Village of Fayetteville

Climate Action Plan

DRAFT OCTOBER 2014

CLIMATE SMART COMMUNITIES NEW YORK STATE

Central New York Regional Planning & Development Board

Central New York climate change innovation program

CNY Energy Challenge

Mayor Mark Olson

Photo Credit: Village of Fayetteville

A MESSAGE FROM THE MAYOR

Dear friends,

The Village of Fayetteville is committed to becoming a greener, more sustainable community. Not only have we adopted the Climate Smart Communities pledge, we have also undergone many 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 Village to continue its efforts to improve sustainability and maintain the lowest possible costs.

One of the energy efficiency projects that the Village has completed is the construction of our LEED silver certified fire station facility, completed in 2011. This project eliminated the use of less efficient buildings that were used previously, and it has reduced the Village's energy costs and greenhouse gas emissions.

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

Sincerely,

Mark Olson
Mayor, Village of Fayetteville

ACKNOWLEDGEMENTS

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

VILLAGE OF FAYETTEVILLE

Lorie Corsette, Village Clerk

Dennis Duggleby, Village Trustee

Patrick Massett, Highway Superintendent

Kristen Pechacek, Tree Commission

CNY REGIONAL PLANNING AND DEVELOPMENT BOARD

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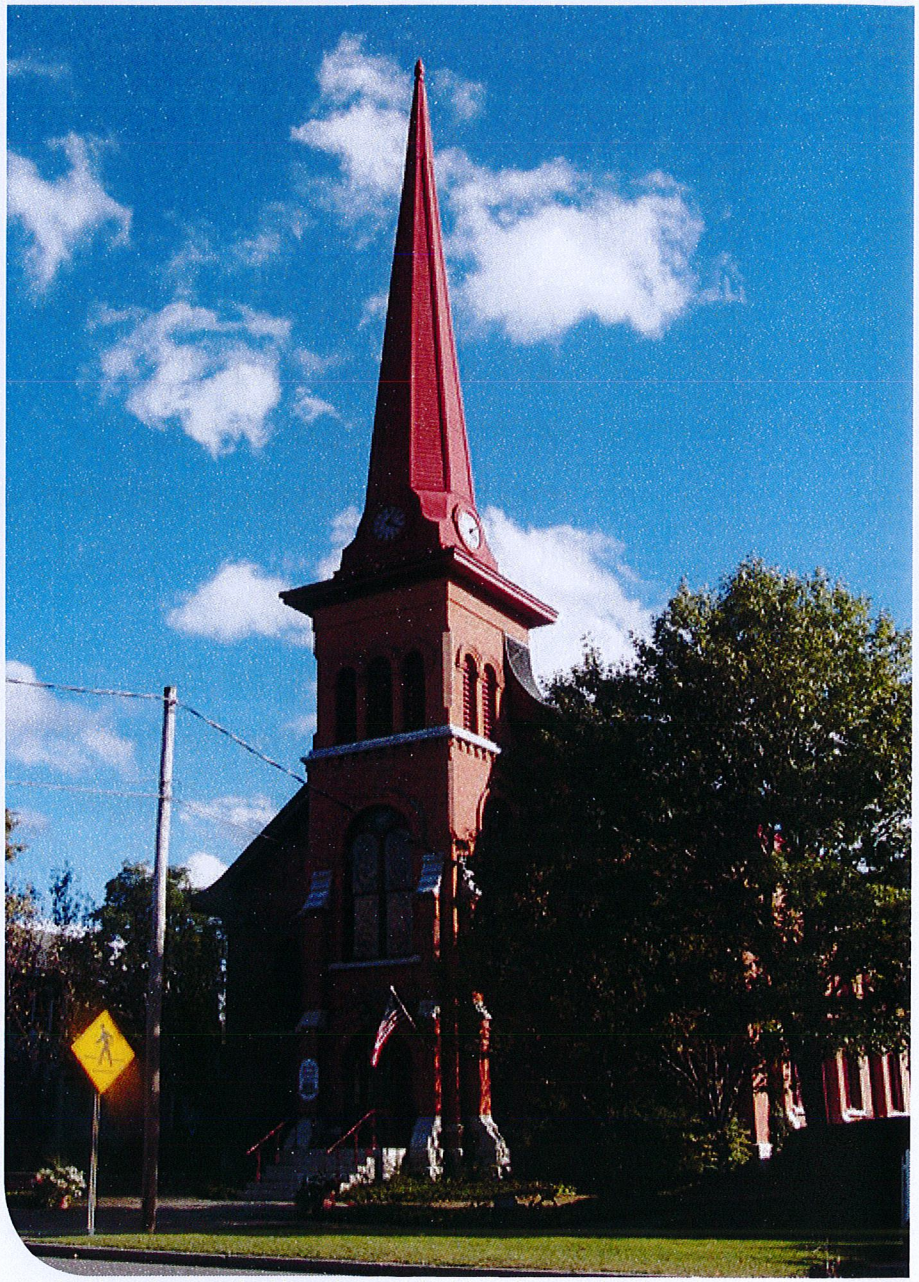

United Church of Fayetteville

Photo Credit: theucf.org

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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.

A NOTE FROM THE CENTRAL NEW YORK REGIONAL PLANNING AND DEVELOPMENT BOARD

This Climate Action Plan document was prepared for the Village of Fayetteville by the Central New York Regional Planning and Development Board (CNY RPDB), 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. The CNY RPDB provided services to this project under the auspices of the United States Environmental Protection Agency's Climate Showcase Communities Program and the New York State Climate Smart Communities Program.

The purpose of this document is to (1) gather information on emission reduction projects and programs already being undertaken in the Village; (2) give public officials, community leaders, and residents the information and support that is needed to advance sustainable programs in their communities; (3) identify opportunities for new emission reduction programs and initiatives; and (4) engage and encourage local participation in greenhouse gas emission reduction strategies.

The Village of Fayetteville Climate Action Plan 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, this document provides estimates of emission reductions that are meant to help public officials, community leaders, and residents better decide which actions may be worthwhile for the community to pursue in the coming years. As such, this document is not meant to be fixed or prescriptive, but rather fluid and flexible.

FRAMEWORK FOR LOCAL CLIMATE PROTECTION

Climate Smart Communities Program

The New York State Department of Environmental Conservation (DEC)'s Climate Smart Communities Program is a partnership between state and local governments with the goal of reducing energy use and GHG emissions. The CNY RPDB is the Climate Smart coordinator for the 5 counties of Central New York, Cayuga, Cortland, Madison, Onondaga, and Oswego. This means that the CNY RPDB provides technical assistance for climate action planning efforts, including compiling GHG inventories and Climate Action Plans, as well as assisting with energy efficiency projects. The CNY RPDB's work as Climate Smart Communities coordinator is referred to as their Climate Change Innovation Program (C2IP).

Canal Landing Park, Fayetteville
Photo Credit: Village of Fayetteville

Introduction

What is Sustainability?

Sustainability *is commonly defined as meeting the needs of the present without compromising the needs of future generations.*

Sustainability means meeting the needs of present generations without compromising the ability of future generations to meet their own needs. By following the sustainability goals outlined in this document, the Village of Fayetteville strives to become a more sustainable community so that both present and future generations will be able to meet their needs.

Sustainability is based on the principle that water, materials, and resources necessary for survival and well-being are all dependent upon the natural environment. Sustainability allows for the social, economic, and other requirements of present and future generations to be met by creating and maintaining the conditions under which humans and nature can exist in productive harmony. [1]

Developing the Plan

The Village of Fayetteville's Climate Action Plan was developed by an advisory committee made up of Dennis Duggleby, Village Trustee; Patrick Massett, Highway Superintendent; and Kristen Pechacek, Tree Commission. The committee was provided technical assistance by the CNY RPDB, who analyzed energy and emissions reduction strategies for the Village 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 Village, 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 to Appendix A: Action Strategy Summary Document.

Implementing the Plan

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

1 http://epa.gov/sustainability/basicinfo.htm#sustainability

Thinking Sustainably: New College at Oxford Example

Founded in the late 1300s, New College at Oxford was built with enormous oak beams in the great dining hall. In the late 1800s, the beams were discovered to be infested with beetles. The College Council was concerned when they heard the news; where would they be able to find oak beams of that size and caliber to replace the beetle-infested ones?

They decided to look into what types of trees were growing on the College lands to see if there were any oaks that could be used to replace the beams. Due to sustainable forestry practices, there were.

Planting stands of mixed broadleaf trees, like oak, hazel, and ash, is standard practice for sustainable woodland management. The hazel and ash are harvested every 20-25 years, while the oaks are left for 150 or more years to grow large so they can be used in major construction work, as beams for example.

New College was able to replace their beams using the oaks that had been growing on their lands for over 100 years for that exact purpose. They continue to grow many oaks on their land so that 150 years from now the beams can be replaced again.

Projected Climate Impacts in the Northeast[1]

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

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

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

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

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

mate Action Plan Advisory Committee could serve this purpose if the Village chooses.

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 year of 2009 to determine progress.

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, reflecting it back into 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. Right now there is more carbon dioxide in the atmosphere than at any time in history, as measured by these samples,[2] and further atmospheric testing shows that we have extended to 402ppm atmospheric CO_2[3], which is well above any other measure in time.[4] Scientists expect that this will lead to a gradual warming of the planet in most areas.

2 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.

Potential Impacts of Climate Change within the Village of Fayetteville

GLOBAL WEATHER CHARACTERISTICS

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 through the northern and southern hemispheres. The heat and water vapor that enter the atmosphere from these cycles can influence weather patterns around the world.

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

4 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 420 kyr. Pre-industrial Holocene levels (~280 ppmv) are found during all interglacials, with the highest values (~300 ppmv) found approximately 323 kyr BP.

Another significant influence on global weather patterns can be attributed to human activity. The long-term accumulation of greenhouse gases in the atmosphere is trapping heat which increases 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 which increases the potential for strong storm events. During the past twenty five years, scientists have measured a 4% average rise in water vapor in the air column. The following sections present information on how these global climate conditions impact local 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. Prevailing weather patterns are influenced by topography, wind direction, and proximity to Lake Ontario. Frost can be expected from early October until late May and the growing season is approximately 18 to 20 weeks long. Serious droughts are rare but growing seasons frequently do experience limited periods of low soil moisture.

Limestone Creek bridge, Fayetteville

Photo Credit: Eagle Bulletin

CO_2 is the most common human-produced greenhouse gas. The climate-changing influence of any greenhouse gas is expressed as a multiple of the heat-trapping ability of carbon dioxide, called "carbon dioxide equivalent" or "CO_2e". In 2007, the last year for which complete measurements are available, the New York State Department of Environmental Conservation reported the following:

"Total greenhouse gases released by human activities in New York State had a CO_2e of 284 million tons, which represents an average of 14.7 tons of CO_2e for every New Yorker. Combustion of fossil fuels generated nearly nine-tenths of the greenhouse gases emitted in New York. One-fourth of New York's CO_2 came from the generation of electric power, with the remainder originating about equally from the transportation sector and from industrial, residential and commercial on-site fuel combustion. Processes other than fossil fuel combustion produced greenhouse gases with CO_2e of approximately 37 million tons.

Compared with other states, New York emits relatively low amounts of greenhouse gases per capita. This is because New York gets less electric power from coal-fired plants (which are the biggest emitters), and because public transportation is widely used in its large cities. Nevertheless, it is important for all New Yorkers -- electric power generators, drivers, homeowners, communities, businesses, industries and institutions -- to reduce greenhouse gas emissions."[5]

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

5 http://www.dec.ny.gov/energy/63848.html

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

Great Lakes Ice Coverage: Scientists at the Great Lakes Research Laboratory are recording long-term changes in ice cover as a result of global warming and their research is helping to determine the current and anticipated impacts on climate patterns, lake water levels, water circulation patterns, 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 lakes are also important components that can influence the thermal cycle in the lakes.

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

Fishing at Beard Park, Fayetteville

Photo Credti: syracuse.com

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.

LOCAL WEATHER CHARACTERISTICS

Temperature and Precipitation: Fayetteville generally experiences seasonable weather patterns that are characteristic of the northeastern U.S. cyclonic system. During the summer and parts of spring and autumn, temperatures rise during the daytime and fall rapidly after sunset. According to the Onondaga County Hazard Mitigation Plan, summer temperatures normally range between 76°F to 81°F (Fahrenheit). Winter high temperatures are usually in the middle to upper 30°F, with minimum temperatures of 14°F. The average high temperature for the Village is approximately 57°F and the average low temperature is approximately 37°F.

Central New York experienced exceptionally heavy snowfall, icy roads, and low temperatures during the 2013-14 winter season. The U.S. Department of Agriculture determined that neighboring counties (Cortland, Madison and Oswego) suffered sufficient production losses due to freezing temperatures that occurred from Dec. 1, 2013 through March 14, 2014, to warrant a Secretarial disaster designation. The designation makes farm operators in both primary and contiguous counties eligible to be considered for assistance from the Farm Service Agency (FSA) provided eligibility requirements are met. This assistance includes FSA emergency loans.

Extreme Weather Events: The relative intensity of local storm events is influenced by air temperature. As air temperature rises, moisture in the atmosphere increases. This, in turn, contributes to an increase in the intensity and frequency of precipitation events. Warming air temperatures observed 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 Fayetteville and around the world are gradually

becoming more extreme with stronger wind and higher levels of rainfall.

Meteorologists report that the total annual amount of precipitation is changing, as well as the distribution and intensity of storm events. According to the ClimAID report, New York State experienced a 64% increase in extreme storm frequency between 1948 and 2011. The increased number of severe storms is expected to gradually continue, with 100-year storms likely to occur every 80 years by the end of the century. Strong storm events contribute to localized flooding, soil erosion, and stormwater runoff. These conditions can cause damage to roads, bridges, and other infrastructure in Fayetteville. The role of agencies such as the Onondaga County Soil and Water Conservation District and the Natural Resource Conservation Service will become increasingly important in the coming years, primarily because 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 our 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 Fayetteville'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 natural hazards combined. FEMA reports that floods kill more people than any other form of severe weather with damages exceeding $3.5 billion annually. With the exception of fire, floods are the most prevalent and widespread of all natural disasters and approximately 75 percent of all presidentially declared disasters are the result of flooding.

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

Fayetteville has worked with state and federal agencies such as the New York State Department of Environmental Conservation (NYSDEC) and the US Army Corps of Engineers (ACE) to address local flooding issues. A gravel bed was removed from the middle of Limestone creek behind the Manlius Town Hall because it had been causing shoreline erosion and contributed to flooding issues.

In response to significant flooding events, the ACE, the NYSDEC, and the Onondaga County Soil and Water Conservation District assisted Fayetteville in a 250-300 foot streambank restoration project along Limestone Creek. The Village has also worked on additional flood control projects in cooperation with the Syracuse Onondaga County Planning Agency.

The term 'assessed value' refers to the dollar value assigned to a home or property by local government in order to calculate property taxes. According to tax parcel data from 2012, the total assessed value of property located within designated FEMA flood zones in Fayetteville represents 9% of the total assessed value of parcels throughout Village (Table 1). Of the 1,771 land parcels in the Village, 11.6% is located in FEMA flood zones (Table 2).

Snowfall: Snow accumulates in Fayetteville to an average depth of 121 inches each year. The Village 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, Fayetteville and other areas to the east and south of the lake will continue to experience heavier and more frequent lake-effect snowfall events. Snowfall has a large impact on communities, from road maintenance to water resources management.

Tourism: Weather has a significant impact on the tourism and recreation sectors in Central New York. Seasonal weather patterns, especially precipitation rates, determine lake water levels for boating, the rate of 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 recreation activities that take place and plays a principal role in the local economic vitality.

Warming trends are anticipated to impact Central New York's outdoor recreation opportunities such as skiing at Toggenberg and may modify recreational income generated for the local economy. Several ski resorts are now developing year-round events because of reduced snowfall during the winter months. In addition to the ski industry, New York State maintains 8,000 miles of snowmobiling trails that also contributes to the local economy. Ski resorts and snowmobiling relies on natural snowfall which is forecasted to decrease with climate change. This also has the potential to reduce business generated from retail stores and associated snowmobiling industries.

Fishing along Limestone Creek is a popular water-based activity. Higher air temperatures and a shorter duration of winter ice cover may increase surface water temperatures, which will likely cause a gradual shift in coldwater fisheries. According to researchers at Cornell University, warming water temperatures may already be contributing to fish species modifications in Oneida Lake. A slight increase in lake water temperature is thought to be causing an

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

Municipality	TAV of Parcels Intersecting Flood Plain	# Acres of Parcels Intersecting Flood Plain	TAV of Municipality	TAV % Floodplain Parcels within the Municipality
Village of Fayetteville	29,614,700	196	315,075,301	9%

1 Source: 2012 tax parcel data, Onondaga County

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

Municipality	Parcels	Parcels in 100-Year Floodplain	% of Parcels in 100-Year Floodplain
Village of Fayetteville	1,771	206	11.6%

1 Source: 2012 tax parcel data, Madison County

increased production of largemouth and smallmouth bass, gizzard shad, and other species near the northern extent of their range. Additionally, at the southern edge of their range, Burbot may be in decline. Brook trout, commonly found in New York State tributaries, are at risk due to changes in habitat resulting from climate change and the presence of invasive species.

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

Public Health: Changes in climate conditions can affect human health. An increase in health impacts from warming temperatures have been documented throughout the country such as 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 are expected to increase 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 populations of these insects increase, 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 warming is thought to be causing a gradual shift in pest populations of invasive and 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 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 Fayetteville 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.

Symphony in Beard Park, Fayetteville

Photo Credit: Village of Fayetteville

Climate Adaptation in Fayetteville

The Village of Fayetteville covers 1.73 square miles in the southern portion of the Limestone and Butternut Creek subwatershed. The Erie Canal provides excellent hiking opportunities and Green Lakes State Park on the eastern edge of the Village provides two lakes and woodland for year-round recreational enjoyment.

An overall vision for the community is presented in the Fayetteville Comprehensive Plan that was written in 1980 and updated in 2008. The plan outlines priority community goals and provides a conceptual road map for how to achieve them. The plan includes guidance to municipal leaders, government agencies, community organizations, local businesses, and residents to ensure that Fayetteville's current and future needs are met through local collaboration, public contributions, land use policies, regulatory

measures, and local laws. In addition to the Comprehensive Plan, The Village has joined more than 137 other municipalities in New York State that have signed municipal resolutions to become Climate Smart Communities.

The list below provides a brief summary of several initiatives that the Village has taken to protect the community against storm events, excessive heat, and other climate influences. The Village of Fayetteville has set emissions reduction targets and has taken the following steps to reduce energy use and emissions:

+ A Greenhouse Gas Inventory was compiled for the Village in 2013.
+ In October 2014, the Village received $314,070 in funding from the State DOT's Transportation Alternatives Program (TAP) for Canal Landing Park Phase IV, a project that will include rehab/narrowing of Feeder Street bridge, installing lighting along the trail, paving the trail from the bridge north to the village/town boundary, and constructing a pedestrian bridge across feeder canal to improve bike/pedestrian accessibility between village and Limestone Littll League Fields.
+ In 2013, the Fayetteville residents participated in an energy conservation program called the CNY Energy Challenge Team Program. Participants met on a regular basis at the Fayetteville Free Library to learn about the science and sources of energy.

Butterfly, Fayetteville

Photo Credit: Kristen Pechacek

They learned how to read home energy meters and used equipment to measure the energy use of home appliances. After implementing measures to reduce electricity, heating, and cooling expenses, they finished the program with free home energy audits provided by NYSERDA.

+ A LEED silver certified building was constructed in 2011 to house the Fire Department.
+ The boiler in the Village Hall was replaced with a more efficient one in 2014.
+ Lighting occupancy sensors were installed in several municipal bathrooms and offices.
+ Electric water pumps were removed and were replaced with a gravity-flow system.
+ Municipal officials developed a plan to improve parking, pedestrian safety, and overall aesthetics near the Limestone Plaza/Brooklea Drive area. Funding from a Save-the-Rain grant is being used for this project.
+ Save the Rain funds are also being used for the installation of rain gardens, porous pavement, detention basins, and rain barrels to reduce stormwater flow into the county sewer system.
+ The Village implemented measures to control stormwater runoff and is working on a traffic enhancement plan for greater transportation efficiency.
+ Recycling information (including batteries and yard waste) is provided to Village residents and is posted on the Village website.
+ The Village provides monthly collection of building debris such as lumber, wood, wooden furniture, plastic pipe, plaster, drywall, plumbing fixtures, concrete, masonry, bricks, soil and rocks.
+ Since 2000, the Village of Fayetteville has been recognized as a Tree City USA by the National Arbor Day Foundation. The Fayetteville Tree Commission was formed in 1991 to care for and maintain the village's street trees. Volunteers are appointed by the Mayor and trustees and the DPW work on routine tree maintenance that reduces stormwater runoff while preserving the health and beauty of the village streets.
+ With funding obtained through a federal ARRA planning grant, the CNY RPDB worked with local officials to identify

sites on or adjacent to water bodies with documented water quality and/or drainage impairments related to uncontrolled stormwater runoff. The CNY RPDB contracted with a local firm on design specifications and construction plans for green infrastructure stormwater controls at Canal Landing Park. This involved shoreline stabilization with native plantings, an infiltration basin, and a bioinfiltration area to control erosion and runoff to Limestone Creek.

+ The Village is working on plans for a building retrofit for the Department of Public Works. This will include the installation of an efficient heating system, HVAC equipment and air curtains, and the removal of the DPW trailer that is currently used by the Highway Superintendent.
+ The Village is researching options for the installation of solar PV systems on municipal property.
+ Municipal officials are also investigating the potential for ground-mounted solar PV installations on park land or other land owned by the Village.
+ In response to significant flooding events, the Army Corps of Engineers, the NYSDEC, and the Onondaga County SWCD assisted Fayetteville in a 250-300 foot streambank restoration project along Limestone Creek. The Village has worked on additional flood control projects in cooperation with the Army Corps of Engineers, SOCPA, and the NYSDEC.

Fall Festival, Beard Park, Fayetteville

Photo Credit: Village of Fayetteville

+ Local officials and agencies monitor stream flow and water quality. Flow in the Limestone/Butternut Creek subwatershed is measured at several stations operated by the USGS. In addition, water monitoring has been conducted on Limestone and Butternut Creeks as part of the 1999 and 2002 CNY RPDB monitoring program, the 1996 RIBS program, and through Project Watershed CNY.
+ Local laws are in place to protect water quality in Fayetteville and throughout the Oneida Lake watershed through zoning, subdivision, and site plan reviews.
+ To provide further protection, the Village passed a NYS model Stormwater Management and Erosion and Sediment Control law in 2006 in compliance with the NYS SPDES Stormwater Phase II Permit requirements.
+ Village officials sponsored a solar workshop in August 2014 that presented information about how solar works and how to cut costs for homes or businesses by joining in bulk purchasing program.
+ Village volunteers participate in a Village of Fayetteville Beautification Committee.

Hazard Mitigation: The Onondaga County Hazard Mitigation Plan was updated in 2011 with assistance from national, state and local agencies. By identifying vulnerabilities and assessing local risks, the county increased its capacity for planning for hazard avoidance and mitigation. The plan was written to improve the overall understanding of local hazards, thereby leading to more sustainable and disaster-resistant communities. Recommendations included in the plan are designed to protect human health and reduce potential impacts on infrastructure from storm events. The Plan (which includes a chapter on the Village of Fayetteville) is available at the following website: http://www.ongov.net/planning/haz.html.

Onondaga County Soil and Water Conservation District: The Onondaga 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. Fayetteville works with the SWCD to identify priority erosion sites in the Village and to design preventative measures to reduce stormwater runoff.

What can be done in Fayetteville?

The Village of Fayetteville has chosen to adopt the NYS Department of Environmental Conservation (DEC)'s Climate Smart Communities Pledge, and municipal operations have already begun reducing their energy use and GHG emissions.

In 2013, the Central New York Regional Planning and Development Board (CNY RPDB) selected the Village of Fayetteville as a participant in the Central New York Climate Change Innovation Program (C2IP) funded through the NYS Department of Environmental Conservation (DEC)'s Climate Smart Communities program.

The CNY RPDB provided the Village with technical assistance in compiling a greenhouse gas inventory in the spring of 2013, as well as assistance compiling the Climate Action Plan itself throughout 2014.

The strategies noted in this document represent further efforts that can be made by the municipality as well as by the community members to reduce energy use and GHG emissions.

In 2013, a GHG inventory report was compiled to detail energy use and the sources of emissions from government operations in the Village in 2009. This Climate Action Plan uses the data provided in the GHG inventory report to address strategies that both government operations and community members can take to reduce energy use and GHG emissions by 2030. Specifically, the emissions reduction target for the Village of Fayetteville is a 20% municipal reduction and 10% community reduction from the 2009 baseline by 2030.

Guided by the strategies explored in this Climate Action Plan, the Village of Fayetteville has the potential to reduce energy use and GHG emissions significantly. By implementing the strategies noted in this document, community members will not only be able to reduce GHG emissions, they will also be able to reduce their overall energy costs, be more comfortable in their own homes, reduce reliance on non-renewable, foreign sources of energy, and conserve Fayetteville's resources for the future.

Fayetteville Free Library

Photo Credit: Lauren Britton Smedley

Recommendations for Future Climate Adaptation

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 a substantial and sustained decrease of greenhouse gas emissions. These are the key conclusions from an assessment by the Intergovernmental Panel on Climate Change (IPCC) that was released in January 2014. 259 scientists from 39 countries around the world further stated that, "Warming of the climate system is unequivocal and since the 1950s, many of the observed changes are unprecedented over decades to millennia."

Human intervention to reduce the rate or extent of climate change can be accomplished in two ways: by avoiding the potential consequences through emissions reduction (referred to as **mitigation**), or making changes to adjust to climate impacts that are unavoidable (referred to as **adaptation**). Many of the mitigation policy discussions in Fayetteville have focused on reducing greenhouse gas (GHG) emissions through fuel efficiency for vehicles and on energy efficiency for buildings and businesses. The mitigation recommendations that are found in this Climate Action Plan were based on the findings from the Village greenhouse gas inventories.

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

The level of intervention required to reduce and adapt to the effects of climate change will require action at all levels of government and society. In June 2014, the Environmental Protection Agency (EPA) released a new policy statement on climate change adaptation to help the nation prepare for and respond to the impacts of a changing climate. The policy states that the EPA will continue to work with states, tribes, and local communities to increase their resilience to extreme weather events and prepare for the impacts of climate change. EPA's policy is consistent with the President's Climate Action Plan which calls on the federal government to strengthen the adaptive capability of its programs and operations.

Setting carbon emission targets and standards fall within the responsibility of federal and state governments. New York State, for example, has set aggressive climate adaptation and mitigation 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 CO_2 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. Adapting to climate change will provide opportunities for Fayetteville and other communities to improve the resilience of the community while protecting natural resources.

The policy recommendations for climate adaptation that are presented in the following table were developed with local input. They are designed to help the Fayetteville community prepare for anticipated changes in climate conditions and to assist decision-makers in identifying opportunities to improve community resilience. Many of these recommendations are consistent with those presented in Fayetteville's Comprehensive Plan. The table provides a summary of actions that Fayetteville can take to protect people, homes, buildings and natural systems by reducing risks from environmental hazards such as extreme heat and storm events. The Fayetteville community is encouraged to update these recommendations each year as additional data becomes available.

TABLE 3- CLIMATE ADAPTATION RECOMMENDATIONS FOR THE VILLAGE OF FAYETTEVILLE

Focus Areas and Recommendations	Actions
Infrastructure Design and Maintenance: Protect and upgrade local infrastructure for cost savings, as well as stormwater management and flood control	•Assess the condition of local infrastructure and document climate vulnerabilities in the areas of energy, water, transportation, and telecommunications •Work with the Onondaga County Soil and Water Conservation District to improve the capacity of stormwater collection systems and to maximize soil infiltration and groundwater recharge, including installing green infrastructure measures (rain gardens, porous pavement, and rain barrels), similar to the green infrastructure implemented for the Limestone Creek project through the Save the Rain grant. Complete planned Western Gateway Green Infrastructure Enhancement Project. Another priority location for green infrastructure could be on North Burdick Street near the cross with Kennedy Street •Inventory and prioritize road culvert and shoulder ditch repairs •Encourage downspout disconnection, bioinfiltration, and rainwater harvesting in Fayetteville's residential and business communities to reduce stormwater runoff to Limestone Creek •Maintain/expand Fayetteville's hiking and biking trails to enhance open space preservation and soil infiltration •Conduct an energy evaluation of the Village water distribution system and water pumping station
Public Health: Establish ways to reduce or eliminate the negative effects of climate change on public health	•Work with the Onondaga County Health Department to document trends in asthma, Lyme disease, and heat-related illnesses that may be influenced by a warming climate •Improve local capacity for health preparedness, response, and recovery programs, such as the development of an extreme-heat response plan and designation of a community location with air conditioning during heat events •Notify the community regarding heat events, air quality, and other climate related health risks
Regional collaboration and communication: Ensure that emergency operations are current and maintain open lines of communications between local agencies	•Update Fayetteville's inventory of emergency operations and public notification lists •Collaborate with national, state, and local agencies to facilitate data collection, sharing, and synthesis of flood and storm event preparedness information •Reconfirm channels of communication with local police and fire departments, the local power utility, and media outlets •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 Village for a more complete coverage during emergencies •Re-establish local protocols for sharing equipment during emergencies •Update land hazard maps and inventories of infrastructure and at-risk communities •Work with Onondaga 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 •Establish a road watch program to alert the public of flooded areas and tree damage during storm events
Local Laws and Planning: Modify local laws to incorporate measures for adaptation to climate change	•Re-evaluate building and zoning codes to discourage/prevent new development in flood-prone and high hazard areas along the Limestone Creek shoreline •Evaluate the use of PACE[ii] as a way for commercial property owners to pay for energy upgrades, on-site renewable projects, and water conservation measures •Identify and remove local barriers to green infrastructure •Incorporate climate adaptation into planning documents such as the Fayetteville Comprehensive Plan
Natural Resources: Promote the resilience of natural systems and resources through open space conservation and smart growth strategies	•Protect open space through conservation land grants, landowner incentives, fee acquisition, and the purchase of conservation easements, and promote smart growth principals •Update local maps that display low elevation areas that may be susceptible to flooding. Display this information on the Village website, along with preparedness guidelines; maps should display varying levels of flood hazard potential •Maintain an annual program to remove branches, ice jams, and other debris from Limestone Creek in order to reduce flooding

[ii] Property Assessed Clean Energy (PACE) is a way for commercial property owners to pay for energy efficiency upgrades, on-site renewable energy projects, and water conservation measures. PACE funding is provided or arranged by a local government for 100% of a project's costs, and is repaid with an assessment over a term of up to 20 years. PACE financing is available for all types of commercial and industrial properties and may be available to non-profits and government facilities as well. PACE projects are affixed to the property and save money for the property owner. PACE is voluntary. In communities that adopt PACE, assessments are only paid by participating owners and only for their own projects. PACE programs are locally based. For additional information, visit www.pacenow.org.

Focus Areas and Recommendations	Actions
Trees: Protect and expand urban trees and woodland ecosystems to increase climate change mitigation potential	•Plant living snow fences (evergreens planted at distances of at least 100 feet upwind of problem stretches of a road) to reduce snow drifts and travel hazards for drivers. Road segments should be prioritized and landowners contacted for participation. •Plant and maintain trees and other vegetative buffers along Limestone Creek in order to reduce the flow of contaminants (primarily sediments and nutrients) from entering the tributary, to reduce shoreline erosion, and to maintain cooler water temperatures through shading •Continue to support the Fayetteville Tree Commission •Encourage the US Forest Service and Onondaga County Cooperative Extension to monitor changes in tree composition and health •Plant low pollen tree species in recreation areas and parks in order to minimize human health issues •Manage tree density throughout the Village to reduce overcrowding and susceptibility to stress and disease •Remove dead or dying trees and replace them with heat and invasive tolerant species
Transportation: Reduce the amount of transportation-related GHG emissions	•Prepare a commuting analysis to evaluate the need for organized carpooling and ride-share opportunities such as "Uber", "Sidekick", and "Lift" •Use smaller school buses when only a few students are being transported to and from school events
Waste Management: Reduce GHG emissions and increase waste management efficiency	•Work with the Onondaga County Planning Department to research food composting and recycling options for the school and local restaurants.
Monitoring, Assessment and Data Collection: Provide for the routine collection of temperature, precipitation, storm frequency, endangered and invasive species, and public health information in order to evaluate the impact of climate changes on local conditions	•Work with Project Watershed (Isaac Walton League) to document invertebrate population trends in Limestone Creek •Compile a database of vulnerable populations (e.g. the elderly and people with special needs) and develop a system to contact them in case of emergency
Invasive Species: Protect local trees and water resources by controlling the introduction and spread of invasive species	•Educate the public and elected officials on the value of prevention and early detection of invasive species •Work with the Onondaga County Soil and Water Conservation Service and the Natural Resource Conservation Service to monitor the introduction and spread of invasive species •Participate in Cornell Cooperative Extension's Emerald Ash Borer control strategy and in the New York State Invasive Species Task Force
Public Outreach and Education: Implement a comprehensive public outreach and stakeholder education campaign to build awareness of climate change	•Develop and implement climate education programs for all grade levels in the Fayetteville Central School District •Train local building officials, planning boards, and elected officials on flood hazards, risk reduction strategies, implementation of floodplain development regulations, post-flood reconstruction, and how to address flood hazards during planning board reviews •Train local building officials and the construction industry on flood proofing techniques for retrofitting existing flood prone development •Add regional topographic maps and information about flood preparedness to the Village website •Incorporate climate adaptation principals on the Village and agency websites in order to increase the awareness of severe weather risks, storm preparedness, and safety practices for homes and businesses. Provide emergency preparedness guidelines for people living and working in flood prone areas such as actions to take if a flash flood warning is issued, relevant emergency websites and information sources, items to include in a disaster/flood supply kit, how to protect properties from flood damage, and guidelines for developing a Family Disaster Plan •Distribute brochures, fact sheets, and posters that show ways in which businesses and residents can prepare for and adapt to climate change •Sponsor a workshop to teach residential and business owners how to calculate their Energy Use Intensity (EUI)[iii] •Sponsor workshops to teach homeowners, local planning boards, elected officials, code enforcement officers, county agencies, businesses, citizen associations and real estate agents about Emerald Ash Borer, storm preparedness, watershed land use influences, and floodplain management

[iii] Energy Use Intensity (EUI) is the number of BTUs, kWh or other value per square foot

LAND USE

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.

Route 5, Fayetteville
Photo Credit: Kristen Pechacek

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

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. 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 are expected to continue to do so 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 environments therefore have the potential to make a significant contribution to overall climate change mitigation.

Commuting to work: The manner in which land uses and transportation infrastructure are developed within a community influences whether residents choose to walk, bike, drive, or use public transit. These travel choices directly affect the amount of transportation-related GHG emissions that are produced. According to the American Community Survey, 59% of the people that commute to work from Fayetteville spend an average of between 15 to 29 minutes traveling (Table 4).

Single-passenger automobile trips to and from Fayetteville generate substantially more GHG emissions per mile than public transit and carpooling. According to the American

Community Survey, 2,529 Fayetteville residents were employed between 2008 and 2012. Of the total number that drove vehicles to their jobs, approximately 78% drove alone and 9% carpooled. 4% walked to work, 2% biked or used taxi, motorcycle or other means, and 6% worked from home (Figure 5). Single-passenger automobile trips constitute the vast majority. Preparation of a commuting analysis would help determine the need for organized carpooling opportunities. Carpooling, ridesharing, and similar efforts to reduce vehicle traffic will help to reduce greenhouse gas emissions.

LAND USE

Additional carbon reductions could come from applying other types of land use planning and redevelopment. Using the critical mass of buildings and activities at the district scale, it is possible to develop practical and efficient heating and cooling systems (district energy systems). This approach shows great promise in reducing the carbon footprint of urban development. Other energy conservation benefits may result from common-wall and vertical living structures found in multifamily city locations.

Urban design in smaller communities such as Fayetteville frequently relies on green infrastructure to reduce stormwater, reduce heating loads, and support localized food production and farmers markets to reduce shipping, storage, and packaging needs. These and other strategies that make use of transportation alternatives contribute significantly to overall GHG mitigation.

55% of the land in the Village is classified as residential and 16% is classified as wild, forested, conservation lands or public parks. Additional land use categories are summarized in Figures 1 and 2.

GHG EMISSIONS REDUCTION THROUGH LAND USE AND TRANSPORTATION

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, density, pedestrian and bicycle conditions, transit accessibility, parking, and streetscape design. 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.

TABLE 4- COMMUTE TIMES TO WORK FROM THE VILLAGE OF FAYETTEVILLE, AVERAGE 2008-2012[1]

Commute Time to Work	Number of Workers	Percentage
Less than 15 minutes	653	27%
15-29 minutes	1,393	59%
30-59 minutes	265	11%
60-89 minutes	54	2%
90+ minutes	15	1%
TOTAL	2,380	100%

1 Source: ACS 2008-2012

TABLE 5- TRANSPORTATION TO WORK IN THE VILLAGE OF FAYETTEVILLE, 2008-2012 APPROXIMATE AVERAGE[1]

Transportation to Work	Number of Workers	Percentage
Car, truck, van - drove alone	1,978	78%
Car, truck, van - carpooled	235	9%
Public transportation (excluding taxicab)	10	0%
Walked	99	4%
Worked from home	149	6%
Taxicab, motorcycle, bicycle, or other means	58	2%
TOTAL	2,529	100%

1 Source: 2008-2012 5-year estimates, American Community Survey

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.

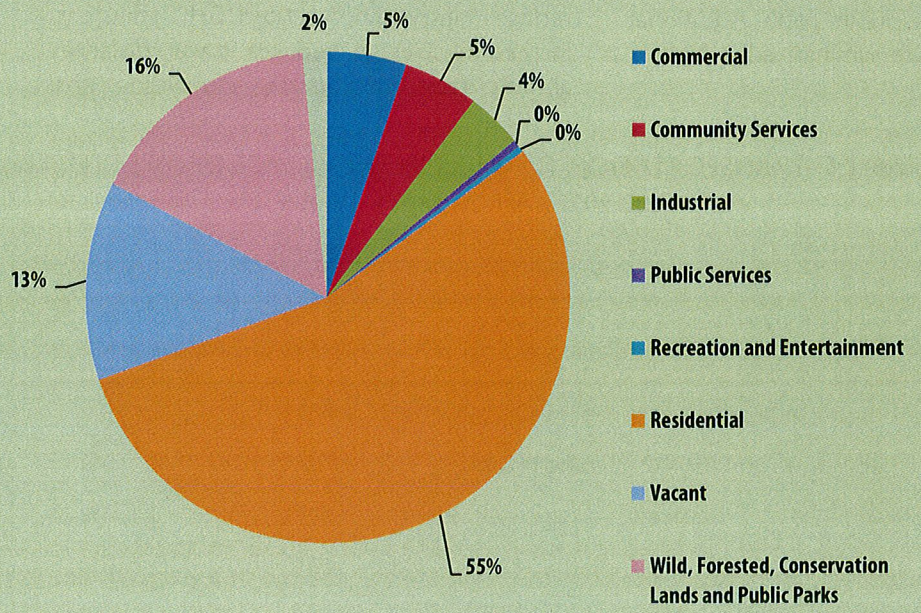
A jobs/housing ratio is commonly used to evaluate the diversity of land uses within a community by describing the relationship between employment opportunities and housing supply. A ratio of 1.0 describes a balance between jobs and housing. A ratio above 1.0 indicates that there are more jobs than housing, while a ratio below 1.0 describes an undersupply of jobs relative to housing. In 2011, there were approximately 1,437 jobs in Fayetteville and 1,912 households and the jobs/housing ratio was approximately .75. This demonstrates that there were more households than job opportunities in the community.

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

Proximity to commercial centers: The first method examined how many residential parcels are located within ¼ mile of commercial districts. This provided insight into the effectiveness of the community's existing zoning and land use pattern from the pedestrian perspective. Although some residential portions of Fayetteville are distant from commercial services, overall, the existing land use pattern creates many opportunities for pedestrian and bicycle travel. Of the 1,525 total residential parcels, 53% are located within ¼ mile of commercial parcels.

Proximity to neighborhood services: The second method of proximity analysis identified eleven categories of neighborhood services (schools, libraries, drugstores, grocery stores, medical facilities, post offices, nursery schools, parks, nursing homes, hardware stores, and restaurants), mapped the locations of these services within Fayetteville, and then examined how many of these distinct uses are within a ¼ mile walking distance of individual residential parcels. The analysis determined that 39% of the residential parcels are located within ¼ mile of three or more amenities. Residents with low levels of pedestrian access to neighborhood-serving uses are more likely to drive to purchase their daily goods and services.

FIGURE 1- FAYETTEVILLE 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.

Density: Density refers to the number of housing units, people, or jobs in a given area. Higher densities refer to an increased number of services, shops, schools, and public buildings located within a neighborhood which increases the availability of transit and pedestrian infrastructure. These conditions tend to reduce the need for vehicle ownership and increase the use of alternative modes. Residential density is normally measured in terms of housing units per acre. Fayetteville has a relatively high to moderate residential density, which is further explained in Table 6 and Figure 3.

Infill development refers to the use of vacant land within a built-up area for additional construction. This term is often associated with community redevelopment or growth management programs or as a component of smart growth. Infill development focuses on the reuse of underutilized buildings and sites where buildings are constructed on vacant property or between existing buildings. 125 acres of the land in Fayetteville is classified as vacant. Potential opportunities for infill development should be evaluated.

Pedestrian and bicycle conditions: Well-developed pedestrian and bicycle infrastructure and pedestrian-friendly design are essential if walking and biking are to be important travel modes in a community. Highly connected sidewalks and bicycle infrastructure reduce travel distances between destinations and improve access and safety. Pedestrian and bicycle infrastructure refers to sidewalks, crosswalks, traffic calming devices, bike lanes, and racks/storage facilities.

Fayetteville has a well-connected network of sidewalks and their overall condition is considered by most to be satisfactory.

FIGURE 2- VILLAGE OF FAYETTEVILLE LAND USE

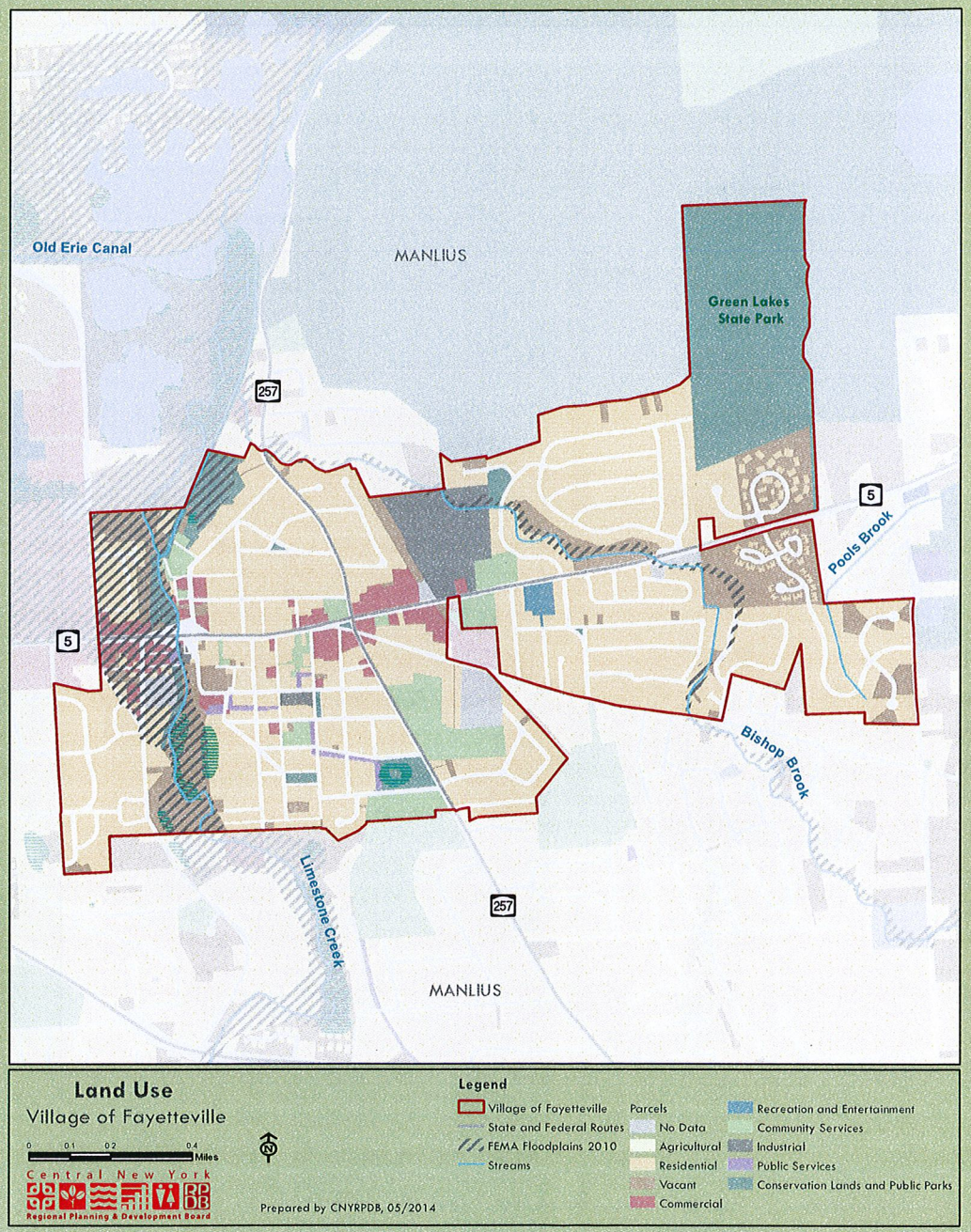
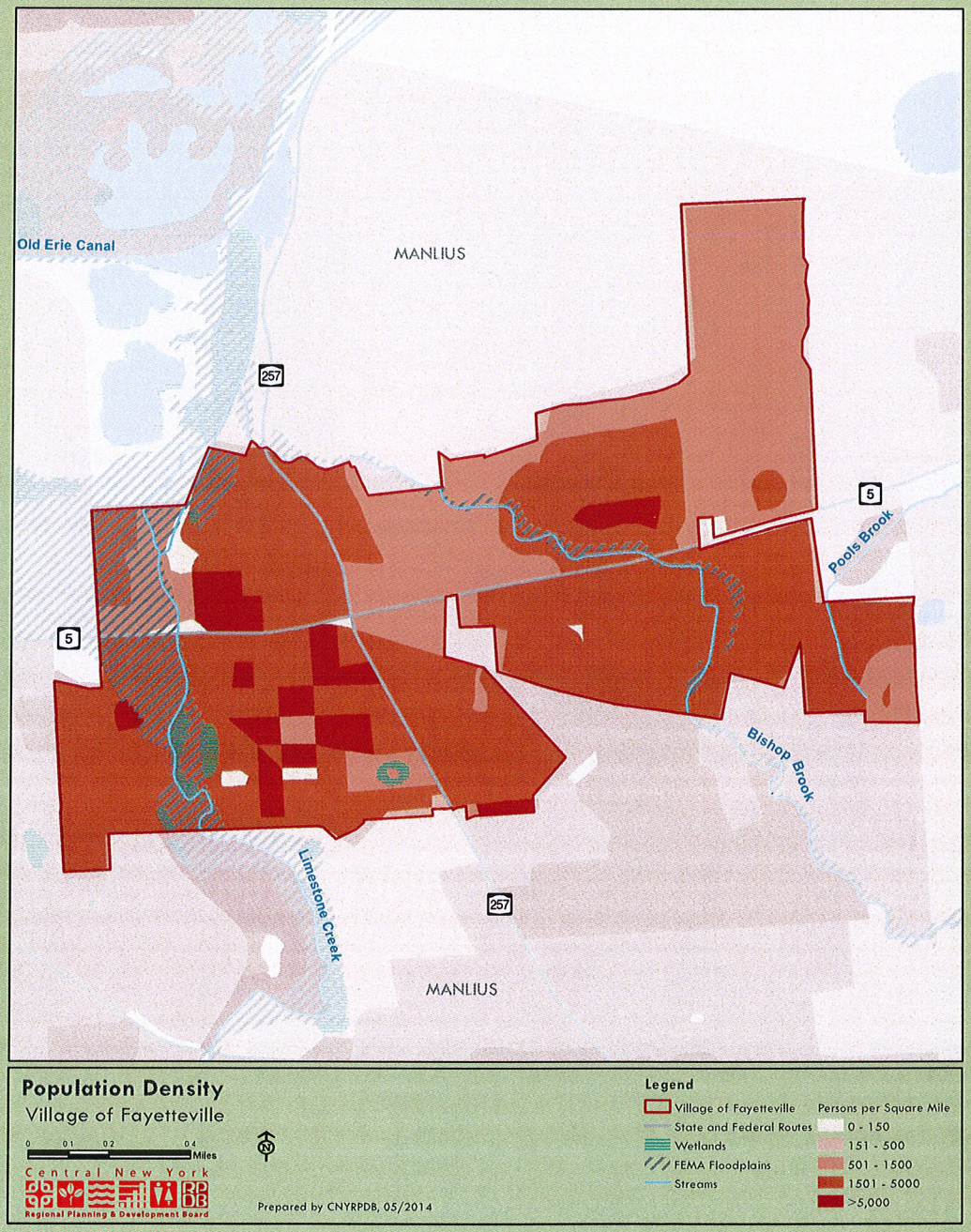


FIGURE 3- VILLAGE OF FAYETTEVILLE POPULATION DENSITY



The Village has maintenance and replacement responsibility for the sidewalks that are located along municipally-owned properties. The remaining sidewalks in the community are the responsibility of the landowners along whose frontage the sidewalk is located. Occasional problems arise when the sidewalks become unsafe and impassible due to poor maintenance. In severe cases, poorly maintained walkways cause people to walk in the roadway.

9 pedestrian accidents and 6 bicycle collisions were reported between January 1, 2002 and December 31, 2011. The highest concentration of pedestrian and bike accidents (most incidents at any one point) occurred along East Genesee Street. The village installed sidewalks from the Village heading east to Duguid Ruin. This provides a valuable pedestrian route into the village from residential developments.

A new pedestrian bridge and a fishing landing were recently constructed over Limestone Creek in Fayetteville's Canal Landing Park. The project also involved the installation of hiking trails on both sides of the bridge, interpretive and directional signs, benches and creative landscaping. The bridge and fishing platform mark the second phase of work on the park which opened in June 2011. The park features outdoor concerts and offers a playground, rest rooms and paved fitness trails. The park has a large bio-infiltration area used to collect and treat stormwater runoff from the parking lot and rest room.

Village leaders are also planning to turn an area by the creek into green space and to extend the trails in Canal Landing. The work is designed to enhance the use of the Erie Canalway Trail and to provide a connection between the trail and the Village.

Transit accessibility: Transit accessibility refers to the ease with which people can access public transit service and the quality of that service. Residents and employees are more likely to use public transit if traveling by bus or train is relatively time-competitive with driving, if transit stations are accessible to pedestrian and cyclists, and if the transit experience is pleasant. There are currently five bus routes in Fayetteville, one of which provides express service.

Parking: This category refers to the supply, price, and regulation of parking facilities in a community. Inexpensive and abundant parking increases automobile ownership and use. Large parking lots also reduce walking and public transit convenience and use. Limiting the availability of parking spaces and imposing fees in city environments can reverse the equation, reducing the number of cars on the road and increasing use of alternative modes of transportation. This strategy isn't applicable for small communities such as Fayetteville where mall parking is available and parking upgrades have recently been implemented.

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

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.

TABLE 6- RESIDENTIAL DENSITY IN FAYETTEVILLE

Number of residential parcels in the community	1,525
Single-family residential parcels	1,456
Single-family residential density (the number of single-family parcels divided by the acreage of all residential parcels	2.9
Total residential acres	521
The average residential density (households per acre)	3.7
Number of vacant parcels	97
Vacant land (acres)	124.8
Number of two and three-family (multiple-residential) parcels	67
Average density of multiple-residential parcels	3.5
Number of parcels with apartment buildings	16
Density of apartment buildings	1.1
Percent of residential land use that is classified as low-density	14
Percent of residential land use that is classified as medium-density	80
Percent of Village's residential land use that is classified as high-density	6
Most populated area	most dense in the following blocks: Walnut St. between Orchard St. and Coln Ave.; Clinton St. between Walnut St. and Chapel St.; and Warren St. between Clinton St. and Cedar St.

GHG Inventory Summary

As part of the Climate Change Innovation Program, an inventory of the Village's municipal and community GHG emissions was conducted in 2013 with the assistance of a student team from the State University of New York College of Environmental Science and Forestry with additional oversight and technical review by CNY RPDB staff. The 2013 inventory report examined emissions generated by government operations in the Village of Fayetteville in 2009, which serves as the baselines for the Climate Action Plan.

The inventory report found that in the 2009 base year, Village government operations generated a total of 672 metric tons of carbon dioxide equivalent ($MTCO_2e$), which were broken up into 5 sectors: buildings and facilities (313 $MTCO_2e$, 47%), streetlights and traffic signals (49 $MTCO_2e$, 7%), vehicle fleet (308 $MTCO_2e$, 46%), wastewater facilities (1 $MTCO_2e$, 0.1%), and employee commute (1 $MTCO_2e$, 0.1%).

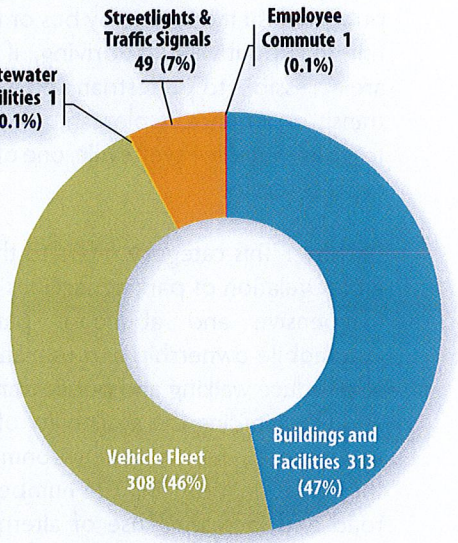
Community emissions totaled 31,614 $MTCO_2e$, which were broken up into 7 sectors: residential energy use (12,072 $MTCO_2e$, 38%), commercial energy use (6,787 $MTCO_2e$, 22%), industrial energy use (1 $MTCO_2e$, 0.003%), transportation (11,818 $MTCO_2e$, 37%), waste (623 $MTCO_2e$, 2%), wastewater treatment (80 $MTCO_2e$, 0.3%), and water conveyance, treatment, distribution (225 $MTCO_2e$, 1%).

The Village of Fayetteville's Climate Action Plan uses the data gathered in the 2013 GHG inventory report as a baseline for analyses to determine which energy efficiency strategies will be most effective. The strategies suggested in this document can help Fayetteville to reduce emissions, energy use, and dollars spent on municipal and community operations further by 2030.

1 $MTCO_2e$ =

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

FIGURE 4- VILLAGE OF FAYETTEVILLE MUNICIPAL EMISSIONS BY SECTOR $MTCO_2E$ (2009 BASELINE)



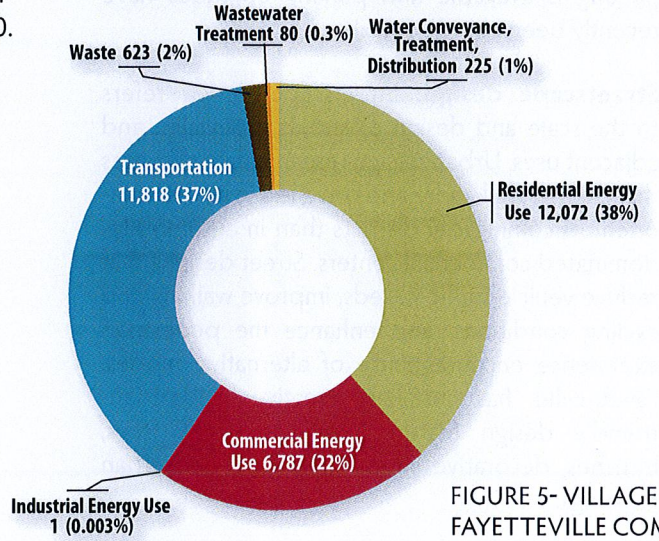
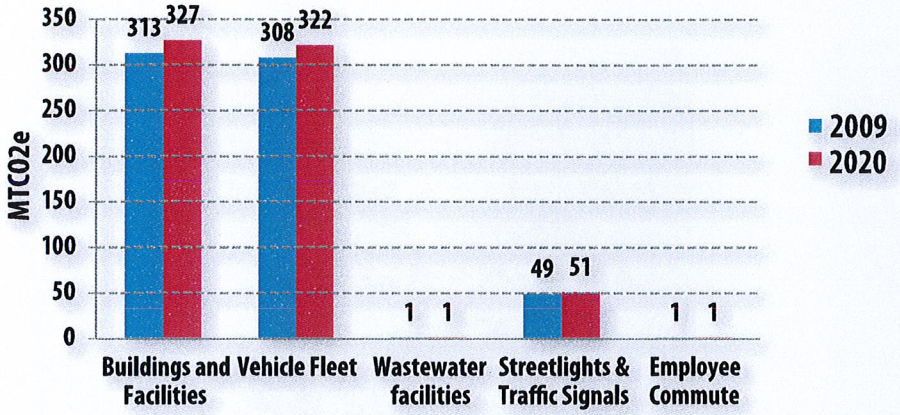


FIGURE 5- VILLAGE OF FAYETTEVILLE COMMUNITY EMISSIONS BY SECTOR $MTCO_2E$ (2009 BASELINE)

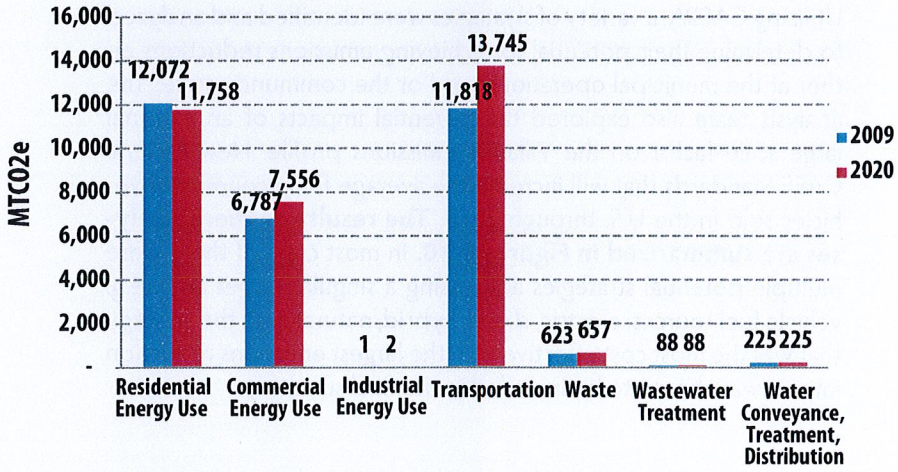
FIGURE 6- EMISSION FORECAST:
MUNICIPAL OPERATIONS



The GHG inventory report also forecasted emissions for the Village of Fayetteville in 2020. The report explained that Village government emissions were expected to total 702 $MTCO_2e$ in 2020, with 14 $MTCO_2e$ increase in buildings and facilities emissions, 14 $MTCO_2e$ increase in vehicle fleet, and 2 $MTCO_2e$ increase in street-lights & traffic signals.

The community forecast showed only slight changes, and were expected to total 34,031 $MTCO_2e$ in 2020, with 314 $MTCO_2e$ decrease in residential energy use, 769 $MTCO_2e$ increase in commercial energy use, 1 $MTCO_2e$ increase in industrial energy use, 1,927 $MTCO_2e$ increase in transportation, and 34 $MTCO_2e$ increase in waste.

FIGURE 7- EMISSION FORECAST:
COMMUNITY



Strategies Overview

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

Utilizing CAPPA, a variety of strategies were identified and analyzed to determine their potential for achieving emissions reductions either at the municipal operations level or the community scale. The analysis team also explored the potential impacts of an external large scale factor on the Village'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 Figures 8-10.** In most cases, if there were multiple potential strategies addressing a singular target area (e.g. vehicle fuel sources: electric, diesel, hybrid, natural gas), the strategy that was the most cost effective with the largest emissions reduction impact was chosen to be included in the final summary.

Veteran's Park, Fayetteville

Photo Credit: Village of Fayetteville

Total possible reductions = 1,864 $MTCO_2e$

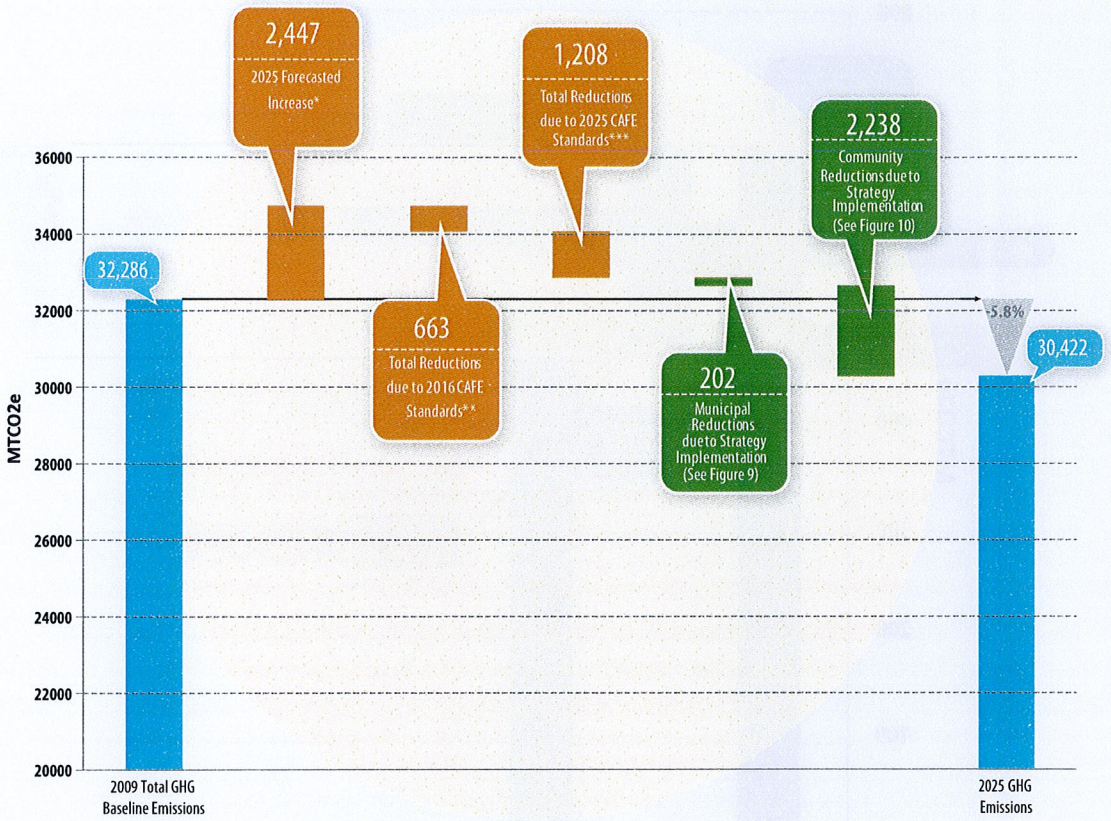
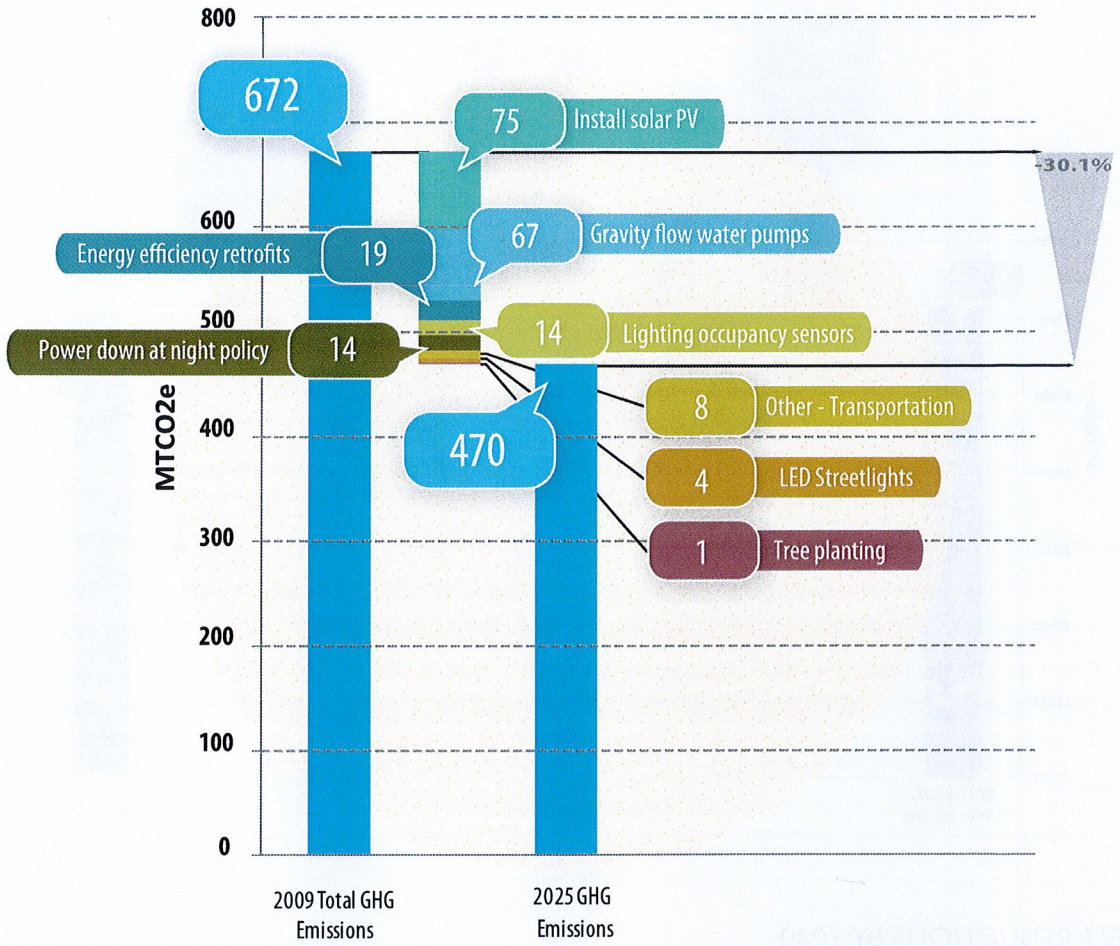


FIGURE 8- TOTAL POSSIBLE REDUCTIONS BY 2030

Figure 8 summarizes the results of the Village of Fayetteville's GHG inventory, a 2020 emissions forecast based on current trends, impacts from the strengthening of Federal CAFE standards, as well as the reductions associated with the Climate Action Strategies that were analyzed for the Village separated into community-wide measures as well as municipal operations measures. Reductions due to Fayetteville actions are shown in green while changes in emissions that will occur regardless of this Plan are shown in orange. It is projected that Fayetteville's total GHG emissions in 2030 could be reduced by 5.8% if the Village implements all of the recommended community-wide and municipal operations measures.

*2013 GHG inventory reported a forecasted an increase of 2,447 MTCO2e from the 2009 baseline to 2020 primarily due to increases in emissions from transportation and commercial energy use.
**2010 Federal CAFE (Corporate Average Fuel Economy) standards have been set at 34.1 miles per gallon by 2016.
***2012 Federal CAFE standards raises average fuel economy to up to 54.5 mpg for the model year 2025.

Total possible municipal reductions = 202 $MTCO_2e$



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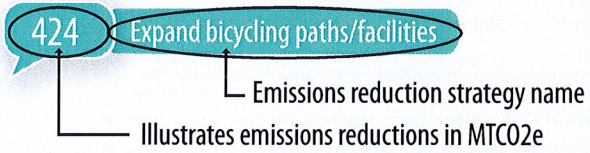


FIGURE 9- POTENTIAL MUNICIPAL REDUCTIONS FROM STRATEGY IMPLEMENTATION

Fayetteville's 2009 baseline municipal emissions as recorded by the GHG inventory report, potential reductions due to suggested strategies, and potential emissions in 2030 should each of the suggested strategies be implemented. It is estimated that there will be a 30.1% reduction in municipal emissions if all suggested strategies are implemented.

Total possible community reductions = 2,238 $MTCO_2e$

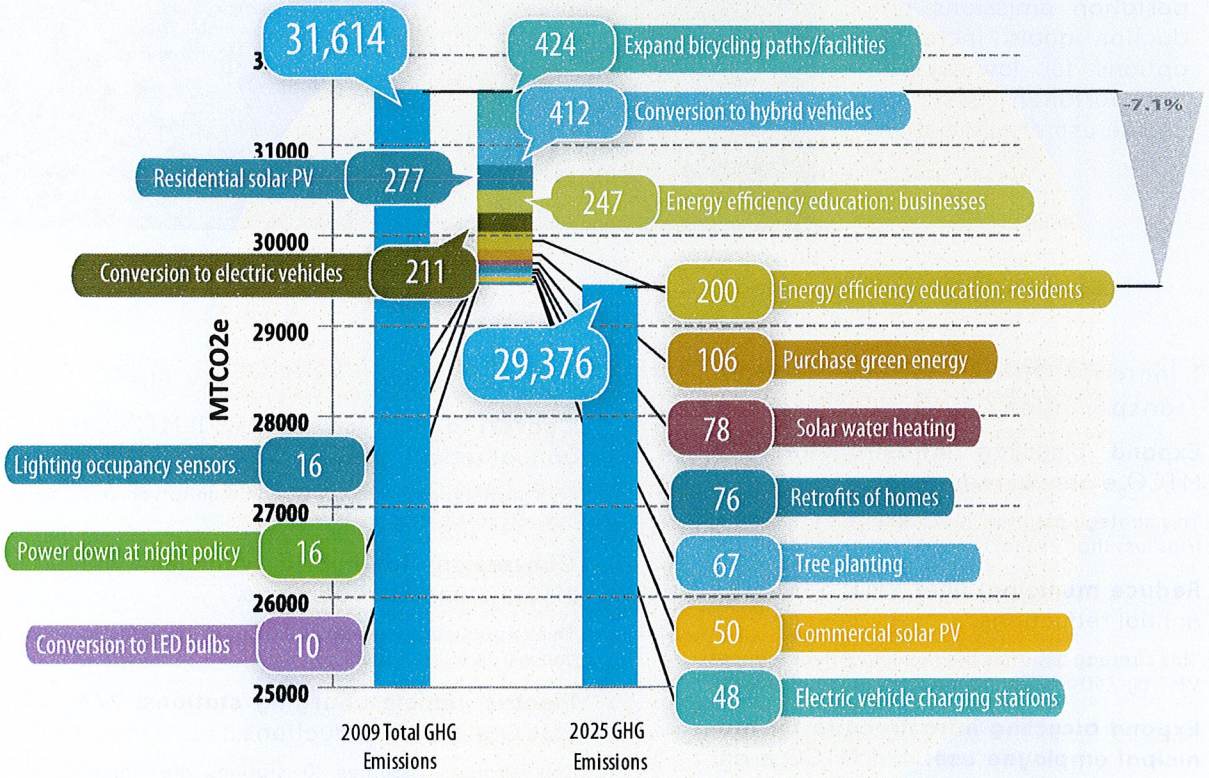
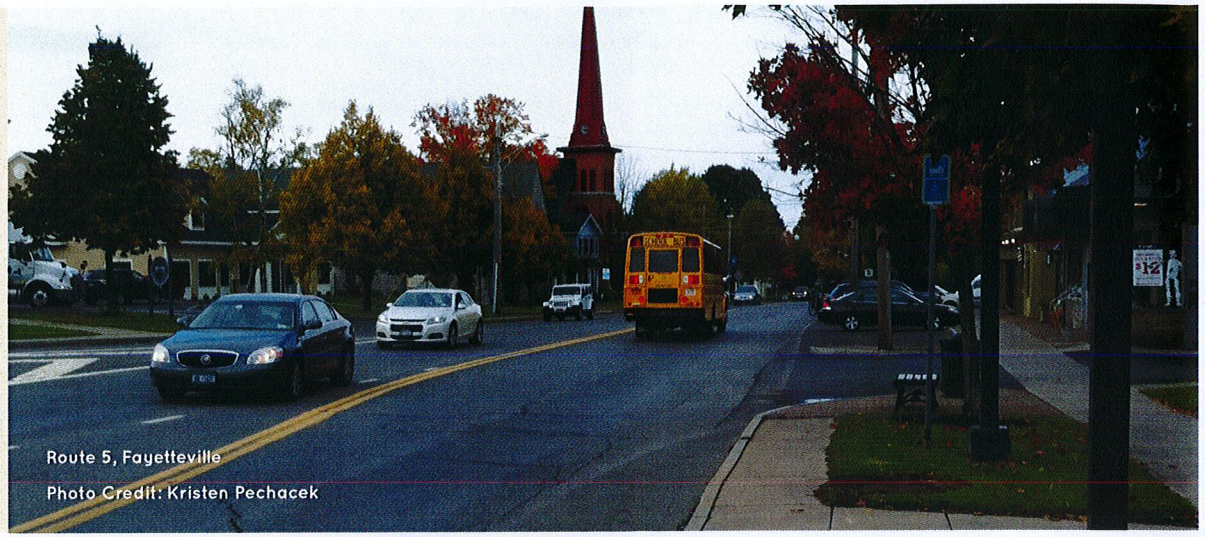


FIGURE 10- POTENTIAL COMMUNITY REDUCTIONS FROM STRATEGY IMPLEMENTATION

Fayetteville's 2009 baseline community emissions as recorded by the GHG inventory report, potential reductions due to suggested strategies, and potential emissions in 2030 should each of the suggested strategies be implemented. It is estimated that there will be a 7.1% reduction in community emissions if all suggested community reduction strategies are implemented.

TRANSPORTATION

According to the Village of Fayetteville's GHG Inventory Report, transportation accounted for 46% of government emissions and 37% of community emissions in the Village in 2009. This Climate Action Plan addresses two main transportation emissions reduction goals: increase options for low-carbon transportation and increase use of alternative fuels.



Route 5, Fayetteville

Photo Credit: Kristen Pechacek

1. Increase Options for Low-Carbon Transportation

Expand bicycling infrastrucutre: 424 $MTCO_2e$ annual reductions.

This strategy assumes 10,178 weekly trips (25% of trips less than 2 miles) convert from car to bicycle.

Reduce municipal fleet VMT: 3 $MTCO_2e$ annual reductions.

This strategy assumes the municipal fleet reduces VMT by 7,500 miles (5% total mileage) each year.

Expand bicycling infrastrucutre for municipal employee use: 424 $MTCO_2e$ annual reductions.

This strategy assumes 5% of municipal employees switch 2 mile trips from car to bicycle.

2. Increase use of Alternative Fuels

Convert to electric vehicles: 211 $MTCO_2e$ annual reductions.

This strategy assumes 5% of community vehicles convert to electric by 2030.

Conversion to hybrid vehicles: 412 $MTCO_2e$ annual reductions.

This strategy assumes 20% of community vehicles convert to hybrid by 2030.

Electric vehicle charging stations: 277 $MTCO_2e$ annual reductions.

This strategy assumes 10 stations are implemented by 2030.

Municipal conversion to hybrid vehicles: 3 $MTCO_2e$ annual reductions.

This strategy assumes 5 municipal vehicles are converted to hybrid by 2030.

Municipal conversion to compressed natural gas (CNG) vehicles: 2 $MTCO_2e$ annual reductions.

This strategy assumes 2 municipal vehicles convert to CNG by 2030.

1. Increase Options for Low-Carbon Transportation

Increasing options for low-carbon transportation would reduce the amount of vehicle miles traveled (VMT), reducing gasoline and diesel use, which would therefore reduce Fayetteville's emissions, fuel costs, and reliance on foreign fossil fuels. Encouraging employees to use transit, bicycles, and walking 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. Combining trips could also help reduce unnecessary trips, reducing VMT, fuel use, emissions, and cost.

Bicycling as a mode of transportation creates no GHG emissions, and by expanding bicycling infrastructure in the community, community members can better take advantage of this form of transportation.

High quality low-carbon forms of transportation provide multiple co-benefits besides energy savings and emission reductions, including congestion reductions, road and parking facility cost savings, consumer savings and affordability, improved mobility for non-drivers, support for strategic land development objectives (i.e. reducing sprawl), and improved public fitness and health.

2. Increase use of Alternative Fuels

According to Fayetteville's GHG Inventory Report, transportation accounted for 46% of government emissions and 37% of community emissions in Fayetteville in 2009. Fuels used for transportation are not only non-renewable fossil fuels, they also produce significantly more carbon emissions than alternative fuel options, such as electric, hybrid, and compressed natural gas (CNG) vehicle technology. Conversion to alternative fuels can therefore be extremely effective when trying to reduce emissions from the transportation sector.

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

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

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

ENERGY EFFICIENCY

According to Village's GHG Inventory Report, emissions from municipal buildings/facilities accounted for 47% of total municipal emissions, wastewater facilities accounted for 0.1%, and streetlights and traffic signals accounted for 7%, while residential energy use accounted for 38% of the community's emissions, commercial energy use accounted for 21%, industrial energy use accounted for 0.003%, and water conveyance, treatment and distribution accounted for 1% of the community's total GHG emissions in the Village of Fayetteville in 2009. This Climate Action Plan addresses two main energy/efficiency emissions reduction goals: increase energy efficiency in buildings; and increase use of renewable energy.

LEED Silver Certified Fire Hall, Fayetteville

Photo Credit: pra-pc.com,

1. Increase energy efficiency and reduce emissions from buildings

Energy efficiency education for residents: 200 $MTCO_2e$ annual reductions.

This strategy assumes 10% of occupied homes participate in program by 2030.

Energy efficiency education for businesses: 495 $MTCO_2e$ annual reductions.

This strategy assumes all businesses in Fayetteville participate in educational program by 2030.

Power-Down at Night Policy: 16 $MTCO_2e$ annual reductions.

This strategy assumes 30,000 square feet of commercial buildings participate in policy.

Lighting occupancy sensors: 16 $MTCO_2e$ annual reductions.

This strategy assumes 30,000 square feet of commercial buildings install sensors.

Conversion to LED streetlights: 4 $MTCO_2e$ annual reductions.

This strategy assumes all 64 municipally-owned streetlights that are not already LEDs convert to LEDs by 2030.

Government building retrofits: 19 $MTCO_2e$ annual reductions.

This strategy assumes the DPW garage undergoes energy efficiency retrofits.

Municipal Power-Down at Night Policy: 14 $MTCO_2e$ annual reductions.

This strategy assumes half of municipal buildings participate in the policy.

Municipal lighting occupancy sensors: 14 $MTCO_2e$ annual reductions.

This strategy assumes half of municipal buildings install lighting occupancy sensors.

Conversion to LED bulbs: 10 $MTCO_2e$ annual reductions.

This strategy assumes each household replaces one bulb with an LED.

Home retrofits: 76 $MTCO_2e$ annual reductions.

This strategy assumes 10% of households undergo energy efficiency retrofits.

Conversion to gravity-flow water pumping system: 67 $MTCO_2e$ annual reductions.

This strategy has already taken place. The Village removed 2 pump and 2 dialer stations at Signal Hill. Water now flows downhill with gravity.

2. Increase use of renewable energy

Residential solar: 277 $MTCO_2e$ annual reductions.

This strategy assumes 1,116 kW installed by 2030.

Purchase green electricity: 106 $MTCO_2e$ annual reductions.

This strategy assumes 5% of community electricity is purchased green.

Solar water heaters: 78 $MTCO_2e$ annual reductions.

This strategy assumes 74 homes (5% of owner-occupied) install solar water heaters.

Commercial solar: 50 $MTCO_2e$ annual reductions.

This strategy assumes 200 kW installed by 2030.

Municipal solar: 75 $MTCO_2e$ annual reductions.

This strategy assumes 300 kW of solar PV is installed.

1. Increase energy efficiency and reduce emissions from buildings

Energy efficiency education can be crucial in working to reduce emissions from buildings and facilities. Without the knowledge of actions that can be taken to increase building efficiency and reduce emissions, it is less likely that important actions, such as the ones listed above, will be taken. Participating in the Central New York Energy Challenge Team Program is a great way to educate community members on actions they can take at home to reduce energy use and emissions, and businesses can be targeted in a similar educational program and/or energy challenge competition.

Many buildings in Fayetteville are also not equipped with the most recent energy efficient technologies, causing the Village and community members to use more energy than is necessary. Retrofitting existing facilities through measures like replacing appliances and light bulbs with more efficient ones, increasing insulation, inserting lighting occupancy sensors, and upgrading HVAC systems can greatly improve energy efficiency and therefore reduce emissions from the Village's buildings and facilities. The Village has already begun this process by building a LEED certified silver Fire Hall. The Village also has begun retrofits at the DPW garage.

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 increases energy and water cost savings.

Powering-down appliances, such as computers, during non-office hours can also significantly reduce energy use and emissions. Placing appliances on power strips and turning power strips off at the end of the day is an easy way to participate in this type of strategy.

The Village has also already reduced its energy use by removing electrical sewer ejector pumps and replacing them with a gravity-flow pumping system. This has already reduced energy use, emissions, and costs to the Village.

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

2. Increase use of renewable energy

By installing renewable energy like solar at the local level, Fayetteville 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 in Madison County and the Solarize Syracuse program in Onondaga County. These programs are an effective way of combining public and private funds for renewable energy. The New York State Energy Research and Development Authority (NYSERDA) provides incentives for the installation of solar PV based on system size. Additionally, there are state and federal tax credits for residential and commercial solar PV and small wind turbine installations. Educational and technical assistance programs can also promote renewable energies. Local governments can offer information clearinghouses and connect consumers with renewable energy installers.

National DSIRE Database

Because incentives available for renewable energies are constantly changing, it is important to remain familiar with which incentives are currently available. 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.

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.

Increasing the use of renewable energy reduces emissions while also providing clean, locally-produced energy that will save money spent on utility bills over time.

"THERE CAN BE NO SUSTAINABLE DEVELOPMENT WITHOUT SUSTAINABLE ENERGY DEVELOPMENT."
–Margot Wallstrom, European Union Environmental Commissioner (2004)

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.

Beard Park
Photo Credit: Kristen Pechacek

1. Promote tree planting for carbon storage and heat mitigation

Promote Tree Planting: 67 $MTCO_2e$ annual reductions.

This strategy assumes 300 trees are planted by 2030 (20% of homes plant 1 tree).

Municipal Tree Planting: 1 $MTCO_2e$ annual reductions.

This strategy assumes 150 trees planted by municipal tree commission by 2030.

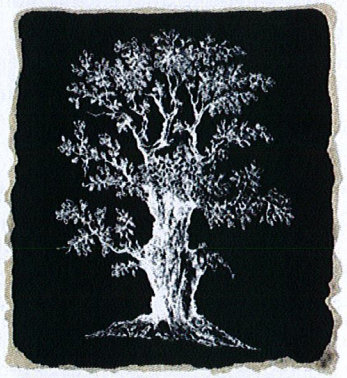
1. Promote tree planting for carbon storage and heat mitigation

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.

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

FAYETTEVILLE



TREE COMMISSION

Beard Park
Photo Credit: Kristen Pechacek

STRATEGY IMPLEMENTATION SUMMARY CHART

Issue	Strategy	Ballpark Rankings (see key below)			Possible Implementation Methods				Additional Benefits			
		Costs (1-5)	GHG Reductions (1-5)	Payback (1-5)	Policy	Program	Capital Projects	Education/ Outreach	Green Job creation	Quality of Life	Water Conservation	Other
Transportation: Municipal	1. Conversion to hybrid vehicles	1	1	3			x			x		x
	2. Reduce fleet mileage	1	1	1	x			x				x
	3. Conversion to CNG vehicles	1	1	5			x					x
	4. Expand bicycling infrastructure	1	1	5		x	x			x		x
Transportation: Community	1. Expand bycicling paths and facilities	1	1	1		x	x			x		x
	2. Conversion to hybrid vehicles	3	1	3			x			x		x
	3. Conversion to electric vehicles	2	1	3			x			x		x
	4. Electric vehicle charging stations	2	1	5			x		x	x		x
Energy/Efficiency: Municipal	1. Solar PV installation	2	3	4			x		x	x		x
	2. Convert to gravity flow water pumping system	2	3	4			x					x
	3. Retrofits to existing facilities	1	2	4			x			x	x	x
	4. Occupancy sensors	1	1	1			x					x
	5. Power down at night policy	1	1	1	x			x				x
	6. LED streetlights	1	1	3			x					x

Issue	Strategy	Ballpark Rankings (see key below)			Possible 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: Residential	1. Residential solar PV	3	1	3		x	x	x	x	x		x
	2. Energy efficiency education: residents	1	1	1				x		x	x	x
	3. Purchase green electricity	1	1	N/A		x						x
	4. Solar water heating	1	1	4			x		x			x
	5. Residential retrofits	3	1	5		x	x	x	x	x	x	x
	6. Conversion to LED bulbs	1	1	2		x	x	x				x
Energy/Efficiency: Commercial	1. Energy efficiency education: businesses	1	1	1				x		x	x	x
	2. Commercial solar PV	2	1	4		x	x	x	x	x		x
	3. Lighting occupancy sensors	1	1	1			x					x
	4. Power down at night policy	1	1	1	x			x				x
Natural Resources	1. Tree planting	1	1	3		x	x	x		x		x
	2. Municipal tree planting	1	1	6		x	x			x		x

Key to Ballpark Rankings

Est. Total Costs	Est. Total GHG Impact	Est. Payback
1 = Less than $250,000	1 = 0-9.9% of goal	1 = Less than 1 year
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

Central New York Regional Planning & Development Board

Central New York climate change innovation program

CNY Energy Challenge

VILLAGE OF FAYETTEVILLE
425 E GENESEE ST, FAYETTEVILLE, NY 13066