Government Operations Climate Action Plan for the Town of North East and Village of Millerton, New York

September 2022

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TABLE OF CONTENTS

TABLES

FIGURES

List of Acronyms

AR5 - Intergovernmental Panel on Climate Change's Fifth Assessment Report
CAGR – Compound Annual Growth Rate
CH_4 - methane
CO_2 – carbon dioxide
CO_2e - Carbon Dioxide Equivalents
CSC – New York State Climate Smart Communities
EF – GHG Emission Factor
eGRID – US EPA Emissions & Generation Resource Integrated Database
EPA – Environmental Protection Agency
GHG – greenhouse gas
GWP – global warming potential
HFC - hydrofluorocarbon
IMP – Inventory Management Plan
IPCC - Intergovernmental Panel on Climate Change
LPG – liquid petroleum gas (propane)
t – metric tonnes
MSW – municipal solid waste
MWh – Mega Watt hour
N_2O – Nitrous Oxide
NYS – New York State
NYSEG - New York State Electric and Gas Corporation
NYSERDA – New York State Energy Research and Development Authority
PE – Pledge Element
PFC - perfluorocarbon
SF_6 – sulfur hexafluoride
TCR – The Climate Registry
US EPA - United States Environmental Protection Agency
UNFCCC – United Nations Framework Convention on Climate Change

Acknowledgments

We are pleased to present this 2022 Town of North East and Village of Millerton Government Operations Greenhouse Gas Inventory, Target Reduction Plan, and Climate Action Plan. It is our hope that future generations of elected officials and residents will continue to inspire awareness and activism about the undeniable threats of climate change upon our Town's and Village's resplendent natural resources and the planet that we and all humankind lovingly call "Home."

The Town of North East's Town Board and Administration

Town Supervisor: Christopher Kennan

Deputy Supervisor: Lana Morrison

Bookkeeper/Budget Officer: Lorna Sherman

Council members: Griffin Cooper, Ralph Fedele, John Midwood

Village of Millerton's Village Board and Administration

Village Mayor: Jennifer Najdek

Deputy Mayor: Alicia Sartori

Trustees: Matthew Hartzog; Laurie Kerr; David Sherman

The Town and Village Boards wish to thank the following agencies, officials, and individuals for their assistance with the development of this Government Operations Greenhouse Gas (GHG) Inventory, GHG Target Reduction Plan, and Government Operations Climate Action Plan:

- NYS DEC's Office of Climate Change
- New York State Energy Research and Development Authority (NYSERDA)
- Local Organizations: Housatonic Valley Association, Cary Institute, and Cornell Cooperative Extension
- First Environment, Inc. – Ms. Lindsey Shanks and Dr. Phil Ludvigsen
- Millerton/North East Climate Smart Task Force:
  - Members: Chris Kennan, Town of North East Supervisor; Griffin Cooper, Town of North East Councilman; Matthew Hartzog, Village of Millerton Trustee; Laurie Kerr, Village of Millerton Trustee; CAC Chair, Rich Stalzer, Kathy Chow, Task Force Coordinator; Jennifer Dowley, Rhiannon Leo-Jameson, Deborah Maier, Tom Parrett, Andrew Stayman, Chris Virtuoso, and Carrissa Whitehead.

Executive Summary

The Town of North East and Village of Millerton (NY) are focused on providing leadership in addressing the causes and local impacts of climate change through actions at both the community and government operations levels. The Town and Village governments are committed to reducing greenhouse gas (GHG) emissions from their operations by implementing climate mitigation best practices that are both practical and cost-effective. To assist in meeting this objective, as lead Municipality on the joint Town / Village project, the Town received a 2018 NYS DEC-OCC grant award toward becoming a certified Climate Smart Community (CSC). This grant matched municipal funding for the development of separate government operations GHG inventories for the Town and the Village (see Appendix A and B), as well as this combined government operations climate action plan.

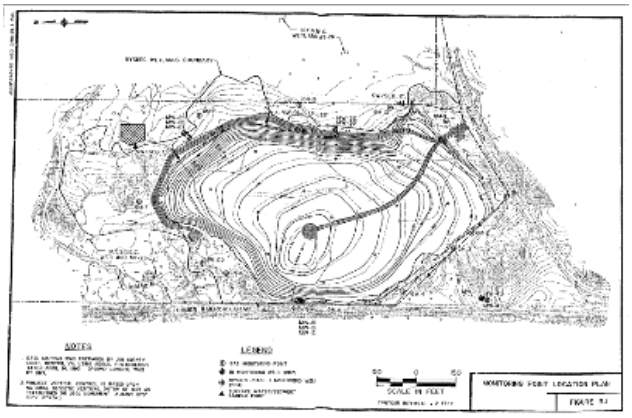
In July 2022, the Town was awarded Climate Smart Bronze Certification earning 142 points of the required 120 point threshold. The Town is also a NYSERDA Clean Energy Community. The Village has completed many CSC actions and is poised to submit for Bronze certification in 2022 / 2023 as well as NYSERDA CEC. Many of these climate actions are joint initiatives between the Town and the Village. Some have been, or will be, funded through NYSERDA and CSC grants. Additional sources of funding or guidance have been identified and can be found in Section 5.4.

The purpose of a local government climate action plan is to reduce GHG emissions from Town and Village operations by prioritizing actions and to gather support for short- and long-term investments. This includes identifying and implementing climate actions that lead to tangible benefits for the local communities. Implementation of these actions also results in CSC certification points, moving the Town of North East/Village of Millerton closer to their goal of having both municipalities become Bronze Certified Climate Smart Communities.

A key element of the combined Climate Action Plan is its GHG emissions inventories. The Town and Village's total GHG emissions (also referred to as a carbon footprint) from government operations for its selected base year of 2020 amounted to a total 2,561.68 metric tonnes carbon dioxide equivalents (tCO_2e). Although several GHG's make up the inventory, each are converted into the equivalent amount of carbon dioxide – the basic unit of global warming potential. The following table presents a breakdown between the Town and Village's total GHG emissions.

Municipality	Total GHG Emissions 2020 tCO_2e
Town of North East	2,491.85[1]
Village of Millerton	69.83
TOTAL:	2,561.68

As a point of reference, the total emissions of 2,562 tCO_2e is approximately equivalent to the GHG emissions produced by an average passenger vehicle driven 6,359,411 miles, according to the US EPA's Greenhouse Gas Equivalencies Calculator.



Based on conservative assumptions, the largest source of municipal related GHG emissions, by a large margin, is the town's closed municipal landfill (2,312.8 Tonnes of CO_2e or over 90% of total carbon footprint). This town-owned landfill was opened approximately in 1965 and operated for 35 years before closing in 1999. Although closed, the landfill continues to emit GHGs, albeit at a declining rate (See Appendix A, Table 18). It is recommended that direct measurements of the flow and concentrations of methane be taken from existing monitoring ports. For smaller and older landfills, passive methane reduction actions, such as bio covers or biofilters, tend to be more cost-effective than active actions such as methane capture and flaring.

The second largest source of emissions comes from the Town's owned and operated Vehicle Fleet (pickups, heavy trucks, and equipment for the highway department). The third largest source is Town facilities (Town Hall, Salt Shed, Storage Garage, Old Garage).

For the Village, the largest source of government operation GHG emissions is its vehicle fleet. The second largest is its building and facilities, followed by Village employee's commute, streetlights, and traffic signal being the last area of emissions. Details on these emissions can

[1] Without the landfill, the Town's carbon footprint would be only 245 tCO2e.

be found in Section 3.2 - Major Sources of Greenhouse Gas (GHG) Emissions in Government Operations, as well as Appendices A and B.

A major element of this Government Operations Climate Action Plan is to develop GHG reduction targets for the short (1-year), medium (5-year), and longer term (10-year) time horizons. Based on practical and cost-effective climate action strategies, the following emission reduction targets have been set forth in this plan.

Government Operations GHG Reduction Target	Target Year	Reduction Goal from 2020 Base Year GHG Inventory (%)
Year 1	2023	3%
Year 5	2027	10%
Year 10	2032	25%

Meeting these targets results in additional bonus performance points counting toward Climate Smart Community certification.

Because the landfill emissions are such a large part of the GHG inventory, the impact of planned emission reductions will be assessed with and without the landfill emission source. Although planned climate activities are projected to meet the Town and Village's combined GHG reduction targets, the following planned or proposed facilities will increase each jurisdiction's carbon footprint:

- new Town/Village garage,
- new combined town hall,
- new wastewater treatment system, and
- expansion of Village Park (Eddie Collins).

It is also important to note that landfill GHG emissions will reduce naturally over time (approximately 5% a year). For these reasons, it is recommended that the GHG inventories be updated annually and a new Climate Action Plan developed every five years.

The following climate actions have been identified to meet the proposed GHG emission reduction targets.

Target Year	Climate Action Reduction Measures	Expected GHG Reductions (tCO_2e/year)	Estimated Cost / Annual Savings	Comments
Year 0-1 (2022-2023)	Village: Pump House Solar Repair (replace 15Kw Invertor)	17 tonnes	Cost: $0 Savings: $3,360/year	• Simple implementation • No cost solution • Significant GHG emission reduction
	Town: replaces one gas vehicle with an EV	5 tonnes	Cost: $750/yr Savings: $750+/year	• Simple implementation • Low cost • Significant GHG emission reduction
	Town: Investigates landfill emissions	N/A	TBD	• Future climate action would be based on known landfill emissions.
	CUMULATIVE TOTAL:	22 tonnes (.9%) or 9% without landfill	✓	Exceeds Year 1-2 Target of 3% without landfill
Year 2 to 5 (2024 -2027)	Town: Green Power Purchase Agreement	3.5 tonnes	Cost: $4,900 Savings: $0	• Simple implementation • Low cost • Significant GHG emission reduction
	Village LED Streetlight Replacement	2.3 tonnes	Cost: $123,000 Savings: $22,000/year	• Simple implementation • Medium cost • Minor GHG reductions
	Village: Upgrade or Expand Pump House Solar	Variable	Cost: $2.50 to $3.22 per watt Savings: Variable	• Medium complexity • Medium/high cost • Significant GHG reductions
	Village: Upgrade Village Pump House Operations – New Eff. Pumps	Variable	Cost: Variable Savings: Variable	• Medium complexity • Medium cost • Minor GHG reductions
	Town: If needed, Landfill - Methane Biotreatment	457 tonnes	Cost: $50,000 to $150,000 Savings: $0	• Medium implementation • Medium cost • Major GHG reductions
	CUMULATIVE TOTAL:	484+ tonnes (179%) or 1517+% without landfill	✓	• Exceeds Year 5 Target of 10% with and without landfill
Year 6 to 10 (2028-2032)	Town: If needed, Landfill - Methane Biotreatment	610 tonnes	Cost: $25,000 to $50,000 Savings: $0	• No implementation • Medium O&M cost • Major GHG reductions
	CUMULATIVE TOTAL:	638+ tonnes (25%) or 260% without landfill	✓	• Exceeds Year 10 Target of 25% with and without landfill

In conclusion, the Town of North East and Village of Millerton have established a credible base year (2020) GHG inventory of its local government operations. The largest sources of GHG emissions are the Town's closed landfill, followed by its fleet of vehicles and buildings/facilities. The Village's largest source of GHG emissions is its vehicle fleet, followed by its buildings/facilities, employee commute, and streetlights/traffic signals.

Based on input from the Climate Smart Task Force, Board and Citizens, practical climate actions have been identified to meet or exceed the Town and Village's 1, 5 and 10 Year GHG reduction targets. In addition, these climate actions will also help meet the Town and Village's Climate Smart Community certification goals.

1. Introduction

1.1 Background on the Town of North East, New York

The Town of North East was founded in 1788 and is situated in the northeastern corner of Dutchess County, from which it takes its name. It lies along the upper reach of the Harlem Valley and is home to the village of Millerton and several historic hamlets.

The Town of North East hosts Rudd Pond State Park and the Harlem Valley Rail Trail. The town features a rural landscape with rolling hills and beautiful valleys. It sustains a mix of agricultural and residential uses surrounding the vibrant Village of Millerton.

According to the United States Census Bureau, the town has a total area of 43.7 square miles (113.2 km^2), 43.2 square miles (111.8 km^2) of which is land and 0.54 square miles (1.4 km^2), or 1.28%, is water.[2] By the year 2020, the Town's population remained stable growing to 2,941 from 2,918 in 1990.[3]

1.2 Background on the Village of Millerton, New York

Founded in 1851, the Village of Millerton was named after Sidney Miller, a Civil Engineer responsible for the design and construction of the main train line into the area. One of the original three rail lines has been transformed into the Harlem Valley Rail Trail, a 16 mile bike and walking trail, which bisects the village and is part of the Hudson River Valley Greenway.

Surrounded by the Town of North East, the Village of Millerton flourished as a railway destination and agricultural hub in the late 19th and early 20th centuries. As rail lines and agricultural processing declined, Millerton

[2] "Geographic Identifiers: 2010 Demographic Profile Data (G001): North East town, Dutchess County, New York". U.S. Census Bureau, American Factfinder. Archived from the original on February 13, 2020. Retrieved November 12, 2015

[3] The Census Reporter, North East town, Dutchess County, NY, North East town, Dutchess County, NY - Profile data - Census Reporter

built on its rural roots to develop a thriving "foodie" scene coupled with a growing focus on the arts. As of the 2020 census[4], there were 899 people and 396 households residing in the village.

The town and village are accessible via the NY Route 22 and US Route 44 highways and are located within one hour of travel time from the county seat of Poughkeepsie, New York and two hours north of New York City (NYC).

1.3 Background of the Town of North East's and Village of Millerton's Combined Government Operations Climate Action Plan

In 2015, Dutchess County consolidated individual and intermunicipal plans into a county-wide AHMP (All Hazards Mitigation Plan). In 2016, with staff and organizational assistance of the Housatonic Valley Association (HVA) of Cornwall Bridge, Connecticut, the Town of North East and neighboring communities along the Ten Mile River (TMR) formed the Ten Mile River Watershed Roundtable.

In 2018, HVA staff introduced the Town of North East to the NYS DEC Climate Smart Communities certification program. The Town of North East and the Village of Millerton both registered as Climate Smart Communities and intend to proceed together towards Certification. With support from the TMR Roundtable and HVA's assistance with technical climate change data, the Town of North East received a 2018 NYS Consolidated Funding Application (CFA) grant in a round of competitive Climate Smart Communities (CSC) Certification Program funding. The grant funded this Climate Action Plan and GHG emission inventories that provides a 2020 baseline of the Town and Village's government operations along with strategies to achieve notable GHG reductions at 1-, 3- and 10-year intervals.

This document offers recommendations for elected officials, department heads, and town staff members to serve as community leaders in local efforts and practices to protect the Town and village's resilient natural resources and ameliorate the preventable causes of climate change wherever possible.

[4] The Census Reporter, Millerton, NY, Millerton, NY - Profile data - Census Reporter

1.4 Regional Efforts to Address Climate Change

In 2010, Dutchess County published a comprehensive[5] report detailing the climatic conditions and air quality of the County as part of the Natural Resource Inventory. The County reported that the area was already facing impacts of climate change, such as increasing mean annual temperature and a longer frost-free season. The number of days with snow cover has decreased, and winter precipitation is anticipated to become more "slushy." The increase in heavy, dense, wet winter precipitation will increase the occurrence of icy roads and fallen trees and power lines, making winter storms more dangerous for motorists and residents.

The Report also describes the region's propensity for flooding. Each major stream in the County has a number of flood prone areas. Certain climatic phenomena, such as hurricanes, tropical storms, and severe thunderstorms often deliver heavy rainfall that causes flooding in the region. The Report also describes the result of climate change on flooding in the region. There is projected to be an increase in the frequency and intensity of extreme precipitation events, which will lead to more frequent and more severe flooding. Additionally, the level of the Hudson River is projected to rise, which will further exacerbate flooding.

In 2012, NYSERDA released the Mid-Hudson Regional Greenhouse Gas Emissions Inventory[6] for the base year 2010. This report included seven counties from the Mid-Hudson region of the state. Dutchess County emissions were consistent with those of other counties, and Dutchess County was about average in both overall GHG emissions as well as GHG emissions per capita. The largest emissions sector was transportation, followed by residential and commercial energy consumption. The Inventory was essential for understanding the sources of emissions in the region and in each county. Local governments now have a data-driven basis for proposing emissions reductions strategies to reduce the future impacts of climate change, many of which were described in the Dutchess County Natural Resource Inventory.

The Town and Village are continuing to build upon these regional efforts, and its own efforts, to address both the causes of climate change and local impacts resulting from climate change. This report is a key component of that effort and will provide a baseline for continuing emissions reductions.

[5] The Natural Resource Inventory of Dutchess County, NY (November 2010)
http://www.co.dutchess.ny.us/CountyGov/Departments/Planning/16138.htm
[6] Mid-Hudson Regional Greenhouse Gas Emissions Inventory (December 13, 2012)
https://www.dec.ny.gov/docs/administration_pdf/midhudghginventory.pdf

2. Climate Smart Communities Program

Climate Change is one of the defining issues of our time. Global warming is of particular significance. The International Panel on Climate Change (IPCC) estimates a greater than 95 percent probability this warming is a result of human activity since the mid-20th century and proceeding at a rate that is unprecedented over millennia.[7] The authors of the 2021 Assessment report conclude that "it is "unequivocal" that humans have warmed the planet, causing "widespread and rapid" changes to Earth's oceans, ice and land surface."[8] National, regional, and local governments from around the world are addressing this challenge by making commitments and taking actions to reduce their own operational emissions (carbon footprint).

In 2009, New York State established the Climate Smart Communities program as a partnership between state and local governments to reduce greenhouse gas emissions (GHGs) in response to Climate Change. Some of the benefits of this program include saving taxpayer dollars and advancing community goals for health and safety, as well as improving economic vitality, energy independence, and quality of life. This partnership includes six New York State agencies that jointly sponsored the CSC Program, including the New York State Energy Research and Development Authority (NYSERDA), Department of State, Department of Environmental Conservation, Department of Health, Department of Transportation, and the Public Service Commission.

2.1 Purpose and Goals

The purpose of the CSC Certification program is to encourage ongoing implementation of actions related to mitigation of climate change through reduction of greenhouse gas emissions and adaptation to effects of climate change, and to recognize achievements of local governments. The primary goal is to provide a more structured framework and guidance for local governments to advance their local climate action through their existing CSC Pledge and the elements. Participation in CSC and the CSC Certification Program is voluntary.[9]

The CSC certification program is designed to address 10 focus areas, or "pledge elements," including:

1. Pledge to be a Climate Smart Community;

[7] IPCC Fifth Assessment Report, Summary for Policymakers
[8] IPCC's sixth assessment report on climate science, 9 August 2021, Q&A, In-depth Q&A: The IPCC's sixth assessment report on climate science - Carbon Brief
[9] New York State Department of Environmental Conservation, 2014, p 1-6. Climate Smart Communities Certification Manual. Albany, New York. http://www.dec.ny.gov/energy/50845.html.

2. Set Goals, Inventory Emissions, Plan for Climate Action;
3. Decrease Community Energy Use;
4. Increase Community Use of Renewable Energy;
5. Realize Benefits of Recycling & Other Climate-Smart Solid Waste Management;
6. Reduce GHG Emissions Through Climate-Smart Land-Use Tools;
7. Enhance Community Resilience & Prepare for the Effects of Climate Change;
8. Support Development of a Green Innovation Economy;
9. Inform & Inspire the Public;
10. Commit to an Evolving Process of Climate Action.

Once a local government adopts the CSC Pledge and submits a certified copy of the adopting resolution to the Department of Environmental Conservation (DEC), it will automatically become a Registered Climate Smart Community. Each CSC can then implement actions at its own pace. There is no time limit between adoption of the pledge and commencement of the remainder of the certification process.

2.2 The Certification Process

CSC Certification is based on a rating system. This system is designed to:

- be broadly applicable and useful to all local governments in New York State;
- user friendly;
- acknowledge early adopters;
- promote ongoing action; and
- reward leaders.

The rating system includes a variety of actions that can have an effect on reducing GHG emissions, enhancing local resilience, or building a green economy. Each action is assigned a score. Score points are awarded based on the program priority, duration, impact, and certainty the action will take place. The types of actions include:

- GHG Inventory development, assessment, and reporting;
- various plan developments including Climate Action planning;
- new policies, laws, or zoning;
- education and outreach;
- partnership and collaboration;
- operational changes;
- programs, services, and incentives;
- facilities and infrastructure;
- reporting; and
- bonus points for innovation and overall performance.

Certified Climate Smart Communities (CSCs) can also earn bonus points by demonstrating innovation or achieved performance. The more actions implemented, the more points are awarded resulting in award levels and certification.

2.3 Award Levels and Certification

The CSC Certification program is based on two types of actions:

- Priority actions: A group of actions that must be completed for each award level. Applicants must complete the required priority actions for each award level along with a minimum number of additional priority actions for each award level.
- Optional actions: All actions that are not labeled as priority. Applicants may select any optional actions to complete to earn points toward one of the award levels.

In addition to certification, CSCs can achieve several award levels: bronze, silver, and gold. Award levels are based on the total points earned and the completion of selected priority actions. For each of the certification and award levels, the program specifies a minimum number of priority actions that must be completed, as indicated in Table 1, as well as a minimum number of points that must be accumulated by completion of optional actions in addition to the points earned by completion of priority actions.[10]

Table 1. CSC Certification Program Requirements

Award Level	Description	Point Requirement	Minimum Pledge Elements	Mandatory Actions	Minimum Additional[2] Priority Actions	Minimum Performance/ Innovation Points
Registered Climate Smart Community	Local governments are recognized as being registered with the program upon signing the CSC pledge.	N/A	PE1	1.1	N/A	0
Certified Climate Smart Community, Bronze	First level of certification or local governments that have made a commitment and have begun to take action.	120 points	At least 1 action completed under 4 different PEs	PE1 Action: CSC Task Force & PE1 Action: CSC Coordinator	3 priority actions	0 Points

[10] New York State Department of Environmental Conservation, 2014, p I-12, Table 2. Climate Smart Communities Certification Manual. Albany, New York. http://www.dec.ny.gov/energy/50845.html.

Award Level	Description	Point Requirement	Minimum Pledge Elements	Mandatory Actions	Minimum Additional[2] Priority Actions	Minimum Performance/ Innovation Points
Certified Climate Smart Community, Silver	The Second level of certification, for local governments that have implemented a wide variety of climate action actions for government operations and the community.	300 points	At least 1 action completed under 7 different PEs	PE1 Action: CSC Task Force & PE1 Action: CSC Coordinator	6 priority actions	10 Points (10% reduction)
Certified Climate Smart Community, Gold	The highest level of certification, for local governments that have successfully taken action to address all pledge elements and can demonstrate tangible reductions in GHG emissions.	Under Development	Under Development	Under Development	Under Development	Under Development

[2] Additional priority actions include 1.2, 1.4, 2.1, 2.2, 2.3, 2.4, 2.5, 2.6, 3.1, 7.1, and 7.3.

The priority actions are focused largely on relatively low-cost assessments and policies that build baseline knowledge and plan for future action, or that establish local government as a leader in emerging fields. The number of priority actions that must be completed increases with each level of certification. The Town and Village's efforts are summarized in the Local Framework for CSC Certification Efforts Section below.

The Climate Smart Communities (CSC) Grant Program is a competitive 50/50 matching grant program for municipalities to implement projects focused on climate change adaptation and greenhouse gas (GHG) mitigation. Project types also include certain planning and assessment projects that are part of a strategy to achieve Climate Smart Communities Certification. Funding for this Climate Action Plan, including development of separate Town and Village GHG inventories, came from the 2018 grant program. Up to $12 million is available in 2022 for implementation grants of between $50,000 and $2,000,000 for mitigation and adaptation projects.

2.4 Regional CSC Certification Efforts

To date, 360 New York communities have adopted the Climate Smart Communities pledge. Over 46 percent of New Yorkers live in these "pledged" ("registered") communities with 85 achieving Bronze level and 9 earning Silver. In 2018, the Town of North East and the Village of

Millerton each signed a pledge, along with hundreds of other municipalities around New York State, to develop community-wide climate mitigation strategies and improve sustainability.

2.5 Local Framework for CSC Certification Efforts (Status)

In July 2022, the Town was awarded Climate Smart Bronze Certification earning 142 points of the required 120 point threshold. The Town is also a NYSERDA Clean Energy Community. The Village has completed many CSC actions and is poised to submit for Bronze certification in 2022 / 2023 as well as NYSERDA CEC.

A list of actions that have been taken towards Bronze-level Climate Smart Communities can be found at https://climatesmartmillerton.org/wp-content/uploads/2022/04/Town-Bronze-Action-Chart.pdf.

So far 85 communities in NY State have achieved Bronze Certification, including the neighboring communities of Village of Ancramdale, Rhinebeck, Dover Plains, and Town of Red Hook. Support for the process has been provided by advisors at Hudson Valley Regional Council and the grant funded Local Champions Program from Partners for Climate Action Hudson Valley.

2.6 Climate Action Plan Development and Interagency Collaboration

The purpose of a local government climate action plan is to reduce GHG emissions from Town operations by prioritizing actions and to gather support for short- and long-term investments. This includes identifying and implementing climate actions that are practical, cost-effective, and lead to tangible benefits for the local community. These benefits include:

- costs savings via energy efficiency and reduced energy consumptions;
- cost savings via reduced maintenance and storm damage;
- increased tax revenue via improved property values and new green economic developments and jobs;
- increased visibility of the Town of North East and the Village of Millerton with potential businesses via leadership awards; and
- grant and low-interest loan opportunities via various State programs.

Development of this Climate Action Plan for government operations project was commissioned as part of the Town and Village grant-funded and community-sponsored activities to achieve Climate Smart Community Certification. Completion of the plan can add up to 12 additional potential points toward program certification.

The scope of this plan includes establishing a local government operations GHG inventory for each Town and Village. This tool will be used to select a base year, set realistic emissions reduction targets, and track GHG performance moving forward. Once the local government operations GHG inventory has been quantified, GHG emission target/s and related emission reduction actions can be identified, prioritized, and implemented. These targets and actions are broken into short (1-5 years), medium (6-10 years), and long-term (over 10 years) time horizons. This allows the Town and Village to see short-term impacts and benefits while keeping longer term goals in mind.

Several New York State agencies have various programs targeted at reducing GHG emissions from municipal operations. For example, New York State Energy Research and Development Agency (NYSERDA) has a Clean Energy Communities Program. Local governments in New York State can use the Clean Energy Communities program to implement clean energy actions, save energy costs, create jobs, and improve the environment. In addition to providing tools, resources, and technical assistance, the program recognizes and rewards leadership for the completion of clean energy projects.

2.6.1 GHG Inventory Base & Target Years

The Town's government activity data for the calendar year 2020 was collected, reviewed, and entered into a GHG inventory quantification tool. Because this was the most recent full year of complete data collection, 2020 has been selected as the Town and Village's base emission year. The base year emissions serve as the foundation for establishing Business-as-Usual (BAU) and reduction forecasts over the short (2023), medium (2027), and long terms (2032). BAU refers to a scenario where the Town and Village pursues no measures or actions aimed at reducing energy consumption and GHG emissions. For more details on the quantification of the Base Year and determination of the Reduction Target as well as the BAU and reduction forecasts, see Appendix A & B – GHG Inventories for Town and Village.

2.6.2 Government Operations GHG Reduction Goals

Table 2 presents the reduction goals set for the target years. These goals were established in conjunction with the Climate Smart Task Force, stakeholder input, and consideration to New York State's energy plan that aims to achieve a 40 percent reduction in absolute greenhouse gas emissions from 1990 levels by 2030. In addition, Former Governor Cuomo's Clean Energy Standard will require 50 percent of New York State's electricity to be sourced from renewable energy sources by 2030.

Table 2. GHG Emission Reduction Goals

Target	Target Year	Reduction Goal from 2020 Base Year GHG Inventory (%)	Reduction Goal from 2020 Base Year GHG Inventory (tCO_2e)
Year 1	**2023**	**3%**	**77**
Year 5	**2027**	**10%**	**256**
Year 10	**2032**	**25%**	**644**

The reduction goals are presented in percent reduction and in metric tonnes of CO_2 equivalent subtracted from the 2020 base year carbon footprint. Meeting these targets results in additional bonus performance points counting toward Climate Smart Community certification. Because the landfill emissions are such a large part of the GHG inventory, the impact of planned emission reductions will be assessed with and without the landfill emission source. It is also important to note that landfill GHG emissions will reduce naturally over time (approximately 5% a year).

Although planned climate activities are projected to meet the Town and Village's combined GHG reduction targets, the following planned or proposed facilities will increase each jurisdiction's carbon footprint:

- new Town/Village garage,
- new combined town hall,
- new wastewater treatment system, and
- expansion of Village park (Eddie Collins).

For these reasons, it is recommended that the GHG inventories be updated annually, and a new Climate Action Plan be developed every five years.

3. Understanding the Town and Village's Government Operations-Related Carbon Emissions

A GHG emissions inventory identifies an organization's GHG emission sources and quantifies them according to a set of acknowledged conventions using established estimation methodologies.

The Town's air emission inventory quantifies six common GHG. These are the most used recognized GHGs from human-made sources, as identified in the United Nations Framework Convention on Climate Change Kyoto Protocol (UNFCCC). The method used to quantify these emissions is the International Local Government GHG Emissions Analysis Protocol. The base protocol was developed by the GHG Protocol initiative and modified by the International Council for Local Environmental Initiative (ICLEI).

The GHG inventory of local government operations (LGO) identifies the amounts of electricity and fuels used in municipal buildings, streetlights, fleets, and other operations controlled by the local government. The LGO GHG inventory does not include emissions generated by the Town and Village residents and businesses, including power generation facilities, if present. The emissions from these sources are accounted for separately and constitute the Community GHG emissions inventory, which are reported under a different Protocol. While a community wide GHG inventory is a Climate Smart Communities certification action and may be conducted by the Town and Village in the future, it was not included in the scope of this report.

3.1 Government Operations-Related Greenhouse Gas Inventory

Organizational boundaries define the limits of a GHG inventory by identifying the activities that are owned and/or controlled by the Town or Village and determining which emission sources should be included in its GHG inventory.

Operational boundaries in a GHG inventory refer to the specific types of emission sources that are included within the Town GHG inventory's organizational boundaries. A key distinction in setting operational boundaries is whether GHG emissions sources are categorized as direct emissions or indirect emissions.

- Direct emissions (or Scope 1): result from emission sources that are owned or operated by the organization.
- Indirect emissions (or Scope 2 and Scope 3): emissions that are due to an organization's activities but occur from sources owned or controlled by another organization.

- Scope 2 indirect emissions cover consumption of three-party provided electric power, steam, heating, and cooling.
- Scope 3 emissions are all other indirect emissions not covered in Scope 2. Scope 3 emissions are not included in this report.

3.2 Major Sources of Greenhouse Gas (GHG) Emissions in Government Operations

A list of emission sources in the Town and Village GHG inventories are presented in the following tables, organized by Scope and Sector.

3.2.1 Scope 1 - Direct Emissions (Fuel Consumption & Refrigerants)

Table 3A presents Scope 1 sources of GHG emissions for the Town and Table 4B present Scope 1 sources for the village.

Table 3A: Scope 1 Emission Sources for the Town

Scope	Source	Emission Category
Scope 1	Town Hall	Emissions from Stationary Fuel Combustion
Scope 1	Old Garage	Emissions from Stationary Fuel Combustion
Scope 1	2011 John Deere Tractor	Emissions from Off Road Vehicles
Scope 1	2006 Salsco Wood Chipper	Emissions from Off Road Vehicles
Scope 1	2014 Gradall XL3100IV	Emissions from Off Road Vehicles
Scope 1	2018 Volvo Wheel Loader	Emissions from Off Road Vehicles
Scope 1	2018 Bobcat Skid Steer	Emissions from Off Road Vehicles
Scope 1	Transfer Tank ID# N28	Emissions from Off Road Vehicles
Scope 1	2019 CAT 420FS ST Backhoe	Emissions from Off Road Vehicles
Scope 1	2015 Chevrolet 1500 Pickup	Fleet Vehicle Emissions
Scope 1	2012 Ford F-350 Pickup	Fleet Vehicle Emissions
Scope 1	2006 International 7500 Dump Truck	Fleet Vehicle Emissions
Scope 1	2005 International 7600 Dump Truck	Fleet Vehicle Emissions
Scope 1	2016 International 7500 Dump Truck	Fleet Vehicle Emissions
Scope 1	2019 International HV513 Dump Truck	Fleet Vehicle Emissions
Scope 1	1995 International 5000 Dump Truck	Fleet Vehicle Emissions
Scope 1	2015 Ford F-350 Dump Truck	Fleet Vehicle Emissions
Scope 1	Unidentified Diesel Used	Fleet Vehicle Emissions
Scope 1	Unidentified Gasoline Used	Fleet Vehicle Emissions
Scope 1	2017 International 4400 Bucket Truck	Fleet Vehicle Emissions
Scope 1	Town of North East Landfill	Solid Waste Facility Emissions

Table 3B: Scope 1 Emission Sources for the Village

Scope	Source	Emission Category
Scope 1	2009 Case Backhoe	Emissions from Off Road Vehicles
Scope 1	5 Gallon Yellow Ca ID# 20	Emissions from Off Road Vehicles
Scope 1	5 Gallon Red Can ID# 21	Emissions from Off Road Vehicles

Scope	Source	Emission Category
Scope 1	2016 Ford F-550	Fleet Vehicle Emissions
Scope 1	Unidentified Gas Used[11]	Fleet Vehicle Emissions
Scope 1	Unidentified Diesel Used[3]	Fleet Vehicle Emissions
Scope 1	2014 Ford F-150 Pick Up Truck	Fleet Vehicle Emissions
Scope 1	2019 Dodge 5500	Fleet Vehicle Emissions
Scope 1	1995 International 4700	Fleet Vehicle Emissions
Scope 1	Pump Plant	Emissions from Stationary Fuel Combustion

Scope 1 emissions were estimated from activity (usage) data related to the above sources. This included fuel consumption data and use of refrigerants (if applicable). For the Town and Village these include gasoline, diesel fuel, and fuel oil. No material use of refrigerants was found.

3.2.2 Scope 2 - Indirect Emissions (Electricity Use)

Table 4A presents Scope 2 sources of GHG emissions for the Town and Table 4B presents Scope 2 sources for the village.

Table 4A: Scope 2 Emissions Sources for the Town

Scope	Source	Emission Category
Scope 2	Town Hall	Emissions from Grid Electricity
Scope 2	Old Garage	Emissions from Grid Electricity
Scope 2	Salt Shed Area Light	Emissions from Grid Electricity
Scope 2	Unheated Storage Garage	Emissions from Grid Electricity
Scope 2	Town of North East Street Lights	Emissions from Grid Electricity

Table 4B: Scope 2 Emissions Sources for the Village

Scope	Source	Emission Category
Scope 2	Village of Millerton Street Lights	Emissions from Grid Electricity
Scope 2	Pump Plant	Emissions from Grid Electricity
Scope 2	Water Tower	Emissions from Grid Electricity
Scope 2	Village Hall	Emissions from Grid Electricity
Scope 2	Main Street Gazebo Outlet	Emissions from Grid Electricity
Scope 2	Veterans Park Outlet	Emissions from Grid Electricity
Scope 2	Rte 44 & 22 Outlet	Emissions from Grid Electricity
Scope 2	Denny Park (Eddie Collins Park)	Emissions from Grid Electricity

[11] Fuel was pumped from Taylor Oil in small miscellaneous quantities into unspecified vehicles and cans. As of June 2020, tracking is handled via Village fuel depot system..

Scope 2 emissions were estimated from activity (usage) data related to the above sources. This included electricity consumption data such as kWh purchased.

Scope 3 emissions from employee commute were estimated from activity data (miles driven) based on survey information or general assumptions for full and time-time employees.

3.2.3 Source Exceptions

No sources of PFCs, NF3, or SF6 (other standard greenhouse gases) were identified in the Town or Village's inventory boundary.

3.3 Quantification of Government Operations Emissions

One of the first steps in the climate action plan process is establishing a baseline from which to set goals and measure progress. The baseline GHG inventory provides the local government the data needed to prioritize actions that will offer the best return on investment, whether through cost, energy consumption, or GHG emissions savings. A baseline GHG emissions inventory of government operations must include all applicable sources of Scope 1 (direct) emissions such as fuel combustion and Scope 2 (indirect) emissions such as electricity usage. Reporting Scope 3 indirect emissions that are not Scope 2, such as government travel, is encouraged.

A full explanation of the Government Operations GHG inventory quantification is included in Appendix A and B for the Town and Village respectively. This includes details on the methods, assumptions, and quantification results as well as the modeling and forecast of the Business-as-Usual (BAU) emissions scenario used to evaluate the effectiveness of the proposed reduction actions.

3.3.1 Total GHG Emissions

The total GHG emissions for the Town of North East municipal operations is 2,491.85 tCO_2e. The Town's Total GHG emissions by scope (Scope 1, 2 and 3) are presented in the following Table 5A. Based on conservative assumptions, the largest source of municipal related GHG emissions, by a large margin, is the town's closed municipal landfill (2,312.8 Tonnes of CO2e or over 90% of total carbon footprint). Without the landfill, the Town's carbon footprint would be only 245 tCO2e. The Town's Total GHG emissions by scope (Scope 1, 2, and 3) are presented in Table 5B. Table 5C presents the total GHG emissions for the Town and Village for base year

2020. This total will serve as the datum or base for projecting and tracking actual GHG reductions related to specific climate actions.

Table 5A: Total GHG Emissions for the Town by Scope (tCO_2e)

GHG Emissions	tCO_2e
Scope 1 Emissions	2,487.87
Scope 2 Emissions	3.46
Scope 3 Emissions	0.52
Total	**2,491.85**

Table 5B: Total GHG Emissions for the Village by Scope (tCO_2e)

GHG Emissions	tCO_2e
Scope 1 Emissions	44.75
Scope 2 Emissions	16.07
Scope 3 Emissions	9.01
Total	**69.83**

Table 5C: Total GHG Emissions for the Town and Village by Scope (tCO_2e)

Municipality	Total GHG Emissions 2020 tCO_2e
Town of North East	**2,491.85**[12]
Village of Millerton	**69.83**
TOTAL:	**2,561.68**

The Town and Village's total GHG emissions amounted to approximately 2,562 metric tonnes carbon dioxide equivalents (tCO_2e). As a point of reference, 2,562 tCO_2e is approximately equivalent to the GHG emissions produced by an average passenger vehicle driven 6,359,411 miles, according to the US EPA's Greenhouse Gas Equivalencies Calculator.

The breakdown of GHG emissions by sector for the Town with and without the Landfill is presented in the following Figures 1A and 1B, respectively. The largest source of emissions for the Town is its landfill that accounts for approximately 93 percent of the Town's emissions. The second largest source of emissions consist of stationary combustion using fuel oil, and mobile

[12] Without the landfill, the Town's carbon footprint would be only 245 tCO2e.

combustion using diesel fuel by the Town fleet vehicles. The breakdown of GHG emissions by sector for the Village is presented in Figure 1C. The Village's largest source of emissions is its vehicle fleet followed by its buildings and facilities.

Figure 1A: Town Total GHG Emissions by Sector, in Percentage

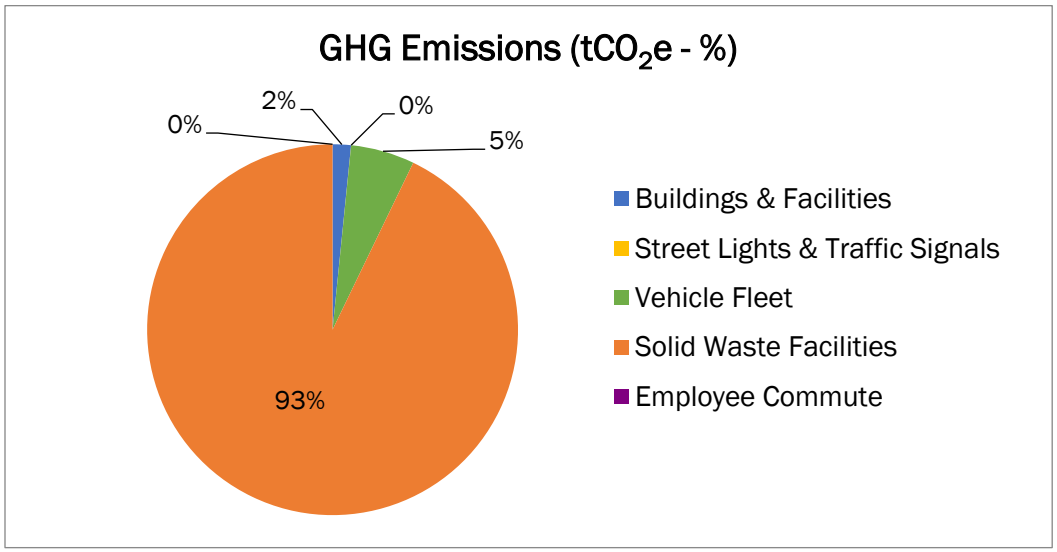


Figure 2B: Town Total GHG Emissions by Sector without Landfill, in Percentage

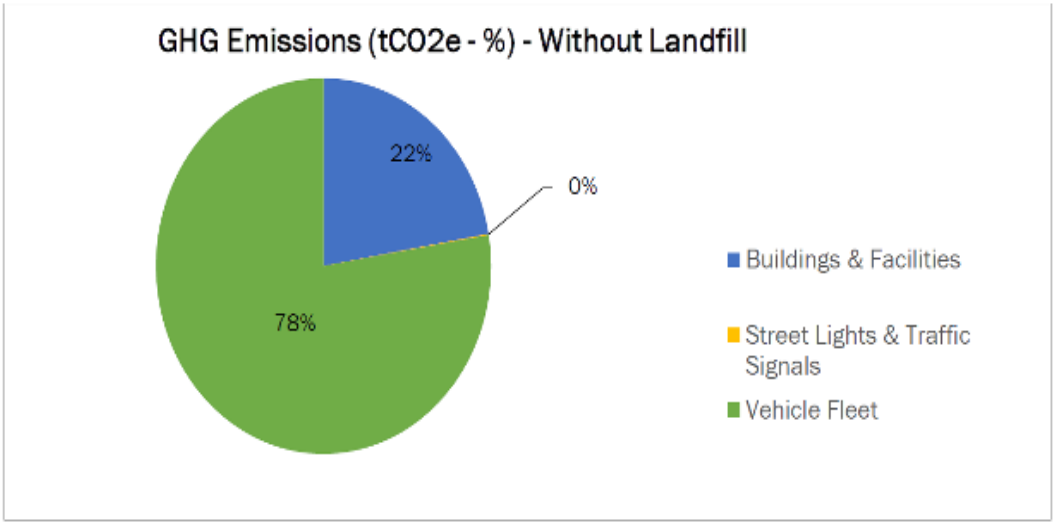
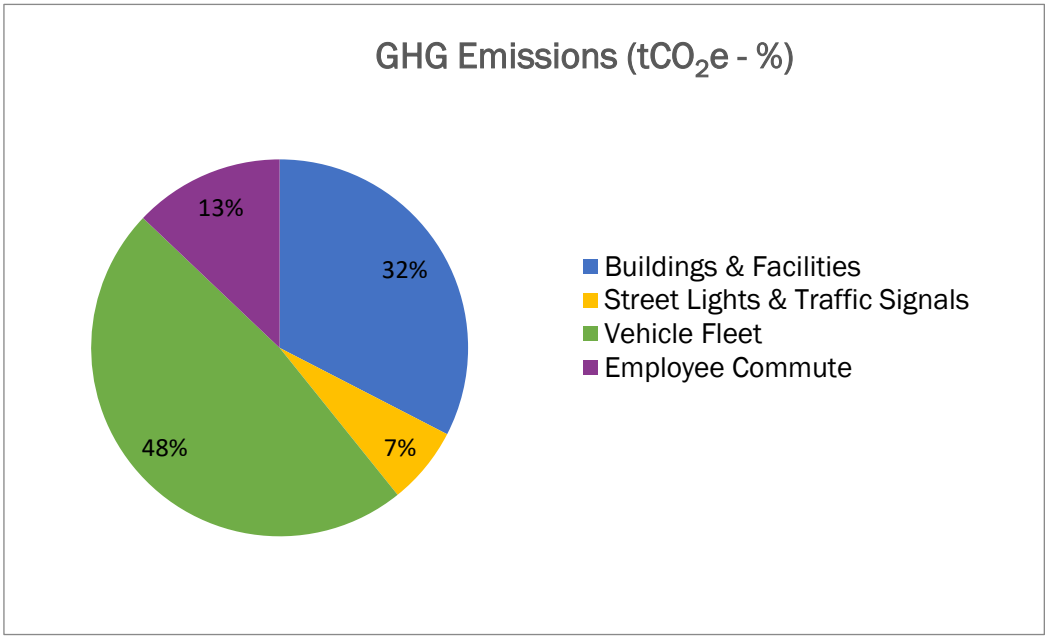


Figure 3C: Village GHG Emissions by Source, in Percentage



A detailed breakdown of the Town of North East and Village of Millerton's Scope 1, 2, and 3 emission sources can be found in Appendices A and B, respectively.

4. Government Emissions Reduction Focus – Reduction Plan

4.1 Practical Considerations

Several factors must be considered when identifying climate actions that make sense for the Town and Village. These include:

- estimated GHG reduction from implementation,
- estimated Cost (initial and ongoing – if available),
- estimated Savings (electricity and fuel),
- timing (short-, medium-, or long-term),
- ability to cost-effectively meet GHG reduction targets ("Bang for the Buck").

4.2 Priority Reduction Actions

Based on potential areas of GHG reduction identified by the Climate Smart Community Task Force, First Environment used available information and engineering assumptions to estimate anticipated GHG emission reductions, costs, and savings for the following priority climate actions:

- Village: Pump House Solar Repair (replace 15Kw Invertor),

- Village: LED Streetlight Replacement,
- Village: Upgrade or Expand Pump House Solar,
- Village: Upgrade Village Pump House Operations – New Efficient Pumps,
- Town: replaces one gas vehicle with an EV,
- Town: Green Power Purchase Agreement,
- Town: Closed Landfill - Methane Biotreatment.

5. Government Operations Climate Action Plan Implementation and Impact

The following government operations-related climate actions were selected based on the practical considerations and priority analysis above. When implemented, these actions may be eligible for CSC points needed for next level award certification.

5.1 Actions to Meet Year 1 Goal of 3 Percent Reductions

The following table summarizes the recommended actions of repairing a broken solar power array at the Village pump house and the replacement of an old gas-powered vehicle with a new Electric Vehicle (EV). It is anticipated that these actions, when implemented, will exceed the Town and Village's Year 1 (2022 - 2023) reduction goal (without landfill) of three percent.

Target Year	Climate Action Reduction Measures	Expected GHG Reductions (tCO_2e/year)	Estimated Cost / Annual Savings	Comments
Year 0-1 (2023)	**Village: Pump House Solar Repair (replace 15Kw Invertor)**	**17 tonnes**	**Cost: $0 Savings: $3,360/year**	• Simple implementation • No cost solution • Significant GHG emission reduction
	Town: replaces one gas vehicle with an EV	**5 tonnes**	**Cost: $750/yr Savings: $750+/year**	• Simple implementation • Low cost • Significant GHG emission reduction
	Town: Investigates landfill emissions	**N/A**	**TBD**	• Future climate action would be based on known landfill emissions.
	CUMULATIVE TOTAL:	**22 tonnes (.9%) or 9% without landfill**	✓	**Exceeds Year 0-1 Target of 3% without landfill**

5.2 Actions to Meet Year 5 Goal of 10 Percent Reductions

The following table summarizes the recommended actions focused on the Town entering into a Power Purchase Agreement (PPA) for clean renewable energy as well as the Village implementing LED streetlight replacement, upgrading or expanding the existing Pump House Solar Electric Array, upgrading Pump House equipment to high-efficiency pumps and implementing landfill biotreatment, if needed. These actions are anticipated to exceed the Town and Village's Year 5 (2026/27) reduction goal of 10 percent.

It was not possible to calculate certain costs and/or savings for projects without initial design specifications. Where possible, engineering assumptions were made, or ranges provided for costs and savings. Where it was not possible, savings and costs are designated as "variable."

Target Year	Climate Action Reduction Measures	Expected GHG Reductions (tCO_2e/year)	Estimated Cost / Annual Savings	Comments
Year 2 to 5 (2027)	Town: Green Power Purchase Agreement	3.5 tonnes	Cost: $4,900 Savings: $0	• Simple implementation • Low cost • Significant GHG emission reduction
	Village: LED Streetlight Replacement	2.3 tonnes	Cost: $123,000 Savings: $22,000/year	• Simple implementation • Medium cost • Minor GHG reductions
	Village: Upgrade or Expand Pump House Solar	Variable	Cost: $2.50 to $3.22 per watt Savings: Variable	• Medium complexity • Medium/high cost • Significant GHG reductions
	Village: Upgrade Village Pump House Operations – New Eff. Pumps	Variable	Cost: Variable Savings: Variable	• Medium complexity • Medium cost • Minor GHG reductions
	Town: If needed, Landfill - Methane Biotreatment	457 tonnes	Cost: $50,000 to $150,000 Savings: $0	• Medium implementation • Medium cost • Major GHG reductions
	CUMULATIVE TOTAL:	484+ tonnes (179%) or 1517+% without landfill	✓	Exceeds Year 5 Target of 10% with and without landfill

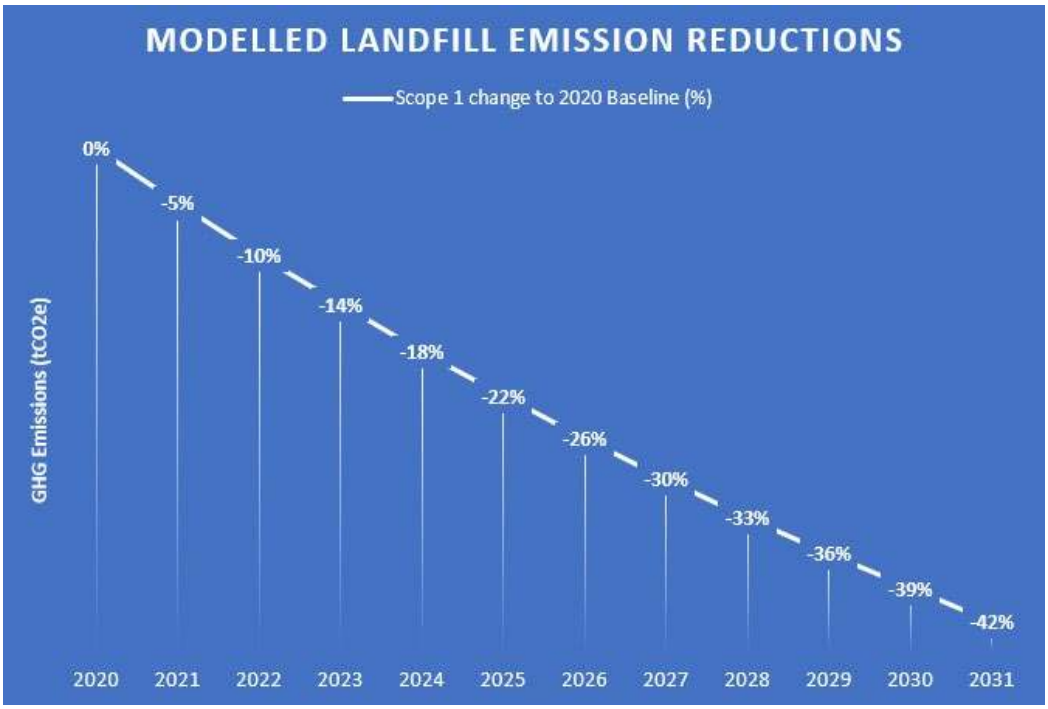
5.3 Actions to Meet Year 10 Goal of 25 Percent Reductions

The following table summarizes the recommended actions focused on maintaining biotreatment of methane from the town's closed landfill. This action is anticipated to exceed the Town and Village's Year 10 (2027/28) reduction goal of 25 percent.

Target Year	Climate Action Reduction Measures	Expected GHG Reductions (tCO_2e/year)	Estimated Cost / Annual Savings	Comments
Year 6 to 10 (2032)	Town: If needed, Landfill - Methane Biotreatment	610 tonnes	Cost: $25,000 to $50,000 Savings: $0	• No implementation • Medium O&M cost • Major GHG reductions
	CUMULATIVE TOTAL:	636+ tonnes (25%) or 260% without landfill	✓	• Exceeds Year 10 Target of 25% with and without landfill

A biofilter consists of a porous material layer as well as an organic material (often compost) layer to oxidize methane in LFG. A flexible tube or similar conveyance connects the gas vent to the biofilter to route the LFG. The biofilter may be enclosed in a container and may have a cover to prevent precipitation from entering the filter. Biofilters are well suited for landfills that have declining gas flow and that have passive vents like the Township's landfill. As bacteria feed on organic material in the landfill, it is converted to primarily Methane gas (a powerful GHG) and released through vents to the atmosphere. Overtime this food source, as well as the resulting methane, is reduced. The following figure 1D shows the projected scope 1 emission reductions for the landfill from the base year 2020 thru 2032.

Figure 4D: Projected Landfill Emission Reduction – Year 2020 Thru 2032



The accompanying picture shows biofilters used at the Jefferson County Landfill in Washington State to reduce the flow of Methane gas. These biofilters were install after the Jefferson Landfill was unable to maintain an active flair.[13]

It is recommended that the Town seek available NYSDEC grants for municipal landfill gas management. The NYSDEC is authorized to provide grants to Municipal Landfill Gas Management projects that promote improved air quality at solid waste landfills, capture greenhouse gases, and encourage energy recovery from landfill gas. The following entities within New York State are eligible to apply for these grants:

- Counties, Cities, Towns or Villages;
- Local Public Authorities;
- Local Public Benefit Corporations (organizations established by State Law);
- School Districts, Supervisory Districts & Improvement Districts;
- Native American Tribes or Nations residing in New York State.

The eligible applicant must own or operate a permitted non-hazardous solid waste landfill in New York State (For more information see https://efc.syr.edu/municipal-landfill-gas-management-program/).

Additional sources to help fund various climate actions are presented in the following section.

5.4 Potential Sources of Funding and Guidance for Government Operations Capital Projects to Reduce GHG Emissions

The following initiatives and State agencies can provide guidance to additional funding sources as well as guidance to project implementation.

- NYSDEC Grants for Municipal Landfill Gas Management Projects (https://efc.syr.edu/municipal-landfill-gas-management-program/).
- Mid-Hudson Streetlight Consortium (http://courtneystrong.com/about-mhsc/).

[13] EPA Landfill Methane Outreach Program (LMOP) Web Site – Apply Biofilters or Biocovers, Apply Biofilters or Biocovers | US EPA.

- New York State Energy Research & Development Authority (NYSERDA): Grants and loans for renewable energy projects (https://www.nyserda.ny.gov/About/Funding).
- New York Department of Environmental Conservation (https://www.dec.ny.gov/pubs/grants.html): Grants for environmental projects, some of which address Climate Change mitigation and adaptation include:
    - purchasing land for the NYS Forest Preserve,
    - restoring habitat,
    - controlling invasive species,
    - upgrading municipal sewage treatment plants,
    - cleaning up waterfront property and creating a public park,
    - helping business develop ways to recycle material,
    - municipal zero-emission vehicle (ZEV) infrastructure grant program.
- New York State Clean Water Revolving Fund: low-interest loans for water shed protection (https://www.efc.ny.gov/cwsrf).
- Home Depot Community Impact Grants Program: (https://corporate.homedepot.com/community/home-depot-foundation-grants).
- New York State Municipal Local Government funding guide database (Funding Guide Database - Environmental Finance Center – Syracuse University).

6. Our Local Governments Could Set an Example in Reducing Carbon Emissions and Addressing Climate Change

Governments in New York State have a history of leading on many issues, such as requiring best practices for design and construction, fair pay for government workers, and non-discrimination policies. Such leadership has both direct and indirect impacts. The direct impacts come from the improvements made to the government operations, and they are important. But they typically pale compared to the indirect impacts, which can be transformational: creating viable examples that the public can see and experience, training local stakeholders and contractors on novel strategies and technologies, and starting to create demand for such expertise. For these reasons, the Town of North East and the Village of Millerton are addressing climate change in their own portfolios.

Town and Village officials have taken the important first steps to adopt the Climate Smart Communities Pledge and register with the Clean Energy Community Program. Many of the CSC actions completed by the Town and Village have identified policies, methods, and practices specific to our community that decrease greenhouse gas emissions and increase resilience. The Joint Comprehensive Plan and the HVA Review of Policies and Procedures both have checklists that prioritize recommended steps toward local sustainability. Additionally, the plans and policies mentioned below offer systems and suggestions for implementation.

The Town earned Climate Smart Bronze status in July 2022. The joint Climate Smart Task Force has also identified actions the Village can undertake and submit to achieve CSC Bronze certification. Many actions have already been completed jointly with the Town and can be submitted with appropriate writeups. Others can follow the framework of approved Town actions once they are adapted to the specific circumstances of the Village. The final category of recommended actions applies only to the Village as the Town does not have those features. In each of those cases, significant work towards completion of the requirements has already been done. It is recommended to submit quickly as the Village has a head start and the benefits of certification include strengthening of grant applications for important and timely projects such as the “game changing” wastewater treatment system.

This section will highlight follow through, initiatives, and actions that elected officials, boards and councils, staff, and the Climate Smart Task Force can implement through this Government Operations Climate Action Plan.

6.1 Stakeholders and Resources

The development of this Govt. Operations Climate Action Plan provides the touchstone of the municipalities' commitments to protecting their natural resources and implementing workplace practices that help reduce GHG emissions and waste and promote recycling and reuse.

The Town and Village each have appointed volunteer boards comprised of talented residents who assist elected leaders with review of land-use development projects, preservation and enjoyment of open space and recreational facilities, and with conservation of town-based natural resources.

Relevant municipal, administrative, and advisory resources include Town and Village Boards, Zoning and Planning Boards, Zoning Review Committees, Emergency Services, Parks / Recreation, Conservation Advisory Council, and the Climate Smart Task Force.

Key Town Staff comprise the Climate Smart Green Team: Town Clerks, Budget Officer, and Highway and Water Superintendents.

Local partner entities include Townscape, North East Community Center, Housatonic Valley Association, Cary Institute, Cornell Cooperative Extension, Dutchess Land Conservancy, and Partners for Climate Action.

It is recommended to engage these substantial resources and the greater networks that of the Conservation Advisory Council and Climate Smart Task Force to consider energy efficiency and environmental impact whenever decisions are made.

6.2 Recommended Actions

Scheduled ongoing monitoring and analysis is the key to achieving the results of these recommendations for GHG reduction. The PE10 Action: GHG Tracking System establishes a system and specifies the tool for annually updating the critical data needed for evaluation. The GHG Calculator being Developed by Climate Action Associates "Small Community GHG Template" is a free tool that will track and convert the data the community wants to monitor. It is

Excel based so staff know how to use it and is compatible with other office procedures for tracking energy that are already in place. Once the planned tool upgrade to include emissions from landfills is available, North East and Millerton are encouraged to implement the tool, complete the PE10 Action, and claim the associated CSC points.

Based on municipal and community interests revealed in the course of this project and from the CSC Survey of 2022, it is recommended that both Town and Village officials consider these CSC actions to further protect natural resources and implement CSC practices:

- Conduct a Climate Vulnerability Assessment (PE7) including establishing official emergency centers for heating and cooling.
- Produce a community Green Vendor Fair (PE8) to educate and empower residents and businesses to improve the resiliency of their own properties and especially in converting to clean energy solutions.
- Conduct a Community GHG Inventory and Climate Action Plan.
- Study options for stretch energy codes.
- Review, finalize, adopt the Master Plan For Bicycling & Walking, 2022.

The following individual plans exist in draft form. It is recommended to include specific opportunities from the sister municipality, then jointly finalize and consider adopting them.

- Town Education and Engagement Plan, 2022;
- Town Complete Streets Plan, 2022;
- Village Pedestrian Plan, 2018.

In addition, the Town and Village have the opportunity to initiate practices that will advance CSC goals. For example:

- Implement recycling in parks and along the main streets in and around the village.
- Assess road salt reduction practices.
- Establish a master calendar of CSC related opportunities as they relate to departmental tasks. For example, a schedule to review prioritized projects identified in this plan and reminders to department heads of procurement policies at appropriate intervals such as the schedule for vehicle replacement.

Importantly, two high impact projects involve complex challenges and would benefit from holistic evaluation of complications and opportunities. They would likely require partnership with county or state government. These include:

- Assessment of the area encompassing the old Town Garage, Kelsey Brook, and Webatuck Creek.
- Improving pedestrian and bicycle access between Eddie Collins Park and the Rail Trail to encourage non-motorized transportation.

Current major projects that deserve special Climate Change attention are the joint NE / Millerton Highway Garage, Parks (especially Eddie Collins and the Rail Trail), the capped landfill, and the potential Wastewater Treatment System.

6.3 Village CSC Actions to Achieve Bronze Certification

At the time of this document's publication (August 2022), the Village of Millerton has made significant progress toward completion of CSC actions to achieve Bronze-level certification. The Village is well positioned and encouraged to earn Bronze Certification within a year.

The following actions have been completed jointly with the Town and are ready for submission:

- PE1 Action: CSC Task Force,
- PE1 Action: CSC Coordinator,
- PE1 Action: National/Regional Climate Program,
- PE1 Action: Partnerships with Other Entities,
- PE3 Action: Energy Code Enforcement Training,
- PE5 Action: Waste Reduction Education Campaign,
- PE6 Action: Comp Plan with Sustainability Elements,
- PE7 Action: Evaluate Policies for Climate Resilience,
- PE7 Action: Culverts & Dams,
- PE9 Action: Climate-related Public Events,
- PE9 Action: Local Climate Action Website,
- PE9 Action: Social Media.

The following actions can be completed if specific Village components are added to the existing Town actions:

- PE6 Action: Complete Streets Policy,
- PE6 Action: Planning for Biking & Walking,
- PE9 Action: Climate Change Education & Engagement.

The following actions can follow existing Town models and policies:

- PE3 Action: Benchmarking - Municipal Buildings,
- PE3 Action: Fleet Inventory,
- PE3 Action: Environmentally Preferable Purchasing Policy,
- PE5 Action: Recycling Bins in Government Buildings,
- PE6 Action: Unified Solar Permit,
- PE10 Action: GHG Tracking System.

The final category of recommended actions applies only to the Village as the Town does not have those features. In each case, significant work towards completion of the requirements has already been done.

- PE3 Action: LED Street Lights,
- PE4 Action: Solar Energy Installation (e.g., future wastewater treatment site),
- PE6 Action: Infrastructure for Biking & Walking,
- PE6 Action: Alternative-fuel Infrastructure,
- PE6 Action: Traffic Calming,
- PE8 Action: Farmers' Markets,
- PE8 Action: Brownfield Clean-up & Redevelopment.

6.4 Communication and Engagement Strategy

The Town of North East has established a Climate Change Education and Engagement Program for the purpose of educating the public about Climate Change Mitigation and Adaptation. Referencing the Town of North East and Village of Millerton Comprehensive Plan, the Climate Smart Task Force has created an Education and Engagement Strategy document to implement a program that seeks to inform and inspire the public to reduce greenhouse gas emissions and to join with the local government in taking steps to reduce harm and increase adaptation to the effects of Climate Change. Partnership with local government, groups, and educational resources will be integral to the program's success.

Communication and engagement strategies include:

- Listening to the public to understand their concerns and needs.
- Engaging the Local Government.
- Collaborating with local groups about Climate Change, Resilience and Mitigation.
- Identifying high-risk populations and opening dialogs.
- Maintaining active and relevant public communication & information.
- Producing public events to inspire and inform.
- Ensuring that the program is ongoing.

The robust ClimateSmartMillerton website, produced by the CS Task Force, is the communities' main hub for Climate Change information. The Greenhouse Gas Inventory page chronicles the goals, results, and recommendations of this project. The full Town and Village Inventories with Forecasts and the joint Climate Action Plan are also posted there.
https://climatesmartmillerton.org/government/#GHGInventory

6.5 Beyond 10 Years: North East and Millerton Could Achieve Carbon Neutrality by 2050

The International Panel on Climate Change, the scientific body behind the Paris Climate Accords, has determined that stabilizing the world's climate requires the developed world to achieve carbon neutrality by 2050. For municipalities in New York State, this is not as difficult as it may sound because New York State has committed to a 100% carbon neutral electrical grid by 2040 (https://www1.nyc.gov/site/sustainability/our-programs/climate-leadership-and-community-protection-act.page). This means that if the village and the town stopped burning fossil fuel and were fully electric, they could achieve carbon neutrality 10 years early, in 2040.

We recommend that the Town and Village adopt policies requiring efficient electrification to be considered for each new purchase of energy-using equipment, including vehicles, landscaping equipment, and space heating and hot water systems in buildings. If the municipality is

considering the purchase of a fuel-based alternative, it should do an analysis to determine the cost of the electric vs. fuel-based system over the useful life of the equipment, including any anticipated savings from maintenance. Also, the municipalities should purchase the most efficient model that makes financial sense over the lifespan of the equipment, since even in a carbon neutral world saving energy will be a prudent strategy, both fiscally and in terms of resilience. Finally, in the out-years -- past 2030 or 2035 -- to address any remaining combustion that is not practical to electrify, the municipalities should consider alternative low-carbon or carbon neutral fuels.

7. Conclusion

This Government Operations Climate Action Plan is the product of a partnership between the Town of North East, Village of Millerton, and the NYS DEC Climate Smart Communities. The Town and Village have established a credible base year (2020) GHG inventory for its local government operations. The largest sources of GHG emissions is the Town's closed landfill, followed by its fleet of vehicles, and buildings/facilities. The Village's largest source of GHG emissions is its vehicle fleet, followed by its buildings/facilities, employee commute, and street lights/traffic signals.

Based on input from the Climate Smart Task Force, Board and Citizens, practical climate actions have been identified to meet the Town and Village's 1, 5 and 10 Year GHG reduction targets. These Climate Actions include the following:

- Village: Pump House Solar Repair (replace 15Kw Invertor),
- Town: replaces one gas vehicle with an Electric Vehicle,
- Town: Green Power Purchase Agreement,
- Village LED Streetlight Replacement,
- Village: Upgrade or Expand Pump House Solar,
- Village: Upgrade Village Pump House Operations – New High Efficiency Pumps,
- Town: Closed Landfill Methane Biotreatment.

In addition, these climate actions will also help meet the Town and Village's Climate Smart Community certification goals.

Appendix A – Town of North East Greenhouse Gas Emissions Inventory and 10 Years Forecast for the Government Operations Activities – Base Year 2020

Greenhouse Gas Emissions Inventory for the Government Operations Activities Year 2020
Town of North East, New York

April 2022

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TABLE OF CONTENTS

TABLES

FIGURES

List of Acronyms

AR5 - Intergovernmental Panel on Climate Change's Fifth Assessment Report
CAGR – Compound Annual Growth Rate
CH_4 - methane
CO_2 – carbon dioxide
CO_2e - Carbon Dioxide Equivalents
CSC – New York State Climate Smart Communities
EF – GHG Emission Factor
eGRID – US EPA Emissions & Generation Resource Integrated Database
EPA – Environmental Protection Agency
GHG – greenhouse gas
GWP – global warming potential
HFC - hydrofluorocarbon
IMP – Inventory Management Plan
IPCC - Intergovernmental Panel on Climate Change
LPG – liquid petroleum gas (propane)
t – metric tonnes
MSW – municipal solid waste
MWh – Mega Watt hour
N_2O – Nitrous Oxide
NYS – New York State
NYSEG - New York State Electric and Gas Corporation
NYSERDA – New York State Energy Research and Development Authority
PE – Pledge Element
PFC - perfluorocarbon
SF_6 – sulfur hexafluoride
US EPA - United States Environmental Protection Agency
UNFCCC – United Nations Framework Convention on Climate Change

Executive Summary

First Environment, Inc. (First Environment) was retained by the Town of North East, New York (the "Town") to prepare a greenhouse gas (GHG) emissions inventory for the government operations activities of year 2020. The GHG inventory was prepared in accordance with the Local Governments for Sustainability (ICLEI)'s Local Government Operations Protocol (LGOP). ICLEI's ClearPath Pro web-based tool provided the platform for data collection, processing, and GHG quantification and reporting.

The GHG inventory assessed emissions of seven greenhouse gases (GHGs):

- carbon dioxide (CO_2),
- methane (CH_4),
- nitrous oxide (N_2O),
- hydrofluorocarbons (HFCs),
- perfluorocarbons (PFCs),
- sulfur hexafluoride (SF_6), and
- Nitrogen tri-fluoride (NF_3).

Conducting the GHG inventory demonstrates the Town's recognition of its relationship to both the local and global environment. It allows the Town to better understand and take responsibility for its activities and their climate impacts. Accordingly, the inventory provides a foundation and starting point for the Town's efforts to reduce greenhouse gas emissions from its activities and demonstrate environmental stewardship. The inventory serves as a reference point to guide the development of policies, programs, and projects as the Town pursues its environmental objectives.

The scope of the inventory included all emissions sources under the Town's operational control. This consisted of the Town's Scope 1 "direct" emissions from stationary combustion, mobile combustion, and emissions from the Town's solid waste landfill, as well as Scope 2 "indirect" emissions from the purchase of electricity. The inventory did not quantify the optional Town Scope 3 emissions except for the required employee commute.

Emissions in the GHG Inventory are reported in Carbon Dioxide Equivalents (CO_2e). CO_2e is used to quantify total emissions because each GHG has a different Global Warming Potential (GWP). Using CO_2e equalizes all GHGs to one standard reference of metric tons of carbon dioxide equivalent. Unless otherwise noted in this report, GHG emissions were converted to CO_2e using Global Warming Potentials (GWPs), a standard conversion factor, from the Intergovernmental Panel on Climate Change's (IPCC) Fifth Assessment Report (AR5).

TABLE 1: Summary of GHG Inventory

Reporting Protocol	Local Governments for Sustainability (ICLEI)'s Local Government Operations Protocol, v1.1, May 2010
Reporting Tool	ICLEI ClearPath – Government Track - https://clearpath.icleiusa.org
Geographic Boundary	Town of North East Municipal Boundary
Organizational Boundary	Operational Control
Operational Boundary	Scope 1, Scope 2, Scope 3 Employee Commute
Inventory Reporting Period	January 1 to December 31, 2020
Base Year	2020

GWP Defaults	IPCC 5th Assessment Report (AR5)

The Town's total Scope 1 GHG emissions for 2020 amounted to 2,487.87 metric tonnes carbon dioxide equivalents (tCO_2e). These total emissions consist of stationary combustion such as fuel oil, mobile combustion, such as diesel consumption by the Town fleet vehicles, and landfill emissions. The landfill accounts for approximately 93 percent of these emissions. As a point of reference, the remaining 175.09 t CO_2e is approximately equivalent to the GHG emissions produced by an average passenger vehicle driven 440,000 miles, according to the US EPA's Greenhouse Gas Equivalencies Calculator.

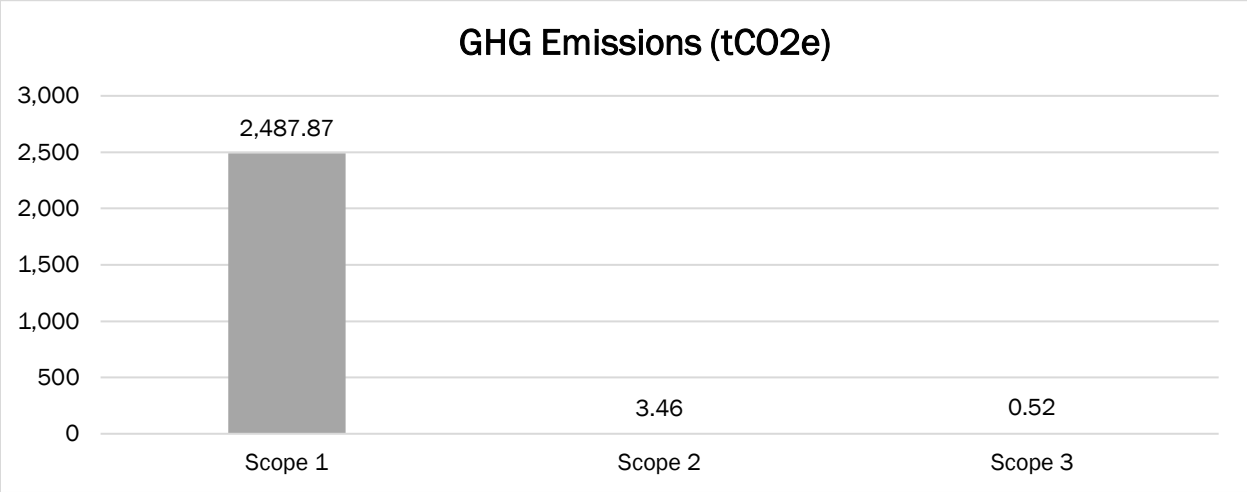
The Town's total Scope 2 GHG emissions for 2020 amounted to 3.46 metric tons carbon dioxide equivalents (t CO_2e). These emissions are associated with electricity usage by the Town and are roughly equivalent to half of the GHG produced from electricity use by a single home for one year.

The Town's Scope 3 GHG emissions for employee commute for 2020 amounted to 0.52 metric tons carbon dioxide equivalents (t CO_2e).

TABLE 2: Total GHG Emissions by Scope (tCO_2e)

GHG Emissions	tCO_2e
Scope 1 Emissions	2,487.87
Scope 2 Emissions	3.46
Scope 3 Emissions	0.52
Total	**2,491.85**

FIGURE 1: Total GHG Emissions by Scope (tCO_2e)



The distribution of emissions by sector is shown in percentage and in tCO_2e in the charts below.

FIGURE 2: Total GHG Emissions by Sector in Percentage

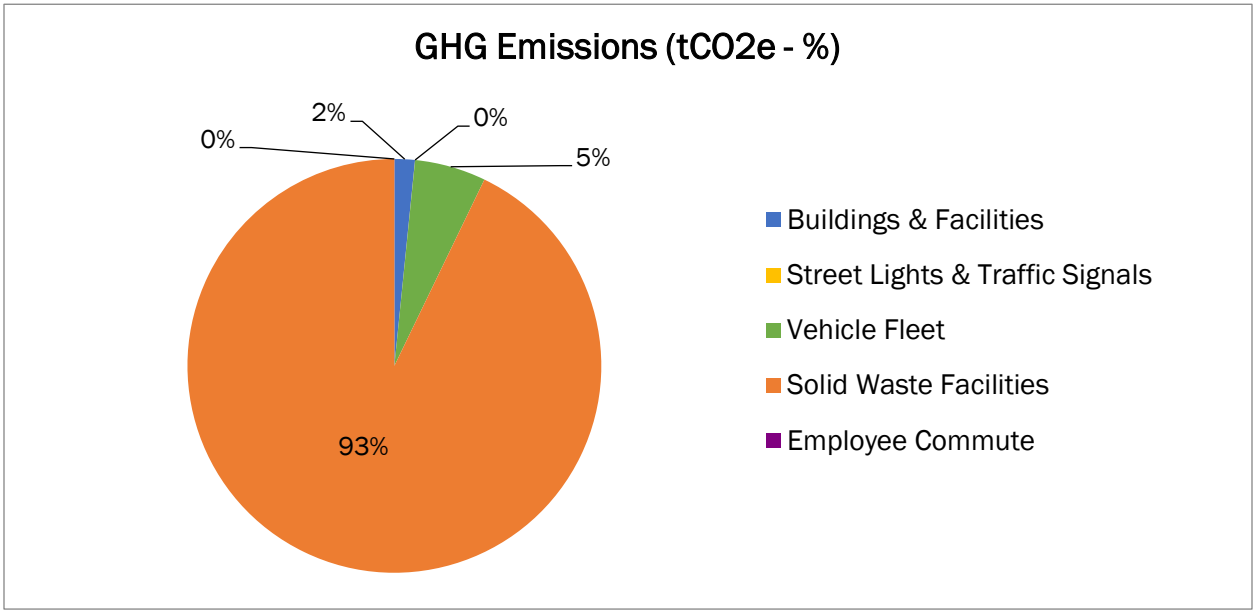
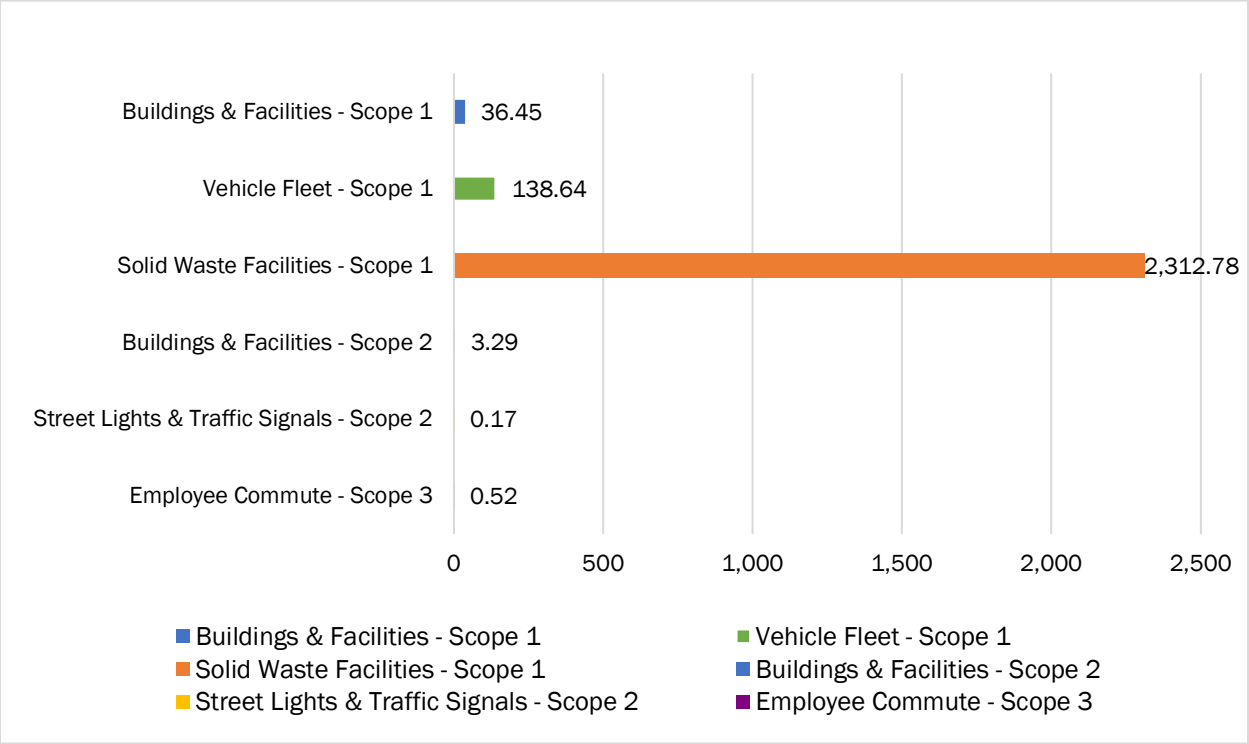


FIGURE 3: Total GHG Emissions by Sector (tCO_2e)



The results highlight the predominance of the solid waste landfill as the major source of GHG emissions. The remaining Scope 1 emissions (mobile fuel combustion) from the vehicle fleet and (stationary fuel combustion) from buildings and facilities rank as the next two largest sources. Electricity consumption by buildings and facilities rank fourth, followed by a small amount of electricity consumption by streetlights. Emissions from employee commute makes up the smallest amount of emissions.

1. Introduction

A GHG emissions inventory identifies an organization's GHG emission sources and quantifies them according to a set of acknowledged conventions using established estimation methodologies.

The Town of North East air emission inventory quantifies GHG from the "Kyoto six" GHGs—carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6) plus the additional nitrogen tri-fluoride (NF_3), recently included to the reportable GHGs. These are the most recognized and common GHGs from human-made sources, as identified in the United Nations Framework Convention on Climate Change Kyoto Protocol (UNFCCC).

The GHG inventory of local government operations (LGO) identifies the amounts of electricity and fuels used in municipal buildings, streetlights, fleets, and other operations controlled by the local government. A major source of Town GHG emissions comes from a closed municipal landfill that operated from approximately 1965 to 1999. Installed venting ports indicate that natural gas continues to be generated from the degradation of municipal waste. There is currently no collection system of generated natural gas (primarily Methane). Water treatment is not currently conducted within the town boundary, so GHG emissions from water treatment is not included.

The LGO inventory does not include GHG emissions generated by the Town residents and businesses, including those produced by power generation facilities, if present. The emissions from these sources are accounted for separately and constitute the Community GHG emissions inventory, which are reported under a different Protocol (U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions). The Town of North East Community GHG Inventory is not included in the scope of this report. The Village of Millerton, which the Town surrounds, is also not included in the scope this report. The Village will be issuing their own GHG inventory report. Both municipalities will be issuing a joint Climate Action Plan (CAP).

2. Overview of the Town of North East

The Town of North East is located in Dutchess County, New York, approximately 100 miles north of New York City and about 65 miles south of Albany. The Town of North East surrounds the Village of Millerton which shares certain municipal functions. Both the Town and Village participate in New York State's Climate Smart Communities program and will be issuing a joint Climate Action Plan. However, the Town and Village will be issuing separate GHG inventories for their respective government operations.

According to the United States Census Bureau[1], the town has a total area of 43.1 square miles, with a population of 2,971 as of the 2020 census. It is bordered by the Town of Ancram to the north, State of Connecticut to the east, Town of Amenia to the south, and the Towns of Pine Plains and Stanford to the west.

The Town was founded on March 7, 1788. The Town operations consist of the Town administration and the Highway Department. The Town government staff is composed of 14 employees.

The Town building and facilities are listed in the following table. All the buildings and facilities listed are owned and operated by the Town. The utilities include electricity and fuel oil.

TABLE 3: Buildings and Facilities with the Town Operations

Building / Facility	Daily Occupancy	Daily Operating Hours	Building Square Footage
Town Hall	8	8	4,125
Salt Shed	N/A	N/A	N/A
Unheated Storage Garage	N/A	N/A	5,128
Old Garage	3	8	4,557

In addition to the buildings and facilities listed above, the Town operations also include one street lighting district.

The Town operates a fleet of vehicles consisting primarily of pickups, heavy trucks, and equipment for the highway department. The fleet uses both diesel and gasoline fuel.

The Town operated a municipal landfill from approximately 1965 to 1999.

The Town does not currently operate waste disposal facilities or wastewater treatment facilities. The Town does not currently operate any public transportation vehicles, police, fire department, or waste hauling vehicles.

2.1 Staff Responsible for the GHG Inventory

In 2018, the Town of North East and the Village of Millerton each signed a pledge, along with hundreds of other municipalities around New York State, to develop community-wide climate mitigation strategies and improve sustainability. A Climate Smart Task Force was assembled and is initiating projects that will build environmental and economic resiliency: Chris Kennan,

[1] https://data.census.gov/cedsci/all?q=north%20east%20ny

Town of North East Supervisor; Griffen Cooper, Town of North East Councilman; Matthew Hartzog, Village of Millerton Trustee; Laurie Kerr, Village of Millerton Trustee; Kathy Chow, Task Force Coordinator; Jennifer Dowley, Rhiannon Leo-Jameson, Deborah Maier, Claire Owens, Tom Parrett, Eliot Ramos, Rich Stalzer, Andrew Stayman, Chris Virtuoso and Carrissa Whitehead. This GHG inventory was developed by First Environment through consultation with the Town staff including Christopher Kennan, Town Supervisor and members of the Town and Village Climate Smart Task Force.

2.2 GHG Inventory Reporting Protocol

The Town of North East Government Operations GHG inventory was conducted in accordance with the ICLEI's Local Government Operations Protocol (LGOP), Version 1.1, May 2010. The LGOP was developed through a partnership among the California Air Resources Board (ARB), California Climate Action Registry (CCAR), The Climate Registry, and ICLEI. The LGOP is based on the "Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard" developed by the World Business Council for Sustainable Development and the World Resources Institute (WRI/WBCSD), which provides the standards and guidance for companies and other types of organizations preparing a GHG emissions inventory. The goal was to offer additional guidance to local governments on applying the Greenhouse Gas Protocol within the context of local government operations. The LGOP provides a standardized method and procedures to assist local governments in quantifying and reporting GHG emissions associated with their operations.

2.3 GHG Inventory Reporting Tool

The GHG inventory was prepared using ICLEI's ClearPath Tool, an online platform designed to incorporate all the LGOP requirements for inventory data, including all parameters, factors, and methodologies necessary to perform the GHG emissions quantification. ClearPath suite of tools also includes modules allowing forecasting of emissions scenarios, as well as planning and monitoring of measures aimed at reducing GHG emission over time.

2.4 GHG Inventory Reporting Period – Base Year

This GHG inventory report covers GHG emissions from the Town operations within the boundaries described below during the period of:

- January 1 through December 31, 2020.

This first GHG Inventory provides a full calendar year baseline of data about the energy consumption and resulting GHG emissions from the Town municipal operations. The baseline will be used to establish emissions reductions targets and track progress towards achieving them. Although 2020 was during the Covid pandemic, a review of past years of activity data (energy and fuel consumption) shows little difference. The year 2020 was selected has being representative prior to the implementation of identified climate actions.

2.5 GHG Inventory Boundaries

2.5.1 Geographic Boundary

The geographic scope of the emissions report determines which emissions are accounted for and reported by the Town. The Town operations are conducted within the Town municipal boundary; the Town does not control or operate any facility outside such geographic boundary.

2.5.2 Organizational Boundaries

Organizational boundaries define the limits of a GHG inventory by identifying the activities that are owned and/or controlled by the entity and determining which emission sources should be included in its GHG inventory. As recommended by the LGOP, the GHG emissions contained in this report were consolidated according to the Operational Control approach. The operational control is established for facilities, activities, and sources over which the Town possesses the authority to implement operating policies such as financial, environmental, health, or safety directives. A description of the facilities and sources included in the Town's Operational Control boundary is provided in the following paragraph, further detailed according to the Operational Boundary described in the next paragraph.

2.5.3 Operational Boundaries

Operational boundaries in GHG inventory identifies the specific types of emission sources that the Town, as defined by the inventory's organizational boundaries, includes in its GHG Inventory. A key distinction in setting operational boundaries is whether GHG emissions sources are categorized as direct emissions or indirect emissions.

- Direct emissions (Scope 1): result from emission sources that are owned or operated by the organization.
- Indirect emissions (Scope 2, Scope 3): emissions that are due to an organization's activities but occur from sources owned or controlled by another organization.

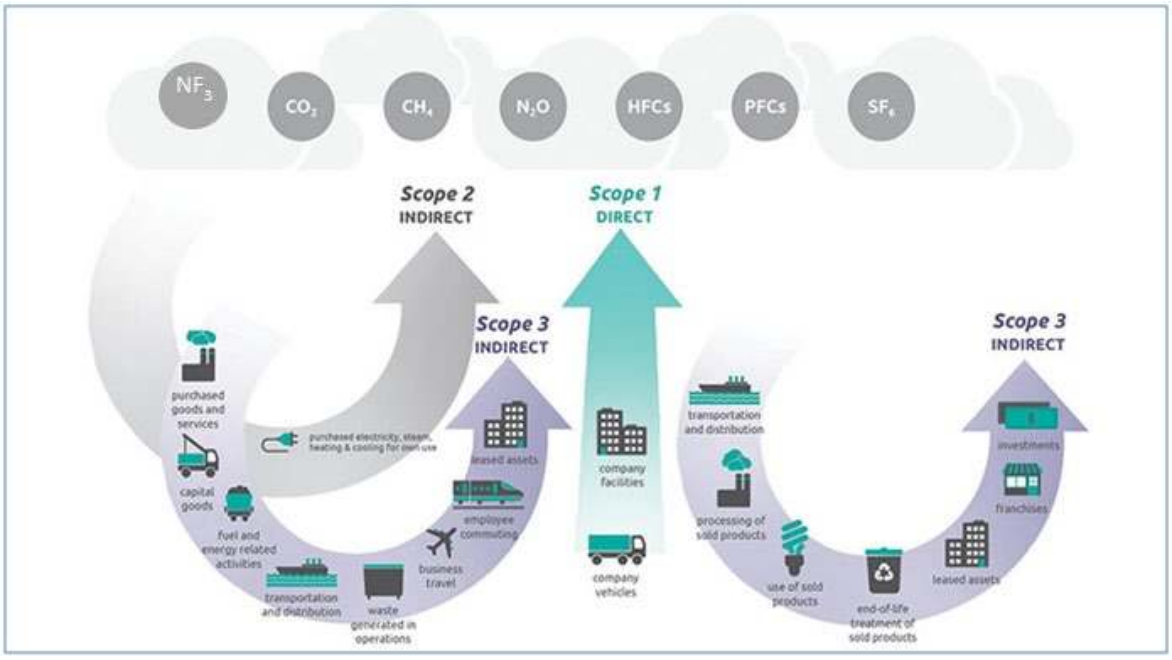
The concept of emission "scopes" expands upon the distinction between direct and indirect emissions, splitting indirect emissions into two separate categories: Scope 2, associated with indirect energy emissions, such as those due to electricity purchased from a utility; Scope 3, capturing all other types of indirect emissions, such as employee commuting, disposal of waste generated, etc. Due to the complexity of determining them, optional Scope 3 emissions are not included in this GHG inventory except as required for employee commute.[2]

In addition, categories of common sources, such as stationary combustion, mobile combustions, solid waste facility emissions, etc. create a framework for the organization of the inventory. This framework facilitates the identification of appropriate quantification methodologies for emission sources, collection of data, and reporting of inventory results.

The following diagram provides a summary of the scopes and categories of emissions across the value chain of a reporting entity, as defined in the WRI GHG Protocol.

[2] Scope 3 emissions related to local government employee commuting is required information under the LGOP v1.1 (2010).

FIGURE 4: Overview of GHG Protocol Scopes and Emissions Across the Value Chain



Source: GHG Protocol - Scope 3 Corporate Value Chain Accounting Reporting Standard_041613 (WRI, WBCSD)

The general operational boundaries of the Town GHG inventory are as follows:

Scope 1: Direct GHG emissions from activities that are owned or controlled by the reporting entity.

The Town Scope 1 GHG emission categories include the following:

- stationary combustion,
- mobile combustion,
- solid waste landfill emissions.

Scope 2: Indirect GHG emissions from the generation of purchased or acquired energy, such as electricity, which is consumed by the reporting entity.

The Town Scope 2 GHG emission categories include the following:

- purchased electricity.

Scope 3: All other indirect emissions not covered in Scope 2. Not included in this report except as required for employee commute.

The complete list of emission sources in the Town GHG inventory are listed in the following tables, organized by Scope and Sector.

2.6 Scope 1 - Direct Emissions

The following sources were identified as Scope 1 sources of GHG emissions:

TABLE 4: Scope 1 Emissions Sources

Scope	Source	Emission Category
Scope 1	Town Hall	Emissions from Stationary Fuel Combustion
Scope 1	Old Garage	Emissions from Stationary Fuel Combustion
Scope 1	2011 John Deere Tractor	Emissions from Off Road Vehicles
Scope 1	2006 Salsco Wood Chipper	Emissions from Off Road Vehicles
Scope 1	2014 Gradall XL3100IV	Emissions from Off Road Vehicles
Scope 1	2018 Volvo Wheel Loader	Emissions from Off Road Vehicles
Scope 1	2018 Bobcat Skid Steer	Emissions from Off Road Vehicles
Scope 1	Transfer Tank ID# N28	Emissions from Off Road Vehicles
Scope 1	2019 CAT 420FS ST Backhoe	Emissions from Off Road Vehicles
Scope 1	2015 Chevrolet 1500 Pickup	Fleet Vehicle Emissions
Scope 1	2012 Ford F-350 Pickup	Fleet Vehicle Emissions
Scope 1	2006 International 7500 Dump Truck	Fleet Vehicle Emissions
Scope 1	2005 International 7600 Dump Truck	Fleet Vehicle Emissions
Scope 1	2016 International 7500 Dump Truck	Fleet Vehicle Emissions
Scope 1	2019 International HV513 Dump Truck	Fleet Vehicle Emissions
Scope 1	1995 International 5000 Dump Truck	Fleet Vehicle Emissions
Scope 1	2015 Ford F-350 Dump Truck	Fleet Vehicle Emissions
Scope 1	Unidentified Diesel Used	Fleet Vehicle Emissions
Scope 1	Unidentified Gasoline Used	Fleet Vehicle Emissions
Scope 1	2017 International 4400 Bucket Truck	Fleet Vehicle Emissions
Scope 1	Town of North East Landfill	Solid Waste Facility Emissions

2.7 Scope 2 - Energy Indirect Emissions

The following sources were identified as Scope 2 sources of GHG emissions.

TABLE 5: Scope 2 Emissions Sources

Scope	Source	Emission Category
Scope 2	Town Hall	Emissions from Grid Electricity
Scope 2	Old Garage	Emissions from Grid Electricity
Scope 2	Salt Shed Area Light	Emissions from Grid Electricity
Scope 2	Unheated Storage Garage	Emissions from Grid Electricity
Scope 2	Town of North East Street Lights	Emissions from Grid Electricity

2.8 Source Exceptions

No sources of HFCs, PFCs, NF_3 or SF_6 were identified in the Town inventory boundary.

2.9 Inventory Data Collection Methodologies

Two primary methodologies were utilized to collect data.

- Data was provided by the Town staff.
- In some cases when data were not available for a particular source, individuals with knowledge of the activities provided an estimate.

The collection methodology for each source is summarized below.

2.10 Scope 1 Emissions

2.10.1 Stationary Combustion

The Town provided an inventory of the building and facilities owned and or operated by the Town. Each building in the inventory was designated as being under the Town control. Therefore, the related fuel and electricity consumption are included in the inventory.

2.10.1.1 Fuel Oil

The Town staff provided the total No. 2 Fuel Oil consumption for heating in the Town buildings for year 2020 compiled from vendor's invoices, quantified in gallons of fuel. Total fuel oil usage in Town-controlled buildings was calculated and the appropriate emissions quantification methodology from the LGOP was applied to this value.

2.10.2 Mobile Combustion

The Town provided the updated fleet inventory of the vehicles owned and operated by the Town. The fleet includes both on-road and off-road vehicles such as backhoes, wood chipper, dump trucks, etc. The fleet inventory also included data on the vehicle age.

2.10.2.1 Gasoline

The Town staff provided a summary of 2020 gasoline usage in gallons attributable to Town's owned and operated vehicles. The appropriate GHG emissions quantification methodology was then applied.

2.10.2.2 Diesel

The Town staff provided a summary of 2020 diesel usage in gallons attributable to Town's owned and operated vehicles. The appropriate GHG emissions quantification methodology was then applied.

2.10.3 Solid Waste Facility Emissions

Methane emission measurements were not available for the Town of North East Landfill. In lieu of measurements, in accordance with NYSERDA guidance, the first order decay model developed by the US EPA, called LandGEM, was used to estimate emissions.

2.10.3.1 Landfill

The LandGEM model required a minimum of three inputs including open date, closure date, and waste acceptance for each year of operation. The Town staff provided detail regarding the landfill operating period. To estimate waste acceptance rates, a New York-specific municipal solid waste generation rate of 5.15 pounds per person per day was taken from NYSDEC's study *Beyond Waste: A Sustainable Material Management Strategy*. It was applied to historical population data from the US Census. The LandGEM model generated methane emissions.

2.11 Scope 2 Emissions

2.11.1 Purchased Electricity

The Town staff provided all the utility invoices for year 2020 electricity consumption by Town buildings and district street lighting. The total electricity consumption was calculated by aggregating the invoices for each electrical service account, prorated as required for the months of January and December. The appropriate GHG emissions quantification methodology was applied to the annual totals for each account.

2.12 Scope 3 Emissions

Employee commute was the only Scope 3 emissions source included.

2.12.1 Employee Commute

The Town staff provided weekly milage for each employee. The appropriate GHG emissions quantification methodology was applied.

3. Emissions Quantification Methodologies

GHG emissions are calculated by applying the appropriate methodologies from:

- ICLEI's Local Government Operations Protocol (LGOP), Version 1.1, May 2010.

In addition, GHG emissions are calculated using emission factors (EF) sourced from:

- US EPA Center for Corporate Climate Leadership - Emission Factors for Greenhouse Gas Inventories – March 9, 2018.
- NYSERDA - Department of Energy and Environmental Analysis – Statewide Electricity Emission Factor - 2014.
- US EPA Emissions & Generation Resource Integrated Database - eGRID2020.
- Fifth Assessment Report of the Intergovernmental Panel on Climate Change - IPCC AR5.

The GHG emissions quantification was performed by ICLEI's ClearPath Pro Tool, which includes the algorithms calculating the emission according to LGOP methods.

The quantification methodology for each source is summarized in the following paragraphs.

3.1 Scope 1 Emissions

3.1.1 Stationary Combustion

3.1.1.1 Fuel Oil

Emissions were calculated according to Equations 6.2 and 6.4 of LGOP by multiplying the total gallons of fuel oil usage by stationary sources by the appropriate CO_2, CH_4, and N_2O emission factors sourced from US EPA emission factors for GHG inventories. The results of these calculations in metric tonnes of CO_2, CH_4, and N_2O emissions were converted to metric tonnes of CO_2e by multiplying for the appropriate IPCC AR5 GWP factor for each GHG.

3.1.2 Mobile Combustion

3.1.2.1 Gasoline

For on-road vehicles, GHG emissions were calculated according to Equation 7.2 of LGOP by multiplying the total gallons of gasoline usage for mobile sources by the appropriate CO_2 emission factor sourced from the US EPA emission factors for GHG inventories. Emissions of CH_4, and N_2O were calculated according to Equations 7.6 and 7.7 of LGOP by multiplying the estimated mileage driven by the vehicles in each fleet category for the appropriate CH_4, and N_2O emission factors sourced from the US EPA emission factors for GHG inventories.

A similar approach was used for non-road vehicles. GHG emissions were calculated according to Equation 7.2 of LGOP by multiplying the total gallons of gasoline usage by mobile sources by appropriate CO_2, CH_4, and N_2O emission factors sourced from the US EPA emission factors for GHG inventories.

The results of these calculations in metric tonnes of CO_2, CH_4, and N_2O emissions were converted to metric tonnes of CO_2e by multiplying for the appropriate IPCC AR5 GWP factor for each GHG.

3.1.2.2 Diesel

For on-road vehicles, GHG emissions were calculated according to Equation 7.2, of LGOP by multiplying the total gallons of diesel usage for mobile sources by the appropriate CO_2 emission factor sourced from the US EPA emission factors for GHG inventories. Emissions of CH_4 and N_2O were calculated according to Equations 7.6 and 7.7 of LGOP by multiplying the estimated mileage driven by the vehicles in each fleet category for the appropriate CH_4, and N_2O emission factors sourced from the US EPA emission factors for GHG inventories.

A similar approach was used for non-road vehicles. GHG emissions were calculated according to Equation 7.2 of LGOP by multiplying the total gallons of diesel usage by mobile sources by appropriate CO_2, CH_4, and N_2O emission factors sourced from the US EPA emission factors for GHG inventories.

The results of these calculations in metric tonnes of CO_2, CH_4, and N_2O emissions were converted to metric tonnes of CO_2e by multiplying for the appropriate IPCC AR5 GWP factor for each GHG.

3.1.3 Solid Waste Facility Emissions

3.1.3.1 Landfill

For the landfill, GHG emissions were calculated from the first order decay model developed by the US EPA, called LandGEM. The results of these calculations in metric tonnes of CH_4 emissions were converted to metric tonnes of CO_2e by multiplying for the appropriate IPCC AR5 GWP factor.

3.2 Scope 2 Emissions

3.2.1 Purchased Electricity

Location-based electricity GHG emissions were calculated according to Equation 6.10 and 6.11 of the LGOP by multiplying the total electricity consumption in MWh by Town-controlled buildings and street lighting for the appropriate CO_2, CH_4, and N_2O electricity emission factors sourced from NYSERDA–NYS CSC. The results of these calculations in metric tonnes of CO_2, CH_4, and N_2O emissions were converted to metric tonnes of CO_2e by multiplying for the appropriate IPCC AR5 GWP factor for each GHG.

An equivalent calculation was performed to quantify “market-based electricity emissions.” Because the Town does not make use of any direct supply of electricity from dedicated sources, or of any contractual instruments that would convey specific emissions rates for the purchased electricity, the market-based electricity GHG emissions are equivalent to the location-based electricity GHG emissions.

Electric Power Transmission and Distribution Losses were also calculated, using the transmission and distribution losses factor for NYS from US EPA eGRID2020 databases. Upstate New York has a very low electricity emission intensity (234.5 lb CO_2e/MWh) compared to the US average (822.6 lb e/MWh) due to its high use of renewable energy (e.g., Hydro-electric).

3.3 Scope 3 Emissions

Scope 3 GHG emissions from Town operations were not accounted for and are not included in this Inventory except as required for employee commute. A quantification method similar to the

approach used for mobile combustion was applied to calculate emissions from employee commute.

3.4 Global Warming Potentials

The Global Warming Potentials, identified in the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, were used to convert the GHG emissions associated with Airport activities into carbon dioxide equivalents (CO_2e).

The Global Warming Potentials applied to the Town GHG inventory are the following:

TABLE 6: Global Warming Potentials

Name	Chemical Formula	SAR GWP Value
Carbon Dioxide	CO_2	1
Methane	CH_4	28
Nitrous oxide	N_2O	265

3.5 Quantification of Emissions

3.5.1 Scope 1 GHG Emissions

The Town Total Scope 1 Emissions were quantified as 2,487.87metric tonnes (t) CO_2e. The quantity includes contributions of the following GHGs:

TABLE 4: Scope 1 GHG Emissions

Greenhouse Gas	t GHG	t CO2e
Carbon Dioxide (CO_2)	174.7937	174.7937
Methane (CH_4)	82.60486	2312.936
Nitrous Oxide (N_2O)	0.000511	0.1354
Total		2487.865

The distribution of Scope 1 emissions by sector is shown in percentage and in tCO2e in the charts below.

FIGURE 5: Scope 1 Emissions by Sector, in Percentage

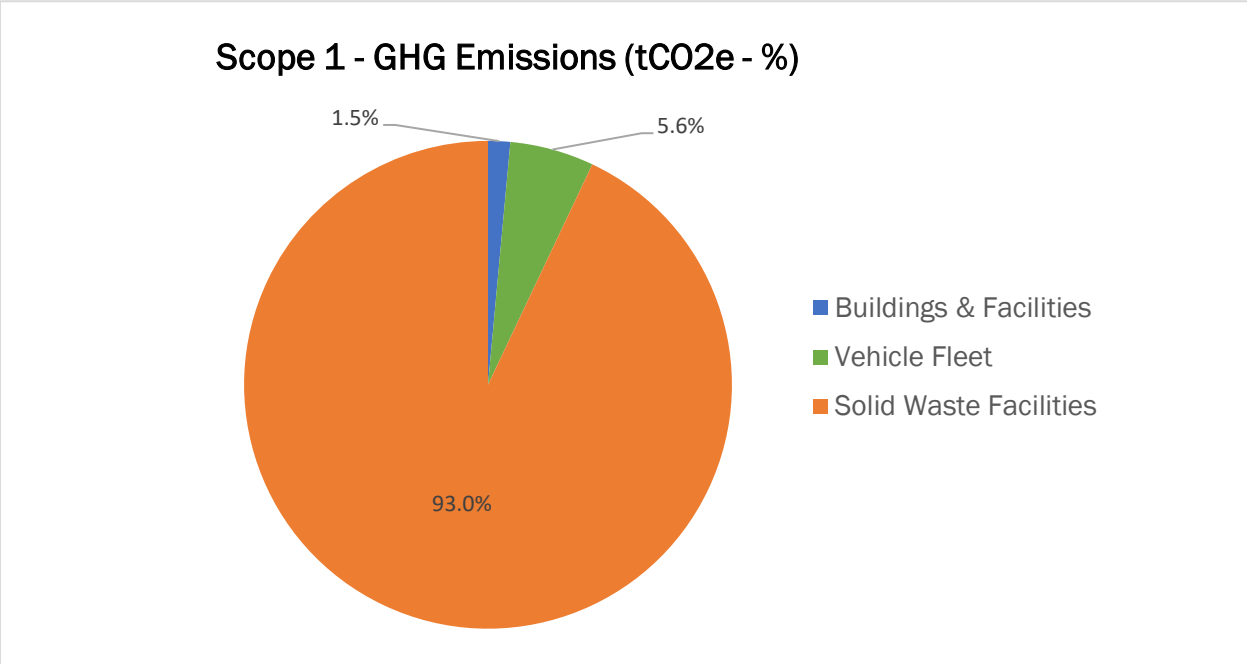
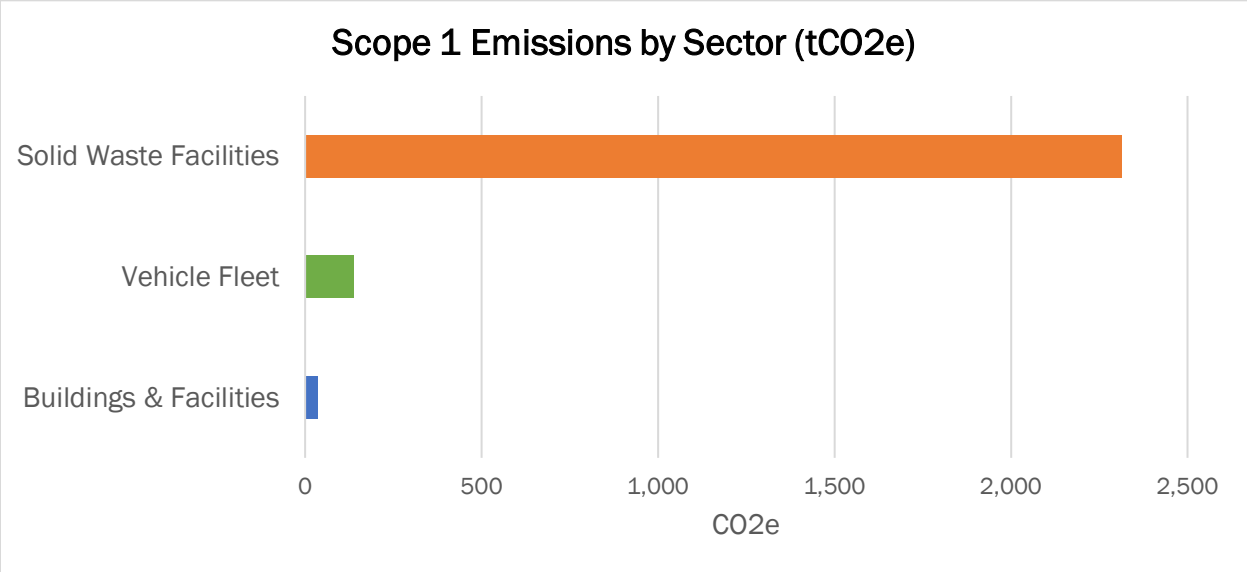


FIGURE 6: Scope 1 Emissions by Sector (tCO_2e)



The results highlight the predominance of the solid waste landfill as the major source of GHG emissions. Vehicle fleet emissions rank second, followed by emissions (stationary fuel combustion) from buildings and facilities.

The following paragraphs detail the sources of GHG emissions in each sector, identifying the contribution by each fuel.

3.5.1.1 Direct Stationary Combustion Emissions – Building and Facilities

The Town direct stationary combustion emissions were quantified as 36.45 t CO_2e. This stationary combustion quantity comes from fuel oil.

3.5.1.2 Direct Mobile Combustion Emissions – Vehicle Fleet

The Town direct mobile combustion emissions were quantified as 138.64 t CO_2e. This mobile combustion quantity includes contributions from the following fuels:

TABLE 8: Direct Mobile Combustion Emissions by Fuel

Mobile Combustion Emissions	
Fuel	t CO_2e
Gasoline	37.58
Diesel	101.06
Total	**138.64**

3.5.1.3 Solid Waste Facility

The Town of North East Landfill emissions was estimated as 2,312.78t CO_2e.

3.5.2 Scope 1 Emissions by Source

The following table and charts show the Scope 1 emissions from each specific source, as identified in the inventory. For each source, the energy usage responsible for the emissions is also reported.

3.5.2.1 Direct Stationary and Mobile Combustion Scope 1 Emissions by Source

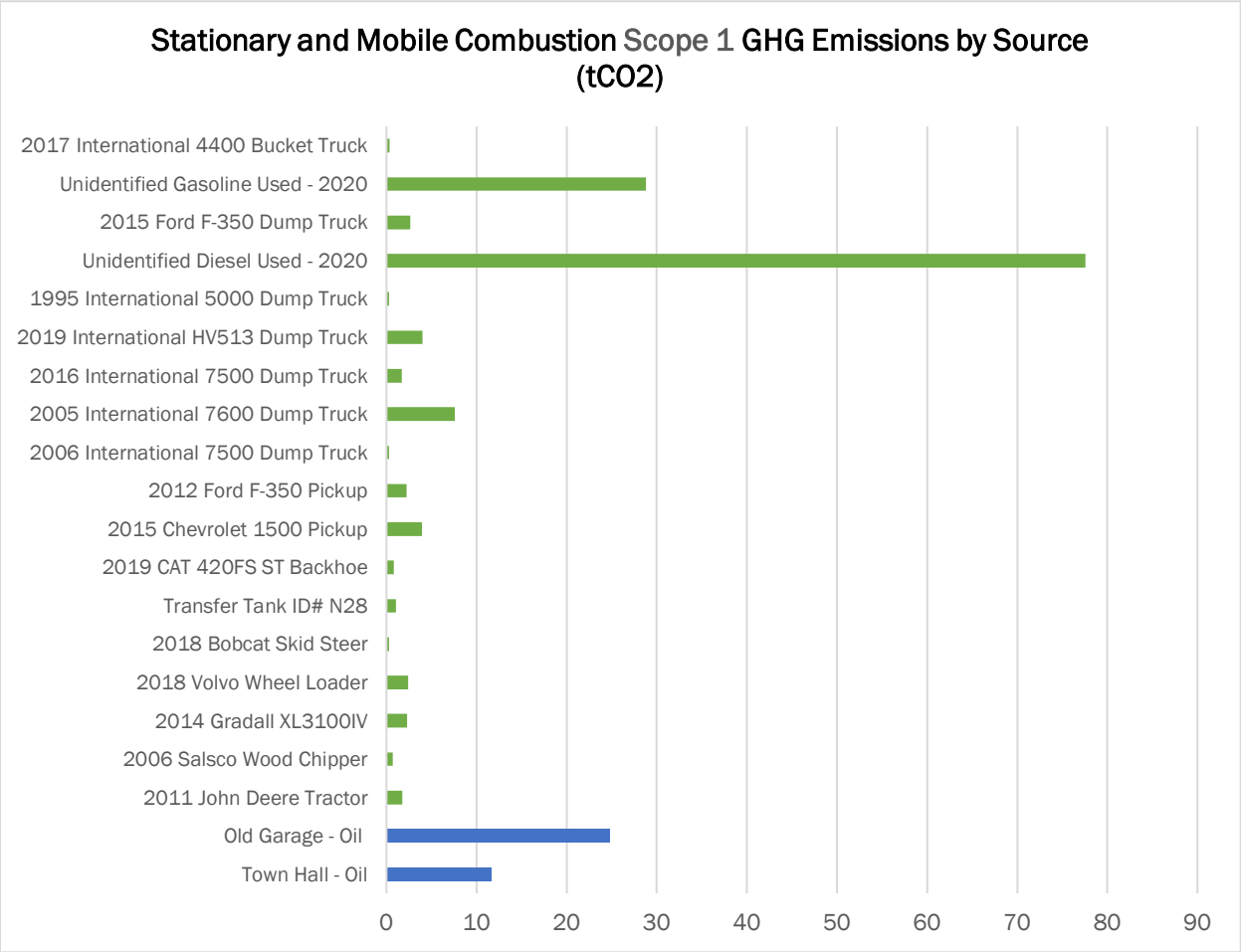
TABLE 9: Scope 1 Emissions from Each Specific Source (tCO_2)

Source	Sector	Energy Use (Gal)	GHG Emissions (tCO_2e)
Town Hall	Emissions from Stationary Fuel Combustion	1,136	11.67
Old Garage	Emissions from Stationary Fuel Combustion	2,411	24.77
2011 John Deere Tractor	Emissions from Off Road Vehicles	172	1.76
2006 Salsco Wood Chipper	Emissions from Off Road Vehicles	65	0.67
2014 Gradall XL3100IV	Emissions from Off Road Vehicles	224	2.31
2018 Volvo Wheel Loader	Emissions from Off Road Vehicles	232	2.38
2018 Bobcat Skid Steer	Emissions from Off Road Vehicles	26	0.27
Transfer Tank ID# N28	Emissions from Off Road Vehicles	101	1.03
2019 CAT 420FS ST Backhoe	Emissions from Off Road Vehicles	80	0.82
2015 Chevrolet 1500 Pickup	Fleet Vehicle Emissions	445	3.91
2012 Ford F-350 Pickup	Fleet Vehicle Emissions	252	2.21
2006 International 7500 Dump Truck	Fleet Vehicle Emissions	28	0.29

Source	Sector	Energy Use (Gal)	GHG Emissions (tCO_2e)
2005 International 7600 Dump Truck	Fleet Vehicle Emissions	744	7.60
2016 International 7500 Dump Truck	Fleet Vehicle Emissions	168	1.72
2019 International HV513 Dump Truck	Fleet Vehicle Emissions	392	4.01
1995 International 5000 Dump Truck	Fleet Vehicle Emissions	29	0.30
Unidentified Diesel Used[3]	Fleet Vehicle Emissions	7,595	77.54
2015 Ford F-350 Dump Truck	Fleet Vehicle Emissions	302	2.65
Unidentified Gasoline Used[3]	Fleet Vehicle Emissions	3,282	28.82
2017 International 4400 Bucket Truck	Fleet Vehicle Emissions	36	0.37

[3] The new Joint Highway Garage FuelMaster Depot began dispensing / recording gas and diesel to specific ID tags in June 2020. Prior to that, "Unidentified gas and diesel" refers to fuel pumped from fuel tanks located at the town garage, with unspecified usage.

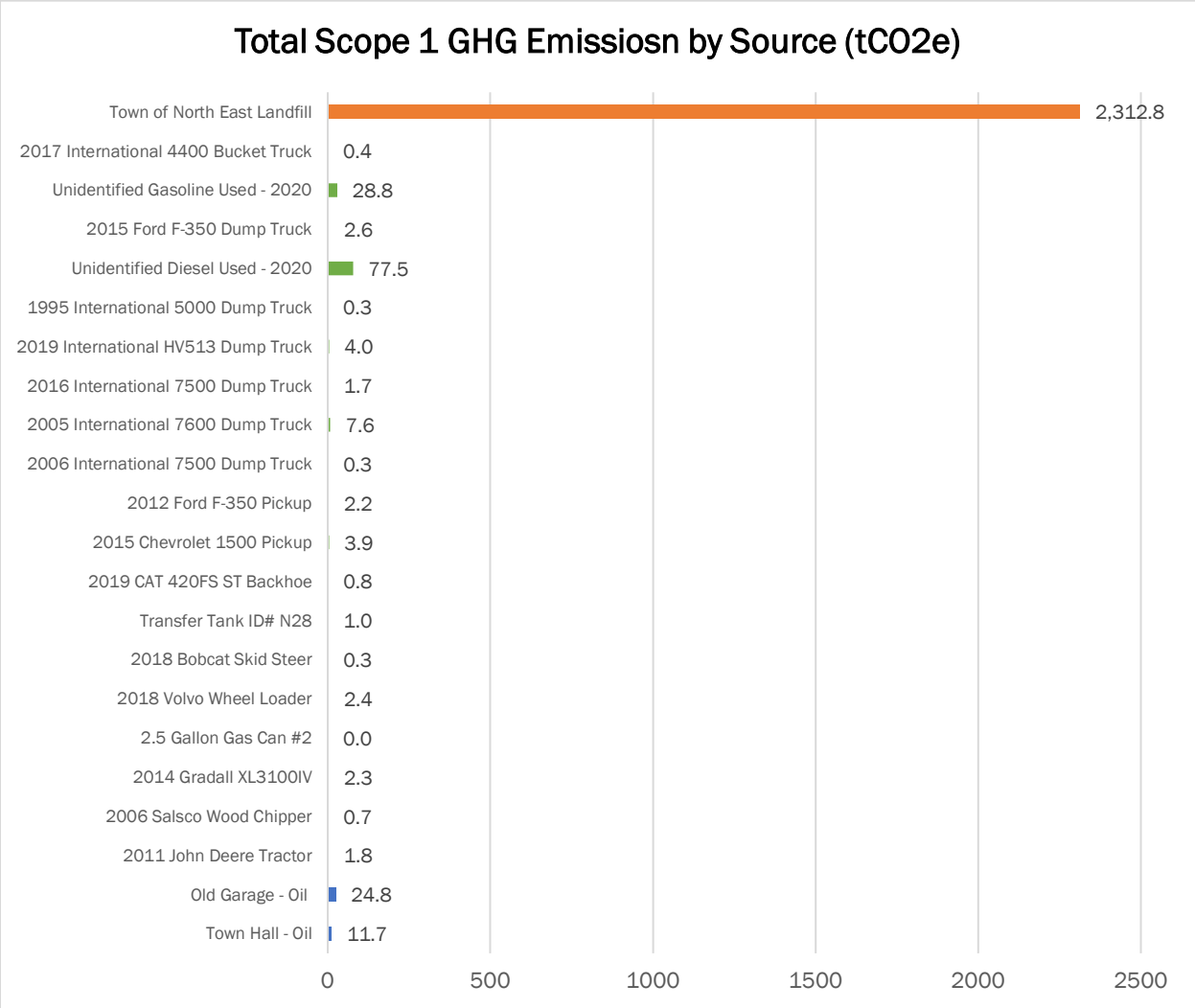
FIGURE 7: Stationary and Mobile Combustion Scope 1 Emission by Source (tCO_2e)



3.5.2.2 Total Scope 1 Emissions by Source

The Scope 1 results displayed in a bar diagram:

FIGURE 8: Total Scope 1 Emission by Source (tCO_2e)



The detailed breakdown above indicates solid waste landfill as responsible for the largest share of emissions.

3.5.3 Scope 2 GHG Emissions – Purchased Electricity

All Scope 2 emissions reported are from purchased electricity. Total Scope 2 Emissions were quantified as 3.46 metric tonnes t CO_2e, including contributions of the following GHGs:

TABLE 10: Scope 2 GHG Emissions

Greenhouse Gas	t GHG	t CO_2e
Carbon Dioxide (CO_2)	3.4469	3.447
Methane (CH_4)	0.000252	0.007
Nitrous Oxide (N_2O)	0.0000297	0.0094
	Total	**3.46**

The distribution of Scope 2 emissions by sector is shown in percentage and in tCO_2e in the charts below.

FIGURE 9: Scope 2 Emissions by Sector, in Percentage

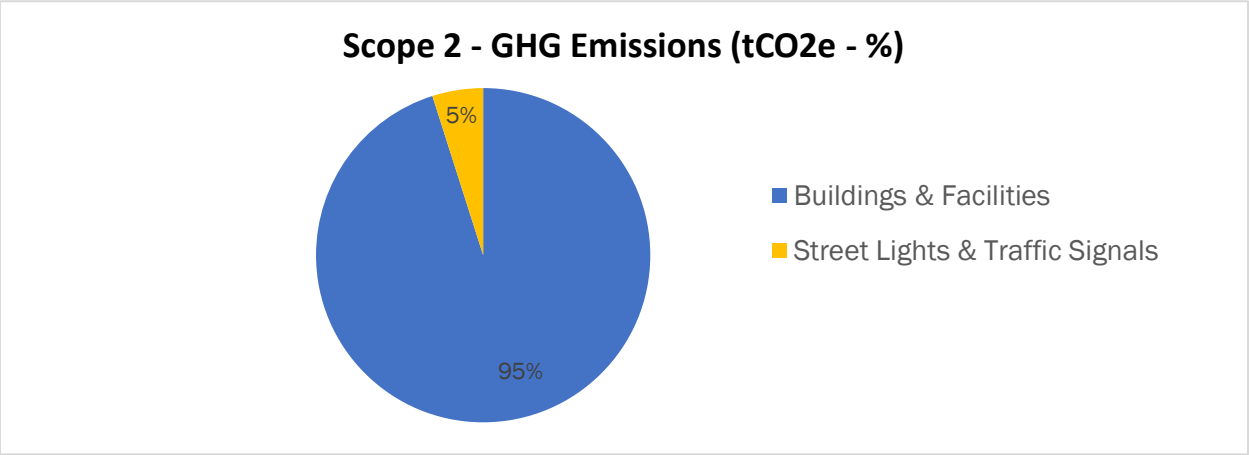
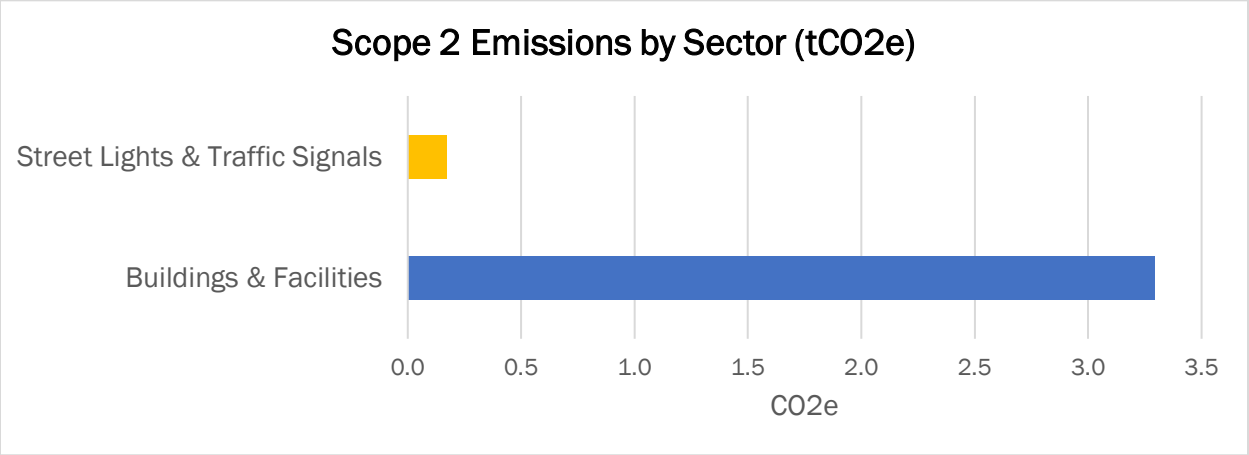


FIGURE 10: Scope 2 Emissions by Sector (t CO_2e)



The results indicate that electricity consumption by buildings and facilities is higher than that by street lights.

3.5.4 Scope 2 Emissions by Source

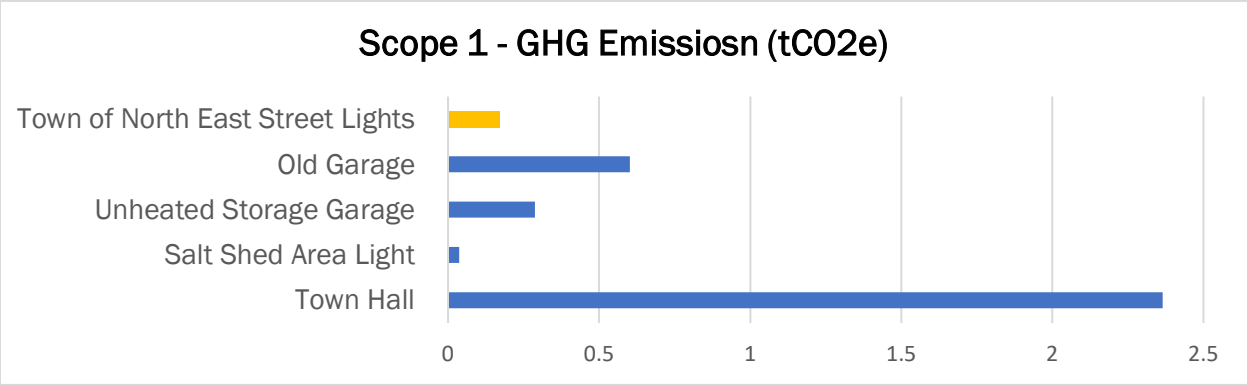
The following table and chart show the Scope 2 emissions from each specific source, as identified in the inventory. For each source, the energy usage responsible for the emissions is also reported, expressed in kWh of electricity used.

TABLE 11: Scope 2 Emissions from Each Specific Source (tCO_2)

Source	Sector	Energy Use (kWh)	GHG Emissions (tCO_2e)
Town Hall	Emissions from Grid Electricity	22,351	2.37
Salt Shed Area Light	Emissions from Grid Electricity	344	0.04
Unheated Storage Garage	Emissions from Grid Electricity	2,717	0.29
Old Garage	Emissions from Grid Electricity	5,692	0.60
Town of North East Street Lights	Emissions from Grid Electricity	1,608	0.17

The same results displayed in a bar diagram:

FIGURE 7: Scope 2 Emission by Source (tCO_2e)



The results show that Town Hall is responsible for the majority of the Scope 2 emissions, followed by the Old Garage and Unheated Storage Garage.

3.5.5 Scope 3 GHG Emissions

Total Scope 3 Emissions were not quantified for the GHG Inventory except as required for employee commute. The Town Total Scope 3 Emissions were quantified as 0.52 metric tonnes (t) CO_2e.

3.6 GHG Inventory Results

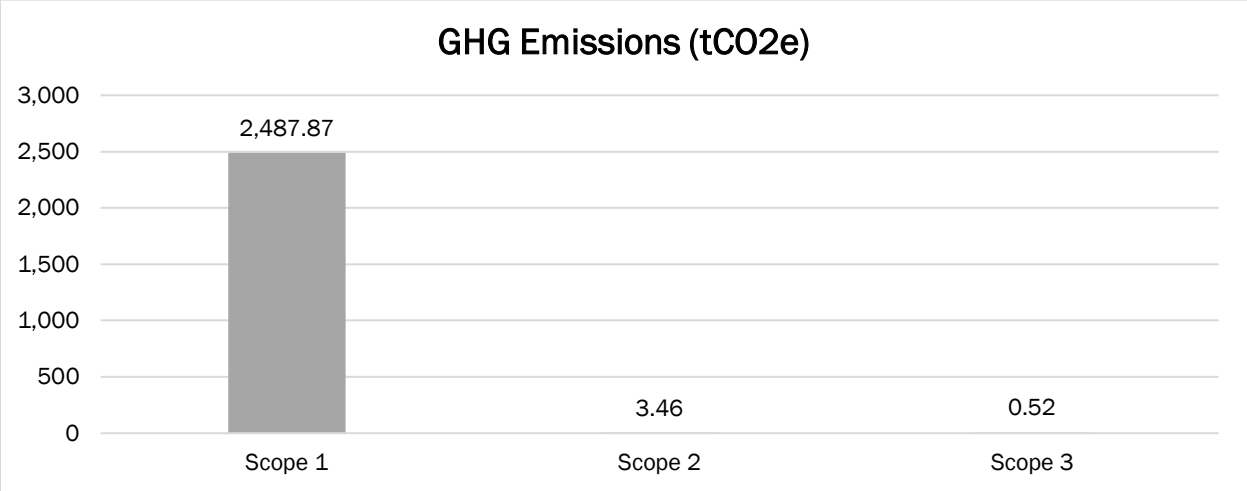
The Town's total Scope 1 GHG emissions for 2020 amounted to metric tonnes carbon dioxide equivalents (t CO_2e). These total emissions consist of stationary combustion, such as fuel oil gas heating; and mobile combustion, such as diesel consumption by the Town fleet vehicles, with an additional small amount associated with refrigerant releases from refrigeration or air conditioning systems. As a point of reference, t CO_2e is approximately equivalent to the GHG emissions produced by an average passenger vehicle driven miles, according to the US EPA's Greenhouse Gas Equivalencies Calculator.

The Town's total Scope 2 GHG emissions for 2019 amounted to metric tons carbon dioxide equivalents (t CO_2e). These emissions are associated with electricity usage by the Town and are roughly equivalent to the GHG produced from electricity use by homes for one year.

TABLE 12: Total GHG Emissions by Scope (tCO_2e)

GHG Emissions	tCO_2e
Scope 1 Emissions	2,487.87
Scope 2 Emissions	3.46
Scope 3 Emissions	0.52
Total	**2,491.85**

FIGURE 12: Total GHG Emissions by Scope (tCO_2e)



The distribution of emissions by sector is shown in percentage and in tCO_2e in the charts below.

FIGURE 13: Total GHG Emissions by Sector in Percentage

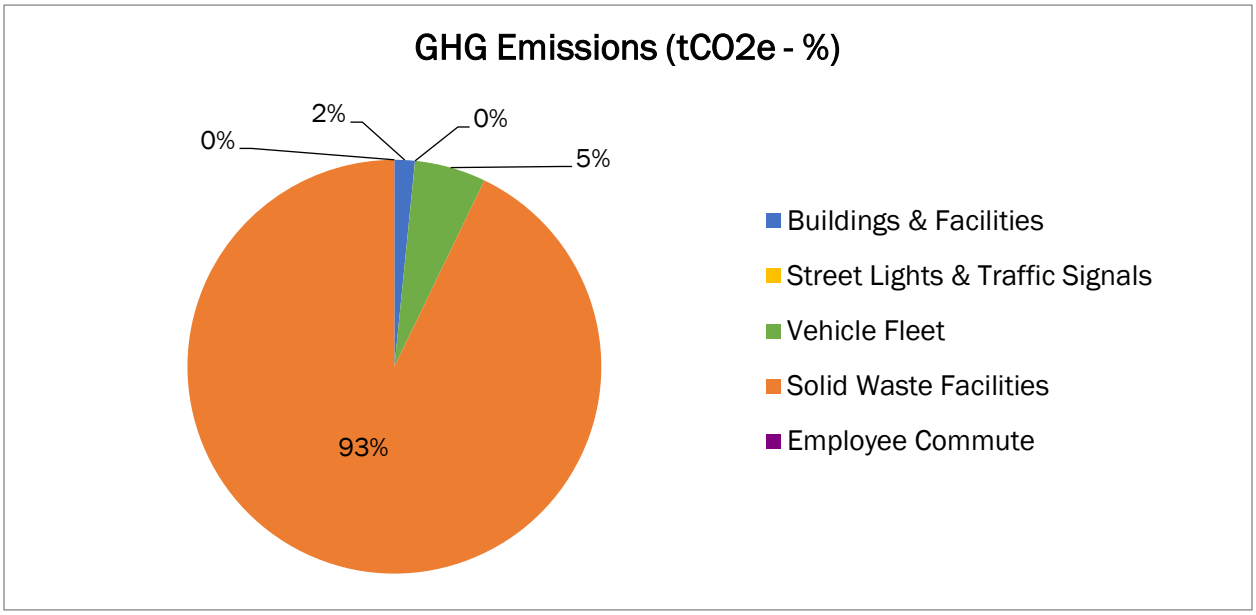
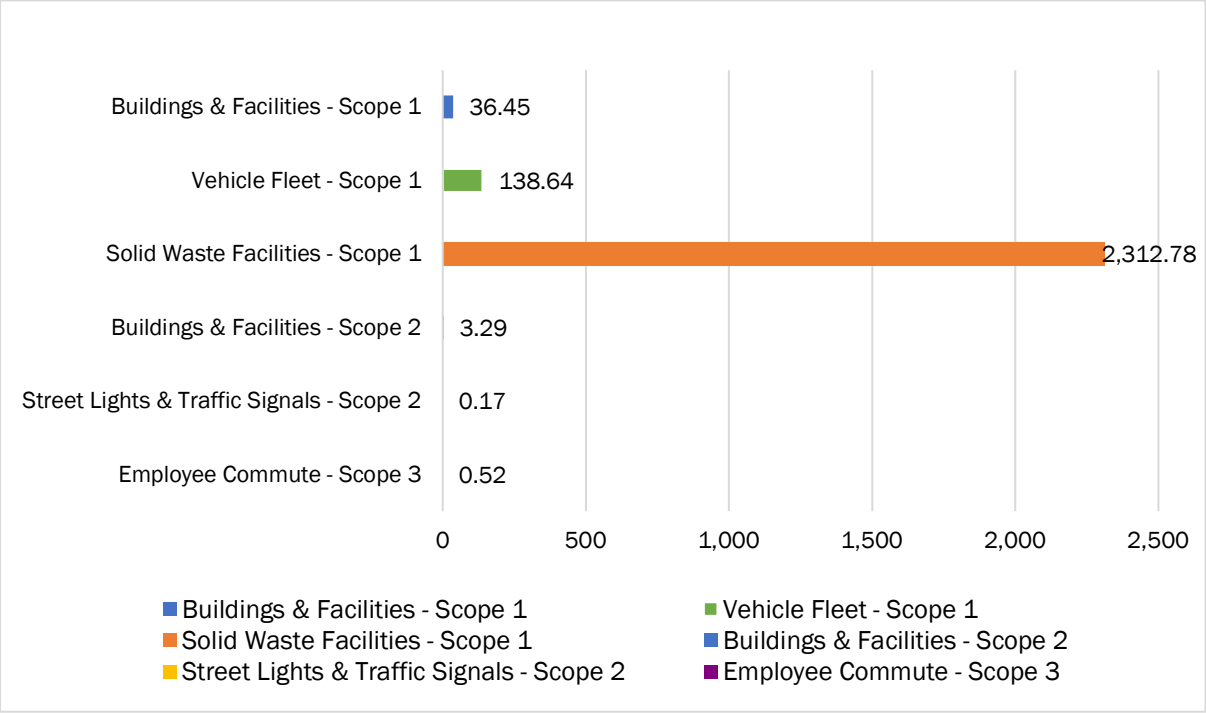


FIGURE 14: Total GHG Emissions by Sector (tCO_2e)



The results highlight the predominance of the solid waste landfill as the major source of GHG emissions. The remaining Scope 1 emissions (mobile fuel combustion) from the vehicle fleet and (stationary fuel combustion) from buildings and facilities rank as the next two largest sources. Electricity consumption by buildings and facilities rank fourth, followed by a small amount of electricity consumption by streetlights. Emissions from employee commute makes up the smallest amount of emissions.

For a closer look at the non-landfill emissions, the final three figures are repeated below without the landfill emissions:

FIGURE 15: GHG Emissions by Scope, Without Landfill (tCO_2e)

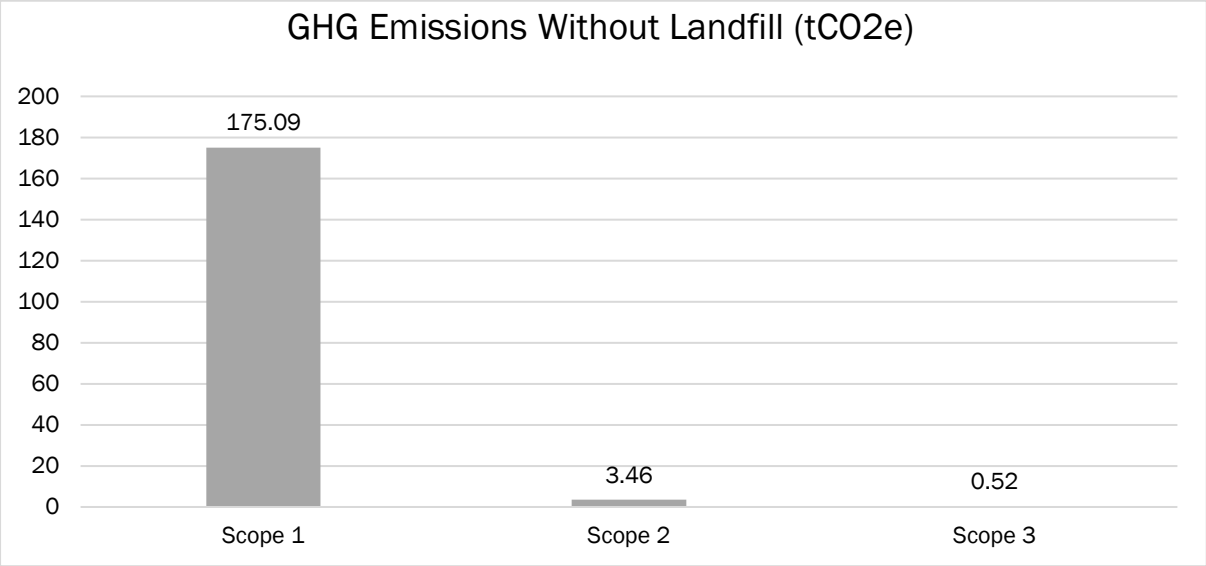


FIGURE 16: GHG Emissions by Sector, Without Landfill, in Percentage

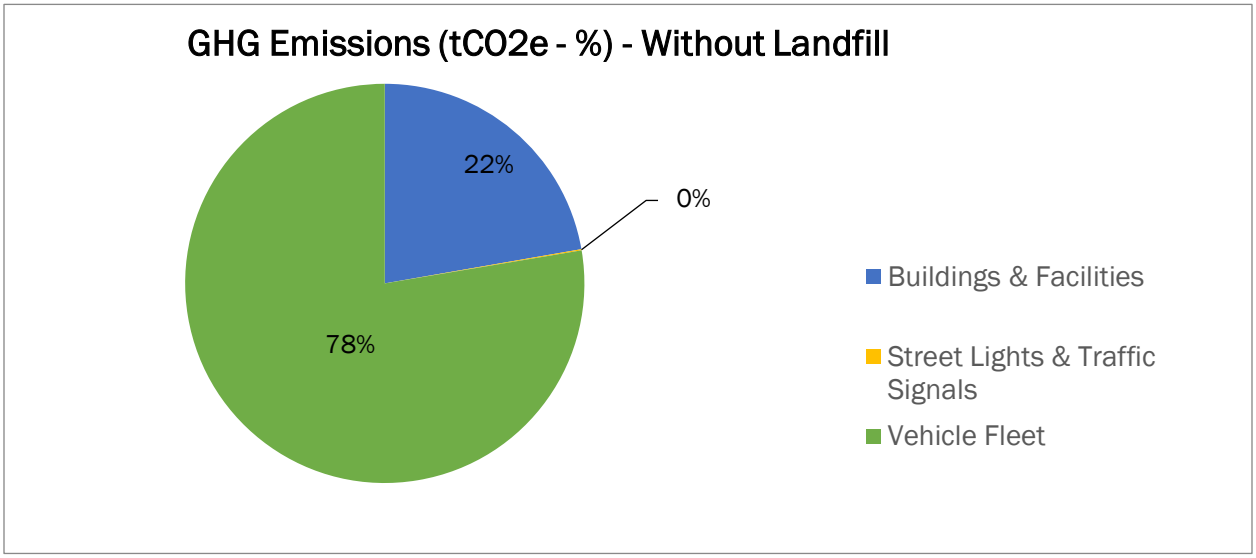
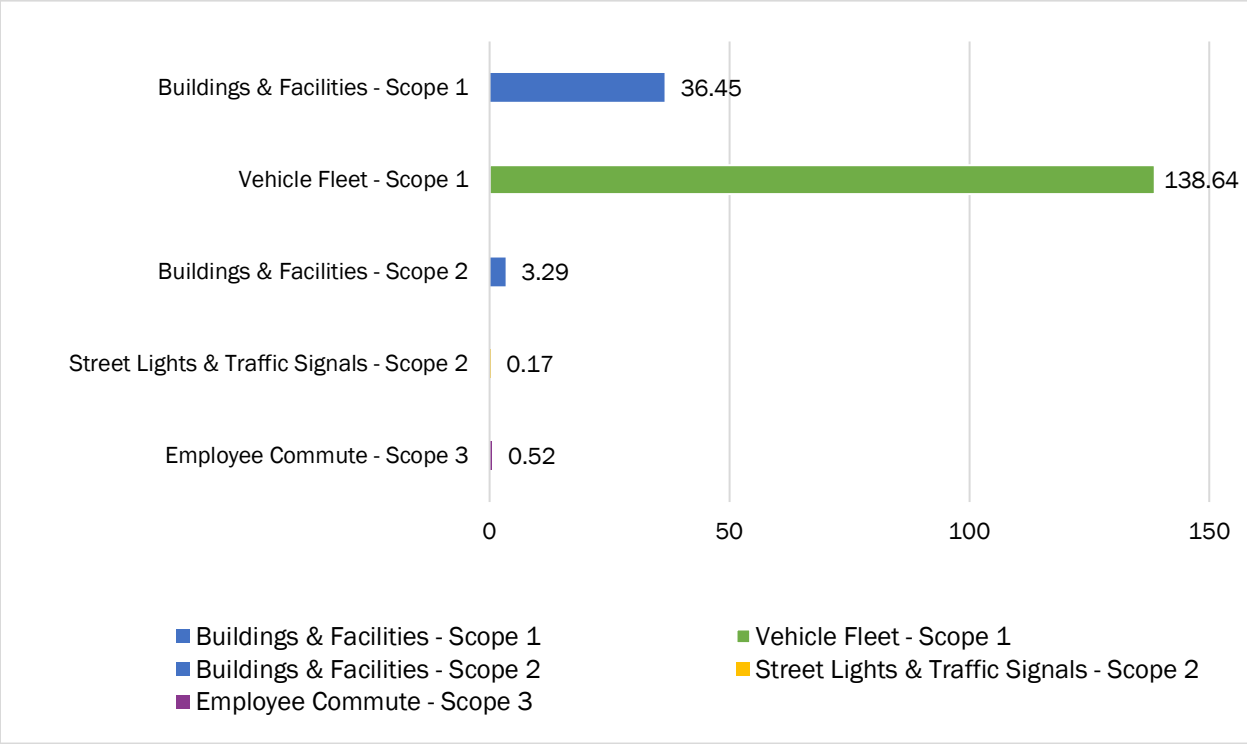


FIGURE 17: GHG Emissions by Sector, Without Landfill (tCO_2e)



4. GHG Inventory Base Year

A GHG inventory base year provides a standardized point of reference against which future inventories can be compared to identify changes, such as reductions, or track progress toward an emission goal or action plan. The Town has selected year 2020 as the GHG inventory base year.

4.1 GHG Inventory Forecast

Once the Base Year has been selected, the next step is to select one or multiple future years by which the Town wishes to reach certain emissions reduction goals. The GHG emissions for that future year are estimated presuming Business As Usual (BAU) growth of emissions from the base year. BAU refers to a scenario where the Town pursues no measures or actions aimed at reducing energy consumption and GHG emissions.

The Town has selected to develop BAU projections of GHG emissions inventory at 1-, 5-, and 10-year intervals from the Base Year. Emissions forecast for each one of these target years will be used as baseline to select appropriate reduction targets and to evaluate the actual results that could be achieved by implementing various reduction measures.

In order to develop the BAU scenario, First Environment evaluated several factors that could affect the GHG emissions independently from any action planned and implemented by the town. Among the many possible factors, the following were reviewed for analysis and discussion:

- weather data normalization;
- Town of North East Demographic Trends;
- energy use in NYS;
- carbon intensity of electric grid in NYS.

4.2 Weather Data Normalization

The Town's location in the Hudson Valley makes its energy and fuel use, as well as its GHG emissions in a given year, dependent upon the weather experienced during that year, both in terms of temperature and precipitation. Besides average temperature, the number of Heating Degree Days (HDD) and Cooling Degree Days (CDD) are useful parameters frequently used to compare energy usage in buildings. HDD is the number of degrees that a day's average temperature is below 65°F, which is the reference temperature below which buildings need to be heated. When the mean daily temperature is above 65°F, HDD is zero. Similarly, CDD data can be used to estimate the energy required for cooling and is defined as the number of degrees that a day's average temperature is above 65°degrees. When the mean daily temperature is lower than 65°F, CDD is zero.

Due to the complexity of modeling the normalization to HDD/CDD and its possible effects on fuels, electricity consumption and therefore GHG emission, no quantitative correction of the 2020 GHG inventory is being performed.

4.3 Town of North East Demographic Trends

One factor that could indirectly affect the LGO GHG emissions could be the Town demographic trend in the next decades. While it is unlikely a direct relation, it is reasonable to link the GHG emissions to the demographic trends, assuming for example that a considerable increase in the

Town population would lead to an increase in the size of the LGO infrastructure, service fleet, road maintenance and repairs services, Town staff, etc.

Demographic projections specific for the Town of North East could not be sourced, so an estimate of actual population trend for the Town were inferred from a combination of Dutchess County population projections and North East historical trend.

The following data is extracted from a study conducted by Cornell University, Program on Applied Demographics[4], providing projection of population growth in New York State from 2010 to 2035. The data is organized by County and the results for Dutchess County are reported in the table below.

TABLE 5: Dutchess County Population Growth Projections 2010 - 2035

Year	2010	2015	2020	2025	2030	2035	2040
Projected Population	297,488	303,374	309,985	316,091	320,734	323,935	326,402
Variation		5,886	6,611	6,106	4,643	3,201	2,467
Variation %		1.98%	2.18%	1.97%	1.47%	1.00%	0.76%
Variation %/year		0.40%	0.44%	0.39%	0.29%	0.20%	0.15%

The demographic projection shows an increase in population in the county at an annual rate of ~0.4% until 2025 then decreasing to 0.2-0.15 percent.

The following US Census information for North East illustrates the population trend from 1970 to 2020, showing population fluctuations but no steady increase or decrease.

TABLE 14: Town of North East Population Historical Data 1970 - 2020

Year	1970	1980	1990	2000	2010	2020
North East Population	2,730	2,877	2,871	2,993	3,021	2,971
Variation		147	-6	122	28	-50
Variation %		5.38%	-0.21%	4.25%	0.94%	-1.66%
Variation %/year		0.54%	-0.02%	0.42%	0.09%	-0.17%

Source: U.S. Census Bureau, Estimates Program

The historical data seems to indicate that Town is not yet following the population growth projected for the County. It does not seem like the potential Town's population change trend will be significant in the next 10 years and, as such, the demographic trends are not going to be included in the GHG inventory forecast.

4.4 Energy Consumption in NYS

The U.S. Energy Information Administration (EIA) provides a large amount of information on energy and fuel usage in the U.S., detailed according to numerous parameters, such as economic sectors, user categories, and geographic location. Both historic and forecast data is

[4] https://pad.human.cornell.edu/counties/projections.cfm

available and the latter was reviewed to extrapolate energy usage change trends that could be useful to project Town energy use and GHG emissions in the future.

In particular, data from the "2021 EIA Energy Outlook[5]" detailing New England region projected energy consumption for 2020 to 2050[6] were reviewed and the CAGR calculated.

The following change rates were identified for use in the Town's GHG 10 year inventory forecast for the period from 2020 to 2031:

TABLE 15: EIA Energy Outlook Consumption for 2017 to 2028

GHG Inventory Sector	Energy Source	Projected Consumption Change Rate (%/year)	Information Source
Buildings and Facilities	Electricity Consumption	-0.03%	EIA Forecast for Residential Commercial Energy Use
Buildings and Facilities	Distillate Fuel Oil - Stationary	-2.87%	EIA Forecast for Residential Commercial Energy Use
Fleet	Gasoline	-1.51%	EIA Forecast for Transportation Energy Use
Fleet	Diesel	-0.78%	EIA Forecast for Transportation Energy Use
Fleet	Construction	-0.78%	EIA Forecast for Transportation Energy Use

It can be observed that in general, the projected consumption trends show a decrease in energy usage in both stationary and mobile sources.

4.5 Carbon Intensity of Electricity Grid in NYS

Besides the data on energy consumption, key factors that will affect the GHG inventory result are the specific emission factors of the various energy sources included in the inventory.

In order to simplify the approach, we assumed that fuel emission factors would not change in the near future. This is reasonable since fuel emission factors are strictly linked to the chemical composition of fuels and these are not projected to change significantly in the near future.

The electricity grid emission factors are instead steadily decreasing due to increase of renewable energy generation and shift from coal to natural gas for the fossil fuel portion. On the other hand, the steady decrease of nuclear energy in the generation mix could lead to a temporary increase in grid emissions before sufficient renewable energy is deployed to replace the lost generation power.

The forecast of the grid emission factor considers the historical trend of the NYSERDA GHG factor for NYS, from 2010 to 2014, published in the CSC guidance for Community GHG

[5] https://www.eia.gov/outlooks/aeo/
[6] https://www.eia.gov/outlooks/aeo/data/browser/

inventories[7] and U.S. EPA eGRID emission intensity data for electricity generation in the New York Upstate subregion, from 2010 to 2020[8].

TABLE 16: NYSERDA New York Average Grid Carbon Intensity

Year	Grid Emission Factor (lbs CO_2e/MWh)	Annual Rate of change (%/year)
2010	826	-6.73%
2011	826	
2012	625	
2013	625	
2014	625	

The CAGR calculated for the short period was -6.73 percent annual percent rate of decrease. Because of the short timeframe of historical data available and the significant rate decrease, the data was compared to U.S. EPA's eGRID emission intensity data for electricity generation in the New York Upstate subregion, from 2010 to 2020.

TABLE 17: NYS Estimated GHG Emissions from Fuel Combustion – Electricity Generation

Year	GHG Emissions (lbs CO_2e/MWh)	Annual Rate of change (%/year)	Annual Rate applied in forecast
2010	548.37	-5.7%	**-5.7 %**
2020	234.5		

The latest eGRID information show a somewhat lower rate of decarbonization compared to the older NYSERDA information. Nonetheless, this data confirms the steady decrease of GHG emissions from energy generation on a long-time span of historical data. It must also be taken into account that the 2020 eGRID information was used in calculating the inventory's Scope 2 emissions. For consistency, the eGRID compound rate of -5.7 percent/year is deemed more appropriate to reflect the decreasing trend of the electric grid carbon intensity and apply it to forecast the Town's GHG Inventory for the next 10 years.

[7] http://www.dec.ny.gov/docs/administration_pdf/ghgguide.pdf
[8] US EPA eGRID 2014 (Calendar Year 2010) Summary Tables, https://19january2017snapshot.epa.gov/energy/egrid-2014-summary-tables_.html and eGRid 2020 Summary Tables, Summary Data | US EPA.

5.0 GHG Inventory Forecast: Business as Usual

As previously mentioned, a BAU forecast refers to a scenario where the Town pursues no measures or actions aimed at reducing energy consumption and GHG emissions. Two factors were identified that could potentially affect the BAU scenario, and both were included in a detailed analysis: 1) EIA Energy Consumption Trend and 2) Electricity Grid Carbon Intensity Variation

5.1 BAU – EIA Energy Consumption Trend and Electricity Grid Carbon Intensity Variation

This forecast presumes no significant changes in Town emissions due to weather or population trends. This forecast applies the EIA 2020-2050 energy consumption outlook trends (decreasing) to the various categories of energy and emissions included in the Town's GHG inventory base year. This forecast also applies the expected decrease in carbon intensity of the NYS electricity grid, projected at –5.7 percent/year, thus reducing the electricity grid EF.

While this forecast does not specify any specific reduction implemented by the Town government, the actions are somewhat implied within the EIA projections where the decrease in energy consumption and associated emissions is predicted as a consequence of technology advancement, mandated stricter energy efficiency, emissions requirements at Local, State and Federal level, and behavioral changes by end-users in the community. The reduction due to projected consumption change could be significant for both Scope 1 and Scope 2 emissions.

This BAU forecast also benefits from the progressive de-carbonization of the NYS grid electricity. Therefore, achieving the reduction targets will be in part facilitated by the measures implemented by the electric utilities at state level. The reduction due to the progressive de-carbonization of the NYS grid electricity will be important for Scope 2 emission, but it will have no effect on Scope 1 emissions.

As such, this scenario should be interpreted as a prediction of the results that could be achieved by the Town if it correctly plans and implements measures in line with the expected trend in energy efficiency, renewable energy, and general technology advancement.

TABLE 18: BAU – EIA Energy Consumption Trend, Electricity Grid EF Variation - GHG Emissions 2020 – 2031 (tCO_2e)

Scope	Source	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Scope 1	Buildings - Fuel Oil No. 2	36	35	34	33	32	32	31	30	29	28	27	26
Scope 1	Fleet Vehicle - Gasoline	38	37	36	36	35	35	34	34	33	33	32	32
Scope 1	Fleet Vehicle - Diesel	92	91	90	90	89	88	88	87	86	86	85	84
Scope 1	Fleet-Small Utility	3	3	3	3	3	3	3	3	3	3	3	3

Scope	Source	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Scope 1	Fleet-Large Utility	6	6	6	6	6	6	6	6	6	6	6	6
Scope 1	Landfill - Waste in Place	2,313	2,200	2,093	1,991	1,894	1,801	1,713	1,630	1,550	1,475	1,403	1,334
Scope 2	Buildings - Electricity Energy	3	3	3	3	3	2	2	2	2	2	2	2
Scope 2	Streetlights - Electricity Energy	0	0	0	0	0	0	0	0	0	0	0	0

TABLE 19: BAU - EIA Energy Consumption Trend, Electricity Grid EF Variation - GHG Emissions 2020 – 2031 by Scope (tCO_2e)

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Total Scope 1 Emissions (tCO2e)	2,488	2,372	2,262	2,159	2,059	1,965	1,875	1,790	1,707	1,631	1,556	1,485
Total Scope 2 Emissions (tCO2e)	3	3	3	3	3	2	2	2	2	2	2	2
Total Scope 1 & 2 GHG Emissions (tCO2e)	2,491	2,375	2,265	2,162	2,062	1,967	1,877	1,792	1,709	1,633	1,558	1,487

TABLE 20: BAU - EIA Energy Consumption Trend, Electricity Grid EF Factor Variation - GHG Emissions Variation to Base Year 2020 (%)

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Scope 1 change to 2020 Baseline (%)	0%	-5%	-9%	-13%	-17%	-21%	-25%	-28%	-31%	-34%	-37%	-40%
Scope 2 change to 2020 Baseline (%)	0%	0%	0%	0%	0%	-33%	-33%	-33%	-33%	-33%	-33%	-33%
Total GHG Emissions change to 2020 Baseline (%)	0%	-5%	-9%	-13%	-17%	-21%	-25%	-28%	-31%	-34%	-37%	-40%

The results of the forecast are also shown in the charts below:

FIGURE 18: BAU – EIA Energy Consumption Trend, Electricity Grid EF Variation - GHG Emissions 2020 – 2031 (tCO_2e) – Without Landfill

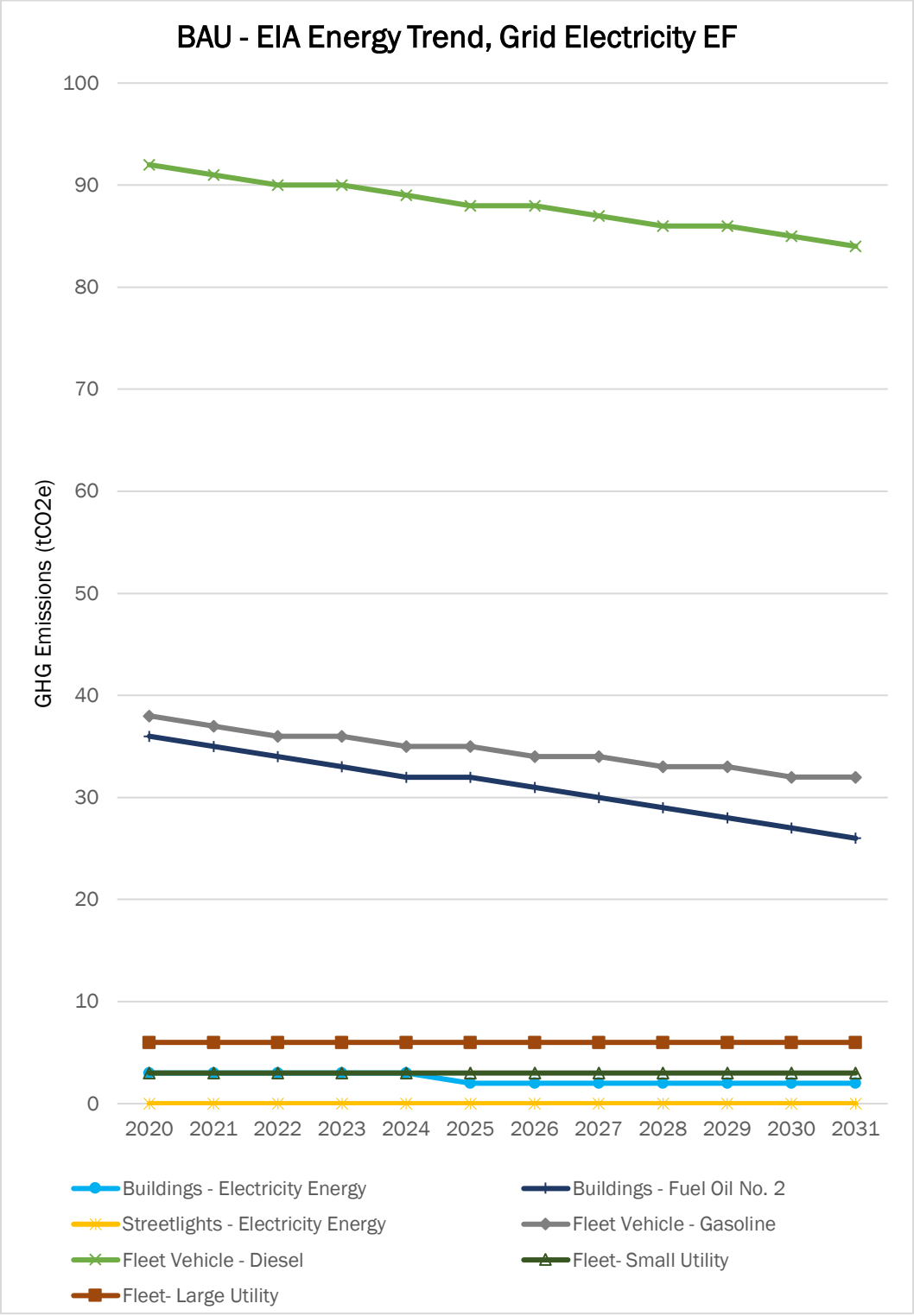


FIGURE 19: BAU - EIA Energy Consumption Trend, Electricity Grid EF Variation - GHG Emissions 2020 – 2031 by Scope (tCO_2e)

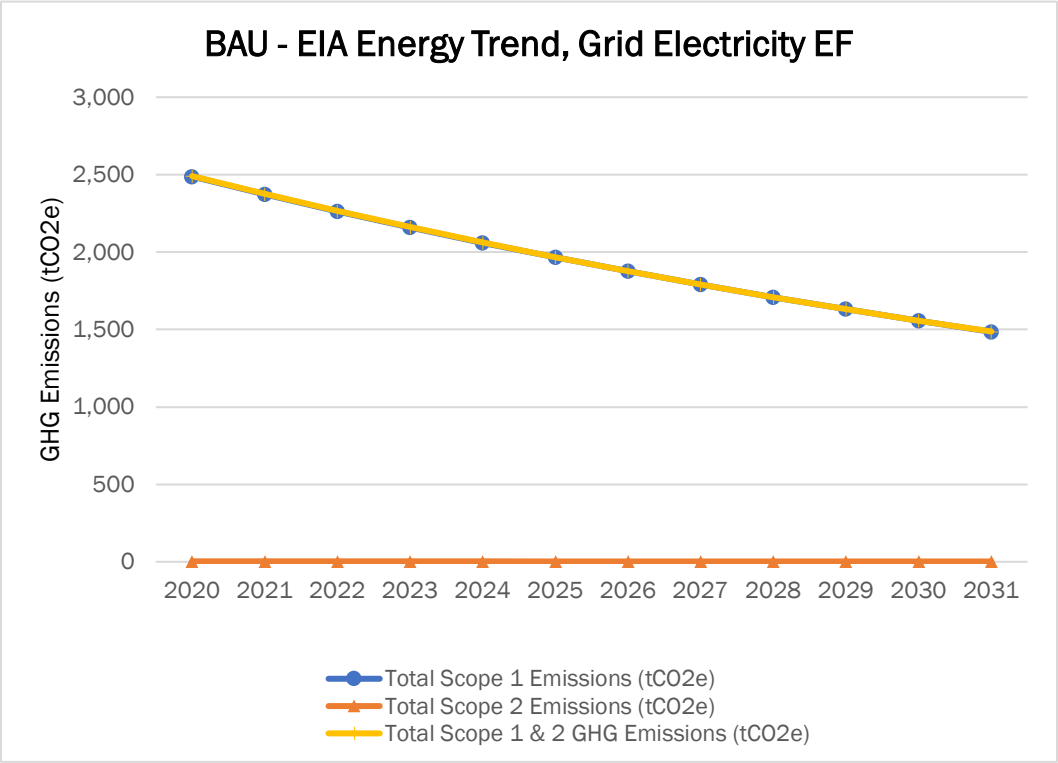
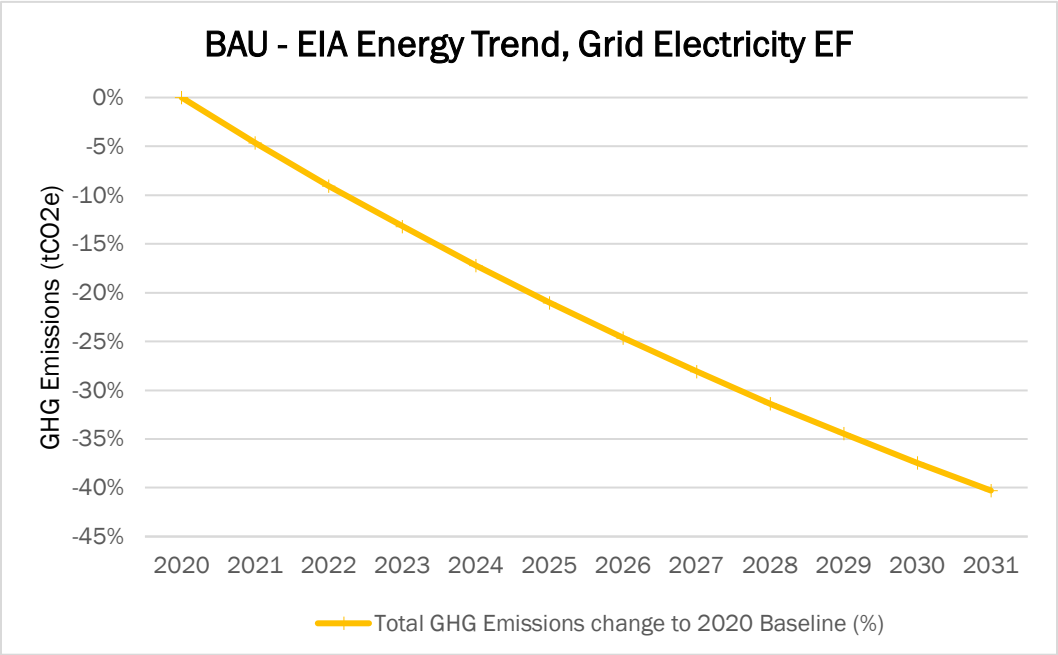


FIGURE 20: BAU - EIA Energy Consumption Trend, Electricity Grid EF Factor Variation - GHG Emissions Variation to Base Year 2020 (%)



Scope 3 was omitted from the analysis due to the relative insignificant impact of employee commuting to the total emissions and the nearly 100 percent reduction from approximately 1 tCO2e to approximately 0 tCO2e (rounded values) in year three of the projections.

The results show that total GHG emissions are expected to be reduced by 40 percent by 2031, as shown by Figure 20. The decrease is almost entirely due to reduction of Scope 1 emissions (stationary and mobile combustion and landfill emissions). These reductions can be attributed to energy consumption trends and natural landfill emissions. There is a minor reduction in Scope 2 emissions (purchased electricity emissions) as well, but the relatively small amount of Scope 2 emissions resulted in a limited impact from the progressive de-carbonization of the NYS grid electricity.

A small amount of Scope 1 emissions reduction is caused by energy consumption trends in stationary and mobile fuel combustion. Instead, the magnitude of reduction in Scope 1 emissions is due to the large amount of landfill emissions and the natural reduction of those emissions. The relatively small amount of Scope 2 emissions caused by purchase electricity shows very little change. For this reason, the Scope 1 emissions tracks the Total GHG Emissions on Figure 19.

After the large reduction in landfill emissions, Figure 18 shows significant reductions in the Fleet Vehicles – Diesel followed by Fleet Vehicles – Gasoline and Buildings – Fuel Oil #2. No reductions are forecasted during the 10-year period for small and large utility vehicles. A very small reduction is shown for Buildings—Electricity, and no reduction is forecasted for Streetlights (which was rounded to zero emissions).

The results presented in this report will be used as a basis for accessing the proposed climate actions presented in the forthcoming joint Town of North East's and Village of Millerton's Climate Action Plan. The projected climate action emission reductions will be used to assess progress to meet the Town's emission reduction targets.

6. Uncertainty Assessment and Quality Assurance

With regard to a GHG Inventory, quality refers to the general accuracy and consistency between an organization's actual emissions and quantified emissions. The difference between actual and quantified emissions results from uncertainty and error introduced by activities such as data collection, data management, calculations, and reporting. Inventory quality is impacted as data progresses from individual sources to the final report.

The inventory contains reporting uncertainty resulting from the potential for errors to be introduced in certain activities. Overall uncertainties are as follows:

- Not all data were received from primary sources (i.e., invoices) and backup data were not provided for the information recorded. Thus, errors present in the initial data will be transferred to errors in the emission calculations.
- Default emission factors, though used as a best practice, may present a level of uncertainty from the actual emissions.

7. Verification of this Report

This report, the information it contains, and the data it is based upon have not been verified by an external third party.

8. Acknowledgement

This project was funded in part by the Climate Smart Community Grant Program, Title 15 of the Environmental Protection Fund through the New York State Department of Environmental Conservation.

Appendix B – Village of Millerton Greenhouse Gas Emissions Inventory and 10 Years Forecast for the Government Operations Activities – Base Year 2020

Greenhouse Gas Emssions Inventory for the Government Operations Activities Year 2020
Village of Millerton, New York

June 2022

Prepared by: **First Environment, Inc.**
10 Park Place
Building 1A, Suite 504
Butler, New Jersey 07405

TABLE OF CONTENTS

TABLES

FIGURES

List of Acronyms

AR5 - Intergovernmental Panel on Climate Change's Fifth Assessment Report
CAGR – Compound Annual Growth Rate
CH_4 - methane
CO_2 – carbon dioxide
CO_2e - Carbon Dioxide Equivalents
CSC – New York State Climate Smart Communities
EF – GHG Emission Factor
eGRID – US EPA Emissions & Generation Resource Integrated Database
EPA – Environmental Protection Agency
GHG – greenhouse gas
GWP – global warming potential
HFC - hydrofluorocarbon
IMP – Inventory Management Plan
IPCC - Intergovernmental Panel on Climate Change
LPG – liquid petroleum gas (propane)
t – metric tonnes
MSW – municipal solid waste
MWh – Mega Watt hour
N_2O – Nitrous Oxide
NYS – New York State
NYSEG - New York State Electric and Gas Corporation
NYSERDA – New York State Energy Research and Development Authority
PE – Pledge Element
PFC - perfluorocarbon
SF_6 – sulfur hexafluoride
US EPA - United States Environmental Protection Agency
UNFCCC – United Nations Framework Convention on Climate Change

Executive Summary

First Environment, Inc. (First Environment) was retained by the Village of Millerton, New York (the "Village") to prepare a greenhouse gas (GHG) emissions inventory for the government operations activities of year 2020. The GHG inventory was prepared in accordance with the Local Governments for Sustainability (ICLEI)'s Local Government Operations Protocol (LGOP). ICLEI's ClearPath Pro web-based tool provided the platform for data collection, processing, and GHG quantification and reporting.

The GHG inventory assessed emissions of seven greenhouse gases (GHGs):

- carbon dioxide (CO_2),
- methane (CH_4),
- nitrous oxide (N_2O),
- hydrofluorocarbons (HFCs),
- perfluorocarbons (PFCs),
- sulfur hexafluoride (SF_6), and
- Nitrogen tri-fluoride (NF_3).

Conducting the GHG inventory demonstrates the Village's recognition of its relationship to both the local and global environment. It allows the Village to better understand and take responsibility for its activities and their climate impacts. Accordingly, the inventory provides a foundation and starting point for the Village's efforts to reduce greenhouse gas emissions from its activities and demonstrate environmental stewardship. The inventory serves as a reference point to guide the development of policies, programs, and projects as the Village pursues its environmental objectives.

The scope of the inventory included all emissions sources under the Village's operational control. This consisted of the Village's Scope 1 "direct" emissions from stationary and mobile combustion as well as Scope 2 "indirect" emissions from the purchase of electricity. The inventory did not quantify the optional Village Scope 3 emissions except for the required employee commute.

Emissions in the GHG Inventory are reported in Carbon Dioxide Equivalents (CO_2e). CO_2e is used to quantify total emissions because each GHG has a different Global Warming Potential (GWP). Using CO_2e equalizes all GHGs to one standard reference of metric tons of carbon dioxide equivalent. Unless otherwise noted in this report, GHG emissions were converted to CO_2e using Global Warming Potentials (GWPs), a standard conversion factor, from the Intergovernmental Panel on Climate Change's (IPCC) Fifth Assessment Report (AR5).

TABLE 1: Summary of GHG Inventory

Reporting Protocol	Local Governments for Sustainability (ICLEI)'s Local Government Operations Protocol, v1.1, May 2010
Reporting Tool	ICLEI ClearPath – Government Track - https://clearpath.icleiusa.org
Geographic Boundary	Village of Millerton Municipal Boundary
Organizational Boundary	Operational Control
Operational Boundary	Scope 1, Scope 2, Scope 3 Employee Commute
Inventory Reporting Period	January 1 to December 31, 2020
Base Year	2020

GWP Defaults	IPCC 5th Assessment Report (AR5)

The Village's total Scope 1 GHG emissions for 2020 amounted to 44.75 metric tonnes carbon dioxide equivalents (t CO_2e). These total emissions consist of stationary combustion of fuel oil gas heating and mobile combustion of gasoline and diesel consumption by the Village fleet vehicles. As a point of reference, 44.75 t CO_2e is approximately equivalent to the GHG emissions produced by an average passenger vehicle driven 111,000 miles, according to the US EPA's Greenhouse Gas Equivalencies Calculator.

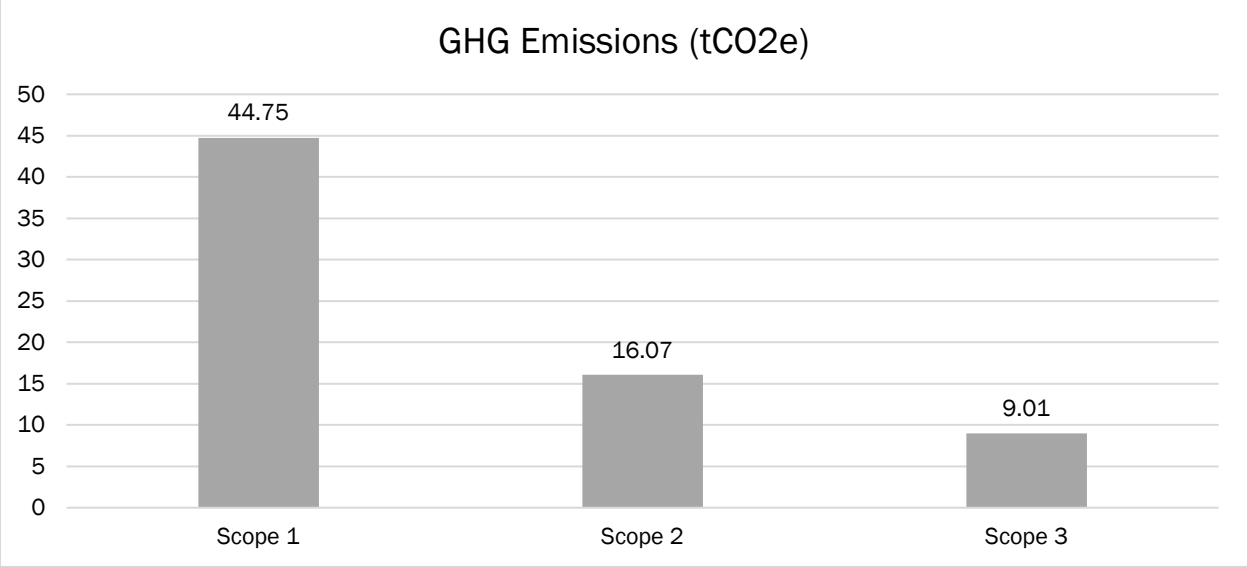
The Village's total Scope 2 GHG emissions for 2020 amounted to 16.07 metric tons carbon dioxide equivalents (t CO_2e). These emissions are associated with electricity usage by the Village and are roughly equivalent to the GHG produced from electricity used by three homes for one year.

The Village's Scope 3 GHG emissions for employee commute for 2020 amounted to 7.64 metric tons carbon dioxide equivalents (t CO_2e).

TABLE 2: Total GHG Emissions by Scope (tCO_2e)

Activity/Source	CO2e
Scope 1	44.75
Scope 2	16.07
Scope 3	9.01
Total	**69.83**

FIGURE 1: Total GHG Emissions by Scope (tCO_2e)



The distribution of emissions by sector is shown in percentage and in tCO_2e in the charts below.

FIGURE 2: Total GHG Emissions by Sector in Percentage

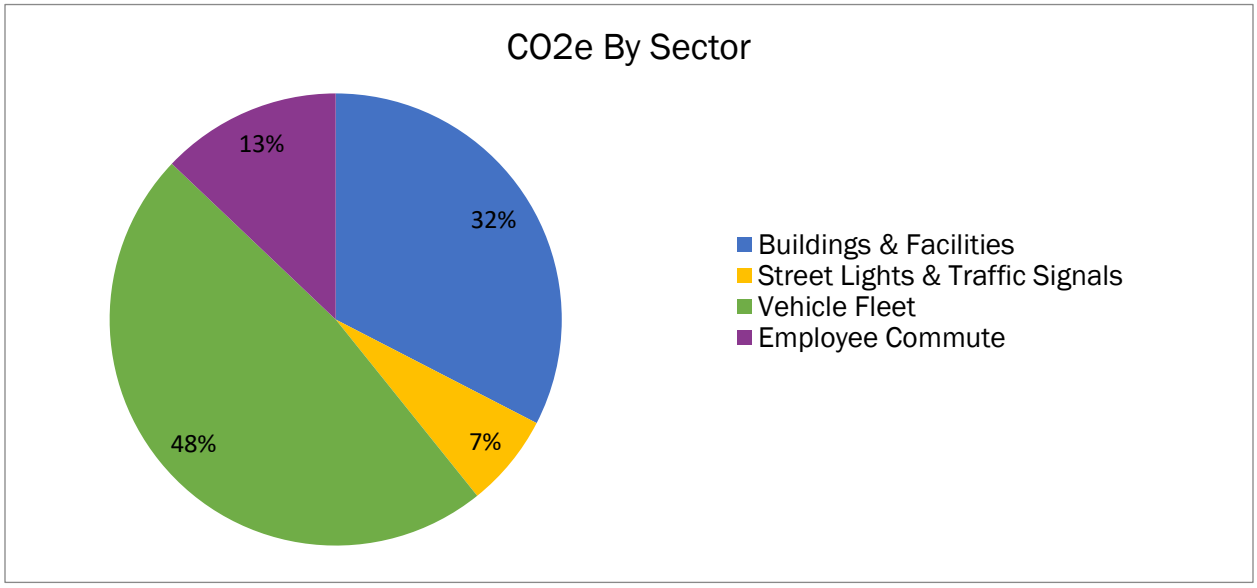
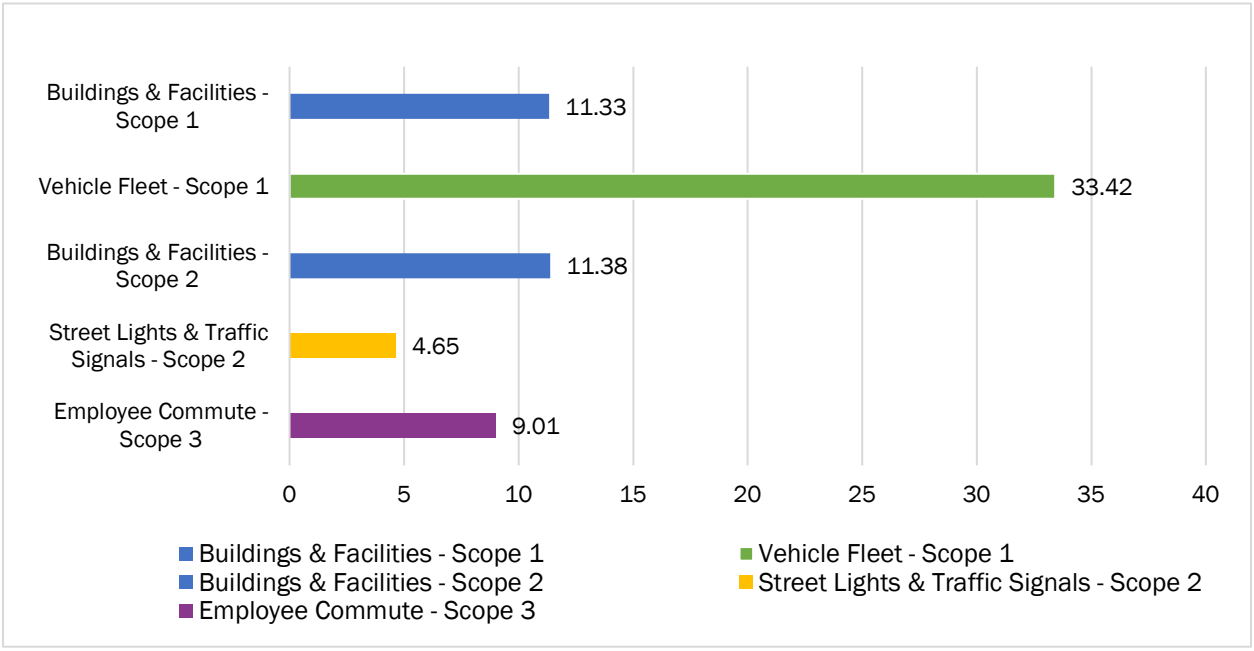


FIGURE 3: Total GHG Emissions by Sector (tCO_2e)



The results highlight fleet vehicle emissions as the largest source of GHG emissions. The Scope 1 and Scope 2 emissions from buildings and facilities rank as the next two largest sources. Emissions from employee commute rank fourth, followed by electricity consumption by streetlights.

1. Introduction

A GHG emissions inventory identifies an organization's GHG emission sources and quantifies them according to a set of acknowledged conventions using established estimation methodologies.

The Village of Millerton air emission inventory quantifies the release of carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Other common GHGs, including hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF_6) and nitrogen tri-fluoride (NF_3), were also considered but no material sources identified. These are the most recognized and common GHGs from human-made sources, as identified in the United Nations Framework Convention on Climate Change Kyoto Protocol (UNFCCC).

The GHG inventory of local government operations (LGO) identifies the amounts of electricity and fuels used in municipal buildings, streetlights, fleets, and other operations controlled by the local government waste and water treatment are not currently conducted within the Village boundary, so GHG emissions from waste and water treatment are not included.

The LGO inventory does not include GHG emissions generated by the Village residents and businesses, including those produced by power generation facilities, if present. The emissions from these sources are accounted for separately and constitute the Community GHG emissions inventory, which are reported under a different Protocol (U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions). The Village of Millerton Community GHG Inventory is not included in the scope of this report. The Town of North East, which surrounds the Village, is also not included in the scope this report. The Town has issued their own GHG inventory report. Both municipalities will be issuing a joint Climate Action Plan (CAP).

2. Overview of the Village of Millerton

The Village of Millerton is located in Dutchess County, New York, approximately 100 miles north of New York City and about 65 miles south of Albany. The Village of Millerton is surrounded by the Town of North East which shares certain municipal functions. Both the Village and the Town participate in New York State's Climate Smart Communities program and will be issuing a joint Climate Action Plan. However, the Village and the Town will be issuing separate GHG inventories for their respective government operations.

According to the United States Census Bureau[1], the Village has a total area of 0.62 square miles, with a population of 903 as of the 2020 census. The surrounding Town of North East is bordered by the Town of Ancramdale to the north, State of Connecticut to the east, Town of Amenia to the south, and the Towns of Pine Plains and Stanford to the west.

The Village was founded on 1851. The Village operations consist of the Highway Department, the Water Department, the Police Department, and Parks and Recreation. The Village government staff is composed of 15 employees (mostly part-time).

The Village building and facilities are listed in the following table. All the buildings and facilities listed are owned and operated by the Village. The utilities include electricity and fuel oil.

TABLE 3: Buildings and Facilities with the Village Operations

Building / Facility
Pump Plant
Water Tower
Village Hall
Main Street Gazebo Outlet
Veterans Park Outlet
Rte 44 & 22 Outlet
Denny Park ("Eddie Collins Park")

In addition to the buildings and facilities listed above, the Village operations also include street lighting.

The Village operates a fleet of vehicles consisting primarily of pickups, heavy trucks, and equipment for the highway department. The fleet uses both diesel and gasoline fuel.

The Village does not currently operate waste disposal facilities or wastewater treatment facilities. The Village does not currently operate any public transportation vehicles, fire department, or waste hauling vehicles.

2.1 Staff Responsible for the GHG Inventory

In 2018, the Town of North East and the Village of Millerton each signed a pledge, along with hundreds of other municipalities around New York State, to develop community-wide climate mitigation strategies and improve sustainability. A Climate Smart Task Force was assembled

[1] https://data.census.gov/cedsci/all?q=north%20east%20ny

and is initiating projects that will build environmental and economic resiliency: Chris Kennan, Town of North East Supervisor; Griffen Cooper, Town of North East Councilman; Matthew Hartzog, Village of Millerton Trustee; Laurie Kerr, Village of Millerton Trustee; Kathy Chow, Task Force Coordinator; Jennifer Dowley, Rhiannon Leo-Jameson, Deborah Maier, Claire Owens, Tom Parrett, Eliot Ramos, Rich Stalzer, Andrew Stayman, Chris Virtuoso and Carrissa Whitehead. This GHG inventory was developed by First Environment through consultation with the Town and Village staff and members of the Town and Village Climate Smart Task Force.

2.2 GHG Inventory Reporting Protocol

The Village of Millerton Government Operations GHG inventory was conducted in accordance with the ICLEI's Local Government Operations Protocol (LGOP), Version 1.1, May 2010. The LGOP was developed through a partnership among the California Air Resources Board (ARB), California Climate Action Registry (CCAR), The Climate Registry, and ICLEI. The LGOP is based on the "Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard" developed by the World Business Council for Sustainable Development and the World Resources Institute (WRI/WBCSD), which provides the standards and guidance for companies and other types of organizations preparing a GHG emissions inventory. The goal was to offer additional guidance to local governments on applying the Greenhouse Gas Protocol within the context of local government operations. The LGOP provides a standardized method and procedures to assist local governments in quantifying and reporting GHG emissions associated with their operations.

2.3 GHG Inventory Reporting Tool

The GHG inventory was prepared using ICLEI's ClearPath Tool, an online platform designed to incorporate all the LGOP requirements for inventory data, including all parameters, factors, and methodologies necessary to perform the GHG emissions quantification. ClearPath suite of tools also includes modules allowing forecasting of emissions scenarios, as well as planning and monitoring of measures aimed at reducing GHG emission over time.

2.4 GHG Inventory Reporting Period – Base Year

This GHG inventory report covers GHG emissions from the Village operations within the boundaries described below during the period of:

- January 1 through December 31, 2020.

This first GHG Inventory provides a full calendar year baseline of data about the energy consumption and resulting GHG emissions from the Village municipal operations. The baseline will be used to establish emissions reductions targets and track progress towards achieving them. Although 2020 was during the Covid pandemic, a review of past years of activity data (energy and fuel consumption) shows little difference. The year 2020 was selected has being representative prior to the implementation of identified climate actions.

2.5 GHG Inventory Boundaries

2.5.1 Geographic Boundary

The geographic scope of the emissions report determines which emissions are accounted for and reported by the Village. The Village operations are conducted within the Village municipal boundary; the Village does not control or operate any facility outside such geographic boundary.

2.5.2 Organizational Boundaries

Organizational boundaries define the limits of a GHG inventory by identifying the activities that are owned and/or controlled by the entity and determining which emission sources should be included in its GHG inventory. As recommended by the LGOP, the GHG emissions contained in this report were consolidated according to the Operational Control approach. The operational control is established for facilities, activities, and sources over which the Village possesses the authority to implement operating policies such as financial, environmental, health, or safety directives. A description of the facilities and sources included in the Village's Operational Control boundary is provided in the following paragraph, further detailed according to the Operational Boundary described in the next paragraph.

2.5.3 Operational Boundaries

Operational boundaries in GHG inventory identifies the specific types of emission sources that the Village, as defined by the inventory's organizational boundaries, includes in its GHG Inventory. A key distinction in setting operational boundaries is whether GHG emissions sources are categorized as direct emissions or indirect emissions.

- Direct emissions (Scope 1): result from emission sources that are owned or operated by the organization.
- Indirect emissions (Scope 2, Scope 3): emissions that are due to an organization's activities but occur from sources owned or controlled by another organization.

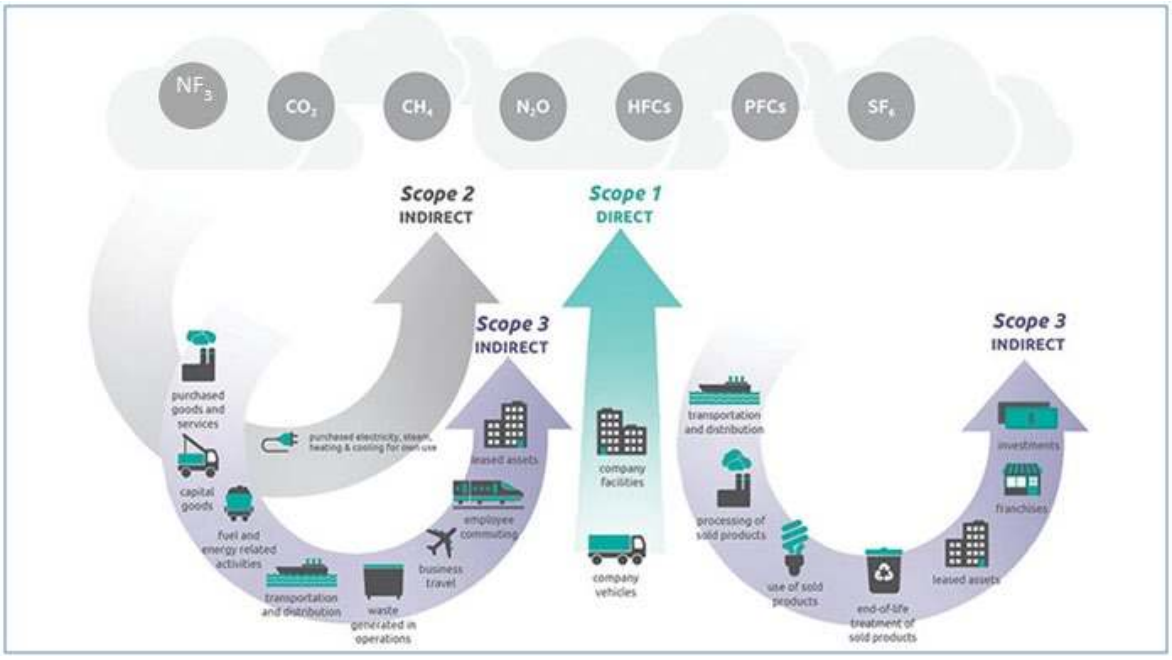
The concept of emission "scopes" expands upon the distinction between direct and indirect emissions, splitting indirect emissions into two separate categories: Scope 2, associated with indirect energy emissions, such as those due to electricity purchased from a utility; Scope 3, capturing all other types of indirect emissions, such as employee commuting, disposal of waste generated, etc. Due to the complexity of determining them, optional Scope 3 emissions are not included in this GHG inventory except as required for employee commute.[2]

In addition, categories of common sources, such as stationary combustion, mobile combustions, etc. create a framework for the organization of the inventory. This framework facilitates the identification of appropriate quantification methodologies for emission sources, collection of data, and reporting of inventory results.

The following diagram provides a summary of the scopes and categories of emissions across the value chain of a reporting entity, as defined in the WRI GHG Protocol.

[2] Scope 3 emissions related to local government employee commuting is required information under the LGOP v1.1 (2010).

FIGURE 4: Overview of GHG Protocol Scopes and Emissions Across the Value Chain



Source: GHG Protocol - Scope 3 Corporate Value Chain Accounting Reporting Standard_041613 (WRI, WBCSD)

The general operational boundaries of the Village GHG inventory are as follows:

Scope 1: Direct GHG emissions from activities that are owned or controlled by the reporting entity.

The Village Scope 1 GHG emission categories include the following:

- stationary combustion, and
- mobile combustion.

Scope 2: Indirect GHG emissions from the generation of purchased or acquired energy, such as electricity, which is consumed by the reporting entity.

The Village Scope 2 GHG emission categories include the following:

- purchased electricity.

Scope 3: All other indirect emissions not covered in Scope 2. Not included in this report except as required for employee commute.

The complete list of emission sources in the Village GHG inventory are listed in the following tables, organized by Scope and Sector.

2.6 Scope 1 - Direct Emissions

The following sources were identified as Scope 1 sources of GHG emissions:

TABLE 4: Scope 1 Emissions Sources

Scope	Source	Emission Category
Scope 1	2009 Case Backhoe	Emissions from Off Road Vehicles
Scope 1	5 Gallon Yellow Ca ID# 20	Emissions from Off Road Vehicles
Scope 1	5 Gallon Red Can ID# 21	Emissions from Off Road Vehicles
Scope 1	2016 Ford F-550	Fleet Vehicle Emissions
Scope 1	Unidentified Gas Used[3]	Fleet Vehicle Emissions
Scope 1	Unidentified Diesel Used[3]	Fleet Vehicle Emissions
Scope 1	2014 Ford F-150 Pick Up Truck	Fleet Vehicle Emissions
Scope 1	2019 Dodge 5500	Fleet Vehicle Emissions
Scope 1	1995 International 4700	Fleet Vehicle Emissions
Scope 1	Pump Plant	Emissions from Stationary Fuel Combustion

2.7 Scope 2 - Energy Indirect Emissions

The following sources were identified as Scope 2 sources of GHG emissions.

TABLE 5: Scope 2 Emissions Sources

Scope	Source	Emission Category
Scope 2	Village of Millerton Street Lights	Emissions from Grid Electricity
Scope 2	Pump Plant	Emissions from Grid Electricity
Scope 2	Water Tower	Emissions from Grid Electricity
Scope 2	Village Hall	Emissions from Grid Electricity
Scope 2	Main Street Gazebo Outlet	Emissions from Grid Electricity
Scope 2	Veterans Park Outlet	Emissions from Grid Electricity
Scope 2	Rte 44 & 22 Outlet	Emissions from Grid Electricity
Scope 2	Denny Park (aka Eddie Collins)	Emissions from Grid Electricity

2.8 Source Exceptions

No sources of HFCs, PFCs, NF_3 or SF_6 were identified in the Village inventory boundary.

2.9 Inventory Data Collection Methodologies

Two primary methodologies were utilized to collect data.

- Data was provided by the Village staff.
- In some cases when data were not available for a particular source, individuals with knowledge of the activities provided an estimate.

The collection methodology for each source is summarized below.

[3] Fuel was pumped from Taylor Oil in small miscellaneous quantities into unspecified vehicles and cans. As of June 2020, tracking is handled via Village fuel depot system.

2.10 Scope 1 Emissions

2.10.1 Stationary Combustion

The Village provided an inventory of the building and facilities owned and or operated by the Village. Each building in the inventory was designated as being under the Village control. Therefore, the related fuel and electricity consumption are included in the inventory.

2.10.1.1 Fuel Oil

The Village staff provided the total No. 2 Fuel Oil consumption for heating in the Village buildings for year 2020 compiled from vendor's invoices, quantified in gallons of fuel. Total fuel oil usage in Village-controlled buildings was calculated and the appropriate emissions quantification methodology from the LGOP was applied to this value.

2.10.2 Mobile Combustion

The Village provided the updated fleet inventory of the vehicles owned and operated by the Village. The fleet includes both on-road and off-road vehicles. The fleet inventory also included data on the vehicle age.

2.10.2.1 Gasoline

The Village staff provided a summary of 2020 gasoline usage in gallons attributable to Village's owned and operated vehicles. The appropriate GHG emissions quantification methodology was then applied.

2.10.2.2 Diesel

The Village staff provided a summary of 2020 diesel usage in gallons attributable to Village's owned and operated vehicles. The appropriate GHG emissions quantification methodology was then applied.

2.11 Scope 2 Emissions

2.11.1 Purchased Electricity

The Village staff provided all the utility invoices for year 2020 electricity consumption by Village buildings and district street lighting. The total electricity consumption was calculated by aggregating the invoices for each electrical service account, prorated as required for the months of January and December. The appropriate GHG emissions quantification methodology was applied to the annual totals for each account.

2.12 Scope 3 Emissions

Employee commute was the only Scope 3 emissions source included.

2.12.1 Employee Commute

The Village staff provided weekly milage for each employee. The appropriate GHG emissions quantification methodology was applied.

3. Emissions Quantification Methodologies

GHG emissions are calculated by applying the appropriate methodologies from:

- ICLEI's Local Government Operations Protocol (LGOP), Version 1.1, May 2010.

In addition, GHG emissions are calculated using emission factors (EF) sourced from:

- US EPA Center for Corporate Climate Leadership - Emission Factors for Greenhouse Gas Inventories – March 9, 2018.
- NYSERDA - Department of Energy and Environmental Analysis – Statewide Electricity Emission Factor - 2014.
- US EPA Emissions & Generation Resource Integrated Database - eGRID2020.
- Fifth Assessment Report of the Intergovernmental Panel on Climate Change - IPCC AR5.

The GHG emissions quantification was performed by ICLEI's ClearPath Pro Tool, which includes the algorithms calculating the emission according to LGOP methods.

The quantification methodology for each source is summarized in the following paragraphs.

3.1 Scope 1 Emissions

3.1.1 Stationary Combustion

3.1.1.1 Fuel Oil

Emissions were calculated according to Equations 6.2 and 6.4 of LGOP by multiplying the total gallons of fuel oil usage by stationary sources by the appropriate CO_2, CH_4, and N_2O emission factors sourced from US EPA emission factors for GHG inventories. The results of these calculations in metric tonnes of CO_2, CH_4, and N_2O emissions were converted to metric tonnes of CO_2e by multiplying for the appropriate IPCC AR5 GWP factor for each GHG.

3.1.2 Mobile Combustion

3.1.2.1 Gasoline

For on-road vehicles, GHG emissions were calculated according to Equation 7.2 of LGOP by multiplying the total gallons of gasoline usage for mobile sources by the appropriate CO_2 emission factor sourced from the US EPA emission factors for GHG inventories. Emissions of CH_4, and N_2O were calculated according to Equations 7.6 and 7.7 of LGOP by multiplying the estimated mileage driven by the vehicles in each fleet category for the appropriate CH_4, and N_2O emission factors sourced from the US EPA emission factors for GHG inventories.

A similar approach was used for non-road vehicles. GHG emissions were calculated according to Equation 7.2 of LGOP by multiplying the total gallons of gasoline usage by mobile sources by appropriate CO_2, CH_4, and N_2O emission factors sourced from the US EPA emission factors for GHG inventories.

The results of these calculations in metric tonnes of CO_2, CH_4, and N_2O emissions were converted to metric tonnes of CO_2e by multiplying for the appropriate IPCC AR5 GWP factor for each GHG.

3.1.2.2 Diesel

For on-road vehicles, GHG emissions were calculated according to Equation 7.2 of LGOP by multiplying the total gallons of diesel usage for mobile sources by the appropriate CO_2 emission factor sourced from the US EPA emission factors for GHG inventories. Emissions of CH_4 and N_2O were calculated according to Equations 7.6 and 7.7 of LGOP by multiplying the estimated mileage driven by the vehicles in each fleet category for the appropriate CH_4, and N_2O emission factors sourced from the US EPA emission factors for GHG inventories.

A similar approach was used for non-road vehicles. GHG emissions were calculated according to Equation 7.2 of LGOP by multiplying the total gallons of diesel usage by mobile sources by appropriate CO_2, CH_4, and N_2O emission factors sourced from the US EPA emission factors for GHG inventories.

The results of these calculations in metric tonnes of CO_2, CH_4, and N_2O emissions were converted to metric tonnes of CO_2e by multiplying for the appropriate IPCC AR5 GWP factor for each GHG.

3.2 Scope 2 Emissions

3.2.1 Purchased Electricity

Location-based electricity GHG emissions were calculated according to Equation 6.10 and 6.11 of the LGOP by multiplying the total electricity consumption in MWh by Village-controlled buildings and street lighting for the appropriate CO_2, CH_4, and N_2O electricity emission factors sourced from NYSERDA–NYS CSC. The results of these calculations in metric tonnes of CO_2, CH_4, and N_2O emissions were converted to metric tonnes of CO_2e by multiplying for the appropriate IPCC AR5 GWP factor for each GHG.

An equivalent calculation was performed to quantify “market-based electricity emissions.” Because the Village does not make use of any direct supply of electricity from dedicated sources or of any contractual instruments that would convey specific emissions rates for the purchased electricity, the market-based electricity GHG emissions are equivalent to the location-based electricity GHG emissions.

Electric Power Transmission and Distribution Losses were also calculated, using the transmission and distribution losses factor for NYS from US EPA eGRID2020 databases. Upstate New York has a very low electricity emission intensity (234.5 lb CO_2e/MWh) compared to the US average (822.6 lb e/MWh) due to its high use of renewable energy (e.g., Hydro-electric).

3.3 Scope 3 Emissions

Scope 3 GHG emissions from Village operations were not accounted for and are not included in this Inventory except as required for employee commute. A quantification method similar to the approach used for mobile combustion was applied to calculate emissions from employee commute based on the mileage provided.

3.4 Global Warming Potentials

The Global Warming Potentials, identified in the Fifth Assessment Report of the Intergovernmental Panel on Climate Change, were used to convert the GHG emissions associated with Airport activities into carbon dioxide equivalents (CO_2e).

The Global Warming Potentials applied to the Village GHG inventory are the following:

TABLE 6: Global Warming Potentials

Name	Chemical Formula	SAR GWP Value
Carbon Dioxide	CO_2	1
Methane	CH_4	28
Nitrous oxide	N_2O	265

3.5 Quantification of Emissions

3.5.1 Scope 1 GHG Emissions

The Village Total Scope 1 Emissions were quantified as 44.75 metric tonnes (t) CO_2e. The quantity includes contributions of the following GHGs:

TABLE 4: Scope 1 GHG Emissions

Greenhouse Gas	t GHG	t CO2e
Carbon Dioxide (CO_2)	46.2858622	46.2858622
Methane (CH_4)	0.0016655	0.046634
Nitrous Oxide (N_2O)	0.00011546	0.0305969
Total		46.363093

The distribution of Scope 1 emissions by sector is shown in percentage and in tCO2e in the charts below.

FIGURE 5: Scope 1 Emissions by Sector, in Percentage

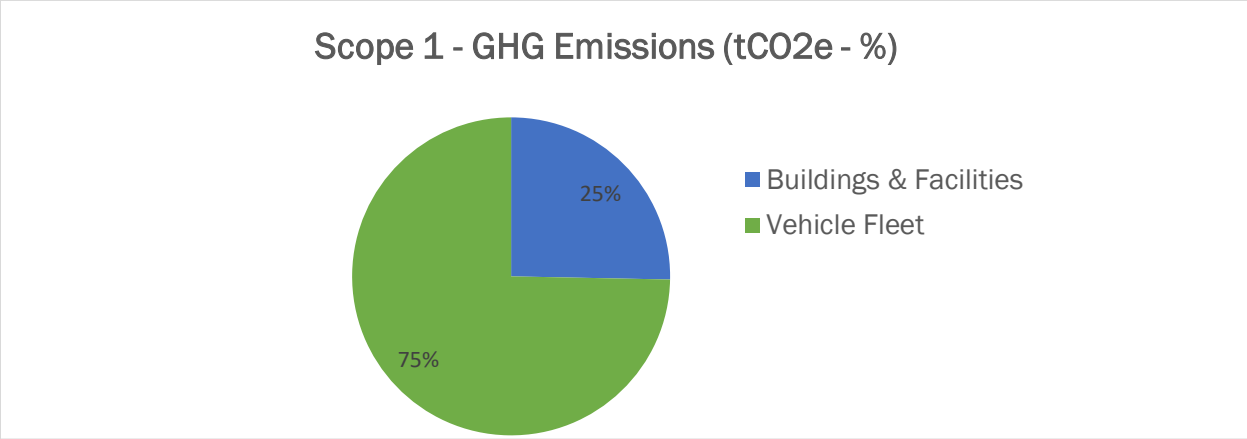
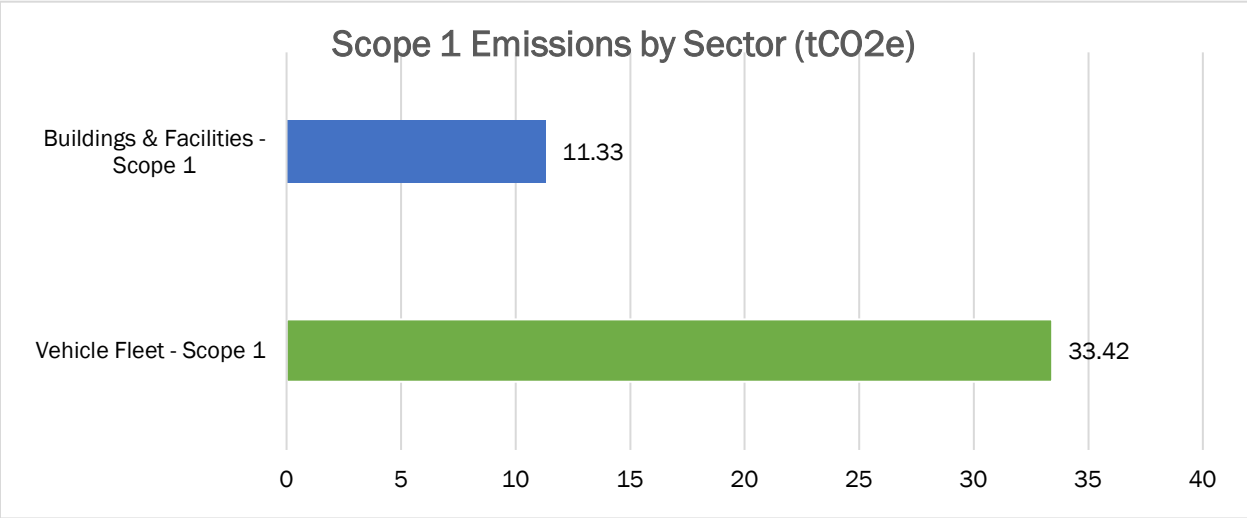


FIGURE 6: Scope 1 Emissions by Sector (tCO_2e)



The results show that emissions from the vehicle fleet amount to nearly three times the number of emissions from buildings and facilities.

The following paragraphs detail the sources of GHG emissions in each sector, identifying the contribution by each fuel.

3.5.1.1 Direct Stationary Combustion Emissions – Building and Facilities

The Village direct stationary combustion emissions were quantified as 11.33 t CO_2e. This stationary combustion quantity comes from fuel oil.

3.5.1.2 Direct Mobile Combustion Emissions – Vehicle Fleet

The Village direct mobile combustion emissions were quantified as 33.42 t CO_2e. This mobile combustion quantity includes contributions from the following fuels:

TABLE 8: Direct Mobile Combustion Emissions by Fuel

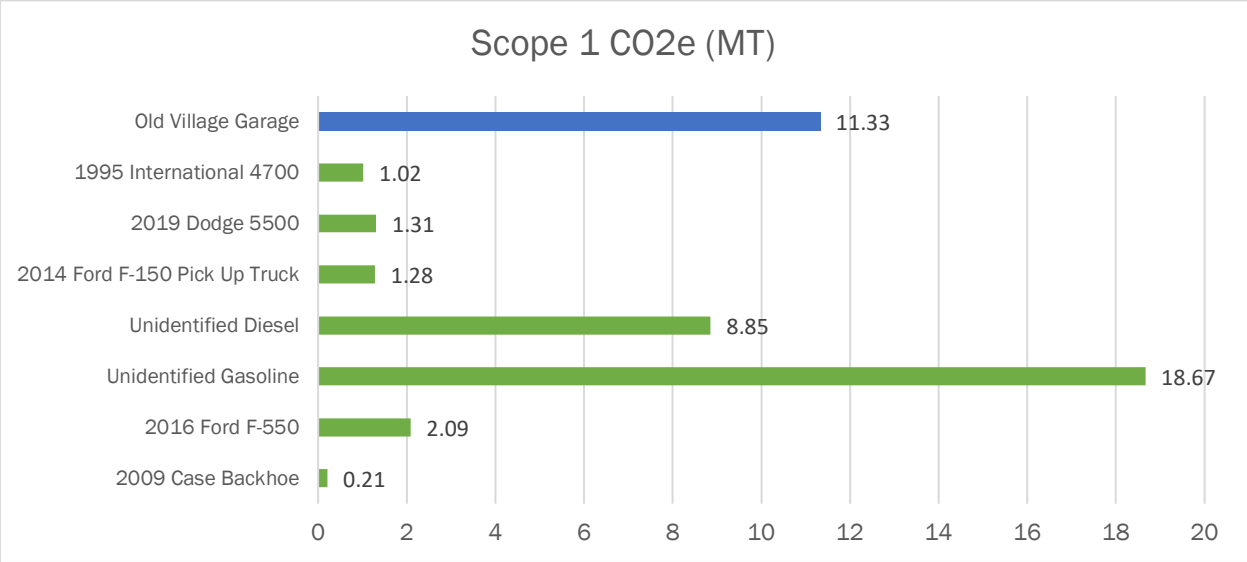
Mobile Combustion Emissions	
Fuel	t CO_2e
Gasoline	20.70
Diesel	14.33
Total	**35.03**

3.5.2 Scope 1 Emissions by Source

The following table and charts show the Scope 1 emissions from each specific source, as identified in the inventory. For each source, the energy usage responsible for the emissions is also reported.

The Scope 1 results displayed in a bar diagram:

FIGURE 8: Total Scope 1 Emission by Source (tCO_2e)



The detailed breakdown above indicates Unidentified Gasoline used as responsible for the largest share of emissions.

3.5.3 Scope 2 GHG Emissions – Purchased Electricity

All Scope 2 emissions reported are from purchased electricity. Total Scope 2 Emissions were quantified as 16.07 metric tonnes t CO_2e, including contributions of the following GHGs:

TABLE 10: Scope 2 GHG Emissions

Greenhouse Gas	t GHG	t CO2e
Carbon Dioxide (CO_2)	16.0022699	16.0022699
Methane (CH_4)	0.00109647	0.03070111
Nitrous Oxide (N_2O)	0.00013706	0.03632051
Total		16.069292

The distribution of Scope 2 emissions by sector is shown in percentage and in tCO_2e in the charts below.

FIGURE 9: Scope 2 Emissions by Sector, in Percentage

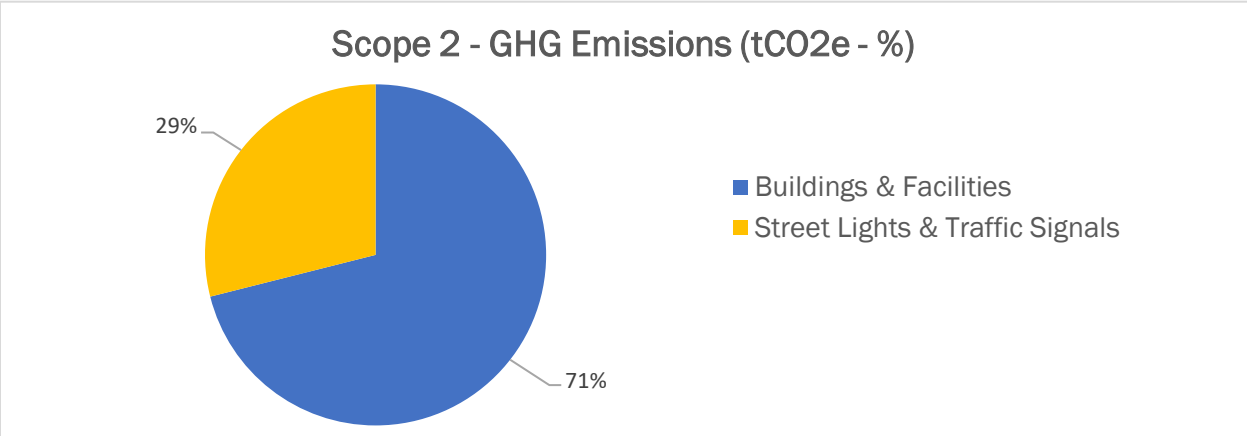
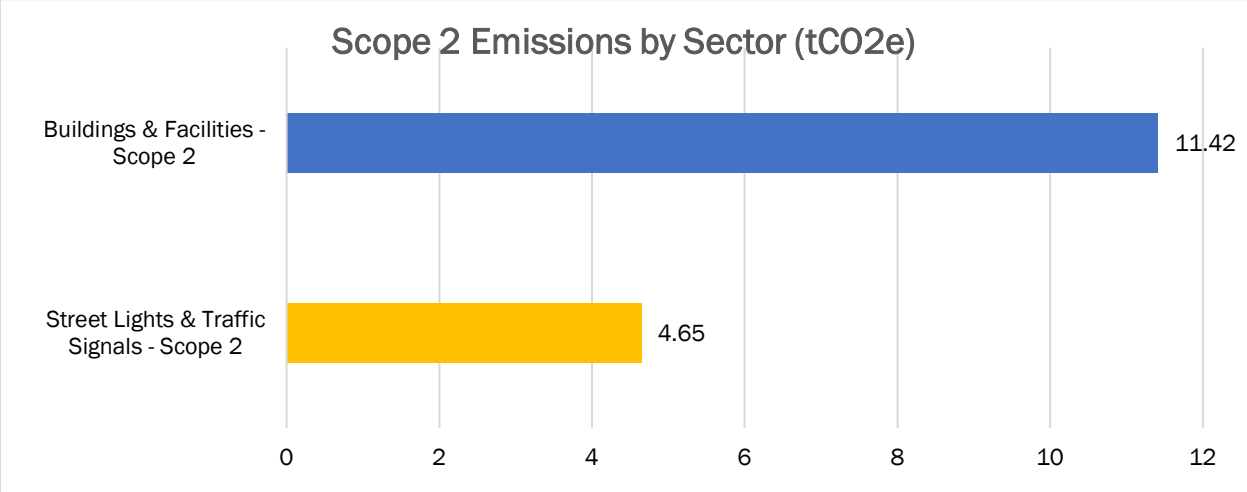


FIGURE 10: Scope 2 Emissions by Sector (t CO_2e)



The results indicate that electricity consumption by buildings and facilities is higher than that by street lights.

3.5.4 Scope 2 Emissions by Source

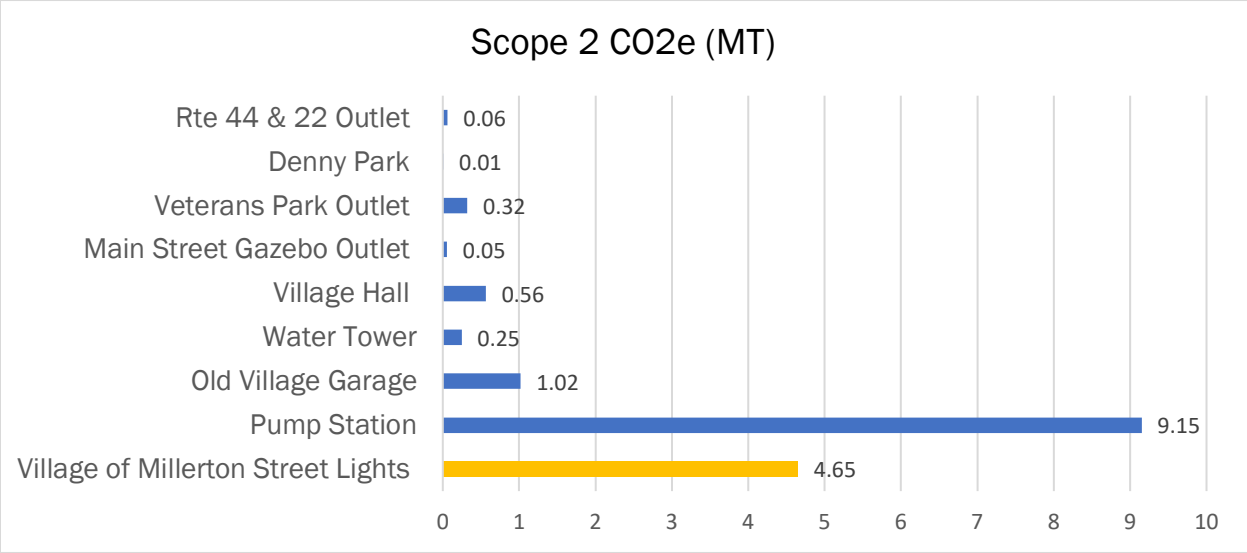
The following table and chart show the Scope 2 emissions from each specific source, as identified in the inventory. For each source, the energy usage responsible for the emissions is also reported, expressed in kWh of electricity used.

TABLE 11: Scope 2 Emissions from Each Specific Source (tCO_2)

Source	Sector	Energy Use (kWh)	GHG Emissions (tCO_2e)
Old Village Garage	Emissions from Grid Electricity	9,560	1.02
Pump Plant	Emissions from Grid Electricity	86,040	9.15
Water Tower	Emissions from Grid Electricity	2,314	0.25
Village Hall	Emissions from Grid Electricity	5,283	0.56
Main Street Gazebo Outlet	Emissions from Grid Electricity	517	0.05
Veterans Park Outlet	Emissions from Grid Electricity	3,016	0.32
Rte 44 & 22 Outlet	Emissions from Grid Electricity	574	0.06
Denny Park	Emissions from Grid Electricity	59	0.01
Village of Millerton Street Lights	Emissions from Grid Electricity	43,718	4.65

The same results displayed in a bar diagram:

FIGURE 7: Scope 2 Emission by Source (tCO_2e)



The results show that the Pump Plant is responsible for the majority of the Scope 2 emissions, followed by street lights. The remaining buildings and facilities produce relatively lower emissions.

3.5.5 Scope 3 GHG Emissions

Total Scope 3 Emissions were not quantified for the GHG Inventory except as required for employee commute. The Village Total Scope 3 Emissions were quantified as 7.64 metric tonnes (t) CO_2e.

3.6 GHG Inventory Results

The Village's total Scope 1 GHG emissions for 2020 amounted to 44.75 metric tonnes carbon dioxide equivalents (t CO_2e). These total emissions consist of stationary combustion of fuel oil gas heating and mobile combustion of gasoline and diesel consumption by the Village fleet vehicles. As a point of reference, 44.75 t CO_2e is approximately equivalent to the GHG

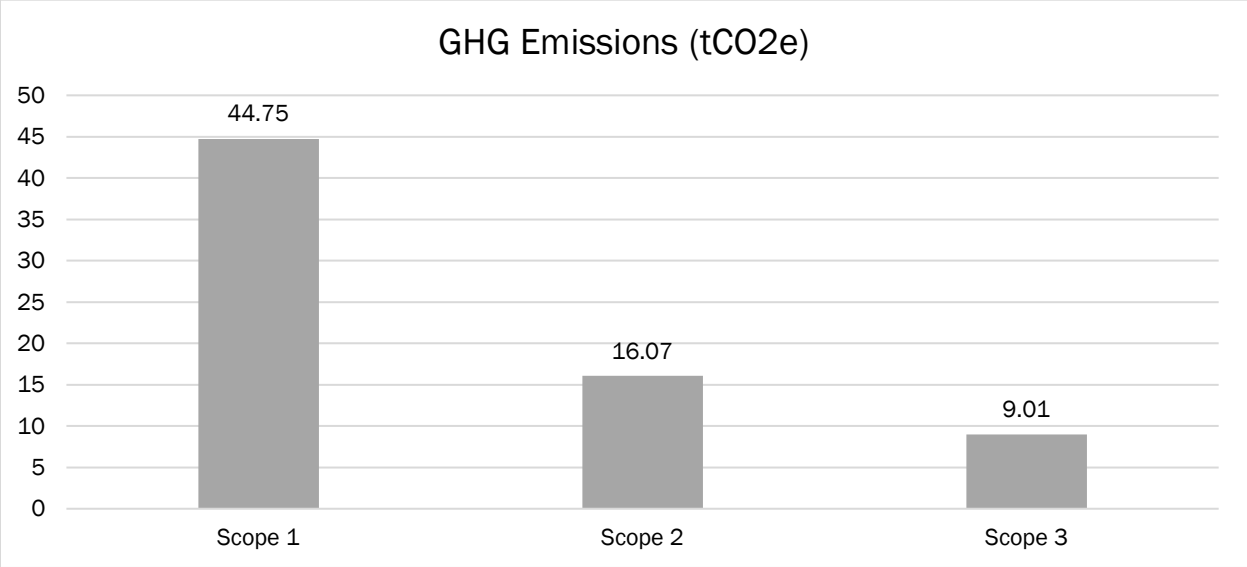
emissions produced by an average passenger vehicle driven 111,000 miles, according to the US EPA's Greenhouse Gas Equivalencies Calculator.

The Village's total Scope 2 GHG emissions for 2020 amounted to 16.07 metric tons carbon dioxide equivalents (t CO_2e). These emissions are associated with electricity usage by the Village and are roughly equivalent to the GHG produced from electricity used by three homes for one year.

TABLE 12: Total GHG Emissions by Scope (tCO_2e)

Activity/Source	CO2e
Scope 1	44.75
Scope 2	16.07
Scope 3	9.01
Total	**69.83**

FIGURE 12: Total GHG Emissions by Scope (tCO_2e)



The distribution of emissions by sector is shown in percentage and in tCO_2e in the charts below.

FIGURE 13: Total GHG Emissions by Sector in Percentage

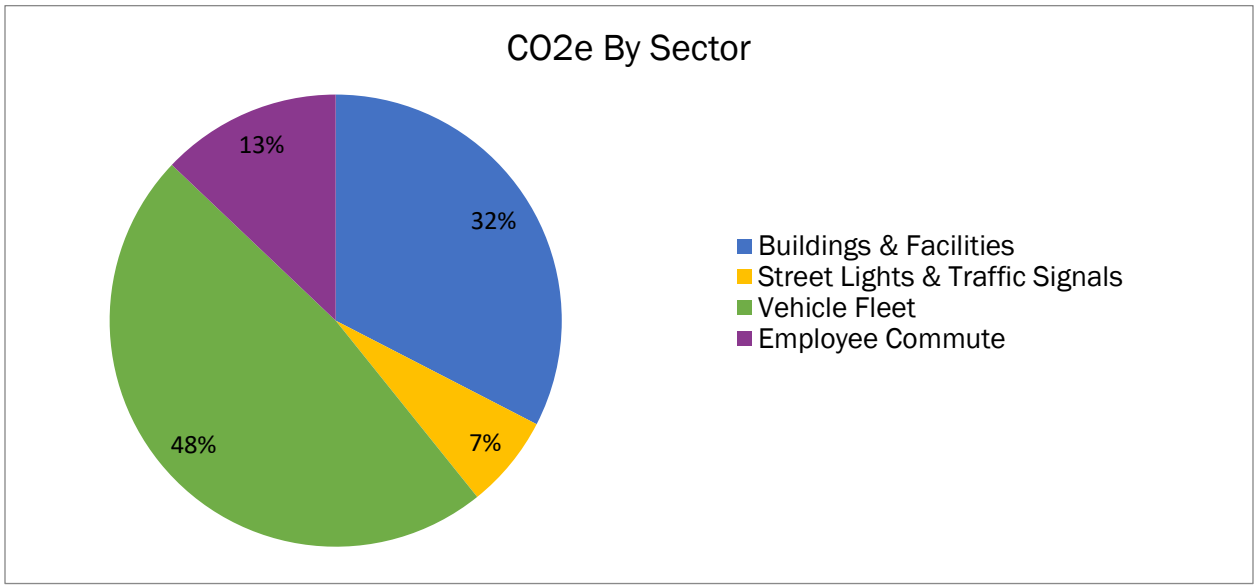
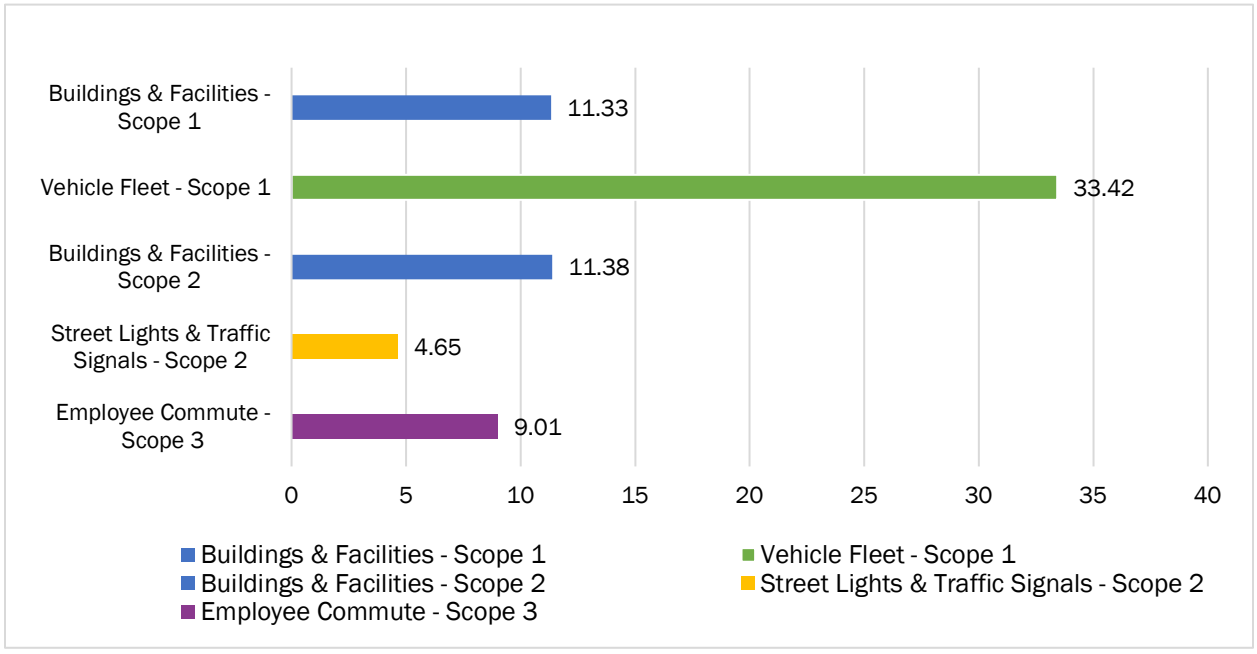


FIGURE 14: Total GHG Emissions by Sector (tCO_2e)



The results highlight fleet vehicle emissions as the largest source of GHG emissions. The Scope 1 and Scope 2 emissions from buildings and facilities rank as the next two largest sources. Emissions from employee commute rank fourth, followed by electricity consumption by streetlights.

4. GHG Inventory Base Year

A GHG inventory base year provides a standardized point of reference against which future inventories can be compared to identify changes, such as reductions, or track progress toward an emission goal or action plan. The Village has selected year 2020 as the GHG inventory base year.

4.1 GHG Inventory Forecast

Once the Base Year has been selected, the next step is to select one or multiple future years by which the Village wishes to reach certain emissions reduction goals. The GHG emissions for that future year are estimated presuming Business As Usual (BAU) growth of emissions from the base year. BAU refers to a scenario where the Village pursues no measures or actions aimed at reducing energy consumption and GHG emissions.

The Village has selected to develop BAU projections of GHG emissions inventory at 1-, 5-, and 10-year intervals from the Base Year. Emissions forecast for each one of these target years will be used as baseline to select appropriate reduction targets and to evaluate the actual results that could be achieved by implementing various reduction measures.

In order to develop the BAU scenario, First Environment evaluated several factors that could affect the GHG emissions independently from any action planned and implemented by the Village. Among the many possible factors, the following were reviewed for analysis and discussion:

- weather data normalization;
- Village of Millerton Demographic Trends;
- energy use in NYS;
- carbon intensity of electric grid in NYS.

4.2 Weather Data Normalization

The Village's location in the Hudson Valley makes its energy and fuel use, as well as its GHG emissions in a given year, dependent upon the weather experienced during that year, both in terms of temperature and precipitation. Besides average temperature, the number of Heating Degree Days (HDD) and Cooling Degree Days (CDD) are useful parameters frequently used to compare energy usage in buildings. HDD is the number of degrees that a day's average temperature is below 65°F, which is the reference temperature below which buildings need to be heated. When the mean daily temperature is above 65°F, HDD is zero. Similarly, CDD data can be used to estimate the energy required for cooling and is defined as the number of degrees that a day's average temperature is above 65°degrees. When the mean daily temperature is lower than 65°F, CDD is zero.

Due to the complexity of modeling the normalization to HDD/CDD and its possible effects on fuels, electricity consumption and therefore GHG emission, no quantitative correction of the 2020 GHG inventory is being performed.

4.3 Village of Millerton Demographic Trends

One factor that could indirectly affect the LGO GHG emissions could be the Village demographic trend in the next decades. While it is unlikely a direct relation, it is reasonable to link the GHG emissions to the demographic trends, assuming for example that a considerable

increase in the Village population would lead to an increase in the size of the LGO infrastructure, service fleet, road maintenance and repairs services, Village staff, etc.

Demographic projections specific for the Village of Millerton could not be sourced, so an estimate of actual population trend for the Village were inferred from a combination of Dutchess County population projections and North East historical trend.

The following data is extracted from a study conducted by Cornell University, Program on Applied Demographics[4], providing projection of population growth in New York State from 2010 to 2035. The data is organized by County and the results for Dutchess County are reported in the table below.

TABLE 5: Dutchess County Population Growth Projections 2010 - 2035

Year	2010	2015	2020	2025	2030	2035	2040
Projected Population	297,488	303,374	309,985	316,091	320,734	323,935	326,402
Variation		5,886	6,611	6,106	4,643	3,201	2,467
Variation %		1.98%	2.18%	1.97%	1.47%	1.00%	0.76%
Variation %/year		0.40%	0.44%	0.39%	0.29%	0.20%	0.15%

The demographic projection shows an increase in population in the county at an annual rate of ~0.4% until 2025 then decreasing to 0.2-0.15 percent.

The following US Census information for North East illustrates the population trend from 1970 to 2020, showing population fluctuations but no steady increase or decrease.

TABLE 14: Village of Millerton Population Historical Data 1970 - 2020

Year	1970	1980	1990	2000	2010	2020
Millerton Population	1,042	1,013	884	925	958	903

Source: U.S. Census Bureau

The historical data seems to indicate that Village is not yet following the population growth projected for the County. It is anticipated that the Village may grow its population related to improved infrastructure (e.g., wastewater treatment). However, it does not seem the potential Village's population change will be significant and, as such, the demographic trends are not going to be included in the GHG inventory forecast.

4.4 Energy Consumption in NYS

The U.S. Energy Information Administration (EIA) provides a large amount of information on energy and fuel usage in the U.S., detailed according to numerous parameters such as economic sectors, user categories, and geographic location. Both historic and forecast data is available and the latter was reviewed to extrapolate energy usage change trends that could be useful to project Village energy use and GHG emissions in the future.

[4] https://pad.human.cornell.edu/counties/projections.cfm

In particular, data from the "2021 EIA Energy Outlook[5]" detailing New England region projected energy consumption for 2020 to 2050[6] were reviewed and the CAGR calculated.

The following change rates were identified for use in the Village's GHG 10 year inventory forecast for the period from 2020 to 2031:

TABLE 15: EIA Energy Outlook Consumption for 2017 to 2028

GHG Inventory Sector	Energy Source	Projected Consumption Change Rate (%/year)	Information Source
Buildings and Facilities	Electricity Consumption	-0.03%	EIA Forecast for Residential Commercial Energy Use
Buildings and Facilities	Distillate Fuel Oil - Stationary	-2.87%	EIA Forecast for Residential Commercial Energy Use
Fleet	Gasoline	-1.51%	EIA Forecast for Transportation Energy Use
Fleet	Diesel	-0.78%	EIA Forecast for Transportation Energy Use
Fleet	Construction	-0.78%	EIA Forecast for Transportation Energy Use

It can be observed that in general, the projected consumption trends show a decrease in energy usage in both stationary and mobile sources.

4.5 Carbon Intensity of Electricity Grid in NYS

Besides the data on energy consumption, key factors that will affect the GHG inventory result are the specific emission factors of the various energy sources included in the inventory.

To simplify the approach, we assumed that fuel emission factors would not change in the near future. This is reasonable since fuel emission factors are strictly linked to the chemical composition of fuels and these are not projected to change significantly in the near future.

The electricity grid emission factors are instead steadily decreasing due to increase of renewable energy generation and shift from coal to natural gas for the fossil fuel portion. The steady decrease of nuclear energy in the generation mix on the other hand could lead to a temporary increase in grid emissions before sufficient renewable energy is deployed to replace the lost generation power.

The forecast of the grid emission factor considers the historical trend of the NYSERDA GHG factor for NYS, from 2010 to 2014, published in the CSC guidance for Community GHG inventories[7] and U.S. EPA eGRID emission intensity data for electricity generation in the New York Upstate subregion, from 2010 to 2020[8].

[5] https://www.eia.gov/outlooks/aeo/
[6] https://www.eia.gov/outlooks/aeo/data/browser/
[7] http://www.dec.ny.gov/docs/administration_pdf/ghgguide.pdf
[8] US EPA eGRID 2014 (Calendar Year 2010) Summary Tables, https://19january2017snapshot.epa.gov/energy/egrid-2014-summary-tables_.html and eGRid 2020 Summary Tables, Summary Data | US EPA.

TABLE 16: NYSERDA New York Average Grid Carbon Intensity

Year	Grid Emission Factor (lbs CO_2e/MWh)	Annual Rate of change (%/year)
2010	826	-6.73%
2011	826	
2012	625	
2013	625	
2014	625	

The CAGR calculated for the short period was -6.73 percent, annual percent rate of decrease. Because of the short timeframe of historical data available and the significant rate decrease, the data was compared to U.S. EPA's eGRID emission intensity data for electricity generation in the New York Upstate subregion, from 2010 to 2020.

TABLE 17: NYS Estimated GHG Emissions from Fuel Combustion – Electricity Generation

Year	GHG Emissions (lbs CO_2e/MWh)	Annual Rate of change (%/year)	Annual Rate applied in forecast
2010	548.37	-5.7%	**-5.7 %**
2020	234.5		

The latest eGRID information show a somewhat lower rate of decarbonization compared to the older NYSERDA information. Nonetheless, this data confirms the steady decrease of GHG emissions from energy generation on a long-time span of historical data. It must be also taken into account that the 2020 eGRID information was used in calculating the inventory's Scope 2 emissions. For consistency, the eGRID compound rate of -5.7 percent/year is deemed more appropriate to reflect the decreasing trend of the electric grid carbon intensity and apply it to forecast the Village's GHG Inventory for the next 10 years.

5.0 GHG Inventory Forecast: Business as Usual

As previously mentioned, a BAU forecast refers to a scenario where the Village pursues no measures or actions aimed at reducing energy consumption and GHG emissions. Two factors were identified that could potentially affect the BAU scenario, and both were included in a detailed analysis: 1) EIA Energy Consumption Trend and 2) Electricity Grid Carbon Intensity Variation.

5.1 BAU – EIA Energy Consumption Trend and Electricity Grid Carbon Intensity Variation

This forecast presumes no significant changes in Village emissions due to weather or population trends. This forecast applies the EIA 2020-2050 energy consumption outlook trends (decreasing) to the various categories of energy and emissions included in the Village's GHG inventory base year. This forecast also applies the expected decrease in carbon intensity of the NYS electricity grid, projected at –5.7 percent/year, thus reducing the electricity grid EF.

While this forecast does not specify any specific reduction implemented by the Village government, the actions are somewhat implied within the EIA projections where the decrease in energy consumption and associated emissions is predicted because of technology advancement, mandated stricter energy efficiency, emissions requirements at Local, State and Federal level, and behavioral changes by end-users in the community. The reduction due to projected consumption change could be significant for all scopes.

This BAU forecast also benefits from the progressive de-carbonization of the NYS grid electricity. Therefore, achieving the reduction targets will be in part facilitated by the measures implemented by the electric utilities at state level. The reduction due to the progressive de-carbonization of the NYS grid electricity will be important for Scope 2 emission, but it will have no effect on Scope 1 and Scope 3 – Employee Commute emissions.

As such, this scenario should be interpreted as a prediction of the results that could be achieved by the Village if it correctly plans and implements measures in line with the expected trend in energy efficiency, renewable energy, and general technology advancement.

TABLE 18: BAU – EIA Energy Consumption Trend, Electricity Grid EF Variation - GHG Emissions 2020 – 2031 (tCO_2e)

Scope	Source	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Scope 1	Buildings - Fuel Oil No. 2	11	11	11	10	10	10	10	9	9	9	8	8
Scope 1	Fleet Vehicle - Gasoline	20	20	19	19	19	18	18	18	18	17	17	17
Scope 1	Fleet Vehicle - Diesel	13	13	13	13	13	13	13	13	12	12	12	12

Scope	Source	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Scope 1	Fleet-Large Utility	0	0	0	0	0	0	0	0	0	0	0	0
Scope 2	Buildings - Electricity Energy	11	11	10	10	9	9	8	8	7	7	6	6
Scope 2	Streetlights - Electricity Energy	5	4	4	4	4	3	3	3	3	3	3	2
Scope 3	Employee Commute	9	9	9	9	8	8	8	8	8	8	8	8

TABLE 19: BAU - EIA Energy Consumption Trend, Electricity Grid EF Variation - GHG Emissions 2020 – 2031 by Scope (tCO_2e)

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Total Scope 1 Emissions (tCO2e)	44	44	43	42	42	41	41	40	39	38	37	37
Total Scope 2 Emissions (tCO2e)	16	15	14	14	13	12	11	11	10	10	9	8
Total Scope 3 Emissions (tCO2e)	9	9	9	9	8	8	8	8	8	8	8	8
Total GHG Emissions (tCO2e)	69	68	66	65	63	61	60	59	57	56	54	53

TABLE 20: BAU - EIA Energy Consumption Trend, Electricity Grid EF Factor Variation - GHG Emissions Variation to Base Year 2020 (%)

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Scope 1 change to 2020 Baseline (%)	0%	0%	-2%	-5%	-5%	-7%	-7%	-9%	-11%	-14%	-16%	-16%
Scope 2 change to 2020 Baseline (%)	0%	-6%	-13%	-13%	-19%	-25%	-31%	-31%	-38%	-38%	-44%	-50%
Scope 3 change to 2020 Baseline (%)	0%	0%	0%	0%	-11%	-11%	-11%	-11%	-11%	-11%	-11%	-11%
Total GHG Emissions change to 2020 Baseline (%)	0%	-1%	-4%	-6%	-9%	-12%	-13%	-14%	-17%	-19%	-22%	-23%

The results of the forecast are also shown in the charts below:

FIGURE 18: BAU – EIA Energy Consumption Trend, Electricity Grid EF Variation - GHG Emissions 2020 – 2031 (tCO_2e)

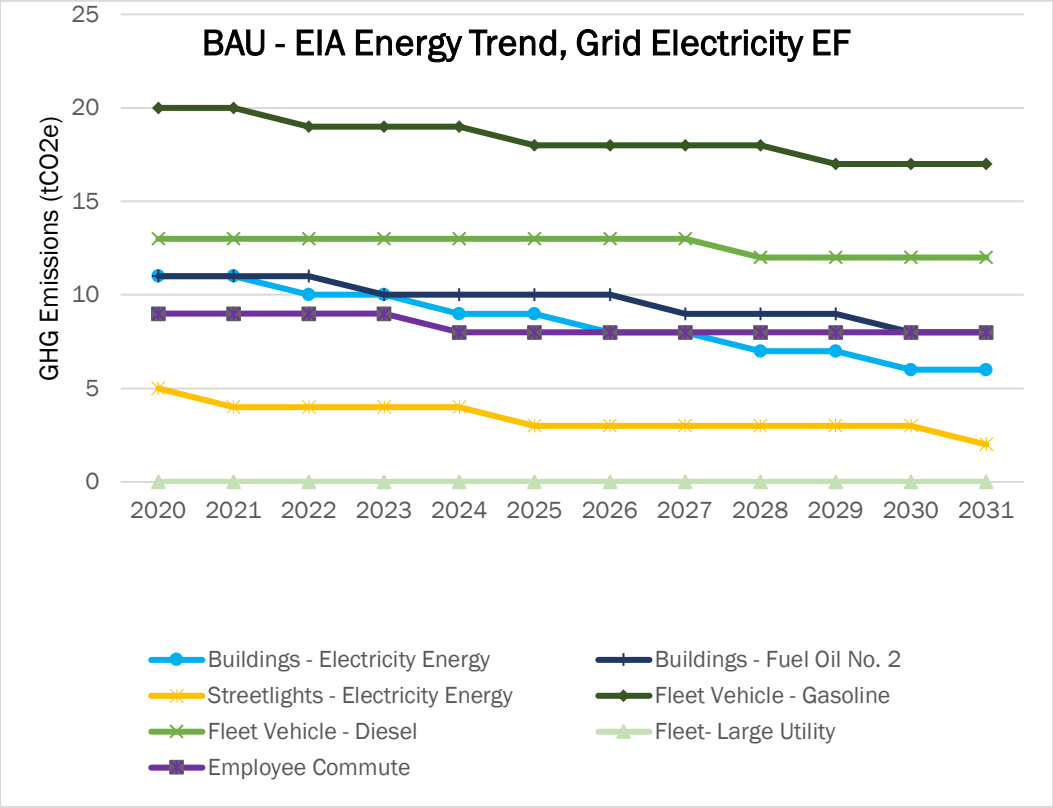


FIGURE 19: BAU - EIA Energy Consumption Trend, Electricity Grid EF Variation - GHG Emissions 2020 – 2031 by Scope (tCO_2e)

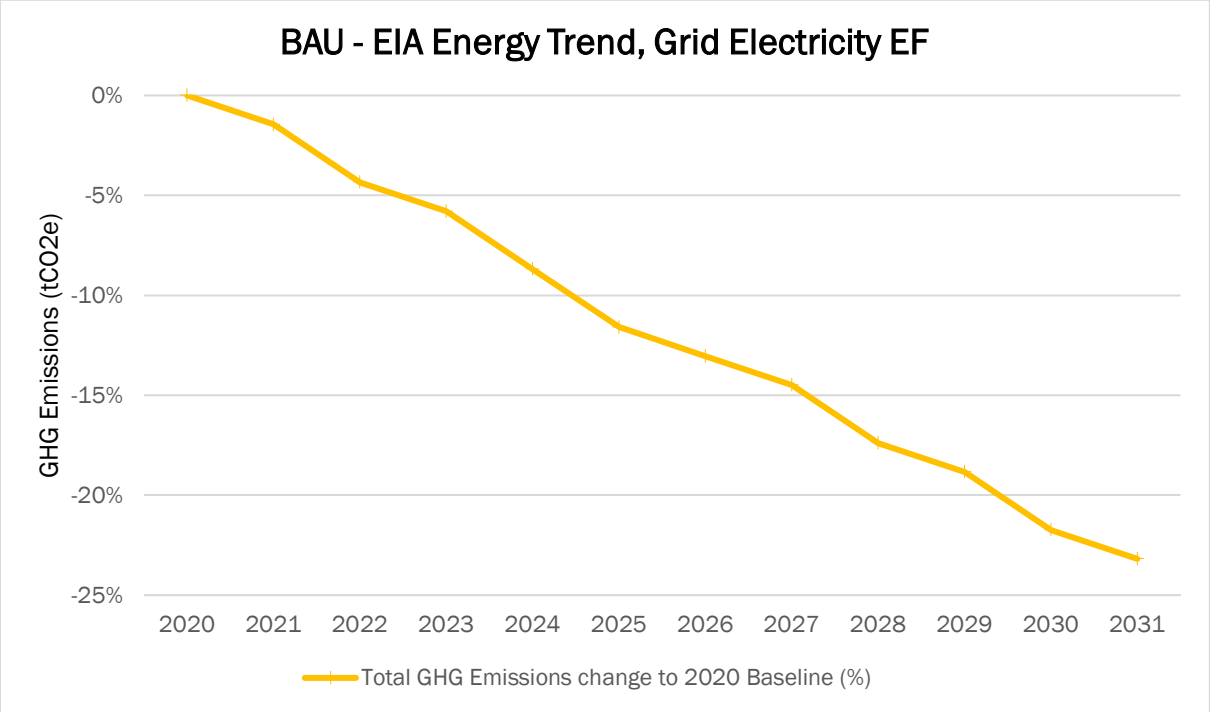
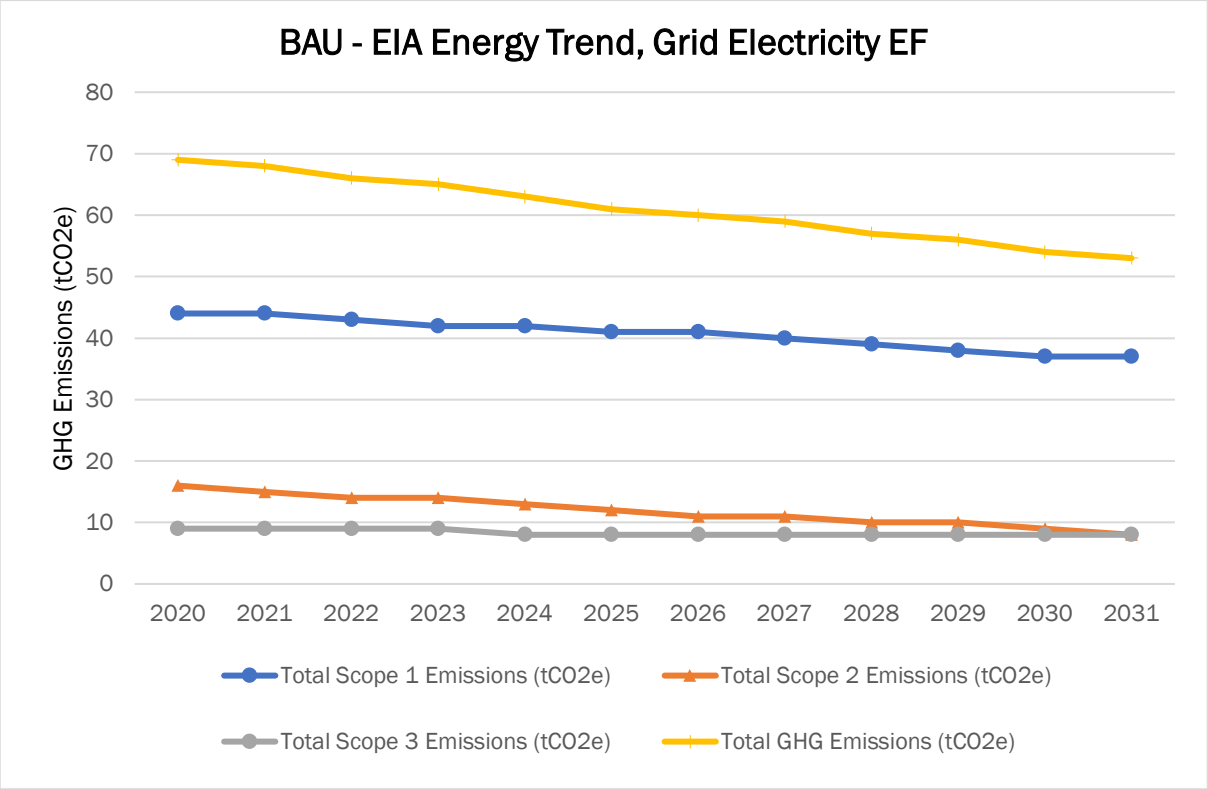


FIGURE 20: BAU - EIA Energy Consumption Trend, Electricity Grid EF Factor Variation - GHG Emissions Variation to Base Year 2020 (%)



The results show that total GHG emissions are expected to be reduced by 23 percent by 2031, as shown by Figure 20. The decrease is almost entirely due to reductions of Scope 1 and Scope 2 emissions (stationary and mobile combustion and electricity). These reductions can be attributed to energy consumption trends and decreased electricity grid emission intensity. There is a minor reduction in Scope 3 emissions (employee commute) as well.

The results presented in this report will be used as a basis for accessing and prioritizing the proposed climate actions presented in the forthcoming joint Town of North East and Village of Millerton's Climate Action Plan. The projected climate action emission reductions will be used to assess progress to meet the Village's emission reduction targets.

6. Uncertainty Assessment and Quality Assurance

With regard to a GHG Inventory, quality refers to the general accuracy and consistency between an organization's actual emissions and quantified emissions. The difference between actual and quantified emissions results from uncertainty and error introduced by activities such as data collection, data management, calculations, and reporting. Inventory quality is impacted as data progresses from individual sources to the final report.

The inventory contains reporting uncertainty resulting from the potential for errors to be introduced in certain activities. Overall uncertainties are as follows:

- Not all data were received from primary sources (i.e., invoices) and backup data were not provided for the information recorded. Thus, errors present in the initial data will be transferred to errors in the emission calculations.
- Default emission factors, though used as a best practice, may present a level of uncertainty from the actual emissions.

7. Verification of this Report

This report, the information it contains, and the data it is based upon have not been verified by an external third party.

8. Acknowledgement

This project was funded in part by the Climate Smart Community Grant Program, Title 15 of the Environmental Protection Fund through the New York State Department of Environmental Conservation.