Rochester Climate Action Plan

Reducing greenhouse gas emissions for a resilient and sustainable future.

Believe.

City of Rochester, NY
Lovely A. Warren, Mayor
Rochester City Council

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Dear Neighbors:

The people of Rochester understand the sense of urgency that must be brought to bear against increasingly damaging impacts of climate change. By taking steps to protect Rochester's environment, we are creating a healthier, more vibrant and livable community for all of our citizens. This is why Rochester is working toward reducing greenhouse gas emissions. By sharing our success with other cities across the nation, we expect our local efforts to have a global impact.

As part of the New York State Energy Research and Development Authority's (NYSERDA) Cleaner Greener Communities initiative, Rochester has developed this community-wide Climate Action Plan in collaboration with key stakeholders, including non-profits, business leaders, community organizations, and colleges and universities. The strategies and actions outlined in the Climate Action Plan will play an important role in revitalizing Rochester's neighborhoods and contributing to Rochester's ability to create and retain jobs. The Plan follows several past sustainability initiatives, including the Municipal Operations Climate Action Plan, the Bicycle Master Plan, and the Energy Master Plan. The Climate Action Plan is a progression of the recommendations laid out in the Finger Lakes Regional Sustainability Plan and the Finger Lakes Regional Economic Development Strategy.

Rochester's Climate Action Plan provides opportunities to create more jobs, revitalize neighborhoods, and stimulate economic development. By doing these things, it contributes to our efforts to improve public safety and educational opportunities in our schools. Through actions related to energy efficiency, transportation, waste management, water and land use, the Plan lays a foundation to reduce the impacts of climate change and adapt to its unavoidable impacts.

I want to thank all who contributed to the planning process, and I look forward to your continued engagement as we implement the plan.

Sincerely,

Lovely A. Warren

Mayor of Rochester

Lovely A. Warren
Mayor,
City of Rochester

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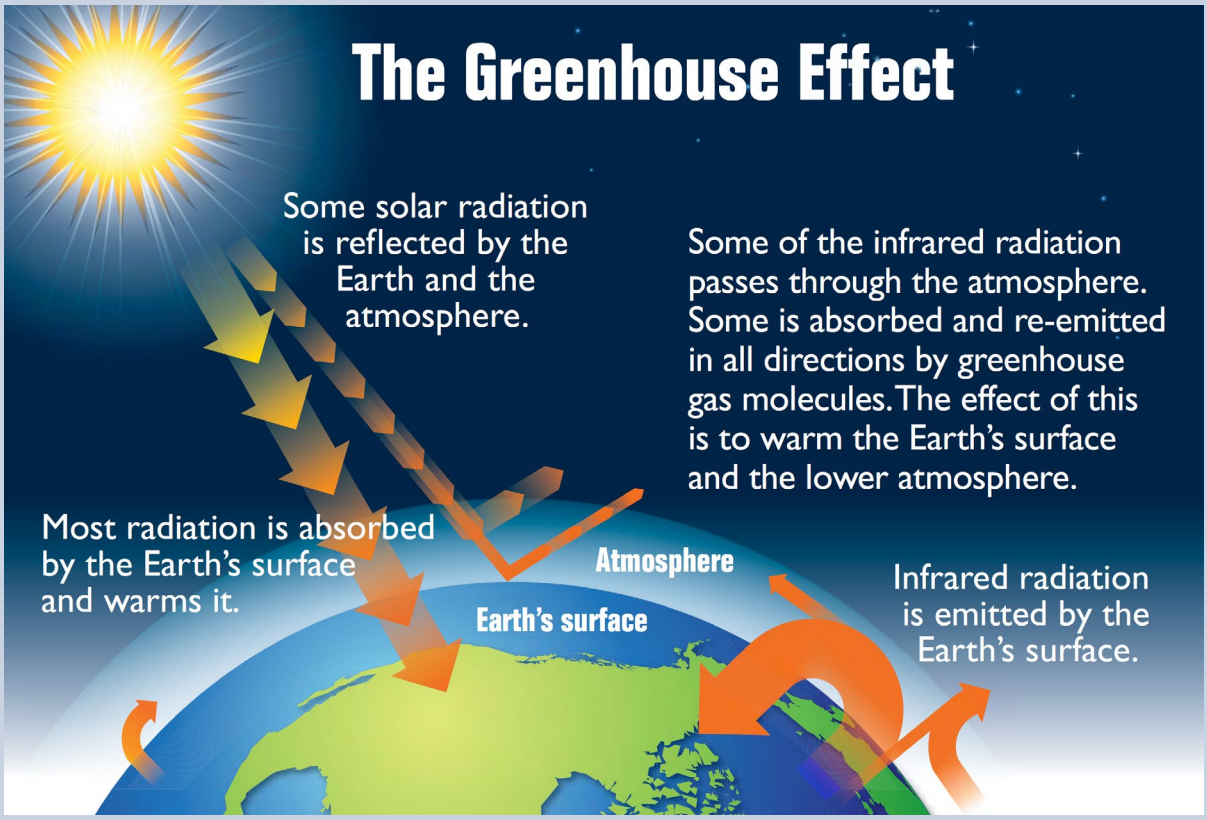
Chapter 1: Introduction

1.1 The Science of Climate Change

Over the past century, human activities have released large amounts of carbon dioxide (CO_2) and other greenhouse gases (GHGs) into the Earth's atmosphere. Most of these GHGs have come from the burning of fossil fuels (such as oil, coal, and natural gas) to produce energy for heating and lighting homes, running vehicles, and keeping businesses and factories operating. Waste disposal, deforestation, industrial processes, and some agricultural practices also emit GHGs into the atmosphere. GHGs act like insulation around Earth, trapping heat and energy in the atmosphere and causing the Earth to warm. This phenomenon is called the greenhouse effect, some of which is natural and necessary to support life on Earth. The excessive buildup of GHGs, however, is changing the Earth's climate, resulting in largely negative consequences to human, environmental, and economic health.

According to the International Panel on Climate Change (IPCC), the global atmospheric concentration of CO_2 has increased from a pre-industrial value of about 280 parts per million (ppm) to 379 ppm in 2005 and has surpassed 400 ppm in 2013. Each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850. The period from 1983 to 2012 was likely the warmest 30-year period of the last 1400 years in the Northern Hemisphere. Sea levels have also been rising, and the observed annual coverage of the Earth's surface in snow and sea ice have shrunk. Further, the first six months of 2016 were the warmest half-year on record, as two key indicators (global surface temperatures and arctic sea ice extent) have broken records.

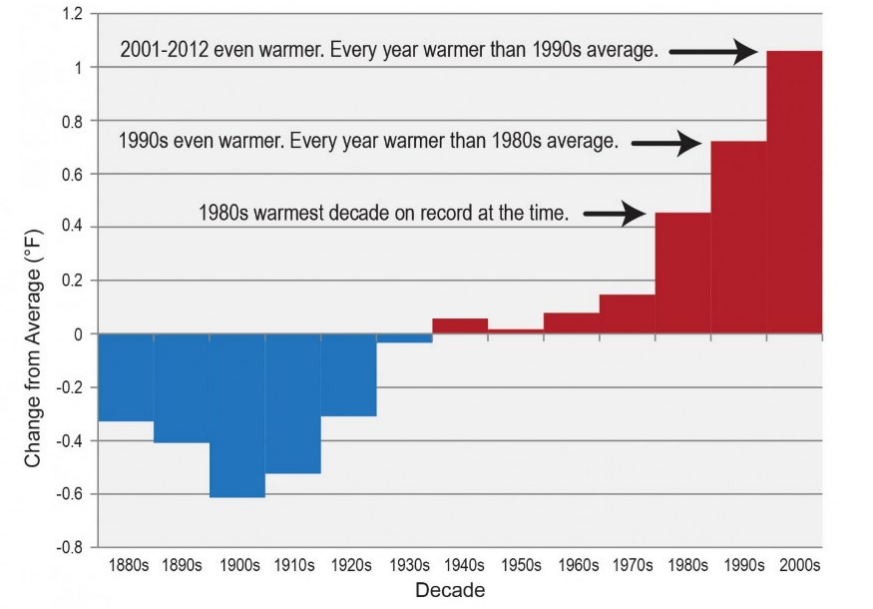
How Does Climate Change Happen?



Source: US EPA 2012

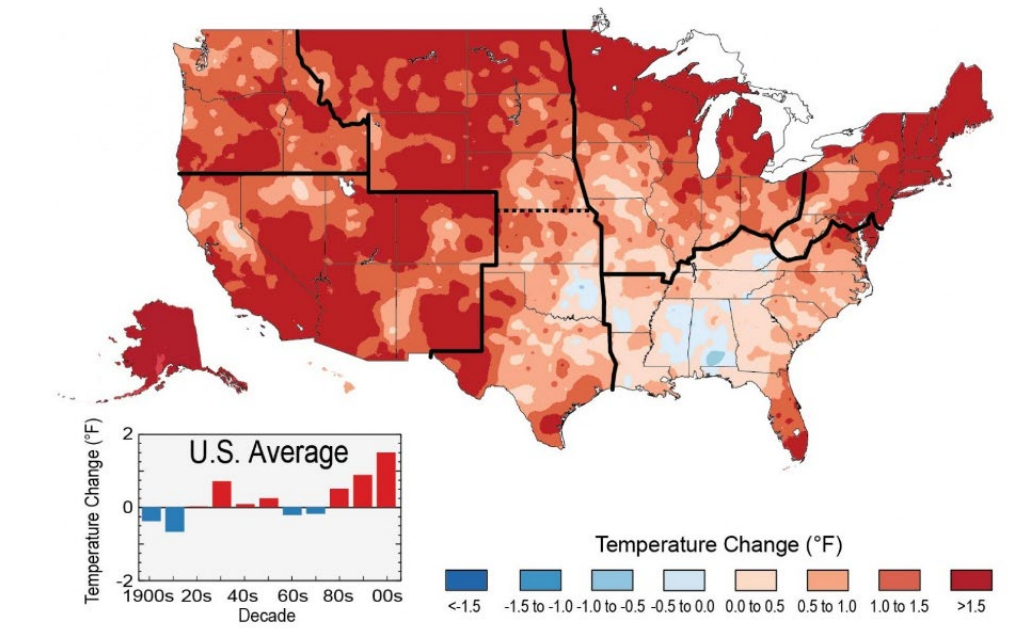
Temperature Change in the US and the World

Global Temperature Change



The period from 2001 through 2012 was the warmest on record globally. Every year was warmer than the average in the 1990s. The bars on the graph to the left show the difference between each decade's average temperature and the overall average for 1901-2000.

Temperature Change in the US



US temperatures have warmed 1.3 to 1.9 degrees since 1895, with the most increase since 1970. The colors on the map above show temperature changes over the past 22 years (1991-2012) compared to the 1901-1960 average for the contiguous U.S. The bars on the graph show the average temperature changes by decade for 1901-2012 (relative to the 1901-1960 average).

Source: US National Climate Assessment, 2014

1.1 What Climate Change Means for Upstate New York

The annual average temperature in New York State has increased approximately 2.4 ºF since 1970. It is expected that the average temperature in New York State will be up to 3 ºF warmer by the 2020s and 6 ºF warmer by the 2050s.[1] Annual precipitation has increased across the state, with year-to-year variability becoming more pronounced. In many areas of New York, spring now begins a week earlier than it did a few decades ago.

Climate change will continue to impose new risks and challenges to Upstate New York communities, the economy, and our infrastructure. Figure 1 illustrates the relationship between activities, GHG emissions, and impacts. While Upstate New York communities will be indirectly impacted by rising sea levels and coastal erosion, other impacts will be experienced more directly by the Rochester community. These impacts are summarized below:

- **Increasing temperature and changing precipitation patterns.** Rising temperatures and shifting rainfall patterns are likely to increase the intensity of both floods and droughts. Average annual precipitation in the Northeast has increased 10 percent since 1895, and precipitation from extremely heavy storms has increased 70 percent since 1958. During the next century, annual precipitation and the frequency of heavy downpours are likely to keep rising.
- **Impacts to the Great Lakes.** Lake ecosystems will also be affected by the changing climate. Warmer temperatures may cause more algal blooms, which can harm fish and degrade water quality. If severe storms become more frequent, then sewer overflows will become more frequent, and more pollutants are likely to run off from the land into the Great Lakes, which could threaten water supplies and require recreational beaches to be closed more often for health reasons.
- **Reduced winter recreation.** Warmer winters may bring more rain and less snow to upstate New York. A decline in snowfall would mean less snow cover for recreational industries, like skiing, snowboarding, and snowmobiling, and it would harm the local economies that depend on them.
- **Impacts to Agriculture.** Longer frost-free growing seasons and higher concentrations of atmospheric carbon dioxide could increase yields for many crops, notably soybeans. But increasingly hot summers are likely to reduce yields of corn, one of the state's most important crops. Higher temperatures cause cows to eat less and produce less milk, so a warming climate could reduce the output of milk and beef, which together account for a large proportion of the state's farm revenues.
- **Impacts to human health and equity.** Climate change will have a variety of public health consequences, including heat-related illnesses, allergies, asthma, water and food borne illnesses, cardiovascular disease, and others. The risk of some diseases carried by insects may increase. The ticks that transmit Lyme disease are active when temperatures are above 45°F. Warmer winters could lengthen the season during which ticks can become infected or people can be exposed to the ticks. Higher temperatures would also expand the area that is warm enough for the Asian tiger mosquito, a common carrier of West Nile virus. Climate change may also exacerbate heat related and respiratory illnesses.

  Vulnerability to the impacts of climate change (and the capacity to adapt to these changes) is highly uneven across communities, neighborhoods, sectors, and demographic groups. Disadvantaged and vulnerable populations, such as children, the elderly, the sick, and the poor, are more likely to experience the negative effects of climate change. Rochester's low-income populations and communities of color are more likely to live in areas with less green space and are often more vulnerable to heat related and respiratory illnesses. Further, low-income populations and communities of color often have less access to healthy and energy efficient housing, transit, or safe bicycling and walking routes, which can further exacerbate the human health impacts of climate change. Later sections of this plan address the specific human health vulnerabilities and ways in which implementation of the CAP can achieve equitable outcomes.

These impacts will potentially affect the livability and economic vitality of communities throughout New York State, as well as the health and safety of residents.

1 Responding to Climate Change in New York State (ClimAid), 2011. Website: https://www.nyserda.ny.gov/climaid

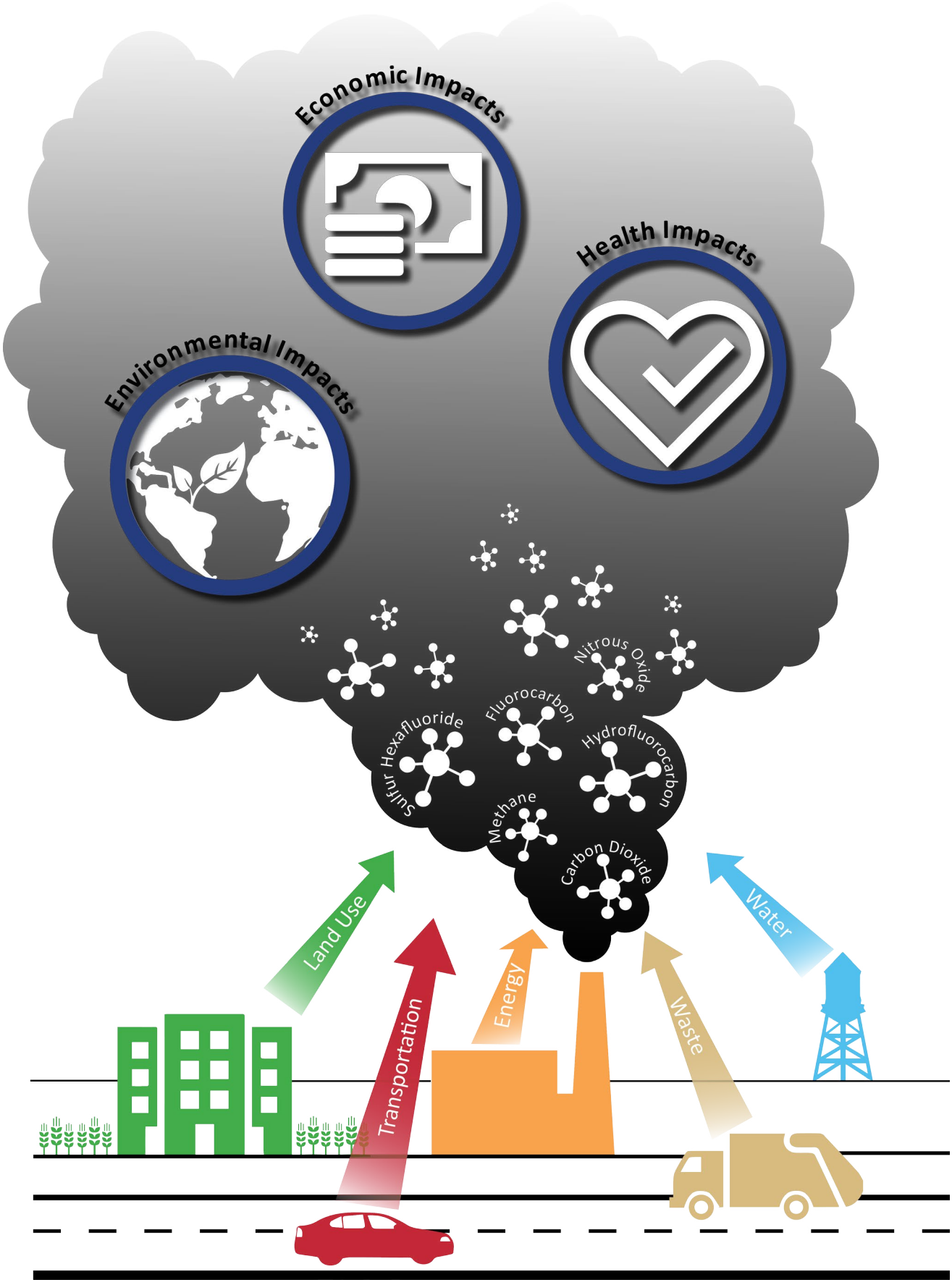


Figure 1: Greenhouse Gas Impacts

1.2 Why a Climate Action Plan?

Climate action planning is a proactive, strategic effort to address growing concentrations of GHGs in the atmosphere. Deliberate planning and adjustment of these activities and practices can **greatly reduce the amount of GHGs produced and generate numerous community benefits, such as lower utility costs and improved environmental and public health.**

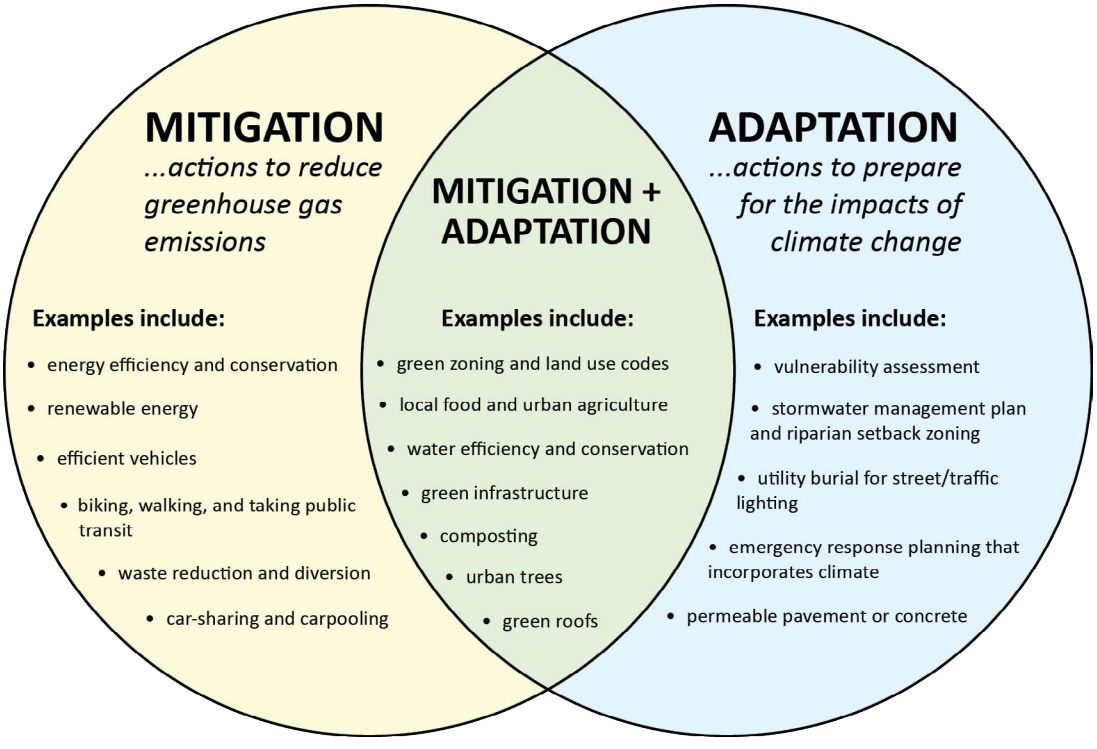
While Rochester is one of the first upstate New York cities to prepare a CAP, dozens of cities across the US have begun to see firsthand that the implementation of climate mitigation strategies, such as improving building energy efficiency and public transit, have a positive impact on local and regional communities.

Studies have shown that climate action leads to economic opportunity. In fact, 91 percent of the 110 global cities tracked by the Carbon Disclosure Project and the C40 Cities Climate Leadership Group state that **climate action created economic opportunities**, thus making cities more attractive for businesses, largely in the sectors related to energy efficiency and the development of non-motorized transportation infrastructure.

The strategies and actions contained in this document seek to reduce Rochester's dependence on non-renewable fossil fuels, prioritize sustainable uses of land and water, reduce waste, and support neighborhood progress. If implemented, these actions will not only reduce Rochester's GHG emissions, but also enhance its economic vitality, resilience, and viability as a healthy, livable city.

In addition to the benefits of climate action, there are also **costs of inaction** that must be considered. These costs include, but are not limited to, increased utility expenses, reduced air quality due to ongoing fossil fuel combustion, the potential costs imposed by future carbon regulations, as well as the cost of ongoing dependence on fossil fuels. For Rochester specifically, just considering the projections for escalating fuel prices, under a business-as-usual growth forecast, the cost to the City's residents and business is expected to be $260 million by 2030, compared to $190 million today.

In addition to reducing the City's contribution to climate change (i.e. **mitigation**) it is important to recognize how climate change will continue to impact our community and how we will adapt (i.e. **adaptation)**. The CAP addresses next steps for Rochester to adequately respond to climate change, including the integration of climate adaptation into planning and decision making within the region.



Source: Center for Clean Air Policy

1.3 The Role of Cities in Climate Action

With a large majority of Americans living in urban areas, cities play a key role in addressing climate change. While each individual city's impact on global greenhouse gas emissions is relatively small, the leadership cities can provide in motivating change can be extremely significant. In a recent survey of 288 major cities, more than half (53%) had committed to reducing greenhouse gas emissions[2]. National and international networks of cities, including 100 Resilient Cities, International Council for Local Environmental Initiatives, C40 Cities, and many others are sharing best practices and comparing results.

The City of Rochester recognizes that local government can play a leading role in reducing GHG emissions, minimizing the impacts of climate change, and fostering sustainability within the community. **The City seeks to provide a sustainable environment while improving the quality of life, encouraging economic growth and creating a vibrant, healthy city.** This CAP outlines a detailed and clear path toward achieving these objectives.

1.4 Project Background

This community-wide Climate Action Plan project was led by the City of Rochester's Office of Energy and Sustainability, with funding from the New York State Energy Research and Development Authority (NYSERDA) Cleaner Greener Communities Phase 2 Implementation program. The CAP was developed in collaboration with community members and key stakeholders. **It is truly a community plan that will only be achieved through collaboration and partnership between Rochester's residents, businesses, organizations, and institutions.**

The City of Rochester Office of Energy and Sustainability is part of the Division of Environmental Quality, with the goals of making Rochester a model for innovative, ecologically sustainable operations, policies and practices, and to connect the City with regional and national sustainability resources. The Office is responsible for helping the city take advantage of the co-benefits generated by adopting more sustainable practices. Additionally, the Office actively solicits grant funding and incentives to implement energy and sustainability projects, from agencies and utilities, including the U.S. Department of Energy (USDOE), New York State Department of Environmental Conservation (NYSDEC), New York State Energy Research and Development Authority (NYSERDA), the New York State Environmental Facilities Corporation (NYSEFC), and Rochester Gas & Electric (RG&E).

Benefits of Climate Action Planning

- ✓ Local job creation and economic development through the support of local businesses
- ✓ Improved public health/reduced health disparities
- ✓ Improved air quality and quality of life
- ✓ Opportunities to showcase and leverage local research and innovation related to climate mitigation and adaptation
- ✓ Reduced utility and operational costs for homes, businesses, and government
- ✓ Improved risk management and resilience to the impacts of climate change
- ✓ Diversified energy supply, providing greater resiliency and reliability
- ✓ Healthier, more comfortable homes
- ✓ Improved water quality and ecosystems
- ✓ A more educated and empowered population with the tools to take action at home, at work, and in their community
- ✓ Opportunities for leadership and recognition

2 Climate Mitigation and Adaptation Actions in American's Cities, 2014, http://usmayors.org/pressreleases/uploads/2014/0422-report-climatesurvey.pdf

Leveraging Past Investments

The CAP builds upon years of planning and implementation efforts undertaken by the City of Rochester and its partners. In 2007, the City signed the U.S. Conference of Mayor's Climate Protection Agreement, committing to reducing GHG emissions to meet or surpass the Kyoto Protocol targets of a seven percent reduction from 1990 levels by 2012. On August 11, 2009, the Rochester City Council unanimously approved the Climate and Environment Protection Resolution, which acknowledged the many activities the City had already undertaken additional efforts to help achieve Rochester's goals to become a livable, green city.

In 2010 the City joined the NYS Department of Environmental Conservation's Climate Smart Communities program, which plays an important role in helping the City leverage technical and financial resources available through state and federal programs. The City also received funding to develop a Greenhouse Gas Inventory and Municipal Climate Action Plan through the Department of Energy's Energy Efficiency and Conservation Block Grant program (DOE EECBG). In May 2012 the City joined the United States Department of Energy's (DOE) Better Buildings Challenge (BBC), which pledges a 20 percent reduction in building Energy Use Intensity (EUI) from a 2009 baseline by 2020. The City joined the Compact of Mayors in 2015, a cooperative effort among mayors and city officials around the world to help reduce greenhouse gas emissions and track progress.

Two key outcomes of these past efforts include (1) the Municipal Operations Climate Action Plan and (2) the City of Rochester Energy Master Plan:

- The **Municipal Operations Climate Action Plan,** completed in 2013, which focused on the City's municipal facilities, fleet and operations. The plan outlines policies and measures intended to help the City achieve GHG emissions reduction goals and evaluate additional measures that may be implemented in the future. Policies and implementation activities cover transportation/fleet management, energy efficiency, renewable energy, materials and waste management, climate change adaptation, green infrastructure, and employee education.

- The **City of Rochester Energy Master Plan** was completed in 2015 in collaboration with the NY Power Authority (NYPA), as part of the Five Cities Energy Plans Initiative. The plan includes goals and recommended actions designed to achieve greenhouse gas reductions and energy efficiency, focused on municipal government and community-wide activities.

Through implementation of these plans and parallel efforts, the City has completed numerous initiatives and projects, including:

- City facility energy audits and energy efficiency upgrades
- Installation of solar PV at city facilities
- Incorporation of alternative fuel vehicles in the city fleet
- Installation of public electric vehicle charging stations
- Installation of green infrastructure at city facilities, such as green roofs, bioswales, rain gardens and porous pavement
- LED lights in city facilities
- LED streetlight upgrades

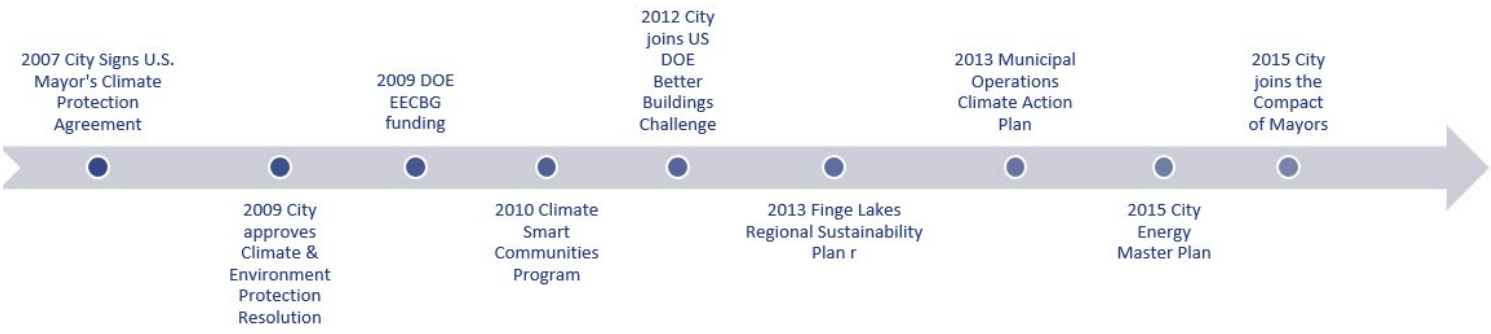


Figure 2: Climate Related Planning

Climate Smart Communities

The New York State Department of Environmental Conservation (NYSDEC) Climate Smart Communities (CSC) program provides local governments with a framework to guide their climate action and enables high-performing communities to achieve recognition for their leadership. The program is designed around ten pledge elements, and also provides recognition to communities for their accomplishments through a rating system leading to four levels of award: Certified, Bronze, Silver and Gold.

Pledge Elements:

1. Pledge to be a Climate Smart Community.

2. Set goals, inventory emissions, plan for climate action.

3. Decrease community energy use.

4. Increase community use of renewable energy.

5. Realize benefits of recycling and other climate-smart solid waste management practices.

6. Reduce greenhouse gas emissions through use of climate-smart land-use tools.

7. Enhance community resilience and prepare for the effects of climate change.

8. Support development of a green innovation economy.

9. Inform and inspire the public.

10. Commit to an evolving process of climate action.

- Development and implementation of the Rochester Bicycle Master Plan (2011) and the Bicycle Boulevard Plan (2014)
- Implementation of a bikeshare program (2016)
- Upgrades to trails
- Adoption of the NYS Unified Solar Permit

The Planning Context

Climate action planning is a process that involves ongoing analysis, stakeholder engagement, and measurement. Equally important is alignment with other local and regional planning efforts. Sustainability planning is also taking place at the regional level: the Finger Lakes Region (Orleans, Genesee, Wyoming, Monroe, Livingston, Wayne, Ontario, Seneca, and Yates Counties) completed a **Regional Sustainability Plan** focused on long-term sustainability efforts that will reduce greenhouse gas emissions and energy use. The plan highlights regional collaboration among stakeholders and is used to leverage investment in regionally significant sustainability projects.

As part of a parallel planning process, the City is updating its **Comprehensive Plan**. As the City's overarching policy document, the Comprehensive Plan guides long-term growth and change in the community. While the CAP is specifically focused on the goal of reducing greenhouse gas emissions, its strategies, actions, and outcomes are naturally interconnected with many elements of the Comprehensive Plan. These elements include land use, transportation, water resources, recreation, education, housing, sustainability, and economic development. The CAP includes recommendations for how the City can integrate target emissions reductions and sustainability concepts into the Comprehensive Planning process.

Implementation of the CAP will need to be closely coordinated with regional and city planning efforts noted above. In addition, the City will ensure that specific implementation action items in the CAP are consistent with the following planning efforts focusing on a specific topic area or geographic boundary:

- **New York State Brownfield Opportunity Areas (BOA).** This Program is administered and managed through the New York State Department of State (DOS). The program provides financial and technical assistance to complete area-wide strategies for neighborhood revitalization and

brownfield redevelopment. The BOA program recognizes that brownfields, underutilized properties, and vacant sites can all have negative impacts on neighborhood vitality, property values and quality of life. The program provides a funding source to facilitate community and neighborhood-based planning, while creating strategies to improve overall conditions and opportunities for reinvestment and revitalization. There are currently four ongoing BOAs in Rochester:

  - South Genesee River Corridor BOA (former Vacuum Oil site) Project
  - Lyell-Lake-State Street BOA
  - Bulls Head Revitalization Plan BOA
  - Group 14621 Neighborhood Revitalization Plan BOA

- **The Local Waterfront Revitalization Program (LWRP)**, funded by the NYS Department of State, aims to assist communities in developing a local comprehensive land and water use plan while addressing coastal issues. The City of Rochester's LWRP, which is in the process of being updated, aims to revitalize identified deteriorated and underutilized waterfront properties by promoting recreation-oriented uses in waterfront locations.

- **The Harbor Management Plan** recommends a structure for and provides direction to a management entity that will oversee operations and events at the Port of Rochester-Genesee River Harbor, facilitate and promote sustainable economic development and tourism, preserve the unique natural environment in the Harbor, seek opportunities to upgrade the infrastructure, and collaborate with law enforcement agencies to ensure public safety.

- **Rochester Monroe Anti-Poverty Initiative.** The Rochester-Monroe Anti-Poverty Initiative (RMAPI) is a community-wide effort to reduce poverty in the Rochester and Monroe County region by 50 percent over the next 15 years.

- **The Transportation Improvement Program (TIP)**, prepared by the Genesee Transportation Council (GTC), is a staged, multi-year program of projects that identifies the timing and funding of all highway, bridge, transit, intelligent transportation system, bicycle, and pedestrian transportation projects scheduled for implementation. The 2017 – 2020 TIP notes that GTC continues to pursue projects that address air quality concerns and energy efficiency. Priorities include increased use of alternative modes of transportation, development of a region-wide multi-use trail system, comprehensive congestion management process, and air quality planning.

Community Engagement

The CAP was developed through rigorous data analysis and supported by community expertise and input. At the outset of the project, the City convened a Stakeholder Advisory Committee made up of community members, business owners, residents, and representatives of organizations at the forefront of climate action planning. The Stakeholder Advisory Committee met three times throughout the course of the project to review technical materials and provide guidance for the following: **(1) developing a climate action vision statement, (2) identifying goals and targets that align with that vision, (3) selecting strategies that can be grouped together to achieve the desired goals, and (4) outlining specific implementation actions for each strategy to ensure progress is made on the ground**.

Other outreach efforts were conducted in an effort to inform the community and broaden the types of opportunities available for engagement throughout the development of the CAP. The City hosted an "open house" style booth at the Seneca Park Zoo's Earth Day event on April 23, 2016. Attendees were invited to learn about the project and provide feedback about the types of climate action activities they already do and would do in the future. In addition, the City developed and distributed an online survey to gather feedback from the public about potential strategies in the plan.

In addition, technical information and updates about the planning process were posted on the City's website:

http://www.cityofrochester.gov/climateactionplan/

1.6 Climate Action Plan Framework

This Climate Action Plan includes an implementation framework designed to achieve community-wide goals for greenhouse gas reduction and sustainability. This CAP is organized around a unifying framework that ties together a multitude of inputs, including technical analysis, stakeholder engagement, and policy evaluation. The framework includes the following key elements:

Vision: The vision is a general guiding statement about the future state of the community as it relates to greenhouse gas emissions and sustainability. The CAP vision statement was developed with input from the Stakeholder Advisory Committee.

Focus Areas: The technical and complex nature of climate action planning is more easily understood and implemented in the context of Focus Areas. Focus areas correspond to activities and type of emissions created, such as "Energy Supply" and "Transportation."

The following focus areas were selected for the CAP:

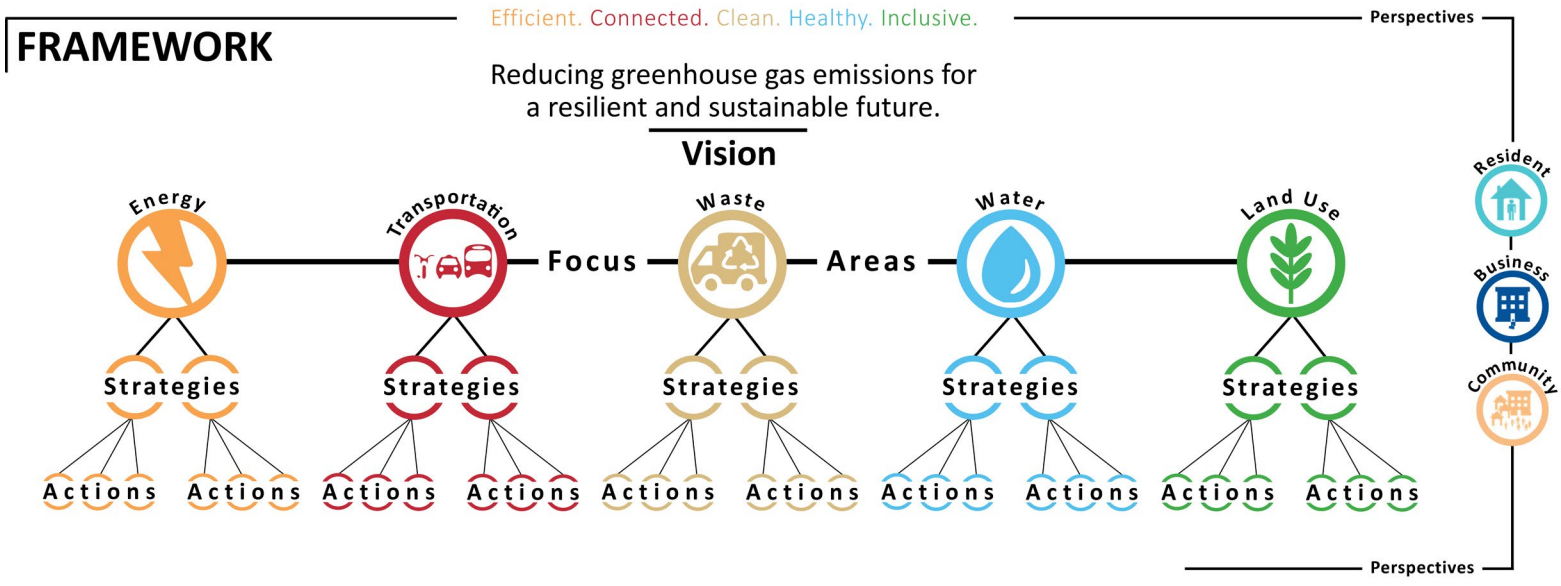
Energy Use and Supply: This focus area includes all electricity and natural gas consumption within the City and also considers the mix of energy generation supplying the City of Rochester. Strategies in this focus area include improved energy efficiency as well as shifts in Rochester's energy supply to cleaner sources.

Transportation: This focus area includes emissions from on-road vehicle traffic occurring in the community. Strategies in this focus area include reductions in vehicle miles traveled as well as shifts to cleaner fueled vehicles in Rochester.

Waste Management: This focus area includes all solid waste generated by residents and businesses within the community while strategies look for opportunities to reduce this waste generation.

Clean Water: This focus area includes the energy used to treat and distribute water to Rochester residents and businesses as well as the process emissions from wastewater treatment within the community. Strategies in this focus area look to opportunities to conserve water resources and protect the quality of local supplies from the impacts of climate change.

Land Use: Direct land use-related GHG emissions are not included in the baseline inventory for Rochester, but strategies in this focus area look for opportunities to improve land use practices to help the City better manage the impacts of climate change.



Strategies: are specific statements of direction that expand on the vision and guide decisions about future public policy, community investment, and actions.

Actions: are detailed items that should be completed in order to carry out the vision and strategies identified in the plan.

Perspectives: Given the community-wide nature of the CAP, it is important to consider the various perspectives within the community that will be affected by the plan. Various subsets of the community create different types of impacts to climate change--and likewise will experience policy decisions and strategies in unique ways. The Rochester CAP has been evaluated from three different perspectives, with unique questions considered for each.

Resident: What impact will the CAP have on Rochester families? How can climate action help improve community health while providing opportunities for direct cost savings to households that can be reinvested in local neighborhoods?

Business: How can the CAP improve local business operations, spur job growth, and make Rochester a desirable place for new companies and industries?

Community: What is the role of City government and other community stakeholders, such as State and Federal agencies, local utilities, schools, universities, and non-profit organizations, in CAP implementation? How can the CAP bring the community together to make Rochester more effective at reducing emission and resilient to the impacts of climate change?

1.7 Organization of This Document

The Rochester CAP sets GHG emissions target reduction goals and identifies strategies to achieve those goals. The CAP document is intended to provide a detailed "how-to" guide and reference for use by the City and other stakeholders leading plan implementation.

The balance of the CAP is organized into following sections:

- ✓ **Section 2, Where We Are Now?** A baseline assessment of the current climate conditions in Rochester, including a general community snapshot, GHG inventory, and summary of the regional climate vulnerabilities.
- ✓ **Section 3, Where Do We Want to Be?** A forecast of future GHG emissions and targets for reducing those emissions over the CAP planning horizon.
- ✓ **Section 4, How Do We Get There?** Targeted strategies and actions needed to meet the selected emission reduction goals with a focus on energy efficiency, green building, renewable energy, sustainable transportation, clean water, waste and materials management, land use, and community engagement
- ✓ **Section 5, Playbook for Implementation.** A tactical work plan for implementing the identified strategies and achieving the defined reduction targets.

Chapter 2: Where Are We Now?

2.1 Introduction

By most measures, Rochester is a diverse and dynamic community that continues to innovate and create opportunity, while facing significant economic and social challenges. The following sections provide a snapshot of the Rochester community that reveals one of Rochester's key attributes: its economic, racial, and ethnic diversity. This diversity is also a key asset in the community that can be engaged to help achieve the goals of the CAP. Understanding and leveraging the variety of experiences and perspectives within the community will be critical to implementation and the future success of the CAP. To that end, the Implementation Plan described in later sections of this plan includes recommendations for ongoing community engagement activities designed to ensure broad reaching participation and benefit.

2.2 Community Snapshot

As with any planning process, understanding the economic and demographic trends within a community is essential to making informed recommendations that more adequately address the community's needs and more closely align with its vision for the future. This section highlights demographic and economic trends in Rochester that may impact implementation of the CAP.

Population Trends

The rate of population growth is a key factor used to generate projections for potential future greenhouse gas emissions. Growth can create more demand for energy and resources, which can in turn impact the greenhouse gas emissions produced within a community. Likewise, a decline in population can result in less demand for energy and resources. Fewer residents does not always translate to lower emissions, but the general trajectory of population growth can inform future projections and help prioritize future actions.

Rochester's population in 2016 was 210,312 (Figure 3). Like many other communities in upstate New York, Rochester's population has declined slightly over the past 15 years, though the rate of decline has stabilized since 2010. Between 2016 and 2021, Rochester's population is projected to increase slightly, to 210,654 (0.03% annually).

Rochester residents are, on average, younger than the surrounding region and the State of New York. The median

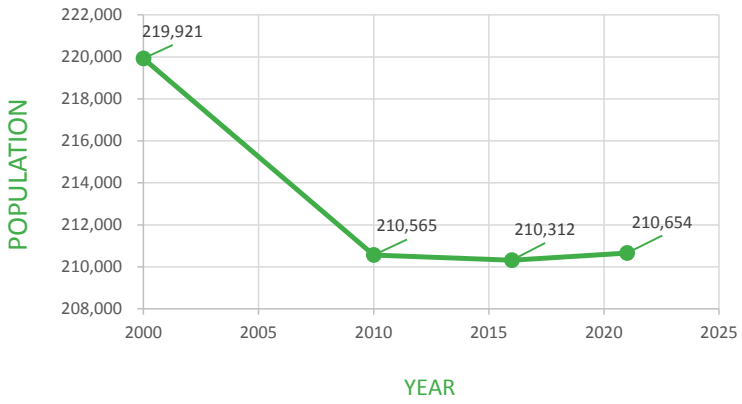


Figure 3: Population Trends, City of Rochester
Source: ESRI Community Profile, 2016

age in Rochester is 31, which is comparable to the median age in other upstate cities like Syracuse (30) and Buffalo (33), but is lower than the median age in Monroe County and New York State (38). As shown in Figure 4, teens and young adults, ranging from 15 to 34 years old, make up the largest proportion of Rochester residents (35%). Given the age distribution of residents in the City of Rochester, it will be important to consider the needs of young children and families, particularly when developing climate action strategies that pertain to parks, schools, transportation, and housing.

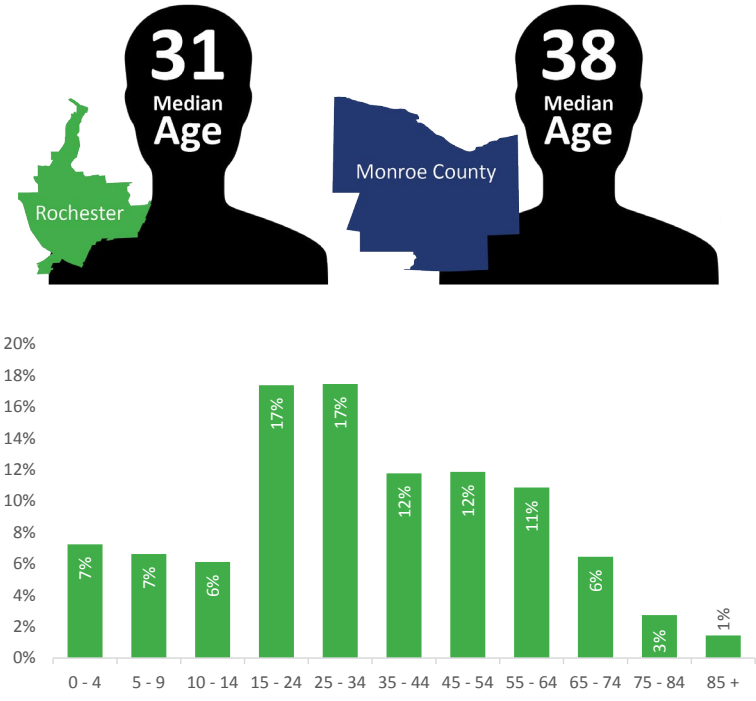
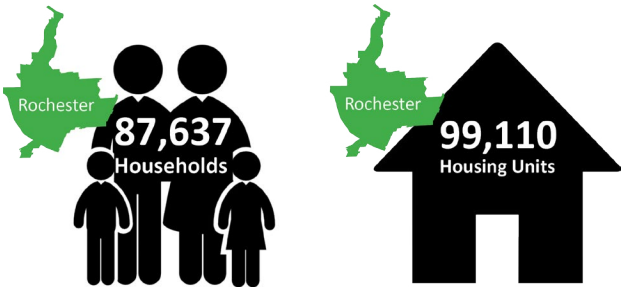


Figure 4: Age Distribution, City of Rochester
Source: ESRI Community Profile, 2016

The City of Rochester is economically, racially, and ethnically diverse. About 41% of Rochester's residents identify as White, 42% identify as Black, 3.4% identify as Asian, 0.5% identify as American Indian, and 7.6% identify as "some other race." Additionally, 18.7% of Rochester residents identify with Hispanic ethnicity. This composition gives Rochester a relatively high diversity index of 75.7, meaning that, if two people are selected at random, there is a 75.7% chance that they will belong to different race or ethnic groups. The relative diversity of the Rochester community suggests that engagement throughout the implementation process will be critical to reaching the goals of the CAP.

Neighborhoods and Housing

There are approximately 87,637 households and 99,110 housing units in Rochester. Of these housing units, 57.1% are renter-occupied and 31.3% are owner-occupied (Figure 5). Almost 50% of housing units are single-family homes while 33% are multi-family homes with 3 or more units (Figure 6). A majority of Rochester's housing units (56.6%) were constructed prior to 1939 with few additional units being constructed since 2000 (Figure 7).



Housing tenure, affordability, and the age of the housing stock are important considerations for the CAP. Given the relatively high proportion of renter-occupied housing units, implementation strategies should focus on ways to involve landlords and renters, particularly lower income renters. Energy efficiency improvements could provide savings for cost-burdened residents while simultaneously supporting revitalization and reinvestment.

New residential development in Rochester is consistent with national trends that show young professionals and retirees increasingly prefer to live in downtowns and surrounding urban areas that offer amenities, walkability,

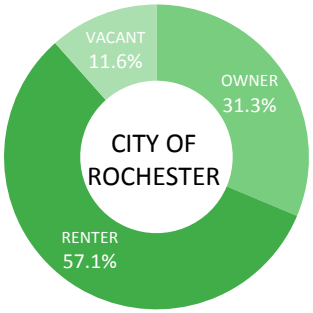


Figure 5: Housing Tenure, City of Rochester
Source: ESRI ACS Housing Summary, 2016

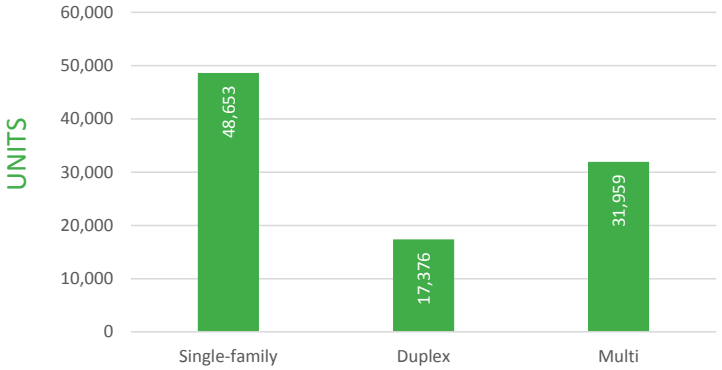
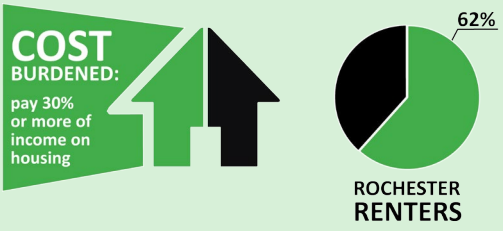


Figure 6: Housing Types, City of Rochester
Source: ESRI ACS Housing Summary, 2016

Housing Affordability in Rochester

About 62 percent of households in renter-occupied units are cost burdened, meaning that 30% or more of their monthly household income is spent on rent. Of those households, approximately 34 percent spend more than half their income on rent.



Source: U.S. Census Bureau, American Community Survey, 2014

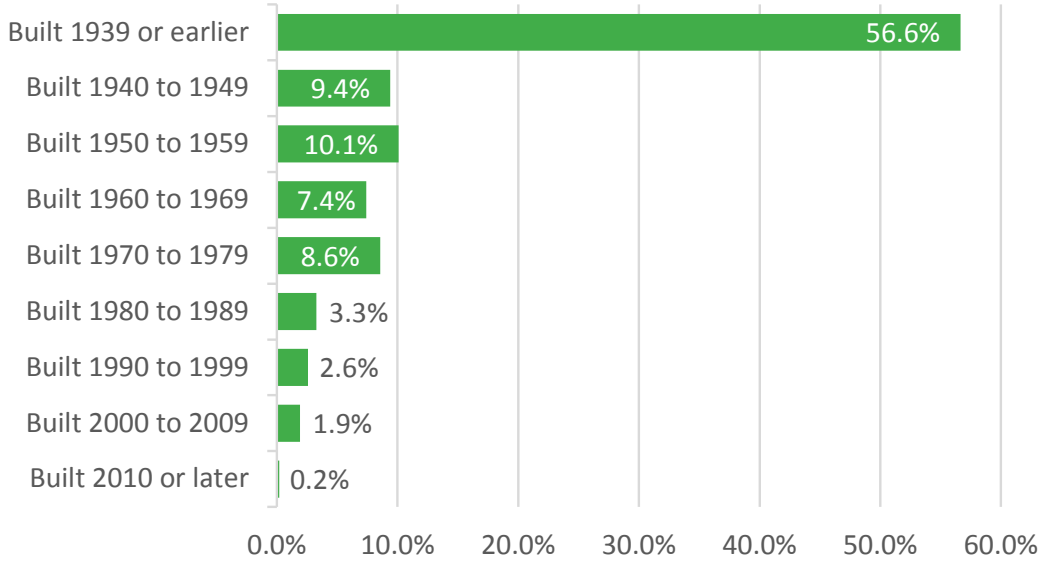


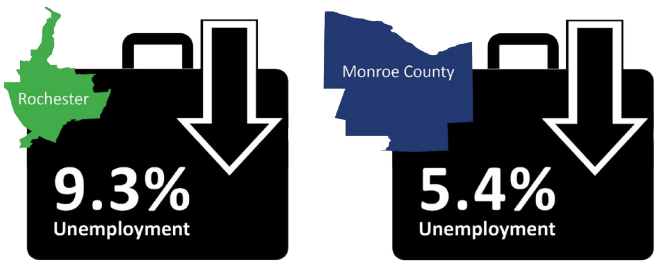
Figure 7: Age of Housing Stock, City of Rochester

Source: ESRI ACS Housing Summary, 2016

and cultural opportunities. Since 2000, the population living downtown has nearly doubled (to 6,542 residents) and is expected to grow to over 9,000 in the next few years. Over 46 commercial buildings have been converted to residential or mixed-use and there is currently $857 million being invested in real estate projects throughout downtown. Over 95 percent of housing downtown is renter-occupied, underscoring the importance of Climate Action strategies that focus on landlords and renters.

Employment & Businesses

There are 9,973 businesses in Rochester and over 90,000 people are employed in the area. Of those employed, 61.9% are in the services industry which includes hospitality, education, health care, professional, and social services (Figure 8). Other major industry sectors include retail trade (11.5%) and manufacturing (9.8%).



Source: ESRI Community Profile, 2016

Rochester's unemployment rate is 9.3% which is greater than benchmark cities of Syracuse (7.8%) and Buffalo (8.8%) and almost double the county and state rates (5.4%).

Despite the higher unemployment rate, Rochester's economy continues to grow, following state and national trends. Employment growth in the region has been focused in the Services sector, which includes professional services, technology, and health care. Initiatives such as the American Institute for Manufacturing Photonics and the Downtown Innovation Zone will continue to support employment and wage growth in the City of Rochester.

In addition, Rochester has seen numerous new development projects that have transformed the community. These include redevelopment of Midtown, the Inner Loop, Eastman Business Park, College Town, City Gate, and the new Transit Center. These efforts and activities indicate that significant reinvestment is occurring in Rochester, which presents opportunities to address energy conservation and savings.

Income & Poverty

The median household income in Rochester is $30,990, which is comparable to other Upstate cities like Syracuse ($30,532) and Buffalo ($31,340) but is considerably lower than Monroe County ($52,720) and New York State ($58,196). According to the U.S. Census, of those who

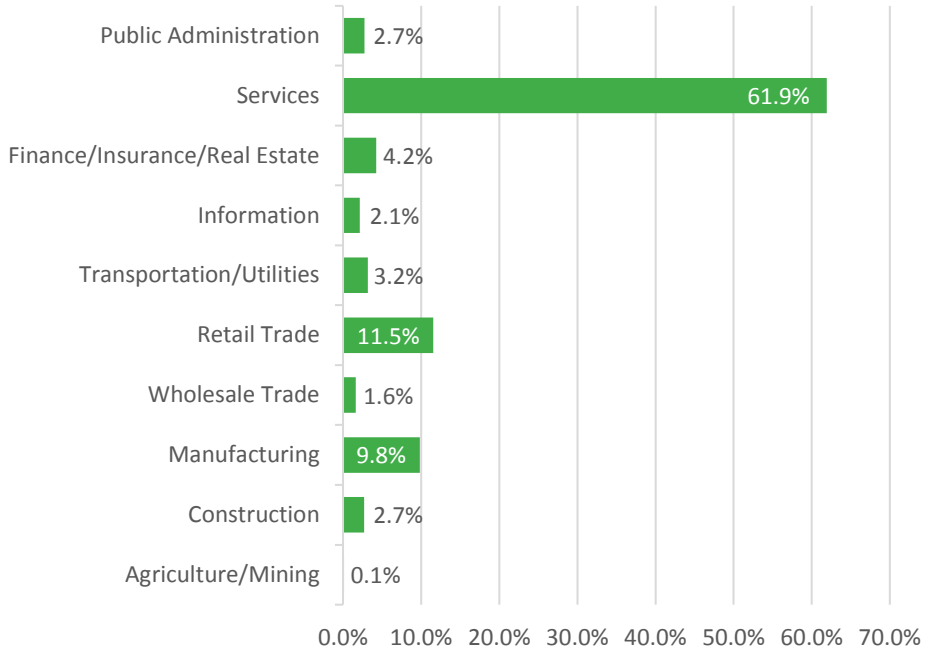


Figure 8: Estimated Employment by Industry, City of Rochester
Source: ESRI Community Profile, 2016

make between $20,000 and $34,999 annually, 13.7% spend 30% or more of their monthly income on housing costs. Likewise, 28.5% of those who make less than $20,000 annually spend 30% or more of their monthly income on housing costs.

According to the 2016 update of the *Poverty and Self-Sufficiency in the Nine County Region* report, the poverty rate in Rochester is 33.8%, making Rochester the 5th poorest city in the United States among the top 75 metropolitan areas. About 47% of Rochester residents living in poverty are women and children in female-headed households. Further, African-American and Hispanic families are more than three times more likely to be poor than those identifying as non-Hispanic white.

Source: ESRI Community Profile, 2016

Equity

The City of Rochester is younger and less affluent than the region. Compared to surrounding areas, the City has experienced greater losses in population, lower rates of homeownership, and significantly higher rates of poverty. Low-income populations and communities of color are more likely to be disproportionately impacted by climate change. Further, low-income populations and communities of color often have less access to healthy and energy efficient housing, transit, or safe bicycling and walking routes.

Strategies to reduce carbon emissions and other implementation efforts should be designed to accommodate and support residents with a variety of experiences and perspectives, and those with less financial capacity than the surrounding region. Implementation should include targeted investments, particularly in areas that have seen under-investment in the past.

2.3 Greenhouse Gas Inventory

Developing a baseline GHG inventory is the first step of any CAP development process. The inventory described in the following sections identifies the magnitude of emissions impacts from key emission sources and activities—and informs goals and strategies developed for the CAP.

Methods

The community-wide inventory for the City of Rochester was assembled through close coordination with City staff and other community stakeholders. **The emission sources included in the inventory were selected according to the following criteria: (1) what is required by protocol, (2) what data are readily available and replicable, and (3) what sources were included in the 2011 Greenhouse Gas Inventory and 2015 Energy Master Plan.**

The ICLEI-Local Governments for Sustainability's U.S. Community Protocol was used as the main protocol reference for the inventory. This protocol was selected because it provides guidelines specific to quantifying GHG emissions from the City's entire community. Additional protocol guidance was taken from The Climate Registry (TCR), the World Resources Institute (WRI), the Intergovernmental Panel on Climate Change (IPCC), and the U.S. Environmental Protection Agency (EPA).

To support the GHG inventory analysis, a Microsoft Excel-based Carbon Management and Planning System (CMPS) was developed for the City of Rochester. The CMPS gathers into one tool the original emission source data, emissions factors, methodology and calculations for converting to GHG emissions, and a summary of GHG emission results. The CMPS also provides charting, forecasting, and benchmarking capabilities to allow City staff to track progress and share results as the inventory is updated in the future. There is also a supporting GHG inventory reference guide (Appendix A) that documents the process for updating the inventory in future years, including data sources and methodology for converting data into total emissions.

Greenhouse Gases and Carbon Dioxide Equivalent

There are six main gases that are typically included in a GHG inventory: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs) and sulfur hexafluoride (SF_6). Almost all of the City's GHG emissions are the result of emissions from carbon dioxide, methane, and nitrous oxide. Therefore, only those three GHGs are included in this inventory.

Each of the GHGs reported in this inventory has a different level of impact on climate change. For example, the emission of 1 ton of N_2O has a global warming potential (GWP) 310 times larger than that of the emission of 1 ton of CO_2. Similarly, the emission of 1 ton of CH_4 has a GWP 21 times that of CO_2. To avoid confusion between the different types of gases and their respective GWPs, all emissions are reduced to the common unit of CO_2e, or carbon dioxide equivalent. Thus, the emission of 1 ton of N_2O is expressed as the emission of 310 tons of CO_2e. All results in this report will be presented in units of metric tons of CO_2 equivalents ($MTCO_2e$) unless otherwise noted.

What is an Emissions Factor?

There are six main greenhouse gases that contribute to climate change, and each one has a different level of impact. For example, the emission of 1 ton of methane has a global warming potential 21 times larger than that of the emission of 1 ton of carbon dioxide. To avoid confusion between emissions of the different types of gases, all emissions are converted into the common unit of CO_2 (or "carbon dioxide equivalent.")

MT = metric tons

$MTCO_2e$ is the term for the quantity of any greenhouse gas translated to an equivalent quantity of CO_2.

Inventory Boundary and Organization

The City of Rochester's jurisdictional boundary defines the boundary for the community-wide GHG inventory (Figure 10).

The ICLEI community protocol used for this GHG inventory provides two ways for communities to categorize their emissions: (1) **sources** and (2) **activities** (Figure 9). It is common for communities to use both categories when completing an inventory.

One of the major differences between the two is that **sources** only occur within the community boundary, while **activities** can occur either inside or outside of the community boundary. **Activity** emissions that occur outside of a community boundary are included in the inventory when the emissions occur due to an **activity** that took place inside the community. Two example **activities** are: (1) emissions from a power plant located outside the community to generate electricity consumed inside the community, and (2) emissions from a landfill located outside the community for waste produced inside the community. The distinction between **sources** and **activities** is summarized in the definitions below.

Sources: Any physical processes inside the jurisdictional boundary of the City that release GHG emissions into the atmosphere (e.g., combustion of gasoline in transportation; combustion of natural gas in home heating).

Activities: The use of energy, materials, and/or services by members of the Rochester community that create GHG emissions directly or indirectly.

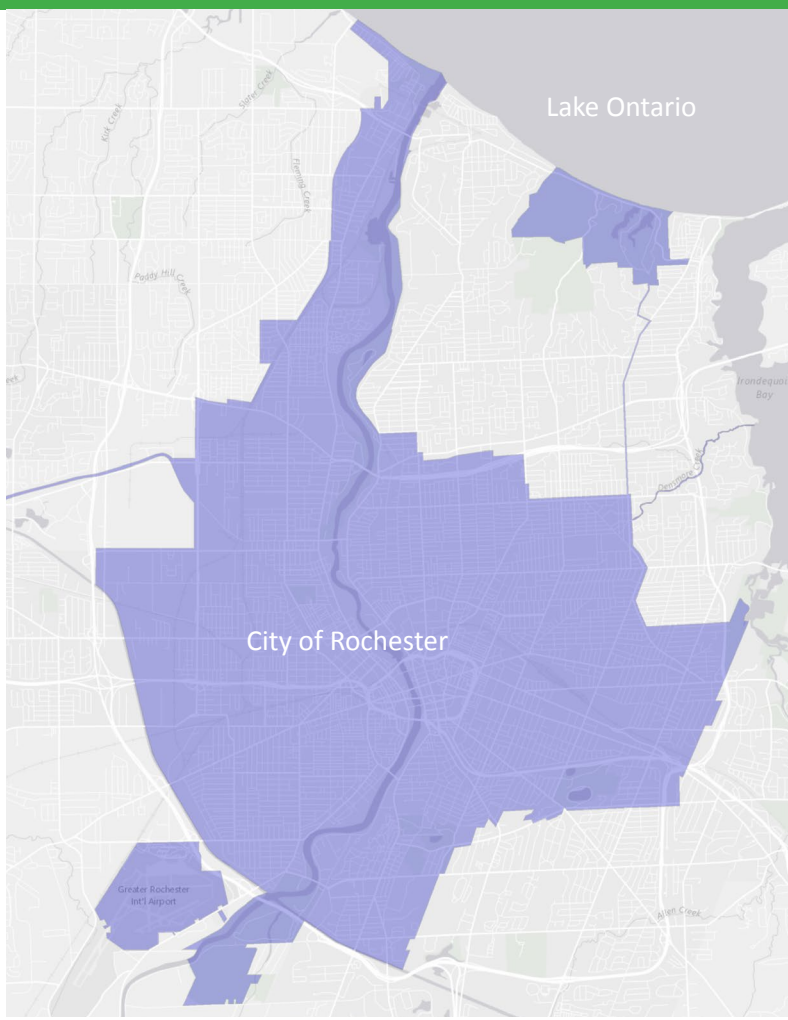


Figure 10: City Limits of Rochester

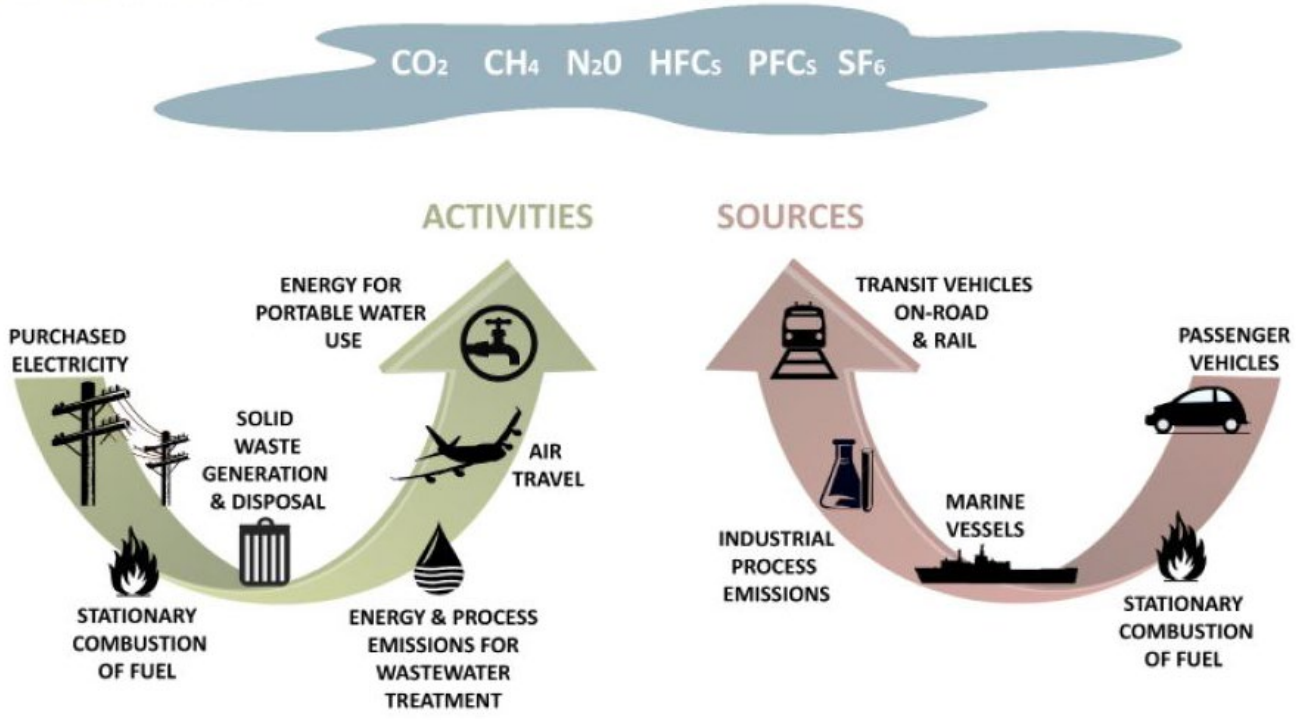


Figure 9: Emissions Sources and Activities
Source: US EPA 2012

Table 1 lists the sources and activities that are included in the inventory update, along with a brief description of each. The CAP inventory update includes three activities that were not included in the Rochester Energy Plan analysis: (1) airline travel, (2) solid waste, and (3) wastewater and water.

Table 1: Emission Sources and Activities Included in the Inventory

Emission Sources/ Activities	Description
Energy	
Electricity*	Use of electricity by the community
Natural Gas*	Use of fuel in residential and commercial stationary combustion equipment (e.g., boilers and furnaces)
Other Fuels	Consumption of liquefied petroleum gas, fuel oil/kerosene, and wood for fuel in the community
Industrial Processes / Large Emitters	Industrial processes occurring within the community and whose emissions are found in the EPA's Large Emitters Database
Transportation	
On-road Transportation*	On-road passenger vehicles operating within the community boundary
Airline Travel	Use of air travel by the community
Waste	
Solid Waste*	Methane emissions from breakdown of landfilled waste
Water	
Water and Wastewater*	Use of energy and process emissions associated with community-generated wastewater; use of septic systems by the community

* Emission sources/activities included in the goal setting and strategy identification within this CAP. This differentiation is clarified in more detail in the following section.

Greenhouse Gas Inventory Results

The inventoried emissions within the City of Rochester jurisdictional boundaries for all activities and sources listed above totaled 2.8 million $MTCO_2e$ in 2014. For purposes of the CAP, large emitters, other fuels, and airline travel emissions were removed from the inventory due to the limited opportunity to be easily impacted or directly influenced through traditional community climate action strategies. (Large emitters are facilities that emit more than 25,000 $MTCO_2e$ per year; these facilities report to the EPA's Greenhouse Gas Reporting Program[3].)

After this adjustment, the **City of Rochester total GHG emissions were 1.8 million $MTCO_2e$ in 2014**, which is the factor used throughout the CAP for goal setting and development of strategies. This is equivalent to 380,000 passenger vehicles being driven in any given year or the energy used by 190,000 homes for one year[4].

Figure 11 and Figure 12 summarize the total GHG emissions for 2014 by source/activity. **The inventory shows that the energy focus area represents 73 percent of total emissions, with natural gas consumption alone making up over half of total emissions generated by the community.** The next largest source is on-road transportation at 24 percent. When broken out by sector, **emissions are split almost equally between residents and businesses** (Figure 13).

Figure 13 groups all emissions sources into one of three sectors: residential, commercial, or industrial. Generally, the residential sector aligns with the residential perspective introduced in Chapter 1. Commercial and industrial sectors together make up the business perspective. These sector definitions are largely driven by RGE's customer classification process for electricity and natural gas consumption within Rochester. For the other emission sources, assumptions were made about sector classification based on available data (see Appendix A for details on this classification process).

3 EPA Large Emitter Database
4 EPA GHG Equivalency Calculator

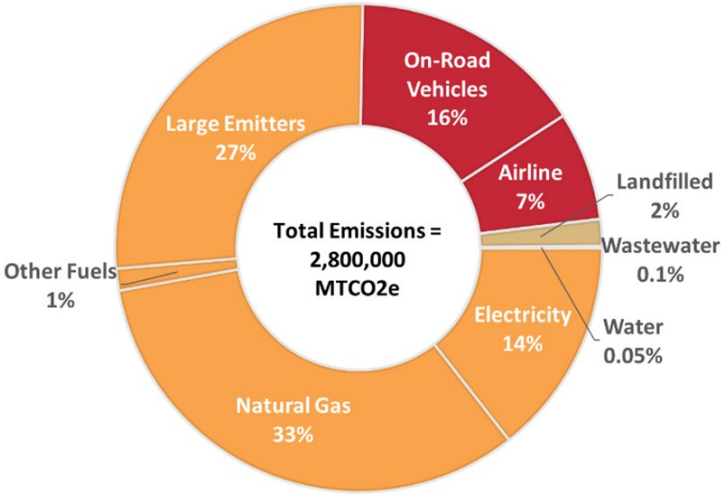


Figure 11: Emissions by Source/Activity (Total Inventory), 2014

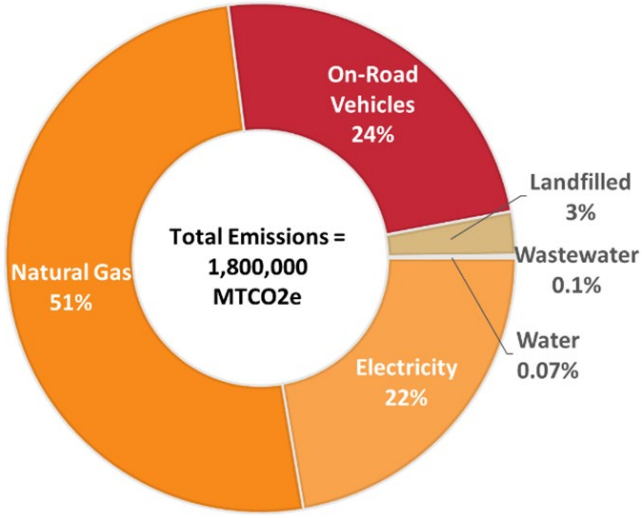


Figure 12: Emissions by Source/Activity (CAP Inventory), 2014

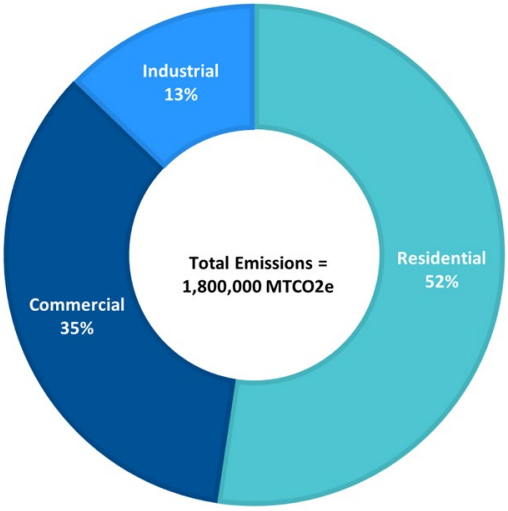


Figure 13: Emissions by Sector, 2014

As shown in Figure 14, **the City has seen an 8 percent decrease in its community-wide emissions from 2010 to 2014**. All of the emission sources saw reductions during this time. There was also a drop in natural gas consumption in 2012 which is largely the reason for the dip in emissions in that year. The various fluctuations in natural gas consumption are likely weather related. Total emissions per capita has been trending downward from 9.1 $MTCO_2e$ in 2010 to 8.5 $MTCO_2e$ in 2014, representing a 6 percent reduction.

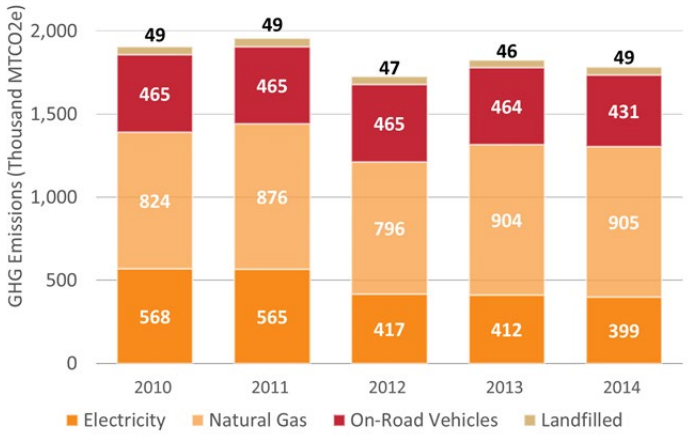


Figure 14: Historical Emissions Trend by Source, 2010-2014

Electricity is the main contributor to emissions reductions since 2010. From 2010 to 2014 emissions from electricity decreased 30 percent. This can be primarily attributed to an improved emissions factor for the electricity grid serving the city. According to the EPA, regional emissions factors in the Upstate NY subregion have decreased 25 percent over this time frame.

Emissions associated with on-road transportation also contributed to the reduction since 2010, decreasing 7 percent. According to the Genesee Transportation Council, which provided an estimate of the number of vehicle miles traveled within Rochester, this decrease is correlated with a reduction in employment in the region (and attributed, in part, to improved vehicle efficiency).

Comparison to the Energy Master Plan

There are overlaps and differences between the approach used in the GHG inventory update included in the CAP and the Energy Master Plan GHG inventory. The differences are summarized below.

Methodology: The CAP inventory analysis follows the ICLEI U.S. Community Protocol because it provides guidelines specific to quantifying GHG emissions from an entire community. As part of the ICLEI protocol, emissions related to building energy use, transportation energy use, solid waste management, water use, and wastewater management are included. However, the Energy Master Plan focused solely on building energy use and transportation energy use. As a result,there are more emission sources and activities included in this CAP inventory than the Energy Master Plan.

Categorization: The Energy Master Plan categorizes emissions by residential, commercial, industrial, and institutional. In this CAP inventory update, institutional emissions are included in the commercial category. This was done to more closely match the categories used by RG&E, which is the electricity and natural gas provider for the City. The Energy Master Plan allocates emissions from the commercial sector to the institutional sector based on square footage and other metrics, rather than actual emissions.

Emission Factors: While the electricity and natural gas data used in the CAP inventory analysis for 2010 through 2013 are the same data used in the Energy Master Plan, the resulting emissions are different. This is due to the use of slightly different emission factors in this CAP inventory analysis. The electricity emissions factor has been updated by the EPA since the Energy Master Plan was released in 2015.

Benchmarking

Though considerations must be made for differences in assumptions and community characteristics, benchmarking against communities of a similar size, climate, and/or demographic can be a helpful point of comparison for a community's GHG emissions. Ultimately, the best comparison for the City of Rochester, as it strives to reduce its GHG emissions, will be itself.

Table 2 **includes a list of communities that were also part of the Five Cities Energy Master Plan initiative sponsored by the New York Power Authority**. The cities of Albany, Buffalo, Syracuse, and Yonkers also created community-wide energy plans that include baseline energy and greenhouse gas data. Of those four communities, only Syracuse and Yonkers provided transportation-related emissions data. Therefore, those are the two communities used to benchmark Rochester's own emissions.

ICLEI-Local Governments for Sustainability U.S. Community Protocol

The ICLEI-Local Governments for Sustainability's U.S. Community Protocol (USCP) was used as the main protocol reference for the CAP inventory. ICLEI's GHG Protocols are the national standards for local-scale accounting of emissions that contribute to climate change. The protocol was developed by ICLEI-Local Governments USA as a greenhouse gas reporting standard tailored to U.S. cities.

Table 2: Benchmark City Energy Comparison

City	Comparison Year	Population	Overall Energy Consumption (MMBtu)	Energy Use per Capita	Community Emissions (MTCO2e)	Emissions per Capita
Rochester	2010	210,000	32.01 Million	152	2.2 million	10.6
Syracuse	2010	150,000	21.26 Million	142	1.5 million	10
Yonkers	2010	190,000	18.87 Million	99	1.3 million	6.8
Albany	2010	100,000	20.73 Million	207	n/a	n/a
Buffalo	2010	250,000	42.67 Million	171	n/a	n/a

Source: NYPA BuildSmart NY Five Cities Energy Plans, 2015

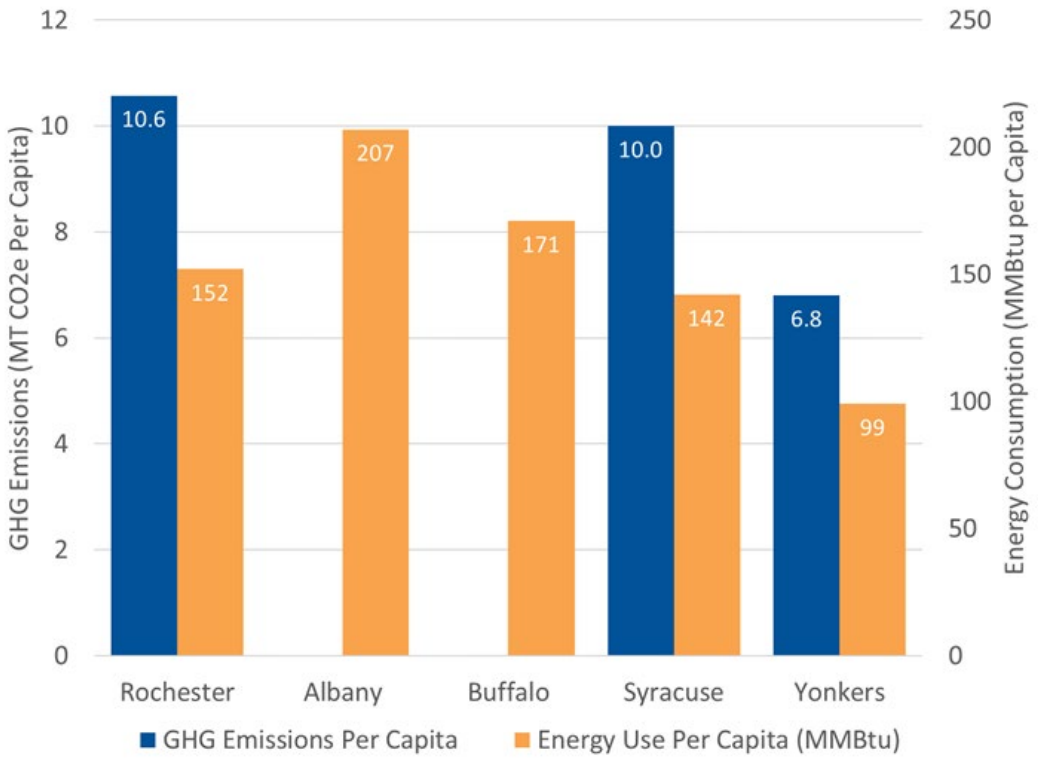


Figure 15: Per Capita Energy and Emission Benchmarks, 2010

Figure 15 provides a graphical comparison of per capita energy use and emissions (where available) for the benchmark cities. To allow for more consistent comparisons, the Rochester results shown here were taken directly from the Five Cities Energy Master Plan, not from the CAP inventory update.

When compared to peer cities, the City of Rochester's per capita emissions and energy use are higher than the other two cities. Syracuse has the lowest population but the next highest per capita emissions at a comparable 10 $MTCO_2e$. Yonkers' population is slightly less than Rochester's but has the lowest per capita emissions at 6.8 $MTCO_2e$. One of the reasons for the lower emissions in Yonkers may be due to its smaller and denser population, which is 11,000 residents per square mile as opposed to Rochester and Syracuse that are closer to 6,000 residents per square mile. However, when energy use per capita is compared (instead of emissions), Rochester is higher than both Syracuse and Yonkers.

Greenhouse Gas Equivalents

What does reducing CO_2 emissions mean in every day terms?

1 MT CO_2 = 41 propane tanks used for BBQ

1 MT CO_2 = 2,397 miles driven by the average passenger vehicle

10 MT CO_2 = 1 home's energy use for one year

Source: US EPA Greenhouse Gas Equivalencies Calculator

2.4 Climate Vulnerability

Identifying climate vulnerabilities for the City of Rochester helps inform what strategies would be most effective for the community. These vulnerabilities represent how the City will be most affected by the potential impacts of climate change.

Climate vulnerabilities represent the degree to which Rochester is susceptible to the adverse effects of climate change and consists of three main components: exposure, sensitivity, and adaptive capacity. The best available climate science and supporting research indicate that the key climate stressors for Rochester are warmer summers, increasing storms, warmer waters, colder winters, and increasing drought. For each climate stressor, there are a number of potential secondary climate impacts. The exposure of priority resources, localities, populations, and systems in Rochester to potential climate impacts was evaluated with input from the Stakeholder Advisory Committee's local knowledge and organized into the five CAP focus areas (Energy Use and Supply, Transportation, Waste and Materials Management, Clean Water, and Land Use).

For each identified **exposure,** a ranking of **sensitivity** (the impact of the stressor on Rochester) and **adaptive capacity** (Rochester's ability to respond to the stressor) were evaluated in order to qualitatively estimate the relative vulnerability of each priority resource, locality, population, or system.

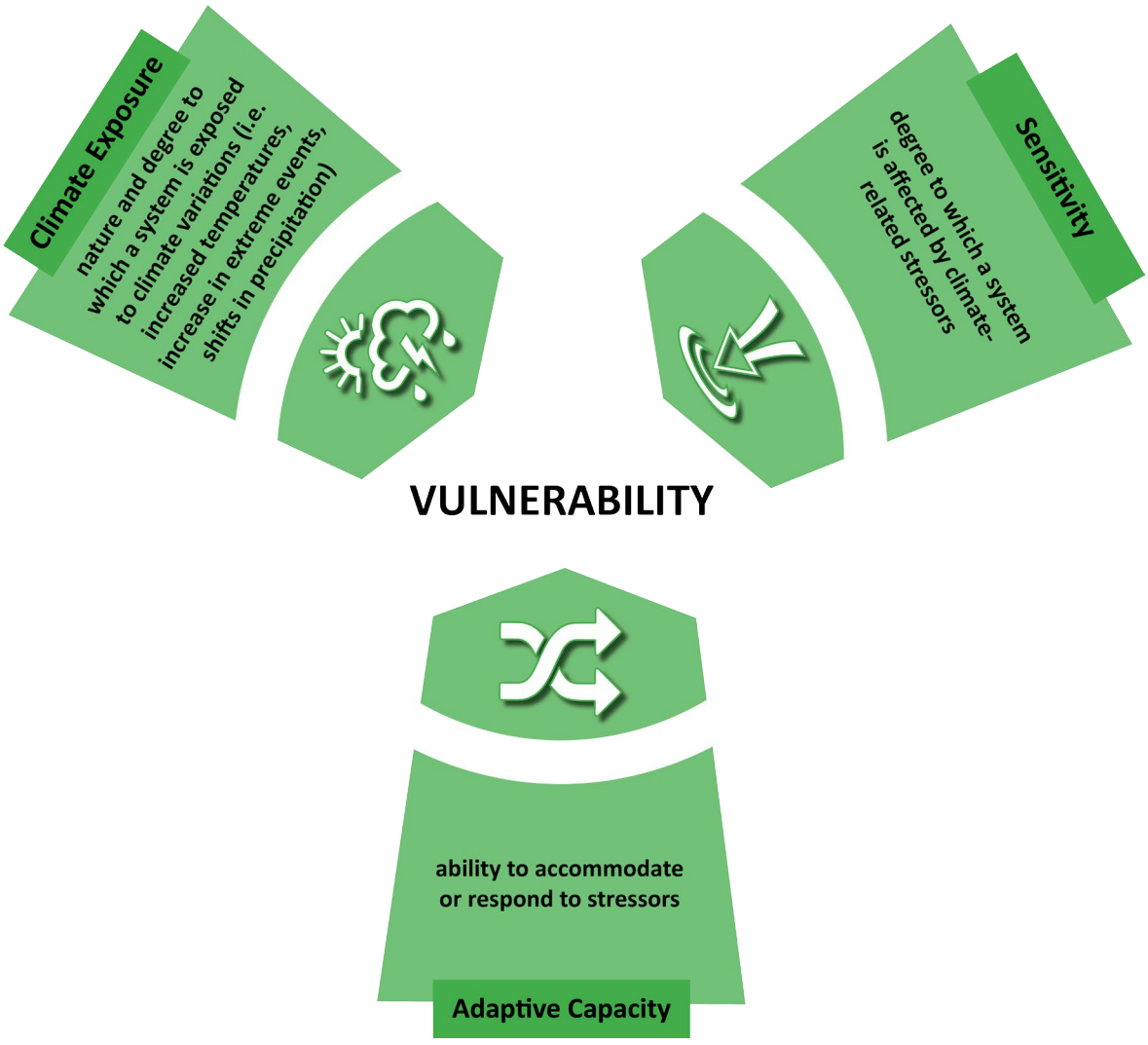


Figure 16: Climate Vulnerabilities

Climate Vulnerability Results

After placing a score for sensitivity and impact potential for each identified exposure, the following matrix of vulnerabilities was developed (Table 3). If an exposure is determined to have a high sensitivity and a low adaptive capacity, the vulnerability for that exposure would be high (bottom right corner of matrix). Whereas, if the adaptive capacity for that same exposure were to have a high sensitivity but low adaptive capacity, the vulnerability would be high.

The matrix of vulnerabilities helps identify where climate mitigation efforts can be directed in the city. Issues such as infrastructure maintenance, infrastructure disruption, crop loss, human health, and air quality impacts are areas of high concern.

The effects of climate change are **more severely felt by vulnerable populations,** including the elderly, people with disabilities, and those in poverty, They are more vulnerable because of their limited capacity to cope with extreme events and disruptions. The impacts of climate change pose serious risks to social and economic equity, as well as the Rochester community's ongoing efforts to reduce poverty.

The evolving best practice in climate adaptation planning is to **integrate climate risk and resiliency into all community planning efforts**. This CAP illustrates best practices by identifying risks to each climate action strategy and opportunities to make each strategy and implementation action more resilient in the face of a changing climate.

Table 3: Climate Vulnerabilities for City of Rochester

Level of Vulnerability

Impact	Low	Medium-Low	Medium	Medium-High	High
	Increased water demand/cost	Changes in water pumping and treatment patterns	Decreased stormwater quality, increased combined sewer flows	Greater algae growth	Increased infrastructure maintenance
	Increased pollutant toxicity	Increased water storage needs and related impacts	Decreased snow pack and river freezing	Increased survival and transmission of parasites and bacteria	Increased infrastructure disruptions due to extreme events
	Longer composting season	Longer growing season	Increased soil erosion	Reduced fisheries production	Decreased food production, increased crop loss
		Increased walking/ biking opportunities	Increased diseases, vector borne illness, and pests	Decreased groundwater levels	Higher intensity of heating and cooling degree days
		Changes in public transportation use	Decreased winter road treatment	Greater threat of invasive species	Increased disease concerns
		Increased odor concerns	Increased freeze/ thaw cycles	Decreased walking/ biking due to higher heat days	Air quality impacts on health
		Increased organic waste generation	Increased energy cost, decreased availability	Increased electricity demand	Loss of winter recreation activities
			Decreased heating degree days and associated energy use	Increased risk to vulnerable populations	
			Changes to population distribution and infrastructure needs	Increased heat and drought related health impacts	

Energy Waste Water Transportation Land Use Health

2.1 Vulnerability and Human Health

A healthy community is one that meets the basic needs of all residents, ensuring a quality environment and adequate levels of economic and social development. Climate change will have a variety of public health consequences, including heat-related illnesses, allergies, asthma, water and food borne illnesses, cardiovascular disease, and others. While climate change will affect the health of the entire community, some groups will be disproportionately more affected than others. For instance, low-income populations and the elderly may lack access to cooled spaces during hot weather--and those with respiratory illness may be more vulnerable to air pollution.

Climate mitigation and adaptation efforts can produce public health "**co-benefits**" (i.e. benefits that occur from acting on climate change that extend beyond mitigation or adaptation). Strategies that reduce emissions (such as reducing vehicle miles traveled and increasing green space) can have multiple non-climate related benefits that improve public health, such as reducing air pollution, increasing physical activity, reducing chronic disease, and improving mental health.

Prioritizing health benefits can increase community commitment to short-and long-term mitigation efforts. Policy and environmental changes that support healthy lifestyles provide the biggest impact. Partnering with public health practitioners can ensure that the CAP and other planning efforts contain health-promoting strategies that simultaneously advance GHG emissions reduction goals. Members of Rochester's public health community will play a key role in implementing the strategies and actions identified.

Potential Health Impacts of Climate Change

The chart below includes examples of how climate change can affect human health, at local and regional scales. The examples listed in the first column are climate change exposures. Moving from left to right along one health impact row, the three middle columns show how climate drivers affect an individual's or a community's exposure to a health threat and the resulting change in health outcome. The overall climate impact is summarized in the final gray column.

	Climate Driver	Exposure	Health Outcome	Impact
Extreme Heat	More frequent, severe, prolonged heat events	Elevated temperatures	Heat-related death and illness	Rising temperatures will lead to an increase in heat-related deaths and illnesses.
Outdoor Air Quality	Increasing temperatures and changing precipitation patterns	Worsened air quality (ozone, particulate matter, and higher pollen counts)	Premature death, acute and chronic cardiovascular and respiratory illnesses	Rising temperatures and wildfires and decreasing precipitation will lead to increases in ozone and particulate matter, elevating the risks of cardiovascular and respiratory illnesses and death.
Flooding	Rising sea level and more frequent or intense extreme precipitation, hurricanes, and storm surge events	Contaminated water, debris, and disruptions to essential infrastructure	Drowning, injuries, mental health consequences, gastrointestinal and other illness	Increased coastal and inland flooding exposes populations to a range of negative health impacts before, during, and after events.
Vector-Borne Infection (Lyme Disease)	Changes in temperature extremes and seasonal weather patterns	Earlier and geographically expanded tick activity	Lyme disease	Ticks will show earlier seasonal activity and a generally northward range expansion, increasing risk of human exposure to Lyme disease-causing bacteria.
Water-Related Infection (*Vibrio vulnificus*)	Rising sea surface temperature, changes in precipitation and runoff affecting coastal salinity	Recreational water or shellfish contaminated with *Vibrio vulnificus*	*Vibrio vulnificus* induced diarrhea & intestinal illness, wound and bloodstream infections, death	Increases in water temperatures will alter timing and location of *Vibrio vulnificus* growth, increasing exposure and risk of waterborne illness.
Food-Related Infection (*Salmonella*)	Increases in temperature, humidity, and season length	Increased growth of pathogens, seasonal shifts in incidence of *Salmonella* exposure	*Salmonella* infection, gastrointestinal outbreaks	Rising temperatures increase *Salmonella* prevalence in food; longer seasons and warming winters increase risk of exposure and infection.
Mental Health and Well-Being	Climate change impacts, especially extreme weather	Level of exposure to traumatic events, like disasters	Distress, grief, behavioral health disorders, social impacts, resilience	Changes in exposure to climate- or weather-related disasters cause or exacerbate stress and mental health consequences, with greater risk for certain populations.

Source: *The Impacts of Climate Change on Human Health in the United States, 2016.* U.S. Global Change Research Program (USGCRP)

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Chapter 3: Where Do We Want to Be?

3.1 Introduction

After clearly defining the baseline condition, the next step in climate action planning is **defining a desired future condition through forecasting and goal setting**. Comparing the community's desired emissions levels with estimated emissions resulting from a "business as usual" scenario highlights a gap that can be addressed through climate action strategies. This section outlines how the climate action **forecasts and goals** were defined for Rochester.

3.2 Projected Future Emissions

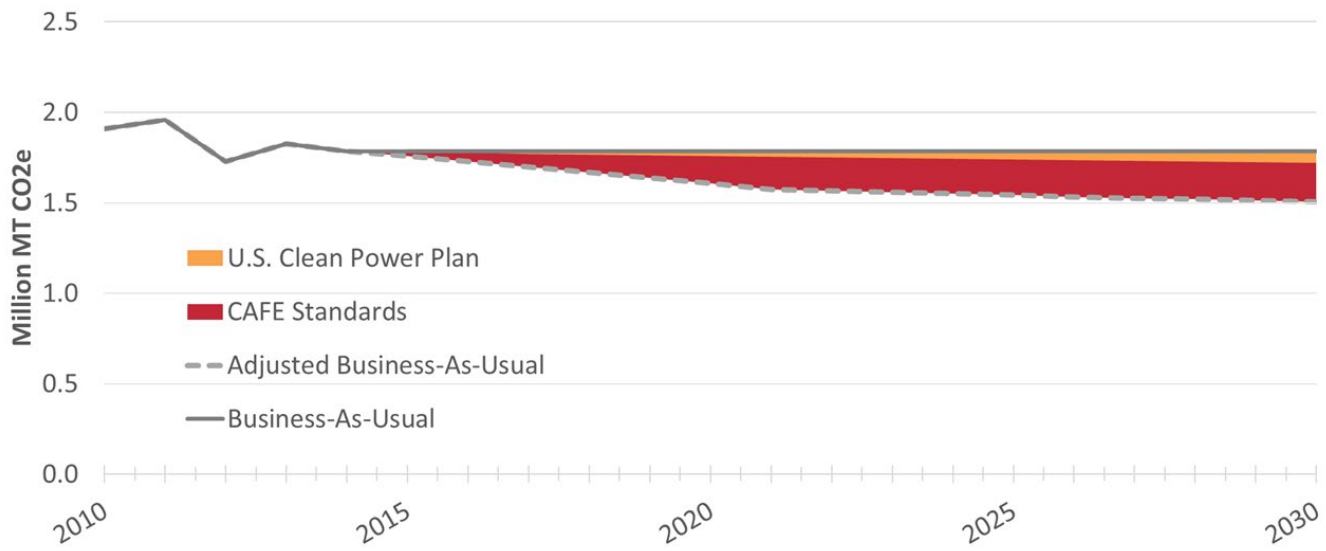
In order to clearly understand the gap to be filled by climate action strategies, it is first important to forecast a future condition without climate action: the business-as-usual (BAU) forecast. **Due to the relatively slow population growth in the City and the slight downward trend in community emissions since 2010, the CAP BAU forecast assumes a conservative, flat-line forecast,** equal to 2014 GHG emissions through 2030, the defined CAP planning horizon. This planning horizon was selected by the CAP Stakeholder Advisory Committee and City staff to allow enough time to make meaningful action, provide clear direction on near-term initiatives, and align with other regional initiatives and goals (i.e. 2030 is the target year for climate action goals at the state level).

Corporate Average Fuel Economy (CAFE) Standards

Enacted by Congress in 1975, CAFE's purpose is to reduce energy consumption by increasing the fuel economy of cars and light trucks. The standards require that the Department of Transportation (DOT) establish fuel economy standards separately for passenger automobiles (passenger cars) and non-passenger automobiles (light trucks) at the maximum feasible levels in each model year, and requires that DOT enforce compliance with the standards. DOT has delegated the responsibilities to the National Highway Traffic Safety Administration (NHTSA).

Figure 17a illustrates historical emissions and the "business as usual" (BAU) forecasts. The "business as usual" (BAU) line indicates that without any action, emissions will remain relatively stable. For the purposes of the CAP, the external factors embedded in the adjusted BAU forecast include: 1) Rochester Gas and Electric's (RG&E) compliance with the U.S. Clean Power Plan, and 2) improvement in on-road vehicle fuel efficiency over time through the adoption of Corporate Average Fuel Economy (CAFE) standards.

Figure 17a: Business-As-Usual Forecast and External Factors



U.S. Clean Power Plan

In 2016, the Environmental Protection Agency (EPA) finalized new rules that will reduce carbon emissions from power plants for the first time. The Clean Power Plan establishes state-by-state targets for carbon emissions reductions, and it offers a flexible framework under which states may meet those targets. The final version of the rule would reduce national electricity sector emissions by an estimated 32 percent below 2005 levels by 2030.

The US Clean Power Plan goal BAU forecast adjustment recognizes the improvements being made in generating electricity through more efficient generation processes and incorporating more renewables into the generating mix. **The Environmental Protection Agency's Clean Power Plan goal for the State of New York results in an average annual reduction in the electric emission factor of one percent per year.** This assumed change in emissions factor for RG&E reduces Rochester's forecasted emissions five percent below BAU levels in 2030.

Similarly, the CAFE BAU forecast adjustment looks to recognize increasing efficiency found in the transportation sector. **Assuming a weighted new vehicle fuel economy of 53 miles per gallon (mpg) by 2030, compared to a current weighted average of 39 mpg, and an average vehicle life of 7 years**, Rochester's projected emissions are reduced 10 percent below BAU levels by 2030.

Emissions Reduction Goals Around the U.S.

Communities across the US have established goals to reduce greenhouse gas emissions. Below is a sample of cities in the US with varying characteristics, such as region, climate, and size.

		Medium-term		Long-term	
Community	**Base Year**	**Decrease**	**Year**	**Decrease**	**Year**
Minneapolis, MN	2006	30%	2025	80%	2050
Atlanta, GA	2009	40%	2030	80%	2050
Cincinnati, OH	2006	40%	2028	84%	2050
Portland, OR	1990	40%	2030	80%	2050
Washington DC	2006	50%	2032	n/a	

Source: Measuring Up 2015, How US Cities Are Accelerating Progress Toward National Climate Goals

3.3 Emission Reduction Targets

The City of Rochester's vision statement for the CAP is an expression of the community's intentions for reducing greenhouse gas emissions. The reduction targets identified in this section will enable the community to reduce GHG emissions while improving its resiliency and adaptive capacity (to address the effects of climate change that will occur regardless of mitigation efforts). To inform these targets, previous plans in the region were identified and assessed to ensure consistency with other efforts occurring in the region.

Using input from the GHG inventory, review of related and previous plans, testing of scenarios, and stakeholder input, the following emission reduction targets were identified for the Rochester community:

- **Reduce greenhouse gas emissions by 20% from 2010 levels by 2020**
- **Reduce greenhouse gas emissions by 40% from 2010 levels by 2030**

Figure 17b illustrates the identified CAP goals in comparison to historical emissions and the "business as usual" (BAU) forecasts. 2010 was selected as the baseline year in order to align with the Rochester Energy Plan goals. These goals align with the other regional goals (Table 4) and are also comparable to the level of emissions reduction other communities throughout the country are trying to achieve. A 40 percent reduction in emissions by 2030 puts the City of Rochester on track to achieve an 80 percent reduction below a 2010 baseline by 2050. The "80 percent by 2050" goal is aspirational, yet accepted throughout the country and the world as the level of reduction needed to stabilize the level of global atmospheric greenhouse gases.

In Rochester, 2010 baseline emissions were 1.9 million MT CO_2e. A 40 percent reduction would bring the community's emissions down to 1.0 million MT CO_2e by 2030. Considering current emission levels in Rochester, this means that, on average, we need to reduce our emissions by almost 50,000 MT CO_2e annually between now and 2030.

Figure 17b: Business-As-Usual Forecast, External Factors, and Climate Action Plan Goals

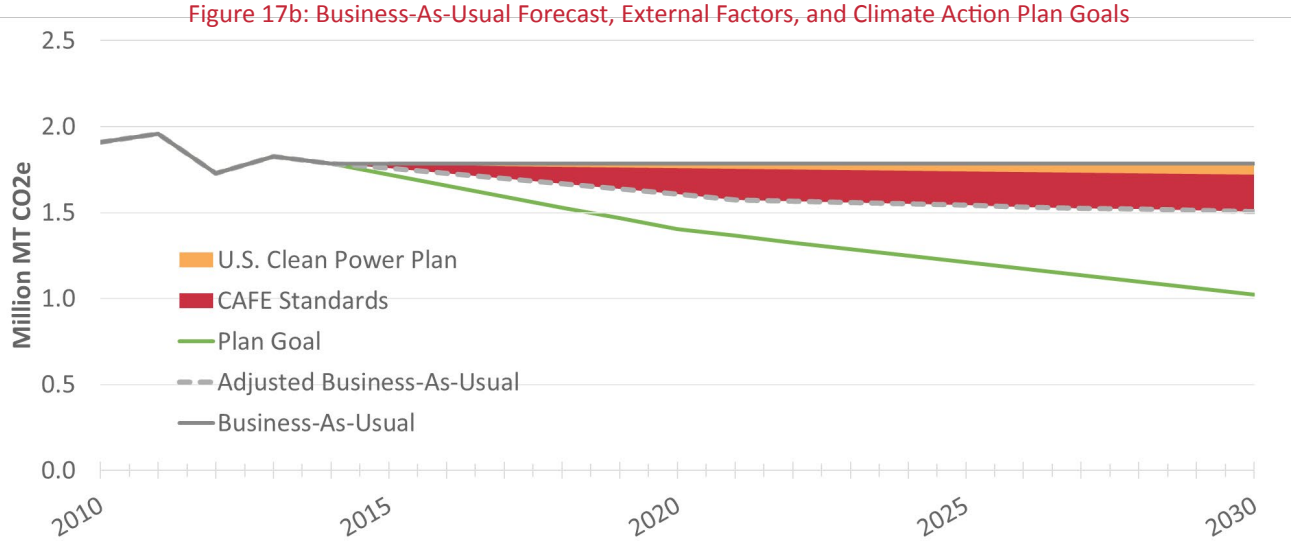


Table 4: Local and State Climate Action Goals

Scale	Benchmark Goal	Source Target	Baseline Year	Goal Reduction
Municipal Operations	Municipal Climate Action Plan	GHG	2009	20% by 2020
Community	Rochester Energy Plan	Energy	2010	20% by 2030
Regional	Finger Lakes Regional Sustainability Plan	GHG	1990	80% by 2050
State	2015 New York State Energy Plan	GHG	1990	40% by 2030 80% by 2050

Chapter 4: How Do We Get There?

4.1 Overview

To achieve the goals of 20 percent GHG reduction below 2010 levels by 2020--and 40 percent reduction by 2030, the Rochester community will need to pursue a variety of emissions reduction strategies and implementation actions across all of the CAP focus areas. The strategies aim to reduce Rochester's climate impact and prepare the community for the changing climate of the future.

This chapter includes a description of mitigation strategies and implementation actions, organized in two ways: (1) by Focus area and (2) by Perspective.

Strategies by Focus Area

To mitigate emissions, six **strategies** were developed that correspond the **focus areas** identified in previous sections of the CAP. The strategies are summarized below (by focus area). It is noted that the potential emissions reductions related to the water and land use focus areas are small relative to other focus areas, and not readily measured within the CAP timeframe. Yet actions related to water and land use bring many co-benefits and will play a vital role in improving the community's health and ability to adapt to the impacts of climate change. Thus the water and land use focus areas are not identified in this chapter as "contributing" to reductions in emissions, but are included in the implementation plan to recognize their key role in adaptation.

Energy and Supply includes stationary energy uses such as residential electricity and natural gas consumption. Strategies include **increasing energy efficiency, implementing renewable energy,** and **fuel switching.**

Transportation includes all on-road transportation such as residents' motor vehicles, commercial vehicles, and mass transit. Strategies include, **promoting multi-modal travel** and **adopting alternative fuel vehicles.**

Waste/Materials Management includes emissions from the breakdown of organic material in solid waste. Strategies include **solid waste reduction** and **diversion.**

Clean Water includes all emissions associated with potable water production and delivery, as well as those associated with wastewater treatment and disposal. The CAP does not include mitigation strategies for this focus area, but includes actions with co-benefits that are designed to improve the community's ability to adapt to the impacts of climate change.

Land Use includes the emissions and sequestration ability associated with changing land use patterns. The CAP does not include specific mitigation strategies for this focus area because direct land use related GHG emissions were not measured as part of the CAP baseline inventory. However, the Land Use focus area includes actions intended to improve the community's ability to adapt to the impacts of climate change.

Perspectives

To understand the impact that the strategies and implementation actions have on the Rochester community, the strategies and actions identified in the CAP are categorized from three perspectives:

Resident. What impact will the CAP have on Rochester families? How can climate action help improve community health while providing opportunities for direct cost savings to households that can be reinvested in local neighborhoods?

Business: How can the CAP improve local business operations, spur job growth, and make Rochester a desirable place for new companies and industries?

Community: What is the role of local government and other community stakeholders, such as State and Federal agencies, local utilities, schools, universities, and non-profit organizations, in CAP implementation? How can the CAP bring the community together to make Rochester more effective at reducing emission and resilient to the impacts of climate change?

The perspective icons are placed next to each implementation action in this chapter indicate which perspectives will likely be most involved in implementation.

4.2 Overview of Mitigation Strategies

The wedge diagram in Figure 18 illustrates the factors that will contribute to meeting the City's reduction goals over the CAP planning horizon.

The thickness of each wedge indicates the magnitude of emissions reduction relative to the goal of 40 percent reduction by 2030. The graphic shows the "business as usual" (BAU) line, which indicates that without any action, emissions will remain relatively the same. The US Power Plan and CAFE standards (in grey) will have a significant contribution towards reducing emissions. Since they are federal requirements outside the City's direct control, their contribution towards emission reduction was used to display the "adjusted business as usual" line. The community's target goal for reducing GHG emissions was calculated from the adjusted BAU.

Locally led and implemented community strategies (in orange, red, and tan) will make up the balance of emission reductions needed to fill the gap between the adjusted BAU and the emissions reduction goal. The wedge diagram in Figure 18 shows that the energy focus area will contribute the most towards emissions reduction potential, followed by transportation and solid waste.

Figure 18. Focus Area Wedge Diagram through 2030

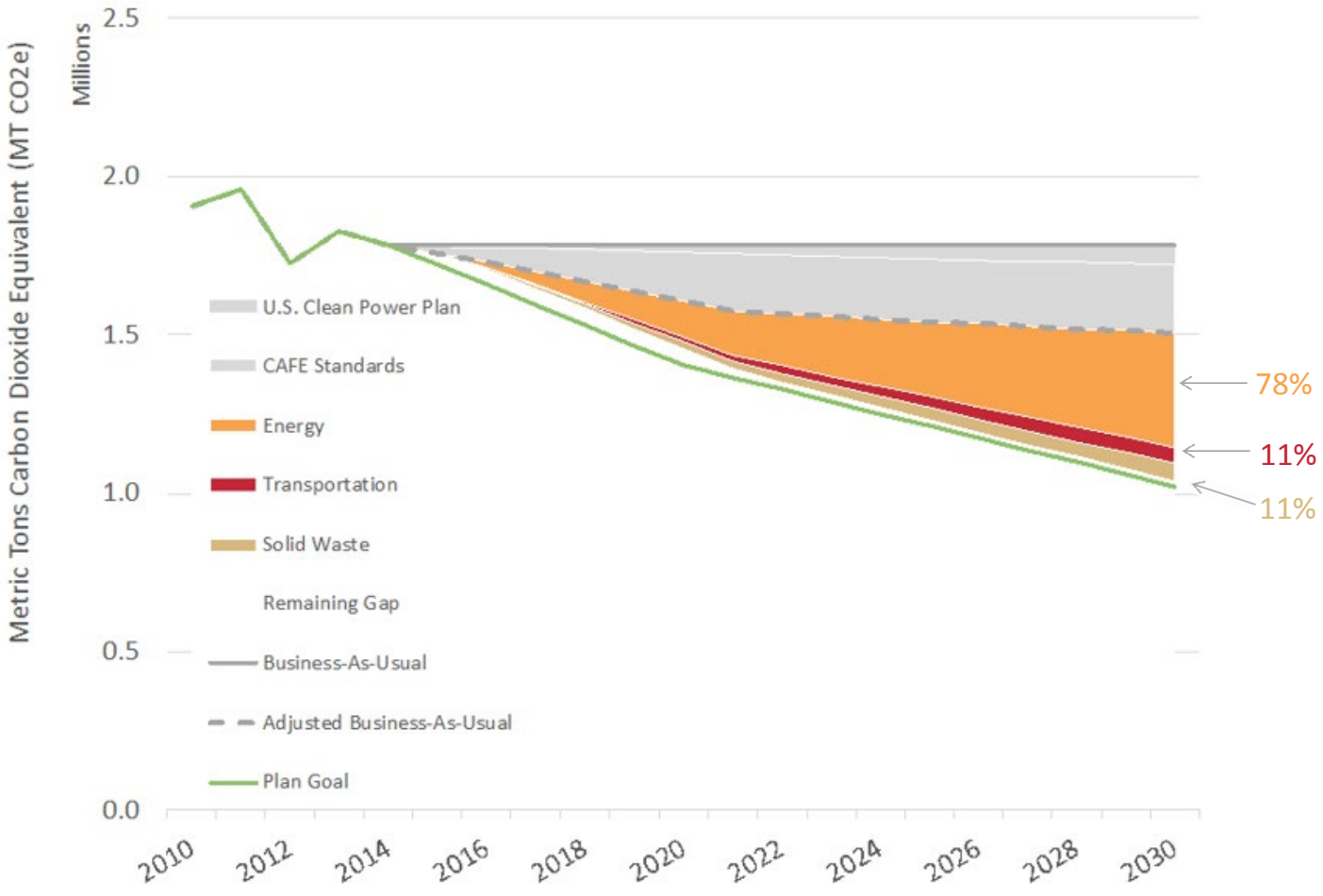


Figure 19 shows the contribution of each strategy towards emissions reduction, organized in this case by sector (residential, commercial, industrial), at the end of the planning horizon in 2030.

Understanding the contributions in the context of sectors can help craft targeted actions. For instance, Figure 19 shows that strategies implemented in the residential sector can contribute 52 percent of the total emissions reductions needed to meet the community's goal. This suggests that implementation activities designed for the residential sector may have the greatest relative impact and should be prioritized.

For example, the combination of the residential and commercial waste reduction strategies in Figure 19 make up the solid waste focus area wedge in Figure 18. Similarly, the combination of the energy related strategies in the pie chart, when added together, are equal to the emissions reduction represented by the Energy focus area wedge in the year 2030. As illustrated in both charts, strategies in the Energy focus area represent the significant proportion of planned emissions reduction included in the CAP, which is expected since Energy emissions make up almost three-quarters of the baseline GHG emissions for the Rochester community. Each strategy is described in more detail in the following section.

CAP Strategies and Implementation Actions

This section includes a description of implementation **strategies** and **actions**, organized by focus area. Under each focus area heading, the emission reduction strategies are described and the associated reduction potential summarized. All strategy assumptions are included in Appendix B.

- **Strategies** are specific statements of direction that expand on the vision and guide decisions about future public policy, community investment, and actions.
- **Actions** are detailed items that should be completed in order to carry out the vision and strategies identified in the plan. This section includes a description of recommended actions. **It is noted in Chapter 5 that Implementation Work Groups that will be established and facilitated by the City will refine these actions and identify additional actions.**
- **Perspective** icons are placed next to each implementation action in this chapter indicate which perspectives will likely be most involved in implementation.

Resident Business Community

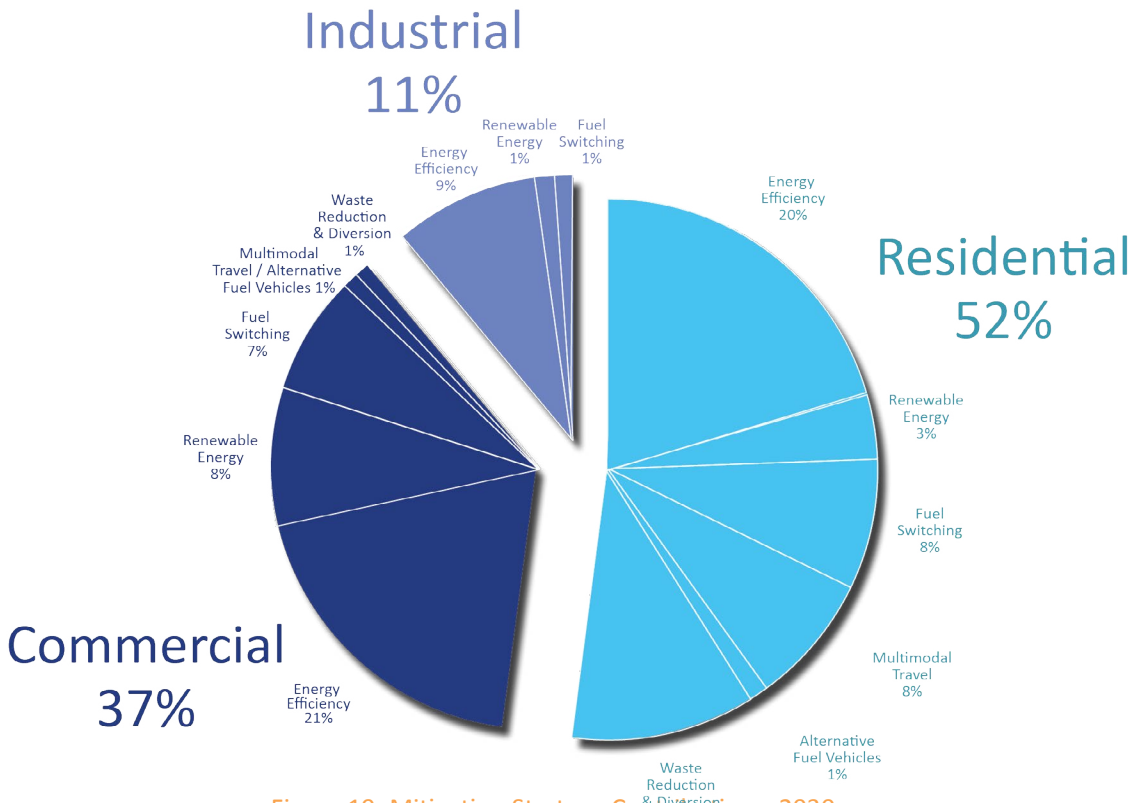


Figure 19: Mitigation Strategy Contributions, 2030

Energy

Energy Strategies

Energy Efficiency: In addition to complying with state building codes to ensure that all new construction is meeting a specified energy efficiency standard, incentive programs to encourage energy efficient retrofits can be implemented. Aligning with the New York State Energy Plan target, the CAP assumes a 25 percent reduction in home and business energy use. If this target is achieved city-wide, 1.9 million MT CO_2e will be realized, equal to a 230,000 MT CO_2e reduction in 2030 alone. This reduction in 2030 is equivalent to the emissions needed to power 24,000 homes for a single year.

Renewable Energy: When combined with energy efficiency and conservation strategies, renewable energy offers additional ways for property owners/managers to reduce energy consumption and costs. Renewable energy sources are clean and inexhaustible. If the city is able to achieve a one percent annual adoption of renewable energy by residents and two percent by businesses, by 2030, a cumulative 400,000 MT CO2e will be realized, equal to a 51,000 MT CO2e reduction in 2030 alone. This reduction in 2030 is equivalent to the emissions needed to power 5,000 homes for a single year.

Fuel Switching: This strategy involves retrofitting homes to use a less carbon intensive energy source, electricity, instead of natural gas. This is a relatively capital intensive strategy but is a critical component to meeting more aggressive emission reduction goals. If one percent of residential and commercial and 0.5 percent of industrial natural gas consumption in Rochester is converted to electricity each year, by 2030 a cumulative 540,000 MT CO_2e will be realized, equal to a 76,000 MT CO_2e reduction in 2030 alone. This reduction in 2030 is equivalent to the emissions needed to power 8,000 homes for a single year.

Energy Implementation Actions

Energy Density Map of the City:
Mapping the energy density/intensity (e.g. MMBtu per parcel) by neighborhood or district will help the City and other key stakeholders use data to prioritize implementation and outreach efforts. Implementing this action early will contribute to the success of many of the other actions in the plan. The City will provide leadership and technical mapping capacity. RG&E will be an important partner in the success of this action, providing data and technical assistance.

Conduct Targeted Outreach to Key Business and Institutional Groups:
Education programs are an essential component of any climate action plan, increasing consumer awareness about the important benefits of energy efficiency, conservation, and sustainable design. The City, in partnership with RG&E, the private sector, and non-profit organizations will develop targeted programs for reaching specific business and institutional groups (schools, hospitals, churches, university). The City will work with RG&E and other key stakeholders to identify priority groups to target based on criteria such as average energy use and geographic energy use intensity (leveraging the Energy Density Map mentioned above), current level of engagement in energy and sustainability initiatives, and stakeholder leadership to ensure successful implementation.

Rental Property Efficiency Program:
Just over 57% of housing units in the City of Rochester are renter-occupied, making energy efficiency programs focused on landlords and renters a priority for the community. There is currently a significant barrier to the investment the implementation of energy efficiency in rental properties because of a common disconnect

"Because I rent, most of the energy efficiency options are out of my control. I think the City should help to incentivize the property management company (i.e. my landlord) to make improvements."

Rochester Resident, Climate Action Plan survey respondent

between who is investing in the upgrade (i.e. the property owner) and who is realizing the cost savings benefit (i.e. the renter). To address this barrier; the City will help to promote existing energy efficiency incentive programs designed for non-owner occupied homes. The large proportion of rental properties in Rochester makes it possible for rental efficiency upgrades to have a large impact on greenhouse gas emissions. This program would focus heavily on outreach and incentives through partnership with local housing organizations. Because the rental sector can be challenging to access, opportunities for renewable energy and fuel switching will also be explored, potentially as part of a comprehensive upgrade package.

Homeowner Energy Efficiency and Conservation Program:
Given the scale of potential greenhouse gas emissions reduction within the residential sector, a program focused on energy efficiency and conservation in owner-occupied homes will be a significant part of the overall energy strategy. Homeowner energy efficiency and conservation programs can complement rental property initiatives and enhance the impact of existing incentive and rebate programs (such as RG&E's residential rebate programs). In Rochester, the challenge of financing efficiency improvements can prevent households from realizing the benefits of reduced energy use and lower utility bills. The network of existing programs and incentives can be unfamiliar, confusing, and difficult to access for many homeowners. The most effective way to encourage homeowners to make important energy efficiency upgrades is through outreach, education, and facilitated access to financial incentives. A comprehensive program designed to reach homeowners in Rochester can be initiated by the City, in partnership with non-profit organizations, neighborhood organizations, and block clubs. This program will focus on outreach and promotion of financial incentives, rebates and programs available through RG&E and NYSERDA, assistance with home energy assessments, and potentially technical and/or financial assistance completing recommended improvements.

> *"I have a very old home with two units and want to keep with the historic character of the home when I do remodeling, but also want to use energy efficient products. I don't really know where to turn for that education."*
>
> Rochester Resident, Climate Action Plan survey respondent

Voluntary Commercial Building Benchmarking and Disclosure Program:
Benchmarking is the process of tracking building energy use over time and comparing it to baseline energy use of other, similar buildings. When implemented effectively, benchmarking can result in energy savings and lower operating costs, GHG emission reductions, higher value of buildings, and improved health of building occupants. The City of Rochester has established a benchmarking program to track performance of its municipal buildings using the EPA's Portfolio Manager tool. A voluntary commercial benchmarking program would focus on privately-owned and occupied buildings. Such programs are intended to create an incentive for energy efficiency improvements by placing buildings in competition with each other, creating a structure that allows the market to value energy performance and provide data needed to effectively manage energy consumption. The program could be administered through the City or in partnership with a non-profit organization.

PACE Commercial Financing:
Property Assessed Clean Energy (PACE) programs are an innovative form of financing that allows commercial property owners to finance capital costs for energy improvement projects and renewable energy installations. In New York State, PACE loans are offered through the Energize NY Finance program, administered by the Energy Improvement Corporation (EIC), a local development corporation and a non-profit.

Under the PACE financing model, a property owner opts to repay the loan for energy improvements by authorizing the municipality where the property is located to add a special tax charge to the property (a loan payment with interest) for that purpose. The loan is then repaid through a line item that is added to the property's annual tax bill over a term of up to twenty years. Rochester's participation in a commercial PACE program would help local businesses finance energy efficiency and renewable

energy projects. To participate, the City of Rochester would pass legislation authorizing PACE financing program, sign a municipal agreement with the Energy Improvement Corporation (EIC) and submit a formal letter requesting EIC membership. Once a member, the Energize NY PACE Finance program would be available for Rochester's non-residential buildings, including commercial offices, retail, medical institutions, industrial facilities, multifamily buildings, not-for-profit businesses and commercially-owned residential property.

Sustainable Development Guide:
The City of Rochester is currently in the process of developing Sustainability Guidance Materials that will inform the design and development of residential, commercial, and mixed-use projects within the City. When completed, the guidance materials will explain the benefits of sustainable design and specifically address GHG emission reduction, green building, energy efficiency, renewable energy, water efficiency, stormwater management, recycling, brownfield redevelopment, green space and transportation.

Municipal Climate Action Plan:
To help generate community buy-in, it is important to look for opportunities for the City to lead by example and illustrate what is possible. The City of Rochester Municipal Climate Action Plan outlines specific actions and steps - spanning the energy, transportation, and waste focus areas - that the City has committed to take on in its own operations and facilities. It will be important for the City to share the results of its Municipal Climate Action Plan implementation with the community, including successes and lessons learned.

Building-Scale Renewable Energy:
In order to achieve the emission reduction goals outlined in the CAP, energy supply is an essential part of the overall package of strategies. Encouraging residents and businesses to install on-site renewable energy systems (typically rooftop solar) can play an important role. On-site energy supply reduces building energy costs, improves property values, and better manages peak energy demand. Education and outreach are critical to expanding the use of on-site renewables. Households and business owners will need information about the solar potential for their home/business, as well as available incentives and financing mechanisms. Adoption can also be encouraged by streamlining permitting and removing barriers that hinder installation. The City of Rochester recently partnered with ROCSPOT and NeighborWorks, an on-site solar campaign known as "Solarize the Flower City 2016." It will be important to document the outcomes of this campaign, including lessons learned and principles that can be applied towards replicating or expanding the program in the future.

Utility-Scale Renewable Energy:
In addition to working with Rochester residents and businesses to install renewable energy on their own properties, it will also be important to identify options and advocate for increasing the quantity of renewable energy within the City's electricity supply. Utility-scale solar plants are significantly larger than solar installations on home rooftops or as part of community solar projects.

Community Shared Solar:
Due to a variety of factors, including the cost, location, condition, and the size of a roof, not everyone is able to install solar panels. Alternative businesses models, like shared solar (or community solar), offer residents and businesses the chance to invest in solar together, benefiting directly from the energy produced by one solar array. By aggregating customer demand, shared solar programs can reduce the financial and technical barriers to going solar. Instead of acting alone to purchase panels and hiring professionals to complete individual site assessments, shared solar programs divide those costs

"Solarize the Flower City" Campaign

among all of the participants. This also makes it easier for participants to buy in at a level that works best for their budgets. Shared solar participants benefit by owning or leasing a portion of a system, or by purchasing kilowatt-hour blocks of renewable energy generation.

Community Choice Aggregation (CCA): CCA is a municipal energy procurement model that replaces the utility with the municipality as the default supplier of electricity for homes and small businesses. By pooling demand, communities are able to choose cleaner energy sources and negotiate lower rates with private suppliers. To implement CCA, the City of Rochester would be required to adopt local legislation authorizing the program, select a CCA program administrator, develop an implementation plan and data protection plan for the Public Service Commission, and contract with an energy supplier to provide clean, renewable energy to all participating customers. NYSERDA offers technical assistance for municipalities pursuing CCA legislation. A CCA can also be implemented with a group of municipalities operating under an inter-municipal agreement.

Solar Panels at the Arnett Branch Library

Transportation

Transportation Strategies

While transportation is crucial to Rochester's economy and quality of life, activities related to transportation are a significant source of GHG emissions. Motor vehicle transportation in Rochester accounts for almost a quarter of total GHG emissions. Since transportation contributes a large percentage of emissions, the CAP recognizes there are numerous opportunities for the transportation sector to contribute to GHG emission reduction goals, with strategies and actions tailored to the Rochester community.

Multi-Modal Travel: This strategy focuses on reducing vehicle miles traveled in Rochester by increasing options for and improving access to sustainable transportation options, such as transit, car-share, bicycling, and walking. With an aim to reduce vehicle miles traveled one percent per year through implementation of the CAP, a reduction of 350,000 MT CO_2e will be realized, equal to a 45,000 MT CO_2e reduction in 2030 alone. This reduction in 2030 is equivalent to taking 9,500 cars off the road for an entire year.

Alternative Fuel Vehicles: Increasing the efficiency of vehicles is a key strategy for reducing transportation related greenhouse gas emissions. This strategy replaces gasoline and diesel powered vehicles with alternative fuels, such as compressed natural gas and electricity. If the Rochester community can increase the average fuel economy of the community's vehicle stock by 2 percent annually (over already established federal efficiency standards), while also achieving a target for three percent of all new vehicles registered in the city to be alternatively powered, a cumulative reduction of 50,000 MT CO_2e by 2030 will be realized, This is equal to a 6,700 MT CO_2e reduction in 2030 alone, which is equivalent to taking 700 cars off the road for an entire year.

Transportation Implementation Actions

Alternative Fuel Vehicle Education

One of the major barriers to the increased adoption of alternative fuel vehicles is lack of public education and awareness. This action focuses on making consumers aware of the availability and of the financial, environmental and health benefits of electric vehicles and other alternative fuel vehicle options. Making electric vehicles more visible by increasing their use in the municipal fleet and pairing this action with expansion of public electric vehicle charging stations would serve as a strong entry point for the education campaign.

City-Wide Electric Vehicle Charging Station Access

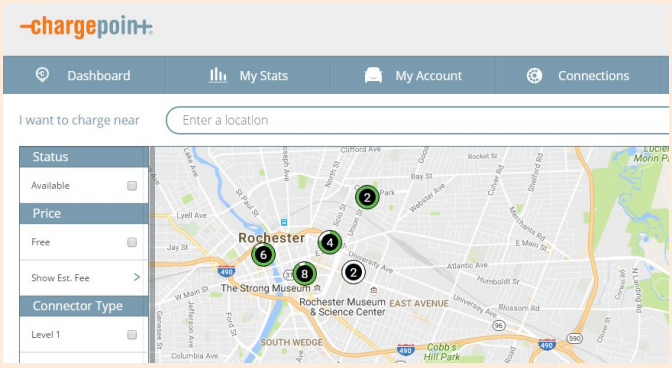
The City of Rochester has installed 24 public electric vehicle charging ports at several City-owned facilities, including municipal parking garages, City Hall, the Public Market and the Port of Rochester.. These charging ports are available to drivers of electric and plug-in hybrid electric vehicles. Parking facilities with charging ports can be located easily using online applications, such as Plugshare and ChargePoint. Easy access to charging stations encourages adoption of electric vehicles and also promotes the electric vehicle option. Placing additional charging stations at locations where people work, shop and recreate will further encourage the adoption of electric vehicles. Installing the charging stations in conjunction with public education and awareness provides opportunity for synergy between implementation actions. Potential partners include large employers, institutions, businesses and apartment buildings/complexes.

"I just bought a Nissan Leaf and I LOVE being able to charge it in the East End Garage. Thank you or providing charging stations!"

Rochester Resident, Climate Action Plan survey respondent

Electric Vehicle Charging Station at the Public Market

The City of Rochester has installed 24 charging ports at 7 City-owned facilities, for electric and plug-in hybrid vehicles. These ports are available to any drivers of electric and hybrid electric vehicles who use these parking facilities. The charging points can be located easily using online applications, such as Plugshare and ChargePoint.



Shared Mobility Programs

As a means to reduce vehicle miles traveled in the city, this action is focused on enabling Rochester residents to reduce vehicle miles traveled, single occupant vehicle trips, and the total number of vehicles. This action can be achieved through a variety of means, including a targeted education campaign, attracting carshare and bikeshare service providers to the city, or community partnerships with existing ride share mobile applications. Shared mobility represents new mobility options for Rochester residents. Community stakeholders can collaborate to determine which approach and steps are most appropriate for Rochester. In addition to reducing emissions this implementation action would also reduce traffic congestion. The City of Rochester can facilitate this action by working with local organizations and other interested partners.

Anti-Idling:

This action includes education and outreach to the community to reduce motor vehicle idling. A reduction in idling will reduce emissions, improve overall air quality, and reduce noise pollution—all of which will positively impact the health of community residents. This is an opportunity for the City of Rochester to lead by example by establishing a policy for its municipal fleet. After demonstrating the potential and sharing the benefits from municipal implementation, the City could work with major employers, institutions, school districts, and community members to encourage similar practices community-wide. One important factor that will need to be considered during the implementation of this action is limitations and challenges to implementation during winter months when vehicles are sometimes idled for heating.

Vanpool Program:

Vanpools can help reduce emissions from single-occupant vehicles—and allow residents a way to share transportation costs, access preferred parking, and create more productive commute time. Vanpools can work in a variety of ways, but typically involve one vehicle with a designated driver, an operator that is responsible for organization and vehicle maintenance, and participants (usually 6 to 12 passengers who decide who drives and how monthly costs are shared). Vanpools offer benefits to suburban commuters, students, low-income residents, and community members without access to personal vehicles, providing multiple co-benefits, such enhanced access to jobs and services, and transit. In 2015, RTS completed a feasibility study for a regional vanpool program that links commuters who live near one another and travel to similar destinations in Rochester. The study recommended that RTS launch a demonstration program with large employers in the region, with potential expansion of the program throughout the community. Similarly, the City is planning a van-pool pilot project designed to assist low income residents with transportation to work.

"I think we should encourage use of alternative forms of transportation, such as bike and bus, as well as provide more bike infrastructure."

Rochester Resident, Climate Action Plan survey respondent

Complete Streets Program:

The City of Rochester adopted a Complete Streets policy in 2011, which seeks to incorporate active transportation into planning, design, and operation of all future City street projects. A complete street is one that accommodates all users, including pedestrians, bicyclists, transit users and persons with disabilities. While different features may be necessary or feasible to complete a street, the goal of accommodating everyone remains the same. Complete streets improve safety, convenience, and access to transit—all features that help to improve mobility while reducing vehicle miles traveled. Complete Streets also offer numerous co-benefits, including improved safety and public health. This action focuses on the City's role in continuing to implement its Complete Streets policy, prioritizing underserved areas

and opportunities to enhance access to transit facilities, employers, and services.

Bicycle Master Plan:
In 2011 the City developed a long-term master plan for bicycling infrastructure and services, which assessed the entire bicycle system and recommended bicycle-supportive infrastructure and policies. The Bicycle Master Plan includes recommendations for additional new bicycle facilities and treatments, including restriping, new bike lanes, bike boxes, buffered bike lanes, bike repair stations, and others. It also includes recommendations for outreach and education, focused on target groups such as young bicyclists, seniors, impoverished and underserved bicyclists, and visitors. This action focuses on leveraging the Bicycle Master Plan by broadening the community's role in implementation, and looking for opportunities to increase bicycle use community-wide.

Encourage Use of Transit
Every transit trip begins and ends with a walk or bike ride, often known as the "last mile." If such walks are convenient, safe, and pleasant, the community is more likely to use transit. Increasing the use of transit community-wide will help reduce vehicle miles traveled and GHG emissions, as well as potentially increase physical activity and promote equitable access to transportation options. The focus of this action is twofold: First, it will be important for the City to work closely with the Rochester-Genesee Regional Transportation Authority (RGRTA) to identify needed improvements to transit services—and the Genesee Transportation Council, which supports strategic plans for public transportation and provides technical assistance to RGRTA. In addition the City would continue to identify ways to improve the "last mile" experience for transit users, improving safety, convenience, and accessibility through policies and programs that focus on infrastructure and the built environment. These include transit-oriented development along key corridors, pedestrian and bicycle amenities, lighting, and key trail connections.

Trail Connections:
The City of Rochester is well-known for its off-road multi-use trail system. These trails provide valuable transportation and recreational opportunities for residents and visitors. Rochester is home to nationally recognized trails, such as the Erie Canal Heritage Trail, the El Camino Trail, and the Genesee Riverway Trail. Together these trails create an important non-motorized network for pedestrians and bicyclists, connecting destinations throughout the community. Increased use of non-motorized trails can replace trips otherwise taken with motor vehicles, thus reducing emissions associated with personal cars and trucks. This action involves improving trail facilities (which could signage, lighting, and maintenance), making new connections within the overall trail system, and exploring future policies regarding snow removal. This will improve equitable access to employers, schools, stores, parks, and other destinations, providing opportunities for community members to use non-motorized forms of transportation. The City of Rochester plays a leadership role in planning and construction of enhanced trail facilities and new trail connections.

Almost 26 percent of Rochester households do not have access to a vehicle, compared to 11 percent in Monroe County. Access to a vehicle can have major impacts on a household's ability to reach jobs, education, health care, and recreational opportunities. This underscores the importance of improving transportation options and accessibility for all residents.

Waste Management

Waste Management Strategy

Solid waste accounts for approximately 3 percent of GHG emissions in Rochester. While this is a relatively small proportion of total emissions, there are numerous opportunities and co-benefits of improved materials and waste management practices. The climate benefits of improved waste management will result from avoided landfill greenhouse gas emissions, generally in the form of methane, reduced raw material extraction, and carbon sequestration in soil (through composting). Co-benefits include improved public health, soil quality, and cost savings.

The actions in this section describe activities the community can take to reduce the amount of waste sent to landfills (reduction and diversion) and the amount of raw material needed create new products (recycling and reuse).

Waste Reduction and Diversion: As organic material decomposes in a landfill it releases GHG in the form of methane. Recycling, composting, and other waste reduction and diversion efforts are important strategies for reducing GHG emissions, prolonging the life of landfills, and reducing disposal costs. With a target to increase the current 8 percent diversion rate to 40 percent by 2030, a reduction of 420,000 MT CO2e could be realized, equal to a 52,000 MT CO2e reduction in 2030 alone. This reduction in 2030 is equivalent to recycling 16,000 tons of waste instead of sending it to the landfill.

Waste Management Implementation Actions

Organic Materials Collection Program: Building on existing recycling and composting programs, this action focuses enhancing collection of organic material (yard and food waste) at a community-wide scale for use in a composting program. Composting provides numerous benefits, including carbon sequestration, improved soil health, reduced soil loss, as well as increased water infiltration and storage. Commercial composting is currently offered by a private sector organization (Community Composting) which operates in many areas of Rochester and is used by numerous restaurants throughout the city. Expansion of services would focus on making composting an affordable option for renters, low-income households, residents with disabilities, and others who currently face barriers to composting on their own. In addition to the reduction in GHG emissions, commercial composting would provide a useful end-product that could be used on city properties or sold to residents for their lawns or home gardens.

Composting yard and food waste can help reduce GHG emissions through carbon sequestration, a is long-term storage of carbon dioxide or other forms of carbon to either mitigate or defer global warming. It has been proposed as a way to slow the accumulation of greenhouse gases, which are released by burning fossil fuels.

Mixed Recycling:
In 2016, the City of Rochester initiated a mixed recycling pilot program, an effort to make recycling easier and more convenient for residential customers. The program provides a 96 gallon wheeled cart in place of the existing 12 gallon recycle box. Recyclables can be placed in the cart, without sorting, and the container can be placed at the curb for pick up by the City. The containers have a weather-proof lid that will keep recyclables clean and dry and prevent materials from being scattered and the larger container allows more recyclables to be collected by customers compared to the recycle boxes. This improved convenience is intended to increase participation, keeping recyclables out of the refuse stream. City-wide expansion of the mixed recycling pilot program,which will occur during 2017 will reduce waste that is landfilled, which in turn will reduce GHG emissions. In addition, mixed recycling with enclosed carts can help reduce the presence of litter in the public realm and within streams, rivers, and Lake Ontario.

Recycling Education Program:
Past education programs in Rochester have been successful in boosting recycling rates and present an opportunity to continue increasing participation. Developing a robust, ongoing education program campaign will be important way to achieve the diversion rate targets included in the CAP. Specific topics that could be addressed as part of this education programs include home composting, education about mixed recycling, upcycling, and consumer information about recyclable products. Providing residents with quick reminders on a consistent basis would help keep community members informed about recycling opportunities and motivated to participate.

Clean Sweep Day

A used tire is re-purposed as a planter box, an example of "upcycling."

Creative Reuse and Upcycling:
Upcycling is the process of transforming by-products, waste materials, and unwanted products into new materials (it is the opposite of downcyling, which involves converting materials and products into new materials, often of lesser quality). Upcycling can help to reduce GHG emissions by reducing the amount of waste sent to landfills. In addition, upcycling often does not require as much energy and water as recycling. Upcycling is often a low-cost, community-led activity with low barriers to entry. Numerous online communities, such as "Upcycle That" and Pinterest provide opportunities to share and learn about creative upcycling ideas.

Consumer Return of Universal and Electronic Wastes
Many items that can be diverted from landfills are not included in traditional curbside collection programs; special programs are often are needed to collect these materials. Some retailers have existing collection programs for materials, such as electronic waste fluorescent lighting and batteries. Additionally, the City can partner with recycling firms to host e-waste recycling events. This action focuses on increasing consumer awareness of these programs while also identifying opportunities for more targeted engagement.

Water

Because of its limited impact on GHG emissions in Rochester, there are no water-related GHG emission reduction strategies included in the CAP. There are, however, implementation actions focused on opportunities to improve resiliency and climate adaptation in Rochester. Each is described in more detail below.

Water Implementation Actions

Green Infrastructure Portfolio Standard:
The Green Infrastructure Portfolio Standard (GIPS) is technique adapted from a similar standard used for renewable energy. The goal of renewable energy portfolio standards is to gradually, but deliberately, increase the use of electricity from renewable sources over twenty or thirty years. In the case of the GIPS, a community with a significant amount of impervious surface gradually scales up the use of green infrastructure, increasing the volume of stormwater runoff and pollutants retained on-site and reducing the amount flowing into the stormwater sewer system and surface waters. By doing so, the GIPS approach not only helps protect water quality, but it is also a useful tool for community-scale green infrastructure planning and prioritization over a period of decades.

A GIPS typically sets goals for a reduction of stormwater runoff and/or elimination of combined sewer overflow over a timeframe of 15 to 20 years. The long-term approach offers communities the chance to incorporate green infrastructure projects and policies into existing and planned projects, programs without major disruption or large annual investments. The incremental approach also allows a community to learn more each year, planning additional investments as schedules and funding allow. The gradual and cumulative installation of green infrastructure over a longer period of time provides a significant return on investment with the least amount of disruption and cost[5].

Developing a GIPS requires collaboration between the City of Rochester, Monroe County (Rochester Pure Waters District), the NYS Department of Environmental Conservation, and other entities involved in water quality, stormwater management and green infrastructure design. Key steps in developing a GIPS would be establishing a task force focused on development and implementation, setting measurable goals for a reduction in stormwater runoff, selecting projects, and identifying priorities.

The City of Rochester has already completed important steps that will contribute to an effective GIPS. In 2016, the City of Rochester, Monroe County, New York Sea Grant and the National Oceanic and Atmospheric Administration

Green Roof at City Hall

The City of Rochester has completed numerous green infrastructure projects associated with municipal buildings, parking lots, and parks. In 2010, the City of Rochester installed a garden system ("green roof") on the roof of City Hall. A green roof can improve air quality reduce storm water runoff by 50% - 90%. The City Hall green roof consists of sedum plantings, chosen because they are perennial, hardy enough for Rochester winters, and require little to no watering once established.

5 Green Infrastructure Portfolio Standard: A Guide to GISP and Building Stormwater Retrofits. The Great Lakes and St. Lawrence Cities Initiative.

(NOAA)partnered to develop a **Green Infrastructure Retrofit Manual**, which focuses on green infrastructure design in our region that addresses water quality, flood prevention, air quality, habitat and wildlife, health and wellness, as well as climate resiliency. The manual will include guidance for design, construction, operation and maintenance of green infrastructure retrofit techniques. Design standards for green infrastructure practices include tree planting, porous pavement, bioretention facilities, rain gardens, green roofs, and retrofits for existing non-green infrastructure facilities (such as drainage ponds). Operation and maintenance guidance will address inspection techniques, schedules, and performance monitoring.

Water Supply System Climate Impact Study:
In order to understand what the impact of climate change will be on Rochester's drinking water supply system (e.g., extreme events, changes in water quality, population changes from climate refugees), a targeted study should be performed. Engaging the local research and science community in this effort as well as experts from the water resources community will be key component of ensuring successful implementation. Taking this action early in the implementation process would allow for better informed decisions to be made for all water related actions.

Integrated Water Management Practices:
IWMP is a process which promotes the coordinated development and management of water, land and related resources, in order to maximize economic and social welfare in an equitable manner without compromising the sustainability of vital ecosystems. This action is intended to enhance the ongoing collaboration and alignment in water planning and management within Rochester. For example, identifying opportunities to align regional watershed management and water supply development with regional land use planning would be a specific component of this action. This action also emphasizes coordinated water supply, wastewater, and stormwater planning and management within the region.

Land Use

Land use planning represents an opportunity for the community to address carbon emissions by fostering vibrant, walkable neighborhoods and supporting alternative forms of transportation. The form of the built environment and shape of the community--including where jobs and housing are located, the presence of parks and open spaces and the location of stores and services—can influence GHG emissions. Community design is one of the major drivers of travel behavior and transportation patterns—i.e. where people go, how far they go, how they get there, and how often. To achieve the goal of reducing GHG emissions, transportation-related reductions can be achieved through coordinated land use policies. In addition, there are multiple co-benefits associated with land use planning, including improved environmental health, public health, and economic vibrancy. In the context of adaptation, land use policy is critical to improving the community's resiliency and ability to adapt to the effects of climate change. Land use policy is critical to improving the community's resiliency and ability to adapt to the effects of climate change.

Land Use Implementation Actions

Coordinated Land Use and Transportation Policies: Transportation and land use are highly interconnected, as land use patterns play an integral role in how people choose to travel. Transportation currently accounts for about a quarter of GHG emissions in Rochester. Policies and actions that make it easier to make trips by foot, bicycle, and transit, can help the community reduce transportation-related GHG emissions. This action focuses on the City's role in continuing to develop and adopt land use policies and zoning standards that have been shown to lower vehicle miles traveled and improve public health (such as mixed-use and transit oriented development). Land use concepts with the greatest influence on travel behavior and vehicle miles traveled (and GHG emissions) include compact development, a greater diversity of land uses, good street connectivity, greater choice of transportation modes, appropriate parking management and pricing, and concentration of activities in centers.

"We should develop solar installations on vacant lots and surround them with perennial flower beds."

Rochester Resident, Climate Action Plan survey respondent

Transit-oriented and Mixed-Use Development (TOD): Transit-oriented development that is compact and contains a mix of uses can help reduce vehicle miles traveled by reducing distances people have to drive, giving people more transportation options, and making transit and non-motorized modes of transportation more feasible. In partnership with the Genesee Transportation Council and RGRTA, the City of Rochester has initiated a planning study that will identify appropriate locations in the City to implement transit-oriented development policies, design standards, and regulations (the Rochester Mobility Enhancement Study). This action represents the ongoing role of the City to continue to develop and adopt TOD policies and supporting zoning regulations

Redevelopment of brownfields and vacant or underutilized properties: Redevelopment of existing buildings and vacant land within the city typically involves reuse of a vacant, blighted, or underused building or property, as well as rehabilitation of older structures that have deteriorated or outlived their usefulness. In many cases, these properties tend to be located in older industrial neighborhoods near the city center and along major transportation corridors. Redevelopment of these properties has the potential to help reduce vehicle miles traveled by repurposing centrally located buildings and properties with easier access to transit and jobs. Redevelopment may also involve the removal of derelict buildings and their replacement with new, often larger structures. Through a variety of planning efforts, including Brownfield Opportunity Area projects, the City plays an important role in identifying strategic properties for redevelopment, as well as coordinating remediation activities, accessing funding opportunities, and partnering with potential developers. The NYSDEC Brownfield Cleanup Program offers income tax credits for both eligible cleanup and redevelopment costs for completed projects. The

City is also preparing developer guidance materials to incorporate sustainable planning and design practices into new redevelopment projects, which will provide developers with best practices to incorporate greenhouse gas reduction techniques into their project designs.

Urban Agriculture:
Urban agriculture is the practice of growing and distributing food in or around an urban neighborhood. The City currently offers a one-year permit for community gardens on vacant, City-owned lots (within raised beds). But there is currently no comprehensive policy directly addressing urban agriculture within the city. This action focuses on supporting community gardening activities as well as the City's role in adopting policies that would allow residents to use vacant property to grow food and distribute agricultural products locally.

EcoDistricts:
An "EcoDistrict" is a neighborhood scale model of sustainable development and design. Greentopia, a non-profit organization based in Rochester, is currently in the planning phase for New York State's first EcoDistrict, located at High Falls. The EcoDistrict will contribute to the revitalization of the High Falls area using sustainable principles. This action focuses on expanding effective elements of the EcoDistrict concept to other parts of the community.

Parks and Open Space Planning:
Rochester has more than 3,500 acres of parks within its boundaries, offering active and passive recreation opportunities. Well-vegetated parks can help moderate higher temperatures created in urban heat islands, sequester carbon and other pollutants, and help mitigate impacts of extreme weather events. In addition, parks and green spaces provide opportunities for active recreation, passive enjoyment of nature, and stress relief—all factors that contribute to a more resilient population. This action focuses on two primary activities: (1) managing and maintaining City and County parks and other natural lands in ways that maximize carbon storage and increase resilience to climate change, and (2) continuing to improve park facilities in the city (i.e. landscaping, programming, play areas), thus leveraging the co-benefits of enhanced park facilities and access, including improved public health outcomes.

Food Choice and Climate Change

It is estimated that the global food production system is responsible for up to one-third of all human-caused GHG emissions. Meat and dairy products contribute more significantly to climate change than vegetables and grains. Choosing fresh fruits, vegetables, grains and legumes can help reduce GHG emissions and support local food systems, benefiting the local economy and health of the community. By choosing to eat lower carbon foods, Rochester residents can achieve multiple benefits, including a healthier diet, a stronger local economy, preservation of local agricultural lands and food production, and reduced emissions from transportation of food.

Expansion of food-buying clubs, cooperatives, public markets, and community-supported agriculture can increase the community's access to affordable fresh fruits and vegetables. This is especially important for disadvantaged and low-income populations that may not have access to fresh foods and unprocessed/packaged foods.

4.3 Implementation Perspectives

Overview: How do Perspectives Relate to Strategies?

Although the Rochester CAP will be implemented at the strategy level, it is through the perspectives that the City's residents, businesses (commercial and industrial), and community at large will engage with the CAP and find their individual roles and opportunities to participate in implementation. In this section, the outcomes and benefits of action for each emissions reduction strategy are summarized from the resident and business perspective. A third, community perspective is also considered in the CAP. Though Rochester's residents and businesses will realize the direct benefits of successful plan implementation, various stakeholders, from the City government to the local energy utility to community groups, have a role to play.

Resident Perspective

Baseline Recap

The residential sector of Rochester represents 52 percent of the total emissions generated in the community, or just under 1 million $MTCO_2e$ in 2014. The residential sector has seen fluctuations in emissions since 2010, with only a very slight decrease (0.1 percent) overall (Figure 20). This relatively stable residential emissions output represents opportunities to develop emission reduction strategies. Acknowledging that the residential housing stock was built largely before 1970, there are significant opportunities to address energy savings in these structures. By addressing the energy efficiency of older homes, Rochester residents will see a decrease in energy consumption and costs by having more efficient homes. Additionally, strategies that focus on the improved efficiency of vehicles, renewable energy, waste reduction, fuel switching, and other conservation activities will assist in reducing the emissions associated with the residential sector.

Benefits of Action

Implementation of the CAP will have many impacts on the residents of Rochester beyond reducing greenhouse gas emissions and energy costs. The CAP can bring benefits in the form of reinvestment, neighborhood revitalization, increased property values, environmental quality improvements, and improved public health.

The cost savings that are gained through the residential strategies offer residents an opportunity to reinvest that money or free up those financial resources for other home expenses. The investment could then help pay for housing, transportation and other living expenses while also creating jobs within the community. These investments would contribute to a more financially stable community that is able to make further investments in reducing greenhouse gas emissions in the future.

Many of the residential strategies are targeted at improving homes. Reinvesting in established neighborhoods through energy efficiency upgrades helps improve marketability, value, livability and encourages community revitalization.

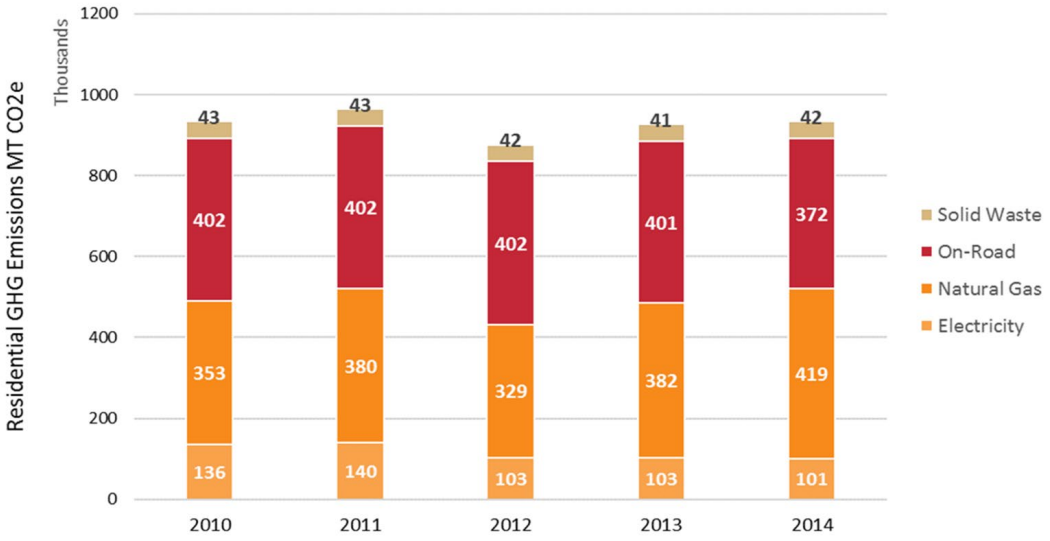


Figure 20. Residential Emissions Sources 2010-2014

The energy efficiency and renewable energy upgrades to Rochester's homes can potentially lead to an increase in property values. Landlords who install noticeable renewable energy upgrades could make the community more attractive to eco-conscious residents.

The strategies outlined in the CAP will also lead to environmental quality improvements for the region. The greatest benefit would be an increase in air quality due to a reduced reliance on fossil fuels for electricity generation and transportation. This improved air quality would improve community health, especially for those that suffer from respiratory conditions, and help make the surrounding area more aesthetically pleasing by reducing visible air pollution and improving overall quality of life.

Outcomes

Through implementation of the strategies in the CAP, it is estimated that the residential sector can remove 240,000 $MTCO_2e$ of GHG emissions annually from the City of Rochester's footprint in 2030, 25 percent below the 2010 residential generated emissions. Through these reduction strategies the residential sector could contribute 52 percent of total community emissions reductions in 2030 with home improvements making up 42 percent of the potential and resident mobility shifts contributing an additional ten percent of the total greenhouse gas reductions in 2030.

If Rochester residents are able to accomplish all of the strategies and related actions outlined in this document, the savings in 2030 would be equivalent to emissions from 25,000 homes or 51,000 cars. Through the implementation of these identified strategies, the residential sector of Rochester will have become 20 percent more efficient in building energy use, approximately 1 out of 7, or almost 11,000 houses, will have an installed solar system, and more fuel efficient vehicles will be utilized. In 2030, the cumulative implementation cost will be approximately $450 million while the cost savings will have reached a cumulative $340 million. This results in a net cost of $110 million or $1,300 per household by 2030. By 2037, savings are expected to outpace implementation costs for all aggregated residential strategies. This point is important when comparing the CAP to the cost of inaction, a scenario in which residents are continuing to realize various impacts such as increased out of pocket expenses due to escalating utility prices and health impacts from reduced air quality. There are secondary benefits such as improved air quality, utility price stability, and more livable neighborhoods, that are not quantified here but are important considerations. All strategy assumptions are included in Appendix B.

Business Perspective

Baseline Recap

The Business perspective includes emissions reported within the Commercial and Industrial sectors, and represent 48 percent of the total GHG emissions, or 800,000 $MTCO_2e$ in 2014. Figure 21 illustrates the emissions generated by the commercial and industrial sectors from 2010 to 2014. During this time period, the commercial sector has experienced a decrease of roughly 9 percent while the industrial sector has seen a decrease of roughly 20 percent. A drop in electricity consumption, potentially due to changes in the industry make-up and activities in Rochester, is largely driving this reduction in industrial sector emissions. This reduction coincides with a decline in manufacturing activity in Rochester.

The lack of substantial decrease in emissions generated by the commercial sector indicates there are opportunities for improvement. With this in mind, similar strategies that were utilized for the residential sector were applied with commercial and industrial assumptions.

When implementing the climate action plan, it will be important to leverage existing sustainability actions in the private and institutional sectors. There are many potential partners within the community, and efforts should be made to align implementation actions to minimize duplication of efforts and help actions best align with the goals of all stakeholders.

Benefits of Action

The CAP will have many impacts on the businesses of Rochester beyond their energy costs and greenhouse gas emissions. The savings from implementing the reduction strategies can be reinvested additional efficiency upgrades and investments.

Development of new transportation options can lead to a more mobile labor force, making job opportunities more accessible and potentially improving equity and economic prosperity throughout the city.

By acting as leaders in reducing greenhouse gas emissions, Rochester businesses can earn a boost in public relations on a regional and national level. Regionally the businesses that make strides towards a reduced carbon footprint can gain support from customers. On a national level, this CAP has the potential to increase visibility for Rochester and provide a platform for promoting sustainability initiatives in the City.

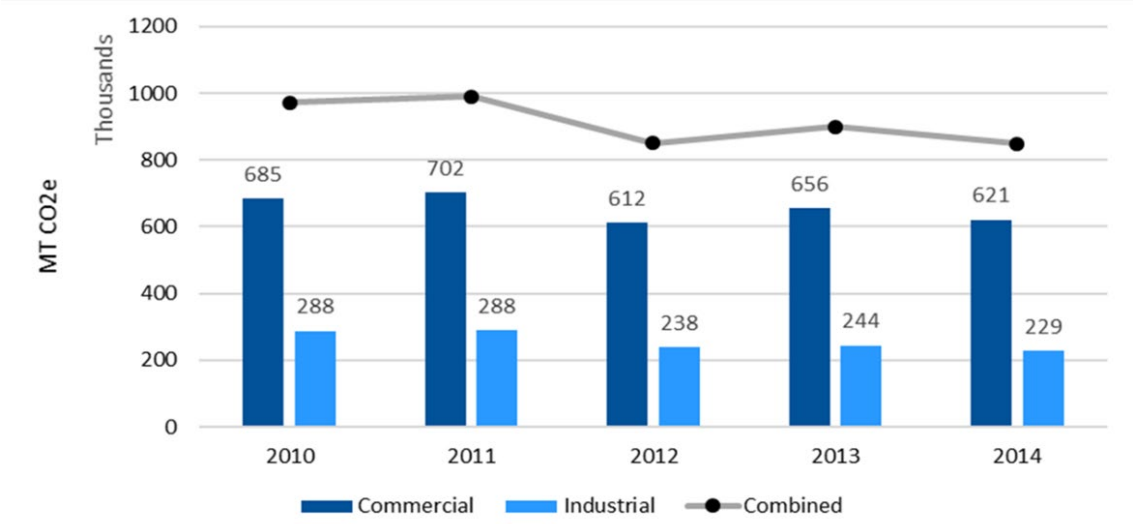


Figure 21. Commercial and Industrial Emissions

Outcomes

Through implementation of the strategies outlined in previous sections, it is estimated that the business community can remove 220,000 $MTCO_2e$ of GHG emissions annually from the City of Rochester's footprint by 2030, 23 percent below the 2010 business (commercial and industrial) generated emissions. Through these reduction strategies the commercial sector could contribute 48 percent of total emissions reductions, with the majority (47 percent) coming from business

improvements and the remainder from business mobility shifts. Industrial strategies contribute 11 percent of the total 48 percent business emissions reductions in 2030 (Figure 19).

The energy-associated strategies include improving energy efficiency, increasing adoption of renewable energy, and fuel switching. Of these strategies, energy efficiency contributes the largest share totaling 30 percent of the city's total reductions. Renewable energy and fuel switching contribute nine and eight percent respectively. This distribution highlights the importance of energy efficiency to meeting the city's emission reduction goals. **The commercial energy efficiency strategy contributes more to the overall GHG emission reduction than any other strategy.**

Meeting the goals and implementing strategies would produce savings in 2030 that would be equivalent to emissions from 23,000 homes or 46,000 vehicles. Through the implementation of these identified strategies 28% of the commercial and industrial spaces will have solar systems installed and 75% of the commercial and industrial spaces in the city will have been renovated for energy efficiency. In 2030, the cumulative implementation cost will be approximately $660 million while the cost savings will have reached a cumulative $650 million. This results in net cost of $10 million or $760 per business by 2030. By 2033, savings are expected to outpace implementation costs for all aggregated business strategies. All strategy assumptions are included in Appendix B.

"I need a car to get to meetings during the day, so I don't carpool, take the bus, or walk to work. If there was a way for me to use a vehicle at work, I would certainly think of alternate means to get to work as opposed to driving solo each day."

Rochester Resident, Climate Action Plan survey respondent

Community Perspective

The "community" in this context includes the City of Rochester, non-government partner organizations, hospitals and health organizations, and key stakeholders, such as the utility, advocacy groups, faith-based organizations, philanthropic foundations, educational institutions, and non-profit organizations that work within the city. The City of Rochester will play a key role by continuing to implement its Municipal Operations Climate Action Plan while also acting as convener and facilitator for a diverse range of community-wide implementation actions. Community partner organizations will play a critical role in implementation of the CAP through tasks related to advocacy, education, promotion, and capacity-building.

This section describes the role many of these community players will have in successful CAP implementation. Additionally, the community plays a key role in climate adaptation – many of the adaptation actions identified as part of this planning process will be implemented at the community scale and are described further in this section.

Benefits of Action

Similar to the benefits realized to Rochester's residents and businesses, the community as a whole will realize many benefits from implementation of the CAP. Reinvestment of cost savings in the local economy, neighborhood revitalization and increased property values, job growth, improved public health and environmental quality improvements are just a few of the benefits that will be realized by the community as a whole. Additionally, showing leadership in climate action will highlight the community's leadership in the area of climate action and provide visibility for Rochester regionally and nationally.

City of Rochester Municipal Operations

As a leader in the development of this community CAP, the City has a role to play in administering implementation of the entire plan while also looking inward at the City's municipal operations. The City's role in ensuring the Plan's success includes (1) leading by example, (2) overseeing the implementation of various initiatives, (3) providing tools for community success (e.g., education, training, and financial mechanisms), and (4) forging and maintaining partnerships with other communities and organizations within the City to ensure that efforts are aligned and not duplicated.

The City has made significant progress in leading by example, establishing an Office of Energy and Sustainability in 2011 and completing the Municipal Operations Climate Action Plan in 2013. The Municipal Operations CAP includes a GHG inventory for City facilities, emission reduction goals, and strategies to meet those goals.

The municipal CAP is organized into the following focus areas:

- Buildings & Facilities
- Vehicle Fleet
- Water Delivery Facilities
- Streetlights
- Port Facilities

Two GHG inventories have been conducted for municipal operations, a 2008 baseline and a 2011 update as part of the NYPA Energy Master Plan (Figure 22). Through energy conservation measures and active tracking, the City achieved a decrease of four percent across municipal facilities from 2008 to 2011. The City also uses Portfolio Manager to actively track ongoing success of reducing energy use within City-owned facilities.

Portfolio Manager

ENERGY STAR Portfolio Manager is a free online tool provided by the U.S. Environmental Protection Agency for building owners and managers to track and improve energy consumption in their facilities. Portfolio Manager can rate or rank eligible buildings, including offices, schools, healthcare facilities and retail stores based on the efficient use of energy. The outputs of Portfolio Manager provide several indicators that can be used to evaluate the performance. These include an ENERGY STAR score, (a rating from 1 to 100 that indicates the position of a specific building against a database of other similar buildings nationwide), the energy use intensity (EUI) and a similar EUI parameter that compares energy consumption against a national mean for like building types. To evaluate and track building performance, Rochester maintains utility, cost data, and other criteria for all municipal buildings using Portfolio Manager.

Source: *Rochester Energy Plan*

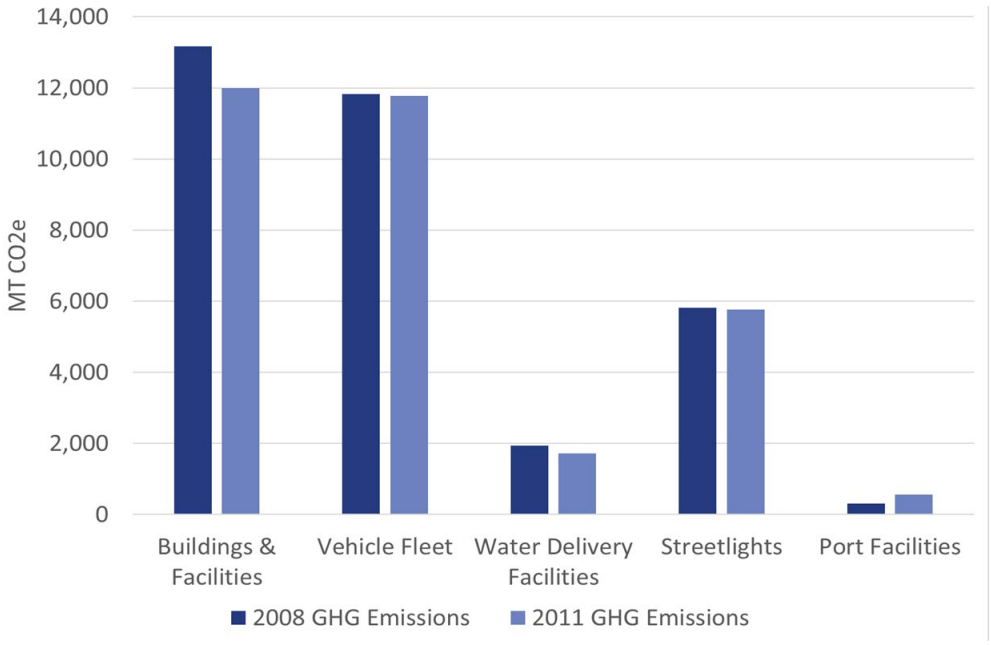


Figure 22. Municipal GHG Emissions, 2008 and 2011

Energy Utility Engagement

Due to the magnitude of energy emissions in the City of Rochester (three-quarters of the total baseline GHG inventory), the involvement of RG&E in CAP implementation will be critical. Even before considering the CAP strategies and implementation actions, achieving the emissions reductions targets identified in the CAP will depend on the success of RG&E in achieving the Clean Power Plan goal for the State of New York (Section 3). Additionally, there is a role for RG&E in many of the strategies and implementation actions in the CAP. Specific actions in which RG&E should play a role include:

- Developing an energy density map of the City
- Targeted energy outreach for key industries in Rochester
- Increasing the use of utility-scale renewable energy

Investment in Community Planning, Facilities, Services, and Infrastructure

A key objective of the CAP is investment in the facilities and infrastructure needed for many of the CAP strategies to be successful. The City of Rochester will also continue to incorporate climate actions into ongoing planning initiatives. Many of the implementation actions in the CAP impact community infrastructure and ongoing planning activities.

4.4 Critical Elements of Success

The following factors emerged as key themes related to successful implementation of the CAP: **education and outreach**, **funding and financing**, targeted **support for underserved communities**, and **implementation at the neighborhood level**. During plan implementation, the City will consider how each action addresses these factors.

Education and Outreach

Education on the impact of individual and collective behaviors is critical in ensuring success of the CAP. Activities such as educational campaigns, training programs, and friendly competitions can help mobilize community members to take ownership of their GHG emissions and influence others to do the same. There are a variety of local organizations with the technical expertise and organizational capacity needed to support the City's education and outreach efforts. The CAP will support, reinforce, and build upon local outreach efforts to encourage the important message of the City's long-term vision for climate resiliency and emissions reduction.

Funding and Financing

In order for many of the strategies and actions described in the CAP to be most effective, they must make financial sense to the community members who will implement them. Tools such as low interest loans can help customers finance some of the upfront costs that often serve as barriers to investing in emissions reduction strategies, such as energy efficiency and renewable energy production.

The City of Rochester cannot invest in and achieve citywide GHG emissions reduction alone. The costs and associated savings from GHG reduction strategies will also require involvement from residents, businesses, and private investors.

Appendix C identifies various local, state, and federal grant and financing programs that could be applied to various CAP strategies and implementation actions. Additional resources will be identified as the CAP is implemented.

Targeted Support for Underserved Communities

The effects of climate change can have disproportionate impacts on vulnerable and underserved populations. A priority for the Rochester CAP is to ensure that implementation activities include the City's underserved communities, including but not limited to low income, elderly, and disabled populations. For example, offering energy efficiency and/or solar financing specifically for lower income Rochester residents or ensuring alternative transportation (e.g., transit, bicycle and pedestrian infrastructure) projects are equally sited in underserved areas. To ensure inclusion in the implementation process, representatives from these communities/populations should be included in the CAP implementation working groups and actions should be identified that are designed exclusively for the underserved.

The City will include community organizations within the implementation work groups to ensure that implementation activities effectively leverage local neighborhood perspectives and expertise. These groups include: non-profit organizations, neighborhood and business associations, and community development organizations. Many of these organizations have been represented on the CAP Stakeholder Advisory Committee.

Implementation at the Neighborhood Level

While cities play a very important role in climate action planning, implementation is most successful at the neighborhood level where people actually live, work, and engage with each other. The neighborhood or district is considered to be the "sweet spot" between individuals and the entire city for achieving sustainability and climate planning goals. Implementing improvements building-by-building can be less efficient. Yet implementation on a community-wide scale can be politically or technically challenging. Approaching implementation at the neighborhood- or district-scale can also help foster a sense of community, creating greater equity, increasing innovation, and attracting investment[6] [7].

The City of Rochester is home to a robust network of neighborhood organizations, business organizations, block clubs, and community development organizations. In addition, the community is organized into the four geographic quadrants, each with its own formal Neighborhood Service Center, established and funded by the City of Rochester. Each quadrant in the City also has its own Quadrant Team, an interdepartmental team of City staff dedicated to improving the quality of life in their assigned area. These teams are intended to directly solve problems, establish community partnerships, and promote strength and growth in city neighborhoods.

These organizations can be leveraged during implementation to broaden the reach of involvement and amplify the benefits of the recommended strategies and actions. CAP implementation working groups should include representation from members of each Quadrant Teams (and Center City) to ensure that implementation activities are coordinated with Neighborhood Service Center team and their initiatives.

6 District-Scale Sustainability Scan Prepared for the Funders' Network and USDN; July 25, 2014
7 EcoDistrct Policy Toolkit for the Urban Sustainability Directors Network, September 2014

Chapter 5: Playbook for Implementation

5.1 Introduction

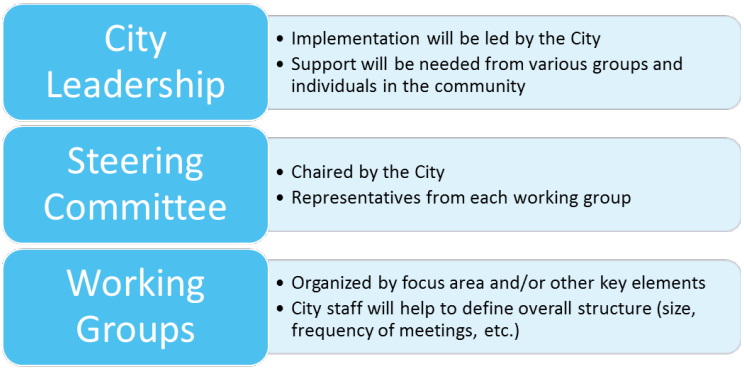
This section includes a guide to implementation of the CAP, including a description of leadership, roles, monitoring, and updating the plan. This section also includes an Implementation Action Matrix, which summarizes the actions described in Chapter 4.

5.2 Ongoing Efforts to Keep the Plan on Track

Plan Leadership

The **City of Rochester Office of Energy and Sustainability** will lead implementation of the CAP, serving as the central coordinator of the implementation actions, delegating responsibility to others as necessary, and seeking approval from the Mayor and City Council, as appropriate. The Office will also be responsible for continuing to convene stakeholder and leadership meetings, overseeing the CAP monitoring and reporting activities, and initiating future AP amendments and updates.

Members of the Stakeholder Advisory Committee as well as additional community stakeholders will form **CAP Working Groups** to support implementation of the CAP. The working groups will be organized by focus area and/or other key topics. City staff will define the overall structure (size, frequency of meetings, etc.) of the working groups. Representatives from each CAP Working Group will comprise a **CAP Steering Committee** to be chaired by the Energy and Sustainability Manager. The CAP Steering Committee will provide oversight of Plan implementation, technical expertise, and a diverse range of perspectives as future implementation actions are considered and planned.



There are currently a number of local, state, and federal agencies and organizations that will be critical in plan implementation by providing funding, technical assistance, and the programs and support (advocacy, education, and promotion) needed to keep the community engaged and involved.

Local

- Faith-based organizations
- Young professional organizations
- Advocacy groups
- Non-profit organizations
- Philanthropic foundations
- Higher education institutions
- Rochester City School District

Regional

- Rochester-Genesee Regional Transit Authority
- Genesee Transportation Council
- Rochester Gas & Electric
- Monroe County (Planning & Development Department, Department of Environmental Services, and Health Department)
- Finger Lakes Region Economic Development Council
- Genesee-Finger Lakes Regional Planning Council

New York State

- New York State Energy Research and Development Authority (NYSERDA)
- New York State Environmental Facilities Corporation (NYSEFC)
- New York Power Authority (NYPA)
- New York State Department of Environmental Conservation (NYSDEC)
- New York State Department of Health (NYSDOH)

Federal

- US Department of Energy (USDOE)
- US Environmental Protection Agency (USEPA)
- US Department of Health and Human Services (USHHS)
- National Oceanic and Atmospheric Administration (NOAA)

Monitoring and Reporting

Ongoing monitoring of progress and reporting of achievements is essential in keeping the CAP current and on track to achieve the emissions reduction goals

identified. Monitoring and reporting activities will include the following:

- **Performance Monitoring:** updating and reporting on the major sectors that contribute to the City of Rochester's community emissions (residential and business energy use and transportation) at a minimum of every 5 years (i.e., 2020, 2025, 2030).

- **Implementation Monitoring:** providing an annual memorandum or report summarizing the status of each strategy and implementation action (including achievements, challenges, and general progress).

Plan Amendments and Updates

Because the CAP is intended to provide a framework for emissions reduction through 2030 and beyond, periodic amendments and updates to the Plan will be needed. The GHG inventory will be updated every five years to reflect monitoring commitments. Other amendments to the Plan may also occur as needed but should, at a minimum, be considered every five years.

Implementation actions identified in this playbook will need to be updated as actions are completed and new ideas and priorities emerge. It is recommended that implementation actions are reviewed and updated annually to remove outdated items, to refine details related to timing and responsibilities, and to add other new actions that are identified.

5.3 Implementation Program

Rochester and its partners will need to continue, expand, and launch actions to achieve its emissions reduction goals. The implementation actions described in Chapter 4 are presented in the Implementation Action Matrix (Table 6). Details include potential time lines for action, potential funding resources, and responsible parties.

Types of Actions

The CAP will be implemented through various types of actions and efforts as outlined below. All actions will fall along the spectrum between motivational, voluntary actions that remove barriers and regulating actions that require participation. It is important to have a balance of actions across this spectrum within the CAP.

- **Programs:** continuation, or addition of programs or services offered by the City or its partners that require ongoing staffing and allocation of resources to support the CAP.

- **Outreach Campaigns and Resources:** communications materials, strategies and informational resources to reach a general or targeted audience. These may require ongoing or one-time allocation of resources and staff time.

- **Supporting Plans and Policies:** existing or new land use, transportation, sustainability, and other topic-specific City and regional plans and policies to guide decision making and investment. These are typically prepared for other primary objectives but support implementation of the CAP.

- **Projects and Investments:** new or replacement equipment, infrastructure, facilities, or other capital resources, either with a direct or indirect objective of supporting the CAP.

- **Other Coordination:** collaboration, partnerships, or agreements with other organizations and stakeholders to support implementation of the CAP.

Timing of Actions

It is recommended that the City and CAP Steering Committee and Working Group members focus on implementing several actions at a time, prioritizing "quick wins" (i.e. actions that are already in progress and/or have potential to begin shortly after adoption of the CAP). Advocating for resources will be a major emphasis of the Steering Committee.

Funding

Funding for recommended CAP actions and initiatives will come from a host of public and private resources. Timing and levels of investment will be predicated on numerous issues beyond the control of City staff, including the disposition of State and Federal budgets and the regional and national economic outlook. In addition, the availability of financing and the costs of investment will dictate the extent and timing of private sector involvement.

Many actions and projects recommended will be dependent upon public financing and grants. Grant funding sources are constantly changing, with available monies becoming increasingly competitive. Appendix C includes a detailed description of key funding programs in existence as of 2016, including a multitude of grant opportunities available through state and federal agencies.

All responsible parties will take on several more implementation actions each year, building on the momentum and successes of the previous actions and adjusting and aligning them to other efforts and priorities. A time period is identified for each action:

- **Immediate:** already in progress or will begin immediately in 2017-18 following adoption of the CAP.
- **Near Term:** actions that will begin within 2 to 5 years of adoption of the CAP (e.g., through 2020) and will be focused on what is needed to achieve the CAP near-term goal of 20 percent reduction by 2020.
- **Longer Term:** actions that will be pursued later in the CAP planning horizon (i.e. beyond 2020)
- **Ongoing:** actions that are continually evolving or in progress

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Table 5: Implementation Actions

Implementation Action	Action Type	Perspective	Description	Key Players	Timeframe	Critical Elements of Success	Addressing Climate Risk and Resilience
Energy							
Energy density map	Project		Map energy density/intensity by neighborhood or district. This information should be used to help inform program prioritization.	City of Rochester, RG&E	Near Term	Implementation at the neighborhood level	Results of this program should be used to inform other programs that reduce risk.
Targeted energy outreach	Outreach/ Campaign		Develop targeted programs for reaching specific commercial/ institutional groups (schools, hospitals, churches, university).	RG&E, NYSERDA, City, DOE, NYPA non-profits	Immediate	Education and Outreach	Use opportunity to also educate targeted businesses on climate risk and resilience.
Rental property energy efficiency program	Program		Address barriers to investment in rental properties; require upgrades at time of certification (required every 3 years).	City of Rochester, RG&E non-profits, property owners	Near Term	Targeted support for underserved communities	Consider future higher future temperatures when performing upgrades.
Homeowner energy efficiency program	Program		Provide education about funding and rebate programs, as well as technical assistance for accessing programs to help homeowners pay for energy efficiency upgrades.	City of Rochester, RG&E, non-profits	Near Term	Education and Outreach, Funding and Financing	Consider future higher future temperatures when performing upgrades.
Voluntary Commercial Building Benchmarking and Disclosure Program	Program		Program for tracking building energy use.	Employers, business owners, property management companies, City of Rochester	Near Term	Education and Outreach	Benchmarking allows for tracking of energy savings over time.
PACE Commercial Financing	Program and Supporting Policy		Property Assessed Clean Energy (PACE) is a financing mechanism for commercial property owners to help finance capital costs of energy efficiency improvements and renewable energy installations.	City of Rochester, commercial property owners, Energize NY	Near Term	Education and Outreach	Financial incentives help create a market for sustainable design.
Sustainable development guide	Supporting Policy		Guidance materials that inform sustainable design practices for new development in the City.	City of Rochester, private sector	Immediate	Education and Outreach	Green infrastructure and sustainable design reduce risk and improve resiliency.
Municipal Climate Action Plan	Program		Implement a variety of actions across focus areas including energy, transportation, and waste. These actions are largely confined to City properties.	City of Rochester	Ongoing	Education and Outreach, Funding and financing	The City should take the opportunity to be seen as a leader in climate action.

Resident Business Community

Implementation Action	Action Type	Perspective	Description	Key Players	Timeframe	Critical Elements of Success	Addressing Climate Risk and Resilience
Building-scale renewable energy	Poject		Increase the adoption of rooftop solar installations by residents and businesses.	Solar providers, NYSERDA, non-profit organizations, DOE	Ongoing	Funding & financing, Targeted support for underserved communities, Implementation at the neighborhood level	Distributed generation reduces risk associated with damaged transmission lines in extreme weather events.
Utility-scale renewable energy	Program		Identify options for increasing the level of renewable energy within the City's electricity supply.	City of Rochester, RG&E, non-profits, solar developers	Ongoing	Funding and financing	Developing renewable energy sources now will reduce the impact of any future carbon tax or similar legislation.
Community Shared Solar	Program		Solar project that aggregates customer demand. Shared solar participants own or lease a portion of a system or by purchasing power in blocks from the system.	City of Rochester, RG&E, non-profits, solar developers	Ongoing	Funding and Financing, Education and Outreach	Increases the community's access to renewable energy over time.
Community Choice Aggregation	Program		Energy procurement model that replaces the utility with the municipality as the default supplier of electricity by pooling demand.	City of Rochester, non-profits	Long term	Education and Outreach	Increases the community's access to renewable energy over time.

Implementation Action	Action Type	Perspective	Description	Key Players	Timeframe	Critical Elements of Success	Addressing Climate Risk and Resilience
Transportation							
Alternative fuel vehicle education	Outreach/ Campaign		Make consumers aware of the availability of the tax credits and other benefits of electric vehicles and other alternative vehicle options.	City of Rochester, Genesee Region Clean Communities, non-profit organizations	Ongoing	Education and outreach	Increase use of alternative fuels can help improve air quality and public health
City-wide EV charging station access	Project		Increasing the ease of use of electric vehicles would make consumers more likely to purchase them. Stations would also serve as a subtle reminder that the option exists.	City, private sector	Long Term	Funding and financing	Electric vehicles provide an alternative transportation option during extreme events when traditional fuel sources may be interrupted.
Shared Mobility Programs	Outreach/ Campaign		Establish or expand shared mobility services (carshare, bikeshare, rideshare) to minimize single occupant vehicle trips and reduce overall VMT.	City of Rochester. Non-profit organizations	Ongoing	Education and outreach, Implementation at the neighborhood level	Helps improve air quality and public health.
Anti-idling education	Program		Anti-idling education program.	City of Rochester, businesses	Immediate	Education and outreach	As temperatures increase likely to have more ozone days, this ordinance could help negate temperature impacts.
Vanpool Program	Program		Program that allows residents to share costs of transportation.	City of Rochester, businesses	Ongoing	Education and outreach	Vanpools provide transportation, can increase access to jobs, and increase community resilience.
Complete streets program	Program		To increase options for biking and walking, and provide access to safe and affordable ways for people to travel around the region while also addressing green infrastructure.	City of Rochester, GTC, Monroe County	Long Term	Funding and financing, Implementation at the neighborhood level	Ensure that design of streets meets the needs of all users, emphasizing bicyclists, pedestrians, and transit users.
Bicycle Master Plan	Supporting policies		Implementation of the City's existing Bicycle Master Plan.	City of Rochester, Monroe County	Ongoing	Funding and financing, Implementation at the neighborhood level	Increase bike ridership can help reduce vehicle miles traveled.
Encourage transit use	Supporting policies		Policies and actions to improve the transit experience and increase ridership.	City of Rochester, RGRTA, GTC, Monroe County	Ongoing	Education and Outreach, Funding and Financing	Increased transit can reduce vehicle miles traveled and make a community less reliance on fossil fuels.
Trail Connections	Supporting plans		Planning and construction of critical trail connections.	City of Rochester. Monroe County, NYS Parks	Ongoing	Funding and Financing	Trails provide transportation options that reduce the community's reliance on fossil fuels.

Implementation Action	Action Type	Perspective	Description	Key Players	Timeframe	Critical Elements of Success	Addressing Climate Risk and Resilience
Waste							
Organic Materials Collection	Program		Collect organic materials at a community-wide scale for use in a composting program.	City of Rochester, Private Sector	Ongoing	Education and outreach, Implementation at the neighborhood level	Pest control strategies should account for increased numbers due to rising temperatures.
Mixed recycling	Program		Expanding on City's pilot program to provide 96 gallon mixed recycling containers to residents.	City of Rochester	Ongoing	Education & Outreach	Mixed recycling in covered contains can limit scattering of waste into habitat areas and water bodies.
Recycling education	Outreach/ Campaign		Continued education about recycling.	City of Rochester, Monroe County, non-profit organizations	Ongoing	Education and Outreach	Increased participation in recycling.
Creative Reuse and Upcycling	Outreach/ campaign		Community-led activities that transform waste and unwanted products into new materials of a higher value and quality.	Residents, non-profit organizations	Ongoing	Education and Outreach	Creative reuse can increase community building and capacity.
Consumer return of universal wastes and electronics	Program		Many items that can be diverted from landfills are not included in curbside collection. Program would be implemented to collect these materials, or promote exiting programs.	City of Rochester, non-profit organizations, retailers	Near Term	Education and outreach, Funding and financing	

Implementation Action	Action Type	Perspective	Description	Key Players	Timeframe	Critical Elements of Success	Addressing Climate Risk and Resilience
Water							
Green infrastructure portfolio standard	Program		To expand the use of more natural ways to manage water that runs off our streets and other paved areas.	City of Rochester, Monroe County	Long Term	Funding and Financing, Implementation at the neighborhood level	Green infrastructure can help reduce heat island effects.
Water supply system climate impact study	Project		Study will address climate impacts (extreme events, changes in water quality, population changes from climate refugees).	City of Rochester, Monroe County, DEC	Near Term	Funding and financing	Better understanding risks increases the efficacy of planning to mitigate those risks.
Integrated water management practices	Program		Regional watershed management and water supply development, alignment with land use planning, coordination of water, wastewater, and stormwater, etc.	City of Rochester, Monroe County, Genesee Finger Lakes Regional Planning Council	Long Term	Education and outreach	It will be important to account for potentially increasing outdoor water demands and higher runoff from storm events.

Implementation Action	Action Type	Perspective	Description	Key Players	Timeframe	Critical Elements of Success	Addressing Climate Risk and Resilience
Land Use							
Coordinated Land Use and Transportation Policies	Supporting policy		Development and adoption of land use policies and zoning standards that lower vehicle miles traveled, such as mixed-use and transit-oriented development.	City of Rochester, Genesee Finger Lakes Regional Planning Council, Monroe County, GTC	Ongoing	Education and Outreach	Land use and transportation planning can help reduce potential economic losses from future exposure to climate change, including extreme weather, volatile energy prices, and public health impacts.
Transit-oriented and mixed-use development	Supporting policy		Adoption of TOD plan and policies to support transit-oriented development.	City of Rochester, Genesee Finger Lakes Regional Planning Council, Monroe County, GTC	Ongoing	Education and Outreach, Funding and Financing	
Redevelopment of brownfields and vacant or underutilized properties.	Supporting policy		Policies and zoning requirements that support redevelopment of existing buildings.	City of Rochester, NYSDOS, NYSDEC	Ongoing	Funding and Financing	
Urban Agriculture	Supporting policy		Develop City policy to allow residents access to vacant or abandoned properties to grow, process and distribute agricultural products locally.	City of Rochester, residents, non-profits	Ongoing	Education and Outreach, Funding and Financing	
EcoDistricts	Project		Neighborhood-scale sustainable development model for revitalization.	Non-profits, residents, local businesses, City of Rochester	Ongoing	Funding and Financing	
Parks and Open Space Planning	Supporting policy		Ongoing implementation of City's plans that address parks and open space.	City of Rochester, Monroe County, Genesee Finger Lakes Regional Planning Council, NYS Parks	Ongoing	Funding and Financing	

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Appendix A: Greenhouse Gas Inventory Maintenance Playbook

Ongoing maintenance of the greenhouse gas (GHG) inventory is important for tracking progress and reporting results to stakeholders. The purpose of this appendix is to summarize the process and assumptions for developing the community-wide inventory in order to orient the entity responsible for maintaining and reviewing the GHG inventory to the process and available resources.

Table 6 lists the required data, units, format, and contacts for each emission source to help with future inventory updates. All original data were input into the Carbon Management & Planning System (CMPS). Emissions factors were applied for carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O). Total emissions were calculated in metric tons of CO_2 equivalent ($MTCO_2e$).

This section provides a summary of the process moving from raw data to $MTCO_2e$ for each emission source included in the City of Rochester's inventory. The emission sources are organized into energy, transportation, and other emissions categories as well as statistics. Lists of assumptions, data sources, and notes for converting all raw data to MTCO2e for each emission source are also included in the CMPS.

Table 6: Summary for City GHG Emission Source Data Collection

Data Source	Units	Contact	Format
Electricity	kWh	Rochester Gas & Electric – Tim Heckman Rochester Water Bureau – Anne Spaulding	Use by subsector Use by meter
Natural Gas	Therms	Rochester Gas & Electric – Tim Heckman	Use by Subsector
Other Fuels	Varies	Varies – commercial & industrial	Varies
Large Emitters	$MTCO_2e$	U.S. EPA Large Emitters Database	Total $MTCO_2e$ by each identified site
On-road Transportation	Vehicle Miles Traveled	Genesee Transportation Council – Rich Perrin	Total annual vehicle miles traveled
Airline Travel	Passengers	Federal Aviation Administration	Total annual enplaned passengers
Solid Waste	Tons	Sophia Leblanc	Total annual tonnage sent to landfill or recycled by subsector
Wastewater	# of people Treatment methods	Monroe County Division of Pure Waters – Stephen Peletz	Population served by wastewater facility Wastewater treatment methods for each facility serving the city
Water	Gallons	City of Rochester Water Bureau – Mary Vande Iogt	Total annual use
Population	# of people	U.S. Census Bureau	Total annual population
Households	# of households	U.S. Census Bureau	Total annual number of households
Building Square Footage	Square Footage	Monroe County Real Property Services – Rob Kubera	Total square footage of by subsector
Geographic Area	Square Miles	U.S. Census Bureau website	Total area of the City of Rochester

Energy

Electricity

GHG emissions from electricity use are indirect emissions, occurring at the source of electricity generation, but are attributed to the consumer of the electricity. These emissions primarily come from combustion of coal, natural gas, and oil to generate electricity.

For this inventory, electricity use data were identified for the entire City of Rochester. Data were not normalized for weather. Emissions from electricity use were calculated using the emission factor for grid-connected electricity from the U.S. Environmental Protection Agency's (EPA's) Emissions and Generation Resource Integrated Database (eGRID) for the region of New York where Rochester is located. This emissions factor includes emissions of CO_2, CH_4, and N_20. The eGRID region for Rochester is the NPCC Upstate New York region (NYUP).

Data were provided by Rochester Gas & Electric (RG&E) and were provided in annual kilowatt-hours (kWh) by subsector from 2010 through 2014. The subsectors included in the dataset were residential, commercial, industrial, light, municipal, and RG&E use. These subsectors were further aggregated with light and municipal data incorporated into the commercial subsector, and RG&E data combined with the industrial subsector.

Natural Gas

GHG emissions from natural gas use are direct emissions, occurring at the site when the gas is combusted for uses such as producing electricity, heating buildings, providing hot water, and providing heating for industrial processes.

For this inventory, natural gas use data were identified for the entire City of Rochester. Data were not normalized for weather. Emissions from combustion of natural gas were calculated using factors for CO_2, CH_4, and N_20 from The Climate Registry (TCR) based on the sector consuming the gas (residential, commercial, or industrial).

Data were provided by RG&E in annual therms by subsector for 2010 through 2014. The subsectors included in the dataset were residential, commercial, industrial, municipal, and RG&E use. These subsectors were further aggregated with municipal data incorporated into the commercial subsector, and RG&E data combined with the industrial subsector.

Other Fuels

GHG emissions from other fuel uses are direct emissions, occurring at the site when the fuel is combusted for uses such as heating buildings, providing hot water, and providing heating for industrial processes. The fuels included in this category include liquid petroleum gas (LPG), fuel oil/kerosene, and wood.

Like was done for the Finger Lakes Regional Sustainability Plan, for residential estimates, data were collected from the U.S. Census Bureau's American FactFinder website, which provides annual home heating fuel data specific to Rochester. Using that data, the amount of LPG, fuel oil/kerosene, and wood consumption were estimated.

As part of the Finger Lakes Regional Sustainability Plan, for the commercial subsector, the amount of LPG, fuel oil/kerosene, and wood consumed by the commercial subsector for Monroe County in 2010 was first determined. Unfortunately, it was not possible to recreate this process for the City of Rochester inventory, so estimates for the consumption of other fuels for subsequent years is based on the ratio of the amount of those fuels consumed in 2010 versus natural gas.

Large Emitters

GHG emissions from large emitters are direct emissions and are found through the EPA's Facility Level Information on Greenhouse Gas Tool (FLIGHT). The EPA requires large GHG emitters to report their annual emissions as part of its Greenhouse Gas Reporting Rule.

The City of Rochester has four large emitters listed in FLIGHT, including a large industrial facility, a district heating cooperative, a natural gas distribution system, and a university. FLIGHT data provides the amount of total $MTCO_2e$ emitted by each facility each year dating back to 2010 when the program started. The technical reports provided with the FLIGHT data typically, but not always, provide more granular detail into the different fuels that contribute to the total emissions.

For three of the large emitters, over 99% of their emissions are attributed to natural gas combustion, therefore, those emissions were not included in this

analysis because it is assumed those emissions are captured by the natural gas consumption data provided by RG&E. However, over 92% of emissions for the fourth large emitter are due to coal combustion. Therefore, the emissions attributed to coal emissions are included in this analysis.

These industrial process emissions were inventoried for the City of Rochester but are not included in the final baseline inventory.

Transportation

On-road Transportation

GHG emissions from on-road transportation are direct emissions, occurring at the tailpipes of vehicles as the result of fossil fuel combustion in the vehicles' engines. For the City of Rochester, on-road transportation includes personal and commercial vehicles and transit services within city limits and trips that cross the city's boundary.

The Genesee Transportation Council (GTC) provided the estimate of the total annual vehicle miles traveled (VMT) for Rochester in 2014. For the years 2010 through 2013, data from the Five Cities Energy Master Plan were used. Key elements of the GTC transportation model include:

- **Functional Class** fractions for various types of roadways (e.g., Principal Arterials, Minor Arterials, Collectors, etc.) by area (Urban, Small Urban, and Rural);
- **Vehicle type distribution** (e.g., Light Duty Vehicles Short Wheelbase, Single Unit Trucks, Buses, etc.) by Functional Class and area;
- **Vehicle Miles Traveled (VMT)** by vehicle type, fuel type, and Functional Class (which incorporates area); and
- **Fuel consumption** by vehicle type and Functional Class.

The estimated amount of VMT specific to Rochester was then determined by using the GTC's travel demand model that estimates the proportion of VMT by Functional Class that occurs within city limits.

To calculate the GHG emissions from the total annual VMT provided by GTC, the miles are allocated into different vehicle type categories. Fuel economies from the Transportation Energy Data Book were then used to estimate fuel use and subsequent energy use from each of those categories. Emissions from fossil fuel combustion were then calculated using factors for CO_2, CH_4, and N_20 from TCR for both gasoline and diesel fuels.

Airline Travel

Airline traffic at Greater Rochester International Airport (ROC) was included as an indirect emissions category within the city's inventory. Fuel use information for airplanes at ROC was not readily available for estimating the energy consumed in air travel. Instead, fuel use was estimated from the number of passengers enplaned at ROC, which was collected from the Federal Aviation Administration's Passenger Boarding (Enplanement) and All-Cargo Data for U.S. Airports webpage. Methodologies for calculating airport emissions generally agree that each airport should account for the emissions of departing aircraft only and thereby clearly define the split of emissions between origin and destination airports.

Since ROC serves a larger region than the City of Rochester, enplanements were apportioned to the city based on an estimate of the number of passengers originating in Rochester compared to other parts of the greater regional area. The amount of fuel consumed per passenger enplaned was extrapolated using data from the U.S. Department of Transportation. Emissions from fossil fuel combustion for departing flights for ROC were calculated using factors for CO_2, CH_4, and N_20 from TCR.

These emissions were inventoried for the City of Rochester but are not included in the final baseline inventory. More details on this decision can be found in the GHG Inventory section of the final Climate Action Plan for the city.

Other

Solid Waste

GHG emissions from solid waste disposed at landfills are indirect emissions because the landfill is located outside city limits, and result from decomposing organic materials and waste management processes.

Annual data and information were supplied by City of Rochester and Monroe County for the years 2010 through

2014. Data include total tons of landfilled and recycled solid waste for residential customers, which is a service provided by the city. There is also some commercial data provided, but the majority of commercial waste is handled by private contractors and data from them was available. It is assumed that the landfill in which city municipal solid waste (MSW) is disposed have landfill gas capture and flaring systems. The emission factor for MSW disposed was estimated using EPA Landfill Methane Outreach program data on the performance of the collection system and TCR's Local Government Operations Protocol.

Wastewater Treatment

GHG emissions from wastewater treatment are direct emissions and can produce CH_4 and N_20 depending on the particular treatment process used.

There is one wastewater treatment plant that serves the entire city, the Frank E. Van Lare Treatment Plant. Data were provided by the Monroe County Division of Pure Waters. CH_4 and N_20 emissions from all seven treatment facilities operated by the county and the septic systems were calculated using ICLEI's Local Government Operations Protocol using the population served at each facility in addition to specific treatment methods.

Water

GHG emissions from treating and distributing water are direct emissions. Emissions are primarily from electricity use for treatment and distribution.

Potable water is delivered to residential, commercial, and industrial customers by two water utilities – the City of Rochester Water Bureau and Monroe County Water Authority (MCWA). For both providers, total annual consumption data were provided for both 2013 and 2014. An estimate of water use by subsector was calculated using data from the U.S. Geological Service's report "Estimated Use of Water in the United States in 2010."

Emissions associated with water use was determined by dividing the total electricity consumption of the Rochester Water Bureau by total water provided to customers located within the city limits to calculate an energy intensity of the city's water supply. This emissions factor was then multiplied by total water consumption within city limits, including water provided by both utilities. Electricity data were not provided by the MCWA, though the water bureau did provide electricity data for both 2013 and 2014. Note, some of the water provided by the Bureau is delivered to customers located outside city limits.

Statistics

Population

Population data were used for benchmarking purposes. The primary benchmarking metric used for the community inventory was the total city population and U.S. Census data were used to determine the population of Rochester.

Building Square Footage

Building square footage data were used for determining the amount Other Fuels consumed in Rochester, as well as, for strategy analysis within the Climate Action Plan. Data were provided by the Monroe County Real Property Services department and broken between residential, commercial, and industrial buildings.

Geographic Area

Geographic area is a key characteristic of a community inventory. The total square miles of Rochester were determined from U.S. Census data from the 2010 census.

Data Collection & Management

Data Requests

Table 6 above provides details about the data collected and sources for collecting that data. When updating the inventory in the future, the list below, along with information in Carbon Management & Planning System (CMPS), should be used to identify the type of data needed to complete an inventory, who can provide that data, and in what format the data should be provided. Once those parameters are established, an email should be developed for each data request. Inventory updates have a built-in advantage because the previous data request and the data received for the previous inventory can be referenced. For example, when requesting data from a utility to update a previous inventory the type of data received and the format in which it was received can be sent along with the request. Below is an example

of a template that can be sent to utilities or others when requesting data. Screen shots of the data file sent for use in the previous inventory can also be used.

The timing of data requests is also important. The data required to complete a GHG inventory are not always available at the same time. For example, some utilities may not have annual usage data available until a few months after the new year, while operational data may be available a few weeks after the new year. Also, some data may come from published reports or websites that could be updated at different times of year. For inventories that are updated continuously it is good practice to note when data is available for each source and establish a timeline based on that guidance to help in data request timing. It is also good practice to establish a deadline for the person to provide the data to you, with two to four weeks being standard. Larger utilities will require more time to fulfill a data request, while waste data requests may be able to be fulfilled sooner, for example.

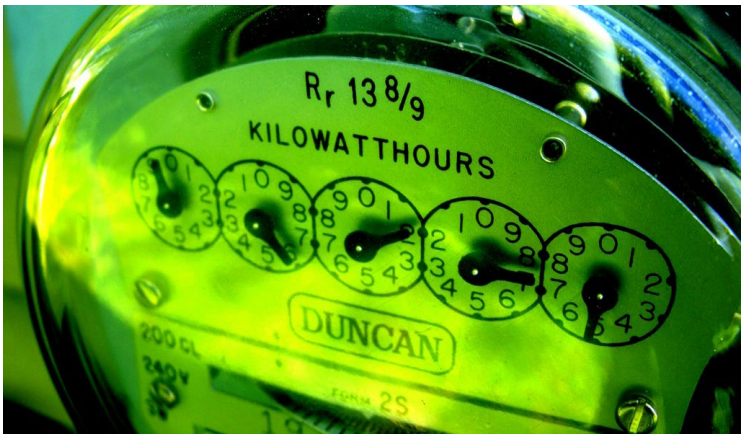
Data Management

Once data is received it should be saved in a folder dedicated specifically for data that will be used for the inventory. Some data, such as large utility files, will require some further analysis to determine total monthly or annual energy or water use totals. Pivot tables are a useful Excel tool for analysis of large utility data files. If a data file requires further analysis, it is good practice to save a master copy of the raw data file, in addition to a copy of the analyzed file. Other data may be part of a report, so the report will need to be reviewed to identify the correct data to use. Once the data to be added to the inventory are identified they should be added to the appropriate inputs tab within the CMPS. Over time the contact person for specific data may change. It is important to track these changes and update the information in Table 6 and in the CMPS.

Greenhouse Gas Inventory Template			
Year	Month	Rate/Category	Unit (kWh or MCE or gallon)

Appendix B: Emission Reduction Strategy Assumptions

Energy Efficiency



- 25% reduction in home and business energy use. This target is closely in line with the New York State Energy Plan's target of a 23% reduction from 2012 levels by 2030
- The initial participation rate is estimated to be 5% with a five percent increase every year for the next fifteen years
- Assume an implementation cost of $2 per square foot of affected area

Renewable Energy

- 1% annual adoption of renewable energy
- Average participating household will install a 4.5 kilowatt array and that that array would produce 1400 kilowatt hours per kilowatt each year. The average participating business will install a 75 kilowatt array and that that array would produce 1400 kilowatt hours per kilowatt each year
- Implementation cost of $3000 per kilowatt of installed solar capacity

Fuel Switching

- 1% annual adoption of fuel switching
- Natural gas supplied energy that would be replaced with combined heat and power (CHP) as 314,612 therms per megawatt of CHP with an increase in electricity consumption of 4.302 megawatt hours per megawatt of CHP
- Electricity rates: Residential: $0.0379/kWh with an annual increase of 2.3% Commercial: $0.0379/kWh and Industrial: $0.0107/kWh with an annual increase of 2.3%
- Natural Gas rates: Residential: $0.0053/therm with an annual increase of 4% Commercial: $0.2154/therm and Industrial: $0.1904/therm with an annual increase of 4%
- CHP estimates both implementation and O&M costs at $710,000 per megawatt and $43,000 per megawatt per year respectively

Alternative Fuel Vehicles

- 2% annual increase in vehicle fuel economy
- 4,844 annual new car purchases
- 3% of new car purchases are alternative fuel vehicles
- New alternative fuel vehicle will have a 37.5% efficiency improvement over conventional vehicle
- Alternative fuel vehicles have a $10,000 premium over conventional vehicles

Multi-Modal Travel

- 1% reduction in residential and business VMT per year.
- $0.75 per VMT reduced

Waste Reduction & Diversion

- 40% diversion rate for both home and commercial waste by 2030
- Current diversion rate is 8%

Appendix C: Funding Resources

Funding for recommended CAP actions and initiatives will come from a host of public and private resources. Timing and levels of investment will be predicated on numerous issues beyond the control of City staff, including the disposition of State and Federal budgets and the regional and national economic outlook. In addition, the availability of financing and the costs of investment will also dictate the extent and timing with of private sector involvement.

Many projects discussed will be dependent upon public financing and grants. Grant funding sources are constantly changing, with available monies becoming increasingly competitive. The following is a brief overview of key funding programs in existence as of 2016.

There are a multitude of grant opportunities available through state and federal agencies. The table below describes the most relevant grant opportunities available to help fund projects identified in the Implementation Actions (Table 7).

The New York State CFA consolidates over 30 programs available through 14 state agencies, acting as a single point of entry for access to funding. The CFA replaces multiple applications for funding with a single, annual application for economic development resources. Applications are coordinated through the Regional Economic Development Councils and grant resources are available for projects that align the Regional Economic Development Plan. Some of the resources described in this section are included in the CFA. Specific funding sources and programs can change from year to year and should be monitored. In future years, some programs may be phased out while other new programs are added.

Tax Credits and Other Financial Support

Through Federal and State sources, there are a variety of tax credits and other programs available to help New York residents buy electric vehicles (EVs); business owners and municipalities install charging stations; and technology developers conduct research and development work focusing on EVs. NYSERDA administers some of these programs.

- **New York State Alternative Fuel Vehicle Recharging Tax Credit:** As of 2013, New York State provides an income tax creditfor 50% of the cost, up to $5,000, for the purchase and installation of alternative fuel vehicle refueling and electric vehicle recharging stations. The credit is available through December 31, 2017, and is targeted at commercial and workplace charging stations.

- **Heavy-Duty Alternative Fuel and Advanced Vehicle Purchase Vouchers:** The New York Truck Voucher Incentive Program provides up to $60,000 for the purchase or lease of all-electric class 3 to class 8 trucks in any air quality non-attainment zone in New York State and up to $40,000 for class 3 to 8 electric and hybrid electric trucks operating in New York City.

- **Federal EV Tax Credit:** EVs purchased in or after 2010 may be eligible for a federal income tax credit of up to $7,500.The credit amount will vary based on the capacity of the battery used to fuel the vehicle.

- **HOV Lane Exemption and Toll Discounts:** The New York State Thruway's Green Pass Discount Plan offers a 10% discount on the E-ZPass rates to vehicles in the Clean Pass Program.

- **Low EV Electric Rates:** Time-of-use (TOU) rates provide electricity customers an opportunity to save money on their electric bill. In a TOU rate structure, electricity is more expensive during on-peak hours (usually morning and late afternoon), but less expensive during off-peak (late night and early morning) when the majority of EV charging takes place. Two utilities, ConEdison and National Grid, offer TOU rates.

- **Federal Residential Renewable Energy Tax Credit.** This program allows taxpayers to claim a credit of 30% for qualified expenditures for a renewable energy system.

- **New York State Solar Tax Credit.** This program allows taxpayers to claim a credit equal to 25% of costs for solar equipment, up to a maximum of $5,000.

- **NYSERDA Megawatt (MW) Block Program.** Through the NY-Sun Program, NYSERDA provides financial incentives and/or financing options for the installation of new grid-connected solar photovoltaic (solar electric) systems that will offset the use of grid-supplied electricity. The Program is divided into two tiers: the NY-Sun Incentive Residential/Small Commercial (<200 kW), and NY-Sun Incentive Commercial/Industrial (>200 kW).

Table 7: Funding Sources

Agency	Resource Name	Description
New York State Energy Research & Development Authority (NYSERDA)	**Clean Energy Communities Program**	Local governments in New York State can use the Clean Energy Communities program to implement clean energy actions, save energy costs, create jobs, and improve the environment. In addition to providing tools, resources, and technical assistance, the program recognizes and rewards leadership for the completion of clean energy projects. Communities that complete four out of the 10 High Impact Actions and meet all other eligibility requirements are: • Designated by New York State as a Clean Energy Community • Eligible to apply for grants to fund additional clean energy projects By completing four of the ten high-impact actions, the applying jurisdiction shall earn the Clean Energy Community designation as well as a grant, up to $250,000 per municipality with no local cost share, to support additional clean energy projects. To earn the Clean Energy Community designation, at least two of the high-impact actions must be completed after August 1, 2016. Eligible project types are those that score highly when evaluated according to identified criteria: • To what extent does the proposer present a thorough, sound, detailed approach for accomplishing the objectives of their proposal within a reasonable timeframe? (25 possible points) • To what extent does the project/initiative have a positive direct impact on energy use and greenhouse gas emissions? (15 possible points) • To what extent does the project/initiative have other sustainability benefits? (15 possible points) • To what extent will efforts be made to collaborate with other municipalities and to transfer knowledge to the broader region and state? (15 possible points) • To what extent does the project/initiative involve an innovative and/or replicable approach? (15 possible points) • To what extent will the project/initiative leverage public and private dollars and/or generate economic development benefits (i.e. temporary or permanent job creation and investment)? (15 possible points)
New York State Energy Research & Development Authority (NYSERDA)	**Solarize Campaign**	Solarize campaigns provide support for community education and marketing of solar group purchasing projects. For Round 3 funding (ends November 2016), NYSERDA will encourage communities to consider participating in the Clean Energy Communities program, a $16 million Clean Energy Fund (CEF) initiative to help local governments across the state reduce energy consumption and drive clean energy use in

Agency	Resource Name	Description
		their communities. The Clean Energy Communities program recognizes community Solarize campaigns as one of 10 actions that have high-impact on energy use and the environment. Solarize campaigns are locally organized community outreach efforts aimed at getting a group of homes and businesses in one area to go solar. When groups of neighbors—including residents and businesses—learn about solar and the installation together, they can often get better pricing and share the tasks. Group members can contribute their strengths and learn new skills. NYSERDA provides technical assistance, marketing materials, and other support for these efforts. Solarize is part of the NY-Sun Incentive Program.

New York State Energy Research & Development Authority (NYSERDA)	**Home Energy Efficiency Programs**	NYSERDA offers a variety of home energy efficiency programs designed to help residents who own or rent in a single family or multi-family home (up to 4 units) reduce energy costs through energy efficiency improvements.
		• *Home Performance with Energy Star* offers home energy assessments to pinpoint where energy dollars are being spent and customize a plan to lower energy bills. The program offers low interest loans between 4.99 and 7.49% for energy upgrades.
		• *Assisted Home Performance with Energy Star* provides those who qualify a discount that covers up to 50% of eligible energy efficiency improvements, up to $5,000 per project for single family homes and $10,000 for two to four-unit residential homes. The program offers low interest loans between 3.49 and 3.99% for energy upgrades.
		• *EmPower New York* provides no-cost energy efficiency upgrades to income-eligible residents in both owner-occupied and renter-occupied units. Upgrades include:
		  ○ Air sealing to plug leaks and reduce drafts
		  ○ Insulation
		  ○ Replacement of inefficient refrigerators and freezers
		  ○ New energy-efficient lighting
		  ○ Free health and safety checks of smoke detectors and appliances

New York State Energy Research & Development Authority (NYSERDA)	**Residential Construction and Rehabilitation programs**	NYSERDA offers a variety of programs to provide assistance for residential new construction and rehabilitation. • *New Construction – Residential and Multi Family* • *Mid and High-rise Multi Family buildings* • *Low-rise Multi Family Buildings* • *Net Zero Energy Homes* • *Gut Rehabiltiation*

Agency	Resource Name	Description
		• *Energy Star Certified Homes*
New York Power Authority	**Recharge NY**	The RNY Power Program is a state-wide economic development power program that consists of 910 megawatts ("MW") of "RNY Power," 50% of which is made available from the hydropower resources of the New York Power Authority ("NYPA") ("RNY hydropower"), and 50% of which is provided by NYPA from other sources, which may include purchased power, power from NYPA sources (other than the Niagara and Saint Lawrence projects), or other sources . RNY Power is available to large businesses, small businesses and not-for-profit corporations for job retention, business expansion and business attraction purposes.
New York Power Authority	**Build Smart NY Operations and Maintenance Program**	Under BuildSmart NY, the New York Power Authority (NYPA) created the O&M Acceleration Program. This competitive award program aims to accelerate minor (up to $250,000) rehabilitation, and operations and maintenance (O&M) projects at state facilities. Direct funding and revolving loan programs will be utilized. BuildSmart NY is Governor Cuomo's Statewide initiative to accelerate energy efficiency in State buildings, while incorporating broader State policy goals to foster cost-effective investment, stimulate the clean energy marketplace, advance energy security and resiliency and protect the environment and public health. At the centerpiece of BuildSmart NY requires a 20% improvement in energy efficiency at State owned and managed buildings by the year 2020.
New York State Department of Environmental Conservation	**Climate Smart Communities Program**	The Climate Smart Communities Environmental Protection Fund grant program will enable communities across the state to put climate plans into action. The program matches state resources with community commitments to bring local and regional plans to fruition. The competition for grant funding will reward foresight and innovation in climate protection and showcase the ingenuity of many communities Applications for this program are administered through the annual Consolidated Funding Application process. Eligible Activities: • Climate protection implementation projects • Construction of natural resiliency measures (green infrastructure, flood mitigation, streambank stabilization) • Relocation or retrofit of climate-vulnerable facilities • Conservation or restoration of riparian areas • Reduction of risk • Clean transportation (on or off road facilities for pedestrians, bicyclists, and other non-motorized forms of transportation, construction of safe routes for non-drivers, and implementation of transit improvements)

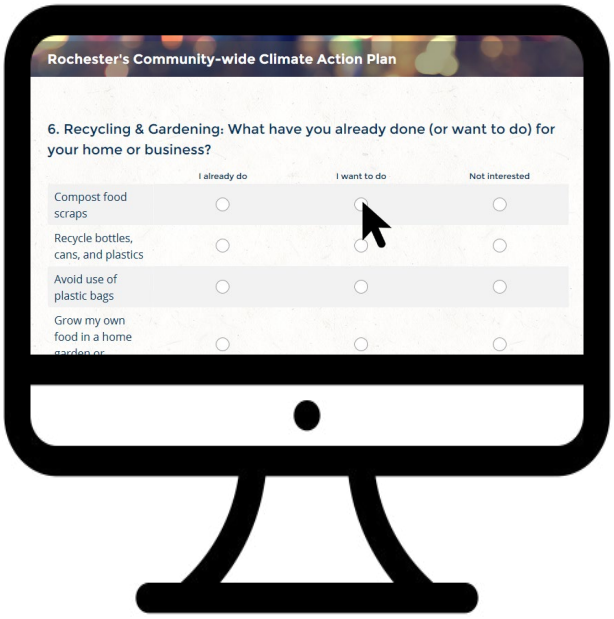
Agency	Resource Name	Description
		• Reduction or recycling of food waste
Rochester Gas & Electric (RG&E)	**Energy Efficiency Programs**	RG&E offers a variety of energy efficiency programs to help residential and non-residential customers save on energy. • *Natural Gas Rebates* program offers rebates to those who install natural gas equipment. • *Residential Multi-Family Program* offers rebates for replacement of equipment that reduces energy use. • *Non-Residential Multi-Family Program* offers rebates and equipment replacement. • *Small Business Program* provides free energy assessments and incentives for up to 70% of the cost of energy efficient equipment upgrades. • *Commercial and Industrial program* offers rebates to businesses who purchase qualifying equipment and currently pay electricity or natural gas Systems Benefits Charge on their utility bills.
New York State Department of State	**Local Waterfront Revitalization Program (LWRP)**	The NYSDOS administers LWRP funding which can be utilized for waterfront improvement projects in conjunction with an approved LWRP document. Funds can be utilized for planning, design and capital improvements, including the preparation of design and construction documentation for infrastructure and shoreline improvement projects, as well as trails and parks
NYS Environmental Facilities Corporation (EFC)	**Green Innovation Grant Program (GIGP)**	The Green Innovation Grant Program (GIGP) supports projects across New York State that utilize unique stormwater infrastructure design and create cutting-edge green technologies. Eligible projects include: • Permeable pavements • Bioretention/bioswales • Green roofs and green walls • Stormwater street trees • Construction or restoration of wetlands, floodplains, or riparian buffers • Stream daylighting • Downspout disconnection • Stormwater harvesting and reuse
NYSERDA	**Cleaner, Greener Communities Program (CGCP) Implementation Grants for**	The New York Cleaner, Greener Communities Program empowers regions to create more sustainable communities by funding smart growth practices. The Finger Lakes Regional Sustainability Plan (FLRSP) was developed through a partnership among public and private experts across a wide range of fields. The FLRSP recommends implementation projects that significantly improve the economic and environmental health of the region. Eligible projects include:

Agency	Resource Name	Description
	Planning Initiatives	• Comprehensive planning, zoning amendments, predevelopment technical assistance for projects, or other innovative planning-related initiatives. These initiatives will prepare a community, region, or project for a more sustainable and resilient future; thereby creating indirect community benefit and carbon reductions.
NYS Office of Parks, Recreation, & Historic Preservation (OPRHP)	**Municipal Grants Program (parks, historic properties, heritage areas)**	A matching grant program for the acquisition, development and planning of parks and recreational facilities to preserve, rehabilitate or restore lands, waters or structures for park, recreation or conservation purposes and for structural assessments and/or planning for such projects. Funds may be awarded to municipalities or not-for-profits with an ownership interest, for indoor or outdoor projects and must reflect the priorities established in the NY Statewide Comprehensive Outdoor Recreation Plan (SCORP). Funding priorities in 2016 include: • Projects that include green improvements that restore, improve, maintain, park lands, and historic properties. • Projects that include climate protection improvements that project park lands, infrastructure, historic properties, or heritage resources from climate change or storm related impacts, creating a more resilient and sustainable function.
Federal Emergency Management Agency (FEMA)	**Pre-Disaster Mitigation Grant**	The Pre-Disaster Mitigation (PDM) program provides funds for hazard mitigation planning and projects on an annual basis. The PDM program is available to local governments. It was put in place to reduce overall risk to people and structures, while at the same time, also reducing reliance on federal funding if an actual disaster were to occur.
Empire State Development	**Economic Development Purposes Grants**	Funding is available for economic development initiatives and projects that create or retain jobs, generate increased economic activity and improve the economic and social viability and vitality of local communities. Example ways the funds can be used include: • Acquiring or leasing land or buildings, machinery, equipment • Acquiring existing business or assets • Demolition and environmental remediation • New construction, renovation, or leasehold improvement • Acquiring furniture and fixtures • Planning and feasibility studies • Site and infrastructure development • Marketing and advertising Eligibility:

Agency	Resource Name	Description
		• For-profit and not-for-profit businesses • Business Improvement Districts and Local Development Corporations • Public benefit corporations, including industrial development agencies • Economic development organizations • Research and academic institutions; incubators • Technology parks • Municipalities, counties, and regional planning councils • Tourist attractions; community facilities

Appendix D: Survey Results

The City of Rochester distributed an online survey to gather feedback from the public that will inform potential strategies in the Community-Wide Climate Action Plan. This memo summarizes the results of the survey. Detailed survey results are attached.



Introduction

The City developed the survey instrument using Survey Monkey and distributed a participation link at the Seneca Zoo Earth Day event, via email, and through social media. The survey was open between April 16 and May 24, 2016. There were 125 responses received.

Demographics

- 62% of respondents live in the City of Rochester
- Over 90% of respondents reported they go to museums, events, and restaurants in the City of Rochester
- 72% of respondents own their home
- 60% of respondents live in a household with fewer than 3 occupants
- 40% of respondents were between 18 and 34 years old. Just 10% were over 65

Climate Actions

Questions 5 through 7 asked respondents to note which climate action activities they already do and which they would like to do.

Energy and Water Use

Respondents indicated they had already done the following:

1. Turn off lights when not in use (96%)
2. Install energy efficient appliances (58%)
3. Install energy efficient windows (48%)

Respondents indicated they would like to participate in the following activities:

1. Upgrade insulation (68%)
2. Install solar panels/wind (65%)
3. Collect stormwater for the garden, and Replace or upgrade home heating system (53% tie)

Recycling and Gardening

Respondents indicated they had already done the following:

1. Recycle bottles, cans, plastics (95%)
2. Avoid Plastic bags (58%)
3. Purchase locally grown food (57%)

Respondents reported they would like to participate in the following top 3 activities:

1. Grown food in a home garden/community garden (38%)
2. Compost food scraps (35%)
3. Avoid using plastic bags (27%)

Transportation
Respondents indicated they had already done the following:

1. Live closer to work/school (55%)
2. Ride bike to work/school (26%)
3. Walk to work/school (22%)

Respondents indicated they would like to participate in the following activities:

1. Drive an alternative fuel vehicle (54%)
2. Ride a bike to work or school (29%)
3. Walk to work or school (26%)

Incentives and Benefits

Respondents noted that grants/incentives (89%) and lower utility bills (72%) would most likely encourage them to install the technologies listed in the previous questions.

Respondents noted the following as the most important benefits of reducing GHGs:

- Reduced reliance on fossil fuels (54%)
- Improved air and water quality (48%)
- Increased resilience (42%)

"Other" Answers - Themes

- Need landlord/renter incentives for many of the actions listed
- A significant barrier to carpooling/transit to work is the inability to get around during the day.
- Need for more education/PR/workshops about how incentives and tax credits work for upgrades
- Improved public transit
- Bike/ped improvements
- Making incentives available for those who are not low income

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Appendix E: Public Participation Materials

Rochester's Resilient & Sustainable Future

Over the past century, human activities have released large amounts of carbon dioxide and other greenhouse gases into the earth's atmosphere. This traps heat and energy, causing the earth to warm. The excessive buildup of greenhouse gases is changing the earth's climate, negatively affecting the environment and human health.

The City of Rochester's community-wide Climate Action Plan will set a goal for reducing greenhouse gas emissions and identify actions we can all take to achieve those goals. The Plan will provide opportunities to create a more livable, equitable, and healthy community. By using energy more efficiently, using renewable energy to power our homes and businesses, improving sustainable transportation choices, recycling waste, and supporting local food systems, we can create green jobs and improve community quality of life.

Community-Wide Climate Action Plan
Rochester, New York

1,800,000

Metric Tons of Carbon Dioxide (Co2)

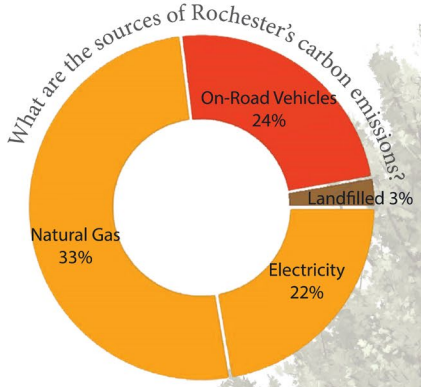
Rochester's Annual Carbon Footprint

What does this mean?

1 ton = 2,381 miles driven by the average passenger vehicle

1 ton = 42 propane tanks used for BBQ

10 tons = 1 home's energy use for one year



What are our proposed goals for reducing emissions?

20% by 2020 baseline 2010

40% by 2030

What are potential community-wide strategies to reduce emissions?

- Encourage use of alternative means of transportation
- Support transition to alternative fuel vehicles
- Create a well-connected network of Complete Streets
- Expand pedestrian, bicycle and transit services

- Encourage building retrofits (upgrades and new technology to make homes and businesses more energy efficient)
- Promote the installation of rooftop solar panels

- Improve stormwater management through green infrastructure (bioswales, permeable pavement, rain gardens)
- Strengthen measures that protect rivers, streams, and wetlands

- Improve and expand parks and green spaces throughout the City
- Promote compact, mixed-use development with good access to transit

- Improve recycling systems
- Support community-wide composting
- Use reusable shopping bags

10 metric tons of CO2 could be saved in 1 year if....

7 households used a solar water heater

8 acres of US forest continues to grow

20 households biked or walked to work

29 households used no bottled water

256 tree seedlings were planted and grown for 10 years

Take a tour of Climate Action in Rochester

In 2011, the City of Rochester completed a greenhouse gas inventory and set a goal to reduce emissions from City operations by 20% over nine years (by 2020). The City achieved a 5% reduction in the first year alone and has since implemented many new projects that will produce an even greater reduction over the next few years.

Other Highlights

- Over 300 alternative fuel vehicles in City fleet
- LED streelighting project
- LED upgrades in City buildings
- Bicycle Enhancement Program
- Trail upgrades
- Green purchasing

Programs & Plans

Compact of Mayors
NYS DEC Climate Smart Community
USDOE Better Buildings Challenge Partner
US EPA Green Power Partnership

Community-Wide Climate Action Plan


Sawdey Way Green Street


Port of Rochester
Bioretention Parking Lot, Porous Sidewalks & Charing Station


Turning Point Park
Porous Parking Lot & Rain Garden

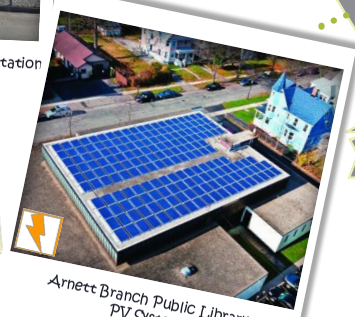

Edgerton Recreation Center Green Roof

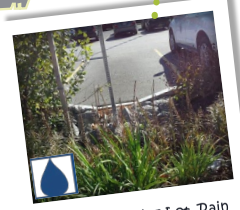

Rochester Public Market
Solar Installation


City of Rochester Green Fuel Station


Multiple Electric Vehicle Charging Stations

Coming Soon!
2mW solar farm @ 1655 Lexington Avenue


Arnett Branch Public Library
PV System


City Hall Parking Lot, Rain Garden & Porous Pavement


City Hall Green Roof

Electric Vehicle Charging Stations
City Hall Parking Lot
30 Church St.
Rochester Public Market
280 N. Union St.
High Falls Garage
240 State St.
Sister Cities Garage
28 N. Fitzhugh St.
Washington Square Garage
111 Woodbury Blvd.
Court Street Garage
194 Court St.


Show us what you do to make a difference!
Place a dot in the circle to show the things you do to reduce your carbon footprint
Rochester's Climate Action Plan is a call for the community to join together to reduce greenhouse gas emissions and curb the impacts of global warming. The Plan will provide actions and tools that empower residents and local businesses to take a leadership role, building on some of the things you and your neighbors are already doing.
ride your bike
compost
eat low carbon foods like vegetables, grains, chicken
install solar panels
take the bus to work
weatherproof your home
recycle
Add your own
use energy efficient light bulbs
carpool
turn off the lights
drive an alternative fuel vehicle
plant trees
Together, Our Actions Make a BIG Difference
Community-Wide Climate Action Plan Rochester, New York

Believe.

City of Rochester, NY
Lovely A. Warren, Mayor
Rochester City Council