

**BuildSmart**NY

# **Five Cities Energy Plans**

Albany ■ Buffalo ■ Rochester ■ Syracuse ■ Yonkers

## CITY OF YONKERS



**NY Power  
Authority**

Issued January 2015

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# 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.

A handwritten signature in black ink that reads "Gil C. Quiniones". The signature is fluid and cursive.

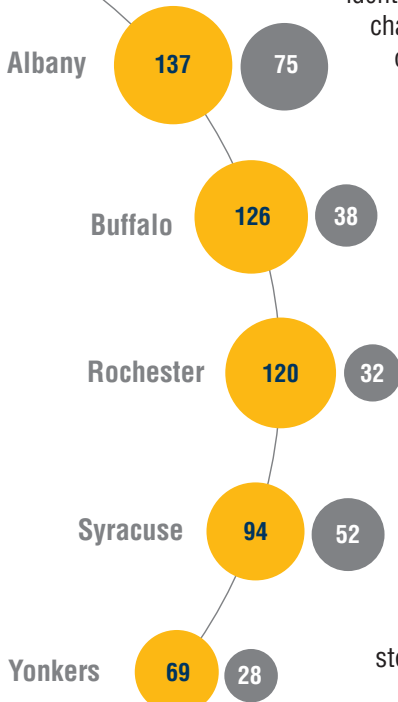
Gil C. Quiniones  
President and Chief Executive Officer  
New York Power Authority



# Introduction

## Energy Consumption per Capita (mmBtu)

■ Building Related  
■ Transportation Related



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 master 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

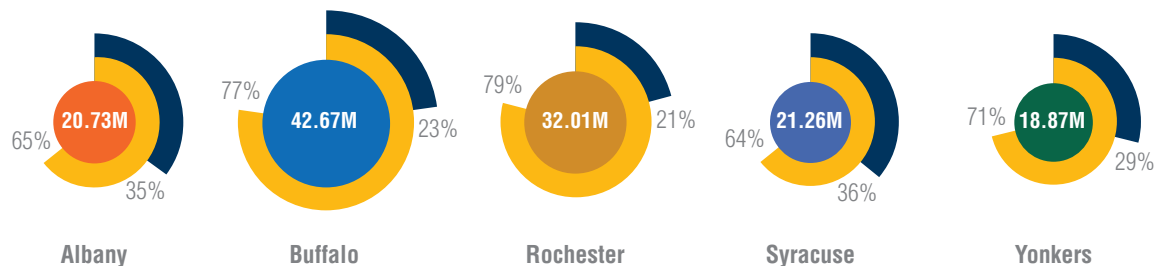
## BuildSmartNY

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 master 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.

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.

## Overall Energy Consumption (mmBtu)

■ Transportation  
■ Buildings



# Goals of the Five Cities Energy Plans

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Reduce energy consumption

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Strengthen reliability and resiliency of cities' energy infrastructure

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Catalyze clean energy investment and economic development

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Contribute to a cleaner environment

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Enhance quality of life

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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

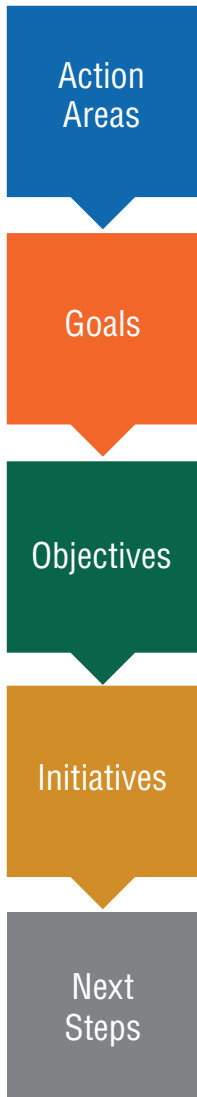
and economic development, reduce the cities' energy consumption and related expenses, contribute to a cleaner environment, and enhance quality of life within the cities. Building on each city's sustainability and economic development successes of the past decade, the plans will also guide municipal energy management as these cities seek to lead by example in reducing energy use.



**NY Power  
Authority**

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 master 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 master 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:

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## Aspirational

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

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## Ambitious

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

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## Achievable

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

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## 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*

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## 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*

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## Adaptable

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

## Planning Process

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.

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

### 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 master 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.



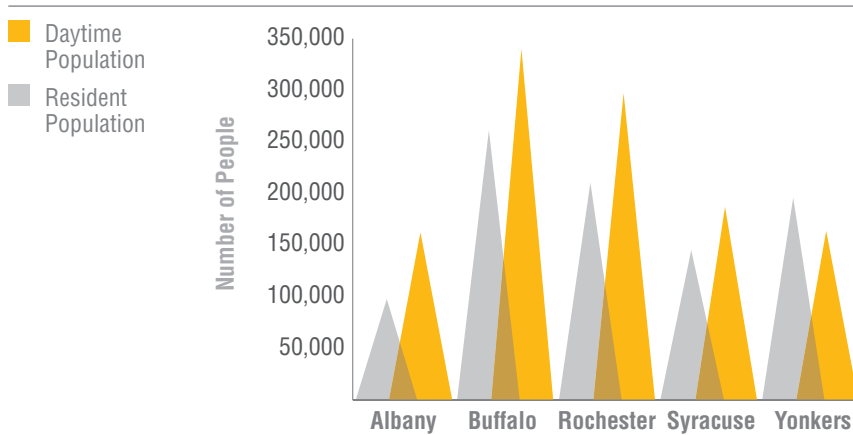
## **Climate action: reducing the city's carbon footprint**

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.

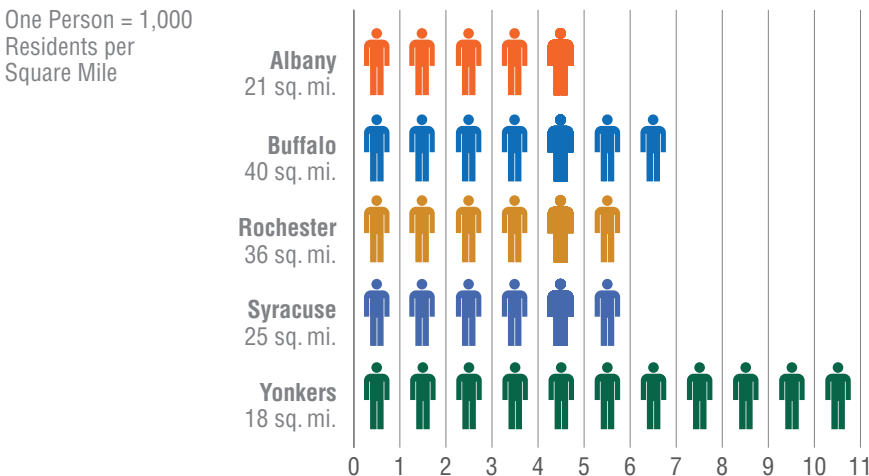
## The Five Cities

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,

### Population

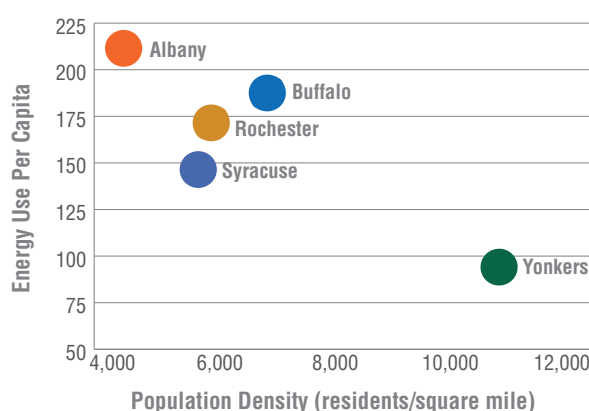


### Density of City Residents



### 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.



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.

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

## 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.

## 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.

## 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.



## 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



YONKERS



# Letter From Mayor Mike Spano



Dear Friend,

The challenge is clear. The opportunity is extraordinary.

We all know from Superstorm Sandy that extreme weather can wreak havoc on our communities. In the days after the storm, when the power was out, we witnessed firefighters assist frail seniors stuck on the upper floors of a high-rise building after their elevator stopped working. When our fuel supplies were disrupted, we saw residents waiting hours in long lines for a chance to fill their cars with gasoline. In the hour our city was most tested, we felt reassured when an army of city workers and volunteers came together to clean up and rebuild.

There is no arguing climate change is real. We know the devastation it has and will continue to cause if we don't act. By making smart choices, we can address our energy challenges, grow our economy and make Yonkers an even more healthy, vibrant and attractive city. This year, the City will complete a project to replace all city street lights with LEDs. It is anticipated to save \$20 million in energy costs over 10 years. Projects like this are not only good for the environment, they're good for the pocketbooks of taxpayers.

As we continue to make remarkable progress on sustainability in Yonkers, this Energy Plan will serve as an important roadmap for the next phase of the city's sustainable development. I'd like to thank the New York Power Authority and the Office of the Governor for their steadfast support of Yonkers.

Together, we're building a better, greener city.

Sincerely,

A handwritten signature in black ink, appearing to read "Mike Spano". The signature is fluid and stylized, with a long horizontal stroke at the beginning.

Mayor Mike Spano



Top left, Untermyer Gardens;  
Top right, Cacace Justice  
Center; Middle, 87 Nepperhan  
Avenue; Bottom, Yonkers  
City Hall

## City of Yonkers Energy Plan



Cities across the globe face increasing pressure from climate change, overburdened and antiquated infrastructure, diminishing resources, and economic uncertainty. A common theme among these challenges is energy, and cities like Yonkers, which has grown more than 4 percent in the last 20 years and is expecting additional growth, must be proactive in tackling energy-related issues to prepare for the future and ensure their continued development. To accomplish this, the City developed the Yonkers Energy Plan as part of the Five Cities Energy Plan initiative. The Yonkers Energy Plan aims to reduce energy consumption and greenhouse gas emissions while improving residents' quality of life, strengthening the economic vitality of local businesses, creating new jobs, fostering a healthy community and natural environment, and making Yonkers more resilient.

### State of the City

Yonkers and its constituents consumed about 18.9 million mmBtu worth of energy in 2010, producing 1.3 million metric tons (mtCO<sub>2</sub>e) in emissions at a cost of nearly \$500 million (**Figure 5**). Buildings are the largest consumer of energy in the city, accounting for 71 percent of energy use in Yonkers. Consequently, there are significant opportunities for energy savings within Yonkers' building stock. Benchmarking energy use can help building owners understand trends and identify potential savings. Enacting more stringent energy codes, on the other hand, can improve building energy performance by design.

The City consumed nearly 600,000 mmBtu and spent around \$16.8 million on energy for municipal government operations in 2010. Of that total, municipal buildings accounted for \$12.1 million and approximately 78 percent of overall energy use. A little more than half of the municipal energy was used by school buildings, making the school district the municipal government's largest end-user of energy by far.

### Action Areas



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## Community Energy Consumption by Sector (mmBtu)

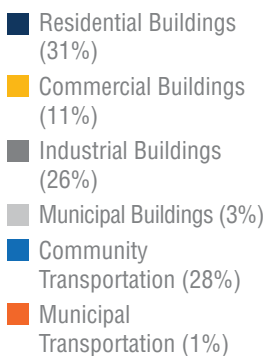
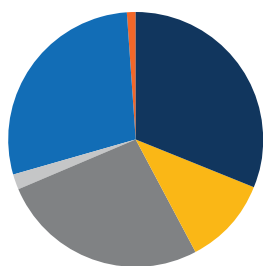


Figure 1

## Community Energy Consumption by Fuel Type (mmBtu)

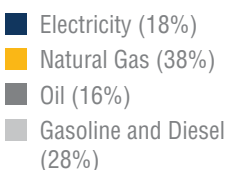
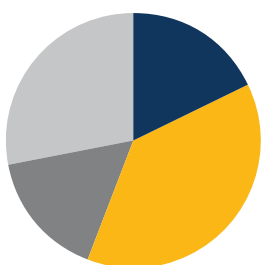


Figure 2

The breakdown of municipal emissions is almost identical to the breakdown of municipal energy use. Not surprisingly, Yonkers' school buildings are by far the leading producer of emissions, representing 54 percent of total emissions. By fuel source, electricity accounts for the largest proportion of municipal emissions at 40 percent with fuel oil not far behind at 37 percent. The school district's heavy reliance on expensive fuel oil to heat buildings also has a major impact on the environment. By converting boilers in the schools to natural gas, the City will save money and lower emissions.

Although buildings account for the majority of energy use in Yonkers, there is also great potential to reduce energy consumption in the transportation sector, which is responsible for 29 percent of total energy use (**Figure 1**).

## Existing programs

### City Programs

The Yonkers Energy Plan is part of a wide range of ongoing sustainability programs at the city and regional levels. Before the development of the plan, the City put several programs and policies in place to reduce the energy use and greenhouse gas (GHG) emissions of municipal government operations and the community at large. In 2009, Yonkers adopted the New York State Climate Smart Communities (CSC) pledge, which includes a commitment to lower the City's emissions and adapt to climate change. As part of the CSC pledge, the Office of the Mayor produced a draft Yonkers Energy Action Plan in 2012, outlining the City's roadmap to reduce citywide greenhouse gas emissions 20 percent below 2005 levels by 2020. The goals, themes and actions found in the draft Yonkers Energy Action Plan have provided a solid foundation for the development of the Yonkers Energy Plan and played a critical role in the plan's evolution.

### Utility Programs

Yonkers' local electricity and gas utility provider, Consolidated Edison (Con Edison), has several programs focused on improving the energy efficiency of its customers' facilities. These

programs are divided into four sectors: residential, small business, multifamily building and commercial/industrial. Examples of Con Edison's energy-efficiency programs include: rebates for HVAC and lighting upgrades, free compact fluorescent light bulbs, water efficient fixtures, smart power strips, and smart controls for A/C systems. These programs are available for Yonkers residents and businesses.

### Regional Programs

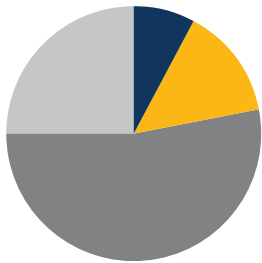
The Mid-Hudson Regional Sustainability Plan (MHRSP), funded by the New York State Energy Research and Development Authority's (NYSERDA) Cleaner, Greener Communities Program, established a sustainability vision for the seven counties north of New York City, including Westchester. The plan looks at sustainability through several focus areas, each with objectives and initiatives, related metrics and targets. For energy, the target is to reduce per capita energy use 50 percent by 2050 compared to 2010. The Strategic Plan for the Mid-Hudson Regional Economic Development Council (MHREDC), which has economic growth as its primary objective, includes measures to reduce energy use and greenhouse gas emissions. These measures include rewarding and supporting projects and programs that involve energy efficiency, renewable energy and energy benchmarking, as well as clean and alternative transportation. Many of the overarching goals and objectives found in the Yonkers Energy Plan were adapted from the mid-Hudson regional plans.

## Summary of goals and initiatives

In response to the patterns, trends and challenges associated with bringing current energy use in line with the plan, the City has identified a number of energy-related goals that the initiatives described in this plan will help to achieve. These goals include:

- Encourage efficient, clean and affordable energy through coordination, awareness and education
- Reduce community and municipal building-level energy 20 percent (from 2010 baseline) by 2020
- Increase transportation options citywide to transform Yonkers into a walkable, bike-friendly and transit-focused city
- Expand the use of district and renewable systems to increase resilience and reduce carbon emissions

## Municipal Energy Consumption by Sector (mmBtu)



- Street Lights (8%)
- City Fleet (14%)
- School Buildings (53%)
- Other City Buildings (25%)

Figure 3

## Municipal Energy Consumption by Fuel Type (mmBtu)



- Electricity (35%)
- Natural Gas (14%)
- Oil (37%)
- Gasoline and Diesel (14%)

Figure 4

Yonkers will achieve these goals through better coordination between City departments and the Board of Education. The work ahead includes expanding the City's Green Development Program, training and educating staff and students, and creating awareness of existing city, state and utility programs and incentives. Building performance will be improved through benchmarking of larger buildings, retrofitting existing buildings, switching heating fuels from oil to natural gas and improving maintenance in municipal buildings.

The city will reduce transport energy by encouraging developers to provide electric charging stations, facilitating better coordination between transit modes, and improving bicycle and pedestrian

routes. Yonkers will develop rideshare programs and replace aging, inefficient vehicle stocks with more efficient vehicles and ecodriving training. The city will also strengthen its energy infrastructure by expanding renewables and ensuring a more resilient energy system through the investigation of opportunities for distributed generation and microgrids, increased solar installations, vulnerability and adaptation plans for the city, and an emergency fuel stock created in concert with Westchester County and the state. Funding for these initiatives will include public and private sources, and will require cooperation from residents and businesses to reduce energy and emissions.



Sarah Lawrence College Center for the Urban River at Beczak

# CITY OF YONKERS ENERGY CONSUMPTION AND GHG EMISSIONS (2010)

		Residential Buildings	Commercial Buildings <sup>1</sup>	Industrial Buildings	Municipal Buildings	Non-Municipal Transportation	Municipal Transportation	Total
Electricity <sup>2</sup>	mmBtu	1,364,673	416,761	1,416,461	162,423	-	47,271	3,407,589
	\$	80,325,868	24,530,811	83,373,743	6,533,210	-	2,808,616	197,572,248
	MtCO <sub>2</sub> e	113,389	34,628	117,692	13,496	-	3,928	283,133
Natural Gas	mmBtu	2,621,687	999,649	3,397,544	81,570	-	-	7,100,450
	\$	36,889,325	14,065,899	47,806,275	985,500	-	-	99,746,999
	MtCO <sub>2</sub> e	139,358	53,137	180,600	4,336	-	-	377,431
Oil <sup>3</sup>	mmBtu	1,884,696	740,974	152,994	222,867	-	-	3,001,531
	\$	40,781,340	12,825,600	3,030,175	4,622,978	-	-	61,260,093
	MtCO <sub>2</sub> e	138,822	55,315	11,333	16,416	-	-	221,886
Gasoline and Diesel	mmBtu	-	-	-	-	5,280,741	81,721	5,362,461
	\$	-	-	-	-	134,378,858	1,837,047	136,215,905
	MtCO <sub>2</sub> e	-	-	-	-	404,374	5,911	410,285
<b>TOTAL</b>	mmBtu	<b>5,871,056</b>	<b>2,157,384</b>	<b>4,966,999</b>	<b>466,860</b>	<b>5,280,741</b>	<b>128,992</b>	<b>18,872,031</b>
	\$	<b>157,996,533</b>	<b>51,422,310</b>	<b>134,210,193</b>	<b>12,141,687</b>	<b>134,378,858</b>	<b>4,645,663</b>	<b>494,795,244</b>
	MtCO <sub>2</sub> e	<b>391,569</b>	<b>143,081</b>	<b>309,626</b>	<b>34,247</b>	<b>404,374</b>	<b>9,839</b>	<b>1,292,736</b>

<sup>1</sup>Institutional buildings are included within Commercial and Industrial buildings

<sup>2</sup>Municipal transportation includes electricity used by city-owned street lights and signals; electricity emissions were calculated using the NYSERDA state average emissions factor (625 lb CO<sub>2</sub>e/MWh)

<sup>3</sup>Oil includes distillate and residual fuel oils

**kWh:** kilowatt-hour

**mmBtu:** million British thermal units

**mtCO<sub>2</sub>e:** metric tons of carbon dioxide equivalent

Figure 5



## Encourage Efficient, Clean and Affordable Energy Through Coordination, Awareness and Education

### Summary of Objectives and Initiatives

#### Improve coordination among City agencies

- Initiative 1:** Initiate a collaborative effort between schools and the City in pursuing group purchasing policies for energy
- Initiative 2:** Use an energy portfolio approach to reduce risk and optimize savings when energy planning

#### Implement programs and policies to support green development

- Initiative 3:** Adopt a citywide Green Development Program
- Initiative 4:** Initiate a design competition for the redevelopment of an iconic, sustainable building, city block or 'eco-district'
- Initiative 5:** Continue to update zoning codes and planning guidelines to encourage high density, mixed-use development and urban infill

#### Increase sustainability awareness and provide educational resources for municipal staff, residents, businesses and students

- Initiative 6:** Establish a sustainability training program for City employees and new hires
- Initiative 7:** Establish an experiential sustainability education program in public schools
- Initiative 8:** Create a Yonkers sustainability website and organize a rewards program for City employees and the public
- Initiative 9:** Establish an Energy and Water Efficiency Forum for large building owners (buildings over 25,000 square feet)
- Initiative 10:** Implement an outreach program targeting low-income residents to help reduce energy costs
- Initiative 11:** Work with the state to promote green (environmentally focused) training programs for schools and the general public

Yonkers has implemented several planning and policy initiatives to reduce energy consumption and advance sustainability at the municipal and city levels. There is extensive potential to build upon these efforts. Energy planning and policy development in Yonkers is currently conducted with limited collaboration and integration between City departments. By improving intergovernmental coordination, the City can take advantage of synergies between different department planning efforts and priorities, thereby reducing redundancies and saving taxpayer money. Furthermore, expanding channels of communication between City government and the community will likely increase stakeholder engagement and private

sector buy-in, and make municipal and citywide initiatives more successful. A more integrated approach to energy planning and coordination within the city will help ensure Yonkers and its constituents have the necessary frameworks, training and resources to support sustainability and affordable, efficient, and clean energy.

#### Improve coordination among City agencies

Yonkers' municipal budget and operations are separate from the education budget and operations. Energy utility accounts and budgeting for school facilities are managed by the Director of School Facilities Management of the Board of Education. Energy utility budgets for non-school facilities are based on past utility bills and usage data, published utility rates or price changes, and assumptions about various factors that may affect future energy demand and prices (e.g., oil to gas conversions, LED streetlight program). When actual energy costs exceed the estimated budget, controls are established to curtail further energy overuse. If necessary, municipal funds are set aside on an "accrual list" to pay the shortfall or compensate for lapses in billing (i.e., a bill comes due in the "13th month" of the year).

The City does not have other hedging strategies to manage unexpected energy expenses. Depending on various factors that may affect energy consumption or energy rates, such as weather or price volatility, unspent funds can be rolled over from previous years to compensate for an expected negative balance in future years. Alternatively, fund transfers may be required as part of an annual fund-balance reconciliation.

#### Initiative 1: Initiate a collaborative effort between schools and the City to pursue group purchasing policies for energy



There are significant benefits and cost savings associated with purchasing energy and energy-related equipment using economies of scale. By collaborating with the school district, the City can save a significant amount on feasibility studies as well as the procurement of energy and equipment, such as alternative transportation fuels and

vehicle upgrades. A collaborative approach among the schools and other city agencies will also support the Mayor's efforts to work closely with the Yonkers School District.

Programs such as energy savings performance contracts (ESCOs), energy services agreements (ESAs), managed energy services agreements (MESAs) and other capital finance can also take advantage of a larger portfolio of buildings, infrastructure, and vehicles, especially when determining the payback and capital expenditure. The New York Green Bank may be able to assist with financing gaps and providing credit enhancements for certain projects as well.

To leverage economies of scale for energy-related procurement, the City will hold regular meetings between the City Sustainability Director, the Purchasing Director, the departments of Public Works and General Services, and the Director of School Facilities Management to assess energy, fuel and equipment needs across City agencies and optimize purchasing plans.

### **Initiative 2: Use an energy portfolio approach to reduce risk and optimize savings when energy planning**



Energy planning represents an investment-decision problem because of its exposure to unpredictable and external economic conditions. Given the uncertain, complex and dynamic environment of the energy sector, attempting to identify the least-cost long-term energy source is impossible.

The City's historic approach to managing energy has been to focus on energy efficiency projects and energy purchasing as separate activities. This approach exposes the City to the volatility of

energy prices and misses portfolio wide opportunities. An alternate approach is to evaluate the energy projects as a portfolio while simultaneously evaluating different energy procurement sources (i.e. less volatile ones). The outcome will identify the best energy mix for diversifying the City's portfolio of energy projects, reduce long purchasing costs and minimize risk.

The City's Sustainability Director will work with the Purchasing Director, the departments of Public Works and General Services, and the Director of School Facilities Management at the Board of Education to use this approach for future energy projects.

## **Implement programs and policies to support green development**

To ensure Yonkers remains a livable and healthy community, future developments must reduce their environmental impact and optimize their operational performance. Green development can achieve this through thoughtful planning and design that aims to reduce resource consumption and provide enhanced environments for people to live, work, and play. Renewable energy systems, access to public transit and open space, recycled materials, and stormwater management are just a few examples of features that make a development "green." These developments can also attract new businesses that are focused on sustainability and providing their employees with healthy working environments. The City supports green development through the Yonkers Green Development Standards, which require private development in the rezoned downtown area and all new municipal facilities to include design elements that minimize their environmental impact, such as reducing

### **CASE STUDY**

### **Yonkers Green Building Ordinance**

In 2013, the City adopted the Yonkers Green Buildings Ordinance, which requires all City-owned buildings — whether of new construction or undergoing major renovation — to meet the provisions of the Yonkers Green Development Standards. New and renovated buildings within the downtown districts must also meet these standards as part of the Downtown Yonkers zoning amendment.

The 2013 ordinance also encourages private participation by requiring all non-residential buildings larger than 15,000 square feet and residential buildings with more than 25 units to submit a Green Development Checklist addressing a multiple focus areas, including: integrative design, site improvements, location and neighborhood fabric, energy efficiency, and operations and maintenance. Although compliance with the Checklist is not enforced, it familiarizes developers with green building requirements and promotes the benefits of sustainable building practices.



# Energy Planning & Coordination

water use, increasing habitat and biodiversity, reducing energy in buildings and exterior lighting, reducing the urban heat island effect and using materials with a low embodied environmental and health impact.

## Initiative 3: Adopt a citywide Green Development Program



Building on the Yonkers Green Development Standards for municipal buildings, the City will adopt a Green Development Program starting with buildings in downtown Yonkers and eventually for the entire city, similar to the requirement for buildings located in the rezoned downtown area. The program will retain the mandatory requirements and include the requisite number of optional points established by the initial Green Development Standards. These requirements would reduce citywide energy consumption and increase the stock of energy efficient buildings in the city.

The Yonkers Department of Housing and Buildings will be primarily responsible for the implementation of this program, with support from the Mayor's Office and the Department of Planning and Development.

## Initiative 4: Initiate a design competition for the redevelopment of an iconic, sustainable building, city block or "eco-district"



The recent rezoning and redevelopment of the city's downtown and waterfront shows that Yonkers values sustainable planning and design. The City's willingness to guide development through zoning strategies, its commitment

to green construction and the relatively high number of local transit stations present many opportunities to continue this trend through new and innovative projects. The City will launch a design competition to expand sustainability development and provide an opportunity for positive publicity. The competition will include ideas for the sustainable redevelopment of an iconic building—similar to that of the Glenwood Power Station, a sustainable city block or the creation of an "eco-district" within Yonkers.

The Yonkers Department of Planning and Development, with assistance from the Department of Housing and Buildings, will administer the competition. The Yonkers Waterfront Business Improvement District (BID), metro-region developers, and local architects and engineers are also expected to be key stakeholders in the competition. The competition will require a defined project (or number of project sites), development of a public Request for Proposals, an announcement of competition, judging and some form of prize money or potential land development rights.

## Initiative 5: Continue to update zoning codes and planning guidelines to encourage high-density, mixed-use development and urban infill



Yonkers' downtown and waterfront rezoning initiatives have encouraged new development and economic growth by allowing higher-density residential and mixed-use programs in these areas. The City will pursue similar rezoning initiatives to promote growth in other locations, such as former industrial zones and areas

Example of a design competition output



surrounding train stations. The use of zoning overlays and amendments, building code updates, and Green Development Standards have set a precedent for the city, and will be used to guide future green development.

The establishment of various local BIDs will provide vital support for rezoning plans and encouraging investment from private developers. The City's Department of Housing and Buildings will be primarily responsible for implementing this initiative, with assistance from the Department of Planning and Development.

### Increase sustainability awareness and provide educational resources for municipal staff, residents, businesses and students

The Yonkers Green City Advisory Committee is comprised of community volunteers appointed by the Mayor and City Council. The objectives of the committee are to define and provide advice and expertise on environmental and health issues, improve quality-of-life of the community through environmental intervention, apply for environmental grants, and foster educational outreach for Yonkers students and residents.

The committee is working with non-governmental partners, such as MetroPool (a not-for-profit organization that works with employers to implement commuter service programs, including ridesharing), to increase sustainability awareness for City workers and the broader community.

Energy programs and initiatives have been widely publicized and water-use reduction is being strongly encouraged.

Energy and water use can be reduced significantly through focused efforts to educate the public about efficient design, fixtures and usage. Metering also plays a key role in reducing use of energy and other utility resources. Reducing water use is especially important for Yonkers, which buys more than 75 percent of its water from New York City (NYC). More than half of Yonkers homes and businesses are metered for water (a change from less than half as of 2010). This means that most water bills are not based on actual usage, and citywide water use cannot be accurately tracked. If the city's per capita water consumption is greater than that of NYC, an excess charge is applied to the bill that is nearly 60 percent more than the base rate. Reducing energy and water use in Yonkers can be achieved through simple outreach programs and would result in significant savings for the City and its residents.

#### Initiative 6: Establish a sustainability training program for City employees and new hires



City staff is responsible for implementing sustainability objectives. To accomplish this, staff must receive training to understand the City's goals, the benefits to achieving them, and the activities that support them. Establishing sustainability orientation sessions for new hires and ongoing training programs for current employees is expected to reduce operating costs (greater than

## CASE STUDY

### Hudson Park and 66 Main

The Hudson Park project and 66 Main St. are mixed-use developments close to the railroad stations under the Alexander Street Urban Renewal Area's influence. 66 Main St. is a commercial and residential building with more than 170 units.



Each unit in 66 Main St. has ground-source (or "geothermal") heating and cooling as well as energy-efficient appliances. Building occupants are within a two-minute walk to Metro-North and Amtrak trains. The cost of the Metro Partners development was \$45 million.

Hudson Park is a 560-apartment development with 15,500 square feet of commercial space. Hudson Park was supported by \$200 million of public investment for the surrounding infrastructure. As part of the project, the City reduced parking requirements by 50 percent compared with the rest of the city to accommodate for the shortage of parking in downtown Yonkers and a more transit-focused development.



# Energy Planning & Coordination

5 percent energy savings), align staff with City sustainability goals and serve as a mechanism for staff input. Sustainability awareness training will also encourage employees to practice what they learn in the workplace in their everyday lives.

The City will establish training programs to increase the sustainability awareness of its employees and contractors. The Yonkers Department of Planning and Development will be primarily responsible for the implementation of training programs, with assistance from participating City departments. Representatives from these departments will meet before the implementation to review similar training programs and incorporate department-specific needs into this initiative.

## Initiative 7: Establish an experiential sustainability education program in public schools



Creating a sustainable and energy-efficient city includes cultivating an awareness of sustainability principles and practices among its younger residents. Numerous resources are available that engage educators and students with information about sustainability and energy efficiency. For example, schools in Yonkers have already implemented We Future Cycle, a lunchroom recycling program which teaches students to sort waste into separate bins containing recyclables and compost. The City will build upon the existing educational programs in the schools to increase energy awareness. Additional programs, tailored to students across a range of age groups, will include: a chemistry class about the creation of clean fuel (ethanol), an assignment to trace common energy uses to their source (i.e. fuel oil is used for heating, gasoline is used for cars and small equipment), and field trips to the Yonkers Science Barge.

The U.S. Department of Energy and the Energy Information Administration have numerous tools available that offer students information about energy conservation and efficiency and renewable energy. Leveraging these tools, the City will integrate sustainability and energy education into the school district's curriculum. This program will be led by the Mayor's Office and the Director of School Facilities Management



The Science Barge, downtown Yonkers

## CASE STUDY

### GreeNYC Outreach and Education Program

GreeNYC is New York City's comprehensive sustainability outreach and education program that focuses on disseminating information about easy actions residents can take to reduce their energy consumption, carbon footprint and overall environmental impact. Rather than overwhelm residents with a multitude of different messages, GreeNYC campaigns focus on a single action to maximize impact and sustain behavioral changes. This includes actions like "Turn It Off," which addresses idling vehicles and poor air quality; "Save Money, Turn Up the Thermostat," about addressing air conditioning systems; "Drink Tap Water," which addresses waste reduction by using tap water instead of bottled water; and "Bike to Work."

The program also unifies the City's voice across multiple agencies, improving the effectiveness of communication related to sustainability issues. A unique branding scheme was created for the program, including the "Birdie" mascot, to build interest and establish recognition and consistency. Other engagement tools used include merchandise, using various forms of media (social media and ads on City-owned message boards), partnerships and a GreeNYC website. The site contains an events calendar and has a strong social media component including, Twitter, Instagram and Facebook.

Large buildings represent more than **80%** of the total building energy and electricity consumption

## CASE STUDY

## Sustainable South Bronx and Sustainable Westchester

Sustainable South Bronx, a not-for-profit organization whose mission is to tackle economic and environmental challenges in the South Bronx and other areas of New York City, prepares low-income residents for green jobs through its Bronx Environmental Stewardship Training (BEST) Academy. Since 2003, over 500 people have graduated from the BEST Academy, which is funded by public (the NYC Department of Small Business Services) and private sources. Graduates complete an intensive 17-week training program in green construction, building retrofits, repair and maintenance, energy efficiency and conservation, and green technologies. The program offers students a chance to earn certifications and provides externships and job placement assistance as well as long-term career support.

Sustainable Westchester is a consortium of Westchester County local governments whose mission is to facilitate effective sustainability initiatives, engage community stakeholders and share tools, resources and incentives to create a more healthy, vibrant and attractive community. More than 80 percent of the county population lives in the 34 municipalities that have already joined Sustainable Westchester.

at the Board of Education with assistance from school administrators and contributions from local non-governmental organizations and public research organizations such as NYSERDA.

### Initiative 8: Create a Yonkers sustainability website and organize a rewards program for City employees and the public



Yonkers is engaged in community outreach through the activities of the Yonkers Green City Advisory Committee and the Mayor's weekly e-mail distribution. The City will supplement these measures with an increased focus on sustainability, such as regular awards for "greenest" City employee and local business. The creation of a City-run sustainability website will provide a new avenue for outreach and provide easily accessible resources for the community and employees such as: a list of "easy fixes" for decreasing energy use and water use at home and at work, a database of energy efficiency and renewable energy incentives, and information on water conservation and reclamation strategies such as home rainwater harvesting kits.

The Mayor's Office, with assistance from the Yonkers Green City Advisory Committee, will develop and run a sustainability awards program for municipal employees and the public. The Mayor's Office will procure a third party to create a Yonkers sustainability website. Stakeholders

from the committee and relevant City departments will be consulted prior to implementation to help define the goals of the website and rewards programs and identify target groups.

### Initiative 9: Establish an Energy and Water Efficiency Forum for large building owners (buildings over 25,000 square feet)



Yonkers will benefit from comprehensive knowledge and technology sharing resources for energy efficiency, water conservation and renewable energy targeted at large building owners (over 25,000 square feet). Nationally, buildings over 10,000 square feet represent more than 80 percent of total energy and electricity consumed among all buildings. These constituents represent a large portion of the city's overall energy consumption. Buildings account for approximately 10 percent of water use nationally. Not all water customers are metered in Yonkers, creating an overconsumption of water that impacts costs for residents and building owners. As such, their adoption of energy and water use reduction measures would yield significant savings.

The City, led by the Department of Housing and Buildings, will establish and manage the forum with assistance from the Department of Planning and Development and the Yonkers Green City



# Energy Planning & Coordination

Advisory Committee. The forum will allow large building owners to share benchmarking knowledge, including peer building performance data, operational features and requirements of peer building owners; share technology knowledge, including advanced prototyping of new and emerging technologies; validate existing and new technologies in practice, and share best practices for implementation of technologies; develop product standards and specifications requirements, including standards and practices for energy system financing; and develop and contribute to new scientific and engineering knowledge, including industry-academic collaboration.

The City will engage local businesses, academic institutions, not-for-profit entities and other relevant local, city and state government to gauge interest and establish priorities for such a program.

## Initiative 10: Implement an outreach program targeting low-income residents to help reduce energy costs



Yonkers will implement an outreach program targeting low-income residents. It will help these residents reduce energy costs by providing guidance and identifying funding opportunities to lower energy payments. Existing programs such as EmPower New York provide no-cost energy-efficiency solutions and on-site energy education for income-eligible residents.

The Department of Planning and Development will be primarily responsible for the implementation of this program, with external assistance from Con Edison, NYSERDA and the U.S. Department of Housing and Urban Development. The City's Department of Housing and Buildings will contact community leaders to determine the optimal approach for engaging low-income residents in the outreach program. A section of the newly created Yonkers sustainability website (see Initiative 8) will be dedicated to resources for low-income residents.

## Initiative 11: Work with the state to promote green (environmentally focused) training programs for schools and the general public



Green jobs provide workers with long-term career opportunities and play a direct role in improving the environment. Yonkers is committed to training a green workforce. The City and Mayor's Office will promote green jobs by working with Sustainable Westchester, Westchester Community College and other NYSERDA partners and not-for-profit organizations that focus on job training. For example, at the Yonkers YWCA, 20 unemployed low-income minority women received training from the New Way Workforce program to prepare them for careers as qualified solar technicians. The training was made possible by funding from the New York State Department of Labor.

## Implementation Matrix

Responsible party	Key partners	Source of funding	Time frame	Next steps
<b>Improve coordination among City agencies</b>				
<b>Initiative 1: Initiate a collaborative effort between schools and the City to pursue group purchasing policies for energy</b>				
General Services/ School Facilities Management	All City agencies	—	Short-Term	Initiate routine meetings between Sustainability Director, Purchasing Director, Department of Public Works/ Department of General Services Director, and Facilities Management at the Board of Education
<b>Initiative 2: Initiate a collaborative effort between schools and the City in pursuing group purchasing policies for energy</b>				
General Services/ School Facilities Management	Planning and Development	—	Short-Term	Pilot approach on City building portfolio

**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
<b>Implement programs and policies to support green development</b>				
<b>Initiative 3: Adopt a citywide Green Development Program</b>				
Housing and Buildings	Planning and Development	—	Short-Term	Initiate Policy to the entire Downtown Yonkers; Mid-term to expand to the entire City
<b>Initiative 4: Initiate a design competition for the redevelopment of an iconic, sustainable building, city block or “eco-district”</b>				
Planning and Development	Housing and Buildings, Metro-region Developers, Waterfront BID, Local Architects and Engineers	Cleaner, Greener Communities Program (CGC)	Short-Term	Locate area, funding and coordinate for public RFP
<b>Initiative 5: Continue to update zoning codes and planning guidelines to encourage high-density, mixed-use development and urban infill</b>				
Planning and Development	Yonkers Downtown/ Waterfront BID, Yonkers South Broadway BID	Cleaner, Greener Communities Program (CGC)	Short-Term	Locate area, funding and coordinate for public RFP
<b>Increase sustainability awareness and provide pertinent resources for municipal staff, residents, businesses and students</b>				
<b>Initiative 6: Establish a sustainability training program for City employees and new hires</b>				
Planning and Development	All City Departments, NGOs	—	Short-Term	Initiate Policy
<b>Initiative 7: Establish an experiential sustainability education program in public schools</b>				
General Services/ School Facilities Management	State/Third Party Vendors	—	Short-Term	Initiate Policy
<b>Initiative 8: Create a Yonkers sustainability website and organize a rewards program for City employees and the public</b>				
Mayor's Office, Planning and Development	Residents Businesses, City employees	—	Short-Term	Develop webpage, update weekly newsletters
<b>Initiative 9: Establish an Energy and Water Efficiency Forum for large building owners (buildings over 25,000 square feet)</b>				
Planning and Development, Building and Housing	WEAC, Local businesses, Energy Service Providers	—	Short-Term	Reach out to local businesses to gauge interest in starting the program
<b>Initiative 10: Implement an outreach program targeting low-income residents to help reduce energy costs</b>				
Planning and Development, Housing and Buildings	Con Edison, HUD, NYSERDA	NYSERDA: Assisted Home Performance Grants, Home Performance with Energy Star Financing, EmPower New York, Con Edison: [Gas/Electric] Residential Energy-Efficiency Rebate-	Short-Term	Determine optimal approach for reaching stakeholders
<b>Initiative 11: Work with the state to promote green (environmentally focused) training programs for schools and the general public</b>				
Mayor's Office	Yonkers Workforce Investment Board, Board of Education, NYSERDA, Department of Labor	NYSERDA: Clean Energy On-the-Job Training, Clean Energy Training for High School Students, Clean Energy Certifications and Accreditation Incentives, Workforce Development and Training for Renewable Energy and Advanced Technologies, Green Jobs - Green NY Act, NYSERDA: Energy Star Home Builders, Yonkers School District, Department of Labor's Workforce Investment Act	Short-Term	Evaluate existing training programs in other schools and jurisdictions to determine feasibility for programs in Yonkers

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



## Reduce Community and Municipal Building-Level Energy 20 Percent (From 2010 Baseline) by 2020

### Summary of Objectives and Initiatives

#### Reduce energy consumption and emissions through energy monitoring systems in buildings citywide

- Initiative 1:** Develop a voluntary online energy and water tracking tool for residents and businesses
- Initiative 2:** Require the benchmarking of energy and water use in large buildings (commercial, industrial, institutional, multi-family)
- Initiative 3:** Require sub-metering for master-metered multi-family, commercial and institutional buildings

#### Implement programs and policies to reduce citywide energy and GHG emissions

- Initiative 4:** Retrofit an existing building to become a sustainable living demonstration center
- Initiative 5:** Investigate opportunities to weatherize residential buildings
- Initiative 6:** Require new single-or multi-family homes with four units or less to meet ENERGY STAR Labeled Home program requirements
- Initiative 7:** Require energy audits, retro-commissioning and upgrades to large (greater than 25,000 square feet) commercial and multi-family buildings
- Initiative 8:** Require energy and water efficiency audits before pre-existing buildings are sold
- Initiative 9:** Encourage energy efficiency in rental/leased properties by introducing lease agreements that tackle the “split incentives” issue
- Initiative 10:** Work with the state and Westchester County to implement a law phasing out the use of No. 4 and No. 6 heating oils
- Initiative 11:** Engage with NYPA and/or third parties to enroll in demand response programs

#### Implement programs and policies to reduce municipal building energy use and emissions

- Initiative 12:** Partner with the state to improve maintenance of buildings through staff training
- Initiative 13:** Continue to switch municipal buildings and schools from fuel oil to natural gas for heating
- Initiative 14:** Consolidate municipal energy data into a web-based interface and monitor, benchmark and respond to whole-building energy saving opportunities
- Initiative 15:** Continue to integrate multiple building control systems into a central monitoring station and manage the portfolio of municipal buildings.
- Initiative 16:** Initiate regular maintenance plans for municipal building systems opportunities
- Initiative 17:** Implement energy conservation measures in City facilities

The annual cost of building energy is approximately \$355 million. Buildings account for approximately 71 percent of the City’s total energy use and 80 percent of the City’s total fuel use.

For buildings, heating fuels (natural gas and oil) account for 75 percent of the energy consumption while the remainder is related to electricity use (**Figure 6**). This large proportion of heating fuel use is to be expected given the temperate climate of the region and the fact that, on average, there are nearly four times as many heating degree days as cooling degree days in Yonkers each year. Close to 1 million metric tons of CO<sub>2</sub> equivalents are emitted by buildings in Yonkers each year.

Buildings and irrigation consume approximately 10.2 billion gallons of water annually in Yonkers, 77 percent of which is purchased from New York City. The lack of metering infrastructure and awareness throughout the city contributes to an unpredictable and unnecessary overconsumption of water, which increases customer rates and energy use by City-owned water pumping stations.

#### Reduce energy consumption and emissions through energy monitoring systems in buildings citywide

Yonkers lacks energy and water monitoring systems for the community, contributing to an unpredictable consumption of energy and water. Energy metering and monitoring systems provide policy makers and building owners with key information on how the city and how different buildings are consuming energy and water. Actual energy and water consumption information can be used to inform policy decisions and create collaboration opportunities amongst building owners and tenants, and ultimately reduce energy, water, emissions and costs for the municipality and building owners citywide.

**Community Building Energy Consumption by Fuel Type (mmBtu)**

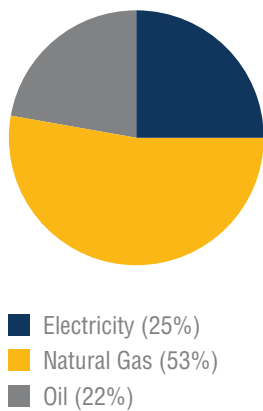


Figure 6

### Initiative 1: Develop a voluntary online energy and water tracking tool for residents and businesses



Before any mandatory requirements to report energy use are implemented, it will be critical to understand the potential participation rate and outcomes of energy benchmarking in the city. A voluntary participation program will allow the City to test the program's framework and implementation strategy before establishing a mandatory large-scale program. To establish a voluntary program, the Mayor's Office will reach out to residents and businesses to gauge interest in participating, determine metrics, recruit volunteers and procure a third party to develop the program's website. The third party will also track and compare the volunteer residential and commercial building owners' energy and water use. Additionally, the City will identify local businesses that are willing to donate prizes (in the form of discounts or free services) for high performers (i.e., those who reduce energy and water consumption over a determined period) as an incentive for usage reductions.

### Initiative 2: Require the benchmarking of energy and water use in large buildings (commercial, industrial, institutional, multi-family)



After the volunteer benchmarking programs described under Initiative 1 conclude, the City will enact a mandatory benchmarking requirement to provide information to building owners about energy and water use in buildings of a type similar to their own. It also encourages building owners and tenants to increase energy efficiency, reduce costs and utilize incentives available through local, state and federal programs. This information also provides the local, state and federal programs

with information that allows them to better measure the improvements in performance of building owners.

The Yonkers Assessment Department will develop a policy requiring owners of large buildings to track, assess and report energy and water use through ENERGY STAR Portfolio Manager. The policy framework will be based on the experience and lessons learned from Initiative 1 and the input from stakeholders and best practices from other cities, such as New York City's benchmarking policy, Local Law 84.

### Initiative 3: Require sub-metering for master-metered multi-family, commercial and institutional buildings



An energy meter measures the amount of electricity, gas or steam that is consumed by a whole building, a section of a building or equipment within the building. A meter that measures usage for a smaller part of a building is called a "sub-meter." Sub-meters can measure more specific types of energy usage, such as indoor or outdoor lighting, equipment or specific spaces within a building. Existing buildings may already have basic energy meters or sub-meters that have been installed by a utility supplier.

Master-metered buildings have only one electric or gas meter that serves the whole building. This creates a disconnect between tenants who consume energy and building owners who typically pay utility bills. By sub-metering master-metered buildings, an owner creates an incentive for tenants to reduce their energy use because the tenant will be responsible for paying for the energy they consume. After installing individual sub-meters in several multifamily buildings, and billing each tenant for their actual energy use, NYSERDA

## CASE STUDY

### Boston Energy Smackdown Competition

Several Boston-area families participated in the Energy Smackdown pilot competition to see who could best reduce their energy consumption and carbon footprint. The competition was managed by the BrainShift Foundation, which setup a tracking tool and publicized the participants' results online. The participants achieved an average year-on-year savings of 14 percent and 17 percent for electricity and natural gas, respectively. After the pilot, the competition was expanded to 120 households and was developed into a reality television show that was broadcast on a local cable channel. The show highlighted the participants, community events and energy audits that took place at the competitors' homes. At the conclusion of the second phase of the competition, participants had reduced their greenhouse gas emissions by 17 percent.



# Energy Efficiency in Buildings

Citywide, energy consumed in buildings costs  
**\$355M**  
 per year

observed an 18 percent to 26 percent decrease in overall energy consumption. Many commercial property owners have realized similar savings when installing tenant sub-meters, according to a 2011 National Science and Technology Council study on Sub-Metering of Building Energy and Water Usage. Installing sub-meters does not reduce energy use on its own; however, sub-metering used in combination with bill allocation, data monitoring and analysis has the potential to save end users energy and money.

The Yonkers Department of Housing and Buildings will work with relevant stakeholders to develop a policy requiring sub-metering for master-metered multifamily, commercial and institutional buildings.

## Implement programs and policies to reduce citywide energy and GHG emissions

Residential and non-residential buildings represent 78 percent and 22 percent of the existing community building stock, respectively. Of the non-residential buildings, roughly 15 percent, or 211 buildings, are larger than 25,000 square feet. The residential building stock in Yonkers is relatively old, with an estimated median year of construction of 1947. About half of the residential units in Yonkers are in buildings with one to four units while the remainder are in buildings with five or more units. The residential energy use intensity (EUI) in Yonkers is 69.5 kBtu/sf, which is about 24 percent higher than the average residential EUI in the state (56 kBtu/sf).

### Initiative 4: Retrofit an existing building to become a sustainable living demonstration center



The City plans to locate a sustainable living demonstration center at a selected facility. The center will connect the community to energy efficiency practices, passive house design and construction, renewable energy technologies and resilience in action. It will also provide visitors with resources on energy and water incentives, conservation strategies, and a Materials for the Arts facility that collects art supplies for reuse in community programs. The Department of Planning and Development will issue an RFP for the renovation and transformation of a selected facility into a sustainable living demonstration center.

### Initiative 5: Investigate opportunities to weatherize residential buildings



Weatherizing homes through the ENERGY STAR® Home Performance Program and on-bill financing will provide residents with support for implementing cost-effective energy-efficiency measures including improvements to the building envelope, heating and cooling systems, electrical and lighting systems and appliances. Residential weatherization can significantly lower home energy bills. Homeowners who participate in the U.S. Department of Energy's Weatherization Assistance Program reduce their energy consumption by an average of 35 percent.

NYSERDA offers an on-bill recovery program to assist in financing these retrofits. On-bill financing is a loan to a household to help pay for an energy-efficient upgrade (or in some cases, a renewable energy project) for the resident's apartment or building. Loans are paid back to the utility by the resident directly through the bill.

The Yonkers Department of Housing and Buildings will publicize available partnerships, programs, and funding mechanisms for residential weatherization. The Buildings Department will also reach out to residential building owners to educate them on the potential energy savings associated with weatherization.

### Initiative 6: Require new single- or multi-family homes with four units or less to meet ENERGY STAR® Labeled Home program requirements



Although residential energy usage in Yonkers decreased between 2006 and 2010, there are programs available to reduce it further. The ENERGY STAR® Labeled Home Program (included in the Green Development Standards) integrates three components to improve the energy performance of a home, including: a high performance envelope (weatherization, insulation and windows), a high-efficiency heating and cooling system, and energy-efficient lighting and appliances.



Philipse Manor Hall

Together, the  
City and school  
district own  
and operate  
**95** facilities

To earn the ENERGY STAR® label, homes must be constructed to meet rigorous energy-efficiency standards within the three components outlined above. Compliance is verified by independent home raters who inspect and test homes under construction. According to the U.S. Environmental Protection Agency, ENERGY STAR®-certified homes can lower annual utility bills by 20 percent compared to conventional homes.

The Yonkers Department of Planning and Development, with support from the Department of Housing and Buildings, will work with relevant stakeholders to develop a policy mandating new single-family homes or multi-family homes with four units or less to be built to meet the ENERGY STAR® Labeled Home program requirements. The Mayor's office will reach out to residential building owners in support of this policy.

#### Initiative 7: Require energy audits, retro-commissioning and upgrades to large (greater than 25,000 square feet) commercial and multi-family buildings



Energy audit and retro-commissioning processes identify low-cost operational and maintenance building improvements that will save energy and money. Studies suggest that retro-commissioning can reduce energy consumption in existing buildings by 10 to 15 percent. Con Edison, NYSERDA and NYPA offer incentives for energy audits and retro-commissioning projects. Yonkers will work with these partners under the Department of Public Service's new Reforming the Energy Vision (REV)

proceeding to take full advantage of expected data transparency reforms to drive better knowledge of available energy efficiency incentives and resulting savings. Private financing is also available for retro-commissioning projects because of their relatively short pay-back periods, suggesting an opportunity to achieve large-scale energy reductions in this sector. Financially viable projects that require longer pay-back periods may also be eligible for Green Bank partnership financing.

The Yonkers Department of Planning and Development, with support from the Department of Housing and Buildings, will work with relevant stakeholders, including building owners, to develop a City ordinance requiring large buildings to undergo an energy audit every 10 years and perform retro-commissioning of certain building systems. By taking advantage of the market of existing programs and incentives to save energy and reduce greenhouse gas emissions, this policy will help large buildings owners and operations save money.

#### Initiative 8: Require energy and water efficiency audits before pre-existing buildings are sold



One of the largest barriers to improved energy performance in cities is a lack of understanding of energy use in pre-existing building stock and which buildings meet code requirements.

A mechanism to facilitate energy improvements in existing buildings is the grading of building energy performance based on the results of a required audit at the time buildings are sold. This would allow potential buyers to understand the future operational costs and needed upgrades of a building before making a purchase. It also provides information to the City about the existing building stock.

Many building owners are not aware of the benefits of energy audits or the potential funding sources that are available to support efficiency improvements. By educating building owners in partnership with public and private organizations, the City will increase implementation of energy audits and energy-efficiency improvements by connecting building owners to energy professionals, incentive programs, and unlocking third-party financing opportunities.



# Energy Efficiency in Buildings

Residential energy consumption has decreased from 2006 to 2010

The Yonkers Department of Housing and Buildings, with support from the Department of Planning and Development, will work with homeowners and business owners to develop a City ordinance requiring all buildings to undergo an energy and water efficiency audit before they are sold. The audit will need to be completed by a certified professional and the results will be required to be given to prospective buyers. The City will reach also out to governmental and non-governmental organizations that have experience with energy audits and retrofits to establish partnerships that will benefit local building owners starting with larger (greater than 25,000 square feet) and older buildings.

## Initiative 9: Encourage energy efficiency in rental/leased properties by introducing lease agreements that tackle the “split incentives” issue



There are multiple options for financing energy efficiency projects, including capital funding, publicly available incentives or grants, utility incentives or grants, or third party-funded projects. However, in cases where a building has a non-owner tenant, a “split incentive” issue occurs in which the savings are disproportionate for either the owner or the tenant. An Energy Aligned Clause in lease agreements allows the owner and tenant to share the costs of an energy-efficiency upgrade by including language where a portion of the energy savings enjoyed by the tenant is applied to the cost of the efficiency upgrade.

The Yonkers Department of Planning and Development, with assistance from the Department of Housing and Buildings, will study other ordinances that aim to enhance the energy efficiency of rental properties and determine best practices that can be applied to Yonkers.

## Initiative 10: Work with the state and Westchester County to implement a law phasing out the use of No. 4 and No. 6 heating oils



The City will work with the state to phase out No. 4 and No. 6 fuel oils, also known as heating oil and residual oil, respectively. Both fuel oils generate a significant amount of air pollution, including particulates, sulfur dioxide, nitrogen oxides and carbon dioxide. Approximately 120 non-residential and multi-family buildings in Yonkers use No. 4 and No. 6 fuel oil, but the number of single-family homes with No. 4 is currently unknown. By switching to low sulfur No. 2 oil, or natural gas, the pollutants in the air will be significantly reduced, improving the health of people in Yonkers.

Natural gas emits approximately 30 percent less carbon dioxide emissions and is less expensive than heating oil. Switching from fuel oil to natural gas will save a home or building owner money and reduce emissions by 5 percent citywide and 7 percent across residential, commercial, industrial and institutional/municipal buildings. These savings will be enhanced with boiler system upgrades.

The Yonkers Department of Planning and Development will collaborate with state agencies and legislators to propose a statewide law phasing out the use of No. 4 and No. 6 heating oils in buildings. The department will also team up with state and Westchester County agencies to create an integrated strategy for helping building owners switch from fuel oil to natural gas. Providing additional resources such as an approved plumber or HVAC contractor list, and funding for feasibility studies, will benefit Yonkers by improving the appeal to building owners of converting boilers. The Buildings Department will reach out to Con Edison to ensure the utility is engaged throughout the process.

Example of Sustainable Demonstration Centers



Approximately  
**120**  
buildings in  
Yonkers use No.4  
and No.6 fuel oils

## CASE STUDY

## ENERGY STAR® Certified Homes Program

Since 2001, Greenburgh, New York, has required newly constructed residential buildings to comply with the requirements of the ENERGY STAR® Certified Homes Program. The law applied to single- and two-family homes as well as multi-family buildings that are three stories high or less. Greenburgh was the first municipality in the state to mandate compliance with the ENERGY STAR® program for new homes. Between 2001 and 2009, approximately 70 ENERGY STAR®-certified homes were constructed in Greenburgh.

### Reduce peak demands in large municipal and community buildings

Peak shaving is the process of reducing a building's peak electrical demand and lowering the amount of energy purchased from the utility company during peak hours. Con Edison and NYPA charge customers for electricity consumption based on total kilowatt-hours used by the building and peak electricity demand based on the largest amount of kilowatts required during a given period of time. Customers with time-of-use billing are charged higher consumption rates during peak hours compared to the rest of the day. Peak hours typically start in the early afternoon and end in the early evening, which is often when buildings have the largest electrical demands. By reducing electricity consumption during peak hours, consumption costs and demand costs drop significantly. In addition, these strategies reduce the impact on the transmission grid during peak hours. It also helps improve air quality by reducing the need for dirtier and more inefficient power plants to run to meet peak demand.

Some conventional peak shaving strategies include use of on-site gas or diesel generators as a power source to offset use of electricity from the grid. These can be controlled manually or automatically through building and energy management systems. Another option to reduce peak demand, when feasible, is through thermal energy storage. This method typically uses electricity to create heat or cooling during periods when electricity prices are low, or during periods of excess electricity, and stores heat for later heating and cooling uses. Two common technologies that can be deployed relatively easily are ice storage (using chillers to create ice that can be

used for cooling systems or chilled water systems during peak daytime use) and hot water storage (using hot water tanks heated by electrodes or heat pumps for domestic hot water or district hot water systems). Additional, less intensive peak shaving strategies include dimmable lighting and daylight sensors, variable speed fans and motors, pre-cooling the building on hot days by turning on the system earlier in the morning, turning off escalators, reducing the number of elevators in use and turning off non-essential loads (fountains, equipment, etc.).

#### Initiative 11: Engage with NYPA and/or third parties to enroll in demand response programs



Studies have shown that demand response programs can reduce an eligible commercial building's peak demand by 10 to 20 percent, earning each building tens of thousands of dollars annually. Reducing peak demands of large electricity consumers in Yonkers will help alleviate congestion on the local grid and decrease emissions from peaking power plants that are turned on to supply electricity during high demand periods. The New York Independent System Operator's (NYISO) demand response program averages three to five demand response events a year, with each event lasting four hours to six hours.

The Yonkers Department of General Services will engage with NYPA and/or third parties to enroll municipal buildings in demand response programs. The Department of Planning and Development will seek out industrial buildings and large buildings to introduce owners to demand response programs.



# Energy Efficiency in Buildings

## Air Pollutants by Heating Type

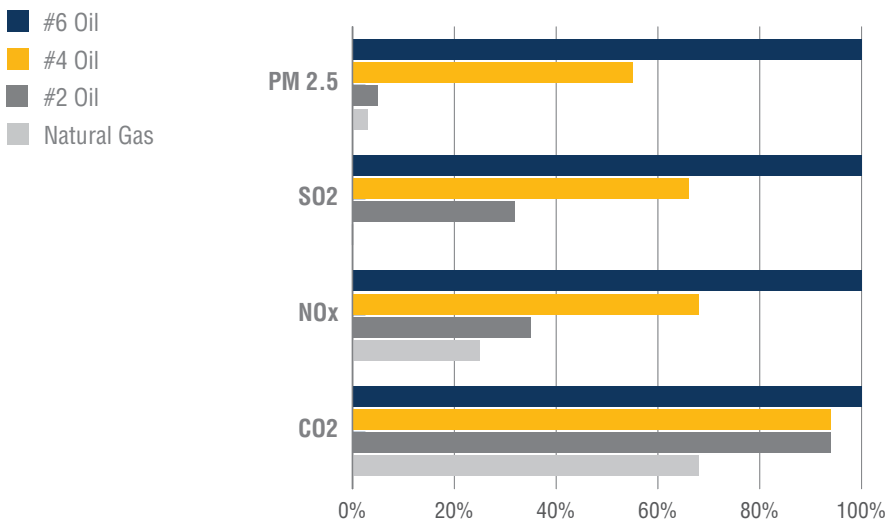


Figure 7

## Implement programs and policies to reduce municipal building energy use and emissions

The City owns and operates nearly 50 municipal buildings. The Yonkers School District owns another 45 buildings. These buildings and facilities consume more than 78 percent of the total municipal energy in Yonkers, with school buildings representing almost 54 percent of the total energy use. Fuel oil and electricity make up 37 percent and 35 percent of the energy consumed by municipal buildings, respectively. The total annual cost of energy for municipal buildings is \$4.14 million while the total cost of energy for the schools is \$8.12 million.

In 2010, the City partnered with NYPA to complete energy audits of 10 municipal buildings. Based on the findings, several energy conservation measures (ECMs) were recommended for implementation. The ECMs focused on lighting retrofits as well as retro-commissioning and upgrading heating control systems. NYPA provided more than \$1.5 million for the upgrades, which were completed in 2013 and are estimated to save the City \$266,300 in energy costs and prevent the release of 547 tons of carbon dioxide annually.

Building on the first round of energy audits conducted in 2010, the City and NYPA completed an additional 20 energy audits in spring 2014. Based on the available data from these audits, many of the facilities owned by the City and the school district have numerous opportunities for energy-efficiency upgrades, including replacing inefficient lighting fixtures, installing lighting controls, upgrading outdated boiler systems with advanced controls and natural gas burners, and performing retro-commissioning on existing heating, ventilation and air conditioning systems. The City lacks sufficient capital to make needed retrofits to the municipal building stock and must seek out funding programs and partners to make recommended upgrades. There are also a number of low- to no-cost opportunities to pursue, such as increased maintenance, lighting upgrades and controls, adding insulation to hot water pipes, retro-commissioning and switching to natural gas with existing dual fuel boilers. Funding partners to alleviate the City's capital concerns may include the state, ESCOs or MESAs.

## Initiative 12: Partner with the state to improve maintenance of buildings through staff training



Yonkers' building portfolio includes a broad range of facility types and ages. Building systems vary in performance and complexity, making comprehensive maintenance plans difficult to formulate and manage. To improve maintenance and operation, the City will team up with state and local partners and start a training program for facilities staff with a focus on energy efficiency and sustainability awareness. Better trained building staff can lead to utility bills that are reduced by 10 to 20 percent.

The Office of General Services and School Facilities Management will be responsible for the implementation of training programs for municipal buildings under their respective jurisdictions. Partnerships with vendors will be necessary for system-specific training, although the scope and administration of training programs will be determined by individual building and types of systems. Green Professional Building Skills Training is a series of courses launched by the Urban Green Council in New York City that teaches people sustainability principles and trade-specific knowledge. Other organizations and programs such as the Building Operators Certification, Certified Energy Manager and Building Performance Institute also offer relevant training.

## CASE STUDY

## Austin Energy Conservation Audit and Disclosure Ordinance

In November 2008, Austin, Texas enacted the Energy Conservation Audit and Disclosure Ordinance, which mandates that single-family, multi-family and commercial properties 10 years or older undergo energy audits before being sold. The audit must be performed by a certified energy professional and the results have to be provided to potential buyers and tenants. Property owners are not required to perform any energy efficiency upgrades, but they can receive an exemption to the ordinance if certain energy conservation measures have been recently completed. Failure to comply with the ordinance can result in fines between \$500 and \$2,000.

### Initiative 13: Continue to switch municipal buildings and schools from fuel oil to natural gas for heating



Although natural gas prices have declined in recent years, fuel oil prices have risen. Based on the most recent available 12-month average price data (May 2013 to May 2014), natural gas costs \$1.62 per gallon of fuel oil equivalent, compared to \$4.09 per gallon for fuel oil. The significant price difference makes natural gas an environmentally preferable and a more economically beneficial alternative to fuel oil.

Natural gas also emits nearly 30 percent fewer greenhouse emissions than fuel oil. While approximately 10 City buildings have already switched from fuel oil to natural gas since 1997, almost half of City buildings still use fuel oil No. 2 for heating. The majority of these facilities are school buildings, with only six non-school buildings using fuel oil.

To minimize municipal costs and emissions, the City will continue to switch existing fuel oil burners to natural gas and further reduce emissions—and possibly energy consumption—by retrofitting boilers with new burners. The Department of General Services and Facilities Management at the Board of Education will identify which municipal buildings are candidates for fuel switching and will reach out to ESCOs and Con Edison for funding opportunities.

### Initiative 14: Consolidate municipal energy data into a web-based interface and monitor, benchmark and respond to whole-building energy saving opportunities



Municipal energy data is recorded via basic spreadsheets with little analysis of trends and changes at the portfolio scale. Assessment of individual building utility data is also minimal. Furthermore, some utility accounts are not associated with specific buildings, resulting in bill payments for unknown energy users. This makes it difficult to determine abnormalities or significant changes in energy usage patterns. By consolidating municipal energy data into an intelligent, secure, web-based interface, such as ENERGY STAR Portfolio Manager, facility managers and department officials will easily identify energy consumption anomalies and investigate their causes. This will improve detection of potentially serious issues with HVAC equipment and highlight energy savings opportunities. Many energy data collection programs contain built-in analytics and warning systems that eliminate the need to actively monitor incoming data.

Grinton I. Will Library





# Energy Efficiency in Buildings

## CASE STUDY

## Energy Efficiency Through Energy Performance Contracts

Wilson County, North Carolina, located near Raleigh, was experiencing high energy costs and occupant discomfort within many of its older buildings. To combat this, the County completed \$900,000 in energy efficiency retrofits, including the installation of integrated building management systems (BMS) in 10 buildings. The county executed an Energy Performance Contract (EPC) with an Energy Service Company (ESCO) to pay the upfront costs of the retrofits. In an EPC, the ESCO provides the initial capital for the retrofit and recoups the retrofit costs through utility bill savings. The newly installed management systems help facility operators to closely manage energy usage and reduced energy consumption by 15 percent while providing \$107,000 in annual savings.

The Department of Planning and Development, along with the Department of General Services, will engage with NYPA and/or release an RFP for a service to feed building energy use and cost data into an intelligent, secure, web-based interface. This will build upon the existing benchmarking of all City buildings over 10,000 square feet that was completed in 2014.

### Initiative 15: Continue to integrate multiple building control systems into a central monitoring station and manage the portfolio of municipal buildings



Several City buildings contain advanced building management systems (BMS) to monitor and control complex building systems such as boilers and chillers. Many of these BMSs are also connected to a database at Yonkers Public Library which monitors and manages the connected buildings from a central location. A BMS can also quickly turn off specific equipment during a demand response event, generating extra revenue

for the City. Adding buildings to the City's existing central database will reduce operational costs by streamlining the management of Yonkers' portfolio of buildings and will increase the potential for demand response program participation.

As buildings receive retrofits and upgrades, the Department of General Services and the Board of Education will assess the feasibility of installing BMSs as part of the scheduled retrofit or upgrade. Newly installed systems will be linked to the existing central database at Yonkers Public Library.

### Initiative 16: Initiate regular maintenance plans for municipal building systems



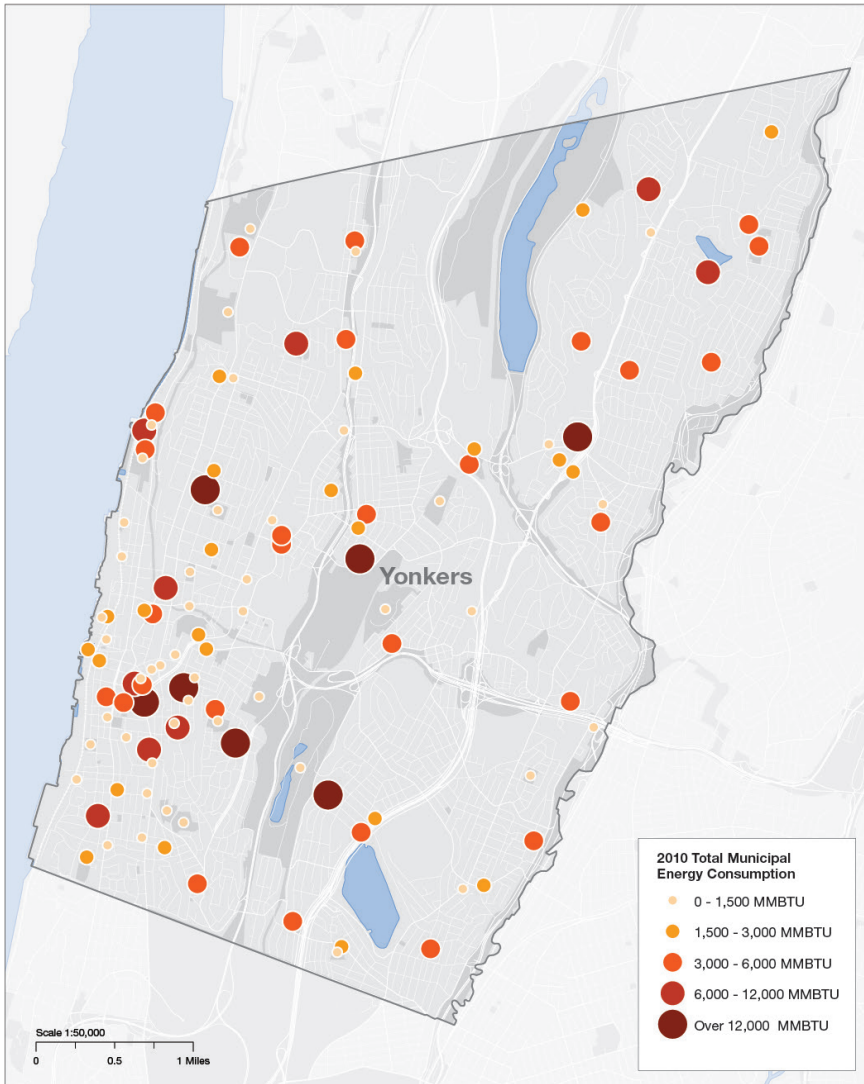
In 2014, 20 municipal buildings underwent ASHRAE Level 1 energy audits to determine their current state of operation and identify opportunities for energy savings. The buildings are a representative sample of the City's diverse building portfolio and include police facilities, primary and secondary schools, parking garages, recreation and cultural facilities, as well as water pump stations. Walk-throughs revealed many of the buildings and their systems were not performing optimally due to deferred maintenance. This was especially true in older facilities such as the 1st Precinct Police Station.

Developing and adhering to regular maintenance plans for HVAC, plumbing, domestic hot water, lighting, controls systems and building envelopes will improve building performance and ensure equipment is functioning properly. This can reduce energy consumption and utility costs while improving occupant comfort. Performing regular maintenance will also help identify minor problems with building systems before they develop into serious situations, thereby avoiding the costs associated with significant repairs and downtime.



Boiler installation

## Energy Consumption of Municipal Buildings



The Department of General Services and the Facilities Management at the Board of Education will assess maintenance plans and schedules to determine gaps and areas for improvement. Updated plans will be developed by both agencies to remedy any issues that are discovered after the assessment.

### Initiative 17: Implement energy conservation measures in City facilities



Specific energy conservation measures (ECMs) were recommended for the 20 buildings that received an ASHRAE Level 1 energy audit in spring 2014. Many of the observations and recommended ECMs follow similar themes. These themes can be grouped into the following categories: lighting and lighting controls, building envelope, and HVAC systems and controls. By implementing the recommended lighting system upgrades and the HVAC system ECMs, the City could significantly reduce its energy consumption and greenhouse gas emissions while improving light quality and occupant comfort. There are also considerable opportunities to reduce operational and future maintenance costs by retro-commissioning, refurbishing or replacing HVAC systems.

The City's Department of General Services will work with NYPA to select, implement and fund the recommended ECMs. The implementation of the recommended ECMs will be modeled after the process and partnership with NYPA that was used to complete the recent energy efficiency retrofits to Yonkers City Hall.

Figure 8

### Yonkers City Hall Energy Efficiency Retrofits

Yonkers City Hall recently had 500 existing single-pane windows replaced with high-efficiency, Low-E double pane windows. The window replacement project is expected to reduce solar heat gain and air leakages while cutting greenhouse gas emissions by more than 50 tons.

The City Hall retrofit was part of a larger collaboration with NYPA to upgrade nine municipal facilities in Yonkers, including: new high-efficiency LED lighting on the Yonkers City Hall roof and in the City Council Courtroom; lighting upgrades and heating upgrades at the Department of Public Works Vehicle Repair Center; lighting upgrades at the E.J. Murray Memorial Skating Rink; lighting upgrades and a new building management system at the Grinton I. Will Branch of the Yonkers Public Library; lighting upgrades and new electrical equipment at the Water Bureau and Treatment Plant; and new boiler timers at the 1st Police Precinct, 2nd Police Precinct/Fire Station No. 7 and 87 Nepperhan Avenue.





# Energy Efficiency in Buildings

## Implementation Matrix

Responsible party	Key partners	Source of funding	Time frame	Next steps
<b>Reduce energy consumption and emissions through energy monitoring systems in buildings citywide</b>				
<b>Initiative 1: Develop a voluntary online energy and water tracking tool for residents and businesses</b>				
Mayor's Office	Web-developers, building owners, businesses	NYSERDA Cleaner, Greener Communities	Short-Term	Reach out to residents and businesses to gauge interest in program participation; Determine metrics, search for volunteers, set up web-site and search for businesses to donate prizes (with donating organization advertised on website)
<b>Initiative 2: Require the benchmarking of energy and water use in large buildings (commercial, industrial, institutional, multi-family)</b>				
Assessment	Housing and Buildings, Planning and Development, Con Edison, ENERGY STAR	—	Short-Term	Develop policy that requires owners of large buildings to track, assess, and report energy and water use through an internet-based benchmarking tool developed by the United States Environmental Protection Agency
<b>Initiative 3: Require sub-metering for master-metered multi-family, commercial and institutional buildings</b>				
Housing and Buildings	NYSERDA, Con Edison	NYSERDA: Energy Smart Multifamily Performance Program	Short-Term	Develop policy that requires sub-metering for master-metered multifamily, commercial, and institutional buildings
<b>Initiative 4: Retrofit an existing building to become a sustainable living demonstration center</b>				
Planning and Development	Housing and Buildings	NYSERDA Multifamily Performance Program, FlexTech Program, Existing Facilities Program, Industrial and Process Efficiency Program, Advanced Buildings Program, Energy Smart Multifamily Performance Program; ConEdison: Commercial and Industrial Energy Efficiency Program, [Gas/Electric] Multifamily Energy Efficiency Incentives Program; HUD: Community Development Block Grant	Short-Term	Public RFP
<b>Initiative 5: Investigate opportunities to weatherize residential buildings</b>				
Planning and Development	Housing and Buildings, Multifamily Building Owners, Tenants	NYSERDA: Energy Smart Multi-family Performance Program; Con Edison: [Gas/Electric] Multi-family Energy Efficiency Incentives Program, HUD: Community Development Block Grant, DOE: Better Buildings Challenge	Short-Term	Publicize partnerships for businesses, residents, and building owners
<b>Initiative 6: Require new single- or multi-family homes with four units or less to meet ENERGY STAR Labeled Home program requirements</b>				
Housing and Buildings	Planning and Development, Residents, Businesses, Building Owners	—	Short-Term	Develop webpage, update weekly newsletters
<b>Initiative 7: Require energy audits, retro-commissioning and upgrades to large (greater than 25,000 square feet) commercial and multi-family buildings</b>				
Housing and Buildings	Planning and Development, Multifamily Building Owners, Tenants, Commercial Buildings, BPI	NYSERDA: Energy Smart Multi-family Performance Program, FlexTech Program, Existing Facilities Program, Industrial and Process Efficiency Program, Con Edison: [Gas/Electric] Commercial and Industrial Energy Efficiency Program, DOE: Better Buildings Challenge	Long-Term	Develop policy that requires large buildings to undergo an energy audit every 10 years, along with retro-commissioning, to "tune up" the building's existing systems and ensure efficient operation

**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
<b>Implement programs and policies to reduce citywide energy and GHG emissions (continued)</b>				
<b>Initiative 8: Require energy and water efficiency audits before pre-existing buildings are sold</b>				
Housing and Buildings	NY State, Planning and Development, BPI	NYSERDA: Existing Facilities Program	Mid-Term	Contact third party auditors
<b>Initiative 9: Encourage energy efficiency in rental/leased properties by introducing lease agreements that tackle the “split incentives” issue</b>				
Housing and Buildings	Planning and Development, Building owners and tenants	NYSERDA, Con Edison, Energy Star	Short-Term	Study other local city ordinances that aim to enhance the energy efficiency of rental properties in New York, California, Wisconsin, Vermont, and Texas to find success stories
<b>Initiative 10: Work with the state and Westchester County to implement a law phasing out the use of No. 4 and No. 6 heating oils</b>				
Housing and Buildings	NY State, Westchester County, Housing and Buildings, Residents, Businesses, Building Owners	NYS: Refundable Clean Heating Fuel Tax Credit (Corporate, Personal) (12/32/16), Con Edison	Short-Term	Work with state agencies and legislators to propose a policy that requires buildings to phase out the use of #4 and #6 heating oil
<b>Reduce peak demands in large municipal and community buildings</b>				
<b>Initiative 11: Engage with NYPA and/or third parties to enroll in demand response programs</b>				
Department of General Services, Board of Education, Planning and Development	Planning and Development	For Community - NYSERDA: FlexTech Program, Existing Facilities Program	Mid-Term	Release RFP for Demand Response on Municipal Buildings; Seek out industrial buildings and large buildings to introduce demand response programs
<b>Implement programs and policies to reduce municipal building energy use and emissions</b>				
<b>Initiative 12: Partner with the state to improve maintenance of buildings through staff training</b>				
General Services/School Facilities Management	State/Third Party Vendors	—	Mid-Term	Initiate Policy
<b>Initiative 13: Continue to switch municipal buildings and schools from fuel oil to natural gas for heating</b>				
General Services, Board of Education, Planning and Development	Facility Managers/Staff, NYPA, NYSERDA, ESCOs, Con Edison	NYPA loan	Short-Term	Investigate fuel switch for City buildings that consume fuel oil, reach out to ESCOs and Con Edison for funding opportunities
<b>Initiative 14: Consolidate municipal energy data into a web-based interface and monitor, benchmark and respond to whole-building energy saving opportunities</b>				
Department of General Services, Board of Education, Planning and Development	Facility Managers	Municipal budget	Short-Term	Planning and Development to release RFP for a service to feed energy use and cost data into an intelligent, secure, web-based interface
<b>Initiative 15: Continue to integrate multiple building control systems into a central monitoring station and manage the portfolio of municipal buildings</b>				
Department of General Services, Board of Education, Planning and Development	Facility Managers	NYPA loan	Short-Term	Ongoing as retrofits occur
<b>Initiative 16: Initiate regular maintenance plans for municipal building systems</b>				
Department of General Services, Board of Education, Planning and Development	Facility Managers/Staff	Municipal budget	Mid-Term	Assess current maintenance plans and schedules to determine gaps and areas for improvement
<b>Initiative 17: Implement energy conservation measures in City facilities</b>				
Department of General Services, Board of Education, Planning and Development	Facility Managers/Staff, NYPA, NYSERDA, ESCOs, Con Edison, local commissioning agents	NYPA loan	Mid-Term	Public RFP



## Increase Transportation Options Citywide to Transform Yonkers Into a Walkable, Bike-Friendly, Transit-Focused City

### Summary of Objectives and Initiatives

#### Create active, mixed-use neighborhoods that are safe and easily accessible by walking, cycling and transit

- Initiative 1:** Develop locations with opportunities for mixed use, transit-oriented development
- Initiative 2:** Encourage coordination between transit agencies
- Initiative 3:** Develop a citywide bicycle and pedestrian master plan in coordination with existing projects and efforts
- Initiative 4:** Adopt a Complete Streets Policy
- Initiative 5:** Encourage businesses and developers to build electric charging stations and other alternative fuel stations
- Initiative 6:** Develop a traffic signal optimization program

#### Expand and encourage commute options for City employees

- Initiative 7:** Implement a pre-tax transit benefit program for City employees
- Initiative 8:** Develop a rideshare program
- Initiative 9:** Develop a City employee guaranteed ride home program
- Initiative 10:** Develop an alternative work schedule program

#### Improve City vehicle fleet efficiency

- Initiative 11:** Replace retiring City vehicles with more fuel-efficient and alternative-fuel models
- Initiative 12:** Upgrade municipal facilities to accommodate alternative vehicles
- Initiative 13:** Implement a pilot employee car-sharing program to help right-size the fleet
- Initiative 14:** Develop a fuel management and vehicle maintenance plan, and provide EcoDriving training to City employees
- Initiative 15:** Evaluate private school bus systems for fuel efficiency

Yonkers is continually working to become a denser, mixed-use and mass transit-oriented city. Transportation accounts for approximately 29 percent of the city's total energy use and 32 percent of the city's greenhouse gas emissions. In 2010, transportation citywide consumed approximately 5,280,000 mmBtu of energy (404,000 MtCO<sub>2</sub>e). Street lights and signals consumed 47,000 mmBtu (4,000 MtCO<sub>2</sub>e), and the municipal vehicle fleet used an additional 82,000 mmBtu (5,900 MtCO<sub>2</sub>e). Currently, 85 percent of trips originating

in Yonkers are taken by automobile, highlighting an opportunity for a switch to alternative vehicles and modes to significantly reduce the city's transportation energy demand.

#### Create active, mixed-use neighborhoods that are safe and easily accessible by walking, cycling and transit

Yonkers sees approximately 900 million vehicle miles traveled (VMT) within the city annually, or about 12.5 miles per person per day. As depicted in **Figure 10**, for travel within Yonkers, approximately 80 percent of residents drive (**Figure 10** – left) while approximately 87 percent of trips in and out of Yonkers are by private automobile (**Figure 10** – center). Of the trips leaving Yonkers, approximately 20 percent of residents use rail (**Figure 10** – right). Overall, the transportation energy use per person is low compared to other U.S. cities (**Figure 9**).

As most trips in Yonkers are taken by car, priority has historically been given to vehicle infrastructure. The pedestrian network of sidewalks, crosswalks and dedicated paths is currently disjointed and feels unsafe in many locations throughout the city. There are a limited number of on-street bicycle lanes, which limits short bicycle trips to work or other destinations. In terms of a recreational bicycle and pedestrian system, off-road paths and shared roadways include the Old Croton Aqueduct Trailway, the South County Trailway and the Bronx River Pathway. As shown in **Figure 11**, there is limited east-west trail connectivity across Yonkers.

The challenging topography and disjointed network of sidewalks and crosswalks contribute to a lack of convenience and safety that does not support cycling or walking within the City.

Yonkers is served by two Metro-North Railroad (Metro-North) lines that primarily serve residents commuting to Manhattan (**Figure 12**). Commuters to destinations outside of Yonkers use automobiles slightly less than other cities in region with 71 percent commuting by automobile and 25

## Yonkers Transport Travel Energy Compared to Other Cities

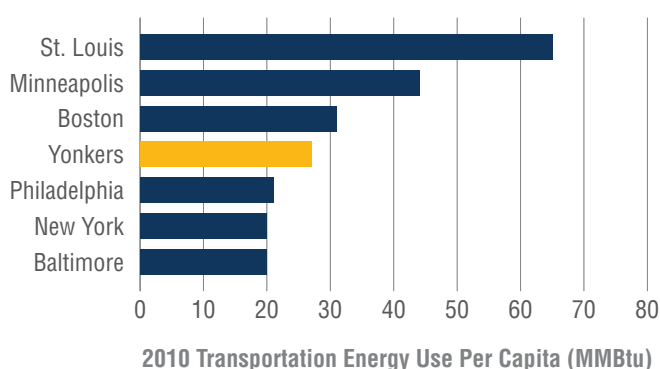


Figure 9

percent by rail. This is supplemented by a number of Bee-Line bus routes connecting Yonkers to the rest of Westchester County as well as a few routes that extend to the Bronx. However, the inconvenience caused by a lack of transit schedule coordination between the Bee-Line bus system and Metro-North discourages public transit use.

Land-use density and mix also play a role in creating places where walking, cycling and mass transit are more convenient than driving. In Yonkers, the high level of single-occupancy vehicle use can be attributed to a land-use pattern that is low-density with activity centers spread across

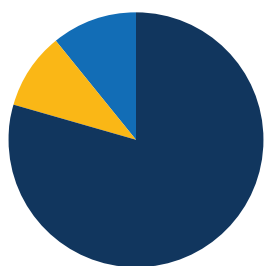
much of central and eastern Yonkers. Over the last decade, the redevelopment of Yonkers Downtown has encouraged mixed-use development and transit-oriented development (TOD). There are additional opportunities for smart growth around each of the 10 Metro-North stations that lie along the city's edges. Yonkers will also consider complementary policies and programs that reduce fuel use and greenhouse gas emissions for those who will continue to drive in the near future.

### Initiative 1: Develop locations with opportunities for mixed use, transit-oriented development



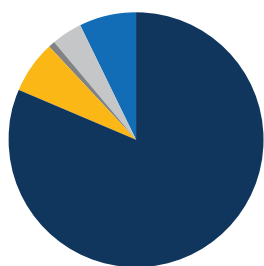
Demographics and economic trends are influencing people's decisions to live in active urban neighborhoods with plentiful transit options. According to several studies, transit-oriented development (TOD) requires at least 12 residential units per acre in residential areas and 50 employees per acre in commercial centers to create active street life and support retail such as grocery stores and coffee shops within walking distance of homes, offices and stations. The locations of Metro-North rail stations in Yonkers create numerous development opportunities for TOD, specifically in areas within 15-minute walking distance (approximately half a mile) around each station (**Figure 13**). Leveraging these opportunities and the expansion of the Yonkers Green Development Program, the City will rezone areas around the rail stations in a manner similar to the recent rezoning of downtown, where there is now greater activity than in areas around other stations in Yonkers.

### Community Mode Share: Internal Trips



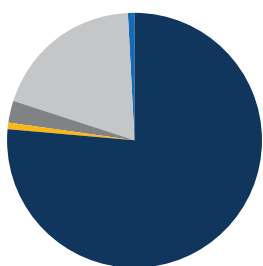
- Automobile (79.8%)
- Bus (9.5%)
- Shared Ride/Taxi (0.2%)
- Rail (0.0%)
- Walk/Non-Motorized (10.6%)

### Community Mode Share: All Destinations



- Automobile (87.1%)
- Bus (6.7%)
- Shared Ride/Taxi (0.8%)
- Rail (3.8%)
- Walk/Non-Motorized (7.1%)

### Community Mode Share: Work Trips



- Automobile (76.5%)
- Bus (0.9%)
- Shared Ride/Taxi (2.6%)
- Rail (19.2%)
- Walk/Non-Motorized (0.8%)

Figure 10



## City of Yonkers Bicycle Network and Bicycle Parking

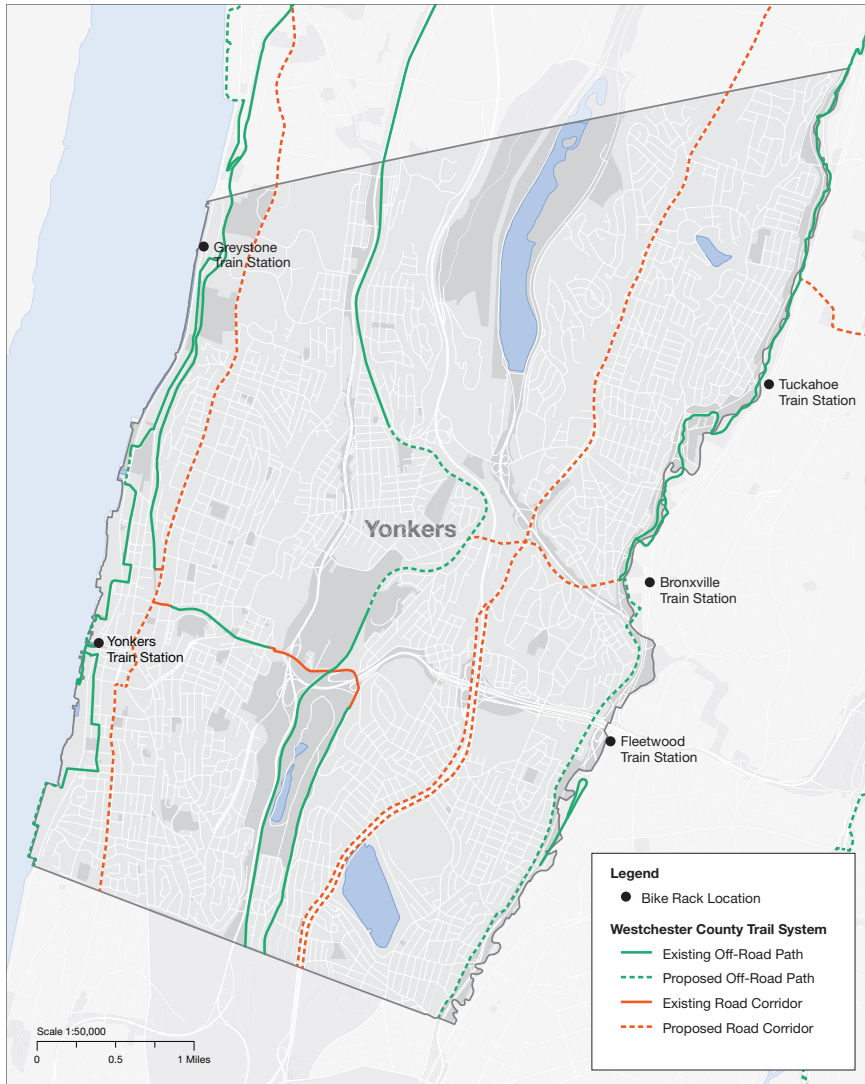


Figure 11



Hudson Street  
in Downtown Yonkers

### Initiative 2: Encourage coordination between transit agencies



Better coordination between Bee-Line and Metro-North schedules would reduce waiting time for riders who transfer from bus to rail and shorten their commute, especially for those traveling between Yonkers and New York City. This would help make mass transit a more attractive option and likely increase overall use. The City will coordinate efforts with non-government organizations, such as the New York Metropolitan Transportation Council (NYMTC) or MetroPool, and representatives from Metro-North and Bee-Line to provide better multi-modal service and improved transit connections, especially in highly congested areas such as Getty Square. The City will also work with Bee-Line to encourage coordination with the potential new Hudson Valley Transit Link BRT.

### Initiative 3: Develop a citywide bicycle and pedestrian master plan in coordination with existing projects and efforts



Yonkers will develop a citywide bicycle and pedestrian master plan to set bicycle and pedestrian related targets aimed at improving walking and cycling within the city. To start, the City will prioritize on-street bicycle infrastructure that connects to regional existing and planned off-road paths, as well as identify new and improved pedestrian and bicycle infrastructure within Getty Square—the central business district and transit hub. Infrastructure will also be developed in the area within the 15-minute walk radius (and two-mile radius for bicycle facilities) from each commuter rail station, especially as development around transit stations increases.

### Initiative 4: Adopt a Complete Streets Policy



Complete Streets are streets that are designed and operated to enable safe access for all users, including pedestrians, bicyclists, motorists and transit riders of all ages and abilities.

Yonkers will develop a Complete Streets Policy that can be used to guide all future development and transportation projects. The City will consider every transportation improvement undertaken in the public right-of-way, including street construction, reconstruction, repaving, etc., as an opportunity to create safer and more

## City of Yonkers Transit Networks

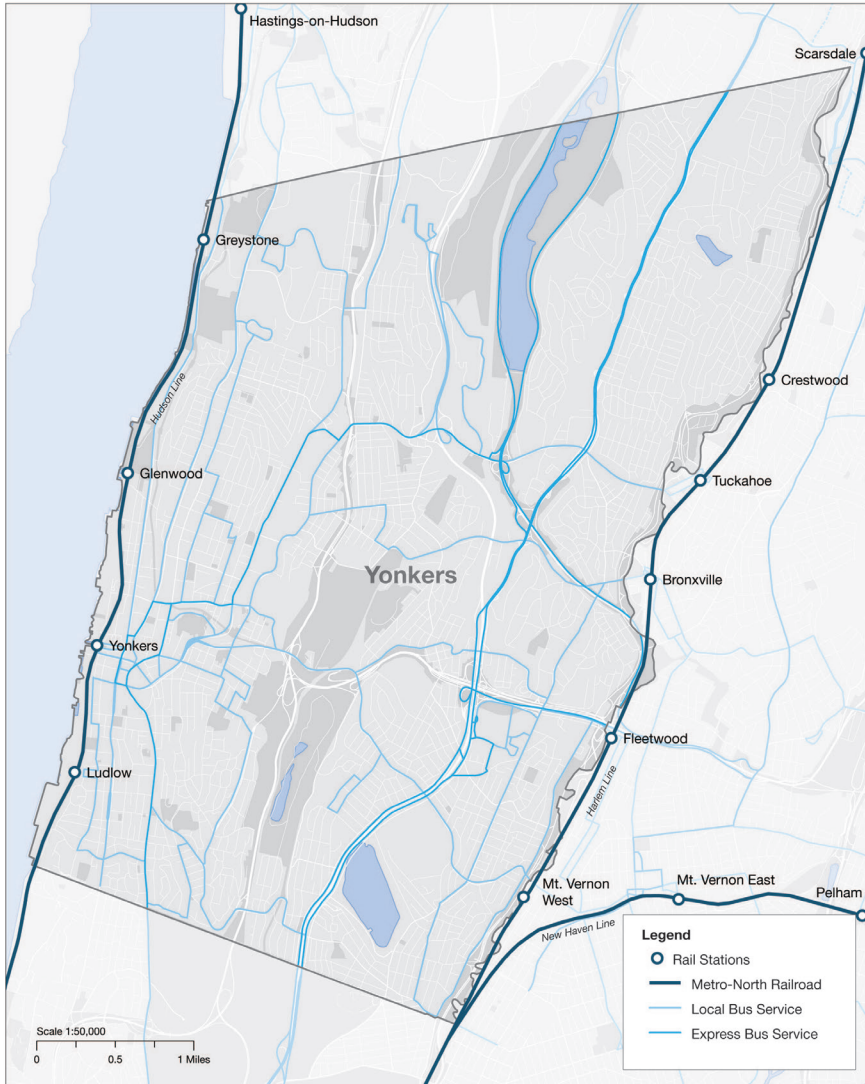


Figure 12

accessible streets. Complete Street principles will be considered early in the planning and design phases of any new project. These principles will guide the planning, funding, design, construction, operation and maintenance of new and modified streets. To develop a Complete Streets Policy, the City will consider a variety of implementation measures, including: updating design guidelines; inclusion in a comprehensive plan; internal policies developed by transportation agencies; executive orders from elected officials; and policies developed by stakeholders from the community and agency staff that are formally adopted by an elected board.

### Initiative 5: Encourage businesses and developers to build electric charging stations and other alternative fuel stations



Plug-in electric vehicles (PEVs) are battery-powered vehicles charged through the electric grid. The number of PEVs on the road are projected to increase across New York State. Charge NY is the state's program to increase a statewide network of up to 3,000 PEV charging stations over the next five years. In recent years, battery-swapping and rapid-charging capability have improved, along with other infrastructure technologies.

As the need for electric vehicle infrastructure increases, the City will take the necessary steps to support its growth. The City, through the Department of Planning and Development, will encourage the development of electric vehicle infrastructure by including electric vehicle charging stations and alternative vehicle priority parking in its Green Development Standards and work with the state to encourage and install charging stations through Charge NY.



### Yonkers LED Street Light Replacement

In 2013, Yonkers launched a Light Emitting Diode (LED) Street Light Replacement Program to replace all of its street lights with LED lights. The program improved the reliability of lighting and street safety, and is expected to save at least \$18 million in municipal energy costs over the next 10 years. It will reduce the carbon footprint of the city by more than 2,700 metric tons annually.



# Transportation Efficiency

## City of Yonkers Trips and Transit Locations with 15-Minute Walk Radius

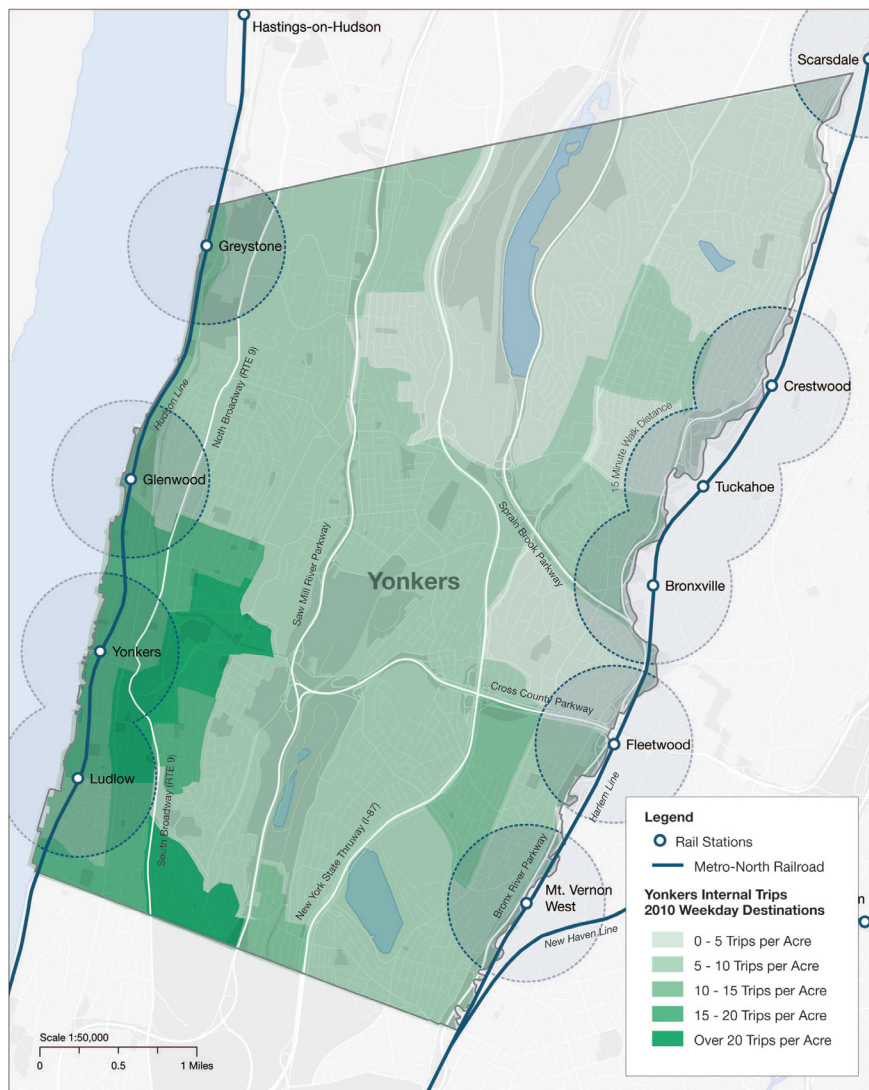


Figure 13

On average,  
commuting  
by car costs  
City employees  
**\$264**  
per month

### Transit-Oriented Development in Yonkers

The City has implemented strategies to decrease fuel use and emissions from transportation. For example, the Alexander Street Urban Renewal Master Plan and the rezoning of downtown encourage transit-oriented development (TOD) to reduce vehicle use and promote high-density, mixed-use development. To promote the comprehensive planning of large scale, mixed-use commercial developments, the City Zoning Ordinance was amended to include Planned Multi-Use Development Districts, which require the adoption of a Comprehensive Development Plan that meets specific planning requirements that support higher density growth.

### Initiative 6: Develop a traffic signal optimization program



Traffic signal timing and signal coordination along heavily travelled corridors have a major impact on traffic flow. Inefficient signal timing causes congestions and travel delays, which in turn requires vehicles to idle at intersections, increasing air emissions and fuel consumption. Power interruptions can also cause traffic signals to go out of sync, resulting in mistimed signals, further exacerbating congestion and delays. This is especially true during rush hour on Central Park Avenue and other major streets in Yonkers.

The City uses software to monitor traffic in real time. As traffic patterns change, signal timing parameters are modified to reflect the traffic patterns during these periods. Yonkers is committed to a traffic signal optimization program to maintain and upgrade signal technology as well as adjust signal timing in real time to improve the overall flow of traffic. The City is also committed to improving the efficiency traffic management and monitoring periods of congestion. Yonkers' Traffic Engineering Department will develop a traffic signal optimization program starting with Central Park Avenue, and other key intersections and will coordinate with the state Department of Transportation and Westchester County to ensure that the traffic signals throughout Yonkers are synchronized and maintained.

### Expand and encourage commute options for City employees

Yonkers has approximately 2,000 full-time municipal employees who commute. According to a 2010 survey, on any given week, 86 percent of employees drive alone and 7 percent participate in a carpool (**Figure 14**). The average commute distance is approximately 11 miles.

## Municipal Mode Share: Employee Commute

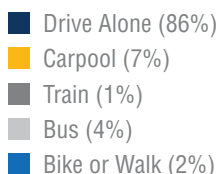
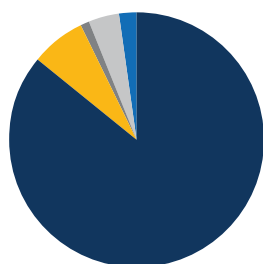


Figure 14

## CASE STUDY

## Transit Coordination in Los Angeles

The Los Angeles County Metro board in California approved an implementation plan to better coordinate schedules and transfer points between transit agencies to maximize system efficiency. The implementation plan included convening the transit agencies within the county to discuss the goal, inventory all Metrolink stations and bus connections, identify all transit centers, hubs and transfer points for bus-bus and bus-rail transfers, review all transit schedules, and coordinate special projects and schedules. As a result, Service Council meetings are held monthly to discuss and schedule coordination issues. Also the board promoted new bus connectivity improvements at stations in local and regional publications (a combined circulation of up to 1.2 million people). An inventory identified 280 bus and bus-rail transfer locations, and committees were convened to determine any special project that could impact the coordination and passenger safety. A set of criteria was used to determine the success of transfer – less than three minutes or greater than 18 minutes between a bus or train arrival or departure is considered a missed connection; four to five minutes or 16 to 17 minutes between a bus or train arrival or departure is considered a connection that needs a minor schedule adjustment; and a six- to 15-minute window between a bus or train arrival or departure considered a good connection.

The cost of driving to work for some City employees includes \$50 per month for parking, as well as any additional costs for fuel, tolls, and vehicle maintenance and repair. A monthly transit pass that includes unlimited Bee-Line and New York City subway service is \$112 per month. Many drivers are not aware of the full cost of driving, as it may seem to be a cheaper alternative. However, the average monthly driving costs for a City employee may be as much as \$264 based on Internal Revenue Service mileage rates. There are no programs in place to encourage employees to consider alternative travel modes.

### Initiative 7: Implement a pre-tax transit benefit program for City employees



The City will develop a comprehensive employee commuting program that will include be a pre-tax transit benefit. Transit is a viable commute option for municipal employees given the extent of the Bee-Line network, as well as the fact that more than half of City employee commutes are no more than five miles in each direction. A transit benefit program would provide an incentive for City employees to switch to transit by allowing those that take mass transit to work to pay for it with pre-tax salary dollars. The 2014 federal tax code allows tax-free transportation fringe benefits of up to \$130 per month per employee for mass transit or vanpool expenses.

Transit-Oriented Development in Downtown Yonkers





## Residential Land Uses by Density in Yonkers

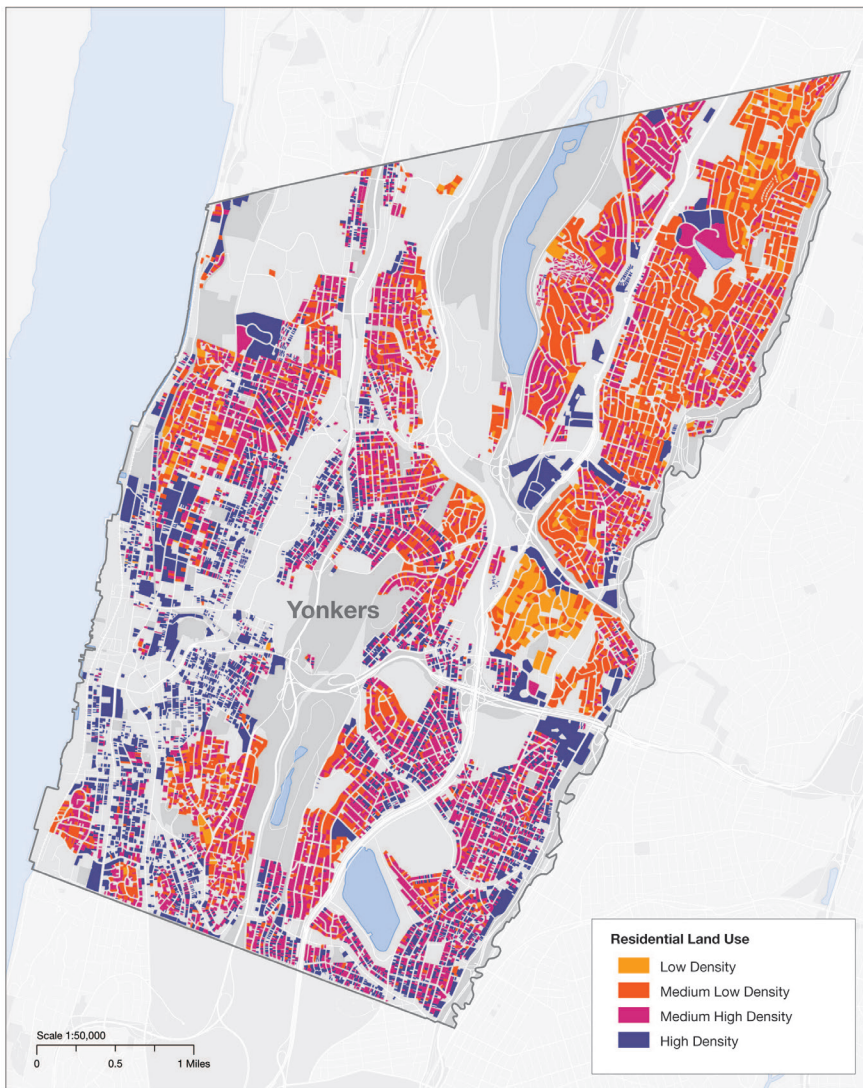


Figure 15

To support transit use, City agencies will begin to offer this pre-tax payroll deduction. Aside from being a no-cost initiative, it offers an added benefit in that the City saves on payroll taxes for participating employees. Employees' awareness of the benefit is critical to the success of the program. Upon implementing the option to participate in the pre-tax transit program, City agencies will encourage enrollment by providing guidance on registration, transit maps and timetables through email and in-office information sessions. Additional incentives, such as competitions between departments, or entry into a monthly lottery for those who commute by alternative modes at least three times a week, will help encourage the shift to non-automobile modes.

### Initiative 8: Develop a rideshare program



Carpool and vanpool programs are other viable commuting options for City employees, given the density of residential development in Yonkers. Many of the employees who live less than five miles from their offices likely live fairly close to one another. Rideshare programs can reduce the total number of automobile commute trips for employees living in areas that are not easily accessible by mass transit.

To support carpooling, the City will develop a rideshare program in which employees use their vehicles to carpool to work with other employees who live close by. Employees who are interested in participating will be able to contact neighboring employees and arrange the scheduling and driver details. To support ridesharing, the City will work

## CASE STUDY

### PlaNYC's Expansion of NYC Bicycle Network



New York City's long-term sustainability master plan, PlaNYC, was released in 2007 and included a phased approach to expanding the city's bicycle network. In PlaNYC, the City committed to building 200 miles of bike lanes by 2009 and another 1,800 miles by 2030. Sidewalk improvements for pedestrians were also a plan focus. With help from extensive public outreach and education to gain political support during the planning process, the City has already added more than 300 miles of bike lanes to the city cycling network.

## CASE STUDY

## City of Campbell River Green City Strategy

The City of Campbell River, British Columbia (population 320,000), is located on the east coast of Vancouver Island. In 2008, its City Council adopted the Green City Strategy, which identified opportunities to reduce community greenhouse gas emissions by supporting plug-in electric vehicle (PEV) charging infrastructure. A stakeholder workshop was held to identify emerging needs and trends around PEVs, during which several businesses and institutions expressed a strong interest in hosting charging stations. As a result of the planning process, 12 new PEV charging stations were installed at locations including City Hall, a City-owned visitor information center, a local college and a major shopping center.

### City Fleet by Vehicles Type

Breakdown of  
City Fleet  
Vehicle Type

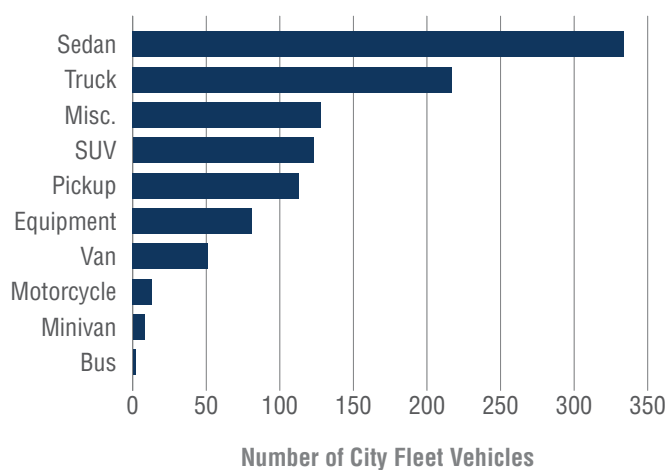


Figure 17

### City Fleet Breakdown by Department

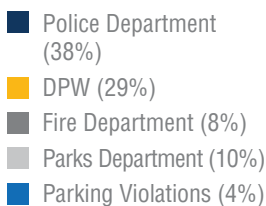
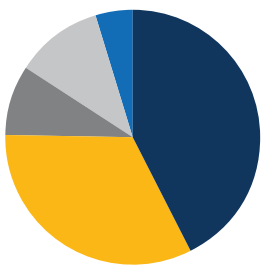


Figure 16

with MetroPool to procure cars or vans for use with participants sharing operating costs. These programs will be structured to be flexible, allowing employees to rideshare anywhere between two and five days a week. Priority parking spaces may be given as an incentive to participate. Ridesharing programs will reduce total vehicle energy usage, alleviate road congestion during peak commute hours and reduce overall greenhouse gas emissions.

#### Initiative 9: Develop a City employee guaranteed ride home program



A guaranteed ride home program will encourage employees to take advantage of the other employee commute program options by addressing the concern of being stranded during an emergency

or unexpected situation. These services will likely rarely be used and thus represent a very low cost to the City, but will have the benefit of increasing transit or rideshare use by providing participating employees with a sense of security in knowing they will be able to get home quickly should any unexpected issues arise. The City will work with local taxi services to develop a voucher or reimbursement system to provide free or low-cost rides home for commuters who use alternative modes in case of unexpected circumstances, such as when an employee has been asked to stay late, or in the event of a personal or family emergency. The City's Human Resources department will work with MetroPool to develop this program.

#### Initiative 10: Develop an alternative work schedule program



Alternative work schedules help reduce peak hour congestion and the number of miles commuted per week. It also provides employees with the benefit of flexibility in their work schedules. These can be structured a number of ways, including staggered shifts or compressed schedules (10-hour shifts over four days rather than eight-hour shifts over five days per week).

The City will pilot an alternative work schedule program that will reduce the number of commute trips for municipal employees. The City will first target municipal staff in customer-facing service roles, such as staff processing parking violations. This provides an added benefit of improving the City's customer service experience by allowing the possibility of extended service hours on certain days of the week. If successful, the City will consider expanding the program to staff in a broader range of departments.



## Non-Residential Land Uses by Type in Yonkers

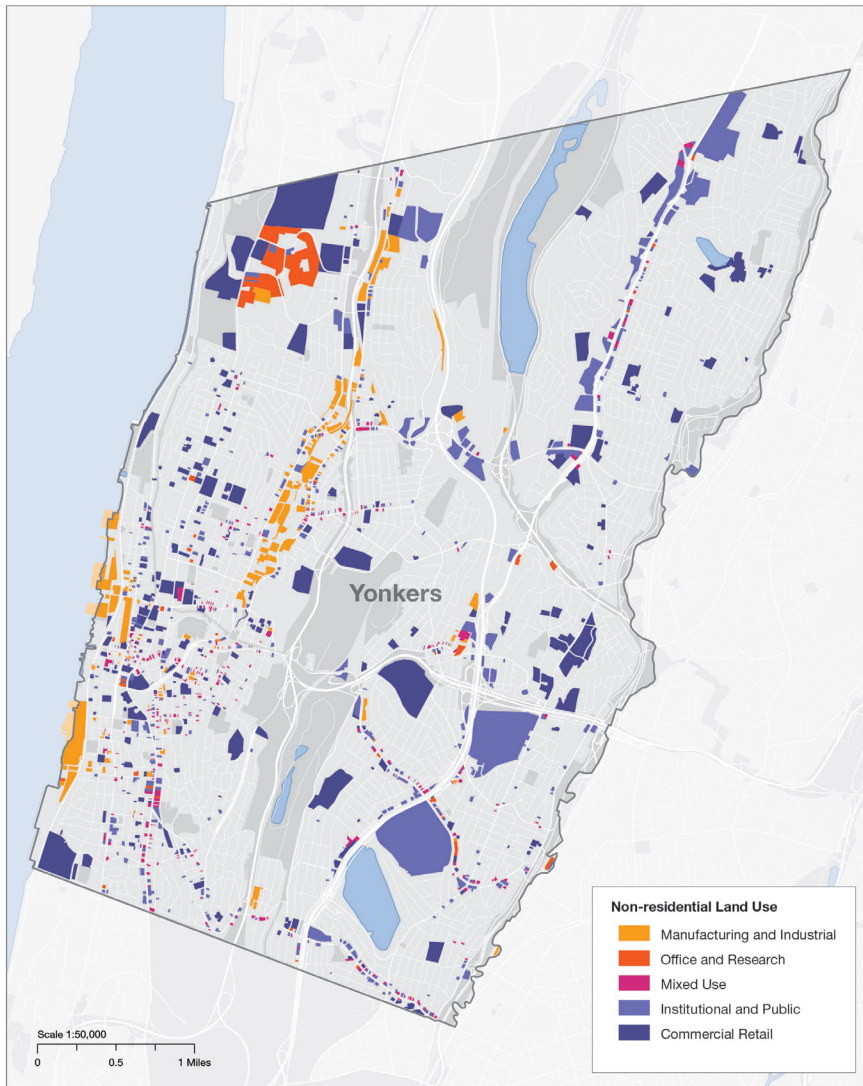


Figure 18

## Improve City vehicle fleet efficiency

Yonkers has approximately 1,070 fleet vehicles, mainly consisting of sedans and trucks (**Figure 17**).

The breakdown of City-owned vehicles by department (**Figure 16**) is as follows: Police Department (38 percent), Department of Public Works (DPW) (29 percent), Parks Department (10 percent), Fire Department (8 percent), and Parking Violations (4 percent).

The breakdown of the amount of fuel consumed by each department (**Figure 19**) follows a similar trend. The Police Department accounts for 37 percent of the total, followed by DPW (33 percent), Fire Department (10 percent), Parks Department (8 percent), and Parking Violations (4 percent). This trend correlates closely with fuel costs, where the price of diesel has a higher impact on the DPW.

The municipal fleet accounts for approximately 14 percent of energy use and 13 percent of CO<sub>2</sub> emissions by municipal operations, and approximately 11 percent of municipal energy costs. There are significant opportunities to reduce energy use and costs through proper sizing of the vehicle fleet, investigation of more fuel-efficient and alternative-fuel vehicles, and upgrades to municipal facilities to allow for better tracking of fuel access.

### Initiative 11: Replace retiring City vehicles with more fuel-efficient and alternative-fuel models



The City will implement a vehicle purchasing policy to ensure transition to smaller and more fuel-efficient vehicles throughout all municipal



### Yonkers EcoDriving Training Pilot

The City of Yonkers recently piloted an EcoDriving training course in which experts spent a day instructing and training City employees using EcoDriving techniques. Each driver started the day driving a route around the City, while recording the fuel usage. The second time the driver rode with the instructor receiving proper instruction. On the final ride, the driver rode without instruction. After the final drive the City employee saved approximately 25 percent of the fuel compared to the initial drive without instruction.

## City Fleet Fuel Consumption by Department and Total Fuel Costs

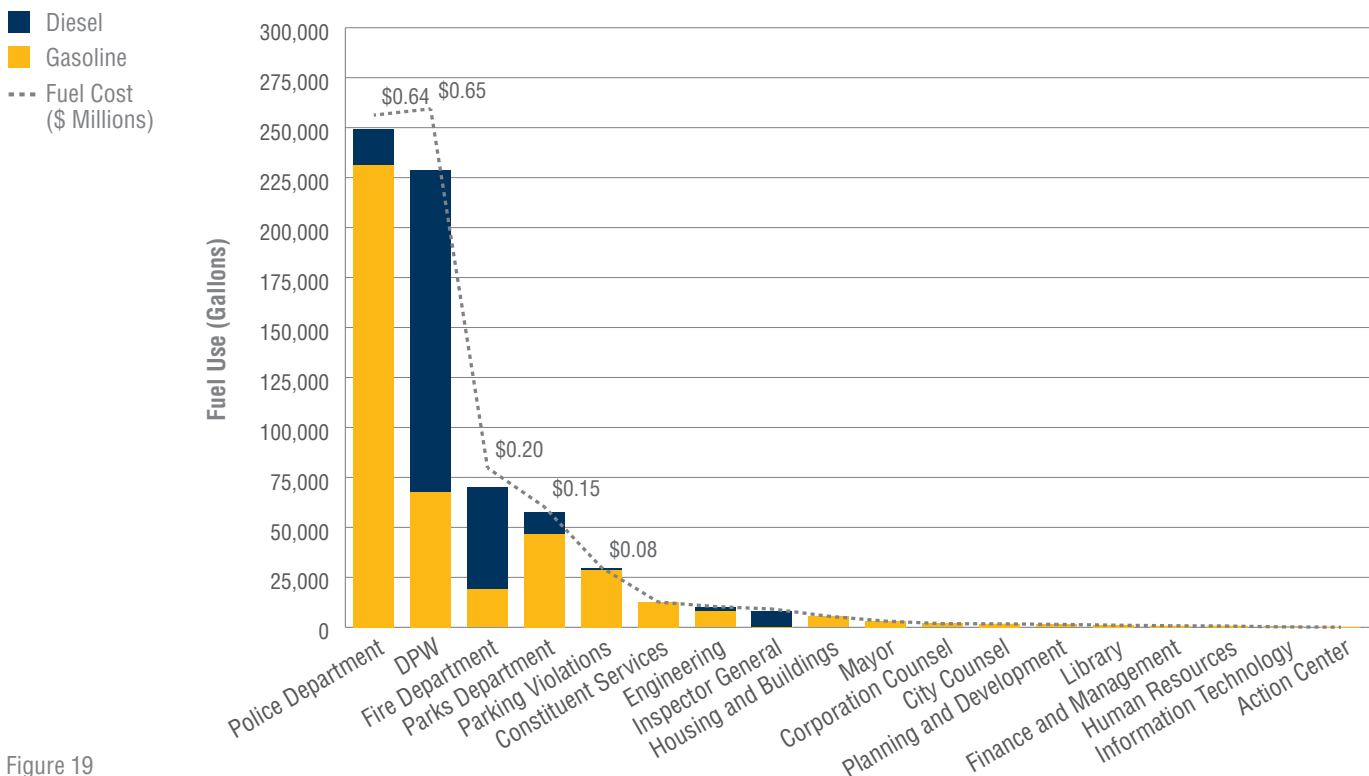


Figure 19

departments. The policy will be based on an assessment of City operational needs and how specific vehicles could help meet them. The creation of detailed guidelines, including a list of approved vehicles, would allow the City Fleet Services and other vehicle purchasing departments to choose vehicles that best meet their needs.

In the short term, for vehicles that will not need to be replaced for several years, the City will install auxiliary batteries or idle reduction systems to reduce gasoline use while the car is idling. These systems recharge the battery using the car's alternator.

In the short to medium term, the City, working through the DPW, Purchasing Department and Planning and Development, will implement a policy to replace 10 percent of the vehicle fleet each year for the next 10 years.

As an example, the City operates 250 vehicles primarily for administrative purposes. Each is driven about 8,200 miles per year (an average of 33 miles per weekday). A representative vehicle that the City operates now, such as a 2004 Chevrolet Cavalier, is estimated to consume 365 gallons of gasoline per year, at a cost of \$1,220. If a single 2004 Chevy Cavalier is replaced by a

Bee-Line Bus

Example of city rideshare program web portal



511NY Rideshare





## Municipal Energy Cost (\$)

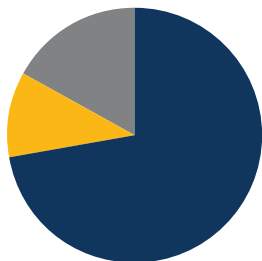


Figure 20

## CASE STUDY

## Philadelphia Car Share Program



In 2005, Philadelphia's municipal fleet was about 6,000 vehicles (including more than 400 non-police sedans), costing the City approximately \$6,200 annually per vehicle for gas, operations and maintenance. In response to significant budget cuts, the City implemented a program to share cars with residents in a major fleet-reduction effort. The project helped reduce fleet size by more than 330 vehicles, saving \$1.8 million annually, without sacrifice to employees' ability to accomplish City business. The local not-for-profit PhillyCarShare, selected through an RFP process, set up an automated vehicle sharing system in which City employees would trade in municipally owned vehicles for 24-hour access to hybrid gas-electric cars, which would also be available to local residents. Program costs were about \$30,000 per year. This eliminated hundreds of vehicles from the fleet that had previously been available for commuting, but which had also been used inefficiently. The initiative is led jointly by the Mayor's Office, the Office of Fleet Management, the Finance Department and the Managing Director's Office. Employees are charged the same rate as residents.

current model year vehicle, the potential annual savings range from \$68 to \$237 for a gasoline vehicle, a potential savings of \$622 to \$966 for a hybrid, electric, or alternative fuel vehicle, not including maintenance cost differences or the cost of capital infrastructure.

The vehicle replacement program will include sedans as well as refuse trucks, work trucks/pick-ups and vehicles used for parking enforcement. Large and fuel-inefficient vehicle types, such as SUVs used for parking enforcement, will be replaced by smaller vehicles, electric vehicles or even bicycles.

### Initiative 12: Upgrade municipal facilities to accommodate alternative vehicles



As vehicles are retired and alternative-fuel vehicles are introduced, the City will continue to upgrade municipal facilities to meet vehicle needs. This includes accommodating larger liquefied petroleum gas (LPG), compressed natural gas (CNG) and electric fleets. The City is converting 20 municipal vehicles (pickup trucks) to propane (or LPG), and it recently installed a LPG filling station at the DPW Vehicle Maintenance Center.

Building on this progress, the City will explore working with Westchester County to install a CNG fuel station at the Westchester County Material Recovery Facility, which could reduce capital costs to the City and help regionalize a CNG refuse fleet. A new CNG fuel station is estimated to cost approximately \$100,000 for two to four pumps

for slow fill up or \$1.2 million for fast fill-up. It will reduce carbon dioxide emissions (and other ambient air pollutants) as well as reliance on diesel fuel.

### Initiative 13: Implement a pilot employee car-sharing program to help right-size the fleet



The City maintains a fleet of more than 1,000 vehicles, including some take-home vehicles. Many take-home vehicles are not used regularly, remaining parked for a large percent of the time, but still requiring regular maintenance and replacement. To reduce fleet size and associated maintenance costs, the Public Works, Purchasing and the Planning and Development departments will explore working with a car-sharing service, such as Zipcar.

A City car share pilot program will involve removing a certain number of fleet vehicles from use, and training City employees on how to use third-party protocols to reserve and check out a vehicle when needed. These vehicles could be shared by residents and City employees, or dedicated for City employee use only during working hours. Car sharing reduces unnecessary trips and has been shown to reduce emissions and VMT. The introduction of a car share program will reduce the overall City fleet size, while still meeting the needs of employees who do not require a vehicle eight hours a day.



CNG refuse vehicle

Yonkers has  
a fleet of over  
**1,000**  
vehicles

**Initiative 14: Develop a fuel management and vehicle maintenance plan, and provide EcoDriving training to City employees**

Municipal fuel pumping stations are located throughout Yonkers. A vehicle and fuel management plan would help reduce operation and maintenance costs, and identify potential improvements in the fleet’s efficiency and use. The City is introducing new technology that will help collect and analyze driver data to support better vehicle and fuel management.

The most technologically advanced add-ons to a fuel management system can automatically pull odometer information, trouble codes, idling time,

maximum speeds and engine time. Vehicles do not have to be fueling for data to download; they can drive near an antenna or a terminal for information to be transmitted. This technology will help track driver behavior, vehicle frequency and purpose of use, and better match vehicle type to use.

To further reduce fuel consumption, the City will continue to offer EcoDriving training, which teaches techniques that promote safe driving and reduce vehicle maintenance costs, fuel energy consumption and costs, and greenhouse gas emissions.

**Initiative 15: Evaluate private school bus systems for fuel efficiency**

Transportation is available to elementary and middle school students in Yonkers and live at least 1.5 miles from their school. School bus services are contracted out to several private operators through the Board of Education. As such, the school bus fleet is composed of vehicles of various ages, fuel efficiencies and rates of greenhouse gas emission. The City will encourage school bus contract providers to leverage the NYSERDA Clean Air School Bus Program to phase out pre-2007 school buses. The City will also create new fuel standards governing new vehicle specifications that will reduce associated air pollution by 95 percent compared to pre-2007 vehicles.

CASE STUDY	Auxiliary Battery Systems in Austin, Texas, Patrol Cars
<p>The City of Austin, Texas, has 650 patrol cars with auxiliary battery systems. Each battery system provides an average of three hours of electrical use per day, saving 2.4 gallons of gasoline per day, and eliminating 113 idling “ghost miles” and 21.4 kilograms of CO<sub>2</sub> per day per vehicle. A 2,000 watt-hour system, typical for police cars, was quoted to cost approximately \$4,300 for the system and \$500 for installation per vehicle.</p> <p>The New York Police Department (NYPD) has been recognized nationally for its adoption of hundreds of hybrid electric vehicles, including marked units. Police Fleet Manager magazine reported in 2012 that the NYPD had 789 hybrid electric fleet vehicles (out of 8,000 total). These included 20 Chevrolet Volt plug-in electric vehicles, 169 Nissan Altimas, 232 Ford Fusions, 59 Ford Escapes, 115 Toyota Priuses and 13 GMC Yukons. The NYPD has other hybrid electric vehicles, including Toyota Camry, Honda Accord and Toyota Highlander models. The Police Fleet Manager article noted that the hybrid vehicles were expected to receive a higher resale value at auction of \$10,000 compared to \$5,000 for the standard Impalas, due to their high demand for use as taxis.</p>	



# Transportation Efficiency

## Implementation Matrix

Responsible party	Key partners	Source of funding	Time frame	Next steps
<b>Create active, mixed-use neighborhoods that are safe and easily accessible by walking, cycling and transit</b>				
<b>Initiative 1: Develop locations with opportunities for mixed use, transit-oriented development</b>				
Planning and Development	Residents, businesses, developers, MTA, Bee-Line, NYMTC, community groups	NYSERDA Cleaner, Greener Communities, City Planning budget to update zoning and land use plans	Short-Term	Develop a proposal to amend the zoning code in TOD areas
<b>Initiative 2: Encourage coordination between transit agencies</b>				
Planning and Development	Traffic Engineering, MTA, Bee-Line	Tax or fee-based sources (sales tax, property tax, vehicle fees, parking fees, advertising revenue)	Short-Term	Analyze current Metro-North and Bee-Line services to identify schedule coordination issues; study physical connections between services to identify opportunities to improve customer experience (transfer connections, waiting areas, real time transit information, etc.)
<b>Initiative 3: Develop a citywide bicycle and pedestrian master plan in coordination with existing projects and efforts</b>				
Planning and Development	Traffic Engineering, MTA, Bee-Line	NYSERDA CGC, FHWA Transportation Alternatives Program (TAP)	Short-Term	Develop an on-street bicycle network including facilities for bicycle parking (both on-street and within office buildings), showers in office buildings for bicycle commuting; improve pedestrian environment especially in downtown Yonkers and adjacent to MTN stations
<b>Initiative 4: Adopt a Complete Streets Policy</b>				
Planning and Development	Traffic Engineering, MTA, Bee-Line	NYSDOT Transportation Enhancement Program (TEP), NYMTC	Short-Term	Host a policy development workshop. Leverage Smart Growth America's Complete Streets Policy Workbook to develop a vision, goals and policy document
<b>Initiative 5: Encourage businesses and developers to build electric charging stations and other alternative fuel stations</b>				
Planning and Development	Businesses, developers, NYSERDA	NYSERDA CGC	Short-Term	Add to Yonkers Green Development Standards
<b>Initiative 6: Develop a traffic signal optimization program</b>				
Traffic Engineering	NYSDOT, Westchester County	NYSDOT Transportation Enhancement Program and Statewide Transportation Improvement Program, Federal Highway Administration	Short-Term	Perform city-wide traffic study focusing on most congested areas.
<b>Expand and encourage commute options for City employees</b>				
<b>Initiative 7: Implement a pre-tax transit benefit program for City employees</b>				
Human Resources Administration	City agencies, City employees, Westchester Smart Commute Program	—	Short-Term	Reach out to provider and initiate policy
<b>Initiative 8: Develop a rideshare program</b>				
Human Resources Administration	City agencies, City employees, Westchester Smart Commute Program, MetroPool	Municipal budget	Short-Term	Work with existing taxi/vanpool services to create a program; develop pilot program; provide information session to employees; create an online tool for employees to sign up for the program; provide priority parking space for carpools and/or vanpools

**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
<b>Expand and encourage commute options for City employees (continued)</b>				
<b>Initiative 9: Develop a City employee guaranteed ride home program</b>				
Human Resources Administration	Taxi/Van vendors, City agencies, City employees, Westchester Smart Commute Program, MetroPool	Municipal budget, CMAQ	Short-Term	Ensures employees who carpool, bike, walk, take transit, are not stranded if they stay late, bus stops running, or employee has an emergency; Identify potential City departments; establish implementation guidelines; contact potential vendors (taxi services) to develop voucher/payment system
<b>Initiative 10: Develop an alternative work schedule program</b>				
Human Resources Administration	Parking violations and other client facing departments	—	Short-Term	Identify potential department for implementation; develop potential schedule; identify interested employees
<b>Improve City vehicle fleet efficiency</b>				
<b>Initiative 11: Replace retiring City vehicles with more fuel-efficient and alternative-fuel models</b>				
Department of Public Works, Purchasing Department	City agencies, City employees	—	Short-Term	Identify use cases and appropriate replacement vehicle types; develop use guidelines; institute safety training program; purchase vehicles and safety equipment
<b>Initiative 12: Upgrade municipal facilities to accommodate alternative vehicles</b>				
Planning and Development, Department of Public Works	—	—	Mid-Term	Develop and release RFQ
<b>Initiative 13: Implement a pilot employee car-sharing program to help right-size the fleet</b>				
Department of Public Works, Purchasing	Zipcar, City agencies, City employees	Municipal funds	Short-Term	Review best practices of other City agencies that have implemented City fleet car share; study vehicle use patterns to identify the number of vehicles to set aside and the number of carshare vehicles to implement; develop pilot
<b>Initiative 14: Develop a fuel management and vehicle maintenance plan, and provide EcoDriving training to City employees</b>				
Department of Public Works	City agencies, Vehicle Maintenance Department, City employees	—	Short-Term	Assess driving profiles/use cases for departments/job classifications; Track fuel usage/mileage; Review maintenance logs/implement vehicle maintenance reporting program; Review which vehicles are being used for what purposes; better match vehicle type to use
<b>Initiative 15: Evaluate private school bus systems for fuel efficiency</b>				
Board of Education	Private bus companies	NYSERA- PON 1896 New York State Clean Air School Bus Program Round 3, FHWA Safe Routes to School	Mid-Term	Inventory existing school bus fleet and identify potential for retrofitting to more efficient vehicles; study current bus service and student demand; survey community to understand needs for student commutes to school; recommend improvements to fleet, routes, and policies

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



## Expand the Use of District and Renewable Systems To Increase Resilience and Reduce Carbon Emissions

### Summary of Objectives and Initiatives

#### Identify and support the expansion of district and renewable energy systems

- Initiative 1:** Investigate opportunities for distributed generation, district heating/cooling and combined heat and power systems
- Initiative 2:** Facilitate and increase renewable energy production on municipal and community buildings through third-party solar developers
- Initiative 3:** Install microgrids at critical facilities
- Initiative 4:** Work with Westchester County to develop a composting program and anaerobic digestion facility

#### Enhance the city's resilience to outages and disaster events

- Initiative 5:** Develop a vulnerability and adaptation plan
- Initiative 6:** Work with Westchester County to create an emergency fuel stockpile
- Initiative 7:** Work with the state to reduce methane emissions associated with natural gas pipeline leaks

Municipal buildings and facilities in Yonkers buy electricity from NYPA, natural gas from Con Edison and heating oil from private companies. Residential, commercial, industrial and institutional facilities buy natural gas and electricity from Con Edison. Their heating oil is purchased from private companies.

Con Edison's electricity fuel mix includes natural gas, nuclear, coal, oil and renewable sources such as wind, solar and hydroelectric stations. Fossil fuels, which emit greenhouse gas emission when they are burned (e.g., coal, natural gas and oil), make up almost two-thirds of Con Edison's electricity generation mix. By 2030, Con Edison predicts that renewables will make up 26 percent of the generation mix while fossil fuels will be reduced to 59 percent of the generation mix (**Figure 22**). This change will help lower greenhouse gas emissions, but further steps will be needed to reach the state's "80 by 50" goal.

### Yonkers Energy Supply Chain

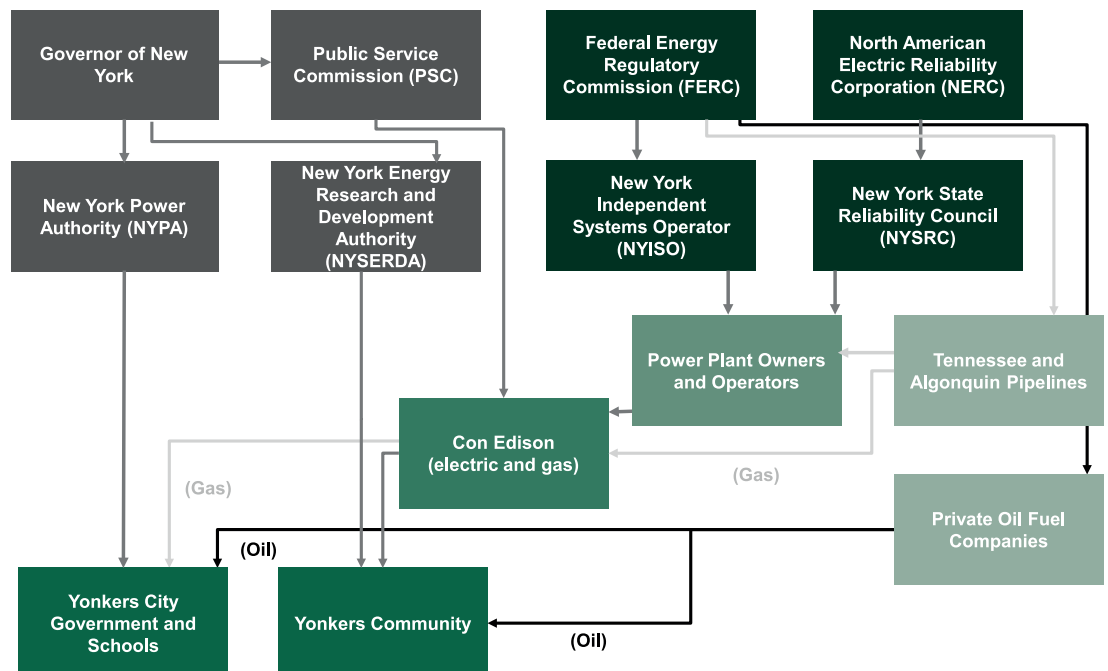


Figure 21

Over half  
of the city's PV  
has been installed  
over the last  
**2 years**

## Identify and support the expansion of district and renewable energy systems

There are no major power plants or district energy networks in Yonkers. Energy generation is partially limited because of the city's relative density and space availability. Regulatory barriers also make it difficult for non-utilities to run power lines across rights-of-ways and build local energy networks that serve multiple customers. Existing legislation, interconnection and right-of-way issues also create challenges for energy generation and distribution projects such as combined heat and power (CHP) systems and renewable energy installations. Yonkers recognizes the greater importance of distributed renewable generation sources in light of the state's Reforming Energy Vision, which seeks to build a more reliable and efficient energy grid infrastructure.

### Initiative 1: Investigate opportunities for distributed generation, district heating/cooling and combined heat and power systems



Distributed generation (DG) technologies provide power locally to meet a specific demand. Spare power is then distributed across the grid or stored for future use. Because the energy is generated and distributed close to the loads, transmission and transformation losses are minimized,

which can make DG more energy efficient than centralized power. District heating and cooling systems include a local centralized plant with high capacity heat and cooling equipment that collectively services several buildings. Compared to building-specific heating and cooling systems, district systems are more efficient and reduce costs. Additionally, the inclusion of CHP to district systems allows for increased efficiency through the reclamation of waste heat. CHP systems convert a primary fuel (typically natural gas) into electricity and recover the "waste heat" byproduct, which can be used for space heating, domestic hot water production, space cooling (via absorption chillers) and industrial processes (**Figure 23**).

Yonkers has one known 49 MW CHP unit in operation; it serves a private sugar refining factory located along the Hudson River. Two alternative fuel units also operate in the city: a 200 kW biogas fuel cell, operated by NYPA at the Yonkers Wastewater Treatment Plant and a private waste-to-fuel plant that converts waste materials such as used waste plastic into diesel fuel.

The Department of Planning and Development will commission a comprehensive feasibility study to identify sites in Yonkers that are well suited for distributed generation, district heating/cooling and CHP systems. The study will focus on determining areas where synergies between demand and energy production exist, concentrating on industrial facilities.

## New York Control Area Electrical Fuel Mix

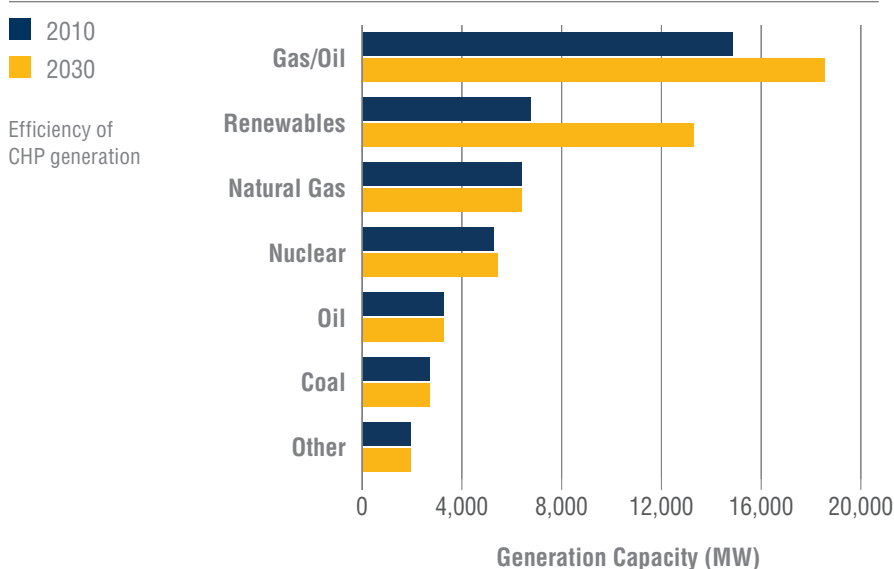


Figure 22

### Initiative 2: Facilitate and increase renewable energy production on municipal and community buildings through third-party solar developers



The number of solar photovoltaic (PV) installations in Yonkers and Westchester County has increased over the last six years—mainly due to NYSERDA incentives, solar lease programs and decreases in PV prices (Figure 24). As of October 2013 there was almost 1.8 MW of solar PV in the city. Although the number of installations has risen recently, PV systems still face market barriers and regulatory challenges in Yonkers. For example, the City requires professional verification from a third party that the PV system was installed to specification. Furthermore, public sector



## Efficiency of CHP Generation

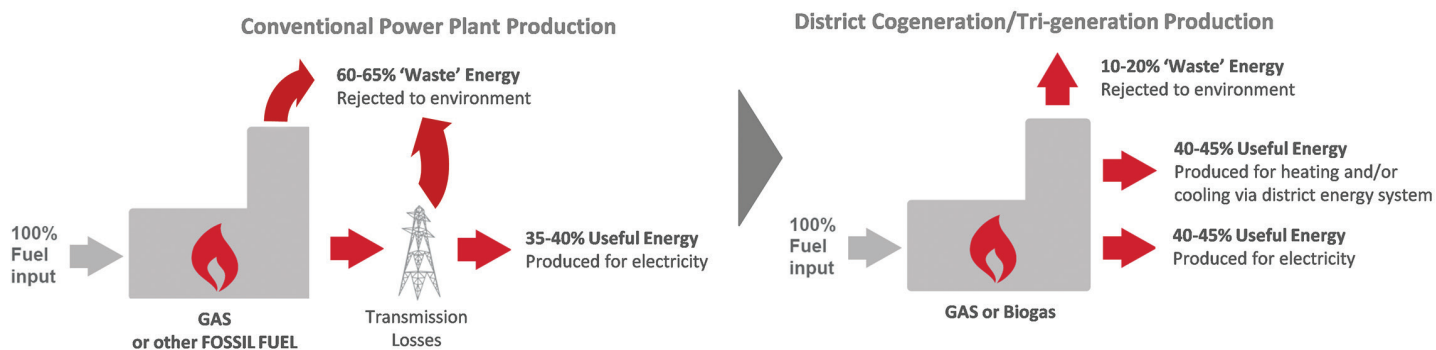


Figure 23

buildings in the state have limited net metering capabilities, which significantly reduce potential utility cost savings. Yonkers will utilize NYSEDA's programs to help reduce these kinds of market barriers, for instance by lowering soft costs related to permitting and system verifications.

There are additional opportunities (**Figure 25** and **Figure 26**) to install PV panels throughout the city. School buildings are particularly good locations for PV systems due to their large, flat roofs. The City will look at collaborating with the K-Solar program, a joint project spearheaded by NYPA and NYSEDA to provide school districts with the tools and expertise to bring solar energy

to their facilities and reduce their energy costs. By increasing the community and municipal government's solar PV capacity, Yonkers' residents, businesses and government can generate additional carbon-free electricity while reducing dependence on dirty fossil fuels.

Yonkers will endorse a program to help homeowners and businesses purchase community renewable energy at a cheaper rate than individual systems through economies of scale. Solarize Westchester will help lead the effort to find third-party providers to install solar panels for homeowners, businesses and municipal properties. Homeowners and businesses would then be able to negotiate a Power Purchase Agreement (PPA) in which the third-party provider sells the generated electricity back to them at a fixed rate that is lower than utility rates. As an alternative, the homeowner or business could finance the panels themselves or apply for NY Green Bank "gap financing" or credit enhancements in the event loan tenors are longer or project risks are greater than conventional banks can agree to.

The Department of Planning and Development, along with the Department of Housing and Buildings will partner with local organizations such as Solarize Westchester to connect Yonkers residents and businesses with third-party renewable energy providers that specialize in Power Purchase Pools and PPAs. The Planning Department will also be responsible for educating the public on the benefits, programs, funding sources related to solar PV, and Power Purchase Pools and PPAs through the City's sustainability website and other forms of communication.

## Number of Solar PV Installations Compared to System Cost (without Incentives) in Yonkers

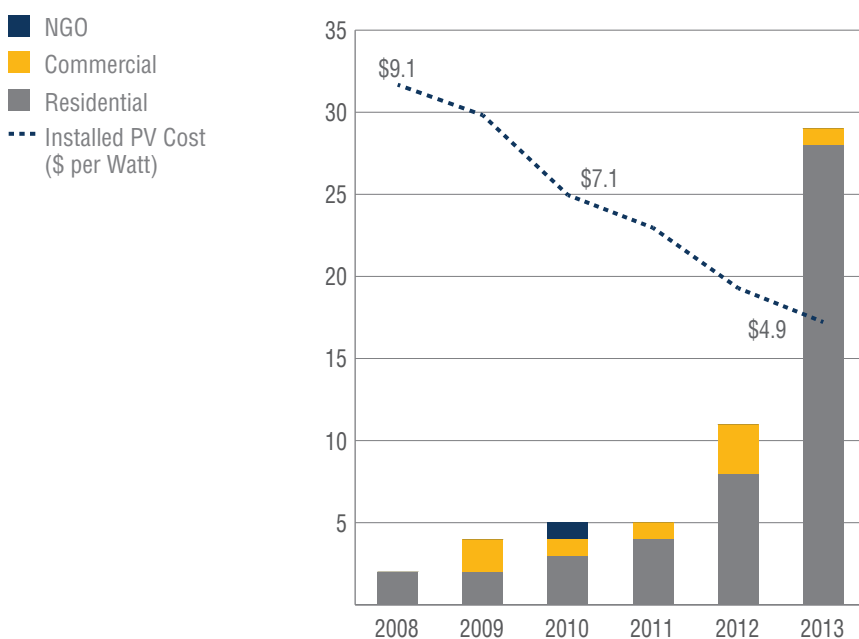


Figure 24

## Yonkers Rooftop Solar Power Capacity

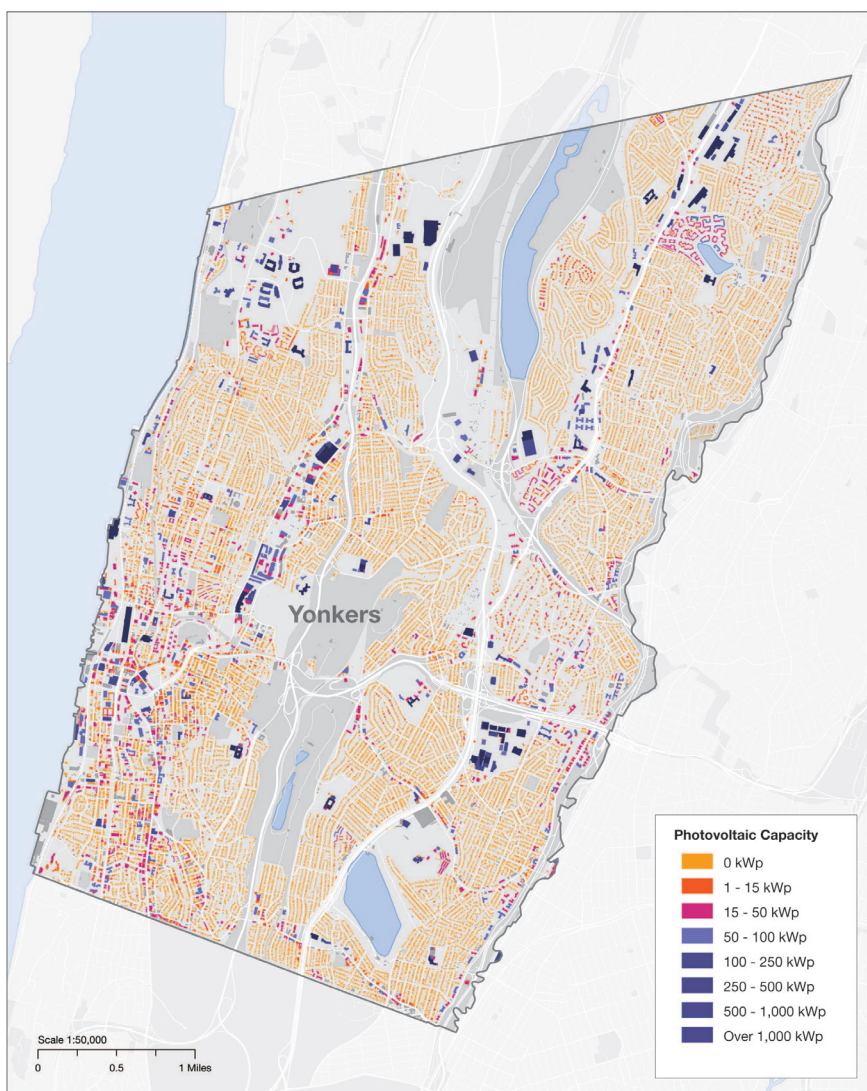


Figure 25

The Department of General Services will reach out to third-party developers to gauge interest in installing solar PV systems on municipal buildings through models such as power purchase agreements. NYPA and NYSEERDA's K-Solar Program may help facilitate solar installation on school buildings in Yonkers.

### Initiative 3: Install microgrids at critical facilities



Microgrids are smaller distributed generation systems coupled with energy storage, management and control systems. Microgrids can augment centralized power generation during peak demand periods and can disconnect and operate independently from the grid as an energy island during grid failure. The ability of the microgrid to “self-heal”—that is, detect problems with the power grid and isolate the microgrid from the main, or primary grid in the event of a disturbance—increases the overall resilience of a central power system and facilities connected to the microgrid. Microgrids can also facilitate cleaner energy production through the use of renewables or by coupling them with heat-distribution networks that use waste heat from the power production process.

There are a number of potential microgrid development sites that contain critical facilities in Yonkers, including: the area around the Cacace Justice Center, City Hall and St. Joseph's Medical Center, the area surrounding the Westchester County Wastewater Treatment Plant and the Ludlow neighborhood, and the area near the Empire Casino (a 24-hour facility) and the Hillview Reservoir, which provides potable water to New York City (**Figure 27**).

## CASE STUDY

### Solarize Brooklyn

Solarize Brooklyn was a volunteer-led initiative that partnered with a not-for-profit renewable energy advisor to bring affordable solar power to the community. The program offered educational sessions and free solar assessments to community members to introduce residents to solar technology and the procurement process. Solarize Brooklyn helped reduce the costs of solar energy systems by partnering with local installers that provided special pricing to residents as well as additional discounts based on the volume of systems that were installed. Twenty-three households decided to install solar energy systems through Solarize Brooklyn, which exceeded the total number of installations during an entire year before the program existed.



# Energy Distribution & Supply

The Department of Planning and Development will engage with proposed site owners and third parties for further evaluation of the proposed microgrid sites to determine the optimal location for the project and apply for the state's NYPrize competition.

## Initiative 4: Work with Westchester County to develop a composting program and anaerobic digestion facility



Yonkers generates approximately 82,000 tons of organic waste such as food and yard waste per year (this represents approximately 25 percent of organics generated in Westchester County). This waste can be composted or processed in an anaerobic digester (**Figure 28**) to reduce the amount of material being sent to landfill. Approximately 3.3 million cubic meters of biogas could be generated if half of the organics were diverted from the waste stream (four times as much for Westchester County). The biogas could be converted into transport fuel in the form of CNG or processed to generate 6.7 GWh of electricity, or 15 percent of municipal building electricity consumption.

The City has already had some success in diverting organic waste through its "Love 'Em & Leave 'Em" program and the We Future Cycle school lunch recycling program. As residents become more aware of the benefits of diverting waste through programs like We Future Cycle, there will be a growing amount of organic waste that requires processing.

DPW, with support from the Department of Planning and Development, will meet with stakeholders, key partners and other Westchester County communities to determine interest in developing a composting program at the county level. To gauge private company interest in the project, DPW and its Westchester County partners

### POTENTIAL POWER CAPACITY OF SOLAR PV

Category	Solar Capacity (kWp)	Solar Generation (MWh/year)
Commercial-Retail	50,858	55,733
Common Land Homeowners Association	299	327
High Density Residential	153,390	168,094
Institutional and Public Assembly	44,456	48,717
Low Density Residential	15,745	18,513
Manufacturing, Industrial, Warehouse	53,972	59,146
Medium High Density Residential	276,556	325,189
Medium Low Density Residential	181,048	212,885
Mixed Use	18,266	21,478
Office and Research	8,187	8,972
	<b>802,777</b>	<b>919,055</b>

Assumptions: 20 percent efficient modules; White Plains, NY weather data; Tilt for pitched roofs — between 25 and 37 degrees (output should be almost the same for that range), no spacing factor used (inclined plane), Tilt for flat roofs — 5-degrees, spacing factor of 1.25 between panels; derate factor of 80 percent; usable roof area of 60 or 80 percent; structural integrity of the roof not taken into account.

### CASE STUDY

#### i.Park Hudson Solar Panel



One of Yonkers's most prominent PV systems can be found on the i.Park Hudson complex, located downtown. The complex has 3,700 solar panels on its roof, covering the same area as two football fields. The panels are capable of generating approximately 1.2 million kilowatt-hours of electricity each year, which is equal to 15 percent of the complex's annual electricity consumption. When it was installed at the end of 2012, it was the largest commercial rooftop system in Westchester County. The \$5 million project was funded by private investment and federal tax incentives that will recoup its costs through energy savings and by charging tenants at the complex a fixed rate for the electricity produced by the panels via power purchase agreement.

## Potential Microgrid Opportunities in Yonkers

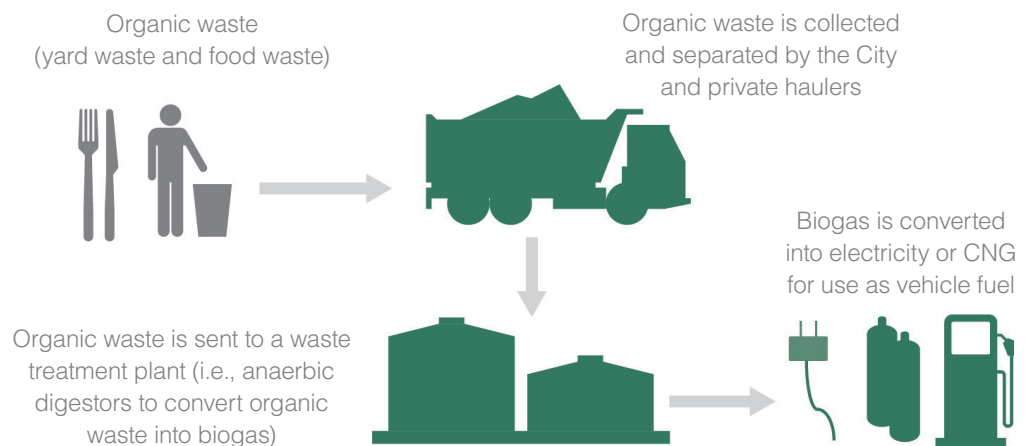
Figure 27

Yonkers  
generates  
approximately  
**82,000**  
tons of organic  
waste per year



## Organics-to-Energy Program in Yonkers

Figure 28





## Snapshot of Outages or Interruptions to the Electricity Grid During Superstorm Sandy

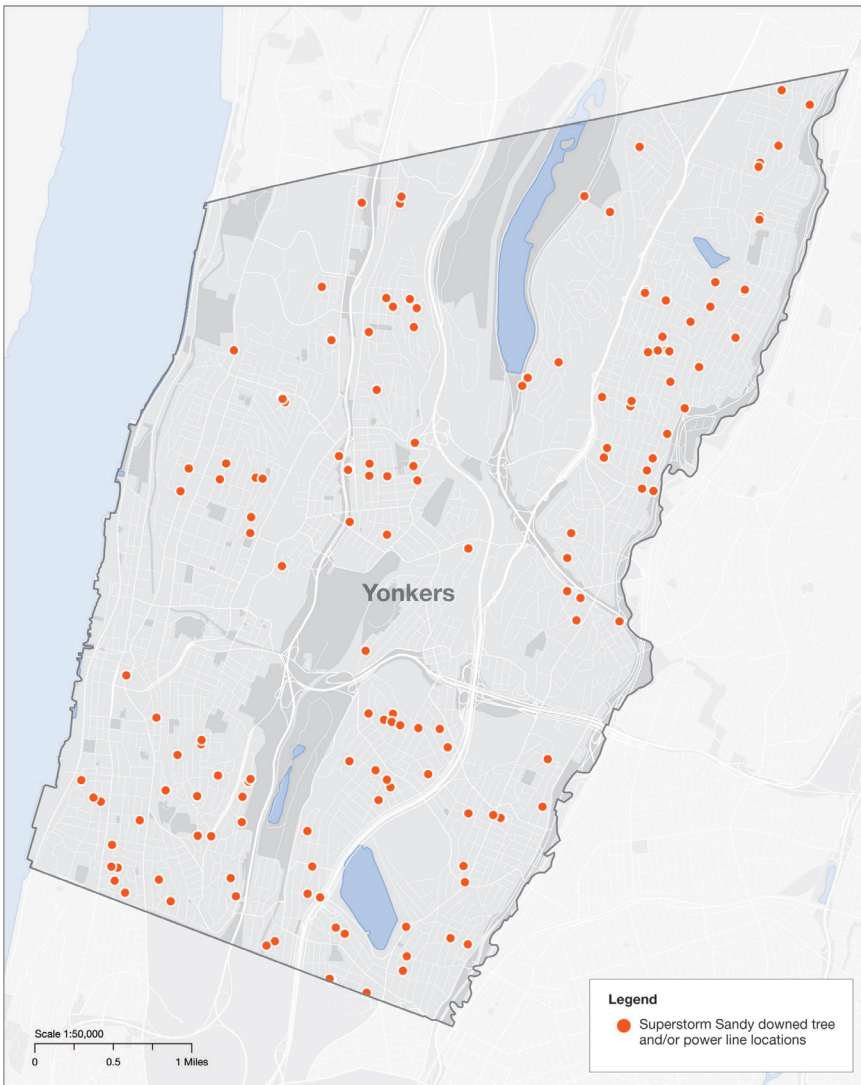


Figure 29

will release a public request for qualifications (RFQ). A countywide anaerobic digestion facility will be investigated after a successful composting program is implemented and organic waste diversion reaches high enough levels. Yonkers will also monitor the Reforming the Energy Vision (REV) proceeding in the event that reforms make anaerobic digestion a more cost-effective alternative energy option for power generation.

## Enhance the city's resilience to outages and disaster events

Extreme weather events such as Superstorm Sandy and Hurricane Irene demonstrated that Yonkers's energy infrastructure was vulnerable to extreme weather events. The City is using lessons from each storm to become better prepared for the next one. The Office of Emergency Management initiated a Hazard Mitigation Plan website with information and fact sheets related to hazard events. The state provided funding to develop a Community Reconstruction Plan for the City to mitigate against future risks and build increased resilience.

### Initiative 5: Develop a vulnerability and adaptation plan



Vulnerability is a function of the character, magnitude and rate of a hazard to which a system is exposed, its sensitivity to that hazard and ability to adapt.

Yonkers' Office of Emergency Management, with support from the Department of Planning and Development, will meet with appropriate stakeholders and establish a working group to develop a vulnerability and adaptation plan. The plan will include an assessment of the vulnerability of locations, populations and key services to natural and man-made hazards. It will also include mitigation measures designed to build resilience and improve adaptability in response to future hazards. On the energy side, this plan will determine which buildings and infrastructure have the greatest need for back-up utilities (e.g., power and heat, electricity, water, etc.), equipment and services during hazard events.

### Initiative 6: Work with Westchester County to create an emergency fuel stockpile



During Superstorm Sandy, numerous terminals in New York Harbor closed, leaving Yonkers and many other nearby municipalities with a shortage of gas and diesel fuels. Working with the Westchester County Department of Emergency Services, the Yonkers Office of Emergency Management will determine the optimal site for an emergency fuel terminal and execute the planning process for the project. A fuel stock will provide short-term relief for the county and first responders after major disasters, and ultimately make Yonkers more resilient to disaster events.

### Initiative 7: Work with the state to reduce methane emissions associated with natural gas pipeline leaks



New York State's pipeline infrastructure is aging and composed in significant part of leak-prone cast iron and unprotected steel pipes. Natural gas that passes through these pipes has high carbon dioxide emission factors. To address this issue, the New York State Energy Plan includes an initiative to require an increase in inspections, repair of leaks (also at compressor stations) and accelerated replacement of faulty portions.

Yonkers's DPW and Department of Engineering will coordinate efforts to advocate for an increase in inspections and improved maintenance of gas pipelines statewide in support of the New York State Department of Public Service's (DPS) ongoing efforts to increase the rate of leak-prone pipe replacement statewide. DPW and Department of Engineering will meet with DPS, the Department of Environmental Conservation (DEC) and Con Edison to ensure these important stakeholders understand the City's desire to reduce the environmental and safety impacts of gas distribution infrastructure.

## Implementation Matrix

Responsible party	Key partners	Source of funding	Time frame	Next steps
<b>Identify and support the expansion of district and renewable energy systems</b>				
<b>Initiative 1: Investigate opportunities for distributed generation, district heating/cooling and combined heat and power systems</b>				
Planning and Development	Building Owners, Residents, Businesses, Developers, Con Edison, NYISO	—	Short-Term	Commission comprehensive DG, district heating/cooling, and CHP feasibility study
<b>Initiative 2: Facilitate and increase renewable energy production on municipal and community buildings through third-party solar developers</b>				
Planning and Development, Housing and Buildings, Department of General Services	Solarize Westchester, NYSEERDA, CUNY, third-party solar developers	NYSEERDA Solar PV Program Financial Incentives, Federal tax incentives, NY Green Bank	Short-Term	Contact third-party developers, identify building owners
<b>Initiative 3: Install microgrids at critical facilities</b>				
Planning and Development	NYSEERDA, Con Edison	NY Prize, Private Finance	Mid-Term	Release RFQ for third-party consultants
<b>Initiative 4: Work with Westchester County to develop a composting program and anaerobic digestion facility</b>				
Department of Public Works, Planning and Development	Westchester County Department of Environmental Facilities, County Executive Office, NYS Department of Environmental Conservation	CGC, Renewable Portfolio Standard Customer-Sited Tier Anaerobic Digester Gas-to-Electricity, Federal tax incentives	Mid-to-Long Term	CGC, Renewable Portfolio Standard Customer-Sited Tier Anaerobic Digester Gas-to-Electricity, Federal tax incentives
<b>Enhance the city's resilience to outages and disaster events</b>				
<b>Initiative 5: Develop a vulnerability and adaptation plan</b>				
Planning and Development, Office of Emergency Management	—	Community Development Block Grants for Disaster Recovery	Short-Term	Meet with appropriate stakeholders and establish a working group tasked with developing plan
<b>Initiative 6: Work with Westchester County to create an emergency fuel stockpile</b>				
Office of Emergency Management	Con Edison, NYSDEC, NYSDPS, Department of State	—	Mid-Term	Determine optimal site for emergency fuel terminal
<b>Initiative 7: Work with the state to reduce methane emissions associated with natural gas pipeline leaks</b>				
Public Works, Engineering	Residents, Businesses, City employees	—	Mid-Term	Meet with NYS PSC, NYS DEC, and Con Edison to discuss the City's concerns

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

## Summary of Cross-Cutting Themes

Several cross-cutting themes are present throughout the initiatives found in the Yonkers Energy Plan. These themes span all of the plan's program areas and highlight the potential for synergies among the initiatives.

- Municipal: leading by example
- Economic development: creating jobs and attracting businesses
- Infrastructure: preparing our cities for the future
- Climate action: reducing the city's carbon footprint

### **Municipal leadership: leading by example**

By creating well-conceived programs and policies, and completing projects and initiatives with tangible energy and cost savings, Yonkers's municipal government will lead by example and serve as a model for local residents and businesses, as well as for other cities. The City is already leading by example through its LED Street Light Program and the Yonkers Green Buildings Ordinance, which demonstrate its commitment to reducing the impacts of the built environment. The City will build upon this progress by establishing sustainability awareness training programs for municipal staff and by developing a citywide EcoDriving training program that aims to reduce

fuel usage and costs of municipal vehicles. Additional initiatives that exhibit the City's commitment to leading by example include creating a rideshare program for municipal employees and implementing an experiential sustainability education program in public schools to teach the next generation of residents how to minimize their impact on the environment.

### **Economic development: creating jobs and attracting businesses**

Creating jobs and attracting businesses to Yonkers will play a key role in the city's future economic success. The City plans to accomplish this by initiating a design competition for the redevelopment of an iconic, sustainable building, city block or "eco-district" in Yonkers. The City will also promote green training programs for schools and the public while encouraging renewable energy projects through Power Purchase Pools and Renewable PPAs. These parallel efforts will function in tandem by creating a demand for local renewable energy professionals and linking residents to programs focused on training the next generation of renewable energy workers.

### **Infrastructure: preparing our cities for the future**

As global temperatures rise, cities must prepare for the future effects of climate change on the natural and built environments. As evidenced by recent disasters such as Superstorm Sandy, cities and their infrastructure are vulnerable to storm events and other impacts that have been linked to climate change. Moreover, Yonkers' high density puts added strain on its aging infrastructure. Yonkers is committed to preparing for the 21st century by modernizing its infrastructure and making it more resilient. To accomplish this, the City will study electrical grid infrastructure to evaluate how increased distributed generation can be safely integrated and where it will be most beneficial to the resilience of the overall grid. The City will also work to develop a microgrid plan around Yonkers' critical facilities to reduce grid congestion and ensure power is available when and where it is needed most.

Waterfront park





### Climate action: reducing the city's carbon footprint

Although city dwellers typically have smaller per-capita carbon footprints than people who live in suburban and rural communities, Yonkers must commit to reducing the city's carbon footprint to mitigate the effects of climate change. The City's Planning Department has already adopted the New York State Unified Solar Permit Application to streamline the solar PV application process. This will help Yonkers increase its solar capacity and reduce emissions by generating carbon-free, renewable electricity. By developing a citywide bicycle and pedestrian master plan and adopting

a Complete Streets Policy, Yonkers will transform itself into a bicycle- and pedestrian-friendly city, thereby decreasing transportation fuel consumption and emissions.

## Implementation

The City Department of Planning and Development, in coordination with the Mayor's Office, and a newly appointed City Energy Manager, will be responsible for the rollout and tracking of the Energy Plan. Existing City departments and personnel will implement and track the plan to optimize existing administrative structures and take advantage of potential synergies between the plan and current programs. The Department of Planning and Development, with support from the Mayor's Office and the City Energy Manager, will coordinate interdepartmental initiatives to ensure open communication and knowledge sharing takes place between departments.

Within each department, personnel will be selected to lead individual initiative implementation. Those employees will also be responsible for coordinating performance tracking. Depending on the initiative, tracking may be carried out internally or by third parties, such as NYSERDA and Con Edison. The reporting entities will be responsible for collating performance tracking results and submitting progress reports to the Department of Planning and Development by the end of the fiscal year on an annual basis. After reviewing individual progress reports, the Department of Planning and Development and the City Energy Manager will produce an overarching progress update for the Yonkers Energy Plan and make necessary updates to the plan itself.

Funding for the initiatives will be derived from a combination of federal and state programs and the City's municipal budget. Specific initiative funding sources are listed in the implementation matrices throughout this plan.

The Yonkers Energy Plan was developed with the goal of reducing energy use and greenhouse gas emissions of municipal government operations and of the community at large. The plan also aims to enhance the quality of life of residents, generate new jobs and economic opportunities, protect the natural environment, and create a more resilient Yonkers. By implementing this plan, the City of Yonkers will ensure it is prepared for the 21st century.

### Baseline with Municipal Initiatives Savings (mmBtu)

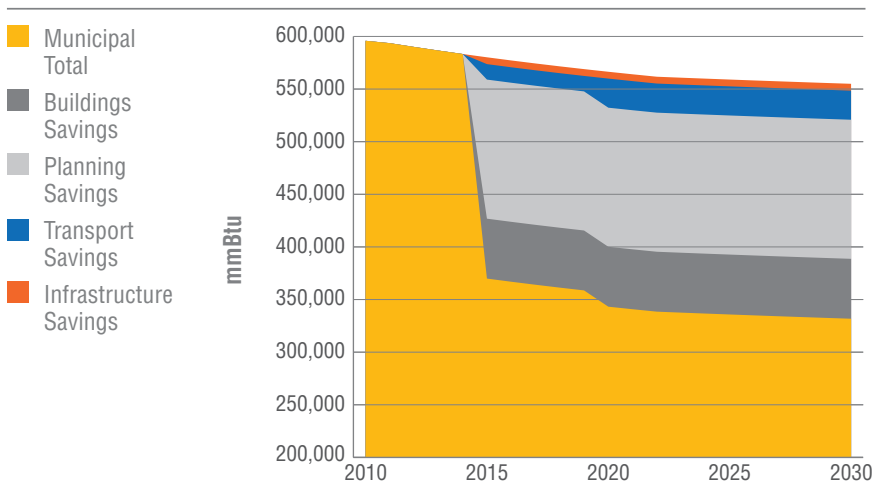


Figure 30

### Baseline with Community Initiatives Savings (mmBtu)

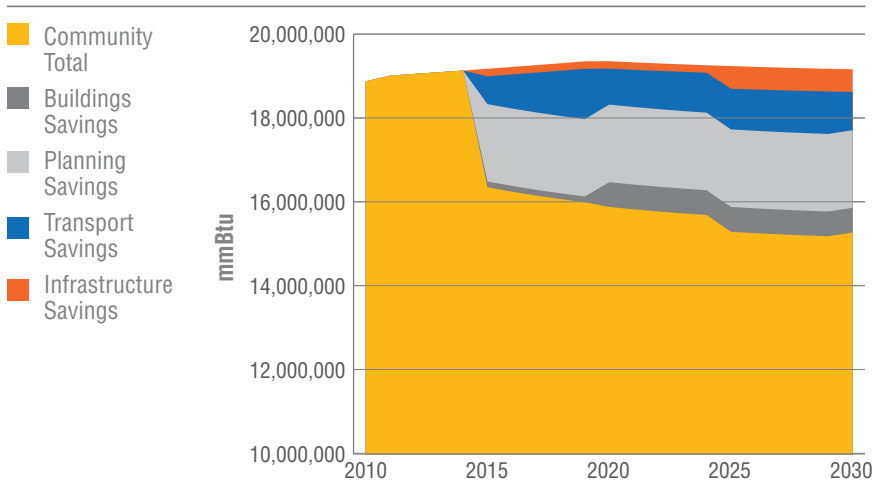


Figure 31

## 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 pursuing 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

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## 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

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## 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\*

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## New York State Public Service Commission

- Communications on Reforming the Energy Vision (REV) initiative

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## 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

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## 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

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## 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)\*

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## Empire State Development

- Facilitation of partnerships with local businesses and other stakeholders
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\* 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'Attilio 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 Canal 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 Development, 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

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**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.

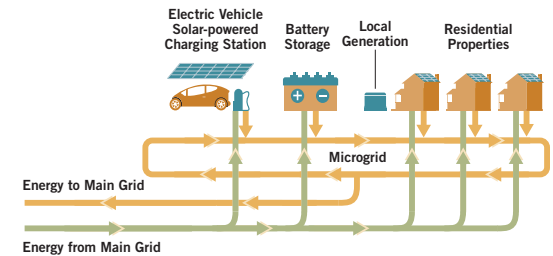
**District energy:** District energy systems produce steam, hot water or chilled water at a central plant, which is then piped underground to individual buildings for space heating, domestic hot water heating and air conditioning.

**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.

**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<sub>2</sub>:** Carbon dioxide is a naturally occurring chemical compound and the primary greenhouse gas emitted through human activities.

**CO<sub>2</sub>e:** Carbon-dioxide equivalent is the term for describing different greenhouse gases in a common unit. For any quantity and type of greenhouse gas, CO<sub>2</sub>e 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<sub>2</sub>.

**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)*

**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 maintenance 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<sub>2</sub>e:** Million tons of carbon dioxide equivalent is a common metric to measure the amount of CO<sub>2</sub> in the atmosphere.

**NYP&A:** 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

**NY&ERDA:** 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](http://www.nypa.gov/buildsmartny/fivecities.html)