

TOWN OF WOODSTOCK CLIMATE SMART TASK FORCE

Erin Moran, Coordinator
Kenneth Panza, Secretary

Application for 16 Points

June 4, 2020

PE2 Action: Government Operations GHG Inventory

16 Points



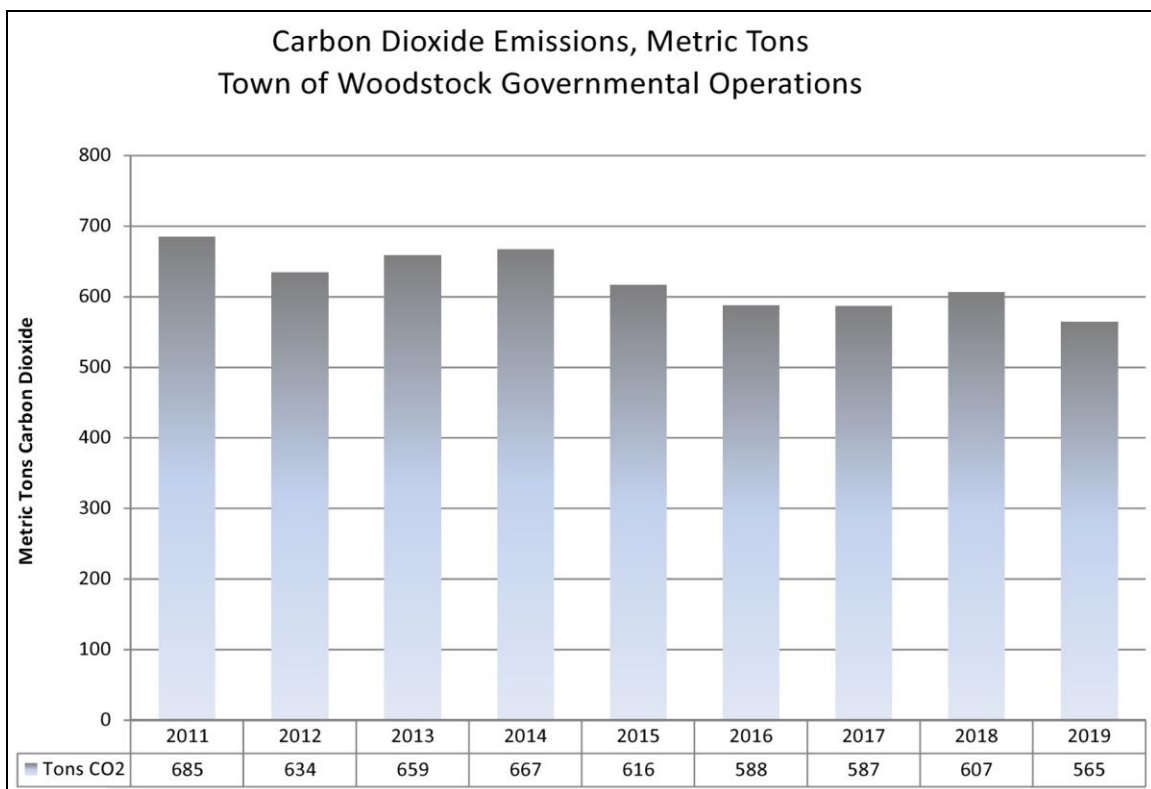
BRONZE PRIORITY



SILVER PRIORITY

In 2007, the Woodstock town board committed that town governmental operations would become carbon neutral by year-end 2017. The town achieved carbon neutrality in 2015, two years early, and was recognized for its accomplishment at the 2017 annual meeting of the New York State Association of Conservation Commissions. The actions required to achieve carbon neutrality seemed to parallel DEC's Climate Smart Communities (CSC) program, and the town was encouraged to apply for recognition. The following is a statement of Woodstock's governmental emissions for 2019.

Woodstock Governmental GHG Inventory for 2019



Beginning in 2011, Woodstock's carbon dioxide emissions have dropped from 685 to 565 metric tons in 2019, a 18% reduction in CO2 emissions from governmental operations

Method of Calculation

Woodstock began systematically tracking its carbon emissions in 2011 using a four part process, which is briefly discussed below.

- 1) Woodstock’s GHG tracking system is based on energy use and cost data required for the yearly financial report to the Office of the NY State Comptroller. The energy usage and cost reports documents all of Woodstock’s Scope 1 and Scope 2 GHG sources.
- 2) Carbon emissions for fossil fuel usage are calculated using the CO2 emission coefficients published by the U.S. Energy Information Administration (EIA).
- 3) Carbon emissions for the town’s electrical usage are calculated using the EPA’s Power Profiler, adjusted for the contribution of local hydroelectric generation.
- 4) An Excel spreadsheet is used to summarize and graph the town’s carbon dioxide emissions, measured in metric tons.

Report to the Office of the NY State Comptroller

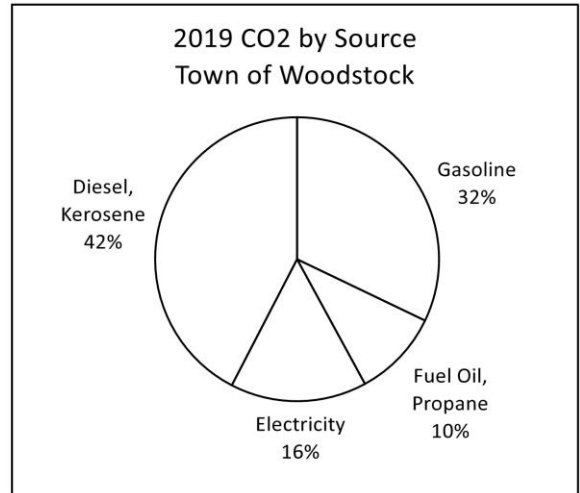
New York government entities are required to file a yearly financial report with the Office of the State Comptroller. Pursuant to Section 21, Subdivision 10A of Town Law, the Supervisor shall submit to the Town Board, the Town Clerk and the New York State Comptroller within sixty days after the close of the fiscal year a copy of the Annual Report, as required by law, and the Town Clerk shall publish within ten days in the official newspapers the fact that such annual report is available for inspection in the Town Clerk’s office. The table, “Energy Costs and Consumption,” is an exhibit that has been required in municipal financial reports since 2008.

TOWN OF Woodstock Energy Costs and Consumption For the Fiscal Year Ending 2019				
Energy Type	Total Expenditures	Total Volume	Units Of Measure	Alternative Units Of Measure
Gasoline	\$39,991	20,390	gallons	
Diesel Fuel	\$49,396	23,555	gallons	
Fuel Oil	\$5,985	2,814	gallons	
Natural Gas			cubic feet	
Electricity	\$121,884	808,484	kilowatt-hours	
Coal			tons	
Propane	\$5,870	4,786	gallons	

Table showing energy consumption and costs from the town’s annual financial report for the fiscal year 2019. The town’s carbon emissions are calculated from these quantities.


74% of Town’s Carbon Dioxide Emissions from Vehicles.

Three quarters of the town’s GHG emissions come from vehicles. The highway department is the major user of diesel fuel, and the police department is the major user of gasoline. Fuel oil and propane used for heating accounts for 10% of the town’s emissions, and electricity for another 16%.



CO2 Emission Coefficients for Fossil Fuels

The Energy Information Administration (EIA) publishes emission coefficients for fossil fuels. This chart provides the lbs. of CO2 emissions by unit of measure for each fuel.¹ The coefficients are used to calculate the carbon dioxide emissions from fossil fuels used by the town government.

 U.S. Energy Information Administration

Environment
Carbon Dioxide Emissions Coefficients
 Release Date: February 2, 2016 | Also available in [spreadsheet](#)

Carbon Dioxide Emissions Coefficients by Fuel

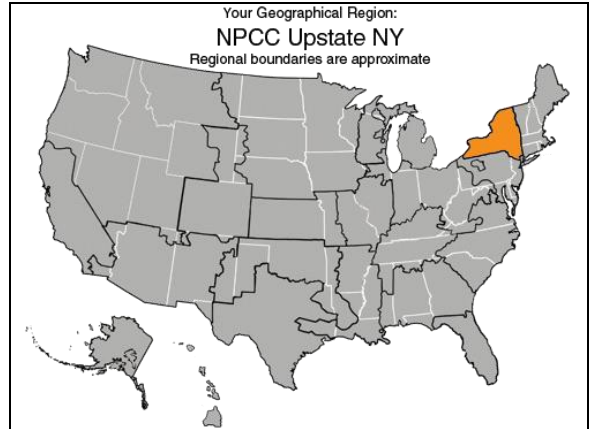
Carbon Dioxide (CO ₂) Factors:	Pounds CO ₂	Kilograms CO ₂	Pounds	Kilograms
	Per Unit of Volume or Mass	Volume or Mass	CO ₂	CO ₂
			Million Btu	Million Btu
For homes and businesses				
Propane	12.70/gallon	5.76/gallon	139.05	63.07
Butane	14.80/gallon	6.71/gallon	143.20	64.95
Butane/Propane Mix	13.70/gallon	6.21/gallon	141.12	64.01
Home Heating and Diesel Fuel (Distillate)	22.40/gallon	10.16/gallon	161.30	73.16
Kerosene	21.50/gallon	9.75/gallon	159.40	72.30
Coal (All types)	4,631.50/short ton	2,100.82/short ton	210.20	95.35
Natural Gas	117.10/thousand cubic feet	53.12/thousand cubic feet	117.00	53.07
Gasoline	19.60/gallon	8.89/gallon	157.20	71.30
Residual Heating Fuel (Businesses only)	26.00/gallon	11.79/gallon	173.70	78.79

EIA Carbon Dioxide Emissions Coefficients
(Partial Page)

¹ Energy Information Agency, “Carbon Dioxide Emissions Coefficients by Fuel,” February 2, 2016, https://www.eia.gov/environment/emissions/co2_vol_mass.php

CO2 Emissions from Electric Generation

The EPA’s Emissions & Generation Resource Integrated Database (eGRID) documents carbon dioxide, methane, nitrogen oxides, sulfur dioxide, and nitrous oxide emissions from electric generation by geographic region.² Upstate New York is one of the regions tracked in eGRID. By Googling ‘EPA Power Profiler’ and entering a ZIP code, the carbon dioxide emissions and fuel composition of power in any geographic region can be found.



Calculating Woodstock Governmental Carbon Dioxide Emissions

Using the above tables, it’s then possible to calculate the total carbon emissions for Woodstock’s governmental operations by multiplying the quantity of fuel and electricity by its carbon coefficient.

Calculating Carbon Emissions

TOWN OF Woodstock
Energy Costs and Consumption
For the Fiscal Year Ending 2017

Energy Type	Total Expenditures	Total Volume	Units Of Measure	Alternative Units Of Measure
Gasoline	\$16,854	13,508	gallons	
Diesel Fuel	\$30,943	21,510	gallons	
Fuel Oil	\$5,199	2,509	gallons	
Natural Gas			cubic feet	
Electricity	\$111,186	764,419	kilowatt hours	
Coal			tons	
Propane	\$8,243	4,970	gallons	

Source	lbs. CO2/Gal	Lbs. CO2
Gasoline	19.64	407,019
Diesel	22.38	496,679
Fuel Oil	22.38	56,957
Propane	12.70	60,998
EPA Power Profiler		
Electricity	lbs. CO2/MWh	
764,419	366	268,232
Total lbs. CO2		1,289,886
Total CO2 Metric Tons		585

1 Metric Ton = 2204.6 lbs.

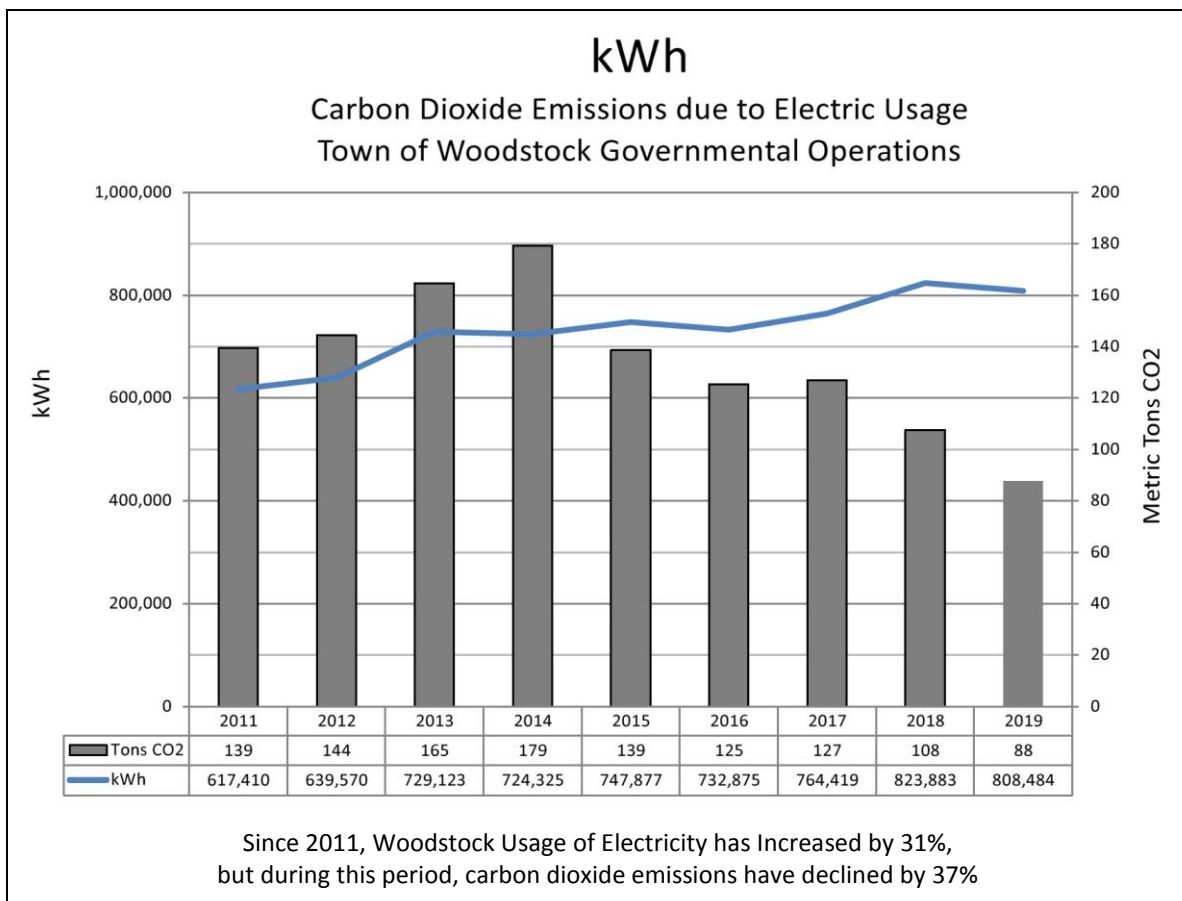
² Environmental Protection Agency, “Emissions & Generation Resource Integrated Database (eGRID)”, Available at <https://www.epa.gov/energy/emissions-generation-resource-integrated-database-egrid>

Woodstock Carbon Dioxide Emissions due to Electricity

eGRID Emission Factor for 2019³	253.1 lbs. CO₂ / MWh
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Since 2011, the town’s electrical usage for governmental operations has grown by 31%, and during this period, carbon dioxide emissions attributable to electricity have dropped by about 37%. Woodstock’s increase in electricity usage has been driven by geothermal and air-sourced heat pumps used for heating and cooling the town’s buildings. Usage is expected to reach 900,000 kWh by 2021 after the renovation of the town offices on Comeau.

Closing of upstate coal-fired generators and the town’s contracts for hydroelectric power from the Natural Power Group, an operator of local hydroelectric generators, have reduced the town’s carbon dioxide emissions attributed to electricity. It is expected carbon dioxide emissions due to electricity will be substantially eliminated in 2021.



³ EPA Power Profiler

Adjustments for Zero-Carbon Hydroelectric Power

In 2018, the Woodstock Town Board signed contracts with the Natural Power Group (NPG) for power sourced from the Wappingers Falls and Walkkill hydroelectric generating facilities under the terms of Community Distributed Generation (CDG). Under these contracts, Woodstock will receive over 90% of its electric power for governmental usage from zero-carbon sources. It's expected that carbon dioxide emissions from town governmental operations will drop to a level 30% below 2011 by 2021.

Woodstock has two contracts with the Natural Power Group, a Community Distributed Generator (CDG). The contract for the Walkkill plant was signed in May 2018 for 37,000 kWh, and then upgraded in 2019 to 44,000 kWh. A second contract for the Wappingers Falls plant was signed in December 2018 for 681,000 kWh. Combined, these two contracts account for over 90% of Woodstock's electricity usage.

The table below summarizes the usage, source, and carbon dioxide emissions for Woodstock's electric supply.

kWh		2018	2019	2020 (est)
Woodstock Usage		823,883	808,484	810,000
Walkkill Hydro	(Note 1)	18,500	44,000	70,000
Wappinger Falls Hydro	(Note 2)			678,000
Total Hydroelectric		18,500	44,000	748,000
Central Hudson (Grid)	(Note 3)	805,383	764,484	62,000
Metric Tons CO2	(Note 4)	108	88	7

Note 1: Only six months of the contracted 37,000 kWh was delivered in 2018. Credit for the full 44,000 kWh contracted amount was received in 2019. To cover usage by the EV charging station at the Rock City Rd Restrooms in 2020, the town increased its Walkkill subscription to 70,000 kWh.

Note 2: Because of a rupture in the penstock at Wappingers Falls, no power was delivered in 2019.

Note 3: Amount of electricity sourced from the grid after deducting hydroelectric power.

Note 4: Hydroelectric power has zero carbon dioxide content. Power sourced from the grid in 2018 had a carbon dioxide content of 294.7 lbs./MWh, based on EPA's upstate New York region eGRID2016. In 2019, power sourced from the grid had a carbon dioxide content of 253.1 lbs./MWh.

GHG Emissions beyond Carbon Dioxide

There are other GHGs besides carbon dioxide associated with the combustion of fossil fuels. For Woodstock, overwhelmingly, vehicles are responsible for most GHG emissions, but vehicles are a special challenge because their emissions are dependent on the effectiveness of the vehicles' emission control systems.

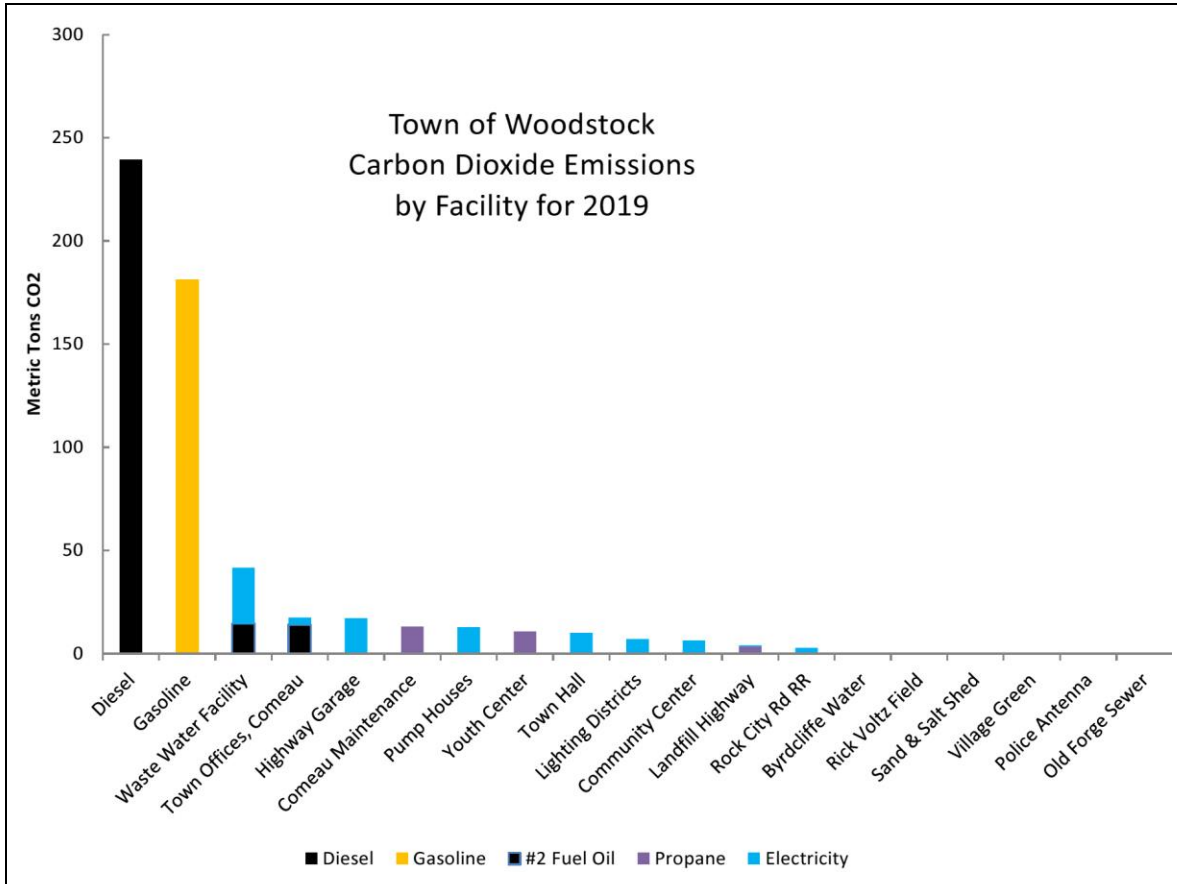
A typical passenger vehicle emits about 4.6 metric tons of carbon dioxide per year. This number can vary based on a vehicle's fuel, fuel economy, and the number of miles driven per year. In addition to carbon dioxide (CO₂), automobiles produce methane (CH₄) and nitrous oxide (N₂O) from the tailpipe and hydrofluorocarbon emissions from leaking air conditioners. The emissions of GHG gases are small in comparison to CO₂; however, the impact of these emissions can be important because they have a higher global warming potential (GWP) than CO₂.⁴

Emissions from mobile combustion sources can be estimated based on vehicle fuel use and miles traveled. CO₂ emissions, which account for the majority of emissions from mobile sources, are directly related to the quantity of fuel combusted and thus can be calculated using fuel consumption

⁴ US Environmental Protection Agency, "Greenhouse Gas Emissions from a Typical Passenger Vehicle," Green Vehicle Guide, Available at <https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle>

data. CH₄ and N₂O emissions depends on the emission control technologies employed in the vehicle and the distance traveled. Calculating emissions of CH₄ and N₂O requires data on vehicle characteristics (which takes into account emission control technologies) and vehicle miles traveled.⁵

Carbon Dioxide Emissions by Facility



⁵ California Air Resources Board, *Local Government Operations Protocol*, Version 1.1, May 2010, page 64, Available at <https://ww3.arb.ca.gov/cc/protocols/localgov/localgov.htm>

Woodstock GHG Emissions for 2019

Total CO2	Facility	Carbon Dioxide (Metric Tons)				Electricity
		Diesel	Gasoline	#2 Fuel Oil	Propane	
239.332	Diesel	239.332				
181.277	Gasoline		181.277			
41.668	Waste Water Facility			14.533		27.135
17.523	Town Offices, Comeau			14.060		3.463
17.221	Highway Garage					17.221
13.115	Comeau Maintenance				13.115	
12.841	Pump Houses				0.159	12.682
10.748	Youth Center				10.748	0.000
10.057	Town Hall				0.000	10.057
7.050	Lighting Districts					7.050
6.337	Community Center					6.337
4.077	Landfill Highway				3.550	0.527
2.807	Rock City Rd RR					2.807
0.144	Byrdcliffe Water					0.144
0.113	Rick Voltz Field					0.113
0.081	Sand & Salt Shed					0.081
0.060	Village Green					0.060
0.006	Police Antenna					0.006
0.005	Old Forge Sewer					0.005
564.462						87.688

Calculation of Carbon Dioxide Emissions by Facility