Cazenovia Climate Action Plan

APRIL 2015


Cazenovia Lake

Central New York Regional Planning & Development Board

NEW YORK STATE OF OPPORTUNITY. Climate Smart Communities

Central New York climate change innovation program ...a Program of the Central New York Regional Planning and Development Board

CNY Energy Challenge ...a program of the Central New York Regional Planning & Development Board

A MESSAGE FROM THE TOWN SUPERVISOR AND VILLAGE MAYOR

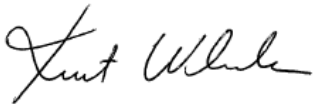
Dear Friends and Neighbors,

The Village and Town of Cazenovia are proud to partner with the Central New York Regional Planning and Development Board to create this Climate Action Plan. Our municipalities have a long history of appreciating our natural environment which is at the very core of our sense of place as a community. Our adoption of the Climate Smart Communities Pledge and participation in this planning process are great examples of "thinking globally and acting locally" to protect our environment.

The Town and Village along with local partners such as Cazenovia Central School District and Cazenovia College have already undertaken numerous initiatives to conserve energy and safeguard the environment, as described on the following pages. This plan symbolizes our commitment to continue and enhance those efforts. We are particularly pleased to have been able to produce a combined plan. It symbolizes our belief that sharing resources and working cooperatively is one of the most effective ways to save both money and energy.

This plan represents the collective vision of the participants to enhance our community's level of sustainability. We gratefully acknowledge the expert guidance of the Central New York Regional Planning and Development Board and others during the process and the time and talent contributed by our municipal delegates, Village Trustee Dave Porter and Town Highway Superintendent Tim Hunt. We urge others to join the cause in the future by contacting the Village or Town to share their ideas and suggestions. This plan is a beginning, not an end, to our commitment to working toward a smart and sustainable future.

Sincerely,



Kurt Wheeler
Village of Cazenovia Mayor

William N. Zupan
Town of Cazenovia Supervisor

Gothic Cottage, Cazenovia

The Central New York Regional Planning and Development Board

The Central New York Regional Planning and Development Board (CNY RPDB) is a public agency that was established in 1966 by Cayuga, Cortland, Madison, Onondaga, and Oswego Counties under the provisions of Article 12B of the New York State General Municipal Law. The CNY RPDB provides a comprehensive range of services associated with the growth and development of communities in Central New York with a focus on the following program areas: Energy Management, Community Development, Economic Development, Environmental Management, Information and Research Services, Intergovernmental Coordination, and Transportation Planning.

ACKNOWLEDGEMENTS

The Town and Village of Cazenovia wish to thank the following community members, organizations, and staff for their contributions to developing this Climate Action Plan:

TOWN OF CAZENOVIA

Bill Zupan, Supervisor
Timothy Hunt, Highway Superintendent
Pat Race, Councilor and Deputy Supervisor
Town Board

VILLAGE OF CAZENOVIA

Kurt Wheeler, Village Mayor
David Porter, Village Trustee
Village Board

ADVISORY COMMITTEE

Lauren Lines, Cazenovia Area Community Development Association
Anne Redfern, League of Women Voters
Jessica Amidon, Cazenovia Chamber
Alexis Ellis, Cazenovia Preservation Foundation
Susan Berger, Cazenovia College

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Roger Saltman, Town Resident
Todd Rogers, Environmental Training Solutions

CNY REGIONAL PLANNING AND DEVELOPMENT BOARD

Chris Carrick, Energy Program Manager
Anne Saltman, Principal Planner
Amanda Sopchak, Planner

Photo Credit: Village of Cazenovia, Madison County, Anne Saltman, Cazenovia Republican, Sotheby's International Realty Affiliates LLC, stage-coachdays.blogspot.com, PeachyGreen.com

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EXECUTIVE SUMMARY

A Climate Action Plan (CAP), often considered a blueprint for the future, evaluates how a community can reduce greenhouse emissions and adapt to climate change. The CAP also identifies the extent to which local actions support New York State's goal for a clean-energy economy. New York State's goal is to reduce greenhouse gas emissions by 80% (below the levels emitted in 1990) by the year 2050. To help reach this goal, local representatives have joined many other municipalities throughout the State to compile a CAP for Cazenovia.

The Town and Village of Cazenovia worked together on this initiative. The CAP provides local goals for reducing energy use from municipal operations and from the Cazenovia community as a whole and includes specific recommendations for categories such as transportation, solid waste disposal, and building energy efficiency. The objectives of the Climate Action Plan are to:

(1) Present information on emission reduction projects and programs that are currently being implemented in Cazenovia;
(2) Provide municipal elected officials, community leaders, and residents with information and support to advance these and additional energy sustainability programs throughout the community;
(3) Identify opportunities for new emission reduction programs and initiatives; and
(4) Engage and encourage local participation in greenhouse gas emission reduction strategies.

A Climate Action Plan Advisory Committee comprised of municipal representatives and community leaders met during 2014 to discuss emission reduction goals and specific strategies for reaching them. In addition to town and village representatives and community members, the following groups participated on the committee: the League of Woman Voters, Chamber of Commerce, Cazenovia College, Cazenovia Preservation Foundation, Energy Training Solutions, and the Cazenovia Lake Association. The committee agreed on a goal to reduce overall greenhouse gas emissions by 20% by the year 2025 from the GHG inventory baseline years for the town (2010) and village (2011).

This CAP was prepared for Cazenovia with guidance from the Central New York Regional Planning and Development Board (CNY RPDB). The CNY RPDB provided this assistance under the sponsorship of the New York State Climate Smart Communities Program.

The CAP is not intended to provide precise information about the potential emission reductions that can be achieved by specific recommendations, and cannot be used as a substitute for thorough project or program planning. Instead, the document provides estimates of emission reductions for specific local recommendations. The report is designed to help public officials, community leaders, and residents decide which actions may be worthwhile for the community to pursue in the coming years and is intended to be a flexible framework for local climate protection.

NEW YORK STATE OF OPPORTUNITY. Climate Smart Communities

Central New York C_2IP climate change innovation program
... a Program of the Central New York Regional Planning and Development Board

Climate Smart Communities Program

The Climate Smart Community (CSC) program is a successful partnership between the New York State Department of Environmental Conservation and local governments. The program helps communities reduce greenhouse gas emissions, save taxpayer dollars, and advance community goals for health and safety, economic vitality, and energy independence. Over 140 municipalities in New York State (including the Town and Village of Cazenovia) are CSCs. The CNY RPDB is the Climate Smart Communities coordinator for five counties in Central New York (Cayuga, Cortland, Madison, Onondaga, and Oswego) and provides technical assistance for greenhouse gas inventories, climate action plans, and energy efficiency projects. The CNY RPDB's work as Climate Smart Communities coordinator is referred to as their Climate Change Innovation Program (C_2IP).

Cazenovia Lake

Lincklaen House, Cazenovia

Cazenovia Lake

INTRODUCTION

What is climate change?

Global concern with climate change is primarily focused on the amount of greenhouse gases in the atmosphere. Greenhouse gases, such as carbon dioxide, water vapor, and methane, among others, are an essential part of our atmosphere, and they serve a vital role in making our planet warm enough for life.

Greenhouse gases trap energy (in the form of long wave radiation) that is being emitted by the Earth, keeping it in the atmosphere to warm the planet. As the amount of carbon dioxide in the atmosphere has increased or decreased over time, the planet's temperature has changed in roughly the same proportion.

Scientists have determined this relationship by studying Antarctic ice core samples that reveal the atmospheric carbon dioxide from 400,000 years ago to present day. There is currently more carbon dioxide in the atmosphere than at any time in history, as measured by these samples.[1] Atmospheric testing shows that we have 402 parts per million (ppm) atmospheric CO_2[2], which is higher than at any other time in history.[3] Scientists expect that this is leading to a gradual warming of the planet in most areas.

Developing the Plan

Cazenovia's Climate Action Plan was developed by an Advisory Committee made up of town and village elected officials and community leaders. The CNY RPDB provided technical assistance by analyzing energy and emissions reduction strategies with data from the town and village GHG inventory reports. CNY RPDB provided information and suggestions to the Advisory Committee as to which energy efficiency strategies would be most successful in Cazenovia, how many $MTCO_2e$ the strategies would prevent, co-benefits of the strategies, and case studies explaining where the strategies have successfully been implemented. They also provided information about the cost of implementation, possible funding sources, and payback period for the strategies. For more information on how the strategies were developed, including cost savings, payback times, assumptions and references,

1 Visit http://www.antarctica.ac.uk/press/journalists/resources/science/ice_cores_and_climate_change_briefing-sep10.pdf to learn more about the Antarctic ice core findings with accompanying graphs for temperature and CO_2.

2 According to the Scripps Institute and NOAA, Mauna Loa Observatory

3 In January 1998, the collaborative ice-drilling project between Russia, the United States, and France at the Russian Vostok station in East Antarctica yielded the deepest ice core ever recovered, reaching a depth of 3,623 m (Petit et al. 1997, 1999). The extension of the Vostok CO_2 record shows the present-day levels of CO_2 are unprecedented during the past 420k yr. Pre-industrial Holocene levels (~280 ppmv) are found during all interglacials, with the highest values (~300 ppmv) found approximately 323 kyr BP.

Thinking Sustainably: the Village of Skaneateles, New York

The Village of Skaneateles serves as a showcase for energy efficiency and environmental stewardship. Renovations were completed in 2013, making the new Village Hall the first municipal net-zero energy building in New York State. The project was launched in 2012 when municipal officials partnered with the Central New York Regional Planning and Development Board (CNY RPDB) under its EPA-funded Climate Change Innovation Program. With an initial EPA grant from the CNY RPDB and funds from the sale of the old Village Hall, municipal officials repurposed a vacant fire station in the Village Center and turned it into the net-zero energy facility. The building, which now houses administrative offices and a police station, is expected to produce more energy than it consumes.

The renovations included a 54 kW PV system on the roof, a geothermal well field and heat pump system to provide on-site energy extracted from the ground, LED lighting, and green exterior upgrades such as insulation and energy efficient windows. The improvements are expected to reduce energy usage by more than 62,000 kilowatt hours of electricity each year and will result in the avoidance of 46 metric tons of greenhouse gas emissions annually. The building has an educational display in the lobby so that visitors can see how the building is performing. The village made every effort to utilize technologies developed in Central New York including the HVAC system that was manufactured in Auburn. Local leaders also worked with the CNY RPDB to complete a greenhouse gas inventory in 2013, and energy efficiency goals and recommendations were presented in a Climate Action Plan that was adopted by village trustees in September 2014.

Climate Impacts in the Northeast[1]

Temperature: Average temperatures across the Northeast have risen more than 1.5 degrees Fahrenheit since 1970, with even more significant changes in average winter temperatures, rising 4°F between 1970 and 2000.

Precipitation: The Northeast region is projected to see a 20 to 30% increase in winter precipitation, and, due to increases in temperatures, less winter precipitation will fall as snow and more will fall as rain.

Additionally, heavy, damaging rainfall events have already increased measurably across the Northeast in recent decades. For example, Hurricane Irene and Superstorm Sandy brought intense rains to the region in 2011 and 2012, causing widespread flooding.

Drought: Rising summer temperatures coupled with little change in summer rainfall are projected to increase the frequency of short-term (one to three month) droughts in the Northeast, therefore increasing stress on both natural and managed ecosystems.

1 US EPA, http://www.epa.gov/climatechange/impacts-adaptation/northeast.html

refer to Appendix C: Action Strategy Summary Document for the village[4] and Appendix D: Action Strategy Summary document for the town.[5]

Implementing the Plan

In order to implement the strategies in this plan and achieve Cazenovia's sustainability goals, the creation of a permanent sustainability committee is highly recommended. The sustainability committee would be comprised of a group of town and village residents who are committed to Cazenovia's sustainable future and are willing to volunteer their time to help implement the strategies explained in this plan.

Progress towards the Climate Action Plan's goals can be measured over time by conducting subsequent GHG emissions inventories. Future inventories can be compared against the baseline years to determine progress.

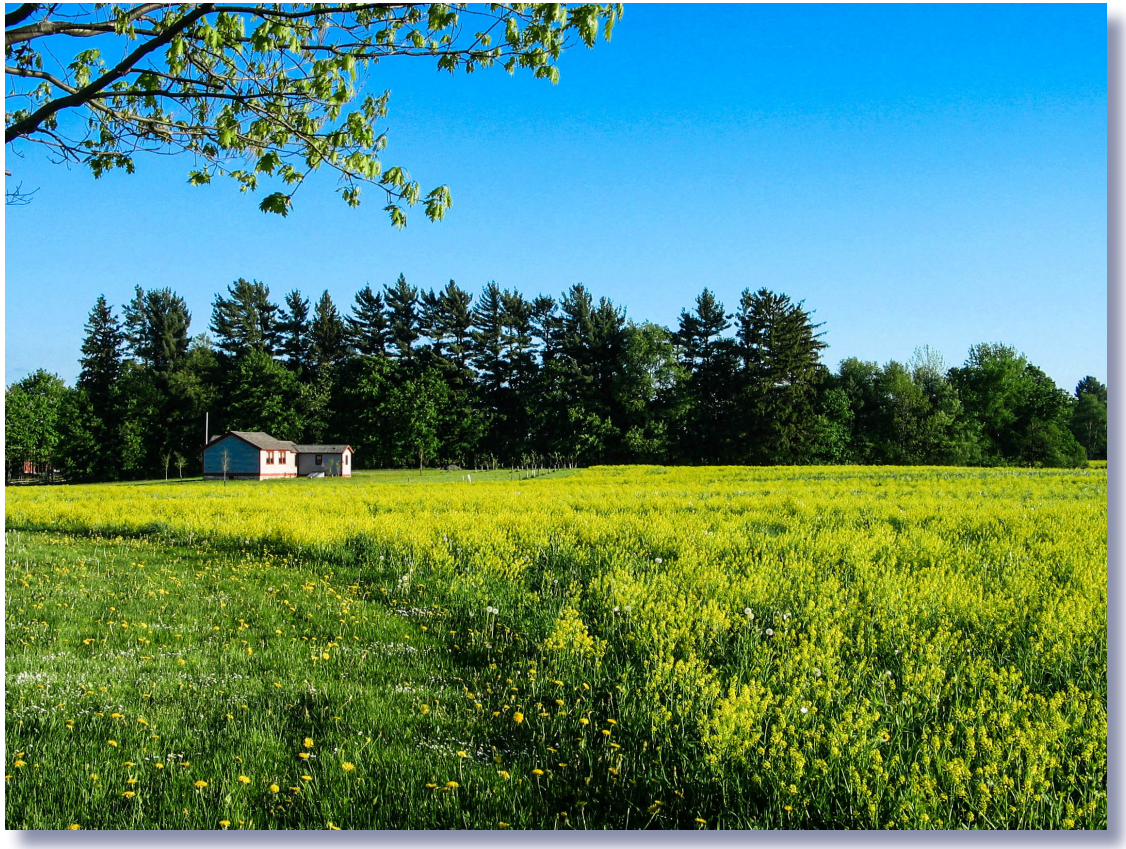
4 Available at www.villageofcazenovia.com
5 Available at www.townofcazenovia.org

Chittenango Falls State Park

NEW YORK STATE WEATHER CHARACTERISTICS

Central New York's climate is characterized by warm, dry summers and cold, snowy winters. The weather patterns are influenced by topography, prevailing westerly wind direction, and proximity to Lake Ontario. Frost can be expected from early October until late May and the growing season is approximately 18 to 20 weeks long. Serious droughts are rare but most growing seasons do experience limited periods of low soil moisture.

In 2011, the New York State Energy Research and Development Authority (NYSERDA) released a comprehensive assessment of the projected effects of climate change in New York State's critical systems and natural resources over the next century. ClimAID: the Integrated Assessment for Effective Climate Change Adaptation Strategies in New York State was compiled by more than 50 scientists and currently serves as an important tool for planners, policymakers, farmers, local governments and residents. According to the report, the annual average temperature in New York has risen approximately 2.4°F since 1970, with winter warming exceeding 4.4°F. Sea level along New York's coastline has risen about a foot since 1900 and the frequency of intense precipitation and heavy downpours has increased in recent decades.



Rural landscape, Cazenovia

LOCAL CLIMATE CHARACTERISTICS

Temperature and Precipitation

Cazenovia generally experiences seasonable weather patterns that are characteristic of the northeastern U.S. cyclonic system. During the summer and parts of spring and autumn, temperatures rise during the daytime and fall rapidly after sunset. The average temperature is 46.6°F, which is lower than the New York average temperature of 48.2°F, and much lower than the national average temperature of 54.4°F.

Annual weather data from the Hancock International Airport in Syracuse from 1950 to 2012 shows a 3.1% increase in average temperature.

Central New York experienced exceptionally heavy snowfall, icy roads, and low temperatures during the 2013-14 winter season. The U.S. Department of Agriculture determined that Cortland, Madison and Oswego counties suffered sufficient production losses due to a freeze that occurred from December 1, 2013 through March 14, 2014 to warrant a Secretarial Disaster designation. The designation made farm operators in both primary and contiguous counties eligible to be considered for assistance (such as emergency loans) from the Farm Service Agency. The following graph shows the annual average temperatures in the City of Syracuse since 1951 (Figure 1) with a trend line showing a gradual warming.

The average annual precipitation in Cazenovia is 46.3 inches, which is slightly higher than the New York State average of 42.8 inches. The average annual snowfall in Cazenovia is 123.8 inches, substantially higher than New York State's average of 59.2 inches. Annual precipitation totals from the Hancock International Airport in Syracuse from 1950 to 2012 shows an increase of 2.3 inches (Figure 2).

Ice Cover

The amount and duration of ice cover on Lake Ontario and other Great Lakes is variable from year to year. Despite the anomaly of winter weather conditions during the 2013 and 2014, scientists have documented an overall decrease in ice extent since the early 1970s. From 1973 to 2010, annual ice coverage on the Great Lakes has declined by 71 percent. Ice characteristics on the Great Lakes are important to monitor because of their influence on hydropower generation, commercial shipping, the fishing industry and other societal impacts.

Ice cover and duration influence lake water characteristics and documentation of long-term changes are helping researchers evaluate the impact on weather patterns (such as lake effect snow), water levels, temperature, circulation, and spring plankton blooms. Weather conditions, lake depth, and heat storage capacity in lakes are also important

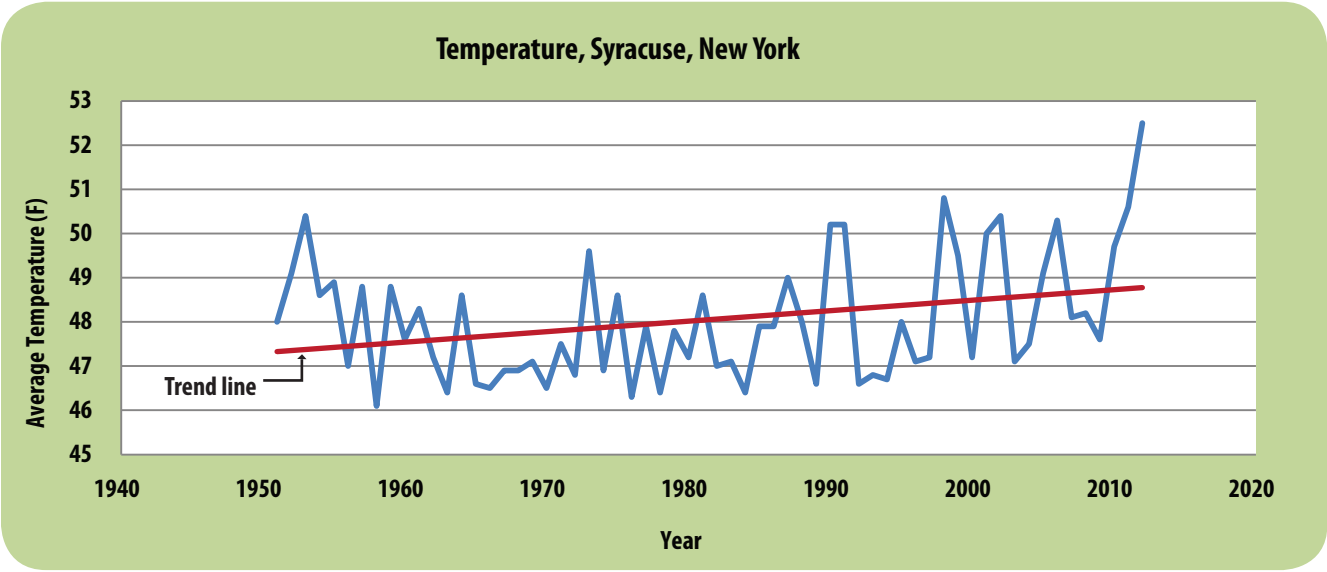


FIGURE 1- ANNUAL AVERAGE TEMPERATURE, SYRACUSE, NEW YORK.
SOURCE: NOAA NATIONAL WEATHER SERVICE FORECAST OFFICE

components that can influence the thermal cycle in the lakes.

Extreme Weather Events

The relative intensity of local storm events is influenced by air temperature. As air temperature rises, moisture in the atmosphere increases. This, in turn, contributes to an increase in the intensity and frequency of precipitation events.

The warmer temperatures observed throughout New York State are caused by fossil fuel emissions and other heat-trapping gasses in the atmosphere. Increased air temperatures cause higher levels of oceanic evaporation which intensifies the water cycle. As a result, storm events in Cazenovia and around the globe are gradually becoming more extreme with stronger wind and higher levels of rainfall.

Meteorologists report that the total annual amount of precipitation is changing, as well as the distribution and intensity of storm events. According to the ClimAID report, New York State experienced a 64% increase in extreme storm frequency between 1948 and 2011. The increased number of severe storms is expected to gradually continue, with 100-year storms likely to occur every 80 years by the end of the century. Strong storm events contribute to localized flooding, soil erosion, and stormwater runoff. These conditions can cause damage to roads, bridges, and other infrastructure in Cazenovia. The role of agencies such as the Madison County Soil and Water Conservation District and the Natural Resource Conservation Service will become increasingly important in the coming years because of their work with stream bank stabilization, erosion and sediment control, and stormwater management.

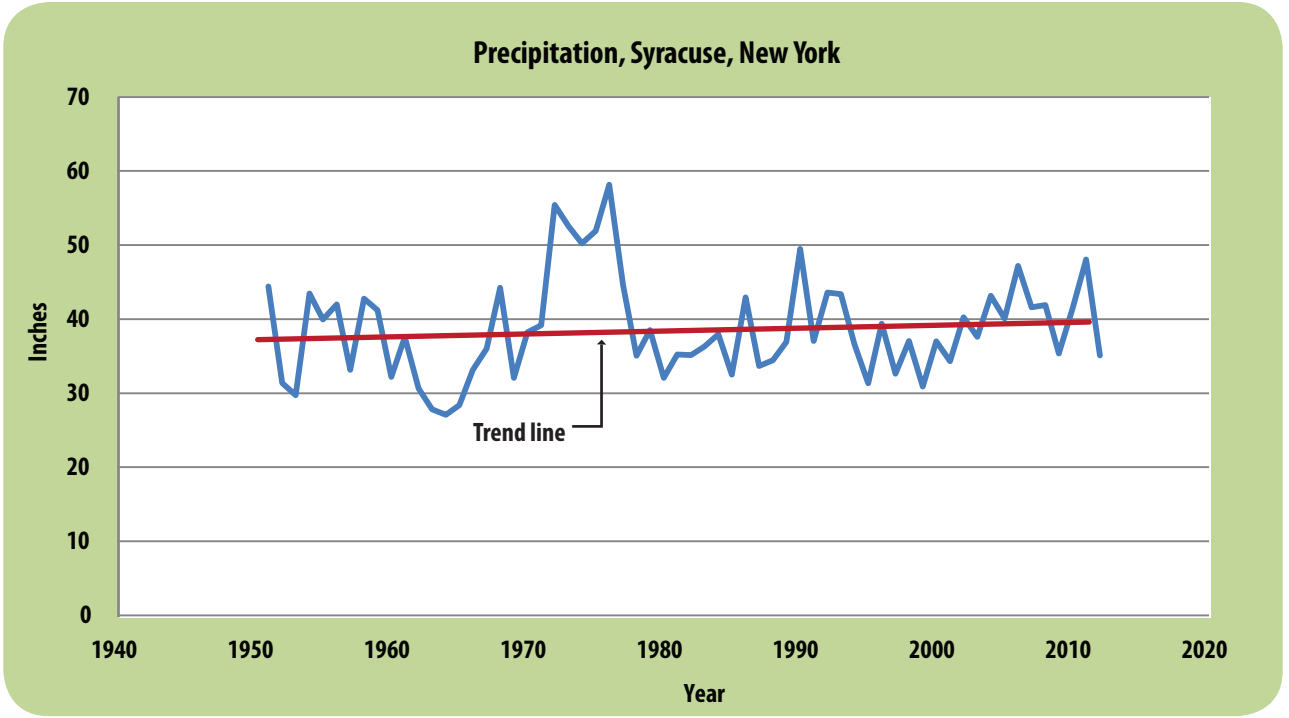


FIGURE 2- ANNUAL AVERAGE PRECIPITATION IN SYRACUSE, NEW YORK 1903-2008
SOURCE: NATIONAL WEATHER SERVICE FORECAST OFFICE

Incorporating green infrastructure and enhancing stormwater management will help Cazenovia to reduce the threat of flooding and erosion during storm events while improving the water quality in Cazenovia Lake and its tributaries. Green infrastructure is a cost-effective approach that can provide additional community benefits such as reduced energy use, mitigated climate change, improved wildlife habitat, and reduced infrastructure maintenance and replacement costs.

Flooding

Flooding is a growing concern throughout New York State, especially with the rise in urban development and subsequent impervious surfaces, and the increased frequency of storm events. Although some areas are more prone to flooding than others, there are no areas in the State that are completely exempt from flood hazards. There are over 52,000 miles of river and streams in New York State and along their banks there are 1,480 communities that are designated as flood prone. An estimated 1.5 million people live in these flood prone areas and many more work, travel through, or use recreational facilities located in these areas.

Flooding is influenced by the intensity and amount of precipitation, spring snowmelt, groundwater levels, and the presence of impervious surfaces and compacted soils from urban development. These conditions limit groundwater recharge and increase surface runoff and flooding. According to the Federal Emergency Management Agency (FEMA), floods have caused a greater loss of life and property, and have disrupted more people in the United States than the impact of all other natural hazards combined. FEMA reports that floods kill more people than any other form of severe weather with damages exceeding $3.5 billion annually. With the exception of fire, floods are the most prevalent and widespread of all natural disasters and approximately 75 percent of all presidentially declared disasters are the result of flooding.

The frequency of localized downpours in Central New York has increased over the past fifty years and this trend is expected to continue. Heavy precipitation events increase the potential for localized flooding and stormwater runoff. Heavy rain events also increase pollution loading to local waterbodies and can decrease the efficiency of wastewater treatment plants.

The term 'assessed value' refers to the dollar value assigned to a home or property by local government in order to calculate property taxes. According to tax parcel data from 2012, floodplain parcels represent 28% of total assessed value in the town and 22% of total assessed value in the village. Of the 3,316 land parcels in the town, 15% is located in FEMA flood zones (Tables 1 and 2).

Snowfall

The Town and Village of Cazenovia are influenced by lake effect snowfall which is caused by a differential between cold air temperatures and warmer water temperatures in Lake Ontario. As cold air flows over the warm water, the bottom layer of air over the surface of the water is heated from below. Since warm air is lighter and less dense than cold air, the heated air rises and cools. As it cools, the moisture from the lake condenses and forms clouds. When enough moisture condenses, snow bands develop over the region downwind of Lake Ontario. The greater the temperature contrast between the cold air and the warm water, the heavier the resulting lake effect snow fall will be. Central New York has experienced a 21.6% decrease in snowfall

TABLE 1- TOTAL ASSESSED VALUE (TAV) OF PARCELS INTERSECTING FLOOD PLAINS[1]

Municipality	TAV of Parcels Intersecting Flood Plain	# Acres of Parcels Intersecting Flood Plain	TAV of Municipality	TAV % Floodplain Parcels within the Municipality
Town of Cazenovia	170,338,407	568	598,938,350	28%
Village of Cazenovia	40,401,907	481	184,811,907	22%

1 Source: 2012 tax parcel data, Madison County

TABLE 2- PARCELS WITHIN 100-YEAR FLOODPLAIN[1]

Municipality	Parcels	Parcels in 100-Year Floodplain	% of Parcels in 100-Year Floodplain
Town of Cazenovia	3,316	508	15%
Village of Cazenovia	968	146	15%

1 Source: 2012 tax parcel data, Madison County

since 1950 (Figure 3). Because of the increased water temperature and reduced duration of ice cover on Lake Ontario, Cazenovia and other areas to the east and south of the lake will continue to experience heavier and more frequent lake-effect snowfall events.

Tourism

Weather has a significant impact on the tourism and recreation sectors in Central New York. Seasonal weather patterns, especially precipitation rates, determine lake water levels for boating, the rate of soil erosion, pollution loading of nutrients and sediment, snow cover for winter sports, and waterfowl breeding rates for sport hunting. Weather influences the duration and types of outdoor recreation activities that take place and plays a principal role in the local economic vitality.

Warming trends are anticipated to impact the region's outdoor recreation opportunities such as the length of the ski season at Toggenburg and may reduce recreational income generated for local retailers. Ski resorts are now focusing on year-round events as a way to adjust to the reduced snowfall during the winter months. In addition to the ski industry, New York State maintains 8,000 miles of snowmobiling trails that also contributes to the local economy.

Fishing and boating in Cazenovia Lake and along Chittenango Creek are popular water-based activities. Higher air temperatures and a shorter duration of winter ice cover may increase surface water temperatures, which will likely cause a gradual shift in coldwater fisheries. According to researchers at Cornell University, warming water temperatures may already be contributing to fish species modifications in Oneida Lake.

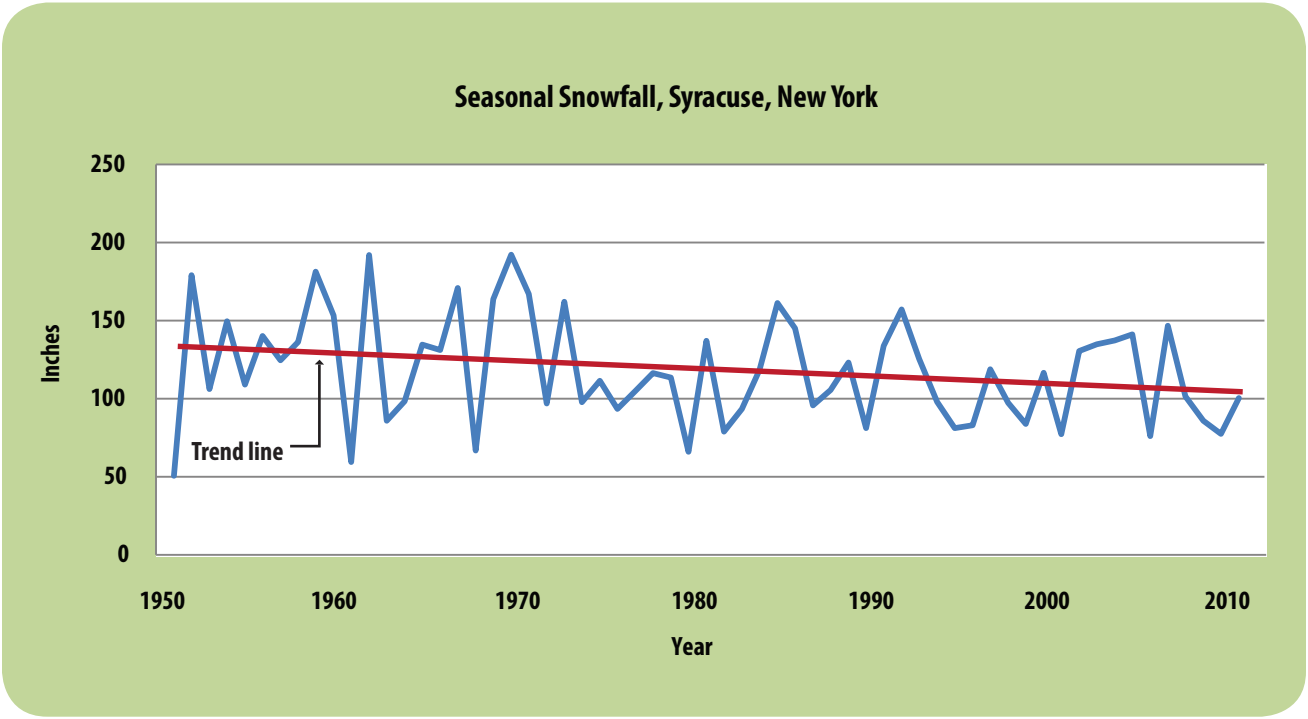


FIGURE 3- SEASONAL SNOWFALL IN SYRACUSE, NY, 1949-50 TO 2008-09
SOURCE: NATIONAL WEATHER SERVICE FORECAST OFFICE

The gradual warming trend is providing a longer growing season for agricultural crops and backyard gardens and is providing a boost to water-based summer recreation such as boating and swimming. However, the combined effect of warmer air and water temperatures and decreasing ice coverage will likely cause an increase in the growth of nuisance aquatic plants and algae in Cazenovia Lake.

Public Health

Projections of warmer winters, hotter summers, and unpredictable precipitation patterns are expected to increase certain types of diseases. An increase in the health conditions thought to be attributed to warming temperatures is being recorded in many parts of the United States. These conditions include, for example, an increase in illnesses and deaths from heat events, injuries and deaths from extreme weather events, and respiratory illnesses such as asthma due to changes in air quality. Climate change in the Northeast is expected to result in increased population rates of mosquitoes and ticks. As the populations of these insects increase, it could result in more frequent outbreaks of West Nile Virus and Lyme disease-causing bacteria.

According to researchers at Arizona State University using data from the Centers for Disease Control and Prevention, warm winters are often followed by severe and early outbreaks of the flu, which means that a warming climate may increase flu cases as well.[1]

1 http://currents.plos.org/influenza/article/climate-change-and-influenza-the-likelihood-of-early-and-

Invasive and Endangered Species

While insects and diseases are a natural part of the aquatic and terrestrial ecosystems, climate warming is thought to be causing a gradual shift in populations of invasive and native species. Some warm-weather species that previously could not survive cold temperatures are now able to establish themselves, threatening the populations of native species. Early detection and a rapid response of new infestations are the most effective ways that the Cazenovia community can address this problem.

The Hemlock Woolly Adelgid, Asian Longhorn Beetle and Emerald Ash Borer are invasive tree pests that pose a threat to Central New York. They have the potential to damage local tree populations and the communities and industries that rely on them. The destruction of hemlock in New England forests affects recreational activities such as fishing. As pests kill trees adjacent to streams, shade is no longer provided and stream water temperatures increase beyond what is ideal for coldwater fish such as trout.

The term "endangered species" refers to at-risk populations such as the ovate amber snail. Chittenango Falls State Park, located on Route 13 in Cazenovia, is the only known site for the snail. An area within the park is sectioned off to protect it from human impacts, but continued monitoring of the population is needed to determine if the snail is influenced by warming temperatures.

severe-influenza-seasons-following-warmer-than-average-winters/

Stone Quarry Art Park, Cazenovia

Vendor at Farmer's Market

COMMUNITY CHARACTERISTICS

There is a growing acknowledgement by scientists and policy analysts that a substantial part of the global warming challenge may be met through the design and development of cities and towns. The form and function of human settlements can either reduce or increase the demand for energy, and can also influence how energy is produced, distributed, and used. Planning and urban design measures can substantially reduce the number and distance of vehicle trips by organizing human activity in compact communities with a range of housing types, providing reliable transit to and from employment, and placing services within easy walking distance of home.

Hiking on Fairchild Hill, Cazenovia

Land Use

Municipalities often approach emission reduction goals by focusing on land use planning and redevelopment. In city environments, it is possible to develop efficient heating and cooling systems (district energy systems) by using the critical mass of buildings and activities. This approach shows great promise in reducing the carbon footprint of urban development. Other energy conservation benefits may result from common-wall and vertical living structures found in multifamily city locations.

Urban design in smaller communities such as Cazenovia focus instead on opportunities for green infrastructure to reduce stormwater runoff and heating/cooling costs, and to support local food production and farmers markets to reduce shipping, storage, and packaging costs. These and other strategies that make use of land use and transportation alternatives could contribute significantly to overall GHG mitigation.

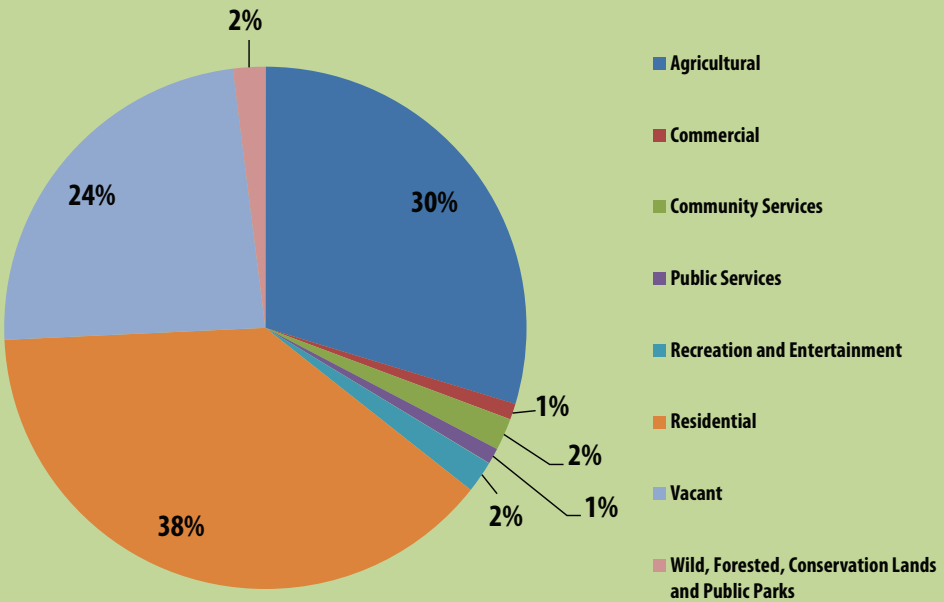
39% of the land in the town and village is classified as residential and 30% is classified as agricultural. Additional land use categories are summarized in Figures 4 and 5.

Transportation

Many scientists and policy analysts believe that a substantial part of the global warming challenge can be met through a change in the design of cities and towns and that municipalities are able to reduce the demand for energy by influencing how it is produced, distributed, and used. Urban planning, for example, can reduce the number and distance of vehicle trips by designing compact communities with reliable transportation to and from employment, and by placing services within easy walking distance from home. Research has shown that miles driven are reduced by between 20 and 40 percent in compact urban development compared to miles driven in the auto-dependent suburbs that have prevailed in North America since the Second World War. Transportation contributes about 33 percent of energy-related greenhouse gas (GHG)

National studies show that a GHG reduction of up to ten percent may result from a change in land use approach alone, and additional reductions will result from employing other strategies such as investments in transit, encouraging development around transit stops, and parking charges. By one estimate, approximately two-thirds of all development in the nation by 2050 will be new or will have been redeveloped since 2007, suggesting that combined land use and transportation strategies could be quite influential in mitigating the increases in GHGs.

FIGURE 4- CAZENOVIA LAND USE TYPES



production in the United States, and single-occupant automobile travel makes up about half of that activity.

Most vehicles burn carbon fuels and are expected to continue to do so for some time, even with aggressive fuel substitution and efficiency measures. Strategies that reduce travel by encouraging compact, walkable, full-spectrum home and working environments therefore have the potential to make a significant contribution to overall climate change mitigation.

Commuting to work: The way that land uses and transportation infrastructure are developed within a community influences whether residents choose to walk, bike, drive, or use public transit. These travel choices directly affect the amount of transportation-

TABLE 3- COMMUTE TIMES TO WORK FROM CAZENOVIA AVERAGE 2006-2010[1]

Commute Time to Work	Number of Workers	Percentage
Less than 15 minutes*	885	34%
15-29 minutes	480	18%
30-59 minutes	1,135	43%
60-89 minutes	65	2%
90+ minutes	45	2%
TOTAL	2,610	100%

1 Source: CTPP 2006-2010

*Note: This data does not include people who work at home.

TABLE 4- TRANSPORTATION TO WORK IN CAZENOVIA 2008-2010[1]

Transportation to Work	Number of Workers	Percentage
Car, truck, van - drove alone	2,304	80%
Car, truck, van - carpooled	190	7%
Public transportation (excluding taxicab)	0	0%
Walk to work	105	4%
Worked from home	277	10%
Taxicab, motorcycle, bicycle, or other means	15	1%
TOTAL	2,891	

1 Source: American Community Survey

related GHG emissions that are produced. Single-passenger automobile trips to and from Cazenovia generate substantially more GHG emissions per mile than if public transit or carpooling were used. 43% of the workers that commute to areas outside of Cazenovia spend between 30 and 59 minutes traveling to their jobs. Commute times to work from Cazenovia is presented in Table 3.

According to the American Community Survey an average of 2,891 Cazenovia residents were employed between 2008 and 2012. Of the total number that drove vehicles to their jobs, approximately 80% drove alone and 7% carpooled. 4% walked to work, 1% biked or used taxi, motorcycle or other means, and 10% worked from home (Table 4). Single-passenger automobile trips constituted the vast majority of trips. Carpooling, ridesharing, and similar efforts to reduce vehicle traffic will help to reduce greenhouse gas emissions. In addition, preparation of a commuting analysis would help determine the need for organized carpooling opportunities.

Many employed residents in Cazenovia (36%) work in the town or village. Others commute to nearby municipalities such as Syracuse (19%) and Dewitt (12%). The average commuting destinations and percentages are summarized in Table 5.

Examining existing land use patterns and transportation infrastructure provides insight into ways a community can reduce GHG emissions. Factors most directly influencing travel behavior include diversity of uses,

FIGURE 5- CAZENOVIA LAND USE

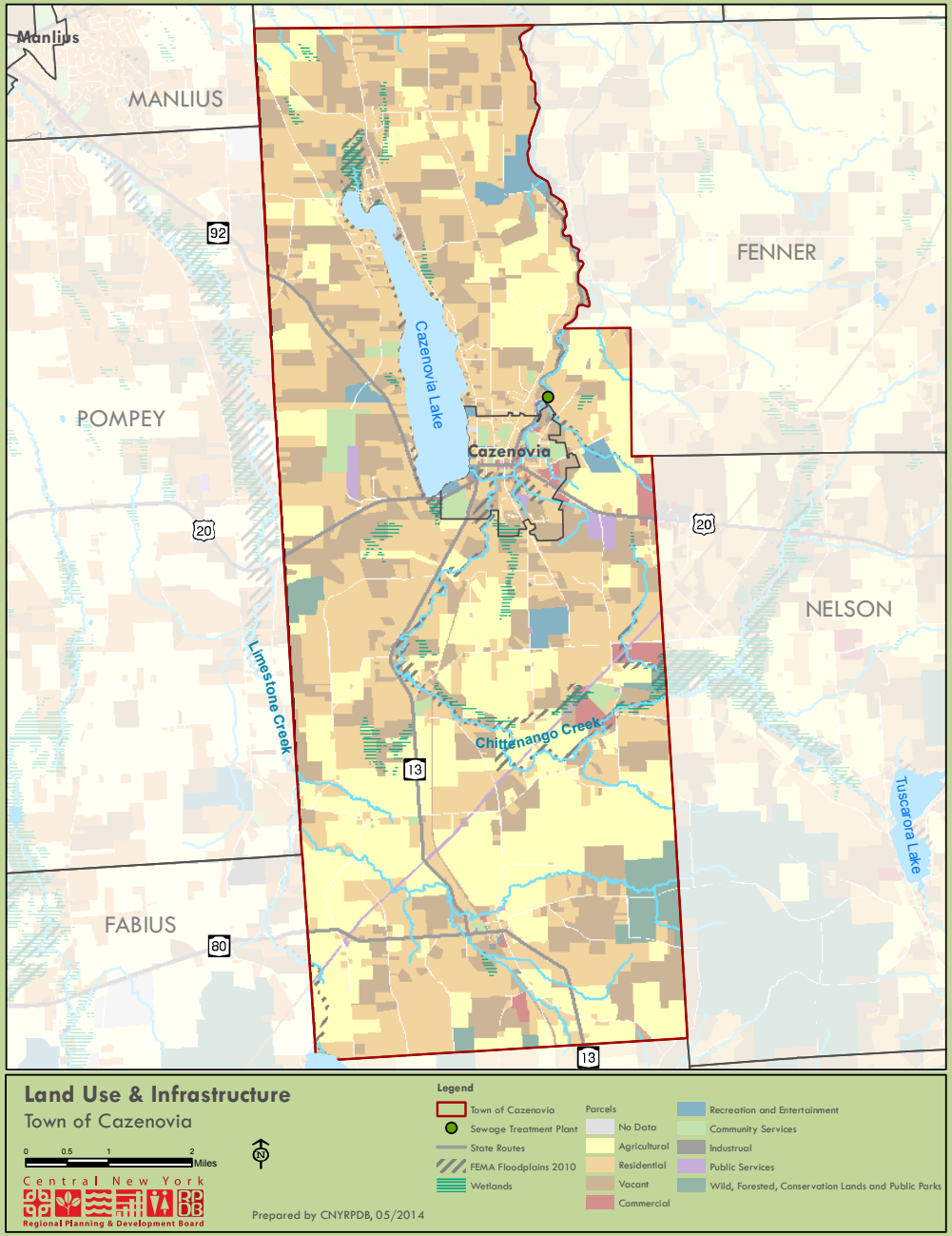


TABLE 5- CAZENOVIA EMPLOYMENT DESTINATIONS 2006-2010 AVERAGE[1]

Destination	Average number of residents commuting to destination	Percentage
Other	372	13%
Sullivan (T) Madison County	50	2%
Salina (T) Onondaga County	55	2%
Oneida (C) Madison County	70	2%
Nelson (T) Madison County	75	3%
Cicero (T) Onondaga County	80	3%
Eaton (T) Madison County	85	3%
Manlius (T) Onondaga County	120	4%
DeWitt (T) Onondaga County	350	12%
Syracuse (C) Onondaga County	545	19%
Cazenovia (T/V)	1,020	36%
TOTAL	2,822	100%

1 Source: American Community Survey

Research has shown that per capita energy consumption and GHG emissions are 2 to 2.5 times higher in low-density developments than in high-density areas.

and the jobs/housing ratio was approximately 0.9. This demonstrates that there were slightly more households than job opportunities in the community.

Proximity of uses: Proximity of uses refers to the distance between neighborhood commercial services and residents' homes. Two methods were used to evaluate the proximity of residences to commercial uses in Cazenovia and to support the recommendations in the Climate Action Plan. The first measured proximity of residences to commercial centers and the second measured proximity of residences to neighborhood services.

Proximity to commercial centers: This method examined how many residential parcels are located within ¼ mile of commercial districts. This provided insight into the effectiveness of the community's existing zoning and land use pattern from the pedestrian perspective. Although some residential portions of Cazenovia are distant from commercial services, overall, the existing land use pattern creates many opportunities for pedestrian and bicycle travel. Of the 2,277 total residential parcels, 790 (34.7%) are located within ¼ mile of a commercial parcels.

Proximity to neighborhood services: The second method of proximity analysis identified eleven categories of neighborhood services (schools, libraries, drugstores, grocery stores, medical facilities, post offices, nursery schools, parks, nursing homes, hardware stores, and restaurants), mapped the locations of these services within Cazenovia, and then examined how many of these distinct uses are within a ¼ mile walking distance of individual residential parcels. The analysis determined that 30% of the residential parcels are located within ¼ mile of three or more amenities. Residents with low levels of pedestrian access to neighborhood-

serving uses are more likely to drive to purchase their daily goods and services.

Density: Density refers to the number of housing units, people, or jobs in a given area. Higher densities refer to an increased number of services, shops, schools, and public buildings located within a neighborhood which increases the availability of transit and pedestrian infrastructure. These conditions tend to reduce the need for vehicle ownership and increase the use of alternative modes. Residential density is normally measured in terms of housing units per acre. Cazenovia has a relatively high to moderate residential density (Table 6).

Infill development refers to the use of vacant land within a built-up area for additional construction. This term is often associated with community redevelopment or growth management programs or as a component of smart growth. Infill development focuses on the reuse of underutilized buildings and sites where buildings are constructed on vacant property or between existing buildings. 24% (7,471 acres) of the land in Cazenovia is classified as vacant. Potential opportunities for infill development should be evaluated, especially along the eastern and southern border of the town.

Pedestrian and bicycle conditions: Well-developed pedestrian and bicycle infrastructure and pedestrian-friendly design are essential if walking and biking are to be important travel modes in a community. Highly connected sidewalks and bicycle infrastructure reduce travel distances between destinations and improve access and safety. Pedestrian and bicycle infrastructure refers to sidewalks,

Chittenengo Creek

TABLE 6- RESIDENTIAL DENSITY IN THE TOWN OF CAZENOVIA
(2010 AND 2013 DATA, INCLUSIVE OF VILLAGE)

Number of residential parcels in the community	2,277
Single-family residential parcels	2,155
Single-family residential density (the number of single-family parcels divided by the acreage of all residential parcels)	0.19
The average residential density (houses per acre)	0.08
Number of two and three-family (multiple-residential) parcels	59
Average density of multiple-residential parcels	1.9 units/acre
Number of parcels with apartment buildings	21
Density of apartment buildings	0.69 buildings/ acre
Percent of residential land use that is classified as low-density	70%
Percent of residential land use that is classified as medium-density	29.5%
Percent of town's residential land use that is classified as high-density	0.5%
Most populated area	Cazenovia College campus

Canoeing on Cazenovia Lake

crosswalks, traffic calming devices, bike lanes, and racks/storage facilities.

Cazenovia has a well-connected and complete network of sidewalks and their overall condition is considered by most to be acceptable. The town and village have maintenance and replacement responsibility for the sidewalks that are located along municipally-owned properties. The remaining sidewalks in the community are the responsibility of the landowners along whose frontage the sidewalk is located. Occasional problems arise when the sidewalks become unsafe and impassible due to snow accumulation. In severe cases, poorly maintained walkways cause people to walk in the roadway.

Striped crosswalks are present on in the village shopping areas and on streets near the schools. 6 pedestrian accidents and 7 bicycle collisions were reported between January 1, 2002 and December 31, 2011. The highest concentration of pedestrian and bike accidents (most incidents at any one point) occurred along Albany Street.

The Cazenovia Area Community Development Association, Inc (CACDA) has selected bicycling as its annual signature project for 2014. The intent of their BikeCaz program is to elevate the community's visibility as a cycling destination. They hope to install new bike racks around the village and assess local roads and businesses to determine which ones are bicycle-friendly.

Transit accessibility: The Madison Transit System maintains a limited bus service along four routes in Madison County each weekday. The County Planning Department oversees the service which is operated by Birnie Bus. One of the routes includes Cazenovia but there is no bus route that transports people between Cazenovia and Syracuse. Cazenovia College provides transportation for their students to the airport and to the bus and train terminals in Syracuse during weekends and holidays. Transportation is also provided to shopping

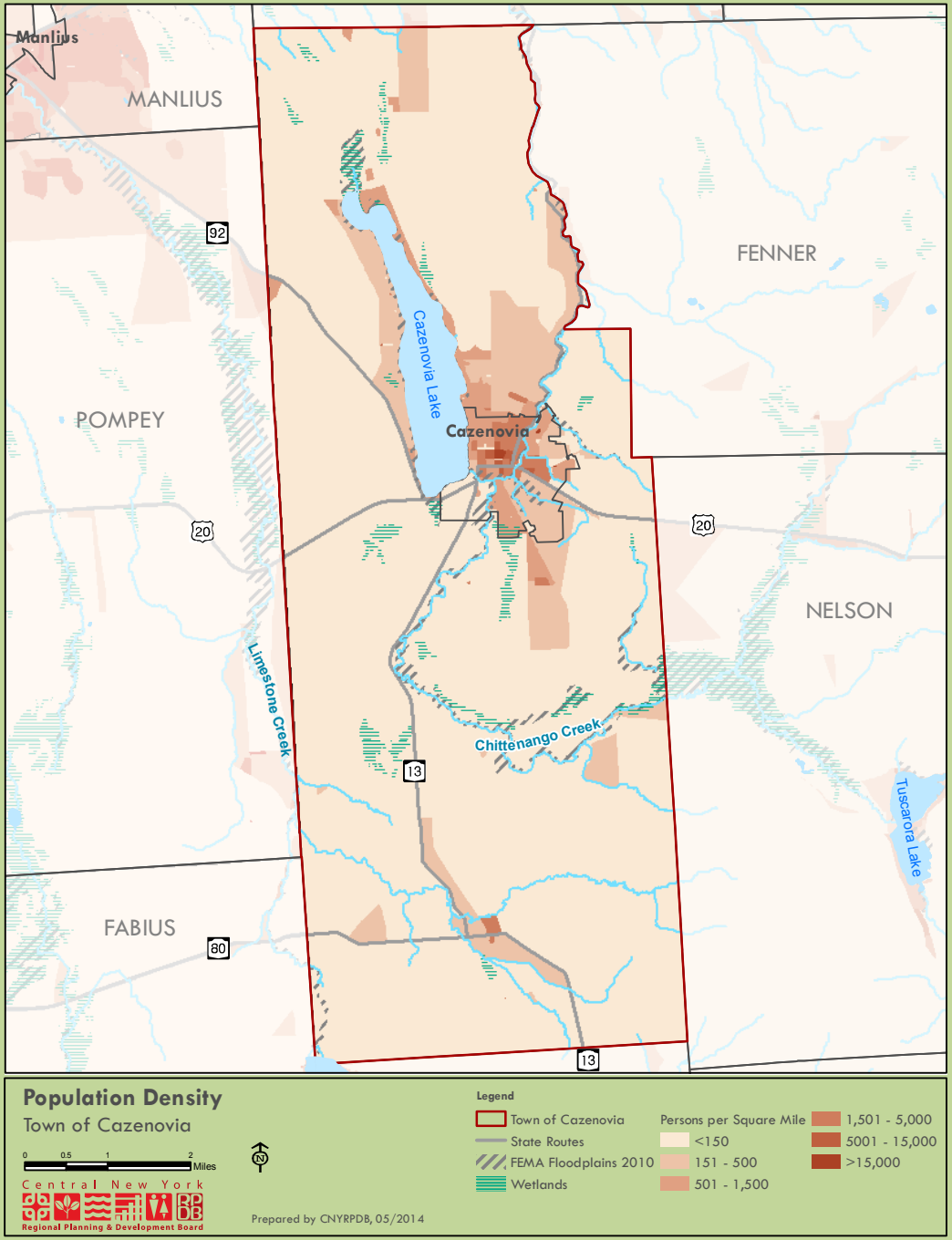
Urban design research demonstrates that most people will walk to destinations that are within ¼ mile or a 5-minute leisurely walk. Neighborhoods are considered to be pedestrian-friendly if residents' homes are within ¼ mile of a diverse array of commercial and civic uses.

areas (Fayetteville Town Center and Destiny USA) several days throughout the week. Options for bus routes between Cazenovia and Syracuse should be re-evaluated, along with opportunities for carpooling and ridesharing.

Parking: This category refers to the supply, price, and regulation of parking facilities in a community. Inexpensive and abundant parking increases automobile ownership and use. Large parking lots also reduce walking and public transit convenience and use. Limiting the availability of parking spaces and imposing fees in city environments can reverse this condition by reducing the number of cars on the road and increasing use of alternative modes of transportation. This strategy isn't relevant for small communities such as Cazenovia where parking upgrades have been implemented such as the new parking lot near the post office containing a few metered spaces and additional parking for business owners, shoppers, students and visitors that is now available in back of the public library. Limiting parking availability would also be counter-productive to Cazenovia's tourism goals.

Streetscape design: Streetscape design refers to the scale and design of streets, sidewalks, and adjacent uses. Urban design research demonstrates that people walk more and drive less in pedestrian-oriented commercial districts than in automobile-dominated commercial centers. Street designs that reduce vehicle traffic speeds, improve walking and cycling conditions, and enhance the pedestrian experience encourage use of alternative modes. Cazenovia has installed creative pedestrian-friendly design features such as street trees, benches, decorative street lights, and pedestrian crossings.

FIGURE 6- CAZENOVIA POPULATION DENSITY



Greenhouse Gas Inventory Summary: Town of Cazenovia

As part of the Climate Change Innovation Program, an inventory of the town's municipal and community greenhouse gas (GHG) emissions was conducted in 2013 with the assistance of a student team from the State University of New York College of Environmental Science and Forestry and with additional oversight and technical review by CNY RPDB staff. The 2013 inventory report examined emissions generated in the Town of Cazenovia in 2010, which serves as the baseline year for the Climate Action Plan.

The inventory report found that in the 2010 base year, town municipal operations generated a total of 469 metric tons of carbon dioxide equivalent ($MTCO_2e$), which were broken up into 4 sectors: buildings and facilities (97 $MTCO_2e$, 21%), streetlights and traffic signals (5 $MTCO_2e$, 1%), vehicle fleet (357 $MTCO_2e$, 76%), and water districts (10 $MTCO_2e$, 2%).

Community emissions totaled 41,092 $MTCO_2e$, which were broken up into 5 sectors: residential (14,458 $MTCO_2e$, 35%), commercial (4,598 $MTCO_2e$, 11%), industrial (288 $MTCO_2e$, 1%), transportation (21,191 $MTCO_2e$, 52%), and wastewater treatment (557 $MTCO_2e$, 1%).

The Town of Cazenovia's Climate Action Plan uses the data gathered in the 2013 GHG inventory report as a baseline for analyses to determine which energy efficiency strategies will be most effective. The strategies presented in this document are based on goals that will help Cazenovia to reduce emissions, energy use, and dollars spent on municipal and community operations by the year 2025.

1 $MTCO_2e$ =

- CO_2 emissions from 112 gallons of gasoline consumed
- CO_2 emissions from 2.3 barrels of oil consumed
- CO_2 emissions from 41.7 propane cylinders used for home barbeques
- Carbon sequestered by almost 1 acre of U.S. forests in one year

FIGURE 7- TOWN OF CAZENOVIA MUNICIPAL EMISSIONS BY SECTOR $MTCO_2E$ (2010 BASELINE)

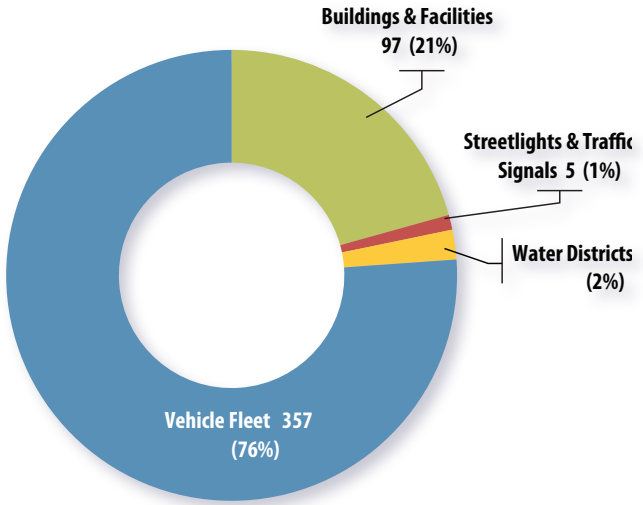


FIGURE 8- TOWN OF CAZENOVIA COMMUNITY EMISSIONS BY SECTOR $MTCO_2E$ (2010 BASELINE)

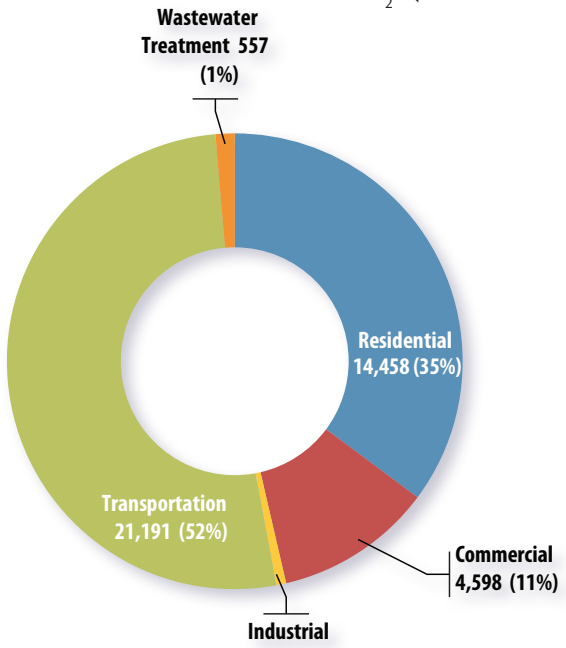
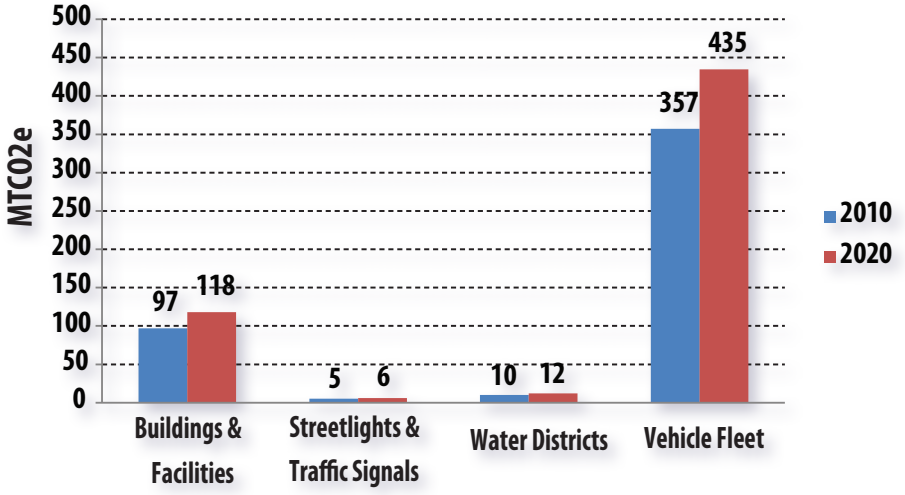


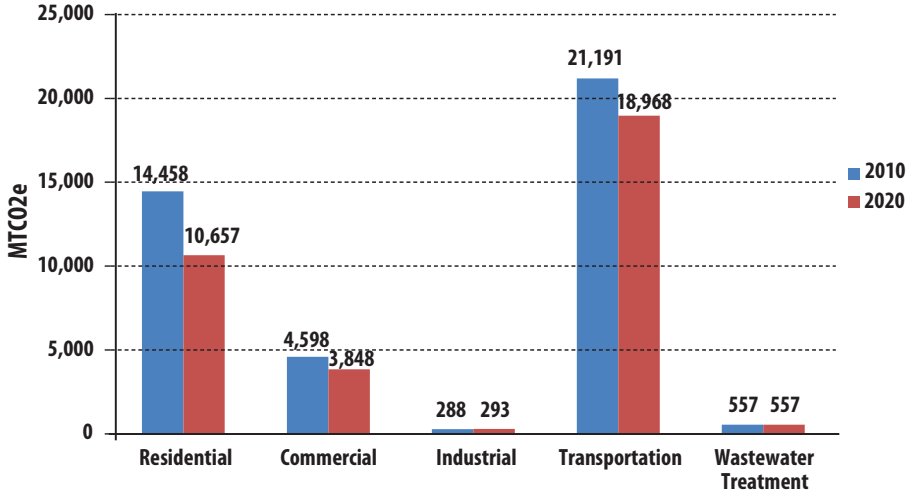
FIGURE 9- EMISSION FORECAST:
MUNICIPAL OPERATIONS



The GHG inventory report forecasted emissions for the Town of Cazenovia in 2020. The report explained that town government emissions were expected to total 571 $MTCO_2e$ in 2020, with a 21 $MTCO_2e$ increase in buildings and facilities emissions, a 1 $MTCO_2e$ increase in streetlights and traffic signals, a 2 $MTCO_2e$ increase in water districts, and a 78 $MTCO_2e$ increase in vehicle fleet emissions.

The community forecast showed only slight changes, and were expected to total 34,323 in 2020, with a 3,801 $MTCO_2e$ decrease in the residential sector, a 750 $MTCO_2e$ decrease in the commercial sector, a 5 $MTCO_2e$ increase in the industrial sector, and a 2,223 $MTCO_2e$ decrease in the transportation sector.

FIGURE 10- EMISSION FORECAST:
COMMUNITY



Greenhouse Gas Inventory Summary: Village of Cazenovia

As part of the Climate Change Innovation Program, an inventory of the village's municipal and community greenhouse gas (GHG) emissions was conducted in 2014 with the assistance of a student team from the State University of New York College of Environmental Science and Forestry and with additional oversight and technical review by CNY RPDB staff. The 2014 inventory report examined emissions generated in the Village of Cazenovia in 2011, which serves as the baseline year for the Climate Action Plan.

The inventory report found that in the 2011 base year, village municipal operations generated a total of 234 metric tons of carbon dioxide equivalent ($MTCO_2e$), which were broken up into 4 sectors: buildings and facilities (61 $MTCO_2e$, 26%), streetlights and traffic signals (26 $MTCO_2e$, 11%), vehicle fleet (138 $MTCO_2e$, 59%), and water delivery facilities (9 $MTCO_2e$, 4%).

Community emissions totaled 16,445 $MTCO_2e$, which were broken up into 4 sectors: residential (6,070 $MTCO_2e$, 37%), commercial (6,150 $MTCO_2e$, 37%), transportation (3,890 $MTCO_2e$, 24%), and solid waste (335 $MTCO_2e$, 2%).

Cazenovia's Climate Action Plan uses the data gathered in the 2014 GHG inventory report as a baseline for analyses to determine which energy efficiency strategies will be most effective. The strategies presented in this document are based on goals that will help Cazenovia to reduce emissions, energy use, and dollars spent on municipal and community operations by the year 2025.

FIGURE 11- VILLAGE OF CAZENOVIA MUNICIPAL EMISSIONS BY SECTOR $MTC0_2E$ (2011 BASELINE)

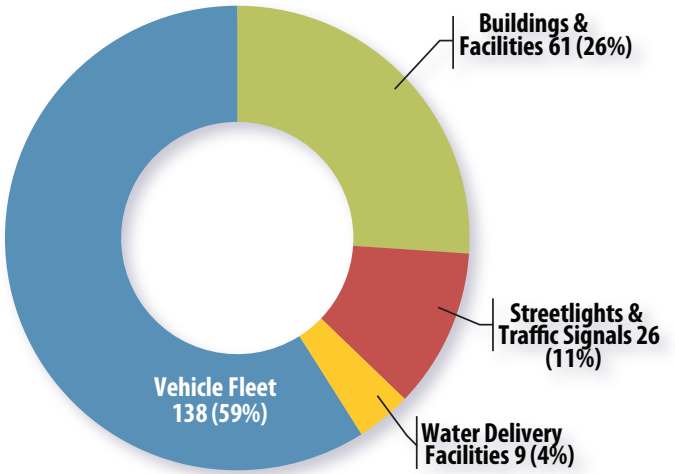


FIGURE 12- VILLAGE OF CAZENOVIA COMMUNITY EMISSIONS BY SECTOR $MTC0_2E$ (2011 BASELINE)

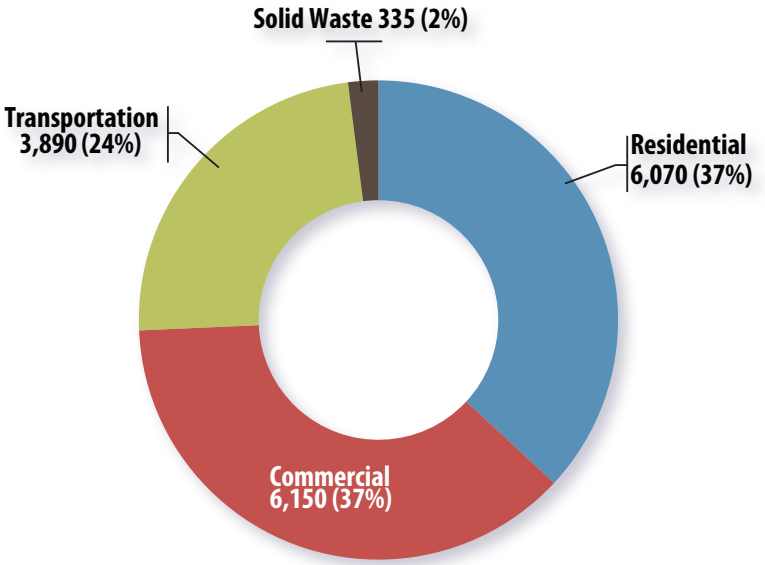
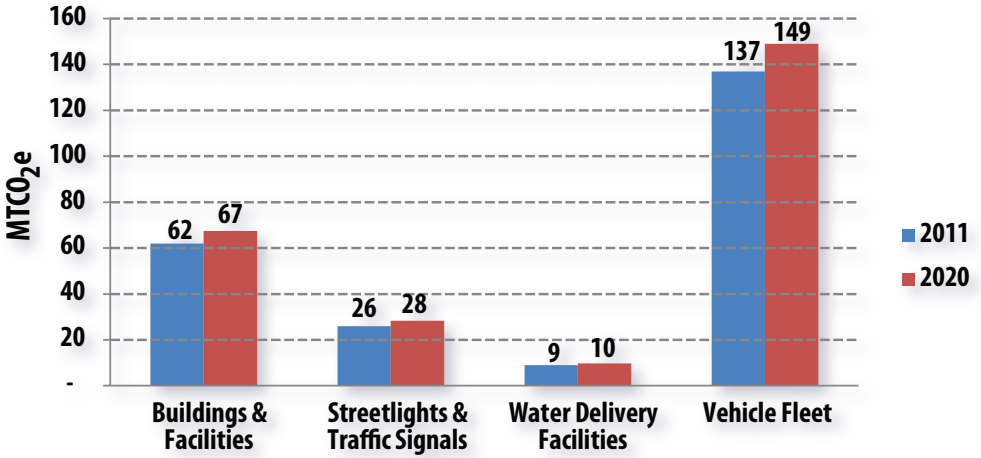


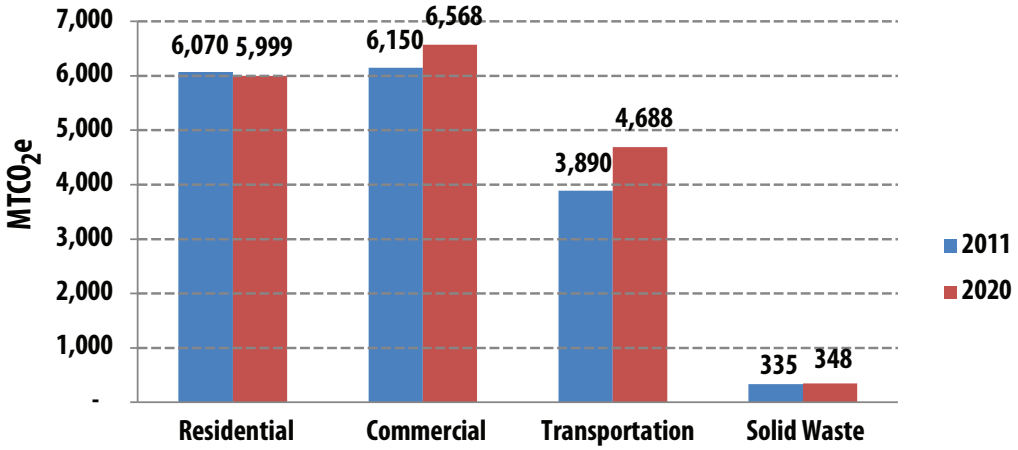
FIGURE 13- EMISSION FORECAST:
MUNICIPAL OPERATIONS



The GHG inventory report also forecasted emissions for the Village of Cazenovia in 2020. The report explained that village government emissions were expected to total 254 $MTCO_2e$ in 2020, with a 5 $MTCO_2e$ increase in buildings and facilities emissions, a 2 $MTCO_2e$ increase in streetlights and traffic signals, a 1 $MTCO_2e$ increase in water delivery, and a 12 $MTCO_2e$ increase in vehicle fleet emissions.

The community forecast showed only slight changes, and were expected to total 17,603 in 2020, with a 71 $MTCO_2e$ decrease in the residential sector, a 418 $MTCO_2e$ increase in the commercial sector, a 798 $MTCO_2e$ increase in the transportation sector, and a 13 $MTCO_2e$ increase in the solid waste sector.

FIGURE 14- EMISSION FORECAST:
COMMUNITY



Climate Action Accomplishments

The Cazenovia community and county planners have been pro-active in reducing greenhouse gas emissions and adapting to climate change. The town and village have joined more than 140 other municipalities in New York State that have signed municipal resolutions to become Climate Smart Communities. The town participated in energy audit program in 2010 and has been working on a utility sponsored lighting retrofit with upgrades. The list below provides a brief summary of several additional initiatives that protect the community against storm events, excessive heat, and other climate influences.

Town, Village, and County

Several important documents have been produced by the Cazenovia community in recent years. A Comprehensive Plan for the town and village was written in 2008 and Greenhouse Gas Inventories were compiled for the town in 2013 and the village in 2014. Environmental and sustainability issues and goals are also found in additional publications such as the Town of Cazenovia's Land Use Guide that was completed in 1984, the Village of Cazenovia Comprehensive Plan that was written in 1991, the Cazenovia Area Planning Project (CAPP) that was compiled in 2002, and the Madison County Agriculture and Farmland Protection Plan that was completed in 2005. These documents are available on the town and village websites.

The Town of Cazenovia has also inserted stormwater diversion ditches along town highways and converted gravel and salt mixtures to brine for deicing of roadways to reduce stormwater runoff and pollutants from entering creeks and the lake. The town and village also have site plan review regulations that restrict the amount of impervious surfaces to protect the lake watershed from harmfull effects of stormwater runoff.

In 2013, the Cazenovia League of Women Voters participated in an energy conservation program called the CNY Energy Challenge. Participants met on a regular basis to learn about the science and sources of energy. They learned how to read home energy meters and used equipment to measure the energy use of home appliances. After implementing measures to reduce electricity, heating, and cooling expenses, they finished the program with free home energy audits provided by NYSERDA.

Cazenovia Central School District

Cazenovia Central School District has been working on climate adaptation for several years. The District covers 112 square miles and the furthest pick-up point is a 50-minute ride, about 10 miles away from school. About 50% of the students ride the bus, 5% drive, 35% are dropped off, and about 10% walk. The following list of actions to reduce energy use in the District was compiled during conversations with David Hazer (Superintendent of Buildings and Grounds) and Karen Cowherd (Transportation Supervisor).

Vendor at Farmer's Market

+ New hot water tanks were installed. Demand-style hot water units are at the high school. Hot water tanks will be upgraded at the middle and elementary schools in 2015.
+ Insulation, ventilation, and lighting (LED/T8) upgrades have been installed at the high school;
+ Energy upgrades within the District have cut costs by $100,000 on energy bills.
+ Daylight harvesting has been installed in the classrooms. Daylight harvesting systems use daylight to offset the amount of electric lighting needed to light a space. This method, used to reduce energy consumption, is accomplished by using lighting control systems that are able to dim or switch electric lighting in response to changing daylight availability.
+ The District has undergone several energy audits. The auditors have said there is not much left to do that would make sense because payback period would be too long.
+ Lighting upgrades are planned for the Burton Street gym.
+ HVAC upgrades are planned during the summer of 2015 at which time 250 units will be updated with new water-source heat pumps.
+ The boilers will be upgraded in 2015. They are currently operating at 82% efficiency. The upgrade will improve this to 90-92% efficiency.
+ The District is evaluating options for renewable (solar and wind) installations.
+ The District uses diesel buses that have a five-minute idling policy - after idling for five minutes the buses turn off.
+ There are opportunities to improve recycling and waste management, but additional staff is needed for implementation and maintenance.
+ Energy efficient lighting retrofits were installed at the bus garage.

Vendors at Farmer's Market

Cazenovia College

In 2010, Cazenovia College President Dr. Mark Tierno joined nearly 700 other academic institutions throughout the nation by signing the American College and University Presidents' Climate Commitment (ACUPCC). ACUPCC member institutions recognize the negative effect that global warming has on the climate and environment and are committed to "reducing the impact of their institutions and to educating current and future generations about the important roles they must play as conservators and educators in determining our environmental future."

As part of the ACUPCC commitment, Cazenovia College identified the following goals:

+ Create and maintain institutional structures to plan and guide the implementation of sustainability actions
+ Complete a comprehensive emissions inventory (Greenhouse Gas or GHG Inventory)
+ Within two years of signing, develop a plan to become carbon-neutral (Climate Action Plan)
+ Take immediate action to reduce greenhouse gas emissions
+ Integrate sustainability into Cazenovia's curriculum
+ Assure public availability of information about the college's sustainability plans and progress

After signing the ACUPCC commitment, the College then hired EYP Architecture and Engineering PC in 2011 to compile a campus Greenhouse Gas Inventory and a Climate Action Plan. The Greenhouse Gas Inventory and supporting emissions data are found at http://rs.acupcc.org/ghg/2183/. The report states the following:

Upon review of the greenhouse gas inventory results it is clear that campus electrical consumption comprises 56% of combined Scope 1 and 2 emissions. Clearly this indicates that either reducing electrical consumption and/or purchasing electricity from cleaner sources should be the focus of any carbon reduction strategies.

Scope 1 emissions are also a significant contributor to the campus carbon footprint. There are three components to this emission category: oil, natural gas, and fleet fuel. Of the three, natural gas comprises the largest GHG component at 80%. Fuel oil follows at 20% and the emissions resulting from diesel fuel for the campus fleet is a negligible.

Any effective climate action plan follow up should focus its efforts primarily on electrical and natural gas consumption with less emphasis on fuel oil and fleet vehicle related initiatives.[1]

The Climate Action Plan was adapted in January 2012 and set a climate neutrality target year of 2050. Recommendations in the Plan are presented in two categories. Phase I includes no cost/low-cost measures such as elimination of hot water in non-residential lavatories, implementation of a "plug load" policy to restrict use of items such as space heaters and desk lamps, and adjusting temperature settings during warm and cool weather. Phase II includes intermediate measures such as implementation of boiler and chiller controls to optimize boilers, pumps and HVAC equipment efficiencies, and replacing deteriorated windows in campus buildings. A full listing of Phase I and II recommendations along with recommendations for the dining services are available on the College website.

1 Cazenovia College Climate Action Plan, EYP, July 11, 2011

Hiking trail, Cazenovia

The College has implemented a policy to purchase Energy Star certified products for new and replacement appliances and equipment and currently purchases 6.5% of their electricity needs from renewable sources through their supplier. 192 solar panels have been installed on campus buildings on Park and Watts Halls. which have the capacity of producing up to 30 kW of electric power. To date, the production has yielded146 MWh, reducing emissions by 88 tons of CO_2. The College has also worked with Eastern Energy Solutions and National Grid to upgrade campus lighting with new energy efficient lighting lamps and fixtures, including T-8 lamps and LED bulbs throughout campus dorms, classrooms, and offices, along with new arena and athletic high bay lighting. New buildings at Cazenovia College are also being built with energy efficiency and green building practices in mind.

The College has also entered into an agreement with "Ground Effects," a landscaping construction firm, which picks up and recycles manure produced at the College's equine facility. The manure is repurposed into mulch and compost that is used in various landscaping products.

The College has installed diversion ditches near the equine facility to reduce effects of stormwater runoff. The athletic field's synthetic turf also helps to control stormwater runoff and includes a sheet drain perimeter collector along with a sub-base underdrain retention system to reduce the flow rate to the existing retention pond facilities and subsequent release to area streams.

The College has a student-run Conservation Club and an Environmental Studies academic program. Recycling programs are also in place at select locations throughout the campus. Cazenovia College is also working on plans to make sustainability a part of the curriculum for its students. A student Sustainability Club was formed in 2011 and students currently monitor the solar energy that is generated by the roof-top solar panel system. The College also received a Tree Campus USA award and students assist with campus tree maintenance.

Cazenovia College was a lead sponsor of the Green Living Conference in 2012 and their energy goals were integrated with the Cazenovia's Comprehensive Plan. The College has supported the Energy Symposium, which draws state-wide attendees and is exploring ways to buy more local products in order to reduce trucking. They hope to partner with local company to reuse manure generated at College Farm and plan to involve students in a composting project in collaboration with Dining Services.

Hazard Mitigation

The Madison County Multi-Jurisdictional Hazard Mitigation Plan was updated in 2004 with assistance from national, state and local agencies. By identifying vulnerabilities and assessing local risks, the county increased its capacity for hazard avoidance and mitigation. Recommendations included in the plan are designed to protect human health and reduce potential impacts on infrastructure.

Madison County Citizen Corps Council

The Madison County Citizen Corps Council identifies vulnerable populations and formulates plans to assist them in the event of an emergency. Membership in the Council includes Retired Senior Volunteer Program (delivers Disaster Preparedness Kits to vulnerable populations), Madison County Office for the Aging, County Health Department, County Office of Disaster Preparedness, the Alzheimer's Association, The Red Cross, and the Salvation Army. In the event of a long-term power failure or other disaster, the County Office of Emergency Preparedness contacts local fire departments to request that they check on at-risk individuals.

New York State Citizen Preparedness Corps

The New York State Citizen Preparedness Corps is a program available to Madison County residents that provides tools and resources to help citizens prepare for emergencies and disasters, respond accordingly, and recover as quickly as possible to post-disaster conditions. Governor Cuomo, Senator Valesky, Assemblyman Magee, Madison County Board of Supervisors Chairman Becker, and Oneida Mayor Smith sponsored training for this program in Madison County during 2014.

Parade, Cazenovia

Climate Adaptation vs. Mitigation

According to climate researchers, continued emissions of greenhouse gases will cause further warming with changes anticipated in all components of the global ecosystem. Reducing the rate of climate change will require substantial and sustained decrease of greenhouse gas emissions. These are the key conclusions from an assessment by the Intergovernmental Panel on Climate Change (IPCC) that was released in January 2014. 259 scientists from 39 countries around the world further stated that, "Warming of the climate system is unequivocal and since the 1950s, many of the observed changes are unprecedented over decades to millennia."

Human intervention to reduce the rate or extent of climate change can be accomplished in two ways: by avoiding the potential consequences through emissions reduction (referred to as **mitigation**), or making changes to adjust to climate impacts that are unavoidable (referred to as **adaptation**).

View of Cazenovia Lake

Mitigation Strategies

The mitigation recommendations that are found in this Climate Action Plan were based on the findings from the town and village greenhouse gas inventories. CNY RPDB staff worked with a team of SUNY ESF students throughout the spring of 2014 to analyze potential mitigation strategies for reducing the town and village's emissions for both municipal operations as well as at the community-wide scale. The team utilized a software tool developed by ICLEI-Local Governments for Sustainability known as CAPPA (Climate and Air Pollution Planning Assistant) version 1.5 to calculate potential GHG reductions as well as cost savings for each mitigation strategy. CAPPA is an Excel-based decision-support tool designed to help U.S. local governments explore and identify potential opportunities to reduce greenhouse gas emissions and other air pollution emissions. CAPPA provides a starting point for two major tasks: determining an achievable emissions reduction target and selecting mitigation strategies to include in a local municipal–operations or community-scale emissions-reduction plan, commonly called a climate action plan. CAPPA users can compare the relative benefits of a wide variety of emissions reduction and clean air measures, and identify those most likely to be successful for their community based on its priorities and constraints.

Utilizing CAPPA, a variety of mitigation strategies were identified and analyzed to determine their potential for achieving emissions reductions either at the municipal operations level or the community scale. The CNY RPDB also explored the potential impacts of an external large scale factor on the community's emissions profile: New Federal CAFE Standards that will increase the average fuel economy of vehicles sold in the U.S. through 2025. The results of these analyses are summarized in the following pages and in Figures 15-17.

Adaptation Strategies

Adaptation strategies require community-wide planning that addresses local conditions associated with storm events, flooding, snowfall, and wind damage. Examples of climate adaptation strategies include, for example, development of early storm warning systems, air-conditioned cooling shelters, stormwater control, and policies that discourage people from building in flood prone areas.

The recommendations for climate mitigation and adaptation that are presented in the following pages were developed with local input from the Cazenovia community. They are designed to help prepare for anticipated changes in climate conditions and to assist decision-makers in identifying opportunities to improve community resilience. Many of these recommendations are consistent with those presented in Cazenovia's Comprehensive Plan. The Cazenovia community is encouraged to update these strategies each year as additional data becomes available.

Vendors at Farmer's Market

TRANSPORTATION

According to the town and village GHG Inventory Reports, emissions from transportation accounted for 76% of government emissions and 52% of community emissions in the town in 2010, and transportation accounted for 59% of government emissions and 24% of community emissions in the village in 2011. This Climate Action Plan addresses two main transportation emissions reduction goals: increase options for low-carbon transportation and increase the use of alternative fuels.

Route 20, Cazenovia

Mitigation Strategy Goals for 2025

Increase Options for Low-Carbon Transportation

Convert to higher efficiency vehicles: 1,550 $MTCO_2e$ annual reductions.

This strategy assumes 1,359 vehicles (30% total vehicles) convert from trucks or SUVs to more efficient vehicles, including hybrids.

Increase telecommuting: 1,028 $MTCO_2e$ annual reductions.

This strategy assumes 10% of community members telecommute.

Promote carpooling/vanpooling: 292 $MTCO_2e$ annual reductions.

This strategy assumes 15% of residents who commute to work outside of the village begin to carpool, reducing trips by 10%.

Expand Bicycling Infrastructure: 264 $MTCO_2e$ annual reductions.

This strategy assumes that 6,349 weekly trips (5% of trips less than 2 miles) are converted from car to bicycle.

Expand pedestrian infrastructure: 221 $MTCO_2e$ annual reductions.

This strategy assumes 8,892 weekly trips (5% of trips less than 1 mile) are converted from car to walking.

Increase bus ridership to and from school: 9 $MTCO_2e$ annual reductions.

This strategy assumes 15% of students who currently drive or are dropped off change to riding the bus.

Provide bicycles for daily trips (bike share): 4 $MTCO_2e$ annual reductions.

This strategy assumes 10 bicycles are made available with five 2-mile trips per day.

Increasing options for low-carbon transportation would reduce the amount of vehicle miles traveled (VMT), reducing gasoline and diesel use which would therefore reduce Cazenovia's emissions, fuel costs, and reliance on foreign fossil fuels. Encouraging employees to use transit, bicycles, and walking instead of driving will provide an opportunity for Cazenovia to reduce VMT. E-mail, video conferencing, and telephones can replace face-to-face meetings, eliminating the need to travel and saving valuable work time.

Bicycling as a mode of transportation creates no GHG emissions, and by expanding bicycling infrastructure in the community, community members can better take advantage of this form of transportation. High quality low-carbon forms of transportation provide multiple co-benefits besides energy savings and emission reductions, including congestion reductions, road and parking facility cost savings, consumer savings and affordability, improved mobility for non-drivers, support for strategic land development objectives (i.e. reducing sprawl), and improved public fitness and health.

Cazenovia Central School District can also encourage its students to ride bicycles to school instead of driving or getting dropped off by sponsoring a ride-your-bike-to-school program. There could also be a bike share program through the school or through Cazenovia College to encourage bicycling in the community.

While Cazenovia Schools has a five-minute idling policy for their school buses, there is still an issue with idling as bus traffic backs up through the community. The school district could investigate alternative busing routes to help with this issue.

Many community members currently drive inefficient SUVs or trucks. By simply converting to smaller vehicles, the community would significantly reduce emissions from transportation while also saving money on gas.

Carpooling is another way community members can reduce emissions and save money. One way to encourage carpooling/vanpooling is to create an electronic bulletin board where community members can go to request or offer rides. This bulletin board could be placed on the village and town websites or some other easily accessible location.

Cazenovia can also explore the idea of creating a single district for trash collection. Instead of having multiple haulers traveling down the same streets, the community could create hauling districts to reduce vehicle trips and emissions.

Sailing on Cazenovia Lake

Adaptation Strategies

Cazenovia can continue to adapt to a changing climate by preparing a commuting analysis to evaluate the need for organized carpooling and ride-share opportunities; using smaller school buses when only a few students are being transported to and from school events; or encouraging a local retailer to offer truck and trailer rentals for short-term use by residents.

Mitigation Strategy Goals for 2025

Increase the use of Alternative Fuels

Convert community vehicle fleet to electric vehicles: 1,978 $MTCO_2e$ annual reductions.

This strategy assumes 15% of the community vehicle fleet is converted to electric vehicles.

Implement electric vehicle charging stations: 29 $MTCO_2e$ annual reductions.

This strategy assumes 10 charging stations are implemented.

Convert municipal vehicle fleet to hybrid vehicles: 26 $MTCO_2e$ annual reductions.

This strategy assumes 4 vehicles are converted to hybrids.

Convert municipal vehicle fleet to electric vehicles: 5 $MTCO_2e$ annual reductions.

This strategy assumes 5 vehicles are converted to electric vehicles.

Convert municipal vehicle fleet to biodiesel: 5 $MTCO_2e$ annual reductions.

This strategy assumes 2 vehicles are converted to biodiesel.

CRIS-CAT is a volunteer transportation program in Cazenovia. Volunteers are available to drive area residents over 60 years old to medical appointments, shopping and events. CRIS-CAT drivers have logged over 20,000 miles since May 2010.

Traditional fuels used for transportation, gasoline and diesel, are not only non-renewable fossil fuels, they also produce significantly more carbon emissions than alternative fuel options, such as electric, hybrid, biodiesel, and compressed natural gas (CNG) vehicle technology. Conversion to alternative fuels can therefore be extremely effective when trying to reduce emissions from the transportation sector.

According to EPA's eGRID 2009, electricity in Upstate New York is currently powered by coal (14.5%), oil (0.9%), gas (18.9%), other fossil (0.4%), biomass (1.6%), hydro (30.8%), nuclear (30.6%), and wind (2.4%) powers. Therefore, about 1/3 of the energy coming from the electric grid is considered renewable, with almost 2/3 coming from non-fossil fuel sources, making electricity a much better option in terms of greenhouse gas emissions than gasoline or diesel fuels.

Not only will using alternative fuels reduce greenhouse gas emissions, it will also reduce US dependence on imported fuels and reliance on fossil fuels in general. Electric and hybrid vehicles are also less expensive to operate and have significantly lower fuel costs than conventional gasoline-powered vehicles.

Increasing the use of alternative fuels would greatly reduce Cazenovia's emissions and provide other benefits to community members as well.

Vendors at Farmer's Market

ENERGY EFFICIENCY

Emissions from municipal buildings and facilities and emissions from residential and commercial energy use represent significant emitting sectors for both the town and village, according to their GHG inventory reports. This Climate Action Plan addresses two main energy/efficiency emissions reduction goals: increase energy efficiency in buildings; and increase use of renewable energy.

Albany Street, Cazenovia

Mitigation Strategy Goals for 2025

Increase energy efficiency and reduce emissions from buildings

Energy efficiency retrofits of existing facilities: 160 $MTCO_2e$ annual reductions.

This strategy assumes 248 homes (10%) update HVAC equipment, and 1,000 square feet of commercial buildings, and 45,139 square feet of municipal buildings (half of village buildings plus Town Hall, Town Highway Garage, and New Woodstock Garage) are retrofitted.

Home weatherization: 146 $MTCO_2e$ annual reductions.

This strategy assumes 248 homes (10%) are weatherized with 15% energy savings.

Lighting occupancy sensors at Cazenovia College: 146 $MTCO_2e$ annual reductions.

This strategy assumes the College installs lighting occupancy sensors in half of their buildings.

Power-Down at Night Policy at Cazenovia College: 69 $MTCO_2e$ annual reductions.

This strategy assumes 126,850 square feet (half of non-residential buildings) participate.

Promote business energy conservation through education: 64 $MTCO_2e$ annual reductions.

This strategy assumes 19 businesses participate with 5% energy savings due to behavior changes.

Promote residential energy conservation through educational program: 57 $MTCO_2e$ annual reductions.

This strategy assumes 10% of households participate in the program with 5% energy savings due to behavior changes.

Energy Star appliances: 26 $MTCO_2e$ annual reductions.

This strategy assumes 152 refrigerators and 166 computers are replaced in residential facilities, and 16 computers, 5 refrigerators, and 10 printers are replaced by energy efficient models in municipal buildings.

Municipal lighting occupancy sensors: 18 $MTCO_2e$ annual reductions.

This strategy assumes 33,177 square feet of municipal buildings (half of village and town buildings) install sensors.

Municipal Power-Down at Night Policy: 18 $MTCO_2e$ annual reductions.

This strategy assumes 33,177 square feet of municipal buildings (half of village and town buildings) participate.

Indoor lighting retrofits: 15 $MTCO_2e$ annual reductions.

This strategy assumes half of the town and half of the village buildings undergo lighting retrofits.

Low-flow faucets and toilets: 2.3 $MTCO_2e$ annual reductions.

This strategy assumes 152 faucets and 152 toilets are replaced in residential facilities, and 15 faucets and 10 toilets or urinals are replaced by energy efficient models in municipal buildings.

Commercial lighting occupancy sensors: 0.4 $MTCO_2e$ annual reductions.

This strategy assumes 747 square feet of town commercial buildings install occupancy sensors.

Commercial Power-Down at Night Policy: 0.4 $MTCO_2e$ annual reductions.

This strategy assumes 747 square feet of town commercial buildings participate.

Energy efficiency education can be crucial when working to reduce emissions from buildings and facilities. Being familiar with actions that can be taken to increase building efficiency and reduce emissions, such as the ones listed above, is the first step in carrying out those actions. Participating in the Central New York Energy Challenge Team Program is a great way to educate community members on actions they can take at home to reduce energy use and emissions, and businesses can be targeted in a similar educational program and/or energy challenge competition.

Many buildings in Cazenovia are not equipped with energy efficient technologies, causing the town, village, and community members to use more energy than is necessary. Retrofitting existing facilities through measures like replacing appliances and light bulbs with more efficient ones, increasing insulation, and upgrading HVAC systems can greatly improve energy efficiency and therefore reduce emissions from Cazenovia's buildings and facilities.

The initial cost of retrofitting heating units may seem daunting; however, the local government, NYSERDA, and the CNY RPDB can offer assistance by providing educational materials, low-interest loans, and guidance on where to find potential grants or incentives to help cover costs.

Each of these actions can significantly reduce GHG emissions in Cazenovia, reducing energy costs, reliance on fossil fuels, and even improving air quality.

Cazenovia could also reduce emissions and improve water quality by converting septic systems to sewaging along East Lake Road. There are also various technologies and strategies that can help reduce nitrogen emissions from septic tanks, like using Nitrex, for example. For more information about these techniques, see Appendix D: Action Strategy Summary for the Town of Cazenovia.

Adaptation Strategies

Cazenovia can modify local laws to incorporate measures for adaptation to climate change, such as evaluating the use of Property Assessed Clean Energy (PACE) financing as a way for commercial property owners to pay for energy upgrades, on-site renewable projects, and water conservation measures. Cazenovia can also re-evaluate building and zoning codes to discourage/prevent new development in flood-prone and high hazard areas along the Cazenovia Lake and Chittenango Creek shorelines. It will also be important for Cazenovia to identify and remove local barriers to green infrastructure, and to incorporate climate adaptation into planning documents such as the Cazenovia Comprehensive Plan.

"WE ARE LIKE TENANT FARMERS CHOPPING DOWN THE FENCE AROUND OUR HOUSE FOR FUEL WHEN WE SHOULD BE USING NATURE'S INEXHAUSTIBLE SOURCES OF ENERGY – SUN, WIND AND TIDE…I'D PUT MY MONEY ON THE SUN AND SOLAR ENERGY. WHAT A SOURCE OF POWER! I HOPE WE DON'T HAVE TO WAIT UNTIL OIL AND COAL RUN OUT BEFORE WE TACKLE THAT." – Thomas Edison in conversation with Henry Ford and Harvey Firestone (1931)


Cazenovia Lake

National DSIRE Database

Incentives available for renewable energies are constantly changing. The Database of State Incentives for Renewables & Efficiency, or DSIRE, is a website that offers comprehensive information on incentives and policies that support renewables and energy efficiency in the United States. Established in 1995, DSIRE is currently operated by the N.C. Solar Center at N.C. State University, with support from the Interstate Renewable Energy Council, Inc. DSIRE is funded by the U.S. Department of Energy. Visit dsireusa.org to learn more about current incentive opportunities.

Mitigation Strategy Goals for 2025

Increase use of renewable energy

Residential geothermal heat pumps: 839 $MTCO_2e$ annual reductions.

This strategy assumes 103 homes currently using fuel oil convert to geothermal.

Residential solar: 369 $MTCO_2e$ annual reductions.

This strategy assumes 25% of owner-occupied homes are suitable for solar and 50% of those homes install a 6 kW system (1,485 kW).

Commercial solar: 212 $MTCO_2e$ annual reductions.

This strategy assumes 853 kW of solar PV is installed.

Solar at Cazenovia Schools: 112 $MTCO_2e$ annual reductions.

This strategy assumes 450 kW of solar PV is installed on the High School, Middle School, and Elementary School buildings.

Municipal geothermal heat pump: 98 $MTCO_2e$ annual reductions.

This strategy assumes the Town Garage installs a geothermal heating system in place of their current propane heating system.

Municipal solar: 71 $MTCO_2e$ annual reductions.

This strategy assumes 285 kW of solar PV is installed.

Solar at Cazenovia College: 20 $MTCO_2e$ annual reductions.

This strategy assumes an additional 82 kW of solar PV is installed on the Cazenovia College buildings.

By installing renewable energies such as solar, geothermal, biomass, and micro-hydro, Cazenovia will reduce greenhouse gas emissions, energy cost, and reliance on fossil fuels.

Many residents or businesses would like to use renewable energies, but the large up-front cost is an obstacle. The local government can help overcome this barrier by offering low-interest loans or organizing group buying programs to negotiate lower prices, as was done in the Solarize Madison program which ran in Madison County in 2012-2013. This is an effective way of combining public and private funds for renewable energy. The New York State Energy Research and Development Authority (NYSERDA) provides incentives for the installation of solar PV based on system size. Additionally, there are state and federal tax credits for residential and commercial solar PV and small wind turbine installations. Educational and technical assistance programs should be used to promote renewable energies. Local governments can offer information clearinghouses and connect consumers with renewable energy installers.

NYSERDA, New York Power Authority (NYPA) and City University of New York (CUNY) developed a NYS Unified Solar Permit that helps to reduce costs for solar projects by streamlining municipal permitting processes and supports the growth of clean energy jobs across the state. The unified solar permit is part of Governor Cuomo's NY-Sun initiative to quadruple in 2013 the amount of solar capacity in New York that was added during 2011.

Adoption of a standardized residential/small business solar permit is a key element to help New York municipalities remove barriers to local economic development in the growing solar industry. The standardized permit cuts costs by creating a uniform permitting process in

municipalities across the state. Installers in New York State have had to work with different permits and permitting processes in each of the State's 1,550 municipalities, which increased the complexity of permitting and have caused project delays and added costs. The Town of Cazenovia has adopted the unified solar permit, and it is recommended that the Village of Cazenovia adopt the unified solar permit to reduce soft costs associated with solar installations.

An increasingly popular way for a local government to overcome the financial hurdles of installing a photovoltaic system is through the "solar services model," also known as a Power Purchase Agreement (PPA). Through this type of arrangement the owner of a property can provide the space for a power producer to install the system. The property owner then agrees to buy the power produced from that system at a set rate that is competitive with grid electricity. Since the power producer retains ownership of the equipment, there are no installation and maintenance costs to the consumer of the electricity produced. This is particularly attractive to government entities that are unable to take advantage of tax-based incentives for renewable energy.

The CNY RPDB is also currently offering a bulk solar purchasing program for municipalities, known as Solarize CNY. This program will bundle solar installations from multiple local municipalities into a single Request For Proposals (RFP), allowing solar installers to offer lower installation prices than if each municipality were to pursue options individually. The CNY RPDB will choose the solar installer and complete the up-front leg-work for the municipalities to help save municipal time and money. The town is currently considering a solar installation at the highway garage as well as a ground-mounted system on 50 acres of vacant town land which the Solarize CNY program could assist in implementing.

Vendor at Farmer's Market

The Town of Cazenovia is also installing another micro-hydroelectric power system on Mill Street in the Hamlet of New Woodstock with assistance from SUNY Morrisville. The system will be installed in the spring of 2015 with funding from the local Common Grounds grant. This system is expected to produce 21,500-26,000 kWh per year, which could cover a significant portion of the annual electric needs of the Town Highway Department.

Another strategy for the Village of Cazenovia to explore is implementing variable speed water pumping. Variable speed water pumps are more efficient than single-speed water pumps because they pump water at a rate that is necessary for local requirements. Variable speed pumps consume less energy when pumping speeds are lower, as opposed to single-speed water pumps which use the same amount of energy regardless of water demand.

WASTE

According to ICLEI's GHG inventory protocols, it was unnecessary to include emissions generated by waste from Cazenovia in the GHG inventory reports. However, emissions reduction strategies have been incorporated into this Climate Action Plan to show additional areas that Cazenovia can address to reduce overall emissions. GHG emissions from waste can be inventoried in the future to determine the effect these strategies may have on overall emissions.

Organics Composting

Mitigation Strategy Goals for 2025

Decrease the waste stream

Kitchen composting: 60 $MTCO_2e$ annual reductions.

This strategy assumes 60 lbs. of food waste (25% of total food waste) per person per year is removed from the waste stream through composting.

Yard waste composting: 0.3 $MTCO_2e$ annual reductions.

This strategy assumes 23 lbs. of yard waste (25% of total yard waste) per person per year is removed from the waste stream through composting.

Enhance curbside recycling: 0.3 $MTCO_2e$ annual reductions.

This strategy assumes 22 lbs. of waste per person per year is removed from the waste stream through recycling.

Waste generated in Cazenovia is sent to the Madison County Landfill for final disposal. As waste breaks down, GHG emissions and other pollutants are emitted. Emission levels can be reduced by decreasing the waste stream.

Composting is one strategy Cazenovia is already doing to reduce the waste stream. Composting produces fertilizer that can be used for farms or gardens, returning nutrients to the soil that were removed with food production and reducing the need for synthetic fertilizers. Composting also reduces the volume of material sent to the landfill, reducing disposal costs.

Composting is something that can be done at individual households or at the community scale. New York State's "Beyond Waste" plan advances food scrap recycling as a key environmental strategy to help communities increase their waste diversion rates. Community composting sites, such as the Amboy Compost Site in Camillus, New York, have efficiently composted yard and food waste for years.

Adaptation Strategies

Cazenovia can also work with the Madison County Planning Department to research food composting and recycling options for the college, school, and local restaurants. This can help determine best practices for reducing the waste stream throughout the community.

NATURAL RESOURCES

Trees that are planted with energy savings in mind can reduce the amount of energy (electricity, natural gas, or other fuel) used to cool and heat buildings. This not only reduces associated emissions, but also saves money.

Vendor at Farmer's Market

Mitigation Strategy Goals for 2025

Plant trees for carbon storage and energy savings

Tree planting: 171 $MTCO_2e$ annual reductions.

This strategy assumes 806 trees are planted.

The shade from a single well-placed mature tree can reduce GHG emissions by reducing annual air conditioning use between two and eight percent (in the range of 40-300 kWh), and peak cooling demand between two and ten percent (as much as 0.15-0.5 kW). The Arbor Day Foundation provides information on how to plant trees to conserve energy most effectively.

Tree planting can also reduce stormwater runoff, decreasing the amount of water that needs to be treated at wastewater treatment facilities. Finally, tree planting increases the aesthetic appeal of properties and increases property values.

Adaptation Strategies

Cazenovia should focus on protecting local trees and water resources by controlling the introduction and spread of invasive species. To do this, they can take adaptation measures such as educating the public and elected officials on the value of prevention and early detection of invasive species; working with the Madison County Soil and Water Conservation District and the Natural Resource Conservation Service to monitor the introduction and spread of invasive species; and participating in Cornell Cooperative Extension's Emerald Ash Borer control strategy and in the New York State Invasive Species Task Force.

Ensuring the resilience of natural systems and resources through open space conservation and smart growth strategies is another adaptation goal for Cazenovia. The town and village can protect open space through conservation land grants, landowner incentives, fee acquisition, and the purchase of conservation easements, and promote smart growth principals. They can also update local maps that display low elevation areas that may be susceptible to flooding and display this information on the town and village websites, along with preparedness guidelines; maps should display varying levels of flood hazard potential. Removing branches, ice jams, and other debris from Chittenango Creek and Cazenovia Lake tributaries will also help to reduce flooding.

Another adaptation strategy Cazenovia can pursue is protecting and expanding urban trees and woodland ecosystems to increase climate change mitigation potential. Planting living snow fences (evergreens planted at distances of at least 100 feet upwind of problem stretches of a road) will help to reduce snow drifts and travel hazards for drivers. Portions of Ridge Road, Lincklaen Road, Number Nine Road, Damon Road, Corkinsville Road, and East Road could benefit from the installation of living snow fences. Road segments should be prioritized and landowners contacted for participation. Planting and maintaining trees

and other vegetative buffers along the lake shoreline can reduce the flow of contaminants (primarily sediments and nutrients) from entering the lake and tributaries, reduce shoreline erosion, and maintain cooler water temperatures through shading. Planting low pollen tree species in Cazenovia recreation areas and parks can also help to minimize human health issues. Managing tree density throughout the village and town can reduce overcrowding and susceptibility to stress and disease. Removing tree and vegetative growth along power lines and removing dead or dying trees and replacing them with heat and invasive tolerant species will also be beneficial in a changing climate.

In order to accomplish these goals, the Cazenovia Village Tree Commission can be expanded to include priority town properties. Cazenovia can also encourage the US Forest Service and Madison County Cooperative Extension to monitor changes in tree composition and health.

Cazenovia should provide for the routine collection of temperature, precipitation, storm frequency, and endangered and invasive species, and public health information in order to evaluate the impact of climate change on local conditions. To do this, Cazenovia should compile long-term lake water temperature trends through the NYSDEC Citizen's Statewide Lake Assessment Program; work with Project Watershed (Isaac Walton League) to document invertebrate population trends in Chittenango Creek and Cazenovia Lake tributaries; document long-term population trends for the ovate amber snail at the Chittenango Falls State Park (NYS-classified as endangered and federally-classified as threatened); conduct flood and erosion studies on priority tributary segments flowing into Cazenovia Lake; compile a database of vulnerable populations (e.g. the elderly and people with special needs) and develop a system to contact them in case of emergency; and assess the economic impacts of climate change through revenue potential from tourism and recreation (for example, how winter warming trends influence the local ski industry).

All of these adaptation strategies will prepare Cazenovia for environmental changes caused by climate change, making Cazenovia more resilient in the long-term.

Vendor at Farmer's Market

"THE BEST FRIEND OF EARTH AND OF MAN IS THE TREE. WHEN WE USE THE TREE RESPECTFULLY AND ECONOMICALLY, WE HAVE ONE OF THE GREATEST RESOURCES ON THE EARTH." – FRANK LLOYD WRIGHT

AGRICULTURE

Agriculture is a key component of Cazenovia's present economy and open-space character, and farmland provides open space and scenic vistas that generate aesthetic benefits and community character. Agricultural lands currently comprise 30% of the land in Cazenovia.

The Town of Cazenovia has established goals for the protection and enhancement of farmland and natural resources in the Agricultural and Farmland Protection Plan. Over 1,800 acres of farmland in Cazenovia is protected from development and the Cazenovia Preservation Foundation recently received funding from New York State to purchase the development rights for 500 additional acres.

Farmland, Cazenovia

Mitigation Strategy Goals for 2025:

Encourage sustainable agricultural practices

Research the benefits of soil management practices on emissions

Research the benefits of nitrogen management practices

Research the benefits and availability of efficient farm equipment

Explore renewable energy opportunities on farm properties

While it is important to preserve Cazenovia's agricultural heritage, it is also important to recognize that agriculture is a significant source of GHG emissions. Agricultural activities are the single largest source of all nitrous oxide emissions and contribute to approximately 35% of all methane emissions nationwide.

According to the Town of Cazenovia's 2013 GHG emissions inventory report, "The total CO_2e emissions produced by agriculture in the Town of Cazenovia are estimated to be 13,178.83 metric tons. This number was produced by adding together three different areas of agricultural emissions: emissions from agricultural soils, emissions from enteric fermentation, and emissions from manure management." Agricultural related emissions were included in the GHG inventory and Climate Action Plan as an information item due to the difficulty of accurately measuring emissions levels from agricultural operations. At the same time, the increased potency of GHGs such as methane make the agricultural sector worth detailed consideration. It should be noted that efforts to reduce agricultural emissions have significant co-benefits, such as reducing run-off and reducing costs of synthetic inputs, such as fertilizers.

Agricultural systems will be impacted by climate change. The local response to the effects of climate change will include strategies to reduce emissions (called mitigation strategies) as well as adaptive strategies that will reduce negative impacts of climate change on Cazenovia's agricultural community. In many cases, both mitigation and adaptive strategies will have important co-benefits regardless of their impacts on climate related concerns.

Farmers in Cazenovia can explore renewable energy, such as wind, solar, or micro-hydro opportunities, in the context of their farms. Dairy farms especially utilize a significant amount of electricity for livestock cooling purposes and milk processing which can be offset by renewable energies. Farmers can also research the benefits and availability of more efficient farm equiment to reduce emissions and energy used in the planting and harvesting processes.

Farmers in Cazenovia have begun to take both mitigative and adaptive actions. Approximately 50% of the farms in Cazenovia participate in Madison County Soil and Water Conservation District's (SWCD) Agriculture Environmental Management (AEM) program, an incentive-based program that helps farmers make cost-effective and science-based decisions to meet business objectives

while protecting and conserving natural resources. AEM is a partnership of farmers, SWCD, local, state and federal agencies, and the private sector that focus on conservation farming. Through AEM, the SWCD works with the agricultural community to develop science-based "Comprehensive Nutrient Management Plans" that are designed to control runoff, conserve soil, and recycle nutrients. SWCD and the farming community have recently expanded the AEM program to include projects that produce renewable energy and reduce greenhouse gas emissions.

In Cazenovia, a wide variety of sizes and types of farms participate in the AEM program, participating in conservation activities such as:

+ Nutrient management
+ Prescribed grazing
+ Animal waste structures (manure storages, etc.)
+ Riparian buffers
+ Conservation tillage (minimum till, no-till)
+ EQIP (Environmental Quality Incentives Program)
+ Wetland protections/abatements
+ CAFO regulations

To help achieve energy reduction and sustainability goals, farmers in Cazenovia can also investigate and utilize resources provided by the New York Farm Bureau, New York Department of Agriculture and Markets, and Cornell Cooperative Extension, including the Cornell Small Farms Program.

According to the town's Agricultural and Farmland Protection Plan, "some farm operations and related businesses may benefit from the installation of wind, solar, biomass, or anaerobic digesters to replace conventional sources of energy. The use of sustainable energy sources has the potential to reduce long-range energy costs and lower greenhouse gas emissions." Some farmers in Cazenovia have decided to install renewable energy systems, such as wind and solar PV. The town's Agricultural and Farmland Protection Plan also includes a list of financial incentives.

By incorporating Cazenovia's agricultural heritage into this Climate Action Plan, the farming community can continue to prosper while reducing energy use, costs, and GHG emissions.

Farmland, Cazenovia

Sustainable Agriculture

"The term 'sustainable agriculture' (U.S. Code Title 7, Section 3103) means an integrated system of plant and animal production practices having a site-specific application that will over the long-term:

+ Satisfy human food and fiber needs.
+ Enhance environmental quality and the natural resource base upon which the agriculture economy depends.
+ Make the most efficient use of nonrenewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls.
+ Sustain the economic viability of farm operations.
+ Enhance the quality of life for farmers and society as a whole."[1]

1 Source: USDA

ADDITIONAL ADAPTATION STRATEGIES

These strategies are additional actions Cazenovia can take to become more resilient in the face of a changing climate. Four key strategy areas are explained here, including infrastructure, public health, education, and emergency operations.

Farmland, Cazenovia

Infrastructure

One of Cazenovia's adaptation goals is to protect and upgrade local infrastructure to achieve cost savings, as well as stormwater and flood control. There are various actions Cazenovia can take to address this goal, such as assessing the condition of local infrastructure and documenting climate vulnerabilities in the areas of energy, water, transportation, and telecommunications. The village can also conduct an energy evaluation of the village water distribution system and water pumping station to see if any actions could be taken here to make Cazenovia more sustainable. Reducing nighttime lighting of the Tops Plaza and adjusting the angle of light bulbs in the Tops Plaza to the downward position can also assist in reducing energy use and emissions.

Green infrastructure measures will also be important for Cazenovia to pursue in order to successfully adapt to a changing climate. Cazenovia should work with the Madison County Soil and Water Conservation District to improve the capacity of stormwater collection systems and to maximize soil infiltration and groundwater recharge. Cazenovia should also inventory and prioritize road culvert and shoulder ditch repairs, install green infrastructure measures such as rain gardens, porous pavement, and rain barrels, encourage downspout disconnection, bioinfiltration, and rainwater harvesting in Cazenovia's residential and business communities to reduce stormwater runoff to the lake, and maintain/expand Cazenovia's hiking and biking trails to enhance open space preservation and soil infiltration.

Public Health

Cazenovia should also establish mechanisms to reduce or eliminate the negative effects of climate change on public health. Adaptation strategies Cazenovia can pursue in this area include: working with the Madison County Health Department to document trends in asthma, Lyme disease, and heat-related illnesses that may be influenced by a warming climate; improving local capacity for health preparedness, response, and recovery programs, such as the development of a extreme-heat response plan and designation of a community location with air conditioning during heat events; and notifying the community regarding heat events, air quality, and other climate related health risks.

Education

Education is an important part of climate adaptation as well. Cazenovia should implement a comprehensive public outreach and stakeholder engagement campaign to build awareness of climate change. The community can develop and implement climate education programs for all grade levels in the Cazenovia Central School District, train local building officials, planning boards, and elected officials on flood hazards, risk reduction strategies, implementation of floodplain development regulations, post-flood reconstruction, and how to address flood hazards during planning board

reviews, and train local building officials and the construction industry on flood proofing techniques for retrofitting existing flood prone development.

The town and village can also provide information to community members on the town and village websites, such as climate adaptation principals to increase the awareness of severe weather risks, storm preparedness, and safety practices for homes and businesses. They can provide emergency preparedness guidelines for people living and working in flood prone areas such as actions to take if a flash flood warning is issued, relevant emergency websites and information sources, items to include in a disaster/flood supply kit, how to protect properties from flood damage, and guidelines for developing a Family Disaster Plan. Town and village websites can also include regional topographic maps and information about flood preparedness.

The town and village can also distribute brochures, fact sheets, and posters that show ways in which businesses and residents can prepare for and adapt to climate change, sponsor workshops to teach residential and business owners how to calculate their Energy Use Intensity (EUI), and sponsor workshops to teach homeowners, local planning boards, elected officials, code enforcement officers, county agencies, businesses, citizen associations and real estate agents about Emerald Ash Borer, storm preparedness, watershed land use influences, and floodplain management.

Emergency Operations

Ensuring that emergency operations are current and maintaining open lines of communications between local agencies is also a significant part of successfully adapting to climate change. Cazenovia can achieve this goal by updating the community's inventory of emergency operations and public notification lists, collaborating with national, state, and local agencies to facilitate data collection, sharing, and synthesis of flood and storm event preparedness information, and updating land hazard maps and inventories of infrastructure and at-risk communities.

Cazenovia should also re-establish local protocols for sharing equipment during emergencies, reconfirm channels of communication with local police and fire departments, the local power utility, and media outlets, establish a road watch program to alert the public of flooded areas and tree damage during storm events, and review the potential use of Hyper-Reach with IPAWS, a government partnership between federal and local emergency responders that is designed to reach non-residents in the town for a more complete coverage during emergencies.

Finally, Cazenovia should work with Madison County officials to update the County's Hazard Mitigation Plan every five years and provide public access to the Plan by adding it to municipal and agency websites. The College has entered into an agreement with the Cazenovia School district and the village to create a comprehensive Emergency Response Plan. These entities should expand conversations and work more closely together to continue these efforts in the future.

All of these additional mitigation strategies will allow Cazenovia to be a resilient and sustainable community in the long-term, despite the effects of climate change.

Artist capturing Cazenovia landscape

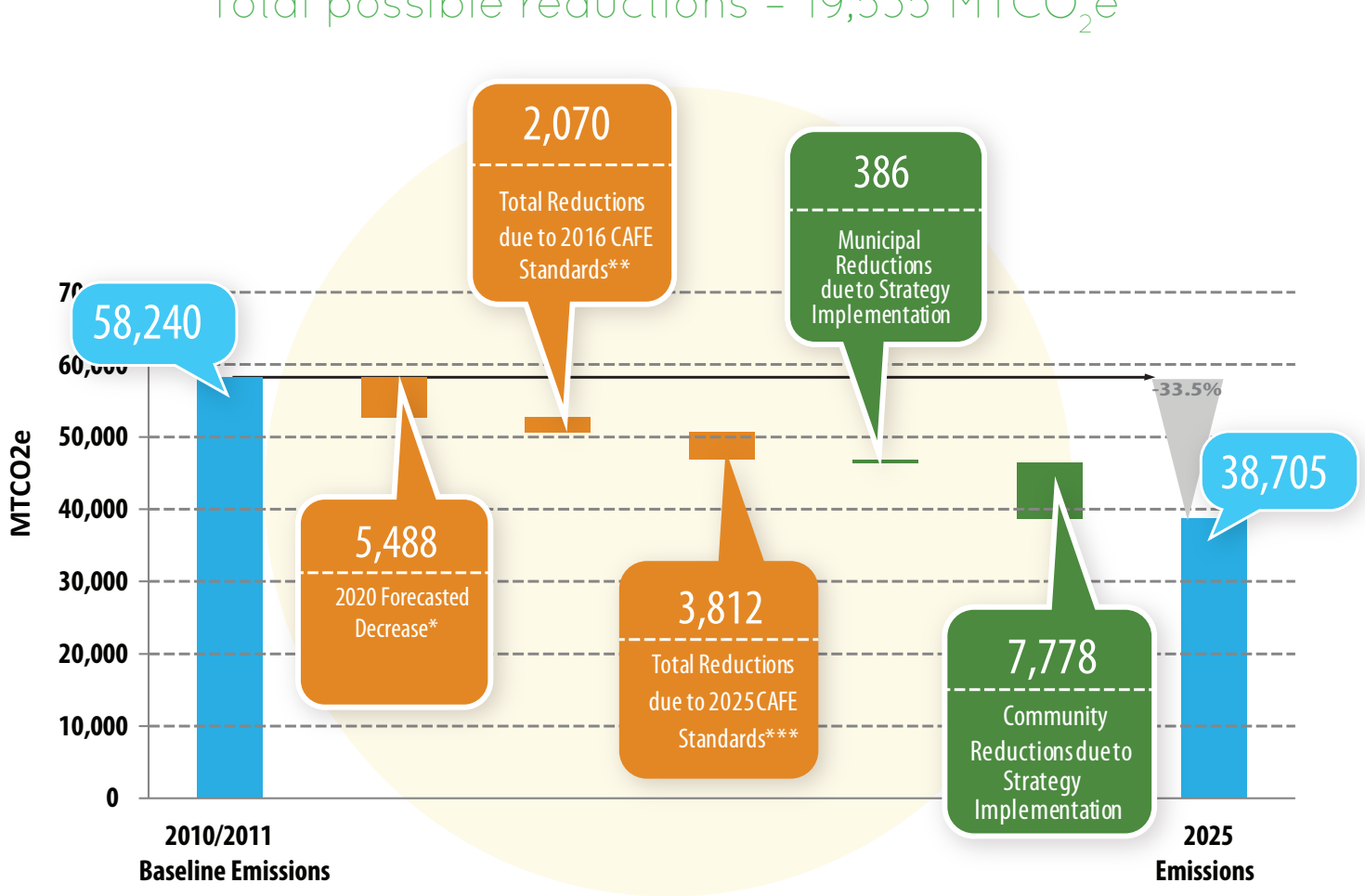
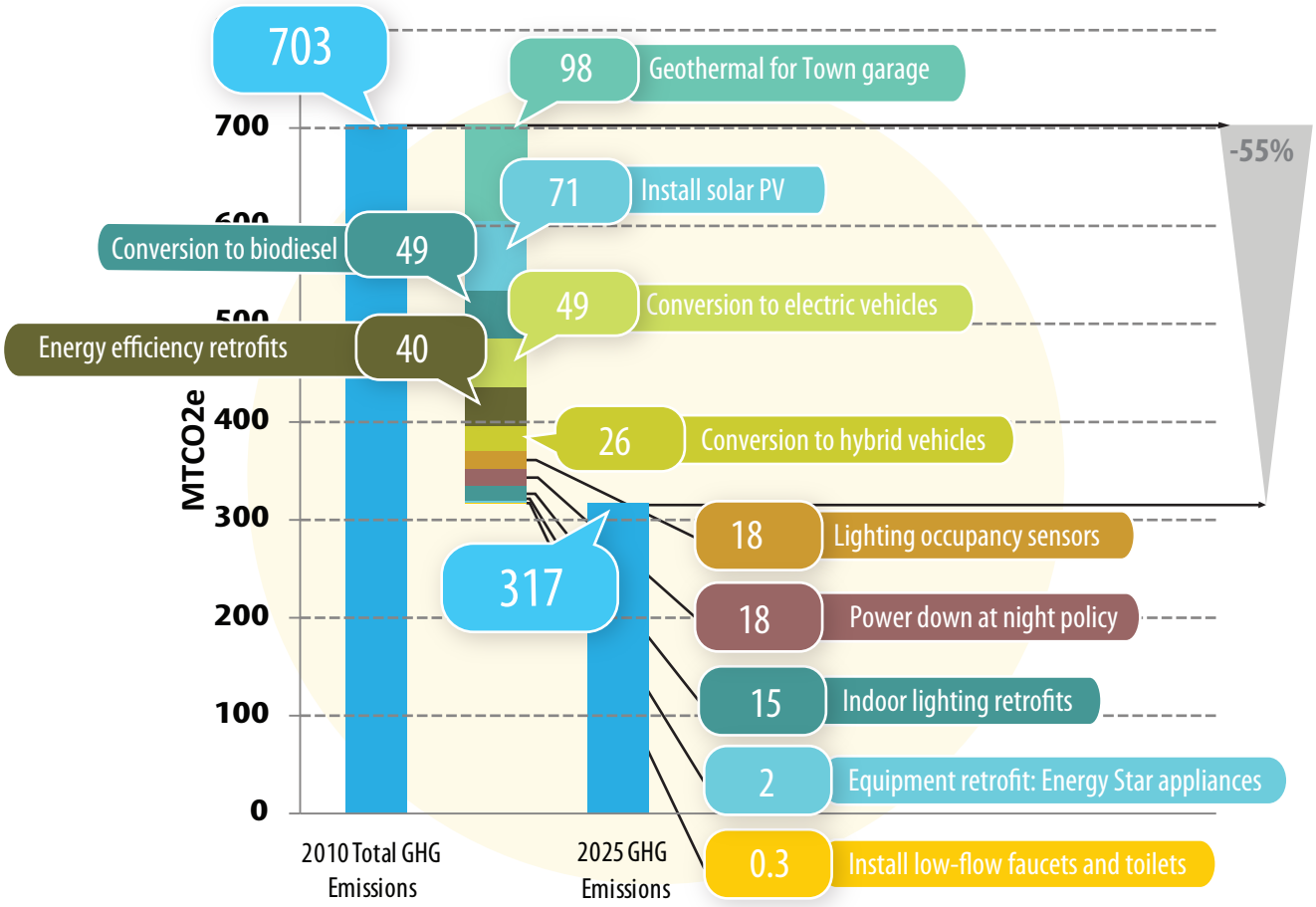


FIGURE 15- TOTAL POSSIBLE REDUCTIONS BY 2025

Figure 15 summarizes the results of the Cazenovia GHG inventories, a 2020 emissions forecast based on current trends, impacts from the strengthening of Federal CAFE standards, as well as the reductions associated with the Climate Action Strategies that were analyzed for Cazenovia separated into community-wide measures as well as municipal operations measures. Reductions due to Cazenovia actions are shown in green while changes in emissions that will occur regardless of this Plan are shown in orange. It is projected that Cazenovia's total GHG emissions in 2025 could be reduced by 33.5% if Cazenovia implements all of the recommended community-wide and municipal operations mitigation measures.

*2013 GHG inventory reported a forecasted a decrease of 5,488 $MTCO_2e$ from the 2010 baseline to 2020 due to decreases in commercial energy use, residential energy use, and transportation.
**2010 Federal CAFE (Corporate Average Fuel Economy) standards have been set at 34.1 miles per gallon by 2016.
***2012 Federal CAFE standards raises average fuel economy to up to 54.5 mpg for the model year 2025.

Total possible municipal reductions from mitigation strategies = 386 $MTCO_2e$



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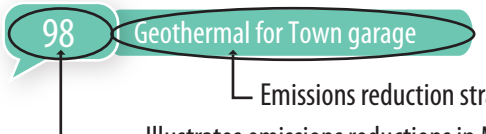

FIGURE 16- POTENTIAL MUNICIPAL REDUCTIONS FROM STRATEGY IMPLEMENTATION

Cazenovia's baseline municipal emissions as recorded by the GHG inventory reports, potential reductions due to suggested mitigation strategies, and potential emissions in 2025 should each of the suggested strategies be implemented. It is estimated that there will be a 55% reduction in municipal emissions if all suggested mitigation strategies are implemented.

Total possible community reductions from mitigation strategies =7,778 $MTCO_2e$

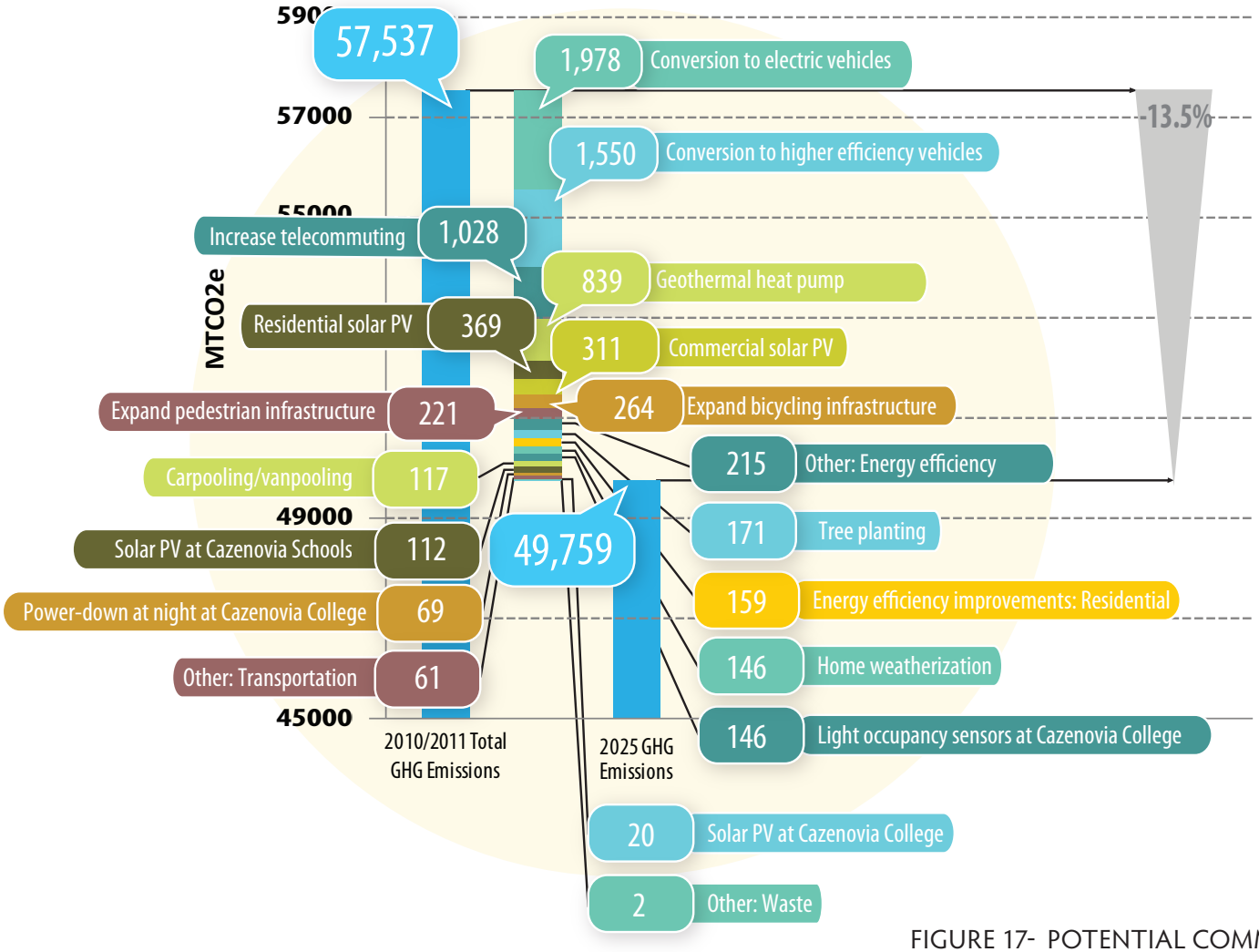

FIGURE 17- POTENTIAL COMMUNITY REDUCTIONS FROM STRATEGY IMPLEMENTATION

Cazenovia's baseline community emissions as recorded by the GHG inventory reports, potential reductions due to suggested mitigation strategies, and potential emissions in 2025 should each of the suggested mitigation strategies be implemented. It is estimated that there will be a 13.5% reduction in community emissions if all suggested community reduction strategies are implemented.

Concluding Remarks

The Cazenovia Greenhouse Gas Inventories and Climate Action Plan provided an opportunity for the town and village to collaborate on the development of energy efficiency and emission reductions. The planning effort encouraged local participation and brought together representatives from local government, the business community, non-profit organizations, citizens, and other key stakeholders to evaluate regional strengths and goals. The process provided a chance to gather information on sustainable community and economic development projects, to give community leaders support to advance sustainable projects, and to identify goals for new sustainable programs and initiatives.

Participants in the planning process worked for nearly a year to identify goals and strategies to improve the environment and address climate change through energy management, infrastructure, land use, and transportation. As a blueprint for the future, the Climate Action Plan efficiently summarizes an action-oriented guide containing strategies to ensure that Cazenovia meets the needs of current and future generations. In addition, the document will now provide State and local officials with the information needed for long-term commitments and investments in economic, social, and environmental resilience.

Our thanks go to the local leaders and community members for a job well-done. Town and village officials are encouraged to now focus on implementation of these recommendations, to review the progress made on an annual basis, and to re-evaluate emission reduction goals. In this way, Cazenovia will continue to protect natural resources, reduce emissions, become more resilient to climate change, and serve as a prominent showcase for energy efficiency and environmental stewardship.

Cazenovia Lake at Sunset

APPENDIX A: STRATEGY IMPLEMENTATION CHART

Issue	Strategy	Ballpark Rankings (see key below)			Implementation Methods				Additional Benefits			
		Costs (1-5)	GHG Reductions (1-5)	Payback (1-5)	Policy	Program	Capital Projects	Education/ Outreach	Green Job creation	Quality of Life	Water Conservation	Other
Transportation: Municipal	1. Conversion to electric vehicles	1	3	2			x			x		x
	2. Conversion to biodiesel	1[Δ]	3	N/A			x					x
	3. Conversion to hybrid vehicles	1	2	1			x			x		x
Transportation: Community	1. Conversion to electric vehicles	3	2	2			x	x		x		x
	2. Conversion to higher efficiency vehicles	1	2	1			x	x	x	x		x
	3. Increase telecommuting	1	1	1		x		x		x		x
	4. Expand bicycling infrastructure	1	1	1			x	x		x		x
	5. Improve/expand pedestrian infrastructure	3	1	5			x	x		x		x
	6. Promote carpooling/vanpooling	1	1	1		x		x		x		x
	7. Electric vehicle recharging facilities	2	1	5			x			x		x
	8. Increase bus ridership to and from school	1	1	1	x	x		x		x		x
	9. Provide bicycles for daily trips (bike share)	1	1	2		x	x	x		x		x
	10. Information item: Create a single district for trash collection	N/A	N/A	N/A	x							x

[Δ]While there would be no initial investment costs of using B20 biodiesel, conversion to biodiesel would be an annual cost of $2,980.33 in increased fuel costs for municipal operations.

Key to Ballpark Rankings		
Est. Total Costs	Est. Total GHG Impact	Est. Payback
1 = Less than $250,000	1 = 0-9.9% of goal	1 = Less than 1 year
2 = $250,000-$999,999	2 = 10-24.9% of goal	2 = 1-4.9 years
3 = $1 million-$24,999,999	3 = 25-49.9% of goal	3 = 5-9.9 years
4 = $25 million-$99,999,999	4 = 50-74.9% of goal	4 = 10-19.9 years
5 = $100 million or more	5 = 75-100% of goal	5 = 20 years or more

Issue	Strategy	Ballpark Rankings (see key below)			Implementation Methods				Additional Benefits			
		Costs (1-5)	GHG Reductions (1-5)	Payback (1-5)	Policy	Program	Capital Projects	Education/ Outreach	Green Job creation	Quality of Life	Water Conservation	Other
Energy/Efficiency: Municipal	1. Geothermal heating of Town Garage	1	4	3			x			x		x
	2. Install solar PV	2	4	3			x		x	x		x
	3. Energy efficiency retrofits of existing facilities	1	3	5			x		x	x	x	x
	4. Lighting Occupancy Sensors	1	2	1			x					x
	5. Power-Down at Night policy	1	2	1	x			x				x
	6. Indoor lighting retrofits	1	2	1			x			x		x
	7. Equipment retrofit: Energy Star appliances	1	1	1			x				x	x
	8. Install low-flow faucets and toilets	1	1	2			x				x	x
	9. Information item: Install LED streetlights	N/A	N/A	N/A			x		x	x		x
	10. Information Item: Convert septic systems to piped- sewage	N/A	N/A	N/A			x					x
	11. Information item: Implement additional solar control systems for water plant pumps	N/A	N/A	N/A			x					x
	12. Information item: Investigate technologies and strategies to reduce nitrogen emissions from septic tanks	N/A	N/A	N/A				x				x
	13. Information item: Micro-hydroelectric power	N/A	N/A	N/A			x		x			x
	14. Implement variable flow water pumps	N/A	N/A	N/A			x					x
Energy/Efficiency: Residential	1. Geothermal heat pump	3	1	3			x		x	x		x
	2. Residential solar PV	3	1	4		x	x	x	x	x		x
	3. Home weatherization	3	1	5			x			x		x
	4. Energy efficiency improvements: Residential	3	1	5			x			x	x	x
	5. Energy efficiency educational campaigns: Residents	1	1	1		x		x		x	x	x
	6. Equipment retrofit: refrigerators, computers, faucets, and toilets	1	1	4			x			x	x	x

APPENDIX A: STRATEGY IMPLEMENTATION CHART, CONTINUED

Issue	Strategy	Ballpark Rankings (see key below)			Implementation Methods				Additional Benefits			
		Costs (1-5)	GHG Reductions (1-5)	Payback (1-5)	Policy	Program	Capital Projects	Education/ Outreach	Green Job creation	Quality of Life	Water Conservation	Other
Energy/Efficiency: Commercial	1. Commercial solar PV	3	1	4		x	x	x	x	x		x
	2. Energy efficiency educational campaigns: businesses	1	1	1		x		x		x		x
	3. Energy efficiency retrofits to existing facilities: commercial	1	1	3			x			x		x
	4. Lighting occupancy sensors	1	1	1			x			x		x
	5. Power-Down at Night policy	1	1	1	x							x
Waste	1. Kitchen composting	1	1	1		x		x		x		x
	2. Yard waste composting	1	1	1		x		x		x		x
	3. Enhance curbside recycling	1	1	1		x		x		x		x
Natural Resources	1. Tree planting	1	1	2		x	x	x		x	x	x
Agriculture	1. Research the benefits of various soil management practices	N/A	N/A	N/A		x		x	x	x		x
	2. Research the benefits of various soil management practices	N/A	N/A	N/A		x		x	x	x		x

Key to Ballpark Rankings		
Est. Total Costs	Est. Total GHG Impact	Est. Payback
1 = Less than $250,000	1 = 0-9.9% of goal	1 = Less than 1 year
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3 = $1 million-$24,999,999	3 = 25-49.9% of goal	3 = 5-9.9 years
4 = $25 million-$99,999,999	4 = 50-74.9% of goal	4 = 10-19.9 years
5 = $100 million or more	5 = 75-100% of goal	5 = 20 years or more

APPENDIX B: ACRONYMS EXPLAINED

Btu and MMBtu: British Thermal Units and Millions of British Thermal Units. A Btu is the amount of energy needed to cool or heat one pound of water by one degree Fahrenheit, and MMBtu represents 1 million Btu.

CAFE: Corporate Average Fuel Economy. CAFE standards have been set by the federal government for the years 2016 and 2025.

CAPPA: Climate and Air Pollution Planning Assistant. CAPPA is a tool provided by ICLEI – Local Governments for Sustainability to help local communities assess the effectiveness of certain emissions reduction strategies in their communities. CAPPA is the tool that was used for all of the calculations in this document.

CNY RPDB: Central New York Regional Planning and Development Board. The CNY RPDB is a public agency that provides a range of services associated with the growth and development of communities in Cayuga, Cortland, Madison, Onondaga, and Oswego Counties.

GHG: Greenhouse Gas. Greenhouse Gases are gases in the Earth's atmosphere, such as water vapor, methane, carbon dioxide, and nitrous oxide, that allow sunlight to enter the atmosphere but also trap heat in the atmosphere, causing rises in Earth's atmospheric temperatures.

ICLEI: ICLEI-Local Governments for Sustainability is a non-profit organization that provides tools to local governments to assist with greenhouse gas inventories and climate action planning.

kW: Kilowatt. kW is a unit of power equal to 1,000 watts.

kWh: Kilowatt hour. A kilowatt-hour (symbolized kWh) is a unit of energy equivalent to one kilowatt (1 kW) of power expended for one hour (1 h) of time.

$MTCO_2e$: Metric Tons of Carbon Dioxide Equivalent. $MTCO_2e$ converts the warming potential of each greenhouse gas (i.e. carbon dioxide, nitrous oxide, methane, etc.) into one measurement.

NYSERDA: New York State Energy Research and Development Authority. NYSERDA is a public benefit corporation created in 1975. Its goal is to help New York meet its energy goals of reducing energy consumption, promoting the use of renewable energy sources, and protecting the environment. NYSERDA offers a variety of incentive programs to help New York residents achieve these goals.

PV: Photovoltaic. Solar PV systems convert sunlight directly into electricity.

VMT and DVMT: Vehicle Miles Traveled and Daily Vehicle Miles Traveled. Vehicle Miles Traveled (VMT) is the total number of miles driven by all vehicles within a given time period and geographic area. It is used by regional transportation and environmental agencies for planning purposes. VMT is influenced by factors such as population, age distribution, and the number of vehicles per household. However, the greatest factor by far is how land uses are arranged. Daily Vehicle Miles Traveled (DVMT) is the total number of miles driven by all vehicles within a geographic area in one day.

Central New York Regional Planning & Development Board

Central New York climate change innovation program ...a Program of the Central New York Regional Planning and Development Board

NEW YORK STATE OF OPPORTUNITY. Climate Smart Communities

CNY Energy Challenge ...a program of the Central New York Regional Planning & Development Board

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