NYC 2023 Greenhouse Gas Inventory Methodology

Mayor's Office of Climate & Environmental Justice

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1. Introduction

a. What is the New York City Greenhouse Gas Emissions Inventory?

The New York City Greenhouse Gas Emissions Inventory is an annual report that measures greenhouse gas (GHG) emissions from different sectors in New York City and tracks emissions reduction progress as the City works to meet its mandate of 80 percent gross reduction and carbon neutrality by 2050 (Local Law 97, 2019). The report consists of two main inventories: Citywide and City Government. These inventories provide the metrics necessary for the City to develop, refine, and optimize programs, policies, and strategies aimed to reduce GHG reductions across all sectors.

The Citywide Inventory tracks all direct and indirect emissions from stationary energy use, transportation, and waste within the boundaries of New York City's five boroughs, in addition to emissions from imported electricity and exported waste. The City Government Inventory tracks all emissions resulting from New York City government operations.

The Citywide Inventory is completed by the Mayor's Office of Climate & Environmental Justice (MOCEJ), while the City Government Inventory is compiled by the New York City Department of Citywide Administrative Services (DCAS) and then reviewed and published by MOCEJ. Certain data sources and analyses in the Citywide Inventory are also inputs to the City Government Inventory. In some sectors, however, a different methodology is used. For example, the Citywide Inventory relies on modeling to determine the on-road private vehicle GHG emissions within the City's boundaries, while the City Government Inventory more precisely accounts for the emissions from City fleet vehicles based on the City's detailed records of fuel and electricity consumption. See the below graphic to understand the overlap in inventory data sources.

Inventory Methodology Sources

	Citywide Inventory	Overlap	City Government Inventory
Stationary	• Citywide Con Edison Electricity, Natural Gas *(2.a.i.1)* • Citywide National Grid Natural Gas *(2.a.i.2)* • Citywide LIPA/PSEG Electricity *(2.a.i.3)* • Citywide Fuel Oil Deliveries *(2.a.i.4)* • Upstream Emission Factors and New York State Emissions Accounting *(2.d.iv)*	• Streetlights and Traffic Signals *(2.a.ii)* • Electricity Grid Coefficient *(2.d.i)* • Steam Coefficient *(2.d.ii)* • EPA GHG Hub Fuel Emission Factors *(2.d.iii)*	• City Government Con Edison Electricity, Natural Gas *(3.a)* • City Government National Grid Natural Gas *(3.a)* • City Government Fuel Oil Deliveries *(3.a)*
Transportation	• NYMTIC VMT *(2.b.i.1)* • MTA and PANYNJ Bridge and Tunnel Crossings *(2.b.i.1)* • DMV Registrations *(2.b.i.1)* • DCAS Fleet Fuel Mix *(2.b.i.1)* • MOVES Emission Factors *(2.b.i.1)* • DOE School Bus VMT, Fuel Mix *(2.b.i.2)* • TLC For-Hire VMT, Fuel Mix *(2.b.i.3)* • MTA, NJ Transit, PANYNJ Transit Fuel and Electricity Consumption *(2.b.ii)* • EDC Ferry Fuel Consumption *(2.b.iii)*	• City-Owned Marine Fleet Fuel Consumption *(2.b.iii)* • City-Owned Aviation Fuel Consumption *(2.b.iii)*	• City Government Bulk Fuels and Gas Usage *(3.b)* • City Government Vendor-Provided EV Charging Rates *(3.b)* • City Government Fugitive HFCs *(3.c)*
Waste	• DEP Wastewater Treatment *(2.c.i)* • Citywide Residential Solid Waste *(2.c.ii)* • Citywide Commercial Solid Waste *(2.c.ii)*	• In-City Composting *(2.c.ii)* • EPA GHG Hub Fuel Emission Factors *(2.d.iii)*	• City Government Wastewater Treatment Process Emissions *(3.d)* • City Government Water Supply *(3.e)* • City Government Fugitive Methane from In-City Closed Landfills *(3.f)*

Table 1: Inventory methodology sources by sector and inventory, including overlap.

New York City Administrative Code mandates that MOCEJ "complete and post on its website an inventory and analysis of citywide emissions measured in carbon dioxide equivalent for the previous calendar year" annually by November 15[1]. The inventory must also "calculate the percentage change in citywide emissions measured in carbon dioxide equivalent for such calendar year, relative to such emissions for the base year for citywide emissions."

In accordance with section 24-803 of the Administrative Code, the Citywide Inventory uses the calendar year when calculating the annual inventory, with a base year of calendar year 2005. In contrast, the City Government Operations Inventory uses the City fiscal year (July 1 through June 30 of the preceding year) for its calculations as major purchases and strategic decisions are decided on this timescale. Additionally, the City government's compliance with Local Law 97 is measured relative to a baseline of emissions from fiscal year 2006. Where the Citywide and City Government Inventories use the same inputs—including the electricity and steam coefficients described later in this document—DCAS conducts the analysis for the fiscal year using the same methodology MOCEJ uses for the calendar year.

MOCEJ completes the Citywide inventory in alignment with the Global Covenant of Mayors for Climate and Energy, a global cooperative effort among mayors and city officials to reduce GHG emissions, track progress, and prepare for the impacts of climate change. The City has committed to using consistent best practices in GHG emissions accounting as part of this shared effort to track progress toward climate mitigation goals. As a result, the Citywide Inventory follows the guidance of Global Protocol for

[1] New York City Administrative Code § 24-803

Community Scale Greenhouse Gas Inventories (GPC).[2] New York City uses the GPC BASIC reporting level as the methodology for the Citywide Inventory, covering Scope 1 and Scope 2 emissions from stationary energy and transportation, as well as Scope 1 and Scope 3 emissions from waste. This encapsulates emissions from stationary and transportation sources within New York City's geographic boundaries, and emissions associated with electricity production and waste management, both within and outside of New York City's geographic boundaries. The City Government Operations Inventory follows the guidelines of the Local Government Operations Protocol (LGOP), which was developed in partnership by the California Air Resources Board (CARB), California Climate Action Registry (CCAR) and Local Governments for Sustainability (ICLEI). The LGOP is a reporting protocol that provides a standardized approach for reporting emissions resulting from local government operations. Per the LGOP, the City reports and organizes Scope 1 and 2 emissions by source and GHG sector.

b. Citywide Calendar Year 2023 Findings

- Since 2005, greenhouse gas (GHG) emissions have decreased citywide by approximately 20%.
- In 2023, New York City's per capita GHG emissions averaged 6.2 metric tons of carbon dioxide equivalent (tCO2e), over 50% lower than the 2020 U.S. average of 13 tCO2e per capita (World Bank, 2020).
- In the 18 years of tracking New York City's emissions, phase-out policies for fossil-fuel based heating fuels have been the most significant policy driver of GHG emission reductions.
- The inventory shows Calendar Year (CY) 2023 saw a slight reduction in GHG emissions citywide, driven by a mild winter and reductions in fuel oil consumption in buildings.
- Emissions remain below pre-pandemic (2019) levels.

c. City Government Fiscal Year 2023 Findings

- Since Fiscal Year 2006, greenhouse gas (GHG) emissions from City government operations have decreased by approximately 26%, significantly surpassing citywide emission reduction levels and demonstrating that City government is leading by example.
- Between Fiscal Year 2022 and 2023, City government emissions were reduced by 6%, driven by emission reduction projects and a mild winter.
- Total energy consumption in buildings and stationary assets in FY 2023 was 14% lower than the five-year annual average from FY 2006-2010, which is before the City scaled up its energy efficiency investments.

[2] *GHG Protocol for Cities | GHG Protocol*. (n.d.). Ghgprotocol.org. https://ghgprotocol.org/ghg-protocol-cities

2. Citywide Inventory Methodology

a. Stationary Emissions Data Sources

i. Buildings

The inventory separates building data into five standard categories: Residential (Small), Residential (Large), Commercial, Industrial, and Institutional. Buildings' emissions data comes from the following sources:

- Con Edison
- National Grid
- Public Service Enterprise Group (PSEG)/ Long Island Power Authority (LIPA)[3]
- Fuel Oil Vendors

i.1 Con Edison

Con Edison is the regulated utility that provides electricity to all five boroughs of New York City, district steam to certain buildings in portions of Manhattan, and natural gas to Manhattan, the Bronx, and the northern portion of Queens.[4] Con Edison provides electricity, gas, district steam, and fugitive emissions data by ZIP code and categorizes customers according to the New York State Public Service Commission (NYS PSC) Service Classes, which groups customers by usage type. MOCEJ applies each Service Class to match the following sub-sectors: Residential (Small), Residential (Large), Commercial, Industrial, Institutional, and Street Lighting. For fugitive emissions, MOCEJ receives data on the total metric tons of CO2e of methane and sulfur hexafluoride in the natural gas delivery and electric transmission and distribution systems, which are used to calculate losses in distribution.

For the 2023 inventory, Con Edison implemented a change in its data management system to align with the latest Service Class definitions from the NYS PSC. As such, MOCEJ worked with Con Edison to match the Service Classes that were amended, removed, or consolidated with Con Edison's previous reporting schema. No change in data categories occurred in the final inventory report because of the changing Service Class Definitions.

i.2 National Grid

National Grid is the regulated utility that provides natural gas service to Brooklyn, Staten Island, and the southern portion of Queens. National Grid sends MOCEJ natural gas data for the inventory, organized by ZIP code and PSC Service Class. National Grid also provides natural gas send-out totals (before distribution losses) by month and fugitive methane emissions in dekatherms, which are used to calculate losses in

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[3] Con Edison and PSEG/LIPA data captures NYPA customers, since the data tracks electricity distribution within the 5 boroughs, not sales.

[4] Con Edison does not provide electricity to the Rockaway Peninsula. Electricity in the Rockaways is provided by LIPA/PSEG.

distribution.[5] MOCEJ applies each Service Class to match the following sub-sectors: Residential (Small), Residential (Large), Commercial, Industrial, and Institutional.

i.3 LIPA / PSEG

The Long Island Power Authority (LIPA) owns the electricity transmission and distribution system that serves the Rockaway Peninsula, and that system is operated by Public Service Enterprise Group (PSEG). PSEG provides monthly electricity data by the following sub-sectors: Residential, Commercial/Industrial, Institutional, Streetlighting, and Other. MOCEJ applies an allocation factor to separate the Residential sub-sector into Residential (Small) and Residential (Large), and the Commercial/Industrial sub-sector into Commercial and Industrial.

i.4 Fuel Oil Vendors

Fuel oil that is used to heat buildings in New York City is provided by retail fuel oil vendors. Section 28-168.1 of the Administrative Code, as added by Local Law 43 of 2010, requires New York City fuel oil vendors to submit records of all fuel oil deliveries, including fuel oil type, gallon amount, and ZIP code, for each inventory year. This reporting also includes the percentage of deliveries composed of biodiesel. MOCEJ applies an allocation factor to estimate the amount of fuel oil sent to the following sub-sectors: Residential (Small), Residential (Large), Commercial, Industrial, and Institutional.

ii. Streetlights and Traffic Signals

Streetlights and traffic signals are considered City government operations, so emissions from their electricity use are accounted for in both the Citywide Inventory and the City Government Inventory. DCAS provides MOCEJ with streetlight and traffic signal electricity data from New York Power Authority (NYPA) and LIPA/PSEG, based on the bills paid by the City.

b. Transportation Emissions Data Sources

i. On-Road Vehicles

i.1 Private and Public On-Road Vehicles

Citywide private vehicle miles traveled (VMT) are not readily available to incorporate into the annual inventory. Therefore, MOCEJ has historically used VMT estimates from the New York Metropolitan Transportation Council's (NYMTIC) Best Practices Model (BPM). NYMTIC's most up-to-date VMT estimate is for calendar year 2010.

The inventory uses NYMTIC's 2005 and 2010 citywide VMT estimates for their respective calendar years. All VMT values for 2006-2009 and after 2010 are estimated using the 2010 NYMTIC VMT value and a

[5] National Grid provides natural gas data only at the zip code level in the Rockaways.

growth rate developed by MOCEJ. This methodology results in growth rates for light-, medium- and heavy-duty private and public vehicles respectively. The growth rate is calculated by:

1. Sourcing bridge and tunnel crossings data from the Port Authority of New York and New Jersey (PANYNJ) and from the Metropolitan Transportation Authority (MTA);
2. Mapping the vehicle types in these respective datasets to light-, medium-, and heavy-duty vehicle categories;
3. Aggregating crossings annually by vehicle category and calculating the annual percent change in crossings per vehicle category; and
4. Calculating an annual average of the percent change in crossings by vehicle category, weighted by the PANYNJ and MTA crossings, respectively.

While the Citywide Inventory models GHG emissions from on-road vehicles because VMT data is generally unavailable for on-road vehicles, there are some fleets that are able to provide more granular VMT and fuel mix data. With this data, MOCEJ has a more accurate methodology to assess emissions. For example, for-hire VMT is subtracted from light duty private-modeled VMT each year to avoid double counting. In addition, school and transit bus VMT were subtracted from the base year (2005 and 2010) BPM estimates, and therefore, do not pose a risk of double counting. Finally, MOCEJ adopts the NYMTIC provided growth rate for public and private solid waste carrier vehicles. EPA's Motor Vehicle Emission Simulator (MOVES) emission factors are calculated per mile by taking the weighted average emission factor per vehicle type, where weights are determined by the age distribution of the citywide fleet in DMV registration data. These emission factors are applied to all on-road vehicle activity.

i.2 School Buses

NYC Public Schools (NYCPS) is the agency responsible for contracting with school bus companies to service New York City public school students. NYCPS has provided annual VMT data for New York City school bus companies that contracted with NYCPS for calendar years 2021-2023. School bus VMT for calendar year 2005 was provided by the EPA MOVES 2014 model. School bus VMT for calendar years 2006-2020 were estimated by MOCEJ using linear regression.

i.3 For-Hire Vehicles

The NYC Taxi and Limousine Commission (TLC) is the agency responsible for licensing and regulating New York City's medallion (yellow) taxis, street hail livery (green) taxis, for-hire vehicles (FHVs), commuter vans, and paratransit vehicles. TLC also provides the data necessary to determine for-hire-vehicle emissions. High-volume for hire vehicles (HVFHV) consist of for-hire vehicles that dispatch more than 10,000 trips per day, such as Uber and Lyft services. The TLC collects trip record information for each taxi and for-hire vehicle trip completed by TLC licensed drivers and vehicles. Taxi trip data comes from the technology service providers (TSPs) that offer electronic metering in each cab, and FHV trip data comes from the app, community livery, black car, or luxury limousine company, or base, that dispatches the trips. With this data, TLC provides fleet fuel mix and VMT for each calendar year for yellow and green taxis, for-hire and high-volume for-hire fleets.

The 2023 NYC Greenhouse Gas Inventory assesses the emissions of for-hire vehicles for the first time, and MOCEJ has incorporated for-hire-vehicle emissions into previous inventory estimates dating back to 2005. The methodology for calculating for-hire VMT and fuel mix from 2005 onward can be found in the *On Road Model Update* section.

ii. Transit

ii.1 Buses

Metropolitan Transportation Authority (MTA)

The MTA provides MOCEJ the compressed natural gas fuel consumption data for MTA buses, based on Con Edison and National Grid data, as well as total diesel purchases from bulk suppliers. MOCEJ assumes all fuel supplied to the MTA is consumed within the five boroughs.

New Jersey Transit (NJT)

The NJT bus fuel consumption data is provided to MOCEJ in diesel gallons from bulk suppliers. NJT derives the total number of diesel fuel gallons used in New York City by multiplying the total mileage of their fleet within their routes in the city by the average fuel economy of their buses. MOCEJ assumes this fuel is consumed within the five boroughs and does not apply boundary factors to this data.

ii.2 Railway

Port Authority Trans-Hudson (PATH)

The Port Authority of New York and New Jersey provides PATH facilities and rail electricity consumption data from their energy management system to MOCEJ. MOCEJ applies boundary factors to the PATH electricity consumption activity to estimate the percentage of activity occurring within the reporting boundary of the five boroughs.

Metropolitan Transportation Authority (MTA)

MTA provides power and fuel consumption data from the NYC Transit Authority, Staten Island Railway, Metro-North Railroad (MNR), and Long Island Railroad (LIRR) to estimate their transit-related emissions within the city. The MTA electricity consumption totals from rail and facilities come from invoice data from Con Edison, NYPA, and PSEG. The MTA railway diesel consumption data for MNR and LIRR are provided by the bulk suppliers to the MTA. Boundary factors are applied to this consumption activity to estimate the percentage of activity occurring within the reporting boundary of the five boroughs.

New Jersey Transit

NJT provides monthly electricity consumption data from its rail and facilities used on the Northeast Corridor (NEC). MOCEJ applies an allocation factor that assumes only a percentage of the electricity used in the NEC is used in New York City.

Amtrak and Freight Operations

Con Edison provides electricity and gas consumption data for Amtrak services and freight operations within the five boroughs.

iii. Marine and Aviation

Marine emissions data from New York City agencies are incorporated into the Citywide Inventory using fuel purchasing data from the NYC Department of Transportation (DOT), Department of Environmental Protection (DEP), Fire Department (FDNY), DCAS, Department of Corrections (DOC), and Economic Development Corporation (EDC) for ferry operations. In addition to the Citywide Inventory, all marine sources, except for EDC, are inputs to the City Government Inventory.

The inventory only captures emissions associated with aircraft that *both* take off *and* land within the city during the same trip. This boundary limits aviation emissions to New York City agency-operated helicopters. Emissions associated with commercial aircraft that have origins or destinations outside of New York City are excluded from the Citywide inventory. DCAS provides MOCEJ jet fuel purchase data in gallons, collected from DOHMH, DEP, and NYPD. The total number of gallons of jet fuel is multiplied by an EPA jet fuel emission factor to get to the emissions from this sector. In addition to the Citywide Inventory, these aviation sources are also inputs to the City Government Inventory.

c. Waste Emissions Data Sources

i. Wastewater Treatment

Wastewater treatment is considered a City government operation, so its emissions are accounted for in both the Citywide Inventory and the City Government Inventory.

Wastewater treatment emissions data comes from DEP, accounting for the City's 14 wastewater resource recovery facilities (WRRF).[6] This data reflects the metric tons of methane and nitrous oxide emissions resulting from DEP's anerobic digestion, discharge, and processing operations.

ii. Solid Waste

The NYC Department of Sanitation (DSNY) provides annual tonnage data for collected residential refuse and organic waste. Organic tonnages are further categorized into in-city compost, out-of-city compost, and anaerobic digestion. Recycled tonnages and commercial refuse are estimated using a commercial waste forecast model developed for *New York City's Roadmap to 80x50.*[7] There is an estimated 80/20 split

[6] The city's 14 WRRFs are 26th Ward, Bowery Bay, Coney Island, Hunts Point, Jamaica, Newtown Creek, North River, Oakwood Beach, Owl's Head, Port Richmond, Red Hook, Rockaway, Tallman Island, and Wards Island.

[7] City of New York Mayor's Office. (n.d.). New York City's Roadmap to 80 x 50. https://www.nyc.gov/assets/sustainability/downloads/pdf/publications/New%20York%20City%27s%20Roadmap%20to%2080%20x%2050_Final.pdf

for landfill and recycling. This approach is used because commercial solid waste collection data is not currently available. Overall, collected waste is included in the Citywide Inventory, while emissions from closed landfills managed by city agencies are included in the City Government Operations Inventory. Both inventories capture emissions from in-city composting.

d. Emissions Factors

i. Electricity

With over 8.3 million residents, New York City has an enormous demand for electricity. Most of the electricity consumed by New Yorkers is generated within the five boroughs, primarily by fossil fuel-fired power plants. However, the city's electricity demand significantly exceeds local generation capacity, so to accommodate the remainder of the City's needs, the grid imports electricity via transmission lines, from power plants, solar arrays, hydroelectric facilities, and wind farms located in upstate New York and New Jersey.

To account for the carbon intensity of electricity that is consumed within the city, MOCEJ develops a New York City-specific electricity grid coefficient ("grid coefficient") every year.[8] To develop the coefficient, MOCEJ:

- Collects data to determine how much electricity is generated within New York City, assuming all the generators in the city exclusively serve the city, as well as electricity imported from Upstate New York and New Jersey ("generation data").
- Estimates the portion of each generator's output that serves New York City ("grid mix").
- Calculates the GHG emissions that result from generating this electricity output ("carbon intensity").
- Divides the total amount of estimated GHG emissions used to produce New York City's electricity by the amount of electricity used in New York City to get an average amount of carbon emissions per unit of electricity ("grid coefficient").

MOCEJ uses this grid coefficient to determine the GHG emissions that result from citywide electricity consumption, as reflected in the Citywide Inventory, and the City government's electricity consumption, as reflected in the City Government Inventory, to power both stationary assets and electric transportation.

[8] The US EPA maintains an electricity emissions coefficient system known as the EPA Emissions & Generation Resource Integrated Database (eGRID) factor. While eGRID is a useful dataset that provides insight into power generation within the New York City and Westchester subregion (NYCW), it is not well suited for the Inventory for the following reasons. First, New York City's electricity demand exceeds the entire amount of electricity that is generated in the NYCW subregion. Since the eGRID coefficient does not account for generation that is imported from other regions into NYCW, it is an insufficient dataset. Second, eGrid coefficients account for electricity generation, rather than consumption, and therefore it does not account for losses that occur as electricity is transmitted over long distances and distributed to its final point of usage.

The City first developed the electricity grid coefficient for its baseline greenhouse gas inventory in 2007 and has continuously improved upon the grid coefficient methodology. In 2019, MOCEJ contracted the consulting firm PowerGEM to enhance its methodology and develop a tool ("coefficient tool") that partially automates the creation of the coefficient.

i.1 How the NYC Greenhouse Gas Inventory Electricity Grid Coefficient is Calculated

The grid coefficient tool calculates the amount of electricity generation that serves New York City from geographic regions within New York State and New Jersey. To do this, MOCEJ groups all generators in New York and New Jersey into four different regions based on their location. Three of these regions correspond to areas defined by the New York Independent System Operator (NYSIO), which operates the state's transmission grid. These areas consist of 1) "In-City" generators located in New York City corresponding to NYISO Zone J; 2) "GHI" generators located in Westchester County corresponding to NYISO Zones G, H, and I; and 3) "ROS" generators located in the rest of New York State, outside of Zone GHI, corresponding to NYISO Zones A through F.[9] The fourth region, referred to as "PJM" represents generators operating in New Jersey that serve New York City.

The grid coefficient tool uses three primary sources of data to account for the GHG emissions from generators that serve New York City. First, MOCEJ compiles the list of generators in the four geographic areas and identify their respective generation capacity from the U.S. Energy Information Administration (EIA) dataset, EIA 860. Second, MOCEJ compiles gross generation (amount of power produced at the terminal) and gross heat input (fuel consumption in MMTBU) for each generator from the EPA's Continuous Emission Monitoring System (CEMS) dataset. Because gross heat input is a better reflection of the fuel consumed to support New York City's grid, the Grid Coefficient Tool takes CEMS data over EIA 923 data, where both are available. CEMS data only reports on fossil fuel generators with generation capacity larger than 25 MW. When CEMs data is not available for particular generators, the tool utilizes a third dataset, EIA 923, to identify net generation and net fuel consumption.[10] EIA 923 data for a given calendar year is not published by the EIA until October of the following that calendar year. For this reason, the grid coefficient cannot be calculated until November of the following calendar year for each annual inventory.

[9] NYSIO Zone K (Long Island) does not contribute electricity to New York City because there are insufficient electricity available for import into NYISO Zone J.

[10] When generation capacity is not available in the 860 dataset for the reporting period, MOCEJ uses historical 860 datasets.

The tool assumes that 100 percent of In-City generation serves New York City.[11] NYISO data provides the annual amount of electricity that is imported into the city from PJM.[12] Of the remaining load, once In-City and PJM generation has been accounted for, half is assumed to be supported by generators in GHI and the other half by generators in ROS.[13] Once these assumptions are set, the tool estimates the amount of fuel consumed by each generator in each of the four regions to support New York City's grid. This is done by normalizing the fuel consumption from each generator with respect to the total regional generation and pro-rating it by the percentage of generation from that region which is assumed to serve New York City's load.

MOCEJ multiplies the fuel consumed by each generator to support New York City's grid by fuel emission coefficients from the California Air Resources Board (CARB) to determine the GHG emissions produced by each generator across the region to support New York City's grid. Ultimately, the grid coefficient is the sum of these emissions, divided by the amount of electricity used annually in New York City.

In addition to the Citywide Inventory, this section is applicable to the City Government Inventory.

ii. Steam

Con Edison provides the carbon intensity of the district steam system to MOCEJ. This carbon intensity is based on the fuel mix and amount of generation at their steam plants. Steam is primarily fueled by natural gas, No. 4 fuel oil and No. 2 fuel oil. The carbon intensity of district steam is calculated by weighting the carbon intensity of these fuels with their annual generation for steam production.

In addition to the Citywide Inventory, this section is applicable to the City Government Inventory.

iii. Fuel Oil and Gas

The inventory uses the EPA Emission Factor Hub for fuel oil and gas emissions factors and updates these factors for each inventory year to be aligned with the most current EPA Emission Factor Hub. Table 2 shows the emission factors sourced from the EPA.

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[11] Since some of the electricity consumed in Zone J is generated by cogeneration plants, which produce district steam as a byproduct, MOCEJ removes the contribution of steam generation from the calculation of the electricity coefficient. Con Edison provides the annual amount of fuel consumed for generating steam and electricity at the six Cogen units in New York City. MOCEJ exclude emissions stemming from the generation of steam

[12] Accounting for imports from the PJM territory is accomplished through using a dataset consisting of five-minute interval readings of electricity flows from the PSEG service area to New York City via transmission lines.

[13] As New York City adds more offshore wind to meet its renewable energy targets, this assumption would need to be modified. A methodology change also might be required if battery storage resources are substantially added.

Inventory Fuel Type	**EPA Emission Factor**
Aviation Jet Fuel	Aircraft Jet Fuel
Biofuel (Transportation)	Stationary Biofuel
Marine diesel	Ships and Boats Diesel
2D (Transportation)	Medium- and Heavy-Duty Vehicle Diesel
Biofuel (Stationary)	Stationary Biofuel
#2 Fuel Oil	Distillate Fuel Oil 2
#4 Fuel Oil	Distillate Fuel Oil 4
Ethanol	Buses Ethanol
Natural Gas	Stationary Natural Gas
CNG	Stationary Natural Gas

Table 2: Emission Factors from US EPA

iv. Upstream Emission Factors and New York State Emissions Accounting

The Climate Leadership and Community Protection Act of 2019[14] (CLCPA) mandates that the New York State greenhouse gas inventory includes in-state emissions as well as all emissions outside of the state associated with in-state energy use.[15] This includes leaked emissions from the transmission and distribution of energy, and emissions from the combustion of fossil fuels.

Global Warming Potentials (GWP) are developed by the International Panel on Climate Change (IPCC) to allow comparisons of the global warming impacts of different gases. These values represent a measure of how much warming a given mass of greenhouse gas produces in relation to the amount of warming the same mass of carbon dioxide (CO2) would produce over a given timeframe. The larger the GWP, the more a given gas warms the earth compared to CO2 over that time period.

Because the lifespan of methane in the atmosphere is around 12 years, its impacts over a 20-year time frame are much more significant than a 100-year time frame, so its 20-year GWP is larger than its 100-

[14] New York Environmental Conservation Law § 75-0105.

[15] *Statewide Greenhouse Gas Emissions Report*. (2023). Department of Environmental Conservation. https://dec.ny.gov/environmental-protection/climate-change/greenhouse-gas-emissions-report

year GWP value. This adjustment from the traditional 100-year GWP to the 20-year GWP places a greater emphasis on the high near-term warming impacts of methane.

The GPC inventory requires using global warming potentials over a 100-year time frame. However, the CLCPA uses a 20-year time frame for New York State.[16] MOCEJ adopts the 100-year GWP values for the Citywide – GPC inventory and the 20-year GWP values for the Citywide-CLCPA inventory.

To compare citywide emissions to statewide emissions, MOCEJ developed the Citywide-CLCPA inventory, using the methodologies described above, and incorporated the following steps:

- Sourced carbon dioxide, nitrous oxide, and methane upstream and downstream fugitive emissions factors from the New York State's Department of Environmental Conservation (DEC) Inventory;[17]
- Applied upstream emission factors to all uses of electricity, steam, CNG, and natural gas in the inventory;
- Applied downstream emission factors to all uses of CNG and natural gas in the inventory;
- Assumed CNG downstream emission factors to be the same as natural gas downstream emission factors; and
- Developed upstream electricity and steam emission factors by replacing the CARB-provided fuel coefficients in the steam and electricity emission factor processes described above with the DEC upstream emission factors for each year available.[18]

For more information on this methodology, please see The NYC Citywide CLCPA Inventory Methodology document.[19]

3. City Government Inventory Methodology

The City Government Inventory calculates and reports GHG emissions based on CARB's Local Government Operations Protocol (LGOP).[20] The emissions boundary for the City Government Inventory corresponds to the definition of "City government operations" that was put forth in Local Law 97 of 2019: "operations, facilities, and other assets that are owned or leased by the city for which the city pays all or part of the annual energy bills."[21] This includes GHG emissions from leased real estate,

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[16] New York Environmental Conservation Law § 75-0101(2).

[17] *Statewide Greenhouse Gas Emissions Report, (Appendix A, Table A1 and A3).* (2023). Department of Environmental Conservation. https://dec.ny.gov/environmental-protection/climate-change/greenhouse-gas-emissions-report

[18] California Air Resources Board. (2010). *Local Government Operations Protocol For the quantification and reporting of greenhouse gas emissions inventories* [Review of *Local Government Operations Protocol For the quantification and reporting of greenhouse gas emissions inventories*]. https://ww2.arb.ca.gov/sites/default/files/classic/cc/protocols/lgo_protocol_v1_1_2010-05-03.pdf

[19] (2022). *New York City Citywide CLCPA Inventory (2005 - 2021)* [Review of *New York City Citywide CLCPA Inventory (2005 - 2021)*]. NYC Mayor's Office of Climate and Environmental Justice. https://climate.cityofnewyork.us/wp-content/uploads/2023/04/NYC-Citywide-CLCPA-Inventory-2005-2021.pdf

[20] https://ww2.arb.ca.gov/local-government-operations-protocol-greenhouse-gas-assessments

[21] New York City Administrative Code § 24-802.

vehicles, and other equipment where the City pays directly for the energy that is consumed. It is important to note that non-City operated public entities (e.g., Metropolitan Transportation Authority) are not included within the LGOP inventory protocol by this definition. The boundary for the City Government Inventory is not confined to New York City's five boroughs. Upstate operations that deliver services for the City are also included, such as DEP agency operations that fall into the wastewater treatment and water supply GHG sectors.

All data used to complete the City Government Inventory is sourced from City agencies or fuel vendors. Collected data is housed and managed by DCAS. Electricity, natural gas, and steam usage for the City's buildings, facilities, and streetlights is provided by DCAS and is originally sourced from regulated local utilities (e.g., Con Edison, National Grid). GHG emissions from fuel are calculated based on fuel usage, which is either a close approximation or a direct measurement. Fugitive and process-related emissions are calculated using data provided by several agencies. The subsections below provide additional detail into sector-level data sources and emissions calculation methodologies.

a. Buildings, Streetlights, and Traffic Signals Emissions Data Sources

This first part of the inventory is comprised of two reported GHG sectors: buildings, and streetlights and traffic signals. For both sectors, electricity consumption is quantified based on DCAS records which are sourced from regulated utility billing data. The buildings sector includes additional utility energy consumption, such as natural gas and distributed steam, along with stationary fuels such as fuel oils, diesel, and propane. Stationary fuel data is provided by DCAS' Office of Procurement (OCP) and individual agencies. Emissions are estimated based on delivered quantities rather than consumption measurements. This methodology is recognized and accepted under the LGOP.

Per LGOP, when fuel oil is blended with biodiesel, the biodiesel component is considered biogenic.[22] In this case, biogenic carbon is tracked separately and omitted from the inventory's GHG calculations. This biogenic accounting methodology is applied across all relevant sectors in the City Government inventory.

b. Transportation Emissions Data Sources

The transportation sector encompasses on-road vehicles, trucks, marine vessels, and helicopters. Data for this sector is largely provided by DCAS Fleet, the DCAS line of service that manages mayoral fleet activities and operations. DCAS Fleet provides a mix of data that can be organized into two general categories: bulk fuel delivery reports (covering all sector activity) and gas card consumption data (specific to on-road vehicles).

However, DCAS Fleet data is not the sole source of information for all agency activity. DEP provides data for its own transportation-related operations. There is a final type of activity data that is handled uniquely: the City's EV fleet. Data for this emissions source is available through the City's contracted

[22] According to the LGOP, "The combustion of biomass and biomass-based fuels (such as wood, wood waste, landfill gas, ethanol, etc.) emit CO_2 emissions, but these CO_2 emissions are distinct from Scope 1 emissions generated by combusting fossil fuels. The CO_2 emissions from biomass combustion are tracked separately because the carbon in biomass is of a biogenic origin—meaning that it was recently contained in living organic matter—while the carbon in fossil fuels has been trapped in geologic formations for millennia."
https://ww2.arb.ca.gov/sites/default/files/classic/cc/protocols/lgo_protocol_v1_1_2010-05-03.pdf

vendor for EV data management. This activity data is collected, analyzed and reported to ensure accurate accounting at the sector level. This is necessary because EV-related operations impact the transportation sector, as well as all other sectors within the stationary assets category, where EVs are charged.

c. Fugitive and Process Emissions Data Sources

The fugitive and process emissions sector is comprised solely of fugitive hydrofluorocarbon emissions (HFCs) that arise from the City's vehicle fleet. These emissions result from vehicle air conditioning and truck refrigeration. Calculations are performed with DCAS Fleet-provided mayoral fleet vehicle reports.

d. Wastewater Treatment Emissions Data Sources

The wastewater treatment sector is comprised entirely of DEP operations, predominantly its Bureau of Wastewater Treatment (BTW). Utility energy consumption data is provided by DCAS. The remainder of the sector's emissions sources are estimated and reported based on DEP-provided data, which covers stationary fuel usage and process-related emissions specific to DEP's wastewater treatment operations within New York City and upstate. These process-related emissions include methane and nitrous oxide emissions that arise from anaerobic, aerobic, and natural processes in the environment related to effluent discharge.

e. Water Supply Emissions Data Sources

The water supply sector is also comprised entirely of DEP operations, which largely include DEP's Bureau of Water Supply (BWS) and Bureau of Water and Sewer Operations (BWSO). Unlike the wastewater treatment sector, water supply operations do not produce process-related emissions. Emissions sources within this sector are entirely fuel-based, which include utility energy consumption data provided by DCAS and stationary fuel delivery data provided by DEP.

f. Solid Waste Facilities Emissions Data Sources

The solid waste facilities sector includes emissions from two categories of operational activity: residual emissions from closed in-City landfills and emissions from in-City treatment of collected organic waste. DSNY provides data for both categories and manages the City's organics collection program. Additional residual in-City landfill emissions data are provided by DEP and the Department of Parks and Recreation.

4. 2023 Citywide Inventory Model Updates

a. Summary of Impact

Periodically, MOCEJ reviews the inventories methodologies to ensure the City is following greenhouse gas accounting best practices and to adjust for the addition of new, more accurate data or changes in input data. This year, MOCEJ identified modifications to the inventory methodologies to determine the electricity grid coefficient, and the on-road transportation emission factors.

As a result of updating the inventory methodology, while the City reduced the energy it consumed in its operations, because the grid was dirtier and the coefficient rose, these energy use reductions resulted in fewer emissions reductions benefits. GHG emission reductions were four percent lower than previously reported for FY22. Consequently, previously reported emission reduction totals relative to the 2006 baseline have been adjusted.

Despite the higher electricity coefficient, improvements to the methodology for estimating vehicle emissions only led to a two percent increase in Citywide GHG emission reductions for CY22. Consequently, previously reported emission reduction totals relative to the 2005 baseline have been adjusted.

b. 2023 Electricity Grid Factor Adjustment

In 2024, MOCEJ re-retained PowerGEM, the consulting firm that had created the NYC Grid Coefficient Tool, to conduct a verification of the grid coefficient and develop an enhanced quality assurance and quality control (QA/QC) process. This process was intended to ensure that the City's methodology for defining the grid coefficient continues to meet best practices and reflect changes in underlying data sources. This process resulted in the discovery of several historic data anomalies that needed to be addressed to more accurately determine the grid mix. This effort also reassessed the carbon intensity of the electricity grid for the past and present reporting years, leading to further enhancements and ensuring data integrity in both inventories. The following sections outline the process improvements and detail how MOCEJ plans to QA/QC this input data in the future.

i. Adjustments to Historic Input Data Methodology Changes

i.1 CEMS Data Reporting Changes

As described above in the methodology section, MOCEJ uses CEMS data to track emissions from power plants in New York and New Jersey.[23] In 2021, EPA CEMS data changed its reporting methodology and began omitting county identifier data from its output reports. CEMS county data had been used in the Grid Coefficient Tool to map generators to specific NYSIO electricity zones, which is an essential step in calculating the grid mix. Without CEMS generator location data, CEMS generator fuel consumption data was not used in the Grid Coefficient Tool calculations, which resulted in a fuel consumption data gap in the calculation of the 2021 and 2022 grid coefficients.

The City fixed this issue in its recalculation of 2021 and 2022 grid coefficients. The data validation report now includes a check for CEMS generators without county data. To ensure data gaps do not occur in the future, PowerGEM updated the Grid Coefficient Tool to automatically populate CEMS generator county information from EIA 860 data.

i.2 EIA 923 Data Reporting Changes

As mentioned in the methodology section, CEMS data does not report on all generators that support New York City's grid. For generators that are not included in CEMS, MOCEJ assigns the calculated plant heat

[23] US EPA, O. (2016, July 15). *EMC: Continuous Emission Monitoring Systems*. Www.epa.gov. https://www.epa.gov/emc/emc-continuous-emission-monitoring-systems

rate to generators using EIA 923 data, which provides fuel consumption data for each generator in New York and New Jersey.[24]

In 2021, EIA changed its reporting protocol for the EIA 923's calculated plant heat rate, which represents the amount of fuel consumed per unit of generation, for renewable generators. As a result, the Grid Coefficient Tool eliminated renewable generators from the calculation of the carbon intensity of the grid. In response to this change, MOCEJ conducted adjustments to the EIA 923 data, under the false assumption that electricity and total fuel consumption were equivalent for generators across New York and New Jersey. This assumption led to an underestimation of fuel consumed by generators serving New York City's grid. The City identified this error when completing the 2023 Inventory, automated the QA/QC checks embedded within the NYC Grid Coefficient Tool, and corrected the 2021 and 2022 coefficients and inventories.

i.3 Impact

Adjusting the Grid Coefficient Tool to account for the changes in CEMS and EIA reporting led to a 2.9 percent and 14.4 percent increase in emissions intensity for 2021 and 2022, respectively. This change means the grid in 2022 was "dirtier" (i.e., had higher emissions) than originally calculated in the 2022 inventory, which was released in November 2023. The increase in emissions aligns with the closure of the Indian Point Energy Center, a 2,000-Megawatt nuclear power plant, in 2021.

ii. Standardized Quality Assurance and Quality Control Processes

ii.1 Default Heat Rate Additions

MOCEJ uses both EIA 923 and CEMS data to estimate fuel consumption for every generator across New York and New Jersey. However, each year, a small percentage of generators fail to report fuel consumption associated with their power generation. This is especially common with certain types of plants, such as nuclear plants. To estimate the impact of these generators on the city's electricity grid, MOCEJ updated the NYC Grid Coefficient Tool to incorporate the EIA provided Average Operating Heat Rate for Selected Energy Sources.[25] For years prior to 2013, which are not included in the EIA heat rate table, MOCEJ applied an average annual heat rate per fuel type (default heat rate).[26]

ii.2 QA/QC Methodology Update

The NYC Grid Coefficient Tool now has a QA/QC function that generates a report of input data anomalies, dataset status, and warnings and errors. This new QA/QC function ensures that data anomalies, including the ones described below, are identified and can be mitigated:

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[24] *Form EIA-923 detailed data with previous form data (EIA-906/920)*. (n.d.). Www.eia.gov. https://www.eia.gov/electricity/data/eia923/

[25] *SAS Output*. (n.d.). Www.eia.gov. https://www.eia.gov/electricity/annual/html/epa_08_01.html

[26] Where average heat rate data and fuel consumption is unavailable, MOCEJ assumes the fuel consumption is zero.

- Plants defined with non-zero generation in EIA 923 without corresponding generators defined in EIA 860,
- EIA data defined for generation without corresponding fuel input,
- CEMS data defined for generation without corresponding fuel input, and
- Additional fuels needed in the fuel mapping files across all years to retain the impact of certain generators, primarily dual fuel systems that do not map to specific fuel types.

ii.3 Impact

Adjusting the Grid Coefficient Tool to account for the addition of the default heat rate and the QA/QC process had the most significant impact on emissions for inventory years 2020 and 2021. This update had minimal impacts for all years prior to 2020 (<1 percent). These changes led to a 1.5 percent and 3.6 percent decrease in emissions intensity in 2020 and 2021, respectively. These changes reflect the inclusion of nuclear generators on New York City's grid for those years that were underreported in EIA and undercounted in the Grid Coefficient Tool.

iii. Results

The adjustments to input data reporting and the establishment of standardized QA/QC and data gap filling processes resulted in significant impacts to the carbon intensity of the grid factor for inventory years 2020 through 2022 (see Table 3). Inventory years 2021 and 2022 saw impacts from EIA and CEMS input data reporting changes because 2021 was the first year EIA and CEMS changed their reporting methodology, and these changes were not rectified until inventory year 2023. Inventory years 2020 and 2021 saw larger impacts from QA/QC and gap filling because a number of generators came on and offline quickly around the closure of Indian Point. These generators did not report correctly to either EIA or CEMS and had to be gap filled. For years prior to 2020, all other impacts remain below one percent.

Year	Adjustments for Input Data Reporting Changes	QA/QC and Gap Filling	Total Adjustment to Grid Coefficient (kgCO2e/kWh)
2005	0.00%	0.055%	0.05%
2006	0.00%	-0.001%	0.00%
2007	0.00%	0.000%	0.00%
2008	0.00%	-0.005%	0.00%
2009	0.00%	-0.001%	0.00%
2010	0.00%	-0.004%	0.00%
2011	0.00%	0.002%	0.00%

2012	0.00%	0.259%	0.26%
2013	0.00%	0.037%	0.04%
2014	0.00%	0.051%	0.05%
2015	0.00%	0.027%	0.03%
2016	0.00%	0.032%	0.03%
2017	0.00%	0.026%	0.03%
2018	0.00%	-0.509%	-0.51%
2019	0.00%	0.019%	0.02%
2020	0.00%	-1.479%	-1.48%
2021	6.74%	-3.591%	2.89%
2022	14.40%	0.000%	14.40%
2023		0.007%	0.01%

Table 3: Impact of Updates to NYC Grid Factor 2005-2023, NYC MOCEJ (2024)

Table 4 shows the resulting CO2e grid coefficient for New York City, both previously reported in the 2022 Greenhouse Gas inventory and the proposed adjustment.

Year	Previously Reported (2022 Inventory) kgCO2e/MWh	Proposed Adjustment (2023 Inventory) kgCO2e/MWh	Total Adjustment to Grid Coefficient (kgCO2e/kWh)
CY2005	498.2	498.5	0.1%
CY2006	420.2	420.2	0.0%
CY2007	424.3	424.3	0.0%
CY2008	380.8	380.8	0.0%
CY2009	334.7	334.7	0.0%
CY2010	341.7	341.7	0.0%
CY2011	309.8	309.8	0.0%

CY2012	324.8	325.6	0.3%
CY2013	298.1	298.2	0.0%
CY2014	326.5	326.7	0.1%
CY2015	319.0	319.1	0.0%
CY2016	320.9	321.0	0.0%
CY2017	280.3	280.4	0.0%
CY2018	309.1	307.5	-0.5%
CY2019	289.5	289.6	0.0%
CY2020	320.2	315.5	-1.5%
CY2021	328.4	337.8	2.9%
CY2022	323.2	369.7	14.4%
CY2023		369.9	

Table 4: Previously Reported and Adjusted NYC Electricity Grid Coefficient (CO2e kg/kWh)

c. On-Road Model Update

In 2023, the on-road transportation methodology of NYC's GHG Citywide Inventory underwent two updates: adopting up-to-date emission factors to reflect recent national vehicle efficiency standards and the addition of for-hire vehicle emissions.

i. Updating On-Road Emission Factors

MOCEJ updated on-road emission factors to reflect the last 10 years of national fuel efficiency standards. EPA's MOVES is a state-of-the-science emission modeling system that estimates emissions for mobile sources at the national, county, and project level for criteria air pollutants, greenhouse gases, and air toxins. This model also produces emission factors on a per mileage basis for urban vehicle activity depending on the vehicle age. By pairing these emission factors with the age distribution of New York City's private fleet, pulled from DMV registration data, MOCEJ was able to calculate weighted averages of up-to-date vehicle emission factors for calendar years 2015 through 2023. A similar method was used for the GHG inventory prior to 2015, however prior to this update, 2015 on-road emission factors were used for inventory years 2015-2022. The update to the EPA MOVES model resulted in a 17 percent increase in estimated on-road emission reductions from 2005 to 2023 and an overall four percent decrease in estimated citywide emissions over the same period.

ii. Incorporating For-Hire Vehicle Emissions into Inventory

For New York City's for-hire fleet, TLC provided vehicle miles traveled (VMT) and fuel mix estimates for 2005-2023. VMT estimates are based on TLC's trip record data,[27] which includes time and distance of each trip, and tracks medallion (yellow) taxis, street hail livery (green) taxis, for-hire vehicles (FHVs), and high-volume for hire vehicles (HVFHV) that dispatch more than 10,000 trips per day, such as Uber and Lyft.

These vehicle types were incorporated into TLC's trip record system at different times, and so their data availability prior to 2018 is variable. The first full year of trip record data is 2010 for yellow taxis, 2014 for green taxis, and 2018 for FHVs and HVFHVs. To account for this variability, TLC used certain proxies, models, and assumptions to gap fill missing historic data, as described below.

ii.1 Estimating Historical For-Hire VMT

Where trip count data was unavailable, TLC used historic taxi studies to estimate VMT.[28] Where data for a specific year could not be found, TLC developed estimates based on the closest year for which data was available. These estimates considered the impact of economic recessions on trip demand in TLC-regulated industries. Where trip distance was missing in data, an average trip distance of 2.75 miles for green and yellow taxis and 4.2 miles for FHV and HVFHV was applied.

TLC-regulated vehicles spend a considerable amount of time driving between passenger pickups, activity time referred to as "cruising," which is not typically incorporated in trip record data, except for the HVFHV fleet. To include those cruising miles, VMT from trip-miles was scaled based on the estimated percentage of time a vehicle spent cruising.

Yellow and green cab cruising estimates were informed by cruising estimates from historical studies of the industry.[29] Cruising miles accounted for 39 percent of trip miles in 2005 and decreased slightly year-to-year, except during the 2009 economic recession, when lower trip demand meant more cruising miles. TLC assumed FHV cruising miles to account for 40 percent of VMT in the traditional FHV industry.

ii.2 Estimating Historical For-Hire Fleet Fuel Type

TLC has limited historical data on fuel types for licensed vehicles. When available, TLC used data for the percentage of hybrid or electric vehicles across the TLC fleet (i.e., for all licensed vehicles in each TLC-regulated sector) for a given year. When the percentage of hybrid vehicles was only available for the taxi industry, as seen in the earliest years of the TLC analysis, the fuel mix of the taxi fleet was assumed to be representative of the fuel mix of the entire fleet. Where no data for the share of hybrid vehicles in the

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[27] *TLC Trip Record Data - TLC*. (n.d.). Www.nyc.gov. https://www.nyc.gov/site/tlc/about/tlc-trip-record-data.page

[28] *Traffic & Transit - Schaller Consulting*. (2018). Schallerconsult.com. http://www.schallerconsult.com/pub/traffic.htm

[29] *Traffic & Transit - Schaller Consulting*. (2018). Schallerconsult.com. http://www.schallerconsult.com/pub/traffic.htm

fleet could be found, TLC estimated the percentage using the most recent two years for which data was available.

5. 2023 City Government Inventory Updates

a. Removal of the City University of New York Senior Colleges (CUNY SC)

During the 2023 inventory publication cycle, emissions associated with the City University of New York Senior Colleges (CUNY SC) were removed from the City Government GHG Inventory across the entire reporting timeline (from the fiscal year 2006 baseline up through the current reporting cycle). The City removed CUNY SC emissions from the City Government GHG Inventory to align with Local Law 97 of 2019, where the definition of "City Buildings" explicitly excludes CUNY SC buildings.[30] Since CUNY SC is a New York State entity, it does not fall within the boundary of City government operations. CUNY Community Colleges (CUNY CC), on the other hand, remain in-boundary.

CUNY SC represented roughly five percent of total portfolio emissions. Because this adjustment was applied across the entire reporting timeline, the change does not significantly impact the City's cumulative or year-over-year emissions reductions to-date (as represented in section 1-c of this document).

Appendix A: Definitions

Biogas: An energy source made up of a mixture of gases including methane, carbon dioxide, and hydrogen sulfide produced by anaerobic digestion.

Biogenic: Emissions produced by living organisms or biological processes, but not fossilized or from fossil sources.[31]

Carbon Intensity: The amount of carbon by weight emitted per unit of energy consumed.[32]

Carbon Neutrality: A net-zero state of carbon dioxide emissions wherein the amount of carbon emitted is not more than the amount absorbed from the atmosphere.

GHG Inventory: A list of sources of emissions, and the amount of emissions from each source, using a standardized methodology.

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[30] New York City Administrative Code § 28-320.1.

[31] *An Accounting and Reporting Standard for Cities Global Protocol for Community-Scale Greenhouse Gas Emission Inventories. (n.d.).* *https://cdn.locomotive.works/sites/5ab410c8a2f42204838f797e/content_entry5ab410fb74c4833febe6c81a/5ab4110fa2f42204838f79ba/files/GPC_Standard.pdf?1541698648*

[32] *Glossary - U.S. Energy Information Administration (EIA)*. (2025). Eia.gov. https://www.eia.gov/tools/glossary/index.php?id=carbon%20intensity

Global Warming Potential: A measure of how much energy the emission of 1 ton of a gas will absorb over a given period of time, relative to the emission of 1 ton of carbon dioxide (CO_2).[33]

Greenhouse Gas (GHG) Emissions: Gases that trap heat in earth's atmosphere, contributing to climate change.[34]

Grid Coefficient: Average amount of greenhouse gas emissions in CO2e per unit of electricity consumed from New York City's electricity grid (kWh).

Grid Mix: The distribution of fuel types that are combusted or expended to power New York City's electricity grid.

Gross Emissions: The total GHG emissions associated with combustion emissions without the considerations of carbon sinks and offsets.

Net Emissions: The GHG emissions associated with combustion emissions and the benefits of carbon sinks and offsets.

Scope 1 Emissions: GHG emissions from sources located within the city boundary

Scope 2 Emissions: GHG emissions occurring as a consequence of the use of grid-supplied electricity, heat, steam and/or cooling within the city boundary.

Scope 3 Emissions: All other GHG emissions that occur outside the city boundary as a result of activities taking place within the city boundary.

Stationary Sources: Buildings, streetlights, and traffic signals which consume energy.

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[33] US EPA. (2023, April 18). *Understanding Global Warming Potentials | US EPA*. United States Environmental Protection Agency. https://www.epa.gov/ghgemissions/understanding-global-warming-potentials

[34] EPA. (2024, April 11). *Overview of greenhouse gases*. US EPA. https://www.epa.gov/ghgemissions/overview-greenhouse-gases