



WOODSTOCK, N.Y.
COLONY OF THE ARTS



Climate Smart
Communities
Certified Bronze

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Application for 16 Points

June 8, 2024

PE2 Action: Community Climate Action Plan

16 Points



BRONZE PRIORITY



SILVER PRIORITY

Town of Woodstock 2024 Community Climate Action Plan

Early in 2024, Woodstock joined other municipalities in a cohort sponsored by the Hudson Valley Regional Council (HVRC) to develop a community greenhouse gas (GHG) inventory and Climate Action Plan (CAP) using an updated *Mid-Hudson Regional GHG Inventory*.¹ The Community Climate Action Plan, a requirement of the Climate Smart Communities (CSC) program, is a strategy document that defines goals, identifies initiatives, and sets targets for reducing community GHG emissions.

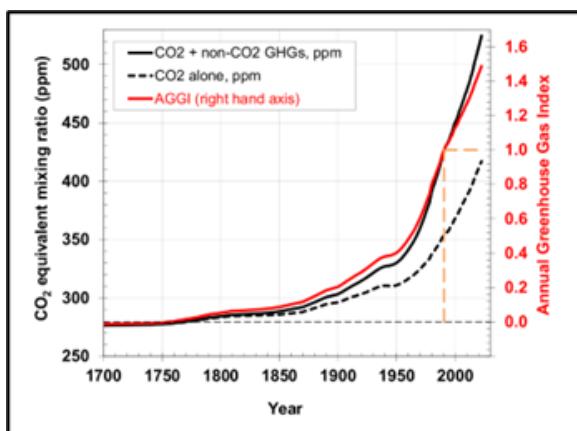
The required Woodstock community greenhouse gas inventory, created for the base year of 2021 and filed under Climate Smart, PE2 Action: Community GHG Inventory, complies with the methodology of the *New York Community and Regional Greenhouse Gas Inventory Guidance*.

Although local governments are encouraged to incorporate climate adaptation strategies into their Climate Action Plans, however, under the CSC Certification program, points for climate adaptation planning are awarded under Pledge Element 7: Enhance community resilience to climate change. The Climate Action Plan presented in this document focuses on reducing Woodstock's community greenhouse gas emissions.

Greenhouse gas emissions for community-wide activities are measured in metric tons of carbon dioxide equivalents (MTCO₂e), and were calculated using emissions factors from the US Energy Information Administration (EIA), US Environmental Protection Agency (EPA), and ICF International / NYSERDA GHG Inventory Tool.

¹ Melanie Patapis, Climate Smart Coordinator, "Mid-Hudson Regional Greenhouse Gas Emissions Inventory: An Update to the 2010 Regional Inventory," Mid-Hudson Regional Council, January 25, 2024, Available at <https://hudsonvalleyregionalcouncil.org/wp-content/uploads/2024/01/2021-Mid-Hudson-Regional-Inventory-MethodologyV2.pdf>

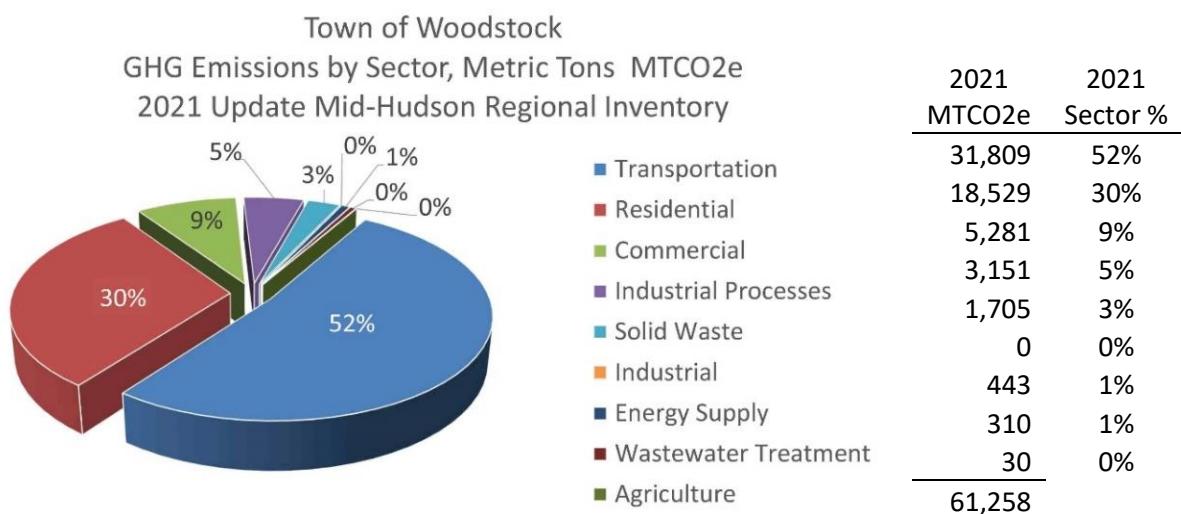
Greenhouse Gase (GHG) Emissions



rapidly since about 1950, and as of 2021, atmospheric concentrations of carbon dioxide were almost 50% higher than pre-industrial levels

Woodstock 2021 Community GHG Emissions

Woodstock's community-wide greenhouse gas emissions in 2021 totaled 61,259 MTCO2e. Transportation, the largest emitting sector, accounted for 31,809 MTCO2e, 52% of the total community emissions. The second largest contributor to Woodstock's communitywide emissions are the town's residences, which accounted for 18,529 MTCO2e, 30% of the overall emissions in 2021. Combined, transportation and the town's residences are responsible for 82% of the Woodstock's communitywide emissions.



2021 update to the Mid-Hudson Regional GHG Inventory

The greenhouse gases, carbon dioxide, methane, and nitrous oxides, are emissions that occur from using fossil fuels for transportation, heating, and the generation of electricity. Greenhouse gases absorb the sun's infrared radiation and trap heat, creating a greenhouse effect that results in the warming of the atmosphere.

Starting in about 1750 with the industrial revolution, burning fossil fuels began to significantly increase the concentration of carbon dioxide and other greenhouse gases in the atmosphere. Emissions have grown

Total Emissions Reduced by 8% by 2030

The expectation is that by implementing Woodstock's Climate Action Plan, total emissions will drop by 8% by 2030.

The largest and most significant opportunity for emissions reduction is from the adoption of zero-emission vehicles. Although residential emissions are significant, adoption of heat-pump technology for new construction will have only a moderate impact on total residential emissions.

The assumptions and explanation for these projections are available in Woodstock's Community GHG Inventory.

All-Electric Building Act

The All-Electric Buildings Act was included in New York's FY 2023-2024 budget, adopted on May 2, 2023. The budget updates the Building and Energy Codes to prohibit the installation of fossil-fuel equipment and building systems (any equipment or infrastructure excluding cooking equipment) used for combustion or supply of fossil fuels beginning December 31, 2025, for new buildings of seven stories or less, and December 31, 2028, for all new buildings regardless of size or building type.

In 2023, following the 2019 passage of the Climate Leadership and Community Protection Act (CLCPA), New York became the first state to enact legislation mandating the electrification of new buildings. The All-Electric Buildings Act amended the State laws governing New York's Energy Conservation Construction Code and the Uniform Fire Prevention and Building Code to effectively implement a ban on natural gas equipment and infrastructure in virtually all new construction.

Woodstock Community GHG Emissions, MTCO2e by Sector			
	2021	2030	Percent Change
Transportation	31,809	25,133	-21%
Residential	18,531	19,535	5%
Commercial	5,281	5,656	7%
Industrial Processes	3,151	3,375	7%
Solid Waste	1,705	1,826	7%
Industrial	0	0	
Energy Supply	443	474	7%
Wastewater Treatment	310	332	7%
Agriculture	30	32	7%
Sum of Woodstock	61,260	56,363	-8%

Woodstock Community Climate Action Plan Goals

Below are the recommended Climate Action goals that will reduce Woodstock's GHG emissions. Although local governments are encouraged to incorporate climate adaptation strategies and mitigation into their Climate Action Plans, however, the listed goals below only address actions that would reduce GHG emissions. Under the CSC Certification program, points for climate adaptation planning are awarded under Pledge Element 7: Enhance community resilience to climate change. The Climate Action Plan presented in this document focuses on reducing Woodstock's community greenhouse gas emissions.

Transportation Sector

Goal: Increasing number of zero-emission and hybrid vehicles.

Vehicle and transportation use of fossil fuels are a major source of carbon emissions. Zero-emission and plug-in hybrid-electric vehicles produce significantly fewer emissions, and increasing their use is essential for achieving long term reductions in emissions.

Goal: Increase the number of installed residential Level-2 EV chargers.

To make the most of EV ownership, high-voltage charging equipment is needed at home. There are a number of ways EV ownership is different from vehicles with an internal-combustion engine, but the big difference is charging. You'll want to be charging at home as much as possible.

Goal: Promote battery powered lawn and landscaping equipment.

Lawn mowing contributes to air pollution. Engines on garden equipment produce up to 5% of the nation's air pollution. Gasoline-powered lawn and garden equipment emit air pollutants such as carbon dioxide, carbon monoxide, hydrocarbons, volatile organic compounds, nitrogen oxides and particulate matter.

Residential Housing Sector

Residential heating with fossil fuels is a significant source of Woodstock's GHG emissions. Starting in 2026, the All-Electric Building Act will restrict fossil fuel use in new homes and buildings. As the electric grid becomes increasingly powered with clean, zero-emissions energy sources, buildings powered with electricity will emit fewer emissions.

Goal: Heat-pumps for heating & cooling in new construction.

A heat pump is a device that can provide heating, cooling and hot water. Heat pumps take energy from the air, ground and water and turn it into heat or cool air. Unlike gas or oil boilers, heat pumps don't burn fossil fuels, and can eliminate the need for a fossil fuel heating system.

Goal: Promote heat-pumps for existing housing units.

Install heat pumps to provide air conditioning in existing housing units, and reduce the use of fossil fuels for heating during the cooler temperatures in spring and fall.

Goal: Promote energy efficiency for existing housing units.

Energy efficiency can reduce greenhouse gas emissions, lower the cost of heating and cooling, and improve overall comfort of a residence. Upgrading insulation and weatherization in existing buildings can reduce energy use, and smaller steps, such as LED light bulbs and energy efficient appliances, are helpful.

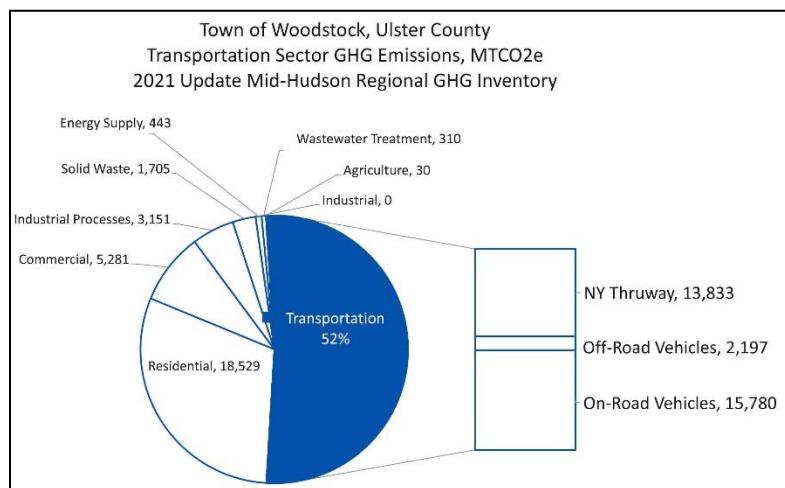
Zero-Emission Electricity Supply

Goal: Achieve 100% zero-emission electricity supply by 2040.

The Climate Act (CLCPA) charges the Public Service Commission with establishing a program to require that by 2030, 70 percent of electric energy provided to customers of the State's jurisdictional electric utilities be generated by "renewable energy systems," and that by 2040, 100 percent of the "statewide electrical demand system will be zero emissions."

Transportation Sector

Emissions in the transportation sector emanate from three sources: on-road vehicles, off-road vehicles, and the NY Thruway. CAP goals are identified for on-road and off-road vehicle emissions.



Goal: Reduce emissions from on-road vehicles

Strategy

The state and federal governments have launched initiatives to accelerate the adoption of low emission and no emission electric vehicles. Reducing gasoline consumption and on-road vehicle emissions in Woodstock is dependent on the adoption lower emissions vehicles.

Initiatives

In 1990, DEC adopted California's Low Emission Vehicle program, requiring all new vehicles sold in the state to meet California emissions standards, which are more stringent than the federal standards. The goal of the Low Emission Vehicle program is to reduce emissions of air pollutants including PM, NOX, carbon monoxide, and VOCs.

In 2023, DEC incorporated California's Advanced Clean Cars II (ACC II) regulations into 6 NYCRR Section 200.9 and 6 NYCRR Part 218 regulations, required by the new Climate Law (CLCPA). These regulations set requirements for the annual sales of zero-emission

vehicles (ZEV), beginning at 35% in model year 2026 and increasing to 100% by model year 2035.

Corporate average fuel economy (CAFE) standards are federal regulations to improve the average fuel economy of cars and light trucks (trucks, vans and sport utility vehicles) produced for sale in the United States. The Biden administration has proposed new fuel economy rules designed to accelerate the transition to all-electric passenger vehicles. Under the proposal, automakers would be required to improve the average mileage of all the passenger vehicles they sell.

How to Implement

The initial focus is education of the environmental community about hybrid and EV technology through regular meetings, demonstrations, and Climate Smart Task Force public reports, and to include low emission vehicle information at climate events, such as Earth Day, and other opportunities for public engagement.

Increase the awareness of available incentives, rebates, tax credits that should be included in any purchase decision.

Key Performance Indicator (KPI)

The Key Performance Indicators are the make, model, and number of low emission vehicles registered. The target is for 20% of on-road vehicles are hybrid or plug-in hybrids, and 6% are EV by 2030.

Emissions Reduction Potential

On-Road vehicle emissions calculations are available in the Community GHG Inventory document, but a summary is included below. All figures are in MTCO2e.

	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
NY Thruway	14,300	13,833	13,395	12,984	12,597	12,233	11,890	11,565	11,257	10,966	10,689
Off-Road Vehicles	2,179	2,197	2,214	2,231	2,249	2,266	2,283	2,301	2,318	2,335	2,353
On-Road Vehicles	16,317	15,780	15,277	14,800	14,347	13,923	13,519	13,137	12,770	12,426	12,091
Total Emissions	32,796	31,809	30,886	30,016	29,193	28,423	27,692	27,002	26,346	25,727	25,133

Cost

None.

Partners

Woodstock Environmental Commission

Woodstock Climate Smart Task Force

Woodstock NY Transition

Transportation Sector

Goal: Increase residential Level 2 EV chargers

Strategy

Woodstock is a regional tourism and recreation center. Property rental has long been a part of Woodstock's summer season, but since the founding of Airbnb in 2008, the use of single-family homes for short-term rentals (STR) has significantly increased. It's expected that many STR visitors will eventually use electric vehicles, and after traveling to Woodstock, will need to recharge their vehicles.

It's unreasonable to expect available public chargers will meet the needs of these visitors. Revised STR regulations should require that STRs provide Level 2 (L2) chargers so visitors can recharge vehicles overnight. Adding a requirement for Level 2 chargers for STRs would be consistent and supportive of the state's climate objectives and a convenience for visitors.

To make the most of EV ownership, high-voltage charging equipment is needed at home. There are a number of ways in which EV ownership will be different from having a vehicle with an internal-combustion engine, but a big difference is charging; you want to be charging at home as much as possible. This has two significant benefits: Charging can be accomplished when the vehicle is otherwise parked and second, home charging is substantially cheaper (roughly one-third the cost) of DC fast-charging.

Early electric vehicles had modest battery capacities, often supporting ranges of less than 75 miles, and when charging at home, owners were satisfied with plugging into 120-volt outlets ("Level 1" charging). But as typical ranges have increased to 250 miles or more, L2 chargers with charging capacities from 7.2 kW (32 amps) to 19.6 kW (80 amps) have become necessary. A Level 1 charger would take over 30 hours to fully charge a 250-mile battery pack compared to 5 to 8 hours for an L2 charger. And because a L2 charger can refresh an EV battery more quickly, it offers more flexibility in charging times.

Initiative

Many, if not most, homes will require a service panel upgrade costing \$2,000 to \$8,000 in order to install a Level 2 ("L2") charger. In a recent L2 pilot conducted by Siemens in New York, Siemens found that approximately 50% of the homes of pilot volunteers would have required service panel upgrades. Upgrades are required for most older homes with 100-amp or 125-amp services (the standard before about 1980), as well as for many homes with 200-amp services whose capacity is fully utilized by existing circuits and appliances. Also, the need for a panel upgrade is greater in disadvantaged communities, which almost always have older housing stock.

The need for service panel upgrades is a significant barrier to home installation of L2 chargers, which, in turn, is a barrier to both EV adoption and leveraging of EVs as grid assets through the advanced capabilities of L2 chargers.

How to Implement

Zoning and STR regulations should be updated to encourage installation of Level 2 charging capability at residential units used for short term rentals.

The building department and planning board should encourage applicants to install electric service panels that would be capable of supporting Level 2 charging in addition to expected household load.

The STR permit renewal should include information about the need for Level 2 charging capability.

Key Performance Indicator (KPI)

The number, determined from building permits, of residential housing units with Level 2 charging capability.

The number, determined from building permits, of residential housing units with 200-amp or greater electric service panels.

Emissions Reduction Potential

The emission reductions associated with Level 2 chargers are reflected in the total vehicle emissions referenced above.

Cost

None

Partners

Woodstock Planning Board, Building Department

Woodstock Housing Committee

Zoning Revision Committee

Rob Liebowitz, Ulster County Planning Department

Transportation Sector

Goal: Promote battery powered lawn and landscaping equipment

Strategy

Gasoline-powered lawn and garden equipment is a surprisingly large source of air pollution.

Lawn and garden equipment – lawn mowers, string trimmers, leaf blowers, chainsaws and other machines – is a significant source of pollution, noise and disruption. The inefficient engines in gasoline-powered lawn equipment can emit as much pollution in an hour as driving hundreds of miles in a typical car.

In the United States, lawn and garden equipment powered by gasoline and other fossil fuels released more than 30 million tons of carbon dioxide into the atmosphere in 2020 – more than all the greenhouse gas emissions from the city of Los Angeles. That same equipment emitted air pollution linked to serious health problems in amounts comparable to tens of millions of cars.

Inefficient two-stroke engines used in smaller gasoline-powered lawn equipment are notoriously polluting. Manufacturers have increasingly adopted more efficient four-stroke engines (similar to those in automobiles) for lawn equipment, but these engines lack the advanced emission controls that reduce pollution from cars and trucks.

Operating a commercial lawn mower for just one hour produces as much smog-forming pollution as driving 300 miles in a car. Leaf blowers are even more polluting. "The hydrocarbon emissions from a half-hour of yard work with the two-stroke leaf blower are about the same as a 3,900-mile drive from Texas to Alaska in a 6,200-pound 2011 Ford F-150 SVT Raptor," said Jason Kavanagh, Engineering Editor at Edmunds.com.²

Initiative

Encourage the adoption of electric equipment and consider restrictions on the most polluting fossil fuel equipment to accelerate the transition to cleaner lawn equipment.

How to Implement

The Pollinator Pathway Project is a participatory art, design and ecology social sculpture initiative founded to connect isolated green spaces and create a hospitable environment for pollinators through a system of ecological corridors of flowering plants.

Woodstock NY Pollinator Pathway is a project of Woodstock Land Conservancy, Catskill Center, Woodstock NY Transition, Woodstock Environmental Commission, and community member partners.

The Pathway hosts a variety of events, seminars, and meetings to promote pollinator friendly habitats, and these activities include instruction about lawn care. Explanations about the use

² Press Release, "Leaf Blower's Emissions Dirtier than High-Performance Pick-Up Truck's," Edmunds' InsideLine.com, December 6, 2011, Available at <https://www.edmunds.com/about/press/leaf-blowers-emissions-dirtier-than-high-performance-pick-up-trucks-says-edmunds-insidelinecom.html>

of electric powered lawn equipment in pollinator pathway activities and events will be the main focus to implement this goal.

Key Performance Indicator (KPI)

KPI will include a count of the number of events that promote electric lawn equipment.

Emissions Reduction Potential

It's estimated that landscaping equipment and consumer off-road recreation vehicles contribute about 635 MTCO2e of Woodstock's emissions.

Off-Road Equipment Emissions
 Town of Woodstock
 Community GHG Climate Action Plan
 Mid-Hudson Regional GHG Emissions Inventory
 2021 Update to 2010 Regional Inventory

			2010 Census MTCO2e		2020 Census MTCO2e				
			Mid-Hudson Regional	Ulster County	Woodstock	Ulster County	Woodstock		
Off-Road Vehicles	Recreation & Landscaping Equipment	Recreation Equipment	54,919	4,170	134	4,149	143		
		Lawn & Garden (Residential)	64,307	4,883	157	4,859	168		
		Lawn & Garden (Commercial)	123,886	9,406	303	9,360	324		
		Sum of Recreation & Landscaping Equipment	243,112	18,459	594	18,368	635		
	Construction & Industrial Equipment	Construction & Mining	298,738	22,682	730	22,571	780		
		Industrial Equipment	133,235	10,116	326	10,067	348		
		Agricultural Equipment	20,784	1,578	51	1,570	54		
		Commercial Equipment	135,464	10,285	331	10,235	354		
		Logging Equipment	1,420	108	3	107	4		
		Airport Equipment	1,344	102	3	102	4		
		Railroad Equipment	216	16	1	16	1		
			Sum of Construction & Industrial Equipment	591,201	44,887	1,445	44,668	1,544	
			Sum of Off-Road Vehicles	834,313	63,346	2,040	63,037	2,179	

Cost

None

Partners

Woodstock Pollinator Pathway

Woodstock Environmental Commission

Woodstock NY Transition

Residential Sector

The major sources of emissions for the residential sector are emissions from heating and emissions from electric usage. The methodologies used to estimate residential emission in the Mid-Hudson GHG inventory are beyond the capability of most municipalities, and in this instance, Woodstock used other approaches. The methodology used in the residential sector was especially challenging. The details are included in the Community GHG Inventory document.

The analysis shows Woodstock's residential sector uses over 22,000 MWh of electricity and about 1.5 million gallons of heating fuel oil. Fuel oil used for heating accounts for 87% of residential emissions, while electricity represents only 13% of emissions.

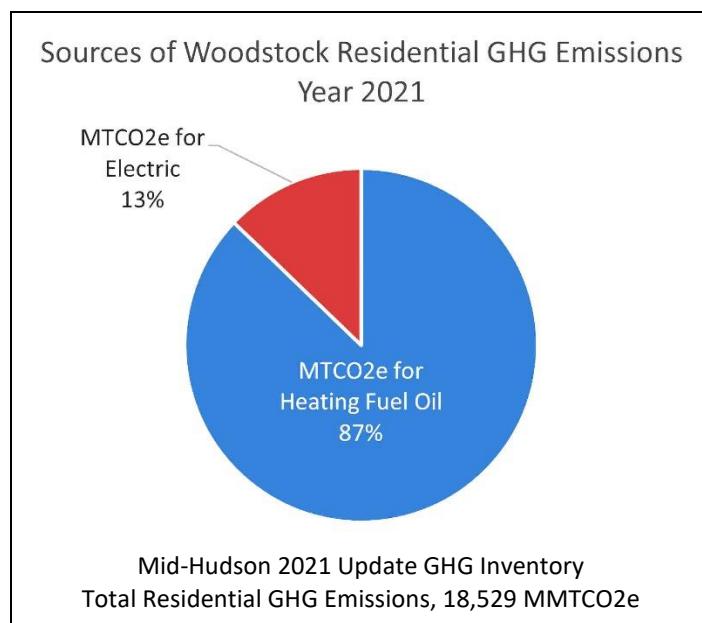


Table of Woodstock Residential GHG Emissions

Housing Type: Total

Residential MTCO2e

		2021	2022	2023	2024	2025	2026	2027	2028	2029	2030
Housing Units		3,551	3,578	3,600	3,626	3,652	3,678	3,704	3,731	3,758	3,784
Electric Usage	Yearly Base MWh Total	22,485	22,656	22,795	22,960	23,124	23,289	23,454	23,625	23,796	23,960
Heating Fuel	Gallons Heating Fuel Total	1,647,192	1,658,462	1,667,963	1,677,163	1,686,362	1,695,562	1,704,762	1,714,193	1,723,624	1,732,824
CO2		17,085	17,202	17,300	17,396	17,491	17,586	17,682	17,780	17,878	17,973
		2,376	2,394	2,408	2,426	2,443	2,461	2,478	2,496	2,514	2,532
		19,460	19,595	19,709	19,822	19,934	20,047	20,160	20,276	20,392	20,505

Goal: Promote heat-pumps for new construction

Strategy

A heat pump heats and cools a home, functioning as a combined furnace and central air conditioner. Because heat pumps absorb and move ambient heat rather than burning fuel, heat pumps are exceptionally energy-efficient and environmentally friendly compared with fuel oil or propane home heating systems.

New homes with only a heat pump for heating and cooling would eliminate the use of fossil fuels, but would require a substantial increase in the use of electricity.

Initiative

The Town of Woodstock established a Housing Committee and the Housing Oversight Task Force with the intention to make housing more available to people of a range of income levels and backgrounds while preserving the town's unique character and scale.

The community has acknowledged that Woodstock is experiencing a severe housing crisis that needs attention on systemic level. The town's Comprehensive Plan, adopted in 2018, lays out a vision for community that will accommodate a diversity of artists, musicians, incomes, generations of young families, diverse workforce, volunteers, increasing older population, for everybody who wants to live and raise a family in Woodstock.

Woodstock has an active Housing Committee and Home Share program, and participates in Ulster County's new Housing Smart Communities Initiative. Organizations such as Family of Woodstock and the Woodstock Housing Alliance are engaged in addressing housing challenges.

Woodstock is on its way to having a robust and innovative set of solutions to meet the housing crisis. While zoning is only one tool to achieve the goals in the Comprehensive Plan and meet the housing needs of our community, it is a key component in the toolbox used by the Planning Board, Zoning Board of Appeals, and the Code Enforcement Officer, as well as property owners, residents, the County Planning Department, regulatory agencies, and nonprofits.

How to Implement

Information about heat pumps will be integrated into recommendations from the Housing Committee, Building Department, and Planning Board.

Information about heat pumps will be integrated into consideration by the Ulster County Housing Advisory Committee and the Ulster County Housing Smart Communities Initiative.

Key Performance Indicator (KPI)

Number of new homes using heat pumps as the primary source of heating and cooling.

Emissions Reduction Potential

See Table of Woodstock Residential GHG Emissions

Cost

None

Partners

Woodstock Planning Board, Building Department

Woodstock Housing Committee, Zoning Revision Committee

Ulster County Housing Advisory Committee and Housing Smart Communities Initiative

New Yorkers for Clean Power

Goal: Promote heat-pumps for existing housing units.

Strategy

Homes with existing ductwork for forced-air HVAC systems can be adapted to heat pumps. Ductless heat pump systems, called mini-splits, can provide heating and cooling in a home without ducts or add climate control to rooms that the main system doesn't reach.

Although a fossil fuel heating system is still available, fossil fuel usage can be reduced.

It is the intention of Woodstock to increase the number of Accessory Dwelling Units (ADU's), where heat-pumps could be used for heating and cooling within the individual units.

Initiative

Same as for promoting heat-pumps for new construction.

Key Performance Indicator (KPI)

KPI will include a count of the number of housing renovations and ADUs that install heat pumps, either as the primary source of heating and cooling or as supplemental to an existing fossil fuel system.

Emissions Reduction Potential

To be determined

Cost

None

Partners

Woodstock Planning Board, Building Department

Woodstock Housing Committee, Woodstock Environmental Commission

Ulster County Housing Advisory Committee and Housing Smart Communities Initiative

New Yorkers for Clean Power

Residential Sector

Goal: Promote energy efficiency for existing housing units.

Strategy

Cost Savings: Enhanced energy efficiency means reduced energy consumption, leading to lower utility bills. Investments in energy-efficient appliances, insulation, windows, and lighting can pay off through long-term savings.

Environmental Impact: Decreased energy consumption translates to lower greenhouse gas emissions and reduced reliance on fossil fuels. By reducing energy usage, households contribute to mitigating climate change.

Improved Comfort: Energy-efficient homes tend to have more consistent temperatures and fewer drafts, leading to increased comfort for occupants. Proper insulation, air sealing, and efficient heating and cooling systems contribute to maintaining comfortable indoor conditions year-round.

Education and Awareness: Encouraging energy efficiency fosters a culture of sustainability and responsible resource management. By promoting awareness and providing education on energy-saving practices, individuals can make informed choices to reduce their environmental footprint and contribute to a more sustainable future.

Initiative

Promote NYSERDA Residential Energy Assessment

Key Performance Indicator (KPI)

Number of residential energy efficiency audits performed.

Number of residential units that complete recommended energy efficiency upgrades.

Emissions Reduction Potential

To be determined

Cost

None

Partners

Woodstock Housing Committee

New Yorkers for Clean Power

NYSERDA

Zero-Emission Electricity Supply

Goal: Achieve 100% zero-emission electricity supply by 2040

The Climate Act (CLCPA) charges the Public Service Commission with establishing a program to require that by 2030, 70 percent of electric energy provided to customers of the State's jurisdictional electric utilities be generated by "renewable energy systems," and that by 2040, 100 percent of the "statewide electrical demand system will be zero emissions."³

The Climate Action Council's Scoping Plan (December 2022, Ch. 13) states:

"During planning, the State should prioritize zero-emission resources (such as storage, energy efficiency, and renewable energy) where feasible when considering the need to meet demand for end uses, technology limitations, GHG emission impacts, and costs."

EPA eGRID Database

The Emissions and Generation Resource Integrated Database (eGRID) is a comprehensive inventory of the environmental attributes of the electric power system.

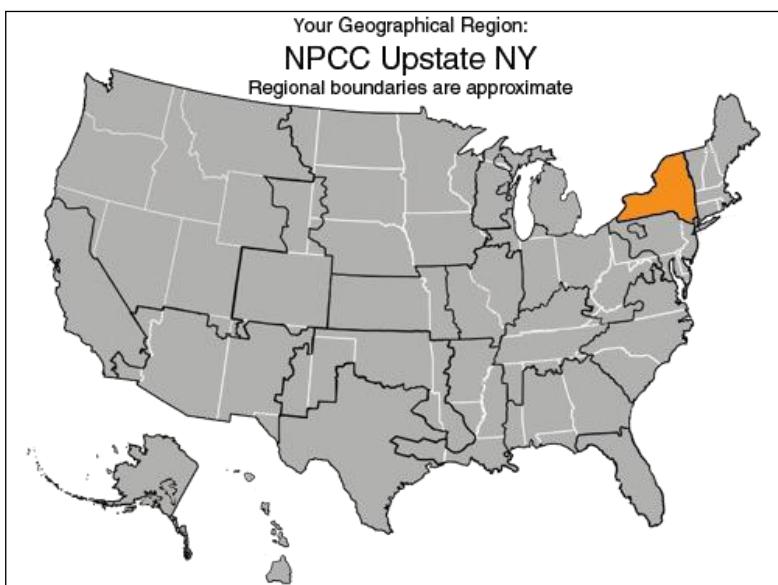
Released for the first time in 1998 (and about every other year thereafter), eGRID includes data about emissions rates, net generation, resource mix, air emissions for nitrogen oxides, sulfur dioxide, carbon dioxide, methane, nitrous gas, and other properties for electric generating plants in the United States.

Electricity emission factors represent the quantity of GHG emissions per unit of electricity, and is usually reported in units of pounds of GHG per kWh or MWh. Woodstock uses eGRID emission factors for the Upstate New York subregion.

eGRID is periodically updated to account for changes in generation profile and fuel sources. Carbon dioxide emissions in upstate NY have been declining during the past several years due to the retirement of coal-fired power plants and because of substantial hydroelectric and nuclear resources.

EPA eGRID NYUP Emission Rates Forecast	
Year	lbs/MWh
2021	233.1
2022	220.8
2023	208.6
2024	196.3
2025	184.0
2026	171.8
2027	159.5
2028	147.2
2029	135.0
2030	122.7
2031	110.4
2032	98.1
2033	85.9
2034	73.6
2035	61.3
2036	49.1
2037	36.8
2038	24.5
2039	12.3
2040	0.0

³ PSL § 66-p (2).



But beginning in 2022, as a consequence of the closure of the Indian Point nuclear power plant and the increased use of natural gas for electricity generation, GHG emissions attributed to electricity increased by 17% in the Upstate New York subregion.

Emissions associated with electricity in Woodstock's updated GHG inventory were calculated using the eGRID2021 emission rate of 233.1 lbs. CO₂/MWh for the Upstate New York (NYUP) subregion.

eGRID emission rates are available from the EPA Power Profiler website at <https://www.epa.gov/egrid/power-profiler/#/>

Forecasting Emissions for Electricity Usage

The Woodstock Community Climate Action Plan requires that emissions associated with electricity usage be projected to 2030. The use of air-source heat pumps for residential heating and cooling and at-home electric vehicle charging stations will increase electricity consumption between now and 2030. To account for emissions from increased electricity usage, it is also necessary to account for a zero-emission electricity supply by 2040.

Using linear interpolation between 233.1 lbs. CO₂/MWh, the emission rate for 2021, and zero-emissions in 2040, it is possible to assign an estimated emission rate for planning to each year between 2021 and 2040. The EPA regularly releases actual emission rates for each year, which is the Key Performance Indicator (KPI) for this goal.

There is a time lag between when eGRID data is collected and when the EPA makes it public. It should be understood that because of the time required to acquire data and the time necessary to calculate the yearly emission rate, the 2040 zero-emission imperative won't be verified before spring of 2042.

Partners

The key partner for this goal is the incumbent utility, Central Hudson Gas & Electric. CLCPA assigns responsibility for achieving zero-emission electricity by 2040 to the jurisdictional electric utilities.

2030 GHG Emissions Forecast

Early in 2024, Woodstock joined other municipalities in a cohort sponsored by the Hudson Valley Regional Council (HVRC) to develop a community greenhouse gas (GHG) inventory and Climate Action Plan (CAP) using the updated *Mid-Hudson Regional GHG Inventory*.⁴

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The expectation is that by implementing Woodstock's Climate Action Plan, total emissions by 2030 will drop by 8%. The largest and most significant source of emission reductions is the adoption of zero-emission vehicles. Although residential emissions are a significant, its expected that adoption of heat-pump technology for new construction will have only a moderate effect on total emissions.

Woodstock Community GHG Emissions, MTCO2e by Sector			
	2021	2030	Percent Change
Transportation	31,809	25,133	-21%
Residential	18,531	19,535	5%
Commercial	5,281	5,656	7%
Industrial Processes	3,151	3,375	7%
Solid Waste	1,705	1,826	7%
Industrial	0	0	
Energy Supply	443	474	7%
Wastewater Treatment	310	332	7%
Agriculture	30	32	7%
Sum of Woodstock	61,260	56,363	-8%

⁴ Melanie Patapis, Climate Smart Coordinator, "Mid-Hudson Regional Greenhouse Gas Emissions Inventory: An Update to the 2010 Regional Inventory," Mid-Hudson Regional Council, January 25, 2024, Available at <https://hudsonvalleyregionalcouncil.org/wp-content/uploads/2024/01/2021-Mid-Hudson-Regional-Inventory-MethodologyV2.pdf>

Graph of Woodstock Community GHG Emissions by Sector

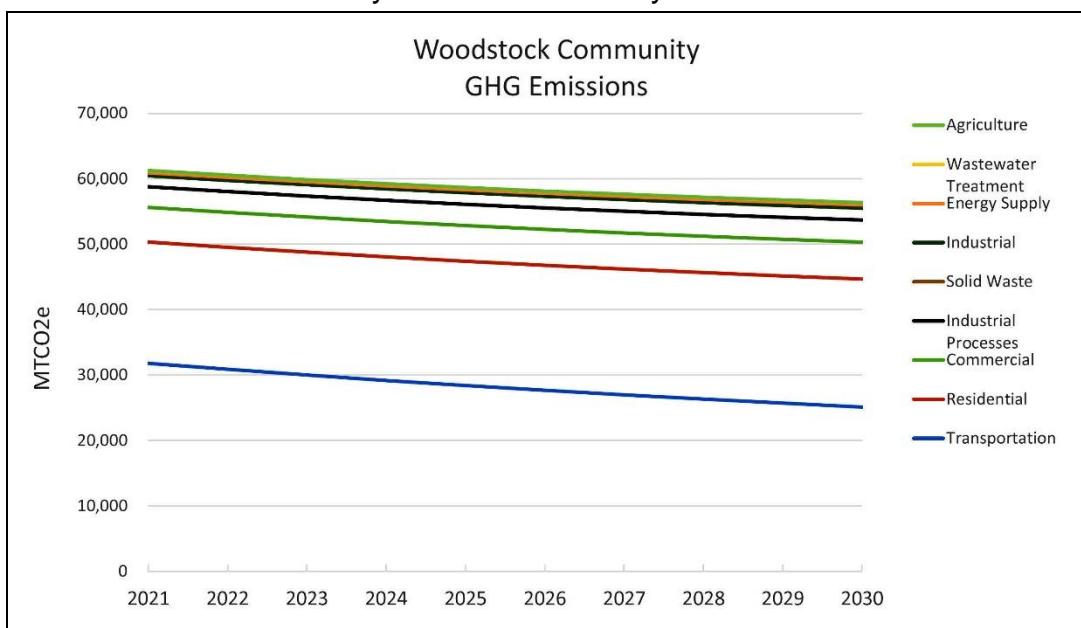


Table of Woodstock Community GHG Emissions by Sector

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	
Woodstock Community GHG Emissions	Transportation	31,809	30,886	30,016	29,193	28,423	27,692	27,002	26,346	25,727	25,133
	Residential	18,531	18,661	18,769	18,878	18,986	19,095	19,203	19,315	19,426	19,535
	Commercial	5,281	5,323	5,364	5,406	5,448	5,489	5,531	5,573	5,614	5,656
	Industrial Processes	3,151	3,176	3,201	3,226	3,250	3,275	3,300	3,325	3,350	3,375
	Solid Waste	1,705	1,718	1,732	1,745	1,759	1,772	1,786	1,799	1,813	1,826
	Industrial	0	0	0	0	0	0	0	0	0	0
	Energy Supply	443	446	450	453	457	460	464	467	471	474
	Wastewater Treatment	310	312	315	317	320	322	325	327	330	332
	Agriculture	30	30	30	31	31	31	31	32	32	32
	Sum of Woodstock	61,260	60,553	59,877	59,249	58,673	58,138	57,642	57,183	56,762	56,363

Appendix – Residential GHG Emissions

This Appendix summarizes the assumptions and results of projecting residential GHG emissions to 2030. The 2021 base case assumptions and data sources for estimating residential GHG emissions are included in Woodstock's Community GHG Inventory. This appendix extends the emission estimates to 2030.

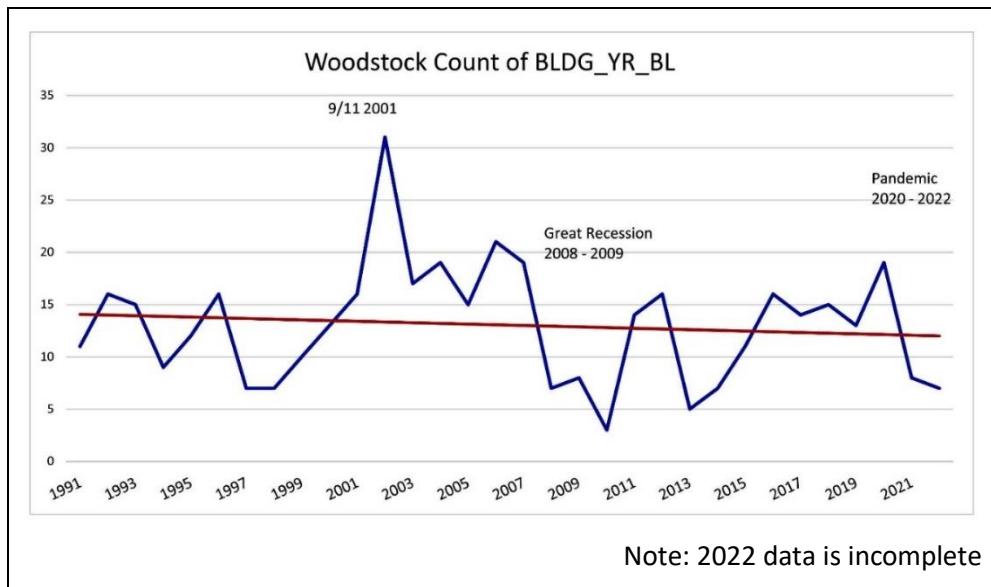


Chart created from the Ulster County Tax Parcel data showing the number of residential buildings, site code 200s, built each year during the past thirty years. Although there have been ups-and-downs, the trend line has been between 12 to 14 units a year.

Assumptions

1. The 30-year trend for new residential construction is between 12 to 14 units per year. For this analysis, 14 new single family residences are built each year. At least one-third of Woodstock's residential units will continue to be classified as vacant, i.e. second homes, STR rentals, and seasonal rentals.
2. Proposed changes to Woodstock's zoning law are designed to encourage multi-family housing units. Currently, one new, multi-family residence is added each year, although this could only be an accessory apartment. Under the new zoning law, it's assumed that two new accessory apartments and two new multi-family dwellings will be added each year.
3. Energy use, in MMBTUs, will continue as presented by the 2021 Mid-Hudson Valley GHG Inventory Update.
4. Emissions for electricity will follow the yearly MTCO2e trend line from 2021 to zero emissions in 2040.

Housing Type	MMBTU
Single Family	108
Multi-Family	54
Vacant	28
Other	108

Woodstock Residential GHG Emissions – 2021

Year:'2021'		Residential MTCO2e				
		Single Family Occupied	Single Family Vacant	Multi-Family	Other	Total
Housing Units		1,999	985	186	381	3,551
MMBTU / Housing Unit		108	28	54	108	
Housing Units MMBTU Total		215,922	27,671	10,044	41,148	
Electric Usage	Yearly Base kWh / Housing Unit	6,332	6,332	6,332	6,332	
	Yearly Base MWh Total	12,659	6,235	1,178	2,412	22,485
	MMBTU / MWh	3.412142	3.412142	3.412142	3.412142	
	Electric MMBTU Total	43,196	21,276	4,019	8,232	
Heating Fuel	Heating Fuel MMBTU Total	172,726	6,395	6,025	32,916	
	Gallons Heating Fuel / MMBTU	7.1429	7.1429	7.1429	7.1429	
	Gallons Heating Fuel Total	1,233,768	45,679	43,038	235,117	1,557,603
	Gallons Heat Fuel/Housing Unit	617	46	231	617	
CO2	Lbs. CO2 / Heating MMBTU	163.45	163.45	163.45	163.45	
	Lbs. CO2 per MWh	233.1	233.1	233.1	233.1	
	Heating Fuel MTCO2e	12,797	474	446	2,439	16,156
	Electric MTCO2e	1,338	659	124	255	2,376
	Total Residential MTCO2e	14,134	1,133	571	2,694	18,531

Woodstock Residential GHG Emissions – 2030

Year:'2030'		Residential MTCO2e				
		Single Family Occupied	Single Family Vacant	Multi-Family	Other	Total
Housing Units		2,087	1,028	283	386	3,784
MMBTU / Housing Unit		108	28	54	108	
Housing Units MMBTU Total		225,401	28,885	15,282	41,688	
Electric Usage	Yearly Base kWh / Housing Unit	6,332	6,332	6,332	6,332	
	Yearly Base MWh Total	13,215	6,509	1,792	2,444	23,960
	MMBTU / MWh	3.412142	3.412142	3.412142	3.412142	
	Electric MMBTU Total	45,092	22,210	6,114	8,340	
Heating Fuel	Heating Fuel MMBTU Total	180,309	6,676	9,168	33,348	
	Gallons Heating Fuel / MMBTU	7.1429	7.1429	7.1429	7.1429	
	Gallons Heating Fuel Total	1,287,931	47,685	65,483	238,203	1,639,302
	Gallons Heat Fuel/Housing Unit	617	46	231	617	
CO2	Lbs. CO2 / Heating MMBTU	163.45	163.45	163.45	163.45	
	Lbs. CO2 per MWh	233.1	233.1	233.1	233.1	
	Heating Fuel MTCO2e	13,359	495	679	2,471	17,003
	Electric MTCO2e	1,396	688	189	258	2,532
	Total Residential MTCO2e	14,755	1,182	869	2,729	19,535