

City of Glens Falls NY Climate Action Plan **FOR PUBLIC REVIEW**



Local Actions and Policies to Reduce the City of Glens Falls Greenhouse Gas Emissions

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Table of Contents

Executive Summary.....	iv
Introduction.....	1
Purpose, Scope, and Process Behind the Climate Action Plan	1
Vision Statements	4
Objectives	4
Benefits of Climate Protection Measures.....	5
Current Climate Change Posture	6
Local Government.....	6
Community-Wide Initiatives	8
City of Glens Falls GHG Emissions Inventory	9
Government Operations GHG Emissions Inventory	9
Community-Wide GHG Emissions (Excluding Government Operations).....	11
Local Government Climate Action Objectives	13
Methodology for Developing the Climate Action Plan Objectives	13
Climate Action Plan Objectives.....	15
Focus Areas for Local Government Climate Action Plan	16
Community Climate Action Objectives.....	17
Methodology for Developing the Climate Action Plan Objectives	17
Climate Action Plan Objectives.....	18
Focus Areas for Community Climate Action Plan.....	19
Stakeholder Input	20
Planned Climate Change Initiatives	21
Local Government Climate Change Initiatives	21
Community Climate Change Initiatives	24
Initiative Implementation.....	27
Implementation Planning.....	27
Roles and Responsibilities.....	28
CAP Implementation Costs	28
Performance Metrics	30
Monitoring Plan	30
Appendix I: Performance Metrics.....	31
Appendix II: References	52

Executive Summary

Significance of climate change - the need for action: Climate change is the greatest environmental challenge of the 21st century. It poses a serious threat not only to New York's natural resources, but also to our economy and our health. Given the critical impacts of climate change on humanity, the time to act to reduce GHG emissions is now. Action is required at all levels, and local governments have a unique role to play in building climate resilient communities. The City of Glens Falls has an opportunity to make changes that will help address this threat while creating jobs and benefiting residents.

Description of the process and the resulting document: The City of Glens Falls is joining an increasing number of local governments committed to addressing climate change by participating in New York State's Climate Smart Communities (CSC) Program. The CSC Certification Program recognizes local communities for their actions through a rating system that leads to three award levels: Bronze, Silver and Gold. The City of Glens Falls already currently holds a bronze CSC certification. Development of a GHG inventory and this Climate Action Plan (CAP) are required to move the City of Glens Falls progress towards a Silver CSC Community designation.

The City of Glens Falls undertook a multipronged technical approach to development of this CAP that included facility energy auditing, technical and economic evaluation of energy conservation measures, preparation of community and government GHG inventories and forecasting future energy use and GHG emissions levels. Through these efforts, the City of Glens Falls has completed energy audits and analyzed energy conservation measures for facilities that collectively represent 94% of government facility electricity use. The Glens Falls CSC Task Force, led by Jeff Flagg, Economic Development Director for the City of Glens Falls, directed the energy and GHG planning efforts. The New York State Energy Research & Development Authority (NYSERDA) provided funding for these efforts and reviewed energy auditing and GHG planning deliverables.

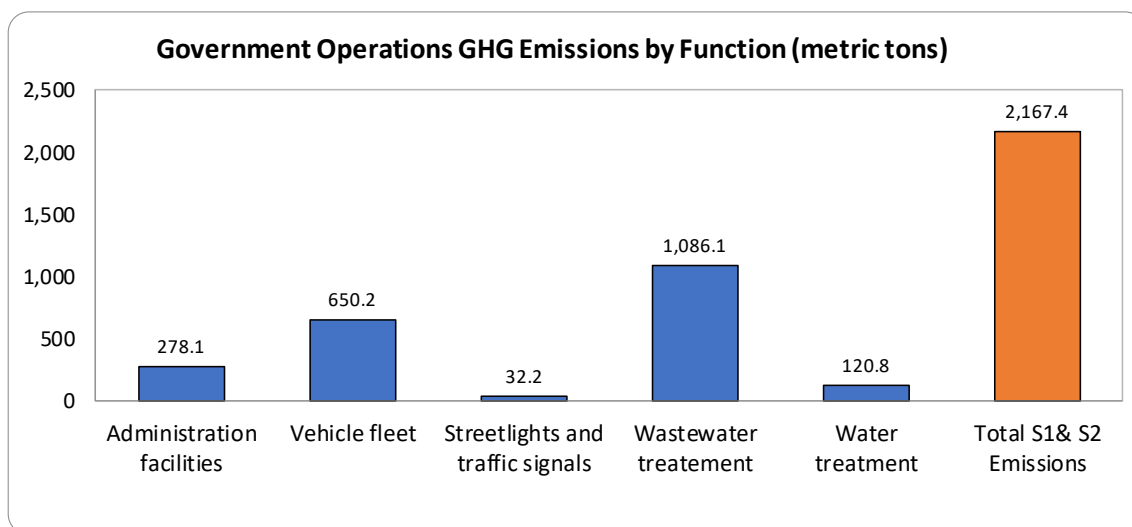
This CAP presents the results of the energy audit and GHG inventories, objectives for reducing GHG emissions for government operations and the community at large. Furthermore, it provides recommendations for initiatives to achieve GHG emissions objectives and performance metrics to monitor progress towards objectives. The objectives are based on the best currently available information on energy use patterns and technology performance for energy conservation and renewable energy options. The objectives and initiatives were reviewed by a group of stakeholders who considered technology limitations, funding constraints, public support, the feasibility of implementation and other considerations.

Vision statement: The following guiding visions for the City of Glens Falls underly the CAP:

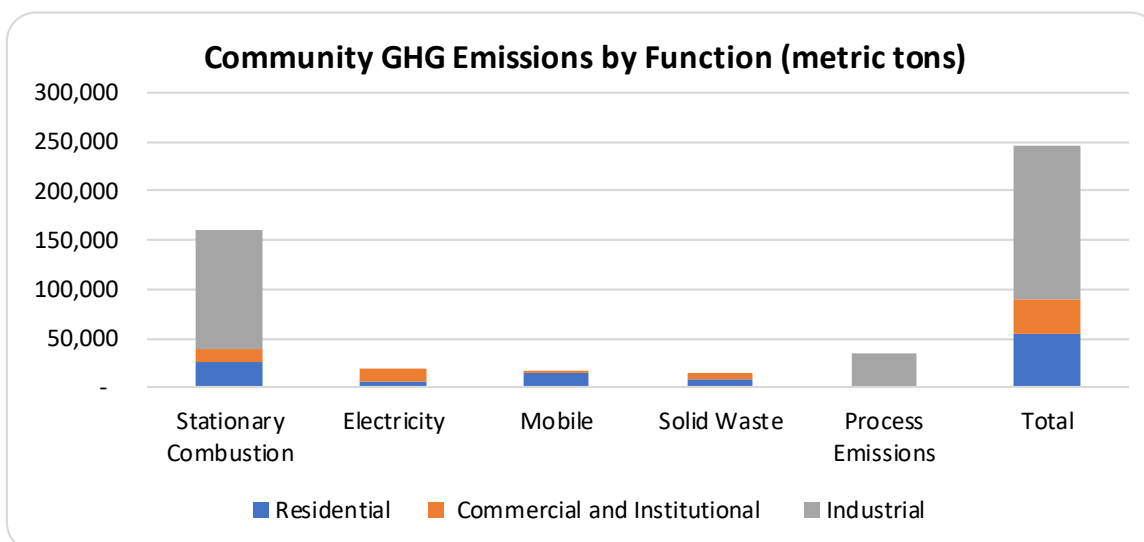
1. Make the City of Glens Falls a leader in clean and local energy.
2. Transform our buildings into high-performing places to live, work, learn, and play.
3. Inspire community action as we transition to a carbon-free energy system.
4. Become a leader in sustainability through innovative partnerships, policies, programs, and technology.

Greenhouse gas inventory findings: The City determined GHG emissions levels for the community as a whole and for City of Glens Falls government operations. Estimates represent the sum of emissions produced within the City of Glens Falls as well as emissions resulting from electricity use within the jurisdiction, even if said electricity is generated elsewhere. In this way, the community-wide figures represent all emissions for which the City is responsible.

The GHG inventory for government operations includes combustion of fuels at buildings and facilities the City owns and operates, use of fuels for vehicles and equipment, and process emissions from the wastewater treatment plant and emissions from purchased electricity for the City of Glens Falls operations for calendar year 2021. Total GHG emissions from government operations from all GHG gas types were 2,167.4 metric tons (MT) of CO_{2e} in 2021. The following graphic breaks down the source of GHG emissions by government function.



The GHG Inventory for the community-at-large includes GHG gas emissions associated with residential, commercial, and industrial electric and stationary boiler natural gas consumption; industrial processes; vehicle transportation fuel use; wastewater treatment; and solid waste generation. Total community GHG emissions, excluding government operations, were 245,575 tons in 2020. The graphic below breaks down the GHG emissions by function and economic sector.



The combined government and community wide GHG emissions are 247,742 metric tons, with government operations making up only 1 percent of the total. Industrial emissions make up 63% of the total emissions. This emissions source offers a singular opportunity for emissions reductions.

Energy audit and baseline findings: The City of Glens Falls developed a list of energy conservation measures (ECMs) and associated cost estimates and potential energy use and GHG emissions savings for government operations based on the outcome of the energy auditing effort. A detailed energy audit report describes these options, including estimated capital and operating costs, payback period and energy savings. Collectively, the recommended improvements would annually result in an estimated \$79,719 in cost savings, reduce electricity use by 961,238 kilowatt-hours (kWh) and reduce fuel use by 333 million British thermal units (MMBtu). The potential GHG emissions reduction from these measures is an estimated 93 metric tons per year (4% of total GHG emissions by Government operations). Implementing these recommended measures in the short-term is a good starting point for the development of time-phased reductions in GHG emissions.

Climate Action Plan targets: The City developed forecasts of energy use and GHG emissions based on implementation of ECMs, changes in the GHG intensity of grid electricity and transportation fuels, and demographic changes such as population growth for the period starting with the baseline year through the year 2050. The City developed near- to mid-term GHG emissions reduction targets (over the next 5 to 10 years) that rely on technology that is either available today or is feasible with only incremental improvements. Longer-term GHG reduction targets are more aggressive and assume that improvements in technology.

Sector of Economy	GHG Reduction Targets	GHG Emissions Reduction Needed (Metric Tons)
Government Operations	• Reduce GHG emissions to 25% below 2021 levels by 2035	542
	• Reduce GHG emissions to 50% below 2021 levels by 2050	1,084
Community (Excluding Government)	• Reduce GHG emissions to 10% below 2020 levels by 2035; and	24,557
	• Reduce GHG emissions to 40% below 2020 levels by 2050	98,230

The City developed strategies to reduce GHG emissions within key focus areas (e.g., energy sourcing, energy use in the built environment and transportation and waste management) for both government operations and the community at large. The CAP document has a dedicated section that outlines specific activities within each focus area that can help reduce GHG emissions. In addition, the CAP provides metrics for measuring progress towards GHG emissions reduction targets based on completion of these activities.

Climate action recommendations: The CSC recommends several formal actions:

1. **Adoption of the Climate Action Plan:** The CSC Task force recommends that the City of Glens Falls Common Council adopt the CAP through a resolution that formally supports and recognizes the objectives of the CAP as City of Glens Falls policy and intent. Council adoption and recognition of the Plan will not result in a mandate to achieve quantitative objectives or blanket acceptance of specific initiatives. Advancing many of the objectives and

initiatives will require further administrative and legislative action. Actions taken on specific initiatives will be based on prioritization of the initiatives and the human and financial resources available to implement them.

2. **Implementation of Near-Term Energy and GHG Emissions Measures:** In the short term, the CSC Task Force recommends the prompt implementation of the high priority energy conservation measures for government operations identified via detailed energy audits conducted in support of this planning effort. The recommended measures would result in an estimated \$79,719 in cost savings, reduce electricity use by 961,238 kilowatt-hours (kWh) and reduce fuel use by 333 million British thermal units (MMBtu). The potential GHG emissions reduction from these measures is an estimated 93 metric tons (4% of total GHG emissions by government operations). This represents a near-term concrete step to begin the process towards meeting the objectives of the CAP.
3. **Development of Organizational Leadership and Management:** The CSC Task Force recommends establishment of new Sustainability Manager and Sustainability Planner positions within the Mayor's Office with reporting responsibilities to the Common Council. The immediate task for these positions is to formalize CAP implementation plans including staff and departmental roles and responsibilities, reporting metrics, policy formation, scheduling, financing and grant coordination, and management and coordination of department efforts.
4. **Integration of CAP into Comprehensive Plan.** Adoption of the CAP does not preclude changes or alternatives to the objectives or initiatives in the Comprehensive Plan for the City of Glens Falls that is under development. The CSC Task Force recommends consideration of the objectives and initiatives of this CAP in the Comprehensive Plan process and integration of CAP content in the Comprehensive Plan as appropriate.

Taking these initial steps are prerequisites to the establishment of program capabilities and conducting implementation planning for the initiatives identified in the CAP document.

Benefits to local government and community: There are concrete economic and health benefits associated with addressing climate change risks:

1. **Saving Money:** Measures taken to reduce GHG emissions can result in significant cost savings. Many of the measures in this plan "pay for themselves" quickly by reducing direct costs, such as fuel or energy used, and indirect costs such as maintenance. Energy efficiency and building improvements result in lower energy bills for residents and employers as well.
2. **Enhancing Resource Security:** Many of the actions that mitigate GHG emissions also help government, businesses, and residents to adapt to a changing climate. For example, extreme and unpredictable weather events can put considerable strain on the reliability of energy delivery, possibly leading to service disruption. By increasing efficiency, such disruptions are less likely.
3. **Creating Jobs:** Renewable energy is a growing sector. Between 2015 and 2019, green jobs grew by 13.2 percent, more than twice the rate of total job growth in New York.ⁱ These climate protection measures can spur business and job growth.
4. **Improving Public Health:** Climate change mitigation activities, particularly those related to transportation, help to clean the air by reducing vehicle emissions. More transit options combined with transit-oriented development make for a more vibrant, livable community with shorter commute times and more opportunities for active transport.
5. **Delivering Benefits to Frontline Communities:** Vulnerable populations are more at risk when it comes to experiencing climate change impacts. By targeting programs and changing services or infrastructure before extreme events happen, we can mitigate impacts to vulnerable populations.

Introduction

Climate change is the greatest environmental challenge of the 21st century, with overwhelming evidence in the past decade. It poses a serious threat not just to New York's natural resources, but also to our jobs and our health. Scientists expect that with the current trends in fossil fuel use, Americans may see more intense heat waves, droughts, rainstorms, floods, wildfires and landslides in the future. These impacts could drag down our economy. Action is required at all levels, and local governments have a unique role to play in building low-carbon communities. Climate change also presents huge opportunities for creating a healthier, safer, and more equitable zero-carbon world. The City of Glens Falls has a real opportunity to make changes that address climate change and that create jobs and benefit all residents.

Climate change is caused by the accumulation of greenhouse gas (GHG) such as carbon dioxide (CO₂) and methane (CH₄) in the atmosphere, primarily resulting from burning fossil fuels and land use change. Carbon emissions from human activities have continued to rise in recent decades. 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. Given the critical impacts of climate change on humanity, the time to act to reduce GHG emissions is now.

With more than 80% of Americans living in urban areas, cities play a powerful role in addressing climate change. The design of cities—how we use our land, how we design our buildings, how we get around—impacts the amount of energy we use and the volume of GHG emissions we produce. In the next 20 years, we expect another 1.5 billion residents in the world's cities, many of them in the developing world. Therefore, it is critical that cities like Glens Falls demonstrate that it is possible to reduce GHG emissions while creating vibrant and prosperous places to live and do business.

Purpose, Scope, and Process Behind the Climate Action Plan

The City of Glens Falls is joining an increasing number of local governments committed to addressing climate change at the local level by participating in New York State's Climate Smart Communities (CSC) Program. The City recognizes the risk that climate change poses to its constituents, and is acting now to reduce the GHG emissions, or "carbon footprint", of both its government operations and the community at-large through the innovative programs laid out in this Climate Action Plan (CAP). Ultimately, local action is needed to reduce the City of Glens Falls' contribution to climate change and adapt to its current

and future effects. This CAP takes advantage of common-sense approaches and cutting-edge policies that our local government is positioned to implement – actions that can reduce energy use and waste, create local jobs, improve air quality, preserve our local landscape and history, reduce risk to people and property, and in many other ways benefit the City of Glens Falls for years to come.

Purpose

The CAP is a framework for the development and implementation of actions that reduce GHG emissions. It provides guiding objectives and strategies to realize the City’s GHG reduction objectives. The CAP creates a course of action so that everyone has a role in creating and achieving climate and sustainability objectives.

Scope

This Plan covers objectives and strategies for reducing GHG emissions resulting from local government and community-wide activities within the City of Glens Falls.

The CAP addresses the major sources of emissions in the City of Glens Falls and sets forth objectives and strategies in six focus areas that local government agencies and the community can implement together to achieve greenhouse gas reductions:

Focus Area	Local Government	Community-Wide
Buildings and Other Facilities	✓	✓
Streetlights and Traffic Signals	✓	
Transportation	✓	✓
Waste Management		✓
Water Delivery	✓	
Wastewater Management	✓	

The CAP distinguishes between GHG reduction objectives for local government activities and community-wide activities, since the strategies needed to address GHG emissions for each of these sectors are significantly different.

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 to departments, staff, or community partners.

Process

New York State's Climate Smart Communities (CSC) Program supports local governments in their efforts to reduce GHG emissions, adapt to the effects of climate change and maintain and grow a resilient economy. The CSC Certification Program recognizes local communities for their actions through a rating system that leads to three levels of award; bronze, silver and gold. The City of Glens Falls already has achieved a bronze CSC certification. Development of a GHG inventory and Climate Action Plan are required to move the City of Glens Falls progress towards a Silver CSC Community designation. The Glens Falls CSC Task Force, led by Jeff Flagg, Economic Development Director for the City of Glens Falls, directed the ongoing energy and GHG planning efforts. The New York State Energy Research & Development Authority (NYSERDA) provided funding for these efforts and reviewed energy auditing and GHG planning deliverables. The City of Glens Falls engaged the ANTARES Group, Inc. (a Stark Tech Company), a consulting firm that provides energy strategy and decarbonization planning, to assist with facility energy auditing, evaluation of energy conservation measures, preparation of community and government GHG inventories and assembly of this CAP. Through these efforts, the City of Glens Falls has completed energy audits and analyzed energy conservation measures for facilities that collectively represent 94% of government facility electricity use.

The CSC Task Force coordinated community and stakeholder outreach efforts based on the draft plan. First, the draft CAP was disseminated internally to the members of the CSC Task Force, which includes members of the Glens Falls Common Council, representatives from Warren County and Glens Falls residents. This is a first step in the public engagement effort to obtain input from affected government agencies, residents and businesses. Next steps include:

- Work with CSC Task Force and the Common Council Sustainability Committee to organize stakeholders for participation, review and comment;
- Circulate the draft plan from the New York Department of Environmental Conservation (DEC) Office of Climate Change (OCC) for feedback;
- Incorporate feedback and ideas into the final draft;
- Preparation of the final draft for review by the Common Council;
- Present the final draft to Common Council for review and comment; and
- Development and approval of the final CAP by the City of Glens Falls Common Council.

Ultimately the CAP will provide actionable objectives and metrics to address GHG emissions that are rooted in the best available data and information on energy and GHG emissions by the local Government agencies and also are consistent with the goals of maintaining a thriving community as expressed by residents and businesses through the stakeholder engagement process.

Vision Statements

The following guiding visions for the City of Glens Falls underly the CAP:

1. Make the City of Glens Falls a leader in clean and local energy.
2. Transform our buildings into high-performing places to live, work, learn, and play.
3. Inspire community action as we transition to a carbon-free energy system.
4. Become a leader in sustainability through innovative partnerships, policies, programs, and technology.

The CAP offers a set of objectives and strategies that will address the climate hazard vulnerabilities. These were reviewed by a group of stakeholders who considered technology limitations, funding constraints, public support, the feasibility of implementation and other considerations.

Objectives

Our CAP drives and coordinates efforts toward reductions in GHG emissions for local government operations and the community as a whole. The time-phased objectives by sector roll up the potential GHG emissions reductions from the strategies outlined in the CAP document.

Local Government Operations and Community-Wide GHG Emissions Reduction Objectives

Sector	Target		Benefits
Local Government	25 percent below 2021 levels by 2035		Advances equity
	33 percent below 2021 levels by 2050		Improves health
Community-Wide	7.5 percent below 2020 levels by 2035		Improves environmental quality
	12.5 percent below 2020 levels by 2050		Supports jobs and prosperity

These objectives are aggressive but realistic. The City's objectives are based on local energy use patterns and assume voluntary adoption of currently available GHG-saving technology, supported by state and federal financial incentives.

Benefits of Climate Protection Measures

1. Saving Money

In addition to addressing climate change, measures taken to reduce GHG emissions have other important benefits. The most obvious of these is the potential for significant cost savings. In 2021, the City of Glens Falls spent \$566,000 on energy to power, heat and cool its buildings, and an additional \$232,000 on fuel for vehicles. Many of the measures in this plan “pay for themselves” by reducing direct costs like fuel or energy use, and indirect costs such as maintenance. Energy efficiency and building improvements also reduce energy costs for residents and employers.

2. Enhancing Resource Security

A strategic side benefit of climate change mitigation is enhanced energy security through reduction in total energy demand. Many of the actions that mitigate GHG emissions also help government, businesses, and residents to adapt to a changing climate. For example, extreme and unpredictable weather events can put considerable strain on the reliability of energy delivery, possibly leading to service disruption. By increasing efficiency, such disruptions are less likely.

3. Creating Jobs

Renewable energy is a growing sector. Between 2015 and 2019, green jobs grew by 13.2 percent, more than twice the rate of total job growth in New York.ⁱⁱ These climate protection measures can spur business and job growth during the design, manufacture, and installation of energy efficient technologies and other green sectors. This presents an opportunity to reinvest in the local economy.

4. 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. More transit options combined with transit-oriented development practices make for a more vibrant, livable community with shorter commute times and more opportunities for active transport.

5. Delivering Benefits to Frontline Communities

Research shows that vulnerable populations such as the elderly or chronically ill, the poor 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 impacts to vulnerable populations.

Current Climate Change Posture

Local Government

The City's efforts to combat climate change began several years ago. One key early milestone is the City's designation as a NYSERDA Clean Energy Community (CEC) in 2017. Since then, the City of Glens Falls has worked to reduce GHG emissions and climate risk through a variety of actions. Later, the City made a Pledge to become a New York State CSC and received a Bronze CSC Certification in September 2021. The CSC Certification framework is based on a point system for achieving certification actions associated with the ten elements of the CSC Pledge. The City of Glens Falls completed 17 actions for a total of 122 points to achieve this Certification level.

This CAP is a critical component of a comprehensive approach to reduce the City of Glens Falls emissions and increase resilience. Development of the GHG Inventory and the CAP are two actions in the process of becoming a Silver CSC, which would position the City among the foremost leaders.

The City's recent past and ongoing efforts make it well-positioned to establish GHG emissions reduction objectives that will help mitigate climate change risks and enhance its economic well-being and quality of life.

Climate Smart Communities Pledge Elements

- 1) Build a climate-smart community
- 2) Inventory emissions, set goals and plan actions
- 3) Decrease energy use
- 4) Shift to clean, renewable energy
- 5) Use climate-smart materials management
- 6) Implement climate-smart land use
- 7) Enhance community resilience to climate change
- 8) Support a green innovation economy
- 9) Inform and inspire the public
- 10) Engage in an evolving process of climate action

The following timeline outlines the actions that the City of Glens Falls took as part of the CSC Certification Process and other ongoing sustainability and climate change resilience actions:

- 2017
 - Became designated a NYSERDA Clean Energy Community
 - Completed energy benchmarking requirement for government buildings
 - Adopted unified solar permit process
- 2018
 - Established a CSC Task Force including the City Economic Development Director, representatives from Common Council, residents and Warren County
- 2019
 - Began offering building energy efficiency financing through the Energize NY Open C-Pace Financing Program
 - Acquired Hyundai Ioniq electric vehicle (EV) for municipal vehicle fleet
- 2020
 - Developed plan to convert high-pressure sodium streetlights to LED fixtures, with a projected \$110,000 in energy savingsⁱⁱⁱ
 - Installed 3 EV dual-port EV charging stations in the Park Street Parking Garage and 10 additional dual-port EV charging stations around the city
- 2021
 - Participated in regional bicycle infrastructure planning and improvement including sidewalk and bike parking improvements, signage and bike share program establishment
 - Conducted energy audits for City Hall and a targeted roof audit for the Ice Arena through NYSERDA's FlexTech Program.
- 2022
 - Conducted energy audits of eight government facilities that collectively represent over 85% of total electricity use by City facilities, identifying potential savings of over \$79,000 annually on energy costs and 6% energy savings compared baseline energy use.

Other activities the City has conducted to increase its overall sustainability and climate change resilience include completion of energy code enforcement training for Glens Falls Buildings and Codes staff, use of the U.S. EPA EnergyStar Portfolio Manager to track electricity and gas use and cost, operating a residential organic waste collection program and making Warren County Hazard Mitigation Plan information related to climate change available via the Climate Smart Communities Portal.

For more information on these and other achievements, see the City of Glens Falls [Climate Smart Communities Certification Report](#).

Community-Wide Initiatives

In February 2022, the data-driven journalism site Stacker compiled data from the Yale Program on Climate Change Communication on how people in Glens Falls feel about climate change.^{iv} The data indicate that 70% of people in Glens Falls believe global warming is happening, a majority (55%) think that it is caused mostly by humans, and 70% think it will harm future generations. A smaller percentage (37%) think global warming will harm them personally. These data, combined with industry and local stakeholder commitments confirm that there is strong support for community GHG reduction efforts. A number of companies with a presence in Glens Falls have made significant climate commitments and other stakeholders can support additional actions:

- **Private Sector and Industry leadership**

- Finch Paper worked closely with the City of Glens Falls in 2016 to conduct a microgrid feasibility study and is committed to green energy and responsible forestry practices^v
- Walmart has committed to achieving zero emissions in its operations by 2040 and engaging supplier through its [Project Gigaton™](#) initiative to reduce or avoid supply chain emissions by 1 billion metric tons by 2030^{vi}
- [BD \(Becton, Dickinson & Company\)](#) has committed to reduce Scope 1 and 2 GHG emissions 46% by 2030 (from its 2019 baseline) and to be carbon neutral by 2040^{vii}
- [Glens Falls Hospital](#) worked with National Grid and NYSERDA through NYSERDA's Energy Efficiency for Health initiative to improve energy efficiency
- Companies identified on the Carbon Disclosure Project (CDP) list of leaders of corporate climate action with a Glens Falls presence include CVS Health, and Hilton Worldwide^{viii}

- **Non—profits and Community Stakeholders**

- [New York State Association of Counties – Climate Action Standing Committee](#) provides a resource to best practices by other county and local government agencies
- [MEGA Community Choice Aggregation \(CCA\) Program](#) is working with the City of Glens Falls to provide clean electric supply choices while still relying on delivery and physical infrastructure provided by National Grid
- [Smart Cities Innovation Partnership](#) provides funding to public-private partnerships that use technology to address challenges, including funds provided through Empire State Development to the City of Glens Falls
- [EIC NY Pace](#) is a New York State non-profit development corporation that operates EIC Open C-PACE to provide financing for clean energy projects in commercial buildings

City of Glens Falls GHG Emissions Inventory

Through the completion of a local GHG emissions study, or “GHG inventory,” the City has determined emissions levels for the community as a whole and for City of Glens Falls government operations. Estimates represent the sum total of emissions produced within the City of Glens Falls as well as emissions resulting from electricity use within the jurisdiction, even if said electricity is generated elsewhere. In this way, the community-wide figures represent all emissions for which the City is responsible.

Government Operations GHG Emissions Inventory

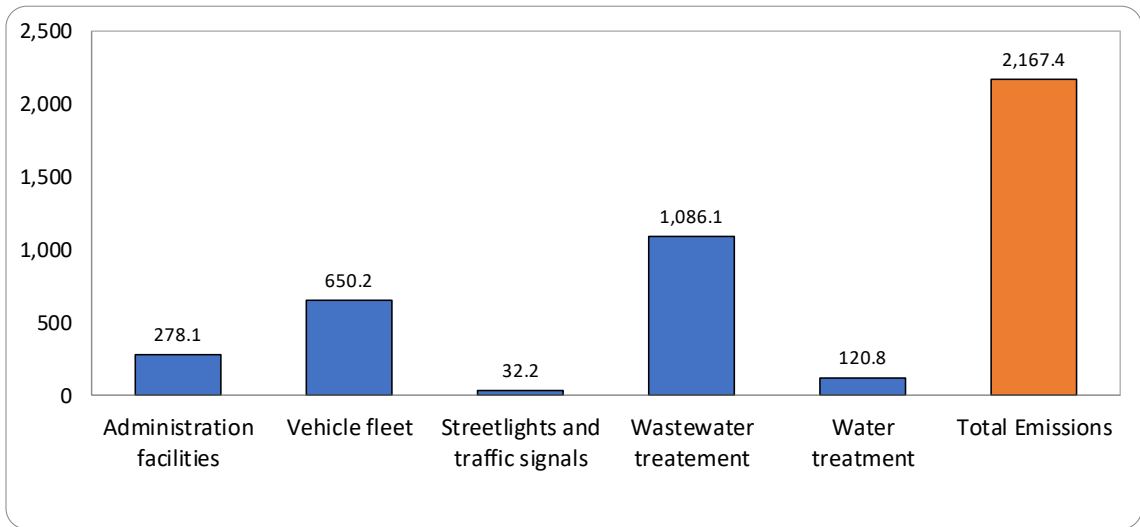
The GHG Inventory for Government Operations includes direct emissions including stationary combustion of fuels at buildings and facilities the City owns and operates, use of fuels for vehicles and equipment, and process emissions from the wastewater treatment plant and indirect emissions from purchased electricity for the City of Glens Falls operations for calendar year 2021. The inventory was prepared following the Local Government Operations Protocol, version 1.1 (ICLEI 2010).^{ix} This is the first year an inventory has been developed, and it will serve as the base year for government operations.

The following sources of GHG emissions are included in the inventory, as applicable: carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulphur hexafluoride (SF₆).

The inventory data and calculations were prepared in an excel spreadsheet tool, based on the Municipal GHG Emissions Inventory tool developed by Climate Action Associates, LLC. The emission calculations follow the methods in the Local Government Operations Protocol and use the default emission factors for fuels. The electricity emission factor uses eGRID 2020 data. The GHG emissions are converted to CO₂ equivalent values (CO_{2e}) based on the IPCC Fourth Assessment Report (AR4) global warming potential (GWP) factors.

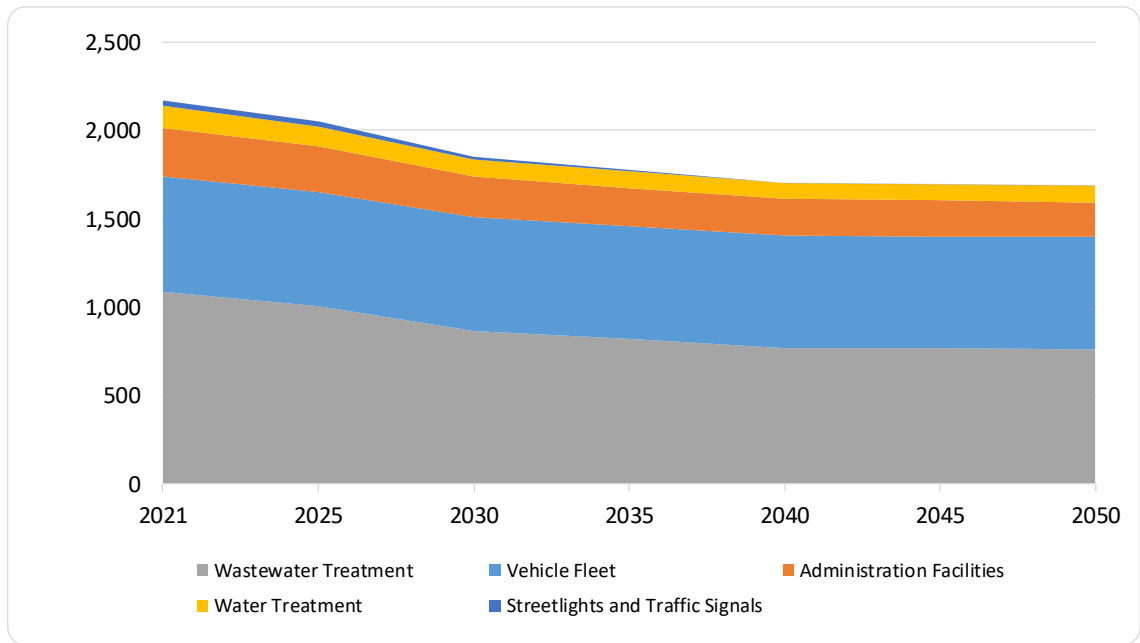
Total GHG emissions from government operations were 2,167.4 metric tons (MT) of CO_{2e} in 2021.¹ The following graphic breaks down the source of GHG emissions by government function.

2021 Government Operations GHG Emissions for Local Government Operations (Metric Tons)



The City also completed an emissions forecast based on projections of current data and expected future trends. The emissions forecast is a “Business As Usual” forecast, a scenario estimating future emissions levels if no further local action (i.e., projects within this CAP) were to take place.

Projected Change in GHG Emissions for Local Government Operations (Metric Tons)



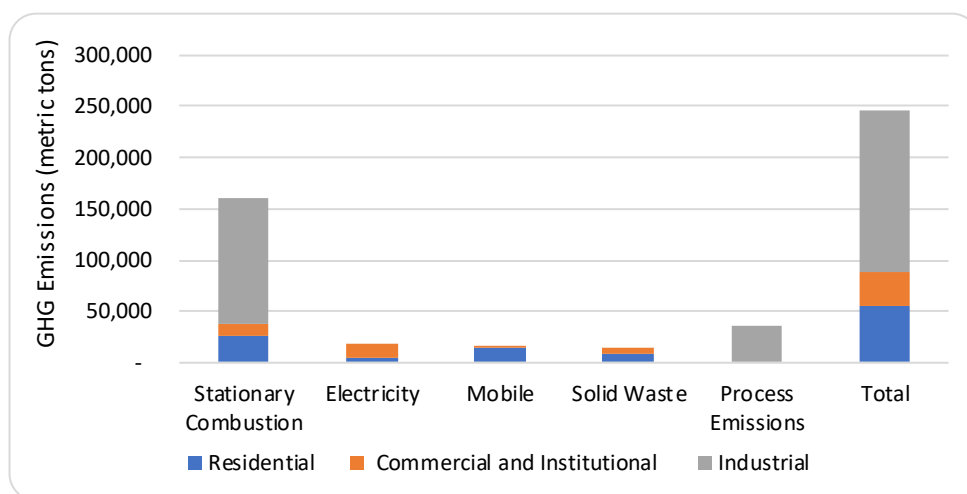
¹ In this report, metric tons, MT and tons are used interchangeably.

Community-Wide GHG Emissions (Excluding Government Operations)

The Glens Falls Community GHG Inventory includes the greenhouse gas emissions associated with residential, commercial, and industrial energy consumption; industrial processes; vehicle transportation fuel use; wastewater treatment; and solid waste generation. The inventory was prepared following the NYS-specific guidance from the 2015 New York Community and Regional Greenhouse Gas Inventory Guidance,^x as well as the U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions,^{xi} where applicable. This is the first year an inventory has been developed, and it will serve as the base year for community emissions.

Total community wide GHG emissions, excluding local government operations, were 245,575 tons in 2020. The following graphic breaks down the source of GHG emissions by function and economic sector.

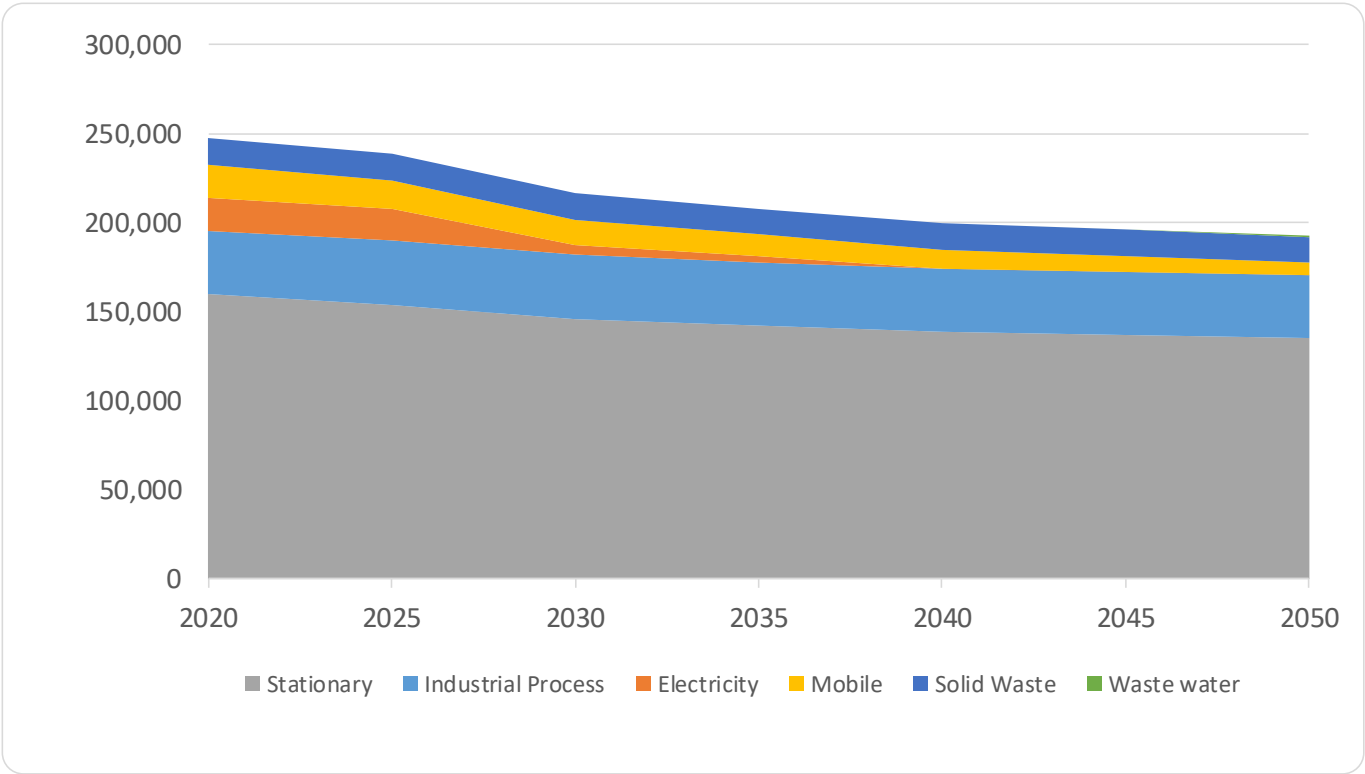
2020 Community GHG Emissions Excluding Local Government (Metric Tons)



The City completed an emissions forecast based on projections of current data and expected future trends. The emissions forecast includes a “Business As Usual” scenario, which reflects future emissions levels if no further local action (i.e., projects within this CAP) were to take place. The BAU scenario considers the impact on activity data such as energy usage due projected changes in the residential population and commercial and industrial opportunities. This data is based on 2020 census data, regional planning board information, and historical data on economic indicators. The forecast also considers impacts due to emission factor changes over time, particularly for grid electricity which is expected to be increasingly less carbon-intensive over time. In addition, continued adoption of electric vehicles is included in the model, which results in emission savings due to reduced fossil fuel consumption and increased electric use.

The graph below shows the BAU Forecast for the Community out to 2050. This assumes that the grid electricity will be carbon neutral by 2040. As a result of the projected changes, the BAU forecast shows an expected 22% overall emissions reduction by 2050.

**Projected Change in Community GHG Emissions Excluding Government Operations
(Metric Tons)**



Later in the CAP, the Community-Wide Climate Action Objectives chapter shows how implementation of proposed actions to reduce GHG emissions can augment the reduction in emissions in the BAU case.

Local Government Climate Action Objectives

Methodology for Developing the Climate Action Plan Objectives

The City of Glens Falls followed an iterative process to develop GHG emissions reduction objectives, based on a detailed analysis of near-term energy conservation measure opportunities, state policy mandates reducing the carbon intensity of purchased energy in New York, and the long-term potential for energy efficiency improvements in City operations. The steps in this process included the following:

- Establish existing conditions that describe current energy use and cost for City facilities
- Develop near-term recommendations for energy and GHG reduction measure implementation
- Assess mid- and long-term GHG savings that are attainable through additional evaluation and deployment of energy conservation measures
- Prepare forecasts of energy use and GHG emissions over the planning period
- Revise proposed objectives based on internal review and feedback from stakeholders.

Additional stakeholder engagement efforts are still required prior to acceptance of the CAP by the City of Glens Falls Common Council.

Development of Existing Conditions Report for the City of Glens Falls

The City developed an existing conditions report that describes major energy-using systems, energy use and cost in buildings, vehicle fleet operations and other local government functions. The existing conditions report is based on detailed engineering and financial analysis, including:

- ASHRAE Level 2 energy audits for the top three energy-consuming City-owned facilities that consume 85% of the City's portfolio of electric energy use. These buildings include the Civic Center, the WWTP, and the Glens Falls Recreation Ice Center.
- ASHRAE Level 1 energy audits for five other City-owned facilities including the Broad St. Firehouse, Ridge St. Firehouse, the Department of Public Works (DPW), Platt St. DPW Garage, and Park St. Parking Garage. These buildings represent 9% of the City's electricity use.
- Analysis of 12 months of utility billing data and an evaluation of vehicle fleet fuel use.

The existing conditions report also relied upon prior audit efforts conducted in 2020 for City Hall and other City-wide energy efficiency initiatives.

Identification of Near-Term GHG Reduction Opportunities

The City of Glens Falls developed a list of energy conservation measures (ECMs) and associated cost estimates and potential energy use and GHG emissions savings based on the outcome of the energy auditing effort. These served as a starting point for the development of time-phased objectives for reductions in GHG emissions. A detailed energy audit report describes these options, including estimated capital and operating costs, payback period and energy savings. Collectively, the recommended improvements would annually result in an estimated \$79,719 in cost savings, reduce electricity use by 961,238 kilowatt-hours (kWh) and reduce fuel use by 333 million British thermal units (MMBtu). The potential GHG emissions reduction from these measures is an estimated 93 metric tons (4% of total GHG emissions by Government operations).

Potential GHG Savings from Additional Energy Retrofits and Policy

Achieving high levels of GHG emissions reductions in City operations that approach New York Climate Act targets will require additional measures, beyond those identified in the energy audits conducted at City buildings. The energy audits performed for the City of Glens Falls focused on building systems and did not address potential savings from renewable energy procurement, reductions in carbon intensity of grid-electricity and transportation fuels and the potential for on-site renewable energy generation to contribute to GHG emissions reduction in City operations. These and additional energy conservation measures were the focus of an additional modeling effort to support an analysis of how the City can establish and meet mid- and long-term GHG reduction objectives. Emissions reduction measures were prioritized in terms of GHG reduction potential, technology readiness, net cost and implementation feasibility. Considerable planning and energy analysis efforts are needed to realize the full range of GHG reductions desired, which is why potential reductions are ramped up over time in planning forecasts.

Forecasts of Energy Use and GHG Emissions Over Planning Horizon

Forecasts of energy use and GHG emissions based on implementation of ECMs, changes in the GHG intensity of grid electricity and transportation fuels, and demographic changes such as population growth were developed for the period starting with the baseline year through 2050 in five-year increments. The forecast values provide the user with the ability to review overall GHG reduction measures possible through the different ECMs analyzed, and to adjust ECM implementation and GHG reduction objectives accordingly. This provides flexibility for the planning process and provides time-phased metrics against which to compare performance over time. The five-year planning horizon can be adapted to provide more frequent performance metrics based (e.g., if annual updates are desired but detailed performance audits are required less frequently).

Objective Setting and Review

Near- to mid-term (e.g., next 10 years) objectives for GHG reduction rely heavily on measures that have already been identified and/or are feasible with incremental technology improvements over off-the-shelf systems. Longer-term GHG reductions that are only technically or economically feasible with improvements in technology. For example, further development of electric vehicle technology in terms of vehicle range, towing capacity and charging speed will facilitate acceptance and adoption by law enforcement, firefighting and other emergency services that currently have fewer viable vehicle choices available on the market today. Modifications to objectives as these technology improvements are realized will result in greater long-term GHG savings.

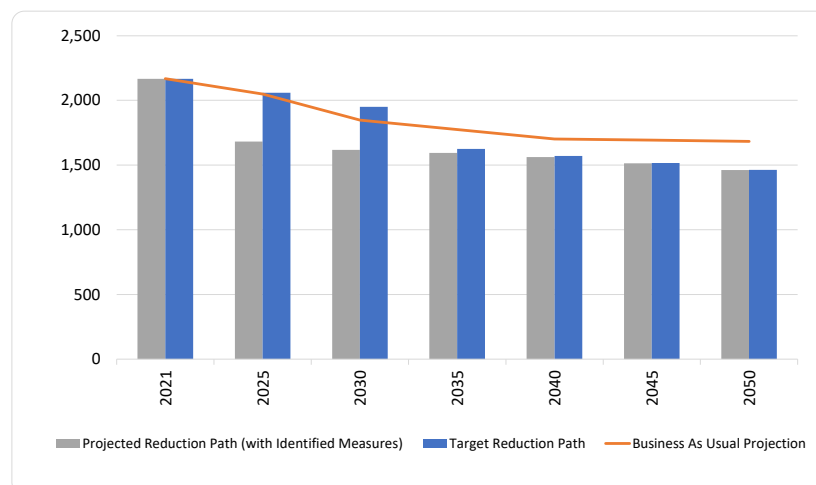
Climate Action Plan Objectives

The City has established the following GHG reduction objectives for Government operations:

- Reduce GHG emissions to 25% below 2021 levels by 2035; and
- Reduce GHG emissions to 33% below 2021 levels by 2050

The combination of measures that the City of Glens Falls has already implemented, are currently planned, and will evaluate in the future and are presented through this CAP are designed to achieve this objective. The City's objectives are lower than the New York Climate Act objective of 85% GHG emissions reduction below 1990 levels by 2050. The reason for this is uncertainty in the feasibility of achieving this objective based on an understanding of the City's energy use patterns and modeling of GHG savings from aggressive deployment of ECMs over the planning horizon. The City would seek to exceed its stated objectives if technological improvements and economic support for municipalities permit achievement of more aggressive reductions.

Government Operations GHG Emissions Reduction Projections and Objectives (Metric Tons)



The BAU projection shows decreasing GHG emissions over time due to reductions based on mandated reductions in GHG intensity of grid electricity and transportation fuels. The projected GHG reduction path meets or exceeds the targeted path over the planning horizon.

Focus Areas for Local Government Climate Action Plan

While local government cannot address climate change by itself, government policies and practices can dramatically reduce greenhouse gas emissions from a range of sources and help prepare the City for the anticipated impacts of climate change. In addition, the City will assist residents and businesses in their endeavors to reduce emissions through programs explained in this Plan. By working together, the City and its residents can do its part toward achieving a stable climate and reap the benefits of healthier air, lower costs for utilities and services, improved transportation and accessibility, a more vibrant local economy, and many other positive side effects of reducing our carbon footprint.

The summary table below identifies the focus areas within the City's Climate Action Plan for government operations and the number of strategies within each focus area. Each focus area has a dedicated section within this document where specific actions (both new and those already employed) are described.

City of Glens Falls Climate Action Plan Summary Table – Focus Areas for Government

Focus Area	Description of Policies and Programs	Number of Distinct Strategies
Energy Sourcing	Produce and/or purchase energy from renewable sources	2
Buildings & Facilities	Reduce energy use and GHG emissions by Government facilities	3
Wastewater Management	Reduce wastewater treatment needs and GHG emissions	1
Transportation*	Reduce transportation related GHG emissions	2
Total		8

*A reduction in GHG emissions for this focus area is a result of a proposed initiative to enhance community walkability/bikeability that being spearheaded by local government. Those GHG impacts are accounted for as part of community GHG inventory reductions because they result from actions (reduced driving) by community residents rather than government employees.

Community Climate Action Objectives

Efforts to develop a Community CAP parallel those for government operations, but there are very significant differences between the two plans. Local government agencies have limited direct control over energy use by key community stakeholders and instead must rely more heavily on partnerships, technical assistance and incentives to convince community stakeholders to reduce GHG emissions. Nonetheless, a CAP that includes realistic technology pathways and achievable objectives for residential, commercial and industrial energy end users is a prerequisite for moving towards GHG reduction objectives. Plans that couple this type of Information with strategies for community outreach and education, workforce development, and incentives for low-carbon technology implementation can be effective tools for achieving community-wide GHG emissions reductions.

Methodology for Developing the Climate Action Plan Objectives

The CSC Task Force worked to identify existing community-based sustainability and climate change initiatives within the City and regionally. The approach to identifying community-level future initiatives relied on a “what works” research effort to identify initiatives that have demonstrated effectiveness in creating community engagement and spurring investment in GHG reduction measures.

The process of setting objectives included a review of technical potential energy and GHG savings for different measures relative to current economic activity levels. Emissions reduction measures were prioritized in terms of technology readiness and capital and operating costs. A key unknown in the development of community-wide objectives is the adoption rate for energy-saving technologies among different business sectors and residents. The CSC Task Force reviewed examples of aggressive but achievable objectives set by other municipalities. Objectives for the City of Glens Falls were based on success stories, and implementation strategies developed for the City are modeled on these cases.

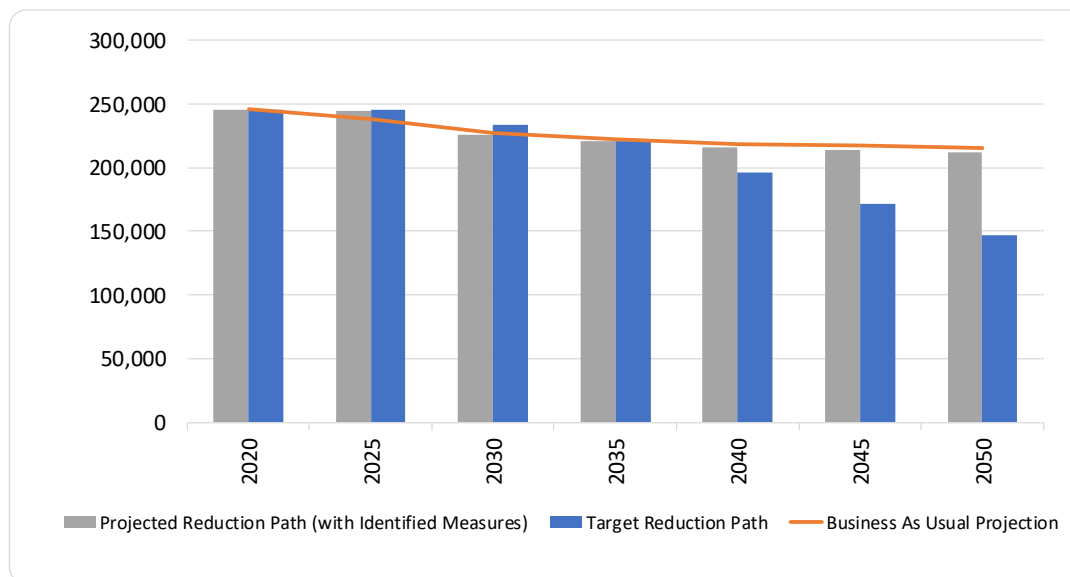
Climate Action Plan Objectives

The City has established the following GHG reduction objectives for Government operations:

- Reduce GHG emissions to 7.5% below 2020 levels by 2035; and
- Reduce GHG emissions to 12.5% below 2020 levels by 2050

The City's community-wide objectives are consistent with objectives adopted by several comparable jurisdictions in New York. However, the New York State Climate Act reductions are more aggressive and plan a reduction of 80% by 2050. The City's objectives are more conservative for several reasons. First, the City has limited authority to mandate GHG reduction limits and must rely on voluntary commitments by residents and businesses. Second, most of the community GHG emissions come from combustion of natural gas by industrial users. Available technology options to replace large-scale industrial thermal use of natural gas with low- or no-carbon sources are currently limited. The City will seek technical assistance and financial resources to incentivize aggressive GHG reductions. Further, the City will work with industry stakeholders to explore the viability of current solutions in the near- to mid-term and emerging technologies in the long-term to improve thermal efficiency and reduce reliance on GHG-producing fuels.

Community GHG Emissions Reduction Projections and Objectives (Metric Tons)



Achieving more aggressive community-wide objectives will require more wide-spread adoption of the energy savings measures in all sectors and improvements in technology performance and cost in the industrial sector more specifically.

Focus Areas for Community Climate Action Plan

The following summary table identifies the focus areas within the Community CAP for the City of Glens Falls and the number of strategies within each focus area. Each focus area has a dedicated section within this document where specific actions (both new and those already employed) are described. In most cases, cooperation with state and utility programs and partnership formation with business and industry groups will be a key component of City activities, even though it is not a focus area in and of itself.

City of Glens Falls Climate Action Plan Summary Table – Community-Wide Focus Areas

Focus Area	Description of Policies and Programs	Number of Distinct Strategies
Commercial & Industrial Buildings	Reduce commercial, municipal, and industrial sector GHG emissions	5
Residential Buildings	Policies and programs to reduce residential sector GHG emissions	5
Transportation	Reduce transportation related GHG emissions	1
Waste, Composting and Recycling	Reduce waste generation and landfill emissions and promote recycling	1
Total		11

The City of Glens Falls will assist residents and businesses in their endeavors to reduce emissions through programs explained in this Plan. Most of the efforts for energy efficiency and renewable energy technology deployment will be accomplished via technical assistance and marketing financial incentives available through state and federal agencies. The City will help reduce transportation-related initiatives through increasing opportunities for walking, biking or public transportation use as an alternative to private vehicle use and through facilitating improvements in infrastructure for electric and alternative fueled vehicles. Reducing waste generation and landfilling will require implementation of a City program and partnerships with businesses to move towards a circular economy that focuses on keeping materials and products in use for as long as possible.

Stakeholder Input

The City of Glens Falls Climate Smart Communities (CSC) Task Force led efforts to ensure that the CAP and its GHG reduction objectives set are aligned with the values and priorities of the City including but not limited to overall sustainability goals. The CSC Task Force is composed of the Mayor of Glens Falls, representatives of the City of Glens Falls Common Council, City of Glens Falls Economic Development Office and other community stakeholders.

The process for establishing CAP objectives occurred concurrently with the review of existing initiatives and identification and prioritization of new initiatives based on their technical and financial implications for the City and its residents and businesses.

Review of preliminary CAP objectives was accomplished via a series of CSC Task Force meetings. The meetings provided an opportunity to review technical and implementation questions and opportunities for group feedback. A matrix of preferred alternatives was developed that showed the contributions of existing and potential future initiatives towards GHG emissions reductions and high-level estimates of implementation costs. This facilitated development of GHG reduction objectives, even if the precise mix of strategies to be implemented is to be part of subsequent detailed planning efforts.

The CSC Task Force will be responsible for circulating the draft CAP and discussing its objectives and strategies with stakeholders within affected City departments and disseminating the draft CAP to the community at large, collecting feedback from businesses and residents. This information will be evaluated and changes made to address questions and concerns as appropriate, prior to generating a final CAP for consideration by the City of Glens Falls Common Council and Mayor's office. Portions of the CAP may be evaluated for inclusion in the Comprehensive Plan for the City of Glens Falls, which is currently under development.

Planned Climate Change Initiatives

Each of the focus areas within the CAP is explored in the following pages. In each focus area, a series of objectives with supporting strategies are explored. A “Goal” is an end result, or objective that supports a focus area, and a “Strategy” is a means of realizing that goal.

Each focus area draws on the actions of both the local government and the City of Glens Falls residents and businesses, although some areas may be largely one or the other.

High level steps for implementing many of the initiatives described below are described later in this CAP, but City approval and detailed implementation plans will be required for each of the proposed initiatives that consider costs, fiscal impacts and service impacts of each initiative. The planning process may identify additional opportunities for GHG and cost savings, as well as ancillary benefits such as public health and environmental quality improvements that were not identified in the current planning effort.

Local Government Climate Change Initiatives

The following graphic summarizes the following goals and strategies to address each of the focus areas for government operations.

Focus Area	Goal	Strategy
Energy Sourcing	Reduce GHG emissions of electricity and natural gas use	• Install renewable energy generation systems • Procure electricity from renewable sources
Buildings and Facilities	Reduce energy use and GHG emissions at government facilities	• Improve energy efficiency of municipal facilities • Improve energy efficient streetlighting • Electrify municipal facilities
Wastewater Management	Reduce wastewater treatment needs and GHG emissions	• Improve wastewater treatment energy efficiency
Transportation	Reduce transportation related GHG emissions	• Develop walkable and bikeable street landscape
Waste Management*	Reduce waste generation and landfill disposal	• Develop education and outreach programs to encourage recycling and waste reduction

*Waste management is not identified as a government focus area. It is a cross-cutting issue that will require leadership and action by public and private stakeholders and therefore it is listed here and in the community CAP list of initiatives.

The following pages explore each of the focus areas within the Government Operations CAP including example performance metrics for each. Appendix I to this report lists performance metrics for each 5-

year planning interval during the planning horizon. The projected reductions identified through the planned initiatives are sufficient to meet targets through 2035. As described previously, additional reductions are needed to meet targets from 2040 through 2050.

Energy Sourcing

The use of fossil fuels for energy is the largest contributor to GHG emissions and climate change. Fossil fuels supply a considerable share of energy for electricity. Opportunities exist for citizens and the City of Glens Falls local government to procure electricity produced from renewable sources or produce small-scale renewable energy. This focus area is limited to electricity production – objectives and strategies that focus on end use energy efficiency are included in other focus areas. The City has committed to procuring electricity from 100% renewable energy sources via a power purchase agreement.

Measure	Metric	Target	GHG Reduction by 2030 (tons)	Lead actor
Renewable energy procurement – promote consumer choice options through utilities and community solar	Percent of City electricity use	100% renewable energy by 2025	148.4	Purchasing and Department of Public Works
Install solar PV on municipal facilities – install systems where feasible	Capacity installed (kW)	400 kW by 2050	8.0	
Total			156.4	

Buildings and Facilities

Improving the efficiency of our City building stock and reducing the energy intensity of Government buildings and facilities will contribute significantly to achieving the City's GHG reduction objective. The following graphic outlines near- and mid-term measures it can take to accomplish this objective.

Measure	Metric	Target	GHG Reduction by 2030 (tons)	Lead actor
Improved energy efficiency of municipal buildings – Audit facilities for energy efficiency opportunities and implement retrofits. Leverage other programs to reduce implementation costs.	Electricity and natural gas use	30% reduction by 2050 in participating buildings	6.6	Department of Public Works
Install energy efficient streetlighting – Replace signal, park and parking lot lighting with efficient LED lighting	Electricity use	150,000 kWh reduction by 2025	12.0	
Electrify existing municipal buildings and facilities – Evaluate to determine where projects are feasible and retrofit these facilities	Buildings retrofitted to electric heating, cooling and water heating	50,000 square feet converted by 2050	17.9	
Total			36.5	

Wastewater Management

Energy audits identified significant potential for energy savings at the City wastewater treatment plant. This focus area concentrates in GHG savings from implementing recommended ECMs.

Measure	Metric	Target	GHG Reduction by 2030 (tons)	Lead actor
Wastewater treatment plant efficiency – Install wastewater treatment ECMs recommended in audit report	Electricity use reduction	918,270 kWh by 2030	29.3	Water & Sewer Department

Transportation

Besides emitting greenhouse gases, transportation fossil fuels also produce a host of criteria air pollutants when combusted, reduce air quality and affect our health. The City is focusing on design-oriented approaches that facilitate the use of transportation modes such as walking, biking, or public transportation to encourage residents to use fossil fuel-based transportation modes less frequently. The City is also considering an energy efficient vehicle policy that would encourage City departments to gradually increase the fuel efficiency of its vehicles through the purchase of higher efficiency models.

Measure	Metric	Target	GHG Reduction by 2030 (tons)	Lead actor
Develop walkable and bikeable street landscape -- Modify landscape to make walking and biking more desirable. Install bike lanes, bike parking, traffic calming measures, and landscaping. Reduce motor Vehicle Miles Traveled (VMT).	Change in number of vehicle trips and distance from survey of bike and walking path users	Build or improve 25 miles of bike lanes by 2050 and reduce VMT by 13,000 miles/year	0*	Parks and Public Works Departments
Increase advanced vehicle technology ownership – Establish policy regarding prioritization of higher efficiency vehicles	Percentage of advanced vehicle ownership	20 percent of new vehicles by 2035 and 40 percent by 2045	6.3	Multiple

*GHG reductions for this focus area are accounted for in community GHG inventory because they result from a change in activity by residents (i.e., reduced driving trips)

Waste Management

Waste management is a cross-cutting issue for the City of Glens Falls. Reducing GHG emissions from landfilled material ultimately depends on action by residents and businesses but requires leadership and support by City government agencies. The measures in the following graphic are examples of actions

that the City can take to help increase recycling rates and reduce associated GHG emissions. Private companies provide waste hauling services and Warren County is responsible for waste management planning, so an interagency collaboration and partnership with private sector entities would facilitate goal setting and tracking for this focus area.

Measure	Metric	GHG Reduction by 2030 (tons)	Lead actor
Recycling rate tracking – Work with County and waste management companies to establish baseline recycling rate and periodic monitoring methods for City	Percent recycling rate	0*	To be determined – interagency effort with Warren County Solid Waste & Recycling and neighboring municipalities
Promote waste reduction and recycling (Commercial) – Seek funds for outreach coordinator and partner with commercial enterprises to establish recycling objectives	Number of commercial entities with recycling objectives	0*	
Promote waste reduction and recycling (Residential) – Set residential recycling rate objective and provide technical assistance (e.g., recycling app, what to recycle) to residents and work with material haulers to enhance services. Market yard waste collection program.	Outreach effort and outcome metrics	0*	

*GHG reductions for this focus area are accounted for in community GHG inventory because they result from a change in activity by residents (i.e., increased recycling rates)

Community Climate Change Initiatives

The following graphic summarizes goals and strategies to address each of the focus areas for community initiatives. For some focus areas the strategies indicated here are supplemented by strategies that would be implanted by the local government operations as described above.

Focus Area	Goal	Strategy
Residential Buildings/ Commercial & Institutional Buildings	Reduce energy use and GHG emissions	• Install renewable energy generation systems • Procure electricity from renewable sources • Promote existing energy efficiency programs • Establish voluntary City energy conservation program • Encourage upgrade to electric heat pump water heating
Transportation	Reduce transportation related GHG emissions	• Increase advanced vehicle ownership
Waste Management	Reduce waste generation and landfill disposal	• Achieve higher waste diversion rate

The following pages explore each of the focus areas within the Community CAP. Appendix I to this report lists performance metrics for each 5-year planning interval during the planning horizon.

Commercial & Institutional Buildings

Improving the efficiency of our commercial & institutional (C&I) building stock and reducing the energy intensity of the local C&I building sector will contribute to achieving the City's GHG reduction objective.

Measure	Lead actor	Metric	Target	GHG Reduction by 2030 (tons)
Incentivize solar energy installation – promote incentives for solar PV system installation and assist with PPA and interconnection processes	Local government promotion and voluntary consumer choice	Permitted systems and capacity	1,200 kW capacity installed by 2030	121.2
Promote commercial energy efficiency programs (existing utility, state & federal) – promote utility, state, and federal commercial efficiency programs and incentives		Percent of building area undergoing energy retrofit based on permit data	2% annually (10% every five years)	349.7
Encourage upgrade to electric heat pump heating – Outreach and technical assistance to upgrade natural gas water heating to accelerate path to all-electric.		Permitted systems and capacity	Participation by 10% of office area by 2050	0.5
Establish commercial energy efficiency conservation program – mandatory benchmarking with voluntary goal setting and reporting at time of sale	Government program	Goal setting participant count and self-reported savings	Participation by 10% of building area by 2050	21.4
Total				492.8

Residential Buildings

Improving the efficiency of our residential building stock will save residents money on utility bills and reduce the need for new electrical infrastructure.

Measure	Lead actor	Metric	Target	GHG Reduction by 2030 (tons)
Renewable energy procurement – promote consumer choice options through utilities and community solar	Local government promotion and voluntary consumer choice	Program subscription rate	10% participation by 2030	171.1
Incentivize solar energy installation – promote incentives for system installation and assist with PPA and interconnection processes		Permitted capacity	2,000 kW capacity installed by 2030	202.8
Encourage upgrade to electric heat pump heating – Outreach and technical assistance to accelerate path to all-electric.		Permitted systems	345 replacements by 2030 (69/year)	358.0
Establish residential energy efficiency conservation program – promote utility-based benchmarking with voluntary energy efficiency goal setting. Reporting at time of sale	Government program	Partner with utility to report residential data	5% energy savings; 1% of homes sold/year	40.5
Total				772.4

Waste Management

Transfer stations within Warren County, New York handle the recycling and waste management needs of its residents. City of Glens Falls residents and businesses use transfer stations at the Town of Queensbury. Drop-off recycling is free. Household trash, compost, brush and C&D waste are accepted for a fee at the transfer station. Curbside waste pickup is available through private haulers.

There are four landfills in Warren County that receive waste from transfer stations and waste haulers. Emissions from decaying waste in landfills contributes to the City of Glens Falls's total GHG emissions. It is in the City of Glens Falls's long-term interest to expand recycling and enable re-use of construction materials and other goods. The City's strategy for accomplishing this is to work with Warren County, other municipalities and private haulers to do outreach and education about reuse and recycling.

Measure	Lead actor	Metric	Targets	GHG Reduction by 2030 (tons)
Waste, Composting and Recycling: Reduce waste generation and landfill emissions and promote recycling	Local government promotion and voluntary consumer choice	Percent recycling/diversion rate	40% by 2030; 60% by 2050	607.1

Transportation

Emissions from transportation are familiar to nearly everyone in the City of Glens Falls. Besides emitting greenhouse gases, combusting fossil fuels for transportation also produces a host of criteria air pollutants, reducing local air quality and affecting our health. This chapter focuses on programs and policies to reduce emissions from transportation and includes design-oriented approaches as well as expansion of alternate modes such as walking, biking, or public transportation.

Measure	Lead actor	Metric	Targets	GHG Reduction by 2030 (tons)
Develop walkable and bikeable street landscape: Measure to be implemented by City government but GHG emissions reductions to result from shifting in resident transportation modes towards biking and walking	Government to implement infrastructure changes; driver behavior change to reduce emissions	Change in number of vehicle trips and distance based on survey of bike and walking path users	13,000 mile annual drop in motorized VMT; 25 miles of new bike lanes by 2050	6.3
Increase electric vehicle ownership: Set community objective for electric vehicle adoption rate (increasing to 15% of vehicle miles traveled by 2050)	Government promotion and voluntary consumer action	Track vehicle registration data for City	10% VMT by EV by 2030; 25% by 2050	16.8
Total				23.1

Initiative Implementation

The prior sections of this planning and guidance document established realistic objectives and strategies. This section discusses prerequisite planning, startup and ongoing monitoring efforts that are necessary parts of realizing the GHG emissions reductions estimated for the government operations and community-wide initiatives.

Implementation Planning

Once stakeholder outreach efforts are complete and approval of the CAP by the City of Glens Falls Common Council and Mayor's office are obtained, implementation planning for the CAP can begin. In the initial months of implementation, the City of Glens Falls will engage with community members, businesses, institutions, and other stakeholders through the CSC Planning Task Force to prepare for prerequisite or additional actions needed to begin Plan implementation.

Examples of prerequisite actions include:

- Creating advisory groups for programs that require considerable community engagement.
- Building City staff and capacity to perform technical and economic analysis of initiatives.
- Securing funds to assist with implementation of measures required to meet stated objectives.
- Gathering bids for contracted services and equipment.
- Making necessary changes to local policies or existing programs.

Based on the input from stakeholders and the implementation planning process, a detailed schedule of initiative milestones, building upon performance metrics outlined in this CAP, will be developed and shared with the community. Significant changes to quantitative goals and approval of specific initiatives may occur based on the technical and economic analysis of initiatives identified in this plan.

Multiple initiatives are required, focusing on different stakeholder groups within the City (e.g., industrial energy users, commercial/institutional and residential end users). A key emphasis will be on leveraging existing program resources available at a state and/or federal level to kick-start or expand the capabilities of community groups to fill in gaps in skills and capabilities.

Roles and Responsibilities

Implementation of the CAP will by necessity be a highly collaborative process. The Mayor's office is responsible for providing leadership and oversight to provide accountability and ensure progress towards objectives in each of the City's departments and the community at large. Departments within the City will continue to be responsible for their services and operations but will work with the Mayor's office to ensure a coordinated approach to implementation. Staff capacity is a key challenge. Many departments share responsibility for implementing the City's sustainability initiatives, but there are no dedicated personnel for these efforts. A climate change and sustainability manager and supporting staff for energy, waste and transportation-related initiatives will be required and a gap analysis to determine departmental needs that may not be fully considered here will be part of preliminary implementation planning efforts. A framework for supporting the buildout of staff and program resources and financing the program and energy conservation measures for City facilities will need to be developed and approved by the City Common Council, in collaboration with key City departments.

CAP Implementation Costs

The costs and activities to the City to implement the CAP can be roughly broken down into two categories 1) program management and 2) GHG reduction measure deployment within each focus area:

- **Program management**
 - **Organizational leadership and management:** Program management at the City level to include outreach, education, fundraising and technical support.
 - **Stakeholder engagement:** Outreach to community residents and businesses to make them aware of program goals, successes, technical assistance and funding opportunities.
 - **Partnership formation:** Strategic planning and fundraising to leverage city and community dollars and boost participation in community initiatives.
- **GHG reduction measure deployment**
 - **Deployment of government GHG reduction measures:** Installation of energy efficiency and electrification measures at city buildings and facilities and transportation infrastructure improvements.
 - **Support for deployment of community-wide GHG reduction measures:** City support for measures to reduce community-wide GHG emissions including permitting and technical support and support for waste reduction and recycling.

The graphic on the following page provides a list of expected outcomes by each of these activity areas and a range of estimated implementation costs. Many energy efficiency and electrification measures will more than pay for themselves over time so while they have an upfront cost, in the mid- to long-term they will be neutral in terms of their impact on government expenditures.

Preliminary List of Key Outcomes by Focus Area for Government Operations

Category	Key Outcomes	Key Departments	Estimated Annual Budget Needs (\$)
<i>Organizational management, leadership and oversight</i>	• 2 new FTE including Sustainability Manager and a Sustainability Planner • Performance metrics and reporting procedures • Updates to Common Council and annual progress reports • Updated policy documents	Mayor's Office, Economic Development	\$250,000 to \$500,000
<i>Stakeholder engagement & communications</i>	• Revamped website and internal guidance • Communication campaign and outreach materials • Public meetings	Mayor's Office, Economic Development	\$125,000 - \$250,000
<i>Partnerships</i>	• Joint procurement and partnership opportunities with chamber of commerce, municipalities, state and private sector	Mayor's Office, Economic Development	\$50,000
<i>City facilities and operations- efficiency and electrification</i>	• Action strategy for phasing and costs • 2 FTE engineering positions to develop project pipeline and manage retrofits • Additional project staff and contractors	Public Works, Engineering, Water & Sewer	\$500,000 - \$1,000,000
<i>Transportation</i>	• Bikeable/walkable infrastructure • EV charging and fleet expansion	Parks, Public Works, Engineering	\$500,000 - \$1,000,000
<i>Residential & commercial energy efficiency and electrification</i>	• 2 FTE permitting professionals • Training for permitting professionals • Outreach and technical support for homes and businesses • Community champion program to highlight local achievements	Mayor's Office, Economic Development, Building and Codes	\$250,000 - \$500,000
<i>Waste</i>	• Waste reduction coordinator (1 FTE) • Waste task force establishment • Recycling and compost signage • Objective setting • Waste baselining, monitoring and reporting • Engineering studies and waste diversion infrastructure investment • Outreach and education campaign • Community champion program	Multiple state & local jurisdictions Mayor's Office Public Works Engineering	\$500,000 - \$1,000,000
Total			\$2,175,000 to \$4,300,000

The CAP implementation budget does not include investments by residents and businesses to achieve community-wide objectives. The community-wide objectives are based on voluntary measure implementation. Quantifying and prioritizing investment requirements for residents and businesses will be a key focus of initiative planning. Providing decision-making tools and technical support for residents and businesses will be a major thrust of efforts by the City to help make realizing those objectives a reality.

Performance Metrics

The outcome of energy and GHG emissions forecasts provides metrics in five-year increments that program performance can be measured against. Appendix II provides the outcomes of 5-year forecasts of both government and community-wide GHG emissions and relevant activity metrics (e.g., electricity and natural gas usage). These forecasts are cumulative impacts of forecasts for specific measures that can be monitored individually to show how each is contributing towards GHG reduction objectives. Also, the GHG emissions reductions for each measure are based on metrics that can be monitored over time since GHG emissions aren't directly measured for many GHG producing activities. Appendix II also provides the underlying assumptions and performance metrics for each measure that is part of the CAP.

Monitoring Plan

Establishing a monitoring process enables the City 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 determination of whether the action is performing well and to identify corrective measures. This process is also an opportunity to understand barriers to implementation and identify best practices or new opportunities in moving forward.

The table below describes the components of the monitoring reports. Action reports occur every year and will include status updates on the overall strategy and the mitigation action plan. The full monitoring report will occur every five years and in addition to the components in the action report, will include an updated community and municipal GHG inventory. This will help the City of Glens Falls track its GHG emissions reduction progress. With the approval of this Climate Action Plan in 2024, the first monitoring action report will be due in 2026 and the first full monitoring report with the updated GHG inventories will be due in 2028.

Monitoring Report Component	Action Reporting (Annual)	Full Reporting (Every 5 years)
Overall Strategy: Reporting any changes to initial strategy as well as updated information on human and financial resources	Yes	Yes
Mitigation and Adaptation Action Plans: Report the implementation status (completed, in progress, on hold) of key actions and update their impacts	Yes	Yes
GHG Emissions Inventories: Provide updated energy consumption and GHG emissions data for the reporting year	No	Yes

Appendix I: Performance Metrics

Summary of Forecast of Government GHG Reductions

Table 1: Reaching Targets						
	2025	2030	2035	2040	2045	2050
Business-as-Usual Emissions (MT CO ₂ e):	2,167	1,847	1,774	1,702	1,693	1,684
Target: Percent Below 2020 Baseline Emissions:	5%	10%	25%	28%	30%	33%
Target Emissions (MT CO ₂ e):	2,059	1,951	1,626	1,571	1,517	1,463
Required Emissions Reduction to Achieve Target (MT CO ₂ e):	108	-104	148	130	175	221
Projected Emissions Reductions from ECMs Identified via Audit (MT CO ₂ e):	93	32	17	2	2	2
Projected Emissions Reduction From Additional Program Efforts (MT CO ₂ e):	392	198	163	138	177	220
Remaining Emissions After ECMs and Program Reductions (MT CO ₂ e):	1,682	1,617	1,594	1,562	1,514	1,463
Percent Below 2021 Baseline after ECMs and Program Reductions (%)	22.4%	25.4%	26.5%	27.9%	30.1%	32.5%
Meets or Exceeds State Goal with Identified Measures?	Yes	Yes	Yes	Yes	Yes	Yes
Remaining Emissions Reduction Needed to Achieve Target:	0	0	0	0	0	0

Table 2: GHG Historical GHG Inventories and BAU Forecast													
Sector	2021	2025		2030		2035		2040		2045		2050	
	(MTCO ₂ e)	Annual growth rate: 2021→2025	(MTCO ₂ e)	Annual growth rate: 2026→2030	(MTCO ₂ e)	Annual growth rate: 2031→2035	(MTCO ₂ e)	Annual Growth rate: 2036 - 2040	(MTCO ₂ e)	Annual growth rate: 2041 - 2045	(MTCO ₂ e)	Annual rate: 2046 - 2050	(MTCO ₂ e)
Buildings and Other Facilities	278	-1.50%	258	-2.05%	226	-1.73%	214	-1.58%	202	-1.29%	201	-1.10%	199
Streetlights and Traffic Signals	32	-1.59%	30	-11.43%	10	-11.94%	5	-100.00%	0	-100.00%	0	-100.00%	0
Wastewater Management	1,086	-1.59%	1,002	-2.23%	867	-1.87%	818	-1.70%	770	-1.38%	766	-1.17%	763
Water Delivery Facilities	121	-1.32%	113	-1.82%	101	-1.52%	96	-1.38%	91	-1.13%	91	-0.95%	91
Fuel Use	650	-0.10%	647	-0.10%	644	-0.10%	641	-0.10%	638	-0.10%	634	-0.10%	631
TOTAL	2,167		2049.8		1847.0		1773.9		1701.5		1692.7		1683.9
% reduction		-6%		-17%		-22%		-27%		-28%		-29%	-22%

Table 3: GHG BAU Forecast Growth Factor Inputs			
Sector	Year	Data:	Current Data Source
Residential (Population)	2021	14,840	Census
	2025	14,914	Lake Champlain Lake George Regional Planning Board - Rate
	2030	14,989	Lake Champlain Lake George Regional Planning Board - Rate
	2035	15,064	Lake Champlain Lake George Regional Planning Board - Rate
	2040	15,140	Lake Champlain Lake George Regional Planning Board - Rate
	2045	15,215	Lake Champlain Lake George Regional Planning Board - Rate
	2050	15,292	Lake Champlain Lake George Regional Planning Board - Rate
Commercial/Industrial (Jobs)	2021	54,087	Bureau of Labor Statistics
	2025	53,670	Estimated based on historical data
	2030	53,256	"
	2035	52,846	"
	2040	52,438	"
	2045	52,034	"
	2050	51,633	"

Summary of Forecast of Community-Wide GHG Reductions

Table 1: Reaching Targets

	2025	2030	2035	2040	2045	2050
Business-as-Usual Emissions (MT CO ₂ e):	245,575	227,305	222,697	218,131	216,880	215,641
Target: Percent Below 2020 Baseline Emissions:	0%	5%	7.5%	10%	12.5%	12.5%
Target Emissions (MT CO ₂ e):	245,575	233,296	227,157	221,017	214,878	214,878
Required Emissions Reduction to Achieve Target (MT CO ₂ e):	0	-5,991	-4,460	-2,887	-2,002	-763
Projected Emissions Reduction From Identified Measures (MT CO ₂ e):	1,213	2,037	2,356	2,833	3,201	3,851
Remaining Emissions with Identified Measures (MT CO ₂ e):	244,362	225,268	220,340	215,298	213,679	211,790
Percent Below 2020 Baseline with Identified Measures:	0.5%	8.3%	10.3%	12.3%	13.0%	13.8%
Meets or Exceeds State Goal with Identified Measures?	Yes	Yes	Yes	Yes	Yes	Yes
Remaining Emissions Reduction Needed to Achieve Target:	0	0	0	0	0	0

From All Measures Summary tab

Table 2: GHG Historical GHG Inventories and BAU Forecast

Sector	2020	2025		2030		2035		2040		2045		2050	
	(MTCO ₂ e)	Annual growth rate: 2021-→2025	(MTCO ₂ e)	Annual growth rate: 2026-→2030	(MTCO ₂ e)	Annual growth rate: 2031-→2035	(MTCO ₂ e)	Annual Growth rate: 2036 - 2040	(MTCO ₂ e)	Annual growth rate: 2041 - 2045	(MTCO ₂ e)	Annual rate: 2046 - 2050	(MTCO ₂ e)
Residential Buildings	32,153	-0.86%	30,798	-1.23%	28,413	-0.99%	27,680	-0.88%	26,940	-0.69%	27,075	-0.55%	27,210
Commercial & Industrial	181,738	-0.64%	176,019	-0.81%	167,521	-0.69%	163,800	-0.63%	160,127	-0.54%	158,892	-0.47%	157,667
Transportation	16,570	-0.10%	16,488	-0.10%	16,406	-0.10%	16,325	-0.10%	16,246	-0.10%	16,167	-0.10%	16,089
Waste	15,114	-0.10%	15,039	-0.10%	14,965	-0.10%	14,891	-0.10%	14,818	-0.10%	14,746	-0.10%	14,675
TOTAL	245,575		238344		227305		222697		218131		216880		215641

Table 3: GHG BAU Forecast Growth Factor Inputs

Sector	Year	Data:	Current Data Source
Residential (Population)	2020	14,840	Census
	2025	14,914	Lake Champlain Lake George Regional Planning Board
	2030	14,989	
	2035	15,064	
	2040	15,140	
	2045	15,215	
	2050	15,292	
Commercial/Industrial (Jobs)	2020	54,087	Bureau of Labor Statistics
	2025	53,670	Estimated based on historical data
	2030	52,256	***
	2035	52,846	***
	2040	52,438	***
	2045	52,034	***
	2050	51,633	***

Government Operation Emissions – Summary of Forecast Emissions and Activity Data

Summary of Measures by Sector: Emissions & Activity Data Impact				
	Emissions Impact	Activity Data Impact		
Sector	2025 Emissions Impact (MT CO2e/year)	2025 Net Electricity Impact (kWh/year)	2025 Natural Gas Impact (therms/year)	2025 VMT Impact (VMT/year)
Energy: Municipal	-386	-64,781	-2,404	0
Transportation: Municipal	-6	0	0	-13,072
Waste: Municipal	0	0	0	0
All Sectors:	-392	-64,781	-2,404	-13,072
Sector	2030 Emissions Impact (MT CO2e/year)	2030 Net Electricity Impact (kWh/year)	2030 Natural Gas Impact (therms/year)	2030 VMT Impact (VMT/year)
Energy: Municipal	-191	133,189	-4,807	0
Transportation: Municipal	-6	3	0	-13,072
Waste: Municipal	0	0	0	0
All Sectors:	-198	133,192	-4,807	-13,072
Sector	2035 Emissions Impact (MT CO2e/year)	2035 Net Electricity Impact (kWh/year)	2035 Natural Gas Impact (therms/year)	2035 VMT Impact (VMT/year)
Energy: Municipal	-138	411,728	-9,396	0
Transportation: Municipal	-25	127,742	0	-13,072
Waste: Municipal	0	0	0	0
All Sectors:	-163	539,470	-9,396	-13,072
Sector	2040 Emissions Impact (MT CO2e/year)	2040 Net Electricity Impact (kWh/year)	2040 Natural Gas Impact (therms/year)	2040 VMT Impact (VMT/year)
Energy: Municipal	-90	391,867	-16,606	0
Transportation: Municipal	-48	255,484	0	-13,072
Waste: Municipal	0	0	0	0
All Sectors:	-138	647,351	-16,606	-13,072
Sector	2045 Emissions Impact (MT CO2e/year)	2045 Net Electricity Impact (kWh/year)	2045 Natural Gas Impact (therms/year)	2045 VMT Impact (VMT/year)
Energy: Municipal	-122	379,956	-22,943	0
Transportation: Municipal	-55	298,065	0	-13,072
Waste: Municipal	0	0	0	0
All Sectors:	-177	678,020	-22,943	-13,072
Sector	2050 Emissions Impact (MT CO2e/year)	2050 Net Electricity Impact (kWh/year)	2050 Natural Gas Impact (therms/year)	2050 VMT Impact (VMT/year)
Energy: Municipal	-158	352,145	-29,716	0
Transportation: Municipal	-62	340,645	0	-13,072
Waste: Municipal	0	0	0	0
All Sectors:	-220	692,790	-29,716	-13,072

Community-Wide Emissions – Summary of Forecast Emissions and Activity Data

Summary of Measures by Sector: Emissions & Activity Data Impact					
Sector	Emissions Impact	Activity Data Impact			
	2025 Emissions Impact (MT CO2e/year)	2025 Net Electricity Impact (kWh/year)	2025 Natural Gas Impact (therms/year)	2025 VMT Impact (VMT/year)	2025 Disposed Waste Impact (tons/year)
Energy: Community	-801	-2,762,298	-43,912	0	0
Transportation: Community	-17	12,061	0	0	0
Waste: Community	-395	0	0	0	-1,317
Water: Community	0	0	0	0	0
All Sectors: Community	0	0	0	0	0
All Sectors:	-1,213	-2,750,237	-43,912	0	-1,317
Sector	2030 Emissions Impact (MT CO2e/year)	2030 Net Electricity Impact (kWh/year)	2030 Natural Gas Impact (therms/year)	2030 VMT Impact (VMT/year)	2030 Disposed Waste Impact (tons/year)
Energy: Community	-1,426.9	-7,253,870	-200,195	0	0
Transportation: Community	-8.3	63,871	0	0	0
Waste: Community	-601.5	0	0	0	-2,005
Water: Community	0	0	0	0	0
All Sectors: Community	0	0	0	0	0
All Sectors:	-2,037	-7,189,999	-200,195	0	-2,005
Sector	2035 Emissions Impact (MT CO2e/year)	2035 Net Electricity Impact (kWh/year)	2035 Natural Gas Impact (therms/year)	2035 VMT Impact (VMT/year)	2035 Disposed Waste Impact (tons/year)
Energy: Community	-1,504	-11,797,539	-357,645	0	0
Transportation: Community	-42	30,152	0	0	0
Waste: Community	-810	0	0	0	-2,699
Water: Community	0	0	0	0	0
All Sectors: Community	0	0	0	0	0
All Sectors:	-2,356	-11,767,388	-357,645	0	-2,699
Sector	2040 Emissions Impact (MT CO2e/year)	2040 Net Electricity Impact (kWh/year)	2040 Natural Gas Impact (therms/year)	2040 VMT Impact (VMT/year)	2040 Disposed Waste Impact (tons/year)
Energy: Community	-1,745	-16,394,694	-516,278	0	0
Transportation: Community	-68	48,243	0	0	0
Waste: Community	-1,020	0	0	0	-3,401
Water: Community	0	0	0	0	0
All Sectors: Community	0	0	0	0	0
All Sectors:	-2,833	-16,346,451	-516,278	0	-3,401
Sector	2045 Emissions Impact (MT CO2e/year)	2045 Net Electricity Impact (kWh/year)	2045 Natural Gas Impact (therms/year)	2045 VMT Impact (VMT/year)	2045 Disposed Waste Impact (tons/year)
Energy: Community	-1,875	-21,045,346	-676,110	0	0
Transportation: Community	-93	66,334	0	0	0
Waste: Community	-1,233	0	0	0	-4,109
Water: Community	0	0	0	0	0
All Sectors: Community	0	0	0	0	0
All Sectors:	-3,201	-20,979,012	-676,110	0	-4,109
Sector	2050 Emissions Impact (MT CO2e/year)	2050 Net Electricity Impact (kWh/year)	2050 Natural Gas Impact (therms/year)	2050 VMT Impact (VMT/year)	2050 Disposed Waste Impact (tons/year)
Energy: Community	-2,285	-24,946,028	-837,157	0	0
Transportation: Community	-119	84,425	0	0	0
Waste: Community	-1,447	0	0	0	-4,825
Water: Community	0	0	0	0	0
All Sectors: Community	0	0	0	0	0
All Sectors:	-3,851	-24,861,603	-837,157	0	-4,825

Measure Analysis: Renewable Energy Procurement: Community

Measure Name:	Participate in community choice aggregation: Community
Sector:	Energy: Community
Measure Description:	Secure clean electricity supply choices to Glens Falls residents and businesses.

Measure selected?	Yes	Yes	Yes	Yes	Yes	Yes
Forecast Year:	2025	2030	2035	2040	2045	2050
Emissions impact (MT CO2e/year):	-274.1	-332.8	-170.6	-92.2	0.0	0.0

Select City:	Glens Falls
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Calculation Methodology & Equations

Scenario	Description	Data / Assumption						Units
	Forecast Year:	2025	2030	2035	2040	2045	2050	Year
Business-As-Usual Conditions	Community electricity consumption excluding renewable energy procurement:	54,297,055	49,817,292	47,717,978	45,707,130	43,781,020	41,936,077	kWh/year
	Solar + energy efficiency CAP measures electricity impact:	-2,762,298	-7,391,722	-12,073,677	-16,809,556	-21,599,380	-25,639,687	kWh/year
	Remaining community electricity consumption (excluding CCA):	51,534,757	42,425,570	35,644,302	28,897,574	22,181,640	16,296,390	kWh/year
	BAU grid electricity emission factor:	0.000106	0.000078	0.000032	0.000016	0.000000	0.000000	MT CO2e/kWh
	Remaining community electricity emissions (excluding CCA):	5,482	3,328	1,137	461	0	0	MT CO2e/year
Measure Impact	Community utility opt-out rate:	5.00%	10.00%	15.00%	20.00%	20.00%	20.00%	%
	Remaining community electricity consumption:	48,958,020	38,183,013	30,297,656	23,118,059	17,745,312	13,037,112	kWh/year
	Average grid electricity emission factor:	0.000106	0.000078	0.000032	0.000016	0.000000	0.000000	MT CO2e/kWh
	Remaining utility community electricity emissions:	5,208	2,995	967	369	0	0	MT CO2e/year
	Measure emissions impact with battery storage:	-274	-333	-171	-92	0	0	MT CO2e/year
	Other CAP measures cumulative battery storage emissions impact:	0	0	0	0	0	0	MT CO2e/year
	Measure emissions impact (excl. electrification add. load):	-274	-333	-171	-92	0	0	MT CO2e/year

Assumptions

The business-as-usual grid electricity emission factor considers the current National Grid emission factor and the projected impact of the State's RPS commitments.

The 2025 CCA electricity emission factor is based off of the a commitment to 100% carbon free electricity.

The community-specific community choice opt-out rate is an assumed value.

Measure Analysis: Incentivize Solar Energy: Community

Measure Name:	Incentivize solar energy installation
Sector:	Energy: Community
Measure Description:	Provide financial incentives for solar PV and hot water system installation. Encourage bulk purchases such as the Peninsula SunShares Program. Provide free assistance for project developers through the PPA and interconnection process.

Measure selected?	Yes	Yes	Yes	Yes	Yes	Yes
Forecast Year:	2025	2030	2035	2040	2045	2050
Emissions impact (MT CO2e/year):	-127	-324	-227	-161	0	0
Electricity impact (kWh/year):	-1,193,330	-4,129,338	-7,102,242	-10,113,280	-13,162,312	-15,445,716

Yellow cells below require user input

Calculation Methodology & Equations

Non-residential Solar PV

Scenario	Description	Data / Assumption						Units
	Forecast Year:	2025	2030	2035	2040	2045	2050	Year
Business-As-Usual Conditions	Non-residential building space:	4,848,192	4,896,869	4,946,034	4,995,692	5,045,849	5,096,510	Square feet
	Non-residential electricity consumption:	77,086,259	77,860,211	78,641,934	79,431,505	80,229,004	81,034,509	kWh/year
	Technical potential % total elec. demand met by PV:	24.8%	24.8%	24.8%	24.8%	24.8%	24.8%	%
	Technical potential electricity generated by PV:	19,117,392	19,309,332	19,503,200	19,699,013	19,896,793	20,096,558	kWh/year
Measure Impact	% non-residential roof installing PV by target year:	4%	8%	12%	16%	20%	20%	%
	Non-res. PV electricity generated by target year:	764,696	1,544,747	2,340,384	3,151,842	3,979,359	4,019,312	kWh/year
	Average electricity emission factor:	0.00011	0.00008	0.00003	0.00002	0.00000	0.00000	MT CO2e/kWh
	Non-res solar PV emissions impact:	-81.3	-121.2	-74.7	-50.3	0.0	0.0	MT CO2e/year
	Cum non-residential kW capacity installed	610	1,232	1,867	2,514	3,175	3,206	kW

Residential Solar PV

Scenario	Description	Data / Assumption						Units
	Forecast Year:	2025	2030	2035	2040	2045	2050	Year
Business-As-Usual Conditions	Number of households:	6,839	6,873	6,907	6,942	6,977	7,012	Households
Measure Impact	% of households installing PV per year:	1%	1%	1%	1%	1%	1%	%
	Number of years policy in place:	1	6	11	16	21	26	Years
	% households installing PV system by target year:	1%	6%	11%	16%	21%	26%	%
	Average residential PV system capacity:	5	5	5	5	5	5	kW
	Cumulative res. PV capacity installed:	342	2,062	3,799	5,554	7,326	9,116	kW
	PV system output:	1,254	1,254	1,254	1,254	1,254	1,254	kWh/kW/year
	Total residential PV electricity generated:	428,634	2,584,592	4,761,858	6,961,438	9,182,953	11,426,405	kWh/year
	Average electricity emission factor:	0.00011	0.00008	0.00003	0.00002	0.00000	0.00000	MT CO2e/kWh
	Measure emissions impact:	-45.6	-202.8	-152.0	-111.1	0.0	0.0	MT CO2e/year

Assumptions

Technical potential of percent of total non-residential electricity demand that can be met by distributed solar PV from NREL (Table 3 for New York)

[NREL Source](#)

Average PV system output (kWh/kW/year) for Glens Falls from NREL's PVWatts Calculator

[NREL Source](#)

Year policy put in place

2024

Measure Analysis: Promote Commercial Energy Efficiency Programs: Community

Measure Name:	Promote commercial energy efficiency programs for existing buildings
Sector:	Energy: Community
Measure Description:	Through marketing and outreach, City promotes participation in commercial energy efficiency programs and demand response programs. City provides or encourages commercial energy audits. City considers supplementing existing efficiency incentives and rebates.

Measure selected?	Yes	Yes	Yes	Yes	Yes	Yes
Forecast Year:	2025	2030	2035	2040	2045	2050
Emissions impact (MT CO2e/year):	-389.3	-349.7	-280.1	-257.5	-234.5	-236.9
Electricity impact (kWh/year):	-1,541,725	-3,098,929	-4,671,768	-6,260,398	-7,864,978	-9,485,668
Natural gas impact (therms/year):	-42,373	-85,172	-128,400	-172,063	-216,163	-260,707

Yellow cells below require user input

Calculation Methodology & Equations								
Scenario	Description	Data / Assumption						Units
	Forecast Year:	2025	2030	2035	2040	2045	2050	Year
Business-As-Usual Conditions	Total area existing non-residential buildings:	4,848,192	4,896,869	4,946,034	4,995,692	5,045,849	5,096,510	Square feet
	% of non-residential buildings receiving EE retrofit:	10%	10%	10%	10%	10%	10%	%
	Cumulative existing non-residential building area receiving EE retrofit:	484,819	489,687	494,603	499,569	504,585	509,651	Square feet
	Average non-residential electricity EUI (kWh/SF/year):	15.9	15.9	15.9	15.9	15.9	15.9	kWh/SF/year
	Average non-residential natural gas EUI (therms/SF/year):	0.437	0.437	0.437	0.437	0.437	0.437	therms/SF/year
Measure Impact	% of targeted electricity savings per participating building:	20%	20%	20%	20%	20%	20%	%
	% of targeted natural gas savings per participating building:	20%	20%	20%	20%	20%	20%	%
	Measure electricity consumption impact:	-1,541,725	-1,557,204	-1,572,839	-1,588,630	-1,604,580	-1,620,690	kWh/year
	Measure natural gas consumption impact:	-42,373	-42,799	-43,228	-43,662	-44,101	-44,543	therms/year
	Average grid electricity emission factor:	0.000106	0.000078	0.000032	0.000016	0.000000	0.000000	MT CO2e/kWh
	Natural gas emission factor:	0.005317	0.005317	0.005317	0.005317	0.005317	0.005317	MT CO2e/therm
	Measure electricity emissions impact:	-164	-122	-50	-25	0	0	MT CO2e/year
	Measure gas emissions impact:	-225	-228	-230	-232	-235	-237	MT CO2e/year

Assumptions

Non-residential electricity energy use intensities (EUIs)	NYSERDA Baseline Study pg. 23
Natural gas energy use intensity for cold or very cold climate (40.2 cubic feet per square foot, converted to therms/cubic foot assuming 0.01 therm/scf = 0.402 therms per square foot of building area per year)	CBECS Table C24

Additional Resources

New York Standard Approach for Estimating Energy Savings from Energy Efficiency Programs - Residential, Multi-Family and Commercial/Industrial Buildings	Estimated Energy Savings Potential
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Measure Analysis: Establish Commercial Energy Conservation Program

Measure Name:	Establish commercial energy conservation program
Sector:	Energy: Community
Measure Description:	City initially starts a voluntary commercial energy conservation program, whereby the City would encourage minimum energy efficiency and water efficiency standards at the time of building sale. Possible transition to mandatory comprehensive energy assessments and benchmarking by registered energy assessors over time.

Measure selected?	Yes	Yes	Yes	Yes	Yes	Yes
Forecast Year:	2025	2030	2035	2040	2045	2050
Emissions impact (MT CO2e/year):	-4.0	-21.4	-31.1	-41.2	-48.8	-60.4
Electricity impact (kWh/year):	-15,900	-95,400	-174,900	-254,400	-333,900	-413,400
Natural gas impact (therms/year):	-437	-2,622	-4,807	-6,992	-9,177	-11,362

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375000

Calculation Methodology & Equations

Scenario	Description	Data / Assumption						Units
	Forecast Year:	2025	2030	2035	2040	2045	2050	Year
Business-As-Usual Conditions	Total area non-residential buildings sold annually:	20,000	20,000	20,000	20,000	20,000	20,000	SF/year
	Non-residential electricity EUI:	15.9	15.9	15.9	15.9	15.9	15.9	kWh/SF/year
	Non-residential natural gas EUI:	0.437	0.437	0.437	0.437	0.437	0.437	therms/SF/year
Measure Impact	Years policy in place:	1	6	11	16	21	26	Years
	Cumulative non-residential buildings participating:	20,000	120,000	220,000	320,000	420,000	520,000	Square feet
	% of targeted electricity savings per participating building:	5%	5%	5%	5%	5%	5%	%
	% of targeted natural gas savings per participating building:	5%	5%	5%	5%	5%	5%	%
	Measure electricity consumption impact:	-15,900	-95,400	-174,900	-254,400	-333,900	-413,400	kWh/year
	Measure natural gas consumption impact:	-437	-2,622	-4,807	-6,992	-9,177	-11,362	therms/year
	Average electricity emission factor:	0.000106	0.000078	0.000032	0.000016	0.000000	0.000000	MT CO2e/kWh
	Natural gas emission factor:	0.00532	0.00532	0.00532	0.00532	0.00532	0.00532	MT CO2e/therm
	Measure electricity emissions impact:	-2	-7	-6	-4	0	0	MT CO2e/year
	Measure natural gas emissions impact:	-2	-14	-26	-37	-49	-60	MT CO2e/year

Assumptions

Non-residential electricity energy use intensities (EUIs)	NYSERDA Baseline Study pg. 23
Natural gas energy use intensity for cold or very cold climate (40.2 cubic feet per square foot, converted to therms/cubic foot assuming 0.01 therm/scf = 0.402 therms per square foot)	CBECS Table C24
Year policy put into place	2024

Measure Analysis: Establish Residential Energy Conservation Program

Measure Name:	Establish residential energy conservation program
Sector:	Energy: Community
Measure Description:	City initially starts a voluntary residential energy conservation program, whereby the City would encourage minimum energy efficiency and water efficiency standards at the time of building sale.

Measure selected?	Yes	Yes	Yes	Yes	Yes	Yes
Forecast Year:	2025	2030	2035	2040	2045	2050
Emissions impact (MT CO2e):	-7.1	-40.5	-68.4	-96.6	-123.0	-152.3
Electricity impact (kWh/year):	-11,342	-68,054	-124,766	-181,478	-238,190	-294,902
Natural gas impact (therms/year):	-1,102	-6,610	-12,118	-17,626	-23,134	-28,642

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Calculation Methodology & Equations

Scenario	Description	Data / Assumption						Units
	Forecast Year:	2025	2030	2035	2040	2045	2050	Year
Business-As-Usual Conditions	Total residential homes sold annually:	34	34	34	34	34	34	homes/year
	Average area of residential home sold:	1,600	1,600	1,600	1,600	1,600	1,600	SF/home
	Total area residential homes sold annually:	54,400	54,400	54,400	54,400	54,400	54,400	SF/year
	Residential electricity EUI:	4.17	4.17	4.17	4.17	4.17	4.17	kWh/SF/year
	Residential natural gas EUI:	0.41	0.41	0.41	0.41	0.41	0.41	therms/SF/year
Measure Impact	Years policy in place:	1	6	11	16	21	26	Years
	Cumulative area residential buildings participating:	54,400	326,400	598,400	870,400	1,142,400	1,414,400	Square feet
	% of targeted electricity savings per participating building:	5%	5%	5%	5%	5%	5%	%
	% of targeted natural gas savings per participating building:	5%	5%	5%	5%	5%	5%	%
	Measure electricity consumption impact:	-11,342	-68,054	-124,766	-181,478	-238,190	-294,902	kWh/year
	Measure natural gas consumption impact:	-1,102	-6,610	-12,118	-17,626	-23,134	-28,642	therms/year
	Average electricity emission factor:	0.000106	0.000078	0.000032	0.000016	0.000000	0.000000	MT CO2e/kWh
	Natural gas emission factor:	0.00532	0.00532	0.00532	0.00532	0.00532	0.00532	MT CO2e/therm
	Measure electricity emissions impact:	-1	-5	-4	-3	0	0	MT CO2e/year
	Measure natural gas emissions impact:	-6	-35	-64	-94	-123	-152	MT CO2e/year

Assumptions

Residential electricity EUI from RBECS Table CE5.3a 6672 kWh/household excluding space heating	RBECS
Natural gas energy use intensity from EIA RBECS	RBECS
Year policy put in place	2024
Average home size in New York 1,600 square feet	St Louis Fed

Measure Analysis: Electric Heat Pump Water Heating Upgrades in Residential

Measure Name:	Encourage upgrade to electric heat pump water heater in existing residential and office buildings to accommodate all-electric technologies. Savings from this measure overlap with savings from panel upgrade measure.
Sector:	Energy: Community
Measure Description:	Encourage residential and office buildings to upgrade natural gas water heating equipment in order to accommodate pathway to all-electric.

Residential Impacts

Forecast Year:	2025	2030	2035	2040	2045	2050
Capital cost to utility (\$):	\$0	\$0	\$0	\$0	\$0	\$0
Emissions impact (MT CO2e/year):	0	-358	-727	-1,096	-1,469	-1,836
Capital cost per emissions avoided (\$/MT CO2e):	N/A	\$0	\$0	\$0	\$0	\$0
Electricity impact (kWh/year):	0	116,276	232,553	348,829	465,106	581,382

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Calculation Methodology & Equations

Scenario	Description	Data / Assumption						Units
	Forecast Year:	2025	2030	2035	2040	2045	2050	
Business-As-Usual Conditions	Number of residential housing units:	6873	6907	6942	6977	7012	7047	housing units
	Average annual natural gas consumption per residential unit:	648	648	648	648	648	648	therms/unit/year
	Total square footage of existing commercial buildings:	4,848,192	4,896,869	4,946,034	4,995,692	5,045,849	5,096,510	square feet
	% commercial buildings that are office space:	40%	40%	40%	40%	40%	40%	% comm. buildings
	Total square footage of existing office buildings:	1,939,277	1,958,747	1,978,413	1,998,277	2,018,340	2,038,604	square feet
Residential Gas Conversions Impact	Years policy in place:	0	5	10	15	20	25	years
	Number of water heating conversions:	0	345	690	1,035	1,380	1,725	conversions
	Water heating conversions natural gas impact:	0	-69,045	-138,090	-207,135	-276,179	-345,224	therms/year
	Gas conversions natural gas emissions impact:	0	-367	-734	-1,101	-1,469	-1,836	MT CO2e/year
	therm to kWh conversion for electrification including efficiency, etc.	1.68	1.68	1.68	1.68	1.68	1.68	kWh/therm
	Total gas conversions electricity impact:	0	116,276	232,553	348,829	465,106	581,382	kWh/year
	Electricity emission factor:	0.0001064	0.0000784	0.0000319	0.0000160	0.0000000	0.0000000	MT CO2e/kWh
	Gas conversions electricity emissions impact:	0.0	9.1	7.4	5.6	0.0	0.0	MT CO2e/year
	Gas conversions net total emissions impact:	0.0	-358.0	-726.9	-1,095.9	-1,468.6	-1,835.7	MT CO2e/year
	% of residential installed panel cost covered by utility incentive:	0%	0%	0%	0%	0%	0%	%
	Installed cost per residential heat pump water heater:	\$1,622	\$1,622	\$1,622	\$1,622	\$1,622	\$1,622	\$/heat pump water heater
	Incentive cost to utility per residential water heating upgrade:	\$0	\$0	\$0	\$0	\$0	\$0	\$/heat pump water heater
	Total residential incentive cost to utility:	\$0	\$0	\$0	\$0	\$0	\$0	\$

Measure Analysis: Electric Heat Pump Water Heating Upgrades in Office

Measure Name:	Encourage upgrade to electric heat pump water heater in existing residential and office buildings to accommodate all-electric technologies. Savings from this measure overlap with savings from panel upgrade measure.
Sector:	Energy: Community
Measure Description:	Encourage residential and office buildings to upgrade natural gas water heating equipment in order to accommodate pathway to all-electric.

Office Impacts						
Capital cost to utility (\$):	\$0	\$0	\$0	\$0	\$0	\$0
Forecast Year:	2025	2030	2035	2040	2045	2050
Emissions impact (MT CO2e/year):	0.0	-0.5	-0.5	0.0	0.0	0.0
Capital cost per emissions avoided (\$/MT CO2e):	N/A	\$0	\$0	N/A	N/A	N/A
Electricity impact (kWh/year):	0	21,576	43,585	66,033	88,928	112,277

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Calculation Methodology & Equations								
Scenario	Description	Data / Assumption						Units
	Forecast Year:	2025	2030	2035	2040	2045	2050	
Business-As-Usual Conditions	Number of residential housing units:	6873	6907	6942	6977	7012	7047	housing units
	Average annual natural gas consumption per residential unit:	648	648	648	648	648	648	therms/unit/year
	Total square footage of existing commercial buildings:	4,848,192	4,896,869	4,946,034	4,995,692	5,045,849	5,096,510	square feet
	% commercial buildings that are office space:	40%	40%	40%	40%	40%	40%	% comm. buildings
	Total square footage of existing office buildings:	1,939,277	1,958,747	1,978,413	1,998,277	2,018,340	2,038,604	square feet
Office Gas Conversions Impact	Years policy in place:	0	5	10	15	20	25	years
	Square feet of office space receiving water heating conversion per year:	193,928	195,875	197,841	199,828	201,834	203,860	square feet/year
	Water heating conversions natural gas impact:	0	-36,746	-74,230	-112,464	-151,457	-191,222	therms/year
	Gas conversions natural gas emissions impact:	0	-1	-1	0	0	0	MT CO2e/year
	therm to kWh conversion for electrification including efficiency, etc.	0.59	0.59	0.59	0.59	0.59	0.59	kWh/therm
	Total office gas conversions electricity impact:	0	21,576	43,585	66,033	88,928	112,277	kWh/year
	Electricity emission factor:	0.000078	0.000032	0.000016	0.000000	0.000000	0.000000	MT CO2e/kWh
	Gas conversions electricity emissions impact:	0.0	0.7	0.7	0.0	0.0	0.0	MT CO2e/year
	Office gas conversions net total emissions impact:	0.0	-0.5	-0.5	0.0	0.0	0.0	MT CO2e/year
	% of cost covered by utility incentive:	0%	0%	0%	0%	0%	0%	%
	Installed cost for office heat pump water heater:	\$1.33	\$1.33	\$1.33	\$1.33	\$1.33	\$1.33	\$/square foot
	Incentive cost to utility per office square foot heat pump water heater update:	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$/square foot
	Total office heat pump water heater upgrade incentive cost to utility:	\$0	\$0	\$0	\$0	\$0	\$0	\$

Measure Analysis: Renewable Energy Procurement Municipal

Measure Name:	Renewable Energy Procurement: Municipality
Sector:	Energy: Municipal
Measure Description:	The City will continue to provide greener renewable electricity to municipal facilities. The City will also "opt up" to 100% renewable electricity service in all municipal facilities by 2025

Measure selected?	Yes	Yes	Yes	Yes	Yes	Yes
Forecast Year:	2025	2030	2035	2040	2045	2050
Emissions impact (MT CO2e):	-354.8	-148.4	-77.0	0.0	0.0	0.0

Calculation Methodology & Equations								
Scenario	Description	Data / Assumption						Units
	Forecast Year:	2025	2030	2035	2040	2045	2050	Year
Business-As-Usual Conditions	Muni electricity consumption:	4,621,452	4,585,823	4,550,468	4,515,386	4,480,574	4,446,031	kWh/year
	Solar + energy efficiency CAP measures electricity impact:	-98,575	65,600	276,550	189,100	109,600	14,200	kWh/year
	Remaining muni electricity consumption:	4,522,877	4,651,423	4,827,018	4,704,486	4,590,174	4,460,231	kWh/year
	Utility electricity emission factor:	0.000078	0.000032	0.000016	0.000000	0.000000	0.000000	MT CO2e/kWh
	Remaining utility muni electricity emissions:	355	148	77	0	0	0	MT CO2e/year
Measure Impact	Muni renewable energy percentage:	100%	100%	100%	100%	100%	100%	%
	Remaining non-renewable utility electricity consumption:	0	0	0	0	0	0	kWh/year
	Utility emission factor:	0.000078	0.000032	0.000016	0.000000	0.000000	0.000000	MT CO2e/kWh
	Remaining utility electricity emissions:	0	0	0	0	0	0	MT CO2e/year
	Utility emissions impact:	-355	-148	-77	0	0	0	MT CO2e/year

Assumptions

The business-as-usual 2025 grid electricity emission factor is calculated in the Assumptions tab and takes into account the current utility emission factor and the projected impact of the State's RPS commitments. See the "Assumptions" tab of this tool for more details.

The electricity emission factor takes into account state RPS requirements. See the "Assumptions" tab of this tool for more details.

Measure Analysis: Improve Energy Efficiency in Municipal Buildings

Measure Name:	Improve energy efficiency of municipal buildings
Sector:	Energy: Municipal
Measure Description:	Audit city facilities for energy efficiency opportunities and implement EE retrofits. Leverage benchmarking to identify opportunities for EE upgrades and track energy performance. Leverage other programs that provide funding.

Measure selected?	Yes	Yes	Yes	Yes	Yes	Yes
Forecast Year:	2025	2030	2035	2040	2045	2050
Emissions impact (MT CO2e/year):	-2.0	-4.8	-5.8	-21.1	-29.0	-41.8
Electricity impact (kWh/year):	-7,950	-31,800	-71,550	-159,000	-238,500	-333,900
Natural gas impact (therms/year):	-219	-437	-656	-3,496	-5,463	-7,866

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Calculation Methodology & Equations								
Scenario	Description		Data / Assumption					Units
	Forecast Year:	2025	2030	2030	2040	2045	2050	Year
Business-As-Usual Conditions	Cumulative existing muni buildings area receiving EE retrofit:	10,000	20,000	30,000	40,000	50,000	60,000	Square feet
	Non-residential electricity EUI:	15.90	15.90	15.90	15.90	15.90	15.90	kWh/SF/year
	Non-residential natural gas EUI:	0.44	0.44	0.44	0.44	0.44	0.44	therms/SF/year
Measure Impact	% of targeted electricity savings per participating building:	5%	10%	15%	25%	30%	35%	%
	% of targeted natural gas savings per participating building:	5%	5%	5%	20%	25%	30%	%
	Measure electricity consumption impact:	-7,950	-31,800	-71,550	-159,000	-238,500	-333,900	kWh/year
	Measure natural gas consumption impact:	-219	-437	-656	-3,496	-5,463	-7,866	therms/year
	Average electricity emission factor:	0.00011	0.00008	0.00003	0.00002	0.00000	0.00000	MT CO2e/kWh
	Natural gas emission factor:	0.00532	0.00532	0.00532	0.00532	0.00532	0.00532	MT CO2e/therm
	Measure electricity emissions impact:	-1	-2	-2	-3	0	0	MT CO2e/year
	Measure gas emissions impact:	-1	-2	-3	-19	-29	-42	MT CO2e/year

Measure Analysis: Install Solar on Municipal Facilities

Measure Name:	Install solar energy on municipal facilities
Sector:	Energy: Municipal
Measure Description:	Through feasibility studies, identify new or existing municipal facilities that are well suited to the installation of solar PV or solar hot water systems. Install systems where feasible.

Measure selected?	Yes	Yes	Yes	Yes	Yes	Yes
Forecast Year:	2025	2030	2035	2040	2045	2050
Emissions impact (MT CO2e):	-5	-8	-8	0	0	0
Electricity impact (kWh/year):	62,675	250,700	501,400	501,400	501,400	501,400

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Calculation Methodology & Equations

Scenario	Description	Data / Assumption						Units
	Forecast Year:	2025	2030	2035	2040	2045	2050	Year
Measure Impact	PV capacity installed on municipal facilities:	50	200	400	400	400	400	kW
	PV system output:	1,254	1,254	1,254	1,254	1,254	1,254	kWh/kW/year
	Electricity generated by target year:	62,675	250,700	501,400	501,400	501,400	501,400	kWh/year
	Average electricity emission factor:	0.00008	0.00003	0.00002	0.00000	0.00000	0.00000	MT CO2e/kWh
	Measure emissions impact:	-5	-8	-8	0	0	0	MT CO2e/year

Assumptions

Average PV system output (kWh/kW/year) from NREL's PVWatts Calculator [NREL Source](#)

Measure Analysis: Install Energy Efficient Streetlighting

Measure Name:	Install energy efficient streetlighting
Sector:	Energy: Municipal
Measure Description:	City replaces street lighting – including signal, park and parking lots – with efficient LED lighting.

Measure selected?	Yes	Yes	Yes	Yes	Yes	Yes
Forecast Year:	2025	2030	2035	2040	2045	2050
Emissions impact (MT CO2e/year):	-16.3	-12.0	-4.9	-2.4	0.0	0.0
Electricity impact (kWh/year):	-153,300	-153,300	-153,300	-153,300	-153,300	-153,300

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Calculation Methodology & Equations

Scenario	Description	Data / Assumption						Units
Measure Impact	Forecast Year:	2025	2030	2035	2040	2045	2050	Year
	Number of lamps replaced:	100	0	0	0	0	0	Lamps
	Average power rating of existing lamps:	0.40	0.40	0.40	0.40	0.40	0.40	kW
	Average power rating of replacement lamps:	0.05	0.05	0.05	0.05	0.05	0.05	kW
	Average lamp daily operating time:	12	12	12	12	12	12	hours/day
	Average lamp operating days in year:	365	365	365	365	365	365	days/year
	Measure electricity consumption impact:	-153,300	0	0	0	0	0	kWh/year
	Average electricity emission factor:	0.00011	0.00008	0.00003	0.00002	0.00000	0.00000	MT CO2e/kWh
	Measure electricity emissions impact :	-16	0	0	0	0	0	MT CO2e/year

Assumptions

Above analysis assumes that average streetlight is operating 12 hours per day for 365 days per year.

Above analysis assumes that average power rating of replaced lamps is 400 watts and the average power rating of replacement lamps is 40 watts. This information should be updated based on city-specific data.

Measure Analysis: Electrify Existing Municipal Buildings

Measure Name:	Electrify existing municipal buildings and facilities
Sector:	Energy: Municipal
Measure Description:	Evaluate municipal buildings and facilities to determine projects where electrification is feasible. Retrofit these facilities to be all-electric, including electric heating, cooling and water heating.

Measure Impacts

Measure selected?	Yes	Yes	Yes	Yes	Yes	Yes
Forecast Year:	2025	2030	2035	2040	2045	2050
Capital cost to city (\$):	\$8,460	\$15,320	\$29,040	\$42,760	\$56,480	\$70,200
Emissions impact (MT CO2e/year):	-8	-18	-42	-66	-93	-116
Capital cost per emissions avoided (\$/MT CO2e):	\$1,054	\$854	\$689	\$643	\$608	\$604
Electricity impact (kWh/year):	33,794	67,589	135,178	202,767	270,356	337,945
Natural gas impact (therms/year):	-2,185	-4,370	-8,740	-13,110	-17,480	-21,850

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Calculation Methodology & Equations

Scenario	Description	Data / Assumption						Units
	Forecast Year:	2025	2030	2035	2040	2045	2050	Year
Business-As-Usual Conditions	Building area of municipal building/s electrified:	5,000	10,000	20,000	30,000	40,000	50,000	square feet
	Natural gas consumption of building/s electrified:	2,185	4,370	8,740	13,110	17,480	21,850	therms/year
	Number of police stations & fire stations:	2	2	2	2	2	2	stations
Measure Impact	Muni kWh to therm conversion for electrification:	15.47	15.47	15.47	15.47	15.47	15.47	kWh/therm
	Muni electrification annual electricity consumption impact:	33,794	67,589	135,178	202,767	270,356	337,945	kWh/year
	Muni electrification cost to city (without end of life adjustment):	\$21,150	\$38,300	\$72,600	\$106,900	\$141,200	\$175,500	\$/year
	Marginal cost savings from end of life timing:	60%	60%	60%	60%	60%	60%	% savings
	Building electrification cost to city (with end of life adjustment):	\$8,460	\$15,320	\$29,040	\$42,760	\$56,480	\$70,200	\$/year
	Municipal utility electricity emission factor:	0.0001064	0.0000784	0.0000319	0.0000160	0.0000000	0.0000000	MT CO2e/kWh
	Muni electrification electricity emissions impact:	4	5	4	3	0	0	MT CO2e/year
	Total muni electrification measure natural gas impact:	-2,185	-4,370	-8,740	-13,110	-17,480	-21,850	therms/year
	Muni electrification natural gas emissions impact:	-12	-23	-46	-70	-93	-116	MT CO2e/year
	Total muni electrification measure emissions impact:	-8	-18	-42	-66	-93	-116	MT CO2e/year

Assumptions

The increase in electricity consumption in municipal buildings resulting from all-electric new construction was estimated using New York data on percent of gas consumption by equipment type and the known energy factors of gas and equivalent electric equipment. See Table 1 and Table 2 below.	See Table 1 and Table 2 below
The cost to electrify a municipal building is based on data from multiple sources. See Table 3 below for details. The above analysis assumes that, among municipal buildings, clothes dryers are only located in police and fire stations.	See Table 3 below
The above analysis assumes that the total cost of electrifying a municipal building can be reduced by 60% by properly timing the electrification effort to correspond with the natural end of life of natural gas equipment. This assumption is based off DNV GL expertise in this area.	DNV GL

Additional Resources

Greentech Media, 2018. "Local Governments Look to All-Electric Buildings to Reduce Greenhouse Gas Emissions."	Greentech Media Source
Local Government Commission, 2018. "Expanding Decarbonization: Electrification Isn't Just for Transportation."	LGC Source

Measure Analysis: Develop Walkable & Bikeable Streets

Measure Name:	Develop walkable and bikeable street landscape
Sector:	Transportation & Land Use: Municipal
Measure Description:	Modify landscape to make walking and biking more desirable. Install bike lanes, bike parking, traffic calming measures, beautification, etc.

Measure selected?	Yes	Yes	Yes	Yes	Yes	Yes
Forecast Year:	2025	2030	2035	2040	2045	2050
Emissions Impact (MT CO ₂ e/year):	-6	-6	-6	-6	-6	-6
VTM impact (VTM/Year):	-13,072	-13,072	-13,072	-13,072	-13,072	-13,072

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Calculation Methodology & Equations

Scenario	Description	Data / Assumption						Units
	Forecast Year:	2025	2030	2035	2040	2045	2050	Year
Business-As-Usual Conditions	Total community VMT:	697,150	697,150	697,150	697,150	697,150	697,150	VTM/year
	Total city land area:	4	4	4	4	4	4	square miles
Measure Impact	Are traffic calming measures being installed across city?	Yes	Yes	Yes	Yes	Yes	Yes	N/A
	VTM reduction factor for installing basic traffic calming:	0.0025	0.0025	0.0025	0.0025	0.0025	0.0025	VTM reduction variable
	Total miles of bicycle lanes:	10	15	20	25	25	25	miles
	VTM reduction factor for incorporating bike lanes into street design:	0.01	0.01	0.01	0.01	0.01	0.01	VTM reduction variable
	Is bike parking providing in most non-residential locations?	Yes	Yes	Yes	Yes	Yes	Yes	N/A
	VTM reduction factor for providing bike parking in non-residential locations:	0.00625	0.00625	0.00625	0.00625	0.00625	0.00625	VTM reduction variable
	Walkable + bikeable street VTM impact:	-13,072	-13,072	-13,072	-13,072	-13,072	-13,072	VTM/year
	Overall vehicle emission factor:	0.000486	0.000486	0.000486	0.000486	0.000486	0.000486	MT CO ₂ e/VTM
	Smart growth emissions impact:	-6	-6	-6	-6	-6	-6	MT CO ₂ e/year

Assumptions

Calculation methodology and VTM reduction variables for traffic calming, bike lanes and bike racks based off California Air Pollution Control Officers Association (CAPCOA) Quantifying Greenhouse Gas Mitigation Measures measures SDT-2, SDT-5, SDT-6 and SDT-7.

[CAPCOA Source](#)

Additional Resources

Cambridge Systematics, 2009. "Moving Cooler: An Analysis of Transportation Strategies for Reducing Greenhouse Gas Emissions."

[Cambridge Systematics Source](#)

U.S. Department of Transportation. "Generalized Assessment of Traffic Calming Measures."

[US DOT Source](#)

Measure Analysis: Establish Electric Fleet Policy

Measure Name:	Establish electric municipal fleet policy
Sector:	Transportation: Municipal
Measure Description:	Establish policy requiring the prioritization of electric vehicles (battery electric or plug-in hybrid electric).

Measure Impacts						
Measure selected?	Yes	Yes	Yes	Yes	Yes	Yes
Forecast Year:	2025	2030	2035	2040	2045	2050
Capital cost to local government (\$):	\$0		\$0			\$0
Emissions impact (MT CO2e):	-8		-41			-48
Capital cost per emissions avoided (\$/MT CO2e):	\$0		\$0			\$0
Electricity impact (kWh/year):	63,871		255,484			298,065

= Yellow cells below require user input

Calculation Methodology & Equations								
Scenario	Description	Data / Assumption						Units
	Forecast Year:	2025	2030	2035	2040	2045	2050	Year
Business-As-Usual Conditions	Number of municipal fleet gasoline vehicles:	31	28	25	19	17	15	vehicles
	Number of municipal fleet diesel vehicles:	24	24	24	24	24	24	vehicles
	Municipal fleet total gasoline consumption:	11,000	9,935	8,871	6,742	6,032	5,323	gallons/year
	Municipal fleet total diesel consumption:	14,500	14,500	14,500	14,500	14,500	14,500	gallons/year
	Municipal fleet average gasoline vehicle MPG:	20.0	25.0	30.0	30.0	30.0	30.0	miles/gallon
	Municipal fleet average diesel vehicle MPG:	10.0	15.0	15.0	20.0	20.0	20.0	miles/gallon
	Municipal fleet average battery electric vehicle fuel efficiency:	3,000	3,000	3,000	3,000	3,000	3,000	kWh/mile
	Municipal fleet average gasoline vehicles VMT:	7,097	7,097	7,097	7,097	7,097	7,097	VMT/year/vehicle
	Municipal fleet average diesel vehicles VMT:	6,042	6,042	6,042	6,042	6,042	6,042	VMT/year/vehicle
	Municipal fleet total gasoline VMT:	220,000	198,710	177,419	134,839	120,645	106,452	VMT/year
Measure Impact	Municipal fleet total diesel VMT:	145,000	145,000	145,000	145,000	145,000	145,000	VMT/year
	Target % of gasoline vehicles replaced with electric:	0%	10%	20%	40%	45%	50%	% vehicles
	Target % of diesel vehicles replaced with electric:	0%	0%	0%	0%	0%	0%	% vehicles
	Target number of gasoline vehicles replaced with electric:	0	3	6	12	14	16	vehicles
	Target number of diesel vehicles replaced with electric:	0	0	0	0	0	0	vehicles
	Annual VMT or replaced gasoline vehicles:	0	21,290	42,581	85,161	99,355	113,548	VMT/year
	Annual VMT or replaced diesel vehicles:	0	0	0	0	0	0	VMT/year
	Target municipal fleet gasoline vehicles VMT:	220,000	177,419	134,839	49,677	21,290	-7,097	VMT/year
	Target municipal fleet diesel vehicles VMT:	145,000	145,000	145,000	145,000	145,000	145,000	VMT/year
	Target municipal fleet electric vehicles VMT:	0	21,290	42,581	85,161	99,355	113,548	VMT/year
	Change in gasoline vehicles VMT:	0	-21,290	-42,581	-85,161	-99,355	-113,548	VMT/year
	Change in diesel vehicles VMT:	0	0	0	0	0	0	VMT/year
	Change in electric vehicles VMT:	0	21,290	42,581	85,161	99,355	113,548	VMT/year
	Battery electric vehicle fuel efficiency:	3,000	3,000	3,000	3,000	3,000	3,000	kWh/mile
	Measure electricity consumption impact:	0	63,871	127,742	255,484	298,065	340,645	kWh/year
	Gasoline vehicle emission factor:	0.000486	0.000486	0.000486	0.000486	0.000486	0.000486	MT CO2e/VMT
	Diesel vehicle emission factor:	0.000486	0.000486	0.000486	0.000486	0.000486	0.000486	MT CO2e/VMT
	Municipal PCE electricity emission factor:	0.000078	0.000032	0.000016	0.000000	0.000000	0.000000	MT CO2e/kWh
	Electrify fleet electricity emissions impact:	0	2	2	0	0	0	MT CO2e/year
	Electrify fleet gasoline emissions impact:	0	-10	-21	-41	-48	-55	MT CO2e/year
	Electrify fleet diesel emissions impact:	0	0	0	0	0	0	MT CO2e/year
	Electrify fleet net total emissions impact:	0	-8	-19	-41	-48	-55	MT CO2e/year

Measure Analysis: Increase Electric Vehicle Ownership

Measure Name:	Increase electric vehicle ownership
Sector:	Transportation & Land Use: Community
Measure Description:	Establish overarching community target for adoption rate of electric vehicles. This target should be based on a combination of the expected market growth of electric vehicles and actions taken by the city (including measures TL-9, TL-10, TL-11 and TL-12 to support electric vehicles through policy and programs).

Measure Impacts						
Measure selected?	Yes	Yes	Yes	Yes	Yes	Yes
Forecast Year:	2025	2030	2030	2040	2045	2050
Emissions impact (MT CO ₂ e/year):	-17	-17	-25	-34	-42	-34
Electricity impact (kWh/year):	12,061	12,061	18,091	24,121	30,152	24,121

- Yellow cells below require user input

Calculation Methodology & Equations								
Scenario	Description	Data / Assumption						Units
Business-As-Usual Conditions	Year	2025	2030	2035	2040	2045	2050	
	Total community VMT:	697,150	697,150	697,150	697,150	697,150	697,150	VMT/year
	All CAP measures cumulative VMT impact:							VMT/year
	Remaining total community VMT:	697,150	697,150	697,150	697,150	697,150	697,150	VMT/year
	% total community VMT from gasoline:	92.9%	90.0%	87.5%	85.0%	85.0%	82.5%	%
	% total community VMT from diesel:	7.1%	5.0%	5.0%	5.0%	2.5%	2.5%	%
	% total community VMT from electric:	0.0%	5.0%	7.5%	10.0%	12.5%	15.0%	%
	Community gasoline VMT:	647,835	627,435	610,006	592,578	592,578	575,149	VMT/year
	Community diesel VMT:	49,315	34,858	34,858	34,858	17,429	17,429	VMT/year
	Community electric VMT:	0	34,858	52,286	69,715	87,144	104,573	VMT/year
Measure Impact	Target % total community VMT from gasoline:	87.9%	85.0%	80.0%	75.0%	72.5%	72.5%	%
	Target % total community VMT from diesel:	7.1%	5.0%	5.0%	5.0%	2.5%	2.5%	%
	Target % total community VMT from electric:	5%	10%	15%	20%	25%	25%	%
	Remaining total community VMT:	697,150	697,150	697,150	697,150	697,150	697,150	VMT/year
	Target community gasoline VMT:	612,977	592,578	557,720	522,863	505,434	505,434	VMT/year
	Target community diesel VMT:	49,315	34,858	34,858	34,858	17,429	17,429	VMT/year
	Target community electric VMT:	34,858	69,715	104,573	139,430	174,288	174,288	VMT/year
	Other CAP measures cumulative gasoline VMT impact:							VMT/year
	Other CAP measures cumulative electric VMT impact:							VMT/year
	EV ownership measures change in gasoline VMT:	-34,858	-34,858	-52,286	-69,715	-87,144	-69,715	VMT/year
	EV ownership measures change in electric VMT:	34,858	34,858	52,286	69,715	87,144	69,715	VMT/year
	BEV fuel efficiency:	0.346	0.346	0.346	0.346	0.346	0.346	kWh/mile
	EV measure electricity consumption impact:	12,061	12,061	18,091	24,121	30,152	24,121	kWh/year
	Fossil fuel vehicle emission factor:	0.000486	0.000486	0.000486	0.000486	0.000486	0.000486	MT CO ₂ e/VMT
	Average EV charging electricity emission factor:	0.000027	0.000011	0.000006	0.000000	0.000000	0.000000	MT CO ₂ e/kWh
	EV measure electricity emissions impact:	0	0	0	0	0	0	MT CO ₂ e/year
	EV measure gasoline emissions impact:	-17	-17	-25	-34	-42	-34	MT CO ₂ e/year
	EV measure net total emissions impact:	-17	-17	-25	-34	-42	-34	MT CO ₂ e/year

Measure Analysis: Achieve Higher Waste Diversion Rate

Measure Name:	Achieve higher waste diversion rate
Sector:	Waste: Community
Measure Description:	Achieve 85% waste diversion rate through a combination of efforts including promotion of traditional recycling and organics recycling programs and local enforcement of recycling requirements.

Measure selected?	Yes	Yes	Yes	Yes	Yes	Yes
Forecast Year:	2025	2030	2035	2040	2045	2050
Emissions impact (MT CO2e/year):	-395	-601	-810	-1,020	-1,233	-1,447
Disposed waste impact (Tons/year):	-1,317	-2,005	-2,699	-3,401	-4,109	-4,825

Selected City: 0.000106371

= Yellow cells below require user input

Calculation Methodology & Equations								
Scenario	Description	Data / Assumption						Units
Business-As-Usual Conditions	Forecast Year:	2025	2030	2035	2040	2045	2050	Year
	Disposed waste emissions:	15,190	15,266	15,342	15,419	15,496	15,574	MT CO2e/year
	Community population:	14,914	14,989	15,064	15,140	15,215	15,292	population
	Community per capita waste disposal rate:	3.7	3.7	3.7	3.7	3.7	3.7	lbs/capita/day
	Community waste diversion rate:	25%	25%	25%	25%	25%	25%	%
	Community per capita waste disposal rate:	0.7	0.7	0.7	0.7	0.7	0.7	tons/capita/year
	Community total waste disposal:	10,126	10,177	10,228	10,279	10,331	10,383	tons/year
Measure Impact	Community target diversion rate:	35%	40%	45%	50%	55%	60%	%
	Community per capita waste disposal target:	3.24	2.99	2.74	2.49	2.24	1.99	lbs/capita/day
	Community per capita waste disposal target:	0.6	0.5	0.5	0.5	0.4	0.4	tons/capita/year
	Community population:	14,914	14,989	15,064	15,140	15,215	15,292	population
	Community target total waste disposal:	8,809	8,172	7,529	6,879	6,222	5,558	tons/year
	Measure disposed waste impact:	-1,317	-2,005	-2,699	-3,401	-4,109	-4,825	tons/year
	GHG savings from waste diversion	0.3	0.3	0.3	0.3	0.3	0.3	MT CO2e/ton
	Measure emissions impact:	-395	-601	-810	-1,020	-1,233	-1,447	MT CO2e/year

Appendix II: References

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- ⁱ Office of the New York State Comptroller, February 2022, Green and Growing Employment Opportunities in New York's Sustainable Economy, <https://www.osc.state.ny.us/files/reports/pdf/green-jobs-in-new-york.pdf>
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- ⁱⁱⁱ Sustainable PR, November 14, 2020, Glens Falls Smart City Initiatives Light Up the Town, <https://sustainablepr.com/glens-falls-smart-city-initiatives-light-up-the-town/>
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- ^{vii} BD, April 22, 2021, BD's Commitment to Address Climate Change, <https://news.bd.com/2021-04-22-BDs-Commitment-to-Address-Climate-Change#:~:text=BD%20is%20committing%20to%20reduce,C%20global%20emissions%20reduction%20pathway.>
- ^{viii} CDP, January 20, 2020, Alphabet, Citigroup and Walmart named among global leaders on corporate climate action in CDP Climate A List, <https://www.cdp.net/en/articles/media/alphabet-citigroup-and-walmart-named-among-global-leaders-on-corporate-climate-action-in-cdp-climate-a-list>
- ^{ix} ICLEI. (2010). Local Government Operations Protocol for the quantification and reporting of greenhouse gas emissions inventories version 1.1. Retrieved 09 15, 2022, from https://s3.amazonaws.com/icleiusaresources/lgo_protocol_v1_1_2010-05-03.pdf
- ^x Climate Action Associates LLC. 2015. New York Community and Regional GHG Inventory Guidance, version 1.0. New York Climate Smart Communities.
- ^{xi} ICLEI. 2019. "U.S. Community Protocol for Accounting and Reporting of Greenhouse Gas Emissions, version 1.2."