
STATE ENERGY PLANNING BOARD



2009 State Energy Plan
DRAFT

GOVERNOR DAVID A. PATERSON

STATE OF NEW YORK

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Acronyms and Abbreviations

AMI: Advanced Metering Infrastructure

ARRA: American Recovery and Reinvestment Act

ASHRAE: American Society of Heating, Refrigerating, and Air-Conditioning Engineers

Board: Energy Planning Board

Btu: British thermal unit

CAFE: Corporate Average Fuel Economy

CCS: Carbon Capture and Sequestration

CHP: Combined Heat and Power

CNSE: The College of Nanoscale Science and Engineering

CO₂: Carbon Dioxide

CONEG: Coalition of Northeast Governors

DEC: Department of Environmental Conservation

DER: Distributed Energy Resources

DG: Distributed Generation

DHCR: New York State Division of Housing and Community Renewal

DOE: United States Department of Energy

DOS: New York State Department of State

DOT: New York State Department of Transportation

DPS: New York State Department of Public Service

ECCC (or simply the Energy Code): Energy Conservation Construction Code

ECWG: Energy Coordinating Working Group

EEPS: Energy Efficiency Portfolio Standard

EIA: U.S. Energy Information Administration

EISA: Energy Independence and Security Act

EM&V: Evaluation, Monitoring, and Verification

ESD: Empire State Development Corporation

FERC: Federal Energy Regulatory Commission

FHWA: Federal Highway Administration

FTA: Federal Transit Administration

GHG: Greenhouse Gas

GSIP: Green Strategic Investment Program

GW: Gigawatt

GWh: Gigawatt Hour

HVAC: Heating, Ventilation and Air Conditioning

IPM: Integrated Planning Model

IT: Information Technology

ITS: Intelligent Transportation Systems

kW: Kilowatt

kWh: Kilowatt Hour

LDC: Local distribution companies

LEED: Leadership in Energy and Environmental Design

LEV: Low Emission Vehicles

LIHEAP: Low Income Home Energy Assistance Program

LIPA: Long Island Power Authority

LNG: Liquefied Natural Gas

MAPS: Multi Area Production Simulation

MARCO: Mid-Atlantic Regional Council on the Ocean

MDth: One thousand Dekatherms

MMBtu: One Million British thermal units

MMS: Minerals Management Service

MPO: Metropolitan Planning Organization

MTA: Metropolitan Transportation Authority

MW: Megawatt

MWh: Megawatt Hour

NEMAG: Northeast and Mid-Atlantic States Governors

NESCAUM: Northeast States for Coordinated Air Use Management

NO_x: Nitrogen Oxides

NY BEST: New York Battery and Energy Storage Technology Consortium

NYISO: New York Independent System Operator

NYPA: New York Power Authority

NYSDOL: New York State Department of Labor

NYSERDA: New York State Energy Research and Development Authority

NYSTAR: New York State Foundation for Science, Technology and Innovation

OTDA: New York State Office of Temporary and Disability Assistance

PHEV: Plug-in Hybrid Electric Vehicle

Plan: State Energy Plan

PPA: Power Purchase Agreement

PSC: Public Service Commission

PSL: Public Service Law

PV or Solar-PV: Solar Photovoltaic

REC: Renewable Energy Credit

RETF: Renewable Energy Task Force

RFP: Request for Proposals

RGGI: Regional Greenhouse Gas Initiative

RNA: Reliability Needs Assessment

RPS: Renewable Portfolio Standard

S₀₂: Sulfur Dioxide

SAFETEA-LU: The Federal Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users

SBC: System Benefits Charge

SEQRA: State Environmental Quality Review Act

STARS: New York State Transmission Assessment and Reliability Study

STEP[®]: Saratoga Technology + Energy Park[®]

TBtu: One trillion Btu

TOD: Transit-Oriented Development

UNFCC: United Nations Framework Convention on Climate Change

VMT: Vehicle Miles Traveled

WAP: Weatherization Assistance Program

Executive Summary

The draft 2009 New York State Energy Plan (Plan or Energy Plan) sets forth a vision for a robust and innovative Clean Energy Economy that will stimulate investment, create jobs, and meet the energy needs of residents and businesses over its 10-year planning horizon. To that end, the Plan provides the framework within which the State will reliably meet its future energy needs in a cost-effective and sustainable manner, establishes policy objectives to guide State agencies and authorities as they address energy-related issues, and sets forth strategies and recommendations to achieve these objectives.

The Plan's strategies and recommendations have been designed to meet five policy objectives:

- Assure that New York has reliable energy and transportation systems;
- Support energy and transportation systems that enable the State to significantly reduce greenhouse gas (GHG) emissions, both to do the State's part in responding to the dangers posed by climate change and to position the State to compete in a national and global carbon-constrained economy;
- Address affordability concerns of residents and businesses caused by rising energy bills, and improve the State's economic competitiveness;
- Reduce health and environmental risks associated with the production and use of energy across all sectors; and
- Improve the State's energy independence and fuel diversity by developing in-state energy supply resources.

Five strategies are outlined in the Plan, which simultaneously achieve these multiple policy objectives. The strategies are: (1) produce, deliver, and use energy more efficiently; (2) support development of in-state energy supplies; (3) invest in energy and transportation infrastructure; (4) stimulate innovation in a Clean Energy Economy; and (5) engage others in achieving the State's policy objectives.

Strategy 1: Produce, Deliver and Use Energy More Efficiently

The Plan has identified energy efficiency as the priority resource for meeting its multiple objectives. New York has been among the nation's leaders in implementing market-based programs to help ensure that energy efficiency is recognized as a cost-effective alternative to supply-side energy resources. Investing in end-use energy efficiency, across all sources of energy and across all energy-using sectors, is the most economical approach to expanding the State's Clean Energy Economy. In the short-run, investments in energy efficiency reduce energy use and bills for participating customers. In the long-run, a significant reduction in electricity demand has been shown to put downward pressure on wholesale electricity prices, reduce price volatility, and reduce emissions of carbon dioxide (CO₂) and other air pollutants. Energy efficiency improvements in the transportation sector will reduce dependence on foreign oil and will reduce emissions, which is of critical importance in congested areas of the State with poor air quality. Energy efficiency investments have also been shown to increase employment opportunities in the State.

Additionally, promoting energy efficiency in low income communities, and making energy efficiency upgrades to affordable housing, can reduce energy-related economic burdens on low income New Yorkers. Finally, improving overall electric system efficiency in a cost-effective manner will also mitigate unavoidable price increases associated with replacement of aging infrastructure, and reduce environmental impacts.

This strategy will be furthered by a number of recommendations summarized below. A full discussion is found in Chapter 2.

- Implement programs to achieve the State’s goal of reducing electricity use by 15 percent below 2015 forecasts.
- Improve coordination of all end-use energy efficiency programs administered by the State and utilities, and consistently measure and report results.
- Update the State’s Energy Code, and improve training and compliance initiatives.
- Enact efficiency standards for products for which the federal government does not preempt the states.
- Ensure energy efficiency programs reach low income customers who are particularly vulnerable to rising energy prices.
- Increase the efficiency of our electric system through expanded demand response programs, deployment of “Smart Grid” technologies, and real time pricing rate structures.
- Improve energy efficiency in public buildings.
- Improve consumer awareness of energy use and costs through the use of energy benchmarking programs and energy disclosure requirements in real estate transactions.
- Implement alternative financing programs to fund energy efficiency retrofits.
- Reduce Vehicle Miles Traveled (VMT) by expanding alternative transportation options.
- Work with the federal government to strengthen Corporate Average Fuel Economy (CAFE) standards, and change transportation funding formula to encourage energy efficiency.

Strategy 2: Support Development of In-State Energy Supplies

Production and use of in-state energy resources – renewable resources and natural gas – can increase the reliability and security of our energy systems, reduce energy costs, and contribute to meeting climate change, public health and environmental objectives. Additionally, by focusing energy investments on in-state opportunities, New York can reduce the amount of dollars “exported” out of the State to pay for energy resources. Increased use of renewable resources should not be limited to power generation: many applications of renewable resources – e.g., solar thermal installations, and bio-fuel blends – have the potential of providing substantial energy and environmental benefits.

This strategy will be furthered by a number of recommendations summarized below. A full discussion is found in Chapter 3.

- Implement programs to increase the proportion of renewable generation to 30 percent of electricity demand by 2015.
- Create a tracking and trading system for renewable energy credits to foster the voluntary market for renewable energy purchases.
- Encourage bilateral contracts as a mechanism to attract private investment in renewable resources.
- Encourage deployment of distributed generation (DG) through improved net metering laws.
- Expand funding and implementation support for environmentally beneficial distributed energy resources such as solar thermal and geothermal heat pumps.
- Encourage development and use of sustainable biomass to displace heating oil and gasoline.
- Encourage development of the Marcellus Shale natural gas formation with environmental safeguards that are protective of water supplies and natural resources.

Strategy 3: Invest in Energy and Transportation Infrastructure

New York's massive energy and transportation infrastructure is in constant need of maintenance and repair to keep the State from backsliding on its high standards of infrastructure reliability. Infrastructure investments are also necessary to support the State's transition to a Clean Energy Economy, and will be driven by strategic longer-term needs, including the need to reduce GHG emissions. The key will be to guide infrastructure investment in a manner that is responsive to environmental concerns, consistent with the long-range GHG reduction goal of '80 by 50', and improves the economic welfare of the State's residents and businesses.

In the case of electricity infrastructure, the State's delivery systems may be able to take advantage of cost-effective Smart Grid technology to increase system efficiency and prepare the State for the deployment of advanced appliances and electric vehicles. Transmission upgrades may also allow the State to fully exploit the potential benefits of upstate wind, additional Canadian imports, and new nuclear capacity, all of which can help meet the multiple policy objectives of the Plan. Electricity infrastructure investments must be developed in light of the need to minimize impacts on host communities, particularly environmental justice communities. In the case of natural gas, enhanced pipeline delivery capacity is needed in the downstate area to maintain reliability while allowing for conversions or repowering of power plants from oil to natural gas and accommodating growing core demand. In the case of transportation, investments can be used strategically to reduce vehicle congestion, expand mass transit and encourage more efficient transportation systems.

This strategy will be furthered by a number of recommendations summarized below. A full discussion is found in Chapter 4.

- Develop a Climate Action Plan in accordance with Executive Order No. 24 to identify strategies, actions and infrastructure needs to reduce GHG emissions by 80 percent by 2050.
- Enact a power plant siting law that provides for early and meaningful public participation with ample intervenor funding, early identification of environmental justice concerns and a time limit for a decision.

- Enact Carbon Capture and Sequestration legislation that will provide a siting process to guide the demonstration of this new and promising technology.
- Encourage repowering of existing facilities where justified by reliability, economic and environmental benefits.
- Support the upgrade and replacement of aging transmission and distribution infrastructure to maintain electric system reliability.
- Identify opportunities to utilize existing rights-of-way for new transmission projects.
- Amend Article VII of the Public Service Law (PSL), the transmission siting statute, to provide for intervenor funding to improve public participation.

Strategy 4: Stimulate Innovation in the Clean Energy Economy

The importance of innovation in the energy and transportation sectors is underscored by the challenge posed by climate change, a challenge which will push New York and the nation inexorably toward a low-carbon, clean energy future. Fostering innovation in these sectors will also drive economic growth. The Governor addressed this subject in his recent New Economy jobs plan,¹ which discussed the need and benefit of economic development focused on increasing the State's capacity for innovation.

Policies that encourage innovation at each stage of the clean energy product and business cycle will position the State to not only meet its own energy policy objectives, but to export knowledge and energy technologies to the rest of the world. New technologies for generating, storing, transmitting and using energy, along with a well-trained workforce to support the design, installation, and maintenance of those technologies, will become critical to successful reduction of GHG emissions, in this State and throughout the world.

In the transition to a Clean Energy Economy, it will be critical to provide continued assistance to retain the existing industrial base in New York.

This strategy will be furthered by a number of recommendations summarized below. A full discussion is found in Chapter 5.

- Foster collaboration among academia, research and development organizations, national laboratories, and private businesses and industry to accelerate the commercialization of emerging clean energy technologies by New York-based firms.
- Foster regional clusters of clean energy businesses and institutions.
- Target the State's economic development programs to attract clean technology industries.

¹ Governor David A. Paterson. *Bold Steps to the New Economy: A Jobs Plan for the People of New York*. June 2009. http://www.ny.gov/governor/press/pdf/press_0608091.pdf

- Continue providing support through the State’s low cost power programs to retain New York’s commercial and industrial base, and encourage firms to reduce energy use and costs through energy efficiency improvements.
- Increase local demand for clean energy technologies through the State’s clean energy programs.
- Expand clean energy job training programs and tailor programs to meet industry needs and create “pathways out of poverty”; develop a formal means to coordinate all agencies involved in workforce training, from basic skills training to clean energy jobs training.

Strategy 5: Engage Others in Achieving the State’s Policy Objectives

Local governments, and the communities they serve, must play a critical role in the overall effort to meet the State’s energy policy objectives. The success of many energy programs depends on sustained commitments by local governments. Energy-conscious local planning and land use policy decisions, particularly zoning ordinances, locally sponsored efficiency initiatives, even locally developed renewables projects, should be some of the building blocks in the State’s effort to build a Clean Energy Economy. The State has a responsibility to collaborate with and support local governments and local communities in these efforts.

Looking beyond its borders, the State’s ability to achieve those same policy objectives depends heavily on establishing mutually beneficial working relationships with our neighboring states and nearby Canadian provinces. Significant challenges – and problems – need to be addressed to, among other things, maintain our fuel diversity, maximize the development of economic renewable resources, minimize future power plant air emissions, and enhance interstate and international power transmission while protecting environmental resources. Offshore siting of a variety of energy supply and storage facilities offers much promise; however, such siting will require multi-state collaboration. In like fashion the prospect of securing hydro power from Canada increases the likelihood that we will be able to reduce GHGs 80 percent by 2050 in New York State; however, realizing this potential requires sustained negotiations with Quebec and neighboring power systems.

Finally, State success depends on federal policies, regulatory programs and funding. Fortunately, the Obama Administration has advanced policy goals consistent with the State’s own priorities. However, given the likelihood of federal adoption of policies to limit GHG emissions, the State’s interests need to be represented in the national debate on policy implementation. Moreover, given the joint jurisdictional issues involved with offshore permitting of major energy facilities, the State must proactively seek to coordinate its review of projects with concerned federal agencies.

This strategy will be furthered by a number of recommendations summarized below. A full discussion is found in Chapter 6.

- Amend the City, Town, Village, and General Municipal Laws to incorporate energy considerations in Comprehensive Plans.
- Enact Tax Increment Financing reform legislation to encourage the redevelopment of distressed communities and revitalize downtown areas.
- Encourage local adoption of Smart Growth policies and strategies, and the adoption of local Climate Action Plans by providing State technical assistance and funding opportunities to local governments.

- Encourage development and growth along existing mass transportation routes, i.e., transit oriented development.
- Provide and enhance mechanisms for early, fair and meaningful public involvement with transparency in energy-related decisions.
- Develop energy facility siting and permitting criteria that assess disproportionate health risks and environmental impacts on potential environmental justice areas.
- Work with multi-state collaborations to advance regional energy initiatives, e.g., Regional Greenhouse Gas Initiative (RGGI), Mid-Atlantic Regional Council on the Ocean, Great Lakes Wind Collaborative.
- Partner with the Congressional delegation to advance New York’s clean energy agenda at the federal level.

Preface

The 2009 State Energy Plan

Governor David A. Paterson created the State Energy Planning Board in April 2008 by Executive Order No. 2 and tasked the Board with preparing a State Energy Plan (Plan or Energy Plan).² The Executive Order requires a 10-year planning horizon and is specific with respect to issues and analyses that must be included in the Plan. These requirements have been met through the development of nine policy Issue Briefs which address: Siting New Energy Infrastructure; Energy Infrastructure; Environmental Impact and Regulation of Energy Systems; Environmental Justice; Energy Costs and Economic Development; Transportation; Climate Change; Regional Collaboration; and Health, Energy Production, and Energy Use. The Executive Order also requires assessments of the State's energy resources and efficiency markets, including: Energy Efficiency; Renewable Energy; Electricity; Natural Gas; Petroleum; and Coal. Energy demand and price forecasts have also been prepared over the 2009-2018 planning horizon and are reported in the Plan. These Issue Briefs and Assessments offer more detailed discussions of issues addressed in this Plan and serve as the basis for the findings and recommendations.

In accordance with the Executive Order, the Plan analyzes a broad range of matters related to the State's energy systems, including the reliability of delivery networks for electricity, natural gas, and petroleum products, and the interrelated effects of energy production and use on the State's economy, environment, and transportation system. The Plan also addresses the impact of energy production and use on public health, particularly for the State's most vulnerable populations.

The Plan provides the Governor's vision for a robust and innovative Clean Energy Economy that will stimulate investment, create jobs, protect public health and the environment, and meet the energy needs of businesses and residents over the planning horizon. To that end, the Plan:

- provides the framework within which the State will reliably meet its future energy needs, in a cost-effective and environmentally conscious manner over the planning period; and
- establishes broad policy objectives to guide State agencies and authorities as they deal with energy-related issues and sets out strategies and programmatic and policy recommendations consistent with these objectives.

Leading up to these strategies and recommendations, the Plan:

- highlights areas of New York's energy sector and transportation systems that are in need of additional public and private investment;
- reviews existing energy and energy-related economic development, environmental, public health, and transportation programs administered by the State's agencies and authorities and utilities; and

² Executive Order No. 2. 2008. http://www.nysenergyplan.com/presentations/EO_2.pdf

- provides in-depth information about the State's energy and transportation systems, as well as the effects of these sectors on the environment and public health.

Planning Process

The Energy Planning Board (Board) established the Energy Coordinating Working Group (ECWG), comprised of staff members from planning agencies and the New York Power Authority (NYPA) and Long Island Power Authority (LIPA), to assist in the planning process, provide the analysis necessary to develop the Plan's findings and recommendations, and prepare the draft and final Plans. The ECWG issued a Draft Scope for the Plan on May 30, 2008 identifying the issues to be addressed, and the schedule and process by which the Plan would be prepared. This followed more than 70 stakeholder meetings held throughout the State soliciting input and comment on developing a work scope. The ECWG also received written comments on the draft Scope from over 65 stakeholders. The public input and comments proved useful in preparing the final Work Scope. The website, www.nysenergyplan.com, was created by the Board to facilitate communications with stakeholders.

The Board has held four public meetings since May 2008. The meetings were webcast and archival videos of the meetings are available at www.nysenergyplan.com. At its December 11, 2008 meeting, the Board modified the Executive Order's schedule for completing the Plan. The modified schedule included the publication of an Interim Report from the ECWG to the Energy Planning Board on March 31, 2009, with the draft Plan being released in August 2009 and the final Plan currently scheduled for release by the end of 2009.

The Interim Report was released in accordance with the modified schedule in March 2009 and 45 sets of written comments were received in response to it. The Board met to hear a summary of recurring themes from those comments on June 19, 2009, and at that meeting authorized the continued preparation and release of the draft Plan in August.

A number of public hearings have been scheduled throughout August and September 2009 to receive comments on the draft Plan. Written comments will also be accepted via the Energy Planning Board website (www.nysenergyplan.com) during a 60-day comment period. Both oral and written comments will be taken into consideration as the final Plan is developed.

The State agencies and authorities that are members of the State Energy Planning Board each have defined missions that are meant to support the public interest. Because energy decisions made by these agencies and authorities can have a wide range of impacts on the economy, environment, public safety, public health, mobility and the quality and reliability of services, it is critical to ensure that such decisions are not made in a vacuum. Through their cooperation in completing the draft Plan, the planning agencies and authorities have developed strategies that meet multiple objectives simultaneously. Individual Board members may disagree with one or more of the Plan's recommendations, but the suite of strategies and recommendations found within this Plan are supported by the majority of the State Energy Planning Board, and per Executive Order No. 2, are meant to guide all State agency actions over the planning horizon unless otherwise restricted by law.

System Modeling

The Plan and its supporting Issue Briefs and Assessments required substantial energy system modeling and related quantitative analysis. The electricity and natural gas systems modeling provided the analytical underpinnings of many of the Plan's findings and recommendations. The modeling offered a basis for understanding how the systems work and interrelate, identifying where investment and

infrastructure support are needed, and understanding how system needs and characteristics may change depending on various assumed future scenarios.

The electricity and natural gas system modeling has been a collaborative effort of the planning agency staffs, in particular New York State Energy Research and Development Authority (NYSERDA), Department of Public Service (DPS), and Department of Environmental Conservation (DEC). In addition, LIPA and NYPA have taken an active role in helping design and assess model scenarios and simulations. The New York Independent System Operator (NYISO) has been generous in its support of the modeling efforts and has assisted the planning agency staffs in data collection, modeling, and analysis.

The electricity system modeling solves for the optimal system dispatch (including imports and exports), new capacity, retirements, and repowering, given the specified demand, system characteristics, reserve margins, and environmental constraints. Two “Reference” cases were developed for the electricity modeling, which differ only in the electricity demand forecasts used as model input, for use as points of comparison for alternative policy directions. The “Starting Point” case is based on the electricity demand forecast used by NYISO in its 2009 Reliability Needs Assessment (RNA). From 2009 to 2018, electricity demand under this case is assumed to increase at an average rate of 0.8 percent per year, or a total increase of 7.3 percent. NYISO used moderately risk-averse assumptions which were widely vetted among market participants and considered to be appropriate for its baseline analysis of system reliability. The RNA forecast assumes that approximately 27 percent of the ‘15 by 15’ policy goal associated with the Energy Efficiency Portfolio Standard (EEPS) is achieved (based on the level of authorized funding at the time the forecast was developed). The “Policy Reference” case is also based on the electricity demand forecast developed by NYISO, but assumes full achievement of the ‘15 by 15’ policy goal; that is, electricity demand is assumed to be reduced by 2015 to a level that is 15 percent lower than the forecasted level without the policy goal. From 2009 to 2018, electricity demand under the Policy Reference case is assumed to decrease by 1.8 percent.

The natural gas system modeling is designed to evaluate both the adequacy of natural gas supply and the ability of the natural gas pipeline system to provide the quantities of gas at the locations and times required by the electricity system, while simultaneously meeting the needs of residential, commercial, and industrial customers. The natural gas system “Reference” case is built off the “Starting Point” electricity modeling reference case to provide a conservative evaluation of the natural gas system. The natural gas system modeling evaluates the adequacy of the gas supply system on an aggregated annual basis as well as on individual peak days (generally occurring in winter) when the greatest volumes of gas are required. The scope of the modeling also includes two sensitivity scenarios, in each of which demand for natural gas is assumed to be significantly higher than the natural gas Reference case due to increased needs in the electricity generation sector.

Organization

The Plan consists of this document and the sixteen supporting Issue Briefs and Assessments. These supporting documents are provided in electronic format on a CD that accompanies this volume and are available on the Energy Planning Board website.

This volume contains seven Chapters and an Appendix. Chapter 1 identifies the fundamental policy objectives against which potential strategies were evaluated for consistency and effectiveness. Chapter 1 also describes the five key strategies that emerged as those the State will pursue to achieve its policy objectives. Chapters 2 through 6 address, in detail, each of the five strategies and related recommendations, as well as the underlying issues that must be addressed for the State to achieve its policy objectives over the planning period. In this draft Plan, Chapter 7 contains the recommendations

that will be pursued during the planning period. In the final Plan, this Chapter will also include an implementation plan for the recommendations.

1 *New York's Energy Policy*

An energy plan by nature focuses on reliably meeting projected future energy demands, while balancing and advancing other public policy objectives. But no credible plan can be developed in a vacuum. Over the past eighteen months, the State confronted a number of “facts on the ground” which by necessity informed the planning process. These facts include:

- The State is in an economic recession and has lost over 200,000 jobs since August 2008, bringing New York's unemployment rate to a 16-year high.
- Many New Yorkers have experienced hardships caused by the extreme volatility in the prices of energy.
- At the national level, the federal government is catching up to New York and other states in recognizing the extraordinary challenges posed by climate change and the urgent need to reduce GHG emissions.
- There is greater interest at the federal level in improving the country's energy security, particularly through development and deployment of clean energy producing technologies.
- Finally, 85 percent of New York's population (based on 2000 U.S. Census data) lives in areas of the State that have not been designated as in attainment of one or more of the national health-based air quality standards.

Clearly defined objectives emerge from these considerations. Section 1.1 identifies these objectives and explains what they mean and why they are important to the State. Strategies for achieving these objectives are formed based on the modeling analyses and findings of the Issue Briefs and Assessments. Section 1.2 introduces the Plan's strategies and describes how they are meant to achieve and balance the State's multiple objectives. Chapters 2 through 6 go into further detail on each of the strategies and discuss what the State has been doing in these areas, what challenges or barriers currently exist, and finally the recommendations that are intended to overcome those barriers.

1.1 **Planning Objectives**

The Plan supports development of a Clean Energy Economy – one that uses energy efficiently, is increasingly powered by low-carbon energy resources with lower environmental and health risks, relies increasingly on modern infrastructure, fosters technology innovation, creates and sustains jobs, encourages smart transportation alternatives and adopts community planning strategies. Investing in the State's Clean Energy Economy and taking immediate steps to mitigate the effects of climate change will drive future policy decisions and will continue to position New York as a leader nationally and globally. As such, actions to implement the State's Clean Energy Economy goals, such as the need for new infrastructure development, may be driven by other longer term objectives that are not normally considered in energy system planning.

Given traditional and current policy drivers, the Energy Plan is guided by the following key objectives:

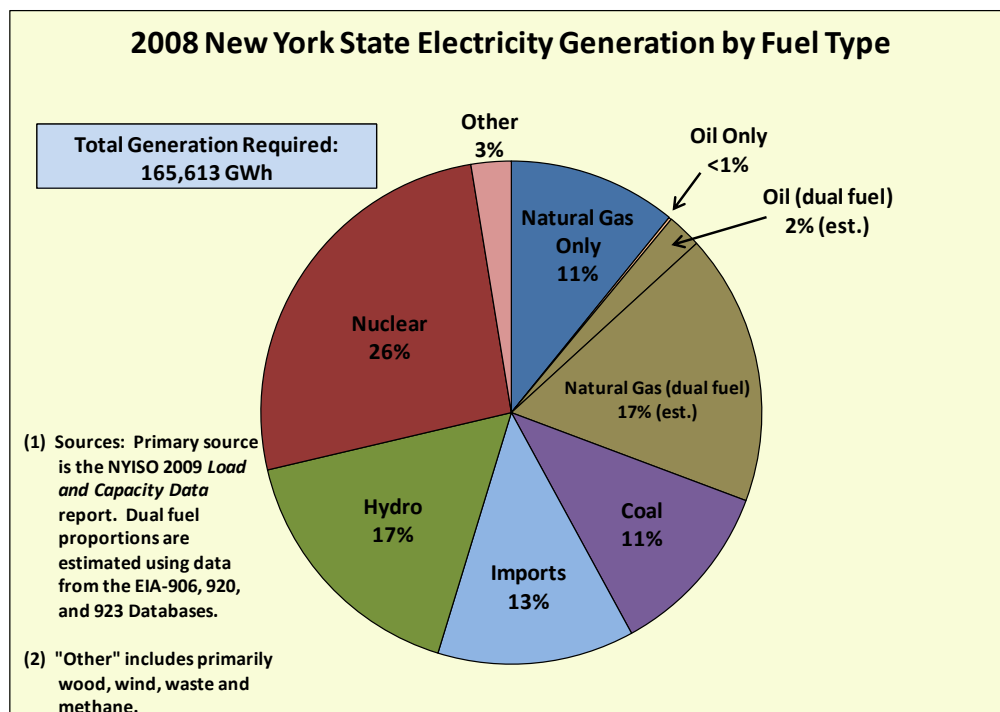
- **Maintain Reliability:** Assure that New York has reliable energy and transportation systems.
- **Reduce GHG Emissions:** Support energy and transportation systems that enable the State to significantly reduce GHG emissions, both to do the State's part in responding to the dangers posed by climate change and to position the State to compete in a national and global carbon-constrained economy.
- **Stabilize Energy Costs and Improve Economic Competitiveness:** Address affordability concerns of residents and businesses caused by rising energy bills, and improve the State's economic competitiveness.
- **Reduce Public Health and Environmental Risks:** Reduce health and environmental risks associated with the production and use of energy across all sectors.
- **Improve Energy Independence:** Improve the State's energy independence and diversity by developing in-state supplies of clean energy.

1.1.1 Maintain Reliability

New York's businesses and residents depend on reliable energy and transportation systems. For all energy systems, reliability is contingent on adequate supplies of fuel, as well as a robust delivery infrastructure. Investments made in these systems help ensure that the systems remain resilient, flexible, and adaptable to accommodate new technologies. The ability to construct new, and maintain existing, delivery infrastructure is key to maintaining reliability. Uncertainty with regard to infrastructure siting and interconnection, cost recovery and jurisdictional issues all discourage needed infrastructure development and increase costs for New York's citizens.

Electric system reliability is strengthened by a diversified fuel supply for generation. Figure 1 shows the State's generation mix comprising primarily nuclear power, natural gas, hydropower, coal, oil and imports. Biomass, wind, and solar photovoltaic (PV) are also included in the State's generation mix under the label 'Other' in Figure 1. Adding to the State's renewable mix can provide further diversity. Reliability is also strengthened by regular upgrades to delivery infrastructure.

Reliability of supply for heating fuels is crucial during the coldest winter months. The petroleum industry maintains inventories of various heating fuels such as home heating oil, propane, and kerosene fuel at levels based on historic normal demand trends and market expectations. Weather conditions, economic events, or disruptions in the supply chain can adversely affect the ability of the industry to meet demand during critical times. Petroleum products, while a small portion of the electric system power supply mix, are also essential for maintaining the reliability of the electric power system. Oil is used as a backup fuel for large power plants during periods of high natural gas demand or for price arbitrage; residual oil is used during periods of high natural gas demand in the winter months and distillate oil is used during the summer peak period.

Figure 1. New York's Electricity Generation Mix

Today, the movement of people and goods depends on a secure and reliable infrastructure and flow of liquid petroleum products, such as motor gasoline, highway diesel fuel and ethanol. Nationwide, the petroleum supply industry maintains adequate inventories to cover two to three weeks of normal demand. An extended supply disruption would likely impose significant economic costs to businesses and residents, as was the case in 2005 when hurricanes Rita and Katrina made landfall near the U.S. Gulf Coast refining center, resulting in the closure of almost 30 percent of U.S. refining capacity.

1.1.2 Reduce Greenhouse Gas Emissions

There is scientific consensus that the increase in GHG concentrations in the atmosphere is driving changes in the earth's climate. The combustion of fossil fuels transforms organic carbon into CO₂, a heat-trapping GHG. Released into the atmosphere, CO₂ retains heat, which alters the earth's energy balance, warms the planet and changes its climate. The science is sufficient to predict that continued, unabated combustion of fossil fuels will contribute to dramatic changes in our climate. Climate change threatens human societies and natural biodiversity because it is expected to significantly alter the ecosystems that supported the development of human civilization.

In New York, average temperatures are rising. Spring bloom occurs a week earlier on average than 30 years ago, and there is an observable northward shift both of plant hardiness zones and of the occurrence of certain wildlife and plant species. While future climate change may marginally help a few areas of New York's economy, such as increasing yields and crop variety in certain types of agriculture and decreasing winter heating needs, it will impose significant economic burdens. For instance, its global impacts on agriculture are likely to increase consumer food costs. Health care and public health expenditures will increase if warmer temperatures increase the incidence of heat related illness and

mortality and vector-borne disease. Protecting or replacing existing communities and infrastructure as the sea level rises will be costly. In an increasingly interconnected world, New York's economy may also be burdened by climate change impacts that destabilize ecosystems, agriculture and economies outside of New York's borders.

Scientific evidence suggests that limiting the global average temperature increase to approximately 3.6°F (2°C), above pre-industrial temperatures may minimize the likelihood of the most severe climate impacts and is consistent with the United Nations Framework Convention on Climate Change (UNFCCC) goal of avoiding dangerous climate change. To keep warming within these limits, the UNFCCC concludes that emissions of GHGs from developed nations must be reduced by 80 to 95 percent of year 1990 levels by the year 2050. Recognizing this need, Governor Paterson issued Executive Order No. 24 that sets a State goal to reduce GHG emissions in New York 80 percent below 1990 levels by the year 2050. The Executive Order also establishes a Climate Action Council that is charged with preparing a draft Climate Action Plan by September 30, 2010. The Climate Action Plan will identify possible strategies for meeting the '80 by 50' goal.

With nearly all of New York's CO₂ emitted in the generation and use of energy, the relationship between climate change and energy planning is inescapable. A central challenge for New York is enabling a transition to an energy system with very low GHG emissions in time to do the State's part to prevent the most severe impacts of climate change, while maintaining the State's reliable energy systems, meeting other environmental goals and increasing the State's economic competitiveness.

1.1.3 Stabilize Energy Costs and Improve Economic Competitiveness

Energy expenses are driven by price and use. Consumers generally have little control over energy prices, which vary throughout the State and are influenced by, among other factors, world markets, the availability of fuels, electric generation resources, electric and gas transmission and distribution facilities, transportation infrastructure, and regulatory requirements. In contrast, consumers have greater control over their energy use, which is governed by their energy and transportation choices, including technology, efficiency practices, and building efficiency. Although consumers may be unable to control the price they pay for energy, through control of their energy usage, consumer may ultimately affect their energy expenses.

Energy costs affect consumers' energy bills and what they pay for goods and services. High energy costs can have a negative impact on household budgets, particularly for families on a limited income who pay a higher proportion of their household income for energy. The State and federal government offer a number of programs to help consumers lower their energy bills, ranging from direct bill assistance through the Low Income Home Energy Assistance Program (LIHEAP) to targeted energy efficiency programs.

Energy costs also can have a significant impact on the economic competitiveness of the State, especially for energy intensive businesses currently located within the State and those considering an expansion or looking to locate in New York. New York's relatively high energy prices are attributable to the State's heavy reliance on fossil fuels from out of State, relatively low dependence on coal which is a lesser expensive fuel, electricity system constraints, natural gas and petroleum product transmission and pipeline system constraints, the State's geographic location away from major supplies of energy, and State and local taxes and fees. In order to address these high costs and stimulate economic development, several State agencies and authorities offer a myriad of economic development and energy assistance programs – described in the Energy Costs and Economic Development Issue Brief – to reduce energy use and energy bills to enhance the economic competitiveness of the State.

1.1.4 Reduce Public Health and Environmental Risks

Combustion of carbon-based fuels, whether for electricity generation, transportation or heating, results in the emission of contaminants such as nitrogen oxides (NO_x), sulfur dioxide (SO₂), particulate matter, carbon monoxide, polycyclic aromatic hydrocarbons, volatile organic compounds and metals, as well as several GHGs including CO₂. These individual contaminants are associated with a number of adverse health effects, including cardiovascular disease, respiratory effects, infections, asthma exacerbation, cancer, central nervous system effects, liver effects, kidney effects, and mortality. The likelihood of health effects depends on multiple factors, including the amount, frequency, and duration of exposure, the toxicity of the contaminant, and an individual's health status. Emissions of acid deposition precursors (NO_x and SO₂) from sources in New York and upwind continue to degrade the State's forests and water bodies and impair visibility. The severity of these impacts is dependent upon a number of factors. However, in general, a decrease in emissions of contaminants will reduce the likelihood of both health and environmental impacts. This can be accomplished through a shift to cleaner carbon-based fuels or non-carbon-based energy sources across all energy sectors.

Environmental justice is the assurance of fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Through Governor Paterson's Environmental Justice Interagency Task Force, and other policies, the State has environmental justice efforts underway that focus on improving both the human and physical environment, with an emphasis on low income communities and communities of color.³ These efforts also work on addressing disproportionate health and environmental burdens that may exist in those communities. Continued study of the areas with disproportionately high rates of poverty, unemployment, traffic, and power generation and industrial facilities is important in helping to unburden communities with high rates of health problems, such as asthma exacerbation and lead poisoning.

1.1.5 Improve Energy Independence

New York spends approximately \$65 billion annually on energy, of which 53 percent or close to \$35 billion leaves the State to pay for energy imports. This reliance on outside sources of energy creates economic opportunities in exporting regions at the expense of New York. It also reduces New York's control over energy supply disruptions caused by market forces or infrastructure issues outside the State. By investing in measures that reduce energy use and supporting in-state energy resource development, New York will reduce the outflow of dollars to pay for energy imports. This will help to stimulate the economy and create local jobs.

Most of the in-state energy available to New York is from low-carbon natural gas and biomass or carbon-free renewable sources, such as wind, hydropower, and solar, that, if developed, will help to achieve climate and public health improvements while increasing energy security.

³ Department of Environmental Conservation (DEC), *Environmental Justice Interagency Task Force*. 2009. <http://www.dec.ny.gov/public/47153.html>

1.2 Clean Energy Strategies

The energy strategies that will simultaneously achieve New York's multiple objectives are:

1. Produce, deliver and use all forms of energy more efficiently in the electricity, transportation and buildings sectors.
2. Support development of in-state clean energy supplies, including natural gas, wind, solar, geothermal, bio-energy, hydropower and hydrokinetic capacity (tides, currents, and waves).
3. Invest in energy and transportation infrastructure to support the State's multiple objectives.
4. Stimulate innovation in the Clean Energy Economy through research and development partnerships with academia and public and private partners, by creating demand for clean energy products and training the workforce, and by supporting existing and attracting new industries that will compete in a Clean Energy Economy.
5. Engage others in achieving the State's policy objectives and bolster stakeholder participation in energy-related decision making.

In sum, the State plans to meet its energy needs through balanced and deliberate investment in energy efficiency in all its forms, greater use of in-state resources, and expansion of the State's energy systems and infrastructure. Recommendations for specific programs, regulatory or legislative actions to support these strategies are found in Chapters 2 through 6 and a comprehensive list is found in Chapter 7.

These strategies are not new to New York or Governor Paterson's Administration. However, New York's success in meeting its policy goals depends on a sustained and broad-based commitment to these strategies.

1.2.1 Produce, Deliver, and Use Energy More Efficiently

Investing in end-use energy efficiency is the most economical approach to expanding the State's Clean Energy Economy. In the short-run, investments in energy efficiency reduce energy use and bills for participating customers. In the long-run, a significant reduction in electricity demand has been shown to put downward pressure on wholesale electricity prices, reduce price volatility, and reduce emissions of CO₂ and other air pollutants. Energy efficiency investments have also been shown to increase employment opportunities in the State.⁴ Additionally, promoting energy efficiency in low income communities, and making energy efficiency upgrades to affordable housing, can reduce energy-related economic burdens on low income New Yorkers.⁵

End-use energy efficiency is an important part of Governor Paterson's goal for the State to meet 45 percent of its electricity needs through improved energy efficiency and clean renewable energy by 2015 ('45 by 15'). The efficiency portion of that goal is 15 of the total 45 percent (also known as '15 by 15') and the State has a number of programs that are designed to work toward that goal and help New Yorkers

⁴ See the Energy Efficiency Assessment for a more detailed discussion on the impacts of energy efficiency programs.

⁵ Energy expenditures as a proportion of total household expenditures decrease as income increases. U.S. Bureau of Labor Statistics. *Household Spending on Energy*. Monthly Labor Review, Vol. 129 No. 6. 2006. <http://www.bls.gov/opub/mlr/2006/06/precis.htm>

invest in energy efficiency measures.⁶ Modeling analyses have shown that full achievement of '15 by 15' in the Policy Reference case results in decreasing average wholesale electricity prices by 10 percent over the planning horizon, when compared to the Starting Point case.

In New York, electric efficiency can be improved enough to offset near-term projected increases in electric demand, reducing the need for additional generating capacity for reliability needs, and saving money for ratepayers. Postponing construction of new fossil-fuel fired generation would allow time to develop the low-carbon-intensity electric generation necessary to reduce GHG emissions for the long-term.

In addition, increasing the efficiency of electric generation, reducing line losses associated with transmission and distribution and optimizing the operation of the electric system, can also lower electric costs, reduce emissions and defer the need to build expensive new facilities.

Energy use in the transportation system can be made more energy efficient through improvements in vehicles, the fuels that power them and through management of and investment in the transportation system to make it more efficient. The transportation, energy and emissions relationship is often described as a "three legged stool", where vehicle technology is one leg, the fuels used to power vehicles is the second leg of the stool, and transportation system activity is the third leg. Transportation system activity includes VMT, congestion and system operational efficiencies. To increase the energy efficiency of the system and to reduce its carbon footprint, all three "legs" of the stool must be addressed. Discussion on the importance of the "three-legged" stool approach and strategies to address each of the legs can be found in the Transportation Issue Brief.

1.2.2 Support Development of In-State Energy Supplies

Developing in-state energy supplies, in particular renewable energy resources and natural gas, helps to reduce the reliance on higher carbon content fossil fuels imported from outside the State and therefore improves the State's energy security. Reducing energy imports also helps to keep more money within the State for economic development purposes. Supporting in-state resources creates jobs, increases capital investment, increases tax revenues for local governments, and increases revenue for landowners.

Use of renewable in-state resources reduce the need for energy derived from by fossil fuel. Less electricity generation from fossil fuel-fired generators results in lower emissions of air pollutants from those plants. This reduces the known health risks associated with carbon-intensive electricity generation and improves the State's ability to mitigate the effects of climate change. Likewise, development of in-state resources for the production of alternative transportation fuels provides the opportunity to reduce the high carbon-intensity fuels that are currently used in the transportation sector. Using renewable technologies, such as solar thermal and geothermal, for heating and hot water provides similar benefits. Renewable energy, particularly solar power, may improve the reliability of the local power supply system during peak demand periods. For example, since cooling load peaks during summer days when the sunlight is plentiful, distributed solar power generation may reduce the risk of localized power disruptions.^{7,8} While these multiple benefits help justify the State's investment in renewable energy

⁶ The renewable portion of the '45 by 15' goal accounts for the remaining 30 of the 45 percent, and is a call to raise the State's Renewable Portfolio Standard (RPS) to meet 30 percent of the State's electricity use with renewable energy generation by 2015.

⁷ Perez, R., *Satellite-Based Solar Resource Assessment: Social, Economic and Cultural Challenges and Barriers, Technological Gaps*. 2004. <http://www.asrc.cestm.albany.edu/perez/publications/Solar%20Resource%20Assessment%20and>

deployment programs, many of which are funded via the Renewable Portfolio Standard (RPS) surcharge on rate-payers utility bills, there are also direct ratepayer benefits.

Demand for natural gas is expected to increase over the planning horizon. Currently, New York meets less than 5 percent of its gas demand with in-state production. The majority of the gas to meet the State's remaining demand is produced in Canada and the Gulf of Mexico and is delivered via pipeline to New York. Increasing in-state production of natural gas will diversify the State's natural gas supply, improving the State's energy security.

1.2.3 Invest in Energy and Transportation Infrastructure

Investments in existing energy and transportation infrastructure and development of new infrastructure, as appropriate, can help to further the Plan objectives of maintaining system reliability, achieving GHG emission reductions, and controlling energy costs. Smaller periodic improvements or "state of good repair" investments prevent the need for larger, more extensive repairs and investments in the future and are essential to maintaining the reliability of the State's energy production and delivery systems for all fuels.

Transmission, distribution and end-user Smart Grid investments will optimize the electric system in order to facilitate the interconnection of renewable resources, reduce customer costs through reductions in line losses, and enable customers to use less electricity during periods of high demand and reduce their energy costs. Transmission Smart Grid investments in particular will facilitate the development of renewable generation in the areas of the State that have the greatest capability to transmit it to the areas of highest demand. These investments will also reduce the clustering of generation facilities in densely populated areas and potential environmental justice areas⁹ that may already be burdened with greater numbers of facilities and with greater disease prevalence. Expanding mass transit options, in combination with using cleaner-burning fuels for cars and buses, linking land use with transportation planning, and keeping roadways and the transportation system in good working order, will lessen traffic congestion, reduce energy use, and also contribute to better air quality and public health.

1.2.4 Stimulate Innovation in the Clean Energy Economy

Policies that encourage innovation at each stage of the clean energy product and business cycle – from research, development, entrepreneurship, through value-added manufacturing, deployment and maintenance of clean technology – will position the State to not only meet its own energy policy

[%20Modeling/Papers%20on%20Resource%20Assessment%20and%20Satellites/satellite-based%20solar%20resource%20assessment-04.pdf](#)

⁸ Perez, R. and B. Collins, *Solar Energy Security: Could Dispersed PV Generation Have Made A Difference In The Massive North American Blackout?* Refocus 5(4). 2004. http://www.sciencedirect.com/science?_ob=ArticleURL&_udi=B73D8-4D4M8HD-15&_user=10&_rdoc=1&_fmt=&_orig=search&_sort=d&_view=c&_acct=C000050221&_version=1&_urlVersion=0&_userid=10&md5=727b66d41fda88d741c05625ca72a058

⁹ DEC currently classifies potential environmental justice areas based on location of low-income and minority populations. Potential environmental justice areas are U.S. Census blocks (200 to 500 households) that, in the 2000 U.S. Census, met one or more of the following criteria: 51.1 percent or more of the population in an urban area reported themselves as members of minority groups; 33.8 percent or more of the population in a rural area reported themselves as members of minority groups; or 23.59 percent or more of the population in an urban or rural area had incomes below the federal poverty level.

objectives, but to export knowledge and energy technologies to the rest of the world. New technologies for generating, storing, transmitting and using energy, along with a well-trained workforce to support the design, installation, and maintenance of those technologies, are critical to successful reduction of GHG emissions, and will become more valuable as the changing climate increases pressure to transform energy systems worldwide.

As described more fully in Chapter 5, the State is supporting energy research and development, innovation, and commercialization of clean energy technologies through existing partnerships funded by NYSERDA and NYSTAR.

The State is also focusing on building a workforce development system that will prepare the New York labor force for the Clean Energy Economy. Realization of the State's clean energy goals will require a workforce with the appropriate knowledge and skills to develop and deploy the technologies that will reduce the State's energy use and its dependence on fossil fuels, along with energy-related impacts on public health and the environment.

As the State and nation transition to a carbon-constrained economy, it will be critical to use economic development resources to both retain the State's existing manufacturing base and attract new companies that are most likely to thrive in a Clean Energy Economy.

1.2.5 Engage Others in Achieving the State's Policy Objectives

The opportunity exists for greater collaboration among all units of government and other stakeholders to advance nearly all aspects of the Plan. Absent greater collaboration, the State risks frustrating efforts that are driven by the Plan's policy objectives.

Local government and community decisions play a significant role in the State's ability to meet the objectives of the Plan. Such examples include local zoning can help or hinder the siting of small renewable resources; land use planning can either encourage sprawl or promote smart growth; local municipalities can work to either increase or reduce disproportionate burdens in urban and environmental justice communities; local governments can either passively or aggressively enforce the State's Energy Conservation Construction Code. Local government and community partners are critical to the success of the State's clean energy strategies.

Not surprisingly, neighboring states and provinces face similar regional energy concerns and challenges, some of which are best met through regional collaboration. New York's energy systems are inextricably linked, physically, economically and environmentally with its neighboring states and Canada. By acting jointly with the State's neighbors, the State will be able to more readily achieve many of its objectives.

2 Produce, Deliver, and Use Energy More Efficiently

New York has been among the nation's leaders in implementing market-based programs to help ensure that energy efficiency is recognized as a cost-effective alternative to additional supply-side energy resources. Energy efficiency also reduces energy bills, making New York businesses more competitive and allowing families to save money; helps the State achieve its environmental goals by reducing emissions of greenhouse gases and other pollutants affecting public health; enhances quality of life by increasing comfort, safety and productivity; creates jobs; and increases energy security by reducing exposure to supply disruptions and price volatility associated with reliance on imported fossil fuels, particularly petroleum.

Although the past three decades have been characterized by growing population and greater demands for energy-dependent technologies, energy use per capita in New York has remained relatively flat – about one-third lower than the national average. New York is the second most energy efficient state in the nation on a per capita basis. New York's relatively low energy use per capita is due in part to its past investments in energy efficiency programs, its highly energy-efficient urban transportation system, and its concentration of multi-family housing. As discussed below, the State can become significantly more energy efficient by building on its past successes.

This Chapter focuses primarily on improving efficiency at the point of end-use for all forms of energy and for all energy-consuming sectors of the economy. In addition, with respect to electricity, this Chapter highlights the increased efficiencies that can be achieved upstream, along the entire process path of generation, transmission and distribution. Overall, by producing, delivering, and using energy more efficiently, the amount of energy required to enjoy the same quality of life can be minimized.

2.1 End-use Efficiency

2.1.1 The History of State Support

New York has a decades-long history of supporting efficiency improvements. Annual funding committed to efficiency programs by New York's utilities and energy authorities began with a modest \$25 million in 1984 and has risen to over \$750 million for 2009. From the mid-1990s through 2008, most State support has been channeled through NYSERDA, NYPA, LIPA and the Division of Housing and Community Renewal (DHCR). Beyond reducing the amount of energy used by customers who install energy efficiency measures, New York's energy efficiency programs are designed to transform markets by changing the products, services, and delivery mechanisms available for improved efficiency and changing consumer behavior. Programs directed at upstream market participants – including distributors, contractors, trade associations, and manufacturers – seek to induce structural changes in the marketplace that will result in accelerated adoption of energy efficient technologies and practices. Programs are designed to promote permanent changes, including in consumer behavior, that result in the availability and adoption of innovative energy efficiency products and services.

Programs administered by NYSERDA have achieved more than 3,000 GWh in annual electricity reductions;¹⁰ NYPA and LIPA have contributed nearly 2,000 GWh in annual electricity reductions. These energy reductions have saved consumers billions of dollars in electricity and fuel costs. Other State agencies also administer successful energy efficiency programs, including the Division of Housing and Community Renewal, which has administered the State's federally funded weatherization program since 1977. During that time it has overseen installation of insulation and other efficiency improvements in 500,000 low income homes – resulting in substantial savings of all fuels. Additionally, the Dormitory Authority of the State of New York and the Office of General Services have committed to green building standards for all new construction they support.

The State's efficiency programs produce other economic benefits. Expenditures and annual savings produced by energy efficiency programs set off a ripple effect of spending that influences many sectors of New York's economy. Energy efficiency programs have already provided and will continue to provide net macroeconomic benefits to New York in the form of increased employment, labor income, and Gross State Output. A more detailed discussion of these benefits can be found in the Energy Efficiency Assessment.

2.1.2 Potential for Additional Efficiency Savings

The State can realize additional cost-effective energy efficiency potential that would provide substantial benefits to both suppliers and consumers. Governor Paterson's reaffirmation of the State's '15 by 15' goal to reduce electricity use 15 percent below 2015 forecast levels has provided the major impetus for the State's electricity efficiency initiatives. Similar potential exists for other energy sources as well.

A 2008 report concluded that opportunities for electricity end-use efficiency are extensive and inexpensive compared with available supply options.¹¹ Results of the study estimate the State's achievable potential through 2015 to be about 26,000 GWh, representing a reduction of approximately 14 percent from the forecast of electricity demand in 2015.^{12,13} In addition, improved building codes and appliance standards, likely to be implemented prior to 2015, could provide a reduction of an additional 11,000 GWh (5.7 percent) from forecasted electricity use.¹⁴ Programs that would capture this achievable potential would cost \$7.2 billion in 2008 dollars over seven years, or an approximate average annual program portfolio budget of \$1.0 billion. Net benefits to the New York economy would total \$12.8 billion, including \$20.8 billion in total statewide benefits and \$8.0 billion in societal costs. The benefit-cost ratio of the electric efficiency measures is estimated to be 2.60, which means that the New York economy would capture approximately \$2.60 in benefits for every dollar invested in efficiency.¹⁵

¹⁰ NYSERDA. *New York Energy \$martSM Program Evaluation and Status Report: Year ending December 31, 2008*. 2009.

¹¹ Optimal Energy, Inc., *Achievable Electric Energy Efficiency Potential in New York State*. 2008.

¹² All savings and forecast energy values in the 2008 Optimal Study are at the "point of purchase" as opposed to "at meter." Point of purchase savings correspond to avoided costs at the entrance to the utility service territories and include savings in transmission line losses. Customer meter level savings also reflect a reduction in distribution level losses commensurate with reduced system deliveries.

¹³ The 2008 Optimal Study relies on adjusted 2015 zonal load forecasts provided by NYISO which were adjusted to reflect a baseline that does not include impacts from future ratepayer-funded efficiency programs, but does assume naturally occurring efficiency gains in the market and recently passed or highly likely codes and standards.

¹⁴ This reflects changes to residential and commercial building codes, as well as federal appliance and equipment standards that have either already passed (but not yet taken effect), or are considered highly likely to take effect during the next ten years.

¹⁵ Optimal Energy, Inc., *Achievable Electric Energy Efficiency Potential in New York State*. 2008.

Similarly, there is significant potential to reduce demand for natural gas through energy efficiency improvements. A 2006 study estimated the program potential, with five years of program delivery and five years of post market effects, would be 1.5 percent of projected natural gas consumption; this potential reduction could occur through approaches, such as increasing efficiencies of domestic heating equipment, promoting ENERGY STAR home construction, promoting low income weatherization, and incentivizing installation of energy-efficient food service and food processing equipment.¹⁶ In 2008, a limited update of the 2006 study showed that spending \$80 million per year for ten years would result in savings on the order of 28,000 MDth (thousand Dekatherms) or 15 percent of the likely achievable potential at the end of the ten years. Estimated savings by sector were 6,697 MDth in the residential sector, 1,520 MDth in the low income weatherization area, and 19,979 MDth in the commercial and industrial areas.

A significant level of efficiency potential likely exists with regard to No. 2 oil, i.e., home heating oil, or distillate fuel. The most important fact to consider is the magnitude of the State's consumption of No. 2 oil. Approximately one-third of New York households (an estimated 2.3 million households) use fuel oil to heat their homes. Based on federal 2007 estimates, New York's residential and commercial sectors consume more distillate fuel than these sectors in any other state, accounting for 24 percent and 22 percent of national residential and commercial consumption, respectively.¹⁷ Overall, New York is ranked third out of the 50 states in total distillate fuel use, with only Texas and California consuming more distillate fuel than New York. While New York has not conducted a comprehensive energy efficiency potential study for fuel oil, general conclusions can be drawn from a study conducted by Vermont in 2007.¹⁸ The Vermont study estimated the achievable cost-effective efficiency savings potential for fuel oil across all sectors to be 14 percent of the forecasted fuel oil use in 2016. Estimated potential oil savings by sector were 10.2 percent in both the residential and industrial sectors and 24.2 percent in the commercial sector. Those results, coupled with the high level of oil consumption in New York in all sectors, suggest that the potential for energy efficiency associated with use of No. 2 oil in New York is very high.¹⁹

Building efficiency could also be improved through the installation of environmentally beneficial distributed generation/combined heat and power (CHP) resources located at customer sites. These resources enhance energy efficiency, particularly in commercial buildings, because the electricity by-product of CHP can be directly used. State action to facilitate implementation for DG, including additional technical and financial support, financial incentives for low-carbon DG resources, and removal of any barriers to interconnection of DG to the electric grid, would result in energy and cost reductions, improved energy security and reliability and reductions in air emissions.²⁰

With respect to energy use in the transportation sector, New Yorkers consume less gasoline per capita than any other state. In New York, auto trips, as a percentage of all travel is significantly lower than the national average. Use of public transportation systems and rail has grown over the last few years. Yet in

¹⁶ Optimal Energy, Inc. *Natural Gas Energy Efficiency Resource Development Potential in New York*. 2006.

¹⁷ U.S. Energy Information Administration (EIA). *State Energy Data System, Table F4a, Distillate Fuel Oil Consumption Estimates by Sector*. 2007. http://www.eia.doe.gov/emeu/states/sep_fuel/html/pdf/fuel_use_df.pdf

¹⁸ Vermont Department of Public Service (prepared by GDS Associates, Inc.). *Vermont Energy Efficiency Potential Study for Oil, Propane, Kerosene and Wood Fuels*. 2007. <http://publicservice.vermont.gov/pub/other/allfuelstudyfinalreport.pdf>

¹⁹ Energy efficiency potential studies also have not been conducted in New York for other home heating fuels, such as propane and wood. It is reasonable to assume that the energy potential for these fuels is similar to that identified for natural gas and home heating oil.

²⁰ While DG/CHP is not necessarily renewable, a recommendation regarding DG/CHP is grouped with renewables in Chapter 3.

2006, 7.2 billion gallons of motor fuel were purchased in the State. Over 1 quadrillion BTUs were consumed by on-road vehicles, resulting in 88.7 million metric tons of CO₂ emissions. There are many ways this consumption can be reduced and have the transportation system operate more efficiently. These include keeping the entire system well-maintained, eliminating bottlenecks, providing alternatives to driving alone and encouraging freight to be shipped and delivered in the most efficient manner. See the Transportation Issue Brief for an in-depth discussion of transportation efficiency.

2.1.3 Realizing Potential Savings

Realizing these potential efficiency savings, across fuels and across end-use sectors, is the challenge the State faces over the planning period. Certain important strategies – including key legislative initiatives – will cut across all energy consuming sectors and all energy sources. More specific programs, including those overseen by the Public Service Commission (PSC), will target those energy sources the State has historically regulated – namely, electricity and natural gas – across all end-use sectors. In addition, NYSERDA-administered programs, funded under RGGI and various federal statutes, will, at least in part, target users of petroleum products and will reach the transportation sector. DHCR will continue to oversee a much expanded weatherization program as a result of additional funding from the American Recovery and Reinvestment Act (ARRA). Additionally, NYPA and LIPA will continue, and likely expand, their efficiency programs currently targeted to electricity use.

The State’s portfolio of programs includes those that target the residential sector, commercial and industrial customers, governmental customers, and with special attention to assist low income customers. Though the programs may vary in their cost-effectiveness, it is critical to have a diverse program portfolio to reach all customers. Programs that assist low income customers will be particularly important in a carbon-constrained economy and a number of those programs are already providing assistance. Low income programs include: the EmPowerNY, which provides electric use reduction and home performance measures free of charge to eligible low income participants; the Weatherization Assistance Program (WAP), which assists income-eligible families and individuals in investing in energy efficiency measures to help reduce their monthly energy expenditures; and the Low income Home Energy Assistance Program (LIHEAP), which provides financial assistance to eligible households to help pay for their home heating costs.²¹

Cross-cutting Initiatives

Program Coordination. The State of New York will continue to develop and implement energy efficiency programs through entities including NYSERDA, NYPA, LIPA, DHCR, Department of State (DOS) and through PSC oversight of utilities. Total annual expenditures on these initiatives through 2015 are expected to exceed \$750 million, consisting of funding for NYSERDA through the System Benefit Charge of approximately \$175 million, NYPA planned spending of approximately \$135 million, LIPA expected spending of an average of more than \$90 million, and expected PSC authorization of utility and NYSERDA spending of an additional \$330 million on electricity efficiency programs and \$130 million on gas efficiency programs. In June 2009, the United States Department of Energy (DOE) approved New York’s Weatherization Plan and awarded New York an initial approximately \$158 million of the total \$394 million in ARRA funding for the State’s WAP.²² This allows the State to move forward on its

²¹ Additional information on energy efficiency and assistance programs for low-income households can be found at *Heat Smart, New York*. <http://www.heatsmartny.com>.

²² The Weatherization Plan was developed by DHCR, the agency that administers the state’s longstanding WAP. DHCR. *Weatherization Recovery Act Funding Plan*. 2009. <http://nysdhcr.gov/Programs/WeatherizationAssistance>

strategy to make at least 45,000 low income households more energy-efficient over the next two years. Furthermore, energy efficiency initiatives will also continue to be developed by local governments, notably the City of New York. Contemporaneous initiatives have the potential to deliver a comprehensive portfolio of programs, including those tailored to specific customer sectors and local circumstances. However, without coordination, it is likely that multiple initiatives will confuse customers and contractors, result in inefficient use of ratepayer and taxpayer funding, and produce less than optimal results. Accordingly, energy efficiency programs should be carefully coordinated to eliminate or minimize overlap, conflicts and customer confusion. Similarly, energy efficiency programs by all administrators should be periodically evaluated and funding re-directed to its most effective use.

There is, as well, an overarching need to rigorously evaluate, monitor and verify (EM&V) all electricity and natural gas programs, and all program results. It is not just a matter of making sure the many hundreds of millions of dollars annually the State directs to efficiency are well spent. In order for energy savings through efficiency to be fully accounted for in reliability planning, robust EM&V is critical. Electric and gas system planners, NYISO, PSC, energy firms and others, must all satisfy themselves that the State can in fact rely on efficiency to carry the load the State has assigned to it. Only by instituting a sustained, well-funded EM&V effort – and only by building a consistent EM&V component into every efficiency program – will the State and all interested stakeholders be in a position to reach that necessary level of confidence.

Recommendations

- All State agencies and authorities and utilities that administer energy efficiency programs must consistently measure and report results of efficiency programs, including energy savings, peak demand reductions, and load shifting, using similar techniques, metrics, and reporting formats. Agencies and Authorities must use those results to optimize program support going forward. Program results should be summarized and made available to the public on an annual basis.
- The State needs to maintain efforts that mitigate short-term impacts of rising energy costs on New York's low income populations caused by implementation of public policy driven programs.

Energy Conservation Construction Code. Among the most significant steps New York can take to realize additional energy efficiency savings are to adopt an up-to-date version of the State's building energy code (formally known as the Energy Conservation Construction Code, hereinafter referred to simply as the "Energy Code"), amend the Energy Code's enabling legislation to extend the Energy Code's reach to more renovation activity, simplify and regularize its amendment/updating process, and upgrade Energy Code training and compliance initiatives.²³

Building energy codes and equipment and appliance standards set minimum efficiency and performance levels, effectively setting a floor or baseline. Over time, with education, enforcement, and technology advances, the stringency of these codes and standards can be increased. Full compliance with building energy codes and equipment and appliance efficiency standards would produce significant annual and cumulative energy savings for New Yorkers beyond what would otherwise occur. As shown in Table 1, a recent study by Optimal Energy, Inc. estimated the potential for substantial energy savings that could be achieved through an enhancement of New York's building codes and appliance standards.²⁴ Additional

²³ Also related, the Mechanical Code addresses maintaining "healthful indoor air quality" and those standards must be maintained.

²⁴ Optimal Energy. *Achievable Electric Energy Efficiency Potential in New York State*. 2008.

benefits include improved building stock, lower demands on New York’s electricity and gas delivery infrastructures, and lower GHG and other harmful emissions.

Savings from improvements to the Energy Code, together with savings from improvement to equipment and appliance efficiency standards, have the potential to achieve about one third of New York’s ‘15 by 15’ electricity reduction target. Such improvements have the potential to produce major savings for all fuel types used in New York. Successful implementation of enhanced Energy Code and enhanced equipment and appliance efficiency standards can be achieved at relatively low cost, resulting in large benefits in terms of energy and cost savings to consumers. The federal government has retained exclusive authority to promulgate efficiency standards for most appliances and equipment, leaving relatively little room for State action. However, the State can still promulgate efficiency standards for certain items, such as consumer audio and video electronics. There are also general product categories that are not currently covered by the federal standards or State law, such as bottled water dispensers, hot tubs, and swimming pool pumps.

Table 1. Estimated Savings from Codes and Standards

Type of Energy Savings	Codes Savings in 2015	Standards Savings in 2015	Total Savings in 2015
Electricity Savings (GWh)	2,158	7,202	9,360
Peak Demand Savings (MW)	469	1,572	2,041
Other Heating Fuels (Billion Btu)	4,960	1,792	6,752

Source: Optimal Energy. *Achievable Electric Energy Efficiency Potential in New York State*. 2008.

A critical strategy to realize these potential savings is to improve the performance of new buildings by strengthening the Energy Code, which establishes minimum requirements for energy-efficient buildings through prescriptive and performance-related standards, making possible the use of new materials and innovative techniques that conserve energy. Implementation of proposed changes to the Energy Code, discussed in detail in the Energy Efficiency Assessment, is an important interim step to making New York’s building stock more energy efficient. As important is assuring that code compliance and enforcement deliver on these potential savings.

New York’s efforts will be greatly enhanced as a result of the recent approval of \$4.4 million in funding from ARRA, which provides the State with new opportunities to further enhance the current Energy Code, address current challenges to maximizing the energy saving opportunities, expand active training and enforcement programs, and measure the rates of compliance.

With respect to the Energy Code, an eligibility requirement of the ARRA State Energy Program funds is that the State must certify to DOE that the Governor will pursue necessary energy-related initiatives.²⁵ To comply, the State will implement: (1) a building energy code for residential buildings that achieves

²⁵ The application filed by NYSERDA with DOE requests a grant in the amount of \$123 million. Approximately \$4,840,000 would be earmarked for technical assistance and compliance support related to the Energy Code.

equivalent or greater energy savings than the 2009 edition of the International Energy Conservation Code (2009 IECC), (2) a building energy code for commercial buildings throughout the State that achieves equivalent or greater energy savings than the 2007 edition of ASHRAE Standard 90.1 (2007 ASHRAE 90.1), and (3) a plan for achieving and maintaining compliance with those codes in not less than 90 percent of new and renovated building space by the end of 2016. The plan must include active training and enforcement programs and provisions for measurement of the rate of compliance each year. Efforts are now underway to enable the State to meet these requirements.

Although the Energy Code is adopted at the State level, it is enforced at the local level. In most situations, the local government (city, town or village) responsible for enforcing the State Uniform Fire Prevention and Building Code (Uniform Code) is also responsible for enforcing the Energy Code. Educational expertise and available manpower vary across the State, with some municipalities being severely understaffed.

Code enforcement personnel responsible for enforcing the Uniform Code are required to take a 114 hour basic training course prior to, or within one year following, commencement of employment, and to take 24 hours of annual in-service training each year thereafter. However, only a small portion of the currently required training courses relate to the Energy Code. A plan to achieve compliance with the Energy Code in at least 90 percent of new and renovated building space within 8 years, as conditioned by ARRA, should include a significant increase in the amount of Energy Code-related instruction that code enforcement personnel will be required to receive.

The ability of the State to achieve the 90 percent compliance rate contemplated by ARRA will be greatly enhanced if all participants in the building and building-related industries receive training in the new Energy Code. Ideally, State-provided instruction would be made available not only to code enforcement personnel, but also to design professionals, builders, and others in the building and building-related industries. Consistent with the provisions of ARRA, DOS, in partnership with NYSERDA, plans to offer a range of energy code training opportunities across the State and on the Web.

DOS has recently adopted an amendment to its regulations which requires local governments that administer and enforce the Uniform Code to file annual reports with DOS detailing their code enforcement activities. Since local governments that administer and enforce the Uniform Code are also required to administer and enforce the Energy Code, the reporting form requests information regarding the local government's efforts in enforcing the Energy Code. This reporting program is expected to be useful for measuring compliance with the Energy Code.

On an annual basis, building renovation activity in New York, as measured in square feet, far exceeds new building construction. Under Article 11 of the Energy Law, the Energy Code applies to renovations only if renovations involve replacement of fifty percent or more of a "building subsystem."²⁶ This high threshold for Energy Code applicability to renovations (referred to as the "Fifty Percent Rule") reduces New York's opportunity to use the Energy Code to achieve improved energy efficiency in existing buildings. The Energy Code should be applicable to renovations of residential buildings and commercial buildings to the same extent that the 2009 IECC and the 2007 ASHRAE 90.1, respectively, are applicable to such renovations. In addition, the Energy Code currently exempts certain historic "properties," rather than historic "buildings," from the Energy Code's requirements. Under this law, renovation of non-

²⁶ A "building subsystem" is defined by Energy Law §11-102(9) as "a building assembly made up of various components which serve a specific function, including but not limited to exterior walls, roof and ceiling, floor, lighting, piping, duct work, and equipment."

historic buildings or construction of new buildings located on “historic properties” would not be subject to the Energy Code. The Energy Code should exempt historic residential *buildings* and historic commercial *buildings* to the same extent that such buildings are exempt from the 2009 IECC and the 2007 ASHRAE 90.1, respectively. Further, the ability to amend the Energy Code should no longer be contingent on obtaining a ten-year payback study to confirm that the cost of compliance with the amended code will be paid back through energy savings in ten years or less. This ten-year payback requirement delays the timely adoption of new energy conservation measures. National model energy codes: (1) do not include a Fifty Percent Rule, (2) exempt historic *buildings*, and not historic *properties*, and (3) contain no ten-year payback study requirements. In addition, provisions of the Energy Law that provide the Energy Code to be updated from time to time should be strengthened to require updating no less frequently than every three years.

Recommendations

- The State should amend Article 11 of the Energy Law to: (1) provide that the Energy Code applies to renovations of residential buildings and commercial buildings to the same extent that the 2009 IECC and the 2007 ASHRAE 90.1, respectively, apply to such renovations, (2) clarify that historic *buildings*, rather than historic *properties*, are exempt, (3) eliminate the 10-year payback requirement, and (4) require the State Fire Prevention and Building Code Council (the Code Council) to amend the Energy Code so that it equals or exceeds the 2009 IECC for residential buildings and equals or exceeds the 2007 ASHRAE 90.1 for commercial buildings.
- DOS should provide regular updates to the Energy Code in response to updates to the IECC for residential buildings and ASHRAE 90.1 for commercial buildings.
- DOS, in consultation with NYSERDA, should follow through on the implementation of the Code compliance plan required by ARRA, including Code training and enhanced Code enforcement resources.
- The State should enact energy efficiency standards for products for which the federal government does not preempt states.

Delivery of Information to Consumers. Achievement of the State’s energy efficiency goals is dependent upon action by consumers to invest in energy efficiency equipment and infrastructure. Enhancing the energy use/cost information provided to consumers, particularly at the time of a purchase decision, will facilitate informed decisions that may have a prolonged effect on energy consumption and bills, and provide a powerful incentive for producers and sellers to make sure that their products satisfy consumer expectations regarding energy efficiency. Although New York has made considerable progress in increasing consumer awareness and understanding of the benefits of energy efficiency, the design and delivery of such information can be improved in several ways.

State-supported outreach, education and marketing efforts regarding energy efficiency should be tailored to promote consumer action. Thus, information provided to consumers should incorporate state-of-the-art behavioral marketing theory and practice. Delivery of this information should also optimize use of diverse delivery vehicles including the Internet, mass media, and community-based organizations. Special attention should be given to communities that are generally considered “hard to reach” by virtue of their economic and demographic characteristics or geographic location, as well as to consumers for whom English is not the primary language. Additionally, where practical, outreach should be targeted to

commercial and industrial customers and community clusters such as housing developments, to maximize program impact.²⁷

In recognition of the fact that one of the most critical energy-related purchase decisions concerns the purchase of a home or lease of an apartment, the information provided to consumers concerning the energy consumption and efficiency of a residence should be enhanced. The State's Truth in Heating Law,²⁸ which requires sellers of residential properties and lessors of residential structures to provide certain information regarding energy use upon request of a prospective purchaser or tenant, should be strengthened to: expand the information that must be disclosed and require that information regarding the energy use of a residential structure be provided to prospective tenants and purchasers before a contract to rent or purchase is signed. These changes would help ensure that consumers have the opportunity to consider information regarding the energy use of a potential residence, before making a purchase decision, thus providing a powerful incentive for building owners to invest in energy efficiency. In addition, the law might be modified to extend the disclosure requirements to commercial structures.

Similarly, energy "benchmarking," which entails the public issuance of a building's energy consumption, indexed against buildings of comparable size and use, would provide information regarding a building's energy use to building owners and managers, prospective tenants and prospective purchasers, thereby increasing the incentive for building owners and managers to reduce energy consumption. Such information would be of particular benefit in the commercial office building sector: because the proportion of electricity consumed in this sector in New York is far above the national average, commercial customers are generally less responsive to energy price changes than other customers, and building owners have a relatively small incentive to invest in energy efficiency where tenants pay the energy bill. The City of New York is currently considering benchmarking legislation.

Consistent with these initiatives, redesigning electric rates to vary by time of use for all electricity users, and providing cost/use information to users on a real time basis would enable customers to make informed decisions about when and how they can reduce their electricity use. This topic is addressed in greater detail below in the Electric System Efficiency discussion.

Recommendations

- Assure that efficiency outreach, educational and marketing efforts conducted by State agencies and authority administrators and utilities reflect best practices in terms of design and delivery, are geared to diverse audiences, and are provided in languages other than English.
- Targeted outreach should be used to deliver energy efficiency programs and services to commercial and industrial customers, residential and low income communities, to improve program performance and reduce administrative costs. Education, outreach and marketing for energy programs should be tailored, e.g., foreign language advertising, to target vulnerable populations and potential environmental justice areas.

²⁷ In his 2009 State of the State, Governor Paterson called for the creation of an energy efficiency clearinghouse to streamline access to the State's energy efficiency programs for schools, hospitals, and local governments. The clearinghouse website (<http://www.nyserda.org/clearinghouse/>) can serve as a model for other targeted outreach efforts.

²⁸ New York State Energy Law, Article 17 §103.

- The State should amend the Truth in Heating law to ensure that prospective purchasers of residential and commercial buildings, as well as lessees responsible for payment of utility bills, are provided relevant information regarding the key energy efficiency attributes of the building.
- The State, in cooperation with New York City and other large municipalities, should implement energy-use benchmarking programs under which a building's energy use indexed against comparable buildings is publicly disclosed. This requirement should cover at least commercial office buildings and should include a report on the opportunities for energy savings, costs of achieving such savings, and impacts on property values and the local tax base.

Reducing Financial Barriers to Energy Efficiency Investment. One of the most significant barriers to adoption of cost-effective energy efficiency measures is lack of capital, or reluctance to commit capital, on the part of consumers. The need for upfront capital to make a substantial investment in energy efficiency is an issue of particular concern in difficult and uncertain economic circumstances. Although this concern is addressed, in part, by energy efficiency programs that provide substantial discounts on the cost of efficiency measures, as well as financing offered through NYSERDA and others, alternative financing programs to fund energy efficiency projects should be implemented. For example, in 2009, legislation passed both the State Senate and Assembly that will allow the City of Binghamton and the Town of Bedford to provide loans to businesses and residents to install distributed energy resources and make energy efficiency improvements; the loans would be paid back through assessments on the real property where the loan was applied. Another promising approach is on-bill financing, under which utilities or third-parties provide upfront financing for efficiency measures that are repaid by the customer through the savings in their monthly energy bills.

PSC has been evaluating the legal, technical and policy issues associated with on-bill financing programs, and recently initiated a proceeding intended to develop an on-bill financing pilot program. Other means to overcome financial barriers to investment in energy efficiency should also be evaluated, including: (i) a micro-loan fund to provide short-term financing for energy efficiency investments conducted by residential and small commercial customers, which would be repaid through monthly bill savings, and (ii) a clean energy district financing program under which efficiency investments by small users would be financed by municipal debt with long term payback obligations repaid through property tax charges secured by a lien against the property.

Recommendation

- The State should identify and implement alternative financing programs to fund energy efficiency projects, exploring all available innovative financing mechanisms, including use of a performance management approach where the beneficiary of the efficiency services repays the lender from energy savings for money loaned. Private and other governmental sources of funding should be explored.

State Government Buildings. The State must lead by example, and make sure that the State's own buildings are energy efficient. Executive Order No. 111, originally issued in 2001, requires State agencies to reduce energy use by 35 percent below 1990 levels by 2010. While many agencies have dramatically reduced their energy use to comply with the Order, the program is not administered and savings are not measured in a consistent manner across the agencies, thereby making it difficult to evaluate progress toward the goal. Additionally, State entities report upward pressure on their energy use as a result of the expansion of air conditioned spaces, increased load from computers and office equipment, and increased numbers of customers and clients. Improvements in the process, scope and metrics of the Order would help to ensure that accurate and meaningful movement toward meeting energy efficiency goals are in place. Furthermore, agencies will soon have another tool to make efficiency improvements in their buildings at no cost to the State. Legislation has passed that expands NYPA's authority to finance energy efficiency projects in all public buildings. NYPA provides 100 percent of the upfront costs of building retrofits and it is reimbursed over time through the energy savings achieved from the project.²⁹

Recommendations

- Amend Executive Order No. 111, which places requirements on State agencies pertaining to energy efficiency and renewable energy, to ensure efficient and consistent administration and measurement of savings.
- Encourage agencies to work with NYPA to take advantage of its efficiency financing programs in order to meet the goals of Executive Order No. 111.

Initiatives by Energy Source

Electricity. The need for infrastructure to produce and deliver electricity is driven by end-use demand. From 1997 to 2007, New York's electricity sales increased 1.2 percent annually. Results of the Starting Point case, which assumed only reaching 27 percent of the '15 by 15' goal, show that from 2009 to 2018, electricity demand increases at an average rate of 0.8 percent per year, or a total increase of 7.3 percent. In dramatic contrast, results of the Policy Reference case, based on full achievement of the '15 by 15' goal, show a reduction in demand over the planning period, as well as a reduction in output from New York's gas-fired combined cycle generating plants and a reduction in electricity imports.

In light of these benefits, the State has taken steps to fully fund electricity targeted efficiency programs in an effort to meet Governor Paterson's '15 by 15' goal. Achieving this goal will require the cooperative efforts of many different entities, including all State agencies and authorities.

²⁹ Governor's Program Bill #34. A.9040 (Cahill) /S.6050 (Stachowski). http://www.ny.gov/governor/bills/pdf/gpb_34.pdf

Figure 2 projects energy use reductions by major program categories that will be needed to meet the ‘15 by 15’ goal, assuming continuation of existing programs, implementation of new programs, and the contribution of enhanced codes and standards. The area marked as “Ratepayer Funded Programs” is the portion of the ‘15 by 15’ goal to be met by new PSC-authorized programs to be administered primarily by utilities and NYSERDA. The other large wedge on the chart, “Codes and Standards,” underscores the importance of enhancing efficiency standards for electrical equipment and appliances and for assuring compliance with the Energy Code – as discussed above. The ongoing programs of NYSERDA, as well as expanded programs by NYPA and LIPA, are projected to make up most of the balance. It is significant to note that even with the considerable achievements made to date in the State’s end-user efficiency programs, achieving the ‘15 by 15’ goal will require nearly a five-fold increase in annual energy savings by 2015.

Achieving the ‘15 by 15’ policy goal is expected to reduce the net retail cost of electricity paid by all ratepayers by 2015.³⁰ Figure 3 and Figure 4 show the results of an analysis of the net impacts of the ‘15 by 15’ policy on Statewide average retail electricity prices in selected years. As shown in Figure 3, in 2015, the Statewide average retail price of electricity is projected to be 0.4 to 0.9 cents per kWh lower, on a net basis, than if the ‘15 by 15’ policy were not implemented. Figure 4 indicates that this estimated reduction in net price per kWh is equivalent to aggregate annual bill savings to ratepayers of \$600 million to \$1.4 billion in 2015.

³⁰ Pursuing the ‘15 by 15’ policy goal impacts average retail electricity prices in two opposing ways. First, the average retail price is expected to increase because the annual cost of implementing and administering energy efficiency programs is added to customer bills and utility fixed costs will be spread across a smaller amount of energy sales. Second, the commodity portion of the electricity price is expected to decrease as a result of the price reduction effect of lower overall demand for electricity. Both types of price impacts affect all ratepayers, assuming that energy efficiency program costs are averaged across all customer classes and locations. This analysis does not include the additional bill savings that accrue to program participants who install energy-saving equipment and thereby benefit as a result of reduced volume of electricity purchased over time. The price reduction (or “market price effect”) impact of achieving the ‘15 by 15’ policy goal is extracted directly from IPM modeling results by comparing the Statewide average electricity prices in the SEP Policy Reference Case, which assumes full achievement of the ‘15 by 15’ policy goal, to the Higher Demand Case, based on NYISO’s econometric forecast, which includes no downward adjustments for implementation of the ‘15 by 15’ policy goal. The lower average electricity prices in the SEP Policy Reference Case are directly attributable to achievement of the ‘15 by 15’ policy goal, due to the reduction in the need for electricity generated by the most inefficient and expensive fossil fuel-fired units, as well as by reducing imports of electricity from outside New York. Because the annual costs to ratepayers of all the programs needed to achieve the ‘15 by 15’ policy goal are not yet known with a high degree of certainty, “low” and “high” estimates are used to bound the analysis. The low estimate is based on a three-year historical average (2006 through 2008) of NYSERDA’s energy efficiency programs funded through the System Benefits Charge. The high estimate assumes that the future cost of energy efficiency programs on a cents per kWh basis is double the cost of programs implemented to-date. The expected system load reduction due to improved Codes and Standards is assumed to be achievable with no incremental cost to ratepayers.

Figure 2. Achieving New York's '15 by 15' goal

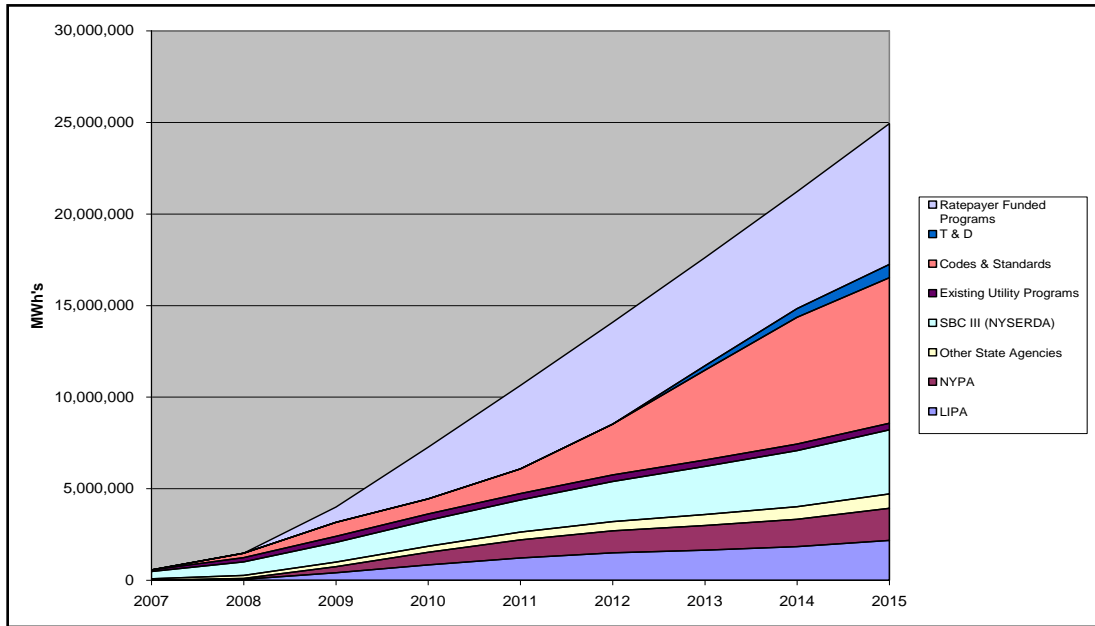
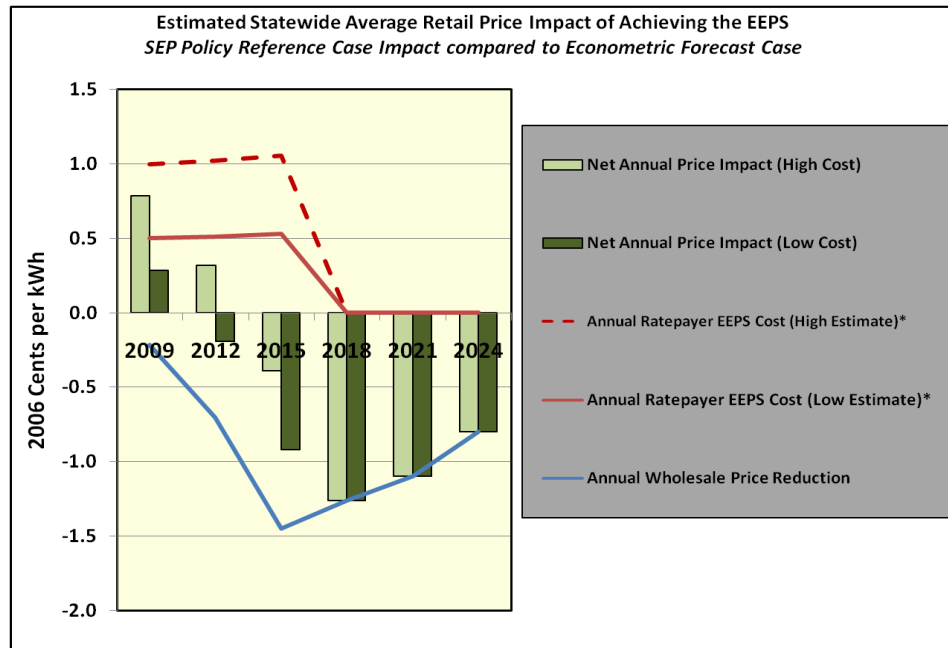
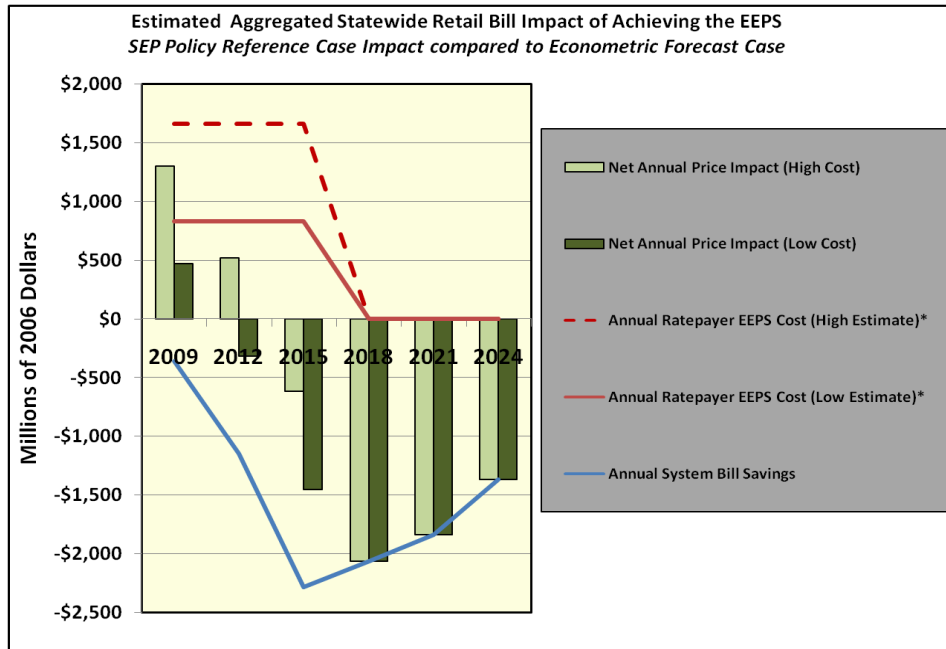


Figure 3. Estimated Statewide Average Retail Price Impact of Achieving the EEPS



Source: NYSERDA

Figure 4. Estimated Aggregated Statewide Retail Bill Impact of Achieving the EEPS



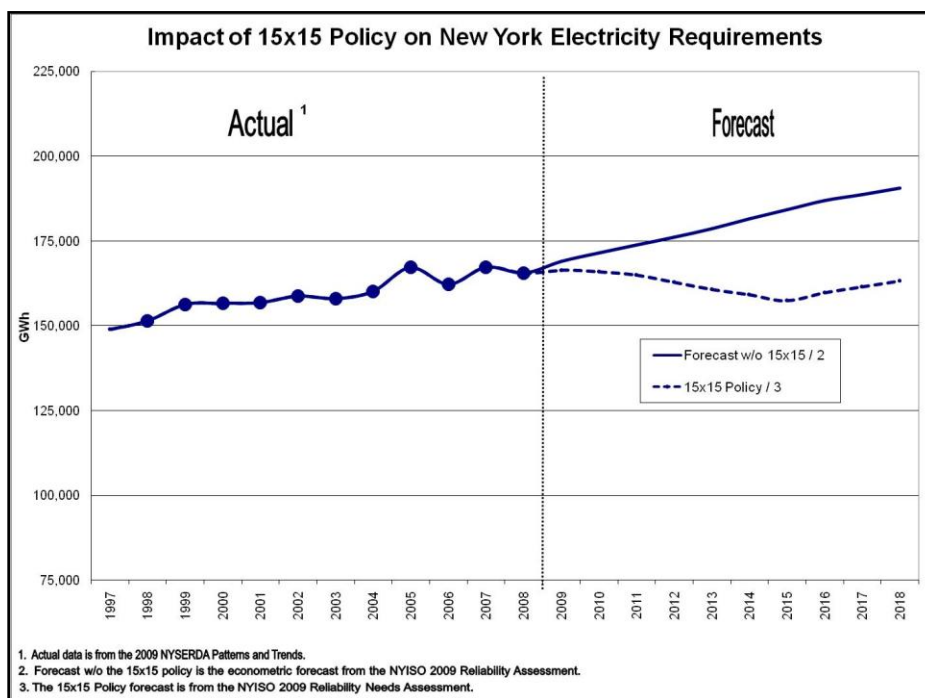
Source: NYSERDA

The EEPS proceeding was initiated by PSC in May 2007 as part of the overall effort to reduce New York’s electricity use by 15 percent from forecasted 2015 levels.³¹ Subsequently, PSC established and approved efficiency targets for the State’s investor-owned electric utilities and NYSERDA.³² Figure 5 shows the expected impact of the ‘15 by 15’ policy on New York’s total electricity needs, compared to forecasted total electricity needs without the policy.

³¹ PSC. *Case 07-M-0548: Proceeding on Motion of the Commission Regarding an Energy Efficiency Portfolio Standard, Order Instituting Proceeding*. Issued May 16, 2007.

³² Implementation of EEPS programs will be the responsibility of NYSERDA, the utilities, and third party program administrators.

Figure 5. Impact of 15 percent reduction in electricity use



In June 2008, the first programs were approved.³³ Approximately \$74 million per year through 2011 was approved for NYSEERDA to expand and enhance a number of existing programs, including a lighting program, low income program and programs to encourage high-performance energy-efficient buildings, improving industrial processes and expanding the number of service providers available to facilitate more informed decision-making with respect to energy efficiency, energy procurement, and project financing. An additional \$74 million per year through 2011 was authorized for investor-owned utility programs that could be implemented quickly and build internal energy efficiency program administration capabilities within the companies. The electricity programs include a residential heating, ventilation and air conditioning (HVAC) program, and a small business direct install program for retrofits of various types of existing equipment with high-efficiency equipment. The approved natural gas program is a residential efficient gas equipment program focusing on incentivizing installation of more efficient furnaces, boilers and water heaters.³⁴

To help ensure the integrity of the energy efficiency savings through collection of accurate data on actual achievements, PSC provided for the development of evaluation, monitoring, and verification protocols, a series of screening metrics, including a total resource cost analysis, and increased evaluation budgets

³³ PSC. *Case 07-M-0548: Proceeding on Motion of the Commission Regarding an Energy Efficiency Portfolio Standard, Order Establishing Energy Efficiency Portfolio Standard and Approving Programs*. Issued June 23, 2008. This approved funding is incremental to funding of \$175 million annually for the pre-existing SBC Program, which is used in part to support energy efficiency programs.

³⁴ PSC approved “Fast Track” utility-administered electric energy efficiency programs with modifications on January 15, 2009. Utility-administered natural gas programs are being considered by PSC. NYSEERDA began implementing additional electric energy efficiency programs on March 13, 2009.

compared to previously approved programs. These approaches are critically necessary for electric system planning, estimation of reduced utility revenues due to lower sales levels, and evaluation of the success and cost-effectiveness of the programs.

Throughout the remainder of 2009, it is anticipated that PSC will consider additional programs to be operated through 2011 as proposed by EEPS Program Administrators. PSC will institute a comprehensive review of the programs included in its EEPS initiative in advance of the December 31, 2011 expiration of the initiative's initial phase to inform its decisions regarding funding beyond 2011. Levels of funding and program selection will depend heavily on the results of the EM&V initiatives PSC has been putting in place.

The State is also undertaking several other initiatives to drive further improvements in the efficient use and delivery of energy, including continued implementation of revenue decoupling mechanisms for all the State's major energy utilities to remove potential disincentives to utility promotion and implementation of efficiency programs, and preparing for the deployment of Advanced Metering Infrastructure (AMI) in a cost-effective manner – as discussed in the Electric System Efficiency section.

Recommendations

- NYPA and LIPA should take the necessary action, including funding decisions consistent with their adoption of '15 by 15' initiative, to ensure they are contributing appropriately to the State's clean energy goals.

Natural Gas. Outside the electricity sector (which accounts for 34 percent of natural gas use in the State), natural gas is used primarily in the residential and commercial sectors for heating, hot water and appliances. End-use efficiency through improvements in products and weatherization can significantly reduce natural gas demand. A reduction in natural gas demand through efficiency can reduce strain on natural gas infrastructure, and because a portion of the electricity system is dependent on natural gas, it can also improve electric system reliability due to reduced risk of fuel supply disruptions.

As discussed in the Energy Demand and Price Forecasts Assessment, it is anticipated that residential and commercial natural gas demand will increase over the planning horizon at annual rates of 0.12 percent and 1.25 percent, respectively. The projected increases are primarily driven by economic growth and increases in the number of customers, but some conversions from heating oil to natural gas are also expected. It is also anticipated that the overall trend of natural gas use *per residence* will decline because appliances and equipment that use natural gas are expected to become more efficient over time in response to federal regulation, and, unlike for electricity, there are relatively few new natural gas products for residential customers coming to market.

There is significant potential to reduce demand for natural gas through energy efficiency improvements. A natural gas efficiency potential assessment update was conducted in 2008.³⁵ The 2008 updated assessment projected program potential energy savings of 2.8 percent of 2017 forecasted energy use.³⁶

While the potential for reducing natural gas use through efficiency programs is significant, efficiency programs in other energy sectors could affect the overall demand for natural gas. For example, many electricity efficiency programs, including NYSERDA's EmPowerNY and Assisted Home Performance with ENERGY STAR[®] programs, encourage switching electric appliances, such as clothes dryers and hot water heaters, to gas-fired appliances. A growing market also exists for CHP technologies, which enable customers – primarily commercial and industrial – to use natural gas on their premises to generate electricity and use the waste heat for space and water heating. Further, utility-sponsored programs promote switching from electricity and oil to natural gas. While these initiatives would tend to increase natural gas consumption, the increase could be at least partially offset by a reduction in natural gas use for central station electricity generation. Also, overall efficiency could be improved. For example, using natural gas for water heaters, which typically operate at between 60 percent and 80 percent efficiency, is more efficient than burning natural gas at a power plant (with a maximum efficiency of 60 percent) and shipping the electricity over power lines (with resulting line losses of 8-10 percent) for an electric water heater (with an efficiency of 90-95 percent) resulting in a net efficiency of approximately 50 percent.

In May 2009, PSC established targets for natural gas efficiency programs as part of the EEPS proceeding in order to establish a comprehensive approach to gas efficiency, including a transition from the interim and “fast track” programs.³⁷ Combined with reductions anticipated from other sources, the natural gas reduction targets will result in a nearly 15 percent reduction in estimated gas use by 2020, independent of any fluctuations in use caused by fuel switching or other economic factors.

Natural gas efficiency programs previously approved on an individual basis outside of the scope of the EEPS proceeding vary in design and duration and are expected to result in natural gas savings of approximately 2,400,000 MMBtu in 2009 with annual funding of approximately \$62.7 million.³⁸

Earlier in the EEPS proceeding, natural gas utilities established energy efficiency programs that provide rebates to consumers for purchasing high-efficiency equipment such as furnaces, water heaters, clothes washers, solar hot water technology, and hot water conservation measures. The programs also provide marketing training for contractors and sponsor discounted sales of low-flow showerheads, faucet aerators,

³⁵ The original study, Optimal Energy, Inc. *Natural Gas Energy Efficiency Resource Development Potential in New York*. 2006, estimated the potential natural gas savings based on \$80 million per year for five years and five years post market effects. The Optimal Energy, Inc. *New York State Natural Gas Efficiency Program Assessment Update*. 2008, changed the length of the \$80 million per year program scenario funding from five to ten years (from \$400 million to \$800 million) and applied a modified discount rate. All other assumptions used in the 2006 study were preserved including budget allocation based on sector spending, 50 percent of the residential budget allocated to low income consumers, and the proposed programs which attempted to balance short-term resource acquisition efforts and long-term market transformation benefits.

³⁶ The updated assessment potential savings is almost twice the figure the 2006 five-year program indicated would be achievable by 2016. The original study estimated approximately 1.5 percent of total projected customer load in 2016 as a result of \$80 million per year for five-year program delivery and five-year post market effects.

³⁷ PSC. *Case 07-M-0548 Proceeding on Motion of the Commission Regarding an Energy Efficiency Portfolio Standard, Order Establishing Targets and Standards for Natural Gas Efficiency Programs*. Issued May 19, 2009.

³⁸ PSC. *Case 07-M-0548 Proceeding on Motion of the Commission Regarding an Energy Efficiency Portfolio Standard, Report on Natural Gas Efficiency Goals, Working Group IV*. Submitted October 17, 2008.

and tank wraps.³⁹ Also, in April 2009, EEPS programs for residential gas efficiency equipment programs, designed to promote the installation of efficient, cost-effective, furnaces, boilers and other equipment were approved. These programs are funded at approximately \$10.6 million per year through 2011, and designed to reduce annual natural gas consumption by approximately 533,000 MMBtu per year.⁴⁰

In total, the EEPS gas efficiency target represents a 14.7 percent reduction in estimated gas usage by 2020, independent of any fluctuations in usage caused by switching or other economic factors, representing an average annual reduction of gas usage of 3.8 billion cubic feet by 2020, enough gas to heat about 39,000 average-sized homes. This target is aggressive in comparison with the gas efficiency potential study identified above, which estimated a maximum achievable potential of 18 percent of projected consumption over ten years. New York's goal is expected to be achieved as a result of changes to codes and standards, a continuation and expansion of programs administered by State authorities and DHCR, as well as through programs authorized by PSC-approved funding totaling \$130 million annually. Now that programs for natural gas efficiency are underway, it is critical that these programs be coordinated with the State's other efficiency initiatives to help ensure maximum benefits without duplication of efforts.

Oil and Other Fuels. Adoption of ultra-low sulfur heating oil for residential, commercial, and industrial heating applications could yield energy efficiency improvements, lower emissions, and reduced system maintenance costs. Reducing the sulfur content of heating oil offers clear benefits including: reduced fouling of heat exchangers and reduced rates of efficiency degradation; reduced emissions of fine particulates; and stimulation of the market for ultra-high efficiency condensing appliances. In these appliances, low sulfur oil produces a condensate that is less corrosive. This allows the use of more compact appliances and use of more common materials of construction, both of which reduce the cost of achieving high efficiency levels. In these condensing appliances ultra-low sulfur fuel also leads to reduced maintenance requirements and longer life. Finally, the use of ultra-low sulfur heating oil will reduce the number of homeowner service calls due to the "clean burn" and subsequent reduction in plugging and soot build up of the heating systems.

NYSERDA has approved a RGGI Operating Plan calling for a set of new programs designed to increase the energy efficiency of homes, businesses, and industrial facilities that use fuel oil for space heat, water heat, and process heat.⁴¹ The programs have been designed to fund activities that are not currently funded by existing programs. These RGGI programs will create an "all fuels, all sectors" approach to New York efficiency activities and capture additional efficiencies and energy bill savings opportunities.

³⁹ PSC. *Case 08-E-1003 Petition of Orange and Rockland Utilities, Inc. for Approval of an Energy Efficiency Portfolio Standard (EEPS) "Fast Track" Utility-Administered Electric Energy Efficiency Programs with Modifications, et al.* Issued January 16, 2009.

⁴⁰ PSC. *Case 08-G-1016 Petition of KeySpan Energy of New York for Approval of an Energy Efficiency Portfolio Standard (EEPS) "Fast Track" Utility-Administered Gas Energy Efficiency Program with Modifications, et al.* Issued April 9, 2009.

⁴¹ *Operating Plan for Investments in New York under the CO₂ Budget Trading Program and the CO₂ Allowance Auction Program.* 2009. <http://www.nyscrda.org/RGGI/Files/Final%202009-2011%20RGGI%20Operating%20Plan.pdf> In New York, the RGGI Program has been implemented through two complementary programs: DEC has established New York's CO₂ Budget Trading Program (6 NYCRR Part 242, 6 NYCRR Part 200, General Provisions) and NYSERDA has established the CO₂ Allowance Auction Program (21 NYCRR Part 507). The CO₂ Allowance Auction Program has established the rules through which New York will sell most of its CO₂ allowances. The CO₂ Allowance Auction Program (at 21 NYCRR Part 507.4(d)) also creates the parameters for use of the proceeds from the sale of allowances, and which will be used to: "... promote and implement programs for energy efficiency, renewable or non-carbon emitting technologies, and innovative carbon emissions abatement technologies with significant carbon reduction potential."

To use energy more efficiently in the transportation sector, the reliance on petroleum must be reduced. This should be accomplished through reduced usage and a transition to cleaner, less carbon intensive vehicles and fuels. Reductions in petroleum use can be accomplished by reducing the number of miles driven by single occupant vehicles. On the passenger side, this requires the availability of other “green” transportation choices such as reliable public transportation, intercity passenger rail options, carpooling and ride-sharing services, and education and outreach programs to inform the public of their transportation choices and the effect those choices have on air quality. On the freight side, increasing options for freight rail services and improving intermodal connections can reduce the growth in vehicle miles of travel.

Many of these strategies and improvements will help the State achieve the goal set by the Governor’s Renewable Energy Task Force Report, namely to reduce VMT by 10 percent statewide from projected levels within 10 years.⁴² The State supports local government policies and actions that will reduce congestion and VMT where such measures are found to be cost-effective and supported locally. To assess the State’s progress in reducing VMTs, the New York State Department of Transportation (DOT) should track statewide VMT levels, data limitations, discrepancies and trends and continue to estimate GHG emissions, energy usage and other emissions as part of adoption and approval of transportation plans, programs and projects.

Innovation in the transportation system can also result in the system becoming more energy efficient. New York has been active in the use of innovative technology in the transportation sector and intends to support additional deployment. Maximization of investment in the Intelligent Transportation Systems (ITS) has energy efficiency benefits. ITS encompasses a broad range of wireless and wire line communications-based information and electronic technologies that can be used to improve safety and efficiency in many ways. As one example, ITS can be used to provide real-time information to travelers, allowing them to make more efficient route choices, and hence use less gasoline, by avoiding congested or closed roadway. They can also be used for communicating to emergency responders and the public, where incidents, accidents and traffic jams have occurred, allowing the responders to get to the scene more quickly and advising the public to take alternate routes.

To reduce GHG emissions from vehicles, the State has promulgated Greenhouse Gas Exhaust Emission Standards revising New York’s existing low emission vehicles (LEV) program to adopt California’s GHG emission regulations.⁴³ President Obama has now endorsed these standards as a model for a federal program. This year the Obama Administration proposed rules to require passenger cars to reach a 39 mpg fuel economy standard by 2016 and 30 mpg for light trucks and sport utility vehicles. This results in an overall fuel efficiency standard of 35.5 mpg. Nationally, the transportation sector contributes nearly a third of the U.S. GHG emissions. There is a need to reduce these emissions to slow the rate of climate change caused by human activity. Given the urgency and recognizing the historic next steps taken by the Administration, New York believes that a more aggressive standard and timetable can be achieved for future CAFE standards. A standard that is equivalent to the “Technology Exhaustion” alternative for light duty trucks and the “Total Costs Equal Total Benefits” alternative for passenger cars is economically and technologically feasible (as described in the Environmental Impact Statement on CAFE standards prepared by National Highway Traffic Safety Administration). This would produce a fuel economy standard of 43.3 mpg for passenger cars and 34.7 mpg for light trucks.

⁴² Renewable Energy Task Force. *Clean, Secure Energy and Economic Growth: A Commitment to Renewable Energy and Enhanced Energy Independence*. 2008. http://www.state.ny.us/governor/press/lt_RETf_Report.pdf

⁴³ 6 NYCRR Subpart 218-8.

While there are many opportunities for the State to use energy more efficiently in the transportation system, providing sufficient resources to accomplish many of the strategies and programs is challenging. Identified funding is not enough to maintain the system in a state-of-good repair, let alone to enhance its energy efficiency. DOT produced a comprehensive needs study in 2007 that showed that transportation investments are less than half of what is needed.⁴⁴ New and innovative funding mechanisms should be explored.

Recommendations

- The State should expand green transportation choices to users of the transportation system (residents and businesses). This includes enhanced public transportation service and carpooling/ride-matching services for commuters and intercity rail, as well as waterborne services, for shippers. In this way, the State will help meet the statewide goal of reducing VMT 10 percent below projected levels by 2020.
- All State agencies should consider transportation choices, energy use, energy conservation, and climate change as part of their State Environmental Quality Review Act (SEQRA) reviews when they are lead agencies. Transportation Plans and Transportation Improvement Programs (TIPs) should embrace smart growth and GHG emission reductions as key principles.
- The State should support changes in federal surface transportation funding that encourages energy efficiency and GHG reductions.
- The State should work with the federal government to strengthen the recently proposed CAFE standards to standards that require greater fuel economy but are technologically and economically feasible. The State should support efforts to develop and promulgate fuel economy standards for heavy duty on-road vehicles.

End-use Efficiency Programs Beyond 2015. The State's policy to achieve 15 percent savings by 2015 is only an interim goal. As shown in detail in the Energy Efficiency Assessment, modeling shows that if these policies and programs are not continued beyond 2015, then electricity demand will increase between 2015 and 2018. PSC expects to conduct a comprehensive review of progress to date from ratepayer funded energy efficiency programs to position itself to reauthorize program funding as appropriate beyond 2011. All entities responsible for energy efficiency initiatives should conduct a similar review of progress, and the potential for additional efficiency gains in the future. That review will determine, among other things, the extent to which improvements in existing codes and standards, as well as the implementation of new codes and standards, have created downward pressure on the growth of energy use in New York. It will also reveal the extent to which market prices, efficiency benefits, and market transformation efforts have reduced the need for future ratepayer support for energy efficiency programs. Similarly, the State needs to evaluate the progress made regarding energy efficiency in the natural gas and fuel oil sectors, and modify programs going forward. A comprehensive examination of program costs and benefits will inform the degree to which these programs are the best tools to reach the State's efficiency potential beyond 2015.

⁴⁴ Department of Transportation (DOT). *Multimodal Investment Needs and Goals for the Future (20 Year Needs Assessment)*. 2008. <https://www.nysdot.gov/programs/repository/multimodal%20investment%20needs.pdf>

2.2 Electric System Efficiency

Making our electric system more efficient will help to ensure a high level of reliability, help mitigate upward pressure on electricity prices, and allow time to develop the low-carbon-intensity electricity infrastructure necessary to meet long-term GHG reduction goals. Actions taken by the State to date – ranging from the design of its competitive wholesale electricity market to the expansion of energy efficiency programs for end-users – have encouraged the efficient production, delivery, and use of electricity.

2.2.1 Progress to Date

The efficiency of electricity production and delivery in New York has been improving in recent years and several ongoing initiatives are expected to continue that progress. First, New York’s competitive electricity market structure, established in 1999 and administered by the NYISO, provides an economic incentive to power plant operators to run as efficiently as possible. Under this structure, power plants and demand side resources⁴⁵ are dispatched by NYISO in order of lowest to highest bid cost.⁴⁶ All dispatched units are paid the market clearing price, which is based upon the marginal bid of the last plant dispatched.⁴⁷ Under this arrangement, suppliers, absent market power, have every incentive to bid into the market their marginal costs of production, because if they bid below it they may run at a loss and if they bid above it they may not be selected for dispatch and will neither run nor be paid. More efficient, i.e. lower heat rate,⁴⁸ resources are attracted to competitive markets where they can profit by competing against less efficient producers, an incentive that doesn’t exist in non-market regions. The market structure also encourages plants to run more consistently and average plant availability in New York increased from 87.5 percent in the 1992 to 1999 timeframe to 94.4 percent in the 2000 to 2007 timeframe.

2.2.2 Potential for Additional Efficiencies

Power Production

The gross heat rate of New York’s power plant fleet has been trending downward since the late 1990s, indicating a continuing improvement in the overall efficiency of the State’s electric generation. NYISO has calculated that since 1999, New York’s gross heat rate has improved 21 percent.⁴⁹ In general, new plants use technologies that are more efficient than those used in older power plants. As older facilities retire and newer, more efficient plants come on line, the average heat rate of the power plant fleet in New York is expected to improve. The State’s markets and its commitment to continually improve them will facilitate this substitution.

⁴⁵ Demand side resources refer to customer loads that can respond to short term price signals by coming off line.

⁴⁶ See the Electricity Assessment: Resources and Markets and the Energy Infrastructure Issue Brief for additional information.

⁴⁷ The marginal cost is the cost to produce the next increment of output. The generating unit that produces that increment is called the marginal unit (or the unit on the margin) at that point in time.

⁴⁸ Heat rate is a measure of a generator’s efficiency in terms of power output for a given heat input. The lower the heat rate or less heat input that is required for a unit of power output, the more efficient a power plant is.

⁴⁹ NYISO. *New York State Power Plant Emissions 1999 – 2008: A Briefing Paper from the New York Independent System Operator*. 2009. http://www.nyiso.com/public/webdocs/newsroom/press_releases/2009/Briefing_Paper_Power_Plant_Emission_Rates_04212009.pdf.

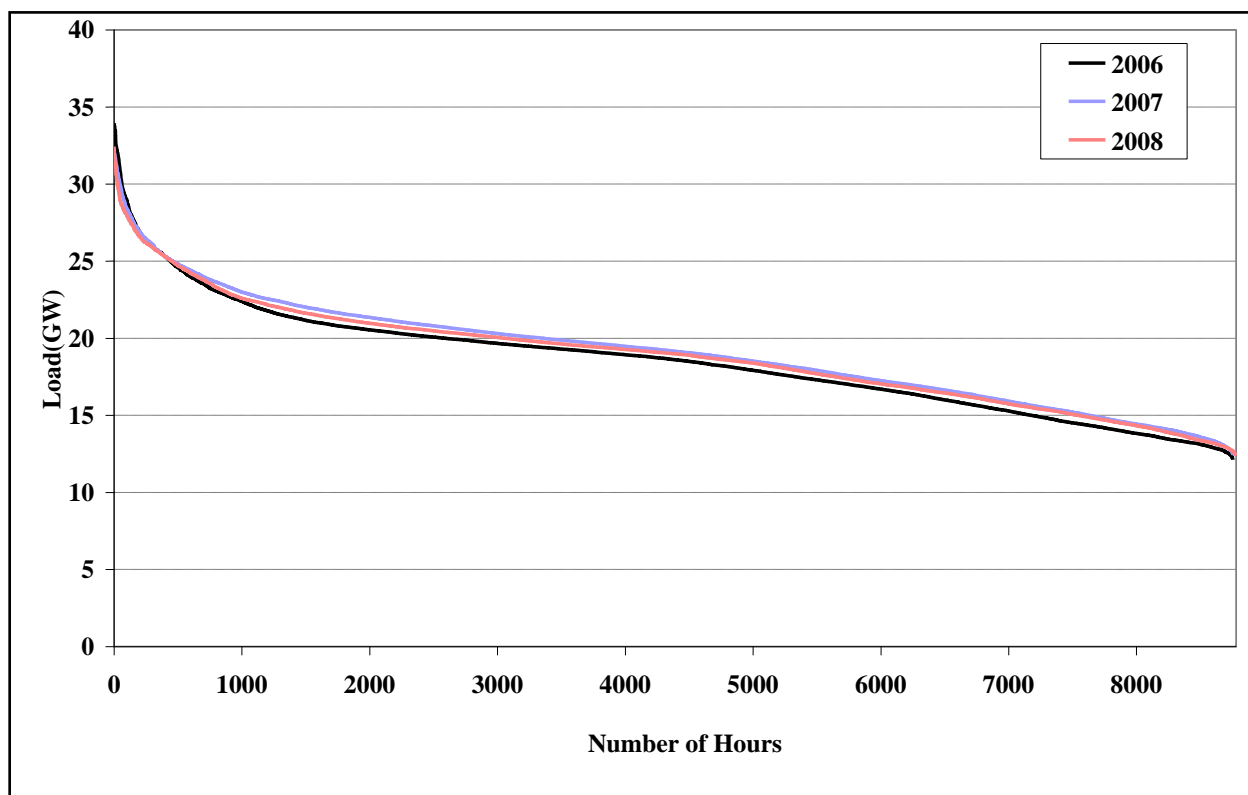
Transmission and Distribution

Improving efficiency in the delivery of electricity from generation facilities to end-users in a cost-effective manner by reducing transmission and distribution system losses will also mitigate prices and environmental impacts. In June 2008 the Public Service Commission commenced a proceeding to reduce system losses and increase power transfer capability.⁵⁰ The proceeding will: examine how generation and existing equipment can be better utilized in efficient system operations; identify actions the utilities could take to minimize their own use of energy; determine what programs the utilities could offer customers to reduce their reactive power uses; and determine what equipment could be installed on the transmission and distribution system to assist in efficient system operations. Commission staff, all the utilities (including LIPA and NYPA), and NYISO are collaborating in this proceeding.

Demand Response. The existing electric grid is structured such that electricity flows from centralized power plants to local sub-stations via the grid's transmission system and then from those sub-stations through the grid's distribution system to the end-user when it is demanded. This infrastructure, i.e., power plants and transmission and distribution systems, must be sized to meet the peak demand of the system, even though this peak may only occur for a few hours every year. As shown in Figure 6, the State needs nearly 35 GW (35,000 MW) of generating capacity to meet peak demand, even though the State only utilizes approximately 70 percent of that capacity for 90 percent of the year. Additionally, during periods of high peak demand, it is often the least efficient, most polluting and most costly plants (peaking units) that must be dispatched.

⁵⁰ PSC. *Case 08-E-0751 Proceeding on Motion of the Commission to Identify the Sources of Electric System Losses and Means of Reducing Them, Order Clarifying Scope of Proceeding*. Issued July 17, 2008.

Figure 6. Load Duration Curves for New York Average Load 2006 - 2008



There are a number of demand response programs in New York which can moderate or shave peak loads. These programs reduce the need for new infrastructure, discipline market prices, help ensure reliability, and promote the efficiency of the system. Programs supported by NYSERDA and PSC have achieved a total of 1285 MW (710 MW permanent, 575 MW callable) of load reductions Statewide. NYISO's demand response programs have been successful in reducing peak load by as much as 900 MW during reserve shortages. The impacts of demand response efforts can be profound and can influence both the need for new infrastructure and the need to call upon the least efficient and most polluting peaking units. Demand response programs are discussed in more detail in the Electricity Assessment: Resources and Markets.

More recently, in February 2009 PSC instituted a proceeding to focus on demand response efforts in New York City stemming from continued peak demand growth and the necessary infrastructure investment needed to meet it, along with the desire to reduce emissions from peaking facilities used to meet peak loads.⁵¹ The proceeding is examining a wide range of demand response issues including an assessment of the total potential cost-effective demand response, the ability to focus programs on system or network peaks (and related impact on potential environmental justice areas), the integration of competitive providers into the programs, funding sources, integration with energy efficiency programs and NYPA demand response programs, and evaluation and measurement methods. Technical conferences are underway and pilot programs are being explored.

⁵¹ PSC. *Case 09-E-0115: Proceeding on Motion of the Commission to Consider Demand Response Initiatives, Order Instituting Proceeding*. Issued February 17, 2009.

Recommendation

1. The State should aggressively pursue cost-effective approaches and technologies that facilitate demand response to achieve reliability and other public policy objectives.

Smart Grid. As described in detail in the Electricity Assessment: Resources and Markets, “Smart Grid” encompasses the use of advanced/enhanced technology and two-way communications to improve the operations and the efficiency of the entire electric grid from generation to end-use consumption. Such an approach, theoretically, would enable active participation of consumers, enable the grid to accommodate all generation and storage options, enable new products, services and markets, provide improved power quality for the digital economy, optimize asset utilization and operational efficiency, and anticipate and respond to system disturbances. Currently, the electric grid in New York, as well as most other large power systems in the world, uses modern and extensive technology to control electricity flow and operations. Increased use of Smart Grid technology in New York could, however, result in significant improvements. Anticipated improvements include enhancing operator decision-making to avoid and manage events similar to the 2003 Northeast Blackout and 2006 Long Island City outages; reduction of power system losses; provision of greater demand response options and results; mitigation of fault duty issues (thereby enhancing DG); improvement of Con Edison’s secondary network monitoring; and automation of distribution system operation.⁵² Further, Smart Grid would likely result in increased dynamic reactive compensation and power flow control in key parts of the system to maintain proper voltages and to increase power flow transfers – or at least reduce power transfer degradations – due to system demands and conditions, and also reduce effects of system disturbances.⁵³

Several initiatives to expand the use of advanced technology and implement Smart Grid elements are underway in New York. Specifically, PSC approved investment of ratepayer funds for investor-owned utilities for Smart Grid project proposals that may be eligible for competitive grants from DOE pursuant to ARRA.⁵⁴ In addition, the State is pursuing Smart Grid through an integrated approach and strategy through its work with utilities and on various task forces and consortiums. The State facilitated the creation of the Smart Grid Consortium, which is a partnership of the utilities, leaders in academia and industry, NYSTAR, NYSERDA, PSC, NYPA, LIPA. The group is coordinating the deployment of Smart Grid projects throughout the State, and leveraging federal ARRA money. The Consortium has expressed support for ARRA Smart Grid applications of its members, which total over \$800 million. Likewise, the State supports these efforts to identify opportunities for accelerating these advancements and cost-effective investment in these technologies with the caveat that any such advancement must anticipate and fully address cyber-security and physical security risks.

Recommendation

1. Consistent with addressing cyber-security and physical security risks, the State supports the ongoing efforts of the Smart Grid Consortium to identify opportunities for accelerating

⁵² Distribution Automation involves the remote monitoring, coordination, and operation of various distribution equipment, e.g., automatic sectionalizing switches.

⁵³ These systems are generally referred to as Flexible AC Transmission Systems (FACTS), which covers a number of system-types that can control voltage and transmission capacity, e.g., Static VAR Compensator (SVC), Static Synchronous Compensator (STATCOM) and those that can control flows, e.g., Unified Power Flow Controller (UPFC), Interline Power Flow Controller (IPFC), and Variable Frequency Transformer (VFT).

⁵⁴ PSC. *Case 09-E-0310: In the Matter of the American Recovery and Reinvestment Act of 2009 – Utility Filings for New York Economic Stimulus Funds, Order Authorizing Recovery of Costs Associated with Stimulus Projects.* Issued July 27, 2009.

advancements and investments in Smart Grid technologies; greater use of distributed resources; advanced meters and pricing mechanisms; and leveraging of federal ARRA Smart Grid funding to support greater system reliability and efficiency, and to reduce electricity costs to customers.

Rate Design and Advanced Metering Infrastructure. Rate design, based on rates that vary by time of use, coupled with advanced metering, may yield end-use efficiency gains and may improve electric system efficiency by reducing peak loads. As explained above, enhancing the information provided to electricity consumers in advance of or at the time of use would facilitate informed decision-making and help reduce customer energy bills. Providing electricity pricing information to consumers at the time consumption decisions are being made, and charging consumers accordingly, would enhance economic efficiency, assist consumers in managing their energy use and controlling their bills and could help reduce system peaks.

PSC has taken action in this regard, including the requirement that the State's largest commercial and industrial customers, generally those with electricity demand exceeding 500 kW, have interval meters to encourage control of daily electric load and discourage use at peak hours. Currently, more than 2200 customers, representing more than 15 percent of peak load, are now billed on day-ahead hourly prices.

In contrast, the vast majority of residential and small commercial electricity customers are informed of the applicable price of electricity only upon receipt of a monthly bill, up to 30 days after-the-fact. Moreover, that unit price represents an average throughout the billing period and does not reflect the consumer's pattern of energy use throughout the month. These customers also generally receive very little information about their consumption behavior and how changes in usage patterns can reduce their energy bills. Finally, these customers do not know when the electricity system is peaking and is using the most expensive units to meet that load. As noted, they receive a bill every month with an average price per kilowatt-hour. If these customers instead received a real-time price signal that reflected the high cost of generation during peak periods, they may be inclined to reduce their energy use during those periods.

LIPA is in the final stages of installing smart meters on approximately 200 residential and commercial customers in two different neighborhoods to determine how smart meters can be integrated into the system. The project will also evaluate how customers can interact with various in-home displays or web-based information tools that will give those customers substantial knowledge on how and when they use their electricity. LIPA's Trustees have recently authorized an AMI pilot rate that will allow LIPA to offer modified time of use rating periods to participating Smart Meter customers in an effort to evaluate alternative time periods and price differentials that would motivate these customers to reduce their energy usage and overall annual electric bills.

Recommendations

- PSC should be authorized to require that electricity be priced on a time of use basis for all customers, upon a finding that it is in the public interest to do so. Issues that should be considered in making that determination include: the practical hardships and difficulties related to implementing time of use rates for residential customers, and possible means to mitigate any such hardships; and alternative rate regimes, based on voluntary participation of residential customers.
- The State should broaden the installation of advanced meters and implementation of mandatory hourly pricing for industrial and commercial customers by continuing to reduce the demand thresholds. PSC and State energy authorities should evaluate and aggressively support implementation of demand response measures where cost-effective and environmentally beneficial.

- The State should continue to implement rate structures and metering requirements for non-residential customers that encourage use of electricity at off-peak hours and/or encourage control of daily electric load.

Energy Storage. Energy storage is also a tool to improve system efficiency. Electricity markets are unique among major commodity markets in that they require instantaneous matching of supply and demand. Other energy commodities, such as natural gas and oil, can effectively be stored in large quantities, providing a buffer between supply and demand. Without an effective means of storage, the electric grid has traditionally maintained excess capacity in generation and transmission. Although it is difficult to store electricity directly, electric energy can be stored in other forms, such as chemical and mechanical energy, and efficiently converted back to electricity as needed. Bulk electricity storage capable of providing hundreds of megawatts of power for several hours and distributed energy storage capable of injecting/absorbing up to several megawatts for seconds or minutes have the potential to provide economic benefits, while improving the stability and reliability of the grid, especially if applied during peak load periods.

Existing and emerging energy storage technologies include pumped hydroelectric generation, compressed air energy systems, batteries (including those used for plug-in electric vehicles), capacitors, and flywheels. Multiple activities to support these technologies are underway. For instance, NYSERDA is involved in an effort to evaluate plug-in hybrid electric vehicles (PHEVs), looking at both the performance and behavior of the vehicles and the potential electric grid impacts that increased penetration levels could have. Related to this effort, in his 2009 State of the State Address, Governor Paterson announced the creation of the New York Battery and Energy Storage Technology (NY BEST) Consortium, which is intended to progress academic research into commercialization of energy storage technologies, with particular focus on applications in the transportation sector. In addition, NYSERDA is supporting a 1 MW flywheel energy storage demonstration project with Beacon Power. The company is also developing a 20 MW application of the flywheel technology to be deployed in Stephentown.

Energy storage technologies optimize the electric system in a number of ways. They could store renewable energy generated off peak for when it is needed. They also provide very rapid frequency and regulation support, responding to signals from NYISO much faster than traditional load-following fossil generation. If storage devices are connected to renewable energy resources, there would be zero emissions.

Recommendation

- The State should include energy storage technologies in the definition of “alternative energy production facility” under PSL, Section 2(2-b), in order to exempt energy storage facilities up to 80 MW from the jurisdiction of PSC. This would reduce the time and cost of permitting and encourage the development of these technologies.

3 Support Development of In-State Energy Supplies

Accelerating the strategic development of New York’s energy resources, both in the renewable energy and natural gas areas, will play a key role in achieving the Plan’s policy objectives. Production and use of in-state energy resources can increase the reliability and security of energy systems, reduce energy costs, and contribute to meeting climate change and environmental objectives. To the extent that renewable resources and natural gas are able to displace the use of higher emitting fossil fuels, relying more heavily on these in-state resources will also reduce public health and environmental risks posed by all sectors that produce and use energy. Additionally, by focusing energy investments on in-state opportunities, New York can reduce the amount of dollars “exported” out of the State to pay for energy resources. By re-directing those dollars back into the State economy, New York can start to increase its economic competitiveness with other states that are less dependent on energy supply imports to support their local economies.

3.1 Renewable Energy

When compared with carbon-intensive fossil fuel resources, renewable resources generally have significantly lower negative impacts on public health and the environment, and contribute less to climate change.⁵⁵ However, while the cost of renewable technologies varies, the levelized cost of renewable energy technologies is generally higher than that of fossil-fuel technologies.⁵⁶ This difference is reflected by the price premium that is paid for renewable electricity under the RPS Program. The price premium, expected to range from approximately \$16 to \$32 per MWh, is the incremental price New York must pay in order to make renewable generation competitive in a market place where price is primarily driven by fossil-fuel resources.⁵⁷ The price disparity between renewable resources and fossil-fueled resources exists in part because the full externality cost of fossil fuel use is not built into its price. These “external” costs include the negative public health and environmental impacts that result from the combustion of fossil fuels. For example, there will likely be increased societal costs associated with the effects of climate change, such as property damage from increased storm activity or moving large populations in newly-inundated areas from floods or rises in sea-levels, and these costs are not currently fully reflected in the price of energy. As a consequence of this disparity, there has not been widespread private investment in and deployment of renewable resources. Therefore, market intervention (typically in the form of regulatory mandates and publicly funded financial incentives) is necessary to reduce the cost disparity to a level that encourages this investment – at least until environmental and other externalities are reflected

⁵⁵ While use of any renewable resources will likely contribute less to climate change than use of fossil fuels, not all renewable resources have significantly lower negative impacts on health and environment. There are environmental impacts and health risks associated with combustion of biomass and bio-fuels that are the subject of current and on-going investigation.

⁵⁶ “Levelized cost” is the net present value of the cost per unit of energy output over the life of the project. It accounts for the upfront capital costs and the marginal costs of operation.

⁵⁷ See the Renewable Energy Assessment for a full discussion of the price premium.

in the prices of fossil fuels. New York is relying on both regulatory mandates, such as the RGGI program, as well as financial incentives for the accelerated development of renewable energy technologies.⁵⁸

Government mandates, e.g., emissions cap and trade programs, renewable fuels standards and financial incentives, that are designed to reduce this disparity are sometimes criticized for having short-term impacts of raising the price of energy. These arguments, however, fail to consider the broader and longer-lasting economic benefits, in addition to environmental and energy security benefits, associated with the development of renewable resources. The direct economic benefits of renewable energy include the creation of short-term (engineering, design and construction) and long-term (administration, operation and maintenance) jobs, increased local capital investment, increased tax revenues for local governments, and increased revenue for landowners. Direct economic benefits lead to additional indirect economic benefits through the macroeconomic “ripple” effects of injecting incremental income into the State economy over the life of various projects, which may be 20 years or more.

As discussed in the next section, the potential exists for renewable energy to meet a large percentage of society’s energy needs, but achieving the full potential in the near-term given current economic and technical realities, would come at an extraordinary cost. As renewable energy programs are designed, targets that are designed to take advantage of the energy, environmental and economic development opportunities must also consider the cost of other resources that are available to meet short-term goals. Over time, the cost of deploying renewable technologies continues to decrease as demand for renewables grows and technologies become more advanced.

3.1.1 In-State Potential and Development Progress

New York’s renewable potential exists in all of the primary energy-consuming sectors of the economy: the electric generation sector, the transportation sector, the residential, commercial, and industrial sectors, and the agriculture sector. New York currently meets approximately 11 percent of its primary energy needs with renewable energy resources. However, the available technical/practical potential, which takes into consideration technical and some social constraints on the pure potential, but not economic constraints, indicates that 37 percent of all New York’s energy needs could be met with renewables by 2018.⁵⁹ This accounts for only hydropower, wind, biomass, and solar-PV. It does not include the potential of significant solar thermal, geothermal, and hydrokinetic energy sources. This “outer-bound” forecast leaves New York with substantial room to expand its use of renewable energy resources. This expansion could technically occur, but there would be a significant cost associated with the implementation of these resources. The solar and wind resources represent approximately 60 percent of the technical/practical potential and an even larger percentage of the overall cost. If the full technical/practical potential for solar and wind resources were installed at current prices, the cost to New York would be approximately \$300 billion dollars.⁶⁰

⁵⁸ RGGI requires electricity generators to purchase CO₂ allowances for every ton of CO₂ they emit. The price of these allowances is built in to the marginal operating costs of the plant, and then passed on in their offering price. In this way, the harmful effects of carbon dioxide emissions are being partially accounted for in the price of electricity.

⁵⁹ Technical/practical potential includes consideration of manufacturing and materials limitations and land-use constraints, e.g., the prohibition of the development of renewable energy projects in State parks, but does not consider economic costs, all social constraints, or system operation, transmission, or distribution limitations.

⁶⁰ The \$300 billion dollar estimate is based on the following approximate installation cost assumptions: solar-PV costs \$8,000 per kW; on-shore wind costs \$2,000 kW, and off-shore costs \$3,300 per kW. The State incentive level required to drive the adoption of this technology would not need to equal the entire \$300 billion, but would be a significant percentage (as much as 1/3

For example, in the electric generation sector, the most significant existing developed resources are hydroelectric power (hydropower), biomass (biogenic waste⁶¹ and wood) and biogas, wind, and solar photovoltaic (PV). As of 2007, in-state hydropower supplied 25,253 GWh (15 percent of total demand), biomass supplied 1,9421 GWh (1 percent of total demand), wind supplied 873 GWh (less than 1 percent of total demand), and solar-PV supplied 17 GWh (less than 1 percent of total demand), for a combined total of 28,085 GWh (17 percent of total demand).⁶² The technical/practical potential of hydropower, biomass, wind, and solar-PV is estimated at 31,000 GWh, 9,400 GWh, 48,000 GWh, and 53,000 GWh respectively, by 2018. This would amount to 141,400 GWh – enough to supply over 75 percent of New York’s projected electricity generation needs by 2018 (assuming full achievement of ‘15 by 15’).

In the transportation sector, biomass has been predominantly used for the production of biofuels, such as ethanol and biodiesel. The State has the installed capacity to produce approximately 175 million gallons of ethanol and 7.5 million gallons of biodiesel annually, which could displace approximately 2 percent of the petroleum demand in the transportation sector. However, as referenced in the Renewable Energy Assessment, a significant portion of the biomass feedstock that is currently used in the production of biofuels is imported from other states. DOE estimates the State’s potential for ethanol production from in-state available biomass feedstocks at nearly 475 million gallons annually today, increasing to 585 million gallons in 2012 or 4 percent of the petroleum demand in the transportation sector.⁶³ These estimates, however, may be overly optimistic given the State’s desire to develop biomass in a responsible and sustainable manner. For example, some forms of ethanol require more energy inputs (farming, transport of feedstock, refining, etc.) than the resulting energy output from the fuel. Taking this into account, a comprehensive assessment of the in-state biomass potential, including estimates of the current and very near-term feedstock potential in New York using current practices and technology, is currently underway in the development of the Renewable Fuels Roadmap and Sustainable Biomass Feedstock Study (“Biofuels Roadmap”) for New York.⁶⁴ A draft of the Biofuels Roadmap is expected by the end of 2009 and will assist policy makers in the development of comprehensive biomass and biofuel policies.

Biomass has been the leading in-state renewable resource consumed in the residential, commercial and industrial sectors as measured by primary energy input. It is typically used in these sectors as a heating fuel in the form of wood. Currently the State uses 94 TBtu of wood and 3 TBtu of biogenic waste annually (8 percent of primary energy demand for these sectors, excluding electricity use) and has the technical/practical potential to develop 280 TBtu and 14 TBtu annually by 2018, respectively (23 percent of primary energy demand for these sectors, excluding electricity use). Biodiesel blends are also used in these sectors as a heating fuel, and are not included in these potential assessments.

depending on federal incentives). DOE has aggressive goals for solar-PV cost reductions. If solar-PV costs were to see rapid reductions to \$3,000 per kW, during the planning period, the total cost would amount to approximately \$150 billion dollars.

⁶¹ Biogenic waste is the organic portion of the waste stream.

⁶² The RPS goal considers the renewable portion of the electricity used, not produced, in-state. Therefore renewable electricity imports can count toward the 25 percent goal. These figures represent renewable generation in-state.

⁶³ DOE, Alternative Fuels and Advanced Vehicles Data Center: State Assessment for Biomass Resources. *New York Potential Biofuel Production*. 2008. <http://www.afdc.energy.gov/afdc/sabre/sabre.php?mode=prod>

⁶⁴ In 2008, the Governor’s Renewable Energy Task Force issued a report calling for the development of a Renewable Fuels Roadmap and Sustainable Biomass Feedstock Study for New York. It is intended to inform the State and the public of the economic and environmental impacts of biofuels.

Comprehensive assessments of the total potential to displace conventional heating sources with solar thermal energy have not been conducted. However, it is estimated that solar thermal energy could provide over half of the energy required for water heating in a typical home in New York that has adequate access to sunlight.⁶⁵ Similarly, while specific data on geothermal potential in New York is unavailable at this time, it is assumed that the potential for space and water heating is significant.⁶⁶

Farm-based renewable energy technologies and applications focus on the ability to turn farm wastes into energy resources, mostly through the use of “digester” technologies. By converting wastes into usable gas, farms can either use this gas on-site by producing electricity for farm operations or can deliver gas to the natural gas pipeline system. Biofuels may also play a more significant role in rural communities, and by creating distribution systems for local use of fuels, farms may play a key role in growing suitable energy crops, aid in the conversion of such crops into usable fuels, and then have local communities and on-farm use of such fuels serve as primary markets. The creation of such “closed loop” energy systems, if ultimately feasible, may help to significantly reduce the amount of fossil fuels needed to power New York’s agriculture sector.

While New York has significant renewable energy potential in its electric generation, transportation, residential, commercial, industrial, and agriculture sectors, barriers exist to the full realization of this potential. Most significantly, the cost of development of the resources is not accounted for in the estimate of technical/practical potential. The vast majority of costs associated with renewable development are the upfront costs of deploying the technologies, since operating costs are low, e.g. wind, water, and solar are free fuels. While the benefits and potential of renewable development are significant, the primary challenge is overcoming the upfront investment that is required for deployment.

3.1.2 Renewable Policies

Public policies to support renewable energy development are primarily aimed at overcoming the economic barriers to widespread use of these technologies. While some policy approaches, such as tax credits and net metering, are meant to provide general support for specific renewable technologies, other approaches are meant to develop markets for broader use of renewable technologies generally, such as the RPS Program which seeks to achieve a targeted level of renewable energy use. Decision-makers must carefully balance setting appropriately ambitious targets for incentive and deployment programs with the cost of achieving such targets. Well-designed programs will use public funds to leverage maximum private investment to achieve the State’s policy targets, and must therefore account for the full spectrum of benefits to be realized from such activities.

As is noted in markets generally, New York’s experience in renewable energy development to date has shown that the most cost-effective projects are developed first. Today’s higher cost renewable energy projects become more cost competitive as the technologies advance and as the cost of fossil fuels rise; as such they will be easier and less costly to deploy in the future. Renewable energy policies should be regularly reviewed to determine if changes are necessary to respond to changing market conditions.

⁶⁵ NYSERDA. *Solar Domestic Hot Water Technologies Assessment: Final Report 08-09*. 2008. http://www.afdc.energy.gov/afdc/progs/view_all.php/NY/0

⁶⁶ ‘Geothermal’ refers to two different uses of the earth: supporting the generation of electricity and the transfer of heat. Geothermal power is the generation of electric power from heat stored below the earth’s surface in the form of hot water, hot rocks, or lava. New York does not currently generate electricity from geothermal resources. A geothermal heat pump, or ground source heat pump, is a heat pump that uses the nearly constant temperature of the earth, instead of outside air, to heat or cool a building’s air or water supply.

Similarly, renewable energy targets should be increased as the economics of the various technologies and market conditions improve.

Each renewable energy technology offers unique challenges and benefits, and policies can take these into consideration. Large-scale wind power is generally more cost competitive than other renewable resources, but in New York its greatest output tends to be during periods of the day when demand is low. Biomass generation can be used as a base load resource, but unlike wind, water and solar, the fuel must be sustainably managed and harvested. Solar-PV systems can be more easily deployed in densely populated areas than other renewables and its output closely matches with peak demand, but solar-PV is among the highest cost renewable technologies. While some technologies may appear to provide greater benefits for their costs, it is important to focus policies on developing multiple technologies simultaneously, as the portfolio of technologies can offer complementary benefits, such as the complementary relationship between wind resources, which peak during the night, and solar-PV that peaks during the day.

Federal Policies

The need for sustained and adequately funded federal government policies and programs is an essential component of renewable energy technology development. With a foundation of sound federal policy, New York will be able to best craft policies and programs that target the in-state energy, environment and economic development opportunities that can provide sufficient incentive for successful realization of benefits from a variety of technologies and applications.

Development of renewables is supported at the federal level through a number of policy tools. In 2007 the federal government provided \$3.97 billion in tax expenditures to support renewable energy, which made up approximately 81 percent of all federal support for renewable energy technology.⁶⁷ The two major types of federal financial support for wind energy are the Production Tax Credit and accelerated depreciation through the Modified Accelerated Cost Recovery System. The Production Tax Credit provides for a \$19 per MWh tax credit which, when monetized, for example, at a 35 percent marginal tax bracket, is worth \$6.65 per MWh. The federal government in 2008 extended the 30 percent Solar Investment Tax Credit for eight years and removed the \$2,000 cap on costs eligible for the credit, sending an important signal of support to the PV marketplace.

The Energy Independence and Security Act of 2007 (EISA) created a number of new programs to support renewable fuels. EISA accelerated the schedule for effectuating the Renewable Fuel Standard (RFS) first enacted in the Energy Policy Act of 2005. The RFS now mandates the sale of nine billion gallons of renewable fuels in 2008 and 36 billion gallons of renewable fuels in 2022 – 21 billion gallons of which must be cellulosic ethanol or other advanced biofuels.

The American Recovery and Reinvestment Act of 2009, like EISA, provides funding for energy efficiency and renewable energy projects, including on-site renewable energy technology that generates electricity for government buildings and renewable energy capital projects. For example, ARRA provides \$2.5 billion in nationwide competitive grants for applied research, development, demonstration, and deployment activities, including \$800 million for biomass projects and \$400 million for geothermal projects. New York's share will be based on awarded competitive grants.⁶⁸

⁶⁷ EIA. *Federal Financial Interventions and Subsidies in Energy Markets, Table ES-1. 2007.*
<http://www.eia.doe.gov/oiaf/servicert/subsidy2/pdf/execsum.pdf>

⁶⁸ These efforts could also be funded under the State Energy Program and the Energy Efficiency and Conservation Block Grants. For these programs, New York's estimated share is approximately \$300 million.

Potential national renewable energy portfolio standard, carbon cap-and-trade, and climate change legislation could provide further support for renewable energy development in New York in addition to the policies mentioned above.

Current State Renewable Policy

To encourage development of renewable generation in-state, New York adopted its RPS in 2004 with the Order Approving RPS Policy.⁶⁹ This remains the State's primary policy initiative to promote the development of renewable resources. The RPS goal set forth in 2004 was to increase the amount of electricity delivered to New York consumers that was generated from renewable resources to 25 percent by 2013.

The 2004 RPS Order anticipated achieving the RPS goal through a number of State initiatives (taking into account the existing large scale hydropower and other renewable resources that counted toward the goal), including the RPS Main Tier and Customer-Sited Tier Programs (RPS Programs) administered by NYSERDA, Executive Order No. 111, and the voluntary green power market.⁷⁰ The RPS Programs are the primary mechanisms for encouraging development of renewables and they constitute approximately 6.6 percent of the RPS goal (85 percent of the incremental goal). The RPS Programs create an incentive for renewable energy investments by providing an additional source of revenue to the owners of the renewable energy systems beyond the market price of electricity. Coupled with federal and State tax incentives, these programs help to overcome the economic barriers to renewable deployment in New York.

Main Tier Program. The RPS Program is divided into a Main Tier and a Customer Sited Tier. The RPS Program Main Tier is directed towards development of medium to large-scale electric generation facilities where the electrical output of the systems is delivered into the wholesale power market. NYSERDA acts as the Program's central administrator and pays production incentives for the Renewable Energy Credits (RECs) under long-term contracts with the renewable generators. The long-term contracts are awarded through a competitive bidding process that takes into consideration a proposal's bid price and potential economic benefits to the State. Though this Central Procurement model is not common among states that has an RPS program, it has the advantage of providing a large bidder pool that stimulates competition and drives down bid prices. As a result, total program cost to ratepayers is minimized.

As of August 2009, three Main Tier solicitations have been offered since program inception and have resulted in contracts with 26 new in-state generation facilities for approximately 1,100 MW of nameplate capacity.⁷¹ This renewable capacity is expected to produce approximately 2.8 million megawatt hours (MWh) of electricity per year, enough clean energy to supply over 440,000 average homes. The majority of this capacity is from wind generation facilities, though hydroelectric and biomass facilities also contribute to this number.

Distributed Generation. To target the development of smaller, "behind-the meter," resources that produce electricity primarily for use on site, the RPS Program includes a Customer-Sited Tier. Programs under the Customer-Sited Tier target specific technologies including solar-PV, small wind, anaerobic digesters

⁶⁹ PSC. *Case 03-E-0188, Proceeding on Motion of the Commission Regarding a Retail Renewable Portfolio Standard, Order Approving Renewable Portfolio Standard Policy*. 2004. (2004 Order) <http://www.dps.state.ny.us/03e0188.htm>

⁷⁰ Additional information on the RPS goal and expected contributions can be found in the Renewable Energy Assessment.

⁷¹ Two out-of-State generation facilities have also won contracts. The capacity of those facilities total 37 MW and they are expected to produce 0.15 million MWh annually.

and fuel cells and offer fixed financial incentives for each technology. As of March 2009, Customer-Sited Tier facilities had an estimated total annual production from installed capacity of 4,490 MWh.⁷²

The RPS Program is not the State's only initiative supporting development of renewables. Since 2006, LIPA has procured RECs and energy from a wide variety of resources, including customer-based solar-PV systems, on-shore wind projects, fuel cells, biofuels, conventional and pumped hydropower, and landfill gas. LIPA also has incentive programs for solar-PV installations which have resulted in the installation of 11.7 MW of capacity.

Bilateral Contracts

Main Tier RPS contracts anticipate sale of project power into the wholesale marketplace. In contrast, power purchase agreements (PPAs) are contracts between energy suppliers and utilities (or other buyers) that specify the terms and conditions under which electricity will be generated and purchased. LIPA and NYPA are using PPAs offered through a competitive bidding process to acquire significant quantities of renewable power from private developers.

LIPA has issued a Request for Proposals (RFP) calling for 50 MW of utility-scale solar-PV whose output would be purchased by LIPA under a PPA.⁷³ Negotiations with a short list of developers resulting from the RFP process, and development efforts and environmental reviews are currently underway. It is anticipated that these solar projects will be installed on parking lots, commercial building rooftops, and federal property in 2010 and 2011. Pursuing a similar path, NYPA has issued a Request for Expressions of Interest that would call for NYPA's purchase of up to 100 MW of solar-PV systems supported by PPAs.⁷⁴

LIPA and NYPA are also considering the use of PPAs in collaboration with other governmental entities and utilities to support the development of offshore wind projects. One of these collaboratives, The Long Island-New York City Offshore Wind Project (consisting of LIPA, Con Edison, NYPA, NYSERDA, New York City Economic Development Corporation, the MTA and the Port Authority of New York and New Jersey) is in the early stages of evaluating a proposed 350 MW project located in the Atlantic Ocean, approximately 13 miles off the Rockaway Peninsula.⁷⁵ The Great Lakes Offshore Wind Project is engaged in a similar effort looking at the potential for development of 120 MW in the Great Lakes.⁷⁶ This Project's feasibility study is addressing wind project siting and permitting issues and evaluating transmission and infrastructure limitations, consistent with a recommendation of the Governor's Renewable Energy Task Force.

⁷² NYSERDA, *RPS Program Progress Report*, March 2009.

⁷³ LIPA. *Governor Paterson Announces Plans for State's Largest Solar Energy Project*. 2008. http://www.lipower.org/newscenter/pr/2008/042208_gov.html

⁷⁴ NYPA. *Request for Expressions of Interest to Support the Preparation of a Request for Proposals for a 100 MW Solar Power Initiative in New York State*. 2009. <http://www.nypa.gov/100mwsolarrfe.html>

⁷⁵ The Long Island-New York City Offshore Wind Project issued a Request for Information on June 30, 2009 and plans to issue a RFP toward the end of 2009. More information on this collaborative can be found at <http://www.linycoffshorewind.com/>.

⁷⁶ NYPA. *Offshore Wind Power Initiative Proposed for Great Lakes*. 2009. <http://www.nypa.gov/press/2009/090422a.htm>.

Net Metering

Net metering allows customers with solar-PV, wind or anaerobic digester systems to get credit for the electricity sent back into the distribution system from their DG systems when those systems are producing more than the power the customers require at that point in time. In essence the meter is allowed to run backwards. New York's current net metering law covers systems located in investor-owned utility service territories allows for the participation of residential and commercial customers. For residential net metering, the statute limits the system's size to 25 kW; and for commercial net metering, the statute limits system size to the lesser of 2 MW or the customer's peak demand. Farm-based wind and anaerobic digestion systems are limited to 500 kW.⁷⁷

On Long Island, LIPA has a net metering policy that applies to solar-PV and wind. Residential systems are limited at 27.5 kW, non-residential systems with a demand less than 27.5 kW are limited to the lesser of 27.5 kW or 110 percent of peak demand, and non-residential systems with a demand greater than 27.5 kW are limited to the lesser of 2 MW or peak demand. Additionally, farm-based solar-PV systems are limited to 27.5 kW and wind systems are limited to 500 kW.⁷⁸

Non-Electric Renewable Incentives

Incentive programs aimed at non-electric renewables are currently being developed. For instance, the RGGI Operating Plan identifies several programs for solar thermal deployment.⁷⁹ One of the programs is being designed for the residential sector and will provide incentives for the installation of solar thermal water heaters that replace fossil-fuel and electric domestic hot water systems. Another solar thermal deployment program under development targets the non-residential sectors. This program will provide incentives for solar ventilation preheating systems which preheat air entering buildings. Roll-out of these programs is expected in late 2009 or early 2010.⁸⁰

A Geothermal Heat Pump Systems program has been authorized under the State's EEPS Program. A recent PSC Order allocated a total of \$2.3 million over three years in support of this NYSERDA-administered program.⁸¹ The program will provide incentives for installing systems for heating, cooling, and summer hot water heating. This program is also expected to be rolled out in late 2009 or early 2010.

⁷⁷ Legislation (A.2442-C/S.4283-B) has passed that would expand New York's net metering law by adding residential micro-CHP systems to the list of currently eligible technologies that can be net metered.

⁷⁸ LIPA. *Tariff for Electric Service*. <http://www.lipower.org/pdfs/lipatariff.pdf>.

⁷⁹ RGGI is the nation's first mandatory, market-based effort to reduce emissions of greenhouse gases over time. Under RGGI, New York, along with nine Northeastern and Mid-Atlantic states, has placed a cap on carbon dioxide (CO₂) emissions from electricity generators. CO₂ emission allowances are sold to fossil fuel generators in quarterly auctions. To the degree that the requirement to purchase CO₂ allowances increases the market clearing price for wholesale electricity, RGGI is expected to make renewable electric generation more competitive with fossil-fueled generation. Proceeds from the auctions will be used to fund programs that target greenhouse gas emissions reductions.

⁸⁰ More information on the RGGI program can be found at <http://www.nyserda.org/RGGI/>.

⁸¹ PSC. *Case 08-E-1132: Petition of NYSERDA for Approval of an Energy Efficiency Portfolio Standard – Energy Efficiency Program, Order Approving Electric Energy Efficiency Programs with Modifications*. Issued June 24, 2009.

State Tax Credits

New York has a personal income tax credit for the residential use of bio-heat (heating oil that contains biofuel).⁸² The tax credit is equivalent to \$0.01/gallon for each percent of biodiesel and is provided up to the first 20 percent of biodiesel that is blended with conventional fuel and thus the tax credit is capped at \$0.20/gallon. This tax credit encourages the use of biodiesel which has no sulfur, and burns cleaner and more efficiently than petroleum-based oil. Biodiesel can also be an important in-state resource as New York is the largest consumer of oil for heating in the country and most bio-diesel is soybean-based, which is a plentiful crop in New York (growers produce over 5 million bushels of soybeans per year on about 144,000 acres).

Personal income tax credits are available for residential solar-PV, solar thermal, and proton exchange membrane fuel cell systems. This tax credit is equivalent to 25 percent for solar systems and 20 percent for fuel cells. The credit is capped at \$5,000 for the cost of solar systems and \$1,500 for the cost of fuel cells. New York exempts residential solar thermal and solar-PV systems from sales tax.⁸³ This includes both the purchase and installation costs. This exemption does not apply to solar thermal pool systems or other like applications.

3.1.3 Expanded State Renewable Policy Goal

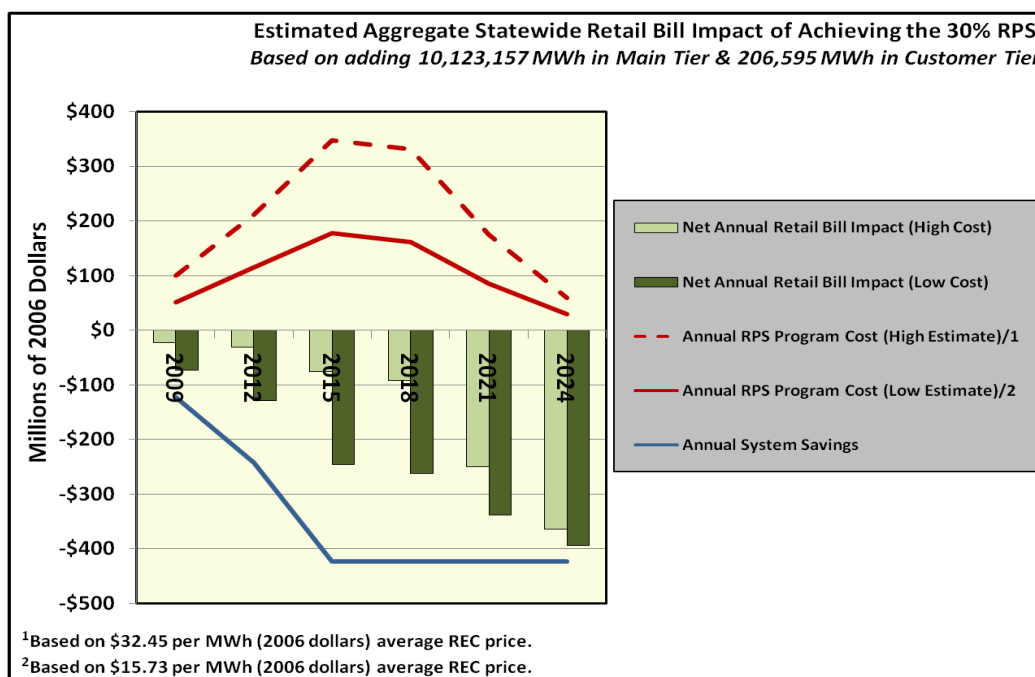
When PSC adopted the 25 percent RPS goal, New York's existing renewable generation (including net imports) was expected to account for 17.2 of forecasted demand in 2013. Thus, the incremental new renewable generation required to meet the 2013 goal represented 7.8 percent of forecasted demand. In 2008, PSC adopted the EEPS, which set a goal to reduce electricity use by 15 percent below forecasted levels in 2015. As a result of this EEPS, a lower amount of new renewable generation (4.8 percent) is required to meet the 25 percent RPS goal.

In his 2009 State of the State Address, Governor Paterson announced that he would pursue policies that would achieve a '45 by 15' clean energy goal. This will require an increase of the RPS policy goal to 30 percent by the year 2015 and full realization of the State's '15 by 15' efficiency goal. This raises the incremental RPS goal, excluding existing major hydroelectric resources, to 9.3 percent of the forecasted demand in 2015, nearly doubling the incremental RPS target.

Electricity sector modeling indicates that achieving the goal of a 30 percent RPS is expected to reduce the net retail price of electricity paid by all ratepayers. In 2018, the average statewide retail price of electricity is projected to be 0.06 to 0.16 cents per kWh lower than it would otherwise be if the RPS did not exist. Figure 7 indicates that this estimated reduction in net price per kWh is equivalent to aggregate annual bill savings to ratepayers of \$93 to \$262 million.

⁸² NY CLS Tax, Article 22 § 606 (mm).

⁸³ NY CLS Tax, Article 28 § 1115 (ee).

Figure 7. Estimated Aggregate Statewide Retail Bill Impact of Achieving the 30% RPS

The reduction in wholesale prices assumes the achievement of the ‘45 by 15’ policy initiative, which would require the addition of 10,123,157 MWh of Main Tier renewable resource generation by 2015.⁸⁴ The majority of renewable resources that have been (and are expected to be) deployed under the Main Tier are wind plants. Given that these units have no fuel costs, they often bid their power into NYISO’s electricity markets at or near zero dollars per MWh. Since New York’s competitive wholesale electricity market dispatches units from lowest to highest marginal costs, when wind units are generating power, they displace the most inefficient and expensive fossil fuel-fired units otherwise required at the time. As a result, adding renewable energy generation in-state has the effect of reducing the average wholesale price of electricity.

In addition to reducing the price of electricity, meeting the 30 percent target will result in additional economic benefits. Including these macroeconomic “ripple” effects, the total projected economic benefits to the State are estimated to be \$12.5 billion over 20 years.⁸⁵ Comparatively, the cost of achieving the goal is estimated at approximately \$1.8 billion.⁸⁶ Thus, the program will have a benefit to cost ratio exceeding six-to-one.

⁸⁴ See Electricity Assessment: Modeling for detailed discussion of modeling structure, assumptions, and results.

⁸⁵ KEMA Inc (prepared for NYSERDA). *New York Main Tier RPS: Impact and Process Evaluation*. 2009.

⁸⁶ La Capra Associates & Sustainable Energy Advantage, LLC (prepared for NYSERDA). *New York Renewable Portfolio Standard Cost Study Update*. 2008.

3.1.4 Challenges and Recommendations

Expand and Improve the RPS to Meet the Governor's 30 Percent by 2015 Goal

The RPS Program is the primary mechanism for increasing renewable energy capacity in New York. By the end of 2009, it is likely that all of the currently allocated funding for the Program will be committed. Therefore, the first challenge to achieving the Governor's goal will be to extend funding authorization for new Main Tier solicitations. It is critical that the primary funding source for the State's program be replenished. New York's RPS Program needs to demonstrate a sustained commitment to renewable development. It must promote market certainty and must be designed to enable timely response to changing market conditions.

Additionally, market certainty and expansion of renewable market opportunity can be realized by providing a stable marketplace in which developers can sell RECs in the voluntary market, which like other commodities, requires using modern technologies to track and account for transactions. Currently, New York has no such REC tracking system.

Electric transmission and distribution system upgrades or expansions will likely be needed to support continued large-scale renewable development of various technologies. For large-scale wind energy development, there exists large undeveloped wind resources in some parts of the State, but insufficient bulk transmission⁸⁷ system capacity exists to move all the energy output throughout the State. This potential "bottlenecking" of renewable resources could thwart steady progress towards the State's renewable energy goals and the attendant benefits. Further, in certain instances the operation of one renewable energy facility may displace output from other renewable energy facilities when both facilities need "space" on the same transmission lines. On a local level, installation of large solar projects within particular local electric networks may require upgrades to help ensure that power surges or other reliability concerns are not created as a result. See Chapter 4 for further discussion and recommendations on infrastructure needs.

As noted above, the vast majority of renewable projects participating in the RPS Program to date are wind projects, most of which are located in northern and western New York where wind resources are greatest. While these projects are providing benefits to the State and helping meet the RPS goal, they are located far from the major load areas of the State, which are also areas of the State in non-attainment of federal air quality standards. As such, it would be advantageous to target efforts to develop resources closer to or in these areas. Clear examples of such targeted efforts are development of off-shore wind resources, which can readily provide electric energy to the New York City and Long Island population centers, and the continued research and ultimate market development of tidal, current and other hydrokinetic resources. As with "conventional" renewable energy development, ensuring the appropriate transmission line interconnections to bring such marine-based energy on-shore will become an essential component of such development.

The current RPS Program has provided good value for the investment to date, both in the cost-effectiveness of the Main Tier program and the ability to provide diversity of investment – with the attendant market development benefits – in the Customer Sited Tier. As noted above, the Plan's modeling has shown that achieving the 30 percent goal will result in a net reduction in wholesale electricity prices, and will provide substantial benefits to the State in avoided air emissions and transitioning to a lower-carbon energy system. Additionally, continuation of the RPS has been

⁸⁷ Bulk transmission is a functional or voltage classification relating to the higher voltage portion of the transmission system.

recommended in both the Governor's Renewable Energy Task Force Report and the RPS Program Evaluation Report.

Recommendations

- Expand the RPS Program to meet the Governor's goal to meet 30 percent of the State's electricity needs with renewable resources by 2015, taking into consideration the voluntary market and other renewable energy initiatives of the State's energy authorities and agencies.
- Enhance certainty in the renewable energy market by scheduling regular solicitations for Main Tier procurements. Consider more flexible solicitation schedules, other than the standard 10 year contracts, to accommodate changing market conditions.
- Create a tracking and trading system for RECs to foster development of a robust voluntary market for REC purchases and to help ensure integrity in measuring compliance with the RPS.
- Continue to provide incentives for environmentally beneficial, renewable DG resources, including CHP, with specific targets determined by PSC in the expanded RPS proceeding, funded through the Customer-Sited Tier; Identify opportunities for targeted DG deployment that may serve to reduce the need for peaking power plants in load pockets.
- Examine the transmission system needs to identify and evaluate appropriate investment strategies for needed bulk transmission system upgrades or expansions needed to allow for delivery of the energy output from renewable energy systems.

Complement the RPS Program with Bilateral Contracts

While much progress has been made toward the existing RPS goal, additional mechanisms for attracting in-state renewable energy development can be further utilized. For instance, purchase power agreements could be enhanced to continue progress in achieving renewable energy goals.

Recommendations

- Encourage the State's power authorities to procure diverse renewable electricity resource development, including solar, on-shore and off-shore wind, hydrokinetic and sustainably managed biomass. LIPA and NYPA should continue analyzing bids received through their RFP and complete their purchases of 150 MW of solar photovoltaic power as expeditiously as possible. Based on the experience of these initiatives, LIPA and NYPA should consider achievable targets for subsequent PPAs.
- Encourage LIPA and NYPA, with utilities and other partners, to proceed with issuing an RFP for the private development of off-shore wind resources (off the waters of Long Island and in the Great Lakes) in a manner protective of natural resources under power purchase agreements.

Facilitate the Deployment of Distributed Renewables

A number of policy approaches have been adopted in New York to overcome the cost, technical, and regulatory challenges associated with deploying renewable resources. Some of the approaches are not fully accomplishing their intended purpose and can be improved. For instance, net metering provides an incentive to end-users to install solar-PV, anaerobic digesters, and wind energy systems. However, the peak demand limit on commercial installations is presenting a new set of challenges. First, not all

commercial customers have a demand meter, making it difficult to determine the customer's peak demand. This has led to disagreements between customers and utilities over determinations of peak demand and thus the size of eligible systems that can be net metered. Second, depending on a customer's load profile, a system limited by their peak demand could result in a system that is insufficient to meet the customer's full energy requirements. Additionally, PSC has standard interconnection requirements that are intended to guide the interconnection of renewable systems to the grid. However, the interconnection requirements provide some level of discretion to the utilities, which reportedly have created challenges to deployment of distributed resources.

There are numerous public buildings in the State that could be host sites for distributed renewable systems. The State Asset Maximization Commission identified these sites as an opportunity for a public-private partnership to increase deployment of distributed renewables and reduce energy costs at State facilities, and/or potentially present opportunities for lease revenue to the State.

Recommendations

- Amend the net metering law to provide greater flexibility to commercial customers to size systems to meet a greater percentage of their energy requirements, while ensuring that system reliability is not negatively impacted.
- Examine the protocols used by NYISO and utilities for connecting DG sources to the grid to help ensure such implementation is timely and cost-effective.
- Assess the potential for siting renewable energy projects, including wind, solar, geo-thermal, hydrokinetic and hydropower on those State-owned lands and waterways where such development would not require a constitutional amendment or be inconsistent with the public trust or parkland doctrines. This will be accomplished by developing a process for installing renewable energy technologies on State facilities, particularly those that are energy intensive, and have open space and/or compatible roofing.

Target Deployment of Non-Electric Renewables

The State's financial incentive programs have predominantly focused on the development and deployment of renewable technologies that generate electricity. While the electric generation sector accounts for the majority (40 percent) of primary energy consumption in the State, it is also critical to support the non-electric primary energy sectors. The transportation sector accounts for 40 percent of New York's CO₂ emissions. To date, most of the financial incentives and regulatory programs affecting this sector have been at the federal level. This has resulted in an unsteady stream of funding for clean transportation initiatives and has resulted in most of the biomass feedstock for in-state biofuels production being supplied from out of State. A New York-specific strategy could help target incentives for the preferred feedstocks that provide New York with the most environmental and economic benefits.

Today the transportation sector relies heavily on petroleum, but technological advances will facilitate a shift away from this dependency through improved efficiency and the use of renewable fuels. Hybrid technologies have already greatly improved the fuel economy of vehicles, and the next stage of hybrid technology – plug-in hybrid electric vehicles (PHEVs) – show tremendous promise. PHEVs, which use batteries that can be recharged via electricity from the grid, provide greater fuel economy – often greater than 100 miles per gallon – and could therefore dramatically reduce fuel use and emissions from vehicles. If coupled with Smart Grid technologies, PHEVs can also be integrated with the electricity grid and “called on” when plugged in to provide power back to the grid if necessary. Currently, PHEV technology is still developing and wide-scale deployment is not expected over the early years of the planning horizon.

However, government actions, including research and development support and government purchases, can increase deployment. Hybrid technologies coupled with the use of renewable fuels would provide even greater environmental benefits.

Technologies such as solar thermal and geothermal heat pumps can significantly reduce fossil energy use in buildings. Given the State's heavy reliance on oil for heating and hot water, these technologies have the potential to drastically reduce CO₂ emissions and other pollutant emissions from the buildings sector. While these technologies are relatively mature and have been deployed widely in other parts of the world, penetration has not occurred on a wide scale in New York. In addition to the financial incentives, greater deployment of these technologies will require increased public awareness and a trained workforce (workforce needs and recommendations are identified in Chapter 5).

Recommendations

- Diversify transportation fuel use and introduce alternative fuel vehicles into public and private fleets in the mid and long term as it moves toward electrification of the transportation sector. This will be accomplished by:
 - Encourage State Agencies and Authorities to use their fleets and facilities as test-beds for “real-world” testing and application of alternative fuel technology.
 - Undertake a full life-cycle analysis to determine the optimal fuel for a substantial replacement of petroleum, considering environmental, economic and energy benefits.
 - Working with federal policymakers to support federal tax incentives for fleet and private individual alternate fuel vehicle purchases.
- Adopt where practicable a low-carbon fuel standard for liquid fuels used in transportation, taking into account the results of the multi-state effort to analyze policy options for a regional low-carbon fuel standard.
- Support biofuels production from sustainably managed feedstocks. State agencies should develop programs to implement measures recommended by the Biofuels Road Map, when it is completed.
- Extend the tax credit for bio-heat beyond the current expiration date of 2011.
- The State should expand funding and implementation support for environmentally beneficial distributed energy resources (DER). Technical and financial support for DER should include solar thermal, geothermal heat pumps, and other resources that are economical and result in energy and cost reductions, improved energy security and reliability, and reductions in air emissions. Furthermore, the State should design programs to increase public awareness of the benefits of using DER.

3.2 Natural Gas

3.2.1 In-State Potential and Development Progress

With the recent discovery of the Marcellus Shale gas potential, there is a renewed interest in natural gas development in-state. At this time, in-state natural gas production from about 6,700 active natural gas

wells supplies about five percent of the State's requirements. The Marcellus Shale gas formation extends northeast from West Virginia, through Pennsylvania to southwestern New York, and holds great promise for future development. The Marcellus Shale's total gas in place is conservatively estimated to be approximately 168 trillion cubic feet, but the figure might be as high as 516 trillion cubic feet.⁸⁸ New York's portion of total recoverable gas remains unknown; however, the State's natural gas production is expected to increase significantly over the forecast period due largely to the projected production from the Marcellus Shale formation. The State's natural gas production is expected to more than double from 55 billion cubic feet in 2007 to about 146 billion cubic feet, representing about eight percent of the State's natural gas requirements by 2020. Although the addition of Marcellus Shale production is expected to result in a significant increase in New York production over the planning period, the natural gas model reflects a conservative Marcellus Shale natural gas production level to account for potential permitting and production difficulties related to horizontal drilling, and hydraulic fracturing. If these difficulties are minimized, Marcellus production levels could potentially be much higher.

This resource presents an opportunity for the State to unlock substantial economic value while helping to achieve a key energy policy objective of importance to the State's energy security. Natural gas extraction would create jobs, create wealth for upstate land-owners, and increase State revenue from taxes and land-owner leases and royalties. Development of State-owned lands could provide much needed revenue relief to the State and spur economic development and job creation in economically depressed regions of the State. Furthermore, the increased supplies of natural gas in combination with natural gas efficiency programs will place downward pressure on natural gas prices, thereby potentially lowering the cost of energy for New Yorkers.

For development of the Marcellus Shale, horizontal well completions combined with hydraulic fracturing are likely to provide the best means for producing economic volumes of natural gas. While neither horizontal drilling nor hydraulic fracturing is new to natural gas development in New York, there are environmental concerns with respect to the effects of fracturing on water supplies, and disposal and contamination issues related to the chemical composition of the fluids used in the fracturing process. Additional concerns regarding drilling in the Marcellus Shale focus on the potential local impacts to communities, including increased truck traffic, noise, aesthetics, and impact on quality of life. DEC regulations govern the well permitting, drilling operations, and well site restoration when drilling is completed. To assess the potential environmental concerns related to the development of the Marcellus Shale formation in New York, DEC is reviewing horizontal drilling and hydraulic fracturing in the context of a Supplemental Generic Environmental Impact Statement which is expected to be finalized in 2009.

3.2.2 Challenges and Recommendations

The extraction of projected economically recoverable reserves from the Marcellus Shale presents a unique challenge with regard to the construction of the pipeline facilities necessary to bring the produced gas to market. In the course of developing a conventional source of natural gas, a company would drill a well and only if that well is successful, would it submit an Article VII application to construct the associated pipeline. The technique used to tap into the Marcellus Shale requires that the gas be produced immediately once the well has been fractured and completed or the well may seal and cease to be productive. The Marcellus Shale formation has a high concentration of clay which makes it susceptible to

⁸⁸ Geologists estimate that the entire Marcellus Shale formation contains between 168 and 516 Tcf of natural gas reserves and that roughly 10 percent of those reserves are economically recoverable. DEC. *Marcellus Shale—Gas Well Drilling in the Marcellus Shale*. 2009. <http://www.dec.ny.gov/energy/46288.html>

re-closing if the gas does not flow immediately. As a result, some producers contend that the pipeline must be certified, built, and ready to accept gas before knowing for certain that the well will be a success. The existing process for siting gas pipelines under Article VII of the PSL would likely accommodate this need.

Recommendations

- Support private interest and investment in drilling in the Marcellus Shale natural gas reserves and natural gas pipeline expansions to improve supply and deliverability of natural gas to markets in New York in an environmentally acceptable manner.
- Study the potential for new private investment in extracting natural gas in the Marcellus Shale on State-owned lands where it would not be inconsistent with public trust or parkland doctrines, in addition to development on private lands.

4 Invest in Energy and Transportation Infrastructure

New York's massive energy and transportation infrastructure is in constant need of maintenance and repair to keep the State from backsliding on its high standards of infrastructure reliability. Infrastructure investments are also necessary to support the State's transition to a Clean Energy Economy and will be driven by strategic longer-term needs, including the need to reduce GHG emissions. The key will be to guide infrastructure investment in a manner that is responsive to both environmental concerns and the economic welfare of the State's residents and businesses while preserving efficient markets.

In the case of electricity infrastructure, the State's delivery systems may be able to take advantage of cost-effective Smart Grid technology to increase system efficiency and prepare the State for the deployment of advanced appliances and electric vehicles. Transmission upgrades may also allow for fully exploiting the potential benefits of upstate wind resources, additional Canadian electricity imports, and new nuclear capacity, all of which can help meet the multiple policy objectives of the Plan. Electricity system investments will be developed and viewed within the context of the need to reduce local impact on host communities, especially potential environmental justice areas.

In the case of natural gas, enhancing pipeline delivery capacity in the downstate area would allow for conversions or repowering of power plants from oil to cleaner burning natural gas, while also meeting core gas demand needs. In the case of transportation, ongoing investments are necessary to maintain the system in good working order, and additional investments can be used strategically to reduce vehicle congestion, expand mass transit and encourage more efficient transportation systems.

4.1 Infrastructure Investment and Climate Change

While New York is making solid progress toward reducing its GHG emissions,⁸⁹ and has identified specific strategies to reduce GHG emissions over the planning horizon, additional measures will be required to reduce GHG emissions by 80 percent below 1990 levels by 2050. These measures will be identified in a Climate Action Plan that will be developed pursuant to Executive Order No. 24. Achieving such a reduction in GHG emissions will require fundamentally transforming how we obtain and use energy, not only in the electric generation sector, but also in transportation, buildings and industry. Infrastructure investments that are made over the next ten years will last well beyond the planning horizon, and therefore decision-makers should be mindful of how such investments will impact the State's future ability to achieve GHG emission reductions.

⁸⁹ New York State has taken aggressive actions to reduce CO₂ emissions. These actions, which are on-going, include adopting and funding energy efficiency and renewable energy goals; participating in the RGGI CO₂ cap and trade program; collaborating in the development of a regional low-carbon fuel standard with neighboring states; promoting alternative vehicle fuels and vehicle demonstrations; developing ways to incorporate GHG emissions mitigation into SEQRA evaluations; supporting smart growth and climate smart communities development; and supporting demonstration of a carbon capture and sequestration coal-fired electricity generating project in Jamestown, New York.

For any long-term GHG reduction plan that uses low-carbon electricity as a key energy carrier, it is likely that New York’s existing electricity infrastructure (generation fleet, distribution network, high voltage transmission lines, and substations) will not be fully adequate. Beginning the design and construction of the electrical system of the future now will allow for economical and efficient upgrades and additions with no interruption to electric flow.

Many transportation experts consider electricity to be the most viable low-carbon fuel for light duty vehicles in the near-term. Expanding electrification of the transportation sector will help achieve GHG reduction goals by transitioning demand from high carbon-intensity liquid fuels, such as gasoline, to electricity generated from low-carbon-intensity energy sources such as hydro, wind, solar-PV or nuclear power. Electricity produced from low-carbon energy sources can power vehicle batteries or light rail. New York can continue advancing this transition by promoting research and development to achieve technological breakthroughs for hybrid electric battery technology and energy storage technologies – as the State is doing with the NY BEST Consortium – along with demonstrations to support infrastructure development.

Infrastructure investments over the planning horizon also need to consider the impacts of climate change, especially from sea level rise. Energy infrastructure at risk from higher sea levels includes electric generating and natural gas facilities, and electric and gas transmission and distribution wires and pipes. In addition to the direct effects of inundation or flooding, sea water contains salt, which can corrode equipment and undermine the strength of infrastructure. Inundation of power plants can result in total loss of service capacity for an area. Flood-induced outages to one centralized facility or primary cable path can result in total loss of service over an entire area and can lead to coincident “cascade-effect” outages to other facilities. Frequent flooding of electric and gas transmission and distribution wires and pipes can accelerate their deterioration, causing more frequent and longer lasting outages with extended repair times. As areas affected by storm surge expand, outage risks increase for those facilities that were not designed to withstand such events or adequately located to avoid such damaging events. Flooding can also impair access to underground gas and electric lines and equipment. These potential risks highlight the importance of utilities implementing Smart Grid technologies to identify system vulnerabilities.

Within the time horizon of this Plan, the State Sea Level Rise Task Force and the NYC Climate Change Adaptation Task Force will examine the needs and costs associated with implementing adaptive and protective measures to address the impending sea-level rise on the energy system’s major components.

Recommendations

- Develop a Climate Action Plan in accordance with Executive Order 24. The Climate Action Plan will identify additional strategies and actions, including likely major infrastructure investments, as well as the benefits and costs of each, consistent with a long-term GHG reduction goal of 80 percent below 1990 levels by 2050. It should also identify appropriate mid-term targets.

4.2 Electricity

NYISO’s 2009 *Comprehensive Reliability Plan* concluded that currently proposed market-based solutions, together with implementation of planned upgrades to the bulk transmission system, would meet system reliability requirements through 2018. This means that markets and expected prices appear to be sufficient at this time to provide for generation and transmission resources to maintain reliability on a statewide basis throughout the Plan’s 10-year planning horizon. The market’s locational prices have provided transparent price signals that in a competitive environment have induced investment in newer

and more efficient generation, as well as new transmission and demand response resources, in the locations where the resources are most valued.

NYISO's conclusion that no generation or new transmission is required over the planning horizon is based on a load forecast that assumes that only 27 percent of the load reductions envisioned by the State's '15 by 15' program are achieved and most of the existing resource base remains in place. Full and timely achievement of the '15 by 15' goal will likely push the reliability need date for new electric generation and transmission even further out in time, and thus underscores the importance of fully achieving the efficiency targets. However, the retirement of the existing resource base to comply with environmental regulations and GHG emission-reduction targets, among other factors, could move the reliability need date earlier. The need to replace aging infrastructure, implement Smart Grid technologies, and reduce GHG and other air emissions will require a measured approach regarding infrastructure investment over the planning horizon due to the upward pressure these combined programs would place on the cost of electric service.

4.2.1 Electricity Generation

The State has a diverse mix of electricity generation sources, including coal, nuclear, hydropower, oil, gas and renewables. Statewide, fuel diversity safeguards against fuel supply disruptions and other factors which could pose reliability risks and/or cause significantly increased price levels and volatility. It is important to continue safe operation of nuclear, coal, natural gas, oil, and hydroelectric generation resources in ways that support the State's energy, environmental and economic objectives. Over the planning horizon, there are a number of electricity generation infrastructure issues that will need to be addressed, including: (1) improving the power plant siting process to facilitate the deployment of renewable and other necessary resources, (2) reducing the climate impacts of coal, and (3) encouraging the repowering of existing facilities to improve the efficiency of the electricity system.

Market-based electricity prices have attracted new merchant generation infrastructure, primarily natural gas-fired combined-cycle plants, as well as imports from neighboring regions with surplus capacity. Since 2000, over 7,600 MW of generation has been added in New York. Most of the generation infrastructure added upstate (about 3,800 MW, primarily the Athens and Bethlehem natural gas facilities and wind facilities) are merchant plants that rely on market-based revenue streams, though wind facilities also rely on RPS contracts and federal tax credits. Most of the plants added downstate (about 3,800 MW), however, have been added by NYPA or are supported by long-term contracts with Consolidated Edison, NYPA or LIPA.

In recent years, the market has responded to environmental regulations with significant new natural gas power generation development, particularly downstate in load pockets where there are few alternatives to meeting both demand and environmental requirements. In these areas (New York City and Long Island), many of these plants have dual fuel generation capability, i.e., natural gas/oil, that allows oil to be used as a back-up fuel in the event of natural gas supply disruptions or sudden price increases. Oil combustion causes higher emissions than gas and should be limited (air permits for these plants limit the number of hours of oil combustion), but the continued availability of these dual fuel units plays an important role in maintaining system reliability.

Power Plant Siting

It is anticipated that there will be power plant proposals by merchant generators over the planning horizon. The majority of these proposals are expected from wind developers in response to RPS solicitations and developers advancing repowering proposals. Experience has shown that the siting process for wind, as well as other generation, is left to a patchwork of local and State regulatory

processes. This creates an uncertain siting process that can cause undue delay, project uncertainty, and ultimately could put New York at a disadvantage compared to other states that are competing for renewable energy investment.

The current process used to authorize the siting, construction and operation of electric generating facilities is a combination of the local land use regulatory process and State agency environmental permits processes, with an overlay of the procedures of the State Environmental Quality Review Act (SEQRA). Although these processes have been utilized recently to successfully site over 1,000 MW of wind facilities and 325 MW of gas-fired generation, with another 3,000 MW of wind projects and another 1,100 MW of natural gas-fired generation currently undergoing review, there are various public and private interests that the SEQRA process and existing State and local laws do not address.

A primary interest of the State is to help ensure an efficient and timely review process for siting needed electric generation facilities that incorporates support for public participation. While the SEQRA overlay ensures that State and local decisions affecting the environment will minimize any adverse impacts associated with electric generating facilities and provides for public participation, it does not establish a decision-making schedule or provide for intervenor funding. The concern for complying with multiple State and local requirements, addressing environmental issues, and supplying intervenor funding, could be consolidated into a single proceeding before a State body, similar to the authority provided to the Siting Board in the former Article X (which expired in January 2003). This could also include a requirement that a decision be rendered within a specified period.

Although several different bills have been introduced in the State Legislature to reauthorize a comprehensive electric generating facility siting process, the key terms have not been agreed upon. The main points of disagreement revolve around the types and sizes of facilities to which the law would apply, the amount and acceptable uses of intervenor funding, and the obligation to consider environmental justice issues and the obligation to conduct an assessment of cumulative impacts. While these issues should be resolved among interested stakeholders, the following key provisions should be included in comprehensive electric generation siting law: a one-stop siting process that combines State and local authorizations into a single approval; a time-certain framework for rendering a decision on an application; authorization to override the application of unreasonably restrictive local laws; opportunities for extensive public input; and the availability of intervenor funding for expert witnesses and consultants.

Recommendations

- The State supports enacting a power plant siting law that provides greater market certainty to developers and investors, enhances public participation with sufficient intervenor funding made available to local communities, includes improved notice provisions, and addresses environmental justice issues.

Long-Term Viability of Coal

The United States relies on coal for half of its electricity needs, and New York has a significant percentage of coal in its electricity generation mix, adding to fuel diversity. Moreover, the use of coal is increasing in the developing world. It has been reported earlier this decade that China was bringing on line a coal plant every week.⁹⁰ As coal is the most carbon-intensive fossil fuel, technologies are being

⁹⁰ Massachusetts Institute of Technology. *The Future of Coal – Options for a Carbon Constrained World*. 2007. <http://web.mit.edu/coal/>

developed to capture and permanently store CO₂ emissions from coal plants in deep geologic formations. Carbon capture and sequestration (CCS) technology is being supported at the federal and State levels, and could be an essential component of any long-term GHG reduction strategy for the United States and the rest of the world. New York is supporting the development and demonstration of CCS by providing geologic research assistance and financial support for a proposed demonstration project in Jamestown.

The successful demonstration of CCS in New York as an operationally and economically viable means to mitigate coal generation GHG impacts may allow New York to retain coal in its generation mix in a way that is consistent with GHG reduction goals. But, perhaps more importantly, the successful demonstration of CCS could, if deployed widely, substantially mitigate climate impacts from the use of coal and other carbon-intensive fuels in the developing world.

Existing law does not directly address the siting or regulation of a captured carbon sequestration reservoir or captured carbon pipeline. However, there is existing law that can serve as a model for CCS siting and regulation. Article VII of the PSL, which governs the siting of new electric and gas utility transmission facilities, and provides PSC with exclusive authority to site such facilities, can be amended to expressly include CO₂ pipelines. Article 23 of the Environmental Conservation Law authorizes the regulation by DEC of oil and gas wells and the underground storage of natural gas. The law governs the drilling of wells, the process by which developers must obtain permission from surface landowners, and the injection and storage of gas. Injection of CO₂ into geologic formations is similar to the process for injecting natural gas for storage, except that CO₂ will be stored permanently underground. In 2009, Governor Paterson submitted a bill to the legislature to provide the statutory framework for siting and regulating a CCS demonstration project that is modeled after Article 23 and amends PSL Article VII accordingly.

Recommendation

1. Enact legislation that addresses CO₂ pipeline siting and CO₂ injection to facilitate the demonstration of Carbon Capture and Sequestration technology.

Nuclear Power

Nuclear power plays a significant role in meeting New York's energy needs. Nuclear capacity – sited, built and operated appropriately – supports key State interests. The Plan's modeling results demonstrate that increasing the State's nuclear capacity will benefit the State by lowering both wholesale prices and GHG and other emissions, and it therefore may play an integral role in the State's efforts to address climate change. Despite these benefits, there are concerns over the disposal of waste from nuclear facilities. Though a federal repository sited at Yucca Mountain in Nevada has been proposed to the NRC by DOE, until this site is approved and constructed, reactor sites must hold their own spent fuel on site. Care must be taken to help ensure that this spent fuel is securely held and any potential for harm to public health or the environment is minimized.⁹¹ Going forward, nuclear power generation should be encouraged within New York where safety, security, and environmental conditions favor its deployment and operation, and retained where it can be demonstrated that the safety and security of its operation can be maintained and its adverse environmental impacts minimized.

At the same time, the State recognizes that there are safety, security and environmental impact concerns related to the two active reactors at Indian Point, located along the Hudson River in northern Westchester

⁹¹ The DOE Secretary of Energy, Dr. Chu, has noted that there may be alternatives to this national repository, however, at this time DOS has not withdrawn its application from NRC.

County. New York is opposing the license renewals of Indian Point Units 2 and 3, whose current 40-year license terms are set to expire in 2013 and 2015, respectively, due to significant safety and environmental impacts associated with their operation. These concerns include the adequacy of the evacuation plan in the event of a sudden, fast moving radiological event in an area of high population density; the risk of a terrorist attack on the spent fuel pools, which are located in buildings adjacent to the containment structures; the impact of earthquakes on the integrity of the facility, the possibility of which are better analyzed with more modern geological methods than existed when the plants were first licensed; and the impact on aquatic life from the use of 2.5 billion gallons of Hudson River water each day which is used to cool the facility and then discharged back into the Hudson River at higher temperatures. These issues must be fully evaluated and addressed in order to protect the health and safety of the communities surrounding the plant.

From a reliability perspective, Indian Point currently provides voltage support and system capacity to help ensure there is sufficient energy to supply demand in the downstate load pocket. With the issuance of this Plan, the State has begun to identify the potential impacts associated with the possible closure of Indian Point and the infrastructure needs that would be necessary to maintain system reliability standards in that event. As discussed in more detail in the Energy Infrastructure Issue Brief, modeling indicates that the retirement of the Indian Point units may present tradeoffs, including higher electricity prices and CO₂ emissions, and that achieving the State's '15 by 15' energy efficiency target reduces, but does not eliminate, the need for replacement infrastructure in the vicinity of Indian Point. As assumed in the modeling, if 15 by 15 is achieved, one possible replacement option under these circumstances would be a 700 MW combined cycle, gas-fired generating plant connected directly to the Buchanan 345 kV substation. It is unclear, however, whether new natural gas pipeline capacity would be needed for such a facility.

Under the relicensing schedule for the Indian Point units, it is anticipated that the earliest a decision could be made is the Spring of 2010, although this time frame could be significantly extended. If Indian Point is not relicensed, then NYISO, PSC, and involved utilities will need to engage in a process to develop various scenarios for replacement generation as well as associated transmission and pipeline infrastructure needs.

Repowering

Repowering of existing power plants under the right circumstances can provide environmental and economic benefits. In other cases, retirement of existing units and replacement with new units can provide comparable benefits. An effective siting law may help facilitate the construction of new or repowered generating units where they are economically warranted.

Recommendations

- The State supports the use of repowering and replacement of existing units with new facilities when such actions can be justified by their reliability, economic and environmental benefits.
- Encourage and facilitate the repowering and replacement of existing energy systems to reduce overall actual emissions and environmental impacts, particularly in potential environmental justice communities.

4.2.2 Electricity Transmission and Distribution

The State's investor owned electric utilities currently have net investment plans of over \$20 billion. The majority of this investment represents the transmission and distribution system. While the current

investment is very large, longer run considerations indicate that much greater investments are needed in the future.

The Replacement of Existing Transmission and Distribution Infrastructure

Because New York's electric infrastructure is old, significant capital investments will need to be made in the utilities' electric transmission and distribution systems to meet future electric demand and allow them to continue to provide reliable service. Replacement and improvement of existing aging infrastructure are critical, as system failures not only raise safety and reliability concerns but can also lead to increased system congestion and therefore higher emissions and costs. While these incremental investments will put upward pressure on rates, PSC will also need to consider whether it is more effective and efficient in some cases to make investments in solar-PV or other customer-driven resources to address localized reliability issues.

In total, the investor-owned utilities project that infrastructure investment for the entire State could be over \$13 billion for the next five years (2009 through 2013) as compared with about \$8.5 billion over the prior five years (2004 through 2008). This level of capital expenditures over the next five years will put significant upward pressure on rates. There is, therefore, a strong need for PSC to carefully scrutinize the capital expenditure plans of the investor-owned utilities and a strong need to balance the potential benefits of any new State policies and actions against their aggregate impact on the State and its ratepayers.

Recommendation

- PSC, along with NYPA and LIPA, should continue a systematic examination and evaluation of the State's transmission and distribution infrastructure and maintain its emphasis on appropriate replacement and upgrade of aging infrastructure to maintain safe and adequate service and also increase the efficient utilization of the electric system, while minimizing, where possible, upward pressure on rates.

Transmission Expansion Considerations

Major additions to the State's transmission system, while not called for to meet reliability needs, may be driven by several factors, including the expected net economic benefits in the form of lower statewide production costs, or the need to eliminate or reduce transmission constraints on the existing system. For example, as more wind comes on line upstate, it may be beneficial to New York as a whole to invest in infrastructure that would facilitate delivery of that power to the areas of the State with higher demand.

The State's clean energy policy goals, which will increase the contribution of renewable resources in meeting electricity requirements, may also require construction of new infrastructure, irrespective of near term reliability or economic benefits. In such circumstances the viability of those projects should account for all relevant considerations including costs and impacts of clean energy sources on system reliability.

Multiple planning efforts are underway in New York to assess the status and needs of the electricity infrastructure. Such efforts generally have used consistent assumptions, although further coordination may be appropriate. Interregional transmission planning and participation in the proposed Eastern Interconnection Planning Collaborative is an example of such coordination. Additionally, the New York Transmission Owners have initiated a long-term transmission study, the *New York State Transmission Assessment and Reliability Study (STARS)* to identify a long-term pathway to: meet the growing electric power needs of New York; encourage the addition of significant renewable energy sources in New York and the surrounding areas; and address an aging infrastructure. Early results of STARS are expected by the end of the third quarter of 2009.

Transmission Siting

Practical experience with the implementation of PSL Article VII has revealed the need for certain amendments. While PSL Article VII requires compliance with the substantive provisions of all applicable State laws and supplants the procedural requirements associated with those laws, in practice, it is difficult for PSC to administer compliance with the New York State Uniform Fire Prevention and Building Code due to the lack of expertise required to do so. Therefore, an amendment to PSL Article VII should be pursued to specifically indicate that State or local approvals, consents, permits, certificates or other conditions for construction and operation of an Article VII facility shall apply in connection with application of the New York State Uniform Fire Prevention and Building Code. This amendment, which would provide for the limited application of the procedural requirements associated with this law, is appropriate since such approvals are ministerial in nature and are best left with State and local governmental entities that already administer the code and can best ensure compliance.⁹²

One of the weaknesses in Article VII is that it is difficult for intervenors to meaningfully participate in the transmission facility siting process. One solution that should be pursued is an amendment to PSL Article VII to require that an application to construct such facilities shall be accompanied by a fee, which can be used to defray intervenor expenses associated with hiring expert witnesses and consultants. This approach is similar to the intervenor funding mechanism for applications to construct major electric generating facilities that existed under PSL Article X (expired January 2003). Applying a funding mechanism similar to PSL Article X to electric transmission facilities under PSL Article VII raises several potential advantages. In addition to providing for more meaningful participation by intervenors, particularly those without resources to actively engage in the Article VII process, intervenor funding would likely benefit ratepayers by contributing toward a more informed decision as to the appropriateness of the route and the facility. While an intervenor funding requirement would raise the cost of siting and constructing transmission facilities, and those costs would ultimately be passed along to ratepayers, the additional costs would likely be minimal in comparison to the total costs of a project, and would be outweighed by the advantages to the public and ratepayers.⁹³ Similarly, there is a slight risk that a potential developer would be discouraged by the additional fee, and the likelihood of public opposition. This risk, however, is outweighed by the benefits of intervenor funding.

Recommendation

- Amend PSL Article VII for siting of transmission lines and pipeline to provide a sufficient level of intervenor funding and to indicate that State or local approvals, consents, permits, certificates or other conditions for construction and operation shall apply in connection with the State's Uniform Fire Prevention and Building Code.

Using Existing Rights of Way

In order to construct new infrastructure facilities, a developer will often need to obtain property interests in a right-of-way across public or private lands. Absent the right of eminent domain, this need may present challenges for a developer in terms of the cost and time required to obtain such rights-of-way through negotiations with numerous property owners. However, the use of existing rights-of-way may

⁹² A similar provision should also be explored in connection with the reenactment of PSL Article X.

⁹³ In establishing the intervenor funding fee, tying the fee to the length of the facility would provide a better measure than using voltage capacity, which would not necessarily correspond with the need for funds.

reduce the time and costs to the developer, and obviate the need to acquire rights to private and/or public lands.

Moreover, the use of existing rights-of-way may present several environmental advantages from the State's perspective. In evaluating the acceptability of a new transmission line, the State is required to look at various alternatives, which may include the use of linear property interests. These property interests may present viable alternatives that avoid and/or minimize environmental impacts.

The primary task in maximizing the use of rights-of-way is to identify where such rights exist. Accordingly, a study is recommended to inventory existing rights-of-way, such as existing utility corridors used for electric, gas, water and telecommunications facilities that are underused, or can be expanded to accommodate new facilities, including Smart Grid technologies, along with highways, railroads, and waterways. This study should also evaluate and assess the risks and cost implications associated with utilizing such rights-of-way. The study may build off of existing efforts to evaluate rights-of-way, such as the STARS study, referenced earlier.

It is envisioned that a study of rights-of-way will assist in developing policy initiatives to achieve the maximum use of these rights-of-way, including whether to pursue an amendment to the State's accommodation policy with the Federal Highway Administration, which currently prohibits the linear co-location of utility facilities, other than telecommunications, within the highway right-of-way, unless an exception is granted. This amendment could provide for the linear co-location of underground utility facilities in highway rights-of-way.

Efforts should also focus on establishing and maintaining a comprehensive database of rights-of-way. While various State agencies, such as DOT and PSC, currently maintain databases of certain rights-of-way, these compilations are not comprehensive. Therefore, interested State agencies and property owners should cooperate in identifying these property interests, which will allow project developers and State regulators to ascertain the suitability of potential alternatives through a shared database.

Recommendations

- The State should initiate a study to inventory existing utility corridors used for electric, natural gas, petroleum products, water and telecommunications facilities that are underused or can be expanded to accommodate new facilities, along with highways, railroads, and waterways. Improve and coordinate efforts to identify and promote the use of linear property interests for use of existing and siting new electric and gas transmission facilities.
- The State should encourage cooperation in the development of electricity transmission and distribution infrastructure, including Smart Grid technologies, using State-owned lands and rights-of-way unless such development would require a Constitutional amendment or be inconsistent with the public trust or parkland doctrines.

4.3 Natural Gas

New York's aggregate natural gas demand is expected to increase over the 10-year planning period, driven largely by growth in the residential and commercial sectors. Reliance of electric generation on natural gas coupled with the almost total dependence on interruptible delivery services for that supply raises reliability concerns, particularly during times of peak gas system demand. To assess the adequacy of the natural gas delivery system properly, the natural gas requirements of the electricity generation, residential, commercial, and industrial natural gas customers were considered together and compared to

available pipeline delivery capacity at peak periods. Modeling of the natural gas system was performed to examine two market scenarios that stress the natural gas system (repowering of aging oil-fired units to gas combined cycle and retirement of the Indian Point facility). The modeling results show that the capacity of interstate pipelines to transport sufficient natural gas to meet peak day demand is a concern, particularly for the downstate area. Under each scenario, available pipeline capacity in the downstate area is essentially fully utilized during peak day demand periods throughout the forecast period. Additional pipeline capacity will be needed to continue to reliably meet demand.

Capacity constraints in the downstate market are of particular concern and the local distribution companies who provide service to the area have identified a need to add delivery capacity into their service territories. Planned pipeline additions for new delivery points into the downstate market, if built, would significantly relieve capacity constraints, increase reliability and reduce the volatility of spot market gas prices and the delivered price of natural gas into the market. The addition of such new delivery points would directly benefit not only natural gas ratepayers, but also downstate electric ratepayers. Methods to have all beneficiaries share the cost of the pipeline capacity additions should be explored. As noted earlier there is particular value to the electric system and its customers in the continued availability of dual fuel electric generation capability in the New York City and Long Island area.

The planning, regulatory approval, and construction processes for new pipeline and liquefied natural gas (LNG) projects can take many years. Delays can represent significant obstacles to constructing the needed natural gas infrastructure to meet growing natural gas market demand. The State can reduce potential delays and facilitate investment in natural gas infrastructure, including LNG facilities for meeting future downstate requirements, by: (a) providing project developers rigorous, pre-application, all-agency evaluations of State and local project siting, environmental and safety concerns; and (b) maximizing agency coordination during permitting proceedings. By providing early indications of acceptable sites, projects that can help meet projected demand while satisfying environmental and safety concerns, can be encouraged.

Additional studies are needed to fully understand important aspects of the adequacy of the gas delivery system serving the State and to fully capture the interdependence of the natural gas and electric systems. Further analysis is needed to determine to what degree the reliance of electric generation on natural gas demand and use of interruptible services for the supply of that gas, impacts the natural gas system's ability to continue to reliably support electric generation requirements. Since the models assume that all elements of the gas system are operating as designed, the vulnerability of the State from pipeline or compressor failures should be examined as part of a separate contingency analysis. Finally, the adequacy of the gas delivery system to meet winter demand during a colder than normal winter season needs to be examined.

4.4 Petroleum Fuels

Petroleum fuels such as motor gasoline, home heating oil, diesel fuel, and residual fuel oil are vital to New York's economy and remain the single largest source of energy used in the State. New York is the fifth largest market for liquid fuels in the United States, and more than 90 percent of the State's supply is imported. Dependence on petroleum fuels in certain sectors – for example, transportation – exposes consumers to price volatility and potential delivery disruptions. It is critical that the infrastructure required to store, handle, blend, and dispense the wide-range of petroleum and petroleum blended fuels be adequate to meet user demand. The petroleum infrastructure includes the delivery system of trucks, barges and pipelines as well as the retail refueling outlets and large primary and secondary bulk storage facilities. This will become increasingly important as liquid fuel composition evolves to include higher

percentages of bio-fuels, such as bio-diesel, bio-heating oil, and ethanol for gasoline blending. The significant construction costs, space limitations, multiple fuel types, and potential local siting considerations make it imperative that New York flag potential issues related to the adequacy of storage capacity for evolving fuel blends.

For a number of years, petroleum product distribution companies throughout the State have expressed concern over the long-term decline in the number of storage terminals and associated storage capacity. One consequence of the lower storage capacity volumes is that suppliers may not be able to respond quickly to spikes in demand that occur because of extreme cold temperatures and unexpected weather conditions. Petroleum storage terminal facilities face many of the same environmental, land use, and economic pressures that affect many other businesses. However, beginning in 2007, the amount of New York storage capacity dedicated to distillate fuels has increased. In certain parts of the State, including Long Island, the petroleum distribution industry has responded to market signals and added tank capacity to meet demand.

The Port of New York, with large petroleum storage terminals located on both the New York and New Jersey sides of the harbor, is an important component of the State's petroleum infrastructure. These deep water terminals receive a steady flow of refined petroleum products and crude oil from domestic and foreign sources. New York also receives petroleum products from several pipeline systems that connect terminals located throughout the State to the major refining centers located along the Gulf and East Coasts. Additionally, crude oil is used by refineries located in the mid-Atlantic region to produce refined products for the northeastern United States. Once refined fuels arrive at these facilities or are produced at the regional refineries, they are distributed by pipeline, barge, and truck transport to smaller coastal and inland terminals for further distribution to customers through retail distribution channels. The continued, uninterrupted operation of this complex distribution system, with its ability to receive, store, and distribute millions of gallons of the various fuels per day, is of critical importance to New York.

Long range solutions to reduce New York's exposure to price volatility and potential delivery disruptions of liquid fuels must include a variety of strategies to reduce significantly the State's use of these fuels. Since the transportation sector accounts for approximately 80 percent of this usage, energy efficiency and fuel-switching programs will be targeted to this sector's use of petroleum-based fuels over the planning horizon.

4.5 Transportation

Keeping New York's diverse, multi-modal transportation system in good working order is vital to the State's economy and environment. The reliable flow of people and goods means less congestion, less pollution, less fuel use and improved quality of life. A transportation system in good working order also improves safety and reduces vehicle wear and tear, lost time, delivery costs and system user stress. The DOT System Performance and Asset Management Bureau has estimated that in 2007 congestion related delays on State-owned highways cost New Yorkers \$9.6 billion.

Despite the congestion, the State's transportation infrastructure, in general, is functioning well. For example, of the 19,500 bridges in New York, only 100 are closed. This is a testament to the State's ongoing focus of "fix-it-first" to preserve the investments that have been made in the State's transportation system.

In 2006, New York received about \$19.8 billion to maintain, operate and improve its transportation system; the majority of which was self generated or derived from local sources. Typically, only 15 percent of New York's transportation funds come from federal sources.⁹⁴ Of that funding, 58 percent supports public transportation, and another 29 percent is being spent on the highway system. Other modes receive a comparatively small amount of this funding. Currently, the vast majority of transportation funding is programmed to maintain and operate the system. This necessary level of commitment to maintenance of the system is expected to continue, if not increase. This reality makes any substantial expansion of the system in any of its varied modes difficult to achieve.

Energy efficiency in the transportation sector can be enhanced by actions at the federal level through legislation, regulation and policy. Federal legislation related to climate change and surface transportation re-authorization can further enhance New York's status as the most transportation energy-efficient state.

Infrastructure investments should include state-of-good repair of the existing system, which favors the maintenance of existing roads and highways instead of building new ones, and strategic new transportation investments to attain the State's goals. Additional investments to support energy-efficient transportation include those that support public transportation and rail (including freight) facilities and provide effective linkages between different transportation modes. The State should also implement strategies to increase freight rail movement of goods, such as providing new intermodal facilities, rail sidings, and rail-truck transfer facilities and raising bridge clearances. Such investments and strategies will be developed as part of New York State's Multi-Year Transportation Capital Program, scheduled for release in October 2009.

Recommendations

- The State should advocate for more federal funding for public transportation in reauthorization of the federal surface transportation bill to guarantee investment in the federal public transportation program to support a doubling of rider-ship nationwide in twenty years; support a federal financial commitment and strategy for rehabilitating, maintaining, operating, and, when necessary, replacing the existing transportation infrastructure before investing in system expansion; retain the Congestion Mitigation and Air Quality programs; and establish a companion program for transportation projects and programs that reduce GHGs.
- The State should allow for more private investment in public transportation and amend the State Tax Law to allow private individuals and or businesses to provide direct public transportation infrastructure investment in return for State income tax credits. For example, an individual or business could sponsor the installation of a bus shelter on a transit line and a portion of the cost of that shelter could be offset by a tax credit.

⁹⁴ These figures do not include any additional infrastructure funding provided through the American Recovery and Reinvestment Act (ARRA), which is expected to be approximately \$2.35 billion for transportation projects.

5 *Stimulate Innovation in the Clean Energy Economy*

The nation is in the midst of a major economic transformation, evolving from the factory economy launched in the late 19th century and the post-World War II mass-production economy to an “Innovation Economy.” There is a move toward a global, entrepreneurial and knowledge-based economy in which the keys to success lie in the extent to which knowledge, technology, and innovation drive the creation of new, enhanced products and services. The importance of innovation in the energy and transportation sectors is underscored by the challenge posed by climate change, a challenge which will push the State, nation, and world inexorably toward a low-carbon, clean energy future. The Governor has addressed this subject in his recent presentation on the New Economy⁹⁵ jobs plan, which asserted that increasing the State’s capacity for innovation would be a crucial factor in future economic growth.

The State needs to be proactive in realizing the promise inherent in these changes. Using the New Economy jobs plan as a starting point, this Chapter addresses how New York government should respond to this fundamentally changing economy. More specifically, it addresses how the State can help create and maintain an environment which stimulates innovation and advances the emerging Clean Energy Economy.

A reasonable first step is to assess New York’s unique and preeminent strengths, coupled with specific initiatives to capitalize on them. In the case of the Clean Energy Economy, there are at least two general strategies for the State to pursue. First, the State can support the emerging clean energy market by increasing demand for clean energy goods and services through its numerous clean energy programs, e.g., ‘45 by 15’, and through targeted workforce training. Second, the State can provide direct support in order to retain existing firms and to attract the most promising new technologies and businesses that will compete in a carbon-constrained global economy.

During the transition period, New York can ill-afford to neglect the current and future energy needs of the State’s existing commercial and industrial base. For commercial and industrial companies alike, energy costs influence decisions on locating or expanding a business in New York. The State’s economic development strategies must continue to address energy costs in order to stimulate expansion of existing businesses as well as investment in new sectors of innovation that create jobs for New Yorkers. Such strategies will need to balance the immediate pressures of energy costs on business with the long-term opportunities for energy efficiency and clean energy technologies. Ultimately, commitment to the latter will help shield businesses from energy price volatility as well as reduce medium- and long-term energy costs.

⁹⁵ Governor David A. Paterson. *Bold Steps to the New Economy: A Jobs Plan for the People of New York*. 2009. http://www.ny.gov/governor/press/pdf/press_0608091.pdf

5.1 New York's Unique Strengths

New York has two unique strengths from which to draw in the development of a Clean Energy Economy. First, New York is home to an enviable mix of higher education institutions – including two Ivy League institutions, seven members of the elite Association of American Universities (AAU) and over 20 major research institutions – and a number of firms in the private sector that are leaders in energy innovation. Second, the State has established public institutions, in particular NYSERDA and NYSTAR, which directly facilitate collaboration between industry and innovators located on college campuses and at research laboratories located throughout the State. NYSERDA and NYSTAR, in conjunction with other government partners including ESD, PSC, NYPA and LIPA, are well positioned to structure an economic development framework that taps into the State's academic and industrial resources and promotes commercial investment in clean energy enterprises that will serve markets in New York and around the world.

5.1.1 Our Academic/Industrial Base

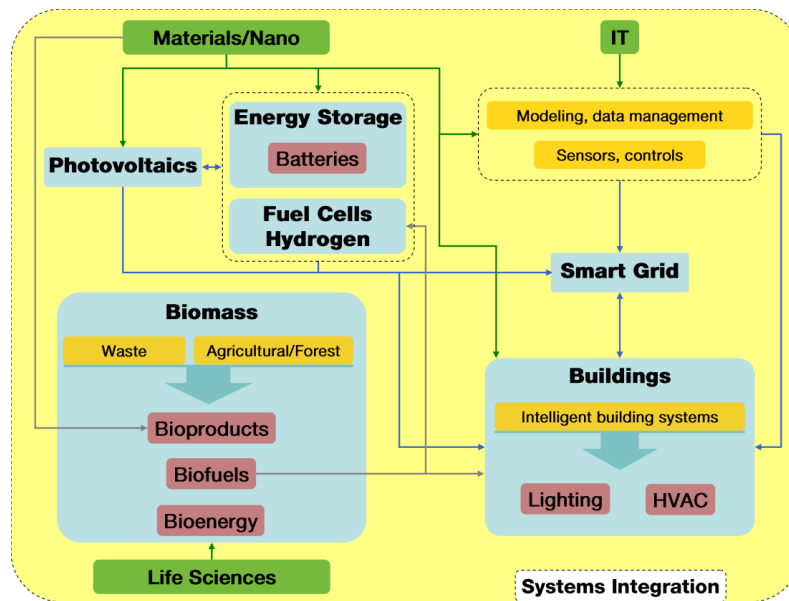
Every region of New York is home to a leading research or academic institution that has some role in developing the next generation of energy technology. There are emerging regional clusters of expertise in power systems/nanotech in the Capital District, solar-PV in the Hudson Valley, building technology in Syracuse and New York City, and substantial advanced transportation equipment manufacturing and development capability in several upstate regions. New York-based Fortune 500 companies and many small start-up companies are active in emerging clean energy markets.

Together, these assets constitute areas of concentrated energy technology expertise in New York, which are highlighted in Figure 8.⁹⁶ These identified strengths stem from a review of the core competencies of New York-based universities, industries, and research institutions. That review of the State's research infrastructure identified four areas in which New York has the opportunity to be preeminent: clean energy technologies, life sciences, information technologies (IT), and advanced materials.

These strategic strengths (shaded in green in Figure 8), provide a vehicle through which the State can more easily and more precisely focus on clean energy opportunities, including bioenergy, building efficiency, energy storage, fuel cells, solar-PV, and Smart Grid. Furthermore, to New York's benefit, these energy technologies are widely viewed as critical towards achieving a long-term sustainable energy system.

⁹⁶ New York Academy of Sciences. *Innovation and Clean Technology in New York State*. 2009.

Figure 8. Core Clean Energy Capabilities and Strengths in New York

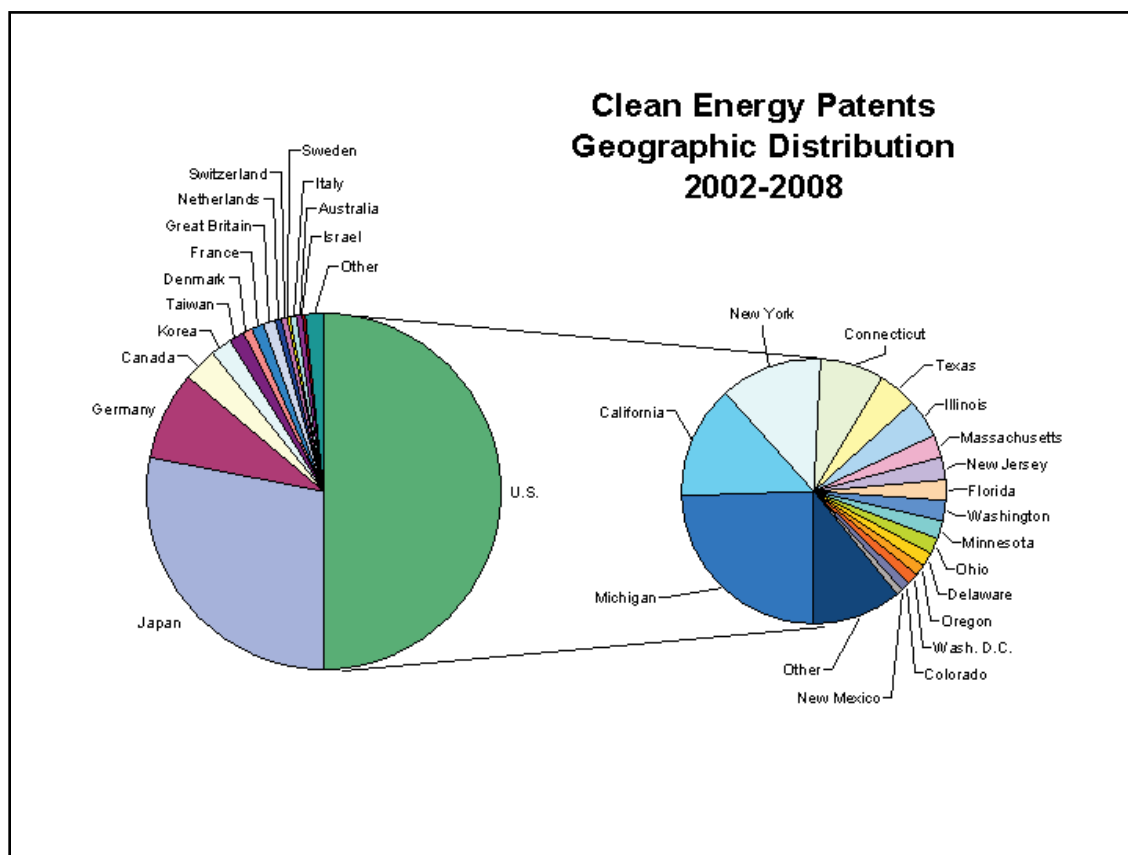


Markets for these technologies have grown substantially in recent years and are projected to continue to grow, and to provide New York with significant economic development opportunities.

According to the 2008 Kauffman Foundation State New Economy Index, New York is well positioned to excel in the innovation economy. New York ranked 9th on the index, with very strong rankings in science and engineering capability, patent development, and alternative energy use. New York is among the top three states in the country in the development of clean energy technology patents, an indicator of innovative activity occurring within the State (see Figure 9).⁹⁷ This level of activity evidences a strong foundation of research and development capacity in New York; the challenge will be in harnessing this activity toward the optimal energy, environmental and economic development outcome for the State.

⁹⁷ Heslin Rothenberg Farley & Mesiti P.C. *Clean Energy Patent Growth Index*. 2009.

Figure 9. Clean Energy Patents



While New York claims a nation-leading position in terms of overall innovative activity, the proportion of academic research that is funded by industry is just 4.3 percent, below the national average of 4.9 percent. Industrial-based research and development from New York-based corporations is only 1.1 percent of industry output, also below the national average of 2.0 percent and behind peer industrial states like Michigan (5.0 percent), Massachusetts (4.6 percent), New Jersey (3.5 percent), and California (3.5 percent). Clearly, there exists significant opportunity to enhance both industrial R&D and university-industry collaboration in New York.

The State is currently examining opportunities to promote collaboration between New York-based academia and industry so as to foster the creation of new and better clean energy products and services for use in New York and for export throughout the country and the world.

- As PHEVs will likely serve as a technology bridge to fully electrified vehicles and an electrified transportation sector, New York has recognized the economic opportunity associated with advancing this technology. NY BEST Consortium has been established to: create in New York a nationally-recognized center for energy storage technology research and development; conduct world-class, industrially relevant, applied, and translational research and development; and support industrial activity in New York in the commercialization of advanced battery and energy storage technology. The goal is for the NY BEST Consortium to facilitate a “cluster” of advanced battery and energy storage research and manufacturing capabilities in New York.

- Five research laboratories in New York have been awarded multimillion dollar Energy Frontier Research Centers grants by DOE. The effort will bring nearly \$100 million into New York over 5 years to hasten the scientific breakthroughs needed to build a new 21st-century Clean Energy Economy. The Energy Frontier Research Centers will bring together groups of leading scientists to address fundamental issues in fields ranging from solar energy and energy storage to materials sciences and superconductors. New York facilities among 46 chosen nationwide include SUNY Stony Brook, Brookhaven National Laboratory on Long Island, Columbia University, Cornell University, and General Electric Global Research in Schenectady. New York is providing supplementary funding to these Centers in order to accelerate commercialization of technologies that emerge there.
- In the field of nanotechnology, and the applications of nanosciences in the energy arena, New York is well poised with the work at the College of Nanoscale Science and Engineering (CNSE) of the University at Albany and Cornell University to attract new business opportunities. CNSE's Albany complex itself is a renowned state-of-the-art research facility, and has already attracted over 250 corporate partners from around the world to New York for research and development opportunities. It is anticipated that as these capabilities grow, the impact on energy systems, and energy business opportunities will emerge.
- Established in 2001, the Saratoga Technology + Energy Park® (STEP®) was established to be a destination for clean-energy and environmental technology companies. STEP was designed as a fully-integrated knowledge community that includes programs, services, partnerships, and amenities to support the success of companies and their employees. In addition, the park environment is designed to provide synergies and collaboration opportunities for related businesses, universities and research centers and business service providers. For example, Hudson Valley Community College is currently building a facility at STEP that will provide learning opportunities for the students on the campus, and train the workforce for the park's tenants. STEP is the home of several new companies, including Auterra, Inc., which is developing materials to reduce the environmental impact of oil refining and coatings to improve photovoltaic performance; and GlobalFoundries, a leading-edge semiconductor manufacturing company.

To help foster this collaboration and promote further such collaborations, Governor Paterson has created the Task Force on Diversifying the New York State Economy through Industry-Higher Education Partnerships. The Task Force will examine opportunities in areas of strategic strength for New York, including energy technology. The Task Force is developing recommendations to accelerate the pace of commercialization, foster the incubation of new companies, promote growing companies, and enhance the collaborative university-industry environment in New York.

These efforts are early results of what will be an ongoing State strategy of serving as a convener for industry, academia and the private sector to come together to pursue targets of interest for the State's Clean Energy Economy.

5.1.2 NYSERDA, NYSTAR and the Innovation Economy

New York has a unique asset in NYSERDA, in that the State has a government agency specialized in the field of energy research, development and deployment. Organized by State statute in 1975, among NYSERDA's missions is to "advance innovative energy solutions in way that improve New York's economy and environment." NYSERDA has organized its activities along the "clean energy continuum," which is a 5-stage development cycle of energy products and services. The development cycle encompasses (1) initial stages of scientific research and market analysis through (2) technology adoption

and market expansion – (3) technology demonstration and business development – (4) technology development and commercial feasibility, ultimately leading to the final stage of (5) standard practice and code enhancement. While NYSERDA itself does not participate directly in these R&D and deployment activities, NYSERDA provides critical support at each stage of the continuum to maintain the development of energy products and services through the continuum stages.

One example of a technology that has successfully navigated the clean energy continuum is a hybrid-electric vehicle powertrain technology now being manufactured by BAE Systems Controls of Johnson City. This technology which is used on medium and heavy duty vehicles was initiated by research work originally targeted for liquid fuels alternatives for transportation application. In the course of such research, this specific electric powertrain technology was conceived to help conserve fuel use when a vehicle stops or applies its brakes going down a hill. NYSERDA invested State funds to support development of this technology. Ultimately, the technology was applied on a 40-passenger bus that was built by Orion Bus Industries in Oriskany. The successful application has grown into orders for more than 2,300 buses and has generated over one billion dollars in revenue. These buses expect to show 25 percent in fuel savings from standard diesel buses, and emissions reductions of 90 percent for particulate matter, 40 percent for NO_x and 25 percent for GHGs. These hybrid buses are now becoming standard in major mass transit markets in New York, San Francisco, Toronto, London, and other cities.

In addition, NYSERDA's deployment programs are structured to achieve public benefits beyond just energy savings. For example, SBC-funded energy efficiency programs were designed to help foster the development of a nascent energy efficiency services industry in New York. A result of the successful response to these programs is the creation of a platform and infrastructure from which the more aggressive EEPS program can build a higher level of energy efficiency – bringing certain energy efficiency services along the continuum into standard practice. A similar creation of these business sectors has also been noted from the continuation of the RPS Program.

As energy policy develops, especially in tandem with emerging climate change policies, continued funding of new energy technologies and services along the clean energy continuum will be necessary to realize the successful achievement of policy and program goals.

Like NYSERDA, NYSTAR supports technology development, innovation and commercialization with the objective of creating economic growth in New York. A central tenet of NYSTAR's mission is the recognition that New York's world-class public and private research centers are powerful economic development engines that can create high-quality, high-technology jobs in New York. NYSTAR's programs and initiatives provide a critical vehicle to translate cutting-edge research into economic development.

NYSTAR provides support to research centers throughout the State, including in some cases providing the physical infrastructure and/or attracting the world's best scientific talent to foster science and technology discoveries and advancements in New York. Among NYSTAR's key programs are:

- Strategically Targeted Academic Research (“STAR”) Centers – which serve as academic research facilities and state-of-the-art facilities for cutting-edge technologies;
- Advanced Research Centers – which serve as vital research centers that will conduct research in concentrated subject areas;

- Centers for Advanced Technology – which support university-industry collaboration in research, education and technology transfer, with the goal of fostering New York businesses gain a competitive technological edge; and
- Centers of Excellence – which focus on critical emerging technologies that are anticipated to become major high-tech growth areas. The Centers function as a network of high-tech research and economic development resources, in an effort to create a mutually-beneficial research and development environment.

Ultimately, NYSTAR’s and NYSERDA’s programs and research facilities are expected to attract a critical mass of nationally recognized researchers, generate significant new research funding, spur the establishment of spin-off enterprises, and increase the development and transfer of technology from the research lab to the marketplace. The collective expertise of NYSTAR and NYSERDA offers a strong platform for the development of an “Innovation Economy” in the clean energy sector in New York. To realize this energy, economic development and environmental strategy, NYSTAR and NYSERDA will help focus the State’s efforts in energy innovation to achieve advances in:

- **Infrastructure** – The State must invest in both near-term and long-term infrastructure needs, and identify opportunities to repurpose New York’s existing manufacturing infrastructure to produce advanced energy technologies and their component parts for New York, regional and domestic U.S. use, as well as export to worldwide markets.
- **Intellectual Capital** -- The State must build on the existing intellectual and professional resources that reside in New York’s universities and colleges, research and development organizations, and private industry, to create a clean energy innovation infrastructure that furthers the State’s capability to develop, commercialize and market advanced energy technologies.
- **International Perspective** – The State must implement policies and programs that not only promote efficient energy use and foster demand for renewable energy products and services, but that also provide a platform for the export of New York efficiency and renewable products to meet growing global demand.
- **Investment** – The State must address policies and programs to facilitate access to public and private capital across the entire spectrum of the Clean Energy Economy: from seed-stage companies to manufacturing expansion to large-scale energy projects. Where necessary and appropriate, the State may make targeted investments in order to realize strategic policies and programs.
- **Innovation** – The State must remain committed to continued advances in energy policies and programs in order to ensure that New York is able to capture emerging opportunities which provide energy, environmental and economic development benefits. Such enduring commitment should result in new opportunities for New Yorkers, from jobs in the “clean energy workforce” to opportunities for engineers and scientists of all disciplines. These policies must promote an environment in which New York’s individuals and companies alike can easily tap into the technical and professional skills needed to be effective in a rapidly changing energy landscape.

Recommendations

- To support the growth of the State’s clean energy sector, the State should strengthen and expand collaboration among, and develop more formal interactions between, the intellectual and professional resources in the State’s public and private education institutions, research and development organizations, national laboratories, private businesses and industry.
- Implement where practicable, the recommendations of the Task Force on Diversifying the New York State Economy through Industry-Higher Education Partnerships, established by Executive Order No. 19. The Task Force will study and report on best practices and generate recommendations on fostering business incubation, growth and emerging technology commercialization.
- Increase the emphasis on State incentives and economic development assistance to clean energy companies and component manufacturers and service businesses, looking to locate and or remain in business in New York.
- Support and enhance research and development of next-generation clean energy technologies in the energy and transportation sectors; seek opportunities to establish New York as a regional energy innovation hub in strategic areas; foster regional clusters of clean energy businesses and institutions to promote long-term economic growth; and develop the export potential for New York-based firms to sell products and services to the rest of the world.
- The State should support efforts to expand electrification in the transportation sector, starting with on-road vehicles such as plug in hybrid vehicles and truck stop electrification, i.e., technology to reduce diesel engine idling, for heavy duty vehicles as well as ancillary equipment in other modes (ground support equipment at airports, hybrid switcher locomotives at rail yards and cold ironing at ports).
 - To demonstrate feasibility of electrification of the transportation system and to promote the use of plug-in hybrids in the State, the State fleet plug-in hybrid vehicle demonstration program should be expanded to private sector fleets.
 - The State should work collaboratively with other States and regional and national groups to encourage electrification of the transportation system at the national level.

5.2 Support Clean Energy Markets

The State supports emerging markets of the Clean Energy Economy in three key ways: (1) Generating demand for the goods and services to foster sufficient in-state demand to attract firms seeking to provide those goods and services to markets worldwide, and to capture the economic development benefits from installation and use of these new products and services; (2) Identifying and addressing market barriers experienced by new technologies to help foster sustained growth; and (3) Targeting workforce training resources to better match skills training to market needs.

5.2.1 Generate Demand for Clean Energy Technologies

There is a growing global demand for energy efficiency technologies and services and the components and systems for renewable generation technologies. As the world economy becomes progressively more

carbon-constrained, these markets will grow even more rapidly. Closer to home, New York's neighboring states with renewable targets, as well as efficiency goals, contribute to this demand. At home, the State's aggressive '45 by 15' goal will increase in-state demand significantly as compared to even one year ago. Through the aggressive funding of energy efficiency programs, the RPS Program and similar programs sponsored by State authorities, the State has generated demand for the investment of hundreds of millions of dollars annually in the goods and services required by the Clean Energy Economy. Providing a robust in-state demand provides a potential base of business for firms seeking to export their goods and services.

The State's energy and economic development programs are designed to lower energy costs and stimulate business development while advancing an emerging Clean Energy Economy. Several State entities offer energy programs to assist energy users in all energy-consuming sectors, including NYPA, NYSERDA LIPA, PSC (primarily through the State's investor-owned utilities), ESD and NYSTAR. The portfolio of programs offered provides energy consumers with opportunities for low-cost energy supply; leverages new investments in infrastructure and project development; fosters renewable and energy efficiency programs and improvements to environmental quality; expands the skilled workforce; and helps stimulate the growth of the Clean Energy Economy in the State through investments in research and development for technologies ultimately produced by New York-based businesses.

New York recognizes the importance of energy costs for businesses seeking to expand or locate in the State. For example, in 2008 ESD and NYPA provided financial assistance and low cost power to Globe Specialty Metals, Inc. (Globe) for the company's development and operation of metallurgical and solar grade silicon production facilities in Niagara Falls, New York. Globe's manufacturing facility will produce nearly 4,000 tons of silicon annually for the solar cell industry. ESD's agreement with Globe will provide 25 percent of the company's solar grade silicon production for attraction of new solar panel manufacturers to the State. In early 2009, ESD and NYSERDA partnered to provide financial assistance to SpectraWatt, a designer and manufacturer of silicon solar cells for the Company's \$80 million investment in a new production/headquarters facility in Dutchess County, New York. As part of the assistance package, ESD offered SpectraWatt a supply of solar grade silicon under the agency's agreement with Globe.

While the State's commitment to these initiatives has been robust, there is a concomitant obligation to periodically review these funding programs to assure that they are necessary to meet State policy objectives, to recalibrate the required level of support and to assure that the funds are being well spent.

5.2.2 Workforce Development

In order to meet the '45 by 15' goal, New York's Clean Energy Economy programs will create an estimated 50,000 jobs. Workforce development investment to address skill shortages in both the conventional energy and clean energy labor markets will significantly contribute toward achieving the State's energy policy objectives and minimize the inefficient use of public resources.

New York's Clean Energy Economy will be characterized in part by high-tech, small-scale development and large and small-scale manufacturing. It will also respond to the increased importance of energy efficiency, renewable resources and a cleaner environment by building on strong research and development facilities, advanced engineering and a highly-educated workforce. To some degree this changing economy will require a workforce with technology-specific knowledge and skills at all stages of the product value chain – from entry level skilled workers to highly skilled and credentialed workers. In addition, recent power industry literature highlights the difficulties utilities and other energy organizations face in obtaining and retaining the human resource skills needed to handle the increased diversity and

complexity of a modern electric grid. This includes serious shortages of personnel with expertise in all technical categories, including engineers, contractors, and line workers.⁹⁸

In May 2009, the New York State Department of Labor (NYSDOL) released a report which addressed three key aspects of clean energy jobs in New York: the characterization of the clean energy labor market, the inventory of existing training programs that support the clean energy sector, and the need for State-level collaboration and where these efforts are already seeing success.⁹⁹ A key finding of the report was that most “clean energy” jobs are not unique to that industry: they require similar education and job skills to those in other energy, construction and manufacturing sectors. So while new occupational titles will emerge in the clean energy industry, the skills for the vast majority of these occupations will be similar to existing job titles, with incremental skill enhancements specific to the industry. This is an important result, because it provides sufficient intelligence to immediately advance workforce strategies to support clean energy jobs in New York with public investment.

State agencies, stakeholders and partners have worked closely over the past year to build a comprehensive New York workforce development system to meet the needs of the Clean Energy Economy. The system is based on a strategy that includes: comprehensive training initiatives, e.g., incremental skills training, certification and accreditation; pathways out of poverty; infrastructure, such as curriculum development, school start-up and accreditation, worker certification and the cost to properly equip workers with the requisite tools for the job; and marketing and outreach.

Looking forward, the Clean Energy Economy workforce issues the State needs to address are:

1. *Program Coordination.* The massive influx of federal dollars and the multitude of workforce training programs creates the risk that funds will be spent inefficiently. Public funding is generally channeled through existing funding streams administered by different State agencies. Each funding stream has legislative and/or regulatory restrictions which preclude a single agency from providing the full-range of activities necessary to support these objectives. The State should develop a formal means to coordinate all agencies involved in workforce training, including unions, non-profits, and colleges. Under this scheme, State agencies, Local Workforce Investment Boards, and stakeholder groups will continue to collaborate, align and leverage their resources to assure that job creation, workforce development and pathways out of poverty initiatives are being addressed comprehensively, such that each agency’s funding is being leveraged in the most effective and optimal manner.
2. *Develop a Comprehensive Training Program Inventory.* The Clean Energy Economy requires a fresh look at the workforce training needs across all levels of the workforce and across all new technologies on the horizon including Smart Grid, renewable energy, transportation, and building efficiency. NYSERDA and the Workforce New York Training Inventory used by NYSDOL’s

⁹⁸ A recent report by Cambridge Energy Research Associates (CERA) predicts that 50 percent of today’s engineers, who now on average exceed age 50, will retire by 2015 and that their loss will not be offset by a sufficient number of new entrants into the engineering field. A major New York utility has had an open senior planning position for over a year and cannot find an experienced engineer to fill the position. Also, technology changes in the power industry and the potential for “green energy” is exacerbating the need for skilled tradespersons. CERA. *Engineering Talent Squeeze -- “People Deficit” -- Likely to Cause Further Delay in Some Oil & Gas Production Projects through 2010*. 2007.
<http://www.cera.com/aspx/cda/public1/news/pressReleases/pressReleaseDetails.aspx?CID=9006>

⁹⁹ NYSDOL. *New York State’s Clean Energy Industry: Labor Market and Workforce Intelligence*. 2009.
<http://www.labor.state.ny.us/workforcenypartners/PDFs/NYS%20Clean%20Energy%20Jobs%20Report%20FINAL%2006-09-09.pdf>

One-Stop system to fund training are being better integrated to more easily provide a comprehensive listing of the State's clean energy training programs. Such consolidated information and efforts are essential to successful implementation of an effective workforce development strategy.

3. *Weatherization Assistance Program.* This program services many of those most in need of energy efficiency measure in their homes. Assessment of the workforce needs of the State's WAP determined that the program needed access to skilled entry-level workers. The strategy to address this workforce need incorporates a multi-agency initiative for entry-level technician training for jobs in weatherization. Specifically, DHCR, NYSERDA, NYSDOL, New York State Office of Temporary and Disability Assistance (OTDA), and DOS will collaborate to provide a continuum of training and job placement services, which will give public assistance recipients and unemployed individuals direct access to these jobs.
4. *Develop the Capacity to Respond to Rapid Changes in Workforce Needs.* Markets are changing rapidly and so are their workforce requirements. The State's labor force would be well-served by a resident capacity to identify emerging trends in the labor market. NYSERDA, ESD and NYSDOL have strong capacity to assess the clean energy industry, e.g., economic modeling and occupational analysis. This capability is of critical importance to project job growth and assess the workforce needs associated with those jobs. NYSERDA, ESD and NYSDOL should collaborate to improve the State's capacity to assess and forecast clean energy jobs and the workforce needs associated with these jobs. This includes tracking business trends in the clean energy industry, and establishing direct communication with businesses to identify their labor profile.

Recommendations

- Coordinate all agencies involved in workforce training, and partner with unions, non-profits, colleges, and BOCES and technical high schools to expand the existing network of 32 clean energy workforce training sites and make a clean energy training curriculum standard for SUNY and CUNY schools.
- Dedicate funding for "pathways out of poverty" programs to train unskilled workers for clean energy jobs. These programs should target residents of environmental justice communities.
- Coordinate a Statewide workforce strategy to address the workforce needs of the State's clean energy industry, and maximize the State's ability to obtain federal workforce training funding.
- Implement NYSDOL's clean energy workforce development plan.

5.3 Retain Firms and Attract Firms that Will Thrive in the Clean Energy Economy

The State maintains a wide range of economic development programs that directly support firms that: need to maintain a competitive position for their products in existing markets; firms intent on transitioning their businesses to producing the goods or providing the services that will likely be called for in the new economy; and start up or early stage development firms offering new products or services. ESD, NYSERDA and NYPA are all authorized to provide such assistance.

5.3.1 Retaining New York's Existing Base in a Carbon-constrained Economy

Manufacturing activity in New York continues to decline, with service sector businesses claiming a larger share of Gross State Product. Yet, the manufacturing base in the State is highly valued for the level of investment in plants and equipment, a supply of good paying jobs, and the ability to sell products in national and international markets. New York remains focused on maintaining and expanding its industrial sector through a variety of economic development assistance programs, including funding for reductions in energy costs and improvements in energy efficiency.

A portfolio of nine NYPA economic development power programs supply electricity to private sector employers in New York. Each program provides electricity at reduced cost to participants but has unique features, including the source of power and eligibility requirements. For example, some programs use hydropower from NYPA power projects, while others rely on power purchased from the competitive market. Some are limited to regions in the vicinity of the power project that supplies the electricity and others serve customers statewide. Currently, more than 400,000 jobs across the State are linked to NYPA power programs through contractual job commitments.¹⁰⁰

NYPA's power programs provide benefits for over 700 participant firms across the State. Overall, more than 75 percent of the program participants are in the energy intensive manufacturing-based sector. Approximately 90 percent of manufacturing companies participating in NYPA programs are provided with low-cost hydropower, and some 80 percent of Power for Jobs customers are manufacturers. The program participants in the upstate region are concentrated in the manufacturing sector, and the downstate region has significant numbers of participants in the financial services and print and electronic media sectors.

The Power for Jobs program was created in 1997 as a three year program intended to be a bridge to a competitive marketplace. The program was designed primarily to be a retention program. Now in its eleventh year, Power for Jobs has been extended on a year-by-year basis since 2004. Businesses have expressed frustration with the current program. Specifically, the short term extensions have limited their ability to reasonably predict their energy costs for planning purposes. Also, this has inhibited their ability to attract capital for on-going and new projects. The Governor and the legislature have acknowledged that Power for Jobs needs to be replaced with a longer term program that will provide price stability.

A reformed program is needed to stave-off further erosion of the State's economy and to establish a foundation for a more rapid recovery down the road. The reformed program should have the ability to retain and expand existing businesses, which are vital to the local economies, as well as the ability to respond to a changing marketplace by attracting emerging industries, such as solar, wind and other clean energy technologies. Criteria for the new program should be flexible and allow for the attraction of targeted industries and must be aligned with the State's economic development and energy efficiency strategies.

In addition to a new State wide program, an evaluation should be conducted on NYPA's current hydropower allocations. Hydropower is an enormously valuable resource and as current contracts expire, the process should be diligent in verifying that all businesses receiving allocations of the low cost hydropower provide maximum benefits to the State.

¹⁰⁰ The one exception is NYPA's Power for Jobs Program that provides part power and part billing rebates, although the bill rebate option is only available to manufacturing companies.

In addition to NYPA's low-cost power programs, to help these participating customers better manage energy costs, NYPA's authority will soon be expanded to finance, design, develop, construct, implement and administer energy-related projects, programs and services, including energy efficiency or renewable or other alternate energy technology. NYPA will soon be authorized to offer such program opportunities for any public entity, as was noted in Chapter 2. Smart investments in energy efficiency initiatives can be a significant economic development tool for New York businesses.

Recommendations

- NYPA's economic development programs to reduce energy prices and bills for businesses, industry, and not-for-profit organizations should be tapped to attract clean energy industries and facilitate energy efficiency in support of the State's '45 by 15' initiative.
- NYPA's Power for Jobs program should be extended for a longer period of time, beyond the current one-year cycle of extensions. Opportunities for increasing the size of the program should also be explored.
- All of NYPA's economic development customers should be incentivized to invest in cost-effective energy efficiency measures.

5.3.2 Attracting Firms that will Thrive in Clean Energy Economy

While it is critical to retain the State's existing firms, the State must also seek to attract the high-tech businesses that will thrive in a new innovation economy. As the world becomes more carbon constrained, the demand for clean energy products, such as solar-PV, batteries, and wind turbines, is expected to grow. In addition, given the State's local demand for these products, these industries are poised for growth in New York. Such growth could result in a repurposing of existing manufacturing infrastructure to increase production of advanced energy technologies and their component parts for domestic use and export to worldwide markets. The State is using a number of strategies to attract clean energy businesses.

The State's \$100 million Innovation Economy Matching Grants Program is intended to help New York companies compete for federal technology development funding under ARRA. Many of ARRA programs provide support for clean energy technology deployment and manufacturing. In addition, the Green Strategic Investment Program (GSIP) of the New York State Common Retirement Fund committed \$500 million over three years to environmentally-focused investment strategies that produce attractive, risk-adjusted financial returns. Under the GSIP, the Fund will actively seek opportunities to invest in renewable energy and clean technologies.

NYSERDA has established four clean energy business incubator programs providing business support to accelerate the successful development of early-stage, clean energy technology companies. Programs have been established in Buffalo, Rochester, Syracuse and Brooklyn. NYSERDA provides a broad array of direct assistance for companies seeking to enter or expand the clean energy industry through its product development, clean energy business growth and development, and manufacturing incentive programs.

The New York Smart Grid Consortium was established as a not-for-profit corporation in July 2009 to promote statewide collaboration among key electric energy stakeholders including generators, utilities, market operators, industry, government, and universities. The goal of this collaborative effort is to implement Smart Grid technologies that improve system reliability, security, and efficiency, while concurrently facilitating increased levels renewable resources and demand management opportunities.

Recommendation

- The State's business attraction strategies for advanced energy technology manufacturing should be a priority for economic development programs offered by ESD, and the State's authorities and utilities.

6 Engage Others in Achieving the State's Policy Objectives

Local governments, and the communities they serve, play a critical role in the overall effort to meet the State's energy policy objectives. The success of many energy programs depends on sustained commitments by local governments. Energy-conscious local planning and land use policy decisions, locally sponsored efficiency initiatives, and locally developed renewables projects should be some of the building blocks in the State's effort to build a Clean Energy Economy. Moreover, siting new energy infrastructure projects will be strongly influenced by informed local participation in the regulatory process. The State has a responsibility to collaborate with and support local governments and local communities in these efforts.

Looking beyond its borders, the State's ability to achieve those same policy objectives depends heavily on establishing mutually beneficial working relationships with our neighboring states and nearby Canadian provinces. Significant challenges need to be addressed to, among other things, maintain the State's fuel diversity, maximize the development of economic renewable resources, minimize future power plant air emissions, and enhance interstate and international power transmission while protecting environmental resources.

Finally, State success obviously depends on federal policies, programs and funding. The country and the State are at a critical juncture; it is essential looking forward that energy policy and environmental and climate change policy proceed in tandem at both the federal and State level. Fortunately, the Obama Administration has advanced policy goals consistent with the State's own priorities. However, now more than ever, the State's interests need to be forcefully represented in the national debate on policy implementation.

6.1 Local Governments and Communities

As discussed below, the roles and responsibilities of local governments and their communities impact the demand for energy, as well as the supply of energy. As appropriate, State support is described and further State action is recommended.

6.1.1 Code enforcement

The most important local responsibility in realizing the State's energy policy objectives is enforcement of the Energy Code. Enforcement, by and large, is a local task. The State is responsible for training and the provision of supporting technical resources. There is little doubt that these efforts will require more people and money. But just as important, State and local officials responsible for Energy Code matters need to develop a shared recognition of how critically important rigorous Energy Code enforcement, and verification of compliance, have become in the State's quest to improve its economy and environment in the coming years.

6.1.2 Planning

Municipalities are authorized to undertake comprehensive planning through New York's General City, Town and Village Laws. Similar provisions exist in the General Municipal Law, which grants counties and regional planning councils the authority to develop county and regional comprehensive plans. While the statutes suggest a wide range of topics to be included in a comprehensive plan, they do not specifically address those related to energy. Making energy an explicit issue area will raise its visibility as an element of a community's or region's long range planning, serve as the basis for modifying local zoning and other land use regulations, and lay the foundation for increased understanding by local governments of the role they play in achieving the State's energy objectives.

Integration of energy considerations into local and regional comprehensive plans will help ensure that such plans promote development patterns and initiatives that reduce energy demand and GHG emissions, lessen environmental impacts on overburdened communities, and encourage energy efficiency. Local planning initiatives may include enhanced building codes and aggressive code enforcement programs. Through comprehensive planning that incorporates stakeholder input adjoining communities and counties can establish regional approaches to energy-related issues, including strategies for public transportation and congestion mitigation in all overburdened communities.

Integration of clean energy goals at the local level fosters energy security through an assessment of a locality's energy assets, both in terms of natural resources and energy infrastructure. Such assessments often identify economic development opportunities, such as the development of local wind resources or achieving energy cost reduction goals through energy efficiency. These opportunities need not be centered only on meeting the locality's individual energy requirements, but also on the identification of opportunities for energy systems investments that can benefit the State as a whole. These types of projects, such as biomass facilities utilizing locally harvested fuels, may produce fuels or energy specifically for "export" to other regions of the State. Assessments of such potentials at the local level, along with stakeholder input, may help facilitate local community acceptance of such projects, and identify potential solutions to State energy needs.

Comprehensive planning, at both the municipal and regional levels, serves as an effective mechanism to identify and initiate so-called "Smart Growth" reforms. Smart Growth can foster fundamental changes in the way New York approaches how and where we live, help to target the State's economic development opportunities, and direct energy investments from federal, State, and local sources. The Governor's Smart Growth Cabinet defines Smart Growth as sensible, planned, efficient growth that integrates economic development and job creation with community quality-of-life by preserving and enhancing the built and natural environments. Chief among the principles behind Smart Growth is that such planning responds to a community's own sense of how and where it wants to grow. Consistent with the State's energy policy objectives, a chief benefit of Smart Growth is the potential efficiency gains derived from communities that plan around compact, mixed-use centers that do not rely on automobile trips for all day-to-day needs.

Smart Growth encourages growth in developed areas with existing infrastructure to sustain it, particularly municipal centers, downtowns ("Main Streets"), urban cores, hamlets, historic districts and older first-tier suburbs. Smart Growth integrates land use planning and transportation on both the local and regional level to create communities that use less energy: that is, compact, mixed-use, walkable/bikable, transit-friendly communities that rely less on automobile travel. For instance, food travels on average between 1,500 to 2,500 miles to be delivered to the consumer; this is over 25 percent farther today than it was in 1980. By buying locally grown food, so called "food miles" can be reduced, along with the release of green house gases from this agriculture transportation. Considering how Smart Growth strategies could be implemented downstate, the greater New York Metro Area has infrastructure that can foster expansion

of “transit-oriented development” (TOD), providing an energy efficient development design that allows for the mixed-use community while also providing a less energy intensive local transportation system. The Tappan Zee Bridge project has explicitly incorporated a municipal outreach program supporting TOD planning by communities in the corridor in anticipation of the significant transit service enhancements that will be introduced as an integrated element of the Bridge project. The Tappan Zee Bridge project TOD outreach modules are being developed as a resource to support TOD training and outreach throughout the State. Specific to foster Smart Growth Upstate, additional investments in rapid transit bus service and associated improvements are needed in transit intensive corridors.

As an indicator of State support, DOS recently announced its Lower Hudson Valley Smart Growth grant program, which includes \$250,000 for a regional plan that integrates land use planning, state transportation infrastructure projects and VMT, with the goal of reducing automobile dependence and transportation-based GHG emissions.

In certain instances, the results of local energy planning initiatives inform State policy and planning efforts. As an example, in June 2009, The City of New York issued a Master Electric Transmission Plan for New York City, a comprehensive and extremely informative investigation of the City’s electricity transmission and generation options over the next 10 years. In late 2009, the New York City Energy Planning Board will present the results of its more general regional energy planning process, which addresses challenges and issues specific to the downstate region. The City’s energy planning effort is an outgrowth of PlaNYC, an ambitious and comprehensive sustainability plan for New York City.

Finally, on occasion, State and local agencies, as well as private parties, enter into joint studies and ongoing collaboration on energy projects of major regional interest. LIPA and Consolidated Edison have completed a technical interconnection study to identify the resources and investment necessary to connect wind resources off long Island that could serve both Long Island and New York City’s electricity needs. This collaborative has expanded to include NYPA, NYSERDA, the MTA, and the Port Authority of New York and New Jersey under the name of the Long Island-New York City Wind Collaborative. A Request for Expressions of Interest to site and build wind resources off the coast of Long Island was released in June to begin the next phase of the development process.

Recommendations

- Revise the City, Town, Village, and General Municipal Laws to incorporate energy considerations in Comprehensive Plans. Revisions should be made to explicitly identify energy components that would engage communities in helping to meet the State’s energy goals.
- Enact Tax Increment Financing reform legislation to encourage the redevelopment of distressed communities and revitalize downtown areas as recommended by the Governor’s Smart Growth Cabinet.
- Collaborate with Metropolitan Planning Organizations, regional planning councils, and municipal governments to promote and incentivize land use patterns that reduce reliance on vehicle trips and establish consistency between transportation planning and land use planning.
- Provide technical assistance and funding opportunities via State grant programs for localities that incorporate land use, transportation, and energy planning.
- Pursue Transit Oriented Development strategies and expand the DOS’s current initiative working with MTA to encourage development in the Hudson Valley and Long Island along MTA transportation routes. Specifically, the State should expand the inter-agency TOD incentive

package beyond the MTA's rail service area to include upstate TOD opportunities around rail and bus. Sustainable transportation features such as TOD should be incorporated into major transportation projects and TOD outreach modules should be incorporated into DOS municipal land use training.

- Encourage municipalities to adopt land use and zoning tools that support Smart Growth.

6.1.3 Local initiatives

Throughout New York, communities are integrating the State's energy policy objectives into municipal and regional initiatives. Recent efforts include:

- Westchester County recently completed an "Action Plan for Climate Change and Sustainable Development" that provides strategies to reduce GHG emissions associated with energy, transportation, land use, recycling and waste management, and water resources management. The county-wide action plan provides guidance on actions to be taken by various sectors within the county, including county government, municipalities, business, education and households.
- On Long Island, the Town of Babylon has been at the forefront of innovative energy efficiency programs. In late 2008, the Town unveiled a new program, the "Long Island Green Homes Program", which provides financing to homeowners for energy efficiency improvements. Prior to this program, Babylon became the first town on Long Island to adopt Energy Star standards for new homes, and subsequently established a requirement that all new commercial and industrial buildings over 4,000 sq. ft. meet the U.S. Green Building Council's LEED (Leadership in Energy and Environmental Design) certification standards.
- In upstate New York, the Central New York Green Team, which consists of over fifty partners within government, industry and the academic community, is actively engaged in green sector development. One such recent green initiative is the partnership between the City of Syracuse, Onondaga County and the SUNY College of Environmental Science and Forestry to develop a willow biomass-to-energy plant that initially is expected to provide power to all public facilities within the county.

The State is supporting – and will continue to support – these and similar initiatives through the promotion of the DEC's and NYSERDA's Climate Smart Communities program. To this end, the State is developing a comprehensive Climate Smart Communities Guide that will provide detailed information to help communities develop and implement climate-smart practices. This guide will include step-by-step guidance for planning and implementing climate smart practices, information on resources and funding, examples of successful implementation, and considerations for measuring and monitoring success. Climate Smart Communities begin by adopting a model resolution that includes a pledge to combat climate change, appointing a taskforce with designated leaders, inventorying the community's GHG emissions and developing a climate action plan (a strategy to put new practices in place). The program emphasizes the importance of community awareness of their contributions to GHG emissions and action in reducing GHG emissions and adapting to climate change. The comprehensive planning process can help communities integrate their climate goals in a way that aligns with their land use goals.

Programs to improve energy efficiency, such as the federal stimulus energy efficiency programs and other existing and proposed programs, are intended to help municipalities take on a level of responsibility for achieving energy policy and climate policy goals together. A number of recent initiatives are meant to foster greater municipal participation in the programs. First, to make it easier for local governments and

schools to access energy efficiency programs, Governor Paterson called for the creation of a clearinghouse to serve as a single point of access for information on all energy efficiency programs, which is now available at <http://www.nyserda.org/clearinghouse/>. Second, the Governor submitted legislation that ultimately passed both Houses that will expand the NYPA's energy services program.¹⁰¹ The expansion will allow any municipality in the State to access NYPA's program, which provides upfront capital for local governments to retrofit public buildings, install clean DG or make other green building upgrades. Lastly, the American Recovery and Reinvestment Act provided \$123 million to New York through the State Energy Program and \$175 million through the Energy Efficiency and Conservation Block Grant Program, both of which will provide grant opportunities for local governments to pursue clean energy projects.¹⁰² Combined, these new State and federal resources enable local governments to implement shared energy priorities.

Recommendation

- Expand Climate Smart Communities as a valuable component of achieving the State's clean energy goals.

6.1.4 Community and Citizen Participation

New York's geographic diversity and the substantial differences in population density from one area of the State to another present unique challenges and opportunities for energy infrastructure planning and development. The major challenge is not new, but has new immediacy. For major energy projects that will advance the State's Clean Energy Economy, from wind farms to transmission lines, benefits and burdens often fall on different communities. This problem is not just an Upstate/Downstate problem, it also arises when projects are proposed to be located in communities within New York City, for example, that are already overburdened by large projects and traffic pollution.

One way to address – if not resolve – these problems is to assure early, meaningful local and public participation in major energy project siting proceedings. Community and citizen participation has been a part of energy policy decision-making in New York for decades; however, public outreach and meaningful participation in energy decision-making could be improved. Collaboration with local communities and stakeholders can further energy policy goals by facilitating the development of needed projects. Early consultation and communication with communities could prevent unnecessary delays by addressing community concerns and promoting transparency in energy development. Community and stakeholder collaboration can also lead to creative, efficient resolution of issues regarding energy-related development.

Enhancing public participation in the siting processes for both generation and transmission facilities has particular importance because it can advance principles of environmental justice. Environmental justice policies must account for both the substantive impact of energy decision-making – such as the location of a new power plant or oil storage tank – as well as the regulatory decision making process that is used by the government. Ensuring that adequate outreach and robust community participation provisions are incorporated into such processes is essential.

¹⁰¹ Governor's Program Bill #34. A.9040 (Cahill) /S.6050 (Stachowski). http://www.ny.gov/governor/bills/pdf/gpb_34.pdf

¹⁰² For more information on the State Energy Program and Energy Efficiency Conservation Block Grant Program, visit NYSEDA. *Economic Recovery and Energy*. 2009. <http://www.nyserda.org/economicrecovery/default.asp>

In particular, community collaboration should be a factor in energy source siting. Energy infrastructure decisions often raise environmental justice concerns, particularly with respect to electric power plant siting decisions and transmission projects. Some processes, including the expired PSL Article X siting law, incorporated some review of environmental justice issues, provided for enhanced public participation and focused on specific potential impacts to neighborhoods, such as air pollution emissions and construction impacts. Since the expiration of Article X, the SEQRA energy infrastructure approval proceeding does not adequately provide for community participation or take into account the impact of new facilities on already burdened communities. As discussed in Chapter 4, creating a siting law similar to Article X, with a comprehensive assessment of the environmental and health impacts of a proposed project, along with funding for community participation in the regulatory process, will advance environmental justice.

Most essential to the collaboration with communities is the impact of energy policies and programs on public health, the environment, and a community's way of life. For example, mapping of environmental justice communities and asthma rates provides data that may better inform government and community programs. Community impact issues may be qualitative in nature, but may nonetheless support the identification of alternatives or mitigation efforts that can meet broad energy policy goals, or meet the health and environmental needs of the community. Opposition to wind energy development has identified some instances where both quantitative and qualitative analysis may be helpful to provide clarity to government decision-makers, resolve public concerns, and result in a more informed process and identification of potential alternatives. Supporting and promoting these mapping and informational analyses will continue to enhance community collaboration.

Recommendations

- Address the public health and safety needs of communities by continuing to provide and enhance mechanisms for early, fair and meaningful public involvement with transparency in energy-related decisions (through such measures as improved public outreach and notice, alternative times and locations for public meetings, and language translation of notices and key documents).
- Develop energy facility siting and permitting criteria that assess disproportionate health risks and environmental impacts on potential environmental justice areas. Identify measures to avoid, or if un-avoidable, to mitigate potential impacts.
- Provide information to the public, especially to environmental justice communities, on such subjects as disease burdens, environmental facilities, energy-related regulatory processes and ways to reduce health or environmental risks. Such information will help communities participate meaningfully in energy planning and siting processes.

6.2 Other States and Provinces

Increased cooperation and coordination among states in the region, and more intense efforts to resolve issues and identify opportunities with nearby Canadian provinces, are needed now more than ever. Success in these initiatives will dramatically improve the State's chances of fully satisfying its energy policy objectives, support economic growth and help bring to fruition a Clean Energy Economy.

At least three important circumstances justify the importance of aggressively pursuing the State's objectives by looking beyond our borders:

- *Offshore Energy Development.* New York's open coastal waters off Long Island Sound, the Atlantic Ocean, and the Great Lakes are attracting increased interest for development of traditional pipeline and cable infrastructure, LNG transshipment and storage facilities, and renewable energy generation from wind, currents and tides. New York has traditionally accessed offshore areas for energy infrastructure, mostly for fuel pipelines or electricity transmission lines, and future access to these coastal areas will require considerable regional collaboration. Meeting New York's energy policy goals will depend on adequate access to these territorial waters. Moreover, the competing needs of neighboring states and provinces will have to be considered in New York's decision-making.
- *Increasing Reliance on Renewables.* The State has deepened its commitment to rely on renewable resources to meet its electricity needs. The State's decades long dealings with Hydro Quebec and Ontario, Canada provide an excellent platform for expanding the State's purchases of hydropower. However, there are issues that must be resolved before this opportunity can be realized. The economics of any proposed transactions must make sense to both parties, and there is a need to resolve interstate and intrastate questions of cost recovery and cost allocation for any capital expenditure for related new transmission capacity.
- *Avoiding Risks and Recognizing the Nature of the Challenges.* As discussed below, the wisdom of proceeding on a regional basis for abating GHG emissions from the electric sector is being confirmed every day. A sustained regional approach to solving similar problems provides comfort that the State is not causing further deterioration in its relative economic position and is a recognition that the nature and scope of certain environmental challenges go far beyond the borders of any single state.

These issues have provided a good deal of the impetus for the following initiatives, in many instances led by New York.

6.2.1 NEMAG

The Northeast and Mid-Atlantic States Governors (NEMAG) meeting on clean energy cooperation was convened in September 2008 to identify activities related to clean energy projects, policies, programs, and market development that are ripe for regional governmental collaboration. The goal of the forum, hosted by Governors Paterson of New York and Patrick of Massachusetts, was to initiate an ongoing process for regional collaboration on clean energy issues identified by the states. The NEMAG proposition is that by acting as a region, the Northeast can find a means to better position the region, and the individual states within the region, to realize the energy, economic development, and environmental opportunities of clean energy policy and program implementation. Plans for continued discussions have been made and are anticipated to continue.

6.2.2 RGGI

RGGI is a market-based cap-and-trade program established to reduce GHG emissions from electric power generation. With 10 participating Northeast and Mid-Atlantic States, including New York, RGGI is the first program of its kind in the nation, serving as a model not only for a future national program to reduce CO₂ emissions, but for other regional energy initiatives. New York has participated in the successful RGGI CO₂ auction program along with neighboring RGGI states. The auction of allowances has generated additional funding for direct State investment and support to leverage private investments in the Clean Energy Economy across all sectors, including energy efficiency in buildings, renewable energy generation, research and development, and transportation efficiency initiatives.

The success of RGGI not only demonstrates how regional cooperation can advance broad policy objectives and provide leadership on issues, but also demonstrates how markets will respond to regional actions. Such regional efforts also provide a working example of how federal policies might be developed to pursue similar national objectives.

RGGI is already serving as a transformational model. The program resolved multi-jurisdictional issues – multi-state and multi-discipline (energy and environment) – to craft a unified program to address critical energy, economic, and environmental issues. The success of RGGI has led the participating states to consider other possible areas of cooperation in advancing climate policy. The low-carbon fuel standard, summarized below, is just such an initiative.

6.2.3 MARCO

Recognizing that renewable offshore energy can foster a more efficient and sustainable regional economy and improve the quality of life for citizens, the Governors of New York, New Jersey, Delaware, Maryland and Virginia are creating a structure - the Mid-Atlantic Regional Council on the Ocean (MARCO) - for the states to collaborate on improving energy security and independence in the region through development of offshore renewable energy while accommodating other ocean uses. In June 2009, Governor Paterson and New Jersey Governor Corzine convened a summit on ocean issues in the Mid-Atlantic region to launch a formal partnership among the states to address shared challenges facing ocean ecosystems, as recommended by New York's Ocean and Great Lakes Ecosystem Conservation Council. One of four initial priority areas for collaboration is the promotion of sustainable development of renewable offshore energy sources, including wind energy, through a more predictable regulatory regime. Council activities are expected to focus initially on coordination of information and data-gathering across the region, in part to identify shared challenges in the siting of new energy development.

6.2.4 Great Lakes Wind Collaborative

The Great Lakes Wind Collaborative is a forum in which information on sustainable wind power development in the region is analyzed and shared, with a focus on offshore development in the Great Lakes. According to DOE, the Great Lakes region has the potential to generate \$80 billion in economic activity and 300,000 jobs for the region from wind.¹⁰³ Furthermore, it is estimated that there is the potential for 3,000 MW in wind capacity off the shore of Lake Erie alone. NYPA and National Grid have released a Request for Expressions of Interest to site and develop wind resources in Lakes Erie and Ontario, to help meet the Governor's '45 by 15' clean energy program goal, consistent with the development plans of the Collaborative.

6.2.5 I-95 Coalition

New York is a member of the I-95 Coalition, a group of States through which the I-95 highway runs. The Coalition efforts include promoting and using ITS and other energy efficient transportation technologies on the highway.

¹⁰³ Great Lakes Wind Collaborative (GLWC). *Quarterly Update*. 2008. <http://www.glc.org/energy/wind/quarterly/july08.html>

6.2.6 CONEG

Governor Paterson is currently chair of the Coalition of Northeast Governors (CONEG), an association of the Governors of the eight Northeastern states, formed in 1976 to encourage intergovernmental cooperation on issues relating to the economic, environmental and social well-being of the Northeast states. CONEG provides a forum for the Governors to identify shared priorities and to develop agreements and take action on regional/state/federal issues. Priorities include renewable energy, transportation, increasing energy efficiency of new and existing buildings, and promotion of the National Biomass Partnership. For example, CONEG is working with Congress to support energy efficient high speed rail as part of the American Recovery and Reinvestment Act. CONEG provides New York the opportunity to help create new intergovernmental relationships and guide regional/state/federal collaborations – of which energy will be a key policy area in the near term.

6.2.7 Other Regional Initiatives

Other less formal, but equally important, regional initiatives are underway, such as:

- New York has been engaged in discussions with Ontario and Quebec to identify feasible opportunities for importing more renewable electricity into New York. The focus to date has been on identifying technical expansions of existing transmission rights-of-way for moving more power from Canada and upstate New York to the downstate region, where supplies are tighter and prices are higher. New York is also working with Ontario and Quebec to improve energy efficient rail services.
- Based on the success of RGGI, the Northeast and Mid-Atlantic States have committed to an effort to analyze low-carbon fuel supply options and develop framework for a regional low-carbon fuel standard to help ensure sustainable use of renewable fuels in the region. Development of the standard as a regional effort, rather than traditional state-by-state adoption of such environmental standards, will help to advance policy more expeditiously, and allow the region to develop a larger voice that would otherwise be experienced by state-by-state action. This effort is in collaboration with the Northeast States for Coordinated Air Use Management (NESCAUM), which is conducting a study of low-carbon fuel standards for the region.
- The State participates in the Eastern Regional Interconnect Collaborative, tasked with transmission planning for the Eastern Interconnect.

Through these and other collaborative efforts, the State is well positioned to take maximum advantage of shared regional interests in pursuing its own energy priorities. Greater collaboration and planning of all the involved jurisdictions and agencies is necessary to help maximize use of the resources. New York should continue to play an integral role in this planning effort to help ensure that the State's needs are incorporated into any such planning efforts, and to assist in the process to analyze and allocate the specific uses, combinations of uses, or areas requiring protections. Such collaboration and planning will reduce conflicts among users, provide greater certainty for private investment, and reduced conflicts between natural resource conservation and economic development.

Recommendations

- Support regional, national, and international cooperation and collaboration in developing energy resources; creating jobs and spurring greater economic development; protecting and enhancing the environmental and coastal resources; and reducing harmful air pollutant and GHG emissions.

- Ensure continued progress in addressing regional clean energy issues through the leadership of NEMAG. Plan and help organize the second meeting of NEMAG to follow-up on implementation actions taken since the meeting held in New York City in the fall of 2008, and plan the actions necessary for further cooperation in the coming year.
- Support and build upon the interstate agreement among MARCO to foster a more efficient and sustainable regional economy and improve the quality of life for citizens.
- Initiate a regional offshore planning effort to identify appropriate areas for energy development, while accommodating and protecting economic activities and environmental resources in collaboration with MARCO and relevant federal agencies. In addition, consultation with ongoing energy development efforts, such as the Long Island-New York City Offshore Wind Project, needs to be built into the planning process.

6.3 Participating in the National Debate and Coordinating with Federal Agencies

6.3.1 National Policy

The Obama Administration has moved aggressively on adopting new energy policies to improve the nation's energy security and help create a Clean Energy Economy and has prompted Congress to advance energy policies that build on New York's policies and those of other leading states. Climate change legislation is advancing in Congress in recognition of the impacts of the nation's energy use on climate. Renewable energy and energy efficiency programs are being funded at unprecedented levels by the federal government, with a partnership role for the states defined in the administration of such programs. Governor Paterson's Washington D.C. office is fully engaged in the development of new federal programs with the Obama Administration and with Congress to develop national programs that coincide with and bolster New York's energy, environment and economic development policies. New York's Congressional delegation – in both the Senate and the House of Representatives – serve as key advocates in federal energy policy and program development, and they have been influential in advancing national policies from which New York will be able to recognize significant benefit. The process to develop a national CO₂ cap-and-trade program, a combined renewable energy and energy efficiency portfolio standard program, electric transmission line siting procedures and other essential policy initiatives, has already benefitted from the expertise of DEC, NYSERDA, DPS and other New York State agencies. These efforts must be continued to ensure that the most effective national programs can be implemented, and that they provide New York a platform upon which the State's clean energy agenda can be fully realized.

In emerging transportation policy, new CAFE standards for light duty vehicles have been adopted for the first time in decades and DOE and National Academy of Sciences are studying the potential for adopting CAFE standards for medium and heavy duty vehicles. While the new CAFE standards are a historic step in the right direction, there is room for greater achievement with fuel economy standards. Achieving a CAFE standard of 43.3 mpg for cars and 34.7 mpg for light trucks is technologically and economically feasible with existing technology.

The State is also working with other states and interested groups in the reauthorization of the Federal Safe, Accountable, Flexible, and Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), which provides funding for highways and public transportation. SAFETEA-LU expires on September

30, 2009. Because this legislation establishes funding and priorities for surface transportation in the nation, the reauthorized SAFETEA-LU is an opportunity to help New Yorkers conserve energy, improve safety and reduce pollution while enhancing the mobility of goods and people. In the new legislation, New York will seek to preserve and maintain essential infrastructure, increase funding for public transportation, preserve the Congestion Mitigation and Air Quality program, increase funding for system efficiency and energy efficient modes, dedicate funding for rail and change federal funding formulae to recognize energy efficient transportation. New York will also seek extension of the federal legislation that authorizes the popular Clean Pass program on the Long Island Expressway.

These and other federal policies will likely require the State to make investments in energy systems or to match federal funding provided for energy projects. It is critical at this juncture in time that the federal government assume more leadership and establish national energy policies, which the states have been pursuing very aggressively on their own. However, collaboration with the federal government, as these policies are developed, will need to focus on retention of State sovereignty in making energy policy and program decisions that meet federal standards. Such sovereignty issues have been an issue in the development of requirements in proposed renewable energy and energy efficiency portfolio standard programs, and decision-making authority and processes with respect to electric transmission lines. Federal policies and programs must recognize New York's unique energy infrastructure and needs, as well as the State's institutional structures and processes that continue to serve the State well. Imposition of federally-designed, one-size-fits-all energy programs might not be the most advantageous or cost-effective means to achieve federal or State goals.

Specifically, collaboration with the federal government must focus on the need for the federal government to establish national programs and standards to provide guidance to the states, energy market participants, and energy policy stakeholders to achieve national standards. The federal government must recognize, however, the essential role of the states to craft specific policies and programs to achieve federal goals and meet individual states' needs. This is particularly pertinent in light of recent proposals for building transmission infrastructure to transport low-cost Midwestern power to the east coast. Regional and in-state transmission projects should take precedence over a one-size fits all federal solution. The regional and in-state solutions would likely also be significantly cheaper and much easier to site. In either case, states should be given the opportunity to site their own energy projects as needs arise rather than having a federal solution imposed upon them.

6.3.2 Agency Coordination

In addition to the impact of federal action to create a Clean Energy Economy and address climate change and fuel efficiency, the federal government has significant regulatory authority that impacts energy planning and development.

Standards and protocols for Smart Grid investments are being developed at the State and federal levels. While the State has jurisdiction over the standards and protocols applicable to distribution and end-user Smart Grid technologies, the Federal Energy Regulatory Commission (FERC) has responsibility for the standards and protocols for transmission Smart Grid technologies. PSC has worked through the National Association of Regulatory Commissioners in a collaborative effort with FERC to provide guidelines to DOE for its Smart Grid Demonstration Project Grant Program. These guidelines address issues including interoperability, cyber security, and stranded costs – issues which apply to transmission and distribution systems and end-user Smart Grid investments alike. This collaborative effort may help avoid possible future uncertainty regarding applicable standards and protocols.

The offshore regulatory environment is complex, with federal and State jurisdictions and responsibilities that influence the siting and development of energy projects. For example, the Energy Policy Act of 2005

granted the Secretary of Interior the primary permitting authority for renewable energy development, e.g. wind, wave, and tidal, in the Outer Continental Shelf. The FERC currently has guidance in place that allows for wave energy conversion facilities to be permitted in a stepped licensing procedure. Under the Deep Water Port Act of 1974 (33 U.S.C. 1501-1524), the U.S. Secretary of Transportation licenses the construction and operation of all oil and natural gas deep water ports, including LNG facilities, located beyond the U.S. territorial seas and off the U.S. coast.

Various other federal agencies have roles in offshore federal permitting processes that may be applicable to energy development, such as: the Army Corps of Engineers (structures in navigable waters), the Federal Aviation Administration (hazard to aviation), the Fish and Wildlife Service (Migratory Bird Treaty Act), the National Oceanic and Atmospheric Administration (Endangered Species Act, Marine Mammal Protection Act, Magnuson-Stevens Fishery Conservation and Management Act, National Marine Sanctuaries Act), the Environmental Protection Agency, the Maritime Administration, the U.S. Coast Guard, the Department of Transportation, the Department of Energy (funding, technical assistance) and FERC (transmission).

These evolving federal initiatives and the large number of agencies and authorities involved point to the need for coordination between New York and the responsible federal agencies to make appropriately sited, economically viable offshore energy projects a reality along the Mid-Atlantic coast and the Great Lakes. There is a growing recognition of this need. For example, as a follow-up to the Northeast and Mid-Atlantic States Meeting on Clean Energy Cooperation, the U.S. Department of the Interior's Minerals Management Service (MMS) has tentatively agreed to establish a *New England-Mid-Atlantic States Joint Planning Agreement*. Among the goals of the Joint Planning Agreement would be the development of "a consistent, efficient approach to integrating state-federal activities, including resource assessment and data collection." The U.S. Offshore Wind Collaborative has drafted a letter to formally request this partnership between the States and MMS.

Recommendation

- The State should work more closely with FERC to address issues of common concern for Smart Grid investments.
- The State and the New York Congressional delegation should optimize coordination and collaboration with the federal government to ensure that New York's energy policy objectives and strategies will be advanced at the national level.

7 Recommendations

The draft Energy Plan contains many recommendations, some of which are already underway in some form and which will be continued and strengthened; some which require new action by agencies and considerations for action by the Legislature, independent authorities, boards and commissions; and some which require the initiation of new processes, procedures, or studies to inform future decisions. During the public hearing phase of the planning process, and prior to release of the final Plan later this year, the planning agencies' staffs and the Planning Board will consider the needs of the agencies and other involved governmental entities to develop an action plan for executing the strategies and recommendations contained in the Plan.

The final Plan will contain a detailed implementation plan complete with milestones and deliverables for tracking progress implementing recommendations. The Planning Board will prepare and release annual reports by December 31 of each year reporting on the status of the Plan's implementation and issues requiring further attention.

A comprehensive list of the recommendations contained within each Chapter in the draft Plan follows.

Produce, Deliver, and Use Energy More Efficiently

- All State agencies and authorities and utilities that administer energy efficiency programs must consistently measure and report results of efficiency programs, including energy savings, peak demand reductions, and load shifting, using similar techniques, metrics, and reporting formats. Agencies and Authorities must use those results to optimize program support going forward. Program results should be summarized and made available to the public on an annual basis.
- The State needs to maintain efforts that mitigate short-term impacts of rising energy costs on New York's low income populations caused by implementation of public policy driven programs.
- The State should amend Article 11 of the Energy Law to: (1) provide that the Energy Code applies to renovations of residential buildings and commercial buildings to the same extent that the 2009 IECC and the 2007 ASHRAE 90.1, respectively, apply to such renovations, (2) clarify that historic *buildings*, rather than historic *properties*, are exempt, (3) eliminate the 10-year payback requirement, and (4) require the State Fire Prevention and Building Code Council (the Code Council) to amend the Energy Code so that it equals or exceeds the 2009 IECC for residential buildings and equals or exceeds the 2007 ASHRAE 90.1 for commercial buildings.
- DOS should provide regular updates to the Energy Code in response to updates to the IECC for residential buildings and ASHRAE 90.1 for commercial buildings.
- DOS, in consultation with NYSERDA, should follow through on the implementation of the Code compliance plan required by ARRA, including Code training and enhanced Code enforcement resources.

- The State should enact energy efficiency standards for products for which the federal government does not preempt states.
- Assure that efficiency outreach, educational and marketing efforts conducted by State agencies and authority administrators and utilities reflect best practices in terms of design and delivery, are geared to diverse audiences, and are provided in languages other than English.
- Targeted outreach should be used to deliver energy efficiency programs and services to commercial and industrial customers, residential and low income communities, to improve program performance and reduce administrative costs. Education, outreach and marketing for energy programs should be tailored, e.g., foreign language advertising, to target vulnerable populations and potential environmental justice areas.
- The State should amend the Truth in Heating law to ensure that prospective purchasers of residential and commercial buildings, as well as lessees responsible for payment of utility bills, are provided relevant information regarding the key energy efficiency attributes of the building.
- The State, in cooperation with New York City and other large municipalities, should implement energy-use benchmarking programs under which a building's energy use indexed against comparable buildings is publicly disclosed. This requirement should cover at least commercial office buildings and should include a report on the opportunities for energy savings, costs of achieving such savings, and impacts on property values and the local tax base.
- The State should identify and implement alternative financing programs to fund energy efficiency projects, exploring all available innovative financing mechanisms, including use of a performance management approach where the beneficiary of the efficiency services repays the lender from energy savings for money loaned. Private and other governmental sources of funding should be explored.
- Amend Executive Order No. 111, which places requirements on State agencies pertaining to energy efficiency and renewable energy, to ensure efficient and consistent administration and measurement of savings.
- Encourage agencies to work with NYPA to take advantage of its efficiency financing programs in order to meet the goals of Executive Order No. 111.
- NYPA and LIPA should take the necessary action, including funding decisions consistent with their adoption of '15 by 15' initiative, to ensure they are contributing appropriately to the State's clean energy goals.
- The State should expand green transportation choices to users of the transportation system (residents and businesses). This includes enhanced public transportation service and carpooling/ride-matching services for commuters and intercity rail, as well as waterborne services, for shippers. In this way, the State will help meet the statewide goal of reducing VMT 10 percent below projected levels by 2020.
- All State agencies should consider transportation choices, energy use, energy conservation, and climate change as part of their State Environmental Quality Review Act (SEQRA) reviews when they are lead agencies. Transportation Plans and Transportation Improvement Programs (TIPs) should embrace smart growth and GHG emission reductions as key principles.

- The State should support changes in federal surface transportation funding that encourages energy efficiency and GHG reductions.
- The State should work with the federal government to strengthen the recently proposed CAFE standards to standards that require greater fuel economy but are technologically and economically feasible. The State should support efforts to develop and promulgate fuel economy standards for heavy duty on-road vehicles.
- The State should aggressively pursue cost-effective approaches and technologies that facilitate demand response to achieve reliability and other public policy objectives.
- Consistent with addressing cyber-security and physical security risks, the State supports the ongoing efforts of the Smart Grid Consortium to identify opportunities for accelerating advancements and investments in Smart Grid technologies; greater use of distributed resources; advanced meters and pricing mechanisms; and leveraging of federal ARRA Smart Grid funding to support greater system reliability and efficiency, and to reduce electricity costs to customers.
- PSC should be authorized to require that electricity be priced on a time of use basis for all customers, upon a finding that it is in the public interest to do so. Issues that should be considered in making that determination include: the practical hardships and difficulties related to implementing time of use rates for residential customers, and possible means to mitigate any such hardships; and alternative rate regimes, based on voluntary participation of residential customers.
- The State should broaden the installation of advanced meters and implementation of mandatory hourly pricing for industrial and commercial customers by continuing to reduce the demand thresholds. PSC and State energy authorities should evaluate and aggressively support implementation of demand response measures where cost-effective and environmentally beneficial.
- The State should continue to implement rate structures and metering requirements for non-residential customers that encourage use of electricity at off-peak hours and/or encourage control of daily electric load.
- The State should include energy storage technologies in the definition of “alternative energy production facility” under PSL, Section 2(2-b), in order to exempt energy storage facilities up to 80 MW from the jurisdiction of PSC. This would reduce the time and cost of permitting and encourage the development of these technologies.

Support Development of In-State Energy Supplies

- Expand the RPS Program to meet the Governor’s goal to meet 30 percent of the State’s electricity needs with renewable resources by 2015, taking into consideration the voluntary market and other renewable energy initiatives of the State’s energy authorities and agencies.
- Enhance certainty in the renewable energy market by scheduling regular solicitations for Main Tier procurements. Consider more flexible solicitation schedules, other than the standard 10 year contracts, to accommodate changing market conditions.

- Create a tracking and trading system for RECs to foster development of a robust voluntary market for REC purchases and to help ensure integrity in measuring compliance with the RPS.
- Continue to provide incentives for environmentally beneficial, renewable DG resources, including CHP, with specific targets determined by PSC in the expanded RPS proceeding, funded through the Customer-Sited Tier. Identify opportunities for targeted DG deployment that may serve to reduce the need for peaking power plants in load pockets.
- Examine the transmission system needs to identify and evaluate appropriate investment strategies for needed bulk transmission system upgrades or expansions needed to allow for delivery of the energy output from renewable energy systems.
- Encourage the State’s power authorities to procure diverse renewable electricity resource development, including solar, on-shore and off-shore wind, hydrokinetic and sustainably managed biomass. LIPA and NYPA should continue analyzing bids received through their RFP and complete their purchases of 150 MW of solar photovoltaic power as expeditiously as possible. Based on the experience of these initiatives, LIPA and NYPA should consider achievable targets for subsequent PPAs.
- Encourage LIPA and NYPA, with utilities and other partners, to proceed with issuing an RFP for the private development of off-shore wind resources (off the waters of Long Island and in the Great Lakes) in a manner protective of natural resources under power purchase agreements.
- Amend the net metering law to provide greater flexibility to commercial customers to size systems to meet a greater percentage of their energy requirements, while ensuring that system reliability is not negatively impacted.
- Examine the protocols used by NYISO and utilities for connecting DG sources to the grid to help ensure such implementation is timely and cost-effective.
- Assess the potential for siting renewable energy projects, including wind, solar, geo-thermal, hydrokinetic and hydropower on those State-owned lands and waterways where such development would not require a constitutional amendment or be inconsistent with the public trust or parkland doctrines. This will be accomplished by developing a process for installing renewable energy technologies on State facilities, particularly those that are energy intensive, and have open space and/or compatible roofing.
- Diversify transportation fuel use and introduce alternative fuel vehicles into public and private fleets in the mid and long term as it moves toward electrification of the transportation sector. This will be accomplished by:
 - Encourage State Agencies and Authorities to use their fleets and facilities as test-beds for “real-world” testing and application of alternative fuel technology.
 - Undertake a full life-cycle analysis to determine the optimal fuel for a substantial replacement of petroleum, considering environmental, economic and energy benefits.
 - Working with federal policymakers to support federal tax incentives for fleet and private individual alternate fuel vehicle purchases.

- Adopt where practicable a low-carbon fuel standard for liquid fuels used in transportation, taking into account the results of the multi-state effort to analyze policy options for a regional low-carbon fuel standard.
- Support biofuels production from sustainably managed feedstocks. State agencies should develop programs to implement measures recommended by the Biofuels Road Map, when it is completed.
- Extend the tax credit for bio-heat beyond the current expiration date of 2011.
- The State should expand funding and implementation support for environmentally beneficial distributed energy resources (DER). Technical and financial support for DER should include solar thermal, geothermal heat pumps, and other resources that are economical and result in energy and cost reductions, improved energy security and reliability, and reductions in air emissions. Furthermore, the State should design programs to increase public awareness of the benefits of using DER.
- Support private interest and investment in drilling in the Marcellus Shale natural gas reserves and natural gas pipeline expansions to improve supply and deliverability of natural gas to markets in New York in an environmentally acceptable manner.
- Study the potential for new private investment in extracting natural gas in the Marcellus Shale on State-owned lands where it would not be inconsistent with public trust or parkland doctrines, in addition to development on private lands.

Invest in Energy and Transportation Infrastructure

- Develop a Climate Action Plan in accordance with Executive Order 24. The Climate Action Plan will identify additional strategies and actions, including likely major infrastructure investments, as well as the benefits and costs of each, consistent with a long-term GHG reduction goal of 80 percent below 1990 levels by 2050. It should also identify appropriate mid-term targets.
- The State supports enacting a power plant siting law that provides greater market certainty to developers and investors, enhances public participation with sufficient intervenor funding made available to local communities, includes improved notice provisions, and addresses environmental justice issues.
- Enact legislation that addresses CO₂ pipeline siting and CO₂ injection to facilitate the demonstration of Carbon Capture and Sequestration technology.
- The State supports the use of repowering and replacement of existing units with new facilities when such actions can be justified by their reliability, economic and environmental benefits.
- Encourage and facilitate the repowering and replacement of existing energy systems to reduce overall actual emissions and environmental impacts, particularly in potential environmental justice communities.
- PSC, along with NYPA and LIPA, should continue a systematic examination and evaluation of the State's transmission and distribution infrastructure and maintain its emphasis on appropriate

replacement and upgrade of aging infrastructure to maintain safe and adequate service and also increase the efficient utilization of the electric system, while minimizing, where possible, upward pressure on rates.

- Amend PSL Article VII for siting of transmission lines and pipeline to provide a sufficient level of intervenor funding and to indicate that State or local approvals, consents, permits, certificates or other conditions for construction and operation shall apply in connection with the State's Uniform Fire Prevention and Building Code.
- The State should initiate a study to inventory existing utility corridors used for electric, natural gas, petroleum products, water and telecommunications facilities that are underused or can be expanded to accommodate new facilities, along with highways, railroads, and waterways. Improve and coordinate efforts to identify and promote the use of linear property interests for use of existing and siting new electric and gas transmission facilities.
- The State should encourage cooperation in the development of electricity transmission and distribution infrastructure, including Smart Grid technologies, using State-owned lands and rights-of-way unless such development would require a Constitutional amendment or be inconsistent with the public trust or parkland doctrines.
- The State should advocate for more federal funding for public transportation in reauthorization of the federal surface transportation bill to guarantee investment in the federal public transportation program to support a doubling of rider-ship nationwide in twenty years; support a federal financial commitment and strategy for rehabilitating, maintaining, operating, and, when necessary, replacing the existing transportation infrastructure before investing in system expansion; retain the Congestion Mitigation and Air Quality programs; and establish a companion program for transportation projects and programs that reduce GHGs.
- The State should allow for more private investment in public transportation and amend the State Tax Law to allow private individuals and or businesses to provide direct public transportation infrastructure investment in return for State income tax credits. For example, an individual or business could sponsor the installation of a bus shelter on a transit line and a portion of the cost of that shelter could be offset by a tax credit.

Stimulate Innovation and a Clean Energy Economy

- To support the growth of the State's clean energy sector, the State should strengthen and expand collaboration among, and develop more formal interactions between, the intellectual and professional resources in the State's public and private education institutions, research and development organizations, national laboratories, private businesses and industry.
- Implement where practicable, the recommendations of the Task Force on Diversifying the New York State Economy through Industry-Higher Education Partnerships, established by Executive Order No. 19. The Task Force will study and report on best practices and generate recommendations on fostering business incubation, growth and emerging technology commercialization.

- Increase the emphasis on State incentives and economic development assistance to clean energy companies and component manufacturers and service businesses, looking to locate and or remain in business in New York.
- Support and enhance research and development of next-generation clean energy technologies in the energy and transportation sectors; seek opportunities to establish New York as a regional energy innovation hub in strategic areas; foster regional clusters of clean energy businesses and institutions to promote long-term economic growth; and develop the export potential for New York-based firms to sell products and services to the rest of the world.
- The State should support efforts to expand electrification in the transportation sector, starting with on-road vehicles such as plug in hybrid vehicles and truck stop electrification, i.e., technology to reduce diesel engine idling, for heavy duty vehicles as well as ancillary equipment in other modes, such as ground support equipment at airports, hybrid switcher locomotives at rail yards and cold ironing at ports.
 - To demonstrate feasibility of electrification of the transportation system and to promote the use of plug-in hybrids in the State, the State fleet plug-in hybrid vehicle demonstration program should be expanded to private sector fleets.
 - The State should work collaboratively with other States and regional and national groups to encourage electrification of the transportation system at the national level.
- Coordinate all agencies involved in workforce training, and partner with unions, non-profits, colleges, and BOCES and technical high schools to expand the existing network of 32 clean energy workforce training sites and make a clean energy training curriculum standard for SUNY and CUNY schools.
- Dedicate funding for “pathways out of poverty” programs to train unskilled workers for clean energy jobs. These programs should target residents of environmental justice communities.
- Coordinate a Statewide workforce strategy to address the workforce needs of the State’s clean energy industry, and maximize the State’s ability to obtain federal workforce training funding.
- Implement NYSDOL’s clean energy workforce development plan.
- NYPA’s economic development programs to reduce energy prices and bills for businesses, industry, and not-for-profit organizations should be tapped to attract clean energy industries and facilitate energy efficiency in support of the State’s ‘45 by 15’ initiative.
- NYPA’s Power for Jobs program should be extended for a longer period of time, beyond the current one-year cycle of extensions. Opportunities for increasing the size of the program should also be explored.
- All of NYPA’s economic development customers should be incentivized to invest in cost-effective energy efficiency measures.
- The State’s business attraction strategies for advanced energy technology manufacturing should be a priority for economic development programs offered by ESD, and the State’s authorities and utilities.

Engage Others in Achieving the State's Policy Objectives

- Revise the City, Town, Village, and General Municipal Laws to incorporate energy considerations in Comprehensive Plans. Revisions should be made to explicitly identify energy components that would engage communities in helping to meet the State's energy goals.
- Enact Tax Increment Financing reform legislation to encourage the redevelopment of distressed communities and revitalize downtown areas as recommended by the Governor's Smart Growth Cabinet.
- Collaborate with Metropolitan Planning Organizations, regional planning councils, and municipal governments to promote and incentivize land use patterns that reduce reliance on vehicle trips and establish consistency between transportation planning and land use planning.
- Provide technical assistance and funding opportunities via State grant programs for localities that incorporate land use, transportation, and energy planning.
- Pursue Transit Oriented Development strategies and expand the DOS's current initiative working with MTA to encourage development in the Hudson Valley and Long Island along MTA transportation routes. Specifically, the State should expand the inter-agency TOD incentive package beyond the MTA's rail service area to include upstate TOD opportunities around rail and bus. Sustainable transportation features such as TOD should be incorporated into major transportation projects and TOD outreach modules should be incorporated into DOS municipal land use training.
- Encourage municipalities to adopt land use and zoning tools that support Smart Growth.
- Expand Climate Smart Communities as a valuable component of achieving the State's clean energy goals.
- Address the public health and safety needs of communities by continuing to provide and enhance mechanisms for early, fair and meaningful public involvement with transparency in energy-related decisions (through such measures as improved public outreach and notice, alternative times and locations for public meetings, and language translation of notices and key documents).
- Develop energy facility siting and permitting criteria that assess disproportionate health risks and environmental impacts on potential environmental justice areas. Identify measures to avoid, or if un-avoidable, to mitigate potential impacts.
- Provide information to the public, especially to environmental justice communities, on such subjects as disease burdens, environmental facilities, energy-related regulatory processes and ways to reduce health or environmental risks. Such information will help communities participate meaningfully in energy planning and siting processes.
- Support regional, national, and international cooperation and collaboration in developing energy resources; creating jobs and spurring greater economic development; protecting and enhancing the environmental and coastal resources; and reducing harmful air pollutant and GHG emissions.

- Ensure continued progress in addressing regional clean energy issues through the leadership of NEMAG. Plan and help organize the second meeting of NEMAG to follow-up on implementation actions taken since the meeting held in New York City in the fall of 2008, and plan the actions necessary for further cooperation in the coming year.
 - Support and build upon the interstate agreement among MARCO to foster a more efficient and sustainable regional economy and improve the quality of life for citizens.
 - Initiate a regional offshore planning effort to identify appropriate areas for energy development, while accommodating and protecting economic activities and environmental resources in collaboration with MARCO and relevant federal agencies. In addition, consultation with ongoing energy development efforts, such as the Long Island-New York City Offshore Wind Project, needs to be built into the planning process.
- The State should work more closely with FERC to address issues of common concern for Smart Grid investments.
 - The State and the New York Congressional delegation should optimize coordination and collaboration with the federal government to ensure that New York's energy policy objectives and strategies will be advanced at the national level.

A1 Stakeholder Input

The following individuals and organizations have provided input to this Energy Planning Process.

Stakeholders Submitting Comments on the Draft Scope

A Page & Associates LLC
Adirondack Council
Air Products and Chemicals, Inc
Alliance for Clean Energy New York, Inc.
American Wind Power & Hydrogen LLC
Audubon, New York
Bay Area Economics
Business Council
Capital District Transportation Authority
(CDTA)
Capital Region Energy Forum
Central Hudson Gas & Electric Corporation
Citizens Campaign for the Environment
Communities Against Regional Interconnect
Consolidated Edison of New York Inc./Orange
& Rockland Utilities
ConsumerPowerline, Inc.
Multiple Intervenors
CPV Valley LLC
Dave Bencic
Energy Council for Citizens Power Alliance
Dormitory Authority of the State of New York
Elizabeth Thorndike, Pd.D.
Empire Advocates
Energy Smart Park Initiative
Energy Association
EnerNOC, Inc.
Environmental Advocates of New York
Fuel Cell Energy
Healthy Planet, Inc.
Horizon Wind Energy LLC
Independent Power Producers of New York, Inc.
Innovative Energy Systems, Inc.
John Droz, Jr.
Liberty Power Holdings LLC
National Energy Marketers Association
National Grid
National Hydrogen Association
National Wind Watch, Inc.
Neighborhood Network
Network for New Energy Choices
New York Association of Public Power
New York Aviation Management Association
New York City Economic Development
Corporation
New York Energy Consumers Council, Inc.
New York Energy Marketers Coalition
New York Interfaith Power and Light
New York Lawyers for the Public Interest
New York State Apollo Alliance
New York State Office of Temporary and
Disability Assistance
New York State Reliability Council
Northeast Gas Association
NYSEG RG&E
Onondaga County Resource Recovery Agency
Oppenheim & MacGregor
Pace Law School Energy and Climate Center
Plug Power
Power for Economic Prosperity
Riverkeeper Inc.
Sierra Club
Small Customer Marketer Coalition
Solar Alliance and New York Solar Industry
Association
Solar Alliance
Stamford Village Planning Board
SUNY College of Technology
The West Firm
TransCanada Corporation
Workforce Development Institute

Stakeholders Submitting Comments on the Interim Report

Aaron Breidenbaugh, EnerNoc, Inc
Adirondack Council
Allan R. Page, The Hudson Renewable Energy
Institute, Inc.
Alliance for Clean Energy New York, Inc.
Atlantic Sea Island Group LLC
Boilermakers Local 5
Business Council of New York State
Business Council of Westchester
Capital Region Energy Forum
Central Hudson Gas & Electric Corporation
Citizens Campaign for the Environment
Consolidated Edison and Orange and Rockland
Utilities, Inc.
David Bradley, Lake Effect Energy, LLC
Deepwater Wind LLC
Dewey & LeBoeuf
EarthKind Energy, Inc.
EcoPerspectives
Empire State Petroleum Association, Inc.
FuelCell Energy
Green Map System
Iberdrola Renewables, Inc.
Independent Power Producers of New York, Inc.
Institute for Policy Integrity
Joint Comments of Pace and Environmental
Advocates

Michael Abbene
Michael Jung, Silver Spring Networks
Millwright and Machinery
Multiple Intervenors
Multiple Intervenors Supplemental Comments
National Grid
New York Independent System Operator
New York Sierra Club Atlantic Chapter
New York State Rural Electric Cooperative
Association, Inc.
Northeast Energy Efficiency Partnerships, Inc.
Northeast Gas Association and its New York
Planning Committee
North Wind & Power
NYC Economic Development Corporation
New York State Metropolitan Planning
Organizations
New York Retail Energy Supply Association
Partnership for New York City
Power for Economic Prosperity
Rockland Business Association
Roraima Consulting, Inc.
Spectra Energy Corp
The Energy Association of New York State
The Solar Alliance

Stakeholders Submitting General Comments

Alice Sokolow Citizens Power Alliance
Andy McEvoy
Anne Harris, Town of Lyme
Archimandrite George Schaefer, Holy Trinity
Monastery
Barry K Miller, PE Concerned Citizens of
Cataaugus County
Boyce Sherwin, Regional Solutions
Capital Region Energy Forum
Central Hudson Gas & Electric Corporation
Citizens Campaign for the Environment
Citizens Environmental Coalition
Cohocton Wind Watch
Cole Peterson
Colleen Green
Consolidated Edison
Cynthia Blair, Citizens Power Alliance
Dan Wing Cohocton Wind Watch
Debra Burns, Naples Valley Bristol Hills
Association
Diane Rutigliano
Doreen Marturano
Elizabeth M Mosher
FuelCell Energy, Inc
Glenn R. Schleede
Guarracina Family
Hall Matilsky Sokolow Cohocton Wind Watch
and Advocates for Plattsburgh
Hans Mueller
Harold Hambrose, Cape Vincent
Hilarion, ArchBishop of Sydney, Australia and
New Zealand
Independent Power Producers of New York, Inc.
J. Taranola
James M. Barbour
James White
Janet Haskins
Jennifer Anderson
Jim Sawicki
Joan Simmons, Citizens Power Alliance

Joe Visalli
John Cowley
John Malizia, Fishermen's Conservation
Association
Justine M. Meccio
Karen Anderson
Karl Burmeisters
Katie Hay
Kevin Connor
Laura-Li Loffredo
Le Moyne College Biology
Linda E. Chiofolo
Mary V. Connor
Maryann Mueller
Mary Beth Yadanza
Mass Dispensation Engine Concept
Maura Gregory
Mellany T. Hale
Michael G. Saccullo
Michael S. Carrington
N. Taranola
National Grid
New York City Energy Planning Board
P. Santiago Oretga
Pace Energy and Climate Center, Environmental
Advocated of New York, Inc. / Alliance for
Clean Energy New York, Inc.
Peter Leonard
Phil Bariteau, Naples Valley Bristol Hills
Association
Ronald D. Morrison
Ronald Gulmi
Ronald Iocono
Ruby Garzon
Schleede Critical Evaluation
Shane Nickel
Shelley Taranola
Timothy Doyle
Wayne Miller

Stakeholders Attending ECWG Stakeholder Meetings

Adirondack Council
Adirondack Energy Smart Park Coalition
Alliance for Clean Energy New York
American Lung Association
Apollo Alliance
Association for a Better Long Island
Association for Energy Affordability
Association of Towns of New York State
Babylon, Town of
Buffalo Niagara Partnership
Business Council of New York State
Citizen's Campaign for the Environment
Clean Energy for Jamestown
Community Energy Services, Inc.
Consolidated Edison Company of New York
Empire State Petroleum Association
Energy Association of New York State
Environmental Advocates of New York
Hauppauge Industrial Association
Healthy Planet
IBEW Local 236
Independent Power Producers of New York
Innovative Energy Systems
Jamestown Board of Public Utilities
Long Island MidSuffolk Business Action
Long Island Oil Heat Institute
Multiple Intervenors
National Grid
Nature Conservancy
Neighborhood Network
Network for New Energy Choices
New York Association of Public Power
New York Aviation Management Association
New York Bicycling Coalition
New York City EDC
New York Energy Consumers Council
New York Farm Bureau
New York ISO
New York Lawyers for Public Interest
New York League of Conservation Voters
New York Motor Truck Association
New York Propane Gas Association
New York Public Transit Association
New York State Association of Counties
New York State Association of Service Stations
& Repair Shops
New York State Association of Town Highway
Superintendents
New York State Conference of Mayors
New York State Reliability Council
New York State Rural Electric Association
New York Thruway Authority
Niagara Frontier Transportation Authority
Northeast Gas Association
Oneida-Madison Electric Cooperative
Pace Energy
Port Authority of New York & New Jersey
Preservation League of New York State
Regional Plan Association
Renewable Energy of Long Island
Retail Energy Supply Association
Riverkeeper
Rockville Center, Village of
Scenic Hudson
Shell Gas & Power
Sierra Club
Small Customer Marketer Coalition
Suffolk County
SUNY – Stony Brook Advanced Energy
Research & Technology Center
Taylor Biomass Energy
UPROSE
Vote Solar Initiative
Workforce Development Institute
