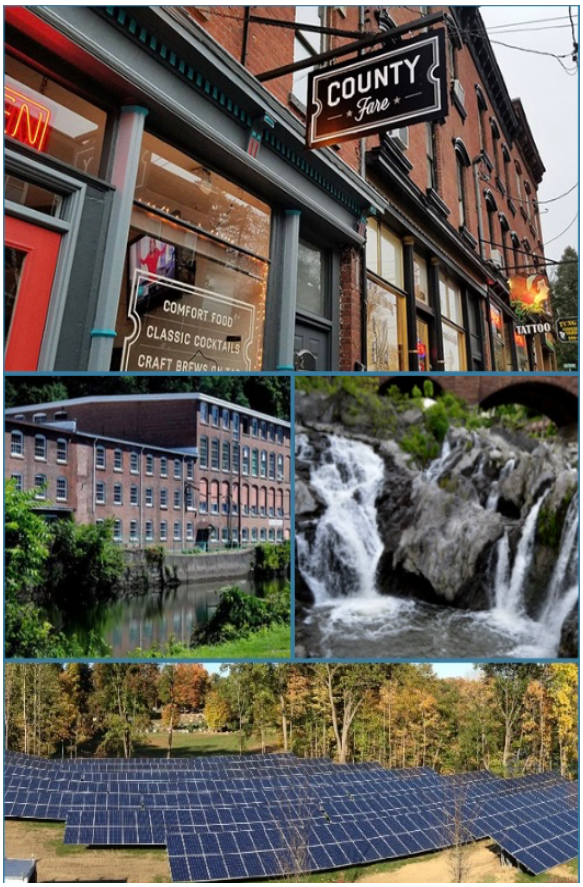
Village of Wappingers Falls

Baseline Year 2019

Local Government Operations Climate Action Plan



MARCH 12, 2024

Produced by the Village of Wappingers Falls Climate Team with Assistance from ICLEI – Local Governments for Sustainability USA and the Hudson Valley Regional Council.

Credits & Acknowledgements

Leader:

- **Tom Morris,** Planning Board Chair and Climate Action Lead

Assisted by:

- **Kevin Huber,** Village Mayor
- **John Karge**, Village Clerk
- **Heather McCormick**, Village Staff Assistant
- **Lori Jiava**, Village Treasurer
- **Bryan Murphy,** Code Enforcement Officer
- **Paul Italiano,** Police Commissioner
- **John Kozak,** Water Department
- **Jason Enson,** Fire Chief
- **John Nuculovic,** Highway Superintendent
- **Charlie Ferry,** Parks Commission

External Agencies and Partners:

- **Mary Lambert**, Climate Action Planning Institute Coordinator
- **Caroline Dickey**, Program Officer ICLEI USA
- **Kale Roberts,** ICLEI

Document Format and Content Examples:

- **Vanessa Bertozzi,** Village of Rhinebeck Trustee

We also acknowledge the support of and extend thanks to the Hudson Valley Regional Council (HVRC), and the International Council for Local Environmental Initiatives (ICLEI), and the representatives of the eight other municipalities in the Dutchess Climate Action Planning Institute (CAPI) cohort. CAPI is a facilitated, collaborative working group through which local governments develop individual government operations greenhouse gas emissions inventories and climate action plans to help bring state funding to the region for important climate change mitigation and adaptation projects.

CAPI is a program of the HVRC funded in part through a grant to Dutchess County as lead applicant through the Climate Smart Communities Grant Program, Title 15 of the Environmental Protection Fund through the New York State Department of Environmental Conservation.

ICLEI-Local Governments for Sustainability USA

This template and its appendices were published in June 2020 and updated by ICLEI in 2022.

Table of Contents

Executive Summary

VISION:
Transform the Village of Wappingers Falls facilities into high-performing and energy efficient buildings and facilities resilient to climate change. The Village also plans to migrate the Village fleet toward clean, carbon-free technologies across all departments.

GOAL:
Reduce the Village government's Greenhouse Gas (GHG) emissions by 40% from 1990 levels by 2030.

This goal is in line with NY State goals (Greenhouse Gas Emissions Reduction - NYSERDA) and represents the Village government's responsibility to our community and the planet. This goal requires a major shift in energy use. The NYS Climate Act sets nation-leading limits on emissions that will enable the State to advance economy-wide carbon neutrality – a balance between how much carbon we emit and how much can be absorbed from the atmosphere.

STRATEGIES:
Reducing greenhouse gas (GHG) emissions, such as carbon dioxide and methane, is key to combatting climate change and creating cleaner, healthier communities. More than half of New York's GHG emissions come from buildings and transportation, while other leading emissions sources include power generation, waste, industry, and agriculture.

The path to environmentally friendly energy sources is a path that will require a phased approach with clear goals. NYS and the federal government are offering rebates and incentives to assist in this shift. The Village Board should take full advantage of these incentives and funding opportunities.

SUMMARY:
The Village of Wappingers Falls is setting goals to reduce GHG emissions and planning strategically to meet those goals.

This Climate Action Plan document, which was developed as part of the Dutchess County CAPI Cohort with ICLEI and HVRC, analyzes the data from the Inventory of the Village of Wappingers Falls Government Operations Greenhouse Gas Emissions dated September 15, 2023, and combines that with practical knowledge of the Village Staff and officials.

NY State has set goals for 2030 and this plan aligns with those goals. This means that the Village will make its best efforts to reduce government operations emissions by 40% by 2030. Since the Village used 2019 as its baseline year for its emissions inventory, all percent (%) reduction goals are based off that year. NYS has set a goal to decarbonize the grid electricity and to be 70% renewable by 2030. This has been factored into the "Business as Usual" (BAU) forecast, along with projections of growth of Village government staff and population by 2030.

The BAU forecast predicts emissions of 561 metric tons (MT) of carbon dioxide equivalent (CO2e) by 2030 if no local actions are taken to reduce emissions. When reviewing data from the Inventory of the Village of Wappingers Falls Government Operations Greenhouse Gas Emissions, there are three areas that comprise the bulk of the Green House Gases (89.7%).

- *Water and Wastewater Treatment Facilities (34.4%)*
- *Buildings and Facilities (31.7%)*
- *Vehicle Fleet (23.6%)*

ICLEI's Cleathpath forecasting model was used to model different reduction strategies. These strategies are detailed in this report.

- *The Village Water Treatment plant is already supported by a solar field.*
- *TriMuni Wastewater Treatment plant should investigate ways to move to more green energy sources (i.e. Hydro, Solar, etc). The Tri-Municipal Sewer Commission (TMSC) concept was formalized and submitted to the U.S. EPA for consideration in March 1981 with the intent to serve a Tri Municipal Sewer Improvement Area (TMSIA) and to do so in the most cost effective and environmentally sound manner. The Commission was formed in June 1987 under provisions of existing state code, and consisted of three (3) initial member municipalities (Town of Poughkeepsie, Town of Wappinger, and Village of Wappingers Falls). The Commission provides wastewater treatment for each of its member municipalities in areas designated by their governing board that may be serviced within their jurisdiction.*
- *The Village Buildings and Facilities should move off oil (Police Department) and gas (Village Hall). In addition to evaluating the Village buildings for green climate opportunities such as installing programmable thermostats, occupancy sensor, and LED lighting. The Village Hall and Highway Department garage should also be evaluated for solar.*
- *The Village Vehicle Fleet should be evaluated for right size as well as replacing vehicles with Electric Vehicles.*
- *In General, the Village should pursue more dependency on the local Hydro plant as well as community solar programs.*

The Village has already made the switch to LED streetlights and the Village Water Treatment plant has a solar panels field. The Village Buildings and Facilities have older HVAC systems, and the insulation envelopes were done before today's stricter energy standards. These structures are aging and need upgrades to be more energy efficient. The structure build dates are as follows.

- *1960 - Police Department*
- *2004 - Village Hall*
- *2010 - Water Treatment Plant*
- *2014 - Highway Garage*

The vehicle fleet is comprised of 19 total vehicles (Heavy Truck – Fire, Light Truck – Pickups, and Cars – SUV, Patrol) currently dependent on fossil fuels. As these vehicles age out a plan should be defined to assess and remove or replace them with alternative fuel sources vehicles (i.e. EV, Hybrid).

Being a small Village with restricted funding it is imperative that incentives and funding opportunities be pursued.

Introduction

Overwhelming evidence has led to the scientific consensus that climate change is the greatest environmental challenge of the 21st century. It poses a serious threat not just to New York's natural resources, but also to jobs and health. Simultaneously, climate change presents unprecedented opportunities for creating a healthier, safer, and more equitable zero-carbon world. The Village of Wappingers Falls has an unparalleled opportunity to make changes to its facilities and general operations in ways that benefit the local government and act as a model for the community and other public agencies. Scientists expect that with the current trends in greenhouse gas (GHG) emissions, Americans will experience more intense heat waves, droughts, rainstorms, floods, wildfires, and landslides in the future. These impacts will have significant repercussions on our economy, stress our natural resources and worsen inequities facing many Americans and millions of people across the globe. Action is required at all levels, and local governments have a unique role to play in building low-carbon communities.

These impacts are caused by the accumulation of GHGs such as carbon dioxide (CO2) and methane (CH4) in the atmosphere, primarily resulting from burning fossil fuels and land use changes. Although the natural greenhouse effect is needed to keep the earth warm, human activities have created an enhanced greenhouse effect due to the rapid accumulation of GHGs in the atmosphere. Unprecedented concentrations of these gases in the atmosphere have led to too much heat and radiation being trapped on Earth. Carbon emissions from human activities have soared in recent decades and are currently at the highest rates in human history. About half of all carbon dioxide emitted between 1750 and 2010 occurred in the last 40 years. The energy, industry and transportation sectors have dominated these emissions increases. With the current trajectory of population growth, urbanization, and reliance on personal vehicles, global transportation emissions are expected to double by 2050. Given the impacts of climate change on humanity, the time to act to reduce GHG and our carbon footprint is now. While there is a great need for community-wide climate action plans, addressing emissions from local government operations and leading by example is critical.

Purpose, Scope, & Process Behind the Climate Action Plan

The 2014 Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5), written by a panel of hundreds of climate experts and scientists and approved by a team of external reviewers, states unambiguously that anthropogenic or "man-made" GHG emissions are impacting global climate change. For this reason, the Village of Wappingers Falls is joining an increasing number of local governments committed to addressing climate change at the local level through reducing emissions in their own government operations and by supporting programs such as NY State's Climate Smart Communities and Clean Energy Communities. The Village of Wappingers Falls recognizes the impact that climate change poses to its constituents, and is acting to reduce the GHG emissions, or "carbon footprint," of its government operations through the innovative programs laid out in this Climate Action Plan. Furthermore, it is recognized that the Village of Wappingers Falls needs to address existing climate impacts and adapt its systems and infrastructure to new conditions. Ultimately, action is needed to reduce the Village of Wappingers Falls contribution toward climate change and adapt to its current and future effects. This Climate Action Plan takes advantage of common-sense approaches and cutting-edge policies that our local government is uniquely positioned to implement – actions that can reduce energy use, waste, and fuel use for the vehicle fleet and employee commutes.

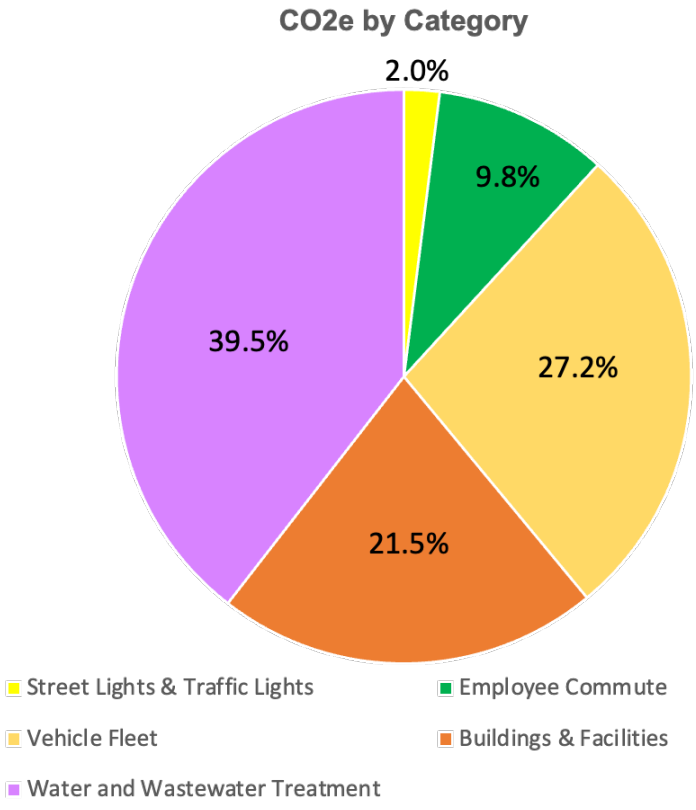
Purpose

By creating a clear course of action so that everyone has a role in creating and achieving climate and sustainability goals, this Climate Action Plan drives and coordinates efforts toward a 33% reduction in local government GHG emissions of 2019 levels by 2030.

The Climate Action Plan is a framework for the development and implementation of actions that reduce the Village's government operations GHG emissions. The Plan provides guiding objectives and strategies to realize GHG reduction goals.

Scope

This Plan covers objectives and strategies for reducing GHG emissions resulting from local government operations within the Village of Wappingers Falls. It addresses the major sources of emissions in the Village's infrastructure and operations and sets forth objectives and strategies in three focus areas that can be implemented to achieve greenhouse gas reductions: Water and Wastewater, Buildings & Facilities, and Fleet.



The Plan creates a framework to document, coordinate, measure, and adapt efforts moving forward. In addition to listing actions, the Plan discusses how each action will be implemented via timelines, financing, and assignment of responsibilities where known.

Process

The Village of Wappingers Falls planning process focused on input from the broader team stakeholders and residents. Please note that most of the following are also residents of the Village, giving a dual perspective.

- *Mayor - Kevin Huber*
- *Village Clerk - John Karge*
- *Code Enforcement Officer - Bryan Murphy*
- *Village Treasurer - Lori Jiava*
- *Police Commissioner - Paul Italiano*
- *Water Department - John Kozak*
- *Fire Chief - Jason Enson*
- *Highway Superintendent - John Nuculovic*
- *Parks Department - Charlie Ferry*

Tom Morris, Lori Jiava, Kevin Huber, and John Karge have been involved with this effort for the past year. Village Department heads have been and are pulled in as appropriate.

Tom Morris presented the Government Operations GHG Emissions Inventory at the 27 September 2023 public Village Board meeting. This report, as well as the complete GHG Emissions Inventory report are posted on the Climate page of the Village of Wappingers Falls Website (https://wappingersfallsny.gov/climate/).

Village Board Climate Liaison defined and established as a conduit to the Village board.

Outreach to the public will be held beyond Village Board meetings to get a broader spectrum of public input.

This Climate Action Plan report will be presented at a Village Board meeting and posted to the Village Climate webpage once the report is finalized.

Vision Statements and Objectives

Transform the Village of Wappingers Falls facilities into high-performing and energy efficient buildings and facilities resilient to climate change. The Village also plans to migrate the Village fleet toward clean, carbon-free technologies across all departments.

The Climate Action Plan offers a robust set of objectives and strategies that will address the local climate hazard vulnerabilities and aim for a 40% reduction in local government GHG emissions by 2030, in line with New York State's Climate Leadership Community Protection Act (CLCPA) goals. Each strategy and objective were created and reviewed through an internal engagement and input process where participants considered technology limitations, funding constraints, and the feasibility of implementation. The following targets are set to maintain and support safe, efficient, and holistically sustainable Village of Wappingers Falls facilities and operations:

By 2030, the Village of Wappingers Falls aims to:

- Work with TriMuni on reducing energy usage and increasing renewable energy sources
- Reduce energy use in its buildings by 20%
- Increase the percentage of renewably sourced electricity for municipal usage to 20% (i.e. Hydro, Solar)
- Convert Police Department Building from oil to HVAC
- Investigate installing solar on Village Hall and on Highway Garage
- Establish an employee's carpool/active transportation plan
- Install EV charging stations at each of the Village Buildings
    - Village Hall
    - Police Department
    - Highway Garage
    - Water Treatment Plant
- Work to add 6 EVs to Fleet
    - 1 @ Zoning
    - 2 @ Police
    - 1 @ Fire
    - 1 @ Highway
    - 1 @ Water
- Install EV Chargers in Municipal Parking Lot
- Require and enforce net-zero building codes for new government buildings

Village of Wappingers Falls' Local Government Operations GHG 2019 Inventory

Inventory Basics

Since the early 1990s, U.S. cities have developed community-wide and local government operations greenhouse gas inventories based on accounting protocols created by ICLEI. Known as the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions and the Local Government Operations Protocol, these standards created a credible and defensible methodology which accelerated the number of inventories created and provides consistency within and across U.S. communities. In 2014, ICLEI partnered with the World Resources Institute and C40 Climate Leadership Group to create the Global Protocol for Community Scale GHG Emissions, which allows communities around the world to compare their emissions footprint. The Village of Wappingers Falls used the Local Government Operations Protocol for the inventory described in this report.

Summary of Inventory Results

Through the completion of a local government operations GHG emissions inventory, the Village of Wappingers Falls has determined emissions levels for government operations. Emissions from local government operations represent the sum of total emissions produced by government facilities, vehicle fleets, and other government-owned or operated activities. In this way, the local government operations figures represent emissions for which the local government is responsible. Government operations are therefore a subset of total community emissions.

For this Climate Action Plan, the Village of Wappingers Falls completed a Local Government Operations inventory that analyzes the 2019 fiscal year. This inventory was conducted using the Local Government Operations Inventory and ICLEI's ClearPath tool. Through this inventory, the Village determined its overall emissions in the 2019 fiscal year equated to 692 metric tons of carbon dioxide equivalent ($MTCO_2e$). The Water and Wastewater sector is the largest source of emissions, with 238 MTCO2e which is 34.4% of the total emissions (Figure 1). This is followed by the Buildings & Facilities at 219 MTCO2 at 31.7% and then Vehicle Fleet at 163 MTCO2 at 23.6%.

The Village of Wappingers Falls Projected Growth in Local Government Operations GHG Emissions

The village of Wappingers Falls has also completed an emissions forecast based on projections of current data and expected future trends. The emissions forecast is a "Business-As-Usual" (BAU) forecast, a scenario estimating future emissions levels if no further local action (i.e. projects within this Climate Action Plan) were to take place.

Projected Growth in GHG Emissions

Figure 2 shows the projected growth in GHG emissions in the Village of Wappingers Falls 2019 to 2030. The emission growth shown in the forecast below is based on population growth, employee count projections, electricity grid decarbonization projections, and changes in automotive fuel efficiency standards. The Village of Wappingers Falls Government Operations business as usual forecast shows that emissions will decrease to 561 MTCO2e by 2030 if no action is taken to reduce the emissions trajectory. This is a 18.9% reduction in emissions.

The Village of Wappingers Falls has set targets to reduce its local government operations emissions to 40% below 1990 levels by 2040. Figure 2 also compares the reduction target with the business-as-usual forecast.

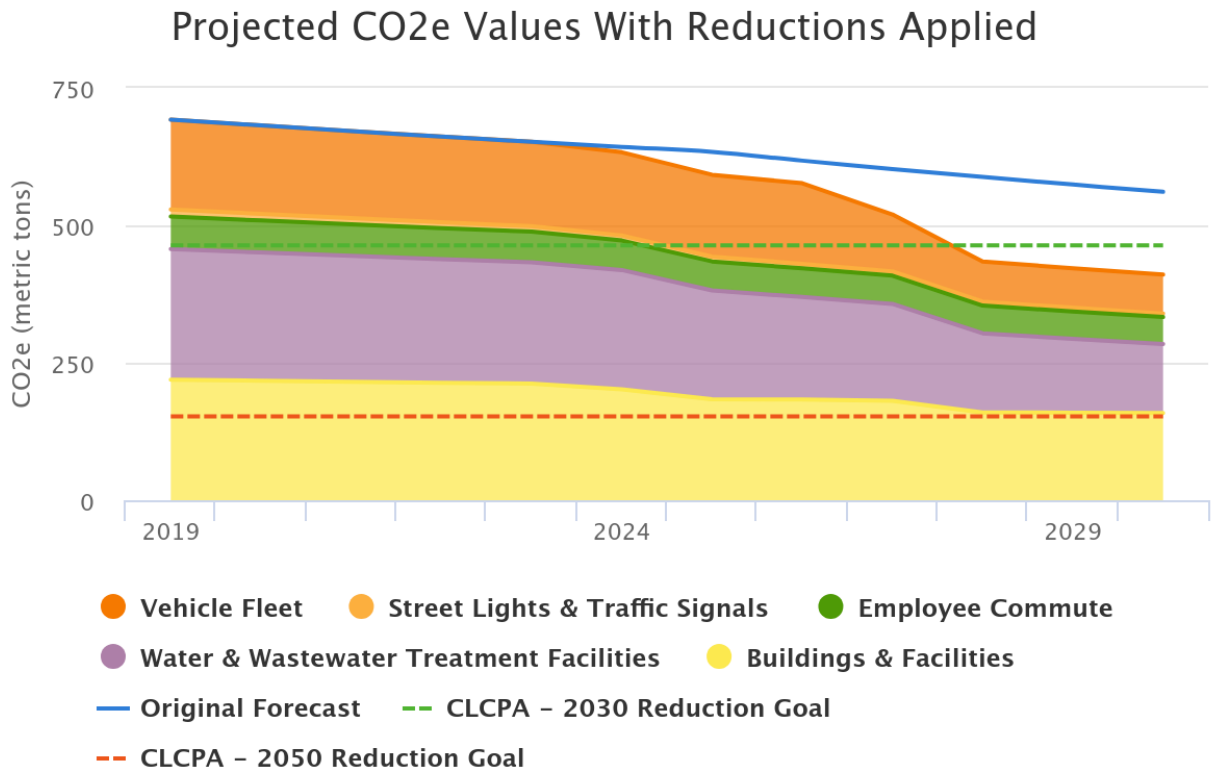


Figure 2: Projected Growth in GHG Emissions from 2019 to 2030

NOTE: This chart does not include the Buildings and Facilities Gas Reduction (20%) mitigation measure due to errors in the ClearPath program.

Government Operations Climate Mitigation

Emissions Reduction Focus Areas

Each of the focus areas within the Village of Wappingers Falls Local Government Operations Climate Action Plan is explored in the following pages. In this Climate Action Plan, the Village of Wappingers Falls has decided to focus their Climate Mitigation measures on the following focus areas:

WTP & WWTP Treatment System (39.5% of GHG emissions)

- Work with TriMuni on reducing energy usage (i.e. replace older equipment with more efficient versions)
- Work with TriMuni on increasing renewable energy sources

Vehicle Fleet (27.2% of GHG emissions)

- Install EV charging stations at each of the Village Buildings
    - Village Hall
    - Police Department
    - Highway Garage
    - Water Treatment Plant
- Work to add 6 EVs to Fleet
    - 1 @ Zoning
    - 2 @ Police
    - 1 @ Fire
    - 1 @ Highway
    - 1 @ Water
- Install EV Chargers in Municipal Parking Lot

Buildings & Facilities (21.5% of GHG emissions)

- Reduce energy use in its buildings by 20%
    - Programmable Thermostats
    - Occupancy sensors

    - LED Lighting Interior and Exterior
- Convert Police Department Building from oil to HVAC
- Investigate installing solar
    - Village Hall
    - Highway Garage

Employee Commute (9.8% of GHG emissions)

- Encourage a reduction in GHG from employee commute through carpooling, active transportation, mass transit and a transition to EVs.

Energy Sources

- Increase the percentage of renewably sourced electricity for municipal usage to 20%
    - Hydroelectric
    - Solar

In each focus area, a series of objectives with supporting strategies are outlined. An "Objective" is a goal, result, or target that mitigates emissions in a focus area, and a "Strategy" is an action designed to help realize the objective.

Key for Potential Impact and Cost in the following sections.

	IMPACT	COST
Low	1% - 5%	<$10K
Medium	6% - 20%	$10K - $50K
High	>20%	>$50K

WTP & WWTP Processes (39.5% of GHG emissions)

The largest GHG emissions sources for the Village government are the operations at the Water and Wastewater Treatment Plants. The objective is to implement upgrades to increase the efficiency of these operations to reduce energy consumption.

The Village Water Treatment Plant is already supported by its own solar field, but additional reduction opportunities should be investigated.

Strategy	Staffing	Timeline	Goal / KPI
Upgrades to the WWTP process and equipment Potential Impact: High Potential Cost: High Co-Benefits: 	The Village of Wappingers Falls is a one third voting partner to the TriMuni Wastewater Treatment Plant and as such shall encourage the reassessment of current processes and to establish a replacement plan for aging equipment. The USEPA estimates that upgrades to old, inefficient plants typically result in a 15-30% increase in efficiency with a commensurate reduction in energy costs. **Co-benefits:** Upgrading these processes and equipment will result in less maintenance and a more efficient treatment plant. **KPI**: Benchmark comparison "before and after" energy usage.		
Phase 1	Jen Niznik (Village Trustee and TriMuni Chair)	START: 3Q 2024 END: 2Q 2025	Completion of an Engineering assessment of current processes and equipment with enhancement recommendations
Phase 2	Jen Niznik (Village Trustee and TriMuni Chair)	START: 1Q 2026 END: 2Q 2027	Implementation of recommended enhancements
Investigate and implement the use of more green energy sources for the WWTP Potential Impact: High Potential Cost: High Co-Benefits:	The Village of Wappingers Falls is a one third voting partner to the TriMuni Wastewater Treatment Plant and as such shall cause the investigation into more green energy sources such as Community Solar and/or Hydroelectric. **Co-benefits:** Reduced operating costs and reduced dependencies on fossil fuels. **KPI**: Benchmark comparison "before and after" energy sources.		

			
Phase 1	Jen Niznik (Village Trustee and TriMuni Chair)	START: 3Q 2024 END: 4Q 2024	Investigate and implement

Vehicle Fleet (27.2% of GHG emissions)

The third largest sector of GHG emissions is from the operation of the vehicle fleet. The goal is to increase efficiency of the fleet and to reduce dependency on fossil fuel burned.

Strategy	Staffing	Timeline	Goal / KPI
Transitioning Village Fleet to Evs Potential Impact: Medium Potential Cost: Medium Co-Benefits: 	The Village Vehicle Fleet is currently totally dependant on fossile fuel for operation. An assessment needs to be executed to determine which vehicles use the most fuel as well as those vehicles that are old and in disrepair. The current use needs to be considered as well (i.e. plowing, patrolling, etc). This analysis needs to be compared to EV capability and availability. Initial assessment allocates 6 possible EVs as follows. o 1 @ Zoning o 2 @ Police o 1 @ Fire o 1 @ Highway o 1 @ Water Funding through grants will be key to this effort. **Incentives:** The Federal government is offering $7500 off and NYS $2000. **Co-benefit:** Reduction in fuel and maintenance costs. Reduction in pollution. **KPI**: Benchmark comparison "before and after" fossil fuel purchased.		
Phase 1	Lori Jiava (Village Treasurer and Grant Writer)	START: 02 2024 END: 04 2024	Submit and procure grant funding

Phase 2	Trustee TBD Tom Morris (EVCS Program Lead)	START: 01 2025 END: 02 2025	Go out to Bid and select supplier
Phase 3	Village Board	START: 03 2025 END: 03 2025	Purchase 2 EVs (Zoning and Police)
Phase 4	Lori Jiava (Village Treasurer and Grant Writer)	START: 03 2025 END: 01 2026	Submit and procure grant funding
Phase 5	Trustee TBD Tom Morris (EVCS Program Lead)	START: 02 2026 END: 03 2026	Go out to Bid and select supplier
Phase 6	Village Board	START: 04 2026 END: 04 2026	Purchase 4 EVs (Police, Fire, Highway, Water)
Install EV Chargers at Each of the Village Buildings Potential Impact: Low Potential Cost: Medium Co-Benefits: 	To support the transition to EVs it is a requirement to have a method to charge them. A charger will be required at each of the Village Buildings (Village Hall, Police Department, Highway Garage, Water Treatment Plant). Funding through grants will be key to this activity. **Co-benefit:** Reduced fuel bills. **KPI**: Chargers installed.		
Phase 1	Lori Jiava (Village Treasurer and Grant Writer)	START: 02 2024 END: 04 2024	Submit and procure grant funding
Phase 2	Tom Morris (EVCS Program Lead)	START: 01 2025 END: 03 2025	Bid, Purchase, and Install EV Charging Stations
Install Community EV Chargers Potential Impact: Low Potential Cost: Medium	The Village is in the process of procuring and installing EV chargers in the Mill Street Municipal Parking Lot. This will help the community by supplying a convenient charging location as well as supporting the Village vehicles once they come online. **Co-benefit:** Local convenient EV charging location in the business district. Encourage commerce and community good will.		

Co-Benefits: 	**KPI**: Installation of the chargers.		
Phase 1	Lori Jiava (Village Treasurer and Grant Writer)	START: 03 2022 END: 02 2023	Received NYS Zero-Emission Vehicle Infrastructure Grant
Phase 2	Tom Morris (EVCS Program Lead)	START: 02 2023 END: 03 2024	Bid, Purchase, and Install EV Charging Stations (Currently awaiting NYS funding release)

Buildings & Facilities (21.5% of GHG emissions)
The second largest contributor to emissions is heating and cooling of buildings. The goal is to implement upgrades to increase building energy efficiency and eliminate oil burning.

Strategy	Staffing	Timeline	Goal / KPI
Assess and Upgrade Buildings Efficiencies Potential Impact: Low Potential Cost: Low Co-Benefits: 	Assess each of the Village buildings (Village Hall, Police Department, Highway Garage, and Water Treatment Plant) for energy efficacies and install Programmable Thermostats, Occupancy sensors, and LED lighting (internal and external). **Co-benefit:** Lower utility costs. **KPI**: Before and after benchmarking of energy usage.		
Phase 1	Trustee TBD Tom Morris (Climate Lead)	START: 3Q 2024 END: 3Q 2024	Assess each building
Phase 2	Trustee TBD	START: 4Q 2024 END: TBD	Procure Funding
Phase 3	Trustee TBD	START: TBD END: 4Q 2025	Install upgrades

Convert Police Department Building Heating from Oil to HVAC Potential Impact: Medium Potential Cost: Medium Co-Benefits: 	Investigate funding sources then remove/replace the oil furnace in the Police Department building with a HVAC. Funding through grants will be key to this effort. **Co-benefit:** More efficient cooling verses window A/C Units. **KPI:** HVAC installed.		
Phase 1	Lori Jiava (Village Treasurer and Grant Writer)	START: 3Q 2024 END: 2Q 2025	Investigate and procure funding sources (i.e. grants)
Phase 2	Trustee TBD Tom Morris (Climate Lead)	START: 4Q 2025 END: 1Q 2026	Go out for Bid and Select contractor
Phase 3	Trustee TBD Tom Morris (Climate Lead)	START: 2Q 2026 END: 3Q 2026	Monitor installation and CO issuance
Investigate installing Solar at Village Hall and Highway Garage Potential Impact: Medium Potential Cost: Medium Co-Benefits: 	Research solar opportunities and efficiency outlook for Village Hall and the Highway Garage. Funding through grants will be key to this effort. **Co-benefit:** Lower utility bills. **KPI:** Solar installed.		
Phase 1	Trustee TBD Tom Morris (Climate Lead)	START: 1Q 2025 END: 2Q 2025	Research Solar opportunities

Phase 2	Lori Jiava (Village Treasurer and Grant Writer)	START: 2Q 2025 END: 3Q 2025	Investigate and procure funding sources (i.e. grants)
Phase 3	Trustee TBD Tom Morris (Climate Lead)	START: 4Q 2025 END: 1Q 2026	Go out for Bid and Select contractor
Phase 4	Trustee TBD Tom Morris (Climate Lead)	START: 2Q 2026 END: 3Q 2026	Monitor installation and CO issuance

Employee Commute (9.8% of GHG emissions)

A smaller yet still important contributor to the Village of Wappingers Falls GHG emissions is the employee commute.

Strategy	Staffing	Timeline	Goal / KPI
Investigate options to reduce GHG emissions from commuting Potential Impact: Low Potential Cost: Low Co-Benefits: 	The Village should investigate options that encourage and incentives for employees to reduce GHG emissions. A few possible options are: • **Carpooling** – Poll employees for interest, Establish a sign up, Coordinate/flexible work shifts • **Active Transportation** – Covered bike racks, Supply umbrellas, Coordinate/flexible work shifts for daylight • **Mass Transit** – Supply schedules, Work with County for reduced fares • **EVs** – Free EV charging for employees **Co-benefit:** Climate awareness and reduced cost of commuting **KPI**: Before and after numbers of employees who take advantage of above offerings.		
Phase 1	Trustee TBD John Karge (Clerk)	Summer 2024	Research/Talk to employee about what options they might be interested in
Phase 2	Village Board	Fall 2024	Implement a free EV charging policy for employees

Energy Sources
An approach to reducing the Village of Wappingers Falls GHG is to move to green energy sources.

Strategy	Staffing	Timeline	Goal / KPI
Community Distributed Generation (CDG) Potential Impact: Medium Potential Cost: Low Co-Benefits: 	The Village shall pursue Community Solar projects such as Sustainable Westchester as well as Community Hydroelectric such as Wappingers Falls Hydroelectric which is part of Natural Power Group, Inc. These Community Distributed Generation (CDG) supply green energy. **Co-benefits:** Savings of 10% on supply portion of the Central Hudson bill for all subscribed accounts. No-cost set up. **KPI**: Move at least 50% of Village accounts to CDG subscription.		
Phase 1	Lori Jiava (Treasurer and Grant Writer) Tom Morris (Climate Lead)	START: 02 2024 END: 04 2024	Minimum of 50% of electricity from CDG
CCA – Community Choice Aggregation Potential Impact: Medium Potential Cost: Low Co-Benefits: 	The Village should investigate Community Choice Aggregation (CCA) opportunities for applicability and possible implementation. One possible avenue to pursue is the Mid-Hudson Energy Transition. The results of the above investigation findings may drive the need for supporting CCA legislation. **Co-benefits:** Switching to a CCA would help attain our LGO goal but would also apply to the entire Village community. **KPI**: By 2030, 100% of the Village's Government Operation's electricity needs should be met by renewables.		
Phase 1	Trustee TBD Tom Morris (Climate Lead)	START: 03 2024 END: 04 2024	Research CCA applicability
Phase 2	Trustee TBD Ian Lindars (Attorney)	START: 04 2025 END: 02 2026	Draft legislation

	Tom Morris (Climate Lead)		
Phase 3	Village Board	Summer 2026	Adopt legislation
Phase 4	Village Board	Fall 2026	Enter a 100% renewables contract

Potential Policies

The following potential policies and projects will not reduce forecasted emissions directly as they were not built into the forecast and have not been tracked on the ClearPath tool.

Street Trees

The Village's Parks Commission is developing a planting plan that will be aesthetically pleasing as well as supporting cooling and shading while acting as carbon sinks.

- Continue to support the Park Commission's efforts to plant new trees.
- Pursue funding for the management of the urban forest.

Materials Management

Policy to include responsible recycling of construction debris for government contracts.
Policy to prioritize use of low embodied or "green" concrete in municipal projects.

Monitoring Plan

While some of the actions within the Village of Wappingers Falls Local Government Climate Action Plan are underway, over the coming months, Trustee TBD and Tom Morris will engage with the Village Board to prepare for any prerequisite or additional actions needed to begin Plan implementation and to understand financial and staffing constraints.

These prerequisite actions include:

- Gathering estimates for contracted services and equipment.
- Researching funding opportunities.
- Making necessary changes to local policies or existing programs.
- Meeting with the Highway Department Superintendent, John Nuculovic, to discuss possible bandwidth for these projects.

Establishing a monitoring process will enable the Village of Wappingers Falls to track the impacts of the actions included in the plan and compare estimated impacts to what is achieved in terms of energy savings, renewable energy production, and GHG emissions reduction. Assessing the implementation status of the actions will allow for determination of whether the action is performing well or to identify

corrective measures. This process is also an opportunity to understand the barriers to implementation and identify best practices or new opportunities for moving forward.

- The table below describes the components of the monitoring reports. A Government Operations Greenhouse Gas Emissions Inventory should be looked at every 5 years. Updates on progress on our CAP should be included in the Village's Annual Climate Progress Report. The Village should undertake another round of major climate action planning and set a 2050 goal before 2030.

Table 8: Monitoring Status

Monitoring Report Component	Annual Update	Full Report
Overall Strategy: Reporting any changes to initial strategy as well as updated information on human and financial resources as well as progress towards goals.	Yes	Yes
GHG Emissions Inventories: Provide updated energy consumption and GHG emissions data for the reporting year.	No	Yes
Mitigation and Adaptation Action Plan for 2030: Report the implementation status (completed, in progress, on hold) of key actions and update their impacts.	Yes	Yes: Complete update by 2030
Gov Operations Climate Action Plan for Mitigation 2050: Create another Action Plan that defines the 2050 goals.	No	Yes: Complete by 2030

Background

Comparison of Local to Statewide Goals

The Village of Wappingers Falls has elected to align its reduction goals with statewide goals. The Climate Leadership and Community Protection Act (CLCPA), signed into law on July 18, 2019, sets goals to reduce emissions to 40% below 1990 levels by 2030 and then to 85% below 1990 levels by 2050.

Table 1: Comparison of Local and Statewide Goals

Year	State Legislation	Percent Reduction	Local Targets	Percent Reduction
2019				
2030	CLCPA	40%	VoWF	40%
2050	CLCPA	85%	VoWF	85%

Co-Benefits of Climate Protection Measures

Saving Money

In addition to addressing climate change, measures taken to reduce GHG emissions have other important benefits, such as the potential for cost savings. Many of the measures in this plan help offset direct costs, such as fuel or energy used, and indirect costs such as maintenance. For instance, a "right-sized" vehicle fleet is less expensive to purchase and fuel, while also being less costly to maintain.

Improving energy efficiency, encouraging the transition to electric vehicles, installing on-site renewables, and other measures will afford an opportunity to lower energy use and costs for the Village of Wappingers Falls. Prompt action will avoid runaway costs of energy due to ever increasing fossil fuels costs and taxes.

Enhancing Resource Security

A key strategic side benefit of climate change mitigation activities is enhanced energy security through reduction in total demand. This will put less strain on the energy system as the transition to clean renewable energy takes place. Many of the actions identified here to mitigate GHG emissions will also help the Village of Wappingers Falls' government adapt to a changing climate. For example, extreme and prolonged heat waves can put considerable strain on the reliability of energy delivery in peak periods, possibly leading to service disruption during times when cooling is most needed. By increasing energy efficiency service disruptions are less likely.

Creating Jobs

The renewable energy industry has become a leading sector in job growth. In 2018, clean energy employment rose 3.6%, and the U.S. Bureau of Labor Statistics expects solar installers and wind technicians to be the two fastest-growing jobs through 2026. Energy efficiency jobs are also growing rapidly. The climate protection measures in this plan can spur business and job growth during the design, manufacture, and installation of energy efficient technologies and other green sectors. This presents a particular opportunity to reinvest in the local economy and help the migration away from fossil fuels toward green jobs.

Improving Public Health

Climate change mitigation activities, particularly those related to transportation, help to clean the air by reducing vehicle emissions and therefore improve public health throughout the community. Transportation mitigation strategies often focus on encouraging the use of active transportation, such as biking and walking, to get to work. The Village of Wappingers Falls employees that increase their use of active transportation will benefit from a healthier lifestyle. The Village should investigate incentive programs to encourage active transportation.

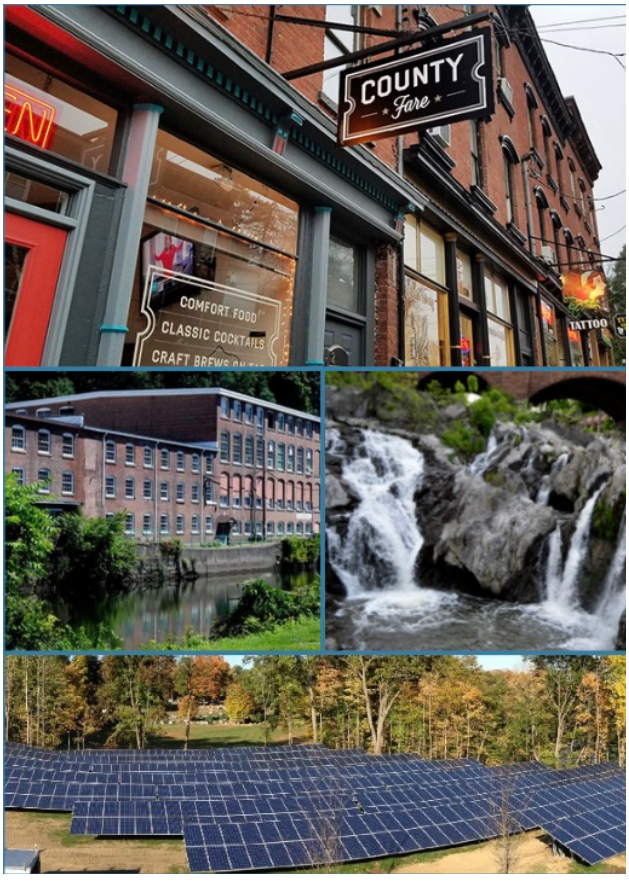
Delivering Benefits to Frontline Communities

Research shows that vulnerable populations such as the elderly or chronically ill, low-income families and people of color are more at risk when it comes to experiencing impacts of climate change. By targeting programs and making changes to services or infrastructure before extreme events happen, we can mitigate the most devastating impacts to already vulnerable populations.

Appendix I: Village of Wappingers Falls LGO GHG 2019 Inventory

NOTE:
This original inventory was completed last year without the knowledge of an oil furnace at the Police Department building. It has not been updated. Going forward, the ClearPath tool for Inventory, Forecast and Planning has been updated to reflect this new information.

Village of Wappingers Falls



Baseline Year 2019

Inventory of Government Operations Greenhouse Gas Emissions

SEPTEMBER 15, 2023

Produced with Assistance from ICLEI – Local Governments for Sustainability USA and the Hudson Valley Regional Council

Credits and Acknowledgements

Leader:

- **Tom Morris,** Planning Board Chair and Climate Action Lead

Assisted by:

- **Mary Lambert**, Climate Action Planning Institute Coordinator
- **Lauren Pacheco**, Vassar College Intern
- **Karen McLaughlin**, Tri Muni Wastewater
- **John Karge**, Village Clerk
- **Heather McCormick**, Village Staff Assistant
- **Lori Jiava**, Village Treasurer

CAPI is a *program* of the Hudson Valley Regional Council. *This program has been funded in part through a grant to the County of Dutchess as lead applicant through the Climate Smart Communities Grant Program, Title 15 of the Environmental Protection Fund through the New York State Department of Environmental Conservation."*

ICLEI-Local Governments for Sustainability USA
This template was updated by ICLEI in 2022

Executive Summary

The Village of Wappingers Falls (to be called “Village”) recognizes that greenhouse gas (GHG) emissions from human activity are catalyzing climate change, the consequences of which pose risks to the future health, wellbeing, and prosperity of our community.

The Village has a solar field located on the northern edge of the Water Plant property to help offset the electrical power required from Central Hudson. The Village streetlights have been transitioned to LED to reduce electricity demands.

This report provides estimates of greenhouse gas emissions resulting from activities within the Village’s government operations. This inventory accounts for Scopes 1, 2 and some scope 3 emissions (employee commuting).

Key Findings

Figure 1 shows local government operations emissions. Water and Wastewater Treatment Facilities accounts for a vast majority (40.2%) of these emissions. The next largest contributor is the Vehicle Fleet (27.6%), followed by Buildings and Facilities (20.2%). Actions to reduce emissions from these sectors will be a key part of any future climate action plan developed by The Village. Employee Commute (10.0%) and Street Lights and Traffic Signals (2.0%) were responsible for the remainder of local government operations emissions. Unfortunately, Solid Waste information was not available as the hauler does not breakout the Village from the surrounding towns.

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

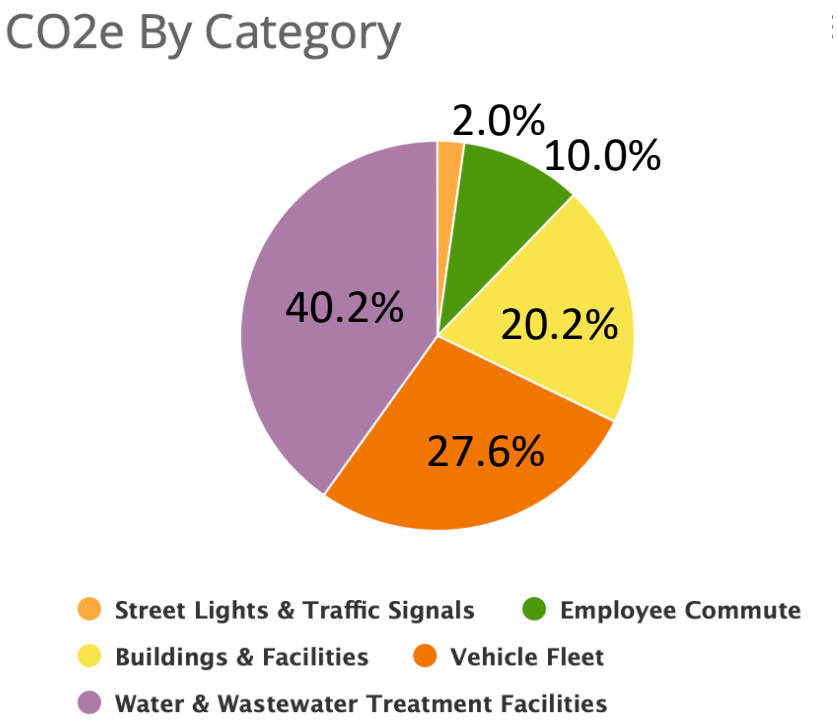


Figure 1: Government Operations Emissions by Sector

Introduction to Climate Change

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

Human activities are estimated to have caused approximately 1.0°C of global warming above pre-industrial levels, with a likely range of 0.8°C to 1.2°C. Carbon dioxide concentrations have increased substantially since the beginning of the industrial era, rising from an annual average of 280 ppm in the late 1700s to 414 ppm in 2021 (a 48 percent increase)[2].

Global warming is likely to reach 1.5°C between 2030 and 2052 if it continues to increase at the current rate. Warming from anthropogenic emissions from the pre-industrial period to the present will persist for centuries to millennia and will continue to cause further long-term changes in the climate system, such as sea level rise, with associated impacts, but these emissions alone are unlikely to cause global warming of 1.5°C. Climate-related risks for natural and human systems are higher for global warming of 1.5°C than at present, but lower than at 2°C. These risks depend on the magnitude and rate of warming, geographic

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

[2]United States Environmental Protection Agency WebSite (www.epa.gov), Climate Change Indicators: Atmospheric Concentrations of Greenhouse Gases, https://www.epa.gov/climate-indicators/climate-change-indicators-atmospheric-concentrations-greenhouse-gases

location, levels of development and vulnerability, and on the choices and implementation of adaptation and mitigation options[3].

According to the 2019 National Climate Assessment, Heat waves, heavy downpours, and sea level rise pose growing challenges to many aspects of life in the Northeast. Infrastructure, agriculture, fisheries, and ecosystems will be increasingly compromised. Many states and cities are beginning to incorporate climate change into their planning.

The Northeast is characterized by a diverse climate. Average temperatures in the Northeast generally decrease to the north, with distance from the coast, and at higher elevations. Average annual precipitation varies by about 20 inches throughout the Northeast with the highest amounts observed in coastal and select mountainous regions. During winter, frequent storms bring bitter cold and frozen precipitation, especially to the north. Summers are warm and humid, especially to the south. The Northeast is often affected by extreme events such as ice storms, floods, droughts, heat waves, hurricanes, and major storms in the Atlantic Ocean off the northeast coast, referred to as nor'easters. However, variability is large in both space and time. For example, parts of southern New England that experienced heavy snows in the cold season of 2010-2011 experienced little snow during the cold season of 2011-2012. Of course, even a season with low totals can feature costly extreme events; snowfall during a 2011 pre-Halloween storm that hit most of the Northeast, when many trees were still in leaf, knocked out power for up to 10 days for thousands of households.[4]

Many communities in the United States have started to take responsibility for addressing climate change at the local level. Reducing fossil fuel use in the community can have many benefits in addition to reducing greenhouse gas emissions. More efficient use of energy decreases utility and transportation costs for residents and businesses. Retrofitting homes and businesses to be more efficient creates local jobs. In addition, when residents save on energy costs, they are more likely to be spend at local businesses and add to the local economy. Reducing fossil fuel use improves air quality, and increasing opportunities for walking and bicycling improves residents' health.

[3]IPCC, 2018: Summary for Policymakers. In: Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. World Meteorological Organization, Geneva, Switzerland, 32 pp.
[4]U.S. Global Change Research Program. 2014. National Climate Assessment – Ch 19: Southeast. Retrieved from https://nca2014.globalchange.gov/chapter/19/

Greenhouse Gas Inventory as a Step Toward Carbon Neutrality

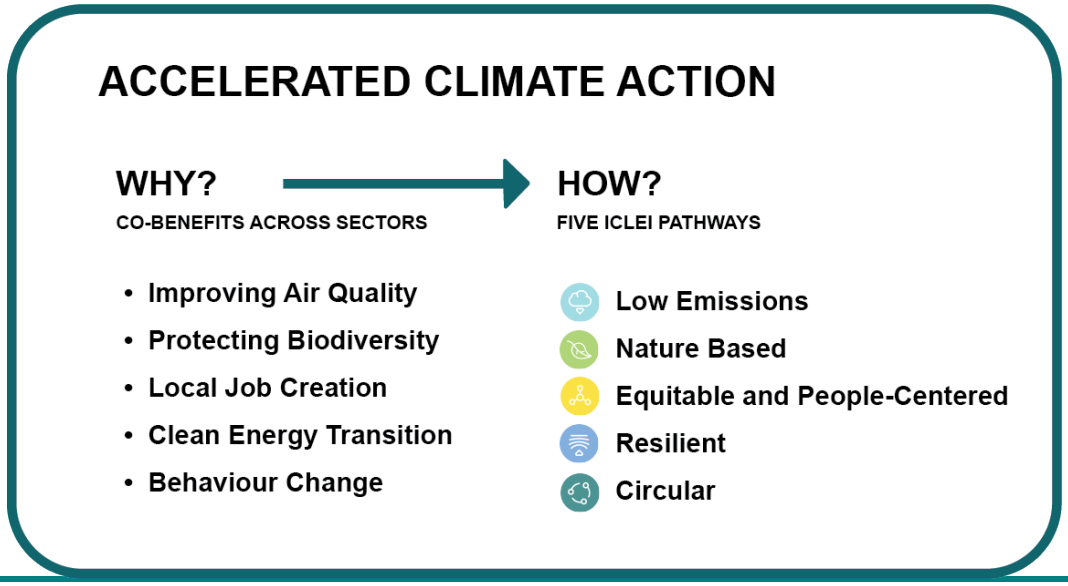
Facing the climate crisis requires the concerted efforts of local governments and their partners, those that are close to the communities directly dealing with the impacts of climate change.

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

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

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

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



ICLEI Climate Mitigation Milestones

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

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

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

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

Figure 2: ICLEI Climate Mitigation Milestones

Inventory Methodology

Understanding a Greenhouse Gas Emissions Inventory

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

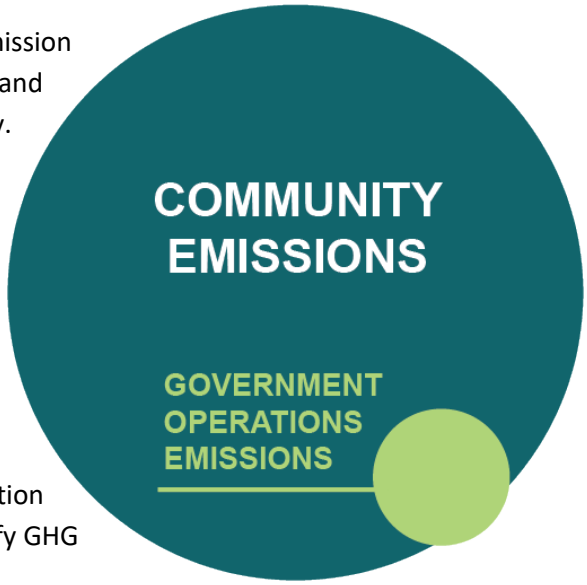


Figure 3: Relationship of Community and Government Operations Inventories

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

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

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

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

Local Government Operations (LGO) Protocol

In 2010, ICLEI, the California Air Resources Board (CARB), and the California Climate Action Registry (CCAR) released Version 1.1 of the LGO Protocol[5]. The LGO Protocol serves as the national standard for quantifying and reporting greenhouse emissions from local government operations. The purpose of the LGO Protocol is to provide the principles, approach, methodology, and procedures needed to develop a local government operations greenhouse gas emissions inventory.

The following activities are included in the LGO inventory:

- Water & Wastewater treatment processes
- On-road transportation from vehicle fleet
- Electric and natural gas consumption from buildings & facilities
- On-road transportation from employee commute
- Street Lights and Traffic Signals

Quantifying Greenhouse Gas Emissions

Sources and Activities

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

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

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

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

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

Base Year

The inventory process requires the selection of a base year with which to compare current emissions. The Village's LGO greenhouse gas emissions inventory utilizes 2019 as its baseline year, for which the necessary data are available. Employee Commute data was not available for 2019 so 2020 was used for this sector.

Quantification Methods

Greenhouse gas emissions can be quantified in two ways:

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

Activity Data x Emission Factor = Emissions

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

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

Picture from https://grinnell-library.org/history-of-the-grinnell-library/

Government Operations Emissions Inventory Results

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

Table 2: Local Government Operations Inventory

Sector	Fuel or source	2019 Usage	Usage unit	2019 Emissions ($MTCO_2e$)
Buildings & Facilities	Electricity	363596	kWh	38
	Natural Gas	15191	Therms	81
Buildings & Facilities total				**119**
Street Lights & Traffic Signals	Electricity	120980	kWh	13
Street Lights & Traffic Signals total				**13**
Vehicle Fleet	Gasoline (on-road)	17087	Gallons	150
	Ethanol (on-road)	779.4	Gallons	7
	Diesel (on-road)	630.6	Gallons	6
Vehicle Fleet total				**163**
Employee Commute	Gasoline	144925	Miles	59
Employee Commute Total				**59**
Water and wastewater	Electricity (Tri-Muni)	2055688	kWh	218
	Electricity (Village Waste Pumps)	17507	kWh	2
	Electricity (Village Water Plant)	77449	kWh	8
	Natural Gas (Village Water Plant)	1892	Therms	10
Water and wastewater total				**238**
			Total government emissions	**592**

Figure 4 shows the distribution of emissions among the four sectors included in the inventory. Water and Wastewater Treatment Facilities represents the majority of emissions (40.2%), followed by Vehicle Fleet (27.6%) and Building and Facilities (20.2). Employee Commute (10.0%) and Street Lights and Traffic Signals (2.0%) account for a small portion of emissions. Solid Waste is not included as records do not break out the Village portions from the surrounding Towns.

Please note that we have not included emissions associated with a water treatment plant, municipal solid waste, because we were not able to obtain this data. We also do not have any large-scale refrigerants. However, in future years, it is recommended that we begin to track and report municipal solid waste and refrigerant data.

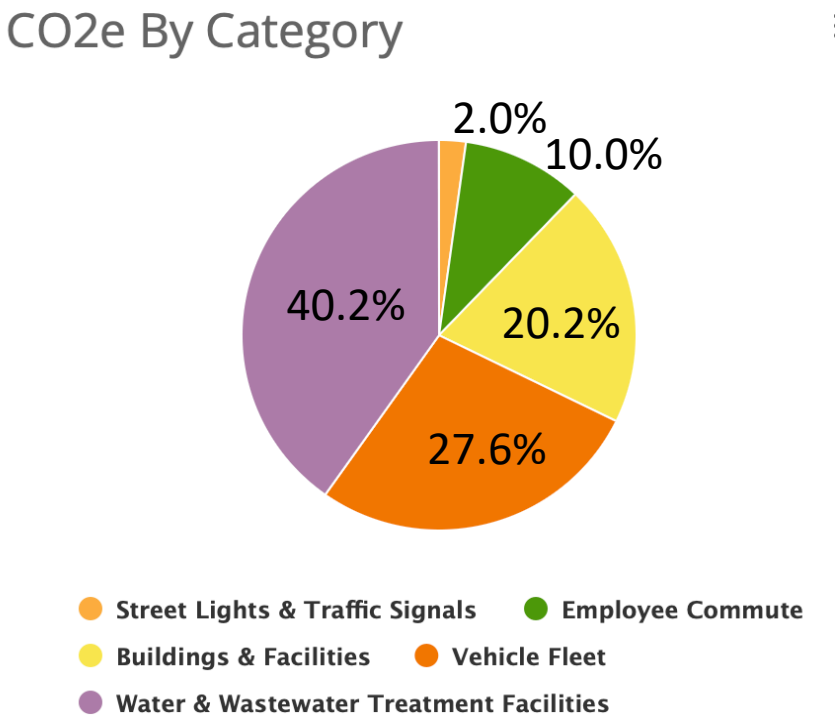


Figure 4: Local Government Operations Emissions by Sector

Next Steps:

The local government operations emissions inventory highlights a need to focus on the top three contributors. Areas of focus and potential actions are described below.

Tri-Municipal Wastewater Treatment

The electric energy used to move and process wastewater is a major contributor to the Village GHGs (40.2%). Focus needs to be on more efficient processes, lower electric demand pumps, and, if possible, lower effluent to process.

Vehicle Fleet

Fleet Vehicles use of Gasoline, Ethanol, and Diesel accounts for over a quarter of the Village GHGs (27.6%). Focus needs to be put on moving to Electric and Hybrid Vehicles.

Buildings and Facilities

The Village Buildings and Facilities account for 20.2% of all GHGs. Focus needs to be on assessing the current building heating and cooling equipment with an eye toward more efficient methods.

Conclusion

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

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

Science-Based Targets are calculated climate goals, in line with the latest climate science, that represent a community's fair share of the global ambition necessary to meet the Paris Agreement commitment. To achieve a science-based target, community education, involvement, and partnerships will be instrumental.

The Village has recently adopted a new Comprehensive Plan that specifically calls out energy efficient actions, such as recommending renewable energy in development plans, implementing green building standards, amending the zoning code to require new buildings conform to EPA Energy Star standards and establish criteria for electric vehicle charging stations (EVCS) in larger new developments and Municipal lots.

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

The next step is to forecast how emissions are projected to change over time, set an emissions-reduction target, and build upon the municipality's existing Climate Smart efforts with a climate action plan that identifies specific, targeted strategies that can realistically meet that reduction target.

Appendix: Methodology Details

Energy

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

Table 3: Energy Data Sources

Activity	Data Source	Data Gaps/Assumptions
Local Government Operations		
Electricity consumption	Central Hudson and Tri-Muni	The Village assumed the records from Central Hudson and Tri-Municipal were accurate and complete
Natural gas consumption	Central Hudson	

Table 4: Emissions Factors for Electricity Consumption

NPCC Upstate NY (NYUP) eGRID 2019

Year	CO_2 (lbs./MWh)	CH_4 (lbs./GWh)	N_2O (lbs./GWh)
2019	232.305	17	2

Transportation

Table 5: Transportation Data Sources

Activity	Data Source	Data Gaps/Assumptions
Local Government Operations		
Government vehicle fleet	Village Administration	Medium Duty vehicles were captured in the Heavy Duty category
Employee commute	Employee Survey	Used database of employee addresses and work departments supplied by Village administration in conjunction with milage calculations

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

Table 6: MPG and Emissions Factors by Vehicle Type

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

Inventory Calculations

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

Appendix II: Climate Change Science

The Intergovernmental Panel on Climate Change (IPCC)'s Fifth Assessment Report affirms that "warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice and rising global average sea level."[6] Researchers have made progress in their understanding of how the Earth's climate is changing in space and time through improvements and extensions of numerous datasets and data analyses, broader geographical coverage, better understanding of uncertainties and a wider variety of measurements.[7] These refinements expand upon the findings of previous IPCC Assessments – today, observational evidence from all continents and most oceans shows that "regional changes in temperature have had discernible impacts on physical and biological systems."

The Fifth Assessment asserts that "it is *extremely likely* that more than half of the observed increase in global average surface temperature from 1951 to 2010 was caused by the anthropogenic increase in GHG concentrations and other anthropogenic forces. Globally, economic and population growth continue to be the most important drivers of increases in CO_2 emissions from fossil fuel combustion. Changes in many extreme weather and climate events have been observed since about 1950. Some of these changes have been linked to human influences, including a decrease in cold temperature extremes, an increase in warm temperature extremes, an increase in extreme high sea levels and an increase in the number of heavy precipitation events in several regions".

In short, the Earth is already responding to climate change drivers introduced by mankind.

Surface temperature is projected to rise over the 21st century under all assessed emission scenarios. It is very likely that heat waves will occur more often and last longer, and that extreme precipitation events will become more intense and frequent in many regions. The ocean will continue to warm and acidify, and global mean sea level to rise. Changes in many extreme weather and climate events have been observed since about 1950. Some of these changes have been linked to human influences, including a decrease in cold temperature extremes, an increase in warm temperature extremes, an increase in extreme high sea levels, and an increase in the number of heavy precipitation events in several regions.[8]

---

[6]. IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K Pachauri, and L.A. Meyer (eds.)]. Geneva, Switzerland, 151 pp

[7]. IPCC, 2014: Summary for Policymakers. In: Climate Change 2014: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M.Tignor and H.L. Miller (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

[8]. IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K Pachauri, and L.A. Meyer (eds.)]. Geneva, Switzerland, 151 pp

Climate Risks

Climate change is expected to cause significant negative effects on food security. Due to projected climate change by the mid-21st century and beyond, global marine species redistribution and marine biodiversity reduction in sensitive regions will challenge the sustained provision of fisheries productivity and other ecosystem services. For wheat, rice and maize in tropical and temperate regions, climate change is projected to negatively impact production under local temperature increases of 2°C or more above late 20th century levels, although in some cases individual locations may benefit. Global temperature increases of ~4°C or more above late 20th century levels, combined with increasing food demand, would pose drastic risks to food security globally. Climate change is projected to reduce renewable surface water and groundwater resources in most dry subtropical regions, intensifying competition for water among sectors.

Until mid-century, projected climate change will impact human health mainly by exacerbating health problems that already exist. Throughout the 21st century, climate change is expected to lead to increases in ill-health in many regions, particularly in developing countries. Health impacts include greater likelihood of injury and death due to more intense heat waves and fires, increased risks from foodborne and waterborne diseases and loss of work capacity and reduced labor productivity in vulnerable populations. Risks of undernutrition in poor regions will increase. Risks from vector-borne diseases are projected to generally increase with warming, due to the extension of the infection area and season, despite reductions in some areas that become too hot for disease vectors.

In urban areas, climate change is projected to increase risks for people, assets, economies, and ecosystems, including risks from heat stress, storms and extreme precipitation, inland and coastal flooding, landslides, air pollution, drought, water scarcity, sea level rise and storm surges. These risks are amplified for those lacking essential infrastructure and services or living in exposed areas. Rural areas are expected to experience major impacts on water availability and supply, food security, infrastructure, and agricultural incomes, including shifts in the production areas of food and non-food crops around the world.

Climate change is projected to increase displacement of people. Populations that lack the resources for planned migration experience higher exposure to extreme weather events, particularly in developing countries with low income. Climate change can indirectly increase risks of violent conflicts by amplifying well-documented drivers of these conflicts such as poverty and economic shocks.

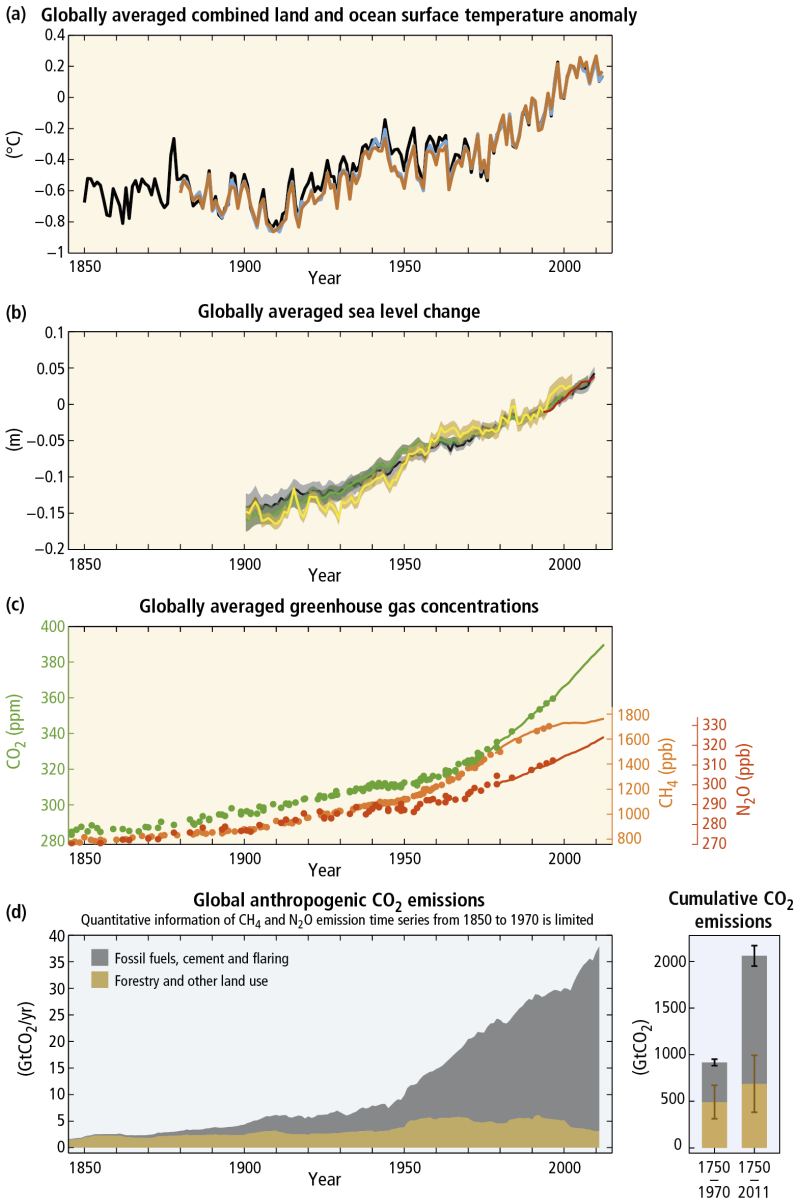


Figure A1: Observations and other indicators of a changing global climate system[9]

[9]. IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K Pachauri, and L.A. Meyer (eds.)]. Geneva, Switzerland, 151 pp

Temperatures and Extreme Events are Increasing Globally

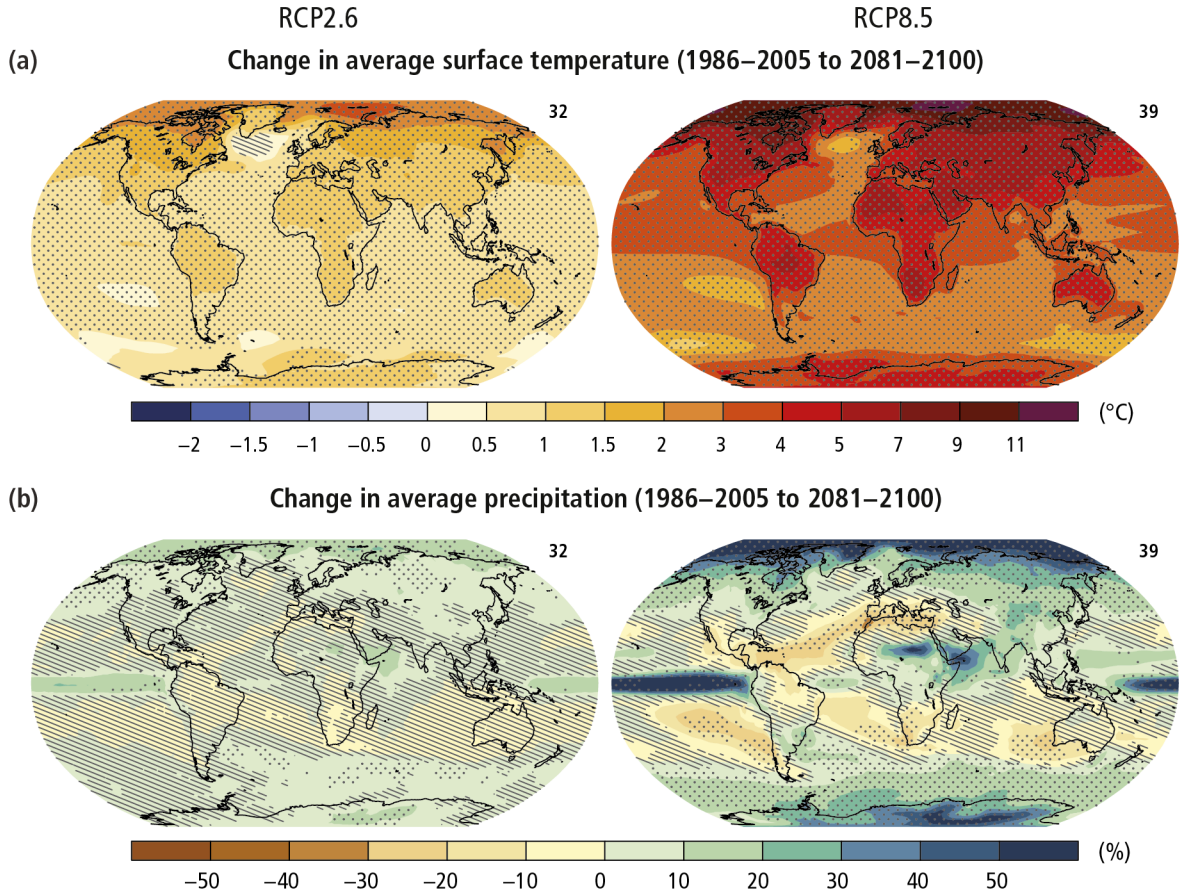
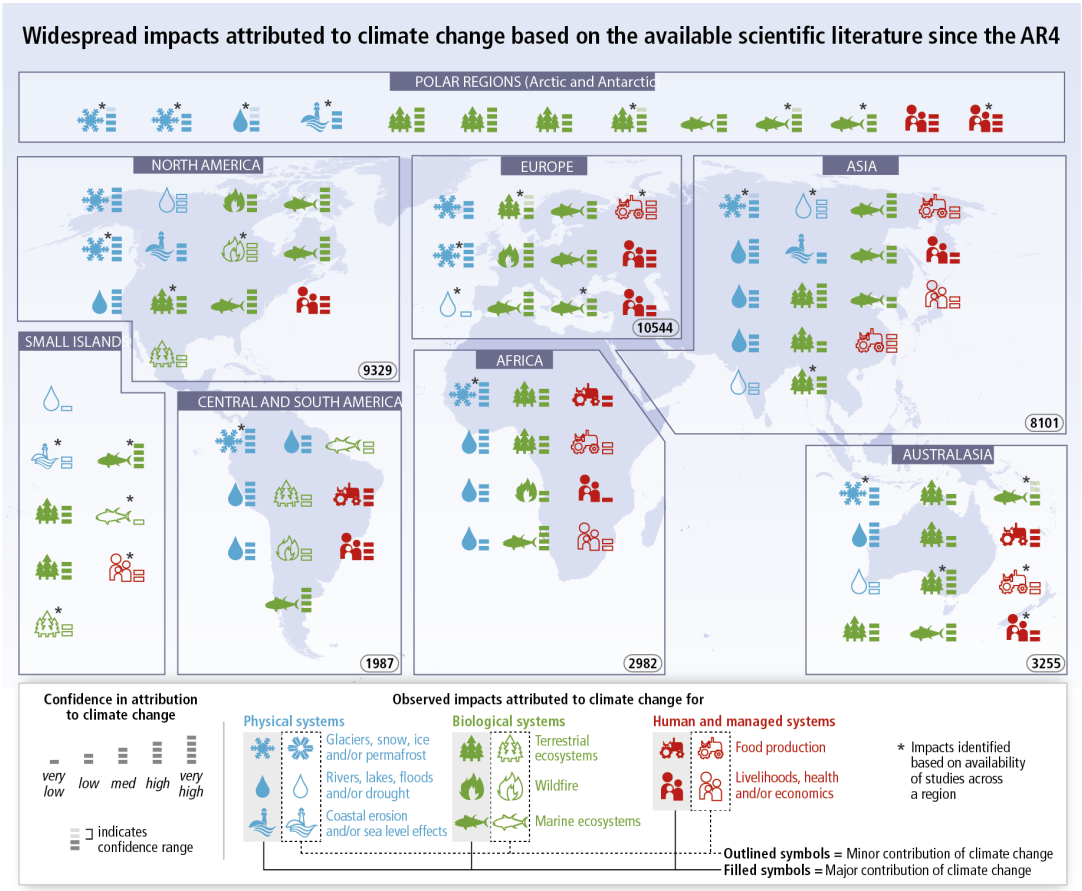


Figure A2: Change in average surface temperature (a) and change in average precipitation (b) based on multi-model mean projections for 2081–2100 relative to 1986–2005 under the RCP2.6 (left) and RCP8.5 (right) scenarios.



10

Figure A3: Climate impacts around the world. Symbols indicate categories of attributed impacts, the relative contribution of climate change (major or minor) to the observed impact and confidence in attribution.

Numbers in ovals indicate regional totals of climate change publications from 2001 to 2010, based on the Scopus bibliographic database for publications in English with individual countries mentioned in title, abstract or keywords (as of July 2011). These numbers provide an overall measure of the available scientific literature on climate change across regions; they do not indicate the number of publications supporting attribution of climate change impacts in each region. Studies for polar regions and small islands are grouped with neighboring continental regions.[11]

[10]. IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K Pachauri, and L.A. Meyer (eds.)]. Geneva, Switzerland, 151 pp

[11]. IPCC, 2014: Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, R.K Pachauri, and L.A. Meyer (eds.)]. Geneva, Switzerland, 151 pp

>>> END OF DOCUMENT <<<