Metro Nashville and Davidson County

Community & Municipal Greenhouse Gas Inventories

2014-2022 Methodology and Results

socket
Nashville's Sustainability Outlet

Department of General Services

UPDATED: DECEMBER 2025

Contents

I. Abbreviations

AFOLU	Agriculture, forestry and other land use
AR6	IPCC 6th Assessment Report
BNA	Nashville International Airport
CH_4	Methane
CNG	Compressed natural gas
CO_2	Carbon dioxide
CO_2e	Carbon dioxide equivalent
DES	District Energy System
DGS	Department of General Services
E85	Ethanol fuel (85%) blend
EF	Emission factor
EIA	US Energy Information Administration
EPA	US Environmental Protection Agency
EV	Electric vehicle
eGRID	EPA's Emissions & Generation Resource Integrated Database
GHG	Greenhouse gas
GNRC	Greater Nashville Regional Council
GPC	Global Protocol for Community-scale GHG Emission Inventories
GWP	Global warming potential
HFCs	Hydrofluorocarbons
HHV	Higher heating value
IOEs	Independently Operating Entities
IPCC	Intergovernmental Panel on Climate Change
JWN	John C. Tune Airport

kWh	Kilowatt-hour
LHV	Lower heating value
LTOs	Landings and Takeoffs
MGG	Municipal General Government
MDHA	Metropolitan Development and Housing Agency
mmBtu	Million British thermal units
MNPS	Metro Nashville Public Schools
MSW	Mixed solid waste
MT	Metric tons
MTA	Metro Transit Authority (WeGo Public Transit)
MNAA	Metro Nashville Airport Authority
MNPD	Metro Nashville Police Department
MOVES	Motor Vehicle Emission Simulator
MWh	Megawatt-hour (1,000 kWh)
MWS	Metro Water Services
N_2O	Nitrous oxide
NDOT	Nashville Department of Transportation
NES	Nashville Electric Service
NF_3	Nitrogen trifluoride
PFCs	Perfluorocarbons
SEDS	EIA's State Energy Data System
SF_6	Sulfur hexafluoride
T&D	Transmission and distribution
TVA	Tennessee Valley Authority
VMT	Vehicle miles travelled

II. Introduction

As part of Metro Nashville's ongoing commitment to sustainability, this report outlines the methodologies and high-level results of Metro Nashville and Davidson County's Community and Municipal Greenhouse Gas (GHG) inventories, updated in 2025 with data from Calendar Year 2022. As part of this inventory iteration, the GHG inventories conducted since the baseline year 2014 were updated to ensure completeness, consistency, accuracy, replicability, transparency and quality control in accordance with the GHG Protocol's Global Protocol for Community-Scale Greenhouse Gas Emissions (GPC).

Metro's Climate Action Plan[1] and Climate Adaptation and Resilience Plan[2] are foundational to the city's sustainability efforts and rely heavily on the GHG inventories to track progress. For example, the municipal and citywide goal of 80% GHG emissions reduction by 2050 requires accurate inventories to measure success.

This GHG emissions inventory was conducted at the behest of the Office of Nashville Mayor Freddie O'Connell and completed by a project team within the Department of General Services (DGS) with the help of an outside consultant, Facility Diagnostics. Additionally, several Metro Nashville Departments and outside agencies, notably the Greater Nashville Regional Council (GNRC), Nashville Electric Service (NES), Piedmont Natural Gas, Metro Water Services, Metro Nashville Airport Authority (MNAA), and the Metro Health Department, as well as many others, played critical roles in data acquisition.

Emissions were calculated using software tools commonly used by localities across the globe who are voluntarily tracking emissions. Emissions data supports Nashville's pledge to implement policies and undertake measures to: (i) reduce/limit greenhouse gas emissions, (ii) prepare for the impacts of climate change, (iii) increase access to secure, affordable and sustainable energy and (iv) track progress toward these objectives.

This is the sixth GHG inventory conducted by Metro Nashville. The first was completed in 2009, reporting 2005 emissions, and the second was completed in 2014, reporting 2011 emissions. Because the methodologies and available data have evolved and improved since the earlier inventories were conducted, the 2014 GHG inventory now serves as the baseline for both Community-wide and Municipal emissions.

[1] Climate Action Plan: https://www.nashville.gov/sites/default/files/2021-04/2021-Report-Climate-Change-Mitigation-Action-Plan.pdf
[2] Climate Adaptation and Resilience Plan: https://www.nashville.gov/sites/default/files/2024-09/Climate_Adaptation_Resilience_Plan_Final.pdf

A high-level summary of the Community and Municipal GHG inventories is available for download here[3]. Detailed results from the 2014-2022 inventories can be accessed in this public-facing dashboard[4].

III. GHG Accounting and Reporting Principles

This section outlines the GHG accounting and reporting principles that Metro Nashville has followed when conducting its Community and Municipal inventories. These principles are aligned with those in the Global Protocol for Community-Scale Greenhouse Gas Emissions and other common reporting frameworks.

Relevance

Metro Nashville and Davidson County Community and Municipal's GHG inventories reflect the relevant specific activities, capacity and regulatory context of its local community and government.

Completeness

Metro Nashville's GHG inventories consider all sectors and categories of emission sources that are significant and mandatory, with any exclusions disclosed and justified using notation keys and/or qualitative explanations.

Consistency

Metro Nashville conducts new GHG inventories at least once every three years. As methodologies or data sources improve over time, efforts are made to re-baseline past years' inventories to consistently apply such improvements and allow for meaningful comparison of GHG emissions performance over time. All inventories are calculated and compiled using the same emissions tracking software which uses widely accepted and current inventory guidance, Global Warming Potentials (GWPs) and emission factors, ensuring consistency in calculation across all years. This update aligns the accounting methodologies, data sources, emission factors and GWPs used in the 2014, 2017, 2019 and 2022 inventories.

Transparency

Metro Nashville is committed to transparency in its GHG management practices. This methodology report and all calculations were completed with the goal of complete repeatability and transparency for future year inventories. All assumptions, limitations

[3] GHG Summary: https://www.nashville.gov/sites/default/files/2025-04/2022_GHG_Inventory_Final.pdf
[4] GHG Dashboard: https://dashboards.nashville.gov/t/Metro/views/MetroNashvilleGHGInventory_2014to2022Dashboards_17449086563830/Summary_DB

and estimations are disclosed, and appropriate references are made to the calculation methodologies and data sources used.

Accuracy

Metro Nashville has committed to conducting a comprehensive GHG inventory process with high data quality and accuracy. The GHG team worked systematically to gather data with the finest granularity and accuracy as possible to reduce uncertainties as far as practical.

IV. Baseline Year and Boundary Conditions

Metro Nashville and Davidson County Community and Municipal GHG Inventories are conducted at least once every three years.

Baseline Data Year

2014 is the baseline data year for Metro Nashville's Community and Municipal GHG inventories as it is the most recent year where a nearly complete dataset for all currently tracked sectors and datasets was available. As noted in the sector-specific sections below, several updates were made to both the Community and Municipal GHG inventories in 2025 to ensure the re-baselined 2014 inventory was conducted in a manner that was "apples-to-apples" with future inventories.

Geographic Boundary

Metro Nashville's Community GHG inventory attempts to comprehensively include emissions from all activity occurring within the geographic boundary of Nashville and Davidson County, covering 526 square miles.

Organizational Boundaries

Metro Nashville sets the organizational boundaries for its Municipal GHG inventory according to the "Control Approach". Consistent with this approach, Metro Nashville accounts for all GHG emissions from locations for which it has direct control over operations. This includes emissions from all city streetlights and traffic lights, emissions from the closed Bordeaux Landfill, as well as emissions from the energy and fuel used in all vehicles, buildings and facilities controlled by the Metropolitan General Government (MGG) including Metro Water Services (MWS) as well as Metropolitan Nashville Public Schools (MNPS).

As part of its commitment to comprehensively account for all municipal emissions over which it holds influence, Metro Nashville also accounts for the energy and fuel used by many independently operating entities (IOEs) connected to city operations. The IOEs included in Metro Nashville's inventory include Metro Nashville Airport Authority

(MNAA), Metropolitan Development and Housing Agency (MDHA), the Convention Center Authority (CCA), Metropolitan Transit Authority (MTA)/WeGo, Nashville Electric Service (NES), District Energy System (DES), and the Sports Authority (SA).

Operational Boundaries / Scopes

Operational boundary conditions provide depth to a GHG inventory by identifying which emission sources will be accounted for within the Geographic and Organizational boundaries defined above. The GHG Protocol outlines three emission sources (referred to as “scopes”) that provide the framework for operational boundaries:

Scope 1 = Direct emissions that come from sources that are controlled by the reporting organization. Scope 1 emissions include stationary fuel combustion, mobile fuel combustion from transportation vehicles and fugitive emissions, including leaks or unintended releases.

Scope 2 = Indirect emissions from the generation of purchased electricity, steam and district heating/cooling. Scope 2 emissions physically occur at the facility where electricity is generated and would be considered a direct scope 1 emission by that facility.

Scope 3 = Other indirect emissions that are a consequence of the activities of the organization or community but come from sources not owned or controlled by the organization. Some examples include emissions from employee commuting and outsourced contractor activities. All emissions associated with Metro Nashville’s independently operating entities (IOEs) were re-categorized as scope 3 as part of the 2025 updates to the 2014, 2017, 2019 and 2022 inventories. This included all fuel and electricity emissions from these entities.

Greenhouse Gases Included

Both the Community and Municipal GHG inventories include emissions from carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), with all results reported in metric tons of carbon dioxide equivalent (MT CO_2e).

Metro Nashville does not yet include emissions from hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6), or nitrogen trifluoride (NF_3) due to limited data availability.

V. Community Inventory

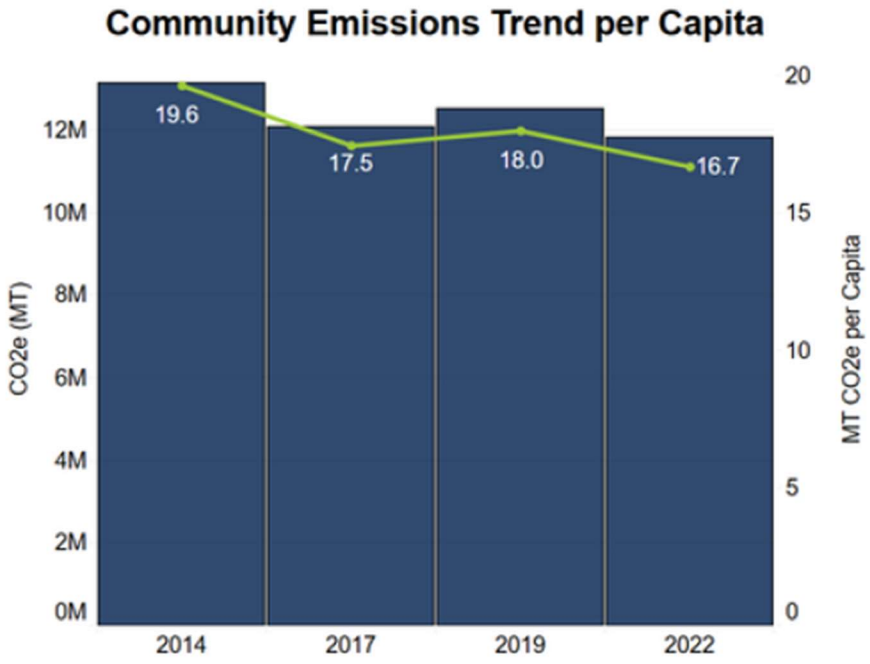
Data for the Community GHG inventories were collected and categorized as per the sector-level structure utilized by the inventory calculation software. This section outlines, for each Sector, the GPC reference numbers and scope for each emission source, a short description of each emission source, data collection specifics for that emission

source, calculation methodologies and re-baselining notes (if applicable) for the 2025 GHG inventory update cycle.

General 2025 Updates: In 2025 all inventories were updated to use AR6 Global Warming Potentials (GWPs).

Community Highlights – 2014 to 2022

- Emissions have dropped 10% since 2014.
- 2022 per capita emissions are lower than the three previous inventories, and 15% lower than 2014.
- The number of vehicle miles traveled decreased 3.3% between 2019 and 2022; meanwhile, aviation is a growing component of transportation emissions.
- Energy use in homes and buildings has stayed relatively flat; however, emissions have dropped significantly due to the power grid transitioning away from carbon-intensive generation methods such as coal.



Yearly trend of GHG emissions in CO2e (Bar) and CO2e per capita (Line), showing emissions normalized by Davidson County's growing population

Residential Energy

Residential Electricity

GPC Reference Number: I.1.2
GPC Scope: 2

Description: Emissions from purchased electricity used in residential buildings in Davidson County.

Data/Source: Nashville Electricity Services (NES) supplies Davidson County residential (RS rate class) electricity data in kWh each year.

Methodology: Purchased electricity kWh entered into the inventory calculation software which multiplies kWh by TVA-provided CO_2 emissions factors by year for General Service electricity in Davidson County. eGRID factors used for CH_4 and N_2O. See Appendix A for factors.

2025 Updates: None.

Residential Natural Gas

GPC Reference Number: I.1.1
GPC Scope: 1

Description: Emissions from natural gas used in residential buildings in Davidson County.

Data/Source: Piedmont (Duke Energy) supplies therms of natural gas sold in Davidson County by rate code (301-Residental Service) and service area (all Davidson County service areas included).

Methodology: Natural gas therms are entered into the inventory calculation software which applies appropriate and consistent stationary fuel combustion emissions factors for CO_2, CH_4 and N_2O (not year specific). These emissions factors are in line with EPA's emission factors.

2025 Updates: Residential therms from previous years' inventories were also updated in 2025 as Piedmont was able to provide more detailed historical usage, by rate class, specific to Davidson County. In the original 2014 and 2017 inventories, therms were estimated based on applying an 80% assumption to a total middle TN number. The updated, more accurate, therms lowered the 2014 and 2017 scope 1 emissions for residential energy significantly while the 2019 update was <1%.

Residential Heating Fuels

GPC Reference Number: I.1.1
GPC Scope: 1

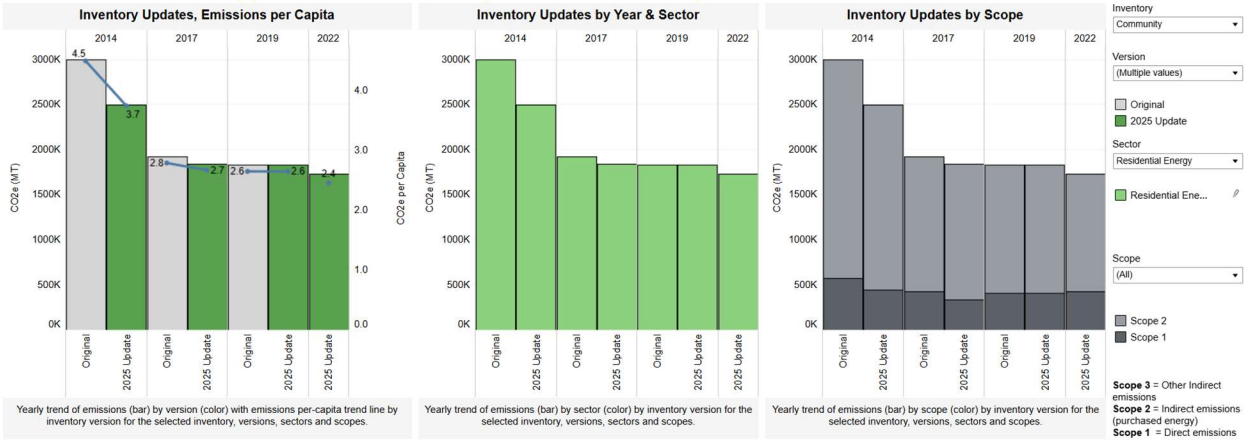
Description: Emissions from fuel oil, kerosene, propane and wood used in residential buildings for heating in Davidson County.

Data/Source: Total energy (state-level) data from US Energy Information Administration's State Energy Data System (SEDS) EIA dataset[5] (use_all_btu_update.xlsx file) is scaled by Census data[6] on customers using each fuel in Davidson County/TN households using each fuel.

Methodology: Entries for scaled mmBtu's of propane, diesel (fuel oil), kerosene and wood are compiled in an internal spreadsheet for all years and then entered into the inventory calculation software which applies appropriate and consistent stationary fuel combustion emissions factors for CO_2, CH_4 and N_2O (not year specific).

2025 Updates: All previous year's fuel totals were updated in 2025 to use the same data source and methodology noted above for consistency. Previous data was similar and was a mix of data from Metro Nashville's Public Health Department and estimated EIA data.

Residential Energy Emissions & Update Summary



Commercial Energy

Commercial Electricity

GPC Reference Number: I.2.2
GPC Scope: 2

Description: Emissions from purchased electricity used in commercial buildings in Davidson County.

Data/Source: Nashville Electricity Services (NES) supplies Davidson County electricity data. Non-residential, non-manufacturing is classified as commercial while manufacturing usage is classified as industrial. Lights are classified as commercial.

[5] SEDS EIA Dataset: https://www.eia.gov/state/seds/sep_update/use_all_btu_update.xlsx
[6] Census Data: https://data.census.gov/table?q=Davidson%20County%20Heating%20fuel%202022&g=010XX00US

Lights (unknown origin) are included but scaled by the ratio of Davidson County households/NES customers. Because Metro Water Services' (MWS) water and wastewater treatment plants' kWh are reported in the Water and Wastewater sector, the total electricity from those plants is also subtracted from the commercial energy total to avoid double counting.

Methodology: Purchased electricity kWh are entered into the inventory calculation software which multiplies kWh by TVA-provided CO_2 emissions factors by year for "General Service" electricity in Davidson County. eGRID factors used for CH_4 and N_2O. See Appendix A for factors.

2025 Updates: All inventories were updated for consistency in accounting, specifically to subtract out the separately reported water and wastewater treatment kWh.

Commercial Natural Gas

GPC Reference Number: I.2.1
GPC Scope: 1

Description: Emissions from the combustion of natural gas in Davidson County commercial buildings.

Data/Source: Piedmont (Duke Energy) supplies therms of natural gas sold in Davidson County by rate code, revenue class and service area (all Davidson County service areas included). Gas usage by rate code was mapped to commercial vs industrial as per Piedmont's guidance. Where codes could represent either category, therms are classified as industrial. Certain rate codes (350, 354, 360, 365) and revenue classes (804, 809, 818, 897) associated with border stations/off-system sales and CNG-specific therms (likely double counts the CNG in transportation sector) are also excluded as per Piedmont's guidance. Since Metro Water Services' water treatment plants have commercial rate codes, their usage is subtracted from the total commercial therms.

Methodology: Natural Gas therms are entered into the inventory calculation software which applies appropriate and consistent stationary fuel combustion emissions factors for CO_2, CH_4 and N_2O (not year specific).

2025 Updates: Commercial therms from previous years inventories were updated in 2025 to consistently separate out MWS' data and use Piedmont's better historical breakouts of usage, by rate and revenue class, specific to Davidson County. In the original 2014 and 2017 inventories, therms were estimated based on applying an 80% assumption to a total middle TN number. The updated therms lowered the 2014 totals by about 10%, increased 2017 by about 3% and negligibly changed 2019.

Commercial Fuels

GPC Reference Number: I.2.1
GPC Scope: 1

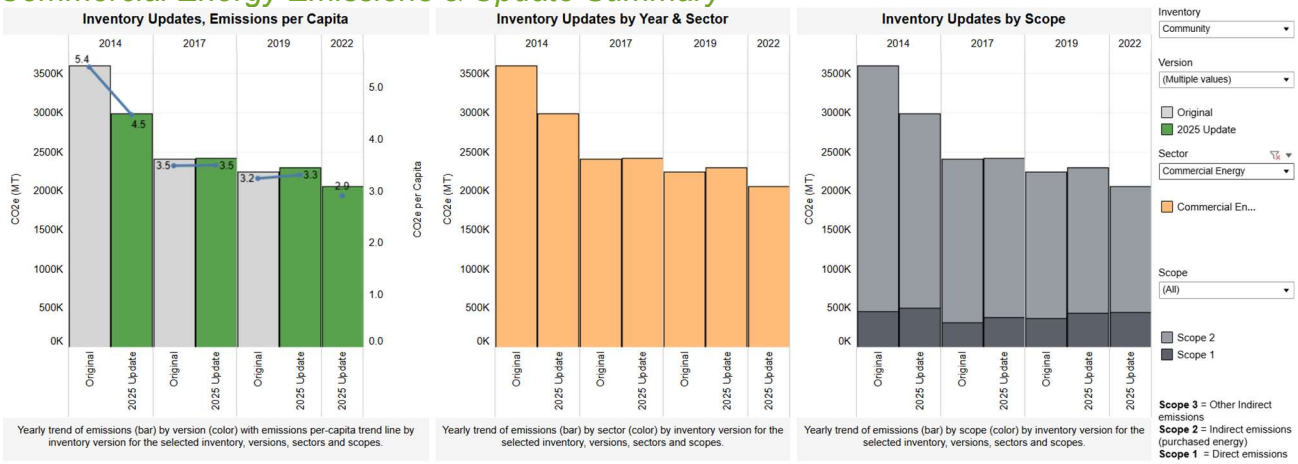
Description: Emissions from coal, fuel oil, kerosene, propane and motor gasoline used in commercial buildings in Davidson County.

Data/Source: Data on state-wide thousand short tons (coal) and thousand barrels (all other fuels) from US Energy Information Administration's State Energy Data System (SEDS) Table CT5 EIA dataset[7] for commercial sector energy consumption is converted to short tons and gallons (respectively) then scaled by population of Davidson County/TN population. Coal data (2014 only) was obtained from the EPA Flight tool[8] for the Vanderbilt energy plant which was the only major source of coal burning in 2014 (phased out after 2014).

Methodology: Entries for scaled consumption of propane, diesel (fuel oil), kerosene and gasoline are compiled in an internal spreadsheet for all years, then entered into the inventory calculation software which applies appropriate and consistent stationary fuel combustion emissions factors for CO_2, CH_4 and N_2O (not year specific).

2025 Updates: All previous year's fuel totals were updated in 2025 to use the same data source and methodology noted above for consistency. Earlier inventories used comparable data, combining figures from Metro Nashville's Public Health Department and estimates from the EIA.

Commercial Energy Emissions & Update Summary



Industrial Energy

[7] Table CT5 EIA dataset:
https://www.eia.gov/state/seds/data.php?incfile=/state/seds/sep_use/com/use_com_TN.html&sid=TN
[8] EPA Flight Tool (Data for 2014 Vanderbilt Coa usage):
https://ghgdata.epa.gov/ghgp/html/2014.do?id=1004102&et=undefined

Industrial Electricity

GPC Reference Number: I.3.2
GPC Scope: 2

Description: Emissions from purchased electricity used in industrial operations in Davidson County.

Data/Source: Nashville Electricity Services (NES) supplies Davidson County electricity data. Non-residential, non-manufacturing is classified as Commercial while Manufacturing usage is classified as Industrial.

Methodology: Purchased electricity kWh is entered into the inventory calculation software which multiplies kWh by TVA-provided CO_2 emissions factors by year for General Service electricity in Davidson County. eGRID factors used for CH_4 and N_2O. See Appendix A for factors.

2025 Updates: None.

Industrial Natural Gas

GPC Reference Number: I.3.1
GPC Scope: 1

Description: Emissions from Natural Gas used in industrial operations in Davidson County.

Data/Source: Piedmont (Duke Energy) supplies therms of natural gas sold in Davidson County by Rate Code and Service Area (all Davidson County service areas included). Rate codes are mapped to commercial vs industrial as per Piedmont's guidance. Where codes could be either, therms are put into the industrial category. Certain codes are also excluded as per their guidance (350, 354, 360, 365) as were all revenue classes (804, 809, 818, 897) associated with CNG-specific therms (deemed these to be double counting the CNG included in transportation sector). Metro Water Services' wastewater treatment plants have industrial rate codes and therefore their usage is subtracted from the total industrial therms.

Methodology: Natural Gas therms are entered into the inventory calculation software which applies appropriate and consistent stationary fuel combustion emissions factors for CO_2, CH_4 and N_2O (not year specific).

2025 Updates: Industrial therms from previous years inventories were updated to consistently separate out MWS' data and use Piedmont's better historical breakouts of usage, by rate and revenue class in Davidson County.

Industrial Fuels

GPC Reference Number: I.3.1
GPC Scope: 1

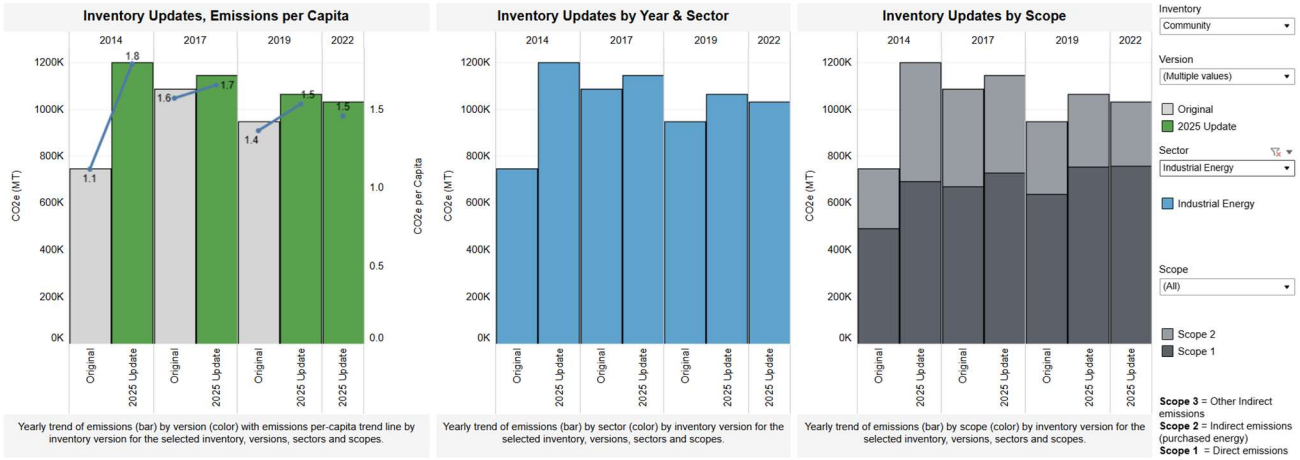
Description: Emission from fuel oil, kerosene, propane and motor gasoline used in industrial operations in Davidson County.

Data/Source: Data on state-wide thousand barrels from US Energy Information Administration's State Energy Data System (SEDS) Table CT6 EIA dataset[9] for industrial sector energy consumption – Note: the kerosene value was not in the online table and came from this EIA Raw Data Table[10] (KSICB code) - scaled by population of Davidson County/TN population.

Methodology: Entries for scaled consumption of propane, diesel (fuel oil), kerosene and gasoline are compiled in an internal spreadsheet for all years and entered into the inventory calculation software which applies appropriate and consistent stationary fuel combustion emissions factors for CO_2, CH_4 and N_2O (not year specific).

2025 Updates: All previous year's fuel totals were updated in 2025 to use the same data source and methodology noted above for consistency. Earlier inventories used comparable data, combining figures from Metro Nashville's Public Health Department and estimates from the EIA.

Industrial Energy Emissions & Update Summary



[9] Table CT6 EIA dataset:
https://www.eia.gov/state/seds/data.php?incfile=/state/seds/sep_use/ind/use_ind_TN.html&sid=TN
[10] EIA SEDS data file used for Industrial Kerosene usage:
https://www.eia.gov/state/seds/sep_use/total/csv/use_all_phy.xlsx

Transportation and Mobile Sources

On-Road Transportation

GPC Reference Number: II.1.1
GPC Scope: 1

Description: Emissions from fuel used (gasoline, diesel, CNG, E85) and miles traveled by on-road vehicles.

Data/Source: Metro Nashville collects vehicle registration data from the County Clerk and works with the Greater Nashville Regional Council (GNRC) to model yearly on-road transportation activity data using EPA's Motor Vehicle Emission Simulator (MOVES). GNRC also receives inputs on vehicles from NDOT which it uses along with the Clerks' data to model the right vehicle mix for MOVES calculation (Clerk data, for example, does not have accurate counts for vehicles that have permanent tags).

Note: Off-road transportation is minimal in Nashville compared to on-road transportation and much of this fuel is likely accounted for in commercial and industrial energy fuel estimates. Off-road emissions are not currently included due to data limitations, though attempts may be made in future inventories to incorporate them.

Methodology: MOVES outputs total emissions for CO_2, CH_4, and N_2O from on-road travel but starting in 2025, GNRC began providing more detailed breakouts for total distance (vehicle miles traveled or VMTs) and energy used in mmBtu using LHV (lower heating value) by fuel type and vehicle type. MOVES vehicle types are mapped to the inventory calculation software vehicle types as noted in Appendix A for data entry. Total fuel use (in gallons for all fuels except CNG which required entry in standard cubic feet, scf) is derived from the MOVES energy used by first converting the LHV to higher heating value (HHV) amounts (divided by 0.95), then converting to gallons (or scf) using the software's energy contents for each fuel (in HHV which are more typical for GHG accounting – see Appendix A).

2025 Updates: In past years, emissions were the only output received from GNRC and these were entered into the inventory calculation software as direct-entry records. In 2025, to ensure consistency in factors being applied to all fuel data in the inventories, on-road transportation entries were entered with total fuel use for each fuel type that included total miles driven and percent breakouts by vehicle type. Bus miles/fuel entries were entered separately (using the public transit calculator) from other on-road miles. In 2025, MOVES5 (an updated version of EPA's modeling software) was used to run a model for 2022, and re-run models for 2019, 2017 and 2014 to ensure consistency across all datasets.

Aviation

GPC Reference Number: II.4.1
GPC Scope: 3 (all fuel at BNA and jet fuel at JWN) and 1 (aviation gas at JWN)

Description: Emissions from the fuel loaded into aircraft at BNA and JWN, as well as police and hospital helicopters.

Data/Source: Jet fuel and aviation gasoline are loaded onto airplanes at BNA and JWN. The Airport Authority (MNAA) provides these gallons loaded as well as LTOs (landings and takeoffs) in their Annual Air Emissions Inventory reports. The MNPD provides fuel used for each police helicopter, while the Vanderbilt LifeFlight team provides LTOs and helicopter types of air medical transport in the Nashville area.

Methodology: For helicopter life flights, gallons of jet fuel used are calculated using 1-hour fuel data from the Guidance on the Determination of Helicopter Emissions, Edition 2, December 2015[11]. The total jet kerosene gallons are then entered into the inventory calculation software which applies appropriate and consistent fuel combustion emissions factors for CO_2, CH_4 and N_2O (not year specific). For police helicopters, gallons of jet fuel are similarly entered into the software.

Fuel loaded at BNA airport is entered as scope 3, since all airplanes fly between jurisdictions. For JWN Airport, local LTOs are significant thus aviation gas is entered as Scope 1 (within jurisdiction), while jet fuel is entered as scope 3.

2025 Updates: In previous years, all airplane emissions were entered as scope 1, since the LTO method was used to calculate emissions. Emissions were entered into the inventory calculation software as direct-entry records. In 2025, all airplane and helicopter entries were changed to fuel data entry so they would utilize the consistent emission factors in the software.

Rail

GPC Reference Number: II.2.1
GPC Scope: 1

Description: Emissions from diesel combusted by CSX freight, passenger, and switch engines, as well as for the STAR commuter train.

Data/Source: Received actual gallon data from CSX for years 2015, 2017 and 2024. RTA provides data on gallons of diesel used by the commuter train. This is scaled by the length of train travel inside Davidson County/total train travel (42%).

[11] Guidance on the Determination of Helicopter Emissions, Edition 2, December 2015: https://www.bazl.admin.ch/dam/bazl/de/dokumente/Fachleute/Regulationen_und_Grundlagen/guidance_on_the_determinationofhelicopteremissions.pdf.download.pdf/guidance_on_the_determinationofhelicopteremissions.pdf

Methodology: Between 2015-2024, total CSX fuel (always ~3M gal/year) dropped 1.7%/year. This was used to model 2019 and 2022 usage. Gallons are entered into the inventory calculation software so that consistent emission factors are used.

2025 Updates: CSX reported new data in 2025 without differentiating between switch engines, freight and passenger trains. Previous inventories were therefore updated to one CSX entry as emission factors are the same for these previously separated entries. Updated STAR commuter train entries to use the software's emission factors instead of using direct-entry (pre-calculated) emissions.

Waterborne

GPC Reference Number: II.3.1
GPC Scope: 1

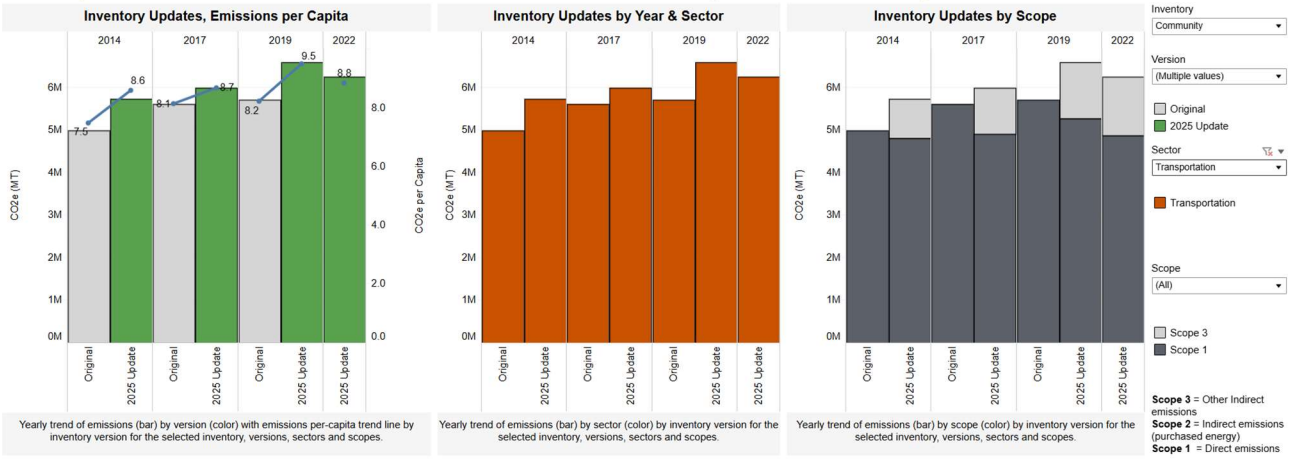
Description: Diesel is combusted to move waterborne barges through the Cumberland River in Davidson County.

Data/Source: Metro Health Department historically calculated diesel used from counts of barge transits through the Cheatham Dam lock. Data provided for 2023 did not align with barge counts from the Army Corps of Engineers. Ingram Barge also provided gallons for 2022.

Methodology: For consistency, used 2014 and 2017 average gallons/barge to calculate 2019 and 2022 gallons using the Cheatham Dam lock total barge counts.

2025 Updates: Only 2019 inventory updated according to new methodology.

Transportation and Mobile Sources Emissions & Update Summary



Solid Waste

Solid Waste

GPC Reference Number: III.1.2
GPC Scope: 3

Description: No active landfills exist within Davidson County, and all waste generated by the city is sent outside the county. Scope 3 (indirect) emissions from the waste sent to the various out-of-county destination landfills are included in the inventory.

Data/Source: Davidson County Solid Waste Region Board's Annual Progress Report[12]

Methodology: Total Municipal Solid Waste (in Short Tons) from the annual reports are entered into the inventory calculation software. Since flaring or active gas collection is done at all landfills, Aggressive Collection is selected. Waste Characterization factor sets from the Nashville Waste Characterization study (Feb 2018)[13] are used and shown in Appendix A.

2025 Updates: Updated the Waste Characterization factor set used for 2017 and 2014 inventories according to the structure used for the 2019 inventory: use 0% Mixed MSW.

Bordeaux Landfill

GPC Reference Number: III.1.1
GPC Scope: 1

Description: Emissions associated with the closed Bordeaux Landfill. Though closed in 1994, the landfill continues to emit methane, which contains relatively high CO_2e from the previously disposed waste.

Data/Source: EPA FLIGHT Tool[14].

Methodology: Enter methane released by landfill from EPA Flight Tool into the inventory calculation software.

2025 Updates: None.

Landfill Flaring

[12] 2022 Davidson County Solid Waste Region Board's Annual Progress Report: https://www.nashville.gov/sites/default/files/2023-03/2022AnnualProgressReport.pdf?ct=1745383506
[13] Metro Nashville and Davidson Country, TN Waste Stream and Recycling Characterization Study (Feb 2018): https://www.nashville.gov/sites/default/files/2025-06/Nashville-Waste-and-Recycle-Characterization-Study-2018-02.pdf?ct=1749735786
[14] EPA Flight Tool Data for Bordeaux Landfill (2022): https://ghgdata.epa.gov/ghgp/html/2022.do?id=1004808&et=undefined

GPC Reference Number: III.1.2
GPC Scope: 3

Description: Emissions associated with flaring methane at landfills where Davidson County municipal solid waste is sent.

Data/Source: EPA FLIGHT Tool data for each landfill receiving Davidson County solid waste, as well as Davidson County Solid Waste Region Board's Annual Progress Report[12] for 2022 for total waste sent to each landfill.

Methodology: Using data from the EPA FLIGHT Tool[15], calculate the cubic feet per day of landfill gas flared for each landfill that received more than 1,000 tons of solid waste from Nashville. This value is scaled by the proportion of Nashville's waste sent to each landfill, relative to the landfill's total waste intake. The destruction efficiency and methane (CH_4) content of the landfill gas are also sourced from the FLIGHT Tool data.

2025 Updates: Added landfills not previously included in previous inventories, updated the short ton to MT conversion, and updated the methane content of landfill gas.

Composting

GPC Reference Number: III.2.2
GPC Scope: 3

Description: Emissions associated with composting of waste at a commercial composting facility.

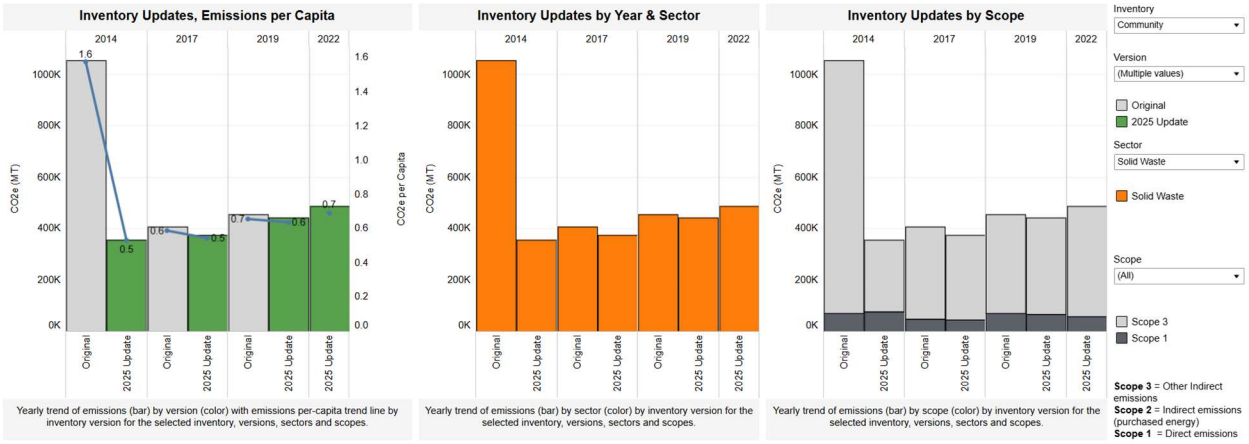
Data/Source: Davidson County Solid Waste Region Board's Annual Progress Report[12] for 2022 for public and private program compost sent to the only composting facility in Middle Tennessee. Since this facility is not in Davidson County, emissions are counted as Scope 3.

Methodology: Composted food waste totals are entered into the inventory calculation software in short tons. Yard trimmings, which are mulched rather than composted in Davidson County, are excluded from the inventory.

2025 Updates: Added composting for 2017 inventory.

[15] EPA Flight Tool (main page): https://ghgdata.epa.gov/flight?viewType=map

Solid Waste Emissions & Update Summary



Water & Wastewater

Process N_2O emissions

GPC Reference Number: III.4.1 and III.4.3
GPC Scope: 1

Description: Nitrous oxide (N_2O) emissions from the processing of wastewater treatment.

Data/Source: Metro Water Services calculates N_2O emissions in short tons and supplies breakdown of wastewater from inside and outside the county boundary that is processed. MWS uses the biological oxygen demand (BOD)/population equivalent method from Ahn et al. (2010) for Plug-Flow Activated Sludge Plant to calculate the N_2O emissions.

Methodology: Emissions in short tons are converted to metric tons and split into wastewater from inside the county, and wastewater processed from outside the county.

2025 Updates: Converted reported short tons to metric tons. Added some process emissions that were not included in previous inventories.

Digester gas emissions

GPC Reference Number: I.3.1 (combustion), III.4.1 and III.4.3 (flaring)
GPC Scope: 1

Description: Emissions associated with wastewater treatment digester gas that is either flared or sent to dryers/boilers for combustion.

Data/Source: Metro Water Services calculates digester gas to flare, and digester gas to dryers/boilers, and supplies breakdown of wastewater from inside and outside the

county boundary that is processed. MWS also stated that the most recent analysis of digester gas found the average methane content to be 64.9%.

Methodology: Split the digester gas for combustion and flaring into two entries each according to the percentage of wastewater processed from inside the county, and percentage wastewater being processed that originated outside the county.

2025 Updates: Updated methane content according to information received from MWS for previous inventories. Also added these categories to the 2017 and 2014 inventories, since it was not previously being tracked.

Septic Systems

GPC Reference Number: III.4.1
GPC Scope: 1

Description: Fugitive emissions from septic systems.

Data/Source: Obtained the approximate number of accounts that pay for water only service (no sewer) from Metro Water Services and Harpeth Valley Utility District.

Methodology: Assumed that people paying for only domestic water services are on a septic system. The number of these accounts was multiplied by the number of people per household in Davidson County (Census data) and entered into the software's "Fugitive Emissions from Septic Systems" calculator.

2025 Updates: Added this entry for the 2014 and 2017 inventories, since it was not previously tracked.

Onsite fuel

GPC Reference Number: I.3.1, VI.1
GPC Scope: 1

Description: Emissions associated with the natural gas used at MWS' water and wastewater treatment facilities.

Data/Source: Metro Water Services and Piedmont provide data on therms used by each water and wastewater facility.

Methodology: Entered therms of gas used by the water and wastewater treatment facilities separately. Subtracted these totals from commercial gas usage totals.

2025 Updates: Separated electricity and gas usage totals for previous inventories.

Electricity

GPC Reference Number: I.3.2, VI.1
GPC Scope: 2

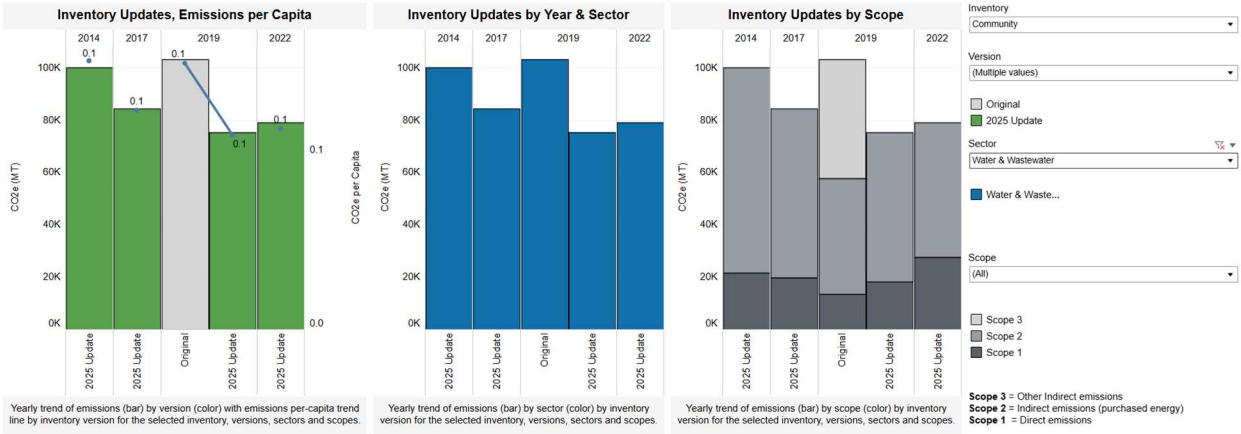
Description: Emissions associated with the purchased electricity used at MWS' water and wastewater treatment facilities.

Data/Source: NES provides data on electricity used by each department and Metro Water Services provides the specific breakouts for all water and wastewater facilities.

Methodology: Entered kWh used by the water and wastewater treatment facilities separately. Subtracted these totals from commercial electrical usage totals.

2025 Updates: Separated electricity and gas usage totals for previous inventories.

Water & Wastewater Emissions & Update Summary



Fugitive Emissions

Natural Gas Distribution

GPC Reference Number: I.8.1
GPC Scope: 1

Description: Emissions associated with the leakage from the distribution of natural gas.

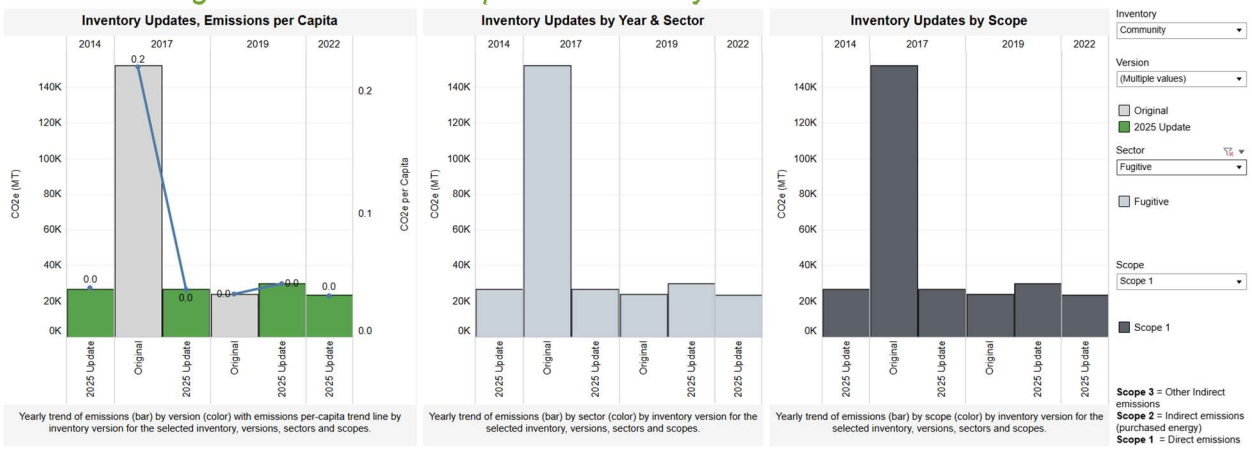
Data/Source: EPA Flight Tool for Piedmont Natural Gas[16] provided the emissions from distribution leaks in TN as well as the volume of natural gas delivered to Tennessee. Piedmont provided the volume of natural gas delivered to Nashville.

[16] EPA Flight Tool for Piedmont Natural Gas – Tennessee (2022): https://ghgdata.epa.gov/ghgp/html/2022.do?id=1005857&et=undefined

Methodology: Methane leaked in Nashville was calculated by multiplying the emissions from distribution leaks in TN by the volume of gas delivered to Nashville divided by the volume of gas delivered to TN. The inventory calculation software default for percentage methane in natural gas was changed from 93.4% to 100% to align with the EPA emissions calculator which considers all leaks to be all methane.

2025 Updates: Updated previous years to use this same methodology. Fugitive emissions had not been previously included in the 2014 inventory.

Process & Fugitive Emissions & Update Summary



Upstream Impacts

Transmission & Distribution Losses

GPC Scope: I.1.3, I.2.3, and I.3.3
GPC Scope: 3

Description: Impacts of electric power transmission and distribution (T&D) losses from all electricity used by the community.

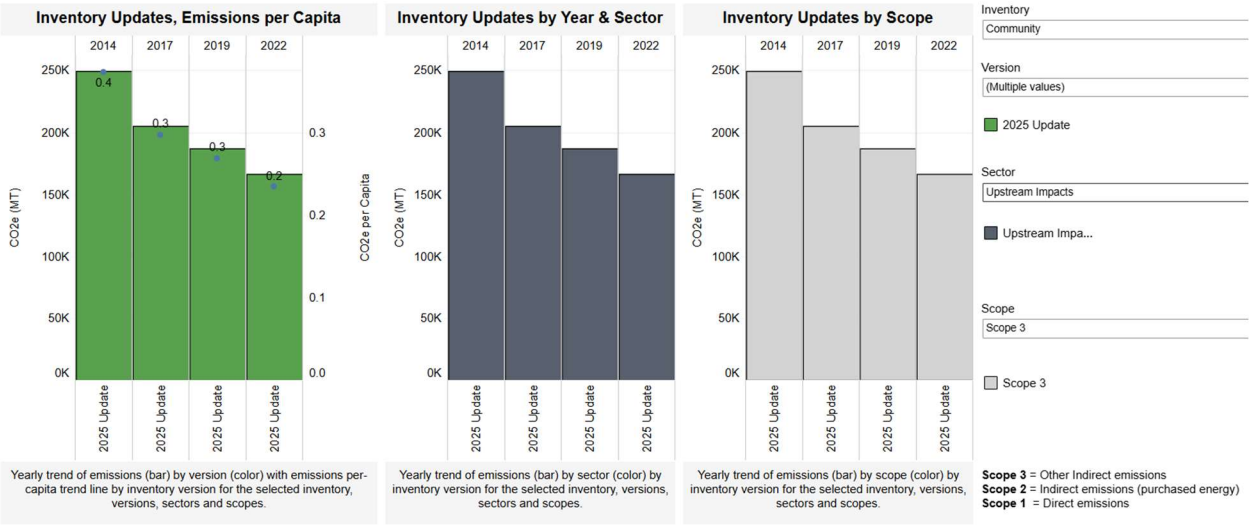
Data/Source: Used the EIA instructions[17] to estimate the T&D losses for Tennessee for each year of inventories.

Methodology: Total electricity used entered for residential, industrial and commercial sectors. Grid Loss Factor entered as estimated from EIA tables:
2014: 4.89%
2017: 5.13%
2019: 5.13%
2022: 5.14%

2025 Updates: Updated all previous inventories to use this same methodology.

[17] EIA guidance on T&D loss calculation: https://www.eia.gov/tools/faqs/faq.php?id=105&t=3

Upstream Impacts Emissions & Update Summary

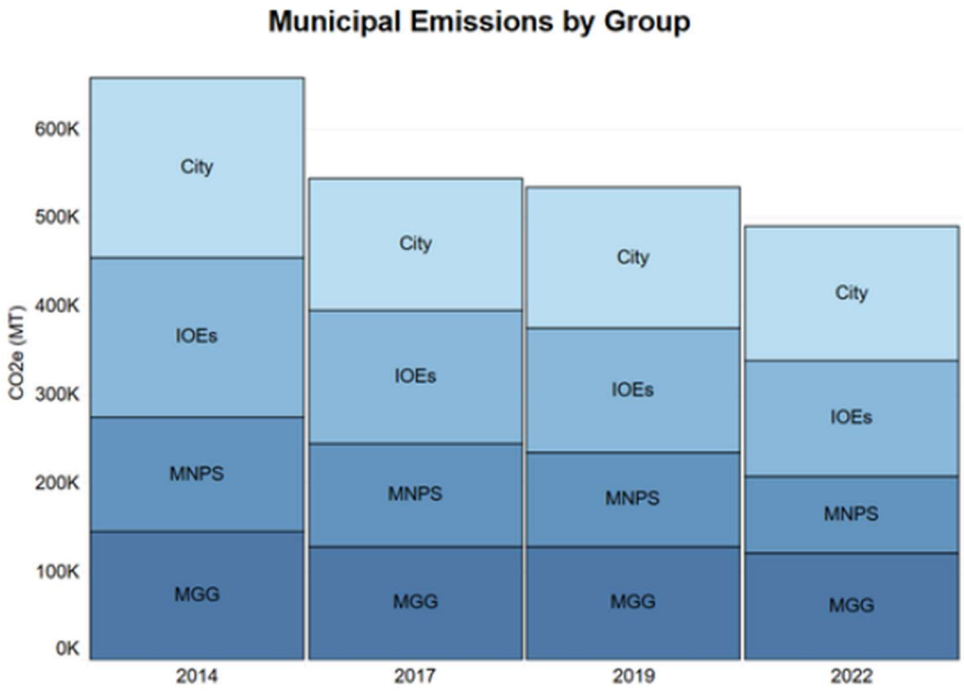


VI. Municipal Inventory

Data for the Municipal GHG inventories were collected and categorized as per the structure utilized by the Government Track structure of the inventory calculation software. This section outlines, for each Sector, the GPC scope, a short description of each emission source, data collection specifics for that emission source, calculation methodologies and re-baselining notes (if applicable) for the 2025 GHG inventory update cycle.

Municipal Highlights – 2014 to 2022

- Municipal emissions have decreased every inventory since 2014.
- Metro buildings and facilities produce the largest share of municipal emissions and are using 7.5% less energy (and producing 33% fewer emissions) than they were in 2014. This is despite aging facilities and an increase in the number of buildings.
- Metro Nashville Public Schools (MNPS) emissions per employee have decreased by 48% since 2014.
- Municipal emissions decreased from a 5% share of overall community emissions in 2014 to a 4.1% share in 2022.



Yearly trend of Municipal GHG emissions in MT CO2e (Bar) broken out by Group (Color)
Groups = **City** (Street/Traffic Lights, Water & Wastewater Plants),Metro General Government (**MGG**), Metro Nashville Public Schools (**MNPS**) and Independently Operating Entities (**IOEs**) which include MNAA, MDHA, Convention Center Authority, MTA/WeGo, NES, DES, and Sports Authority

Buildings & Facilities

Onsite Fuels

GPC Scope: 1 (for MGG and MNPS), 3 (for IOEs)

Description: Emissions from the use of natural gas and propane in Metro Nashville government facilities.

Data/Source: Natural gas consumption data for all Metro General Government (MGG) facilities are provided by Piedmont Natural Gas. MNPS and many of the IOEs (DES, NES, MNAA, MTA, & Sports Authority) provide their gas data to DGS as part of the GHG inventory data gathering process. Natural gas consumption data for all Metro Nashville Public Schools buildings are provided by MNPS. DES also reports a small amount of propane.

Methodology: DGS compiles a spreadsheet with all department-level (within MGG) and agency level (IOEs and MNPS) annual data to ensure completeness and uses Tableau visual reports to evaluate the trends from across all inventor years for anomalies. Any data errors, gaps and issues discovered are investigated and corrected as needed. Starting in 2025, data are entered into the inventory calculation software aggregated by MGG, IOE and MNPS so IOE data can be classified as scope 3 vs scope 1. The software applies appropriate and consistent stationary fuel combustion emissions factors for CO_2, CH_4 and N_2O (not year specific).

Beginning in 2025, the treatment of DES' data was revised to include only the percentage of natural gas used to generate steam and chilled water for non-Metro/non-IOEs customers, preventing double counting. These calculations rely on data provided by DES on the total yearly steam and chilled water produced. Spreadsheets containing all the updates, estimates (where needed) and adjustment calculations for all inventory years are maintained for use in future inventories.

2025 Updates:

- DGS received Piedmont account numbers for MDHA accounts and updated, more complete account numbers for Convention Center Authority, so these can now be included in the MGG datasets sent directly to DGS from Piedmont.
- NES also reported a small amount of natural gas usage for the first time in 2025 and confirmed consumption began in 2019 (totals updated).
- MWS-reported gas totals for their water and wastewater treatment plants were also reviewed cross walked against the Piedmont-provided data for all years to ensure the water and wastewater plant usage was consistently tracked in that sector and the remaining non-plant usage is all that was entered in the Buildings and Facilities section.

- Sports Authority provided some missing historical data for First Horizon, Bellevue Ford Ice and Bridgestone (may still be missing a small amount of Nissan Stadium gas usage after 2014).
- DES fuel totals adjusted down to only include non-Metro % so as not to double count (as noted above in the Methodology section)
- Many departments' Piedmont 2017 gas totals were adjusted down as they had mistakenly included 13 invoices/site (more than 12 months of data).
- MTA 2014 data corrected in 2025 (was mis-entered too high)
- All IOE gas and fuel data tracked as scope 3 in 2025 (previously scope 1).

Electricity

GPC Scope: 2 (for MGG and MNPS), 3 (for IOEs)

Description: Emissions from the use of purchased electricity in Metro Nashville government facilities.

Data/Source: Grid electricity usage data in kWh are provided by Nashville Electric Service (NES) who provides department/agency level data in a spreadsheet for each year as well as a spreadsheet containing year-specific, TVA-specific CO_2 emissions factors (lb/MWh) for electricity.

Methodology: DGS compiles a spreadsheet with all department-level (within MGG) and agency level (IOEs and MNPS) annual data to ensure completeness and uses Tableau visual reports to evaluate the trends across all past inventories for anomalies. Any data errors, gaps and issues discovered are investigated and corrected as needed. Starting in 2025, data are entered into the inventory calculation software aggregated by MGG, IOE and MNPS so IOE data can be classified as scope 3 vs scope 2. The software multiplies the entered kWh by the TVA-provided CO_2 emissions factors by year for General Service electricity in Davidson County. eGRID factors are used for CH4 and N2O. See Appendix A for factors.

Beginning in 2025, the treatment of DES' data was revised to include only the % of electricity used to generate steam and chilled water for non-Metro/non-IOEs customers, preventing double counting. These calculations rely on data provided by DES on the total yearly steam and chilled water produced. Spreadsheets containing all the updates, estimates (where needed) and adjustment calculations for all inventory years are maintained for use in future inventories.

2025 Updates:

- DES usage was reduced to represent only the percentage of electricity related to production of non-Metro used steam & chilled water (as noted above).
- NES' usage increased significantly vs previous years (for all years) to include substation usage.

- 2014 and 2017 Convention Center Authority data significantly increased (was missing the largest account in original inventory and NES was able to pull the historical data in 2025).
- MTA 2014 data entry error corrected (reduced kWh significantly).
- MWS-reported electricity totals for their water and wastewater treatment plants were also reviewed cross walked against the NES-provided data for all years to ensure the water and wastewater plant usage was consistently tracked in that sector and the remaining non-plant usage is all that was entered in the Buildings and Facilities section.
- 2017 was missing a large portion of General Services electricity kWh total in the inventory calculation software and this gap was filled/corrected with the actual data provided from NES in 2017.
- All IOE electricity data tracked as scope 3 in 2025 (previously scope 2).

Steam & Chilled Water

GPC Scope: 2 (for MGG and MNPS), 3 (for IOEs)

Description: Emissions from the use of purchased steam and chilled water in Metro Nashville government facilities.

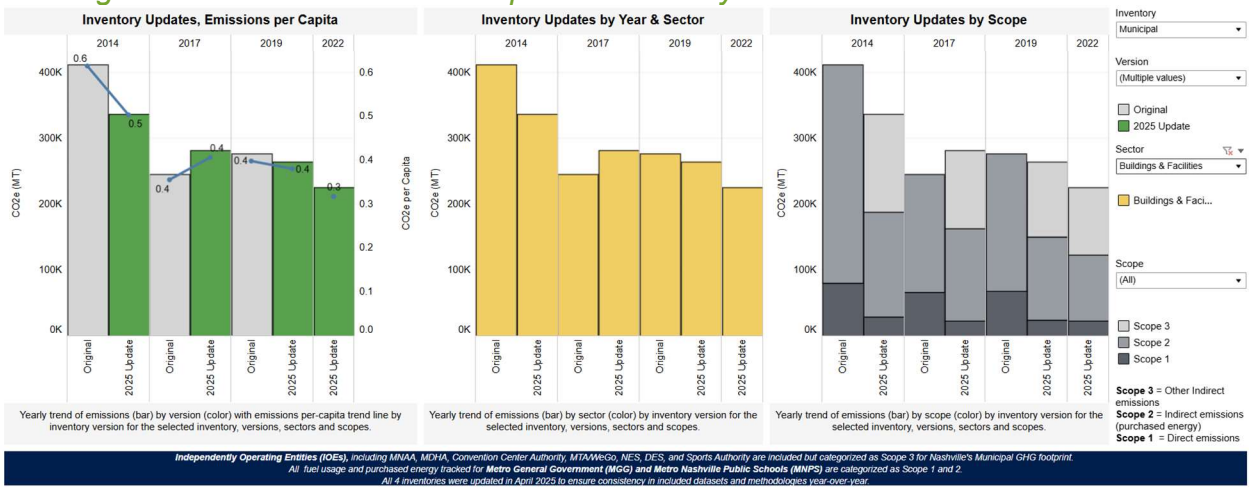
Data/Source: Monthly totals for all inventory years of steam (in lb) and chilled water (in ton-hr) are provided by DES to DGS in a spreadsheet which contains the amounts for every MGG, MNPS and IOE site that utilizes district energy. DES also provides detailed data on plant operations including total boiler and chiller production and sales as well as the plant's annual electricity and fuel usage. DES also provided a value for the enthalpy of the steam (1048.2 Btu/lb - appropriate to use every year), and calculates the annual steam transportation loss %, boiler efficiency % and the chiller plant coefficient of production (COP) which vary annually.

Methodology: Steam and chilled water usage data are aggregated into MGG, MNPS and IOE totals. These totals and inputs for the enthalpy, annual transport loss %, and boiler efficiency (for steam) and coefficient of performance (COP) (for chilled water) are entered into the inventory calculation software which applies the appropriate emissions calculations. These calculations rely on the same grid electricity and natural gas factors used for other data sources in the inventory.

2025 Updates:
- DES provided updated data for total steam and chilled water production and sales (used to properly account for DES within the Municipal inventory and avoid double counting as noted in the sections above)
- DES sent an updated enthalpy value: 1048.2 Btu/lb which they clarified was appropriate to use every year. Previous years had used a much higher default enthalpy of 1264.8 Btu/lb.
- DES provided updated calculations for transportation losses, boiler efficiencies and COP for each inventory year since 2014.

- Convention Center and the Downtown Library's 2019 steam values were corrected (misreported as the chilled water values in previous inventory)

Buildings & Facilities Emissions & Update Summary



Streetlights & Traffic Signals

Electricity

GPC Scope: 2

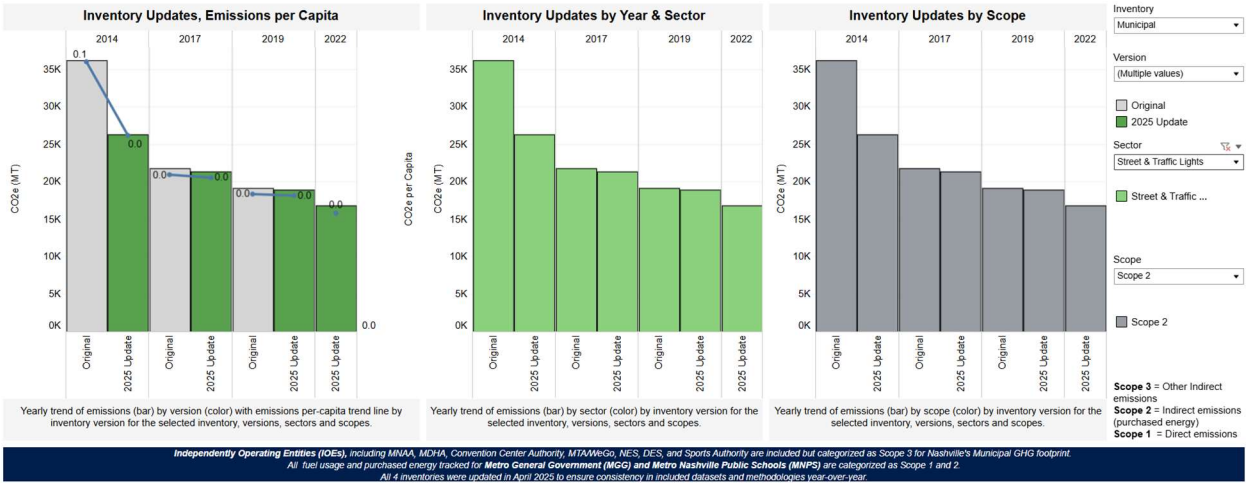
Description: Emissions from the use of purchased electricity in city streetlights and traffic signals.

Data/Source: Grid electricity usage data in kWh for streetlights and traffic lights is provided by Nashville Electric Service (NES) who provides department/agency level data in a spreadsheet for each year as well as a spreadsheet containing year-specific, TVA-specific CO_2 emissions factors (lb/MWh) for electricity.

Methodology: Data are entered into the inventory calculation software separately for streetlights vs traffic signals and the software multiplies the entered kWh by the TVA-provided CO_2 emissions factors by year for General Service electricity in Davidson County. eGRID factors are used for CH_4 and N_2O.

2025 Updates: 2014 Streetlights and Traffic lights were reported as a combined total and in 2025 these entries were split to be consistent with future inventories. All past year's totals were adjusted down slightly to remove usage from a "METRO PARKING SYSTEMS" account that was clarified by NES to be a private account, not a Metro Nashville account.

Street Lights & Traffic Signals Emissions & Update Summary



Vehicle Fleet

Off-Road Fuel

GPC Scope: 1 (for MGG), 3 (for IOEs – MNAA and MTA/WeGo Star)

Description: Emissions from the use of gasoline, diesel and jet fuel in Metro Nashville government off-road fleet vehicles and equipment.

Data Source: Off-road vehicle fleet data for MGG includes fuel used by boats, utility vehicles, generators and equipment. Fuel amounts are provided by General Services' Fleet Division, with reports pulled from their fleet management system. MNPD provides helicopter (jet fuel) consumption data. Off-road fuel is also provided by MNAA (all fuel data they provide is classified as off-road though a small amount is used by airport staff vehicles) and MTA for the WeGo Star (commuter train).

Methodology: Off-road fuel consumption data are entered into the inventory calculation software by fuel type and equipment type (impacts CH_4 and N_2O factors). No mileage data is entered for Off-Road emissions calculations.

MGG Fleet data for gasoline is entered as fuel for "Small Utility" equipment (mowers, etc) and diesel off-road usage is entered as fuel for "Large Utility" equipment despite some of this off-road fuel being for marine vehicles. MNPD's Special Operations Division provides fuel usage data for its helicopters, and this is entered as jet fuel for "Aircraft" equipment in the software's off-road emissions calculator.

MNAA's Gasoline and diesel fuel data is entered as off-road "Large Utility" as fuel is used mostly used onsite at the airport and reliable mileage data are not available. MTA-provided fuel data for the WeGo Star is entered as "Locomotive" diesel. MNAA and MTA data are tagged as representing "outsourced services" (these are IOEs) and therefore the emissions are classified as scope 3.

2025 Updates:

- MGG off-road fuel data for 2014, 2017 and 2019 were re-analyzed in 2025 to ensure alignment with methodology and consistency in datasets (e.g. equipment classification) by department for all four inventory years. Off-road fuel data for FY14 (not calendar year) was used for 2014 data and an estimate was put in place for 2017 off-road diesel which had not been provided in previous years (fleet tracking system changed).
- MNPD helicopter fuel had not been previously tracked for the 2014 and 2017 inventories. In 2025, MNPD was able to provide a total for 2014 from fuel receipts but was unable to provide 2017 data. An average of 2014 and 2019 data was used to estimate 2017 helicopter fuel usage.
- MNAA's fuel data was re-classified as scope 3 and off-road for all years (previously was a mix of on and off-road and had been included in scope 1 emissions). 2014's diesel usage was significantly higher than in future years but was kept as-is (gallons were traced back to data submission).
- The portion of fuel used in Davidson County by the RTA-owned/MTA-operated WeGo Star commuter train data had been included in past Community inventories but only was incorporated into the Municipal inventories in 2025 when the total amount of fuel (not just Davidson County portion) was included for each year (as a scope 3 emission).

On-Road Fuel/Miles

GPC Scope: 1 (for MGG), 3 (for IOEs)

Description: Emissions from the use of gasoline, diesel, ethanol (E85), CNG, and jet fuel in Metro Nashville government fleet vehicles.

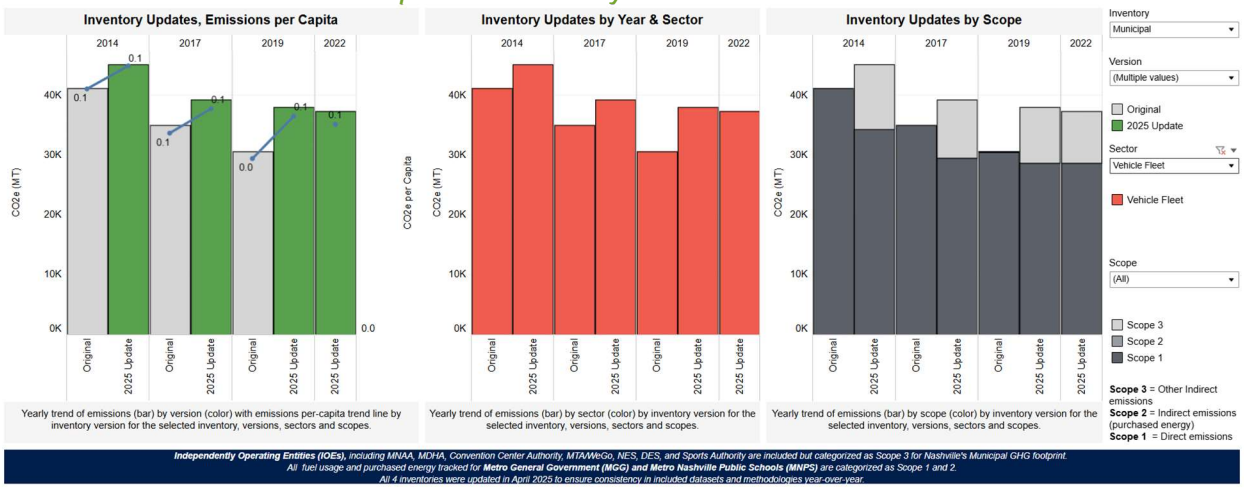
Data Source: On-road fleet data (vehicle lists, fuel consumption, VMTs, etc.) for MGG vehicles is provided by General Services' Fleet Division, with reports pulled from their fleet management system. MNPS provides fuel use and mileage data for all vehicles (includes transit and fleet). IOEs (specifically MDHA, NES, and MTA/WeGo) each provide vehicle fleet data for their respective agencies.

Methodology: Fuel usage and total vehicle miles traveled (VMTs) are entered into the inventory calculation software's On-Road calculator by fuel type along with the percentage of miles driven by vehicle class (motorcycle, passenger, light truck, and heavy truck). The software applies the correct CH_4 and N_2O emissions factors based on the vehicle classifications and miles data. Information only records are added to track the miles driven by EVs for MGG's Fleet vehicles, though emissions are not calculated to avoid double counting MGG's electricity emissions (vehicles are charged primarily at Metro properties).

2025 Updates:

- 2014 and 2017 on-road fuel data for vehicles managed by General Services' Fleet division was re-analyzed at the department level to ensure consistency and completeness and was then reported under MGG, and as a composite. Previously, fleet vehicle data was reported for each individual MGG department.
- 2014 MGG diesel totals were reclassified as 100% heavy truck. 2014 gasoline mileage splits by vehicle type were recalculated based on revised vehicle classification lookups for fuel and vehicle types in the original dataset, resulting in an allocation of 53.4 % passenger vehicle, 43.3% light truck, and 3.3% heavy truck.
- All 2017 MGG data were extrapolated based on only 5 months of usage (systems changed that year). Flex fuel usage previously reported as E85 was reclassified as 100% gasoline usage.
- 2017 MGG CNG fuel use (first year CNG was reported) in the inventory calculation software was corrected to be in scf using a 126.67 scf/gal conversion rate. VMTs for CNG vehicles were estimated based on the avg 2019/2022 miles/scf. Previously entered CNG volume (gallons) had not calculated an emissions output.
- MNPS – previous year's estimates for percentage offroad usage were removed and all fuel totals were allocated to either on-road vehicle or transit fleet. In 2025, MNPS provided revised/better mileage data for the 2019 fuel totals, and these were used to revise splits for passenger/light/heavy duty trucks. The splits between vehicle and transit fleet for 2014 and 2017 total gallons were also revised, assuming the same %s as 2019 for diesel (all gasoline remained in vehicle fleet). Average 2019 mpgs were also used to enter VMT estimates for both 2014 and 2017 which previously were missing.
- MDHA on-road vehicles were re-classified as outsourced (scope 3) for all years and VMTs were estimated for previous years based on a 2018 vehicle inventory list provided by MDHA with 83 vehicles and the avg miles/year. In previous years, mileage data were missing and CH_4/N_2O emissions did not get calculated. All gasoline miles were allocated to light-truck, diesel miles allocated as heavy-truck. Some off-road usage is likely included in the gallons provided by MDHA though it is all reported as on-road.
- MTA/WeGo – 2014 gasoline data previously reported as all fleet data was split based on future year's ratio (93/7% transit/fleet). Data for 2017 was missing in the original inventory and fuel usage totals were found in an email from MTA - 2019 data were used to estimate 2017 miles/vehicle % allocation. MTA's records were re-classified as outsourced (scope 3) for all years.
- NES mileage and gallons data were mistakenly omitted from the original 2019 inventory but were added in the 2025 update. Vehicle distribution for gasoline and diesel is estimated to be 50/50 light/heavy truck. Mileage estimates were added for the first time for 2014 and 2017 based on average mpg from 2019. All E85 assumed to be for light trucks. NES records were re-classified as outsourced (scope 3) for all years.

Vehicle Fleet Emissions & Update Summary



Transit Fleet

Vehicle Fuel//Miles

GPC Scope: 1 (for MNPS), 3 (for MTA/WeGo)

Description: Emissions from the use of gasoline, diesel, and propane in Metro Nashville's transit vehicles.

Data Source: MNPS provides fuel use and mileage data for all vehicles (includes transit and fleet). All school bus fuel usage (approx. 93% of diesel, small amount of gasoline and propane) is entered as transit vs fleet. MTA/WeGo provides fuel usage and mileage data for WeGo-operated city bus fleet.

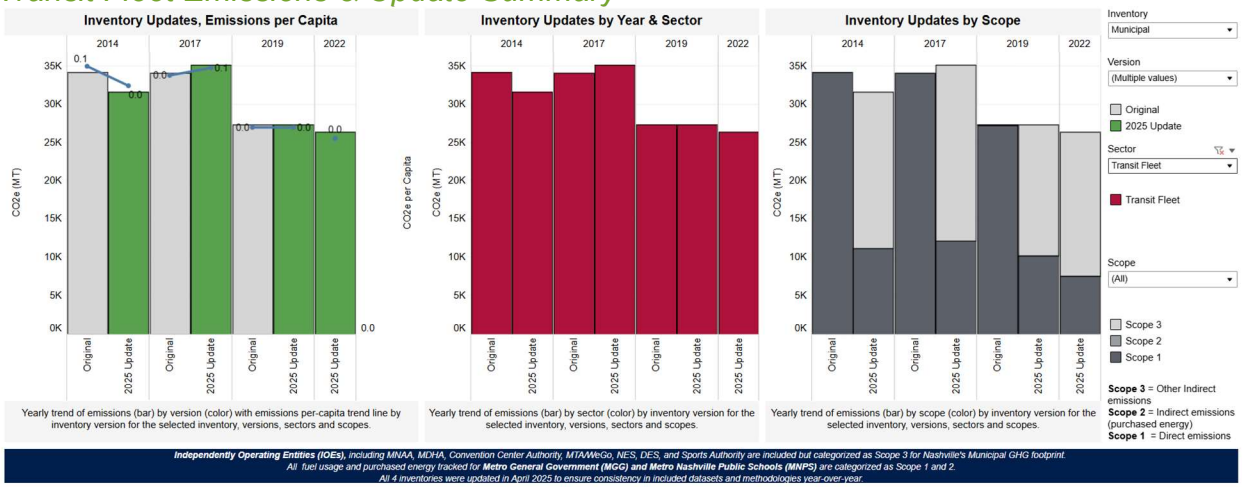
Methodology: Fuel usage and total vehicle miles traveled (VMTs) are entered into the inventory calculation software's Transit Fleet emissions calculator by fuel type with Vehicle Type = Transit Bus selected. The software applies the correct CH_4 and N_2O emissions factors based on the vehicle classifications and miles data. Information only records are added to track the miles driven by EVs for WeGo's electric vehicle usage, though emissions are not calculated to avoid double counting MTA/WeGo's electricity emissions (vehicles are charged primarily at WeGo properties).

2025 Updates:

- MNPS – Better mileage data were submitted for 2019 and the splits between vehicle and transit fleet for 2014 and 2017 total gallons were revised, assuming the 92% of diesel (2019 %) was used in transit buses for both 2014 and 2017. Gasoline previously reported as transit in 2014 was moved to fleet totals. VMT estimates were added for earlier years based on 2019 mpgs.

- MTA/WeGo – VMT estimates were added for 2014 and 2017 based on average mpgs from 2019/2022. MTA's records were re-classified as outsourced (scope 3) for all years.

Transit Fleet Emissions & Update Summary



Employee Commute

Vehicle Miles

GPC Scope: 3 (MGG and MNPS only)

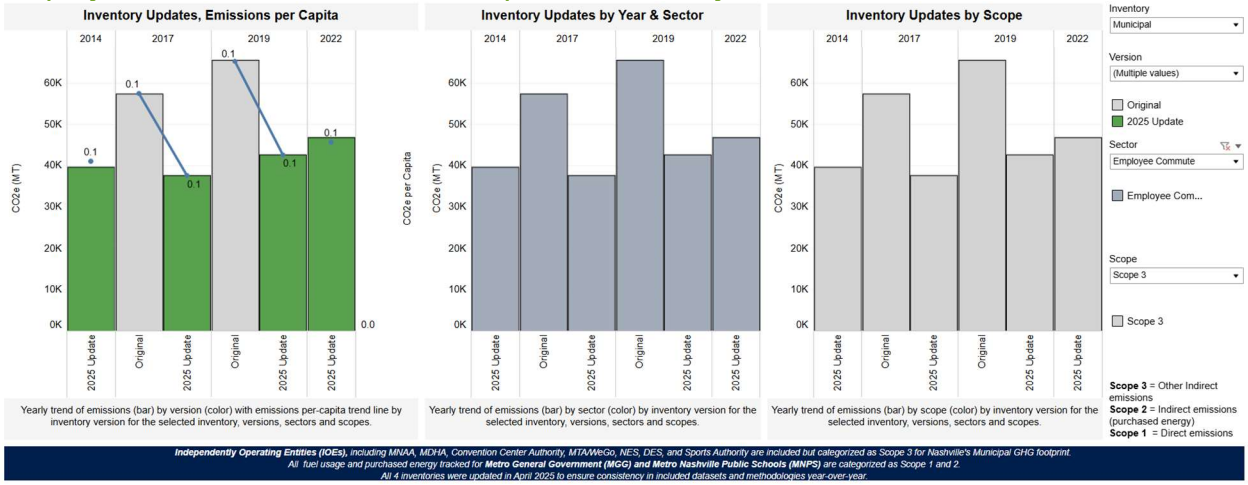
Description: Emissions from the use of gasoline, diesel or electricity (EVs) in Metro employees' vehicles and transit options.

Data Source: Surveys were sent to all MGG and MNPS employees, to ask about commuting methods and mileage as part of the 2019 and 2022 inventories. 2014 and 2017 data were estimated based on the results of the 2019 survey and 2014/2017 employee counts and a growth projection of EV vehicle usage.

Methodology: Mileage for each method of commuting, for MNPS and MGG employees separately, is entered into the inventory calculation software's Employee Commute or Employee Transit Use emissions calculator. The software applies the correct CH_4 and N_2O emissions factors based on the vehicle classifications and miles data.

2025 Updates: Calculations were revised in 2025 to use a consistent methodology for estimating VMTs/Employee Counts for each travel method.

Employee Commute Emissions & Update Summary



Electric Power Production

GPC Scope: 3 (IOEs)

Description: Emissions from the generation of electric power (n/a, all power is imported). Emissions from DES (District Energy System) are included in the Buildings & Facilities sector.

Solid Waste Facilities

Employee Waste

GPC Scope: 3 (MGG and MNPS only)

Description: Emissions associated with the waste generated by government employees (while at work). All landfills are located outside of the city boundary.

Data Source:
https://www2.calrecycle.ca.gov/WasteCharacterization/BusinessGroupCalculator
"Education" group gave a 0.4268 tons/person average.

Methodology: Multiplied tons/person by average employee count to estimate waste. Used the institutional/commercial waste profile from the Nashville Waste Characterization study (Feb 2018)[13].

2025 Updates: Updated previous inventories to use the same institutional/commercial waste profile and business study to estimate employee waste.

Bordeaux Landfill

GPC Scope: 1

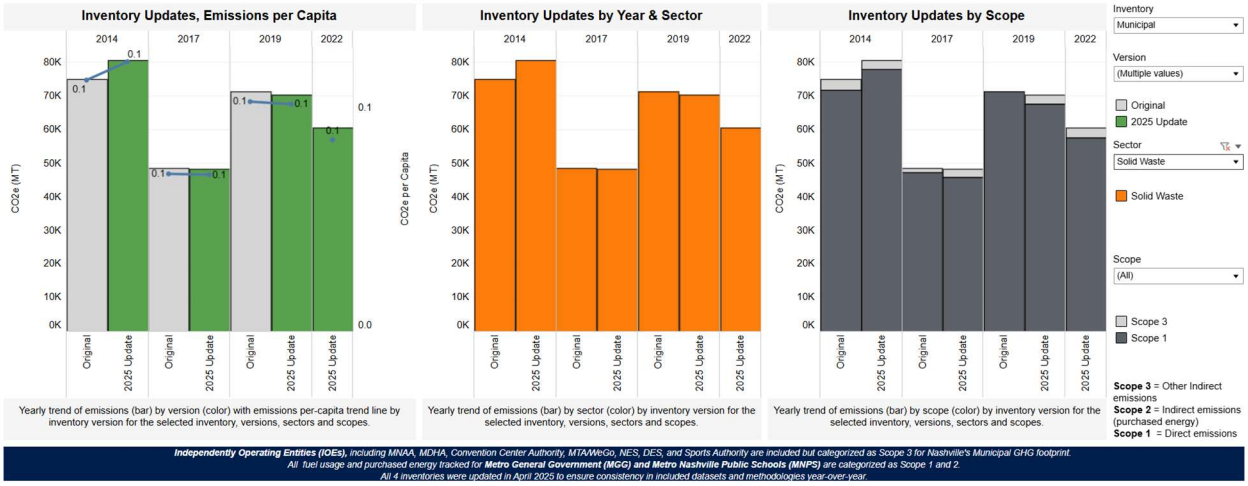
Description: Emissions associated with the closed Bordeaux Landfill. Though closed in 1994, the landfill continues to emit methane from the previously disposed waste.

Data/Source: EPA FLIGHT Tool[14]

Methodology: Enter methane released by landfill from EPA Flight Tool into the inventory calculation software.

2025 Updates: none

Solid Waste Emissions & Update Summary



Water & Wastewater Treatment Facilities

Process N_2O emissions

GPC Scope: 1

Description: Nitrous oxide (N_2O) emissions from the processing of wastewater treatment

Data/Source: Metro Water Services calculates N_2O emissions in short tons. MWS uses the BOD/population equivalent method from Ahn et al. (2010) for Plug-Flow Activated Sludge Plant to calculate the N_2O emissions.

Methodology: Convert emissions from short tons to metric tons and enter as previously calculated N_2O.

2025 Updates: Converted reported short tons to metric tons.

Digester gas emissions

GPC Scope: 1

Description: Emissions associated with wastewater treatment digester gas that is either flared or sent to dryers/boilers for combustion.

Data/Source: Metro Water Services calculates digester gas to flare, and digester gas to dryers/boilers. MWS also stated that the most recent analysis of digester gas found the average methane content to be 64.9%.

Methodology: Enter the digester gas for combustion and flaring into two entries.

2025 Updates: Updated methane content according to information received from MWS for previous inventories. Changed previous inventories to site-specific calculator not the population-based method, since the data received from MWS is site-specific.

Onsite fuel

GPC Scope: 1

Description: Emissions associated with the natural gas and diesel fuel used at MWS' water and wastewater treatment facilities

Data/Source: Metro Water Services and Piedmont provide data on therms used by each water and wastewater facility.

Methodology: Entered therms of gas used by the water and wastewater treatment facilities separately. Diesel fuel used by backup generators is entered as "information only" to avoid double-counting the emissions from Metro Fleet-reported MWS fuel totals.

2025 Updates: Updated the natural gas usage allocations between treatment plants and "miscellaneous buildings" (in Buildings & Facilities sector) in earlier inventory years for consistency.

Electricity

GPC Scope: 2

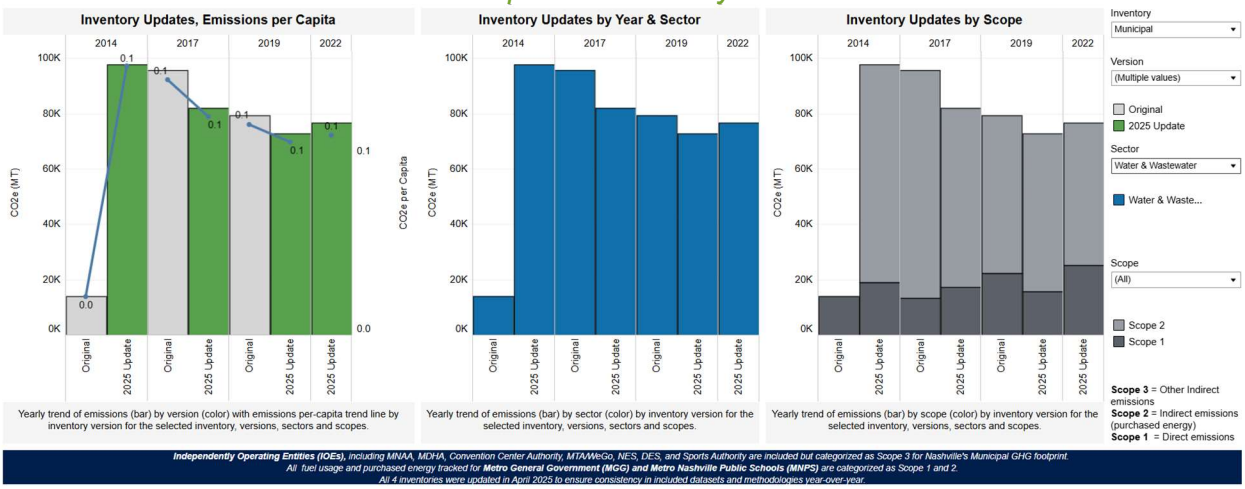
Description: Emissions associated with the purchased electricity used at MWS' water and wastewater treatment facilities.

Data/Source: Electricity data for calendar year 2022 was provided by Nashville Electric Service (NES) and Metro Water Services (MWS). MWS provided a breakdown of the sites that consumed grid electricity, including their water pumping stations.

Methodology: According to the LGO protocol, emissions stemming from water distribution systems should be accounted for in the Buildings & Facilities sector. The pumping stations/miscellaneous buildings usage therefore was excluded from this sector which only includes kWh from MWS' water and wastewater treatment facilities (and biosolids facilities).

2025 Updates: Updated electricity totals for all years to ensure the methodology above was consistently followed.

Water & Wastewater Emissions & Update Summary



Fugitive Emissions

Natural Gas Distribution

GPC Scope: 3

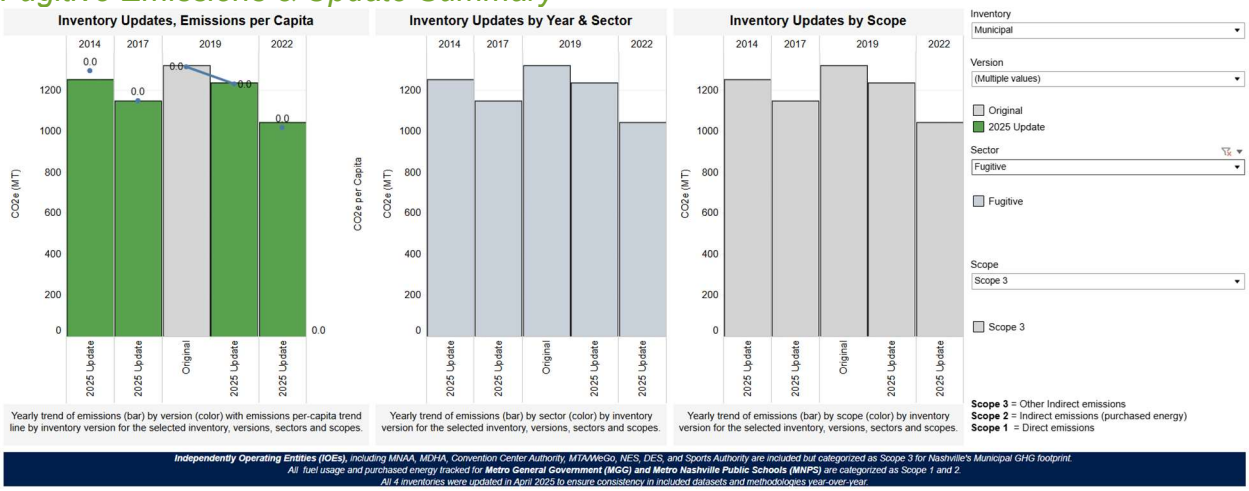
Description: Emissions associated with the leakage from the distribution of natural gas to Metro Nashville government facilities.

Data/Source: EPA Flight Tool for Piedmont Natural Gas[16] provided the emissions from distribution leaks in TN as well as the volume of natural gas delivered to Tennessee. Piedmont provided the volume of natural gas delivered to Metro.

Methodology: Methane leaked associated with Metro facilities was calculated by multiplying the emissions from distribution leaks in TN by the volume of gas delivered to Metro divided by the volume of gas delivered to TN. The inventory calculation software default for percentage methane in natural gas was changed from 93.4% to 100% to align with the EPA emissions calculator which considers all leaks to be all methane.

2025 Updates: Updated previous years to use this same methodology. Fugitive emissions had not been previously included in the 2014 and 2017 inventories.

Fugitive Emissions & Update Summary



VII. Recommendations for future inventories

1. Enhance Data Collection Practices

Continue to strengthen data collection efforts to improve both the quality and quantity of data available. As a specific action, include gas account numbers for Sports Authority facilities to ensure comprehensive utility tracking.

2. Develop More Detailed Tableau Dashboards

Create a Tableau dashboard that displays municipal emissions data broken out by department. This will improve transparency and allow for more targeted analysis across operational units.

3. Off-Road Emissions Data

An opportunity exists to better account for off-road emissions in future iterations of the Community-wide GHG inventory. Despite efforts to obtain data specific to off-road emissions in Davidson County, it was not feasible within the current project timeline. Although the MOVES off-road model is recognized as a tool for estimating off-road emissions, additional time and technical resources would be needed to implement it effectively.

4. Utilize Green Programs Data

Incorporate data received from NES and Piedmont's Green Programs into the analysis. Although this data was provided, it has not yet been applied meaningfully and represents an opportunity for further insights into renewable energy participation and environmental impact.

5. Wedge Analysis Updates

Update the wedge analysis using either the inventory calculation software or the previously developed spreadsheet, depending on availability and alignment with other data sources.

APPENDIX A – Emission Factors

AR6 Global Warming Potentials (used by the GHG Software)

CO_2 = 1
CH_4 = 29.8 (fugitive emissions from natural gas distribution)
CH_4 = 27.2 (non-fossil and fossil combustion of natural gas – used for landfills, wastewater treatment and combustion)
N_2O = 273

TVA Standard Service Emission Factors (lb CO_2 /MWh)

2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
1051.83	1013.8	1010.97	864.12	839.79	755.55	575.09	649.56	671.11	624.94

Grid Electricity Emission Factors for 2022 (CH_4 and N_2O factors are eGRID SRTV factors)

CO_2 lbs/MWh	671.11 (TVA)
CH_4 lbs/GWh	82 (eGRID SRTV)
N_2O lbs/GWh	12 (eGRID SRTV)

US National Transportation Emission Factors for 2022

Gas Passenger Vehicle Fuel Economy (MPG)	24.8
Gas Passenger Vehicle g CH4/mi	.0078
Gas Passenger Vehicle g N2O/mi	.0061
Gas Light Truck Fuel Economy (MPG)	18.1
Gas Light Truck g CH4/mi	.011
Gas Light Truck g N2O/mi	.0073
Gas Heavy Truck Fuel Economy (MPG)	7.3
Gas Heavy Truck g CH4/mi	.032
Gas Heavy Truck g N2O/mi	.0041
Gas Transit Bus Fuel Economy (MPG)	7.3
Gas Transit Bus g CH4/mi	.032
Gas Transit Bus g N2O/mi	.0041
Gas Para Transit Bus Fuel Economy (MPG)	7.3
Gas Para Transit Bus g CH4/mi	.032
Gas Para Transit Bus g N2O/mi	.0041
Gas Motorcycle Fuel Economy (MPG)	44
Gas Motorcycle g CH4/mi	.0672
Gas Motorcycle g N2O/mi	.0069
Electric Vehicle Fuel Economy (MPGe)	91
Diesel Passenger Vehicle Fuel Economy (MPG)	24.8
Diesel Passenger Vehicle g CH4/mi	.0302

Diesel Passenger Vehicle g N2O/mi	.0192
Diesel Light Truck Fuel Economy (MPG)	18.1
Diesel Light Truck g CH4/mi	.029
Diesel Light Truck g N2O/mi	.0214
Diesel Heavy Truck Fuel Economy (MPG)	7.3
Diesel Heavy Truck g CH4/mi	.0095
Diesel Heavy Truck g N2O/mi	.0431
Diesel Transit Bus Fuel Economy (MPG)	7.3
Diesel Transit Bus g CH4/mi	.0095
Diesel Transit Bus g N2O/mi	.0431
Diesel Para Transit Bus Fuel Economy (MPG)	7.3
Diesel Para Transit Bus g CH4/mi	.0095
Diesel Para Transit Bus g N2O/mi	.0431
Diesel Motorcycle Fuel Economy (MPG)	44
Diesel Motorcycle g CH4/mi	0.0302
Diesel Motorcycle g N2O/mi	0.0192

Mapping of MOVES to the GHG Software Vehicle Types

MOVES Vehicle Type	GHG Software Vehicle Type
Motorcycle	Motorcycle
Passenger Car	Passenger Vehicles
Passenger Truck	Passenger Vehicles
Light Commercial Truck	Light-duty Truck
Other Buses	Buses
Transit Bus	Buses
School Bus	Buses
Refuse Truck	Heavy-duty Truck
Single Unit Short-haul Truck	Heavy-duty Truck
Single Unit Long-haul Truck	Heavy-duty Truck
Motor Home	Heavy-duty Truck
Combination Short-haul Truck	Heavy-duty Truck
Combination Long-haul Truck	Heavy-duty Truck

Nashville Waste Characterization Study – Landfilled Waste (Feb 2018)

Percentage Mixed MSW	0
Percentage Newspaper	0.8
Percentage Office Paper	4.9
Percentage Corrugated Cardboard	8
Percentage Magazines / Third Class Mail	12.5

Percentage Food Scraps	19.4
Percentage Grass	1.3
Percentage Leaves	1.3
Percentage Branches	0
Percentage Dimensional Lumber	0

Nashville Waste Characterization Study – Institutional, Commercial, Industrial (ICI) Waste (Feb 2018)

Percentage Mixed MSW	0
Percentage Newspaper	0.5
Percentage Office Paper	5.4
Percentage Corrugated Cardboard	10.2
Percentage Magazines / Third Class Mail	11.9
Percentage Food Scraps	15.1
Percentage Grass	1.1
Percentage Leaves	1.2
Percentage Branches	0
Percentage Dimensional Lumber	0