

CITY OF JERSEY CITY
Carbon Footprint Analysis
Municipal Operations



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1. Introduction

The City of Jersey City (Jersey City or the City) is dedicated to reducing the greenhouse gas emissions associated with the operation of the municipal government, specifically the City-owned facilities and vehicles. Jersey City engaged Gabel Associates, Inc. (Gabel) to conduct a Carbon Footprint Analysis in accordance with the municipal carbon footprint Sustainable Jersey action. Sustainable Jersey is a sustainability certification and recognition program for municipalities in New Jersey which includes different actions to achieve points and improve the sustainability of New Jersey's cities and towns.

As with most efforts of this sort, accurate data is integral for accurate results. The City had data available for the facility energy usage from a different time period than the vehicle fleet data. Sustainable Jersey, the City, and Gabel had preliminary discussions to help decide whether mismatched time periods or estimates were more appropriate. Sustainable Jersey directed the City and Gabel to use the data from the mismatched time periods to complete the Carbon Footprint Calculator (attached to his report).

The following report includes details and summaries of the methodology and results of the carbon footprint analysis conducted by Gabel.

2. GHG Emissions Quantification Methodologies

2.1. Overview of the City of Jersey City

The City of Jersey City is located in Hudson County, New Jersey. It has a total area of 21.13 square miles (14.74 square miles of land and 6.39 square miles of water). Based on the 2019 US Census Bureau's data, its population is approximately 262,075.

The City operates a number of facilities as listed in Appendix A. Both electrical energy and natural gas (where applicable) for all facilities is provided by PSE&G, a local energy supplier. In addition, the City also operates traffic lights, street and parking lot lighting and CCTV cameras. Electricity for these services is also provided by the same utility company. Finally, the City is responsible for a fleet of different vehicles used by police, fire department, public works and other services. A detailed list of these vehicles is available in the City's 2016 vehicle inventory.

2.2. GHG Inventory Reporting Protocol

GHG emissions are calculated based on the Global Protocol for Community-Scale Greenhouse Gas Emission Inventories (GPC). As per GPC, the following elements are used to account GHG emissions in a single reporting year:

- Stationary Energy
- Energy used for Transportation Services
- Waste Management
- GHG emissions from purchased services

The emissions were calculated utilizing an Excel spreadsheet tool provided by Sustainable Jersey and made available on its website. The spreadsheet consists of worksheets used to enter energy usage totals for electricity, natural gas, and heating oil as well as an additional worksheet used to calculate emissions from combustion of fuels used in vehicle transportation.

2.3. GHG Inventory Reporting Period (Base Year)

The time periods for the available data for different types of emissions sources does not match. The City and Sustainable Jersey discussed the mismatch in time periods between vehicle and facility energy usage. The City and Gabel offered to estimate the energy usage to help match the time periods, but Sustainable Jersey expressed a preference for actual data. At the direction of Sustainable Jersey, this GHG inventory report covers emissions from direct, stationary combustion (natural gas) and indirect emissions from purchased electricity for the period of July 2017 through June 2018 and GHG emissions from mobile, transportation services was derived from the City’s 2016 vehicle fleet inventory.

2.4. GHG Inventory Boundaries

All municipal operations of Jersey City are conducted within geographic boundaries of the City. Therefore, all direct emissions, both stationary and mobile occur within the city limits and are included in this report. Similarly, indirect emissions from electricity consumed by the City’s operations are also accounted for by the GHG calculator. On the other hand, direct or indirect emissions resulting from employee commuting, disposal of waste outside of the city boundaries or fugitive emissions from equipment are not captured by the GHG inventory tool due to difficulty estimating these values.

2.5. Scope 1 Emissions

Scope 1 emissions were calculated based on an inventory of facilities and vehicles provided by the City including the following:

- Buildings and facilities – emissions from combustion of natural gas
- Public transit and other vehicles – emissions from combustion of gasoline and diesel fuel

For natural gas, fuel usage data was collected from PSE&G for a list of buildings and facilities operated by the City. Then, emissions were calculated by multiplying total MMBtu of gas used by each building with appropriate emission factors for CO₂, CH₄ and N₂O as provided in the Municipal Carbon Footprint Calculator. Finally, total emissions of these greenhouse gases were converted to total metric tons of CO₂ (equivalent CO₂ emissions). The factors used are summarized in the table below:

Table 1:

GHG emission factors for natural gas (tons/MMBtu)		
CO ₂	CH ₄	N ₂ O
0.53106633	0.000005	0.0000001

For emissions from gasoline and diesel fuel from vehicles, CO₂ emissions were calculated using total fuel consumption in gallons which were multiplied by appropriate factor for each type of fuel. For CH₄ and N₂O, emissions were calculated based on total mileage driven by each vehicle multiplied by appropriate factor for type and age of vehicle. Factors used in the calculations of CO₂ are provided in the table below:

Table 2:

CO₂ emission factors for gasoline and diesel fuel (lbs/gallon)		
	Gasoline	Diesel
CO₂ emission factors	19.54	22.37

2.6. Scope 2 – Energy Indirect Emissions

Scope 2 includes GHG emissions from electricity supplied by electric grid for the following:

- Buildings and facilities
- Street and parking lot lights
- Traffic signals and CCTV cameras

The emissions were calculated for CO₂, CH₄ and N₂O combined and converted to equivalent CO₂ by applying the following factor:

Table 3:

CO ₂ e emission factors for electricity (lb/MWh)
1,312

2.7. GHG Emissions Not Quantified

The following emissions were not quantified:

- Fugitive emissions from refrigerants
- Emissions from waste related activities
- Emissions from significant purchased services

2.8. Inventory Data Collection

All data for the municipal GHG inventory is provided by the following:

- Electricity and Natural Gas (where applicable) consumed by buildings, facilities, street and parking lot lighting, traffic signals and CCTV cameras were provided directly by the local utility (PSE&G) upon authorization by the City. This includes data for the July 2017-June 2018 period for each building individually.
- Electricity generated by renewable energy sources (PV solar) were provided by the City for the period of January 2016 – December 2018.
- Municipal vehicle fuel consumption and total mileage of each vehicle type were provided by the City for 2016 calendar year.

3. Results of Analysis

3.1. Scope 1 GHG Emissions

Total GHG emissions from natural gas combustion are shown in the following table:

Table 4: Jersey City Municipal Natural Gas GHG Emissions, July 2017-June 2018

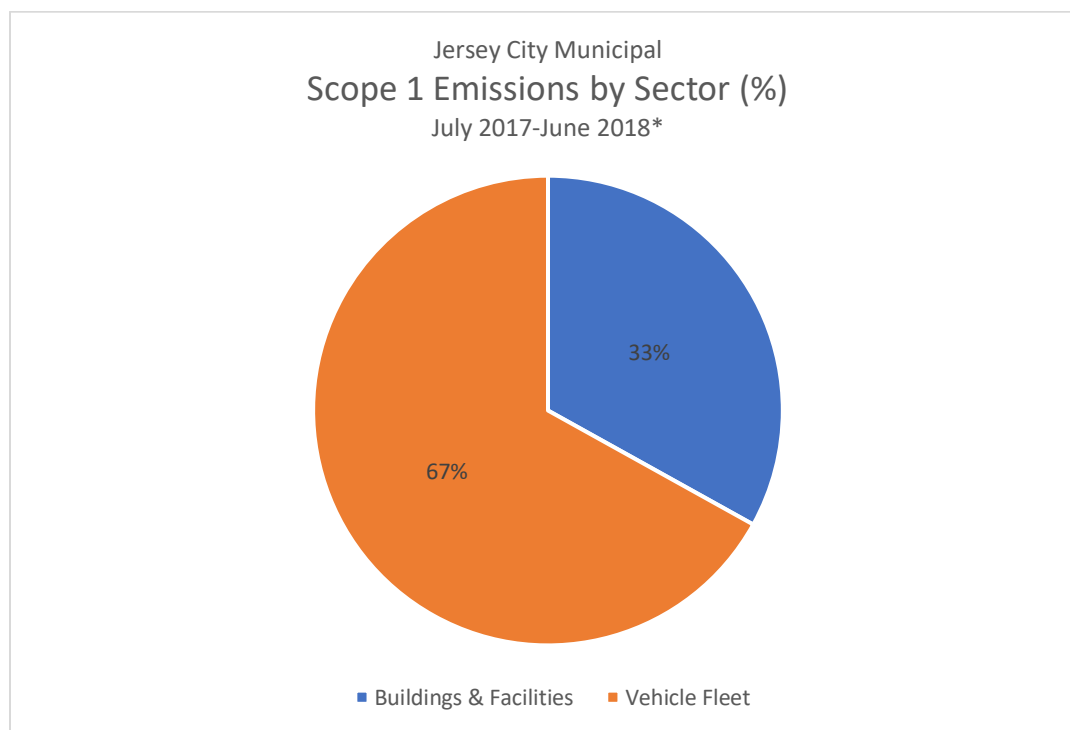
Greenhouse Gas	Metric Tons	Metric Tons of CO ₂ e
CO ₂	2,878.66	2,878.66
CH ₄	0.2710	6.7757
N ₂ O	0.054	1.6153
Total		2,887.05

GHG emissions from vehicle fleet operated by Jersey City are shown in the table below:

Table 5: Jersey City Municipal GHG emissions from vehicles, 2016

Greenhouse Gas	Metric Tons	Metric Tons of CO ₂ e
CO ₂	5,820.92	5,820.92
CH ₄	0.0946	2.3651
N ₂ O	0.0668	19.9180
Total		5,843.20

Scope 1 GHG emissions distribution by sector is shown in the following chart:



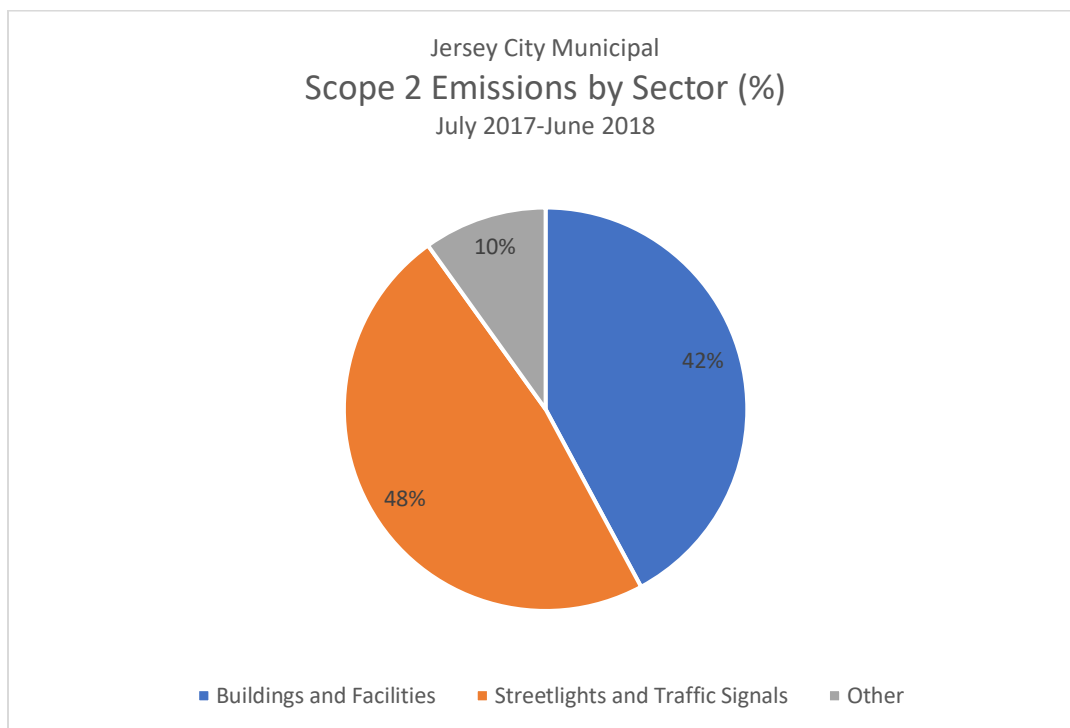
*Vehicle fleet data is from 2016

3.2. Scope 2 GHG Emissions

Total GHG emissions from electricity are shown in the following table:

Table 6: Jersey City Municipal Electrical Consumption GHG Emissions (tons CO₂e), July 2017-June 2018

Greenhouse Gas	Metric Tons of CO₂e
Buildings and Facilities	7,357.64
Streetlights & Traffic Signals	8,368.84
Other	1,730.58
Total	17,457.07



4. Conclusion

The methodology described in this report is consistent with the direction and resources provided by Sustainable Jersey. The total emissions from the City’s municipal government operations is 26,187.32 Metric Tons of CO₂e emissions. These emissions are substantial but are only a small portion (less than 1%) of the greater Jersey City Community emissions measured in 2016.

The following table provides a rough comparison of Jersey City’s municipal government operations related GHG emissions with other cities in New Jersey and the Northeast that have completed carbon footprint studies.

City	Year	Municipal Govt. Footprint (tCO2e)	Population	Muni Govt. Emissions Per Capita (tCO2e/Person)
Hoboken, NJ	2017	4,280	55,131	0.0776
Trenton, NJ	2008	44,879	82,883	0.5415
Woodbridge, NJ	2015	3,102	100,245	0.0309
New York City, NY	2015	3,000,000	8,517,000	0.3522
Rochester NY	2011	32,532	210,859	0.1543
Cambridge, MA	2016	19,910	112,183	0.1775
Boston, MA	2018	6,400,000	696,000	9.1954
Jersey City, NJ	2017-2018	26,187	262,075	0.0999

The City is actively working to reduce the emissions tabulated above with the installation of on-site solar, the electrification of the vehicle fleet, and development of an energy efficiency program. The City, through a Hudson County program, was able to attain the benefits of an on-site, behind-the-meter solar project at Pershing Field. Behind the meter solar projects directly offset purchases of electricity from the utility by providing electricity directly to the facility. If the facility needs more electricity than the electricity provided by the solar, it then pulls electricity from the utility. The Pershing Field solar array generated 90,833 kWh of electricity in 2018, which is the approximate average annual generation expected from this solar project. The annual Pershing Field solar array generation provides a reduction of the indirect greenhouse gas emissions of approximately 54 Metric Tons of CO2e emissions per year.

In 2019, the City engaged a Power Purchase Agreement provider to develop, own and operate an approximately 1 MW on-site, behind-the-meter solar project at the Department of Public Works Complex. This project is expected to generate approximately 1,420,789 kWh annually, reducing emissions by approximately 846 Metric Tons of CO2e emissions.

In 2020, the City engaged an Energy Service Company (ESCO) to develop an energy savings plan as part of the City’s Energy Savings Improvement Program (ESIP). The ESIP will include numerous energy conservation measures to reduce electricity and natural gas consumption at the City’s facilities. The ESIP scope is under development by the ESCO at the time of this report. It is likely that the current studies and development efforts will increase the scope and savings from the ESIP compared to the proposals received. Based on the proposal accepted by the City, the ESIP will reduce electricity consumption by approximately 1,920,623 kWh and reduce natural gas consumption by approximately 63,542 therms annually. The ESIP will reduce emissions by approximately 1,480 Metric Tons of CO2e emissions, a 5% reduction in greenhouse gas emissions.

The City has purchased numerous electric vehicles including most recently electric garbage trucks and is continually planning for the electrification of the vehicle fleet and increasing the electric vehicle charging infrastructure at City-owned facilities. Electrification of the vehicle fleet will reduce the direct emissions from the City’s vehicle fleet but will increase the indirect, emissions associated with the increased electricity usage. As the mix of electricity generation sources shifts towards renewable and carbon free technology and the City installs more on-site renewable energy systems, the emissions associated with electricity usage for the facilities and fleets will decrease.



The City is well on the way to implementing programs and projects that will reduce the emissions measured in this report. Jersey City is a leader amongst the municipalities in New Jersey for its actions to reduce direct and indirect emissions from municipal activities and its commitment to continued reductions in order to meet its goals.

5. Appendix A – Facilities Included in Report

Building Name and Address
1. City Hall - 280 Grove St
2. Commerce Division - 382 MLK Drive
3. Firehouse HQ – 465 Marin Boulevard
4. Firehouse – 14 Orient Ave
5. Firehouse – 152 Lincoln St
6. Firehouse – 152 Linden Ave
7. Firehouse – 160 Grand St
8. Firehouse – 2 Bergen Ave
9. Firehouse – 255 Kearney Ave
10. Firehouse – 486 Ocean Ave
11. Firehouse – 595 Palisade Ave
12. Firehouse – 200 Sip Ave
13. Firehouse – 697 Bergen Ave
14. Firehouse & OEM – 714-731 Summit Ave
15. Firehouse Consolidated – 349 Newark Ave
16. Joseph Connors Senior Center – 28 Paterson St
17. Lafayette Pool – 395 Johnston Ave
18. Mary McLeod Bethune Community Center – 134-142 MLK Drive
19. Maureen Collier SC – 335 Bergen Ave
20. Municipal Courthouse - 365 Summit Ave
21. Pavonia Pool – 914 Pavonia Ave
22. Pershing Field Athletic Complex – 201 Central Ave
23. Police Precinct, East District – 207 7 th Street
24. Police Precinct, North District – 282 Central Ave
25. Police Precinct, South District – 191 Bergen Ave
26. Municipal Services Complex (3 buildings), 13-15 Linden Avenue East
27. Records Warehouse – Linden Avenue East
28. Loews Theater – 51 Journal Sq
29. Apple Tree House – 298 Academy St
30. Summit Ave Garage – 199-203 Summit Ave
31. Firehouse – 44 State St
32. Firehouse Gong Club – 244 Bay St-
33. Fire Union Hall – 139 South St
34. New West Police Precinct – 1 Jackson Ave
35. PD Parking Enforcement – 392 Central Ave
36. PD West District – Old – 576 Communipaw Ave, Fl 3
37. Public Safety Communication Center – 73-85 Bishop St
38. Recreational Director – Caven Point and Chapel Ave
39. JSQ Administration – 1 Journal Sq, Fl 3
40. Citi Hall Annex – 360 Martin Luther King
41. Firehouse – 283 Halladay St
42. Firehouse – 582 Communipaw Ave
43. PD Pistol Range – Van Keuren Ave
44. Metro Field (Field House) – 179 Westside Ave

