

Town of Montezuma Climate Action Plan DECEMBER 2015



Farmland, Montezuma

Photo Credit: Amanda Mazzoni

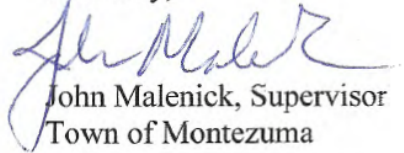
A MESSAGE FROM THE SUPERVISOR

Dear friends and neighbors,

The Town of Montezuma is committed to becoming a greener, more sustainable community. Not only have we adopted the Climate Smart Communities pledge, we have also planned energy efficiency projects that have helped reduce our ecological footprint while saving taxpayer dollars. This Climate Action Plan provides a course of action for the town to continue its efforts to improve sustainability and maintain the lowest possible costs.

This Climate Action Plan provides a benchmark of the town's energy use and emissions and outlines a variety of actions that the town and our community members can take to reduce energy use, emissions, and dollars spent on energy. Together we can enhance Montezuma's quality of life by continuing to make our community more sustainable.

Sincerely,



John Malenick, Supervisor
Town of Montezuma

ACKNOWLEDGEMENTS

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

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Cows in pasture, Montezuma
Photo Credit: Amanda Mazzoni

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.

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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 Montezuma.

The CAP provides local goals for reducing energy use from municipal operations and from the Montezuma 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 Montezuma;
- (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 2015 to discuss emission reduction goals and specific strategies for reaching them. The committee agreed on a goal to reduce municipal greenhouse gas emissions by 50% by the year 2025 and reduce community emissions by 10% from the GHG inventory baseline year (2010).¹

This CAP was prepared for Montezuma 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.



**Climate Smart
Communities**



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 160 municipalities in New York State (including the Town of Montezuma) 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 (C₂IP).

¹ The 10% community reduction goal refers to a 10% reduction from community emissions with thruway traffic emissions removed. This approach was used because there is no entrance or exit to the thruway in Montezuma, and all thruway traffic is therefore through-traffic only and unable to be influenced by the Montezuma community.



Left: Farmland by ADM facility

Photo Credit: Amanda Mazzoni



Right: Richmond Aqueduct

Photo Credit: Jean Mackay, Erie Canalway National Heritage Corridor

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 CO₂,² which is

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 CO₂.

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

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

The Town of Montezuma's Climate Action Plan was developed by an advisory committee made up of Barbara Culotti, Donald Ellinwood, Marian Ellinwood, John Fordyce, Carol Fordyce, Cheryl Longyear, John Malenick, and Joe Verdi. The committee was provided technical assistance by the CNY RPDB, who analyzed energy and emissions reduction strategies for the town utilizing data from the GHG inventory report. CNY RPDB provided information and suggestions to the advisory committee as to which energy efficiency strategies would be most successful in the town, how many MTCO₂e the strategies would prevent, co-benefits of the strategies, and other case studies explaining where the strategies have been implemented successfully. They also provided information about cost of implementation, possible funding sources, and payback period for the strategies. For more information on how the strategies were developed, including assumptions and references, refer

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 CO₂ record shows the present-day levels of CO₂ 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 323k yr BP.

Thinking Sustainably: The Village of Skaneateles, NY

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 Northeast¹

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>

to Appendix C: Action Strategy Summary Document.⁴

Implementing the Plan

In order to implement the strategies in this plan and achieve Montezuma's sustainability goals, the creation of a permanent sustainability committee is highly recommended. The sustainability committee would be comprised of a group of town residents who are committed to Montezuma's sustainable future and are willing to volunteer their time to help implement the strategies explained in this plan. It is recommended that the Climate Action Plan committee continue to meet in this capacity and work towards implementation of the strategies within 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.

Global Weather Extremes

Regions throughout the world are experiencing dramatic weather extremes. A primary influence on wind and precipitation variability can be attributed to the natural climate cycles of El Nino and La Nina that originate in the equatorial Pacific region. The cycles influence the direction and characteristics of jet streams, causing them to meander in the northern and southern hemispheres. The heat and water vapor resulting from these cycles enter the atmosphere and influence weather patterns around the globe.

⁴ Available at <http://townofmontezuma.org/>



Cayuga/Seneca Lock 11

Photo Credit: <http://montezumaheritagepark.blogspot.com/2012/05/clean-sweep-volunteers-prepare-park-for.html>

Another significant influence on weather patterns can be attributed to human activity. The long-term accumulation of greenhouse gases in the atmosphere is trapping heat and increasing temperatures in both terrestrial and aquatic ecosystems. The average surface temperature worldwide has increased approximately one degree Fahrenheit within the past four decades. As a result of this warming trend, Arctic sea ice has lost approximately 40% of its summer sea ice since the 1980s and autumn ocean temperatures have risen 3.6 to 9°F. As the ocean temperature increases, more moisture is released into the atmosphere. During the past twenty five years, scientists have measured a 4% average rise in water vapor in the air column which increases the potential for strong storm events. The following sections present information on how these global findings impact local climate characteristics in New York State and in Central New York.

NEW YORK STATE WEATHER CHARACTERISTICS

Central New York's climate is characterized by warm, dry summers and cold, snowy winters. Local 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. Although serious droughts are rare, 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 is a 600-page report that presents projected changes in climate for seven geographic regions in the State. It has served as a valuable resource for planners, policymakers, farmers, local governments and residents. The ClimAID report outlines the potential impacts of climate changes on eight sectors: water resources, coastal zones, ecosystems, agriculture, energy, transportation, telecommunications and public health, as well as steps that government, businesses, and private citizens can take to adapt to those impacts. 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.

In 2014, NYSERDA released updated data and projections of climate changes throughout the State that will likely result in greater impacts on flooding, agriculture, winter tourism, and many other areas. The report applies up-to-date climate models and methods to evaluate potential changes to New York State's climate as a result of increasing greenhouse gas emissions. The results reinforce the importance of preparing New York for the realities of a changing climate. The study confirms and refines the following projections that had originally been presented in the ClimAID report:

- + Sea level could rise significantly, permanently flooding some areas and increasing the likelihood of damage to coastal infrastructure from storm surge, including roads and bridges.
- + Inland and upstate, heavy downpours and subsequent flooding are expected to increase. In the winter, more rainstorms in place of snow are expected.
- + While winters will be milder, summers are expected to see more extreme and longer heat waves, with more droughts as well⁵

Flooding is a growing concern throughout New York State, especially with the rise in urban development 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,

⁵ http://www.nyc.gov/html/planyc/downloads/pdf/publications/NPCC2_Climate%20Methods%20Memorandum_2013.pdf



Updating Mentz Church Cemetery

Photo Credit: Montezuma Historical Society

travel through, or use recreational facilities located in these areas.

LOCAL CLIMATE CHARACTERISTICS

Montezuma is expected to experience a gradual increase in air temperature and a rise in the frequency of extreme weather events. According to Cooperative Extension, higher temperatures can lead to greater insect and disease pressures. The increased occurrence of storm events can contribute to flooding, stormwater runoff, and sediment loading to nearby Cayuga and Owasco lakes.

Montezuma committed to climate awareness and environmental protection by becoming a Climate Smart Community and has worked with the CNY RPDB for the past year on projects associated with the Climate Change Innovation Program. The Cayuga Lake Watershed Network, NYS Soil and Water Conservation's Agricultural Environmental Management Program, and NYS Concentrated Animal Feeding Operations (CAFO) regulations are also designed to help communities address the impacts of storm events by reducing runoff and pollution loading from agricultural operations. Viticulture, the production of grapes, is an important part of the Finger Lakes wine industry which contributes to an estimated 50,000 jobs and a \$2.7 billion economic impact for the region. Vineyards and other businesses in the agricultural community are implementing long and short-term efforts to reduce greenhouse gas emissions that contribute to climate change and to protect field crops, grapes, orchards and livestock that serve as the foundation of the local economy.

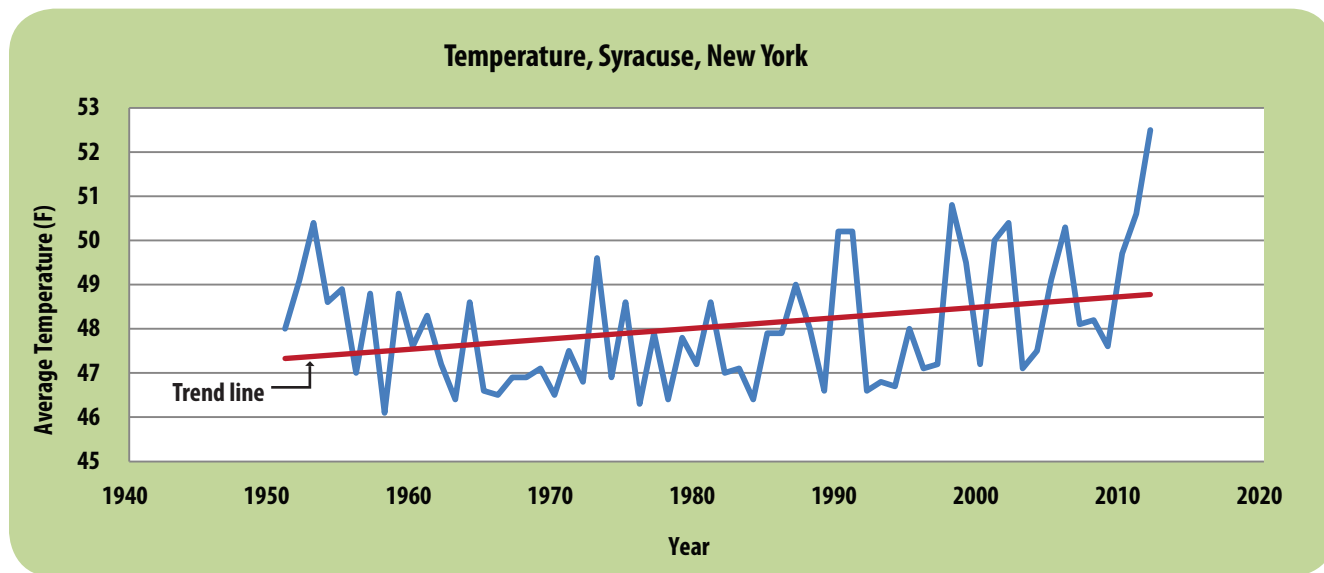


FIGURE 1- ANNUAL AVERAGE TEMPERATURE, SYRACUSE, NEW YORK.
SOURCE: NOAA NATIONAL WEATHER SERVICE FORECAST OFFICE

Temperature and Precipitation

The average July temperature (80.7°F) in Cayuga County is lower than the national average of 86.5°F. The average year-round temperature is 46.6°F, which is lower than the New York State average of 48.2°F, and much lower than the national average of 54.4°F. During the summer and parts of spring and autumn, temperatures rise during the daytime and fall rapidly after sunset. The following graph shows the annual average temperatures in the City of Syracuse since 1951 (Figure 1). The trend line shows a gradual warming trend. This information was recorded at the NOAA weather station at the Hancock International Airport.

The Finger Lakes region provides excellent air and water quality and ranks better than the national average. The county also ranks higher (54) than the national average (44) on the comfort index. The comfort index is based on humidity during the hot month and is rated on a scale of 1 to 100. Higher numbers reflect a greater degree of comfort.

Montezuma and neighboring communities generally experience seasonable weather patterns that are characteristic of the northeastern U.S. cyclonic system. Cayuga County receives an average of 36.3 inches of rain each year. This is similar to the national average of 36.5 inches. Long-term precipitation trends recorded at the Hancock International

Airport weather station in Syracuse New York are displayed below in Figure 2.

Snowfall

The average annual snowfall in Montezuma is 59.7 inches, which is higher than the New York State average of 57.9 inches. Central New York experienced exceptionally heavy snowfall, icy roads, and low temperatures during the 2013-14 winter season. Cayuga County normally receives an average of 74.5 inches of snow each year. This is significantly higher than the national average of 25 inches.

The Town of Montezuma is influenced by lake effect snowfall which is caused by a differential between cold air temperatures and warmer water temperatures found 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. Because of the increased water temperature and reduced duration of ice cover on Lake Ontario, Montezuma and other areas to the east and south of the lake are expected to experience heavier and more frequent lake-effect snowfall events.

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, relative to 1973.

Ice characteristics on the Great Lakes are important to monitor because of the influence on hydropower generation, commercial shipping, the fishing industry and other societal impacts. Scientists at the Great Lakes Research

Laboratory are observing long-term changes in ice cover as a result of global warming. Ice research is helping to determine the impacts on climate patterns, lake water levels, water movement patterns, water temperature structure, and spring plankton blooms. Ice coverage and duration influence lake water temperatures, as incoming solar radiation needs to melt the ice before it warms the lake water. However, weather conditions, lake depth, and heat storage capacity in the lakes are also important components that can influence the thermal cycle in the lakes. Because of the importance that ice has on lake characteristics, lake communities in the Finger Lakes region are encouraged to compile ice-in and ice-out dates on an annual basis.

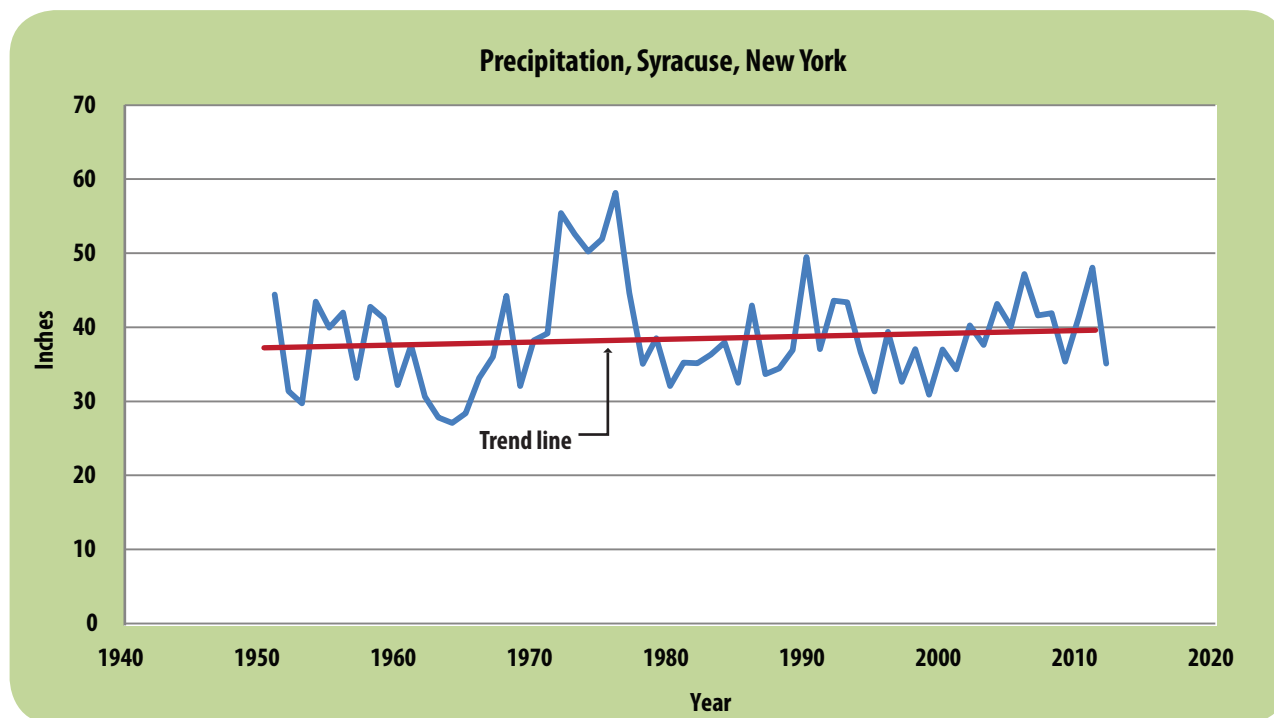


FIGURE 2- ANNUAL AVERAGE PRECIPITATION IN SYRACUSE, NEW YORK 1903-2008
SOURCE: NATIONAL WEATHER SERVICE FORECAST OFFICE

Extreme Weather Events

The relative intensity of local storm events is influenced by air temperature. As the air temperature rises, moisture in the atmosphere increases which contributes to a greater intensity and frequency of precipitation events. The warming air temperatures that are seen throughout New York State are caused by emissions of heat-trapping gasses in the atmosphere including pollution from fossil fuels. Warming air temperatures cause higher levels of oceanic evaporation which intensifies the water cycle throughout the globe. As a result, storm events in Montezuma and around the globe are gradually becoming more extreme with stronger wind and higher levels of rainfall.

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. Meteorologists report that the total annual amount of precipitation is changing as well as the distribution and intensity of storm events.

Strong storm events in Central New York contribute to localized flooding, soil erosion, and stormwater runoff. These conditions can cause damage to roads, bridges, and other infrastructure in Montezuma. The role of agencies such as the Cayuga County Soil and Water Conservation District and the Natural Resource Conservation Service will become increasingly important in the coming years, especially in terms of their work with stream bank stabilization, erosion and sediment control, and stormwater management. Incorporating green infrastructure and enhancing stormwater management helps to reduce the threat of flooding and improves

the water quality in local lakes and tributaries. In addition to improving air and water quality, green Infrastructure is a cost-effective approach that can provide additional community benefits such as reducing energy use and mitigating climate change; improving habitat for wildlife; reducing Montezuma's infrastructure costs; and promoting economic growth.

Flooding

Flooding is influenced by the intensity and amount of precipitation, spring snowmelt, groundwater levels, and the concentration 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

TABLE 1- TOTAL ASSESSED VALUE (TAV) OF PARCELS INTERSECTING FLOOD PLAINS¹

Municipality	TAV of Parcels Intersecting Flood Plain	# Acres of Parcels Intersecting Flood Plain	TAV of Municipality	TAV % Floodplain Parcels within the Municipality
Town of Montezuma	\$15,492,891	5,778	\$50,200,248	30.9%

¹ Source: 2014 tax parcel data, Cayuga County

TABLE 2- PARCELS WITHIN 100-YEAR FLOODPLAIN¹

Municipality	Parcels	Parcels in 100-Year Floodplain	% of Parcels in 100-Year Floodplain
Town of Montezuma	682	160	23.5%

¹ Source: 2014 tax parcel data, Cayuga County

natural hazards combined. FEMA reports that floods kill more people than any other form of severe weather with damages exceeding \$3.5 billion annually. Further, 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.

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 2014, the total assessed value of property located within designated FEMA flood zones in Montezuma represents 30.9% of the total assessed value of parcels throughout town (Table 1). Of the 682 land parcels in the Town, 23.5% is located in FEMA flood zones (Table 2).

Tourism and Recreation

Weather has a significant impact on the tourism and recreation sector throughout the Finger Lakes region. Seasonal weather patterns, especially precipitation rates, determine lake water levels for boating, the rate of erosion and pollution loading of nutrients and sediment, snow cover for skiing, and waterfowl breeding rates for sport hunting. Weather influences the duration and types of outdoor

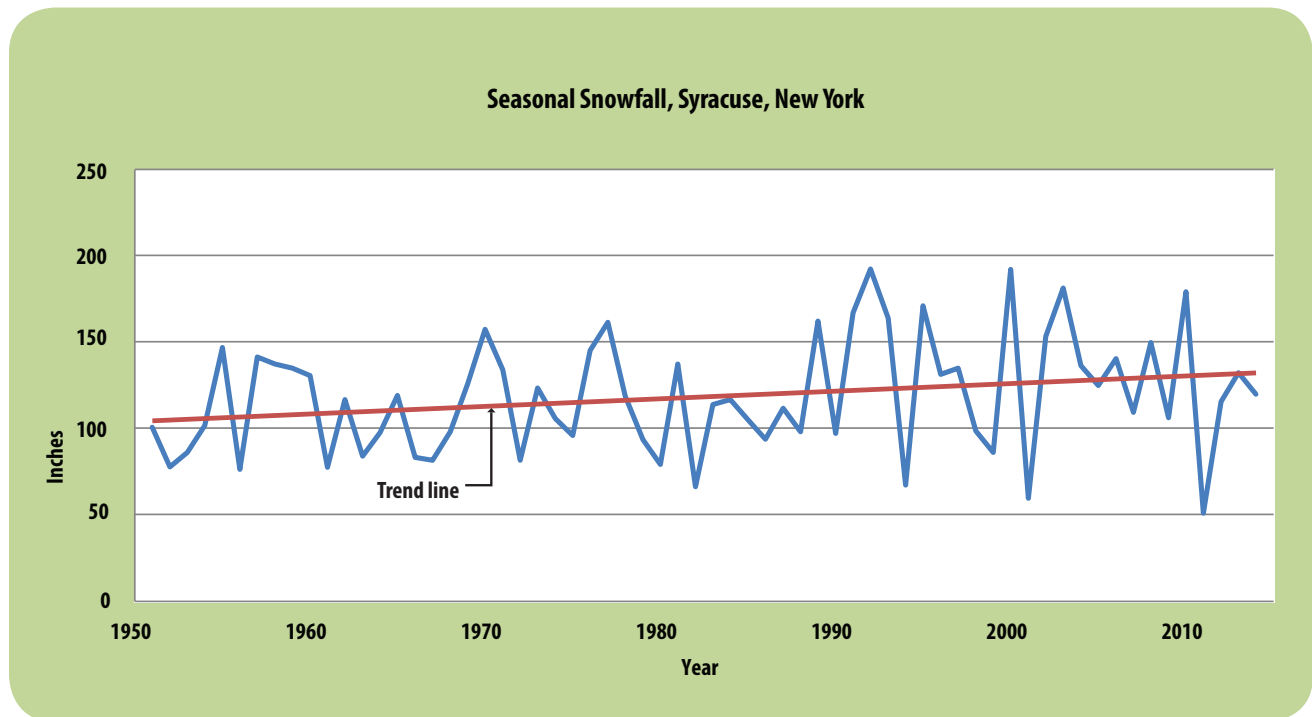


FIGURE 3- SEASONAL SNOWFALL IN SYRACUSE, NY, 1949-50 TO 2014-15
SOURCE: NATIONAL WEATHER SERVICE FORECAST OFFICE

recreation activities that take place and plays a predominant role in determining local economic vitality.

1,334 acres of land in Montezuma are wild, forested, conservation lands, or public parks, including all or portions of Giardina Park, Willow Grove Park, Montezuma Heritage Park, the Montezuma National Wildlife Refuge, and the Northern Montezuma Wildlife Management Area. The Montezuma National Wildlife Refuge is a National Natural Landmark. Located in the middle of one of the most active flight lanes in the Atlantic Flyway, Montezuma National Wildlife Refuge was established in 1938 as a refuge and breeding ground for migratory birds and other wildlife. It provides

resting, feeding, and nesting habitat for waterfowl and other migratory birds on its 9,809 acres. 242 species of birds, 43 species of mammals, 15 species of reptiles, and 16 species of amphibians can be found on the refuge for at least part of the year.

Warming trends will impact the region's outdoor recreation opportunities and may reduce recreational income generated for the local economy. In addition to the ski industry, New York State maintains 8,000 miles of snowmobiling trails that also contributes to the local economy. Ski resorts and snowmobiling relies on natural snowfall which is forecasted to decrease with climate change. This has the potential to reduce business generated from

retail stores and associated snowmobiling industries. The local warming trend is also 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.

Public Health

Changes in climate conditions are affecting human health. Several health impacts of warming temperatures have been documented throughout the country such as increased 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. Food, water, and animal-borne diseases affecting humans, livestock, and wildlife are governed by environmental conditions. Projections of warmer winters, hotter summers, and unpredictable precipitation patterns can cause increases in certain types of diseases. For example, climate change in the Northeast is expected to result in the increased population rates of mosquitoes and ticks. As the population of these insect increases, it could result in more frequent outbreaks of West Nile Virus and Lyme disease-causing bacteria.

Invasive and Endangered Species

While insects and diseases are a natural part of the aquatic and terrestrial ecosystems, climate change is gradually shifting pest populations of some invasive as well as native species. Some warm-weather species that previously could not survive cold temperatures are now able to

establish themselves, threatening populations of native species. This is already occurring with increasing invasive species populations throughout New York State. Early detection and a rapid response of new infestations of invasive species are the most effective ways that Montezuma 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.

Agriculture

Montezuma is located northwest of the City of Auburn at the great bend in the Seneca River. The region features deep north-south valleys. The gently rolling farmland in Montezuma varies in elevation between about 380 and 670 feet. In places, the landscape of the town offers spectacular views of surrounding farmland. Cayuga Lake offers a prime water supply source to populations in the region.

46% of the land in Montezuma is classified



Historic photo of Erie Canal Basin, Montezuma

Photo Credit: Town of Montezuma

as agricultural. Farmers participate in numerous conservation activities to avoid surface and groundwater contamination and to reduce pollution runoff to nearby waterbodies. The Cayuga County Soil and Water Conservation District (SWCD) develops erosion and sediment control plans, assists with stormwater facility permitting, works on streambank restoration to reduce erosion and sedimentation, and provides assistance in the identification of green infrastructure opportunities. Montezuma is working with the SWCD to identify priority erosion areas in the watershed and to design preventative measures to reduce stormwater runoff.

As with many New York State farming communities, the conversion of land from agricultural to non-agricultural uses is often caused by development pressures and land use conflicts. Farmland protection for Montezuma and neighboring communities in Cayuga County involves laws, policies and programs that support a strong local economy and that protect agricultural land use. Several methods of farmland protection strategies are found at the state, county and local levels. Examples of these tools include the County Agricultural District No. 5, agricultural value assessments, local and state right-to-farm laws, infrastructure support, economic development, conservation easements and land use planning that is sensitive to the needs of farms and agriculturally based businesses. The Cayuga Farmland Protection Plan is intended to evaluate existing farmland protection policies and laws, and propose ways to strengthen or add to them.



Hejamada Campgrounds

Photo Credit: Hejamada Campgrounds

Cayuga County contains a single agricultural district that was created under Article 25AA of the New York State Agriculture and Markets Law. Agricultural District #5 was consolidated from six County Agricultural Districts in 2013. It contains 15,270 parcels and 360,866.75 acres, 64% of which is active viable agricultural land. Approximately 82% of the total land area in the county is within the Agricultural District.

Valuable surface water resources including lakes, wetlands and high-quality groundwater can be found in Montezuma and throughout Cayuga County. Despite an abundant availability of water, certain areas of the county have experienced drought. Big Salmon Creek experienced several droughts, most recently

in the 1990s, which alternated from year to year with flood events. Several agricultural operations including large dairy farms depend on Big Salmon Creek for their water supply. If farms continue to expand in the southern areas of the county, some farmers may eventually be challenged by the availability of a reliable and abundant water source. The County Soil and Water Conservation District, Cornell Cooperative Extension and the Natural Resources Conservation Service are available to provide assistance to Montezuma farmers in developing and implementing best management practices that can address pollution runoff, flooding and drought.

COMMUNITY CHARACTERISTICS

There is a growing recognition by scientists and policy analysts that a substantial part of the global warming challenge could be met through a change in the design of cities and towns. The form and function of municipalities can reduce the demand for energy by influencing how energy 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.



Clifford House

Photo Credit: Amanda Mazzoni

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.

Transportation

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

The vast majority of vehicles burn carbon fuels and this is expected to continue for some time, even with aggressive fuel substitution and efficiency measures. Strategies that reduce travel by limiting low-density development and encouraging compact, walkable, full-spectrum living and working communities 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, or drive. These travel choices directly affect the amount of transportation-related GHG emissions that are produced.

According to data from the U.S. Census Bureau, Center for Economic Studies, about 25% of the residents in Montezuma that work outside of the home commute to jobs in the City of Auburn. Additional transportation destinations are found in Table 4.

Single-passenger automobile trips to and from Montezuma generate substantially more GHG emissions per mile than carpooling, walking, or biking. According to the U.S. Census Bureau, 664 residents in Montezuma were employed in 2013. Of this total, the majority was employed in manufacturing (17.8%), health care and social assistance (15.4%), or retail (12.5%).

Of the total number of employed residents, approximately 448 (83%) drove alone to work, 55 (10.2%) carpoolled, and 19 (3.5%) worked from home (Table 5). Single-passenger automobile trips constituted the vast majority. Preparation of a commuting analysis would help determine the need for organized carpooling opportunities. The majority of workers (65.5%) commuted less than 30 minutes to work (Table 6). Carpooling, ridesharing, and similar efforts to reduce vehicle traffic will help to reduce greenhouse gas emissions.

Land Use

Recommendations for urban design in smaller communities such as Montezuma include the installation of green infrastructure to reduce stormwater runoff near homes and businesses. Support of localized food production and reliance on farmers markets will reduce shipping, storage, and packaging needs. These and other strategies that make use of land use and transportation alternatives could contribute to overall GHG mitigation.

TABLE 4- COMMUTING DESTINATIONS FROM MONTEZUMA, NY¹

Municipality	Estimated percentage of Montezuma Residents Commuting to Destination
Auburn City, Cayuga County	24.5%
Syracuse City, Onondaga County	6.9%
Aurelius Town, Cayuga County	4.1%
Skaneateles Town, Onondaga County	3.5%
Owasco Town, Cayuga County	3.0%
Mentz Town, Cayuga County	2.7%
Sennett Town, Cayuga County	2.7%
Seneca Falls Town, Seneca County	2.3%
Brutus Town, Cayuga County	2.0%
Rochester City, Monroe County	2.0%
Other	46.4%

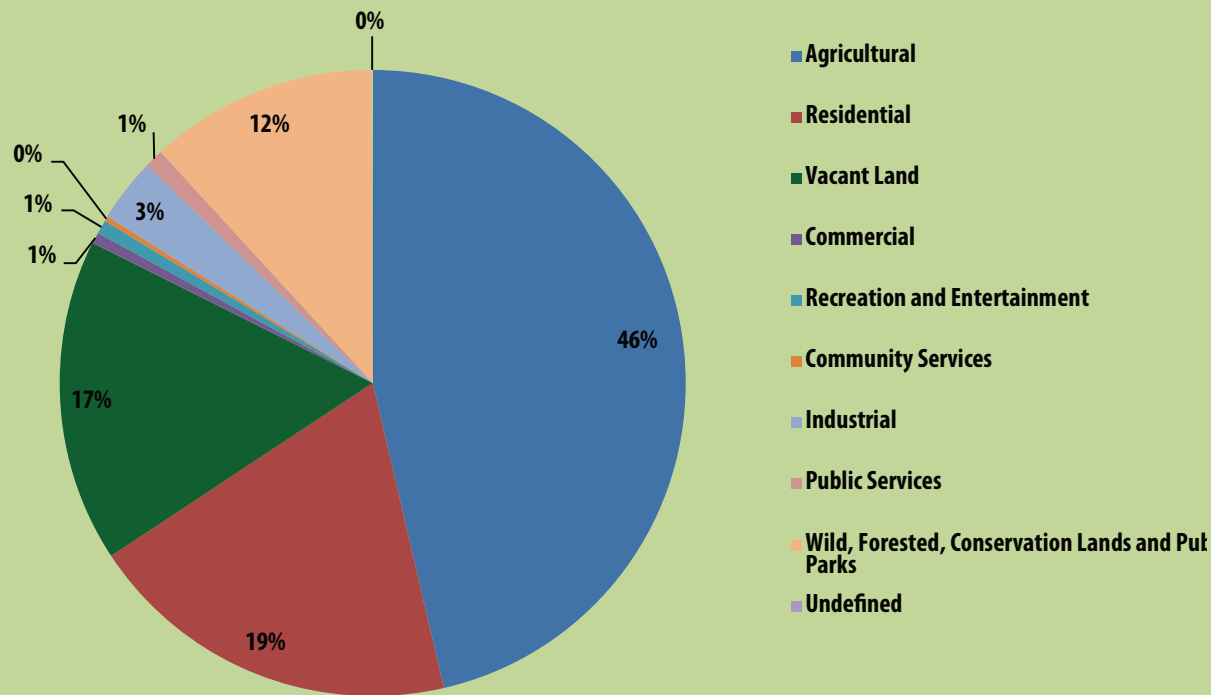
¹ Source: U.S. Census Bureau, Center for Economic Studies, 2013

TABLE 5- TRANSPORTATION TO WORK IN MONTEZUMA¹

Transportation to Work	Number of Workers	Percentage
Car, truck, van - drove alone	448	83.0%
Car, truck, van - carpoolled	55	10.2%
Public transportation (excluding taxicab)	0	0%
Walk to work	18	3.3%
Worked from home	19	3.5%
Taxicab, motorcycle, bicycle, or other means	0	0%
TOTAL	540	100%

¹ Source: American Community Survey, 2009-2013

FIGURE 4- MONTEZUMA LAND USE TYPES



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.

Land use categories for the Town of Montezuma are summarized in Figure 4. The category called 'wild, forested, conservation lands and public parks' includes land tracts with merchantable timber, state-owned forest land, county-owned reforested land, public parks, and wetlands. The category called 'Vacant' includes non-productive and abandoned agricultural land and residential vacant land.

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, proximity of uses, and density. Each of these topics is discussed on the following pages.

Diversity of Use: Diversity of use refers to the degree to which residential, commercial, industrial, institutional, and recreational uses are located together. Increasing the diversity of neighborhood-serving, and specifically job-rich, uses within a community could help reduce transportation-related GHG emissions. Increased diversity reduces travel distances and facilitates more walking and cycling trips. Improving the mix of uses within a community can also reduce commute distances, particularly if affordably priced housing is located in areas with a high number of jobs and employees can commute to work using alternative modes.

A jobs/housing ratio is commonly used to evaluate the diversity of land uses within a

FIGURE 5- TOWN OF MONTEZUMA LAND USE

community by describing the relationship between employment opportunities and housing supply. A ratio of 1.0 describes a balance between jobs and housing. A ratio above 1.0 indicates that there are more jobs than housing, while a ratio below 1.0 describes an undersupply of jobs relative to housing. In 2013, there were approximately 51 jobs in Montezuma and 463 occupied households and the jobs/housing ratio was approximately 0.1. This demonstrates that there were significantly 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. Of the 431 residential parcels in Montezuma, 137 (29%) are located within ¼ mile of a commercial parcel either within the town or in neighboring towns. Although some residential areas are distant from commercial services, overall, the existing land use pattern creates some opportunities for pedestrian and bicycle travel.

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 increase the use of alternative modes of transportation. Residential density is normally

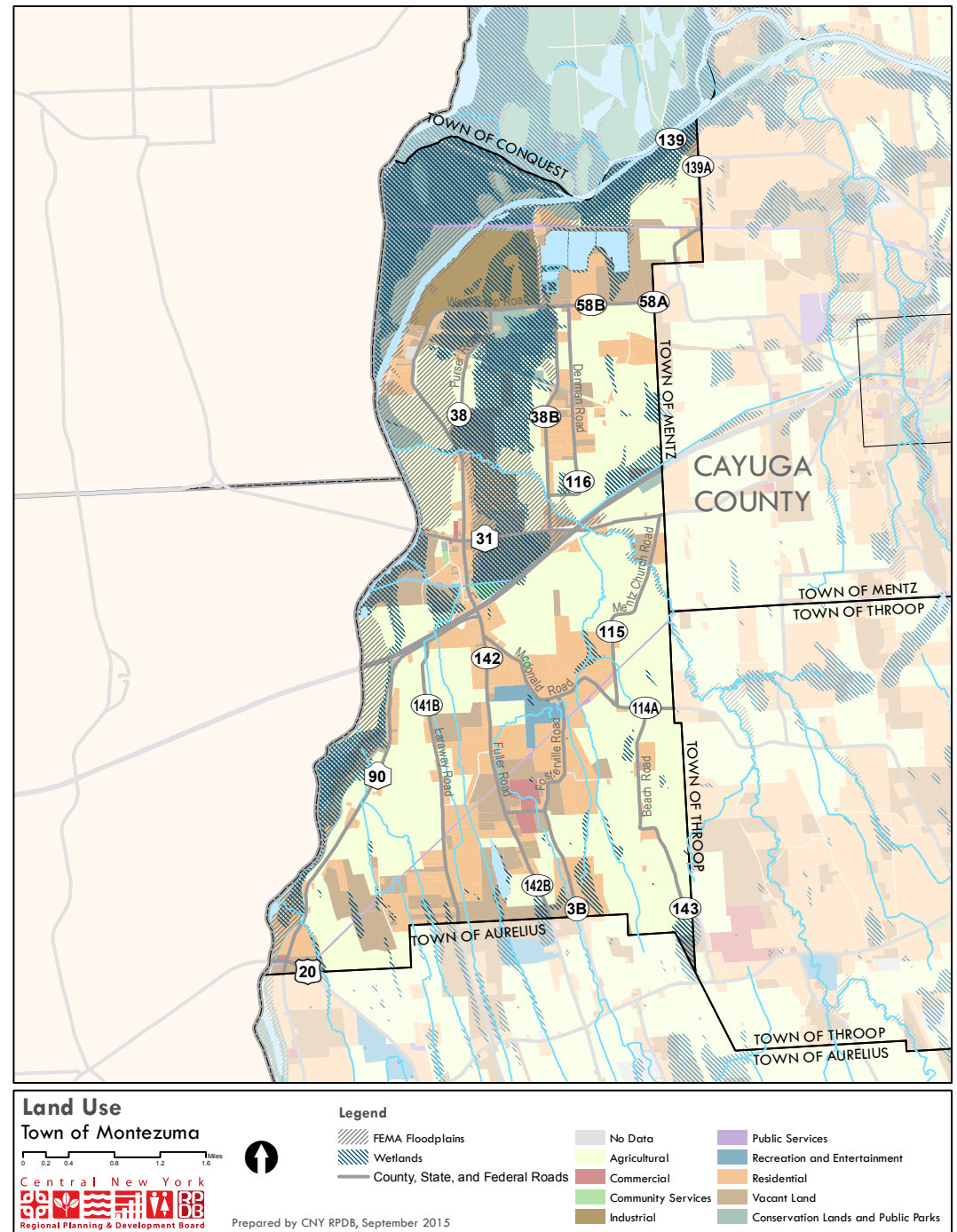
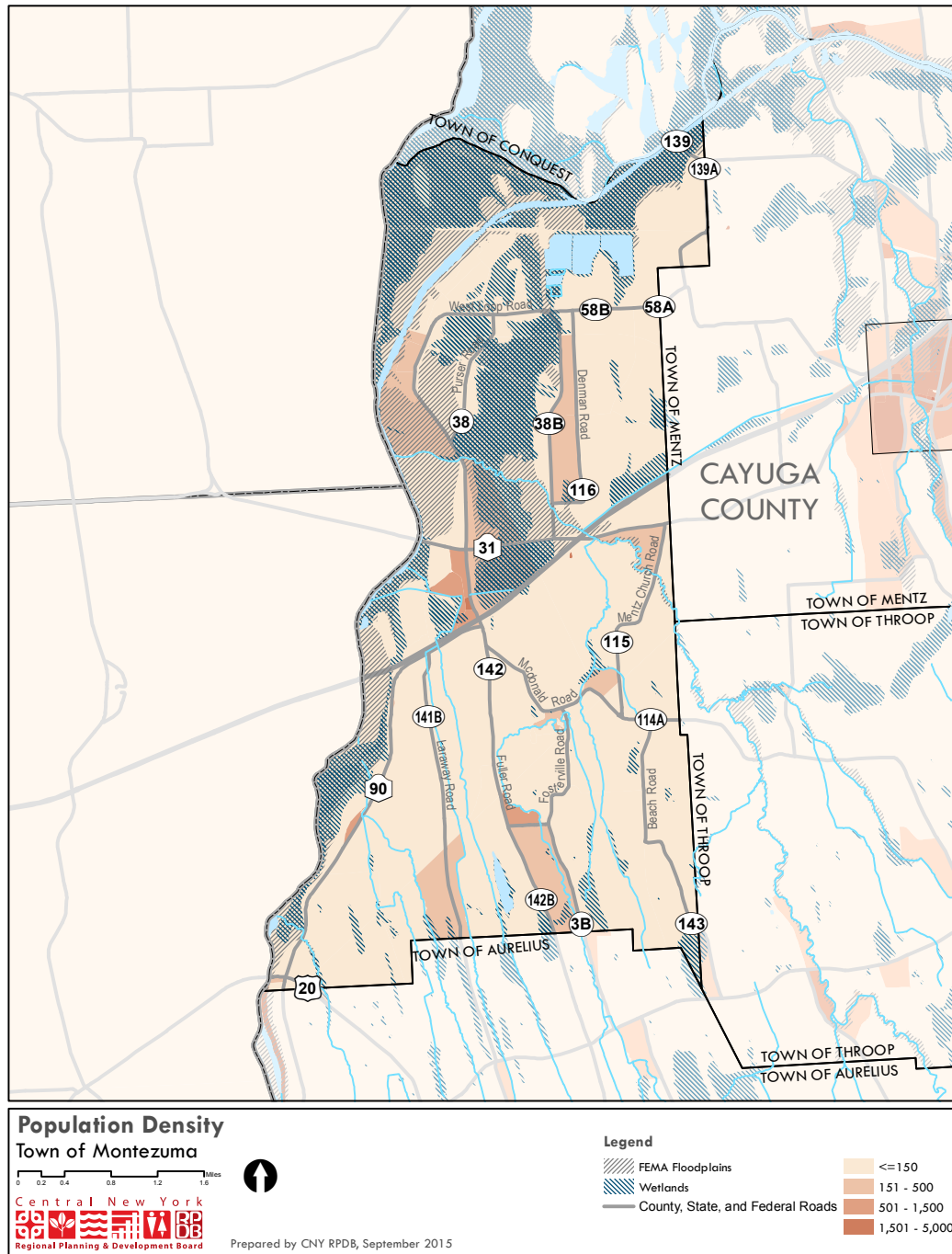


FIGURE 6- TOWN OF MONTEZUMA POPULATION DENSITY



measured in terms of households per acre. According to the 2013 American Community Survey, Montezuma has a relatively low residential density of 0.04 households per acre.

TABLE 6- COMMUTE TIMES TO WORK FROM THE TOWN OF MONTEZUMA¹

Commute Times	Workers	Percentage
Less than 15 minutes	129	24.8%
15-29 minutes	212	40.7%
30-59 minutes	134	25.7%
60-89 minutes	26	5.0%
90+ minutes	20	3.8%
TOTAL	521	100%

¹ Source: American Community Survey, 2009-2013

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.



Farmland, Montezuma

Photo Credit: Amanda Mazzoni

Greenhouse Gas Inventory Summary

As part of the Climate Change Innovation Program, an inventory of the town's municipal and community Greenhouse Gas (GHG) emissions was conducted in 2015 with the assistance by CNY RPDB staff. The 2015 inventory report examined emissions generated in the Town of Montezuma 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 53 metric tons of carbon dioxide equivalent (MTCO₂e), which were broken up into 4 sectors: buildings and facilities (17 MTCO₂e, 32%), streetlights and traffic signals (8 MTCO₂e, 15%), vehicle fleet (27 MTCO₂e, 51%), and water delivery facilities (1 MTCO₂e, 2%).

Community emissions totaled 24,976 MTCO₂e, which were broken up into 4 sectors: residential energy (2,243 MTCO₂e, 10%), commercial energy (993 MTCO₂e, 4%), transportation (21,268 MTCO₂e, 85%), and waste (472 MTCO₂e, 2%). Because there is no entrance or exit to the thruway in Montezuma, all thruway traffic is through-traffic and therefore not able to be influenced by the town. This data has been removed from the community emissions graph in Figure 9.

The Town of Montezuma's Climate Action Plan uses the data gathered in the 2015 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 Montezuma to reduce emissions, energy use, and dollars spent on municipal and community operations by the year 2025.

FIGURE 7- TOWN OF MONTEZUMA MUNICIPAL EMISSIONS BY SECTOR MTCO₂E (2010 BASELINE)

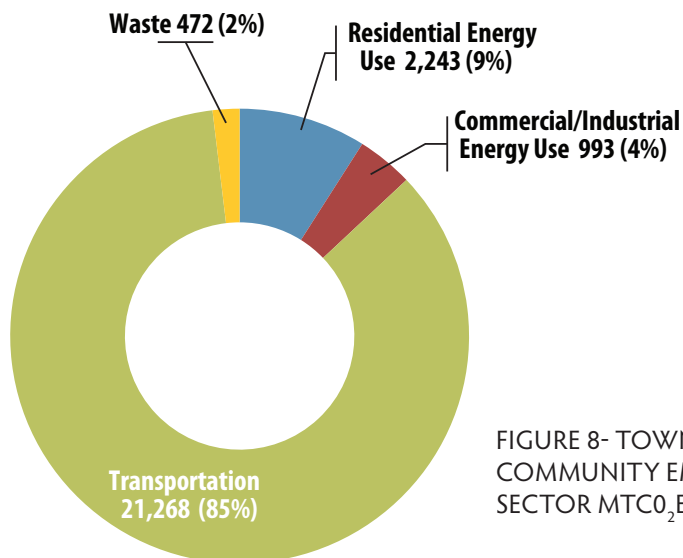
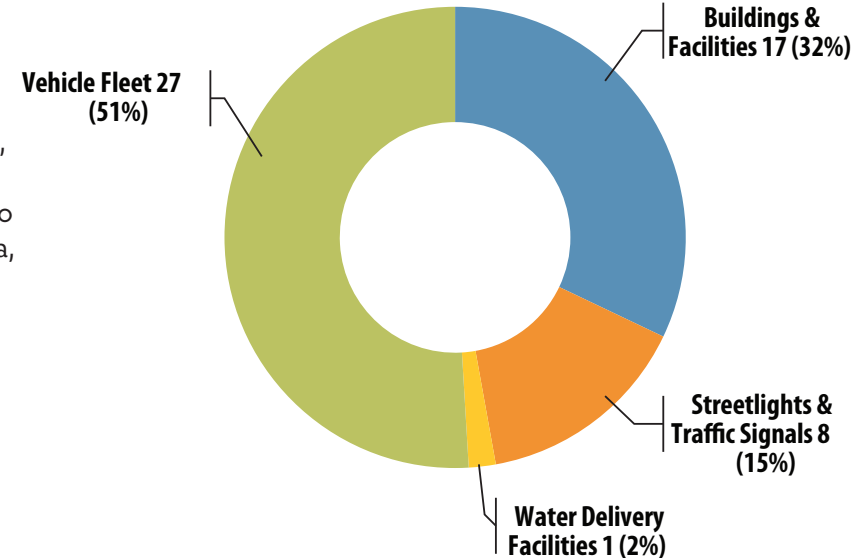


FIGURE 8- TOWN OF MONTEZUMA COMMUNITY EMISSIONS BY SECTOR MTCO₂E (2010 BASELINE)

FIGURE 9- TOWN OF MONTEZUMA COMMUNITY EMISSIONS BY SECTOR MTCO₂E (2010 BASELINE) WITH THRUWAY TRAFFIC REMOVED

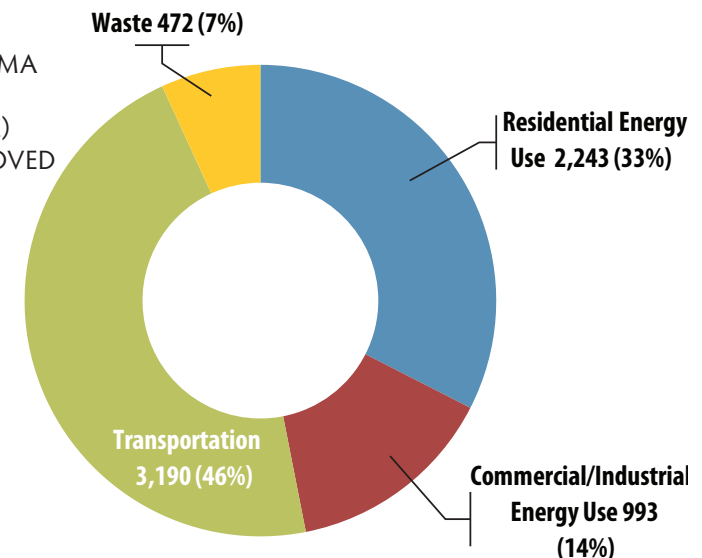
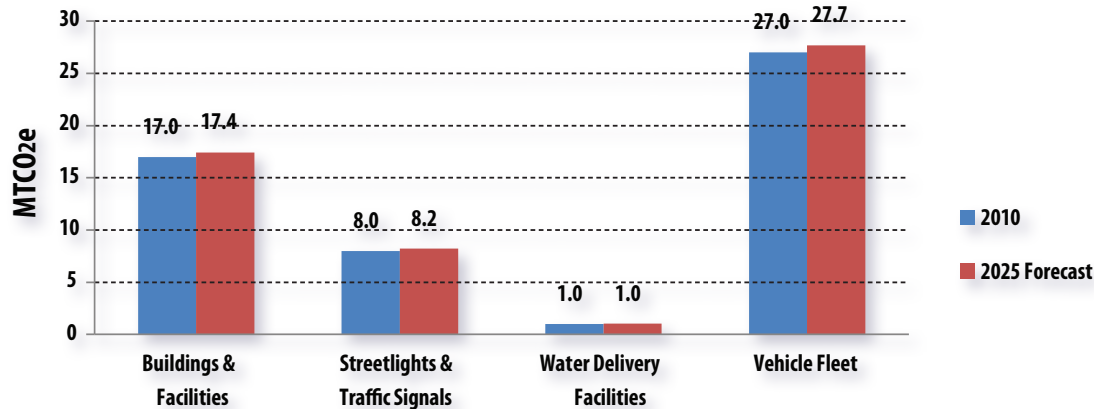
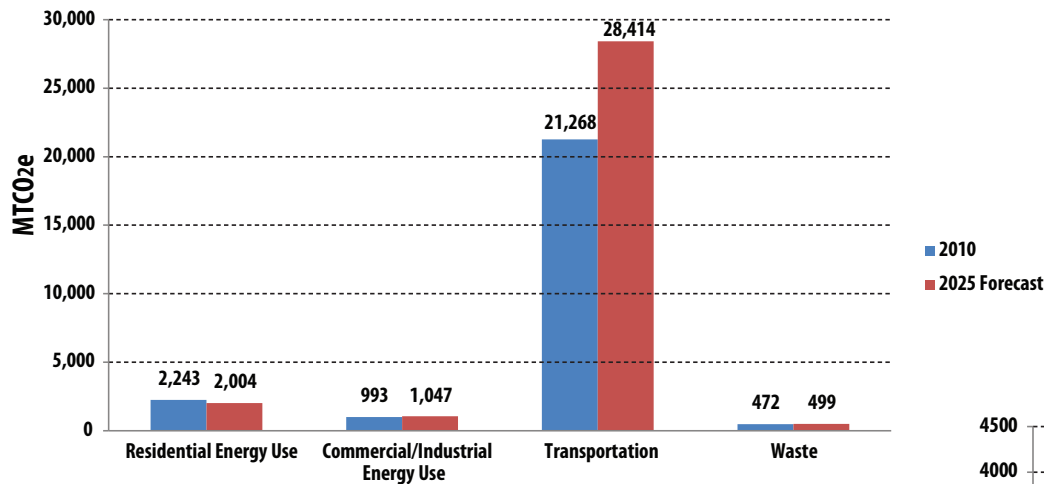


FIGURE 10- EMISSION FORECAST:
MUNICIPAL OPERATIONS



The GHG inventory report also forecasted emissions for the Town of Montezuma in 2025. The report explained that town municipal emissions are expected to total 54 MTCO₂e in 2025, with a 0.4 MTCO₂e increase in buildings and facilities emissions, a 0.2 MTCO₂e increase in streetlights and traffic signals, and a 0.03 MTCO₂e increase in water and sewer facilities, and a 0.7 MTCO₂e increase in vehicle fleet.

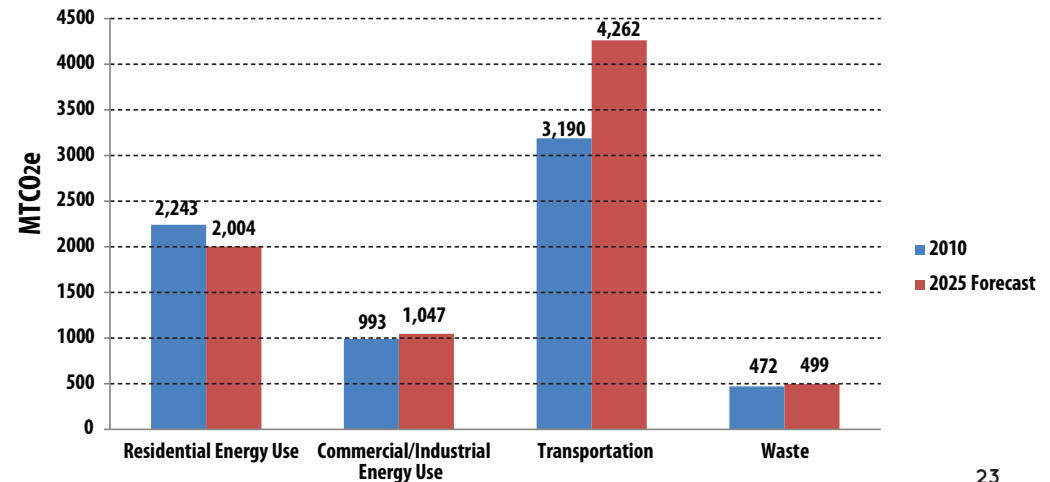
FIGURE 11- EMISSION FORECAST:
COMMUNITY







Community emissions are expected to total 31,964 MTCO₂e in 2025, with a 239 MTCO₂e decrease in the residential sector, a 54 MTCO₂e increase in the commercial/industrial sector, a 7,146 MTCO₂e increase in the transportation sector, and a 27 MTCO₂e increase in the waste sector.

Because there is no entrance or exit to the thruway in Montezuma, all thruway traffic is through-traffic and therefore not able to be influenced by the town. This data has been removed from the community emissions graph in Figure 12.

FIGURE 12- EMISSION FORECAST:
COMMUNITY - WITHOUT THRUWAY



1 MTCO₂e =

-  CO₂ emissions from 112 gallons of gasoline consumed
-  CO₂ emissions from 2.3 barrels of oil consumed
-  CO₂ emissions from 41.7 propane cylinders used for home barbeques
-  Carbon sequestered by almost 1 acre of U.S. forests in one year

Climate Action Accomplishments

The Montezuma community and county planners have been pro-active in adapting to climate change and have taken steps to reduce greenhouse gas emissions. The town, along with more than 160 other municipalities in New York State, signed municipal resolutions to become Climate Smart Communities. The town worked with the CNY Regional Planning and Development Board to complete a greenhouse gas inventory in July 2015. The following narrative provides a brief summary of several additional initiatives to protect the community against storm events, excessive heat, and other climate influences.

The Town of Montezuma is in the process of creating a Comprehensive Plan with assistance from the CNY RPDB. The Comprehensive Plan committee is using LEED's Technical Guidance Manual for Sustainable Neighborhoods to guide Plan development and discussions. The Comprehensive Plan should include suggestions for sustainable growth and development, including Smart Growth principals.

The Town of Montezuma is participating in the CNY RPDB's Solarize program for municipalities. The town has selected municipally-owned sites within the town as possible locations for solar installations to offset municipal energy use and reduce emissions. These sites are currently being assessed by the CNY RPDB and their consultant, Optony, to determine the feasibility of the sites for solar PV.

The Town of Montezuma is also helping to promote Solarize CNY, a solar PV bulk-purchasing program for Cayuga, Cortland, Madison, Onondaga, and Oswego Counties. The program offers significant discounts for solar PV installations for residents, businesses, and municipalities.

The goal of the Cayuga County agricultural community is to provide viable and sustainable farms and agriculture-related businesses that support the local economy. A well-defined agricultural strategy is presented in a document called the Cayuga County Agriculture and Farmland Protection Plan. Energy conservation and environmental stewardship are components of county goals. According to the Plan,

"Our farms, businesses, institutions and governments strengthen our agriculture's economic viability through improved farm management and technology; generation of on-farm energy; increased access to quality agricultural education and training for farmers, farmworkers and the general public; enhanced support of new and young farmers; outreach to increase the awareness of agriculture as vital to our communities; implementation of sound environmental stewardship practices and encouragement of agriculture-friendly land use policies."

Researchers should continue water quality sampling on the Seneca River and Cayuga and Owasco lakes. Water quality is influenced by storm events, streambank erosion, and nutrient



Birds in flight at Montezuma National Refuge

Photo Credit: NYS DEC

runoff from agricultural and other land uses within the watershed. Detailed sampling (called segment analysis) should continue to help identify non-point sources of pollution.

A comprehensive approach to emergency management can save lives and minimize property damage while identifying activities, functions, and expertise necessary to deal with emergencies. The Cayuga County Comprehensive Emergency Management Plan was developed to ensure that the County can efficiently and effectively manage weather emergency and disaster situations. The Plan is a management tool based on four categories: preparedness, risk reduction (prevention and mitigation), response, and recovery). This approach helps Montezuma and other municipalities deal efficiently with emergencies or disasters.

Public awareness of emergency situations and the ability of the public to appropriately react in a prompt and effective manner is extremely important. Additional information on how to prepare for an emergency or disaster is available at the following websites:

- + Department of Homeland Security and Emergency Services, New York State Aware / Prepare Website
- + New York Alert, NY-Alert
- + FEMA Ready Alerts, <http://www.ready.gov/alerts>
- + Emergency Management literature, New York State Emergency Management Preparedness Brochure
- + National Weather Service storm awareness materials, National Weather Service Preparedness



Montezuma Town Hall

Photo Credit: Town of Montezuma

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." Their findings are based on numerous independent scientific analyses and observations of the climate system, paleoclimate archives, theoretical studies of climate processes and simulations using climate models. The Summary for Policymakers of

the IPCC Working Group I assessment report was approved in September 2013 by the member governments of the IPCC meeting in Stockholm, Sweden.

Climate Adaptation vs. Mitigation

Unprecedented human intervention will be required in the coming decades to reduce the extent of climate change. This can be done by avoiding the potential consequences (referred to as **mitigation**), or making changes to accommodate those effects that are unavoidable (referred to as **adaptation**). Much of the mitigation policy discussion to date has centered on reducing greenhouse gas (GHG) emissions through fuel substitution and fuel efficiency for vehicles and on energy efficiency for buildings and industries. Many of the adaptation and mitigation recommendations for Montezuma were based on findings from the town's greenhouse gas inventory.

Mitigation Strategies

CNY RPDB staff and the advisory committee worked throughout 2015 to analyze potential mitigation strategies for reducing the town's emissions for both municipal operations and from the community-at-large. CNY RPDB utilized a software tool developed by ICLEI-Local Governments for Sustainability known as CAPP (Climate and Air Pollution Planning Assistant) version 1.5 to calculate potential GHG reductions as well as cost savings for each mitigation strategy. CAPP 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. CAPP 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. CAPP users can compare the relative benefits of a wide variety



High Street Trailhead, Montezuma Heritage Park

Photo Credit: <http://montezumaheritagepark.blogspot.com/p/components-of-park.html>

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 CAPP, 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 13-17.

Adaptation Strategies

The U.S. Environmental Protection Agency refers to the term 'adaptation' as the adjustment or preparation of natural or human systems to a changing environment which moderates harm or exploits beneficial opportunities. Examples of community adaptation to extreme weather include development of early storm warning systems, air-conditioned cooling shelters, and policies that discourage people from building in flood prone areas. This type of initiative requires comprehensive, community-wide planning

that addresses all climate risk factors that may be associated with storm events, flooding, snowfall, and wind damage.

The scale of intervention required to reduce and adapt to the effects of climate change will require action at all levels of government and society. International accords to limit overall carbon emissions will involve national governments. Setting carbon emission targets and standards by industry or sector, or fuel efficiency standards for vehicles, falls within the traditional purview of federal and state governments. New York State, for example, has set aggressive energy and climate goals, including meeting 30% of the state's electric needs with renewable energy sources by 2030, and reducing greenhouse gas (GHG) emission by 80% (below 1990 levels) by 2050.

A primary goal for Central New York, as presented in *Vision CNY: Central New York Regional Sustainability Plan*, is to reduce CO₂ emissions, increase use of alternative energy such as solar and wind, and adapt to a changing climate by improving community resilience, protecting infrastructure, and protecting natural systems. A gradual increase in high and low temperature extremes, coinciding with an increase in the frequency and intensity of storm events are expected to impact transportation infrastructure, human health, agricultural practices, forest diversity, and migratory patterns of invasive species. Adapting to climate change will provide opportunities for Montezuma- to improve the health and resilience of the community and will provide long-term protection of natural resources.

Town governments are leading by example by reviewing options to reduce energy usage in



Helmer's Marsh

Photo Credit: Amanda Mazzoni

municipal facilities through alternative fuels for transportation fleets and renewable energy sources. Local officials and the CNY RPDB are meeting with community leaders to review building codes and standards, and to explore options to educate the public about adaptation measures and alternative energy choices.

Recommendations for climate mitigation and adaptation that are presented in the following pages are designed to help the Montezuma community prepare for current and anticipated changes in climate conditions and to assist decision-makers in identifying opportunities to

improve community resilience. The suggested actions will protect people, homes, buildings and natural systems by reducing risks from environmental hazards such as extreme heat and storm events. These are actions that the community can take to reduce its emissions and promote energy efficiency through vehicle fuel efficiency, alternative transportation, land use planning, and other strategies. The Montezuma community is encouraged to update these recommendations each year as additional data becomes available.

TRANSPORTATION

According to the Town of Montezuma's GHG Inventory Report, transportation accounted for 51% of government emissions and 85% of community emissions in the town in 2010. This Climate Action Plan

addresses two main transportation emissions reduction goals: utilize efficient methods of transportation and increase use of alternative fuels in transportation.



Mitigation Strategy Goals for 2025

Utilize Efficient Methods of Transportation

Increase telecommuting: 124 MTCO₂e annual reductions.

This strategy assumes that 5% of people with primary jobs in Montezuma telecommute.

Expand bicycling infrastructure: 109 MTCO₂e annual reductions.

This strategy assumes that 10% of trips less than 2 miles are converted to bicycle.

Expand pedestrian infrastructure: 46 MTCO₂e annual reductions.

This strategy assumes that 5% of weekly trips less than 1 mile are converted to walking.

Efficient municipal vehicles: 3 MTCO₂e annual reductions.

This strategy assumes the 2004 International truck is replaced with a more efficient vehicle.

Reduce municipal fleet mileage: 2 MTCO₂e annual reductions.

This strategy assumes 1,000 miles are reduced.

***Create single waste district for town**

Utilizing efficient methods of transportation would reduce the amount of vehicle miles traveled (VMT) and the amount of gasoline and diesel use which would therefore reduce emissions, fuel costs, and reliance on foreign fossil fuels. Encouraging community members to walk instead of driving will allow municipalities 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.

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.

Reducing the municipal vehicle fleet mileage through efforts such as combining trips, tracking mileage, and only making trips when necessary will also reduce emissions, energy use, and energy costs from the town.

Many different garbage services currently operate within the Town of Montezuma, which means that there are often trips by different waste haulers down the same roads each day to collect garbage. The town is interested in bidding out for one waste hauler for the entire town to reduce vehicle trips in the town. This will reduce emissions as well as reduce maintenance on town roads as they are traveled on less.

Adaptation Strategies

Montezuma can reduce the amount of transportation-related GHG emissions by establishing local carpooling and ridesharing program or encouraging residents to buy smaller cars. The town could provide a cost benefit analysis to show financial savings and emission reduction comparisons.



Marina boat launch

Photo Credit: Amanda Mazzoni

Mitigation Strategy Goals for 2025

Increase use of Alternative Fuels

Conversion of community vehicles to hybrid: 65 MTCO₂e annual reductions.

This strategy assumes 5% of community vehicles convert to hybrid.

Governor Cuomo announced on April 11, 2013 that more than 360 electric vehicle and plug-in hybrid charging stations will be installed across the state in support of his Charge NY initiative, which is an initiative to create a statewide network of up to 3,000 public and workplace charging stations over the next five years and to put up to 40,000 plug-in vehicles on the road during that period.

Hybrid and plug-in hybrid vehicles are less expensive to operate than regular vehicles, and while certain issues related to battery life still remain,

maintenance and fuel cost savings are expected to outweigh the price of battery replacement.

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

ENERGY EFFICIENCY

According to town's GHG Inventory Report, emissions from municipal buildings/facilities accounted for 32% of total municipal emissions, water delivery facilities accounted for 2%, and streetlights and traffic signals accounted for 15%, while residential energy use accounted for 9% of the community's emissions

and commercial/industrial energy use accounted for 4% of the community's total GHG emissions in the Town of Montezuma in 2010. This Climate Action Plan addresses two main energy/efficiency emissions reduction goals: increase energy efficiency in buildings; and increase use of renewable energy.

Marina building

Photo Credit: Amanda Mazzoni



Mitigation Strategy Goals for 2025

Increase energy efficiency and reduce emissions from buildings

Home weatherization: 157 MTCO₂e annual reductions.

This strategy assumes 10% of households weatherize their homes.

Energy efficiency education for residents: 141 MTCO₂e annual reductions.

This strategy assumes 25% of households participate in an educational program.

Promote loans/incentives for energy efficiency retrofits: 73 MTCO₂e annual reductions.

This strategy assumes 10% of households undergo a retrofit with the assistance of loans/incentives.

Energy efficiency education for businesses: 23 MTCO₂e annual reductions.

This strategy assumes 5 businesses participate.

Lighting occupancy sensors at municipal facilities: 5 MTCO₂e annual reductions.

This strategy assumes the DPW garage and Town Hall install occupancy sensors.

Lighting occupancy sensors: 5 MTCO₂e annual reductions.

This strategy assumes 10,000 square feet of commercial buildings install sensors.

Retrofit of Highway Garage: 4 MTCO₂e annual reductions.

This strategy assumes a 25% energy savings.

LED streetlights: 3 MTCO₂e annual reductions.

This strategy assumes all streetlights are converted to LED.

Energy efficiency behavior changes at Town Hall/Court: 1 MTCO₂e annual reductions.

This strategy assumes 10% energy savings.

Energy efficiency education can be crucial in 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.

Buildings and facilities in Montezuma may also not be equipped with the most recent energy efficient technologies, causing the town 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 the town'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 and support to make retrofits easier by providing educational materials, low-interest loans, and

guidance on where to find potential grants or incentives to help cover costs. Improving energy efficiency can help to reduce criteria air pollutants as well as greenhouse gas emissions and increase energy and water cost savings.

Behavior changes, such as turning off lights without sensors when not in use, reducing the thermostat a few degrees in the winter and increasing the thermostat a few degrees in the summer can also reduce energy use and emissions.

With the planned expansion of the town's water line, there will be additional power needs in the town. There will also be a new master meter pit and master control valve that will require additional power. This only increases the importance of implementing the strategies in this plan so that energy use and emissions from the town can decrease over time despite infrastructure updates.

Converting streetlights to LED could reduce emissions, energy use, and energy costs as well. Currently, utilities are not always willing to work with municipalities to allow them to purchase lighting assets in order to convert to LED. However, recent legislation passed by the New York State Assembly and Senate would allow purchase of lighting assets and conversion to LED streetlights to be an easier process.

Adaptation Strategies

Montezuma 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, and establish/maintain strong building codes regarding energy use.



Historic Mentz Church, Montezuma

Photo Credit: Amanda Mazzoni

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.



Cayuga Mennonite School

Photo Credit: Amanda Mazzoni

Mitigation Strategy Goals for 2025

Increase use of renewable energy

Wind energy: 86 MTCO₂e annual reductions.

This strategy assumes 5 small wind energy systems of 50 kW are installed in the town.

Residential solar: 26 MTCO₂e annual reductions.

This strategy assumes 105 kW of solar PV is installed.

Municipal solar: 17 MTCO₂e annual reductions.

This strategy assumes 67 kW of solar PV is installed.

***Geothermal heating/cooling for residential properties**

By installing renewable energies like solar, wind, and geothermal, Montezuma can ensure that their energy is provided by clean and local renewable energy sources, therefore reducing 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, such as the Solarize Madison program offered in Madison County in 2012-2013, the Solarize Syracuse program offered in Syracuse in 2014. These programs are an effective way of combining public and private funds for renewable energy. The CNY RPDB and municipalities throughout Central New York are currently offering a bulk-purchasing program for residents and businesses, known as Solarize CNY.

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 renewable energy tax credits for residential and commercial solar PV, wind, and geothermal installations.

Educational and technical assistance programs can also 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 Montezuma has adopted 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 that the Town of Montezuma has submitted information to participate in if the conditions are right. 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.



A. A. Gates Elementary School solar array, Port Byron

Photo Credit: Amanda Mazzoni

"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)

WASTE

In 2010, 2% of the community's GHG emissions came from waste. Waste from the town is disposed of at the Auburn Landfill. As

the waste decomposes, it releases greenhouse gases that can be reduced by reducing the waste stream through composting.



Mitigation Strategy Goals for 2025

Decrease the waste stream

Kitchen composting: 0.3 MTCO₂e annual reductions.

This strategy assumes that food waste is reduced by 25%.

Waste generated in the Town of Montezuma is sent to the Auburn Landfill for disposal. The decomposition of this waste creates GHG emissions and other pollutants that can be reduced by decreasing the waste stream through composting.

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, and community composting sites, such as the Amboy Compost Site in Camillus, New York, have effectively composted yard and food waste for years.

NATURAL RESOURCES

Planting trees in strategic ways to shade buildings can reduce energy used to cool buildings. Trees that are properly 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.

Deer in Montezuma farm field
Photo Credit: Amanda Mazzoni



Mitigation Strategy Goals for 2025

Plant trees for carbon storage and energy savings

Tree planting: 21 MTCO₂e annual reductions.

This strategy assumes 20% of households plant 1 tree (93 trees).

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

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

Adaptation Strategies

One action Montezuma can take to adapt to a changing environment is to encourage landowners to plant buffer strips along river and stream shorelines. A buffer strip is an area of land with vegetation that helps to control pollutant (nutrients and sediment) loading to a waterbody. Buffer strips are especially important in agricultural communities such as Montezuma because they slow water runoff, trap sediment, and promote soil infiltration. Buffer strips can trap fertilizers, pesticides, pathogens, and heavy metals before they enter lake or stream. They also help stabilize streamside soil and reduce the water temperature.

Farmers in Montezuma should continue to implement management practices to protect surface and ground water quality. Agricultural Best Management Practices should be installed to reduce nutrient and sediment loading from agriculturally-rich watersheds. The County Soil and Water Conservation District, Cornell Cooperative Extension and the Natural Resources Conservation

Service are available to provide assistance to the Montezuma farming community in developing and implementing best management practices.

Montezuma can protect and expand 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) can reduce snow drifts and travel hazards for drivers. Road segments should be prioritized and landowners contacted for participation.

The town can also plant and maintain trees and other vegetative buffers along the Seneca River in order to reduce the flow of contaminants (primarily sediments and nutrients) from entering waterbodies, to reduce shoreline erosion, and to maintain cooler water temperatures through shading. Land owners in Montezuma are also encouraged to remove snags and ice jams along the Seneca River. Snags can be caused by an

accumulation of plant and woody debris that blocks a flowing stream. Removing the snags can restore flow capacity and reduce the threat of flooding.

Montezuma can encourage the US Forest Service and Cayuga County Cooperative Extension to monitor changes in tree composition and health and plant low pollen tree species in recreation areas and parks in order to minimize human health issues. The town can manage tree density to reduce overcrowding and susceptibility to stress and disease. The town should remove tree and vegetative growth along power lines and remove dead or dying trees and replace them with heat and invasive tolerant species.

Finally, Montezuma should ensure the resilience of natural systems and resources through open space conservation and smart growth strategies. The town can protect open space through conservation land grants, landowner incentives, regulation, fee acquisition, and the purchase of conservation easements, and promote smart growth principals.



Bird in wetland, Montezuma National Wildlife Refuge

Credit: The Nature Conservancy

ADDITIONAL ADAPTATION STRATEGIES

These strategies are additional actions Montezuma 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.



Infrastructure

One of Montezuma'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 Montezuma 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. Montezuma can also reduce the threat of flooding by working with the Cayuga County Soil and Water Conservation District to improve the capacity of stormwater collection systems and to maximize soil infiltration and groundwater recharge.

Montezuma can inventory and prioritize road culvert and shoulder ditch repairs, install green infrastructure measures (i.e. rain gardens, porous pavement, and rain barrels), and encourage downspout disconnection, bioinfiltration, and rainwater harvesting in residential and business communities to reduce stormwater runoff.

The town can also re-evaluate building and zoning codes to discourage/prevent new development in flood-prone and high hazard areas.

Public Health

Montezuma should also establish ways to reduce or eliminate the negative effects of climate change on public health. Adaptation strategies Montezuma can pursue in this area include: working with the Cayuga 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. The town should also encourage farmers and landowners to reduce spraying of pesticides, as rain and flooding can cause runoff into water sources that could significantly affect public health.

Education

Education is an important part of climate adaptation as well. Montezuma can implement a comprehensive public outreach and stakeholder engagement campaign to build awareness of climate

change that includes some of the suggestions noted below.

The town can train local building officials, planning boards, and elected official on flood hazards, risk reduction strategies, implementation of floodplain development regulations, post-flood reconstruction, and how to address flood hazards during planning board reviews. The town can also train local building officials and the construction industry on flood proofing techniques for retrofitting existing flood prone development, encourage homeowners to sign up for NYSERDA energy audits, and encourage the local school district to develop and implement climate education programs.

The town can also provide emergency preparedness guidelines and topographic maps and information on the town websites, including recommendations for people living and working in flood prone areas, 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. The town can also distribute brochures, fact sheets,

and posters that show ways in which businesses and residents can prepare for and adapt to climate change and incorporate climate adaptation principals on town and agency websites in order to increase the awareness of severe weather risks, storm preparedness, and safety practices for homes and businesses.

The town can also 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 storm preparedness, watershed land use influences, and floodplain management.

Finally, the town can educate the public and elected officials on the value of prevention and early detection of invasive species by working with the Cayuga County Soil and Water Conservation Service and the Natural Resource Conservation Service to monitor the introduction and spread of invasive species. The town can also participate in Cornell Cooperative Extension's Emerald Ash Borer control strategy and in the New York State Invasive Species Task Force.

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. The town could update the community's inventory of emergency operations and public notification lists and collaborate with national, state, and local agencies to facilitate data collection, sharing, and synthesis of flood and storm event preparedness information. Montezuma can also reconfirm channels of communication with local police and fire departments, the local power utility,

and media outlets.

The town can 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 and re-establish local protocols for sharing equipment during emergencies.

Montezuma can update land hazard maps and inventories of infrastructure and at-risk communities and work with Cayuga 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 town can also provide for the routine collection

of temperature, precipitation, storm frequency, endangered and invasive species, and public health information in order to evaluate the long-term impacts of climate change on local conditions.

Finally, Montezuma can establish a road watch program to alert the public of flooded areas and tree damage during storm events. Montezuma can update local maps that display low elevation areas in the town that may be susceptible to flooding and display this information on the town website.

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



Aqueduct 5K Run/Walk

Credit: Town of Montezuma

Total possible municipal reductions from mitigation strategies = 35 MTCO₂e

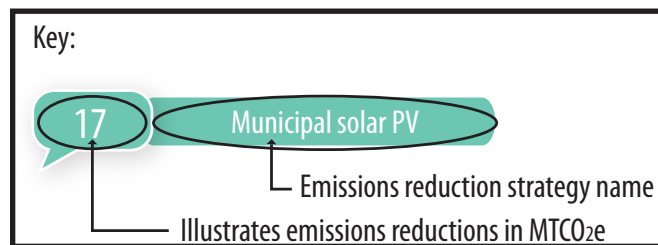
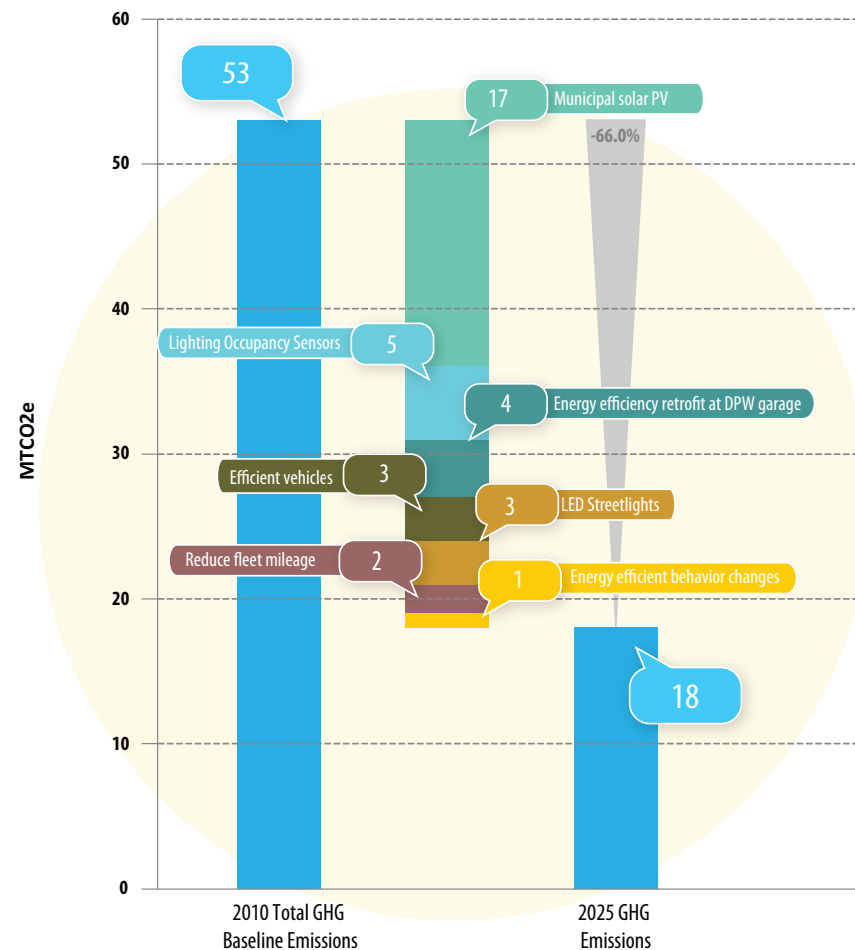


FIGURE 13- POTENTIAL MUNICIPAL REDUCTIONS FROM STRATEGY IMPLEMENTATION

Montezuma's 2010 baseline municipal emissions as recorded by the GHG inventory report, potential reductions due to suggested strategies, and potential emissions in 2025 should each of the suggested strategies be implemented. It is estimated that there will be a 66.0% reduction in municipal emissions if all suggested strategies are implemented.

Total possible community reductions from mitigation strategies = 876 MTCO₂e

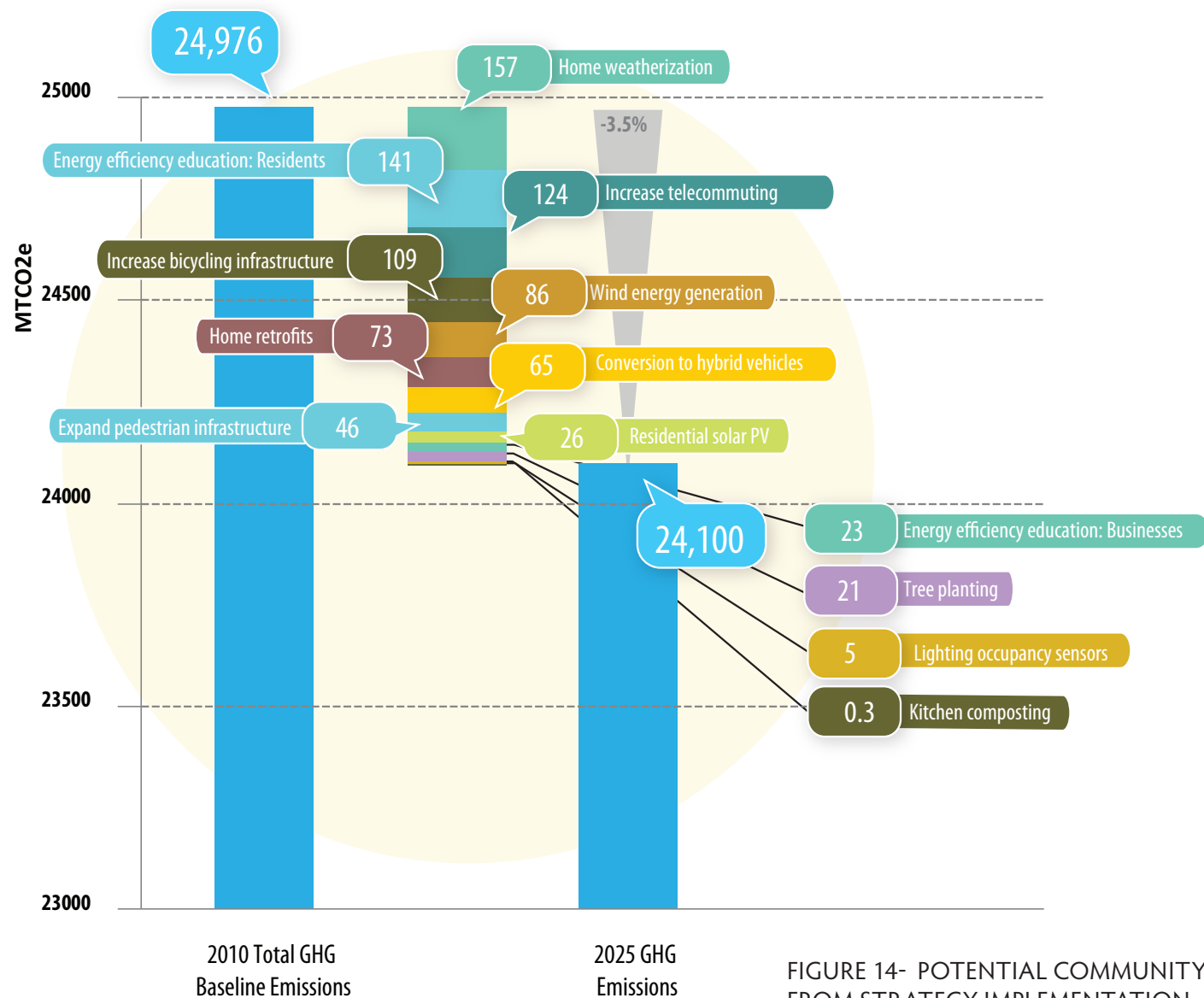


FIGURE 14- POTENTIAL COMMUNITY REDUCTIONS FROM STRATEGY IMPLEMENTATION

Montezuma's 2010 baseline community emissions as recorded by the GHG inventory report, potential reductions due to suggested strategies, and potential emissions in 2025 should each of the suggested strategies be implemented. It is estimated that there will be a 3.5% reduction in community emissions if all suggested community reduction strategies are implemented.

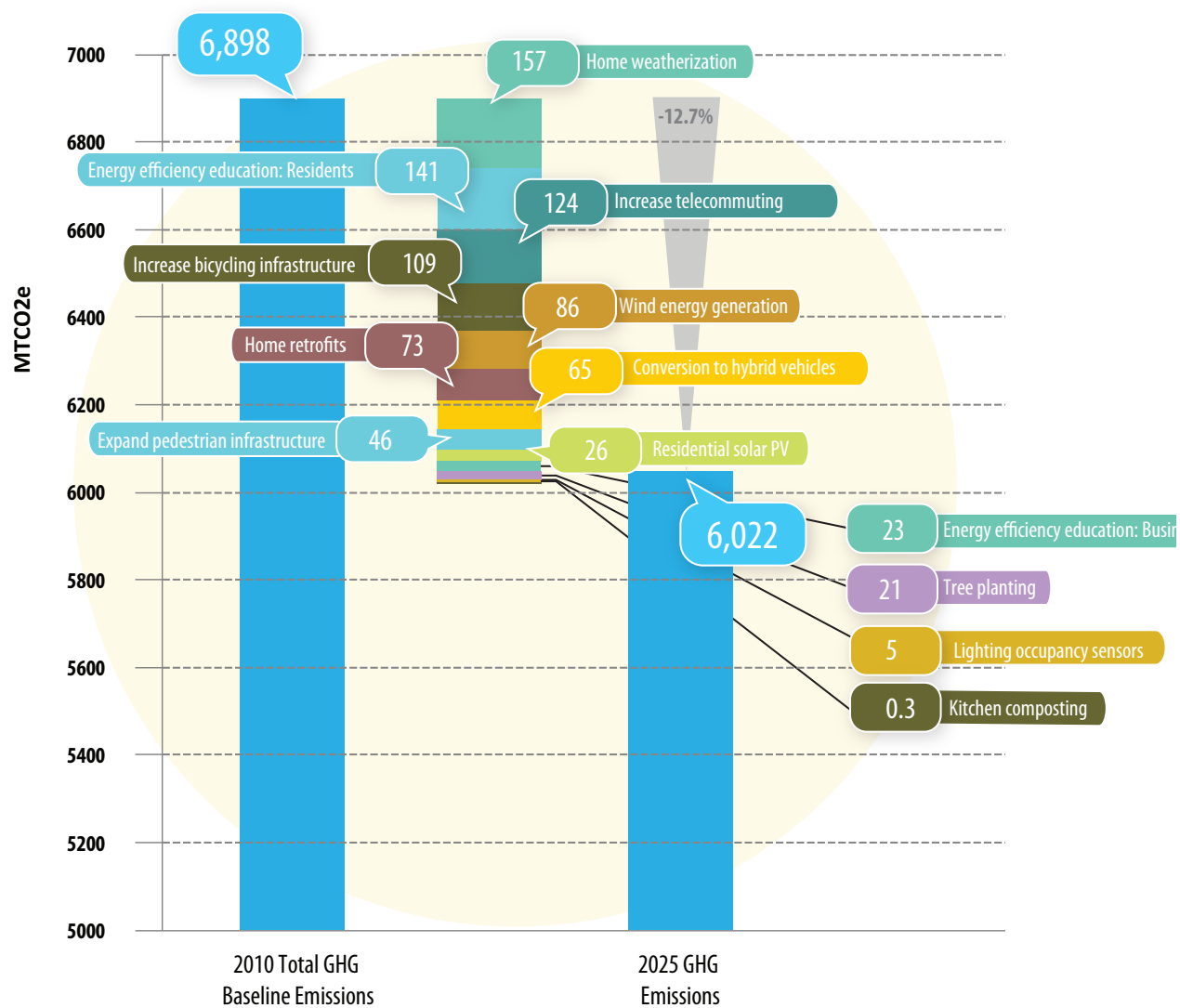


FIGURE 15- POTENTIAL COMMUNITY REDUCTIONS FROM STRATEGY IMPLEMENTATION: THRUWAY EMISSIONS REMOVED

Montezuma's 2010 baseline community emissions as recorded by the GHG inventory report with thruway emissions removed, potential reductions due to suggested strategies, and potential emissions in 2025 should each of the suggested strategies be implemented. It is estimated that there will be a 12.7% reduction in community emissions if all suggested community reduction strategies are implemented.

Total possible reductions from 2025 forecast = 2,088 MTCO₂e

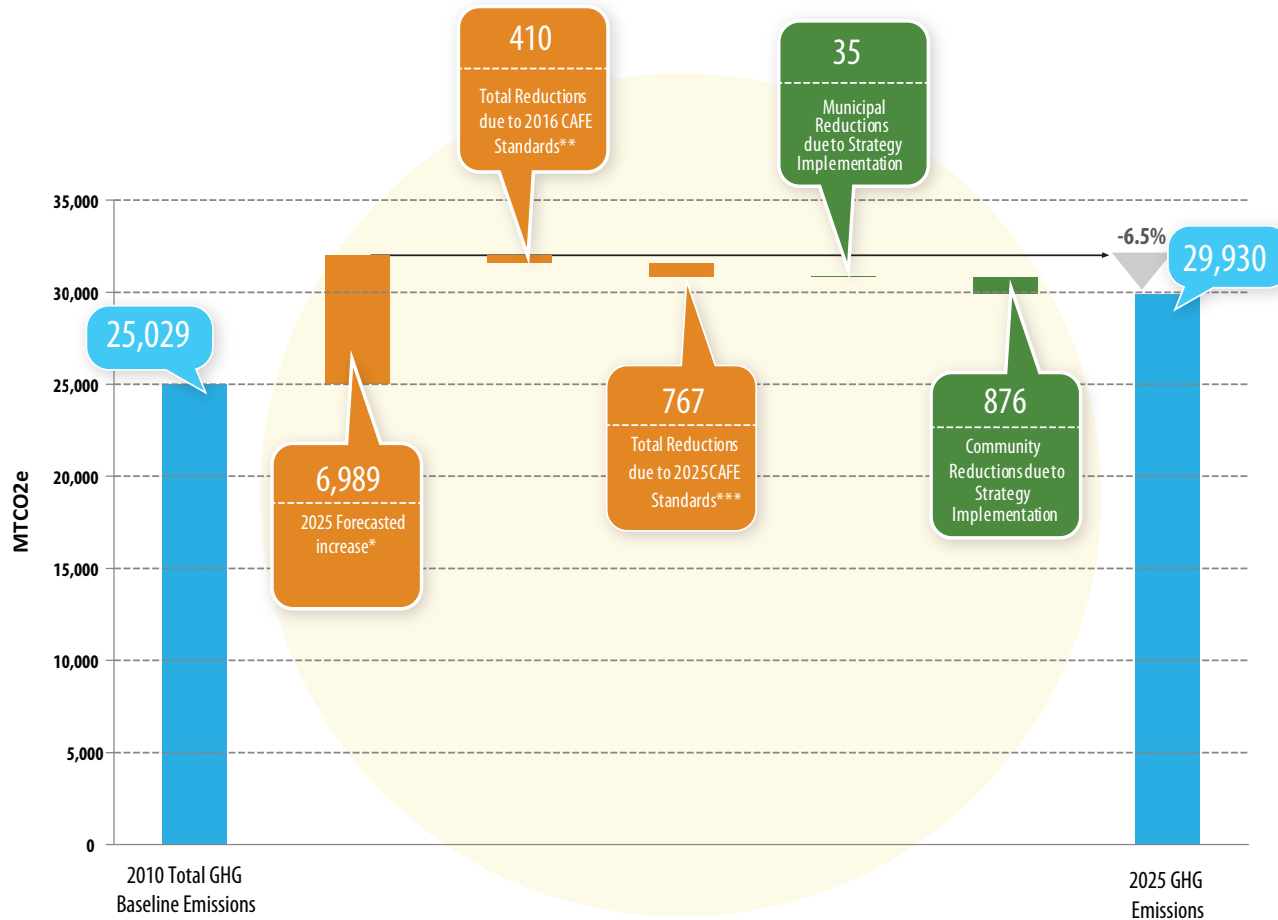


FIGURE 16- TOTAL POSSIBLE REDUCTIONS BY 2025

Figure 16 summarizes the results of the Town of Montezuma's GHG inventory, a 2025 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 the town separated into community-wide measures as well as municipal operations measures. Reductions due to Montezuma actions are shown in green while changes in emissions that will occur regardless of this Plan are shown in orange. It is projected that Montezuma's total GHG emissions in 2025 could be reduced by 6.5% from the 2025 forecasted levels if the town implements all of the recommended community-wide and municipal operations measures.

*2015 GHG inventory reported a forecasted an increase of 6,989 MTCO₂e from the 2010 baseline to 2025 due to increases in emissions from transportation, commercial energy use, and waste,
 **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 reductions from 2010 baseline with thruway emissions removed = 1,173 MTCO₂e

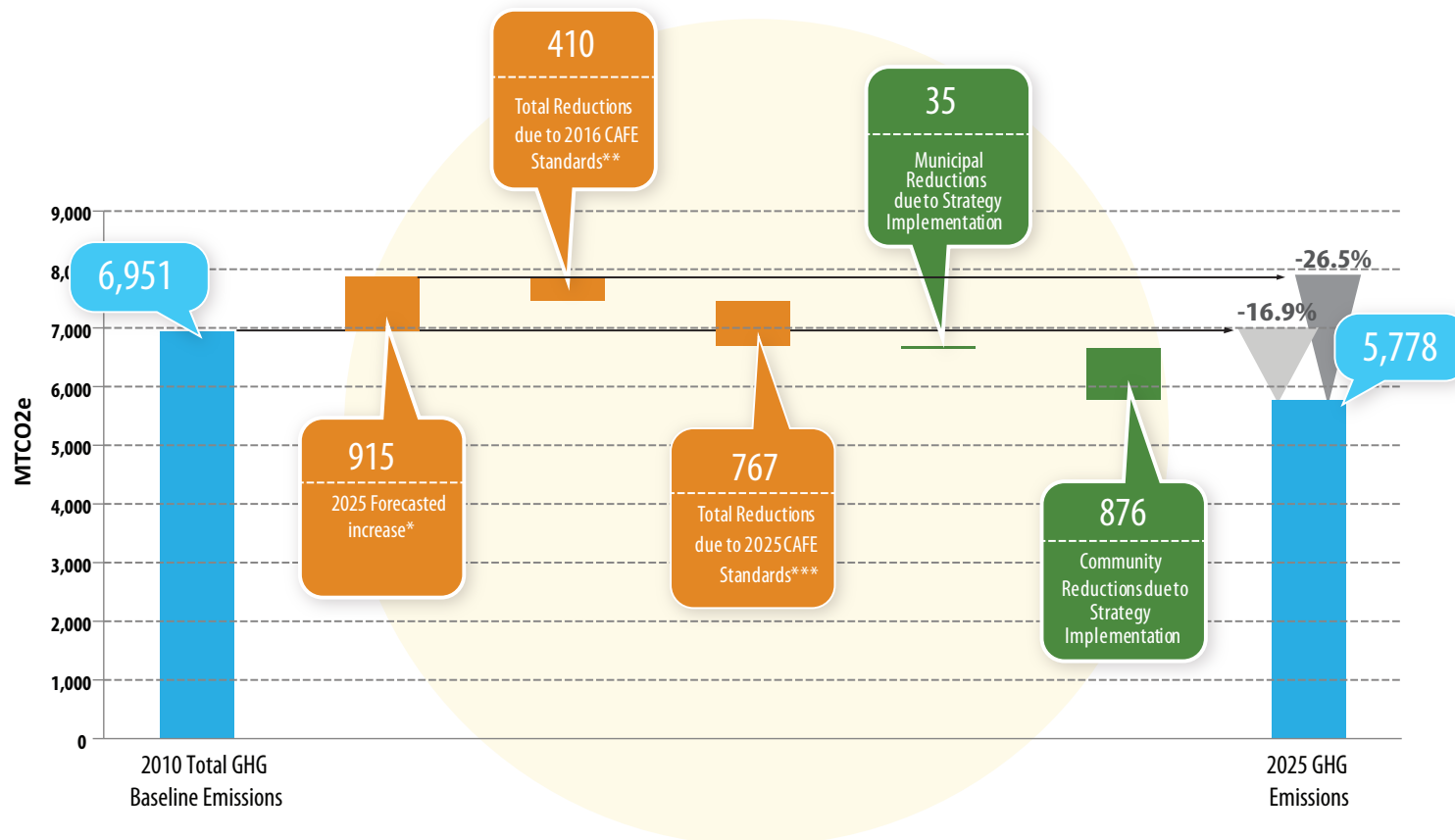


FIGURE 17- TOTAL POSSIBLE REDUCTIONS BY 2025,
THRUWAY EMISSIONS REMOVED

Figure 17 summarizes the results of the Town of Montezuma's GHG inventory, a 2025 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 the town separated into community-wide measures as well as municipal operations measures. Reductions due to Montezuma actions are shown in green while changes in emissions that will occur regardless of this Plan are shown in orange. It is projected that Montezuma's total GHG emissions in 2025 could be reduced by 16.9% if the town implements all of the recommended community-wide and municipal operations measures. There would also be a 26.5% reduction from 2025 forecasted emissions.

*2015 GHG inventory reported a forecasted an increase of 915 MTCO₂e from the 2010 baseline to 2025 due to increases in emissions from transportation, commercial energy use, and waste, with thruway emissions removed.
 **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.

Concluding Remarks

The Montezuma Greenhouse Gas Inventory and Climate Action Plan provided an opportunity for the town to develop energy efficiency and emission reductions strategies. The planning effort encouraged local participation and brought together representatives from local government, 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 about 6 months 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 Montezuma 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 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, Montezuma 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.



Farmland, Montezuma

Photo Credit: Amanda Mazzoni

APPENDIX A: 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.

MTCO₂e: Metric Tons of Carbon Dioxide Equivalent. MTCO₂e 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.

APPENDIX B: 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. Efficient vehicles	1	1	1			x					x
	2. Reduction in fleet mileage	1	1	1	x	x		x				x
Transportation: Community	1. Increase telecommuting	1	1	1		x		x		x		x
	2. Expand bicycling infrastructure	1	1	1			x	x		x		x
	3. Conversion to hybrid vehicles	1	1	2			x	x	x	x		x
	4. Expand pedestrian infrastructure	1	1	4			x	x		x		x
	5. Create a single waste district for the town	*	1	*	x	x		x		x		x

Note: all community GHG reduction percentages are based off of GHG emissions scenario with thruway emissions removed.

*Values are uncertain at present

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. Solar PV	1	4	3		x	x	x	x	x		x
	2. Lighting occupancy sensors	1	2	1			x			x		x
	3. Energy efficiency retrofits to DPW garage	1	2	5			x		x	x	x	x
	4. LED Streetlights	*	2	*		x	x		x	x		x
	5. Energy efficiency behavior changes	1	1	1				x		x	x	x
Energy/Efficiency: Residential	1. Home weatherization	1	1	2		x	x	x	x	x		x
	2. Energy efficiency education: residents	1	1	1		x		x		x	x	x
	3. Small wind generation	2	1	4			x		x	x		x
	4. Promote loans for energy efficiency improvements	2	1	3			x	x	x	x	x	x
	5. Residential solar PV	1	1	3		x	x	x	x	x		x
	6. Geothermal	*	1	*			x		x	x		x
Energy/Efficiency: Commercial	1. Energy efficiency education: businesses	1	1	1		x		x	x	x	x	x
	2. Lighting occupancy sensors	1	1	1			x			x		x
Waste	1. Kitchen composting	1	1	*				x				x
Natural Resources	1. Tree planting	1	1	3		x	x	x		x		x

*Values are uncertain at present



Climate Smart
Communities



TOWN OF MONTEZUMA
8102 DOCK STREET, MONTEZUMA, NY 13117