

An aerial photograph of a town, likely Newfield, is shown with a semi-transparent green overlay. The text is centered on the page in white. The background shows a mix of residential and commercial buildings, streets, and green spaces.

Town of Newfield Greenhouse Gas Emissions Inventory:

A Baseline Evaluation of Government
Operations during 2019

Compiled by
Cornell Cooperative Extension
Tompkins County

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An aerial photograph of a city, showing a dense grid of buildings and streets. The image is overlaid with a semi-transparent gradient that transitions from a dark green at the top to a dark blue at the bottom. The word "INTRODUCTION" is printed in white, bold, uppercase letters across the upper portion of the image.

INTRODUCTION

This evaluation of greenhouse gas (GHG) emissions in the Town of Newfield, New York, from 2019, serves as a preliminary step in creating strategies to reduce GHG emissions. It is important for local governments to understand their town emission levels and their impacts as it allows them to prioritize actions when creating a local Climate Action Plan to mitigate the effect of these emissions.

This information was compiled per the [Local Government Operations Protocol \(LGOP\), version 1.1](#). The LGOP is a policy framework that provides guiding methodologies to help local governments calculate and understand the GHG emissions of their operations. The LGOP was developed by the International Council for Local Environmental Initiatives and the Climate Registry in collaboration with the California Climate Action Registry and the California Air Resources Board.

This Greenhouse Gas Inventory was prepared as a component of the Town of Newfield's participation in the Climate Smart Communities program of the New York State Department of Environmental Conservation. The inventory was prepared by Rachel Zevin on behalf of the Town of Newfield and under the guidance of Heather McCarty and Blixty Taetzsch

Communities that have been certified as Climate Smart Communities are committed to reducing GHG emissions and improving climate resilience, which allows them to reduce long-term costs and adapt to a changing climate.

Greenhouse Gas Emission and Energy Use in New York State

Greenhouse gases are gases that trap heat in the Earth's atmosphere when they accumulate in high concentrations. Common greenhouse gases include carbon dioxide, methane, nitrous oxide, and fluorinated gases, which are synthetic gases produced by industrial processes. These gases are released into the atmosphere in several ways: everyday activities of all kinds can have a direct impact on greenhouse gas emissions and climate change.

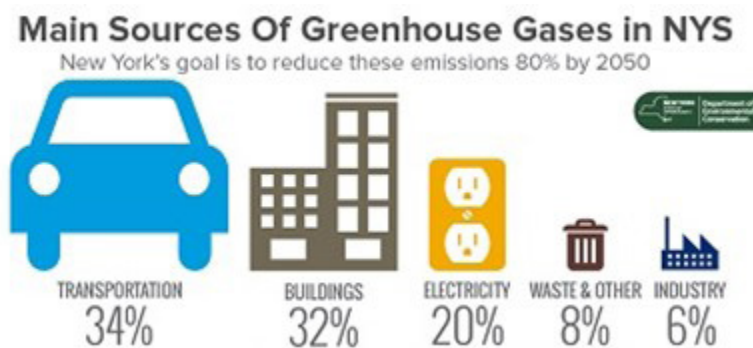


Image source: New York Department of Environmental Conservation http://www.dec.ny.gov/images/administration_images/ghgsrscsm.jpg

Greenhouse gas emissions in New York State come mostly from transportation (34%). This includes all travel of people and goods by cars, trucks, ships, airplanes, trains, and other vehicles. Greenhouse gases in the state are also produced by the industrial sector from the manufacturing processes that create the goods and raw materials that we use every day. Residential and commercial activity contributes as well, mostly resulting from heating, cooking, wastewater management, and refrigerant leaks. GHG emissions in rural areas of New York State also come from soil management of agricultural land that releases nitrous oxide into the atmosphere. These activities include the use of synthetic and organic fertilizers, growing nitrogen-fixing crops, and various irrigation processes. Livestock also contribute to GHG emissions, as their natural digestive processes produce methane. This can be exacerbated or mitigated by proper management of livestock waste.

Greenhouse gases, such as water vapor, carbon dioxide, and methane occur naturally in small percentages and help the atmosphere retain enough heat to sustain life. This balance is disrupted by greenhouse gas emissions from human activity, which cause the atmosphere to retain more energy from the sun than it normally would. These GHG emissions combine to “thicken the Earth’s blanket” and change climatic conditions.

Once greenhouse gases are emitted into the atmosphere, they can linger for decades or even centuries, even if emissions are reduced in the future. Some gases have a greater impact on the atmosphere than others. For example, methane gas has a higher 100-year global warming potential (28-36x greater) on the atmosphere than carbon dioxide, but it dissipates in ~12.4 years. Carbon dioxide can potentially remain in the atmosphere for 1000s of years as CO₂ is not destroyed over time, but instead slowly moves among different parts of the ocean–atmosphere–land system making it difficult to approximate average lifetime in the atmosphere.

A variety of research, including [New York’s Climate Aid report \(2011, 2014\)](#) and the [National Climate Assessment \(2014\)](#), has shown that impacts of climate change have already begun to occur in New York State. Climate change manifests as changes in temperature, precipitation, sea levels, seasonal changes, and severe weather events. These changes have direct effects on the health of humans, animals, and plants in New York State.

Since 1970, the average annual temperature has risen by 2.4°F in New York State. Average winter temperatures have increased by over 4.4°F. Climate change has also resulted in increased precipitation in the winter, and less in the summer. Climate change also includes climate events beyond global warming, namely an increase in severe weather events, such as superstorms and hurricanes. Between 1958 and 2010, the number of very heavy precipitation events increased by over 70% in the United States.

New York’s coastal areas have seen a sea level rise of over a foot since 1900. Sea level rise is a result of climate change, which causes warmer temperatures that melt polar caps, glaciers, and land-based ice. Sea level rise is especially imminent in New York State, where the rate of rise (1.2 inches per decade) is nearly twice as high as the global rate (0.7 inches per decade). Climate change has also resulted in variation in seasonal patterns. In New York State, for example, spring

begins a week earlier than it once did. The first leaf date in autumn is, correspondingly, over a week late.

It is important to understand how greenhouse gas emissions are affecting our region to create strategies for reducing future greenhouse gas emissions. Modeling has projected that climate change will continue in New York State. The region will experience more precipitation, more variability in precipitation, and warmer temperatures. By 2020, average precipitation increased by ~8%, compared to the 1971-2000 period, and annual average temperatures will increase by 3°F.

Climate change also negatively impacts the availability of clean air, water, and food supplies. Changing environmental conditions in New York State also help insects such as mosquitoes and ticks spread infectious diseases such as West Nile virus and Lyme disease. Human health is also affected directly by the changing climate, especially elderly and children, who are already vulnerable. This can be caused by things such as increased pollen production, ground-level ozone formation, or the presence of other forms of air pollution. All these factors exacerbate asthma, allergies, and other respiratory conditions.

In summary, greenhouse gas emissions and the resulting climate change have already begun to affect the health and sustainability of communities in New York State. These negative effects can be partially mitigated by reducing greenhouse gas emissions and the activities that create them. This Greenhouse Gas Inventory for the Town of Newfield, New York, serves as a first step in taking action to plan for a healthier and more environmentally responsible town that may be enjoyed for generations to come.

An aerial photograph of a city, likely Los Angeles, showing a dense urban landscape with buildings, roads, and green spaces. The image is overlaid with a semi-transparent blue-green gradient, which is darker at the top and lighter at the bottom. The text 'METHODODOLOGY & RESULTS' is centered in the upper half of the image in a white, sans-serif font.

METHODODOLOGY & RESULTS

The calculations in this report were performed using the Local Greenhouse Gas Inventory Tool: Government Operations Module, provided by the US Dept of Environmental Conservation. The tool is based on the Local Government Operations Protocol, which serves as a national standard for municipal greenhouse gas inventories across the country. Buildings emissions data for the Town of Newfield were collected from the New York State Electric and Gas Corporation (NYSEG) over a 12-month period. Vehicle emissions data was gathered through municipal gas logs, bills, and surveys of town staff.

Stationary Combustion of Fossil Fuels: Natural Consumption in Municipal Buildings

The Town of Newfield has 2 buildings using stationary combustion (the Highway Barn and Town Hall). The Highway Barn accounts for more than 2/3 of the town's 2019's natural gas energy usage.

Table 1: 2019 Municipal Building Fuel and Energy Consumption (million BTU)

Building	2019 Natural Gas Energy Use (million BTU)
Highway Barn	268.1
Town Hall	99.8
Total Stationary Combustion Energy Use	367.9

The stationary combustion at these two buildings caused 20 million British Thermal Units (BTU) in corresponding CO₂ emissions (see Table 1). A BTU is defined as the amount of heat required to raise the temperature of one pound of water by one degree Fahrenheit. To analyze emissions across energy/fuel sources, we compare the amount of CO₂ emitted per unit of energy (million BTU). The Highway Barn emitted approximately 3 times as much CO₂ as Newfield's Town Hall.

Table 2: 2019 GHG Emissions from Natural Gas by Municipal Building (MT CO₂E)

Building	2019 CO ₂ Emissions (MT CO ₂ E)
Highway Barn	15
Town Hall	5
Total Stationary Combustion Emissions	20

Electricity Consumption in Municipal Buildings

The Town of Newfield has 19 buildings/units consuming electricity across the municipalities management. Most of these units are under the Department of Public Works operational control. The largest electrical consuming buildings/units in 2019 were the "Highway Barn", "Town Hall", "Lighting District", "Street Lighting at Intersections", "Pump Station - Rt 13", and the "Well House".

Table 3: 2019 Electrical Consumption by Municipal Building (kWh)

Building/Unit	2019 Electrical Use (kWh)
Mill Park and School Sign	252
Highway Barn	23,620
Salt Shed	1,735
Covered Bridge	135
Town Hall	17,360
Lighting District	56,243
Street Lighting at Intersections	23,548
Pump Stations (Depot Rd. Sewer Dist., Beach St., Bank St., 294 Main St, 155 Main St, and Rt. 13)	36,942
Sewer Leach field controls and pumps	3
Water Tanks (Vankirk, Trumbulls Corners Rd., Shelter Valley Rd., Emira Rd. Pump Station)	45,923
Well House	107,440
Total Electrical Consumption	313,201

In 2019, the Town of Newfield emitted 33.23 million BTU in CO₂ GHG emissions from electricity use by municipal buildings/units. The top emissions were from the Well House, which accounted for more than a third of total emissions in 2019 (see tables 3 and 4). The Lighting District was responsible for just over half as much CO₂ emissions as the Well house, making it the second largest emitter from electricity use. Again, the third largest emitter, the Highway Barn, corresponded with just under half as much CO₂ as the second largest emitter. Since the Well House emissions are nearly double compared to the average CO₂ GHG emissions from electricity use by municipal buildings/units, it is an outlier compared to the other buildings.

Table 4: 2019 GHG Emissions from Electricity by Municipal Building/Unit (MT CO₂E)

Building/Unit	2019 CO ₂ Emissions (MT CO ₂ E)
Mill Park and School Sign	0.03
Highway Barn	2.71
Salt Shed	0.2
Covered Bridge	0.2
Town Hall	1.99
Lighting District	6.46
Street Lighting at Intersections	2.7
Pump Stations (Depot Rd. Sewer Dist., Beach St., Bank St., 294 Main St, 155 Main St, and Rt. 13)	4.24
Sewer Leach field controls and pumps	0
Water Tanks (Vankirk, Trumbulls Corners Rd., Shelter Valley Rd., Emira Rd. Pump Station)	2.36
Well House	12.34
Total Electrical Consumption	33.23

Mobile Combustion of Fossil Fuels: Municipal Vehicle Fleet Consumption

In 2019, the mobile fleet in the Town of Newfield consisted of 22 vehicles: 19 which consumed biodiesel and 3 of which consumed gasoline. The vehicle types used by the town include “Heavy-Duty Vehicles”, “Light Trucks”, “Utility and Recreational Equipment”, and “Construction Equipment”. In 2019, the town’s the oldest vehicle was a 1986 model and youngest were models from earlier in 2019. Most of the vehicles are used and operated by the department of Public Works. In 2019, the municipal vehicle fleet in the Town of Newfield used a total of 3,763 British Thermal Units (MMBtu) of energy (see table 5), from 27,906.5 gallons of fossil fuel.

Table 5: 2019 Vehicle Fossil Fuel Use by Type (MMBtu)

Year	Gasoline (MMBtu)	Diesel (MMBtu)	Total (MMBtu)
2019	391	3,371	3,763

The fossil fuel use for the municipal vehicle fleet caused greenhouse gas emissions in carbon dioxide of 230 MT CO₂E in 2019 (see table 6).

Table 6: 2019 GHG Emissions from Municipal Vehicle Fleet (MT CO₂E)

Year	CO ₂ Emissions (MT CO ₂ E)
2019 Fleet	230

Results Summary: Greenhouse Gas Emission in Town of Newfield, New York

Table 7: 2019 GHG Emission Sources (MT CO₂E)

Year	Stationary Combustion (MT CO ₂ E)	Electricity (MT CO ₂ E)	Mobile Combustion (MT CO ₂ E)	Total (MT CO ₂ E)
2019	20	33.23	230	283.23

In 2019, the Town of Newfield's total GHG emissions from municipal activities was 283.23 MT CO₂E (see table 7). The largest contributor was the town's mobile combustion. Mobile combustion for the town during 2019 emitted more than 4 times stationary combustion and electricity usage combined.

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CONCLUSIONS:

Impacts and Further Action

In 2019, the Town of Newfield created 283.23 metric tons of carbon dioxide equivalent (MTCO₂) (see table 7). This is approximately equivalent to driving 790,000 miles in an average passenger car. Newfield's emissions are contributing the over abundance of GHGs in the atmosphere that are causing climatic changes to the region and the world at large. The Town of Newfield is dedicated to reducing their emissions.

Previous climate smart actions taken by the Newfield includes updating interior lighting, adopting NYStretch energy code, undergoing energy code enforcement training and performing a clean heating and cooling community campaign. The town is currently an active member in both the [New York Clean Energy Communities](#) (CEC) and [Climate Smart Communities](#) (CSC) programs.

This GHG Emissions Inventory will act as a baseline to help guide the Town of Newfield's efforts to mitigate the impacts of climate change. The results here will inform their future municipal Climate Action Plan (a strategic organizational document to guide the town's process in reducing GHG emissions to mitigate climate change).

The town is already planning strategic actions to reduce their GHG emissions moving forward. Newfield plans to do an energy study and energy upgrades for Town Hall and Highway Barn, install a municipal electric vehicle charging station and complete their LED streetlight upgrades in the coming year. In addition, Newfield will be taking other climate smart actions, a waste reduction campaign with ReBusiness Partners and creating a Natural Resources Inventory and a Critical Environmental Areas Inventory, that will likely not directly impact municipal GHG emissions, but will help the town remain sustainable and safe in the future.

In five years (2024), the Town of Newfield will create an updated GHG Government Emissions Inventory. That inventory will be a chance to compare results with 2019 emissions to evaluate if the town's planned actions are reducing their overall emissions.

In addition to the previously stated plans for climate mitigation, there are additional actions the town may consider to reduce GHG emissions. Cleaning the Newfield fleet, through increasing fuel efficiency or switching to electric vehicles, would have the largest impact on emissions from the municipal operations. Electric vehicles are ideal, but expensive and not yet practical for all applications. Upgrading to newer or more fuel-efficient vehicles could also help the town reduce their emissions.

Further reductions in emissions could come from upgrades to heating and cooling systems in municipal buildings, such as installing air source heat pumps or geothermal. Replacing or improving insulation in the Town Hall and other municipally owned buildings would also reduce heat loss in the winter and improve overall energy efficiency. Further energy cutting solutions include installing building energy management systems, water efficiency fixtures, and installing new windows.

There are also a variety of energy-conscious actions that the town could recommend for employees to reduce their contribution to greenhouse gas emissions. Opting for alternative

modes of transportation, such as carpooling, or biking, or walking in warmer months not only drastically reduces automobile emissions but can also have benefits for personal health and wellbeing. Turning off and unplugging computers and other electronics, such as microwaves, coffee makers, printers, etc. when not in use reduces electricity consumption as well, as these things consume electricity even when they are not in use.

The results of this GHG Emissions Inventory will guide the Town of Newfield's efforts to mitigate the impacts of climate change for a climate-smart, sustainable future.

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SOURCES & ADDITIONAL INFORMATION

Department of Environmental Conservation Climate Smart Communities Program
<https://climatesmart.ny.gov/>

Local Government Operations Protocol (LGOP), version 1.1
<https://www.epa.gov/statelocalenergy/local-greenhouse-gas-inventory-tool>

National Climate Assessment Report (2014)
<https://nca2014.globalchange.gov/>

New York's Climate Aid Report (2011, 2014)
<https://www.nyserda.ny.gov/climaid>

New York State Department of Environmental Conservation: Climate Change and Health
<http://www.dec.ny.gov/energy/68917.html>

New York State Department of Environmental Conservation: Impacts of Climate Change in New York
<http://www.dec.ny.gov/energy/94702.html>

New York State Department of Environmental Conservation: Mitigation of Climate Change
<http://www.dec.ny.gov/energy/99223.html>

NYSERDA Clean Energy Communities Program
<https://www.nyserda.ny.gov/All-Programs/Clean-Energy-Communities>

U.S. Department of Energy Office of Energy Efficiency and Renewable Energy
<https://www.fueleconomy.gov/feg/evtech.shtml>

United States Environmental Protection Agency: Greenhouse Gas Overview
<https://www.epa.gov/ghgemissions/overview-greenhouse-gases>

University of Michigan Center for Sustainable Systems
<http://css.umich.edu/factsheets/carbon-footprint-factsheet>

For Questions Regarding this Greenhouse Gas Inventory
Please contact the Newfield Town Clerk, Attn: CSC Taskforce
townclerk@newfieldny.org

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