BuildSmartNY

Five Cities Energy Plans

Albany ▪ Buffalo ▪ Rochester ▪ Syracuse ▪ Yonkers

CITY OF ALBANY

NEW YORK STATE OF OPPORTUNITY.

NY Power Authority

Issued January 2015

Table of Contents

Cover Photo: Albany skyline

Letter from Gil Quiniones

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

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

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

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

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

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

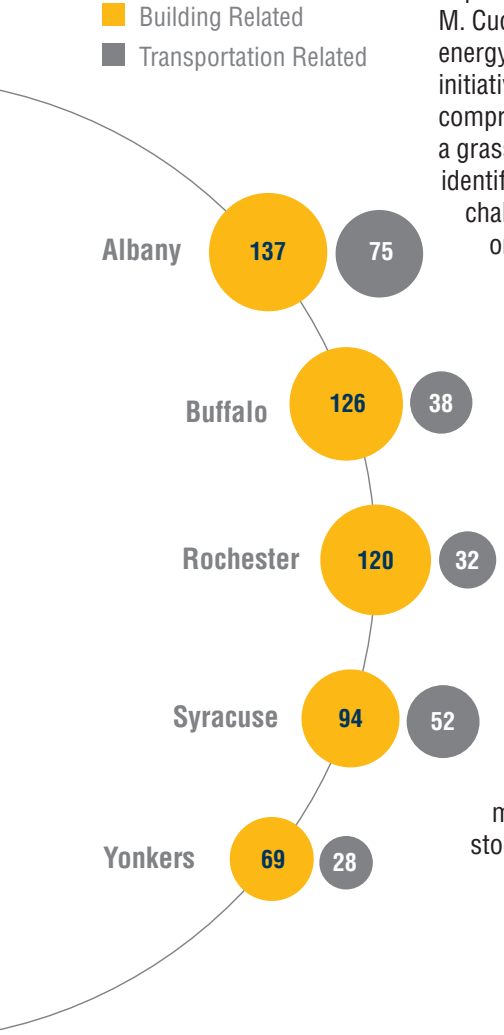
NEW YORK STATE OF OPPORTUNITY. | NY Power Authority

Introduction

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 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.

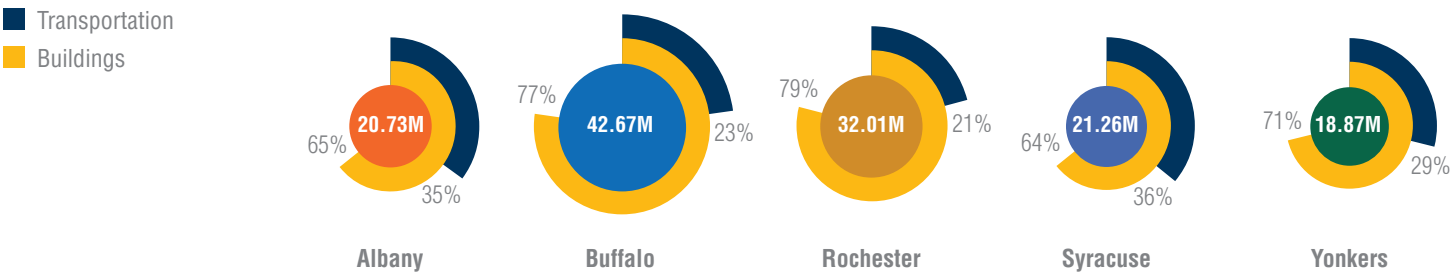
Energy Consumption per Capita (mmBtu)



BuildSmartNY

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

Overall Energy Consumption (mmBtu)



Goals of the Five Cities Energy Plans

Reduce energy consumption

Strengthen reliability and resiliency of cities' energy infrastructure

Catalyze clean energy investment and economic development

Contribute to a cleaner environment

Enhance quality of life

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

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

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

Aspirational

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

Ambitious

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

Achievable

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

Accessible

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

Accountable

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

Adaptable

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

Planning Process

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.

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

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

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

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

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

Scenes from Five Cities stakeholder meetings.

Action Areas

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

Energy Planning & Coordination

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

Energy Efficiency in Buildings

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

Transportation Energy Efficiency

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

Energy Distribution & Supply

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

Cross-Cutting Themes

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

Municipal leadership: leading by example

The Five Cities' participation in and dedication to this 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

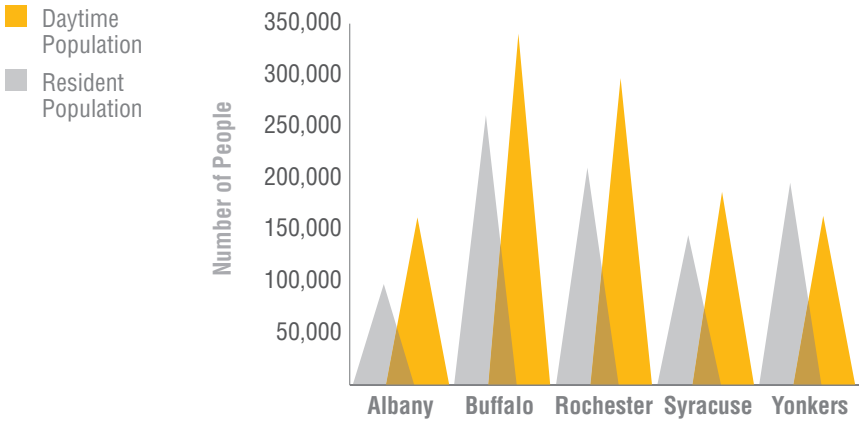
Albany, Buffalo, Rochester, Syracuse, and Yonkers are the five largest cities in the state after New York City. Their combined populations would make them the 11th largest city in the country, providing a significant opportunity to meaningfully reduce energy consumption and greenhouse gas emissions.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

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

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

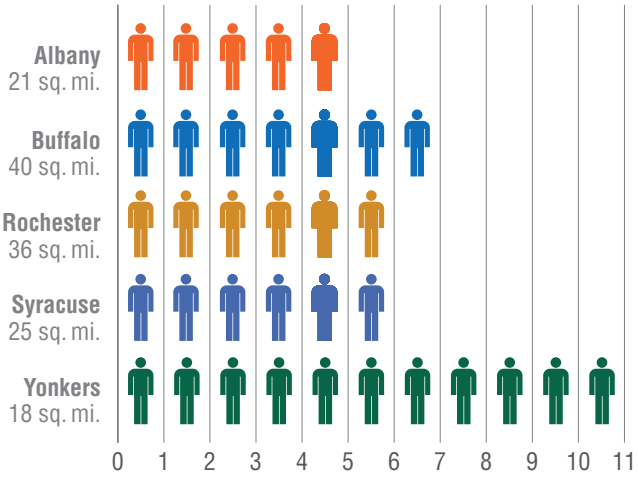
Several key initiatives emerged from the data collection, baseline assessments and planning process, as well as from the unique character of each of the Five Cities. These key initiatives cut across action areas and sectors.

Population



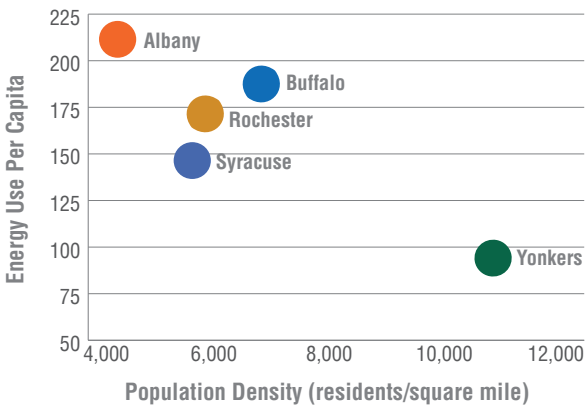
Density of City Residents

One Person = 1,000 Residents per Square Mile



Energy Use Per Capita/Population

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



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

Albany

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

Rochester

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

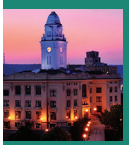
Buffalo

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

Syracuse

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

Yonkers



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

Key Initiatives

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

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

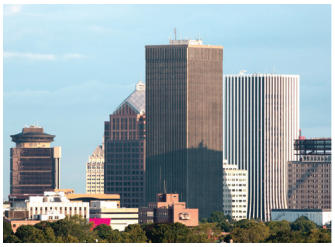
To reduce energy consumption from the transportation sector, all five cities have prioritized initiatives that promote alternative modes of transportation through expansion of pedestrian and bicycle infrastructure, improved transit service, and modifications of zoning to promote walkable and transit-oriented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

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

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

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

All Five Cities Include Initiatives Around these 10 Topics



Promote/support community building retrofits

Pursue energy-efficiency improvements for municipal buildings

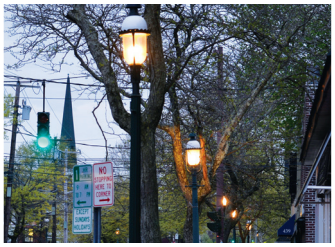
Improve infrastructure/modify zoning to promote alternative modes of transportation

Reduce emissions/fossil-fuel dependence of fleets

Increase electricity generation from renewable energy sources

Implement transportation management tools to reduce idling and vehicle emissions

Expand clean, distributed generation infrastructure



Improve energy efficiency of outdoor lighting

Reduce municipal utility costs

Coordinate with utilities/state to enhance energy infrastructure

ALBANY

Letter From Mayor Kathy Sheehan

Dear Albany residents, employees, businesses and stakeholders,

Since the early 1600s, Albany has served as an important gateway in the Northeast for transportation, goods and services. As we move into the 21st century, Albany is committed to maintaining this central position, with the understanding that it needs to follow a more sustainable path, and this includes how it consumes and generates energy. I am pleased to say that the Albany Energy Plan establishes that path forward. The plan will serve as an important tool for municipal operations and services as well as the greater Albany community as it continues to rebound from the recent recession. The strategies identified in the plan will help manage municipal costs, reduce our carbon footprint, modernize our infrastructure to increase our resiliency, provide cleaner transportation options, create a more livable community and continue to promote Albany as a leader in sustainable economic development.

This year-long planning effort allowed the City to take part in a unique opportunity that combined the ideas and dedication of dozens of municipal, regional and statewide stakeholders. With support from the New York Power Authority, Albany collaborated with four other cities—Buffalo, Rochester, Syracuse and Yonkers—to develop the first Energy Plan for our City. While the goals and initiatives of this plan are tailored to the City's needs, we were able to leverage ideas and besat practices from the other four cities to create a robust, implementable plan that will guide our energy policy and program decisions for years to come. As a result of this planning effort, we developed and enhanced lasting relationships with stakeholders across the City, region and state that will help us realize our goals.

As with any effective planning effort, an important step in creating the Energy Plan was to review and cull the relevant components of our previous and existing plans. Albany 2030, the Bicycle Master Plan, the Electric Vehicle Feasibility Study and other plans were consulted for pertinent elements that would support the development of the Energy Plan. I am pleased to see that our efforts have aligned so strongly and am confident that this plan outlines a realistic framework for the City to manage municipal energy use and costs, support community scale efforts to improve energy efficiency, reduce greenhouse gas emissions, and transform our infrastructure to be smarter, cleaner and more resilient.

I want to thank everyone who participated in this collaborative planning effort and also extend my gratitude to our residents and stakeholders who are helping Albany be a more sustainable place to live, work, play and do business. We look forward to implementing the important initiatives in this Energy Plan.

Warm Regards,

Mayor Kathy Sheehan
Mayor of Albany, New York

Top left, Broadway, downtown Albany; Top right, The University at Albany; Middle, New York State Capitol; Bottom, NY Exteriors, landmark locations for Five Cities Energy Plan

City of Albany Energy Plan

Empire State Plaza

As the capital of New York and Albany County seat, a key hub of commerce and transportation in the Northeast, and home to numerous state agencies, Albany seeks to demonstrate leadership in transitioning New York to a clean and sustainable economy. Equally important, the City has an opportunity to better serve the community by improving the efficiency of its own operations and also by providing clean, reliable, and affordable energy to the residential, commercial, industrial, and public sectors.

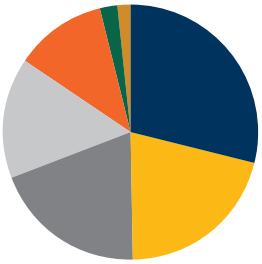
The City took a critical first step in demonstrating this leadership by ensuring that sustainability principles were incorporated into Albany 2030, the first comprehensive plan in its 400-year history. Albany 2030, adopted in 2012, was developed to guide local development in a manner that maintains the city's character while improving quality of life, and environmental and fiscal health. In addition to initiatives to support economic development and make housing more affordable, the Albany 2030 planning process included a greenhouse gas assessment that informed the development of a climate action plan with initiatives to improve energy efficiency, modernize infrastructure and enhance transportation networks.

Consistent with Albany 2030, as well as the Capital Region Sustainability Plan, the City seeks to build upon its strong sustainability foundation with the Albany Energy Plan and implement strategies that will further support a vibrant community through affordable, clean, and efficient energy supply, distribution, and consumption. For nearly 10 years, the City of Albany has been leading efforts to become more sustainable by developing plans and programs that will better position the government and community at large to increase energy efficiency, reduce emissions, save money, grow the economy and improve the quality of life for residents. To date, numerous plans have been developed by the City to further advance its energy, climate and sustainability efforts. Many of these efforts have been carried out by the City's Office of Energy and Sustainability, established in 2010.

In parallel with the development of the Albany Energy Plan, the City is focused on the Albany 2030 Sustainable Code Project.

Action Areas

Municipal Energy Consumption by Type (mmBtu)

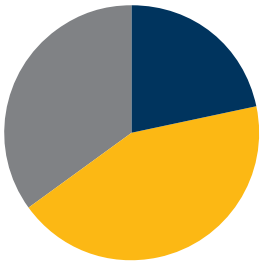


- Streetlights and Traffic Signals (29%)
- Recreational Facilities (21%)
- Public Safety Facilities (19%)
- Administrative Buildings (15%)
- Water Delivery (12%)
- Wastewater Treatment (2%)
- Other (2%)

Energy Use (mmBtu), By Type, FY11

Figure 1

Community Energy Consumption by Fuel Type (mmBtu)



- Electric (22%)
- Natural Gas (43%)
- Trans Fuels (35%)

Figure 2

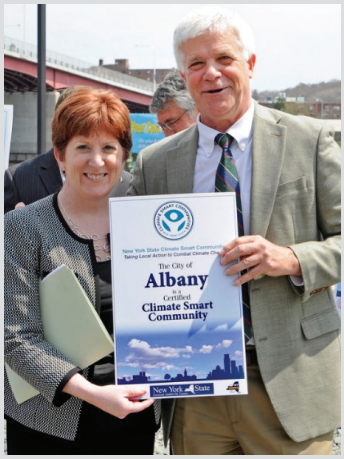
In December 2013, the City was awarded a $300,000 Cleaner Greener Communities Phase II grant from the New York State Energy Research and Development Authority (NYSERDA) to conduct a comprehensive code update and integrate into it the sustainability principles adopted in the Albany 2030 Comprehensive Plan. The update, known as the Albany 2030 Sustainable Code Project and Unified Sustainable Development Ordinance, will incorporate sustainable design and smart growth principles, including green building codes, stormwater management, bike infrastructure and streamlined permitting, among other components.

The City has also made a commitment to energy efficiency and sustainability through its participation in the STAR Communities Rating System (STAR) and the Climate Smart Communities (CSC) program. Albany is a STAR pilot community, which includes numerous energy and climate related objectives in its comprehensive sustainability framework. In 2014, Albany was rated a 3-STAR Community, as recognition as a community for sustainability leadership. In 2009, the City adopted the Climate Smart Communities pledge, which outlined 10 Pledge Elements that reduce energy use and greenhouse gas (GHG) emissions, adapt to a changing climate, and save taxpayer dollars. Albany is one of six communities to become certified as a Climate Smart Community after participating in a certification pilot program in 2013.

In 2013, Albany completed a Climate Change Vulnerability Assessment and Adaptation Plan to identify energy infrastructure vulnerabilities and priority areas for enhanced resilience. The assessment began before the impacts of Superstorm Sandy were felt by many New Yorkers; and the Adaptation Plan provides a clear strategy to further enhance the resilience of its energy systems and infrastructure and demonstrate forward-thinking leadership as a resilient and sustainable city.

Albany recognizes that increasing energy efficiency, utilizing clean energy technologies, modernizing the grid and enhancing transportation networks are necessary to shift to a greener, more sustainable economy. These efforts create jobs and support research and innovation already occurring within Albany's many institutions.

Albany faces a number of challenges with regard to its buildings and infrastructure – including an aging building stock. Many buildings in the commercial, residential and institutional sectors are in need of updates to equipment, windows and building envelope. Even when renovations are performed or new buildings are constructed, energy code compliance is relatively low.



On April 22 - Earth Day - Governor Andrew M. Cuomo launched the New York State Climate Smart Communities Certification Program and recognized the first six municipalities to achieve certification. The CSC Certification Program is designed to support municipal efforts to meet economic, social and environmental challenges posed by climate change. The new certification effort, which will award certification in the bronze, silver and gold levels, will provide a means to recognize those communities that achieve success under their CSC pledge, a means to track and reward local actions, and a better defined framework for local climate action.

Mayor Kathy Sheehan receives Albany's CSC Certification from NYS DEC Commissioner, Joseph Martens.

Municipal Energy Consumption Forecast by End Use (FY 2011-2020)

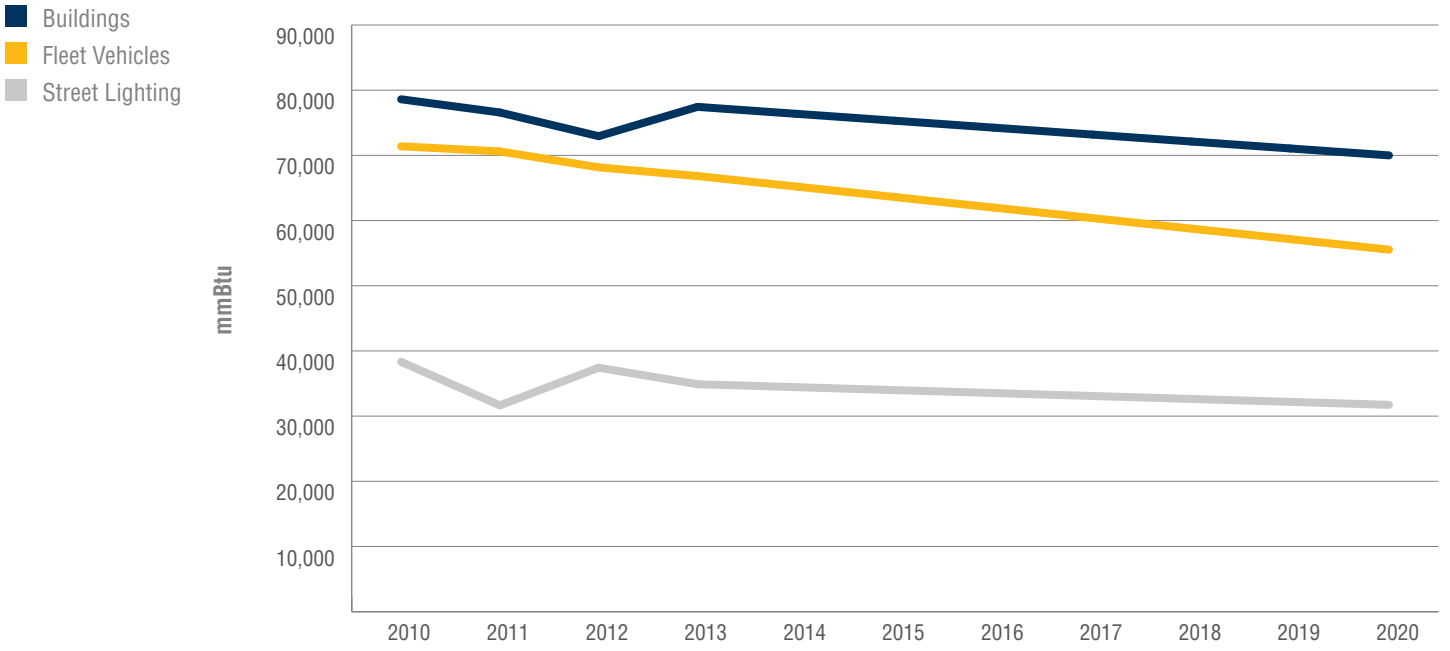


Figure 3

Statewide energy code compliance rates may be as low as 36 percent for recently constructed commercial buildings.

Energy use in buildings and infrastructure is also expensive. Energy costs for municipal buildings and outdoor lighting alone were nearly $6.3 million in fiscal year (FY) 2011. As buildings are renovated or new ones constructed, they should be designed with energy efficiency in mind. Energy efficient buildings are typically more comfortable, result in less pollution and GHG emissions, and save owners money, which can then be invested elsewhere.

Albany strives to provide a safe, functional and efficient transportation network to its residents and visitors. At the crossroads of two of the Northeast's busiest interstates, 90 and 87, a gateway between upstate New York, the Hudson Valley, and New England, combined with a modern port and the navigable waterways of the Hudson River, plus an international airport, Albany has significant transportation infrastructure networks to operate and maintain. It is not surprising, given these significant networks running through the city, that the transportation sector accounts for more than one third of citywide energy consumption and is the largest source of GHG emissions in the city (**Figure 3**).

Maintaining transportation infrastructure, including roadways and bridges, is expensive for government entities and taxpayers. Additionally, vehicle fuel prices, which are already a significant expense to drivers and fleet operators, continue to rise. In recognition of these challenges, the City is actively planning for a more sustainable

transportation system throughout Albany and the region. In collaboration with the Capital District Regional Planning Commission (CDRPC),the Capital District Transportation Committee (CDTC), and the Capital District Transportation Authority (CDTA), as well as with the New York State Department of Transportation (NYSDOT), NYSERDA, and other agencies, Albany has improved bicycle and pedestrian infrastructure, enhanced public transit routes, developed the City Bicycle Master Plan, and completed an Electric Vehicle Feasibility Study among other efforts. In further support of these efforts, the Albany Energy Plan provides a comprehensive approach to transportation planning with initiatives to enhance bicycle and pedestrian infrastructure, alternative fuel vehicles and infrastructure, transit-oriented development, and smart growth.

Similar to buildings and transportation infrastructure, the region's electric grid is aging and at risk of experiencing failures. For 2009 through 2013, there were nearly 20 million customer minutes of service interruption in National Grid's New York service area (of which the City of Albany is a part), and equipment degradation plays a significant role in these service interruptions (**Figure 4**).

Maintaining a functioning electric supply and distribution infrastructure is critical for public safety, access to services and economic stability. As this infrastructure is replaced in the coming years, the City and its utility and state agency partners will need to focus on modernizing the grid and incorporating smart and renewable technologies that enhance efficiency and reliability while reducing pollution and GHG emissions.

Coordinated planning within municipal government and among stakeholders throughout Albany and the region will be essential for implementation. The City has laid a foundation of quality planning and coordination through its numerous sustainability planning efforts as well as through this Energy Plan effort.

Causes of Service Interruptions in Albany

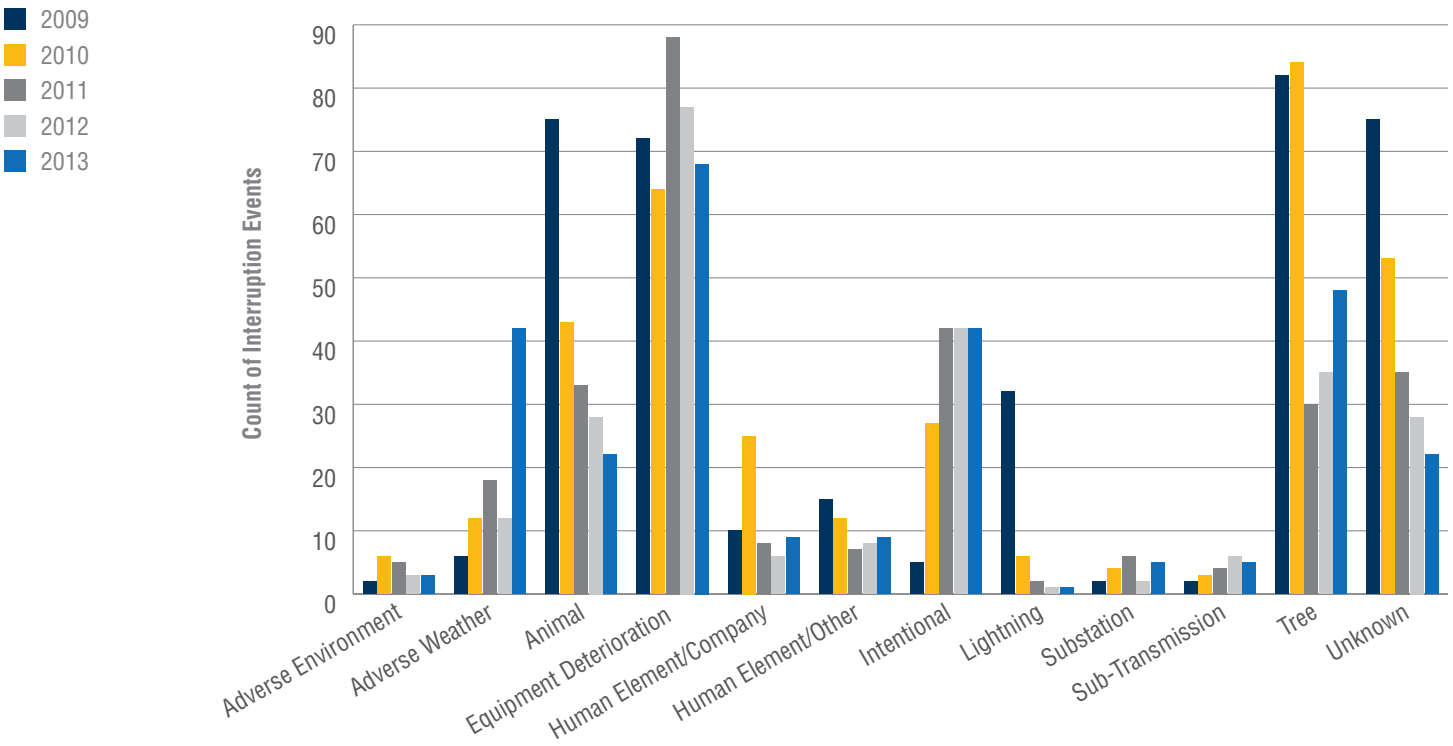


Figure 4

Source: National Grid

Overview

The City will need to capitalize on previous and existing efforts and the relationships established during the implementation of the Albany Energy Plan. Going forward, the City will also need to establish internal structures and procedures to better manage its energy data and costs. Finally, a critical component of planning and coordination for the City will be to provide the structure, information, and resources necessary to empower the community to take action.

Albany City Hall

Summary of goals and initiatives

The City has identified the following goals within the four action areas:

- Secure Albany's energy needs through cost-effective policies, integrative planning and strategies that emphasize clean and efficient technologies;
- Promote building efficiency throughout all sectors of the community, including municipal buildings;
- Reduce fossil fuel consumption in the transportation sector; and
- Increase grid efficiency and energy security while decreasing reliance on fossil fuels

Some initiatives are particularly critical to successful implementation of this plan and the ultimate success in achieving the City's goals. The first such strategy is for the City to begin utilizing a web-based energy data management tool. Data collection, tracking and benchmarking are essential to the effective implementation of building energy improvements as well as the implementation of initiatives across all of the action areas. The second critical strategy is hiring an Energy Manager to enhance the capacity of City staff to track performance data and the implementation of projects and build awareness of energy efficiency projects, which is necessary to fully realize the benefits of Albany's energy improvement efforts.

Additionally, the City will expand existing efforts to shift away from single-occupancy vehicles by enhancing transit systems, promoting transit-oriented development, and enhancing bicycle and pedestrian infrastructure. Much of this will build upon the work underway in the Albany 2030 Sustainable Code Project, funded in part by a NYSERDA Cleaner Greener Communities Phase II implementation grant, and also through the coordinated efforts to implement the region's New Visions Regional Transportation Plan.

Delaware Avenue

The initiatives in the Albany Energy Plan are expected to foster energy savings and reduce greenhouse gas reductions in the city. The reductions in energy use and GHG emissions that will be realized by achieving the goals of the Albany Energy Plan will create operational efficiencies in municipal government, increase mobility and connectivity, and improve quality of life in revitalized neighborhoods. These outcomes are expected to spur economic activity across the city and region and make Albany a leader in smart growth and sustainable development.

City of Albany Energy and Sustainability Plans and Studies

2007 Albany Sustainable Development Assessment Team: A Sustainable Capital for the 21st Century

2009 Greenhouse Gas Emissions Inventory

2009 City of Albany Bicycle Master Plan

2011 Climate Action Plan

2012 Albany 2030 Plan

2012 Electric Vehicle Feasibility Study

2012 City of Albany TOD Guidebook

2013 Local Waterfront Revitalization Plan

2013 City of Albany Bike Share Feasibility Study

2013 City of Albany Bicycle Signage and Wayfinding Strategy

2013 Capital Region Sustainability Plan

2013 Albany Climate Change Vulnerability Assessment and Adaptation Plan

Secure Albany's Energy Needs Through Cost-Effective Policies, Integrative Planning and Strategies That Emphasize Clean and Efficient Technologies

Summary of Objectives and Initiatives

Prepare Albany's workforce for meeting the city's energy and sustainability goals

Initiative 1: Implement the Albany Green Business Program
Initiative 2: Support a green jobs training program

Manage City government energy costs through effective energy procurement, demand management and energy use monitoring

Initiative 3: Develop a long-term energy supply strategy
Initiative 4: Create a citywide Energy Manager position
Initiative 5: Utilize a web-based energy data management tool

The City of Albany faces a number of challenges with regard to maximizing efficiency in its buildings and infrastructure. However, these challenges also present tremendous opportunities for improved efficiency, cost savings, pollution reduction, economic development, increased resiliency and enhanced livability. With an economy comprised of energy intensive sectors such as government operations, educational institutions, research facilities, medical centers and laboratories, Albany has significant energy needs that are likely to increase as the economy continues to recover from the most recent recession. These sectors also provide a wealth of knowledge and innovation that, with strategic coordination, can lead Albany to implement smart, efficient, more sustainable technologies.

Planning and coordination play a critical role in ensuring Albany's energy needs are met and its systems and infrastructure are reliable. As energy demands continue to grow, the City of Albany will have a significant role to play in managing those demands both within its own municipal operations, as well as in establishing effective policies and strategies for managing energy demands at the community scale and catalyzing investment in the clean energy market.

The City manages municipal buildings, vehicles, streetlights, traffic signals, pumping stations and other equipment. In 2011, municipal energy costs totaled $8.1 million (**Figure 5**).

By 2030, the City's energy use is projected to remain relatively flat or experience a minor reduction, though energy costs are likely to continue to increase. Smart energy demand management, efficient operations, and thoughtful procurement will be critical to minimizing municipal energy costs and impacts to the environment.

As demonstrated in **Figure 6**, the City has a strong record of integrative planning, coordination with stakeholders and effective sustainability policymaking that will support the goal of securing energy needs while creating jobs and transitioning Albany to a cleaner, greener economy.

MUNICIPAL OPERATIONS ENERGY CONSUMPTION (FY 2011)

Electric use	Gas use	Vehicle fleet fuel	Total energy used	Energy costs	Total $MtCO_2e$
20,944,402 kWh	476,207 therms	70,605 mmBtu (371,527 gallons of gasoline 175,100 gallons of diesel)	196,458 mmBtu	$8.1 million	11,971

Figure 5

City of Albany Timeline of Sustainability

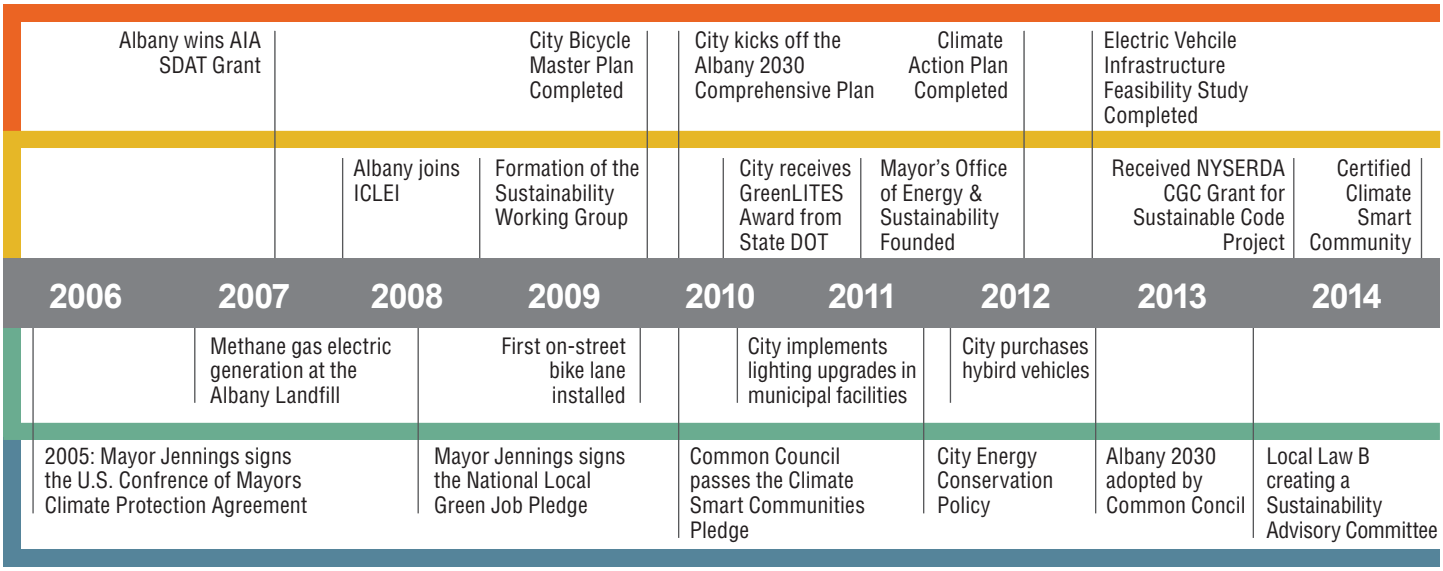


Figure 6

Prepare Albany's workforce for meeting the City's energy and sustainability goals

The City recognizes the important role it can play in providing resources to support energy efficiency throughout the community. The Albany 2030 Sustainable Code Project, for example, will formalize energy efficiency standards and requirements throughout Albany; however, the City also has a responsibility to build capacity among all sectors to properly implement these changes. Fortunately, a number of technical and financial resources already exist among utilities, NYSERDA, the New York Power Authority (NYPA), and others to support these efforts. Local stakeholders have identified the need for a centralized clearinghouse of all of these resources that could further build understanding and capacity among residents, businesses and institutions in Albany and statewide.

Transformer being loaded onto a barge at Port of Albany

Initiative 1: Implement the Albany Green Business program

Albany's commercial sector accounts for 13 percent of citywide energy consumption. To support environmental improvements in this sector, the City in 2012 established the framework for a voluntary Green Business program to work with business leaders, government agencies and nonprofit organizations to reduce energy use, waste, and water consumption. To increase participation rates and rejuvenate implementation efforts, the City will collaborate with Albany County, business improvement districts, the Albany-Colonie Regional Chamber of Commerce and other stakeholders to build off the existing Green Business program structure and pilot a Green Business Certification (GBC) program, following the success of similar programs at the regional level.

The GBC program will be an impartial way to identify, certify and promote businesses in Albany that have taken specific actions to improve their economic, environmental, and operational performance. The objective, third-party certification will be given to businesses that are leaders and innovators in "greening" their operations and providing guidance to others, and will serve as an incentive for businesses to reduce energy and pollution. The program will also leverage growing interest in green companies, provide a platform for sharing best practices and encourage additional companies to go green, while contributing to Albany's energy and climate goals and supporting overall economic development.

The City will implement the GBC program through an Adopt a Green Business Pledge campaign or challenge. If the City of Albany decides to lead the effort to implement and maintain a GBC program, it will require a significant amount of attention from municipal staff. Other GBC programs have been successful at a county or regional level, allowing the City to focus on increasing participation rates and supporting local economic development by connecting local stakeholders to the resources made available through a more broadly scaled program.

CASE STUDY **Westchester Green Business Challenge**

In 2009, Westchester County partnered with The Business Council of Westchester to create the Westchester Green Business Challenge (WGBC) to encourage sustainable business practices that will save money, conserve resources and protect the environment. The WGBC is a public-private partnership that provides support to more than 275 businesses in the county. The challenge included four different scorecards with a checklist of actions businesses can take to be "greener" based on their control over operations: tenants, property managers, owner-occupied and home-based businesses. The scorecard provides resources for each action and automatically generates a business' score across four tiers of achievement. The WGBC scorecard is based on business sector recommendations in the Westchester Action Plan for Climate Change and Sustainable Development, focusing on outreach, energy, transportation, land use, water resources, waste and recycling, and green procurement strategies. Beyond the challenge, businesses can advance to the Westchester Green Business-Certified (WGB-Certified) program to create and implement a formal environmental sustainability program for their business organization.

Initiative 2: Support a green jobs training program

Today's green economy demands more workers with advanced skill sets in the energy efficiency and renewable energy fields. Green jobs apply to a broad spectrum of technical positions that benefit community health, protect the environment, reduce GHG emissions and stimulate the local economy. The clean energy sector is rapidly growing with an increasing need for professionals who are trained to conduct building energy audits, retrofit buildings for energy efficiency improvements, install or repair solar panels or wind turbines, repair hybrid cars or alternative fuel vehicles, or build green rooftops. Albany is looking to support a green jobs training program to enhance the workforce's access to "green" skills development in the fields of renewable energy and energy efficiency. The City will leverage existing green jobs training programs, including those provided by NYSERDA and its local training partners, and connect individuals or local companies to state or regional resources to support green skills development.

The City will support these training efforts by hosting informational sessions on how to enroll in NYSERDA training programs, providing space for training workshops and increasing access to online training courses or online certification and licensing exams.

Manage City government energy costs through effective energy procurement, demand management and energy use monitoring

Initiative 3: Develop a long-term energy supply strategy

The City of Albany spends more than $6 million per year on natural gas and electricity. Over the last decade, high demand for natural gas in the Northeast has caused significant fluctuations in natural gas and electricity prices. These fluctuations contribute to higher uncertainty in budget allocations for fuel expenses. To address these fluctuations and bring down costs, the City will develop a long-term energy supply strategy to reduce these vulnerabilities.

Green Job Skills Training for Professional Services

Based on 2009 data for the combined Capital District, Mohawk Valley and North Country region

Ninety-two percent (270) of green employers in professional services require that employees have enhanced skills to produce green products or services. In the combined Capital District, Mohawk Valley, North Country region, firms most often utilize professional trade associations and on-the-job training programs.

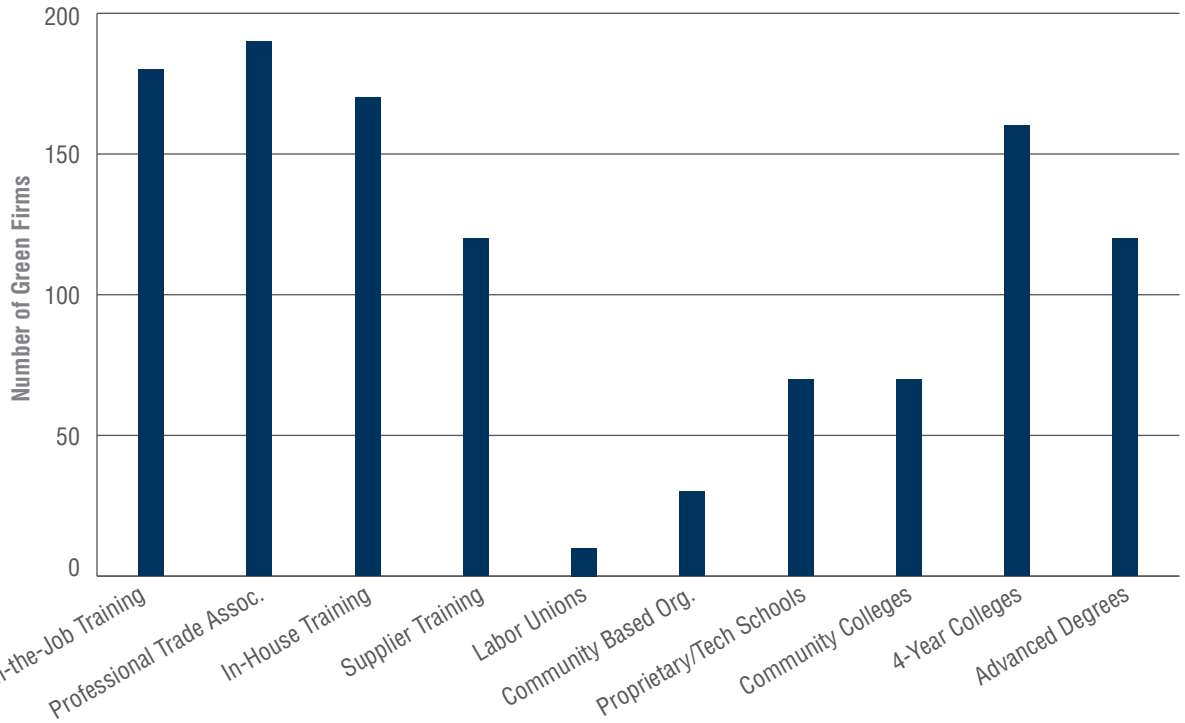


Figure 7

Source: 2009 New York State Green Jobs Survey

CASE STUDY **Massachusetts Municipal Energy Managers**

The Massachusetts Department of Energy Resources provides funding on a competitive basis to support municipal Energy Manager positions. The grant supports the position for two years and is open to all Massachusetts municipalities that do not employ an energy manager for more than 15 hours per week. In the first year, awardees are eligible to receive a grant of up to $50,000 for a full-time energy manager or up to $25,000 for a part-time position. In the second year, based on achievements in the first year, grantees may be awarded up to $35,000 for a full-time position and $17,500 for part time. Kansas and Iowa also provide this type of state support for local government energy management positions.

In developing a long-term energy supply strategy, the City will assess clean energy options, develop a plan to integrate clean energy resources into the consumption mix and establish a process to procure clean, affordable, reliable energy that helps the city meet its renewable energy and greenhouse gas reduction goals. The strategy will also include measures to maintain uninterrupted energy supply to critical facilities during power outages.

To develop a long-term energy supply strategy, the City will consider competitive energy supplier options. As a first step, the City will assign staff and/or hire a consultant to assess energy pricing risks and develop and maintain long-range energy use forecasts.

Initiative 4: Create a Citywide Energy Manager position

The City of Albany will create an Energy Manager position to actively monitor energy consumed by the City's buildings, manage projects aimed at reducing consumption and provide City department heads or other leadership with energy bills and consumption data to facilitate goal setting.

The Energy Manager will also coordinate implementation of preventive maintenance programs for equipment and training for maintenance personnel to facilitate proper equipment operation and maintenance. The Energy Manager will provide technical support and lead energy and sustainability efforts at the municipal and community levels, including the implementation of the Albany Energy Plan.

The position of the Energy Manager within City government is key to their success. The Energy Manager will require regular access to decision makers to report on the City's energy performance and to make recommendations for continued improvement. In addition, the Energy Manager needs to be engaged with capital programs and operations and maintenance (O&M) staff to integrate energy efficiency into capital improvements and to guide O&M personnel on preventive maintenance. The Energy Manager will be responsible for managing energy use through building management systems and monitoring consumption and costs through energy data management tools, overseeing applications for energy efficiency incentives and grants, overseeing contracted services and providing guidance on energy procurement, and directing the City's participation in local, regional, or national energy related programs or challenges.

Solar Insatllation

Old Nipper Building

Initiative 5: Utilize a web-based energy data management tool

The City of Albany is responsible for the management and payment of hundreds of utility accounts and fuel invoices, with annual energy costs exceeding $8 million (when accounting for electricity, natural gas, heating oil and vehicle fuel). While the City collects and processes utility bills regularly for payment and budgeting purposes, maintenance personnel and other building and equipment users are not regularly informed about costs and consumption.

Albany has an opportunity to not only continue monitoring and tracking municipal energy use data, but also to revise energy tracking, policies and procedures. Albany does not have a central tracking system in place for all of its energy consumption and expenditure data; this sometimes results in inconsistencies and anomalies in account, meter, consumption and cost data. These inconsistencies pose challenges to understanding municipal energy use and developing appropriate procurement and management strategies, sometimes resulting in incorrect billing.

There are a number of tools available for managing, monitoring, and reporting energy data. The tools provide the ability to centrally manage all energy consumption, cost and facility information, helping to ensure billing consistency and accuracy, track progress on efficiency improvements, measure actual energy savings from those improvements, and review and report data on a monthly or quarterly basis.

Energy Planning & Coordination

Times Union Center

The U.S. Environmental Protection Agency's ENERGY STAR® Portfolio Manager is the most commonly used energy tracking tool. Portfolio Manager utilizes facility descriptions and utility data to calculate an ENERGY STAR® Score (where applicable) and energy use intensity of buildings. In 2014, the City used Portfolio Manager to benchmark its 49 buildings, some of which were eligible for an ENERGY STAR® rating (currently limited to office buildings and wastewater treatment facilities).

Building on the collected information for Portfolio Manager, the City will continue to benchmark its buildings and centrally track energy and water consumption. To enhance this effort, the City will evaluate additional low-cost energy tracking tools which will work with Portfolio Manager to provide more energy management support. These tools can be directly linked to the City's National Grid accounts for automatic and regular consumption data updates. They also generate trend lines for energy use to identify and/or track high energy users or data anomalies, allowing for early identification of potential issues.

Implementation Matrix

Responsible party	Key partners	Source of funding	Time frame	Next steps
Prepare Albany's workforce for meeting the city's energy and sustainability goals				
Initiative 1: Implement the Albany Green Business Program				
OES or Albany-Colonie Regional Chamber of Commerce	CAC, BID, EDC, CEG, ACES, NYSERDA EDGE, Albany County, Utility Providers, Large Employers	GB participation fees, Community Loan Fund of the Capital Region	Short-Term	Meet with County, Albany-Colonie Regional Chamber of Commerce and key partners to determine roles and structure of GB program. Identify key business partners to participate in GB pilot program.
Initiative 2: Support a green jobs training program				
OES, Department of Youth and Workforce Development	ACES, CEG, CES, DGS, EDC, NYSERDA, NYSERDA EDGE, SUNY ALBANY Local academic institutions, Employers in clean energy sectors	Corporate sponsors, NYSERDA PONs	Medium-Term	Meet with key partners to define green jobs and assess potential green job opportunities and type of training needed. Meet with Regional EDGE Coordinator to identify relevant training opportunities and enrollment information.
Manage City government energy costs through effective energy procurement, demand management and energy use monitoring				
Initiative 3: Develop a long-term energy supply strategy				
OAC, Budget Office, Purchasing	OES, DGS, DWWS, APD, Fire & Emergency Services, Energy service companies, Energy consultants	—	Short-Term	Assess funding and resource options for developing and implementing a long-term energy supply strategy Identify key components of the strategy (e.g. goals and priorities, mix of resources, implementation plan)
Initiative 4: Create a citywide energy manager position				
Mayor's Office	Budget Office, OES, DGS, DWWS, APD, Fire & Emergency Services	NYPA	Short-Term	Determine scope of position and reporting structure
Initiative 5: Utilize a web-based energy data management tool				
OAC, OES, Mayor's Office	Energy data management tool / software providers; National Grid, OES, DGS, DWWS, APD, Fire & Emergency Services	—	Short-Term	Review options and select a tool Collect all needed data and populate tool Medium/Long-term: Monitor energy use, identify opportunities, track progress

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

Promote Building Efficiency Throughout All Sectors of the Community, Including Municipal Buildings

Summary of Objectives and Initiatives

Update and enforce zoning and building codes to promote energy efficient and resilient buildings

Initiative 1: Adopt a Residential Energy Conservation Ordinance

Initiative 2: Establish energy efficiency standards through green building code and development incentives

Initiative 3: Promote building energy codes training for designers, contractors and local code officials

Initiative 4: Implement a building energy benchmarking and disclosure program

Implement financing strategies that support the residential and commercial sectors in implementing energy efficiency upgrades

Initiative 5: Participate in a Commercial Property Assessed Clean Energy (PACE) program

Initiative 6: Launch a new neighborhood energy challenge

Implement energy conservation measures in municipal buildings to reduce energy use by 20 percent by 2020

Initiative 7: Update existing service contracts to cover energy saving maintenance procedures and equipment upgrades

Initiative 8: Implement preventative maintenance procedures through training and reallocation of existing resources

Initiative 9: Set up a revolving energy fund

Initiative 10: Utilize existing funding programs to cost share higher level technical assistance

Initiative 11: Incorporate energy efficiency into the Water and Wastewater Master Plans

Albany's building stock is aging and many buildings in the commercial, residential and institutional sectors need updates to equipment and the building envelope. Even when renovations are performed or new buildings are constructed, energy code compliance is low.

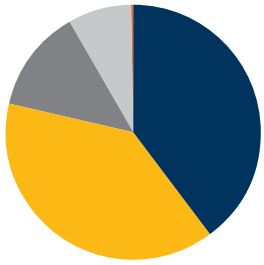
Energy use in buildings represents approximately 46 percent of GHG emissions in the city. Municipal buildings energy costs were nearly $1.7 million in 2011. Consequently, municipal and private development and renovations should be carried out with energy efficiency in mind. Energy efficient buildings are typically more comfortable, result in less pollution and GHG emissions, and save owners money. Design guidelines and building codes, accompanied with strong enforcement, can provide guidance and assurance that these benefits are realized.

Albany's Department of General Services (DGS) recently completed lighting upgrades in 23 buildings, with savings anticipated to be as much as $55,000 per year. DGS is also installing window reglazing and storm windows, expected to contribute to improved energy management and reduced consumption.

There are approximately 51,215 buildings citywide, with the vast majority being residential. Residential buildings are responsible for approximately 28 percent of the city's electric and natural gas consumption. More than 55 percent of Albany's residences were built

Albany street scene

Municipal Energy Consumption by Department (mmBtu)



- Albany Police Department (40%)
- Department of General Services (39%)
- Water Department (13%)
- Fire and Emergency Services (8%)
- Albany Housing Authority (0%)

Energy Use (mmBtu), By Department, FY11

Figure 8

before 1940, and an additional 25 percent were built between 1940 and 1970. There are 2,804 buildings in Albany that are classified as non-residential, representing over 52 million square feet. Of these buildings, 35 percent are larger than 10,000 square feet, and an additional 19 percent are larger than 25,000 square feet, all representing a significant opportunity for improved energy efficiency throughout Albany's commercial sector.

Update and enforce zoning and building codes to promote energy efficient and resilient buildings

Initiative 1: Adopt a Residential Energy Conservation Ordinance

A Residential Energy Conservation Ordinance (RECO) is a city ordinance that establishes energy efficiency and water conservation standards for all types of residential properties, including single-family homes, mixed-use buildings, condominiums and multifamily properties.

At the time of a sale, transfer of a lease, or a substantial renovation, a RECO requires a building inspection to ensure that the residential building meets the energy and water standards established in the ordinance. Based on the building inspection or energy audit, recommendations are made to bring the building up to code before the project can move forward or change occupancy. The RECO model takes advantage of safety inspections, rental license inspection processes, or the sale of a property to apply energy standards for residential buildings to reduce operating costs, lower energy use, conserve water and decrease GHG emissions.

The City will explore the feasibility of developing a RECO to increase the energy efficiency of residential buildings. A number of considerations will be evaluated (**Figure 9**) regarding the establishment of an appropriate RECO structure for Albany's residential housing market.

Case studies have shown that, on average, a RECO increases energy efficiency of buildings covered by the ordinance by 10 to 20 percent. A RECO would help stimulate the local economy through

CONSIDERATIONS FOR ESTABLISHING A RECO IN ALBANY
When will the RECO be applicable (e.g. time of sale, transfer of a lease, substantial renovation, safety inspections, etc.)?
What will constitute a substantial renovation (e.g. cost value, square footage, etc.)?
Who will be financially responsible for hiring a certified inspector to conduct the energy audit (e.g. the seller, the buyer, etc.)?
What will be the standard energy requirements or mandatory energy efficiency improvements (e.g. attic insulation, water heater or piping insulation, duct sealing, etc.)?
Will there be limitations to ensure that the costs of energy improvements is not excessive for the homeowner?
What is the specified time period to complete energy improvements?
Who will inspect quality of energy improvements within the specified time period?
How can the RECO process build off existing NYSERDA programs for residential energy audits, such as EmPower NY program, Home Performance with ENERGY STAR® or the Multi-Family Performance Program

Figure 9

demand for energy auditors and contractors, and would make housing more affordable by lowering ongoing energy costs for the property owner.

Initiative 2: Establish energy efficiency standards through green building code and development incentives

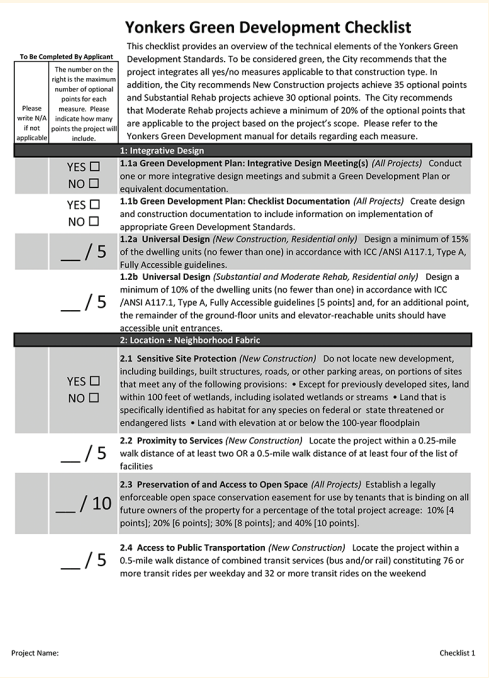
Albany and other communities in the region have been considering adoption of energy codes that are more stringent than the Energy Conservation Construction Code of New York State. The Capital Region Sustainability Plan included an initiative to adopt an energy efficient building code as a component of its overall energy efficiency goal. The state is considering development of a "stretch" energy code, similar to one developed in Massachusetts, that New York cities and towns could adopt. In addition to adoption of a "stretch code" if developed, the City of Albany will evaluate the most cost-effective and impactful strategies to promote energy efficiency standards in residential and commercial buildings. There are a number of ways to provide incentives for compliance with local energy efficiency or green building standards, including green building overlay districts, density and height bonuses, and expedited permitting. The City will evaluate the options and incorporate the most appropriate ones into the Albany 2030 Sustainable Code Project.

One such option, a green building overlay, establishes guidelines for sustainable site design and energy efficient development in target areas with existing or planned transit access and neighborhoods in need of densification, diverse housing opportunities, and economic development. The overlay could include energy efficient and green building standards for residential or commercial development.

The City will also consider structural and financial incentives for green buildings that have little or no financial impact on the municipal budget. Incentive to promote energy efficient design and adherence to green building standards can increase revenues or save the developer money. Examples of structural incentives include increased density and height bonuses and expedited permit processing and plan review. Financial incentives include tax credits, property tax abatements, reduced permitting fees or revolving loan funds.

CASE STUDY Yonkers Green Development

The City of Yonkers created the Green Development Workbook to make it easier for commercial and residential developers to meet sustainability standards and expectations outlined in the Yonkers Green Building Ordinance. The ordinance focuses on increasing energy and water efficiency, improving air quality, and minimizing other environmental impacts of municipal, residential and commercial developments or renovations. The workbook includes a Green Development Checklist that must be completed for all new non-residential developments larger than 15,000 square feet and residential developments with more than 25 units. The workbook was formally adopted in June 2013 and aligns with local, state and federal incentive programs and regulations.

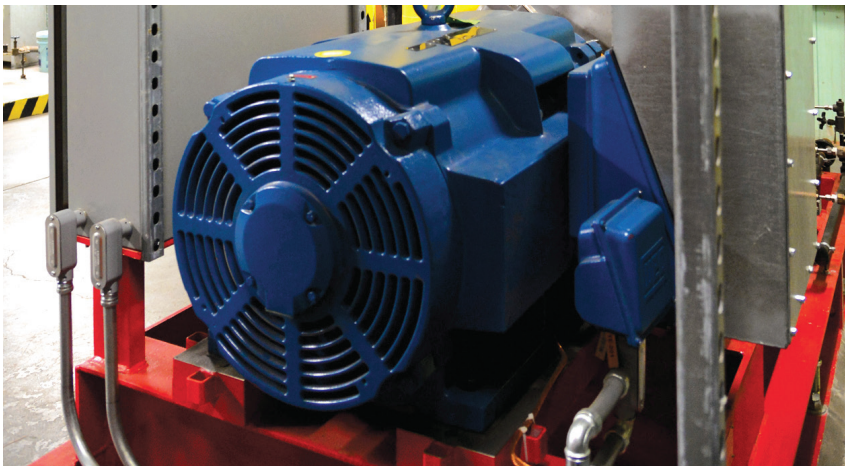


Yonkers Green Development Checklist

This checklist provides an overview of the technical elements of the Yonkers Green Development Standards. To be considered green, the City recommends that the project integrates all yes/no measures applicable to that construction type. In addition, the City recommends New Construction projects achieve 35 optional points and Substantial Rehab projects achieve 30 optional points. The City recommends that Moderate Rehab projects achieve a minimum of 20% of the optional points that are applicable to the project based on the project's scope. Please refer to the Yonkers Green Development manual for details regarding each measure.

To Be Completed By Applicant: Please write N/A if not applicable	The number on the right is the maximum number of optional points for each measure. Please indicate how many points the project will include.	
		1: Integrative Design
	YES ☐ NO ☐	**1.1a Green Development Plan: Integrative Design Meeting(s)** *(All Projects)* Conduct one or more integrative design meetings and submit a Green Development Plan or equivalent documentation.
	YES ☐ NO ☐	**1.1b Green Development Plan: Checklist Documentation** *(All Projects)* Create design and construction documentation to include information on implementation of appropriate Green Development Standards.
	__ / 5	**1.2a Universal Design** *(New Construction, Residential only)* Design a minimum of 15% of the dwelling units (no fewer than one) in accordance with ICC /ANSI A117.1, Type A, Fully Accessible guidelines.
	__ / 5	**1.2b Universal Design** *(Substantial and Moderate Rehab, Residential only)* Design a minimum of 10% of the dwelling units (no fewer than one) in accordance with ICC /ANSI A117.1, Type A, Fully Accessible guidelines [5 points] and, for an additional point, the remainder of the ground-floor units and elevator-reachable units should have accessible unit entrances.
		2: Location + Neighborhood Fabric
	YES ☐ NO ☐	**2.1 Sensitive Site Protection** *(New Construction)* Do not locate new development, including buildings, built structures, roads, or other parking areas, on portions of sites that meet any of the following provisions: • Except for previously developed sites, land within 100 feet of wetlands, including isolated wetlands or streams • Land that is specifically identified as habitat for any species on federal or state threatened or endangered lists • Land with elevation at or below the 100-year floodplain
	__ / 5	**2.2 Proximity to Services** *(New Construction)* Locate the project within a 0.25-mile walk distance of at least two OR a 0.5-mile walk distance of at least four of the list of facilities
	__ / 10	**2.3 Preservation of and Access to Open Space** *(All Projects)* Establish a legally enforceable open space conservation easement for use by tenants that is binding on all future owners of the property for a percentage of the total project acreage: 10% [4 points]; 20% [6 points]; 30% [8 points]; and 40% [10 points].
	__ / 5	**2.4 Access to Public Transportation** *(New Construction)* Locate the project within a 0.5-mile walk distance of combined transit services (bus and/or rail) constituting 76 or more transit rides per weekday and 32 or more transit rides on the weekend

Project Name: Checklist 1



A new micro steam turbine at the Sheridan Avenue Steam Plant

The City will also evaluate the feasibility and effectiveness of requiring green building and/or energy efficiency measures to be incorporated into projects funded through the City of Albany's Industrial Development Agency (IDA). Other local governments in the region have also been considering this approach. Partnering with neighboring municipalities and their associated IDAs will further support this analysis, and ultimately, the design of the overlay and/or incentive program. The City will also leverage these partnerships to reach out to and educate businesses and developers of Albany's future green building and energy efficiency programs to ensure their success.

Initiative 3: Promote building energy codes training for designers, contractors and local code officials

NYSERDA has developed comprehensive online energy code training modules on energy code essentials, compliance tools, building science and best practices, and building equipment, which are publicly accessible and available for free or at low cost. The City will utilize these resources to ensure that local code officials and those involved in design and construction projects are informed of stricter requirements and stay up to date on the required local building energy codes.

The City will provide building designers and contractors direct access to these resources and promote the course materials and participation in code trainings. The City will issue a statement on its Buildings and Regulatory Compliance webpage to demonstrate its intention to improve building energy code knowledge among designers and contractors, and will provide links to NYSERDA's energy code training resources and energy code hotline. When pulling permits for building construction and retrofits, the City will ask designers and contractors for proof of energy code training. Additionally, City code officials will take advantage of NYSERDA's third-party resources for plan review and on-site visits to ensure energy code compliance.

Initiative 4: Implement a building energy benchmarking and disclosure program

A building energy benchmarking and disclosure law provides transparency around building energy performance and encourages energy improvements in existing buildings. Such programs typically require owners of non-residential and multifamily buildings to track and publicly report their annual energy usage. The availability and transparency of such data is valuable for building owners and operators to identify inefficiencies that might otherwise go unnoticed. It also provides existing and potential occupants insight into the efficiency and cost effectiveness of the building's operations, helping to inform real estate related decisions. In this context, such programs are intended to create an incentive for energy efficiency improvements by placing buildings in competition with each other as the real estate and investment markets consider energy costs. In addition, these programs create a structure that allows the market to value energy performance and provide the data needed to effectively manage energy consumption.

State Department of Environmental Conservation, 625 Broadway

Several U.S. cities, including Austin, Texas; Washington, D.C.; Seattle; and San Francisco, have adopted building energy benchmarking and disclosure laws. Non-residential properties tend to be the focus of these existing programs, with the minimum building square footage ranging from 10,000 to 50,000. All programs require monthly electric and natural gas bills, and some require water usage data. Benchmarking is primarily carried out using the ENERGY STAR® Portfolio Manager program.

An evaluation of existing benchmarking programs found a statistically significant effect on energy consumption from the adoption and implementation of building energy benchmarking and disclosure laws. To help Albany's larger commercial and multi-family building owners realize similar savings, the City will require reporting of annual energy consumption and/or benchmarking and disclosure of energy consumption prior to sale. The City will develop standards appropriate for each sector covered by this requirement and leverage existing benchmarking tools, such as ENERGY STAR® Portfolio Manager. To support the annual reporting process, the City will coordinate with National Grid to create a process for utility data to be easily provided to building owners or directly entered into the benchmarking system, consistent with data transparency efforts encouraged in the new Reforming the Energy Vision (REV) paradigm. Once thresholds, sectors, standards and processes have been established, the City will adopt a policy or ordinance to formalize and implement the energy benchmarking and/or disclosure program.

Implement financing strategies that support the residential and commercial sectors in implementing energy efficiency upgrades

Initiative 5: Participate in a Commercial Property Assessed Clean Energy program

Property Assessed Clean Energy (PACE) programs allow commercial property owners to borrow money from a local government to cover capital costs for energy improvement projects and renewable energy installations. In June 2014, the New York Green Bank provided a letter of credit to the Energy Improvement Corporation (EIC), a non-profit local development corporation, to extend Energize NY PACE financing to large jurisdictions throughout the state. Energize NY PACE financing makes energy efficiency projects more economically feasible for commercial property owners by funding the entire project cost upfront, which is then repaid through a lien on the property tax bill over a term of five to 15 years. Albany will participate in existing commercial PACE programs to help local businesses finance energy efficiency and renewable energy projects.

To participate, the City of Albany or Albany County will pass legislation adopting a PACE financing program, sign a property tax increase agreement and submit a formal letter requesting EIC membership. Once a member, the Energize NY Finance program will be available for Albany's non-residential buildings, including commercial offices, retail, medical institutions, industrial facilities, multifamily buildings, not-for-profit businesses and commercially-owned residential property. Increasing accessibility to PACE financing will stimulate investment in energy efficiency or renewable energy projects at commercial properties and create clean energy jobs in the city.

ENERGIZE NY™ FINANCE

Municipal buildings result in nearly

$1.7

million in energy costs

Initiative 6: Launch a new neighborhood energy challenge

Energy reduction challenges creatively engage residents and businesses to take action to lower their energy bills and reduce greenhouse gas emissions through big and small steps, such as replacing light bulbs with more efficient lamps, walking to work or turning down the thermostat. The social component of a neighborhood energy challenge spurs positive behavior change often through the encouragement of the signing of public pledges, sharing information, providing resources for low-cost ways to save energy and reporting progress to compete for either recognition as a green, sustainable neighborhood or earn a green project enhancement for the local community.

The City of Albany will launch a new neighborhood challenge based on best practices from other jurisdictions. A successful neighborhood energy challenge establishes the scope and framework for energy reductions, and could include a focus on water, waste and/or transportation. To support participants and drive competition, the City and/or its partners will look to identify achievable goals and provide supporting materials, such as a public website with instructions for participants, as well as a checklist or online tool for reporting progress. The City will make involvement easy by providing achievable energy reduction goals and specific steps to realize those goals. The City will also create an online space for reporting and tracking progress to help inspire others to join the challenge and keep participants engaged in behaviors that become sustainable habits.

In 2012, Albany's Affordable Housing Partnership completed a year-long neighborhood energy challenge that included participants who received residential energy efficiency audits supported by NYSERDA. The City will build off existing resources and lessons learned from that challenge to create a more structured program with specific actions and defined reporting requirements. In addition to engaging homeowners, the City will promote energy efficiency resources for tenants, such as the EmPowerNY program. By placing a strong emphasis on GHG emission reductions and sustainability, Albany will be a model for civic engagement and economic prosperity through increased energy efficiency and cost savings.

Albany Fire Station No. 1

Implement energy conservation measures in municipal buildings to reduce energy use by 20 percent by 2020

Based on 2011 data Albany's municipal buildings consumed 89,879 mmBtu, resulting in nearly $1.7 million in energy costs and 5,511 metric tons of GHG emissions. Identifying opportunities to reduce energy use in municipal buildings is critical for the City to save money and reduce its environmental impact. In 2014, ASHRAE Level 1 energy audits were completed in a number of City-owned facilities, including water and wastewater treatment facilities. As a result, a comprehensive list of energy conservation measures (ECMs) have been recommended, including opportunities for lighting upgrades, HVAC duct and pipe insulation, efficiency improvements for plumbing fixtures and pumps, and installation of variable frequency drives. Some of the key findings that the ECMs aim to address include reactive (instead of preventive) maintenance; a number of old and failing steam traps; lack of or poorly functioning building controls and settings; improperly sized HVAC equipment; and insufficient insulation and building envelope penetration.

Boiler installation

Initiative 7: Update existing service contracts to cover energy saving maintenance procedures and equipment upgrades

Third-party service contractors are responsible for conducting maintenance on several mechanical systems in City buildings. Because of municipal staff capacity limitations and the specialized knowledge necessary for some mechanical systems, the City relies on service contracts to ensure that maintenance activities are carried out regularly and are not impacted by other facility or staffing issues.

The City will utilize service contracts for implementation of ECMs by updating the contracts to include equipment upgrades, equipment specifications and other maintenance procedures that have been identified as having energy saving potential. Benefits of addressing ECMs under service contracts include minimizing additional workload placed on existing City personnel and minimizing the need to make new hires, which reduces overhead costs.

Initiative 8: Implement preventative maintenance procedures through training and reallocation of existing resources

Due to a combination of many factors, including the large number of aging City buildings, a limited number of maintenance staff, along with the existing job responsibilities of facility staff, the ASHRAE Level 1 energy audits identified lapses in equipment and building maintenance. This, in turn, has led to a large number of energy inefficiencies in Albany's municipal facilities. In many cases, facility staff is only able to perform equipment maintenance when issues arise. This reactive maintenance is much less efficient and more costly than preventative maintenance. Implementation of preventative maintenance, which involves a series of operational, maintenance and management tasks, can prevent system failures and keep equipment functioning optimally. To transition Albany's facility management towards preventative maintenance, the City will enhance training, update job descriptions, the work order system and operating procedures, and allocate required resources for facility staff.

Updates to job descriptions will provide existing employees, who are otherwise adequately trained to address most of the identified ECMs, the time to carry out ECM implementation on a part-time basis. To support their ability to spend time on preventative maintenance, and less time addressing deferred maintenance and system issues, the City may hire additional staff, including apprentices, journeymen and interns to support tasks that do not require highly trained tradesmen to complete and maintain.

Albany uses a work order system to disseminate work tasks along with basic background details, including location, priority, trade and a brief description of the assignment. With a software upgrade, building system inventory and simple programming, the work order system can also support implementation of preventative maintenance procedures. To take advantage of this capability, the City's Energy Manager—working with facility staff—will incorporate preventative maintenance tasks into the work order system, including programming and/or calibrating of thermostats, posting schedules, closing and latching windows and storm windows, replacing worn weather stripping, replacing steam traps, and others, as necessary.

Initiative 9: Set up a revolving energy fund

Relying on the traditional City budget process to provide funding for ECM implementation could result in inconsistent funding that varies significantly each year, making implementation and ongoing efficiency improvements difficult to plan. To better support efficiency efforts and realize tangible improvements to municipal buildings, the City will explore the feasibility of establishing a revolving energy fund for ongoing implementation of ECMs.

An effective program would make funds available within a reasonable time frame and with minimal overhead, allow for multiple ECMS to be implemented at any given time, and be able to be replenished and reallocated for additional investment. This approach supports the overall implementation of the Albany Energy Plan by promoting energy programs and policies that are self-sustaining and that generate savings that can in turn be funneled back into additional efficiency and sustainability efforts.

Albany will explore best practice models in developing similar funds, including those developed for Ann Arbor, Michigan, and San José, California. The City will also evaluate potential seed funding sources, including allocation through the municipal budget or through the issuance of bonds. If found to be feasible, the City will draft a standard operating procedure, outlining the parameters, methodology and requirements for use of the funds. This will include the level of replenishment back into the fund and the treatment of rebates and incentives obtained from implemented energy measures.

Initiative 10: Utilize existing funding programs to cost share higher level technical assistance

NYSERDA provides technical assistance and funding to municipalities to assist in analyzing and implementing energy savings measures through its FlexTech program, which can cover up to half the cost of procuring consulting engineering assistance.

The City will pursue FlexTech support to conduct comprehensive energy audits for high cost and consumption municipal buildings based on the existing site survey audits. These energy audits will help the City identify additional short- and long-term energy conservation measures to save money and lower emissions, allowing for a comprehensive implementation strategy that prioritizes ECM implementation across the City's portfolio. Additionally, the City will look to utilize this funding to implement other municipal energy management activities, including general feasibility studies for equipment replacement and upgrades, retro-commissioning implementation, O&M procedures, procurement support (e.g., RFP drafting and proposal evaluation), and reviewing comprehensive energy audits.

Initiative 11: Incorporate energy efficiency into the Water and Wastewater Master Plans

Water and wastewater treatment are energy-intensive processes that are responsible for a significant portion of the City's energy costs. The City is required to update its Water and Wastewater master plans every five to 10 years. To help reduce costs and emissions, the City will incorporate energy efficiency and demand management into its Water and Wastewater master plans.

Specifically, the City will include strategies to enable facilities to focus on process improvements that would improve energy efficiency, including: benchmarking and continuous monitoring of energy use; review of current operation and maintenance procedures; assessment of facilities' demand and consumption profiles; and feasibility studies for on-site energy generation and renewables. The Water and Wastewater master plans will also include the identification and implementation of ECMs, such as the installation of building management systems and other energy saving capital improvements, as well as retro-commissioning.

By including energy efficiency goals and strategies in the Water and Wastewater master plans, the City's Department of Water and Water Supply (DWWS) and the Albany County Sewer District will take a holistic approach to managing Albany's water and wastewater infrastructure, with the goals of improving efficiency, saving money, protecting the environment and promoting public health.

Implementation Matrix

Responsible party	Key partners	Source of funding	Time frame	Next steps
Update and enforce zoning and building codes to promote energy efficient and resilient buildings				
Initiative 1: Adopt a Residential Energy Conservation Ordinance (RECO)				
Dept. of Development & Planning, Dept. of Buildings & Regulatory Compliance	AHA, AHP, OES, ACLT, UTA, ACDA, CDACD	NYSERDA EmPower NY, The Community Loan Fund of the Capital Region	Short-Term	Arrange stakeholder outreach, develop ordinance, propose to applicable legislators
Initiative 2: Establish energy efficiency standards through green building code and development incentives				
Dept. of Development & Planning, Dept. of Buildings & Regulatory Compliance	ACDA Albany IDA	NYSERDA CGC Phase II Grant and City Match	Short-Term	Continue development of Albany 2030 Sustainable Code and Unified Development Ordinance. Begin coordination with Albany IDA
Initiative 3: Promote building energy codes training for designers, contractors, and local code officials				
Dept. of Buildings & Regulatory Compliance	NYSERDA Independent contractor	Comprehensive low and no-cost training is available from NYSERDA	Short-Term	Find a champion within Department of Buildings & Regulatory Compliance
Initiative 4: Implement a building energy benchmarking and disclosure program or energy labeling program				
Dept. of Development & Planning, Dept. of Buildings & Regulatory Compliance	OES Business community	—	Short-Term	Develop Policy
Implement financing strategies that support the residential and commercial sectors in implementing energy efficiency upgrades				
Initiative 5: Participate in a Commercial Property Assessed Clean Energy Program				
Albany County or Dept. of Development & Planning, Property Tax Assessor & Tax Receiver	EIC EnergizeNY NYSERDA	Energy Improvement Corporation	Short-Term	Pass legislation adopting a PACE financing program and sign a property tax increase agreement
Initiative 6: Launch a new neighborhood energy challenge				
OES	AHA, AHP, NYSERDA, CDACD	Funding for home energy audits and improvements are provided through NYSERDA and EmPower NY.	Short-Term	Meet with key partners and determine framework, roles and responsibilities. Create the supporting materials for the challenge including guidance and a website or other mode of communication and solicit participation from target audience/ neighborhoods.

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
Implement energy conservation measures in municipal buildings in order to achieve a twenty percent reduction in energy use by 2020				
Initiative 7: Update existing service contracts to cover energy saving maintenance procedures and equipment upgrades				
Purchasing, Budget Office	DGS, DWWS, APD, Fire & Emergency Services, Service Contractors	—	Short-Term	Identify ECMs and associated contracts to change
Initiative 8: Implement preventative maintenance procedures through training and reallocation of existing resources				
DGS, Budget Office	DWWS, APD, Fire & Emergency Services	—	Short-Term	Identify ECMs that can be addressed by staff
Initiative 9: Set up a revolving energy fund				
Budget Office	Mayor's Office, OES, OAC	Grants	Medium-Term	Identify options
Initiative 10: Utilize existing funding programs to cost share higher level technical assistance				
OES, Budget Office	DGS, APD, DWWS, Fire & Emergency Services, Engineering Consultants, NYSERDA	NYSERDA Programs	Medium-Term	Meet with NYSERDA representatives to discuss existing funding programs
Initiative 11: Incorporate energy efficiency into Water and Wastewater Master Plans				
AWD	Albany County Sewer District	Existing DWWS planning budget	Medium-Term	Review results of Level 1 Energy Audits and begin incorporating into next master plan

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

Reduce Fossil Fuel Consumption in the Transportation Sector

Summary of Objectives and Initiatives

Upgrade transportation infrastructure to maximize efficiency and reduce automobile dependency

Initiative 1: Expand traffic signal optimization program

Initiative 2: Build on- and off-road bicycling infrastructure within the city

Initiative 3: Implement the City's Complete Streets policy

Expand and improve multi-modal transportation options

Initiative 4: Implement a bike-share system for the city

Initiative 5: Expand bus rapid transit (BRT) routes throughout the city

Remove barriers to installing alternative fuel infrastructure and using alternative fuels

Initiative 6: Provide expedited permitting for electric vehicle charging infrastructure

Maximize efficiency of vehicle fleets

Initiative 7: Adopt a right-size approach to municipal fleet management as part of a green fleet policy

Maximize efficiency and reduce the costs of streetlights

Initiative 8: Convert streetlights to more energy efficient technologies

Within its jurisdiction, the City of Albany has a robust network of vehicular infrastructure that serves an estimated 1 billion vehicle miles traveled (VMT) per year. The transportation sector is responsible for more than one third of citywide energy consumption. Reducing energy consumption and emissions from this sector requires a thoughtful and comprehensive approach that reduces overall fuel consumption and shifts people from traditional single-occupancy vehicles to alternative modes of transportation such as high-occupancy vehicles, bicycling and walking. This approach will also need to include support for high-efficiency and alternative fuel vehicles, infrastructure, transit-oriented development and smart growth principles.

The City is actively employing strategies to reduce overall VMT, with a focus on creating a more sustainable transportation system throughout the city and the region. In collaboration with the Capital District Regional Planning Commission, Capital District Transportation Committee (CDTC), and the Capital District Transportation Authority (CDTA), NYS DOT, and NYSERDA, the City has improved bicycle and pedestrian infrastructure, enhanced public transit routes, and completed a number of planning studies.

Transit-Oriented Development (TOD) and smart growth are key principles embedded in the Albany 2030 Sustainable Code Project. This effort has been augmented through active partnerships with CDTC in the planning and implementation of the New Visions Regional Transportation Plan, which includes service and connectivity of multiple modes of transportation and land use planning.

Upgrade transportation infrastructure to maximize efficiency and reduce automobile dependency

Initiative 1: Expand traffic signal optimization program

Inefficient traffic signal timing and equipment can unnecessarily increase traffic congestion, fuel consumption and air pollution. Traffic signal optimization programs involve retiming and/or synchronization of traffic signals at key intersections to improve the progression of traffic along specified corridors at peak demand. The Federal Highway Administration estimates that signal improvements on arterial road systems can reduce travel delays between 15 and 40 percent, resulting in reduced fuel consumption and air polluting emissions.

Albany has begun implementing a signal optimization program to reduce traffic congestion and associated impacts. The City has already collected and evaluated traffic-related data from select intersections and corridors targeted for improvement. Optimized signal timings are being developed for five main traffic corridors using

CASE STUDY **City of Portland Traffic Signal Optimization**

In 2002, the City of Portland Oregon, implemented a traffic signal optimization program that enhanced traffic signal timing at 135 intersections on 16 streets within its jurisdiction. The City received funding from The Climate Trust, a non-profit organization that finances and verifies carbon offset projects, to support this effort. To date, the traffic signal optimization has reduced gasoline consumption by 1,750,000 gallons and greenhouse gas emissions 15,460 tons per year. Portland is looking to expand this program.

Source: http://t4america.org/2010/10/13/smarter-transportation-case-study-5-traffic-signal-optimization-portland-oregon/

Signal Improvements can reduce travel delays between

15 and 40%

Syncro optimization software. This data will then be entered into the traffic signal controller at each intersection and the central system software. Albany will continue analyzing traffic data and add new intersections to the central traffic signal system.

Initiative 2: Build on- and off-road bicycling infrastructure within the City

Over the past five years, the City of Albany has engaged in numerous efforts to increase pedestrian and bicycle activity. These include the City of Albany Bicycle Master Plan (December 2009), the City of Albany Bicycle Signage and Wayfinding Strategy (June 2013), and the City of Albany Bike-Share Feasibility Study (June 2013). Additionally, the City has been incorporating on-road bicycle accommodations in roadway improvement projects, including along Delaware Avenue, Broadway, New Scotland Avenue, Clinton Avenue, and Northern Boulevard. These efforts were facilitated by Albany's demographics, existing infrastructure and demand for enhanced bicycling infrastructure.

Focusing on the routes and destinations identified in the City of Albany Bicycle Master Plan, the City will continue to add bicycle lanes, racks and other infrastructure along key routes to support the development of a citywide cycling network. The City will also investigate the potential for off-road mixed-use paths, especially along former railroad rights-of-way. Former railroad rights-of-way, such as the Albany County Rail Trail, are typically flat, straight, and sheltered from vehicle traffic, providing safe and comfortable cycling conditions.

Initiative 3: Implement the City's Complete Streets policy

To further support Albany's efforts to enhance bicycle and pedestrian infrastructure and the safety and livability of the city's neighborhoods, the City's Common Council adopted a Complete Streets ordinance. Complete Streets are streets that are designed with safe access for all users in mind, including motor vehicles, public transit vehicles and users, bicyclists, and pedestrians of all ages and abilities.

Since the passing of the Complete Streets ordinance, the City has signed a Memorandum of Understanding with the CDTC and received funding from the CDTC's Linkage Program to produce a Complete Streets Policy and Design Manual. The manual will establish criteria for the various types of streets and intersections found throughout the city. It will also detail design guidelines and outline policies and standards for implementation. The City's municipal departments will refer to this manual when instituting or approving any public or private street construction, reconstruction, or resurfacing projects.

Cyclist at Corning Preserve

Expand and improve multi-modal transportation options

Initiative 4: Implement a bike-share system for the city

In 2013, the City of Albany commissioned a Bike-Share Feasibility Study, which concluded that the city's physical, demographic and political environments were conducive to the implementation of a bike sharing system. The study recommends that the City implement a system to be owned by the City or a non-profit organization and operated by a private vendor. The City's readiness for a bike-sharing system is exemplified by its participation in a week-long bike-share pilot program in August 2014.

Following the recommendations made in the feasibility study, the City will implement a bike-sharing system that will be seasonal, offer both annual and short-term memberships, and be well integrated with the CDTA's bus routes and stations. The City will consider future expansion of service times and station locations from the onset of system planning and design.

While direct energy savings and GHG emissions reductions resulting from the operation of a bike-sharing system will be modest, the system will contribute to an overall mode-shift by promoting cycling in the city. This will showcase the City of Albany as a leader in sustainability as well as help support local businesses located near the cycling infrastructure.

Albany bike share pilot program

Initiative 5: Expand bus rapid transit routes throughout the city

Roughly half of Albany's population lives within a quarter mile of a bus stop; however, just 13 percent use mass transit to commute. Improving transit usage can directly decrease the vehicle miles travelled by single-occupancy vehicles and related GHG emissions. Additionally, improving transit access and reliability can encourage economic development along transit corridors, connect residents with jobs and reduce household spending on transportation. Increasing transit usage in the city can be achieved by making existing routes more frequent and reliable, and by adding new routes.

The CDTA recently added bus rapid transit (BRT) lines, known as BusPlus, between Albany and Schenectady. These lines have fewer stops than local buses, dedicated bus lanes, and Intelligent Transportation Systems features such as signal priority. All of these elements help make BusPlus lines significantly faster than traditional buses, allowing them to better compete with single-occupancy vehicles. Implementing proposed BusPlus lines along the River Corridor and Washington/Western avenues routes is expected to improve transit mode share by shifting trips away from single occupancy vehicles. The City will work with CDTA to improve existing routes and implement additional ones, including the proposed River Corridor and Washington/Western avenues BusPlus routes.

Remove barriers to alternative fuel infrastructure and alternative fuels use

Initiative 6: Provide expedited permitting for electric vehicle charging infrastructure

In 2012, the City of Albany completed an Electric Vehicle Feasibility Study that found the city's demographics and infrastructure make it a good candidate for developing alternative fuel infrastructure, including electric vehicle (EV) charging stations. There are 12 EV charging stations in Albany, 10 of which are publicly accessible.

Electric vehicle charging stations at Albany International Airport

Increasing the use of EVs over conventional vehicles requires a more robust EV charging infrastructure. While the City's codes do not restrict development of electric vehicle charging infrastructure, the City — which is an active member of the Capital District Clean Communities Coalition — would like to more actively encourage the use of EVs and the development of EV charging infrastructure.

To encourage developers to incorporate EV charging infrastructure into their projects, the City will provide expedited permitting and inspection processes as applicable. In association with the Albany 2030 Sustainable Code Project and Unified Development Ordinance, the City will also update its zoning regulations to be more favorable to the development of EV charging infrastructure.

Maximize efficiency of vehicle fleets

Initiative 7: Adopt a right-size approach to municipal fleet management as part of a green fleet policy

The City of Albany's municipal fleet consists of 586 vehicles. It costs $1.8 million per year to operate and generates more than 5,000 metric tons of greenhouse gas emissions. The City has the opportunity to reduce fuel consumption and greenhouse gas emissions by right-sizing vehicles, improving fleet management, and incorporating alternative fuels and fuel-efficient vehicles.

As often is the case, the City has more vehicles and equipment than is required for its operations. Further, many vehicles are larger — and therefore more fuel intensive — than their functions require. To address this situation, the City will adopt a green fleet policy and right-size approach to municipal fleet management. To do so, the City will create and maintain a comprehensive vehicle inventory, develop minimum utilization criteria, and conduct vehicle condition and purpose assessments.

In addition, the City will require its departments to purchase fuel-efficient and low-emission vehicles and equipment whenever practicable. To implement the green fleet policy, the City will perform a complete fleet inventory and identify minimum efficiency requirements by vehicle type (e.g., heavy duty, light duty, etc.).

CASE STUDY **TCI Northeast Electric Vehicle Network**

In 2011, the Transportation Climate Initiative established the Northeast Electric Vehicle Network to support the widespread adoption of electric vehicles (EVs) by increasing public access to charging stations across the District of Columbia and 12 states: Connecticut, Delaware, Maine, Massachusetts, Maryland, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island and Vermont. Funded by a $1 million U.S. Department of Energy grant for EV readiness, these states and the district are improving planning processes for EV infrastructure and developing public-private partnerships to locate charging stations along interstate highways. With approximately 1,000 public charging stations and 70 companies committed to the deployment of electric vehicles, these participants are sharing resources and infrastructure needed to reduce greenhouse gas emissions while benefitting from the local economic growth and job creation related to electric vehicles.

Source: http://www.transportationandclimate.org/content/northeast-electric-vehicle-network

Albany Police Department Center Station

This information will help the City determine the appropriate size and composition of the fleet and plan for eventual vehicle reassignment, replacement and/or elimination through the retirement process. This in turn will inform the setting of fuel consumption and emissions reduction targets. To support the implementation of the green fleet and right sizing policies, the City will track key performance metrics (e.g., mileage, fuel consumption, percent of fleet using alternative fuels, etc.) and perform regular progress reviews to assess the effectiveness of policies and the viability and applicability of current technology.

The outcome of these efforts will balance the fleet's energy and environmental performance with the need to ensure that the City's operational needs are met. Through this approach, the City aims to reduce fuel consumption and maintenance needs, helping to lower the operating costs associated with fuel, maintenance and insurance.

Maximize efficiency and reduce the costs of streetlights

Initiative 8: Convert streetlights to more energy efficient technologies

The City will work with National Grid and the New York State Public Service Commission (PSC) to develop a plan to convert existing street lights to more energy efficient technologies, such as LEDs, high-efficiency metal halide or induction lighting. Energy-efficient street lighting can reduce energy and maintenance costs as well as improve lighting quality and visibility.

The City has already taken some important first steps in this process by convening National Grid, NYSERDA and municipal maintenance and finance staff to discuss challenges and options associated with streetlight conversions. Continued collaboration among parties will be critical to finding a solution that reduces energy consumption and saves the City money. Albany will also evaluate possible opportunities to engage with the New York Green Bank to leverage gap financing or credit enhancements for retrofitting of LED streetlights. The next step for the City will be to determine which path it will pursue in its efforts to convert streetlights.

One option is to support National Grid's streetlight conversions and to participate in efforts with the PSC to establish a new tariff for LED streetlights that is fair to the utility and the customer, and reflects the energy and maintenance savings the streetlight conversions will achieve. Another option is for the City to work with National Grid on a strategy to purchase the assets, enabling the City to convert and maintain the streetlights.

CASE STUDY **City of San Jose Green Fleet Policy**

The City of San Jose, California, instituted a green fleet policy in 2007. Associated targets include a nearly 30 percent reduction in greenhouse gas emissions and a nearly 43 percent reduction in fuel consumption by 2022, using 2007 as a baseline year. Also by 2022, the City has targeted 100 percent of its public fleet vehicles to run on alternative fuels.

Source: http://www.sanjoseca.gov/index.aspx?NID=2953

Implementation Matrix

Responsible party	Key partners	Source of funding	Time frame	Next steps
Upgrade transportation infrastructure to maximize efficiency and reduce automobile dependency				
Initiative 1: Expand a traffic signal optimization program				
APD Traffic Engineering	Mayor's Office; Common Council; DGS, CDTA National Grid, NYS DOT	Federal and state transportation grants, CDTC, Internal Capital, Debt Financing, Existing Traffic Engineering Budget, Federal Congestion Mitigation and Air Quality (CMAQ) program	Medium-Term	By the end of 2014, approximately 100 traffic signals will have been incorporated into a central traffic signal system. Continue to bring new intersections online with central traffic signal system
Initiative 2: Build on- and off-road bicycling infrastructure within the city				
APD Traffic Engineering, Dept. of Development & Planning, DGS	NYS DOT, CDTC, Community cycling advocates, neighborhood groups, national groups like League of American Bicyclists	Albany road improvement budget, NYS DOT, CDTC	Short-Term	Plan has been conducted and installation of some infrastructure is underway. Funding should be secured in future budgets to continue expanding infrastructure
Initiative 3: Implement the City's Complete Streets policy				
Dept. of Development & Planning, APD Traffic Engineering, DGS	APD, Fire & Emergency Services, Capital District Transportation Committee, community cycling and walking advocates	CDTC, City match	Medium-Term	Collaborate with CDTC to develop RFP for development of policy and design guidelines
Expand and improve multi-modal transportation options				
Initiative 4: Implement a bike-share system for the city				
Dept. of Development & Planning, APD Traffic Engineering, DGS	APD Traffic Engineering, DGS, CDTC, community cycling advocates, academic institutions, local businesses	Federal and State grants, CDTC, Private Funders, advertising, user fees	Medium-Term	A Bike Share Feasability Study identifying potential site locations has already been compelted. The next step is to develop funding methods and establish partnerships
Initiative 5: Expand bus rapid transit routes throughout the city				
CDTA; APD Traffic Engineering, Dept. of Development & Planning	CDRPC, CDTC	Federal funding, CDTA	Long-Term	Actively promote current BRT routes and engage with partners to plan for additional routes
Remove barriers to installing alternative fuel infrastructure and using alternative fuels				
Initiative 6: Provide expedited permitting for EV charging infrastructure				
Building & Regulatory Compliance, Dept. of Development and Planning	OES, NYSERDA	Little funding necessary (can be funded under the Albany 2030 Sustainable Code Project)	Short-Term	Incorporate code update recommendations from EV Feasibility Study into Albany 2030 Sustainable Code Project
Maximize efficiency of vehicle fleets				
Initiative 7: Adopt a right-size approach to municipal fleet management as part of a green fleet policy				
Budget Office, OES, DGS	Purchasing, DWWS, APD, Fire & Emergency Services	NYSERDA, Empire Cities	Medium-Term	Draft, evaluate, and implement evaluative criteria to determine which vehicles should be "right-sized". Perform a fleet inventory
Maximize efficiency and reduce the costs of streetlights				
Initiative 8: Convert streetlights to more energy efficient technologies				
Budget Office, OAC, DGS	Mayor's Office, Common Council, OES, APD Traffic Engineering, National Grid, NYSERDA, Public Service Commission, NYPA	Internal Capital; Debt Financing; New York State Existing Facilities Program; NYPA Energy Services Programs for Public Entities	Medium-Term	Continue discussions with NYSERDA and National Grid to determine best strategy

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

Increase Grid Efficiency and Energy Security While Decreasing Reliance on Fossil Fuels

Summary of Objectives and Initiatives

Expand use of renewable energy to power municipal buildings and operations

Initiative 1: Enter into a solar power purchase agreement

Expand use of renewable energy to power commercial, industrial, and residential facilities

Initiative 2: Install solar powered generators at critical facilities

Initiative 3: Reduce or eliminate permitting fees for renewable energy installations

Improve the resilience of energy delivery systems

Initiative 4: Plan for development of microgrids

Initiative 5: Establish partnerships for resilient grid development

Maintaining a functioning energy supply and distribution infrastructure is critical for public safety, access to services, reducing economic losses and providing a foundation for powering economic activity. As this infrastructure is replaced in the coming years, Albany, National Grid and state agency partners will focus on modernizing the grid and incorporating smart and renewable technologies that enhance efficiency and reliability while reducing pollution and greenhouse gas emissions.

As the primary electric and natural gas provider in Albany, National Grid operates and maintains the transmission and distribution networks and provides outage management services. The electricity supplied by National Grid is generated from a mix of fuels that primarily consists of nuclear energy, natural gas, hydro-electric and coal, with smaller amounts coming from biomass, solar and solid waste. Albany's fuel mix includes 14 percent more nuclear than the state average, which, from an emissions standpoint, leads to a relatively cleaner fuel mix.

The combination of New York's high electricity rates, the existence of numerous incentive programs and a changing regulatory framework (particularly with the implementation of the Reforming the Energy Vision proceeding), improve the economics for further cleaning the fuel mix through increased renewable energy generation. Since 2006, the City has approved permits for the installation of 1,780 kilowatts of solar on residential, commercial, non-profit and institutional buildings. Interest in solar has been supported by the City's participation in the NYSolar Smart plan, a strategic effort supporting the U.S. Department of Energy SunShot Initiative and the NY-Sun Initiative, intended to increase solar use through standardizing permitting, reducing installation costs and training local permitting officials.

National Grid's 15-Year Plan

When it comes to reliability of the grid, equipment degradation plays a significant role in service interruptions. National Grid issued an asset condition report and a 15-year plan focused on improving reliability. The plan includes initiatives to address additional capacity and congestion relief, projected load growth, increases in fault levels, the need to replace over-worked breakers, and thermal issues observed on transformer banks.

New York has a reliable electric system, but its transmission lines are aging and will be in need of replacement over the next 10, 20 or 30 years (**Figure 10**).

Source: 2012 New York State Transmission Assessment and Reliability Study (STARS) Phase II Report

TRANSMISSION SYSTEM VOLTAGE AND YEARS TO REPLACEMENT

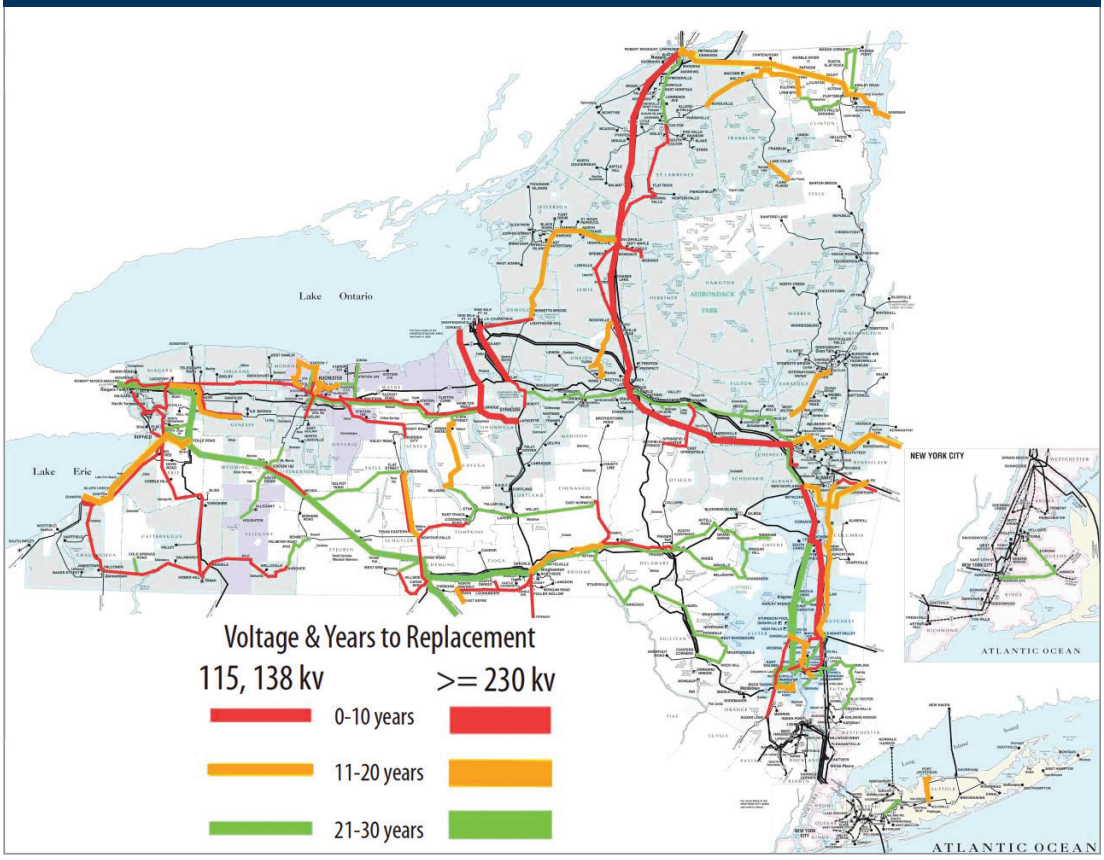


Figure 10

Source: 2012 New York State Transmission Assessment and Reliability Study (STARS) Phase II Report

Expand use of renewable energy to power municipal buildings and operations

Initiative 1: Enter into a solar power purchase agreement

A power purchase agreement (PPA) is a financial arrangement that can involve a third-party developer that designs, finances, purchases, installs and maintains solar photovoltaic (PV) panels and related equipment on the host's property. In exchange, the host purchases the power generated by the PV system from the developer for a predetermined period (usually 20 years). A developer may be able to offer lower rates than the utility because of the availability of tax credits and other renewable energy incentives. Numerous companies are working to standardize language and structure for municipal PPAs which could reduce soft costs and encourage more municipalities to work together with suppliers of renewable energy. Under a PPA, government agencies and other tax-exempt organizations can indirectly take advantage of the federal investment tax credit and depreciation bonus that are available to for-profit firms for renewable energy installations.

In September 2013, the City released a Request for Proposals (RFP) for renewable energy design and installation services for three City-owned locations: 85 Erie Boulevard, the Loudonville Reservoir, and property in Coeymans, New York. The RFP stated the City's preference to lease the renewable energy equipment. The City's next steps are to select a design firm and to work to develop drawings and complete necessary applications to National Grid. The projects will provide lessons learned to expand the program to include other City-owned sites, potentially including ground-mounted and rooftop solar arrays.

CASE STUDY **Town of Clarkstown Power Purchase Agreement**

The Town of Clarkstown, New York, financed a 2.5 MW, 8,000-panel solar farm on a former landfill site in West Nyack, utilizing a PPA with a solar developer, OnForce. OnForce will own and operate the facility and the Town will purchase all of the electricity generated by the system for 20 years.

The agreement includes a stipulation that the Town will receive a $100,000 payment for project expenses incurred—such as expenses for a feasibility study, New York State Department of Environmental Conservation (DEC) permitting fees, and applications for grid interconnection and remote net metering through its utility, Orange and Rockland (a subsidiary of Consolidated Edison.)

Expand use of renewable energy to power commercial, industrial and residential facilities

Initiative 2: Install solar powered generators at critical facilities

One of the recommendations of the City's Climate Change Vulnerability Assessment and Adaptation Plan is to increase local renewable energy supply. Consistent with this, solar-powered generators will be installed at critical facilities throughout the city to enhance power reliability at these locations. Critical facilities include police and fire stations, health service stations, schools and other facilities that can serve as shelters during emergencies. It is essential that these facilities maintain reliable power sources.

Solar power, when combined with energy storage technologies, improves resiliency by allowing critical facilities to operate during grid outages and times of fuel disruption. Solar power also reduces reliance on fossil fuels, reducing fuel costs and greenhouse gas emissions. In comparison to diesel generators, solar-powered generators also improve local air quality and reduce noise pollution.

Establishing areas where multiple clean distributed generation arrays are connected together may further enhance reliability, decrease demand on the grid and reduce costs associated with necessary grid upgrades.

Solar panels

Initiative 3: Reduce or eliminate permitting fees for renewable energy installations

The installation of renewable energy sources on buildings and other types of properties requires building and electrical permits to ensure that engineering and safety standards are met. The installed renewable energy capacity in Albany is shown in **Figure 11**. The City of Albany will reduce or eliminate permitting fees for renewable energy installations, consistent with NYSERDA's desire to reduce soft costs and barriers to increased deployment of distributed energy resources through its Clean Energy Fund.

INSTALLED RENEWABLE ENERGY CAPACITY BY SECTOR

Sector	Nameplate capacity
Commercial	1,367 kW
Institutional	153 kW
Non-Profit	32kW
Residential	229 kW
Total	**1,780kW**

Figure 11

This initiative is supported by NYSERDA through the Cleaner, Greener Communities program, which awards funding to local governments that adopt streamlined permitting processes or other ordinances for installing PV systems less than 12 kW. Albany will customize the New York State Unified Solar Permit and extend this streamlined permitting process to include wind and other renewable energy installations to lower costs and increase the feasibility of projects.

By eliminating or reducing permitting fees for renewable energy installations, the City is joining other municipal leaders in demonstrating its support for community investment in renewable energy. Removing barriers and simplifying the process will help support a green innovation economy and spur local economic development. Distributed generation through renewable energy installations reduces greenhouse gas emissions and reliance on the larger, more vulnerable electric grid system. It also aligns with the emerging state regulatory framework and the New York State Public Service Commission's (PSC) Reforming Energy Vision (REV) initiative.

Improve the resilience of energy delivery systems

Initiative 4: Plan for development of microgrids

A microgrid is a localized energy system within a fixed boundary that is capable of generating and distributing energy and electricity independently or in conjunction with the larger electric grid system. Severe weather events, such as Tropical Storm Irene, Superstorm Sandy, and the Northeastern U.S. blackout of 2003, have demonstrated that regional energy supply networks are vulnerable and that improving local energy delivery systems can better protect residents and businesses.

Microgrids increase community resilience by ensuring that emergency response and health-care providers retain power during extreme weather events, allowing them to continue to provide public health and safety services. Smart grid technology used in microgrid systems also increases the grid's capacity for renewable energy installations and compensates for intermittent solar or wind generation. Microgrids can also be configured to respond to energy pricing, which reduces energy costs for local businesses by automating the system to draw from the most cost-effective source.

With support from the NYS Department of State (DOS) and the NYS Department of Environmental Conservation (DEC), Albany is working with the Affordable Housing Partnership and members

The results of an energy efficiency upgrade at the Sheridan Avenue Steam Plant

of the Community Development Alliance to redevelop 68.6 acres of the Sheridan Hollow neighborhood. The state-owned Sheridan Avenue Steam Plant in Sheridan Hollow provides steam for heating and cooling Empire State Plaza using natural gas boilers and backup gasoline generators. As part of the BuildSmart NY implementation of Executive Order 88, energy efficiency retrofits were completed at the plant in 2013. The Albany 2030 Comprehensive Plan identified the neighborhood as a brownfield opportunity area, which could potentially be suitable for future renewable energy installations or energy storage sites.

Albany will assess the feasibility of expanding operations or improving smart grid capabilities to serve the energy demands of Sheridan Hollow or a larger district. The City will also study the feasibility of microgrid development around the Sheridan Avenue Steam Plant. These assessments will involve mapping existing infrastructure, evaluating the plant's physical capacity and connectivity to the larger distribution network, and determining whether service could be expanded to additional properties. Funding for such projects may be possible through Governor Cuomo's $40 million dollar NY Prize competition for development of community microgrids announced earlier this year.

Utility involvement in microgrid development is essential to understanding regulatory barriers, system configuration requirements, charges for standby service, changing patterns of energy demand, and acceptable ownership models and billing structures (innovative frameworks and price signals for which will be created under the new Reforming the Energy Vision proceeding). The City will work closely with utility representatives, NYSERDA, NYPA, NYS Office of General Services (OGS) and other key stakeholders throughout this process.

Initiative 5: Establish partnerships for resilient grid development

Grid resiliency efforts are generally focused on strategies to prevent electricity outages during extreme weather and other natural disasters. Significant "grid hardening" efforts are underway by a number of state agencies and other organizations to protect electricity distribution networks. National Grid is also pursuing a regional approach to deploying smart grid technologies. Enhanced grid automation offers an opportunity to increase system performance and to control and improve system efficiency. Opportunities also exist for grid integrated renewable energy and technologies, such as battery storage, that help optimize renewable energy use. These initiatives provide opportunities and foundation to enhance system reliability and resilience.

To demonstrate the applicability of smart grid, distributed renewable energy and battery storage technologies, the City will form a smart grid working group. The group will include leading organizations in New York working on grid resiliency strategies, including NYSERDA, NYPA, National Grid, NY Battery and Energy Storage Technology (NY BEST), the New York State Smart Grid Consortium, and the University at Albany. The working group will identify local business partners to develop a proof-of-concept microgrid and smart grid application in Albany.

The City will also seek out partnerships to develop a smart grid demonstration and education center to exhibit how different technological approaches result in a more secure and resilient grid. The center would be a showcase for policymakers and lawmakers in New York State and will further highlight the City of Albany's leadership efforts in clean energy and enhanced energy security.

CASE STUDY **Duke Energy's Envision Center**

As an example of a smart grid demonstration site, Duke Energy's Envision Center in Erlanger, Kentucky, was created to allow utility customers to experience the benefits of smart grid technologies and software. The center has exhibits that can simulate outages and recovery responses through smart grid technology. Other exhibits provide a close up view of integrated home energy systems, such as solar panels and plug-in hybrid vehicles. The showcase also includes an apartment complex with advanced metering and a power delivery control center with real time data monitoring.

The Envision Center also serves as a tool to educate government officials, policy makers and other key stakeholders on the benefits of a smarter grid. By conveying the numerous benefits of smart grid technology, the Center promotes a high level of engagement in the decision making process around future energy choices.

Source: http://www.cincinnatichamber.com/uploadedFiles/Events/EnvisionCenterDirections.pdf

Implementation Matrix

Responsible party	Key partners	Source of funding	Time frame	Next steps
Expand use of renewable energy to power municipal buildings and operations				
Initiative 1: Enter into a solar power purchase agreement				
OES, DGS	Mayor's Office, Corporation Counsel, NYSERDA, National Grid, Private Sector Partners	Many PPAs require no upfront cost. Third parties take advantage of the NYSERDA PV Incentive Program and federal incentives for renewable energy and the City indirectly benefits from these incentives and tax breaks	Short-Term	Review results of 2013 RFP issued by the City. Work with design firm to create drawings and complete applications to utility and prepare for incentives applications.
Expand use of renewable energy to power commercial, industrial, and residential facilities				
Initiative 2: Invest in solar powered generators at critical facilities				
OES, Fire & Emergency Services, APD	National Grid, Property owners of critical facilities (hospitals, senior centers, etc.), NYSERDA	—	Medium-Term	Identify locations for installation. Collaborate with property owners at critical facilities, NYSERDA, and National Grid to develop plan for implementation.
Initiative 3: Reduce or eliminate permitting fees for renewable energy installations				
Building & Regulatory Compliance, Dept. of Development and Planning	OES, Budget Office	NYSERDA: Cleaner, Greener Communities (PON 2721 - Category 1)	Short-Term	Review current permitting processes and compare to best practices. Develop and adopt permitting standards for all renewable energy projects or customize NYS Unified Solar Permit and apply for CGC funding.
Improve the resilience of energy delivery systems				
Initiative 4: Plan for development of microgrids				
Dept. of Development & Planning OES	DGS, ACES, AHP, BID, NYS DOS, NYS DEC, NYS OGS, NYPA, BuildSmartNY, National Grid, NYSERDA	Build Smart NY, NYSERDA: Flex-Tech program (PON 1746), Existing Facilities (PON 1219), Combined Heat and Power (PON 2568), New Construction (PON 1601), Assisted Home Performance Program through ENERGY STAR.	Long-Term	Contact National Grid to discuss feasibility of microgrid development in Sheridan Hollow neighborhood. Contact New York Power Authority or New York State Office of General Services to determine if Sheridan Steam Plant can facilitate microgrid development.
Initiative 5: Establish partnerships for resilient grid development				
OES	NYSERDA, NYPA, National Grid, NYS Smart Grid, Consortium, BuildSmartNY, NY-BEST, SUNY Albany	Most funding from key partners with small investment from the City.	Medium-Term	Find champion in city to create a group with partners for Albany.

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

The Albany Energy Plan goes beyond advancing clean energy technologies, increasing energy efficiency, and sustainable operations of City buildings and infrastructure. It furthers the City's commitment to creating healthy, livable communities and strengthening the regional economy. Undertaking the energy and sustainability initiatives outlined in the plan will address four themes across all action areas, including:

- Municipal: cities 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

As the capital of New York and home to the Albany County seat, Albany is well-positioned to demonstrate leadership in transitioning New York to a clean energy and sustainable economy. The Albany Energy Plan is more than an energy assessment and implementation roadmap; it is a beacon to other communities of holistic energy management with examples of how to implement cost-effective, sustainable strategies to increase operational efficiency and reliability. Local neighborhoods, institutions, businesses and residents can look to the plan and its associated resources to identify applicable projects and be inspired to take action within their own operations. The City will lead by example through efficient management of its own energy costs and consumption in its buildings, fleet and infrastructure.

Economic development: creating jobs and attracting businesses

Increasing energy efficiency, advancing technologies and locally generating renewable energy will keep money circulating in Albany's economy and allow the city to capitalize on the emerging industries of green innovation. Advancing environmentally sound technologies that harness and use energy efficiently will help lower business costs, making the city an attractive location for companies to locate. Energy efficiency measures also support the City's downtown revitalization priorities. Several initiatives outlined in the Albany Energy Plan highlight statewide training opportunities that will allow people to upgrade their skills, facilitate goals of lifelong learning and prepare the workforce to assume positions in the jobs created locally.

Infrastructure: preparing our cities for the future

Due in part to rapidly aging infrastructure, communities are increasingly vulnerable to brownouts or blackouts which threaten economic productivity, public health and safety. To prepare for the effects of climate change and increased storm intensity and frequency, the Albany Energy Plan focuses on partnering with the state and utilities to modernize the grid and implement smart technologies that increase energy security and reliability. Through the implementation of supply and distribution infrastructure initiatives, Albany will enhance community resilience and ensure grid capacity for economic growth and the continuous integration of renewable energy systems.

Climate action: reducing the city's carbon footprint

The Albany Energy Plan aims to prepare the city for the impacts of climate change and works to limit Albany's contribution to greenhouse gas emissions through implementation of initiatives across all action areas. Since climate change is the result of the combustion of fossil fuels, there is an enormous opportunity to mitigate climate change through strategic energy management and planning and increased reliance on renewable energy. The initiatives outlined in the plan target the technological, operational and behavioral changes that can be made to significantly decrease energy consumption in buildings and vehicles and increase the share of Albany's energy generated from clean, renewable sources, thus decreasing the city's carbon footprint.

Implementation

The Albany Energy Plan will be implemented through a strategic and coordinated effort among City departments and community stakeholders. The City's Office of Energy and Sustainability will oversee the effort in close coordination with the Mayor's Office, the Department of General Services, the Department of Development and Planning, the Office of Audit and Control, the Water and Water Supply Department, and numerous others.

While many initiatives are focused on municipal operations, the expertise, technical and financial resources of the numerous public and private stakeholders engaged in this planning effort will be critical to its successful implementation. The Albany Energy Plan expands and enhances the other sustainability and energy-related efforts currently underway by the City — led in large part by the Office of Energy and Sustainability. The City has a strong relationship with National Grid and will need to continue to work closely with utility representatives to successfully implement relevant initiatives. The Capital District Regional Planning Commission, Capital District Transportation Committee, Capital District Transportation Authority and other regional stakeholders will be especially important partners in implementing a number of the transportation initiatives.

Municipal Baseline and Savings Projections (mmBtu)

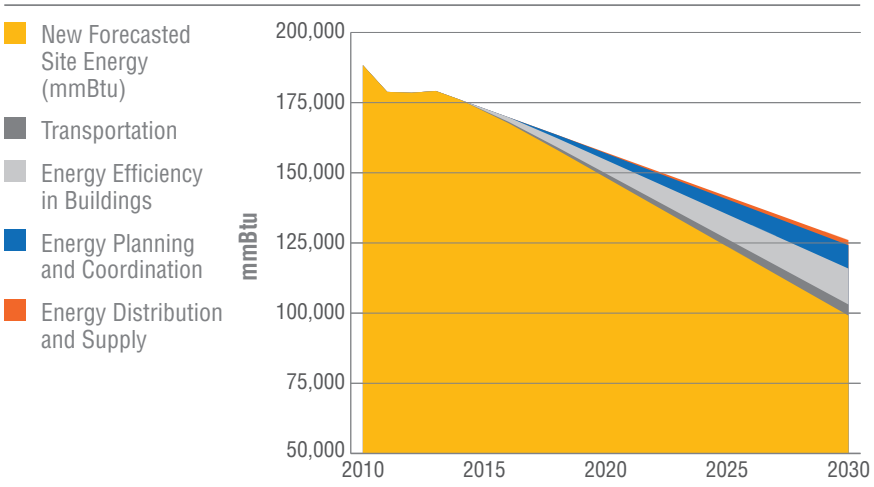


Figure 12

Community Baseline and Savings Projections (mmBtu)

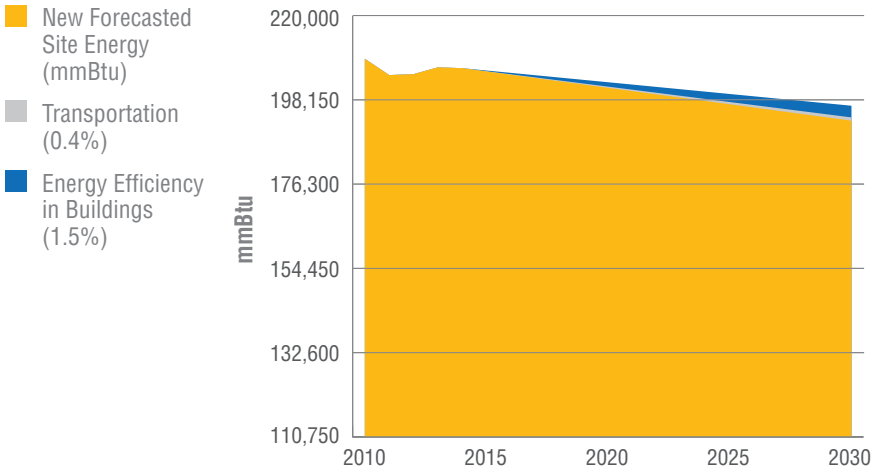


Figure 13

Synergies with Parallel Efforts

The City's Albany 2030 Sustainable Code project aligns well with implementation of the Albany Energy Plan. The codification of Albany's sustainability principles will be significant in supporting many of the initiatives identified in this plan with regard to integration of energy efficiency into building code and development regulations, promotion of alternative fuel vehicles, and enhancements to transportation infrastructure to improve air quality, reduce greenhouse gas emissions, and enhance public health and livability.

Another important component of implementation will be utilization of the City's new Sustainable Advisory Committee (SAC), which includes five Mayoral appointees, five Common Council appointees, and five municipal employees representing key City departments. The SAC has the authority to create subcommittees to focus on specific sustainability topics, including Energy, Equity, Transportation, Water, Waste and Food Systems. The Energy, Transportation, and Water subcommittees will be well-positioned to implement the initiatives identified in this plan. The Sustainability Advisory Committee will be critical to moving the City from planning to action. Inclusion of both municipal representatives and experts from the community will give the SAC the insight, resources and expertise needed to implement priority initiatives.

Alfred E. Smith Building

Financing

Initiatives outlined in the plan have varying levels and sources of funding identified. Some efforts identified in this plan have partial funding in place for implementation, including initiatives that fall under the Albany 2030 Sustainable Code Project, Complete Streets Policy and Design Manual, and some transportation planning initiatives. The City hopes that sharing an understanding of the synergies and benefits of the initiatives with public and private audiences through the Albany Energy Plan will support further investment in related programs.

The engagement of NYPA, National Grid and NYSERDA has been an important step in communicating financial needs and considerations for achieving goals that benefit the City, utilities, and the state. These entities can provide information on technical and financial resources and incentives that will support building upgrades, vehicle efficiency improvements and other projects. In turn, utilities and state agencies have gained a deeper understanding of Albany's needs in regards to implementing initiatives that will accomplish its energy goals.

Conclusion

Next Steps

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

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

State Support

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

Keys to Success

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

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

State Assistance and Educational Support

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

* Financial support also provided

Acknowledgements

Albany

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

Buffalo

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

Rochester

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

Syracuse

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

Yonkers

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

Special Thanks

Webinars/Other Special thanks to the experts who provided insight throughout this planning process: Donna DeCostanzo, Samantha Wilt, Jen Becker and others of NRDC • Tom Bourgeois, Deputy Director of the Pace Energy and Climate Center, for his webinar on microgrids • Greg Hale, Senior Advisor to the Chairman of Energy & Finance, Office of the Governor, for his webinar on financing tools and efforts including the Green Bank • Laurie Kerr, Director of the City Energy Project from NRDC, for her presentation on Greener, Greater Buildings **State Entities** Special thanks to all state agencies and authorities that participated on the inter-agency working group: New York State Energy Research and Development Authority • New York State Department of Public Service • New York State Department of State • New York State Department of Transportation • Empire State Development Corporation • Office of the Governor

Glossary

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

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

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

Combined heat and power (CHP): See cogeneration.

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

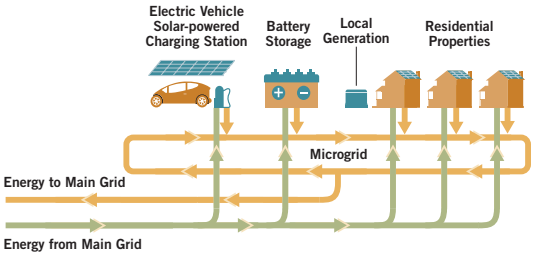
District energy: District energy systems produce steam, hot water or chilled water at a central plant, which is then piped underground to individual buildings for space heating, domestic hot water heating and air conditioning.

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

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

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

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



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

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

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

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

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

Acronyms

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

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

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

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

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

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

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

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

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

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

ESD: Empire State Development Corporation

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

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

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

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

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

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

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

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

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

(continued)

Acronyms

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

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

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

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

NYPA: New York Power Authority

NYS DEC: New York State Department of Environmental Conservation

NYS DOS: New York State Department of State

NYS DOT: New York State Department of Transportation

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

NYSERDA: New York State Energy Research and Development Authority

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

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

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

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

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

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

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

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

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

www.nypa.gov/buildsmartny/fivecities.html