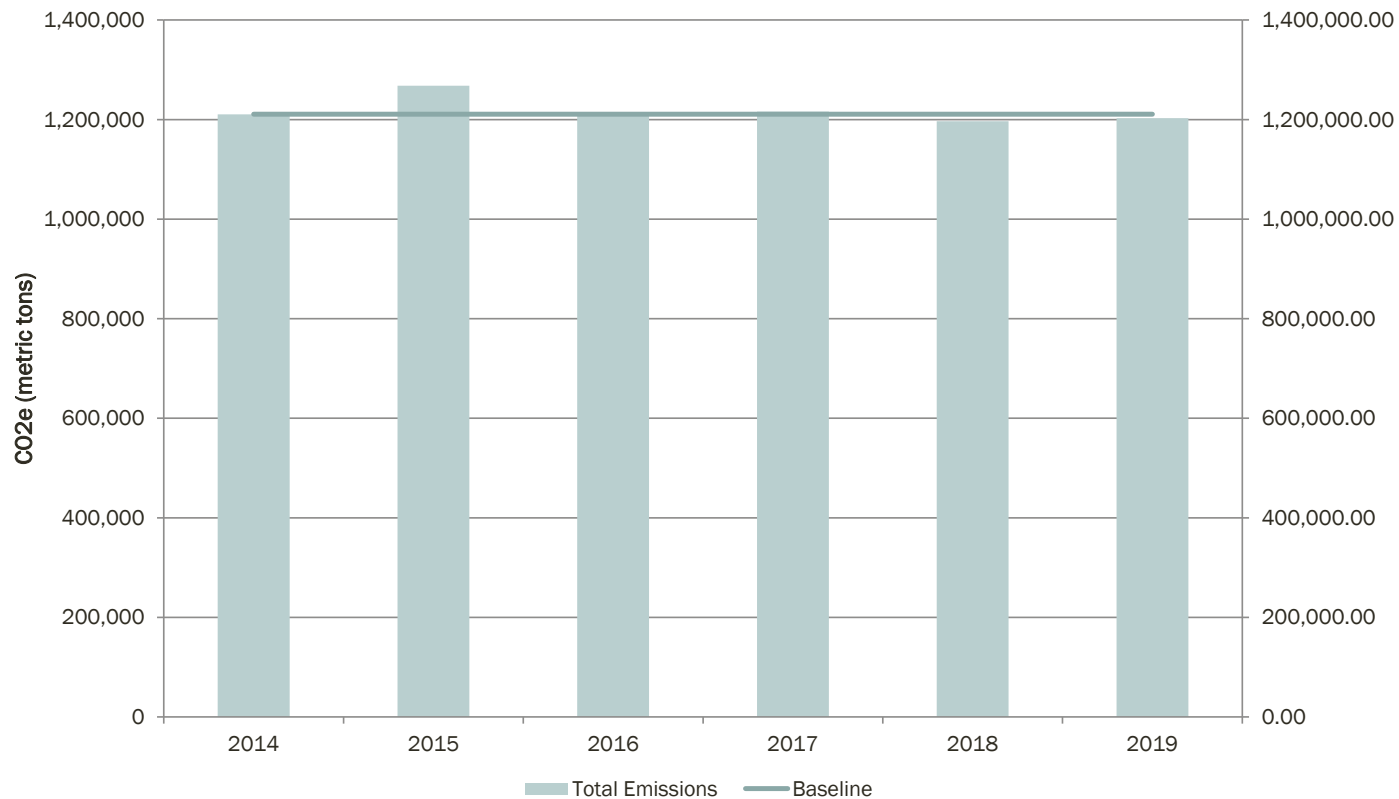
City of Miami Beach Transportation Department: annual report of trolley Vehicle Miles Travelled (VMT)

Factor sets are created from data from national and regional reports and studies.



COMMUNITY WIDE INVENTORY

COMMUNITY WIDE EMISSIONS OVERVIEW

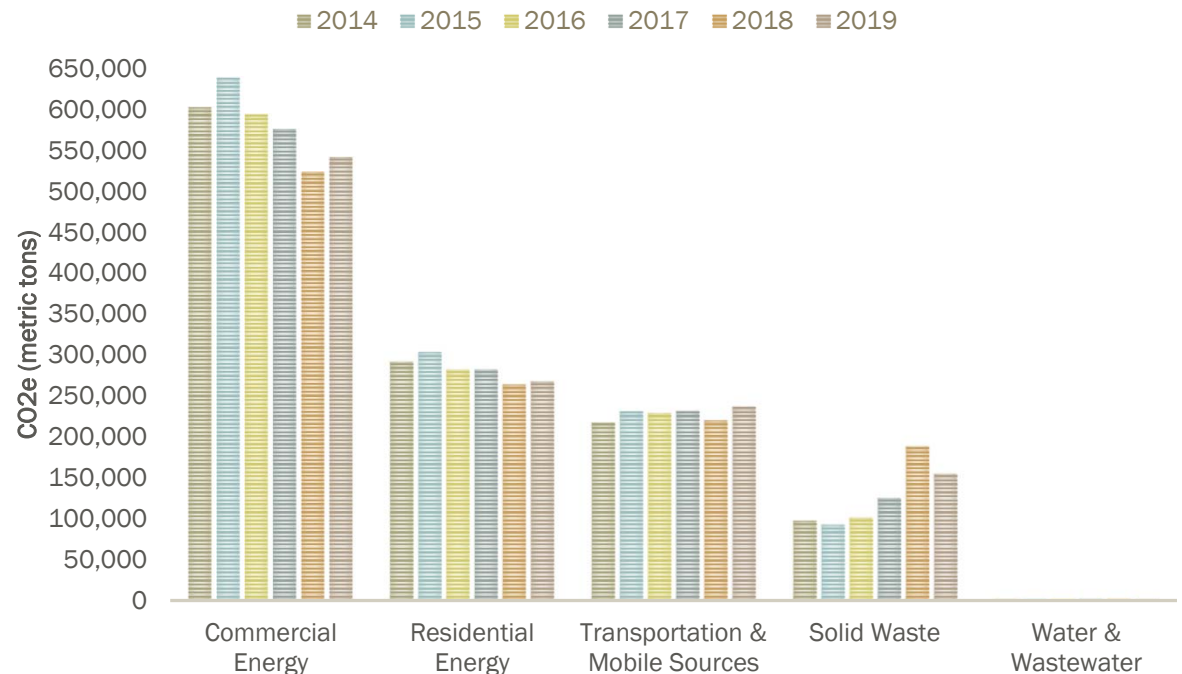


- Total community wide emissions in 2019 remained comparable to previous years and close to the baseline emissions.
- Between 2014 and 2019, the average community wide emissions have totaled around 1,217,048 MT CO₂e each year.

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- There has been a slight decrease in emissions from Commercial and Residential Energy use over the past few years, mainly due to the lower emissions from the fuel mix.
- The City of Miami Beach does not have data available regarding solid waste generation inside its city limits. The emissions from solid waste are estimated using data from Miami-Dade County and population ratio. The total solid waste generation county-wide has increased in the past few years.

COMMUNITY WIDE GHG EMISSIONS



COMMUNITY WIDE INVENTORY

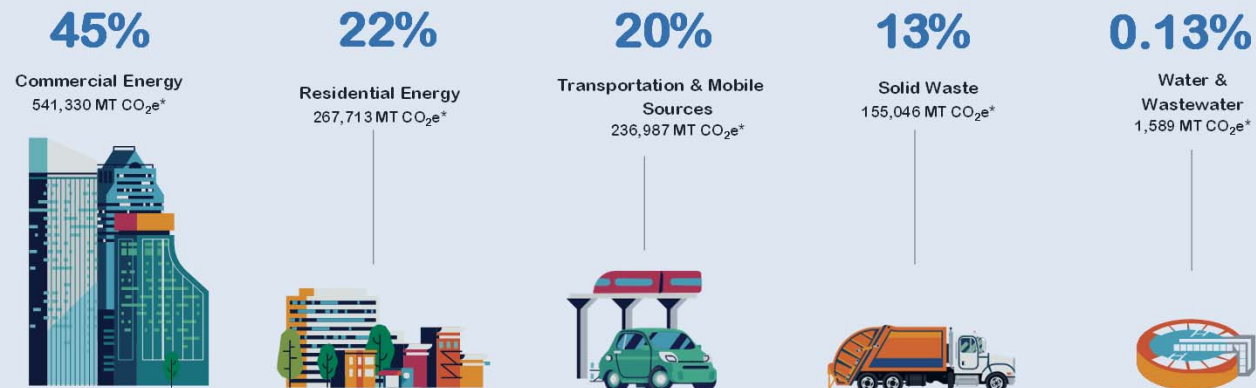
Residential Energy	Usage	Units	CO2e (MT)	% of Emissions
Residential Natural Gas	2,412,206	Therms	12,830.00	1.07%
Residential Public Authority Electricity	223,175	kWh	94.76	0.01%
Residential Electricity	600,070,154	kWh	254,788.00	21.19%
Commercial Energy				
Commercial Natural Gas	12,536,029	Therms	66,675.00	5.54%
Commercial Public Authority Electricity	89,451,290	kWh	37,981.00	3.16%
Commercial Electricity	1,013,914,703	kWh	430,505.00	35.80%
Public Streets & Highway Lighting	11,379,495	kWh	4,831.70	0.40%
Other Sales Electricity	233,902	kWh	99.31	0.01%
GO Natural Gas	72,785	Therms	387.12	0.03%
Industrial Rate Electricity	2,002,796	kWh	850.38	0.07%
Transportation & Mobile Sources				
Diesel Vehicles	493,209,068	VMT	48,481.00	4.03%
Gasoline Vehicles	493,209,068	VMT	188,506.00	15.67%
Water & Wastewater				
Combustion of Digester Gas	88,885	People	5.57	0.00%
Process N2O from Effluent Discharge	88,885	People	1,583.60	0.13%
Solid Waste				
Community Waste Landfilled	99,794	Tons	155,046.00	12.89%
*Waste to Energy	15,767	Tons	5,465.00	
2019 Community Wide				
Total Emissions			1,202,664.44	100.00%

*Information item only - not included in GHG inventory accounting

2019 Community GHG EMISSIONS

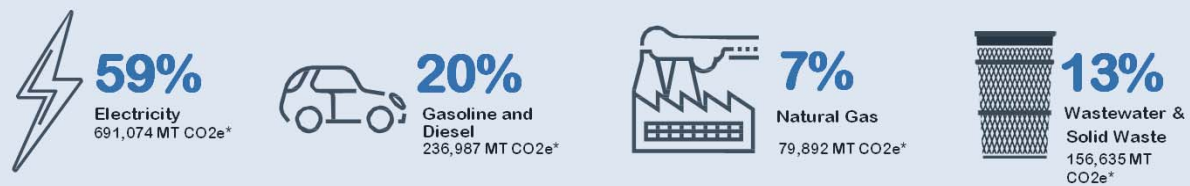
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Emissions by Sector



Total emissions in the community: 1,202,664 MT CO₂e*

Emissions by Source



*MT CO₂e = metric tons of CO₂ equivalent

GHG Emissions = greenhouse gas emissions

Based on the most current data available.

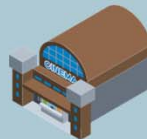
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Scope 1

Total: 316,879 MT CO₂e*

Commercial Natural Gas
67,062 MT CO₂e*



Residential Natural Gas
12,830 MT CO₂e*



On Road Transportation
Gasoline Vehicles
188,506 MT CO₂e*



On Road Transportation
Diesel Vehicles
48,481 MT CO₂e*



Scope 2

Total: 691,074 MT CO₂e*

Commercial
Electricity
473,417 MT CO₂e*



Public Streets &
Highway Lighting
4,831 MT CO₂e*

Residential
Electricity
254,883 MT CO₂e*

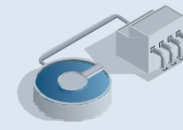
Other Sales (Electricity) 99 MT CO₂e*

Scope 3

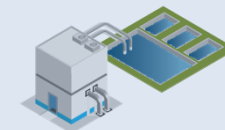
Total: 156,635 MT CO₂e*



Community Waste
Landfilled
155,046 MT CO₂e*



Process N₂O from
Effluent Discharge
1,583 MT CO₂e*



Combustion of Digester Gas
from Wastewater Treatment
6 MT CO₂e*

*MT CO₂e = metric tons of CO₂ equivalent

2019 COMMUNITY EQUIVALENCIES

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1,202,664
METRIC TONS
OF CARBON DIOXIDE

Greenhouse gas
emissions from



2,984,277,916

Miles driven by an average
passenger vehicle

CO₂ emissions
from



135,328,457

Gallons of gasoline
consumed



1,325,170,734

Pounds of coal burned

CO₂ emissions
absorbed by



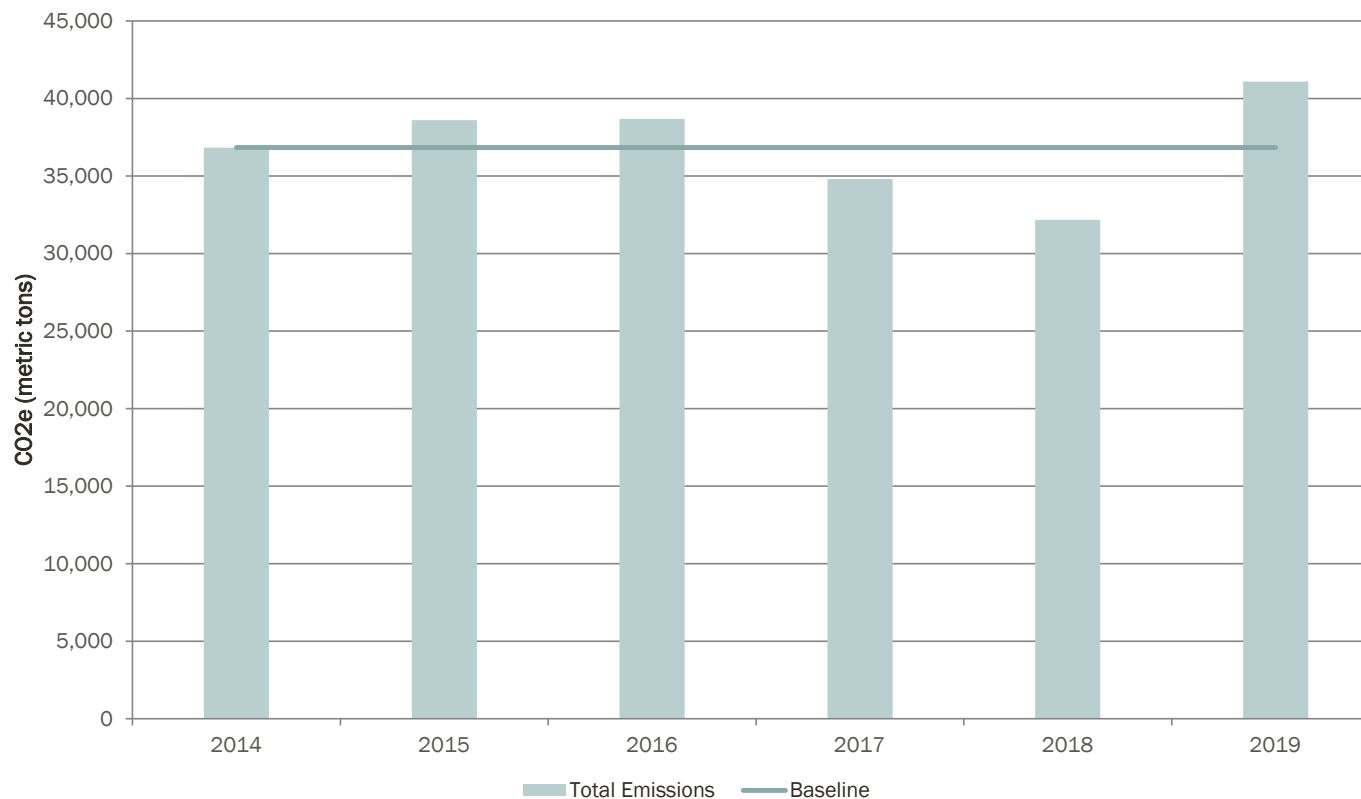
65.6%

of the Everglades in one year



GOVERNMENT OPERATIONS INVENTORY

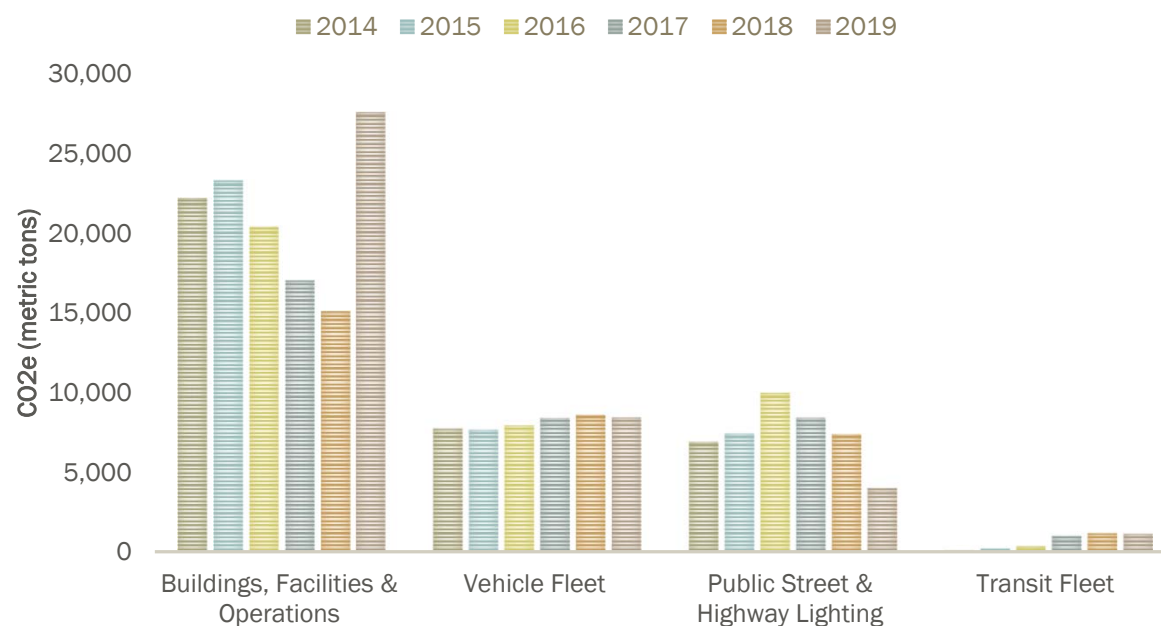
GOVERNMENT OPERATIONS EMISSIONS OVERVIEW



- Emissions from government operations were higher than baseline year and significantly increased compared to the previous years.
- Between 2014 to 2019, the total emissions increased by 11.5%. This was caused by an increase in emissions from electricity use.

- The emissions from energy use in buildings declined between 2015 and 2018 due to the Convention Center closing for renovation. The Convention Center reopened at the end of 2018, so there was a sharp increase in emission in 2019.
- There were changes in the rate structure of our lighting accounts and some upgraded light fixtures which have caused a decrease in emissions from Public Street & Highway Lighting in 2019.
- There has been a 25,551% increase in emissions, between 2014 and 2019, from the Transit Fleet as the trolley program has expanded each year since its inception in 2014.

GOVERNMENT OPERATIONS GHG EMISSIONS



GOVERNMENT OPERATIONS INVENTORY

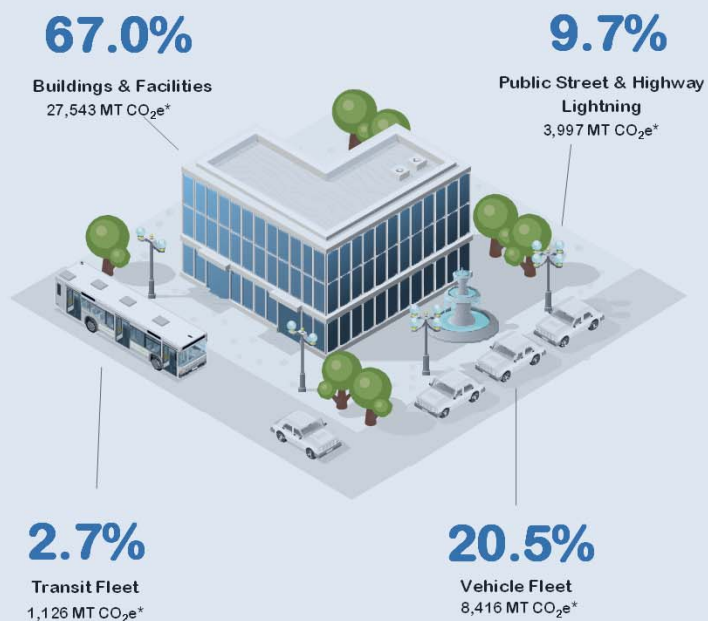
The government operations inventory only includes scope 1 and scope 2 emissions. The city does not have solid waste data available. Staff is working to add data requirements for future contracts.

Buildings and Facilities	Usage	Units	CO2e (MT)	% of Emissions
Residential Public Authority	42,628.00 kWh		18.10	0.04%
Commercial Public Authority	63,680,343.00 kWh		27,038.00	65.82%
Other Sales to Public Authority	233,902.00 kWh		99.31	0.24%
Buildings Natural Gas	72,785.00 Therms		387.12	0.94%
Public Street & Highway Lighting				
Street Lighting Electricity	9,413,859.00 kWh		3,997.10	9.73%
Vehicle Fleet				
Diesel Vehicles	154,306.00 Gallons		1,576.20	3.84%
Gasoline Vehicles	766,872.00 Gallons		6,839.60	16.65%
Transit Fleet				
City Trolley	126,233.41 Gallons		1,125.90	2.74%
2019 Government Operations				
Total Emissions			41,081.33	100.00%

2019 Government GHG EMISSIONS

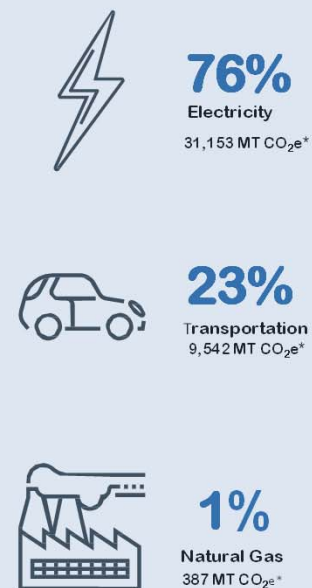
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Emissions by Sector



Total emissions: 41,081 MT CO₂e*

Emissions by Source



*MT CO₂e = metric tons of CO₂ equivalent

GHG Emissions = greenhouse gas emissions

Based on the most current data available.

2019 GOVERNMENT INVENTORY

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Scope 1 Total: 9,929 MT CO₂e*

City Operations
Gasoline Vehicle
Fleet Emissions
6,840 MT CO₂e*



City Operations
Diesel Vehicle
Fleet Emissions
1,576 MT CO₂e*



Government Natural Gas
Usage 387 MT CO₂e*



City Trolley Service
1,126 MT CO₂e*



Scope 2 Total: 31,153 MT CO₂e*

Government
Electricity
Usage
27,155 MT CO₂e*



Public Streets
& Highway
Lighting
3,997 MT CO₂e*

MT CO₂e = metric tons of CO₂ equivalent

2019 GOVERNMENT EQUIVALENCIES

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41,081
METRIC TONS
OF CARBON DIOXIDE

Greenhouse gas
emissions from



101,937,965

Miles driven by an average
passenger vehicle

CO₂ emissions
from



4,622,595

Gallons of gasoline
consumed



45,265,626

Pounds of coal burned

Carbon
sequestered by



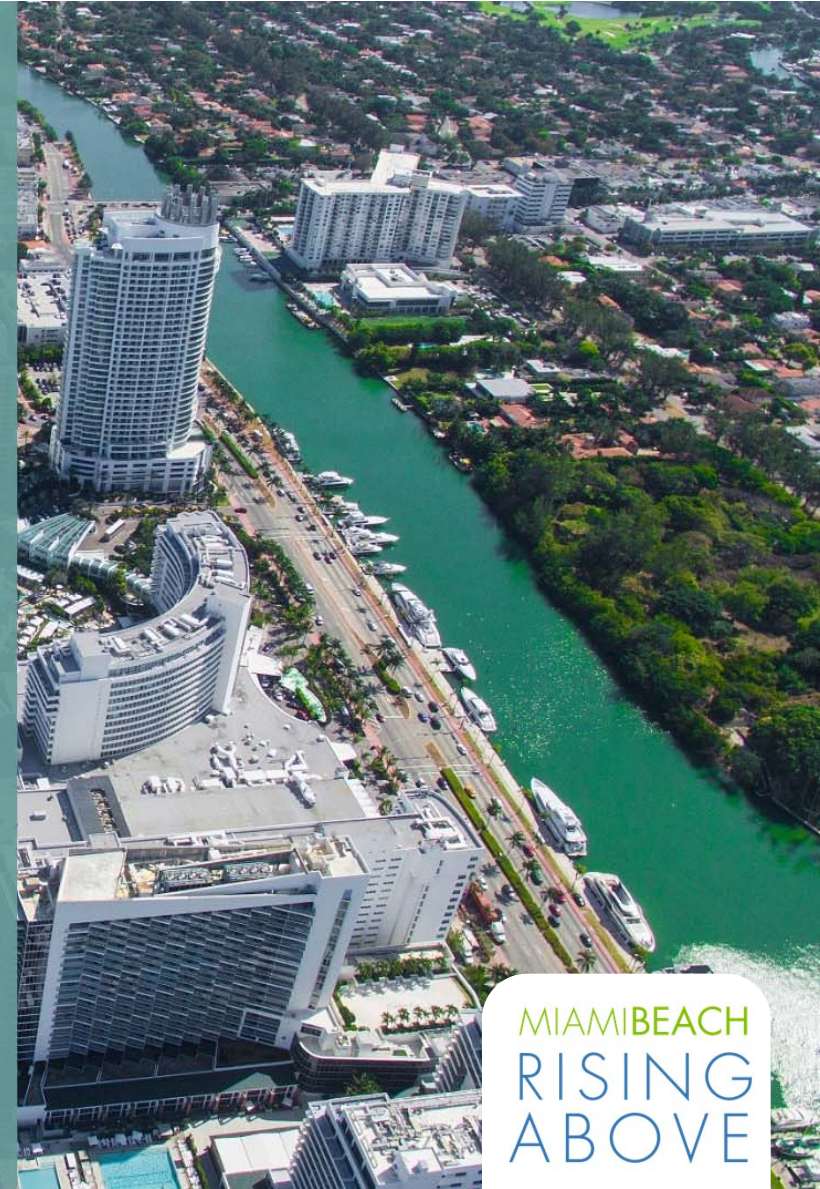
53,650

Acres of U.S. forests
storing carbon in one year

NEXT STEPS

The City is working with consultant AECOM to develop its first Climate Action Plan (CAP). The CAP will address the largest sources of GHG emissions community wide and will provide recommended actions to reduce emissions and reach its emissions reduction targets. The CAP will be instrumental to implement high-impact policies and programs to reduce GHG emissions and move towards net-zero emissions.

The Environment & Sustainability and Property Management Departments are working to develop an energy assessment project. The energy assessment will analyze the electricity consumption and audit the municipal buildings with the highest electricity consumption and provide project retrofits recommendations to improve energy efficiency and reduce electric utility costs.



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GLOSSARY

CH₄: methane. It is a greenhouse gas with a GWP between 28-36.

CO₂: carbon dioxide. It is the principal greenhouse gas produced through human activities.

GHG: greenhouse gases. These are gases that trap heat in the atmosphere and contribute to climate change.

GWh: gigawatt-hour. This is a unit for energy. 1 GWh is equivalent to 1,000,000 kWh.

GWP: global warming potential. A value given to gases depending on how much energy 1 ton of a gas will absorb over 100 years. These values can easily be compared to CO₂ which has a GWP of 1. The higher the GWP, the more that a gas warms the planet over time.

kWh: kilowatt-hour. This is a unit for energy and is equivalent to one kilowatt of power consumed for one hour.

MWh: megawatt-hour. This is a unit for energy. 1 MWh is equivalent to 1,000 kWh.

MT CO₂e: metric ton of carbon dioxide equivalents. This unit is a standard used to represent the GWP of various greenhouse gases.

N₂O: nitrous oxide. It is a greenhouse gas with a GWP between 265-298.