

COMMUNITY GREENHOUSE GAS INVENTORY
INVENTORY INPUTS - CITY OF ROCKVILLE TOTALS

Emissions Type (Main ClearPath Tab)	Emissions Activity or Source (ClearPath Calculator)	Inventory Records (Entered in ClearPath)		Local Data Inputs					
			Metric	2005	2012	2015	2018	% Change, 2005 - 2018	
BUILT ENVIRONMENT									
Residential Energy	Emissions from Grid Electricity	Residential Electricity	# of Accounts ¹	-	22,553	-	23,225	#VALUE!	
			Consumption (kWh) ¹	257,387,469	218,013,580	232,238,356	239,413,531	-7%	
	Emissions from Stationary Fuel	Residential Natural Gas	# of Accounts ¹	-	17,541	17,736	18,061	#VALUE!	
			Consumption (Therms) ¹	14,280,263	11,634,226	14,506,636	15,172,479	6%	
		Residential Fuel Oil	# of Households Using Fuel Oil ²	534	363	363	363	-32%	
			Consumption (Gallons) ³	397,361	167,496	244,190	181,961	-54%	
		Residential LPG	# of Households Using LPG ²	288	342	342	342	19%	
			Consumption (Gallons) ³	270,996	308,151	384,215	380,935	41%	
Commercial Energy	Emissions from Grid Electricity	Commercial Electricity	# of Accounts ¹	-	3,477	-	3,347	#VALUE!	
			Consumption (kWh) ¹	808,439,228	713,847,322	701,245,760	710,671,659	-12%	
	Emissions from Stationary Fuel Combustion	Commercial Natural Gas	# of Accounts ¹	-	1,344	1,434	1,420	#VALUE!	
			Consumption (Therms) ¹	14,668,244	14,774,164	15,114,832	15,094,550	3%	
		Commercial Fuel Oil	# of Commercial Buildings ⁴	500	532	543	557	11%	
			Total Commercial Sq Footage ⁴	18,767,089	21,450,154	22,098,763	22,561,381	20%	
			Sq Feet of Commercial Space Using Fuel Oil ⁵	3,293,369	5,271,577	5,430,979	5,544,672	68%	
			Consumption (Gallons) ⁵	65,867	105,432	108,620	110,893	68%	
		Commercial LPG	Sq Feet of Commercial Space Using LPG ⁵	1,885,578	1,848,134	1,814,013	1,851,988	-2%	
			Consumption (Gallons) ⁵	94,279	92,407	90,701	92,599	-2%	
TRANSPORTATION AND MOBILE EMISSIONS									
Transportation and Mobile Emissions	On Road Transportation	On Road Mobile Emissions	Annual Total Vehicle Miles Travelled ⁶	508,537,114	508,134,575	537,411,052	570,044,059	12%	
	Aviation Travel	Passenger Air Travel	Air Passengers Leaving BWI ⁷	17,382	24,263	19,075	38,705	123%	
			Air Passengers Leaving DCA ⁷	12,322	15,328	14,342	63,452	415%	
			Air Passengers Leaving IAD ⁷	24,398	13,839	26,058	76,154	212%	
	Rail Transportation	Rail Transportation	N/A ⁸	-	-	-	-	N/A	
	Emissions from Off Road Vehicles	Off Road Mobile Emissions	N/A ⁶	-	-	-	-	N/A	
WASTEWATER TREATMENT									
Water and Wastewater	Fugitive Emissions from Septic Systems	Septic System Emissions	Population Served by Septic ⁹	0	0	0	0	#DIV/0!	
	Nitrification/Denitrification Process N2O Emissions from Wastewater Treatment	Sewer System Emissions	Population Served by Sewer ⁹	59,600	62,900	63,973	69,846	17%	
	Process N2O from Effluent Discharge to Rivers and Estuaries	N2O Effluent Discharge Emissions	Daily Nitrogen Load (kg N / day) ⁹	131	81	63	66	-50%	
AGRICULTURE									
Agriculture	Emissions from Agricultural Activities	Enteric Fermentation	Dairy Cows ('000 head) ¹⁰	-	-	-	-	#VALUE!	
			Beef Cattle ('000 head) ¹⁰	-	-	-	-	#VALUE!	
			Sheep ('000 head) ¹⁰	-	-	-	-	#VALUE!	
			Goats ('000 head) ¹⁰	-	-	-	-	#VALUE!	
			Swine ('000 head) ¹⁰	-	-	-	-	#VALUE!	
			Horses ('000 head) ¹⁰	-	-	-	-	#VALUE!	
		Manure Management (all enteric fermentation metrics + chickens)	Poultry, Layers ('000 head) ¹⁰	-	-	-	-	#VALUE!	
			Poultry, Broilers ('000 head) ¹⁰	-	-	-	-	#VALUE!	
			Poultry, Turkeys ('000 head) ¹⁰	-	-	-	-	#VALUE!	
		Soils (all enteric fermentation and manure management metrics + crop production and fertilizer use)	Crop Production-Corn ('000 bushels) ¹⁰	-	-	-	-	#VALUE!	
			Crop Production-Wheat ('000 bushels) ¹⁰	-	-	-	-	#VALUE!	
			Crop Production-Soybeans ('000 bushels) ¹⁰	-	-	-	-	#VALUE!	
			Urban Fertilier Applied, Synthetic (kg N) ¹⁰	41,414	45,016	46,203	47,321	14%	
			Fertilier Applied, Manure (kg N) ¹⁰	-	-	-	-	#VALUE!	
			Fertilier Applied, Biosolids (kg N) ¹⁰	-	-	-	-	#VALUE!	
SOLID WASTE TREATMENT									
Solid Waste	Waste Generation	Landfill Waste Generation	MSW Landfilled (tons) ¹¹	-	-	-	-	#DIV/0!	
			Methane Collection at Receiving Landfill? ¹²	N/A	N/A	N/A	N/A	N/A	
	Combustion of Solid Waste Generated by the Community	Combustion of Solid Waste	Mass of MSW Combusted (tons) ¹¹	11,404	10,829	11,639	10,088	-12%	
OTHER EMISSION TYPES									
Process and Fugitive Emissions	Hydrofluorocarbon & Refrigerant Emissions	HFCs	Population ¹³	57,409	60,960	64,331	67,062	17%	
	Fugitive Emissions from Natural Gas Distribution	Natural Gas Fugitive Emissions	Total Natural Gas Consumption (Therms) ¹	28,948,507	26,408,390	29,621,469	30,267,029	5%	
DEMOGRAPHICS									
US Census American Community Survey	Main source of demographic data. Used for greenhouse gas emission calculations and benchmarking for the Built Environment, Solid Waste, and HFCs.		Population ¹⁴	57,409	60,960	64,331	67,062	17%	
			Housing Units ¹⁴	24,163	25,476	25,775	26,517	10%	
			Households (Occupied Housing Units) ¹⁴	23,386	24,306	24,755	25,197	8%	
			Population in Labor Force ¹⁴	31,292	34,119	35,660	38,150	22%	
MWCOG Cooperative Forecasts	Regional models for Transportation and Mobile Emissions use COG Cooperative Forecast data. For the purposes of this inventory work, these models provide greenhouse gas emission outputs.		Population ¹⁵	59,600	62,900	63,973	69,846	17%	
			Housing Units ¹⁵	23,000	-	26,504	27,877	21%	
			Employment ¹⁵	76,600	-	76,296	77,800	2%	

Column Header	Description
Emissions Type	This column lists the main tabs in the online ClearPath tool's GHG inventory entry pages in the same order listed in ClearPath.
Emissions Activity/Source	This column lists the ClearPath calculators used in for the development of these inventories. These calculators are found under each of the main tabs in the same order
Inventory Records	This column lists COG's inventory record entries according to which calculator was used to create that entry.
Local Data Inputs	This column lists the main local input data that impacts the greenhouse gas emission outputs (Metric Tons of CO ₂ Equivalent - MTCO ₂ e) and the percent change in those inputs between 2005 and 2015.

Sources and Notes:

MWCOG conducts community inventories for the region and all its member local jurisdictions. In order to have comparable inventories that are consistent from the top down and bottom up, the same data sources and methodologies are used across all the inventories. Data comes from sources that are regularly available over the years to compare inventories across past, present, and any future inventories. MWCOG inventories have been verified as compliant with national and global protocols for greenhouse gas accounting. MWCOG follows the U.S. Communities Protocol as the methodology for these inventories. The data presented above includes the leading local data inputs called for by the USCP. The local data inputs and emission factors influence the resulting greenhouse gas emissions (see Output tab).

¹ MWCOG. (2020). Metropolitan Washington Energy Utility Data Survey Analysis for 2005, 2012, 2015 and 2018

Note : Pepco account numbers for 2015 were interpolated. Washington Gas provided zip code level account and consumption data from 2009 - 2016 with an "unassigned" category to protect the privacy of some accounts. Since 2017, an "unassigned" category has not been provided and those accounts and consumption are attributed to the jurisdiction in which they reside. This does not affect the overall consumption and emissions for the region when comparing 2005 to 2018 inventory years; however, it may be one reason for a noticeable increase in 2018 consumption and emissions at the individual jurisdiction level.

² U.S. Census Bureau. American Community Survey

5 year estimates 2005-2009, and 2011-2015

General Housing Characteristics (ACS, DP04)

Subheader: Home Heating Fuel; Rows: "Fuel oil, kerosene, etc" and "Bottled, tank or LP gas"

<https://data.census.gov/cedsci/>

Webpage last accessed: June 2020

³ Energy Information Administration (EIA) State Energy Data System (SEDS)

Table C14. Residential Sector Energy Consumption Estimates, 1960-2018

<https://www.eia.gov/state/seds/>

Webpage last accessed: June 2020

Notes : Residential consumption is derived by downscaling EIA statewide consumption totals:

$$\text{Per Household Consumption} = \text{Total gallons of statewide residential consumption} / \text{Statewide \# of households using fuel oil}$$

$$\text{Residential Consumption in Gallons} = \# \text{ of households using fuel oil in community} * \text{Per household consumption}$$

Number of households using fuel oil and LPG was not available for cities in 2005 (exceptions: District of Columbia and Alexandria). The city to county ratio of households in 2015 was applied to 2005 to downscale from county households. Household data was interpolated for 2012.

⁴ CoStar. (2018). Commercial Property Records.

www.costar.com

Note : MWCOG has a license for the CoStar database. MWCOG's main use of the CoStar database is in the development of the annual regional commercial construction reports.

⁵ Energy Information Administration (EIA). (2007, 2012). Commercial Buildings Energy Consumption Survey (CBECS)

Table B23. Energy Sources, Floorspace, 2003 South and 2012 South Atlantic

<https://www.eia.gov/consumption/commercial/data/2012/>

Webpage last accessed: September 2017

Energy Information Administration (EIA). (2007, 2016). Commercial Buildings Energy Consumption Survey (CBECS)

Table C35. Fuel oil consumption and conditional energy intensity by Census region, 2003 and 2012

Row: Energy Sources, Fuel Oil; Column: Fuel Oil Energy Intensity, South

<https://www.eia.gov/consumption/commercial/data/2012/c&e/cfm/c35.php>

Webpage last accessed: September 2017

Note : Based on EIA data, it is estimated that 18-25% of the commercial square footage in the region uses fuel oil and 8-10% use LPG (varies by year). CoStar and EIA data are used to calculate the commercial consumption of non-utility fuel:

$$\text{Commercial Buildings Using Fuel Oil or LPG} = \text{Total number of commercial buildings} * \% \text{ of commercial buildings using fuel oil or LPG}$$

$$\text{Square Footage of Commercial Buildings Using Fuel Oil or LPG} = \text{Total square footage of commercial buildings} * \% \text{ of commercial buildings using fuel oil or LPG}$$

$$\text{Total Fuel Oil or LPG Consumption} = \text{Square footage of commercial buildings using fuel oil} * \text{Fuel oil energy intensity}$$

⁶ Metropolitan Washington Council of Governments. (2019). Transportation Planning Board Constrained Long Range Plan (CLRP), Version 2.3.57 travel demand model, MOVES2014b mobile emissions model, and Round 8.4 and 9.1

Note : On Road emissions account for all VMT occurring within the jurisdiction's boundary, including trips that start, stop, and pass through the jurisdiction with no stops.

⁷ MWCOG. (2019). 2017 Washington-Baltimore Regional Air Passenger Survey Geographic Findings Report

Section II. Findings. Page 13. Table 1: Annual Trip Originations by Airport

Appendix H. Page 79. Table 21: Originating Passengers by Jurisdiction

<https://www.mwco.org/documents/2019/04/08/washington-baltimore-regional-air-passenger-survey-geographic-findings-report-airport-access/>

Webpage last accessed: February 2020

MWCOG. (2016). Washington-Baltimore Regional Air Passenger Survey Geographic Findings Report 2015

Section II. Findings. Page 8. Table 1: Annual Trip Originations by Airport

Appendix H. Page 65. Table 16: Originating Passengers by Jurisdiction

www.mwco.org/documents/2016/11/16/washington-baltimore-regional-air-passenger-survey-geographic-findings-report-airport-access/

Webpage last accessed: July 2017

MWCOG. (2013). Washington-Baltimore Regional Air Passenger Survey Geographic Findings Report 2011

Section II. Findings. Page 6. Table 1: Annual Trip Originations by Airport

Appendix G. Page 68. Table G-1: Originating Passengers by Jurisdiction

MWCOG. (2008). Washington-Baltimore Regional Air Passenger Survey Geographic Findings Report

Page 10. Table 3: Originating Passengers by Jurisdiction, 2007 data

MWCOG. (2005). Washington-Baltimore Regional Air Passenger Survey Geographic Findings Report

Section II. Findings. Page 6. Table 1: Annual Trip Originations by Airport

Bureau of Transportation Statistics. Airline Information: Revenue Passenger Miles.

All Carriers, Domestic and International by Origin Airport for All Airports, BWI, Dulles, and Reagan

https://www.transtats.bts.gov/Data_Elements.aspx?Data=3

Webpage last accessed: May 2020

U.S. Environmental Protection Agency. (2020). Inventory of U.S. GHG Emissions and Sinks - 1990-2018

Chapter 3. Energy. Page 3-26. Table 3-13: CO₂ Emissions from Fossil Fuel Combustion in Transportation End-Use Sector (MMT CO₂ Eq.), Commercial Aircraft row, 2018 column

<https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2018>

Webpage last accessed: May 2020

MWCOG. (2016). Washington-Baltimore Regional Air Passenger Survey Geographic Findings Report 2015

Section II. Findings. Page 8. Table 1: Annual Trip Originations by Airport

<https://www.mwco.org/documents/2019/04/08/washington-baltimore-regional-air-passenger-survey-geographic-findings-report-airport-access/>

Webpage last accessed: May 2020

Note : EPA's greenhouse gas inventory for the U.S. provides an estimate total emissions from the commercial aircraft sector. This is downscaled to the local level using data from local passenger travel surveys, local enplanements, and passenger miles. 2005 local passenger travel statistics are an interpolation of 2000 and 2007 data. Data in the 2018 column is from 2017, the latest available data.

⁸ Federal Transit Administration. National Transit Database

2005, 2012, 2015 and 2018 Annual Energy Consumption

<https://www.transit.dot.gov/ntd/data-product/2005-annual-database-energy-consumption>

<https://www.transit.dot.gov/ntd/data-product/2012-annual-databases-energy-consumption>

<https://www.transit.dot.gov/ntd/data-product/2015-annual-database-energy-consumption>

<https://www.transit.dot.gov/ntd/data-product/2018-annual-database-energy-consumption>
Website Last Accessed: February 2020

Note : FTA provides passenger rail diesel consumption data for transit authorities. Emissions are calculated using diesel consumption in gallons and a percent attributable to metropolitan Washington. 59% of MARC stations are located in the COG region in MD.

⁹ MWCOG Regional Wastewater Flow Forecast Model for 2005, 2012, 2015, and 2018

MWCOG Cooperative Forecasts

Round 8.0 Cooperative Forecasting Summary Tables - Adopted November 10, 2010 (Excel Spreadsheet)
Round 8.3 Cooperative Forecasting Summary Tables - Adopted October 8, 2014 (Excel Spreadsheet)
Round 8.4 Cooperative Forecasting Summary Tables - Adopted October 14, 2015 (Excel Spreadsheet)
Round 9.1 Cooperative Forecasting Summary Tables - Adopted October 10, 2018 (Excel Spreadsheet)
<https://www.mwcog.org/documents/2016/11/16/cooperative-forecasts-employment-population-and-household-forecasts-by-transportation-analysis-zone-cooperative-forecast-demographics-housing-population/>
Webpage last accessed: May 2020

MWCOG. (2016). Original 2005 Greenhouse Gas Inventory

¹⁰ U.S. EPA. (2020). Chesapeake Assessment Scenario Tool (CAST).

Fertilizer applied
<https://cast.chesapeakebay.net>
Webpage last accessed: June 2020

U.S. EPA. (2017). EPA State GHG Inventory and Projection Tool.

AG Module
www.epa.gov/statelocalenergy/download-state-inventory-and-projection-tool
Webpage last accessed: January 2018

Note: CAST model outputs are entered into the EPA AG Module, which calculates the GHG emissions based on state-level agricultural and emission factors. Urban fertilizer for Maryland cities are downscaled from county data.

¹¹ 2005, 2012 and 2015 data provided by Mark Charles, City of Rockville, via phone conversation, September 2017.

2018 data and all WTE disposal confirmed by Erica Shingara, City of Rockville, via email, May 2020.

¹² US Environmental Protection Agency. (data year 2015). Facility Level Greenhouse Gas Tool (FLIGHT)

Sector: Waste. Search by state, county, and or facility name for all facilities jurisdictions send municipal solid waste (MSW). Click on facility and data year 2015. Under Facility Information and the question "Does the landfill have an active gas collection system?" there will be a Y/N answer.

<https://ghgdata.epa.gov/>
Website Last Accessed: September 2017

¹³ U.S. Census Bureau. American Community Survey 1 and 5-Year Population Estimates

1 and 5 year estimates, 2005, 2008-2012, 2011-2015 and 2014-2018
Demographic and Housing Estimates (2005, 2012, 2015, 2018 ACS, Table DP05)
<https://data.census.gov/cedsci/>
Webpage last accessed: May 2020

U.S. Environmental Protection Agency. (2020). Inventory of U.S. GHG Emissions and Sinks - 1990-2018

Executive Summary, Page ES-8, Table ES-2: Recent Trends in U.S. Greenhouse Gas Emissions and Sinks (MMT CO₂ Eq.), row titled "Substitution of Ozone Depleting Substances" under HFCs subheader, 2018 column
<https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2018>
Webpage last accessed: May 2020

U.S. Environmental Protection Agency. (2018). Inventory of U.S. GHG Emissions and Sinks - 1990-2016

Executive Summary, Page ES-8, Table ES-2: Recent Trends in U.S. Greenhouse Gas Emissions and Sinks (MMT CO₂ Eq.), row titled "Substitution of Ozone Depleting Substances" under HFCs subheader, 2012 column
<https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks-1990-2016>
Webpage last accessed: May 2020

Note: EPA's US greenhouse gas emissions inventory provides a national emissions estimate of substitutions for Ozone depleting substances, which primary result in HFC emissions as well as small amounts of perfluorocarbons (PFC) emissions. Data is not available at the local level for ozone depleting substances. The national total has been downscaled to the local level by population. Population estimates in 2005 are downscaled from the ratios found in the U.S. Census Bureau 2008-2012 American Community Survey 5-Year Population Estimates.

$Local\ Jurisdiction\ HFCs = (US\ HFC\ total\ in\ MMTCO_2e * 1,000,000) * (local\ population / US\ population)$

¹⁴ U.S. Census Bureau. American Community Survey 1 and 5-Year Population Estimates

1 and 5 year estimates, 2005, 2008-2012, 2011-2015, and 2014-2018
Demographic and Housing Estimates (2005, 2012, 2015 and 2018 ACS, Table DP05)
General Housing Characteristics (2005, 2012, 2015 and 2018 ACS, DP04)
General Economic Characteristics (2005, 2012, 2015, 2018 ACS, DP03)
<https://factfinder.census.gov>
<https://data.census.gov/cedsci/>
Webpage last accessed: May 2020

Note: 2005 estimates are downscaled from the ratios found in the U.S. Census Bureau 2008-2012 American Community Survey 5-Year Population Estimates.

¹⁵ MWCOG Cooperative Forecasts

Round 8.0 Cooperative Forecasting Summary Tables - Adopted November 10, 2010 (Excel Spreadsheet)
Round 8.3 Cooperative Forecasting Summary Tables - Adopted October 8, 2014 (Excel Spreadsheet)
Round 8.4 Cooperative Forecasting Summary Tables - Adopted October 14, 2015 (Excel Spreadsheet)
Round 9.1 Cooperative Forecasting Summary Tables - Adopted October 10, 2018 (Excel Spreadsheet)
<https://www.mwcog.org/documents/2016/11/16/cooperative-forecasts-employment-population-and-household-forecasts-by-transportation-analysis-zone-cooperative-forecast-demographics-housing-population/>
Webpage last accessed: May 2020

Legend:

	Table organization only. Do not alter, enter or calculate data in gray-shaded cells.
	Light blue are data entry cells.
	Shades of green are cells that contain calculations. Moderate green colored cells contain subtotals, darker green cells contain grand totals.