



Greenhouse Gas Inventory

City of Binghamton
Binghamton, NY

Prepared by:



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Executive Summary

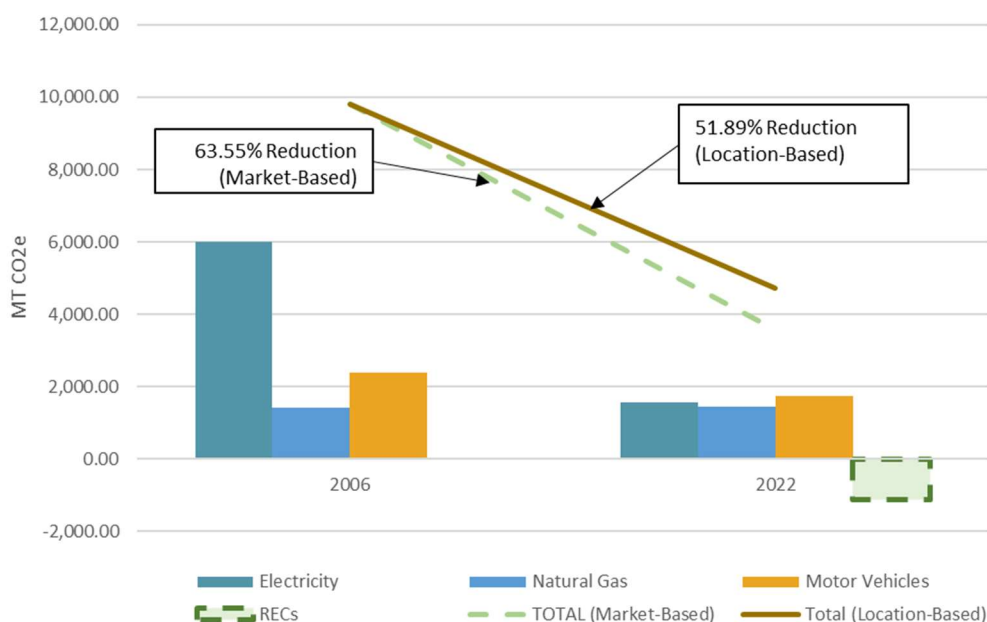
In alignment with the City of Binghamton’s goals of updating its Climate Action Plan and achieving certification through New York State’s Climate Smart Community’s program, this greenhouse gas emissions (GHG) inventory was completed for the inventory year of 2022. This inventory serves as an update from the last inventory year of 2006, and was completed using the Government Operations and Community modules of the USEPA Local Inventory Tool (USEPA Inventory Tool).

The Government Operations module, referred to as the “Municipal Inventory” in this report, included emissions from the following sources:

- ◆ Natural gas combustion for heating of City-owned buildings
- ◆ Fuel consumption from City-owned fleet vehicles
- ◆ Wastewater treatment process emissions
- ◆ Electricity consumption for powering buildings and infrastructure
- ◆ Energy related to importing and distribution of water for government operations
- ◆ Fuel consumption from employee commute vehicles
- ◆ Emissions benefits from the City’s urban forestry program
- ◆ Emissions reductions related to the purchase of renewable energy certificates (RECs)

Emissions from the Municipal Inventory resulted in 4,715.62 metric tons of carbon dioxide equivalents (MT CO₂e), representing a 51.89% reduction over 2006 levels (**Figure E-1.1**).

Figure E-1.1 Comparison of Municipal Inventory Results

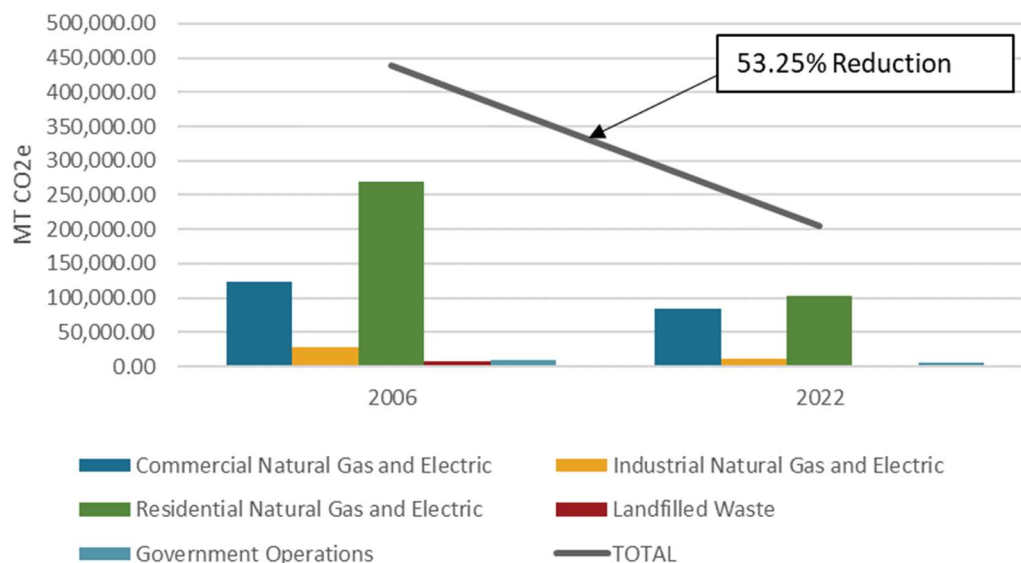


The Community Module, referred to as the “Community Inventory” in this report, included emissions from the following sources:

- ◆ Natural gas consumption for residential, commercial, and industrial sectors
- ◆ Fuel consumption from vehicle miles traveled within the boundary of the City
- ◆ Solid waste disposal in Broome County Landfill
- ◆ Electricity consumption for residential, commercial, and industrial sectors
- ◆ Energy related to importing and distribution of water for residential, commercial, and industrial sectors

Emissions from the Community Inventory resulted in 256,375.90 MT CO₂e. **Figure E-1.2** compares the results of the 2006 and 2022 Community and Local inventories (associated with the consumption of natural gas and electricity; landfilled waste; and government operations), representing a 53.25% reduction over 2006 levels.

Figure E-1.2 Comparison of Community Inventory Results (excluding Transportation Emissions)



It should be noted that the percent reduction calculation does not include emissions from transportation as the values vary significantly between 2006 and 2022. While census data indicates that the percentage of workers that work from home has increased from 2.9% in 2010 to 6% in 2021, the difference is more likely due to a change in methodology between the inventory years. During the 2006 inventory, BMTS indicated that the average daily VMT within the City boundary was 885,499 miles, or 323,207,135 miles for 2006 when multiplied by 365. Follow up discussions with BMTS indicated that the methodology used to calculate VMT in 2006

could not be replicated. Therefore, the 2022 VMT was calculated to be 164,252,190 based on available census data.

The previous Climate Action Plan set an emissions reduction goal of 25% by 2025. In addition, the State of New York has set an emissions reduction goal of 85% from a 1990 baseline by 2050. The City of Binghamton has exceeded its goal for government operations by more than double and has helped New York State make progress towards its overall goal.

1 Introduction

The 2018 U.S. Global Change Research Program (USGCRP) Fourth National Assessment stated that, as a consequence of increased concentrations of greenhouse gases (GHG) in the atmosphere, the Northeast region of the United States is experiencing rising temperatures that will negatively impact the region's economy, environment, and public health. At the same time, extreme weather events such as heatwaves, droughts, and flooding are expected to become more frequent and severe under the warming climate scenario in which we are living today.

Binghamton has been hit by several major floods in the recent past, the most devastating of which was the remains of Tropical Storm Lee in September 2011 (just before the City's original Energy and Climate Action Plan (CAP) was published), which is estimated to have caused approximately two billion dollars of damage¹. Beyond the immediate destruction it caused, the storms were a significant setback to and distraction from the City's long-term efforts to address multiple infrastructure and economic development issues, create well-paying jobs and high quality housing, and chart a pathway to prosperity, equity, and sustainability. If the City can become more climate resilient, future events will cause less damage and divert less resources and attention away from community goals.

The City of Binghamton Energy & Climate Action Plan (CAP) was first published in December of 2011 and was developed by the Climate Action Citizen Advisory Committee with significant involvement from additional key stakeholders. This report was developed in response to a series of climate extremes experienced by the citizens of Binghamton between 2000 and 2010. These climate extremes included high temperatures of 90-degrees and above, heavy winter snowfall, and extreme flooding. The 2011 CAP established key areas of focus and specific initiatives to be taken, in order to achieve the overall goal of a 25% reduction by 2025, using a 2006 level baseline. The CAP also identified tangible and actionable steps to mitigate and plan for current and future impacts of climate change. The 2024 CAP maintained seven primary areas of strategic action as follows:

- Buildings and Energy
- Transportation and Land Use
- Water Management, Reduction, Re-Use, and Recycling
- Local Food, Agriculture, and Urban Forestry
- Outreach & Education
- Government Action
- Adaptation

¹ NOAA, NWS. *4th Anniversary of the Flooding From Tropical Storm Lee*. September 2015
https://climatesmart.ny.gov/fileadmin/csc/documents/GHG_Inventories/ghgguide.pdf

The City's 2024 CAP update is intended to:

- Create new baseline and targets for City and Community GHG emissions based on a revised GHG inventory
- Assess the progress made on the 2011 Climate Action Plan actions
- Identify new climate actions and goals to reduce emissions and increase climate resilience
- Identify the tools and metrics needed to track progress and achieve those goals

The CAP will also be informed by other plans, including the City of Binghamton Comprehensive Plan (2014), downtown revitalization efforts, and other activities in public safety, sustainability, and economic development. The 2024 CAP will be developed with input from the community to ensure the voices and concerns of the citizenry are heard, plans integrate with neighborhood and community goals, and the citizenry understand and support the Plan's purpose and pathways.

The purpose of this GHG inventory is to support the 2024 CAP by establishing an updated baseline of GHG emissions for municipal (i.e. City-owned buildings and activities) and the community (all other emissions within the City attributed to Binghamton residents; not attributable to City government). This baseline will benchmark the progress to date since the last GHG inventory of 2006 and form the basis of targets for future GHG emissions reductions. The report narrative documents why changes have or have not occurred, what areas have experienced the largest and least changes, and where opportunities for reductions lie. It will also contribute points towards the City's objective of achieving silver certification under the New York Climate Smart Communities (CSC) program.

2 Background

2.1 City and Greater Binghamton Area

The City of Binghamton is located in Broome County in the Southern Tier region of New York State along the Pennsylvania border. According to the 2020 U.S. Census, Binghamton's population is 47,969 (or 4,577.6 people per square mile) with a median household income of \$39,012 and 31.7% poverty rate. The Binghamton Metropolitan Statistical Area, also known as the Greater Binghamton Area is defined by a 30-mile radius from the center of the City itself and has a population of nearly 248,000 people as of the 2020 census. The major employers within

the City are the City of Binghamton, Broome County, the State of New York, Lockheed Martin, and Binghamton University. The City employs 581 people in a number of job functions.

The total GHG emissions for the City (both municipal and community) in 2006 was 648,544 tons of carbon dioxide equivalent (CO₂e).² This number comprised three key elements as follows:

- Commercial, Industrial, and Residential buildings: 60.5%
- Transportation: 32.3%
- Governmental and Landfill Waste: 3%

Ninety-eight percent of total emissions were attributable to the community, the remaining two percent were attributable to the municipal government.

2.1.1 Boundary Setting

As described in the New York Community and Regional GHG Inventory Guidance (September 2015), the City is required to define and set an emissions boundary for community activity and consumption. The guide defines Scope 1, 2, and 3 emissions as follows:³

Scope 1- Direct emissions that occur physically within a defined boundary (i.e. a building or directly attributable to a vehicle)

Scope 2- Indirect emissions from utility energy plants based on the utility consumption within a defined boundary (this is regardless of where the plants are physically located)

Scope 3- Additional indirect or lifecycle emissions generated through community activity (this is regardless of where these emissions generating activities occur)

The New York Community and Regional GHG Inventory Guidance (September 2015) recommends that community inventories include government operations since those operations are no different from those of any business operating in the community. Therefore, the 2022 inventory will be completed for both the government operations and the community of the City of Binghamton as a whole.

² Being that different GHG pollutants trap different amounts of heat in the atmosphere, emissions of pollutants are converted to "carbon dioxide equivalents" based on a weighted factor, known as a global warming potential (GWP). For example, one metric ton of methane CH₄ is equivalent to 25 metric tons of carbon dioxide and therefore has a GWP of 25. By converting all greenhouse gas emissions to CO₂e, it is easy to compare the impact of different emissions sources.

³ NYSERDA. *New York Community and Regional GHG Inventory Guidance*. September 2015
https://climatesmart.ny.gov/fileadmin/csc/documents/GHG_Inventories/ghgguide.pdf

3 Inventory Methodology

This section describes the methodology, data sources, data values, and inventory tool used in the 2022 GHG inventory.

The preparation of this document began with a review of the 2006 GHG inventory data and report. The 2006 GHG inventory was developed for both municipal and community emissions using the inventory tool provided by the organization ICLEI-USA⁴ (formerly International Council for Local Environmental Initiatives), of which the City of Binghamton was a member at the time. For the 2022 GHG inventory, GHG emissions were calculated instead using the USEPA's Local Greenhouse Gas Inventory Tool⁵ (USEPA Inventory Tool), a comparable device which combines user-provided data for various emissions sources with USEPA-published emissions factors for different GHG pollutants (e.g. carbon dioxide, methane, nitrogen dioxide). Both the ICLEI-USA tool used in 2006 and the USEPA GHG Inventory Tool used in 2022 utilize standard calculation methodologies, therefore results are comparable between the two inventory years. The added benefit to the USEPA Inventory Tool is that it is a free, publicly-available tool, unlike the ICLEI-USA tool which requires a membership fee.

Community and municipal GHG emissions sources (buildings, vehicles, certain activities such as commutes and local travel) for 2022 or the most recent year that data were available were catalogued to identify the major changes in the sources since the 2006 baseline. These included the renovated sewage treatment plant, new buildings, demolished buildings, changes in vehicle fleet, changes in population, and changes in electricity generation and consumption.

The City has historically purchased RECs, meaning there are two ways to account for emissions from electricity consumption - market based and location based. Market-based incorporate reductions from RECs, whereas location-based do not. Both market-based and location-based emissions are disclosed in this report.

Appendix A details the sources of emission data included in the inventory, along with the type of data received, and the point of contact for each data source.

3.1 Municipal Inventory

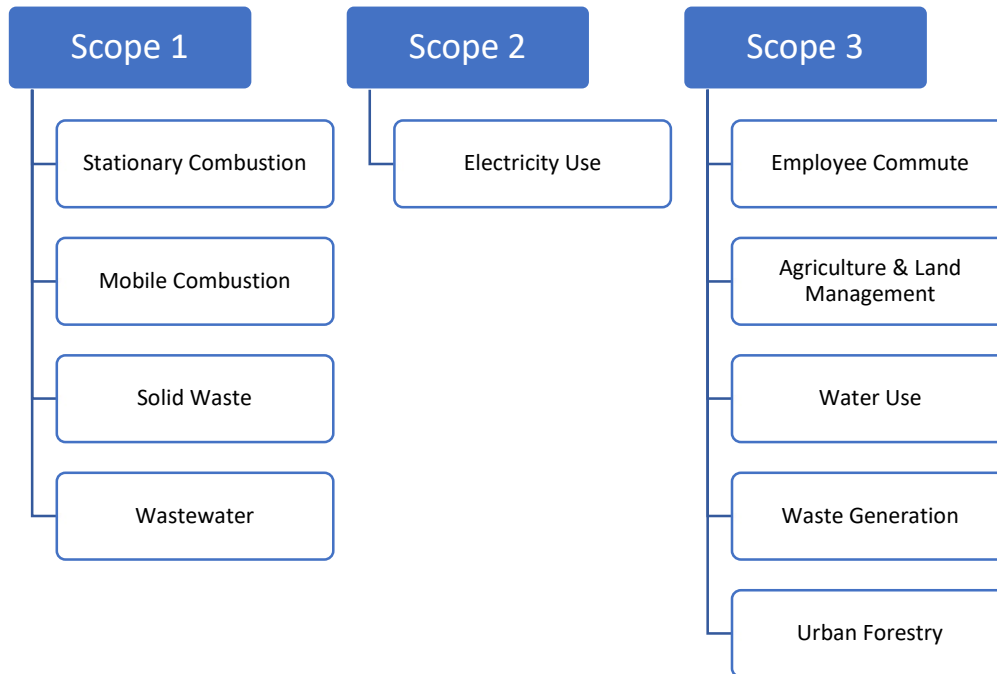
This section describes the emissions associated with the City of Binghamton's government operations, referred to as the "Municipal Inventory". Emissions were calculated using the

⁴ ICLEI USA's webpage: [ICLEI USA | Local Governments for Sustainability](#)

⁵ EPA's Energy Resources for State and Local Governments website: [Local Greenhouse Gas Inventory Tool | US EPA](#)

Government Operations module of the USEPA’s Inventory tool. The following sections are organized to mirror the structure of the USEPA’s Inventory Tool, as detailed in **Figure 3.1** below.

Figure 3.1 Sources of Emissions



The following emissions sources were not included within the Municipal Inventory:

- Solid Waste: Solid waste generated by government operations is transported in bulk to the Broome County Landfill, which is not owned or operated by the City of Binghamton. Consistent with the 2006 inventory, neither the City of Binghamton nor the Broome County Landfill track the amount of waste coming solely from the local government. Instead, the waste was included in the total amount coming from Binghamton, which is described further in the Community emissions inventory.
- Although solid waste generated from the City of Binghamton’s government operations would be classified as a Scope 3 source, the municipal solid waste stream from the City is not measured separately from the community.
- Agriculture & Land Management: This emissions source relates to the total amount of synthetic, organic, and manure fertilizers applied in the inventory year. Conversations with the Parks Department indicated that the City does not regularly spread fertilizer, therefore emissions from this source would be negligible.

The sections below detail the assumptions made or additional steps made for the remaining categories.

3.1.1 Scope 1: Stationary Combustion

Stationary combustion relates to the burning of natural gas for the heating of a building. NYSEG provides the City with invoices for natural gas consumption by department code. The consumption of natural gas and associated charges for all monthly invoices are compiled into a spreadsheet that is maintained by the City. The following details the departments by account number for the inventory year:

- Fire
- General Fund: This is associated with the Department of Public Works Municipal Garage and Refueling Station
- Police
- Sewer
- Ramps
- Parks,
- Water Filtration Plant, and
- Streetlights, traffic signals, and miscellaneous items

These accounts were also checked against a list of facilities owned and operated by Broome County (provided by the Broome County planning department) to be sure to not double count emissions. One shared building is the government building complex that houses offices for the City of Binghamton, Broome County, and New York State. A tripartite agreement between the City, County, and State indicates that the City is responsible for 26.37% of costs associated with this complex, which is reflected in the monthly consumption and costs in the City's spreadsheet. Therefore, only 26.37% of the natural gas consumption associated with the City Hall building (identified as 38 Hawley Street in the utility bills) was included within the Municipal Inventory.

The Binghamton-Johnson City Joint Sewage Treatment Facility was not listed as an account within the NYSEG data. Therefore, the natural gas records were provided by the plant's Superintendent for a 12-month period starting in August 2022 and ending in September 2023. The natural gas consumption was adjusted by 54.8% to reflect only the City of Binghamton's share of the utility bill. Johnson City is responsible for the balance of 45.2%.

To understand the types of facilities that contribute to natural gas consumption, bills and accounts were cross referenced to City-provided lists of lift stations, buildings, and parks. The facility types were then matched to the available facility types within the USEPA Inventory Tool. **Table 3-1** below summarizes natural gas consumption by department and facility type, as entered into the tool.

Table 3-1 Natural Gas Consumption by Department

Department	Facility Type	USEPA Tool Facility Type	2022 Natural Gas Consumption (MCF)
Fire	Building	Office Building	1,112.39
Department of Public Works	Building	Office Building	1,880.64
Parks	Building	Office Building	11,425.62
Parks	Park	Other	614.25
Parks	Traffic Light	Outdoor Lighting	91.95
Parks	Water Tower	Water Infrastructure	10.00
Parks	Building	Other	168.91
Police	Building	Office Building	476.39
Police	Traffic Light	Outdoor Lighting	2.04
Joint Sewer Treatment Plant	Building	Wastewater Infrastructure	9,435.08
Unknown	Building	Office Building	713.37
Unknown	Ramp	Other	7.10
TOTAL MCF			25,937.75

Source: City of Binghamton, 2023

The resulting GHG emissions for fuel consumption from stationary sources is 1,428.03 MT CO₂e.

3.1.2 Scope 1: Mobile Combustion

Mobile combustion relates to the consumption of fossil fuels (e.g. diesel, gasoline) for motor vehicles owned and operated by the City. The USEPA Inventory Tool requires both the fuel consumed and the vehicle miles traveled to be entered for each vehicle.

The City maintains a list of all City-owned vehicles per department with details including year of manufacture, make and model, fuel type, and an annual odometer reading. However, the odometer reading is not kept for past years. Separately, the City provided C&S with the total gallons of diesel and gasoline consumed, along with the percentage consumption by department. C&S entered representative vehicle types into the USEPA Inventory Tool based on

the vehicles used within each department. The total gallons of gasoline and diesel in the inventory year were multiplied by the percent usage by department to obtain gallons of usage by department, which was applied proportionally to the vehicle types within each department. Vehicle miles traveled (VMT) were calculated by multiplying the total annual fuel consumed by vehicle type by the available fuel economy for each vehicle class in the USEPA tool. The average age of the vehicle for each department was used for all vehicles, unless an average was not available. In this case, the average age of all City-owned vehicles was used. **Table 3-2** below summarizes the representative vehicles for each department based on the above-referenced methodology.

Table 3-2 Fuel Consumed and Miles Traveled by City-Owned Vehicles

Department	Vehicle Year	USEPA Vehicle Type	2022 Fuel Consumed (gallons)	VMT
<i>Gasoline-Fueled Vehicles</i>				
General	2012	Light Truck	33,951.80	628,108.30
Police	2015	Light Truck	26,275.74	486,101.13
Fire	2010	Light Truck	8,758.58	162,034.00
Refuse	2012	Heavy-Duty Vehicle	18,107.62	183,430.23
Ramps	2012	Light Truck	295.23	5,461.81
Water	2014	Light Truck	6,003.07	111,056.81
Joint Sewer	2013	Light Truck	4,231.67	78,285.95
Sewer	2013	Light Truck	787.29	14,564.83
<i>Diesel-Fueled Vehicles</i>				
General	2012	Light Truck	29,190.80	540,029.71
Police	2015	Light Truck	22,591.14	417,936.03
Fire	2010	Light Truck	7,530.38	139,312.01
Refuse	2012	Heavy-Duty Vehicle	15,568.42	157,708.14
Ramps	2012	Light Truck	253.83	4,695.91
Water	2014	Light Truck	5,161.27	95,483.51
Joint Sewer	2013	Light Truck	3,638.27	67,308.05
Sewer	2013	Light Truck	676.89	12,522.43

Source: C&S Engineers, 2023

The resulting GHG emissions for natural gas consumption from mobile sources is 1,736.55 MT CO₂e.

3.1.3 Scope 1: Wastewater Treatment

Wastewater within the City's municipal boundary is conveyed to the sewage treatment plant that is jointly owned between the City of Binghamton and Johnson City. The City of Binghamton owns 54.8% of the facility, while Johnson City owns 45.2% of the facility. Sewage treatment plants consume large quantities of electricity and natural gas, which are accounted for within **Section 3.1.1** and **Section 3.1.4**. The USEPA Tool also accounts for the releases of CH₄ and N₂O during specific wastewater treatment processes. Based on information provided by the City, selections were made in the USEPA Tool to reflect that the sewage treatment plant uses aerobic treatment and only conducts nitrification (but not denitrification).

The USEPA Inventory Tool requests the user to identify the population served by the wastewater treatment facility. In order to only account for the City of Binghamton, only the number of residents from the City of Binghamton were included. The USEPA Inventory Tool also asks for the number of residents served by septic systems. According to the New York Department of State GIS mapping data layer *Septic Systems for New York*, there are 68 septic systems within the City of Binghamton.⁶

The resulting GHG emissions for wastewater treatment processes is 62.51 MT CO₂e.

3.1.4 Scope 2: Electricity Consumption

NYSEG provides the City with monthly electricity consumption by address for all City owned and operated facilities. Similar to **Section 3.1.1**, consumption was totaled by department based on available account codes, and the City Hall complex electricity records reflected the City's share of the utility bills, or 26.37%. **Table 3-3** below summarizes the electricity consumption by department for the inventory year.

The Binghamton-Johnson City Joint Sewage Treatment Facility (BJCJSTF) was not listed as an account within the NYSEG data. Therefore, the electricity records were provided by the plant's Superintendent for a 12-month period starting in August 2022 and ending in September 2023. The electricity consumption was adjusted by 54.8% to reflect only the City of Binghamton's share of the utility bill.

⁶ New York Department of State. *Septic Systems for New York* updated: Aug 3, 2023. NYSDOS_GIS <https://www.arcgis.com/home/item.html?id=24637ac159f64e38a4c1612c3758a26c>

Table 3-3 Electricity Consumption by Department

Department	Facility Type	EPA Facility Type	2022 Electricity Usage (kwh)
Fire	Building	Office Building	114,925.00
Parks	Building	Office Building	2,246,246.51
Parks	Liftstation	Water Infrastructure	42,991.00
Parks	Light	Outdoor Lighting	1,312,400.56
Parks	Park	Other	487,938.97
Parks	Parking Meter	Other	19,332.00
Parks	Pool	Other	35,109.00
Parks	Sign	Outdoor Lighting	147.00
Parks	Traffic Light	Outdoor Lighting	233,292.12
Parks	Vacant	Office Building	28,030.00
Parks	Water Tower	Water Infrastructure	57,208.21
Parks	(blank)	Other	81.27
Police	Building	Office Building	468.00
Police	Camera	Outdoor Lighting	247.00
Police	Traffic Light	Outdoor Lighting	1,544.00
Sewer	Electric Station	Wastewater Infrastructure	6,200.00
Sewer	Flood Control	Wastewater Infrastructure	21,800.00
Sewer	Liftstation	Wastewater Infrastructure	835,575.84
Sewer	Park	Other	10,100.00
Sewer	Traffic Light	Outdoor Lighting	176,800.00
Sewer	Vacant	Other	1,567.08
Unknown	Building	Office Building	1,525,864.52
DPW	Liftstation	Wastewater Infrastructure	428,333.40
DPW	Light	Outdoor Lighting	25,060.47
Parks	Park	Other	99,069.61
Parks	Pool	Other	31,760.00
DPW	Ramp	Other	171,020.80
Unknown	(blank)	Other	485,168.90
Joint Sewage Treatment Plant	Building	Wastewater Infrastructure	5,973,956.24
DPW	Building	Building	400,000.00
DPW	BJCJSTF Solar Array	Other	-31,490.82*
DPW	Water Treatment Plant Solar Array	Other	-57,465.00
General	RECs	General	10,797,000.00
TOTAL (Location Based – without RECs)			14,683,281.68
TOTAL (Market Based - with RECs)			14,655,248.68

Source: City of Binghamton, 2023

*Represents the City's share (54.8%) of total electricity generated from the BJCJSTF solar array (57,465 kwh)

The City of Binghamton owns and operates two 50 kW solar photovoltaic system on the roofs of the City's Water Treatment Plant and the BJCJSTF. Based on the PVWatts Model, which is provided by the National Renewable Energy Laboratory, each array is estimated to generate 57,465 kWh per year. The electricity generated from the BJCJSTF roof was adjusted by 54.8% to reflect only the City of Binghamton's share of the electricity generated, and then added to the electricity generated by the Water Treatment Plant array. The combined estimated electricity generation was subtracted from the total electricity consumption for the inventory year.

Since the emissions factors from electricity consumption can vary based on how a region generates its electricity, the NYUP eGRID subregion was selected within the USEPA Inventory Tool to accurately represent the electric grid of the Binghamton area.

The resulting municipal GHG emissions from electricity consumption is 1,551.04 MT CO₂e (or 408.34 MT CO₂e if using a market-based approach).

3.1.5 Scope 3: Employee Commute

The City employs a total of 581 people in all of its departments. An employee commute survey was developed and distributed by e-mail and hard copy to all employees to determine commuting patterns, mode choice preference, number of days per work week, and average commuting distance. The survey received 91 responses, which equates to approximately 16% of the City's staff. City employees predominately drive themselves, with 93% of employees driving alone, 4% carpooling, and 3% biking or walking as weather allows. On average, City employees work 4.3 days per week and have a one-way commute distance of 5.2 miles. The survey results were used as the basis for calculations for all 500+ City employees within the USEPA Inventory Tool, but will also be considered during the development of the Climate Action Plan for potential emissions reduction initiatives.

The resulting GHG emissions from municipal employee commutes, assuming 93% of the City's 500+ employees driving, is 516.77 MT CO₂e.

3.1.6 Scope 3: Water Consumption

The USEPA Inventory Tool calculates the emissions resulting from distribution of water for a municipality's use. According to the Binghamton Water Department's 2022 Annual Water Quality Report, 621,719,443 gallons of water was used by the City for firefighting; parks; non-revenue miscellaneous usage; pools and street flushing; biannual hydrant flushing/flow testing program; and water main breaks and leakage. This value was entered into the USEPA Inventory Tool, resulting in a total of 368.77 MT CO₂e.

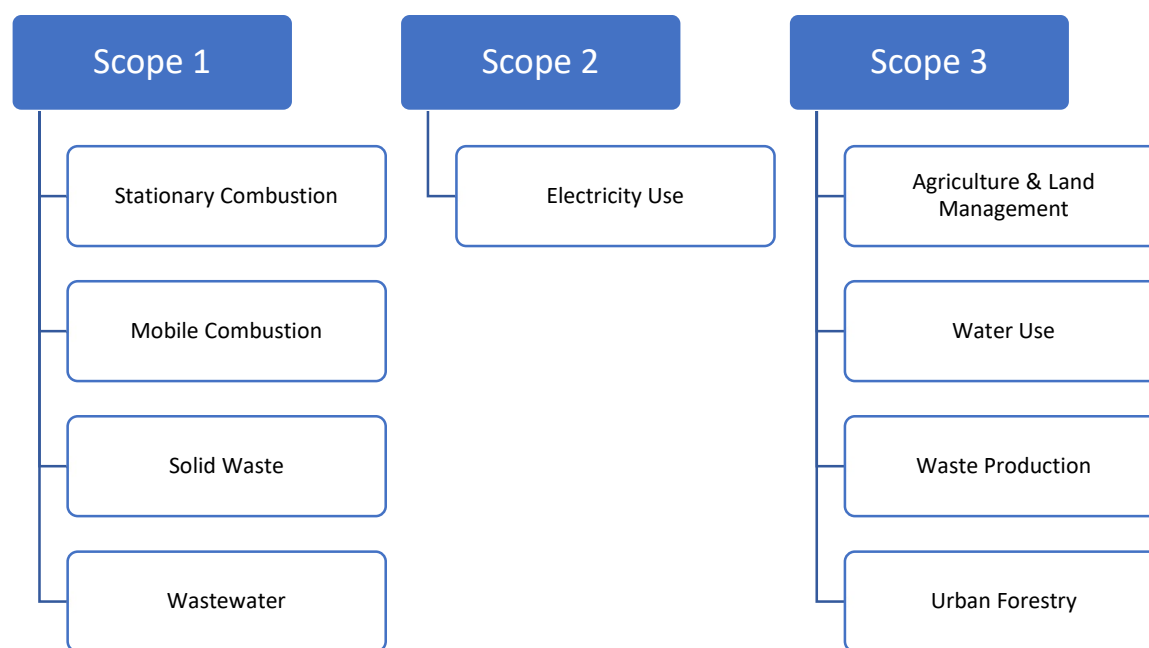
3.1.7 Scope 3: Urban Forestry

The USEPA Inventory Tool estimates the carbon dioxide sequestration associated with urban trees managed by a municipal government. The City of Binghamton’s Urban Forestry program utilizes the TreeKeeper software for managing 10,518 trees. The software estimates that approximately 666.21 MT CO_{2e} has been sequestered by the City’s trees over the inventory year.

3.2 Community Inventory Module

This section describes the emissions associated with the community of the City of Binghamton’s, referred to as the “Community Inventory”. Emissions were calculated using the Community Module of the USEPA’s Inventory Tool. The following sections are organized to mirror the structure of the USEPA’s Inventory Tool, as detailed in **Figure 3.2** below.

Figure 3.2 Sources of Emissions



The following emissions sources were not included within the GHG inventory:

- Solid waste: There is not a landfill treatment facility within the City of Binghamton; solid waste is transported to the Broome County Landfill. Therefore, any solid waste calculations are accounted for within the Scope 3 section of the Community Inventory.
- Agriculture & Land Management: The USEPA Inventory Tool requests the user to enter fertilizer consumption data for each sector, which is not tracked by the City of Binghamton.
- Government Operations: The total emissions from each category of the government operations module were subtracted from the total emissions of the City of Binghamton

to avoid double counting. This affects the stationary combustion, mobile combustion, and electricity use categories.

- Wastewater: Since the City of Binghamton government owns and maintains all processes related to wastewater treatment, emissions from the treatment of wastewater within the City of Binghamton are accounted for in **Section 3.1** (Municipal Inventory) and are not included in the Community Inventory.

3.2.1 Scope 1: Stationary Combustion

The New York State Energy Research and Development Authority (NYSERDA) maintains the Utility Energy Registry (UER), an online database platform that provides public access to community-scale energy data. Total natural gas consumption was obtained for the inventory year for the City of Binghamton for the different available sectors (residential, commercial, and industrial). Consumption was converted from therms to thousand cubic feet (mcf) for entry into the USEPA Inventory Tool. Total consumption and GHG emissions are presented in **Table 3-4** below.

Table 3-4 GHG Emissions from Stationary Sources

Sector	Natural Gas Consumption (mcf)	GHG Emissions (MT CO ₂ e)
Residential	1,630,961	89,794.08
Commercial/Institutional	1,193,446	65,706.29
Industrial	196,580	10,822.89
Total	3,020,988	166,323.26

Source: NYSERDA UER, <https://publish.utilityregistry.org>, 2023

As detailed in **Section 3.1.1**, GHG emissions for natural gas consumption from government operations is 1,428.03 MT CO₂e. Therefore, total GHG emissions from the community's natural gas consumption is 164,895.23 MT CO₂e.

3.2.2 Scope 1: Mobile Combustion

The USEPA Inventory Tool requires the user to enter the year of manufacture, fuel type, fuel consumed, and vehicle miles traveled for each vehicle type within the inventory.

According to the U.S. Department of Transportation (DOT) Bureau of Transportation Statistics, the average weekday household vehicle miles traveled for the City of Binghamton is 21.48 miles⁷. The U.S. Census American Community Survey from 2021 indicates the City of

⁷ Bureau of Transportation Statistic's webpage: [Local Area Transportation Characteristics for Households Data | \(bts.gov\)](https://bts.gov)

Binghamton has a total of 20,950 households⁸. Therefore, if every household drives the average of 21.48 miles per day, the total VMT for households within the City of Binghamton is equal to 164,252,190 for the inventory year.

The Transportation Energy Data Book, published by the U.S. Department of Energy (DOE), indicates that the average age of a vehicle in 2020 was 12.1 years⁹. Therefore, it was assumed that all vehicles within the 2022 inventory year had a manufacture year of 2010.

The DOE Alternative Fuels Data Center (AFDC)¹⁰ publishes the number of vehicles registered in each state by fuel type. The percentage breakdown of vehicles by fuel type for New York was applied to the VMT provided by the Binghamton Metropolitan Transportation Study (BMTS) to obtain the total number of VMT by fuel type within the inventory year. Fuel consumption by fuel type was obtained by multiplying the VMT by the fuel economies provided within the USEPA Inventory Tool. The fuel economies for hybrid vehicles and vehicles fueled by ethanol, compressed natural gas, and propane were not listed within the tool and were therefore obtained from fueleconomy.gov, the official U.S. website on fuel economy information, using a 2010 year of manufacture. **Table 3-5** below summarizes the data entered into the USEPA Inventory Tool for motor vehicles.

Table 3-5 Motor Vehicle Data Summary

Fuel Types	Percent of NYS Registered Vehicles	VMT by Fuel Type	Fuel Economy (miles per gal)	Fuel Consumption
Electric (EV)	0.460%	754,757.91	0	0
Plug-In Hybrid Electric	0.395%	648,597.35	55	77,424.49
Hybrid Electric	1.962%	3,222,627.21		
Biodiesel	0.381%	625,329.29	32.4	19,300.29
Ethanol/Flex (E85)	5.876%	9,651,884.84	21	459,613.56
Compressed Natural Gas (CNG)	0.008%	13,088.29	31	467.44
Propane	0.001%	1,454.25	31	51.94
Gasoline	89.568%	147,118,167.52	24.1	6,104,488.28
Diesel	1.349%	2,216,283.34	32.4	68,403.81

Source: DOT, US Census, AFDC, fueleconomy.gov, 2023

⁸ US Census Bureau. *DP02 | Selected Social Characteristics in the United States*. (2021). ACS 5-Year Estimates Selected Population Data Profiles.

<https://data.census.gov/table?g=160XX00US3606607&tid=ACSDP5YSPT2021.DP02>

⁹ Davis, Stacy C., and Robert G. Boundy. *Transportation Energy Data Book: Edition 40*. 2022.

¹⁰ USDOE's webpage: [EERE: Alternative Fuels Data Center Home Page \(energy.gov\)](https://www.afdc.energy.gov/)

Total GHG emissions from mobile sources within the City of Binghamton were calculated to be 55,911.87 MT CO₂e. As detailed in **Section 3.1**, GHG emissions from City-owned vehicles is 1,736.55 MT CO₂e, and the GHG emissions from the commutes associated with City of Binghamton employees is 516.77 MT CO₂e. Therefore, total adjusted GHG emissions from the community’s mobile sources is 53,658.55 MT CO₂e.

3.2.3 Scope 2 - Electricity Consumption

Similar to Section 3.2.1, NYSERDA UER was used to obtain total electricity consumption for the inventory year for the City of Binghamton for the different available sectors (residential, commercial, and industrial). Consumption was converted from megawatt-hours (MWh) to kilowatt-hours (kWh) for entry into the USEPA Inventory Tool. Total consumption and GHG emissions are presented in **Table 3-6** below.

Table 3-6 GHG Emissions from Electricity Consumption

Sector	Electricity Consumption (kwh)	GHG Emissions (MT CO ₂ e)
Residential	122,095,784.20	12,922.0
Commercial/Institutional	168,688,123.70	17,853.1
Industrial	9,574,178.30	1,013.3
Total	300,358,086.20	31,788.40

Source: NYSERDA UER, <https://publish.utilityregistry.org>, 2023

Since the emissions factors from electricity consumption can vary based on how a region generates its electricity, the NYUP eGRID subregion was selected within the USEPA Inventory Tool to accurately represent the electric grid of the Binghamton area. As detailed in **Section 3.1.1**, GHG emissions from electricity consumption from government operations is 1,551.04 MT CO₂e. Therefore, total GHG emissions from the community’s electricity consumption is 30,237.33 MT CO₂e.

3.2.4 Scope 3 – Waste Production

The City of Binghamton tracks the total tons of recycled material and the type and quantity of solid waste hauled to the landfill each year, categorizing the waste as municipal solid waste; sludge; construction and demolition waste; industrial waste; contaminated material; aggregates; and tires. All waste collected within the City of Binghamton is transported to the Broome County Landfill, which is operated by the Broome County Division of Solid Waste Management, for disposal. Emissions from municipal solid waste are included in the total for the Community Inventory.

The USEPA Inventory Tool refers to the USEPA’s WAsTe Reduction Model (WARM), which quantifies the emissions associated with the decomposition of waste based on the quantity and type of waste landfilled or recycled. **Table 3-7** below summarizes the types and quantities of waste landfilled during the inventory year, as entered into the USEPA WARM tool.

Table 3-7 Summary of Recycled and Landfilled Materials

Waste Material Category	Tons
Mixed Recyclables	1,976.98
Tires	9
Mixed MSW	15,138.07
Total	17,124.05

Source: City of Binghamton, 2023

According to the USEPA WARM tool, the solid waste transported to the Broome County Landfill generated 1,767.55 MT CO₂e.

3.2.5 Scope 3 - Water Consumption

According to the Binghamton Water Department’s 2022 Annual Water Quality Report, the total amount of water pumped out of the water treatment facility in the inventory year was 1,731,278,707, with 621,719,443 gallons of water was used by the City for government operations. The total amount of water used for residential, commercial, and industrial customers was therefore equal to 1,109,559,264 gallons.

Water consumption is not tracked by sector and therefore cannot be divided among residential, industrial, and commercial customers. Therefore, in order to approximate consumption of water among these sectors, it was assumed that the percentage of each sector’s water consumption would be similar to electricity consumption, which equates to 56.2%, 3.2%, and 40.7% of electricity consumption by commercial, industrial, and residential users, respectively. Total water consumption was split among residential, commercial, and industrial sectors based on these percentages and entered into the USEPA Inventory Tool, resulting in a total of 819.78 MT CO₂e.

4 Results

The results of the 2022 GHG inventory are summarized in **Table 4-1**. Detailed inputs and output printouts are provided as **Appendix A**.

Table 4-1 2022 GHG Emissions Inventory (metric tons)

Scope	Source	GHG Emissions (MT CO ₂ e)
<i>City of Binghamton Municipal GHG Inventory</i>		
1	Stationary	1,428.03
	Mobile	1,736.55
	Wastewater Treatment	62.51
2	Electricity Consumption – Location Based	1,551.04
	Electricity Consumption – Market Based	408.34
3	Employee Commute	516.77
	Water Consumption	368.77
	Urban Forestry	-666.21
<i>Subtotal – Location Based</i>		4,997.45
<i>Subtotal – Market Based</i>		3,854.75
<i>City of Binghamton Community GHG Inventory</i>		
1	Stationary	164,895.23
	Mobile	53,658.55
2	Electricity Consumption	30,237.33
3	Water Consumption	819.78
	Waste Generation	1,767.55
<i>Subtotal</i>		251,378.44
<i>Total GHG Emissions (with location-based municipal inventory)</i>		256,375.89
<i>Total GHG Emissions (with market-based municipal inventory)</i>		255,233.19

Source: C&S Engineers, 2024

5 Comparison with 2006 Inventory

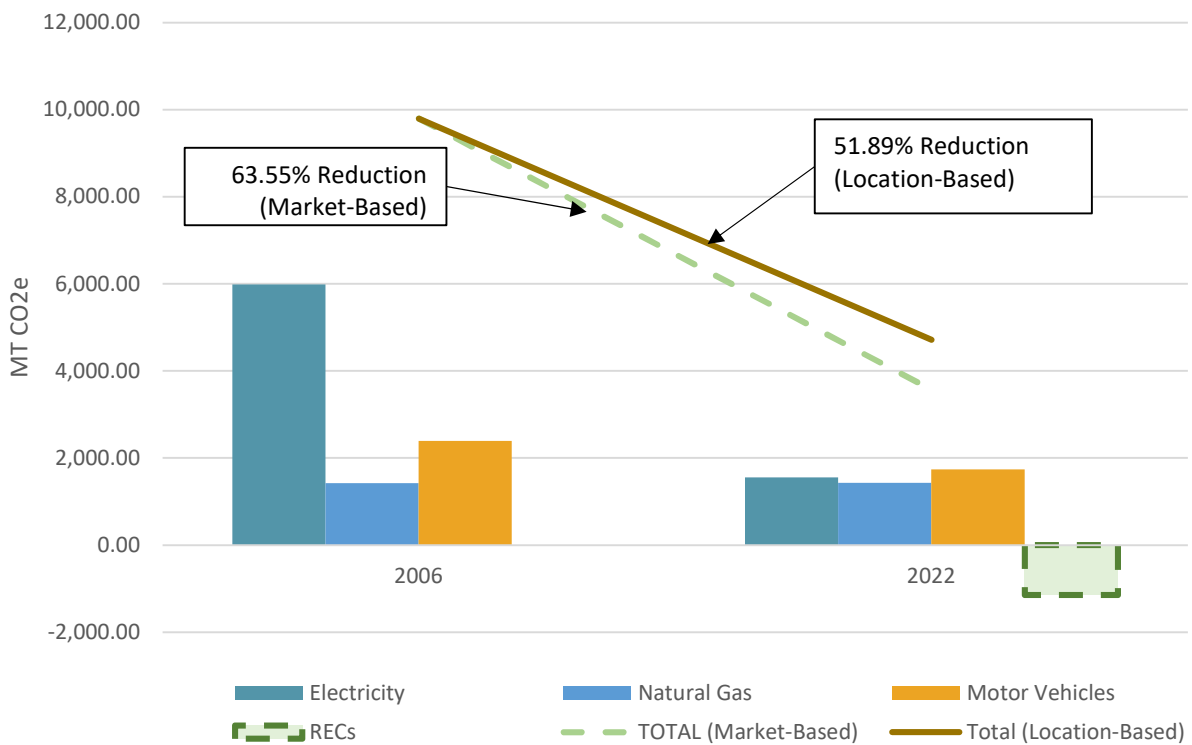
Table 5-1 and **Figure 5.1** present a comparison of the total emissions results between 2006 and 2022 for the three highest-emitting sources, which represents a 51.89% reduction in emissions (or 63.55% if using a market-based approach).

Table 5-1 Comparison of Municipal Inventory Results

Emissions Sources	2006 GHG Emissions (MT CO2e)	2022 GHG Emissions (MT CO2e)
Electricity	5,984.80	1,551.04
Renewable Energy Certificates	0	-1,142.70
Natural Gas	1,423.30	1,428.03
Motor Vehicles	2,393.00	1,736.55
TOTAL Location Based	9,801.10	4,715.62
Total Market Based (with recs)	9,801.10	3,572.92

Source: City of Binghamton, C&S Engineers, 2024

Figure 5.1 Comparison of Municipal Inventory Results



It is assumed that the decrease in emissions resulted from the following:

- ◆ Electricity: The NYUP electricity grid has experienced an increased use of renewable energy sources, which have caused CO₂e emissions factors to decrease from approximately 1,041.99

lb CO₂e/MWh to 233.33 lb CO₂e/MWh. The City has also undertaken energy-conserving initiatives, like replacing light bulbs for City street lights with LED bulbs.

- ◆ Natural gas: The decrease in natural gas is likely due to more efficient heating and ventilation equipment within the various sectors.
- ◆ Motor vehicles: While it is estimated that VMT from the City’s fleet vehicles has increased, the fleet is comprised of more fuel-efficient vehicles since the 2006 inventory.

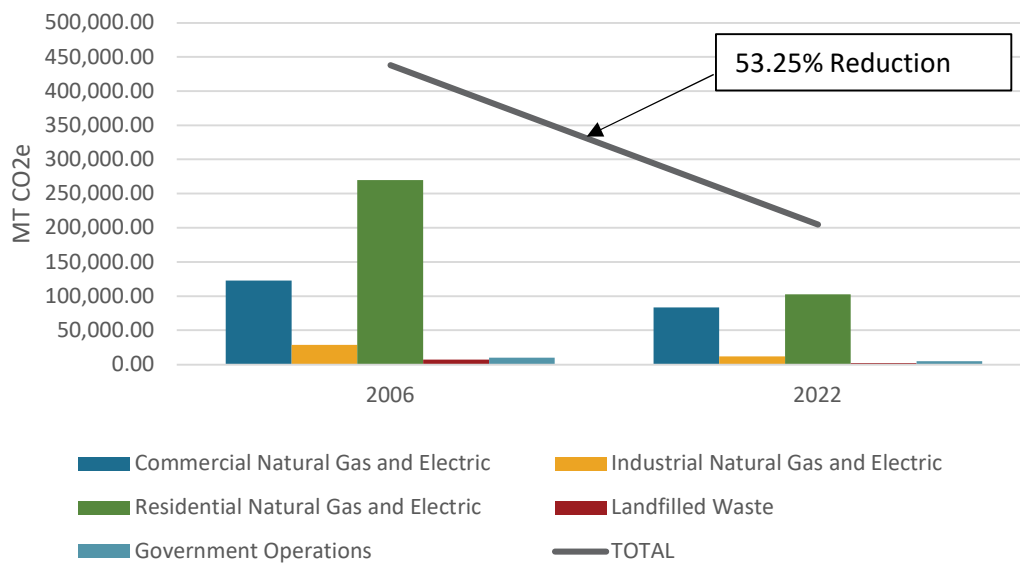
Table 5-2 and **Figure 5.2** presents a comparison of the total emissions results between 2006 and 2022, which represents a 53.25% reduction in emissions.

Table 5-2 Comparison of Community Inventory Results

Emissions Source	2006 GHG Emissions (MT CO ₂ e)	2022 GHG Emissions (MT CO ₂ e)
Commercial Natural Gas and Electric	122,724.00	83,559.38
Industrial Natural Gas and Electric	28,466.00	11,836.17
Residential Natural Gas and Electric	269,986.00	102,716.07
Transportation	207,628.00	53,658.55
Landfilled Waste	7,270.00	1,767.55
Municipal Inventory – location based	9,801.10	4,997.46
Municipal Inventory – market based	9,801.10	3,854.76
<i>Subtotal – With Transportation</i>	645,875.10	258,535.18
TOTAL – location based (without transportation)	438,247.10	204,876.63
TOTAL – market based (without transportation)	438,247.10	203,733.93

Source: City of Binghamton, C&S Engineers, 2024

Figure 5.2 Comparison of Community Inventory Results (Location Based)



It is assumed that the decrease in emissions resulted from the following:

- ◆ Landfilled waste emissions (which includes solid waste emissions from the City government buildings and operations as well as the community) reduced significantly between 2006 and 2022, which could be due to the increased landfill gas recovery operations that have reduced methane emissions from the Broome County Landfill. The amount of methane captured has not been quantified.
- ◆ Electricity: The NYUP electricity grid has experienced an increased use of renewable energy sources, which have caused CO₂e emissions factors to decrease from approximately 1,041.99 lb CO₂e/MWh to 233.33 lb CO₂e/MWh.
- ◆ Natural gas: The decrease in natural gas is likely due to more efficient heating and ventilation equipment within the various sectors.
- ◆ Transportation: It should be noted that the percent reduction calculation does not include emissions from transportation as the values vary significantly between 2006 and 2022. While census data indicates that the percentage of workers that work from home has increased from 2.9% in 2010 to 6% in 2021, the difference is more likely due to a change in methodology between the inventory years. During the 2006 inventory, BMTS indicated that the average daily VMT within the City boundary was 885,499 miles, or 323,207,135 miles for 2006 when multiplied by 365. Follow up discussions with BMTS indicated that the methodology used to calculate VMT in 2006 could not be replicated. Therefore, the 2022 VMT was calculated to be 164,252,190 based on available census data.

The previous Climate Action Plan set an emissions reduction goal of 25% by 2025 goal. In addition, the State of New York has set an emissions reduction goal of 85% from a 1990 baseline by 2050. The City of Binghamton has exceeded its goal for government operations by more than double and has helped the community of Binghamton and New York State make progress towards its overall goals.

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Appendix A – Modeling Results

Municipal Inventory Results - Location Based

Inventory Emissions Summary

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Please use the drop-down menu in the Scope 2 Emissions Selection box to determine which scope 2 emissions methodology is used in the summary tables

Scope 2 Emissions Selection: **Location Based**

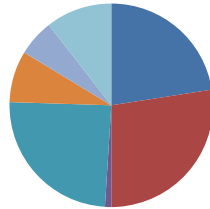
0.10 Per capita Emissions for City of Binghamton (MT CO₂e/person)

Total City of Binghamton Emissions (MT CO ₂ e)								
	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	Total MT CO ₂ e	Percent of Total
Scope 1	2,485.78	21.15	53.95	-	-	-	2,560.87	51%
Scope 2 - Location Based	1,544.25	2.83	3.96	-	-	-	1,551.04	31%
Scope 2 - Market Based <i>(for informational purposes only)</i>	406.55	0.74	1.04	-	-	-	408.34	
Scope 3	883.93	0.67	0.94	-	-	-	885.54	18%
Total Gross Emissions	4,913.95	24.64	58.85	-	-	-	4,997.45	100%
Total Net Emissions	4,913.95	24.64	58.85	-	-	-	4,997.45	100%

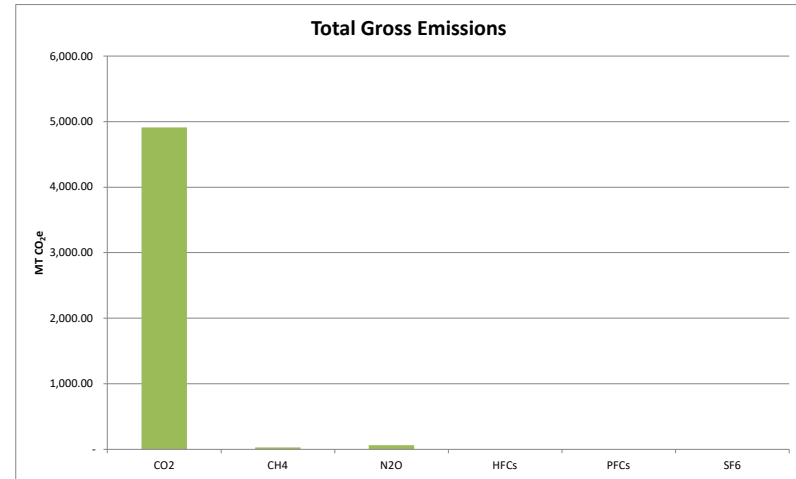
Emissions by Source (MT CO ₂ e)								
Source	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	Total	Percent of Total
Stationary Combustion	1,424.06	3.16	0.80	-	-	-	1,428.03	29%
Mobile Combustion	1,727.93	1.22	7.40	-	-	-	1,736.55	35%
Solid Waste	-	-	-	-	-	-	-	0%
Wastewater Treatment	-	16.76	45.74	-	-	-	62.51	1%
Electricity - Location Based	1,544.25	2.83	3.96	-	-	-	1,551.04	31%
Electricity - Market Based <i>(for informational purposes only)</i>	406.55	0.74	1.04	-	-	-	408.34	
Employee Commute	516.77	-	-	-	-	-	516.77	10%
Water	367.15	0.67	0.94	-	-	-	368.77	7%
Ag & Land Management	-	-	-	-	-	-	-	0%
Urban Forestry	-	-	-	-	-	-	-	0%
Waste Generation	-	-	-	-	-	-	-	0%
Total (Gross Emissions)	4,913.95	24.64	58.85	-	-	-	4,997.45	100%
Total (Net Emissions)	4,913.95	24.64	58.85	-	-	-	4,997.45	100%

Emissions by Source (MT CO₂e)

- Stationary Combustion
- Mobile Combustion
- Solid Waste
- Wastewater Treatment
- Electricity - Location Based
- Employee Commute
- Water
- Ag & Land Management
- Urban Forestry
- Waste Generation
- Other

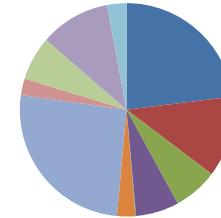


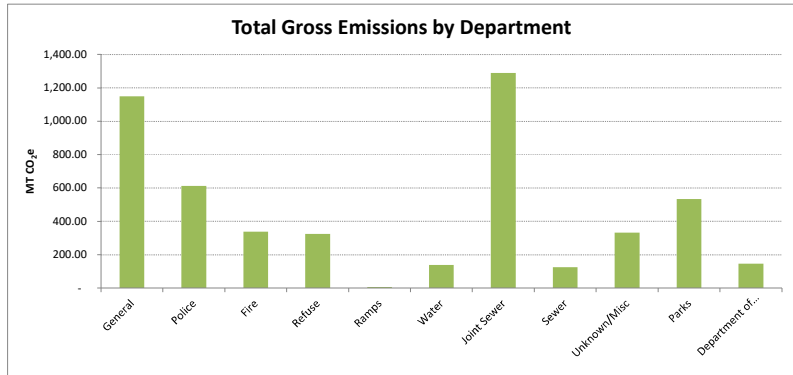
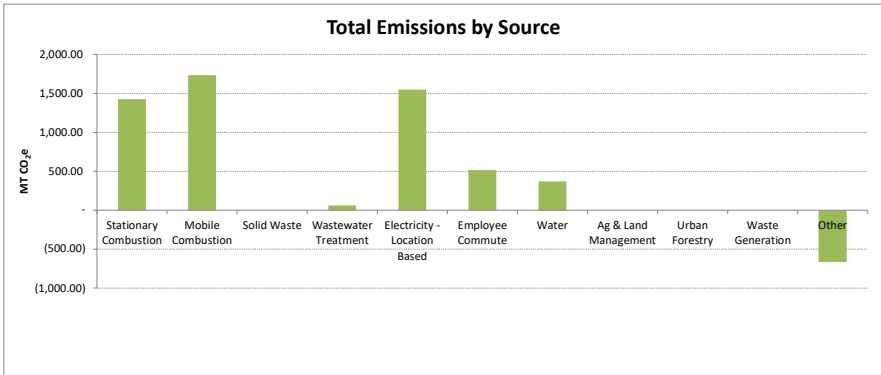
Gross Emissions by Department		
Department	Total (MT CO ₂ e)	Percent of Total
General	1,149.99	23%
Police	612.85	12%
Fire	339.28	7%
Refuse	324.16	6%
Ramps	5.21	0%
Water	139.16	3%
Joint Sewer	1,288.95	26%
Sewer	125.25	3%
Unknown/Misc	332.43	7%
Parks	534.29	11%
Department of Public Works	145.87	3%
Total	4,997.45	100%



Gross Emissions by Department

- General (23%)
- Police (12%)
- Fire (7%)
- Refuse (6%)
- Ramps (0%)
- Water (3%)
- Joint Sewer (26%)
- Sewer (3%)
- Unknown/Misc (7%)
- Parks (11%)
- Department of Public Works (3%)





Total Emissions by Department and Source (MT CO ₂ e)													
Department	Location Based			Solid Waste	Waste water	Employee Commute	Water	Agriculture & Land		Urban Forestry	Other	TOTAL GROSS	TOTAL NET
	Stationary	Electricity	Mobile					Management	Forestry				
General	-	(6.08)	599.63	-	-	187.68	368.77	-	-	-	-	1,149.99	1,149.99
Police	26.34	0.24	461.75	-	-	124.52	-	-	-	-	-	612.85	612.85
Fire	61.24	12.16	154.69	-	-	111.18	-	-	-	-	-	339.28	339.28
Refuse	-	-	320.60	-	-	3.56	-	-	-	-	-	324.16	324.16
Ramps	-	-	5.21	-	-	-	-	-	-	-	-	5.21	5.21
Water	-	(3.33)	106.02	-	-	36.47	-	-	-	-	-	139.16	139.16
Joint Sewer	519.46	632.25	74.74	-	62.51	-	-	-	-	-	-	1,288.95	1,288.95
Sewer	-	111.34	13.91	-	-	-	-	-	-	-	-	125.25	125.25
Unknown/Misc	39.67	292.77	-	-	-	-	-	-	-	-	-	332.43	332.43
Parks	677.78	469.35	-	-	-	53.37	-	-	-	-	(666.21)	534.29	534.29
Department of Public Works	103.54	42.33	-	-	-	-	-	-	-	-	-	145.87	145.87
Total	1,428.03	1,551.04	1,736.55	-	62.51	516.77	368.77	-	-	(666.21)	(666.21)	4,997.45	4,997.45



Municipal Inventory Results - Location Based

Inventory Emissions Summary

[Return to Table of Contents](#)

Please use the drop-down menu in the Scope 2 Emissions Selection box to determine which scope 2 emissions methodology is used in the summary tables

Scope 2 Emissions Selection: **Market Based**

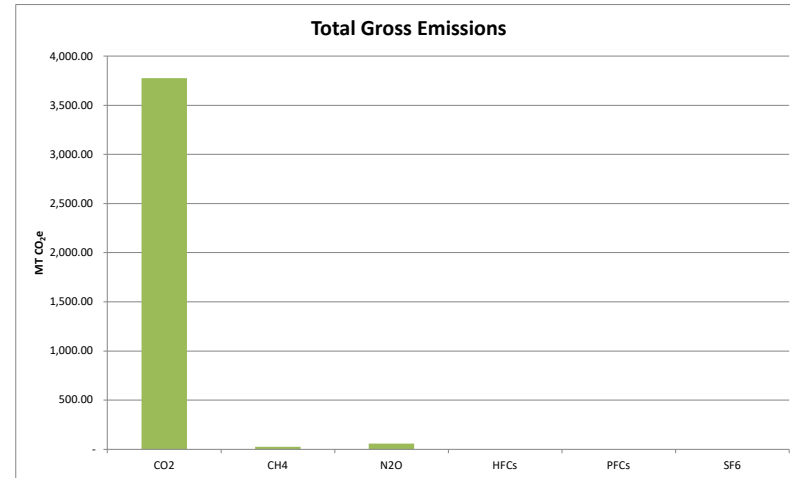
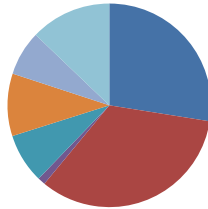
0.08 Per capita Emissions for City of Binghamton (MT CO₂e/person)

Total City of Binghamton Emissions (MT CO ₂ e)								
	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	Total MT CO ₂ e	Percent of Total
Scope 1	2,485.78	21.15	53.95	-	-	-	2,560.87	66%
Scope 2 - Location Based	1,544.25	2.83	3.96	-	-	-	1,551.04	
Scope 2 - Market Based <i>(for informational purposes only)</i>	406.55	0.74	1.04	-	-	-	408.34	11%
Scope 3	883.93	0.67	0.94	-	-	-	885.54	23%
Total Gross Emissions	3,776.25	22.56	55.93	-	-	-	3,854.75	100%
Total Net Emissions	3,776.25	22.56	55.93	-	-	-	3,854.75	100%

Emissions by Source (MT CO ₂ e)								
Source	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	Total	Percent of Total
Stationary Combustion	1,424.06	3.16	0.80	-	-	-	1,428.03	37%
Mobile Combustion	1,727.93	1.22	7.40	-	-	-	1,736.55	45%
Solid Waste	-	-	-	-	-	-	-	0%
Wastewater Treatment	-	16.76	45.74	-	-	-	62.51	2%
Electricity - Location Based	1,544.25	2.83	3.96	-	-	-	1,551.04	
Electricity - Market Based <i>(for informational purposes only)</i>	406.55	0.74	1.04	-	-	-	408.34	11%
Employee Commute	516.77	-	-	-	-	-	516.77	13%
Water	367.15	0.67	0.94	-	-	-	368.77	10%
Ag & Land Management	-	-	-	-	-	-	-	0%
Urban Forestry	-	-	-	-	-	-	-	0%
Waste Generation	-	-	-	-	-	-	-	0%
Total (Gross Emissions)	3,776.25	22.56	55.93	-	-	-	3,854.75	100%
Total (Net Emissions)	3,776.25	22.56	55.93	-	-	-	3,854.75	100%

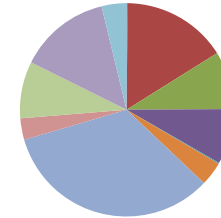
Emissions by Source (MT CO₂e)

- Stationary Combustion
- Mobile Combustion
- Solid Waste
- Wastewater Treatment
- Electricity - Market Based
- Employee Commute
- Water
- Ag & Land Management
- Urban Forestry
- Waste Generation
- Other

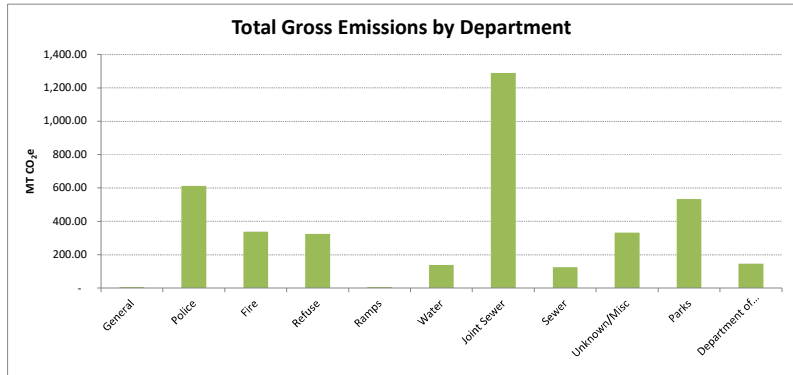
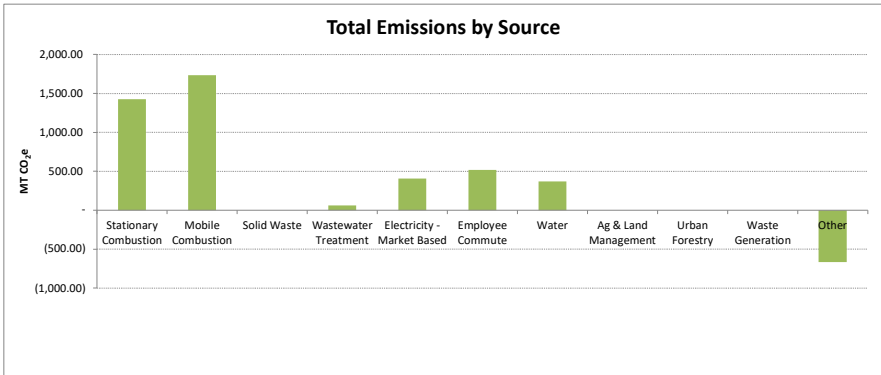


Gross Emissions by Department

- General (0%)
- Police (16%)
- Fire (9%)
- Refuse (8%)
- Ramps (0%)
- Water (4%)
- Joint Sewer (33%)
- Sewer (3%)
- Unknown/Misc (9%)
- Parks (14%)
- Department of Public Works (4%)



Gross Emissions by Department		
Department	Total (MT CO ₂ e)	Percent of Total
General	7.29	0%
Police	612.85	16%
Fire	339.28	9%
Refuse	324.16	8%
Ramps	5.21	0%
Water	139.16	4%
Joint Sewer	1,288.95	33%
Sewer	125.25	3%
Unknown/Misc	332.43	9%
Parks	534.29	14%
Department of Public Works	145.87	4%
Total	3,854.75	100%



Total Emissions by Department and Source (MT CO ₂ e)													
Department	Market Based			Solid Waste	Waste water	Employee Commute	Water	Agriculture & Land		Urban Forestry	Other	TOTAL GROSS	TOTAL NET
	Stationary	Electricity	Mobile					Management	Forestry				
General	-	(1,148.78)	599.63	-	-	187.68	368.77	-	-	-	-	7.29	7.29
Police	26.34	0.24	461.75	-	-	124.52	-	-	-	-	-	612.85	612.85
Fire	61.24	12.16	154.69	-	-	111.18	-	-	-	-	-	339.28	339.28
Refuse	-	-	320.60	-	-	3.56	-	-	-	-	-	324.16	324.16
Ramps	-	-	5.21	-	-	-	-	-	-	-	-	5.21	5.21
Water	-	(3.33)	106.02	-	-	36.47	-	-	-	-	-	139.16	139.16
Joint Sewer	519.46	632.25	74.74	-	62.51	-	-	-	-	-	-	1,288.95	1,288.95
Sewer	-	111.34	13.91	-	-	-	-	-	-	-	-	125.25	125.25
Unknown/Misc	39.67	292.77	-	-	-	-	-	-	-	-	-	332.43	332.43
Parks	677.78	469.35	-	-	-	53.37	-	-	-	-	(666.21)	534.29	534.29
Department of Public Works	103.54	42.33	-	-	-	-	-	-	-	-	-	145.87	145.87
Total	1,428.03	408.34	1,736.55	-	62.51	516.77	368.77	-	-	-	(666.21)	3,854.75	3,854.75



Inventory Emissions Summary

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Please use the drop-down menu in the Scope 2 Emissions Selection box to determine which scope 2 emissions methodology is used in the summary tables

Scope 2 Emissions Selection: **Location Based**

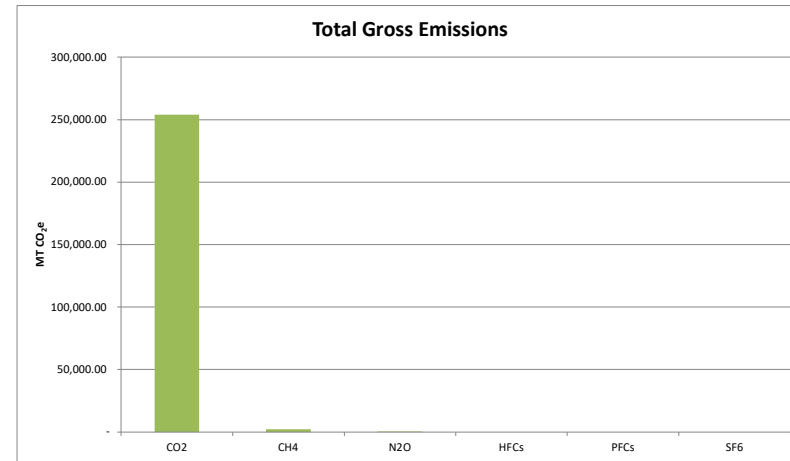
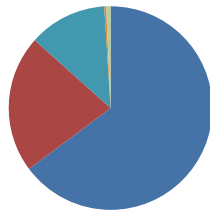
5.35 Per capita Emissions for Binghamton (MT CO₂e/person)

Total Binghamton Emissions (MT CO ₂ e)								
	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	Total MT CO ₂ e	Percent of Total
Scope 1	221,632.97	398.05	204.11	-	-	-	222,235.13	87%
Scope 2 - Location Based	31,649.26	57.90	81.20	-	-	-	31,788.37	12%
Scope 2 - Market Based <i>(for informational purposes only)</i>	31,649.26	57.90	81.20	-	-	-	31,788.37	
Scope 3	-	-	-	-	-	-	-	0%
Total Gross Emissions	254,098.43	2,224.99	287.40	-	-	-	256,610.83	99%
Total Net Emissions	254,098.43	2,224.99	287.40	-	-	-	256,610.83	99%

Emissions by Source (MT CO ₂ e)								
Source	CO ₂	CH ₄	N ₂ O	HFCs	PFCs	SF ₆	Total	Percent of Total
Stationary Combustion	165,861.36	368.45	93.45	-	-	-	166,323.26	65%
Mobile Combustion	55,771.61	29.59	110.67	-	-	-	55,911.87	22%
Solid Waste	-	-	-	-	-	-	-	0%
Wastewater Treatment	-	-	-	-	-	-	-	0%
Electricity - Location Based	31,649.26	57.90	81.20	-	-	-	31,788.37	12%
Electricity - Market Based <i>(for informational purposes only)</i>	31,649.26	57.90	81.20	-	-	-	31,788.37	
Water	816.20	1.49	2.09	-	-	-	819.78	0%
Ag & Land Management	-	-	-	-	-	-	-	0%
Urban Forestry	-	-	-	-	-	-	-	0%
Waste Generation	-	1,767.55	-	-	-	-	1,767.55	1%
Total (Gross Emissions)	254,098.43	2,224.99	287.40	-	-	-	256,610.83	100%
Total (Net Emissions)	254,098.43	2,224.99	287.40	-	-	-	256,610.83	100%

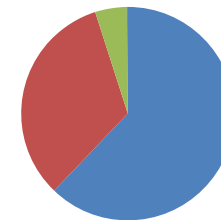
Emissions by Source (MT CO₂e)

- Stationary Combustion
- Mobile Combustion
- Solid Waste
- Wastewater Treatment
- Electricity - Location Based
- Water
- Ag & Land Management
- Urban Forestry
- Waste Generation
- Other

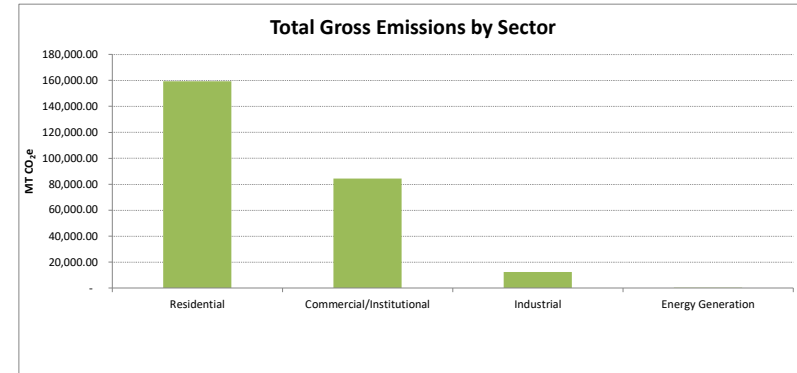
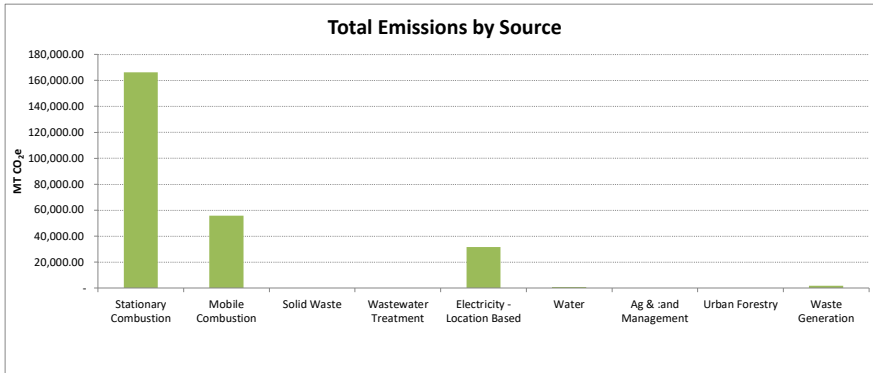


Gross Emissions by Sector

- Residential (62%)
- Commercial/Institutional (33%)
- Industrial (5%)
- Energy Generation (0%)



Gross Emissions by Sector		
Sector	Total (MT CO ₂ e)	Percent of Total
Residential	159,487.26	62%
Commercial/Institutional	84,370.89	33%
Industrial	12,310.79	5%
Energy Generation	441.89	0%
Total	256,610.83	100%



Total Emissions by Sector and Source (MT CO ₂ e)												
Sector	Stationary			Solid Waste	Waste water	Water	Agriculture & Land Management			Other	TOTAL GROSS	TOTAL NET
	Stationary	Electricity	Mobile				Management	Urban Forestry	Other			
Residential	89,794.08	12,921.99	55,911.87	441.89	-	417.43	-	-	-	159,487.26	159,487.26	
Commercial/Institutional	65,706.29	17,853.09	-	441.89	-	369.62	-	-	-	84,370.89	84,370.89	
Industrial	10,822.89	1,013.28	-	441.89	-	32.73	-	-	-	12,310.79	12,310.79	
Energy Generation	-	-	-	441.89	-	-	-	-	-	441.89	441.89	
Total	166,323.26	31,788.37	55,911.87	1,767.55	-	819.78	-	-	-	256,610.83	256,610.83	

