

City of Manassas Greenhouse Gas Emissions, Local Government Operations (LGO)

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Introduction

The City of Manassas is one of a growing number of municipalities across the U.S. and Commonwealth planning for climate change. Utilizing relationships from the Northern Virginia region, including the Metropolitan Washington Council of Governments (MWCOG), George Mason University's Center for Energy Science and Policy (CESP), and the International Council for Local Environmental Initiatives (ICLEI) Local Governments for Sustainability, Manassas is currently developing their Sustainability Plan. In order to develop a measurable and science-based plan, Manassas provided data and assistance to MWCOG and CESP to develop two distinct greenhouse gas (GHG) inventories; respectively, a Community and a Local Government Operations (LGO) GHG inventory.

Greenhouse gases such as carbon dioxide (CO₂), methane (CH₄), and nitrous oxide (N₂O) are emitted by burning fossil fuels and other activities. The gases accumulate in the atmosphere where they amplify the capacity of the atmosphere to absorb and retain thermal energy and cause the climate to warm and change in other ways.

MWCOG provides periodic Community GHG inventories for its members, including Manassas. CESP began its collaboration with Manassas in August 2021 and conducted multiyear LGO GHG inventories. This summary highlights results taken for 2020.

Differences between a Community and LGO GHG Inventory?

Community GHG inventory reports typically focus on *all* (public and private sector) selected GHG emissions occurring within the jurisdictional boundary of the community (e.g., emissions from combustion of natural gas in furnaces throughout the community), as well as certain trans-boundary emission sources associated with community activities (e.g., emissions from electricity generation at a power plant located outside the community associated with electricity use occurring in the community). GHG removals may also

occur, particularly in the land sector.

The LGO GHG inventory focuses specifically on local *government-controlled sectors*, including:

- Buildings and other facilities
- Streetlights and traffic signals
- Airport facilities and services
- Municipal Vehicle fleet
- Power generation facilities

Other contributions to emissions through public sector water/wastewater and solid waste use was also estimated. GHG emissions are estimated from activity data (e.g. electricity and other energy use, travel by car and truck, and disposal of municipal solid waste) and average rates of emissions from the activities were input to ClearPath, an online greenhouse gas inventory tool that meets the Global Protocol for Community-Scale Greenhouse Gas Inventories (GPC²): An Accounting and Reporting Standard for Cities Version 1.1. Emissions of each type of greenhouse gas are converted into metric tons of carbon dioxide equivalent (MTCO₂e) to provide a standard. Detailed source information is captured in the ClearPath tool with associated comments for city records.

LGO GHG inventory emissions should *not* be interpreted as complementary or additive to the Community GHG inventory emissions, rather they are a more refined assessment of GHG emissions resulting from the public sector and, therefore, a subset of the Community GHG inventory. There is, however, a subset of LGO GHG emissions that are unique to this inventory. They include all *emissions that support activities or customers outside of Manassas' geographic boundaries*. These include, 1) airport operations and 2) water and wastewater treatment. These public services are *only* captured in the LGO GHG inventory.

Summary of LGO GHG Inventory

Total Emissions

The City of Manassas's total greenhouse gas

¹ Chloe Delhomme, Senior Planner, served as primary City of Manassas liaison for data collection

² Global Protocol for Cities

emissions for the public sector in 2020 are estimated to be equivalent to 30,184 metric tons of carbon dioxide (MTCO_{2e}). See Table 1 and Figure 1.

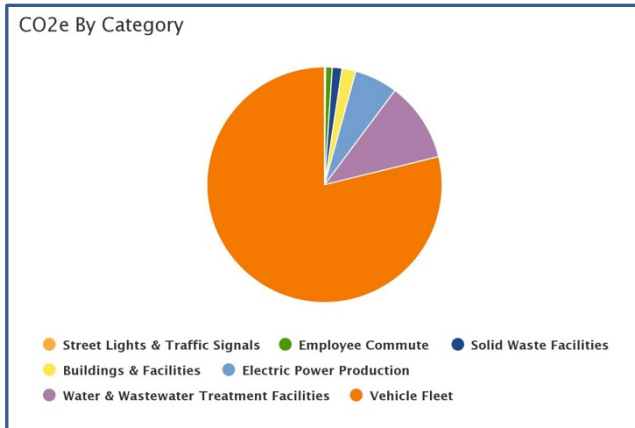


Figure 1 - Total LGO GHG (MTCO_{2e}) Emissions

Table 1 – LGO GHG (MTCO_{2e}) Emissions by Sector

Inventory By Sector

CO_{2e} by sector for the selected inventory year.

Sector	CO _{2e}
Buildings & Facilities	577
Street Lights & Traffic Signals	50
Vehicle Fleet	23,799
Employee Commute	271
Electric Power Production	1,791
Solid Waste Facilities	401
Water & Wastewater Treatment Facilities	3,295

Emissions by Sector

Building and Facilities

Emissions for this sector (577 MTCO_{2e}) was based on energy consumption information collected for all publicly-owned buildings within the city boundaries³. All energy consumption was assessed to be electrical, kilowatt-hour (kWh) usage was converted to GHG emissions using a regionally-based “SERC VA/Carolina (SRVC) eGRID 2020” conversion factor provided by the EPA. All emissions are categorized as Scope 2, as all emissions occurred from generators outside of Manassas’ municipal boundaries.

³ Data provided by Ana Davis - Includes: City Hall, Regional Airport, Old Town Hall, Museum, Police Department, Fire Department, and Rescue Department

⁴ Type 1 -- Ships and boats
Type 3 -- Agriculture
Type 4 -- Construction

Streetlights and Traffic Lights

Emissions for this sector (50 MTCO_{2e}) was based on energy consumption information collected for all publicly-owned streetlights and traffic lights within the boundaries of the City of Manassas. Kilowatt-hour (kWh) usage was converted to GHG emissions using a regionally-based “SERC VA/Carolina (SRVC) eGRID 2020” conversion factor provided by the EPA. All emissions are categorized as Scope 2, as virtually all emissions occurred from generators outside of Manassas’ municipal boundaries.

Vehicle Fleet

Vehicle Fleet emissions (23,799 MTCO_{2e}) were determined from emissions generated from three primary sources, 1) aviation operations (jet fuel and aviation gasoline), 2) On-road public fleet vehicles (gasoline and diesel-powered), and 3) off-road equipment (gasoline, diesel and propane)⁴. Detailed vehicle type, gallons used, and (if applicable) vehicle miles traveled data are included in the “Vehicle Fleet” section of the LGO GHG Inventory (see attachment in section)⁵. All fuels have CO₂, CH₄, and NO₂ 2020 emission factors applied (provided by EPA) and converted to MTCO_{2e} based on global warming potentials.

Airport operations provided historic aviation gasoline and jet fuel consumption (in gallons) for multiple years, including 2020⁶. These Scope 3 emissions (19,449 MTCO_{2e}) contributed not only the bulk of vehicle fleet emissions, but slightly more than 73% of all LGO GHG emissions. By comparison, aviation operations are equivalent to about 31% of all residential GHG emissions, but only about 2% more than all GHG emissions from solid waste (see Community GHG Inventory)

Employee Commute

Total employee commuter-related emissions were (271 MTCO_{2e})

CESP, in collaboration with ICLEI and Manassas

Type 6 – Small Utility Vehicles

Type 7 – Large Utility Vehicles

⁵ Data provided by Mr. Mike Morgan

⁶ Data provided by Mr. Richard Allabaugh, Airport Operations, Manassas Regional Airport

officials, used a comprehensive employee commuter survey to assess emissions resulting from employee commuter-related emissions. Conversion factors were based on emissions from gasoline and diesel fuel associated with Light duty-SUV and Passenger Vehicle as well as miscellaneous vehicles (battery-electric (BEV), hybrid, and Heavy-Duty Trucks). 116 employees responded ⁷to the survey indicating average commute distances and types of vehicles driven as shown in Table 2.

Table 2 - Employee Commuter Survey Results

Gasoline		%
Mile Traveled: Two Way	2235.9	55%
Total Annual VMT	585805.8	
Light Trucks	58	
Passenger Car	46	
Misc	2	
Total Employees	106	43%

Diesel		%
Miles Traveled: Two Way	50	100%
Total Annual VMT	13100	
Total Employees	1	

Hybrid		%
Miles Traveled: Two Way	223.2	28.57%
Total Annual VMT	58478.4	
Light Trucks	2	
Passenger Car	4	
Misc	1	
Total Employees	7	57.14%

Electric		%
Miles Traveled: Two Way	33.6	0.14%
Total Annual VMT	8803.2	
Total Employees	2	

Total Survey Response:	116
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Electric Power Production

Emissions for this sector (1791 MTCO₂e) accounted for electricity-related generation within city

⁷ Survey went out to 524 employees for a response rate of 22.1%.

⁸ Diesel generator fuel usage data provided by Mr. Tarek Aly. Data collection and interviews with city officials indicated there

boundaries⁸. Although Manassas Electric is primarily a distribution public utility it does account for occasional peak generation, contributing to Scope 1 emissions. Fuel data for 2020 was collected for the various diesel generators that are owned/operated by the Electric Department. Conversion factors provided by EPA were used to calculate GHG emissions.

Solid Waste

Emissions for this sector (401 MTCO₂e) was determined by estimating public sector contributions to the city’s waste load. City officials provided waste collection information (e.g. location/size) on all public-sector operated waste collection bins. An estimate of “half-full” for each pickup opportunity was applied for each bin. The city shares the same disposal landfill as the community utilizes.

Clearpath utilizes the standard First Order Decay (FOD) model for methane emissions resulting from landfill waste decay.

Water and Wastewater treatment

Emissions for this sector (3295 MTCO₂e) accounted for the City of Manassas Water Treatment Plant, a waterworks in Prince William County. Manassas Lake reservoir is more than 790 acres and holds approximately 5.3 billion gallons of water at full capacity. The Community GHG inventory accounts for GHG emissions generated from the wastewater treatment process itself. The LGO GHG inventory accounts solely for Scope 2 emissions emitting as a result of electricity consumption requirements needed at the facility itself and to power the pumps needed to distribute water to its various consumers (incl. residents of Manassas)⁹.

School District Emissions

Although not included in either the LGO or Community GHG inventory numbers, Manassas officials requested emissions data for the school district. Two sources of emissions (buildings and vehicle fleet – buses) were collected and included in the ClearPath LGO GHG Inventory (as information only). Using the same methodology and GHG

was no additional generation from stand-alone generators at government-owned facilities.

⁹ Data provided by Ms. Ana Davis.

conversion/global warming potential factors, the following emissions were calculated (see Table 3)

Table 3 - School District GHG emissions

Source	Energy Type	MTCO ₂ e
School bldgs ¹⁰ .	Natural Gas	8.8
	Electricity	2605
Bus Fleet ¹¹	Diesel	272
	TOTAL	2885.8

¹⁰ Data provided by Mr. Russ Helton

¹¹ Data provided by Mr. Mike Morgan