BuildSmartNY

Five Cities Energy Plans

Albany ▪ Buffalo ▪ Rochester ▪ Syracuse ▪ Yonkers

CITY OF SYRACUSE

NEW YORK STATE OF OPPORTUNITY.

NY Power Authority

Issued January 2015

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Cover Photo: Clinton Square, Syracuse

Letter from Gil Quiniones

The New York Power Authority is pleased to support the Five Cities Energy Plans initiative. When viewed collectively, it represents a wide-ranging effort to rethink how municipalities can reduce their energy use in a systematic, cost-effective fashion. Guided by Gov. Andrew M. Cuomo's landmark BuildSmart NY program that seeks to improve energy efficiency in state government buildings by 20 percent by 2020, the cities of Albany, Buffalo, Rochester, Syracuse and Yonkers have conducted a comprehensive examination over the past year to determine how they can use their resources more efficiently.

With the challenges of climate change and its expected impacts becoming more apparent and severe, state authorities and agencies are pursuing a series of measures that are designed to reduce greenhouse gas emissions while lowering their expenses. A cornerstone of this strategy is making a transition to cleaner generation and a more resilient distribution infrastructure. By engaging in a smart, sustainable use of energy, technology and natural resources, New York will be far better prepared for the environmental and economic challenges of the next decade.

The energy goals and plans set out in the following pages will enable Albany, Buffalo, Rochester, Syracuse and Yonkers to measure their progress, adapt new ideas and pursue best practices. By creating a detailed roadmap for strengthening infrastructure, building more reliable facilities, becoming more accountable for energy use and making critical long-term investments, these urban areas can better address climate change and build a vibrant clean energy economy.

This effort builds on a foundation of success. Prior to developing their plans, the Five Cities had already begun extensive activities that have been reducing energy costs and carbon emissions, making gains in energy sustainability, and supporting green industries and jobs. The Five Cities Energy Plans will enable these cities to further reduce energy costs and alleviate the related environmental impacts while also improving quality of life of their residents. Developing the recommendations in the Five Cities Energy Plans was a demanding task, requiring months of data analysis, meetings with more than 100 stakeholder groups and an extensive sharing of thoughts and proposals across cities.

This document tells a great story about where New York is heading. These Energy Plans should inspire cities throughout the state and across the country to find new ways to manage their own energy use and for their communities. We look forward to working with governments, large and small, to embrace new ideas and approaches for creating a cleaner, more sustainable and more economically prosperous environments for the current and future generations.

Gil C. Quiniones
President and Chief Executive Officer
New York Power Authority

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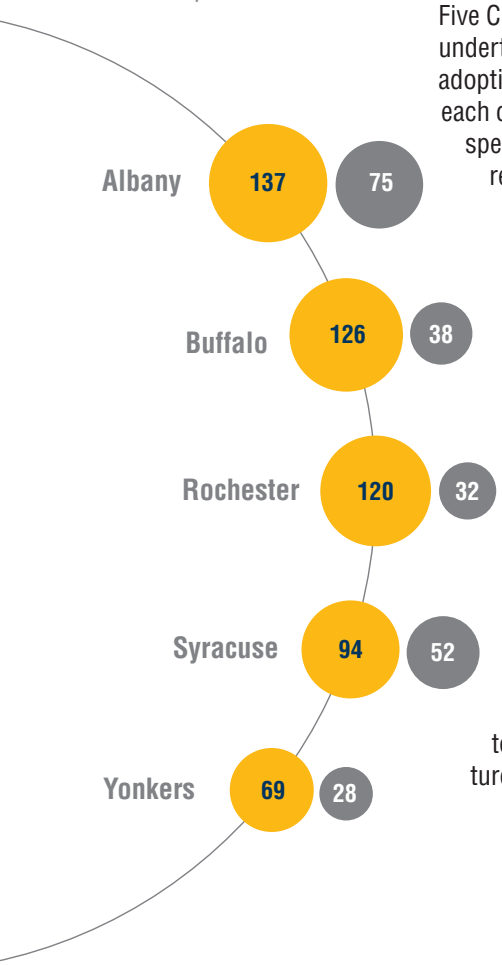
Introduction

Energy Consumption per Capita (mmBtu)



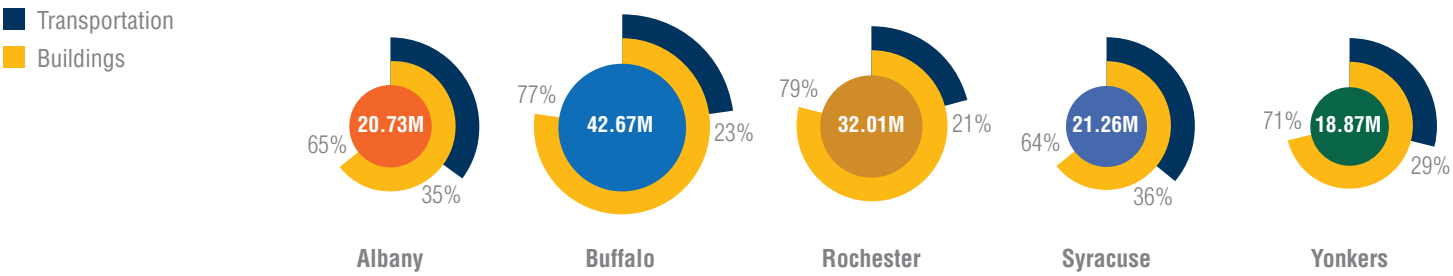
New York State has a long history of energy leadership and innovation, from the development of the first central power plant to the pioneering use of hydropower and air conditioning. The New York Power Authority (NYPA), in partnership with the cities of Albany, Buffalo, Rochester, Syracuse and Yonkers (the "Five Cities"), seeks to build on this legacy with this Five Cities Energy Plans initiative. Expanding upon the successes of Gov. Andrew M. Cuomo's BuildSmart NY initiative to reduce energy usage in state buildings, the Five Cities initiative enabled each of the cities to undertake a comprehensive planning process, adopting a grassroots approach that allowed each city to identify its energy priorities, address specific challenges and create a strategy that reflects its ongoing progress in energy planning.

The Five Cities thrived as centers of industry and commercial manufacturing in the early to mid 1900s. Early city planners established dense downtown centers and built the infrastructure and buildings necessary to support residents, workers and visitors. In the decades since, the highway system, suburbanization and the changing economy have changed the form and populations of these cities. While these cities seek to reinvent themselves, reactivate their urban cores, enhance open space and meet the needs of their residents, they face increasing challenges to maintain and modernize aging infrastructure and building stock, compete economically with surrounding towns and regions, deal with increasing costs of services and resources, and address the impacts of climate change. A common theme among these challenges is energy, and the Five Cities are committed to being proactive in tackling energy-related issues in order to support improved quality of life for all residents, leverage economic development opportunities associated with an emerging clean energy economy and enhance the resiliency of the built environment and the people it supports.

BuildSmartNY

The Five Cities Energy Plans effort is an expansion of Governor Cuomo's BuildSmart NY initiative. Build Smart NY, initially launched by Executive Order 88 in December 2012, is a program that aims to improve the energy efficiency of New York State buildings by 20 percent by 2020 in a strategic, coordinated, cost-effective, and data-driven manner. BuildSmart NY is working to benchmark the energy usage of state buildings, execute energy plans at the most energy-intensive campuses, target retrofits in the largest, most inefficient buildings, and implement best practices for building operations and maintenance to ensure efficiency improvements are sustained. In addition to reducing energy waste, costs and greenhouse gas emissions, BuildSmart NY seeks to catalyze investment in energy efficiency by demonstrating the economic, social, and environmental benefits of building energy efficiency.

Overall Energy Consumption (mmBtu)



Goals of the Five Cities Energy Plans

Reduce energy consumption

Strengthen reliability and resiliency of cities' energy infrastructure

Catalyze clean energy investment and economic development

Contribute to a cleaner environment

Enhance quality of life

NYPA established the Five Cities Energy Plans program to develop strategic frameworks for the cities of Albany, Buffalo, Rochester, Syracuse,and Yonkers to comprehensively reduce energy consumption citywide. The plans are intended to be roadmaps to help the cities collaborate with governmental agency partners, institutions, utilities, communities, NGOs and the private sector to achieve the following goals: strengthen the reliability and resiliency of their energy infrastructure, catalyze clean energy investment and economic development, reduce the cities' energy consumption and related expenses, contribute to a cleaner environment, and enhance quality of life within the cities. Building on each city's sustainability and economic development successes of the past decade, the plans will also guide municipal energy management as these cities seek to lead by example in reducing energy use.

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The New York Power Authority is a national leader in promoting energy efficiency, the development of clean energy technologies, and electric vehicles. The energy-efficiency improvements undertaken by NYPA over the last two and a half decades have been responsible for lowering the annual electricity bills at more than 5,300 public facilities by $168 million. Peak electricity demand has been cut by more than 238 megawatts and greenhouse gas emissions by nearly 964,000 tons a year. With the Five Cities Energy Plans initiative, NYPA has significantly expanded the nature and scope of its traditional energy efficiency efforts to support energy planning, municipal energy management and citywide clean energy deployment. It has taken a far more comprehensive and coordinated approach, encompassing the public and private sectors in each city, and going well beyond energy usage at individual facilities.

Plan Structure

The plans cover four Action Areas that support achievement of the overall goals of the Five Cities Energy Plans: Energy Planning and Coordination, Energy Efficiency in Buildings, Transportation Energy Efficiency, and Energy Distribution and Supply. Additionally, to reflect the unique history, characteristics, challenges and opportunities of each city, each plan has its own high-level set of aspirational, yet achievable goals for each of the action areas, along with a set of objectives and actionable initiatives to achieve those objectives. Significantly, as municipal efforts alone will not achieve the energy usage and greenhouse gas emission reductions required to meet the state's overall energy goals, the Five Cities Energy Plans include City government-led and community-wide strategies to unlock institutional and third-party support for clean energy deployment.

Governor Cuomo has undertaken a number of efforts through multiple state agencies and authorities to support a more resilient and sustainable New York and promote a cleaner and healthier environment. Energy management, infrastructure upgrades, climate action, resiliency and the transition to a clean energy economy are all high priorities for the state and are driven by a myriad of innovative policies, programs and financing mechanisms. The Five Cities Energy Plans will complement and work within these new paradigms and programs, including the regulatory and programmatic redesigns undertaken by the Public Service Commission's Reforming the Energy Vision (REV) proceeding, and the New York State Research and Development Authority's redesigned market development programs. In so doing, the Five Cities Energy Plans will build off of the strong support for market animation and clean energy deployment in New York State, supporting sustainable, private sector-driven clean energy markets, which in turn will help the state achieve its goal to deliver a cleaner, more resilient and affordable energy system for all New Yorkers.

The development of these plans is just the beginning. Energy planning is a process that involves ongoing assessments of conditions, stakeholder engagement, strategic planning, implementation, measurement of impact and regular reporting of progress. Consequently, NYPA will continue to support the Five Cities in their energy planning and implementation efforts. More specifically, in collaboration with NYSERDA, the New York State Energy Research and Development Authority's, New York State departments of Environmental Conservation, Transportation, State and Public Service, as well as the Empire State Development Corporation, NYPA will provide technical and financial assistance for the implementation of the plans and ensure progress is reported on annually.

To ensure the Five Cities Energy Plans help the cities achieve their goals and have a real impact on municipal operations and citywide buildings and infrastructure, the development of the plans followed six key principals. The plans had to be:

Aspirational

to inspire City staff, businesses, residents and other stakeholders to take action

Ambitious

with clear implementation and performance targets to organize and facilitate this action

Achievable

in terms of their legal, fiscal and technical feasibility, supported by data analysis and precedence in other jurisdictions

Accessible

to the general public, key stakeholders and decision makers with the use of understandable language, clear opportunities for public involvement and partnerships, and regular updates on progress

Accountable

to ensure implementation of initiatives occurs and progress towards the goals is achieved, with clear assignment of responsibilities coupled with ongoing tracking and reporting of progress

Adaptable

incorporating a process for regular updates as policies, trends and resources change over time

Planning Process

Stakeholder engagement was a priority of the planning process from the inception of the Five Cities initiative

The Five Cities Energy Plans were developed based on a data- and stakeholder- driven planning approach. Through a competitive process, consultants were selected to form teams with NYPA and the cities to complete the plans. Soon after the effort kicked off in October 2013, the teams embarked on their literature review, data collection and baseline assessment efforts. As part of this effort, consultants for each city benchmarked the energy performance of all municipal buildings over 10,000 square feet and conducted energy audits for the municipal buildings with the highest energy consumption. Additionally, the cities and the consultants reached out to the cities' utilities and infrastructure providers, sister agencies, and major institutions to assess the reliability and responsiveness of the city's infrastructure networks and the preponderance of clean distributed energy systems and alternative transportation services. This baseline assessment helped identify the goals and initiatives for the plans and will serve as a benchmark for measuring progress.

Stakeholder engagement was a priority of the planning process from the inception of the Five Cities Energy Plans initiative. The cities leveraged existing sustainability or energy-related stakeholder groups or created new ones for this effort, with representatives from key institutions, community and environmental groups, local development corporations, the real estate sector, and utilities.

Each city had at least three stakeholder meetings that were scheduled around key planning milestones to provide feedback, brainstorm goals and objectives, prioritize initiatives, and identify potential partnerships.

Based on the findings from the baseline assessment, the stakeholder engagement process and global best practices, the teams developed a long list of potential initiatives that could help meet their identified clean energy goals. To narrow the potential initiatives to those included in the Five Cities Energy Plans, the cities and their consultants evaluated each of them across a set of weighted criteria, with input from their stakeholders and with consideration given to overarching state priorities. Among other criteria, the evaluations all considered the role for City government in the implementation and consistency with city, state and stakeholder priorities. Other criteria included alignment of priorities between and among the plans, expected contributions to energy reduction and climate action goals, technical and legal feasibility, cost effectiveness, and economic viability.

Finally, implementation details were developed for each plan's initiatives. Each initiative lists details on the party responsible for its implementation, key partners and next steps.

FIVE CITIES ENERGY PLANS CONSULTANTS
Vanasse Hangen Brustlin, Inc. (VHB) – City of Albany
Wendel – City of Buffalo
LaBella Associates, D.P.C. – Cities of Syracuse and Rochester
Arup – City of Yonkers
Happold Consulting – Coordinating Consultant

Scenes from Five Cities stakeholder meetings.

Action Areas

The Five Cities Energy Plans take a comprehensive approach to energy management, including a look at energy consumption of municipal government as well as capturing opportunities for citywide impacts. Each of the plans covers four main action areas: Energy Planning and Coordination; Energy Efficiency in Buildings; Transportation Energy Efficiency; and Energy Distribution and Supply.

Energy Planning & Coordination

The Energy Planning & Coordination action area includes goals, objectives and initiatives designed to improve energy procurement and management processes and foster public-private partnerships and cooperation around clean energy deployment. This action area also contains initiatives around general sustainability and green development that encompass buildings, transportation and infrastructure strategies, and therefore, do not fit neatly into any of the subsequent areas.

Energy Efficiency in Buildings

The Energy Efficiency in Buildings action area focuses on improvements to building performance in municipal and private buildings. Strategies include building standards and energy code compliance, improved data collection and reporting, public awareness and education, and innovative financing mechanisms to unlock markets for energy efficiency.

Transportation Energy Efficiency

The Transportation Energy Efficiency action area includes a focus on compact and transit-oriented development, congestion reduction strategies, alternative transportation infrastructure, and clean vehicle deployment. The initiatives cover zoning and development standards, public and private fleets, transit, bike and pedestrian infrastructure, and energy-efficient streetlight improvements.

Energy Distribution & Supply

The Energy Distribution & Supply action area focuses on clean, distributed energy generation infrastructure, including through the deployment of renewable energy technologies, such as solar PV and microgrid demonstration projects. Similar to the Energy Efficiency in Buildings and Transportation Energy Efficiency action areas, there are initiatives by which the municipalities can lead by example and others to support community action and private-sector investment.

Cross-Cutting Themes

While the Five Cities Energy Plans are organized into four action areas, energy management and planning does not happen in silos, but rather cuts across institutions, infrastructure typologies and scales. A holistic look at the initiatives developed to achieve the state's and the cities' energy goals reveals four cross-cutting themes. Throughout the plans, icons representing these four themes will be located next to each relevant initiative.

Municipal leadership: leading by example

The Five Cities' participation in and dedication to this planning process make clear their commitments to lead by example to reduce energy consumption and greenhouse gas emissions. Most of these cities have been demonstrating this leadership for years with municipal building retrofits, clean vehicle infrastructure and purchases, and renewable energy installations. The Five Cities Energy Plans will build on this strong foundation and provide models for other cities to adopt best energy management practices, animate clean energy markets through new financing strategies and demonstrate emerging technologies.

Economic development: creating jobs and attracting businesses

The investments the cities make in their assets and the policies they create to guide new and existing development and infrastructure citywide will impact the cities' overall economies. As these cities continue to invest in their urban cores, revitalize underutilized land and activate neighborhoods with new uses and amenities, the implementation of the plans will help to attract clean energy businesses and spur additional job creation as they foster the demand for new energy services and technologies. At the same time, the cities' sustainability leadership and enhancement of infrastructure will make them more attractive for employees and residents alike through the promotion of walkable, transit-oriented neighborhoods.

Infrastructure: preparing our cities for the future

While the design of the cities' infrastructure systems has changed little over the past few decades, the needs of the systems' users have evolved dramatically. Users today are more dependent on constant, reliable energy services, require the ability to integrate with and use emerging technologies, and value the efficient use of resources. In addition, recent storm events have demonstrated the vulnerability of these cities' infrastructure systems to extreme weather and other disruptive events. Moving towards more distributed and renewable energy generation, and towards more transportation options are just a few of the ways these cities plan to enhance their infrastructure systems to address climate related risks and prepare their cities for the 21st century.

Climate action: reducing the city's carbon footprint

Many communities across New York State have experienced the dramatic effects of climate change, including severe weather and devastating floods. To mitigate the impacts of climate change, all five cities are committed to reducing their carbon footprint. This commitment is visible throughout the plans, from initiatives to make municipal buildings more energy efficient and generate more renewable energy, to those that encourage more transit-oriented development and promote cycling as a viable commuting option.

The Five Cities

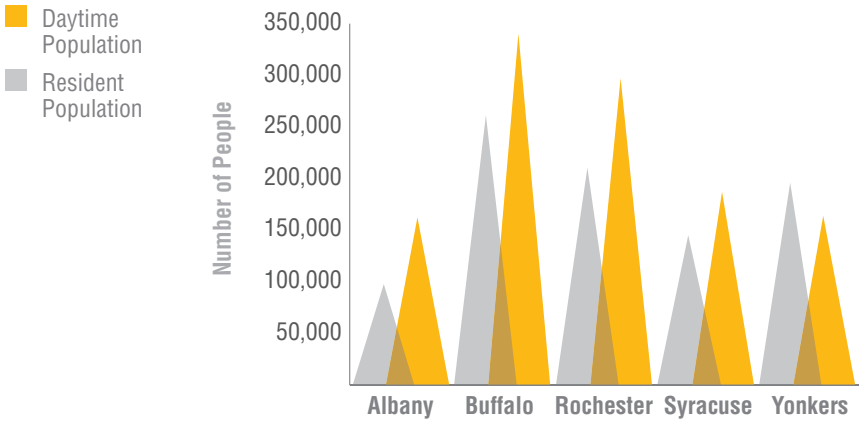
Albany, Buffalo, Rochester, Syracuse, and Yonkers are the five largest cities in the state after New York City. Their combined populations would make them the 11th largest city in the country, providing a significant opportunity to meaningfully reduce energy consumption and greenhouse gas emissions. Due to transit infrastructure and relatively dense, urban cores, these cities on average consume less per capita than the state average. Still, cold winters along with aging infrastructure and building stock mean these cities spend over $2.2 billion in energy-related costs a year. Reducing energy consumption, and therefore costs, while spurring economic development and improving the quality of life for residents are key goals these cities have in common.

On average, buildings consume more than 64 percent of total energy within the cities. Municipal buildings tend to contribute only 1 to 3 percent of this consumption; making it clear that efforts to engage citywide partners to improve building energy performance is critical. Transportation related energy contributes 26 to 39 percent of energy consumption, with the dependence on single-occupancy vehicles for transportation the main source of this consumption. Related costs and emissions are further exasperated by congestion on the roadways within the cities.

The Five Cities have historically been some of the most innovative cities in the United States, consistently placing themselves at the forefront of energy, transportation and building technology. As these cities seek to implement 21st century infrastructure improvements and revitalize downtown cores, they have been putting those innovation legacies to work. Each city is working to promote compact, transit-oriented and mixed-use development in their downtowns through zoning changes. To further reduce automobile dependence, they have taken steps to make walking, cycling, carpooling and public transit more attractive transportation options. And to lead by example, each has pursued energy audits and upgrades to their municipal buildings. Finally, some have already completed greenhouse gas inventories and detailed climate action plans.

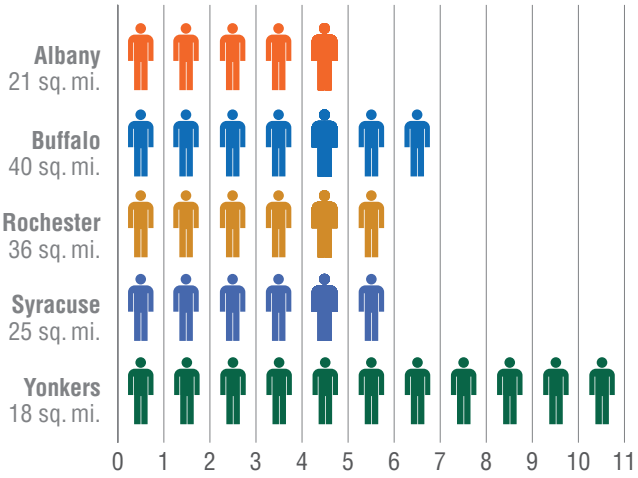
Several key initiatives emerged from the data collection, baseline assessments and planning process, as well as from the unique character of each of the Five Cities. These key initiatives cut across action areas and sectors.

Population



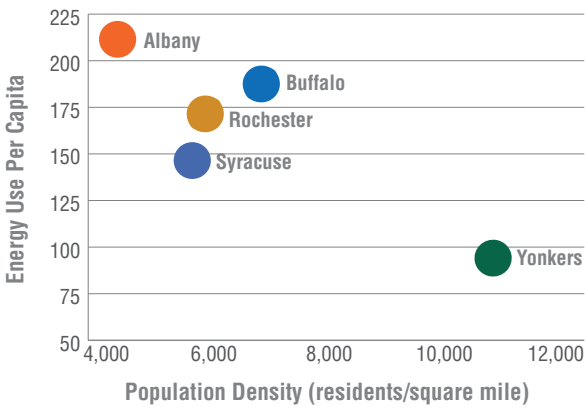
Density of City Residents

One Person = 1,000 Residents per Square Mile



Energy Use Per Capita/Population

In general for the Five Cities, it is shown that the higher the population density, the lower the energy use per capita, and vice versa.



The Five Cities have a history of pursuing innovative initiatives to reduce energy consumption and greenhouse gas emissions.

Albany

Bike Share
In 2013, Albany commissioned a bike-share feasibility study to explore the implementation of a program similar to those in Boston, New York City and Washington, D.C. The study found that demand, demographics and existing infrastructure in Albany would be generally favorable to a program. In 2014, Albany hosted a pilot program where registered riders could use one of 25 bicycles at kiosks. The University at Albany runs a successful free bike share program for students.

Rochester

Office of Energy & Sustainability
Rochester has established the Office of Energy and Sustainability (OES) in the Division of Environmental Quality. OES's goals are to make Rochester a model for innovative, ecologically sustainable operations, policies and practices, and to connect the City with regional and national sustainability resources. OES takes advantage of the multiple benefits generated by adopting more sustainable practices. These include reduced operating costs, a healthier, safer and more livable community, natural resource conservation and restoration, and mitigating and adapting to climate change.

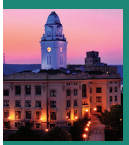
Buffalo

Green Code
Buffalo is updating its development framework to promote investment, facilitate job creation, restore the environment and improve the quality of life. The Green Code updated the city's 60-year-old zoning code. It includes a Land Use Plan that provides a framework for decision making about the city's physical development and a comprehensive zoning revision which emphasizes walkable, transit-supportive neighborhoods. The Land Use Plan includes specific plans for the waterfront and brownfield areas.

Syracuse

Electric Charging Stations at City Hall
Syracuse is a leader in electric vehicle infrastructure. During the last few years, electric vehicle infrastructure has significantly increased in the area. There are 16 electric charging stations in Syracuse and three in nearby Liverpool. The city is well positioned for further expansion, especially as electric and plug-in electric vehicles become more common. Syracuse continues to partner with Clean Communities of Central New York to increase alternative fuel vehicle deployment and enhance charging infrastructure.

Yonkers



LED Street Light Replacement Project
The City of Yonkers launched the LED Streetlight Replacement Project in July 2013 with the aim to replace the city's 12,000 streetlights with more energy efficient LED lights. The program improved the reliability of lighting and street safety. It is estimated that the project will cut Yonkers's energy bill by 60 percent, save taxpayers $18 million in energy costs over 10 years, and reduce Yonkers's carbon footprint by more than 2,700 metric tons annually.

Key Initiatives

While the cities may differ in key ways, all five plans touch upon similar topics.

To improve the energy efficiency in buildings, all five cities included initiatives to support community building retrofits and the pursuit of energy efficiency improvements in municipal buildings. Community-wide initiatives include stricter enforcement of building codes, establishment of a building energy performance benchmarking and disclosure programs, and support of existing energy awareness campaigns. The cities also committed to lead by example through pursuing energy-efficiency improvements for their own buildings and better processes for energy procurement.

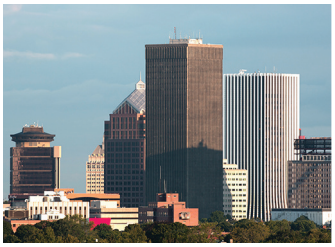
To reduce energy consumption from the transportation sector, all five cities have prioritized initiatives that promote alternative modes of transportation through expansion of pedestrian and bicycle infrastructure, improved transit service, and modifications of zoning to promote walkable and transit-oriented neighborhoods. Similar to buildings, the cities plan to lead by example in the transportation sector by greening their own fleets. This includes reducing the size of their fleets, replacing retiring vehicles with smaller, more efficient, and cleaner models, and promoting alternative vehicles. The cities also have included initiatives to reduce vehicle miles travelled by municipal staff while working and commuting.

Additionally, all five cities have prioritized the retrofitting of streetlights to be more energy efficient.

There was also consensus around the desire to expand clean distributed generation infrastructure (e.g., cogeneration, microgrids) and increase electricity generation from renewable energy sources to enhance resiliency and reduce greenhouse gas emissions. To do so, the cities are pursuing a wide range of initiatives, including feasibility studies to understand the best opportunities for clean distributed generation and renewable energy generation, expansion of existing district energy infrastructure, third-party financing and ownership structures through power purchase agreements, and partnerships with local organizations to launch community solar programs and other aggregation initiatives that will spur market activity in the sector.

Altogether, full implementation of these plans will result in significant annual energy savings. For the five municipal governments alone, achievement of their energy goals will result in a reduction of over 400,000 mmBtu of energy and 55,000 metric tons of greenhouse gas emissions. And many of these initiatives are initial steps to deeper and broader energy management efforts. A 20 percent reduction of energy costs citywide for the Five Cities could mean over $400 million in savings a year.

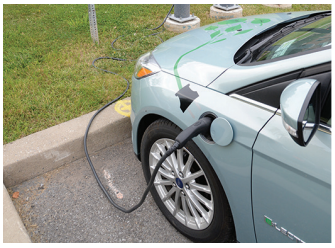
All Five Cities Include Initiatives Around these 10 Topics



Promote/support community building retrofits

Pursue energy-efficiency improvements for municipal buildings

Improve infrastructure/modify zoning to promote alternative modes of transportation

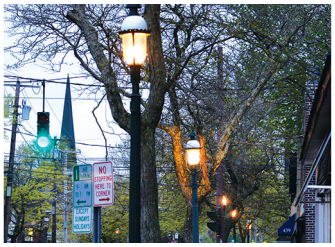


Reduce emissions/fossil-fuel dependence of fleets

Increase electricity generation from renewable energy sources

Implement transportation management tools to reduce idling and vehicle emissions

Expand clean, distributed generation infrastructure



Improve energy efficiency of outdoor lighting

Reduce municipal utility costs

Coordinate with utilities/state to enhance energy infrastructure

SYRACUSE


AXA EQUITABLE


THE SENATOR JOHN H. HUGHES
STATE OFFICE BUILDING

Letter From Stephanie A. Miner

On behalf of the City of Syracuse, I am pleased to introduce you to the Syracuse Energy Plan. This document represents a substantial effort undertaken by both the New York Power Authority and the City of Syracuse to find efficiencies in energy usage and opportunities to reduce our environmental footprint. This plan builds on some of the efforts my administration has taken and we look forward to the continued partnership with NYPA to implement the practices developed for this plan.

Keeping the community green and energy efficient is a top priority of my administration. When I assumed office, I established Syracuse's first-ever Bureau of Planning and Sustainability. This new department was laser focused on building an environmentally sound future for the City through smart urban planning and design. One of the chief accomplishments of this bureau was developing a Sustainability Plan for inclusion in our Comprehensive Plan: 2040. This plan will help guide the City of Syracuse as we reduce emissions, support green practices and promote urban sustainability.

The Syracuse Energy Plan will complement the efforts already underway at City Hall. This plan will expand our efforts and integrate them with regional solutions focused on energy-efficient development. Working together, we will implement a holistic approach to energy management. This plan will help us achieve our mutual goals of reducing consumption, increasing energy infrastructure reliability and spurring the investment which will create the jobs that give Syracuse a cleaner, greener future.

I would like to thank the staff from NYPA as well as the City of Syracuse who worked tirelessly on this Plan. I look forward to its implementation and the greener future we can bring to Syracuse.

Stephanie A. Miner
Mayor of Syracuse

Top right, Syracuse bird's-eye view; Middle, Syracuse skyline; Bottom left, Sen. John H. Hughes State Office Building; Bottom right, Onondaga County Courthouse

City of Syracuse Energy Plan

The Syracuse Energy Plan builds on the City's strong tradition in sustainability and energy planning as well as previous and ongoing plans, energy conservation improvements, and renewable energy installations. It is designed to take successful initiatives to the next level, integrate key objectives of regional sustainability and economic development planning efforts, and provide a comprehensive strategy for energy management with respect to energy efficiency measures, usage reduction, and renewable deployment across sectors and interests. Altogether, the initiatives of the Syracuse Energy Plan are intended to reduce energy consumption, strengthen reliability of the energy infrastructure, leverage private sector investment in clean energy projects, create jobs in related industries and contribute to a cleaner environment.

Action Areas

Overview of energy consumption

As the seat of Onondaga County, Syracuse is a major economic hub of Central New York. It is home to numerous universities, colleges and medical facilities. The residential population is 145,170, with a daytime population of 194,000 due to the influx of commuters, including those working for the region's largest employers, SUNY Upstate Medical University and Syracuse University.

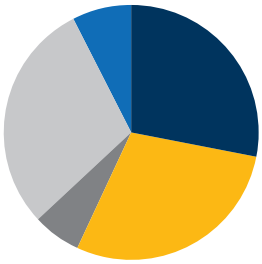
In Syracuse, energy consumption exceeded 21 million mmBtu in 2010, resulting in approximately 1.5 million metric tons of greenhouse gas emissions. Buildings account for 64 percent of this energy consumption, including those used for residential, commercial, institutional and industrial uses. The remaining 36 percent of energy consumption comes from gasoline and diesel fuel used by vehicles traveling through and within Syracuse. Municipal operations account for 1.7 percent of energy consumption in the city, with transportation (vehicular fuel and street lighting) accounting for almost half of governmental energy use.

Existing energy, sustainability, and climate action efforts

The Energy Plan advances and complements the goals and recommendations documented in the City of Syracuse Sustainability Plan, Comprehensive Plan 2040, the Land Use & Development Plan 2040 and the Syracuse Bicycle Plan. The City of Syracuse Sustainability Plan presents a roadmap to reduce Syracuse's greenhouse gas emissions by reducing energy usage in City operations and promoting energy use reductions citywide in the building and transportation sectors. The Sustainability Plan set a goal to reduce greenhouse gas emissions from municipal operations by 40 percent above 2002 levels and citywide emissions by 7 percent by 2020. To help the City measure progress toward its sustainability goals, the City of Syracuse Greenhouse Gas Emissions Report documented the greenhouse gas emissions from municipal operations as well as the community at large.

New York State Fair

Community Greenhouse Gas Emissions by Fuel Type



- Electricity (28.3%)
- Natural Gas (28.6%)
- Other Fuels* (6.3%)
- Gasoline (29.3%)
- Diesel (7.4%)

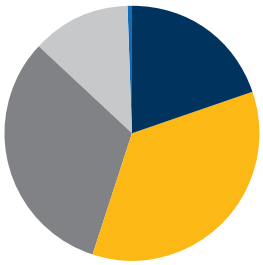
*Other Fuels Breakdown:
Fuel Oil (3.2%)
LPG (0.5%)
Coal (2.6%)

Figure 1

The Syracuse Sustainability Plan is a component of the City's Comprehensive Plan 2040, which contains a vision for Syracuse's future and identifies policies, actions, regulations and investments that the City intends to undertake to achieve this vision. Two other components of the City's Comprehensive Plan 2040 are important in the context of this Energy Plan: the Land Use & Development Plan 2040 and the Syracuse Bicycle Plan. The Land Use & Development Plan includes recommendations for compact development patterns and walkable neighborhoods that aim to reduce the number of trips made using private vehicles. Development and redevelopment in accordance with the land use plan recommendations will reduce the amount of energy used in the transportation sector citywide. The Bicycle Plan recommends infrastructure improvements to support increased bicycle use as a viable mode of transportation within the city. Bicycle infrastructure is essential to encourage more bicycle trips within Syracuse, thereby reducing fuel consumption from vehicles.

The three-county region that includes Syracuse completed the Central New York Regional Sustainability Plan in 2012, which aims to reduce the region's per capita energy consumption 40 percent below 2010 levels by 2030 and increase the amount of electricity generated by renewable sources by 25 percent. Strategies include the deployment of New York State Energy Research and Development funded commercial energy efficiency projects and the certification of existing public and new residential buildings to ENERGY STAR® or similar energy-efficiency standards. Planning for energy and sustainability is critical to the City's goals for robust economic development. The Central New York Regional Economic Development Council identifies clean energy and environmental systems as a priority industry concentration, supporting more than 10,000 green jobs. Several projects recommended in the Five-Year Strategic Plan Regional Economic Development Strategy support additional research, design and manufacturing that complement the Syracuse Energy Plan.

Municipal Energy Consumption by Fuel Type (mmBtu)



- Natural Gas (19.9%)
- Electricity (35.2%)
- Diesel (31.9%)
- Gasoline (12.7%)
- CNG (0.3%)

Figure 2

Syracuse has completed numerous projects to advance its goals in energy conservation and sustainability. Renewable energy projects such as the photovoltaic and micro-hydro at the Westcott Reservoir and the solar photovoltaic (PV) system at City Hall Commons reduced the use of traditional electricity generation. The improvement of bicycle and pedestrian infrastructure supports alternatives to trips in cars. Improved traffic signal coordination will reduce fuel wasted idling at intersections. Energy audits, building upgrades, streetlight replacement and the substitution of lighting in garages and traffic lights to more energy-efficient LED lighting have reduced Syracuse's energy consumption. Several more projects are underway. For instance, the City hopes to coordinate more traffic signals along major corridors to alleviate congestion and cut down on vehicle idling, and is working on the construction of more bike lanes. In the building sector, a City ordinance requires LEED-silver standards in newly constructed or renovated City facilities, and also offers a 10-year property tax exemption for LEED-certified buildings citywide.

New York State Fair

Summary of goals and initiatives

The Syracuse Energy Plan takes a comprehensive look at energy-related planning, buildings, transportation, and infrastructure trends. It identifies goals and initiatives that build on the success of the Sustainability Plan and other efforts to date to further enhance the City's energy efficiency and resiliency.

To improve energy planning and coordination, Syracuse intends to continue to maintain communications and collaborate with utility, government and private sector partners to support energy policies and programs that benefit residents, businesses and institutions. Key initiatives include participating in the decision-making process of the New York Public Service Commission (PSC), particularly as the Reforming the Energy Vision (REV) proceeding is implemented, and continuing collaborative procurement of natural gas and electricity.

To unlock private sector investment opportunities, Syracuse will begin to improve energy efficiency of citywide building stock, while leading by example with its own buildings. Key municipal energy efficiency initiatives include partnerships with business and community leaders to increase benchmarking of buildings citywide and implementing energy efficiency measures in municipal buildings.

In line with the Comprehensive Plan 2040, Syracuse will promote transit, cycling and walking in the city. For its own fleet, the City will reduce idling and increase the number of alternative fuel vehicles. The conversion of streetlights to LED fixtures will reduce municipal electricity costs.

To help utilities, other institutions and private sector partners strengthen and modernize energy infrastructure for enhanced reliability and lower environmental impact, the Syracuse Energy Plan includes initiatives to coordinate with National Grid to improve infrastructure within City rights-of-ways, support private efforts to establish district energy and microgrids and to increase the amount of renewable energy generated within Syracuse.

Sen. John H. Hughes
State Office Building

Coordinate Energy Policies and Programs

Summary of Objectives and Initiatives

Collaborate with government, utility and private sector partners to advance energy policies and programs

Initiative 1: Participate in Public Service Commission decision-making processes relating to tariffs and utility regulation.

Initiative 2: Continue and expand collaborative energy procurement through ESCOs

Monitor municipal energy usage and communicate trends to decision-makers

Initiative 3: Maintain and formalize procedures for ongoing monitoring of energy usage and building performance

Initiative 4: Integrate energy-efficiency performance into capital improvement and fleet procurement decision-making

Meeting Syracuse's energy goals requires the coordination of a wide range of public and private actors, from natural gas and electricity utilities and local, state and federal agencies to private citizens, developers and investors. Layers of regulations and institutional policies affect the availability, cost and type of energy used in buildings and vehicles by residents, businesses, institutions and governments.

To facilitate ongoing energy planning and monitoring, as well as the management of sustainability projects and the administration of grants, Syracuse employs a Sustainability Coordinator who works within the City Planning Division of the Syracuse-Onondaga County Planning Agency. The coordinator's duties include project planning and coordination, feasibility assessments and analyzing the impacts of energy efficiency improvements. Syracuse uses an energy consultant to provide monthly reports to individual departments regarding energy usage. Syracuse recognizes the opportunity to build on this capacity by coordinating with the state, utilities and the private sector to reduce costs, increase reliability, promote clean energy generation and catalyze private sector investment in energy initiatives.

Numerous public, private and not-for-profit entities have a role in supporting Syracuse's energy and sustainability goals. The Central New York Regional Planning and Development Board (CNYRPDB) frequently acts as a conduit for grant funding and coordinates community programs relating to energy and sustainability. For example, CNYRPDB coordinated a pilot bill comparison program that engaged neighborhood representatives in reducing energy usage. The Syracuse Center for Excellence carries out research into promising technologies relating to energy efficiency and renewable energy sources. Syracuse University was a key partner in securing funds and implementing transit, bicycle and pedestrian improvements in the "Connective Corridor" that links downtown with Syracuse University. Ensuring continued collaboration between all of these stakeholders is critical to meeting the Energy Planning and Coordination Objectives and Initiatives identified below.

Collaborate with government, utility and private sector partners to advance energy policies and programs

Utilities, government regulators, businesses and institutions affect the cost, reliability and type of energy available to Syracuse. Decisions made by these entities affect Syracuse and other municipalities. Collaboration can help Syracuse gain influence in regulatory decisions and leverage economies of scale in procurement.

Initiative 1: Participate in Public Service Commission decision-making processes relating to tariffs and utility regulation

The New York Public Service Commission (PSC) regulates the rates that natural gas and electricity utilities can charge customers and requires utilities to adhere to maintenance and repair standards. As Syracuse and other utility customers are affected by PSC decisions, such as the Reforming the Energy Vision (REV) proceeding, keeping informed and becoming involved as needed helps ensure that the City's interests are addressed. Other governments, businesses, residents and institutions throughout the region are also affected

State Tower Building

by PSC regulation. Regional organizations such as the Central New York Regional Planning and Development Board maintain information about PSC actions and decisions.

As part of Syracuse's energy-monitoring responsibilities, a City Planning Division staff person or a consultant will continue to monitor PSC decisions that affect City interests relating to energy costs, rates and procedures. When coordinated efforts would enhance its influence with regulators and other decision-makers, Syracuse will collaborate with other municipalities and organizations to advocate for regulations that would benefit Syracuse's municipal operations and its residents, businesses and institutions.

Initiative 2: Continue and expand collaborative energy procurement through ESCOs

Syracuse participates in joint energy purchasing of electricity and natural gas in cooperation with Onondaga County and the Syracuse City School District to heat and power most of the facilities operated by the City, including streetlights. On behalf of this consortium, Onondaga County's Purchasing Department issues Requests for Proposals for the procurement of natural gas and electricity and the partners enter into contracts with Energy Service Companies (ESCOs) at established pricing levels.

When cost effective, Syracuse will continue to utilize professional guidance to secure competitive bids for electricity and natural gas. When collaborative bidding will achieve reduced prices, Syracuse will continue the collaborative procurement process with Onondaga County and the Syracuse School District through an ESCO and consider expanding the consortium to achieve additional economies of scale.

Monitor municipal energy usage and communicate trends to decision-makers

Syracuse's municipal government has five operating departments in addition to executive and finance agencies that manage 182 buildings and 1,029 vehicles. Department heads at each agency work with the Budget Department to prioritize capital investments and develop operating budgets, both of which impact energy consumption and related costs. Energy-related operating costs and performance are factored into those decisions to varying degrees. Monitoring energy use and integrating energy considerations into standard City processes, such as budgeting and procurement, are low-cost ways to foster more informed energy management decisions.

Energy Planning & Coordination

Syracuse's Sustainability Plan will reduce municipal GHG emissions

40%

by 2020

Initiative 3: Maintain and formalize procedures for ongoing monitoring of energy usage and building performance

Syracuse has contracted with a consultant to monitor and report to the Department of Budget on municipal electricity and natural gas usage and costs by department and to communicate trends to facility managers, occupants and senior management. Fuel usage by vehicles is monitored by the individual departments where vehicles are housed. The City Sustainability Coordinator uses the information collected through regular monitoring to measure progress toward sustainability goals.

Going forward, Syracuse will continue to utilize a consultant or on-staff City energy manager (CEM) to apply a variety of management tools to track energy consumption and greenhouse gas emissions by agency and by fuel type and report progress to individual departments and senior management to inform day-to-day behavior and capital investment decisions. To track overall progress toward sustainability goals, the CEM will monitor energy usage and greenhouse gas emissions from municipal buildings as well as from vehicles. These coordination activities will supplement the initiatives described below for municipal buildings and vehicle fleets.

CASE STUDY **Syracuse Sustainability Plan**

Implementation of the Syracuse Sustainability Plan is part of the City of Syracuse Comprehensive Plan 2040 that was adopted by the Common Council in 2014. The Plan is designed to guide City operations in ways that preserve and enhance the local and global environment, reduce the City's energy costs, and improve quality of life for Syracuse residents. The Bureau of Planning & Sustainability developed the plan with extensive public input from local experts, City staff, stakeholders and community members.

Implementation of the Sustainability Plan will reduce Syracuse's greenhouse gas emissions from City operations by 40 percent by the year 2020. Measures to reduce energy usage citywide, including incorporating smart-growth principles into upcoming zoning revisions and partnering with other entities on community projects such as "Energy Challenges," will achieve a 7 percent reduction in community emissions in the same time period.

Recommended actions address five topic areas: Energy & Green Building; Education; Food Systems; Natural Environment; and Waste & Recycling. In general, the actions support one or more of the following goals:

1. Reduce the volume and impact of energy consumption in the City of Syracuse
2. Reduce negative impacts on the Onondaga Creek watershed
3. Improve the City of Syracuse's local water, food and energy independence
4. Reduce waste and increase recycling
5. Improve quality of life for Syracuse residents

The plan recommends feasible actions that the City can accomplish and suggests personal actions that citizens can take. The Bureau of Planning and Sustainability will lead the implementation process, in collaboration with other City departments and partners. To ensure public accountability, implementation will include additional public engagement as well as measurements and reporting of progress.

Initiative 4: Integrate energy-efficiency performance into capital improvement and fleet procurement decision-making

Each municipal department has a budget for and utilizes its own capital improvement budgeting process. Each department identifies its facilities' improvement needs based on a standard template. The City Budget Department reviews each department's capital requests and determines budget allocations. Pending Common Council approval, each department has discretion over how to expend these funds. Similarly, each department that maintains vehicles utilizes its own procurement process for vehicle purchases. The decentralized process makes it difficult to implement building portfolio and fleet-wide energy performance improvements. Further, it results in lost opportunities for major energy efficiency gains and eventual cost savings through the replacement of building systems and outdated fleet vehicles.

To better leverage replacement opportunities and facilitate strategic capital investment decisions, a team of staff from the Budget, Planning and Operating departments will evaluate the feasibility of reassigning or clarifying responsibilities for central oversight of capital building improvements, including energy efficiency, to a single agency or responsible individual and team with the necessary technical expertise. For example, as recommended in the 2012 Sustainability Plan, Syracuse will create a process for the Engineering and Skilled Trades Division of the Department of Public Works to thoroughly review plans prior to the start of an HVAC, chiller, lighting or other energy-consuming installation to ensure right-sizing. The City will also establish an energy policy that dictates temperature settings, overnight and weekend settings, and demand control to support its facilities maintenance team in achieving further efficiencies from buildings. In addition, Syracuse will establish a more coordinated vehicle replacement policy. These processes will establish energy efficiency as a key factor in the selection and design of capital improvement projects and vehicle replacement decisions.

Implementation Matrix

Responsible party	Key partners	Source of funding	Time frame	Next steps
Collaborate with government, utility and private sector partners to advance energy policies and programs				
Initiative 1: Participate in Public Service Commission decision-making processes relating to tariffs and utility regulation				
Legislators; Legal Department	NYS PSC; Community Organization	City Staff Budget	Ongoing	Identify staff liaison or community organization to advocate for City
Initiative 2: Continue and expand collaborative energy procurement through ESCOs				
Division of Purchase and Office of Management and Budget	ESCOs	City Staff Budget	Ongoing	Solicit proposals from ESCOs
Monitor municipal energy usage and communicate trends to decision-makers				
Initiative 3: Maintain and formalize procedures for ongoing monitoring of energy usage and building performance				
Sustainability Coordinator	DPW, Facilities Operators, Department Heads	City Staff Budget	Ongoing	Establish monitoring and communication procedures and responsibilities
Initiative 4: Integrate energy-efficiency performance into capital improvement and fleet procurement decision-making				
Sustainability Coordinator	DPW, Facilities Operators, Department Heads	City Staff Budget	Ongoing	Establish monitoring and communication procedures and responsibilities

Time frame: Short-Term = less than five years, Medium-Term = five to 10 years, Long-Term = more than 10 years

Reduce Energy Usage and Greenhouse Gas Emissions from Buildings

Summary of Objectives and Initiatives

Increase energy efficiency in buildings citywide

Initiative 1: Ensure Energy Code compliance and evaluate adoption of more stringent code requirements for new construction of large buildings

Initiative 2: Require benchmarking and compliance with energy efficiency standards for properties receiving funding from the City

Initiative 3: Partner with business and community leaders and state agencies to increase the number of buildings benchmarked through Portfolio Manager

Initiative 4: Increase energy efficiency awareness and engagement through energy reduction challenges and public outreach efforts

Reduce energy consumption in municipal buildings by 20 percent by 2020

Initiative 5: Benchmark and report on municipal energy performance on an annual basis

Initiative 6: Reduce the amount of energy required to heat buildings and provide hot water by implementing weatherization measures

Initiative 7: Implement energy conservation measures (ECMs) recommended in energy audits

Initiative 8: Continue to require LEED Silver standards for new construction and substantial renovation of municipal buildings

Initiative 9: Promote behavioral changes to reduce energy usage among City departments through awareness and incentives

Initiative 10: Institute operational changes to reduce energy usage through changes in purchasing, maintenance and operations policies and procedures

Initiative 11: Allow energy efficiency cost savings to accrue to a fund dedicated to priority energy projects

The energy used to heat and cool buildings and electricity needed to power lighting and appliances represent 64 percent of all the energy used in Syracuse. If Syracuse is to achieve demonstrable progress toward its energy goals, it will need to support public-private collaborations that will reduce energy consumption in this sector. It has already made significant strides in reducing energy usage in its own buildings and can continue to lead by example by installing additional energy conservation measures. For buildings citywide, Syracuse will work with institutional and business leaders to identify market opportunities to animate private markets.

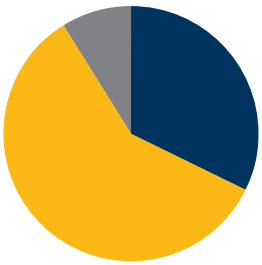
Increase energy efficiency in buildings citywide

Buildings account for almost two-thirds of energy consumption in Syracuse. The building stock in Syracuse consists of 63,539 residential housing units (accounting for 36.3 million square feet), 36.8 million square feet of commercial, 21.0 million square feet of institutional, and 28.0 million square feet of industrial floor area. Residential buildings are responsible for 42 percent of total building-related energy consumption, followed by commercial buildings (27 percent), and institutional and industrial buildings (approximately 15 percent each). Reducing the energy consumption of these buildings by 20 percent would be the equivalent of the total annual energy usage of 30,500 households or 45,000 cars.

Initiative 1: Ensure Energy Code compliance and evaluate adoption of more stringent code requirements for new construction of large buildings

Current regulations require all new construction and major renovations in Syracuse to comply with the New York State Energy Conservation Construction Code. However, based on the findings of a recent NYSERDA study, construction may not fully comply with Energy Code requirements. In the residential sector, insufficient

Community Buildings Energy Consumption by Fuel Type (mmBtu)



- Electricity (32.3%)
- Natural Gas (59.1%)
- Other Fuels* (8.6%)

*Other Fuels Breakdown:
Propane/Butane (1%)
#2 Fuel Oil (3.9%)
#4 Fuel Oil (0.9%)
Coal (2.8%)

Figure 3

Community Energy Consumption by Building Type (mmBtu)

- Residential (41.6%)
- Commercial/Office (27%)
- Industrial (15.9%)
- Institutional (15.5%)

Figure 4

compliance with the Energy Code leads to "lost savings" representing 8 percent of residential and 5 percent of commercial total energy costs. Every year, Syracuse issues permits for new buildings, which represents an annual opportunity to ensure new construction and major renovations meet Energy Code requirements, and in turn bring the City more energy-efficient than non-compliant buildings. In the next year alone, Syracuse anticipates issuing approximately 10 permits for new single- or two-family residential and 12 permits for multi-family or commercial construction, in addition to 350 residential and 500 commercial renovation permits.

Syracuse's Division of Code Enforcement is responsible for enforcing State codes, including the energy conservation provisions contained therein, in conjunction with the municipal departments of Engineering, Fire Prevention, Zoning, Public Works, Planning and Water. City code enforcement officers attend periodic training sessions to maintain their certifications.

To ensure the Energy Code is effectively enforced, Syracuse will continue to maintain the current level of staffing at the Division of Code Enforcement. As recommended in the Sustainability Plan, Syracuse will provide specialized training to appropriate staff, such as Building Performance Institute (BPI) or Leadership in Energy and Environmental Design (LEED) certification. Further, the City will continue to provide required training to enforcement officers and increase staffing levels as resources permit and the rate of new development warrants.

Initiative 2: Require benchmarking and compliance with energy efficiency standards for properties receiving funding from the City

Syracuse has an opportunity to increase the energy efficiency of buildings in the community by requiring benchmarking and energy efficiency improvements as a condition of receiving grant funds administered by the City. The Department of Neighborhood and Business Development administers federal Community Development Block Grant (CDBG) funds that are used to construct and renovate housing for low- and moderate-income residents. This program supports homebuyer assistance, rehabilitation and new construction that involve an average of 200 units per year. Over the past few years, the Business Development Division has supported approximately $300,000 annually in new construction.

Syracuse will investigate the feasibility of requiring entities that receive funding through City-administered programs to benchmark buildings using EPA Portfolio Manager or to achieve specified standards of energy efficiency. For the housing improvements, such requirements will need to be consistent with the program goal of supporting low- and moderate-income households. For the business development programs, energy-efficiency standards will need to be part of the agreed-upon incentive package and consistent with the economic development and community revitalization goals of the program.

Initiative 3: Partner with business and community leaders and state agencies to increase the number of buildings benchmarked through Portfolio Manager

Widespread benchmarking of buildings citywide can be an effective aid in reducing energy usage in buildings. Benchmarking allows building managers to monitor energy usage and costs over time and learn how their buildings compare to similar buildings nationwide. A 2010 study by the U.S. Environmental Protection Agency reported that energy consumption in benchmarked buildings decreased by an average of 7 percent.

The 2030 District model, established in Seattle and promoted by various grassroots organizations nationwide, utilizes partnerships among property owners and managers, local government, businesses, and community stakeholders to set collaborative targets for energy reductions, and to share resources and leverage funding to achieve those targets. For existing buildings, the recommended target is 10 percent below the national average, with incremental targets to reach a 50 percent reduction by 2030. In Syracuse, the Central New York Regional Planning and Development Board (CNY RPDB) has introduced the concept to Syracuse's Downtown Committee, which provides services to a business improvement district, and has discussed the concept with building owners.

Citywide Buildings Energy Consumption By Fuel Type and Building Type

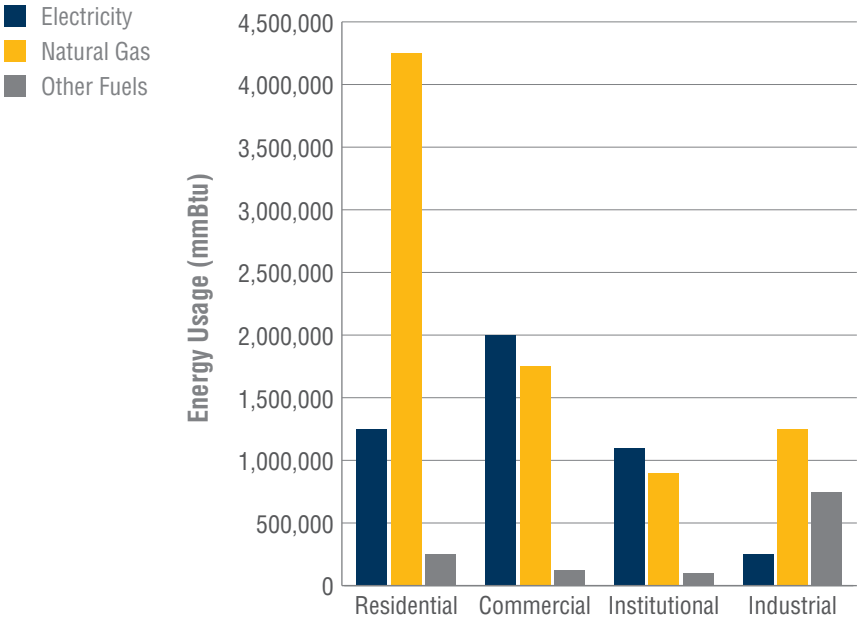


Figure 5

Syracuse will utilize its network of contacts with neighborhood and business organizations to support community programs such as the Syracuse 2030 District or other groups of property owners that will result in additional benchmarking of privately owned buildings. Specifically, the City will make its facilities available for meetings and facilitate communications as staff resources are available.

Kasson Apartments

Initiative 4: Increase energy efficiency awareness and engagement through energy reduction challenges and public outreach efforts

In 2012, Syracuse launched a Mayoral Challenge, coordinated by the Central New York Regional Planning and Development Board, to compare residential energy bills and improve household energy efficiency. The bill comparison program is currently administered by National Grid and raises awareness of energy consumption among homeowners in comparison to similar buildings in their neighborhood. The pilot program—CNY Energy Challenge—provided each participant extensive training in household energy efficiency measures. The 34 participating households reduced their energy consumption by 30 percent. Syracuse will continue to support bill comparison programs initiated by National Grid, the Central New York Regional Planning and Development Board or other entities by participating in outreach efforts, putting information on the City's website and disseminating information through neighborhood organizations.

Additionally, the City will maintain communications with state agencies regarding the availability of resources, including incentives, to support building retrofits. Syracuse will make this information available through its website and through brochures located in relevant City offices. The City will also work with the CNY RPDB and business and institutional leaders to distribute information to neighborhood and business organizations.

Reduce energy consumption in municipal buildings by 20 percent by 2020

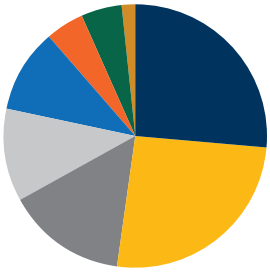
The 182 buildings owned and operated by the City vary in size and use, ranging from historic office buildings to an asphalt plant. The buildings collectively consume 110,331 mmBtu of energy annually, resulting in total energy costs of $3,440,983. An additional 20 percent reduction on top of the City's previous energy reduction successes would save Syracuse $340,000 a year in operating expenses. Some of these savings will support additional sustainability efforts.

Municipal Buildings Energy Consumption by Fuel Type

- Natural Gas (47.8%)
- Electricity (52.2%)

Figure 6

Municipal Building Energy Consumption by City Department



- Dept. of Public Works (26.51%)
- Parks & Recreation (25.97%)
- Fire Department (14.82%)
- Water Department (11.29%)
- Parking Garages (10.47%)
- City Hall Commons (4.75%)
- City Hall (4.53%)
- Police Department (1.67%)

Figure 7

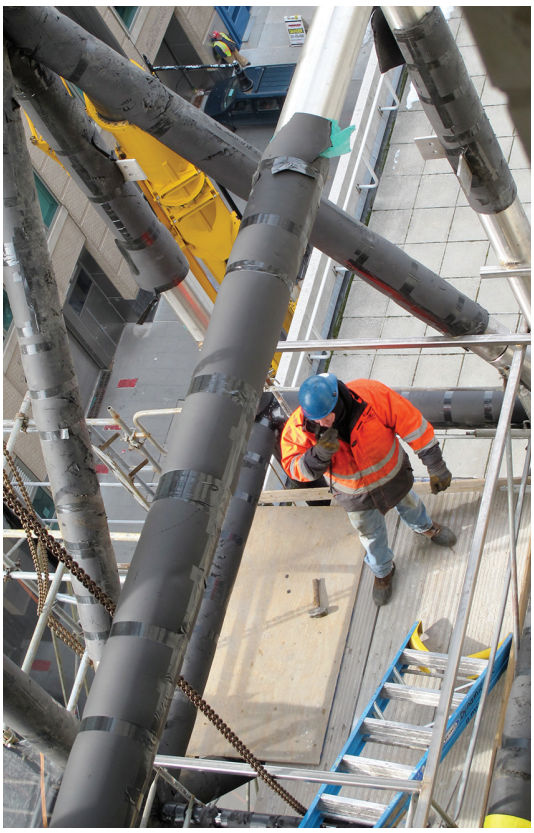
Initiative 5: Benchmark and report on municipal energy performance on an annual basis

In 2014, all municipal buildings with an area of 10,000 square feet or greater—37 in total—were benchmarked using ENERGY STAR Portfolio Manager, a free online service that allows building owners and managers to track energy consumption in their facilities. This service can rate or rank buildings based on the efficient use of energy compared to similar buildings within a portfolio. Benchmarking can help building managers monitor building performance over time and track the success of measures taken to improve energy efficiency.

As recommended in the Sustainability Plan, the City will institute an ongoing benchmarking program to support decisions about energy efficiency measures and capital improvements. Such a program would include maintaining benchmarking for the City's 37 largest buildings, monitoring performance annually, adding smaller buildings not currently in the system and potentially issuing an annual benchmarking report. This will allow Syracuse to compare like buildings and track performance year over year. Steps toward instituting such a program will include identifying appropriate staff, ensuring sufficient resources, and coordinating information collection and dissemination among building managers and department heads.

Initiative 6: Reduce the amount of energy required to heat buildings and provide hot water by implementing weatherization measures

Syracuse's climate demands a large amount of energy for building heating. Approximately 47 percent of the energy consumed by municipal buildings is natural gas used for heating. During the summer, electricity is used to cool buildings. Weatherization—the sealing and insulating of building envelopes to maximize energy use within the building enclosure—includes low-cost measures such as caulking, door seals and the insulation of ducts and pipes that can



Installation of HVAC system

have a significant and immediate impact on the energy efficiency of buildings and energy costs. Syracuse's buildings include 71 structures (29 percent of the total) that are more than 50 years old. These older buildings (and even some newer ones) often lack proper insulation, which allows outside air into buildings and conditioned air out of buildings, resulting in wasted energy.

To reduce the amount of energy required to heat—and cool—buildings and provide hot water, the City's Skilled Trades personnel will evaluate ways to integrate weatherization measures into their maintenance work schedule to expedite the completion of these low-cost, quick payback solutions. These measures are expected to include periodic inspection and replacement of caulking, pipe insulation and door seals. As recommended in the City of Syracuse Sustainability Plan, Syracuse will provide training to the appropriate staff in green energy and building practices to support maintenance practices that would save energy.

Energy Efficiency in Buildings

20% reduction of energy use in municipal buildings will save **$340k** per year

Initiative 7: Implement energy conservation measures recommended in energy audits

Recent energy audits of Syracuse's municipal buildings found opportunities to lower energy consumption and costs through low-cost building system upgrades to lighting and lighting controls, heating and cooling plants, HVAC units and systems, motors and drives, building management control systems, domestic hot water systems, and the building envelope (roof, walls, windows). Several building improvements installed by the City, including LED lighting in parking garages, have reduced energy usage.

An ASHRAE Level I audit is based on an on-site survey of the building and recommends low-cost measures for improving energy efficiency; additional research can identify measures that would result in greater savings. When a site survey shows opportunities for significant energy reduction, an ASHRAE Level 2 audit is often conducted, during which the costs and benefits of retrofitting building systems are calculated. Additional investment in building retrofits can result in significant additional energy reduction and cost savings.

A number of strategies can be employed to implement the Energy Conservation Measures: enhancement of existing operations and maintenance (O&M) assignments by facility staff and/or contractors, procurement of an Energy Performance Savings Performance Contract (EPSP) with an Energy Service Company (ESCO), and/or integration into the City's capital planning process. Syracuse will evaluate these implementation options and determine the combination of strategies that best meet its energy, procurement, administrative and financial needs. As part of the capital improvement budgeting process, the Budget Director and individual department heads will identify and evaluate opportunities to integrate ECMs into other planned building projects. The City Engineer and the Skilled Trades Department will explore whether weatherization, lighting replacement and other tasks can be accomplished by City personnel, and incorporate these functions into maintenance routines where feasible. For those ECMs that require more significant investment in labor and capital, Syracuse will evaluate financing alternatives, including procurement of an Energy Performance Savings Performance Contract (EPSP) with an ESCO.

As resources become available, the City will also conduct additional studies, including ASHRAE Level 2 Audits and retro-commissioning, to develop whole-building comprehensive strategies in those buildings with the greatest opportunities for significant energy performance improvements. This will provide planning and budget information for future capital projects. Syracuse will work with the New York Power Authority, NYSERDA and other sources to secure financing for cost-effective retrofits.

Initiative 8: Continue to require LEED Silver standards for new construction and substantial renovation of municipal buildings

LEED standards, certified by the U.S. Green Building Council (USGBC), include specifications relating to energy efficiency. Buildings designed to LEED standards meet, if not exceed, the current Energy Code.

In 2007, Syracuse passed a law requiring all new construction and major renovations of City-owned buildings, including schools, to meet the LEED Silver standard. To date, one of the three certified buildings is LEED Gold and two are LEED Sliver. Two more buildings under design are on track for LEED Silver certification.

Syracuse will continue to require this LEED Silver standard. The City Engineer and other staff are responsible for ensuring this requirement is met. As part of the construction program currently underway for Syracuse City Schools, the design of new and renovated schools will meet the LEED Silver standard.

Sunnycrest Park lacrosse

Initiative 9: Promote behavioral changes to reduce energy usage among municipal departments through awareness and incentives

Many of the daily decisions made by City department heads, facility staff and other employees affect energy use. These decisions relate to the type of equipment purchased, such as computers, refrigerators, televisions and vending machines, as well as the use of building maintenance contracts. Similar to most cities, Syracuse does not provide direct incentives to City employees or agencies to reduce their energy consumption.

Maintenance and operational protocols can reduce energy use in buildings by up to

20%

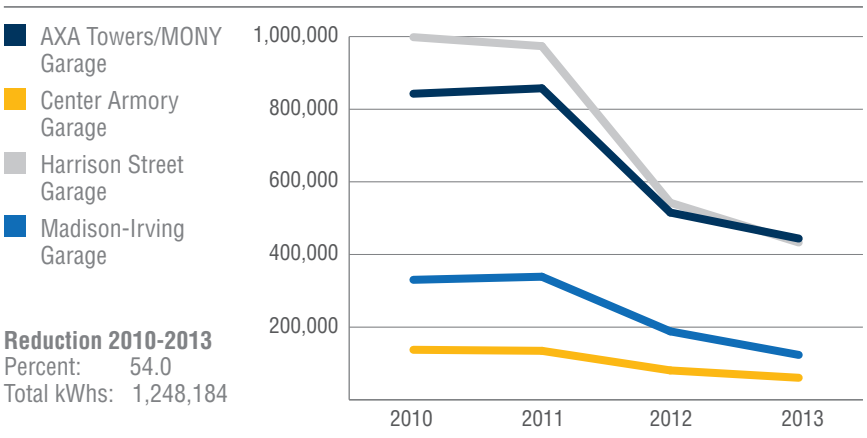
CASE STUDY Parking Garage LED Projects

In 2011, Syracuse replaced 1,300 high pressure sodium lights with LED fixtures in four parking garages: AXA Towers MONY Garage, Harrison Parking Garage, Madison Irving Parking Garage and Center Armory Parking Garage. As these garages operate nearly 24/7, with lighting used constantly, this was a clear opportunity for energy and cost savings. The new 20- to 71-watt LED fixtures replaced 195-watt high pressure sodium fixtures. In addition, the new LED fixtures incorporate sensors and controls that allow for lower lighting levels when the garages are unoccupied and in spaces that have sufficient day lighting.

The project reduced electricity use in the four garages by 54 percent—1,248,184 kWhs annually—between 2010 and 2013. In addition, the project reduced the average peak "demand" (measured in kilowatts) for all four garages by 41 percent.

Syracuse obtained funding for the $713,860 project through the Energy Efficiency and Conservation Block Grant (EECBG) awarded to Syracuse by the U.S. Department of Energy and from National Grid. In addition to the energy supply cost savings of more than $100,000/year, the reduction in average peak "demand" resulted in additional savings of nearly $200,000/year.

Annual Electricity Consumption at Four Parking Garages Before and After LED Lighting Replacement



Reduction 2010-2013
Percent: 54.0
Total kWhs: 1,248,184

Eastwood house

Offering tangible rewards to staff could signify the City's commitment to energy efficiency and generate participation by staff.

In addition, Syracuse will evaluate instituting a program to solicit and recognize the most innovative and effective ideas for behavioral changes to promote energy efficiency from agency staff and offer prizes or public recognition to those employees who make the greatest impact toward energy efficiency. A first step in establishing such a program is to identify appropriate staff and secure sufficient resources to design and implement an employee energy efficiency engagement program.

Initiative 10: Institute operational changes to reduce energy usage through changes in purchasing, maintenance and operations policies and procedures

Maintenance procedures and operational protocols can reduce energy use in buildings by 5 percent to 20 percent. More efficient operation and maintenance practices can reduce energy usage of equipment through solutions such as uniform or standardized temperature settings, overnight and weekend settings and demand control.

As recommended in the Sustainability Plan, Syracuse will create a municipal energy policy that spells out specific energy protocols and performance criteria. Guidelines will be consistent for all buildings by type, including thermostat settings. The policies will identify the responsibilities of maintenance and other personnel, and may identify an Energy Manager for each building. The City Energy Manager will provide information to department heads and other employees to help them identify ways that purchasing, contracts and other decisions can affect energy efficiency. Purchasing policies for equipment such as HVAC components, office equipment, vending machines, and pumps will favor energy-efficient models.

To be successful, City facility staff will require training designed to support improved operations and maintenance and energy efficiency of buildings. Existing training programs supported by NYSERDA and the New York State Department of State (DOS) are provided at no cost to the City. As a next step, the City Engineer, Skilled Trades and other department heads will investigate additional opportunities for staff training and identify the appropriate staff to receive specialized training.

Initiative 11: Allow energy efficiency cost savings to accrue to a fund dedicated to priority energy projects

Any savings generated through energy improvements to City-owned buildings are attributed to the general fund. Allowing departments to retain the savings generated through energy improvements to buildings that they operate and invest those savings in other building improvements (or, potentially, use as a basis for providing financing for such improvements) would create an incentive for energy efficiency—and cost savings—in City-owned buildings.

As recommended in the Sustainability Plan, and contingent upon Common Council approval, Syracuse will create a fund that is replenished by savings created through energy efficiency projects. The funds will be dedicated to priority energy projects as well as selected departmental projects. This initiative would raise awareness of energy usage and reduce waste as well as provide an incentive for agency staff to pursue energy efficiency gains. Additionally it will require development of clear budget processes and City Council action. As a next step, the City Budget Director, City Engineer, Skilled Trades and department heads will evaluate the potential for modifying the budgeting process to support this initiative.

Implementation Matrix

Responsible party	Key partners	Source of funding	Time frame	Next steps
Increase energy efficiency in buildings citywide				
Initiative 1: Ensure Energy Code compliance and evaluate adoption of more stringent code requirements for new construction of large buildings				
Code Enforcement	NYS Department of State (Training)	City budget – Enforcement Staff DOS - training	Ongoing	Identify training needs
Initiative 2: Require benchmarking and compliance with energy efficiency standards for properties receiving funding from the City				
Division of Neighborhood & Business Development	CDBG and other funding recipients	City staff budget	Short-Term	Identify suitable contracts
Initiative 3: Partner with business and community leaders and state agencies to increase the number of buildings benchmarked through Portfolio Manager				
Sustainability Coordinator/ Neighborhood & Business Development	CNY RPDB; Local building owners and builders	NYSERDA; National Grid Incentives	Short-Term	Identify appropriate staff and partners to conduct outreach
Initiative 4: Increase energy efficiency awareness and engagement through energy reduction challenges and public outreach efforts				
Sustainability Coordinator/ Neighborhood & Business Development	National Grid; CNY RPDB; Not-for-profit organizations; Neighborhood organizations	NYSERDA; National Grid; Foundations	Short-Term	Identify appropriate roles for staff and/or partners
Reduce energy consumption in municipal buildings by 20 percent by 2020				
Initiative 5: Benchmark and report on municipal energy performance on an annual basis				
All City departments	Sustainability Coordinator	City allocation of staff time	Short-Term	Solicit ideas from employees
Initiative 6: Reduce the amount of energy required to heat buildings and provide hot water by implementing weatherization measures				
Skilled Trades; DPW	Mayor; City Council	Operating Budget	Short-Term	Identify priority projects and schedule work
Initiative 7: Implement energy conservation measures (ECMs) recommended in energy audits				
Skilled Trades; DPW	Consultant, Contractor, Energy Performance Contract	NYSERDA, National Grid, Capital Fund	Medium-Term	Evaluate potential delivery options and divide energy conservation measures into three categories
Initiative 8: Continue to require LEED Silver standards for new construction and substantial renovation of municipal buildings				
Buildings	All Departments	Operating Budget	Ongoing	Allocate staff time
Initiative 9: Promote behavioral changes to reduce energy usage among City departments through awareness and incentives				
Sustainability Coordinator	Mayor; All City Departments	City Staff Budget	Medium-Term	Identify appropriate roles for staff and/or partners
Initiative 10: Institute operational changes to reduce energy usage through changes in purchasing, maintenance and operations policies and procedures				
Department of Public Works	Mayor; Sustainability Coordinator; All City departments	City Staff Budget	Medium-Term	Identify operational procedures, train workers, incorporate into work schedules
Initiative 11: Allow energy efficiency cost savings to accrue to a fund dedicated to priority energy projects				
Office of Management and Budget	Sustainability Coordinator; Skilled Trades, DPW, Mayor's office	City Staff Budget	Medium-Term	Establish a single agency lead and responsible individual and team. Assess pros and cons of 2-3 options for agency lead and draft necessary legislation or regulatory change

Time frame: Short-Term = less than five years, Medium-Term = five to 10 years, Long-Term = more than 10 years

Reduce Transportation-Related Energy Usage and Greenhouse Gas Emissions

Summary of Objectives and Initiatives

Increase the proportion of trips made by walking, bicycle and transit

Initiative 1: Revise zoning to encourage compact development patterns, walkable neighborhoods, bicycle accommodations and transit-oriented design

Initiative 2: Partner with CENTRO, businesses and institutions to encourage and support the retention and expansion of transit routes

Initiative 3: Construct bicycle lanes and support infrastructure

Initiative 4: Design and maintain the existing network of sidewalks and trails to support walking as a safe and comfortable mode of transportation

Reduce emissions from vehicles by minimizing idling and facilitating use of cleaner fuels

Initiative 5: Reduce idling on busy corridors through traffic signal coordination

Initiative 6: Set a time limit for idling

Initiative 7: Partner with Clean Communities of Central New York to expand size and use of alternative vehicle infrastructure

Reduce energy consumption and greenhouse gas emissions from the City's fleet 10 percent by 2020

Initiative 8: Decrease City fleet vehicle miles traveled through improved tracking and route optimization

Initiative 9: Right-size the City fleet by establishing efficiency and size standards for vehicle purchases

Initiative 10: Increase number of alternative fuel vehicles in City fleets

Initiative 11: Pilot use of anti-idling technologies in police vehicles

Initiative 12: Create a driver-awareness campaign for City vehicle drivers to use less fuel and decrease tailpipe emissions

Reduce energy usage and cost of municipal street lighting

Initiative 13: Convert street lights to LEDs

Residents, suburban commuters, employees and visitors contribute to energy consumption and emissions in the transportation sector whenever they drive within or through Syracuse. In 2010, vehicles travelled approximately 893.6 million miles in Syracuse, consuming approximately 53.5 million gallons of gasoline and 11.7 million gallons of diesel fuel. This fuel consumption resulted in greenhouse gas emissions totaling 551,850 metric tons. By 2030, average fuel consumption by municipal vehicles is expected to be 31 percent lower than the current baseline due to improved fuel efficiency standards. Additional reductions can be achieved by reducing the number and length of vehicle trips and increasing the use of alternative fuels.

Syracuse can directly manage its own municipal fleet and reduce its energy consumption. The City can also help to reduce energy use and related greenhouse gas emissions citywide by encouraging more trips to be made by walking, bicycling and transit, by maintaining and constructing infrastructure and promoting more compact land use and development patterns. Through implementation of Syracuse's Bicycle Infrastructure, Land Use and Sustainability plans, Syracuse is making considerable efforts to increase the proportion of trips made by these alternative modes. In addition, City initiatives reduce fuel use and greenhouse gas emissions by reducing idling and delay at intersections and increasing the use of alternative fuel vehicles.

Means of Transportation to Work

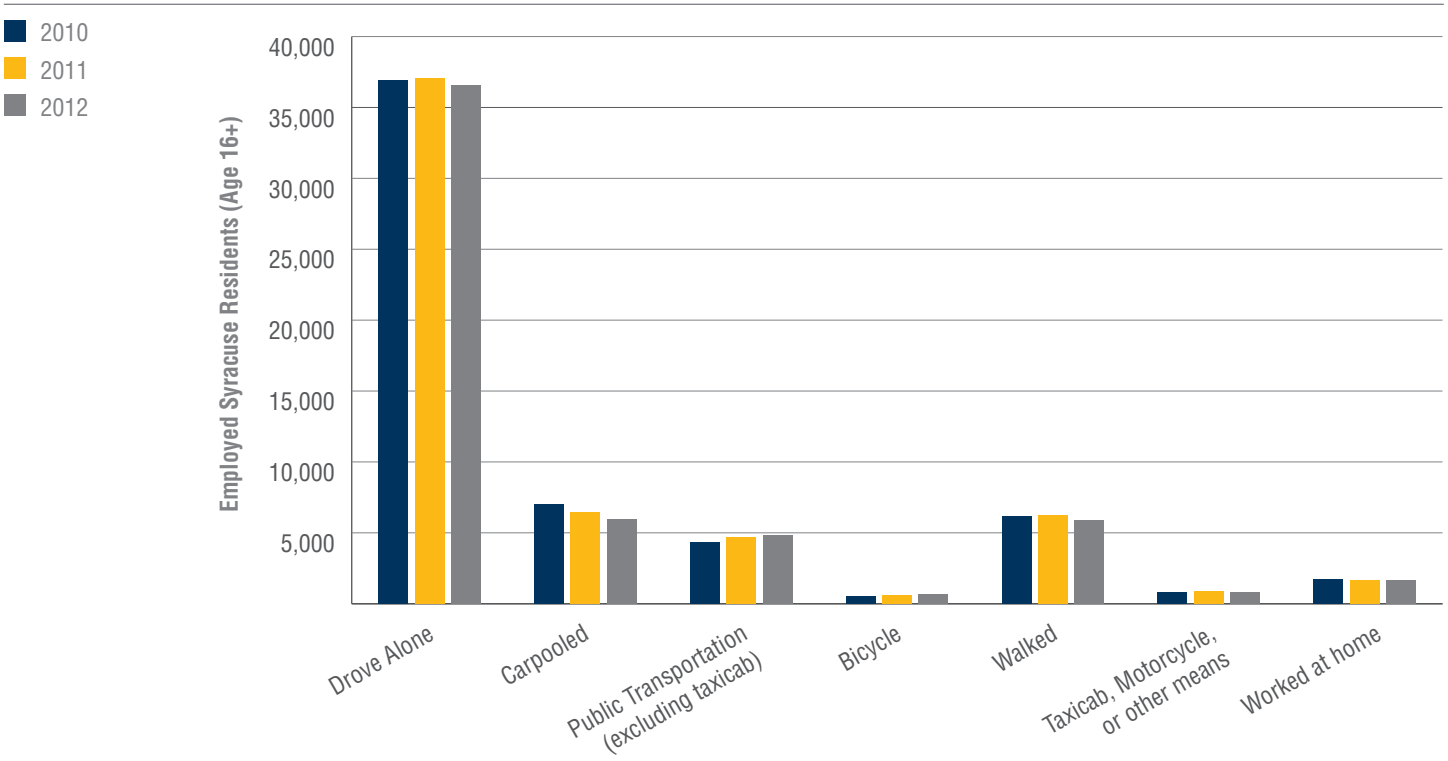


Figure 8

Source: American Community Survey ACS 5 Year, 2006-2010, 2007-2011, 2008-2012

Compact and mixed-use development around transit hubs can reduce VMT by up to

40%

Increase the proportion of trips made by walking, bicycle and transit

A great majority of trips within Syracuse are made by private vehicles, as less than 3 percent of trips are made by alternative modes of transportation such as public transit, cycling and walking. Syracuse can affect transportation choices within the community by installing infrastructure to accommodate alternative modes of travel and encouraging land-use patterns and development that make walking, bicycling and transit more attractive options.

Initiative 1: Revise zoning to encourage compact development patterns, walkable neighborhoods, bicycle accommodations and transit-oriented design

Land-use patterns have a significant impact on transportation energy consumption. Population growth in the suburbs has meant more commutes to the region's employment centers in the city, resulting in a 12 percent increase in vehicle miles traveled (VMT) by Onondaga County residents between 2000 and 2007. Compact development patterns and mixed-use communities planned and built around transit hubs can reduce VMT by up to 40 percent.

The City of Syracuse Land Use Plan established guidelines for rezoning that prioritize bicycle and pedestrian transportation and encourage walking, biking and transit. It establishes a focus on residential and business development in existing neighborhood centers and along historic transportation corridors. The plan establishes design guidelines for the various "character areas" that make up the city and its neighborhoods.

The City Planning Division and City Zoning Administration are undertaking a comprehensive zoning revision in accord with the Land Use Plan with financial assistance from NYSERDA. The divisions will revise zoning regulations to increase accommodations for bicycling and transit, including amended parking and site plan standards and design guidelines for neighborhoods. The City Planning and City Zoning divisions of the Syracuse-Onondaga County Planning Agency will lead the

By 2030, federal fuel efficiency standard will result in

31%

lower fuel consumption by vehicles

implementation of the Land Use Plan, assisted by a consultant. Syracuse's Common Council will vote on adoption of the revised zoning ordinance following input from the City Planning Commission.

Initiative 2: Partner with CENTRO, businesses and institutions to encourage and support the retention and expansion of transit routes

The public transit service CENTRO, operated by the Central New York Regional Transit Authority (CNYRTA), recently constructed a transit hub at the corner of Adams and South Salina streets in downtown Syracuse. The majority of CENTRO's routes operate on a hub-and-spoke system, centered downtown, which enhances connections between different routes. Ridership during September 2010 was 43,417 people per day on more than 100 routes. Future improvements under consideration include instituting bus rapid transit along key corridors and identifying suitable locations for transit-oriented development.

Several initiatives underway in Syracuse help make transportation by transit, walking and cycling more viable and comfortable. A significant example of this type of initiative is the Connective Corridor, which attracted $42.5 million in funding for a variety of transportation and streetscape improvements that will result in increased use of transit, bicycling and walking within the corridor, which connects downtown with Syracuse University and surrounding neighborhoods. The City improved the sidewalks, striped the pavement with bicycle lanes and installed bus pull-outs, lighting and landscaping. The City also installed public art at key gateways and new seating, fountain renovations, native plantings, pathways and recycling facilities at a park. CENTRO partnered with Syracuse University to establish a free, dedicated bus line that connects downtown with the campus. Businesses along the corridor have access to grant funding to improve building facades.

Connective Corridor

Syracuse's Connective Corridor is a recent example of a successful collaboration to encourage alternative modes of transportation, and it provides a useful model for future partnerships. The corridor connects University Hill with downtown Syracuse and more than 30 arts and culture venues. The project received funding from numerous sources: Syracuse University and the City secured $42.5 million in grants from the Empire State Development Corporation and the Dormitory Authority of the State of New York, a $10 million TIGER II transportation grant, $2 million from Onondaga County for green infrastructure, and $1 million from National Grid. In cooperation with CENTRO, Syracuse's transit authority, new buses and digital technology have enhanced bus service between Syracuse University and downtown destinations. Downtown façade improvements and public art enhance the aesthetics of the city center. The City installed streetscape improvements, bike lanes, landscaping, green infrastructure and lighting projects to create a "gateway" to University Avenue that enhances the travel experience along the corridor. CENTRO operates a free, dedicated bus line between University Hill and downtown. Another key partner in the Connective Corridor is the Syracuse Center of Excellence, which is testing new technologies such as LED lighting, battery and energy storage, energy efficient/smart building systems and smart transportation along the path. Other complementary projects include technology improvements at Syracuse Stage, improvements to City-owned Forman Park and bike lanes and streetscape improvements along East Genesee Street.

Creekwalk Bike Sign

Syracuse will continue to support partnerships with community organizations to secure grant funding and private investment for transportation improvements that support increased use of alternative forms of transportation. In addition to the energy benefits of these improvements, residents and visitors will enjoy improved quality of life and the city will continue to retain businesses and attract new private investment.

Initiative 3: Construct bicycle lanes and support infrastructure

The City has installed numerous street improvements to accommodate bicycles, as recommended in the Syracuse Bicycle Plan 2040. By the end of 2012, more than 13.6 miles of bicycle lanes had been added, primarily through striping along streets. The early focus of this effort was in the University Hill neighborhood, which expressed strong support for improved accommodations for bicyclists. Key off-road bicycle lanes include the Syracuse Creekwalk, which connects Armory Square in downtown Syracuse to Onondaga Lake. A study is underway to develop an off-road route or other enhancements for the New York State Erie Canalway Trail, which utilizes Erie Boulevard.

With the completion of the Bicycle Plan, Syracuse has a clear methodology for identifying optimal bicycle corridors and designing appropriate infrastructure for specific corridors. Each year, Department of Public Works staff convenes a committee, with input from the Syracuse Metropolitan Transportation Council (SMTC), to discuss opportunities and recommend projects for funding in the City's capital budget. Considerations include coordination with other street reconstruction projects and consistency with other municipal projects.

As recommended in the Sustainability Plan, Syracuse will improve infrastructure for multi-modal transportation that enhances appeal and safety for bicyclists through the construction of additional bike lanes, "sharrows," cycle tracks, bicycle parking and other infrastructure. The City will continue to partner with Syracuse University and other organizations involved in the Connective Corridor project to establish a continuous bicycle system between the University Hill neighborhood, downtown Syracuse and the Near Westside neighborhood.

Initiative 4: Design and maintain the existing network of sidewalks and trails to support walking as a safe and comfortable mode of transportation

"Complete Streets" are planned and designed to address access and mobility for roadway users of all ages and abilities, including pedestrians, bicyclists, wheelchair users, public transportation riders, and motorists. The Syracuse Comprehensive Plan 2040 directs the City to plan for Complete Streets when developing the City's Capital Improvement Program and to view any modification to public and private streets as an opportunity to improve safety, access and mobility for all travelers.

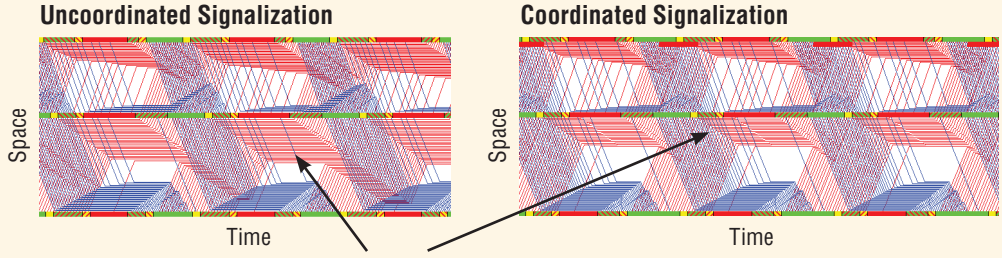
The City will continue to implement Complete Streets principles in the design and construction of roadway improvements. The implementation of form-based codes and design standards in the upcoming zoning ordinance revision will ensure that new development is consistent with each neighborhood's character and will support alternative modes of transportation.

CASE STUDY Monroe County Traffic Signal Optimization

Monroe County's Regional Traffic Operations Center (RTOC), constructed in collaboration with NYSDOT, monitors and remotely controls traffic signals at more than 450 intersections within Rochester and adjacent communities. Real-time monitoring with cameras at 85 key intersections allows the RTOC to quickly adjust signal timings to control traffic congestion in the case of accidents or upon notification from the public safety coordinator. Monroe County is recognized as a leader in the use of Synchro modeling software to analyze and monitor traffic flow based on input data on traffic signal timings, traffic volumes and roadway network.

The two-dimensional "time-space diagrams" shown below, generated by the Synchro model, compare traffic flows at a single intersection under two scenarios—coordinated signal timing and uncoordinated signal timing—along a major east-west suburban Rochester corridor during the afternoon peak hour. The horizontal axis represents time and the vertical axis represents space. The figures depict the position of vehicles through time (horizontal axis) as they travel from one intersection to another (vertical axis).

The horizontal red, yellow and green bands at the top, middle and bottom of the images represent the red, yellow and green phases of a traffic signal at a particular intersection. The red lines represent westbound vehicles (depicted as traveling from the bottom to the top of the diagram) and the blue lines represent eastbound vehicles (shown traveling from the top to the bottom of the diagram.) Each line shows the path of a single vehicle. Horizontal lines represent vehicles that are stopped at intersections—time passes for these vehicles but they do not move in space. Sloped lines represent vehicles in motion.



Nearly twice as many cars idling at this intersection in the "uncoordinated" model

In the uncoordinated diagram on the left, there are nearly twice as many horizontal red lines shown below the red phase of the traffic signal, representing stopped vehicles in the westbound direction.

Note that there is not a significant difference in the blue lines (eastbound vehicles) between the two diagrams. At this location during the afternoon rush hour, the signal coordination is set to favor the heavier westbound traffic volumes.

A 2010 study using Synchro measured delay at intersections under two scenarios—with and without signal coordination at each intersection during the morning and evening peak hours. Based on calculations for these two weekday hours only, that improved traffic signal coordination reduced gasoline consumption in Monroe County by more than 450,000 gallons per year.

Idling vehicles consume

1 gallon

of fuel per hour

Reduce vehicle emissions by minimizing idling and facilitating use of cleaner fuels

While Syracuse continues to encourage use of alternative modes of transportation, personal vehicles and commercial vehicles will continue to dominate commutes and trips made to, from and within the city. Therefore, in addition to reducing vehicle miles traveled, it is necessary to reduce emissions from those trips that will continue to occur by passenger and commercial vehicles to reduce citywide energy consumption and improve air quality. This requires vehicles to use fuel more efficiently, reduce wasteful consumption and switch to cleaner energy sources.

Initiative 5: Reduce idling on busy corridors through traffic signal coordination

In vehicles with standard combustion engines, when drivers sit in traffic with their engines running, the vehicle consumes fuel and emits pollutants. On average, idling consumes 1 gallon of fuel per hour per vehicle. Reducing idling can have a significant impact on overall fuel consumption.

One strategy to reduce idling is to reduce delay at intersections with traffic signals. Syracuse is working to do this by upgrading its traffic signal infrastructure to enable coordination of the signal network and its ability to be remotely operated and monitored by City staff. While the majority of Syracuse's signal network is not coordinated, much of the physical infrastructure to do so —including controllable traffic signals, signal controllers and necessary conduit—is in place. The effect of traffic signal coordination will be to reduce wasteful fuel consumption at intersections and to improve air quality.

Syracuse will continue to implement the $10 million traffic signal coordination project, funded by the Syracuse Metropolitan Transportation Council (STMC). These upgrades will allow for 90 percent of interconnected signals to be controlled remotely and enable the real-time monitoring of conditions at key intersections along the most heavily travelled north, south, east and west corridors. With real-time monitoring, City staff will be able to manage signal timing in response to accidents or periods of unusually heavy traffic. In addition to reducing idling, the City will utilize the infrastructure to improve the efficiency of

NYPA lighting upgrade project

Syracuse has
16
EV charging stations

transit at traffic signals (giving priority to buses) and improve in-pavement vehicle detection systems. Syracuse will continue to collaborate with New York State Department of Transportation (NYSDOT) to integrate traffic signals into the signal coordination program. The City is also planning for future expansion of a traffic signal optimization project.

Initiative 6: Set a time limit for idling

Turning off vehicles is a no-cost strategy to reduce energy use and greenhouse emissions within the city. Numerous municipalities have set quantifiable and useful idling limits around the country, and Syracuse will consider doing the same.

To reduce unnecessary fuel consumption from idling vehicles, Syracuse will investigate the feasibility of establishing and enforcing a formal "no idling" policy for municipal vehicles as well as a "no idling" ordinance. The policy would set a time limit for idling—either New York State's five minutes or three minutes as established in other municipalities. As resources allow, City staff or a qualified consultant will review existing models, standards and guidelines, draft the policy, manage an internal review process and present to the Common Council for approval.

Once approved, City Planning staff will investigate ways to promote public awareness, such as with a press release and information on the City's website. The informational campaign and enforcement would best be focused on high idle areas, such as school zones, with support from parking enforcement staff and police in extreme circumstances.

Initiative 7: Partner with Clean Communities of Central New York to expand size and use of alternative vehicle infrastructure

In addition to reducing wasteful energy consumption from the transportation sector, efforts to expand the use of cleaner fuel sources, such as compressed natural gas, biodiesel and electric vehicles can foster efficiency gains and greenhouse gas emissions reductions in the transportation sector. During the past few years, electric vehicle infrastructure has grown exponentially in the greater Syracuse area. There are 16 electric charging stations in Syracuse, including the Hills Building, the Carousel Center Mall, the Farmer's Market lot, the SUNY College of Environmental Science and Forestry, and the Convention Center. Three additional charging stations are located in nearby Liverpool.

During 2012, area car dealerships reported sales of 49 electric and plug-in hybrid vehicles. Given its extensive electric vehicle charging infrastructure and the growing number of commercially available electric and plug-in electric vehicle models, Syracuse is well positioned to make use of the existing infrastructure and encourage further expansion.

To help foster this expansion, Syracuse will continue to partner with Clean Communities of Central New York (CCCNY) and its members to increase alternative fuel vehicle deployment among municipal and other public and private fleets. Participation in a coalition of private and public partners will improve both the City's and its partners' ability to attract outside funding. As resources allow, Syracuse will participate in CCCNY events, support efforts to increase the number of clean fuel vehicles deployed at the airport (shuttles, rental vehicles, Airport Authority vehicles), and support Syracuse University's effort to increase its number of alternative fuel vehicles and enhance charging infrastructure.

Locations of Alternative Fuel Stations in Syracuse, 2013

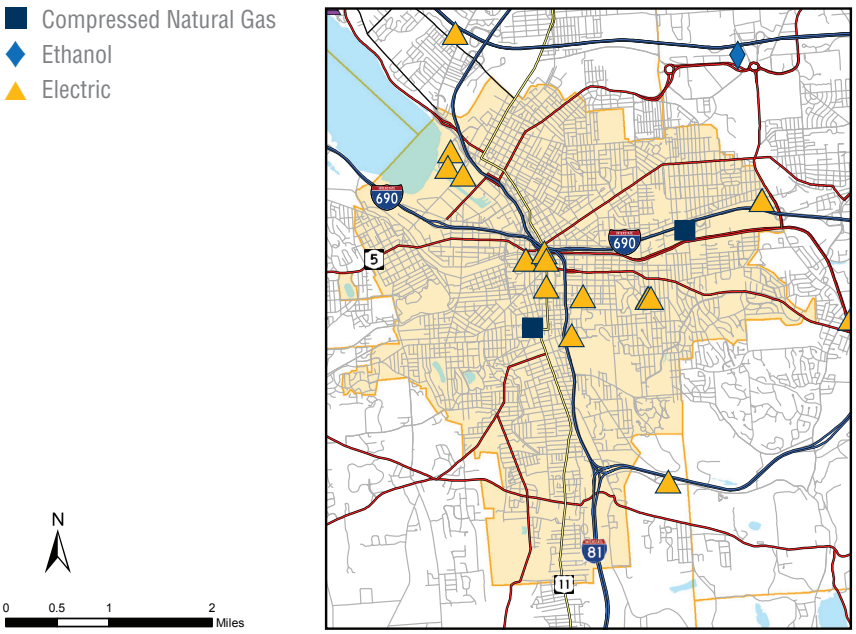


Figure 9

Reduce energy consumption and greenhouse gas emissions from the City's fleet by 10 percent by 2020

The City of Syracuse maintains a fleet of 1,029 on- and off-road vehicles, including waste collection and fire trucks, park maintenance vehicles, police patrol vehicles and standard passenger vehicles. The largest component of the municipal fleet, with 382 vehicles, is police vehicles. Excluding in-house labor, Syracuse spends approximately $8.5 million annually to operate its fleets, with 38 percent going towards fuel purchases. To cost-effectively reduce those expenses and the environmental impact of municipal vehicle operations, the City has developed a comprehensive strategy to consume less fuel by reducing vehicle miles traveled, minimizing idling and right-sizing vehicles. Syracuse plans to further reduce emissions and lead by example by incorporating more alternative fuel vehicles into its vehicle replacement processes. Given the decentralized nature of the City's fleet management, inter-departmental coordination, standardized and transparent processes and accountability will be critical to reducing the fleet's energy use.

Initiative 8: Decrease City fleet vehicle miles traveled by 3 percent through improved tracking and route optimization

The City of Syracuse has made progress to decrease vehicle miles traveled (VMT) without impacting municipal services, including adjustments to trash and recycling pickup routes. To achieve additional reductions, Syracuse will leverage existing staff resources from each relevant department to form an interdepartmental fleet management team as recommended in the Sustainability Plan. The team will work with the City Energy Manager to coordinate VMT reduction efforts and identify opportunities for route optimization across departments. As resources allow, the team will track and report VMT and fuel consumption trends, communicate VMT goals throughout their departments and share VMT reduction suggestions.

Possible VMT reduction strategies include elimination of unnecessary trips, trip chaining, examination of central equipment locations and equipment delivery methods and route optimization, which seeks to eliminate unnecessary driving

CASE STUDY **CENTRO: Transforming an Urban Transit Fleet**

The Central New York Regional Transit Authority (CENTRO) has comprehensively "greened" its transit fleet by applying a variety of best available technologies which save fuel and improve air quality, along with reducing fuel costs. CENTRO has a large-scale compressed natural gas (CNG) bus operation based at its downtown Syracuse headquarters, servicing routes throughout the city. In addition to its CNG units, CENTRO has added hybrid electric buses to its fleet. CENTRO has one of the largest natural gas transit bus fleets in the state. Its large CNG station was constructed in 1996 and was one of the original transit fleets to make use of CNG in the state. Out of 144 large transit buses at the Syracuse location, CENTRO stages 102 large CNG transit buses from the facility, as well as nine diesel electric hybrid buses. Thirty-three buses run on diesel fuel. Its bus garage is outfitted for CNG vehicles, and highly trained staff members operate and maintain the vehicles and fueling station. CENTRO also operates an important public CNG fueling station in south Syracuse. The City has a collaborative fueling agreement whereby City natural gas vehicles are able to fuel there. The U.S. Department of Energy's most-recent alternative fuel and vehicle deployment report shows CENTRO's buses displaced 878,592 gallons of fuel (based on gasoline equivalents) during 2013.

and is generally applied to repetitive vehicle routes. Syracuse will evaluate the feasibility of expanding its use of technology such as Automatic Vehicle Locator (AVL) to improve management of vehicle miles traveled within each department and, if recommended by the fleet management team, the use of route optimization software and higher level technology applications with the assistance of a fleet professional.

CENTRO Bus

Initiative 9: Right-size the City fleet by establishing efficiency and size standards for vehicle purchases

Syracuse uses a decentralized process to acquire vehicles with each department responsible for its own vehicles. Generally, the departments choose the smallest vehicle for the job and some downsizing has been realized through attrition. A municipal right-sizing policy involves evaluating the duty cycle of a vehicle versus the model chosen, in order to choose the smallest, most fuel-efficient vehicle to perform the job. Formalizing criteria for right sizing vehicle choices could assist in lowering overall fuel usage.

As recommended in its Sustainability Plan, Syracuse will adopt policies to guide energy efficiency of municipal vehicles to ensure that each department chooses the least expensive and smallest vehicle for a particular task. The fleet management committee will consider efficiency and size standards for each duty application as well as policies for take home vehicles to ensure the "best efficiency vehicle in class." The fleet management committee will work with the City Energy Manager and each operating department to integrate these policies into vehicle procurement procedures.

Initiative 10: Increase number of alternative fuel vehicles in City fleets

Most vehicles in the City's fleet run on traditional diesel or unleaded gasoline. Syracuse also maintains a small number of natural gas and hybrid electric vehicles, including four compressed natural gas heavy duty vehicles, two hybrid heavy duty vehicles and a number of flexible fuel vehicles. In 2010, the fleet consumed 711,823 gallons of diesel fuel, 322,743 gallons of unleaded gasoline and 6,681 gallons of gasoline equivalent of CNG. Municipal vehicles emitted nearly 70,000 MT CO2e in 2010.

To reduce dependence on air-polluting diesel fuel, Syracuse will evaluate replacing four heavy-duty refuse trucks, two street sweepers and four mid-size gas sedans with comparable CNG vehicles, based on the availability of funding and projected fuel costs. Staff will fuel these and the City's other CNG vehicles at CENTRO's fueling station, located at CENTRO's headquarters on the south side of Syracuse. The City will support efforts by CENTRO to modernize the station as a partner in grant applications and through fuel purchase agreements. To obtain the best prices, Syracuse will explore collaborations with Onondaga County, Onondaga County Resource Recovery Authority (OCRRA) and other entities to obtain lower prices through bulk purchases.

Salt Truck in DPW Garage

Additionally, the City will evaluate the feasibility of integrating electric vehicles into its fleet with the purchase of five plug-in hybrid electric medium duty trucks, four midsize electric cars, and one small electric SUV to replace comparable conventional vehicles. With today's technology, plug-in hybrids are more suitable than pure electric vehicles given Syracuse's harsh winters. To ensure effective maintenance of these vehicles, the Department of Public Works will provide training to its mechanics and assist in receiving certifications for hybrid vehicles. The City will seek grant funding to help cover the incremental additional cost of these vehicles. Based on the experience with the initial purchase of electric vehicles, Syracuse will evaluate whether to acquire additional electric vehicles.

To lead by example, Syracuse will publicize its alternative vehicle program to provide awareness to the public about the benefits of clean air vehicles and provide information on resources. In addition, Syracuse will work with the charging station operator (Car Charging Group) to facilitate the placement of "EV Charging Station" signage in street rights-of-way.

Initiative 11: Pilot use of anti-idling technologies in police vehicles

The police fleet comprises 37 percent of the vehicles used in City operations. Police vehicles operate constantly with little downtime and are estimated to idle approximately four hours per day. Limiting idle time represents an effective method to decrease fuel use by patrol vehicles. Police vehicle anti-idling technology packages account for their unique public safety requirements, enabling the vehicle's lights and computers to continue to operate with the engine off.

The Syracuse Police Department will evaluate the feasibility of installing an anti-idling package into five vehicles as a pilot test of anti-idling technology. This initiative is projected to reduce gasoline usage by 1,679 gallons per vehicle annually. Some municipalities have reported fuel reduction of up to 2.4 gallons per day or 4,380 gallons annually per unit. After the first year, the Syracuse Police Department will evaluate the savings and consider expanding the technology to additional vehicles.

Downtown Syracuse at night

Initiative 12: Create a driver-awareness campaign for City vehicle drivers to use less fuel and decrease tailpipe emissions

A driver-awareness campaign for municipal employees is another low-cost approach to reducing energy usage. Such a campaign articulates energy reduction goals and creates interest among drivers in taking measures and changing behavior to meet the goal.

As resources allow, Syracuse will prepare and distribute information to drivers, such as a short handout and web links. These materials will explain fuel reduction goals for the municipal fleet, offer simple explanations and suggestions on how to use less fuel and encourage interested workers to take an online eco-driving course. A good model for such a handout is a short, half-page document with a photo or graphics. The City will coordinate distribution of information to department heads with other fleet management team efforts and anti-idling campaign material.

Another driver-awareness tool that has been effective in other areas is tags hung in City vehicles. Simple contests among employees at the Water Department or Department of Public Works can acknowledge those employees that have reduced fuel consumption the most. These contests can be effective if the goals and rewards are well understood, participation is voluntary and competitions result in budgetary savings.

Reduce energy usage and cost of municipal street lighting

There are 17,720 streetlights in Syracuse. Nearly all (17,656) are high pressure sodium (HPS) and 64 are metal halide (MH). Syracuse leases most of these from National Grid, paying the utility company for maintenance and energy use.

In 2010, street lighting consumed 14,215,784 kWh of electricity, representing 48 percent of the City's total electricity usage. Due to facility charges paid to National Grid for maintenance of the fixtures and infrastructure, the cost of street lighting represents 61 percent of Syracuse's electricity costs for municipal facilities.

Sidewalk and Streetlight at Franklin Square

Streetlights account for

48%

of the total municipal operations electricity use

Initiative 13: Convert streetlights to LEDs

Many U.S. cities have converted or are in the process of converting their streetlights from high intensity discharge (HID) fixtures (e.g., high pressure sodium, metal halide and mercury vapor) to light emitting diodes (LEDs). The market for LED street lighting has been changing rapidly, with costs decreasing and fixture reliability increasing. Additionally, LED luminaires have been found to provide better uniformity of illumination than is achievable with HID fixtures. This helps reduce light spillage into locations where it would be a nuisance while enhancing it where needed.

If all of the streetlights in Syracuse were converted to LEDs, the cost (excluding design fees and the cost of purchasing the streetlights and associated equipment from National Grid) would be approximately $6 million and the City would save approximately $1 million per year. The purchase of streetlights from National Grid is estimated to cost another $4.6 million. As a first step, Syracuse will acquire selected underpass lighting from National Grid and convert those to LED. The expected cost of this project is $500,000, with estimated savings of more than $81,000 annually, based on reduced maintenance requirements and energy usage. Syracuse will explore a range of options for financing and long-term maintenance, including the phased purchase of all streetlights from National Grid and the use of an Energy Services Performance Contract (ESPC) with an Energy Services Company (ESCO).

Syracuse will explore the feasibility of acquiring all of the streetlights in the city from National Grid and converting the lights to LEDs on a phased basis. An alternative option is to support National Grid in its effort to convert streetlights to LED and participate in the New York State Public Service Commission (PSC) efforts to establish a new tariff for LED streetlights that is fair to the utility and the City. Syracuse will also explore multiple potential financing options, including the use of an ESPC with an ESCO, along with possible NY Green Bank partnerships.

Implementation Matrix

Responsible party	Key partners	Source of funding	Time frame	Next steps
Increase the proportion of trips made by walking, bicycle and transit				
Initiative 1: Revise zoning to encourage compact development patterns, walkable neighborhoods, bicycle accommodations and transit-oriented design				
Planning and Zoning Divisions	Neighborhood Associations, Businesses	NYSERDA Cleaner Greener implementation grant	Medium-Term	Specify scope of work and retain consultant
Initiative 2: Partner with CENTRO, businesses and institutions to encourage and support the retention and expansion of transit routes				
Sustainability Coordinator	CENTRO; Community Organizations, Syracuse University, Other institutions	City budget	Ongoing	Identify funding opportunities, community initiatives
Initiative 3: Construct bicycle lanes and support infrastructure				
DPW (bicycle/pedestrian infrastructure)	Community organizations	Reduced energy use from vehicles (fewer VMTs)	City budget; State Department of Transportation grants	Program bicycle improvements in Capital Improvement Program
Initiative 4: Design and maintain the existing network of sidewalks and trails to support walking as a safe and comfortable mode of transportation				
DPW (infrastructure)	Community organizations	City budget, NYS DOT and other grants	Short-Term; Ongoing	Program improvements in Capital Improvement Program
Reduce emissions from vehicles by minimizing idling and facilitating use of cleaner fuels				
Initiative 5: Reduce idling on busy corridors through traffic signal coordination				
DPW	NYS DOT, Onondaga County	NYS DOT; Federal highway funding	Short-Term	Implement recommendations in recent study
Initiative 6: Set a time limit for idling				
Mayor's Office, Fleet managers	Clean Communities of Central New York (CCCNY); Common Council	City staff budget	Short-Term	Evaluate policies of other cities to determine appropriate idle time
Initiative 7: Partner with Clean Communities of Central New York to expand size and use of alternative vehicle infrastructure				
Sustainability Coordinator and Department of Public Works	Syracuse University and other CCCNY stakeholders	City staff budget	Short-Term; Ongoing	Designate liaison to CCCNY; provide vehicles for display if requested for local events; provide letters of recommendation for grants

Time frame: Short-Term = less than five years, Medium-Term = five to 10 years, Long-Term = more than 10 years

Implementation Matrix

Responsible party	Key partners	Source of funding	Time frame	Next steps
Reduce energy consumption and greenhouse gas emissions from the City's fleet 10 percent by 2020				
Initiative 8: Decrease City fleet vehicle miles traveled by 3 percent through improved tracking and route optimization				
Department of Public Works	Fleet managers; Sustainability Coordinator; Onondaga County Purchasing Staff	City staff budget; Grants	Short-Term; Ongoing	Track vehicle use on units with AVL/GPS to determine wasteful use patterns; assess potential for route optimization software
Initiative 9: Right-size the City fleet by establishing efficiency and size standards for vehicle purchases				
Mayor's Office	Fleet Managers; Office of Budget; Sustainability Coordinator	City staff budget	Ongoing	City must determine which office to center effort since each department has its own vehicle purchase procedures.
Initiative 10: Increase number of alternative fuel vehicles in City fleets				
Department of Public Works- Fleet (heavy duty vehicles) and Mayor's Office/Engineering (for any vehicles staged out of City Hall)	CCCNY, NYSERDA; Vehicle vendors	NYSERDA or new CNG state funding programs	Short-Term to Medium-Term	Identify select number of units for replacement with CNG and plan for grant funding for incremental cost; apply for grant when available. For plug-in electric, identify vehicles stored downtown that could use existing charging stations; open account with charging station operator
Initiative 11: Pilot use of anti-idling technologies in police vehicles				
Police Department Fleet Managers	NYSERDA, CCCNY	State or other grants, Technology Innovation funds	Medium-Term	Acquire funds and select technology provider
Initiative 12: Create a driver-awareness campaign for City vehicle drivers to use less fuel and decrease tailpipe emissions				
Mayor's Office, Fleet Managers	Clean Communities of Central New York (CCCNY)	City staff budget	Short-Term	Assign responsibility for creating campaign
Initiative 13: Convert streetlights to LEDs				
DPW - Street Lighting Coordinator	Sustainability Coordinator; National Grid	City capital budget; NYSERDA or other incentives; Energy performance contract	—	Acquire and convert underpass lighting; Investigate alternatives regarding ownership and maintenance for lighting owned by National Grid; Evaluate financing options

Time frame: Short-Term = less than five years, Medium-Term = five to 10 years, Long-Term = more than 10 years

Modernize Energy Infrastructure to Ensure Safe, Reliable and Affordable Energy for City Consumers

Summary of Objectives and Initiatives

Support the upgrade and modernization of local energy infrastructure in conjunction with utilities and other stakeholders

Initiative 1: Support National Grid's infrastructure modernization program by coordinating the scheduling of work in City rights-of-way

Initiative 2: Improve resiliency by supporting expansion of district energy and micro grids

Support community efforts to generate electricity from renewable sources

Initiative 3: Provide information to homeowners, homebuyers, commercial businesses and builders on opportunities for solar and other renewable energy generation

Initiative 4: Partner with a not-for-profit or governmental agency to administer a "Solarize Syracuse" program

Increase the generation of electricity from renewable sources at City-owned facilities

Initiative 5: Perform site-specific studies for facilities where solar, wind and micro-hydro energy generation are most promising

Initiative 6: Consider issuing an RFP for a Power Purchase Agreement or lease for the installation of renewable energy generating equipment

Residents, businesses and institutions rely on the consistent supply and reliable distribution of electricity and natural gas to maintain a high quality of life and to support continued economic development. Increased decentralized generation, especially from renewable sources such as solar, is needed to support resiliency in case of disruption to the primary supply and distribution infrastructure. As numerous federal, state, local and regional agencies influence energy decisions, including siting, scheduling and rates made by utilities and other entities, Syracuse has an opportunity to facilitate coordination among these entities as they work toward achieving this goal.

National Grid is the public utility authorized by the New York State Public Service Commission to deliver electricity and natural gas to customers throughout Syracuse. It distributes electricity to customers within the city via high-voltage transmission lines that convey the electricity from generating plants elsewhere. It distributes natural gas through a network of pipelines and pressure-regulating valves from long-distance transmission pipelines.

The electricity generated for use in upstate New York, including Syracuse, mostly originates from independently operated power plants such as the Ginna nuclear plant in Wayne County, NYPA's hydro-electric plant in Niagara County and other plants powered by natural gas, fuel oil or coal. There are two smaller generating facilities within or near Syracuse, including a waste-to-energy facility. Upstate New York's fuel mix for electricity is a combination of hydro, nuclear, gas and — to a lesser extent — coal. This is significantly cleaner than the U.S. average, with pounds of emissions per megawatt hour averaging less than 550, compared to the U.S. average of 1,232.

The regulatory framework that governs electricity generation and distribution is designed to meet energy needs the city might only experience a few days a year, in the peak of summer. The cost of building large-scale infrastructure to meet these large capacity needs is borne by utility rate payers. The high cost of this system has necessitated a transition to more a more distributed generation network, comprised partly by renewable energy sources such as solar and wind. In addition to cost benefits, a modern, distributed energy infrastructure offers clean energy solutions that can lower emissions and enhance resiliency to the effects of climate change and other extreme weather events.

Upstate New York Electricity Generation Fuel Mix

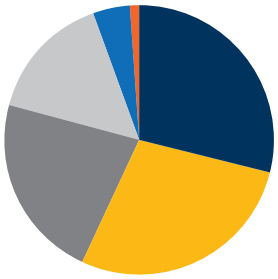


Figure 10

Syracuse possesses some of the foundation of this modern infrastructure, including combined heat and power facilities at school, university and government facilities. In addition, the Public Service Commission's Reforming Energy Vision (REV) presents a unique opportunity for National Grid and smaller electricity generators to take advantage of new regulatory frameworks to increase the amount of electricity generated from distributed energy and renewable sources.

Support the upgrade and modernization of local energy infrastructure in conjunction with utilities and other stakeholders

Initiative 1: Support National Grid's infrastructure modernization program by coordinating the scheduling of work in City rights-of-way

The paramount purpose of the energy distribution and supply system remains to ensure safety and reliability, which enables the continued functioning of Syracuse's economic and social activity. Since a large proportion of the electric and natural gas distribution infrastructure is located within the rights-of-way of City streets, ensuring this reliability and safety hinges on careful coordination between the City and utilities on public works projects and priorities. National Grid's modernization efforts include the phased replacement of older natural gas pipelines to improve reliability and reduce the potential for leakage. In addition, improvements to electric substations and distribution lines are both planned and underway.

To coordinate scheduling of work within City rights-of-way, Syracuse Department of Public Works (DPW) staff meet regularly with representatives from National Grid to coordinate scheduling for upcoming work within City street rights-of-way. National Grid notifies City staff when it needs access to City streets to address reported leaks and to schedule pipeline replacement and electric system upgrades within street rights-of-way. City staff coordinate with National Grid to schedule utility work in conjunction with street improvements or water or sewer projects underneath streets. This coordination helps to avoid inefficiencies resulting from repeated work within the same section of roadway.

DPW staff will continue to take the lead in coordinating infrastructure improvements within municipal rights-of-way. DPW staff will continue to participate in regular meetings with National Grid and other entities that maintain infrastructure within City rights-of-way to coordinate utility infrastructure improvements with other road repairs, water main replacements and other projects.

Initiative 2: Improve resiliency by supporting expansion of district energy and microgrids

Continued expansion of district energy and microgrid development has potential to improve system reliability, efficiency and resiliency while decreasing participants' cost and emissions. Syracuse will support efforts by the state, utilities, businesses and institutions to expand district energy systems, microgrids and other distributed energy resources that align with the Reforming the Energy Vision (REV) proceeding designed to encourage the overall system efficiency of the grid.

District energy systems provide energy to a building or area without requiring connection to the utility. In Syracuse, Onondaga County's District Heating and Cooling Plant supplies steam to the county's downtown buildings for heating and cooling in addition to generating electricity. Syracuse University's Steam Station provides steam and chilled water to campus buildings, neighboring hospitals and SUNY College of Environmental Science and Forestry.

A microgrid is a group of interconnected electricity loads within clearly defined boundaries that can be either connected to the wider electrical grid or operate independently. District energy and microgrids can support system reliability and resiliency by continuing to provide electricity and other energy during disruptions to the larger electricity grid and energy distribution network.

Project Orange and Other Incarnations of the SU District Steam System
Syracuse's history with district energy systems includes large, high-profile systems that no longer operate, such as Project Orange. It operated a combined heat and power plant from 1992 until 2009, providing steam to Syracuse University and other buildings on University Hill and selling electricity to National Grid through a lucrative state-mandated contract. Ultimately, the price of Project Orange's electricity was too high for National Grid, which bought out the contract. Without National Grid as an electricity customer, Project Orange lost money generating steam and experienced unsuccessful lawsuits against Syracuse University in attempts to achieve better terms with a revised contract. Had it been possible for Project Orange to sell electricity via a microgrid, the outcome might have been different. Project Orange sold its equipment and demolished its remaining facilities as consequences of bankruptcy, and Syracuse University revived its 1929 steam plant to ensure availability of district steam to client buildings.

There are numerous cogeneration (combined heat and power, also known as CHP) projects in Syracuse that use the heat created during the electricity generation to heat buildings. These include Syracuse University's Green Data Center, SUNY College of Environmental Science and Forestry (ESF) and Onondaga County's Metropolitan Syracuse Wastewater Treatment Plant. The Syracuse City School District has several CHP facilities installed at schools. These installations add up to nearly 3.1 MW, enough power and heat to supply more than 1,000 households.

Syracuse will continue to support district energy and microgrid projects through permitting and advocacy. If district energy systems can offer reliable energy and reasonable cost, the City will evaluate becoming a customer of district energy systems.

Syracuse will work with Syracuse University, Onondaga County, SUNY ESF and other organizations to support continued development and expansion of district energy. The City will facilitate project permitting, support grant applications and participate in identifying expansion opportunities.

Support community efforts to generate electricity from renewable sources

A small proportion of the energy used Syracuse is generated from renewable sources. Renewable systems connected to the electric grid include 36 PV systems, three wind energy systems, one hydro-electric system and three combined heat and power systems. These include three renewable energy systems on City facilities—an 11 kW photovoltaic system on the roof of City Hall Commons, 50 kW of photovoltaic on top of the Westcott Reservoir tank and a 50 kW micro-hydropower generator at Westcott Reservoir. Challenges to installing additional renewable energy include net-metering difficulties in areas such as downtown, where the electricity grid is networked.

Syracuse University has installed solar thermal (solar hot water) systems on 20 buildings that contain 160 apartments. The systems are expected to supply 50 percent to 60 percent of the energy required to heat domestic hot water for the apartments.

CASE STUDY Solarize Madison County

Madison County was the first county in New York to apply the Solarize model program developed by Portland, Oregon. One of the main organizers of the program was a student at SUNY Morrisville.

The program issued a Request for Proposals and selected private sector solar installer partners to publicize the opportunities of solar PV, including open house tours for existing solar installations. The first 15 households that signed up for solar PV installations under the Solarize program received a $2,000 incentive in addition to the NYSERDA incentives and state and federal tax credits already available. The $2,000 incentive was funded by a bulk purchasing arrangement with the participating installer(s). A Solarize program in three towns within southeastern Tompkins County has since been modified and expanded to apply countywide. Genesee County has also implemented a Solarize program, allowing Rochester and Monroe County to learn from the experience of other state municipalities.

Community outreach programs like Solarize generate enthusiasm for solar PV through grassroots marketing efforts. Many people are not aware of the dramatic decline in the cost of solar panels and regard Central New York as too cloudy for solar PV; a Solarize program will help demonstrate that solar generation of electricity is a viable option in the state. According to the Solarize New York web site, most communities around the country that have implemented the Solarize model report tripling the number of installed solar systems within their communities.

Madison County is predominantly rural and implementation of a countywide program there presents communication challenges. Nonetheless, Madison County's map of "Solar Ambassadors" shows 184.2 kW of solar PV installed in 29 locations during 2012, although Solarize Madison only subsidized 15 installations.

Initiative 3: Provide information to homeowners, homebuyers, commercial businesses and builders on opportunities for solar and other renewable energy generation

While the cost of solar PV installations has fallen dramatically in recent years, public awareness of solar as a cost-effective source of renewable energy has not kept pace. Despite upstate New York's cloudy and rainy weather, state and federal incentives and tax credits now make home solar systems more practical. Additional outreach is needed to ensure that homeowners, businesses and contractors are aware of the opportunities, incentives and tax credits that are available.

Syracuse offers information on current solar incentives at its Central Permit Office. The City will continue to make such information available there for residents, businesses and developers.

Initiative 4: Partner with a not-for-profit or governmental agency to administer a "Solarize Syracuse" program

Solar installations can be encouraged through a Solarize program that informs residents, organizes volume purchases, and passes along the savings as an incentive. The first Solarize program was developed and implemented in Portland, Oregon, and resulted in 600 solar electric installations over two years. By purchasing solar panels and installation services in larger quantities, residents benefit from lower costs.

Solarize programs are most successful when they are implemented as joint efforts between municipalities and community organizations. The success of the program can be measured in the number of solar installations during the program. Some Solarize programs offer a small direct subsidy to participants in addition to the cost savings from bulk purchases, but the added publicity typically stimulates installations in addition to those that are subsidized.

Syracuse is working with a consortium of non-profit entities to help publicize a new Solarize Syracuse program for local residents. The program has received enough signed contracts to more than double the number of solar installations in Syracuse, from 22 to 50 (as of October 2014). Solarize Syracuse aligns with the strategic vision of NYSERDA's Clean Energy Fund by reducing soft costs, aggregating community participants to lower overall energy costs and stimulating local level interest in clean energy.

Roof-mounted solar panels

Increase the generation of electricity from renewable sources at City-owned facilities

Syracuse has an opportunity to lead by example in generating additional electricity from renewable sources at City facilities. Power generated from renewable sources adds resiliency to the electric grid and reduces the need for electricity generated by less sustainable sources.

Initiative 5: Perform site-specific studies for facilities where solar, wind and micro-hydro energy generation are most promising

The cost-effectiveness of renewable power generation is often dependent on the physical or geographic characteristics of the proposed site. Strategic deployment of renewable generation is therefore critical to producing renewable energy affordably. Syracuse previously commissioned assessments of the solar feasibility of five of its most promising sites in 2011. City-owned buildings with

CASE STUDY Westcott Reservoir

Westcott Reservoir is a City-owned structure comprised of two tanks that store drinking water. Syracuse's water supply comes from Skaneateles Lake, which is 245 feet higher in elevation than the Westcott Reservoir site. This feature enabled the installation of a 30 kW micro turbine which uses 55 to 80 feet of the hydraulic head to generate electricity when the supply of water exceeds the demand. In addition to the micro turbine, a 50 kWh solar PV system on the roof of one tank was sized to generate enough electricity to meet the power requirements of the facility.

The renewables were added during a significant upgrade to the facility that covered the formerly exposed reservoir with a roof. At the time of its installation, the Westcott Reservoir solar project was projected to have a 15-year payback period. Half of the cost was funded by a grant from the federal government. The Chief Engineer who was responsible for the operation of the reservoir during the project noted that the inclusion of renewable energy equipment added significant complications and demands on staff time during the reservoir's design and construction.

City representatives agreed that the process of interconnecting to the electric grid was the greatest challenge. The utility company required field testing of a breaker designed to keep power from the renewables from flowing to the grid during power outages. This "islanding" issue is common to all electrical generation equipment, including solar PV, wind generators, emergency generators and CHP. The lesson learned from this experience is that timely communication between City staff and National Grid is necessary during the design phase.

In April 2013, the New York Public Service Commission issued new standardized interconnection regulations that apply to installations up to 2 MW in capacity. The new regulations are intended to facilitate the interconnection process by setting time limits for utility responses.

the largest roof exposures are the Public Works Compound and Water Department offices.

The 50 kW hydropower turbine at the Westcott Reservoir takes advantage of the higher elevation of the City's water supply to generate electricity when the water flows downward from the tank. There may be other locations in the Syracuse water system suitable for a similar installation; according to the former water commissioner, it is possible to use micro hydro generators in place of pressure relief valves.

Hydropower generates clean reliable energy

Before Syracuse can design or fund additional renewable generation, additional study is needed to investigate the cost and feasibility of renewable generation at particular sites. As recommended in the Sustainability Plan, Syracuse staff will conduct renewable energy studies at City facilities and will periodically re-evaluate the feasibility of solar installations at City facilities as market conditions change. Any new studies commissioned by the City will address any design requirements established by National Grid for the proper installation of net-metering equipment. Communication with National Grid early in the design process is essential to ensure that net-metering equipment is properly designed. In addition, National Grid and the New York State PSC will need to address the physical challenges of net metering downtown where the grid is networked. Potential funding opportunities through NYPA, NYSERDA, National Grid or other financial incentive programs may be available to reduce the capital cost.

Initiative 6: Consider issuing an RFP for a Power Purchase Agreement or lease for the installation of renewable energy generating equipment

Alternative financing arrangements can provide up-front capital for renewable energy systems. With a Power Purchase Agreement (PPA), a third-party developer owns, operates and maintains the system and the customer purchases the electricity generated by the system for a predetermined period. This arrangement allows the customer to receive stable, and sometimes lower cost electricity, while avoiding capital costs, risk for system performance, and the design and permitting process. The solar services provider benefits from the tax credits and income generated from the sale of electricity to the customer.

For those facilities where Syracuse determines that solar or other renewable energy generation is feasible, the City will investigate potential financing mechanisms such as a Power Purchase Agreement, lease, or other suitable financing mechanism. Incentives offered by utilities, NYSERDA and other sources may also help to reduce the capital cost. In addition, numerous private companies are working to standardize the language and structure for municipal PPAs which could reduce soft-costs and encourage more municipalities to work together with suppliers of renewable energy.

Implementation Matrix

Responsible party	Key partners	Source of funding	Time frame	Next steps
Support the upgrade & modernization of local energy infrastructure in conjunction with utilities & other stakeholders				
Initiative 1: Support National Grid's infrastructure modernization program by coordinating the scheduling of work in City rights-of-way				
DPW	National Grid	City budget for staffing	Ongoing	Continue regular meetings and communication with National Grid
Initiative 2: Improve resiliency by supporting expansion of district energy and microgrids				
Sustainability Coordinator	PSC, National Grid, Syracuse University, Onondaga County, Syracuse School District, other institutions	City staff budget; SU, County, Possible grants	Short-Term; Medium-Term	Continue discussions with SU and Onondaga County to determine type of support needed from City
Support community efforts to generate electricity from renewable sources				
Initiative 3: Provide information to homeowners, homebuyers, commercial businesses and builders on opportunities for solar and other renewable energy generation				
Sustainability Coordinator; Central Permit Office	Solar installers; Residents	City staff budget	Short-Term	Compile information to provide to public
Initiative 4: Partner with a not-for-profit or governmental agency to administer a "Solarize Syracuse" program				
Sustainability Coordinator/ City Energy Manager	CNY RPDB; community organizations; not-for-profit organizations; institutions	City staff budget	Short-Term	Identify partners to lead/ continue effort
Increase the generation of electricity from renewable sources at City-owned facilities				
Initiative 5: Perform site-specific studies for facilities where solar, wind and micro-hydro energy generation are most promising				
DPW	Sustainability Coordinator; City Council; Mayor	NYSERDA; other grant funding	Short-Term	Identify facilities for initial studies; Work with National Grid and PSC to address obstacles to net metering at downtown locations
Initiative 6: Consider issuing an RFP for a Power Purchase Agreement or lease for the installation of renewable energy generating equipment				
Syracuse City Department of Engineering	Public Works, Police, Water Dept.	Third-party investor	Medium-Term	Identify potential partners for PPA or lease

Time frame: Short-Term = less than five years, Medium-Term = five to 10 years, Long-Term = more than 10 years

Organizational structure to support implementation

The City Sustainability Coordinator, who sits within the City Planning Division of the Syracuse-Onondaga County Planning Agency, will continue to coordinate energy planning and policy for the City. Syracuse will engage a City Energy Manager to supplement these efforts and focus on partnerships with the Regional Planning & Development Board, Syracuse Metropolitan Transportation Council and community not-for-profit entities to support initiatives aimed at reducing energy use in buildings and vehicles citywide.

Projected Reductions in Municipal Energy Consumption by Action Area

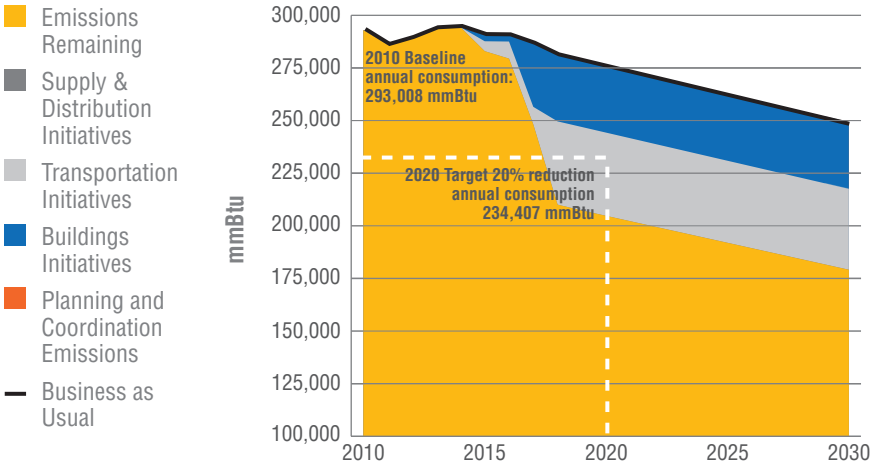


Figure 11

Projected Community Reductions in Energy Consumption by Action Area

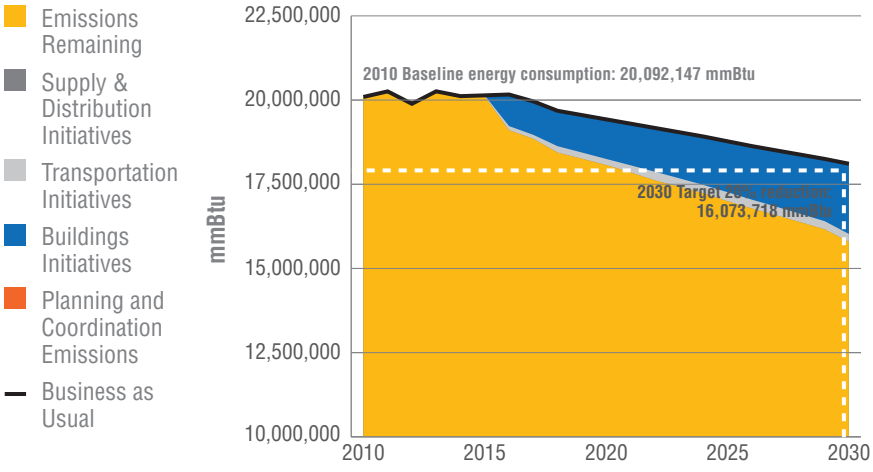


Figure 12

Financing

The City will leverage a number of resources to implement the initiatives in the Syracuse Energy Plan. Many of the initiatives in this plan advance procedures that are already in place and can be implemented at minimal additional cost to the City. Where there are upfront capital costs, the City will seek state and federal funding, innovative financing strategies and partnerships with other organizations.

To finance capital improvements for energy efficiency in buildings and the expansion of renewable generation at municipal facilities, Syracuse will evaluate funding mechanisms such as NYPA financing and ESPCs from ESCOs that use savings from reduced energy expenses to finance the upfront costs. The City will also pursue incentives from NYSERDA, National Grid and others to help reduce costs for specific energy efficiency measures such as lighting fixtures, HVAC and motors and renewable energy systems such as solar panels and vehicle replacements such as alternative fuel vehicles. To secure funding for additional traffic signal coordination, the City will work with the Syracuse Metropolitan Transportation Council to allocate funds in the New York State Transportation Improvement Program.

As collaboration with other governmental and private institutions help improve the competitiveness of grant applications, Syracuse will continue to support these partnerships. This includes continuing to partner with Syracuse University and other institutions to support transportation initiatives along the Connective Corridor and to expand of district energy and microgrids infrastructure. City staff will continue to support grant applications led by the Central New York Regional Planning & Development Board that would increase energy efficiency and renewable energy generation citywide.

Reporting and updates

The Sustainability Manager, with support from the City Energy Manager, will track progress toward implementing the initiatives in the Syracuse Energy Plan. Over the next five years, the City will coordinate annual reviews of the progress toward implementing the initiatives and report the impact of these initiatives on energy use and greenhouse gas emissions.

Summary of Cross-Cutting Themes

Municipal: leading by example

Leading by example, Syracuse will implement energy-efficiency measures in its own buildings and vehicle fleets and install cost-effective renewable energy generation capacity at City facilities. It will install energy conservation measures and renewable energy capability at its buildings when it is cost effective to do so and reduce fuel use in its vehicle fleet.

Economic development: creating jobs and attracting businesses

Improving the energy efficiency of buildings citywide will reduce costs for businesses and help retain these businesses in Syracuse. Expanding district energy at key institutions, such as Syracuse University and SUNY Environmental Science and Forestry, supports resiliency and reduces energy costs for these institutions that are significant economic drivers in the region. Improved infrastructure for bicycles, pedestrians and transit will help residents access jobs in the city and improve the quality of life.

Infrastructure: preparing our cities for the future

Syracuse will work with National Grid to facilitate repairs and improvement to infrastructure within City rights-of-way and to support expansion and improvement projects that benefit residents, businesses and institutions. Syracuse will continue to investigate the feasibility of installing additional renewable capacity at municipal facilities and install such capacity when it is cost effective to do so. Syracuse will support Syracuse University and other institutions to expand district energy and create microgrids to increase resiliency.

Climate action: reducing the city's carbon footprint

Many of the initiatives in this plan will help Syracuse reduce its greenhouse gas emissions. These include reducing energy consumption from buildings and vehicles, increasing the amount of electricity generated from renewable sources, and working with National Grid to facilitate the replacement of older natural gas pipelines within municipal rights-of-way.

Conclusion

Next Steps

Energy planning does not end with the release of the Five Cities Energy Plans; it is just the beginning. To ensure these plans move forward into implementation, and energy management and planning processes continue, the plans specify who is responsible for implementing each initiative, who the key partners are and what the next steps are to move the initiative forward.

The cities plan to bring Energy Managers onboard to help oversee the implementation of the plans as a whole and manage continued stakeholder engagement to enhance their impact. The Energy Managers will be responsible for tracking and reporting on progress annually and for updating the plans on a regular basis. Some of the cities will embark on the process to formally adopt their respective plans, while others will begin implementation of the initiatives right away. Either way, the cities are committed to making progress on implementing the plans.

State Support

Unique to this effort, each city, with the guidance from the state and their consultants, had the opportunity to develop these plans in a collaborative effort with the other cities. The state, through NYPA, will continue to bring the cities together to support their collective implementation efforts, so that these cities can continue to learn from each other. Additionally, the state will provide technical and financial assistance to enhance their implementation efforts. Specifically, NYPA will continue to support the municipalities' efforts to improve their own energy performance—including through upgrades to municipal buildings—and their citywide energy priorities. NYSERDA will bring technical and other programmatic assistance to the cities to help them catalyze private investment in clean energy and to develop self-sustaining clean energy financing plans. Other state agencies will also continue to provide relevant assistance to further support implementation and future planning efforts.

Keys to Success

Achieving the cities' clean energy goals will be dependent on a number of variables. Primarily, the continued commitment of the cities and their stakeholders is necessary to ensure implementation of the plans moves forward to create momentum around energy action and provide proven results on the benefits of energy performance improvements. To ensure this momentum continues, and grows, the principles demonstrated in the plans must be integrated into existing city processes—i.e., procurement, budgeting, facility management, building codes, zoning—to cost-effectively make energy efficiency and clean energy deployment a part of business as usual. Equally important is engagement with third-party partners, including large institutions, businesses, and investors, to leverage market-based advancements in the local clean energy sector. This combination of sustained municipal action and the activation of local clean energy markets found in these plans could be a model for significant and sustainable reductions in energy consumption for communities across the state, if not the country.

With the Five Cities Energy Plans, Albany, Buffalo, Rochester, Syracuse and Yonkers are following in the footsteps of early city planners, showing energy leadership and pursing innovative strategies to prepare for future needs. Through the plans, the cities share their visions for their cities' future; a future with cleaner air, lower energy costs, more resilient infrastructure and a thriving clean energy economy. They also provide the roadmap to begin to make these visions into realities with action-oriented initiatives, bringing these cities, their regions and the state closer to achieving their clean energy goals.

State Assistance and Educational Support

NY Power Authority	• Ombudsman: support cities and liaise between state and city-level efforts • City Energy Managers: support cities in the implementation of the plans and report on progress • NY Energy Manager: collect, analyze and report energy performance • Municipal energy efficiency and clean energy* • Support solar installations on school buildings through K-Solar program
New York State Energy and Research Development Authority	• Street lighting • Electric vehicles* • Benchmarking • Available financing opportunities (e.g., PACE, Green Bank) • Clean distributed generation (e.g., renewables, cogeneration, microgrids)* • New construction, commercial, industrial and multi-family buildings energy-conservation measures*
New York State Public Service Commission	• Communications on Reforming the Energy Vision (REV) initiative
New York State Department of Environmental Conservation	• Climate Smart Communities program: guidance and case studies on municipal energy procurement, renewable energy deployment, energy efficiency, reducing transportation energy use and low-energy policies • Direct municipal support through CSC coordinators
New York State Department of State	• Modifications to building and energy codes, including those to support the development of solar energy generation at the building and/or community scale • Zoning, land use and watershed planning, smart growth and transit-oriented development • In-person and online training for municipal staff • Shared and consolidated municipal services
New York State Department of Transportation	• Transportation Demand Management programs • Complete streets and smart growth efforts • Alternative transportation research and development (with NYSERDA)* • Bicycle and pedestrian transportation projects (through Transportation Alternatives Program - TAP)* • Integration of advanced vehicle technologies in the commercial truck and bus sectors (with NYSERDA)*
Empire State Development	• Facilitation of partnerships with local businesses and other stakeholders

* Financial support also provided

Acknowledgements

Albany

Stakeholders Affordable Housing Partnership • Albany Airport Authority • Albany County Executive's Office • Albany Housing Authority • Albany Law School • Albany Medical Center • Capital District Clean Communities Coalition (Clean Cities) • Capital District Community Loan Fund • Capital District Regional Planning Commission • Capital District Transportation Authority • Capital District Transportation Committee • Capital Region Building Owners and Managers Association • Center for Economic Growth • City School District of Albany • College of Saint Rose • Dormitory Authority of the State of New York • EDGE Regional Outreach • Golub Corporation • National Grid • NY League of Conservation Voters • NYS Department of Environmental Conservation • NYS Smart Grid Consortium • One Hundred Black Men of the Capital District • One Hundred Black Men of the Albany, New York Capital Region • Port of Albany • Sage College of Albany • University at Albany • University at Albany—College of Nanoscale Science & Engineering **City Departments** Albany Fire Department • Albany Housing Authority • Albany Parking Authority • Albany Police Department • Albany Water Department • Budget Office • Department of Development and Planning • Department of General Services • Office of Audit and Control • Port of Albany **Main and Subcontractors** Vanasse Hangen Brustlin, Inc. (VHB) • DNV GL • Novus Engineering, P.C. • JK Muir, LLC • Watts Architecture & Engineering **Mayor** Special thanks to the Mayor's Office and Mayor Kathy Sheehan **Other** Special thanks to our city representative for her consistent dedication throughout the process: Kate Lawrence • Special thanks to Mary Millus of the City of Albany for photo recommendations and other logistical assistance • Leif Engstrom, City of Albany for providing data essential to the process • Kim Lynch and Mike D'Atillo of the College of St. Rose for logistical coordination for the city's stakeholder meetings

Buffalo

Stakeholders Buffalo Complete Streets Coalition • Buffalo Development Corporation • Buffalo Municipal Housing Authority • Buffalo Niagara Manufacturing Alliance • Buffalo Niagara Medical Campus • Buffalo Niagara Partnership • Buffalo Public Schools • Buffalo Sewer Authority • Buffalo Urban Development Corporation • CertainTeed • Erie Cancal Harbor Development Corporation • Empire State Development • Erie Community College • Erie County Department Environment & Planning • Erie County Industrial Development Agency • Greater Buffalo Niagara Regional Transportation Council • Kaleida • National Fuel • National Grid • Niagara Frontier Transportation Authority • Niagara International Transportation Technology Coalition • NYS Department of Transportation • One Region Forward • People United for Sustainable Housing • Regional Economic Development Council • ROSWELL • Sonwil • TM Montante • Uniland • University at Buffalo • Urban Design Project • WNY Environmental Alliance **City Departments** Buffalo Fire Department • Buffalo Police Department • Buffalo Urban Renewal Agency • Buffalo Water Authority • Department Public Works • Management Information Systems • Office Strategic Planning • Telecommunications, Utilities & Franchises **Main and Subcontractors** Wendel • Larsen Engineeres • CORE Environmental • Blue Springs Energy • Fisher Associates **Mayor** Special thanks to the Mayor's Office and Mayor Byron W. Brown **Other** Special thanks to our city representatives for all of their consistent dedication throughout the process: Julie Barrett-O'Neill • Brendan Mehaffy • Jason Shell • Steve Stepniak • Special thanks to the Buffalo & Erie County Historical Society for hosting the Buffalo stakeholder meeting

Rochester

Stakeholders Center for Environmental Information • Constellation NewEnergy • Friends of the Garden Aerial • Genesee Transportation Council • Genesee Finger Lakes Regional Planning Council • Greater Rochester Enterprise • Recycled Energy Development—RED Rochester • Rochester Business Alliance • Rochester City School District • Rochester District Heating Cooperative • Rochester Gas & Electric • Rochester Genesee Regional Transportation Authority • Rochester Institute of Technology Institute for Sustainability • University of Rochester **City Departments** Department of Environmental Services, Bureau of Architecture & Engineering • Department of Environmental Services, Bureau of Operations & Parks • Department of Environmental Services, Division of Sustainability • Department of Environmental Services, Office of the Commissioner • Department of Neighborhood & Business Deveiopment, Bureau of Planning & Zoning • Department of Neighborhood & Business Development, Bureau of Inspection & Compliance **Main and Subcontractors** LaBella Associates, D.P.C. • Taitem Engineering, P.C • Clean Fuels Consulting • HR&A Advisors • Larsen Engineers • Haven Rendering **Mayor** Special thanks to the Mayor's Office and Mayor Lovely A. Warren **Other** Special thanks to our city representative for her consistent dedication throughout the process: Anne Spaulding

Syracuse

Stakeholders Building Owners and Management Association—CNY • Central New York Regional Planning & Development Board • Centro/CNY Regional Transportation Authority • CNNY Building Trades Council • Energy Automation, Inc. • National Grid • Onondaga County Environmental Office • Onondaga County Facilities Management • SUNY College of Environmental Science & Forestry • Syracuse Center of Excellence in Environmental & Energy Systems • Syracuse Metropolitan Transportation Council • Syracuse University **City Departments** Syracuse—Onondaga County Planning Agency • Syracuse—Onondaga County Planning Agency, Division of City Planning • Syracuse—Onondaga County Planning Agency, Division of City Zoning • Department of Neighborhood and Business Development • Department of Public Works • Department of Public Works, Division of Building Services, Skilled Trades • Engineering Department • Law Department • Office of Fleet Operations • Budget Office • Water Department **Main and Subcontractors** LaBella Associates, D.P.C. • Taitem Engineering, P.C • Clean Fuels Consulting • HR&A Advisors • Larsen Engineers • Haven Rendering **Mayor** Special thanks to the Mayor's Office and Mayor Stephanie A. Miner **Other** Special thanks to our city representative for her consistent dedication throughout the process: Rebecca Klossner

Yonkers

Stakeholders Con Edison • Downtown BID • Federated Conservationists of Westchester County • Grassroots Environmental Education • Green Guru Network • Greyston Foundation • Groundwork Hudson Valley • Mclean Avenue Merchants Association • MetroPool • Mid Hudson Regional Development Council • Metro-North Railroad • New York League of Conservation Voters • New York Metropolitan Transportation Council • Pace University Land Use Law Center • Sarah Lawrence College Center for the Urban River at Beczak • South Broadway BID • Sustainable CUNY • Sustainable Westchester • Westchester Community Foundation • Yonkers Chamber of Commerce • Yonkers Committee for Smart Development • Yonkers Green City Advisory Committee **City Departments** Yonkers Department of Planning and Development • Yonkers Assessment • Yonkers Department Bureau of Purchasing • Yonkers City Engineer • Yonkers Department of Housing and Buildings • Yonkers Department of Information Technology • Yonkers Department of Parks and Recreation • Yonkers Department of Public Works • Yonkers Fire Department • Yonkers Human Resources • Yonkers Office of General Services • Yonkers Police Department Traffic Engineering • Yonkers Water Bureau • Yonkers Public Schools **Main and Subcontractors** Arup • Setty & Associates, Ltd. • Ellana Inc. **Mayor** Special thanks to the Mayor's Office and Mayor Mike Spano **Other** Special thanks to our city representative for his consistent dedication throughout the process: Brad Tito

Special Thanks

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Glossary

City: the municipality, including executive levels, agencies, staff and property (i.e. municipal government).

city: geographical boundary of the municipality (i.e. community or citywide).

Cogeneration: Distributed cogeneration or combined heat and power (CHP) use heat engines to simultaneously generate electricity and useful heat. Steam turbines, natural gas-fired fuel cells, microturbines or reciprocating engines turn generators and the hot exhaust is used for space or water heating or for cooling such as air-conditioning.

Combined heat and power (CHP): See cogeneration.

Complete streets: Complete streets are designed and operated to enable safe access for all users, including pedestrians, bicyclists, motorists and transit riders of all ages and abilities. Complete Streets allow buses to run on time, make it easy to cross the street, walk to shops and bicycle to work.

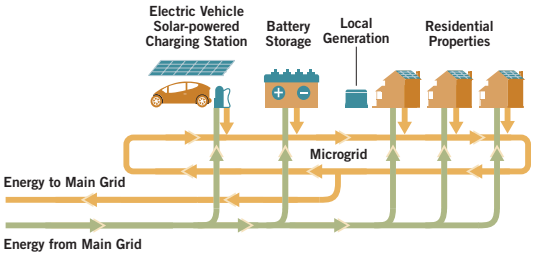
District energy: District energy systems produce steam, hot water or chilled water at a central plant, which is then piped underground to individual buildings for space heating, domestic hot water heating and air conditioning.

Distributed generation: Electricity generated from many small energy sources that provide an alternative to or enhancement of the traditional electric power system.

Geothermal: Geothermal energy is thermal energy generated and stored in the Earth. Geothermal has historically been limited to areas near tectonic plate boundaries. Recent technological advances have however expanded the range and size of viable resources, especially for applications such as home heating.

Initiatives: Policy changes, establishment of offices, hiring of staff, development of new programs, release of campaigns and other actions that support attainment of objectives.

Microgrid: A microgrid is a localized grouping of electricity generation, energy storage and loads that normally operates connected to a traditional centralized power grid. The microgrid can be disconnected from the centralized grid and function autonomously.



Objectives: something that specific efforts/ actions are intended to accomplish (e.g., improve energy efficiency of buildings).

Plug-in hybrid: A plug-in hybrid vehicle is a vehicle which utilizes rechargeable batteries or another energy storage device that can be restored to full charge by connecting a plug to an external electric power source.

Renewable energy: Energy generated from natural resources—such as sunlight, wind, rain, tides and geothermal heat—which are renewable (naturally replenished), ranging from solar power, wind power, hydroelectricity/micro hydro, biomass and biofuels for transportation.

Stakeholders: Non-City individuals who have interest in the plan's success and outcomes, including experts, academic, institutions or other entities representing interests of the cities.

Waste-to-energy: Municipal solid waste and natural waste, such as sewage sludge, food waste and animal manure will decompose and discharge methane-containing gas that can be collected and used as fuel in gas turbines or micro turbines to produce electricity as a distributed energy source.

Acronyms

ASHRAE: Formerly the American Society of Heating, Refrigerating and Air Conditioning Engineers, ASHRAE is a building technology society that focuses on building systems, energy efficiency, indoor air quality, refrigeration and sustainability.

BMS: A Building Management System controls and monitors a building's mechanical and electrical equipment to manage energy demand.

BPI: The Building Performance Institute is a national standards development and credentialing organization for residential energy efficiency retrofit work.

CHP: Combined Heat and Power, also referred to as cogeneration systems, produce electricity and heat. CHP systems capture waste-heat from electricity generation to provide heating or hot water, making each unit of fuel more efficient.

CNG: Compressed natural gas is an alternative fuel to gasoline. CNG emits less greenhouse gas emissions than gasoline, diesel and propane/LPG.

CO_2: Carbon dioxide is a naturally occurring chemical compound and the primary greenhouse gas emitted through human activities.

CO_2e: Carbon-dioxide equivalent is the term for describing different greenhouse gases in a common unit. For any quantity and type of greenhouse gas, CO_2e signifies the amount of carbon-dioxide which would have the equivalent global warming impact.

ECM: Energy Conservation Measures are projects or technologies that reduce energy consumption in a building.

ESA/MESA: An Energy Services Agreement allows building owners to pay for energy efficiency projects through savings so that there is no upfront cost to the owner. Managed Energy Service Agreements (MESA) offer the same service and is managed by a third party.

ESCO: An Energy Service Company is a commercial or non-profit business providing a broad range of energy solutions including designs and implementation of energy savings projects, retrofitting, energy conservation, and power generation and energy supply.

ESD: Empire State Development Corporation

ESPC: Energy Savings Performance Contracts are agreements between a governmental office/facility and an ESCO under which the ESCO designs, implements and maintains energy efficiency projects and guarantees a certain level of energy savings. In exchange, the governmental office/facility promises to pay the ESCO a share of the savings resulting from the project. They are also sometimes referred to as EPC, or Energy Performance Contract.

EUI: Energy Use Intensity is defined as energy consumption per square foot per year for any given property.

EV/HEV/PEV: Electric vehicles rely on an electric motor rather than combustion fuel for propulsion. Types of EV include hybrid electric vehicles (HEV) and plug-in electric vehicles (PEV).

E-85: 85 percent ethanol and 15 percent gasoline. Fuel for "flex-fuel" vehicles that can use either gasoline or E-85.

GHG: A greenhouse gas is any gas in the atmosphere which absorbs heat and thereby keeps the planet's atmosphere warmer than it otherwise would be. Greenhouse gases include CO_2.

HVAC: Heating, ventilation and air conditioning systems control indoor air quality and temperature.

kW/MW: Kilowatt and megawatt are units of electric power. A kilowatt is equivalent to 1,000 watts, and a megawatt is equivalent to 1,000 kilowatts.

KWh/MWh: Kilowatt-hour (KWh) is an energy unit equivalent to one kilowatt of power expended for one hour. Megawatt-hour (MWh) is equal to 1,000 KWh.

LED: Light-emitting diodes consume less energy, have a longer lifetime and are smaller than incandescent bulbs. They often replace streetlights as an energy-efficiency alternative.

(continued)

Acronyms

LEED: Leadership in Energy and Environmental Design is a designation given to buildings and communities that have satisfied the U.S. Green Building Council's ratings on design, construction and maintanance of green buildings.

LPG: Liquefied petroleum gas, also known as propane, is an alternative fuel that emits less carbon dioxide than gasoline.

mmBtu: One million British thermal units is an energy unit. One Btu is the amount of energy required to cool one pound of water by one degree Fahrenheit.

MT CO_2e: Million tons of carbon dioxide equivalent is a common metric to measure the amount of CO_2 in the atmosphere.

NYPA: New York Power Authority

NYS DEC: New York State Department of Environmental Conservation

NYS DOS: New York State Department of State

NYS DOT: New York State Department of Transportation

NYS DPS: New York State Department of Public Service/Public Service Commission

NYSERDA: New York State Energy Research and Development Authority

PPA: A power purchase agreement is a financial arrangement in which a third-party renewable energy developer installs, owns, operates, and maintains the system on municipally owned property.

PV: Photovoltaics are solar cells that convert sunlight into electricity.

REV: Reforming the Energy Vision Initiative promotes more efficient use of energy, deeper penetration of renewable energy resources such as wind and solar, and wider deployment of distributed energy resources.

RFQ/RFP: A request for qualifications is a document that is distributed to gather information from prospective vendors. A request for proposal follows an RFQ and is a solicitation for potential suppliers or businesses to submit proposals.

TDM: Transportation demand management is the application of strategies and policies to reduce travel demand, specifically for single-occupancy vehicles, at times of peak demand in specific congested areas.

TOD: Transit oriented development is a mixed-use residential and commercial area designed to maximize access to public transport

TSM: Transportation system management is a set of strategies used to reduce greenhouse gas emissions by reducing congestion through improved transportation system efficiency.

USGBC: The U.S. Green Building Council certifies buildings and communities according to LEED standards and provides opportunities to obtain LEED AP credentials.

VMT: Vehicle Miles Traveled is a measurement of miles traveled by vehicles in a specified region for a specified time period.

www.nypa.gov/buildsmartny/fivecities.html