Town of Ossining

2019 Inventory of Government Operations Greenhouse Gas Emissions

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Produced by the Town of Ossining Office of the Town Supervisor with Assistance from ICLEI – Local Governments for Sustainability USA

Credits and Acknowledgements

Elizabeth R. Feldman, Town Supervisor

Eileen Tacuri, Confidential Secretary

David Margulis, Environmental Advisory Committee

Mary Lambert, Hudson Valley Regional Council

Kale Roberts, ICLEI

ICLEI-Local Governments for Sustainability USA

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Executive Summary

The Town of Ossining recognizes that greenhouse gas (GHG) emissions from human activity are catalyzing profound climate change, the consequences of which pose substantial risks to the future health, wellbeing, and prosperity of our community.

Since 2019, the Town has pursued the acquisition of lower emissions and/or electric vehicles whenever cost-effective and available. This has lead to the acquisition of a hybrid bus for our Senior Center and a hybrid car for our building inspector. Additionally, grants have been obtained for the purchase of electric park maintenance equipment and for EV charging stations and other emissions lowering projects.

This report provides estimates of greenhouse gas emissions resulting from activities within the Town's governmental operations during the year 2019.

D Margulis/Margulis Photo

Key Findings

Figure 1 shows local government operations emissions. The largest contributor to emissions is vehicle fleet (45%), followed by employee commute (37%).The Buildings and Facilities sector follows and is small due to the lack buildings (one) owned by the Town. This sector accounts for 10% of emissions. Actions to reduce emissions from these sectors will be a key part of any future climate action plan developed by Town of Ossining. The transit fleet, water and wastewater facilities (sewage pumps only) and street lighting were responsible for the remainder (less than 9%) of local government operations emissions.

The Inventory Results section of this report provides a detailed profile of emissions sources within Town of Ossining; information that is key to guiding local reduction efforts. These data will also provide a baseline against which the city will be able to compare future performance and demonstrate progress in reducing emissions.

Sector	CO2e	% Total
Vehicle Fleet	183	45%
Employee Commute	151	37%
Buildings & Facilities	41	10%
Transit Fleet	19	5%
Water & Wastewater Treatment Facilities	10	2%
Street Lights & Traffic Signals	7	2%

Figure 1: Government Operations Emissions by Sector

Introduction to Climate Change

Naturally occurring gases dispersed in the atmosphere determine the Earth's climate by trapping solar radiation. This phenomenon is known as the greenhouse effect. Overwhelming evidence shows that human activities are increasing the concentration of greenhouse gases and changing the global climate. The most significant contributor is the burning of fossil fuels for transportation, electricity generation and other purposes, which introduces large amounts of carbon dioxide and other greenhouse gases into the atmosphere. Collectively, these gases intensify the natural greenhouse effect, causing global average surface and lower atmospheric temperatures to rise, threatening the safety, quality of life, and economic prosperity of global communities. Although the natural greenhouse effect is needed to keep the earth warm, a human enhanced greenhouse effect with the rapid accumulation of GHG in the atmosphere leads to too much heat and radiation being trapped. The Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report confirms that human activities have unequivocally caused an increase in carbon emissions[1]. Many regions are already experiencing the consequences of global climate change, and the Town of Ossining is no exception.

Human activities are estimated to have caused approximately 1.0°C of global warming above pre-industrial levels, with a likely range of 0.8°C to 1.2°C. Global warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate (high confidence). Warming from anthropogenic emissions from the pre-industrial period to the present will persist for centuries to millennia and will continue to cause further long-term changes in the climate system, such as sea level rise, with associated impacts (high confidence), but these emissions alone are unlikely to cause global warming of 1.5°C (medium confidence). Climate-related risks for natural and human systems are higher for global warming of 1.5°C than at present, but lower than at 2°C (high confidence). These risks depend on the magnitude and rate of warming, geographic location, levels of development and vulnerability, and on the choices and implementation of adaptation and mitigation options (high confidence)[2].

[1]IPCC, 2021: Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [MassonDelmotte, V., P. Zhai, A. Pirani, S. L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M. I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J. B. R. Matthews, T. K. Maycock, T. Waterfield, O. Yelekçi, R. Yu and B. Zhou (eds.)]. Cambridge University Press. In Press.

[2]IPCC, 2018: Summary for Policymakers. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. World Meteorological Organization, Geneva, Switzerland, 32 pp.

According to the 2018 National Climate Assessment, the Northeast U.S. will experience "declining snow and ice, rising sea levels, and rising temperatures. By 2035, and under both lower and higher [emission] scenarios (RCP4.5 and RCP8.5), the Northeast is projected to be more than 3.6°F (2°C) warmer on average than during the preindustrial era." The Town of Ossining, like the rest of the Northeast "face[s] multiple climate hazards, including temperature extremes, episodes of poor air quality, recurrent waterfront ... flooding, and intense precipitation events that can lead to increased flooding on [sub]urban streams." These events can be expected to have significant economic impact on the Town of Ossining due to that flooding causing infrastructure damage, business sales reduction and an eroding tax base. Public health and the quality of life can be expected to suffer as well.

Many communities in the United States have started to take responsibility for addressing climate change at the local level. Reducing fossil fuel use in the community can have many benefits in addition to reducing greenhouse gas emissions. More efficient use of energy decreases utility and transportation costs for residents and businesses. Retrofitting homes and businesses to be more efficient creates local jobs. In addition, when residents save on energy costs, they are more likely to spend at local businesses and so add to the local economy. Reducing fossil fuel use improves air quality, while increased opportunities for walking and bicycling improves residents' health. The 2018 MOGO study, involving NY State, Westchester County and local-area municipalities, was a first step towards enhancing these walking and bicycling opportunities.

Greenhouse Gas Inventory as a Step Toward Carbon Neutrality

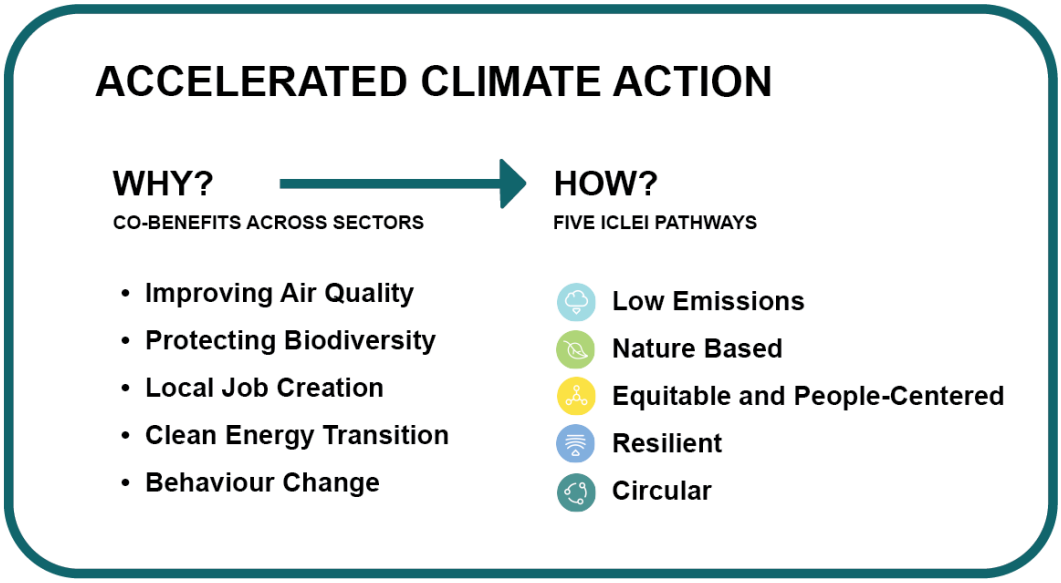
Facing the climate crisis requires the concerted efforts of local governments and their partners, those that are close to the communities directly dealing with the impacts of climate change.

Cities, towns and counties are well placed to define coherent and inclusive plans that address integrated climate action — climate change adaptation, resilience and mitigation. Existing targets and plans need to be reviewed to bring in the necessary level of ambition and outline how to achieve net-zero emissions by 2050 at the latest. Creating a roadmap for climate neutrality requires the Town of Ossining to identify priority sectors for action, while considering climate justice, inclusiveness, local job creation and other benefits of sustainable development.

To complete this inventory, the Town of Ossining utilized tools and guidelines from ICLEI - Local Governments for Sustainability (ICLEI), which provides authoritative direction for greenhouse gas emissions accounting and defines climate neutrality as follows:

> The targeted reduction of greenhouse gas (GHG) emissions and GHG avoidance in government operations and across the community in all sectors to an absolute net-zero emission level at the latest by 2050. In parallel to this, it is critical to adapt to climate change and enhance climate resilience across all sectors, in all systems and processes.

To achieve ambitious emissions reduction, and move toward climate neutrality, the Town of Ossining will need to set a clear goal and act rapidly following a holistic and integrated approach. Climate action is an opportunity for our community to experience a wide range of co-benefits, such as creating socio-economic opportunities, reducing poverty and inequality, and improving the health of people and nature.



ICLEI Climate Mitigation Milestones

In response to the climate emergency, many communities in the United States are taking responsibility for addressing emissions at the local level. Since many of the major sources of greenhouse gas emissions are directly or indirectly controlled through local policies, local governments have a strong role to play in reducing greenhouse gas emissions within their boundaries, as well as influencing regional emissions through partnerships and advocacy. Through proactive measures around land use patterns, transportation demand management, energy efficiency, green building, waste diversion, and more, local governments can dramatically reduce emissions in their communities. In addition, local governments are primarily responsible for the provision of emergency services and the mitigation of natural disaster impacts.

ICLEI provides a framework and methodology for local governments to identify and reduce greenhouse gas emissions, organized along Five Milestones, also shown in Figure 2:

1. Conduct an LGO inventory and forecast of local government greenhouse gas emissions;
2. Establish a greenhouse gas emissions target;
3. Develop an LGO climate action plan for achieving the emissions reduction target;
4. Implement the climate action plan; and,
5. Monitor and report on progress.

This report represents the completion of ICLEI's Climate Mitigation Milestone One, and provides a foundation for future work to reduce greenhouse gas emissions in Town of Ossining.

Figure 2: ICLEI Climate Mitigation Milestones

Inventory Methodology

Understanding a Greenhouse Gas Emissions Inventory

The first step toward achieving tangible greenhouse gas emission reductions requires identifying baseline emissions levels and sources and activities generating emissions in the community. This report presents emissions from government operations of the Town of Ossining. The government operations inventory is mostly a subset of the community inventory, as shown in Figure 3. For example, data on commercial energy use by the community includes energy consumed by municipal buildings, and community vehicle-miles-traveled estimates include miles driven by municipal fleet vehicles.

Figure 4: Relationship of Community and Government Operations Inventories

As local governments continue to join the climate protection movement, the need for a standardized approach to quantify GHG emissions has proven essential. This inventory uses the approach and methods provided by the U.S. Community Protocol for Accounting and Reporting Greenhouse Gas Emissions (Community Protocol) and the Local Government Operations Protocol for Accounting and Reporting Greenhouse Gas Emissions (LGO Protocol), both of which are described below.

Three greenhouse gases are included in this inventory: carbon dioxide (CO2), methane (CH4) and nitrous oxide (N2O). Many of the charts in this report represent emissions in "carbon dioxide equivalent" (CO2e) values, calculated using the Global Warming Potentials (GWP) for methane and nitrous oxide from the IPCC 5th Assessment Report.

Table 1: Global Warming Potential Values (IPCC, 2014)

Greenhouse Gas	Global Warming Potential
Carbon Dioxide (CO2)	1
Methane (CH4)	28
Nitrous Oxide (N2O)	265

Local Government Operations (LGO) Protocol

In 2010, ICLEI, the California Air Resources Board (CARB), and the California Climate Action Registry (CCAR) released Version 1.1 of the LGO Protocol.[3] The LGO Protocol serves as the national standard for quantifying and reporting greenhouse emissions from local government operations. The purpose of the LGO Protocol is to provide the principles, approach, methodology, and procedures needed to develop a local government operations greenhouse gas emissions inventory.

The following activities are included in this LGO inventory:

- On-road transportation from employee commute and vehicle/transit fleets
- Energy and natural gas consumption from buildings & facilities
- Wastewater treatment pump fuel consumption
- Energy consumption by streetlights

Quantifying Greenhouse Gas Emissions

Sources and Activities

Communities contribute to greenhouse gas emissions in many ways. Two central categorizations of emissions are used in the community inventory: 1) GHG emissions that are produced by "sources" located within the community boundary, and 2) GHG emissions produced as a consequence of community "activities".

Source	Activity
Any physical process inside the jurisdictional boundary that releases GHG emissions into the atmosphere	The use of energy, materials, and/or services by members of the community that result in the creation of GHG emissions.

By reporting on both GHG emissions sources and activities, local governments can develop and promote a deeper understanding of GHG emissions associated with their communities. A purely source-based emissions inventory could be summed to estimate total emissions released within the community's jurisdictional boundary. In contrast, a purely activity-based emissions inventory could provide perspective on the efficiency of the community, even when the associated emissions occur outside the jurisdictional boundary. The division of emissions into sources and activities replaces the scopes framework that is used

[3] ICLEI. 2008. Local Government Operations Protocol for Accounting and Reporting Greenhouse Gas Emissions. Retrieved from http://www.icleiusa.org/programs/climate/ghg-protocol/ghg-protocol

in government operations inventories, but that does not have a clear definition for application to community inventories.

Base Year

The inventory process requires the selection of a base year with which to compare current emissions. Town of Ossining's LGO greenhouse gas emissions inventory utilizes 2019 as its baseline year, for which the necessary data are available.

Quantification Methods

Greenhouse gas emissions can be quantified in two ways:

- Measurement-based methodologies refer to the direct measurement of greenhouse gas emissions (from a monitoring system) emitted from a flue of a power plant, wastewater treatment plant, landfill, or industrial facility.
- Calculation-based methodologies calculate emissions using activity data and emission factors. To calculate emissions accordingly, the basic equation below is used:

Activity Data x Emission Factor = Emissions

Most emissions sources in this inventory are quantified using calculation-based methodologies. Activity data refer to the relevant measurement of energy use or other greenhouse gas-generating processes such as fuel consumption by fuel type, metered annual electricity consumption, and annual vehicle miles traveled. Please see appendices for a detailed listing of the activity data used in composing this inventory.

Known emission factors are used to convert energy usage or other activity data into associated quantities of emissions. Emissions factors are usually expressed in terms of emissions per unit of activity data (e.g. lbs. CO2/kWh of electricity). For this inventory, calculations were made using ICLEI's ClearPath tool.

Government Operations Emissions Inventory Results

Government operations emissions for 2019 are shown in Table 2 and Figure 4.

Table 2: Local Government Operations Inventory

Sector	Fuel or source	2019 Usage	Usage unit	2019 Emissions ($MTCO_2e$)
Buildings & Facilities	Electricity	154,524	KWh	8
	Propane	5,883	Gal	33
Buildings & Facilities total				**41**
Street Lights & Traffic Signals	Electricity	143,057	KWh	7
Street Lights & Traffic Signals total				**7**
Vehicle Fleet	Gasoline (on-road)	9,095	Gal	80
	Diesel (on-road)	10,170	Gal	104
Vehicle Fleet total				**184**
Transit Fleet	Gasoline	2,203	Gal	19
Transit Fleet total				**19**
Employee Commute	Gasoline	333,635	Gal	151
Employee Commute Total				**151**
Water and wastewater	Electric/Sewage Pump	98,981	KWh	5
	Propane/ Sewage Pump	946	Gal	5
Water and wastewater total				**10**
			Total government emissions	**411**

Figure 4 shows the distribution of emissions among the sectors included in the inventory. The Vehicle Fleet represents the majority of emissions, followed by Employee Commute. The remaining sectors account for less than 20% of emissions.

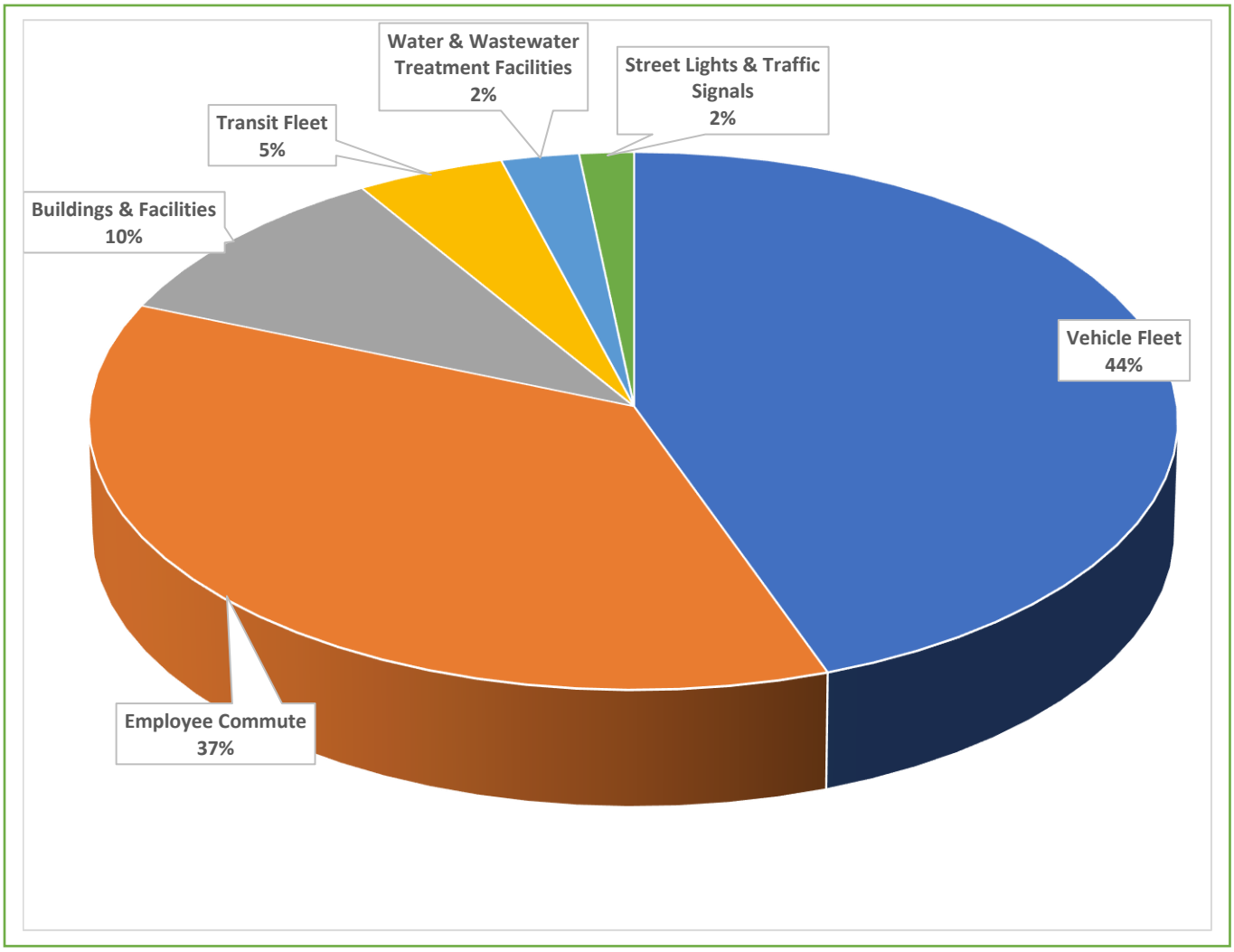


Figure 5: Local Government Operations Emissions by Sector

Next Steps

The local government operations emissions inventory points to a need for on-going focus on conversion to electric vehicles. Some progress has been made on conversion of the transportation fleet and personal vehicles to EV or hybrid. But this has been a problem for heavy electric equipment due to the high cost of electric replacements (roughly 3x diesel). Continued focus on cost-effective opportunities though will ultimately yield significant emissions savings.

The Employee Commute sector is another area that could benefit from emissions reduction. One idea is to install a number of charging stations at Town-owned work sites(Highways garage, Parks barn) for use by employees with electric cars. A more radical idea is to encourage/build affordable housing and make it available to Town employees to reduce the need for long daily commutes.

Further, a grant has been obtained to install solar panels on our Arts Center (shown on page 5) and solar lights at our Cedar lane Dog Park, our Parks and Highway departments are looking into acquisition of electric lawn equipment. And our Senior Center is purchasing dishes in order to discontinue use of disposal tableware.

And, finally, replacement of sewage pumps, as they age out, by higher efficiency and/or electric models could reduce emissions in our Water and Wastewater Treatment Facilities sector.

All in all, the Town is committed to reducing its environmental footprint.

Conclusion

This inventory marks the completion of Milestone One of the Five ICLEI Climate Mitigation Milestones. The next steps are to forecast emissions, set an emissions-reduction target, and build upon the existing Town efforts with a more robust climate action plan that identifies specific quantified strategies that can cumulatively meet that target.

The Intergovernmental Panel on Climate Change (IPCC) states that to meet the Paris Agreement commitment of keeping warming below 1.5°C we must reduce global emissions by 50% by 2030 and reach climate neutrality by 2050. Equitably reducing global emissions by 50% requires that high-emitting, wealthy nations reduce their emissions by more than 50%. More than ever, it is imperative that countries, regions, and local governments set targets that are ambitious enough to slash carbon emissions between now and mid-century.

Science-Based Targets are calculated climate goals, in line with the latest climate science, that represent a community's fair share of the global ambition necessary to meet the Paris Agreement commitment. To achieve a science-based target, community education, involvement, and partnerships will be instrumental. The Town of Ossining looks to incorporate Science Based Targets in its Climate Action Plan in order to comply with the goals set by the State of New York

In addition, Town of Ossining will continue to track key energy use and emissions indicators on an on-going basis. It is recommended that communities update their inventories on a regular basis, especially as plans are implemented to ensure measurement and verification of impacts. Regular inventories also allow for "rolling averages" to provide insight into sustained changes and can help reduce the change of an anomalous year being incorrectly interpreted. This inventory shows that the Town vehicle fleet and its employees' commuting pattern as well as other ,communitywide, transportation patterns will be particularly important to focus on. Through these efforts and others, the Town of Ossining can achieve environmental, economic, and social benefits beyond reducing emissions.

Appendix: Methodology Details

Energy

The following tables show each activity, related data sources, and notes on data gaps.

Table 3: Energy Data Sources

Activity	Data Source	Data Gaps/Assumptions
Local Government Operations		
Electricity consumption	NYPA	Query and Response, provided by NYPA via HVRC, assumed accurate and complete
Propane gas consumption	Vendor queries of Town Accounting system	Two vendors: one did not have unit cost data, 2nd did not have gallon data. Missing values calculated Unit costs from NYSERDA historical price data, calculated cost factor table or actual cost.

Table 4: Westchester County Emissions Factors for Electricity Consumption

NYPA

Year	CO_2 (lbs./MWh)	CH_4 (lbs./GWh)	N_2O (lbs./GWh)
2019	110.010538	21	2

Transportation

Table 5: Transportation Data Sources

Activity	Data Source	Data Gaps/Assumptions
Local Government Operations		
Government vehicle fleet	Town mechanic, pump billing records	• All diesel vehicles assumed to be heavy trucks • Pump records assumed complete
Employee commute	Survey	• 35% response expanded to total headcount • Word responses converted to numbers • Respondent memory accuracy assumed • Gas use from mileage in Table 6

For vehicle transportation, it is necessary to apply average miles per gallon and emissions factors for CH4 and N2O to each vehicle type. The factors used are shown in Table 6.

Table 6: Westchester County MPG and Emissions Factors by Vehicle Type

2019 US National Defaults (updated 2021)

Fuel	Vehicle type	MPG	CH_4 g/mile	N_2O g/mile
Gasoline	Passenger car	24.1	0.0183	0.0083
Gasoline	Light truck	17.6	0.0193	0.0148
Gasoline	Heavy truck	5.371652	0.0785	0.0633
Gasoline	Motorcycle	24.1	0.0183	0.0083
Diesel	Passenger car	24.1	0.0005	0.001
Diesel	Light truck	17.6	0.001	0.0015
Diesel	Heavy truck	6.392468	0.0051	0.0048

Inventory Calculations

The 2019 inventory was calculated following the US Community Protocol and ICLEI's ClearPath software. As discussed in Inventory Methodology, the IPCC 5th Assessment was used for global warming potential (GWP) values to convert methane and nitrous oxide to CO2 equivalent units. ClearPath's inventory calculators allow for input of the sector activity (i.e. kWh or VMT) and emission factor to calculate the final CO2e emissions.