Town Of Pleasant Valley

2019 Inventory of Government Operations Greenhouse Gas Emissions

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Produced by the Pleasant Valley Climate Smart Taskforce with Assistance from Hudson Valley Regional Council (HVRC) and ICLEI – Local Governments for Sustainability USA

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Executive Summary

The Town of Pleasant Valley 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.

Therefore, the Town made a commitment to finding ways to create a sustainable community and to act against climate change. One such action was to become a Climate Smart Community by adopting the Climate Smart Communities pledge and taking actions to move the Town in a direction that would protect our infrastructure, economy, and livelihoods.

One such action is creating a greenhouse inventory which can be monitored moving forward and will show the Town where further actions need to take place.

This local government operations GHG inventory report is an accounting and analysis of the GHG emissions resulting from the day-to-day operations of the Town. It summarizes the GHG emissions from the consumption of energy and materials in government buildings, from wastewater, from municipal vehicle fleets, from government-owned outdoor lighting, and from other sources. A greenhouse gas (GHG) emissions inventory is one of the most important steps in the local climate action process. By establishing a baseline of where emissions sources and levels are today it builds a data-based justification for how to select actions for tomorrow.

Key Findings

Figure 1 shows local government operations emissions. The Buildings and Facilities sector accounts for the vast majority of GHG emissions, or 42.6% of all emissions. The next largest contributor is vehicle fleet at 40.14%, followed by employee commute 14.19%. Actions to reduce emissions from these sectors will be a key part of any future climate action plan developed by the Town.

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

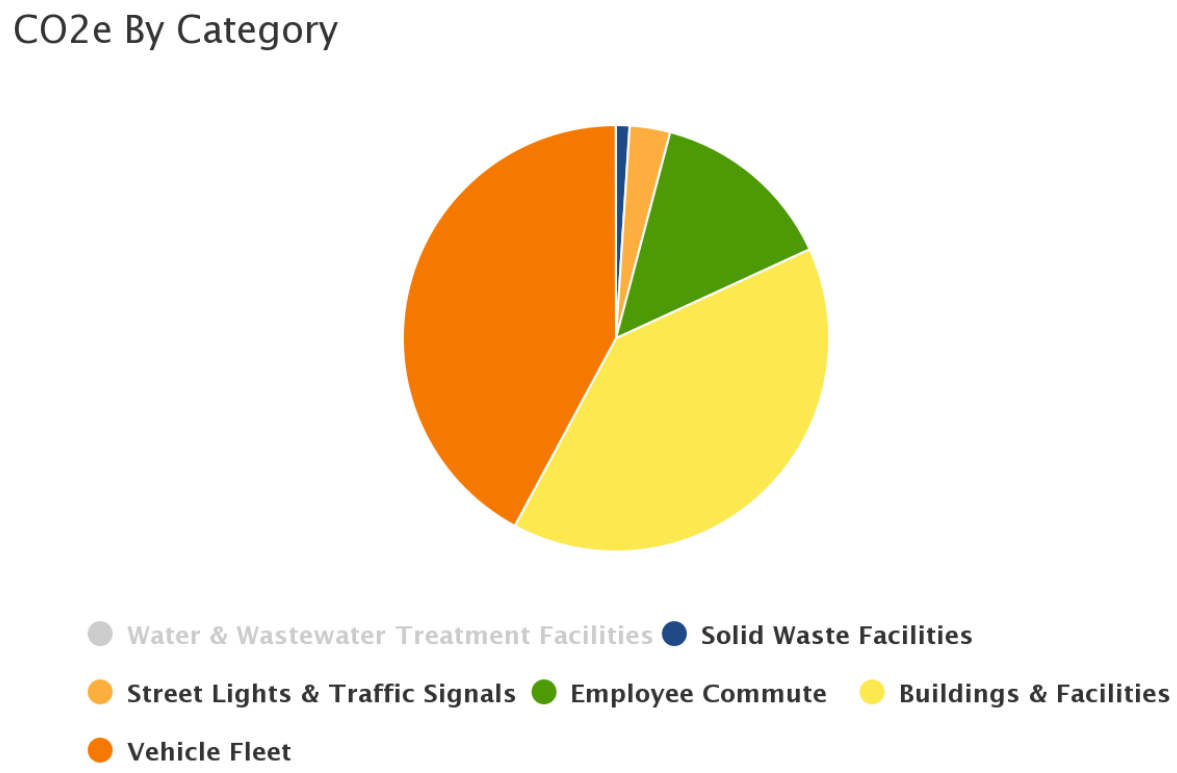


Figure 1: Government Operations Emissions by Sector

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 Pleasant Valley 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 distinct seasonality of the Northeast's climate supports a diverse natural landscape adapted to the extremes of cold, snowy winters and warm to hot, humid summers. This natural landscape provides the economic and cultural foundation for many rural communities, which are largely supported by a diverse range of agricultural, tourism, and natural resource-dependent industries *(see Ch. 10: Ag & Rural, Key Message 4)*.[1] The recent dominant trend in precipitation throughout the Northeast has been towards increases in rainfall intensity,[2] with increases in intensity exceeding those in other regions of the contiguous United States. Further increases in rainfall intensity are expected,[3] with increases in total precipitation expected during the winter and spring but with little change in the summer.[4] Monthly precipitation in the Northeast is projected to be about 1 inch greater for December through April by end of century (2070–2100) under the higher scenario (RCP8.5).[4]

Ocean and coastal ecosystems are being affected by large changes in a variety of climate-related environmental conditions. These ecosystems support fishing and aquaculture,[5] tourism and recreation, and coastal communities.[6] Observed and projected increases in temperature, acidification, storm frequency and intensity, and sea levels are of particular concern for coastal and ocean ecosystems, as well as local communities and their interconnected social and economic systems. Increasing temperatures and changing seasonality on the Northeast Continental Shelf have affected marine organisms and the ecosystem in various ways. The warming trend experienced in the Northeast Continental Shelf has been associated with many fish and invertebrate species moving northward and to greater depths.[7,8,9,10,11] Because of the diversity of the

Northeast's coastal landscape, the impacts from storms and sea level rise will vary at different locations along the coast.[12,13]

Increases in annual average temperatures across the Northeast range from less than 1°F (0.6°C) in West Virginia to about 3°F (1.7°C) or more in New England since 1901.[18,19] Although the relative risk of death on very hot days is lower today than it was a few decades ago, heat-related illness and death remain significant public health problems in the Northeast.[20,21,22,23] For example, a study in New York City estimated that in 2013 there were 133 excess deaths due to extreme heat.[24] These projected increases in temperature are expected to lead to substantially more premature deaths, hospital admissions, and emergency department visits across the Northeast.[23,25,26,27,28,29] For example, in the Northeast we can expect approximately 650 additional premature deaths per year from extreme heat by the year 2050 under either a lower (RCP4.5) or higher (RCP8.5) scenario and from 960 (under RCP4.5) to 2,300 (under RCP8.5) more premature deaths per year by 2090.[29]

Communities, towns, cities, counties, states, and tribes across the Northeast are engaged in efforts to build resilience to environmental challenges and adapt to a changing climate. Developing and implementing climate adaptation strategies in daily practice often occur in collaboration with state and federal agencies (e.g., New Jersey Climate Adaptation Alliance 2017, New York Climate Clearinghouse 2017, Rhode Island STORMTOOLS 2017, EPA 2017, CDC 2015[30,31,32,33,34]). Advances in rural towns, cities, and suburban areas include low-cost adjustments of existing building codes and standards. The approaches are designed to maintain and enhance the everyday lives of residents and promote economic development. In some cities, adaptation planning has been used to respond to present and future challenges in the built environment. Regional efforts have recommended changes in design standards when building, replacing, or retrofitting infrastructure to account for a changing climate[3].

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, the money is more likely to be spent at local businesses and add to the local economy. Reducing fossil fuel use improves air quality and increases opportunities for walking and bicycling which improves residents' health.

[3] U.S. Global Change Research Program. 2018. National Climate Assessment – Ch 18: Northeast. Retrieved from https://nca2018.globalchange.gov/chapter/18/

Greenhouse Gas Inventory as a Step Toward Carbon Neutrality

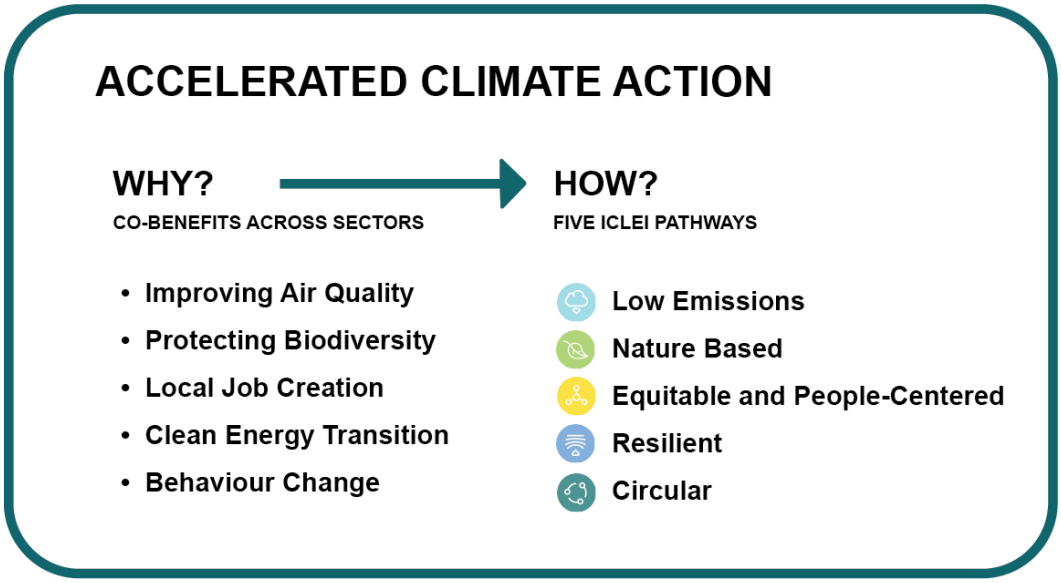
Facing the climate crisis requires the concerted efforts of local governments and their partners, those that are close to the communities directly dealing with the impacts of climate change.

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 Pleasant Valley 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 Pleasant Valley 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, Pleasant Valley 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 Local Government Operations (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 Pleasant Valley.

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 operations of the Town of Pleasant Valley government. 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 3: 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.4 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 the LGO inventory:

- Energy and natural gas consumption from buildings & facilities
- Streetlights and Traffic Signals
- On-road transportation from employee commute and vehicle fleet
- Solid Waste
- Water and Wastewater Treatment Facilities

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 up to estimate total emissions released within the community's jurisdictional boundary. In contrast, a purely activity-based emissions inventory could provide perspective

[4] 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

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 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. Pleasant Valley'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

Government Operations Emissions Inventory Results

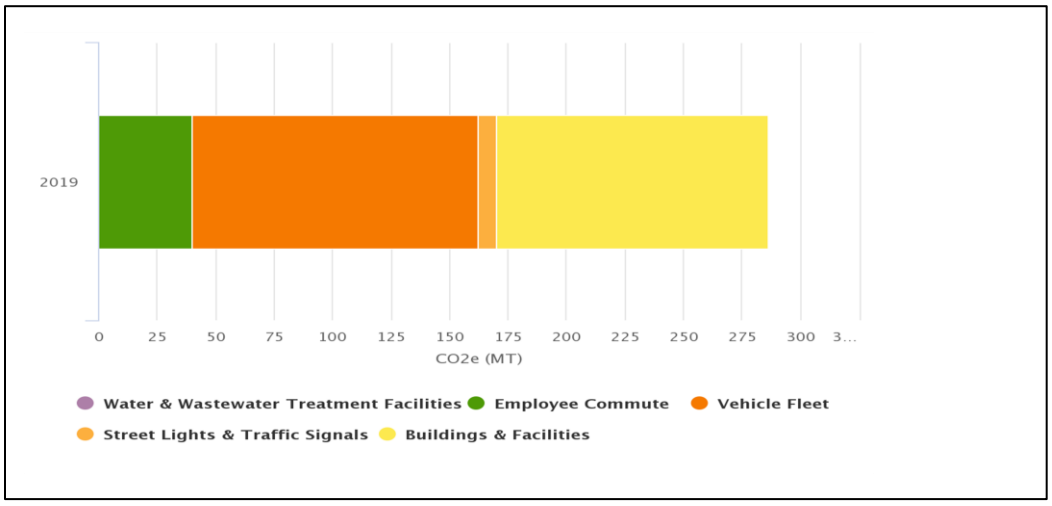
Government operations emissions for 2019 are shown in Table 3 and Figure 6.

Table 2: Local Government Operations Inventory

Sector	Fuel or source	[Baseline Year] Usage	Usage unit	[Baseline Year] Emissions ($MTCO_2e$)
Buildings & Facilities	Electricity	246,807	kWh	46
	Natural Gas	15,986	therms	70
			Buildings & Facilities total	**116**
Street Lights & Traffic Signals	Electricity	80,756	kWh	8
			Street Lights & Traffic Signals total	**8**
	Gasoline (on-road)	2917	gallons	25
	Diesel (on-road)	9493	gallons	97
			Vehicle Fleet total	**122**

Employee Commute	Gasoline	84,480	gallons	
			Employee Commute Total	**40**
Solid Waste	Waste Generation	2	Tons	
			Solid waste total	**3**
Water and wastewater	Emissions from Pumps			
			Water and wastewater total	**.2**
			Total government emissions	**289**

Figure 4 (below) shows the distribution of emissions among the four sectors included in the inventory. Vehicle Fleet represents the majority of emissions at 122 metric tons or 42.21%, followed by Buildings & Facilities at 116 metric tons, or 40.14%. Employee Commute came in at 40 metric tons, or 13.84%. Streetlights account for 8 metric tons or 2.77%.



Next Steps:

The local government operations emissions inventory points to a need for further analysis of ways to reduce GHG emissions from the Town's two largest GHG emissions sectors: Building and Facilities and Vehicle Fleet. The next step will be the creation of a Climate Action Plan in conjunction with the Hudson Valley Regional Council's Climate Action Planning Institute (CAPI). CAPI is a facilitated working group of nine Dutchess municipalities taking a collaborative approach to climate action planning to address climate change more efficiently at the local level.

Next steps include research on the expansion of demand reduction response for larger municipal buildings, exploring opportunities to transition buildings to cleaner energy sources, and looking into adding electric vehicles to the vehicle fleet as existing vehicles are replaced. Additional high priority actions to explore include changing over the remaining streetlights to LEDs, as well as the use of energy efficient HVAC, lighting, and water flow options at the new Town Hall. Discussions should be held with the Highway Superintendent to see what the best course of action would be to reduce emissions within the Highway Department's building and fleet.

Conclusion

This inventory marks the completion of Milestone One of the Five ICLEI Climate Mitigation Milestones. The next steps are to establish a time period to forecast emissions, set an emissions-reduction target, and build a Pleasant Valley Climate Action Plan 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. This exercise brought to light just how important it is to reduce greenhouse gas emissions and that science is telling us we need to set ambitious targets that incorporate a fair share consideration of our historic contributions to global GHGs. The understanding means we should identify strategies that get us to a 50% reduction by 2030 and possibly beyond that target.

The Town of Pleasant Valley is committed to reducing carbon emissions. We understand that this is not an easy task, and it requires a comprehensive and collaborative approach, involving Town government and members of our community. Regular inventories can provide insight into sustained changes, and over time, as the Town builds its capacity to conduct inventories on a regular basis, the process will help to increase its ability to operate efficiently and use taxpayer resources effectively. Through these efforts and others, the Town can achieve environmental, economic, and social benefits beyond reducing emissions.

Appendix: Methodology Details

Energy

The following tables shows 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	Central Hudson	Provided detailed bill for baseline year
Natural gas consumption	Central Hudson	Provided detailed bill for baseline year
Heating / Fuel oil consumption	Kosco Heritage and Botini	Provided detailed bills for baseline year

Table 4: Emissions Factors for Electricity Consumption

NPCC Upstate NY (NYUP) eGRID 2019

Year	CO2 (lbs./MWh)	CH4 (lbs./GWh)	N2O (lbs./GWh)
2019	232.305	17	2

Transportation

Table 5: Transportation Data Sources

Activity	Data Source	Data Gaps/Assumptions
Local Government Operations		
Government vehicle fleet	Globel Montello Group Corp	2019 detailed invoices. Highway department also provided fuel usage by department.
Employee commute	Survey	A survey was sent to all municipal employees in 2023 asking them for data about their 2019 commute. 15 surveys (33%) responded. In 2019 the Town had 45 employees, so the numbers were scaled up to represent all employees.

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: MPG and Emissions Factors by Vehicle Type

2019 US National Defaults (updated 2021)

Fuel	Vehicle type	MPG	CH4 g/mile	N2O 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

Solid Waste

Table 7: Solid Waste Data Sources

Activity	Data Source	Data Gaps/Assumptions
Local Government Operations		
Tonnage	Deputy Commissioner, Division of Solid Waste Management	The community-wide tonnage (356 tons), for a population of 9,696, was scaled down to represent just the solid waste produced by the Town's 45 employees. Gaps include data for the Town dump, which may include municipal construction waste.

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.