Draft New York State Energy Plan and Draft Environmental Impact Statement

December 2001

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PREFACE

INTRODUCTION

The United States, by and large, has access to abundant supplies of energy. These energy resources enable our country to be the world's largest producer of goods and services and the leader in the world economy. Events in recent years, however, have served to remind Americans just how critical energy is to our society. After having access to plentiful and inexpensive energy supplies through much of the 1980s and 1990s, the nation has experienced intermittent price increases for natural gas and petroleum products, particularly over the past several years. In the winters of 1996-1997 and 2000-2001, natural gas prices spiked, as increasing demand for this fuel threatened to outstrip available supply, and starting in 1999, heating oil and gasoline prices also increased. During this same period, after a natural gas pipeline explosion in New Mexico, and power outages in the West and Midwest, concerns began to grow over the safety and reliability of the nation's energy infrastructure. In 2000, events in the State of California focused the country's attention on the adequacy and reliability of electricity markets, when its plan to restructure the electricity industry was undermined by supply shortages and extreme price volatility.

The New York State Energy Planning Board (Planning Board) recognizes the inextricable link between economic activity and the availability and price of energy. The country's position in the world economy and the standard of living of its residents cannot be maintained without ready access to sources of energy. The primary sources of energy are, to a large degree, imported from abroad, have significant and long-term effects on the environment, and face depletion. Until new and sustainable sources of energy are developed, the United States (U.S.) and New York will continue to experience the economic and social challenges of fossil fuel dependency.

A global problem – such as ensuring an adequate energy supply – requires a global solution. There is, however, a vital role for the states in addressing future energy needs. Although there is considerable uncertainty surrounding emerging developments in energy markets and technology, states can position themselves for the future. They can adopt policies to: diversify energy supplies, sources, and uses; cost-effectively improve the efficiency of energy use; stimulate the production of indigenous energy resources; foster production of new products and services that can be developed, manufactured, and sold for the benefit of local economies; enhance mobility; and minimize harm to the environment from energy use.

The *Draft 2002 State Energy Plan and Draft Environmental Impact Statement* (Draft Energy Plan) encompasses policies designed to keep New York at the forefront among the states in providing its citizens with fairly priced, clean, and efficient energy resources. This Draft Energy Plan positions New York to take advantage of technological developments among the most advanced uses of energy, and to participate in emerging markets for valuing and trading environmental attributes associated with energy use. In addition, implementation of this plan will stimulate job growth associated with the development of new technologies for the efficient production and use of a variety of energy sources and the expanded use of indigenous sources of power.

The Draft Energy Plan is a blueprint to inform energy decision making and help ensure that: customers have the ability to choose the energy products and services that best suit their needs; a secure and well-maintained energy infrastructure is provided; the State's transportation system becomes more energy-efficient; and, adequate energy supplies that are critical to the State's stability are available.

Draft Energy Plan

Providing a secure and well-maintained energy infrastructure, while ensuring adequate energy supplies in New York, is critical to the State's economy. New Yorkers spent $38 billion on energy in 2000 to support the State's economy and residents, including its industrial processes, commerce, services, transportation, lighting, heating, and cooling. The State's economic resurgence and expanding employment since 1998 resulted in larger than anticipated increases in energy demand, particularly for electricity. In turn, this has spurred the State's need for new energy supplies and enhanced delivery capability. Further, in light of the recent terrorist attacks in New York and Washington, D.C. and additional threats, the State is working closely with the Federal government to further protect the State's entire energy and transportation infrastructure against future terrorist attacks or acts of war.

In response to the tragic events of September 11, 2001, Governor Pataki created the Office of Public Security to coordinate and bolster anti-terrorist efforts throughout New York State. The Office, which reports directly to the Governor, is responsible for:

- Reviewing existing State policies, protocols and strategies designed to detect, respond to and recover from terrorist acts or threats, identifying potential shortfalls, and implementing appropriate revisions and enhancements;

- Coordinating State resources for the collection and analysis of information regarding terrorist threats, and facilitating information sharing among local, State and Federal law enforcement; and

- Assessing the preparedness of State and local health systems to respond to terrorists attacks.

The Office of Public Security is specifically charged with developing a comprehensive Statewide anti-terrorism strategy, including an assessment of the vulnerability of critical infrastructures to terrorist attack. Energy Planning Board agencies, specifically the State Departments of Transportation (DOT), Public Service (DPS), and the New York State Energy Research and Development Authority (NYSERDA), are working closely with the Office of Public Security to address security at important energy and public resources, including nuclear power plants and other electric generating facilities, electricity transmission and distribution systems, telecommunication systems, public roadways, railways, bridges and tunnels, natural gas pipelines, and water systems. The Energy Planning Board agencies have committed their full support to the Office as it develops strategies and plans to protect these facilities from attack, and if attacks occur, ensure rapid restoration of critical infrastructures.

As energy demand increases, the effects of energy production and use on the State's natural resources require that New York consider the implications of energy decisions on the State's environment and the public's health and safety. The Draft Energy Plan balances the need for new energy supplies and investments in critical energy infrastructures with the need to protect the State's environment and public health. It also takes into consideration the significant changes that are transforming New York's energy markets. Finally, the Draft Energy Plan provides strategic direction and policy guidance to foster further collaboration on the State's energy, environmental, transportation, and economic development activities.

The Draft Energy Plan's balanced approach considers the role of new energy supplies, enhanced energy distribution infrastructure, and improved energy productivity, to meet energy needs. This balanced approach incorporates environmentally-sound strategies for developing new sources of energy, improving energy efficiency and energy demand management, and greater energy diversity. This balance requires access to the financial resources necessary to develop new energy supplies and a commitment to environmental protection by energy decision makers. A benefit of greater energy diversity, as discussed elsewhere in the Draft Energy Plan, is greater energy security in the form of reduced risk of energy supply disruption and price volatility. Moreover, a balanced portfolio of energy resources provides greater economic development opportunities within the State, particularly in the development of indigenous energy resources, including renewable energy resources, and energy service reliability.

Energy Planning Process

The Planning Board initiated the 2002 Energy Planning Proceeding at its March 12, 2001 meeting. A Notice of Commencement, published in the April 18, 2001 *New York State Register*, opened the 60-day public comment period. The comment period closed on June 18, 2001; however, several parties have continued to correspond with the Planning Board agencies' staffs throughout development of the Draft Energy Plan. During the comment period, the Planning Board received 47 sets of written comments from interested parties regarding the issues raised by the Planning Board for inclusion in the Draft Energy Plan. Parties that submitted comments are listed in Table 1, included at the end of this Section. Throughout development of the Draft Energy Plan, the staffs of the Planning Board agencies met with 50 interest groups, also listed in Table 1. The increased outreach efforts of agencies' staffs and the level of public comment by interested parties throughout development of this Draft Energy Plan are unprecedented.

Continuing on this track, the Planning Board will schedule a Technical Briefing on the content and analyses contained in the Draft Energy Plan, and eight Public Hearings will be held throughout the State to solicit public comment on the Draft Energy Plan.[1] Following completion of the Public Hearings, the Planning Board anticipates releasing the Final 2002 State Energy Plan and Final Environmental Impact Statement in Spring 2002.

NEW YORK'S ENERGY MARKETS

New York's energy markets have changed significantly over the past few years. These changes, especially in the utility sector, have focused the State's attention to ensure that the

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[1] The Planning Board is required by statute to hold three public comment hearings in three geographic locations in the State upon release of the Draft Energy Plan. The Planning Board held five public comment hearings in development of the 1998 Energy Plan and plans to hold eight in development of the 2002 Energy Plan.

transition to competition and customer choice unfolds in an orderly and reliable manner. While energy supplies and prices are determined to a great extent by world and national markets, the State continues monitoring markets and adopting polices to support the development of competitive energy markets and to maintain necessary consumer protections. The benefits of greater competition, in the form of increased diversity in supplies, greater supply availability, greater technological innovation, and prices that are lower than might otherwise be anticipated under regulation, are expected to be realized once this transition is completed. The State continues to monitor the reliability and safety of its energy infrastructure during the transition to competition to ensure that the quality of energy services is maintained.

Recent Accomplishments

During the past several years, the State's electric and gas customers have received the benefits of significant reductions in their electric and gas delivery rates. Since 1996, the New York Public Service Commission (PSC) has issued orders that have so far resulted in cumulative customer rate reductions of about $3.4 billion, with at least that same amount of further cumulative savings to be available over the next several years. The Long Island Power Authority has similarly provided rate reductions for its customers in the amount of about $2 billion through 2001. In addition, further customer savings ($152 million per year) will result from the recent PSC Order determining electric revenue requirements for the Niagara Mohawk Power Corporation, and customer savings might also result when the on-going New York State Electric and Gas Corporation and Rochester Gas and Electric merger proceeding is completed.

While changes are occurring in all energy markets, the State's electricity system has undergone profound changes. Utility companies have nearly completed the process of divesting their generation assets, including nuclear plants, transforming themselves from vertically integrated utilities to distributors of electricity and natural gas. Generation is largely independently-owned and managed in New York, with generators selling electricity, either directly to wholesale customers through bilateral contracts or to the wholesale market operated by the New York Independent System Operator (NYISO). This, in turn, has created opportunities for independently-owned energy providers, marketers, and brokers to serve New York's electricity customers. As a result of State regulatory initiatives, more than 80% of the electricity generating capacity formerly owned by regulated investor-owned utilities has been sold to independent power producers. Such independently-owned generating capacity now participates in the State's new competitive wholesale electricity market, operated since 1999 by the NYISO.

Currently, all electricity and natural gas customers in New York that were formerly served by regulated utilities are able to choose their electricity and natural gas commodity supplier. In addition, the New York State Public Service Commission (PSC) is requiring that metering (for 50 kilowatt or greater demand customers), billing, and associated administrative customer service functions be opened to competition.

Ensuring the delivery of adequate supplies of electricity remains an important challenge for New York. Recent State efforts have simplified the certification and review process for siting new power plants. Article X of State Public Service Law (PSL) authorizes the State Board on Electricity Generation and the Environment (Siting Board) to issue a Certificate of Environmental Compatibility and Public Need prior to construction and operation of an electric generating facility with a capacity of 80 megawatts (MW) or more. Article X was amended in 2001 (Chapter 222 Of the Laws of 2001) to require Siting Board action within six months for applications that replace or repower existing generating facilities and result in decreased water use and decreased emissions of certain air pollutants. The Article X amendments, in effect, expedite the certification process for applications that replace or repower facilities with new facilities that meet certain air and water standards.

In a competitive market, participants will determine when and where new electricity generation or demand reductions are most needed and economically viable. Plans for new electricity generation that promote or contribute to development of a competitive market will be consistent with the long-range plans for expansion of the State's electricity system, as envisioned in the Draft Energy Plan.

Many new independently-owned power plants have been proposed to serve the New York market. As of December 2001, five new power plants, totaling approximately 3,490 megawatts (MW) of additional capacity (representing a net addition of 3,300 MW), have been approved through New York's Article X siting process. Developers of an additional nine plants, totaling 6,156 MW, have filed applications and another nine proposed plants, representing 5,575 MW, have been announced. As the metropolitan New York region faced a limited ability to import power and a rising demand that threatened to outpace local generation capacity in 2001, the New York Power Authority (NYPA) purchased and installed 11 new 44-MW natural gas-fired generating plants in New York City and Long Island, greatly adding to the reliability of the regional electric system, particularly during the peak summer demand periods.

In addition to opening the electricity and natural gas markets to greater competition, the PSC has enacted a public benefits program through which System Benefits Charge[2] (SBC) funds are used to promote energy efficiency, assist low-income customers, encourage research and development (R&D), and protect the environment. The PSC recognized the responsibility to ensure that electricity service be provided safely, cleanly, and efficiently, and that continuing such public benefits programs beyond what competitive markets might provide was necessary. This program, predominately administered by the NYSERDA, is funded through June 2006 at $150 million a year.[3] From 1998 through 2006, New York's public benefits funding is $984 million. With interest earnings, this amount will exceed $1 billion. In addition to this funding, the NYPA and the Long Island Power Authority (LIPA) together will spend another $130 million annually on energy efficiency and related public benefits programs.

Collectively, over the eight-year period of 1998 through 2006, the State will spend more than $2.0 billion on public benefits energy programs. Moreover, these programs are designed to forge partnerships with New York businesses and require investments of private capital for energy efficiency and improvements and research and development projects. Overall, these programs result in more than $2 of private investment for every $1 of public funding provided. In many instances, this amount is more than $3 for every $1 of public funding.

Improving energy efficiency remains a central focus of New York's energy policy. Effective energy efficiency programs reduce energy use and energy costs, and improve the environment through reduced pollutant emissions that result from energy use. Through its public benefits program, the State has begun assisting development of an energy services industry that will help shift the impetus for providing energy efficiency to the private sector. The economic development potential of investments in energy efficiency, in terms of lower energy bills and jobs created or retained in the State, is on the order of 20 jobs per $1.0 million in energy savings. The long-term effects of facilitating market development, new technology manufacturing and use, and expanded choice in consumer services, are expected to help grow

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[2] The SBC is a non-bypassable charge on the transmission and distribution of electricity in New York State that is collected by the State's electricity load serving entities.

[3] NYSERDA administers approximately $140 million annually with the remainder of funding being administered by utilities to serve selected low-income customer needs. These programs are described more fully in the Preserving Energy-Related Public Benefits Programs issue report, and the Energy Efficiency, and Renewable Energy assessment reports in the Draft Energy Plan.

the State's economy in an environmentally-sound manner. Upon issuing Executive Order 111, Governor Pataki put State government in a leadership role for promoting energy efficiency and the wise use of natural resources to protect and enhance the State's environment and economy. Under the Executive Order, all State agencies, departments, and authorities must seek to reduce their buildings'energy use by 35% relative to 1990 levels and seek to purchase 20% of their electricity from renewable energy sources by 2010.[4]

During the transition period to competition, the State's SBC-funded public benefits programs are providing a wide range of services to residents and businesses. These programs provide energy efficiency and related services to small customers and low-income households, support development of markets for manufacturing, stocking and sales of energy efficient products, and support R&D activities in renewable energy development, new product development and applications, and environmental protection. At the direction of the PSC, the State's public benefits program was expanded to include load management and emergency generation resources procurement to help meet the State's peak electricity needs until new generation resources become available.

In support of the State's load management initiatives, in 2001, the NYISO implemented a day-ahead economic demand response program. This program enables demand reductions and new electricity supplies to compete on equal footing to meet the State's peak load needs and in an emergency requires cooperating customers to reduce demand when requested by the NYISO. These efforts facilitate competition among alternatives (*e.g.*, energy efficiency and load management and electricity generation) and are expected to promote greater customer choice and diversity in energy resources. During the summer of 2001, as a result of these coordinated efforts, the State's peak demand was reduced by approximately 710 MW. In addition, through public appeal, State government programs, and voltage reductions, peak load was reduced by another 840 MW, bringing the total Statewide reduction to approximately 1,550 MW. The availability of these demand management resources, including energy efficiency, enabled New York to assist neighboring states in maintaining electricity service and stabilized wholesale electricity prices at the time of system peak.

While load reduction and energy efficiency programs are important components of New York's strategy, California has demonstrated the risk in relying solely on these initiatives to meet future energy needs. As our economy continues to grow and businesses and residents

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[4] Guidelines for implementing the Executive Order were issued in December 2001, in the NYSERDA report entitled, *Executive Order No. 111 "Green and Clean" Buildings and Vehicles Guidelines*.

become more reliant on technology, so too does the State's demand for electricity grow. To keep pace with this growth, the State must increase its capacity to generate electricity by siting new, cleaner, state-of-the-art power plants and by increasing other alternative sources of electricity generation.

As electricity and natural gas markets become more competitive, petroleum and other energy commodity markets become increasingly interdependent. Natural gas and petroleum markets are already very competitive in the heating fuels and industrial processes market. With greater competition in the electric industry, more electricity generating plants are being proposed that have dual-fuel capability, to burn natural gas or petroleum, depending on prevailing market economics. The volatile nature of these markets requires that energy decisions be made quickly and that an adequate energy supply infrastructure be in place to respond to nearly instantaneous changes in the demand for particular fuels.[5] In addition to the large number of new power plants proposed to serve the New York market, the Federal Energy Regulatory Commission (FERC) recently approved five natural gas pipeline projects to serve the Northeast, and another 13 projects have been proposed.

To address the environmental impacts of stationary sources of pollution, the State is currently developing and implementing strategies to reduce stationary source emissions. These include: (1) working with industry to promulgate emission standards for distributed generation; (2) implementing the Governor's Acid Deposition Reduction Initiative, (3) providing expedited permitting procedures to encourage siting of electricity generating facilities that minimize aquatic and air quality impacts; (4) working with the Federal government to develop national strategies to reduce multi-pollutant emissions from electricity generating facilities; and, (5) using Systems Benefit Charge-funding to promote the development of clean energy generation technologies.

The State continues to be heavily dependent on petroleum products for sectors other than electricity generation. These include motor gasoline, home heating oil, diesel fuel, propane, and residual oil. New York is the fourth largest petroleum fuel market in the U.S., exceeded only by Texas, California, and Florida, and the largest market for home heating oil in the U.S. A diverse distribution network has developed over the years to transport petroleum products into and throughout the State, including several pipelines connecting New York to Gulf and East

[5] The State is studying the interdependencies of its energy markets and assessing the need for energy system improvements to facilitate a workably competitive market for energy and energy services as described later in this Draft Energy Plan. The study is jointly funded by NYSERDA and the NYISO.

Coast states and a vast port and barge waterway system. As demand for energy increases and investment in new supplies and distribution infrastructures becomes increasingly responsive to market forces, energy producers, suppliers, and users also must have the ability to respond to market forces.

The State is continuing its efforts to maintain and improve the existing transportation network to provide mobility to its residents and businesses and enhance the efficiency of the transportation system. Actions to enhance efficiency include greater emphasis on public transportation, technological innovations, alternative fuel vehicle deployment, and pollutant emission reductions. To lessen the State's reliance on a single transportation fuel, the State now leads the nation in the use of alternative fueled vehicles and is continually incorporating new clean-fueled vehicle technologies. Since 1995, the State has increased the number of alternative-fueled vehicles in the State fleet from less than one dozen to more than 1,400.

In 2000, the New York State DOT approved $7.0 million for capital improvements throughout the State to improve mobility, promote economic development, and improve the environment. These projects include the purchase of new buses that use a clean-burning diesel technology and will reduce hydrocarbon and particulate emissions. In addition, beginning with model year 2004, the California Low Emission Vehicle (LEV II) standards will be required of all light- and medium-duty vehicles in New York State. The LEV II program: extends passenger car emission standards to sport utility vehicles and pick-up trucks; expands and tightens average fleet emission standards; and presents a super-ultra-low-emission vehicle category for light duty vehicles. In addition, LEV II requires that 10% of vehicles sold be advanced technology vehicles, which includes electric vehicles, hybrid vehicles, and vehicles powered by fuel cells.

These programs are expected to reduce the amount of air pollution from motor vehicles, especially in metropolitan areas, by continuing to drive the development of new technology to produce cleaner and more durable cars and trucks. DOT, through its Environmental Initiative, has integrated environmental considerations into its Statewide transportation planning and project development. The State is developing and implementing innovative strategies to reduce environmental impacts from mobile sources of pollution by: (1) working with automobile and truck manufacturers to develop new technologies to reduce emissions from such vehicles, and to promote the introduction of such technologies into the marketplace; and, (2) promoting the introduction of clean fuels, including renewable-based fuels, low-sulfur diesel, and other alternative fuels by purchasing vehicles that use such fuels for use in the State fleet and developing incentives to encourage their use in the private sector.

New York State has established the first business park in the country that is specifically devoted to promoting the development of clean energy technologies. Over the next five years, the new Saratoga Technology Energy Park (STEP), located in Malta, NY, will help attract between 1,000 and 1,500 jobs to the Capitol Region as emerging, environmentally-friendly energy companies take advantage of the park's resources. The business park will provide companies with technology development and prototyping support through the University at Albany, funding to support technology development and commercialization through NYSERDA, and tax incentives and other economic development incentives through Saratoga Economic Development Corporation. The project advances the local development of cleaner energy technologies that address energy supply and reliability issues, as well as environmental impacts.

National statistics indicate that the energy technology sector grew by 134% in 2000 and the market for clean energy technologies is projected to grow from $7 billion per year to about $82 billion per year by 2010. New York State, already home to more than 20 leading energy technology companies, is well suited to take advantage of this rapid growth. The STEP demonstrates how the State can use its resources to partner with local communities and create opportunities for new jobs and new businesses. The partnership among State government, the Saratoga Economic Development Corporation, and the University at Albany can attract new businesses and jobs to New York State to address the growing need and demand for clean-energy and energy-efficient technologies.

The State's commitment to reducing energy costs and developing energy markets by lowering taxes, streamlining and eliminating unnecessary regulations, and providing energy customers with greater choices among energy service providers is an important impetus behind the polices and strategies in the Draft Energy Plan. Equally important, however, is the State's commitment to: improving energy diversity and energy efficiency; increasing energy supplies; fostering a sustainable market for indigenous and renewable energy; encouraging new, cleaner energy technologies; and improving transportation system efficiencies. These commitments will lead to increased economic development in an environmentally sustainable manner.

The 2000-2001 State Budget eliminated the Gross Receipts Tax (GRT) paid by manufacturers and industrial energy customers, began a gradual elimination of the GRT for all other business customers over five years, and provided a major reduction in GRT for residential energy customers over a five-year period. When fully implemented in 2005, annual tax savings from GRT modifications are expected to reach $330 million. The State also is eliminating the sales tax on the delivery of energy, providing $150 million in tax savings to the State's natural gas and electricity customers. The first phase of this tax cut began in September 2000, and the entire reduction will be fully implemented by September 2004. When combined with the GRT reductions, State taxpayers will save approximately $580 million a year, further lowering their energy costs.

NEW YORK'S ENERGY POLICY

The policies and strategies included in the Draft Energy Plan place New York on a path toward greater energy self-sufficiency and customer choice. The policy and strategy recommendations support a flexible and market-based approach to growing the State's economy, improving the environment, and enhancing the transportation system. The recommendations will drive technological innovation and facilitate competition in energy markets that will result in the delivery of new and efficient energy products and services at competitive prices. In addition, they are designed to provide for continued energy system security and reliability.

Energy Policy Objectives

The Draft Energy Plan provides broad statewide energy policy direction rather than prescribing specific government agency actions. As markets continue to develop and new energy resources and services become available, new policies may be warranted. The broad public policy objectives are:

1. Supporting the continued safe, secure, and reliable operation of the State's energy and transportation systems infrastructure;

2. Stimulating sustainable economic growth through greater reliance on market forces to spur technological innovation and job growth in the State's energy and transportation sectors;

3. Increasing energy diversity in all sectors of the State's economy through greater use of energy efficiency technologies and alternative fuels;

4. Promoting and achieving a cleaner and healthier environment; and,

5. Ensuring fairness, equity, and consumer protections in an increasingly competitive market economy.

To meet these public policy objectives, State government policies must be balanced and based on long-term strategies that encourage and support development of new cleaner technologies, more efficient energy-consuming practices, and improved transportation, energy production, and delivery systems.

New Yorkers want affordable energy from reliable, clean, and efficient sources. The energy policies and long-range planning strategies presented in the Draft Energy Plan are designed to ensure that New York's energy needs are met by encouraging competition while ensuring fairness and equity, ensuring mobility, ensuring system reliability, and improving the State's environment.

ORGANIZATION

The Draft State Energy Plan is organized as follows:

Section 1	Preface, Draft Energy Plan Findings and Conclusions, and Energy Policy Objectives and Recommendations.
Section 2	Analyses of the energy related issues that the Planning Board identified for inclusion in the Draft Energy Plan.
Section 3	Assessments of the State's energy markets and infrastructure, including forecasts of energy demand, prices, and supplies; and assessments of energy efficiency and renewable energy resources.
Section 4	The compliance document integrating the requirements of the State Environmental Quality Review Act (SEQRA) within the Draft Energy Plan.

Table 1: Participants in Interest Group Meetings During Energy Plan Development

AES Westover, LLC
American Wind Energy Association
Assisted Environmental Decisions
Association for Energy Affordibility
Business Council of New York State**, **Incorporated
Central Hudson Gas and Electric Corporation
Citizen's Awareness Network
Citizens Campaign for the Environment
Communities United for Responsible Energy
Consolidated Edison Company of New York**, **Incorporated
Consumer's Union
Couch White, LLP
Dynegy, Incorporated
East River Environmental Coalition
Empire State Petroleum Association
Energy Association of New York State
Environmental Advocates
Environmental Defense
Ford Motor Company
Honorable Joseph R. Lentol, New York State Assemblyman, 50th Assembly District
Honorable Paul D. Tonko, New York State Assemblyman, 105th Assembly District
Hudson River Sloop Clearwater, Incorporated
Independent Power Producers of New York**, **Incorporated
Integrated Waste Services Association
KeySpan Energy Corporation
Long Island Association, Incorporated
Long Island Power Authority
Mirant Corporation
Mr. Chuck Dworkin, Esq.
Mr. Guy Merckx
Mr. Robert A. Smith
Mr. Sigmund F. Zakrzewski, Ph.D.
Ms. Pamela Slater
Ms. Lois M. Sturm
Mother Earth Research
Multiple Interveners

SECTION 1.2

DRAFT ENERGY PLAN FINDINGS AND CONCLUSIONS

INTRODUCTION

In conformance with the Planning Board's direction, and in compliance with Article 6 of State Energy Law, the Draft Energy Plan contains five Issue Reports and six Assessment Reports. The Planning Board directed agencies staffs to address these issues in the Draft Energy Plan at its July 17, 2001 meeting, following a review of public comments and of the matters discussed during the staffs outreach meetings with interested parties. Broadly defined, these issues are:

1. Promoting Energy Industry Competition
2. Energy and Economic Development
3. Energy and the Environment
4. Energy and Transportation
5. Preserving Energy-Related Public Benefits Programs

<u>Promoting Energy Industry Competition.</u> The Energy Industry Competition report assesses the status and effects of energy industry competition on the development of energy markets, energy prices, energy facility planning and siting, and the interrelationships existing among major energy sources, including electricity, natural gas, and petroleum products.

<u>Energy and the Environment.</u> The Energy and the Environment report addresses the interactions between energy use and environmental quality, particularly with regard to current trends in environmental regulation, acid rain, greenhouse gas emissions, and non-air impacts.

<u>Energy and Transportation.</u> The Energy and Transportation report addresses the interactions between energy use and transportation, particularly with regard to transportation system use and management, technology, and efficiency. This report explores the interrelationship between a modern, effective, safe, and environmentally

sound transportation system and enhancing the efficient use of energy in the transportation sector.

Energy and Economic Development. The Energy and Economic Development report addresses the interactions between energy use, costs, and economic development, including the State's competitiveness in attracting and retaining jobs. This report also discusses the factors that influence New York's energy prices and rates, including taxes, delivery costs and infrastructure maintenance, and the effects of energy costs on the competitiveness of New York's industries and businesses.

Preserve Public Benefits for New York's Energy Consumers. This report addresses the role of market-based and needs-based public benefits programs in an era of energy industry restructuring and greater competitiveness in energy choices, particularly with regard to government-coordinated efforts to serve small commercial, residential, and low-income consumers.

In addition to the Issue Reports, the Draft Energy Plan contains several Assessment Reports (20-year forecasts of energy demand and prices, and assessments of available energy supplies, including energy efficiency, renewable energy, electricity, natural gas, petroleum, and coal). The Assessment Reports identify emerging trends related to energy supply, price, and demand. The Draft Energy Plan also contains a statement of the State's energy policies, long-range planning objectives, and strategies, and recommendations for administrative and legislative actions to implement the State's energy policies, objectives, and strategies. A Draft Environmental Impact Statement is integrated into the Draft Energy Plan.

The Issue Reports are presented in the Draft Energy Plan as Sections 2.1 through 2.5, respectively. Following are the key findings from these Issue Reports.

ISSUE REPORT FINDINGS AND CONCLUSIONS

Promoting Energy Industry Competition

- The findings of the 1998 State Energy Plan related to the introduction of competition in the electricity and natural gas industries remain valid today.

- The State must remain vigilant and flexible, and it must resolve issues as they arise, in order for the competitive energy markets in New York State to reach their true potential and for New Yorkers to realize the full benefits of restructuring.

- The State's administrative approach to restructuring its energy industries was premised on input from stakeholders and experts and designed to provide flexibility to make adjustments, as necessary, as competitive barriers are revealed and competitive markets develop. This approach has served New York State well.

- The primary barrier to achieving effective wholesale competition in the energy industries is the lack of adequate resources (energy commodity, delivery infrastructure, and demand reduction techniques) where they are needed.

- The Article X Power Plant Siting Process in New York State has benefitted the State and provided protection for its environment.

- The natural gas delivery system, built to serve the winter peak needs of residential, commercial, and industrial customers, is now fully used during peak periods. The competitive electricity generation market is moving toward a greater dependency on natural gas. Such a greater dependency on natural gas suggests a need to: expand the natural gas infrastructure; use resources that will reduce our dependency on natural gas, such as greater use of renewable energy resources; implement further electricity demand reduction techniques; continue safe operation of nuclear power plants; and apply clean coal technologies, where viable.

- The U.S. Congress can assist New York by repealing the mandatory purchase of power from qualified generating facilities required of utilities under the Public Utility Regulatory Policy Act (PURPA), by reforming the Public Utility Holding Company Act (PUHCA) to allow utilities to diversify their operations in ways that could enhance competition, and by establishing national mandatory reliability rules for the bulk power system (while allowing states to continue to set more rigorous standards when it is in the public interest).

Energy and Economic Development

- Businesses need secure and reliable energy supplies that are reasonably priced to expand operations and grow in the State. Policies promoting greater energy supply certainty will lead to greater private sector investment in New York State.

- Low-cost power programs have been successful to date in retaining and expanding employment opportunities in the State. The development of joint State and utility economic development programs has been successful in supporting economic development.

- Power for Jobs has been successful and consideration should be given to authorizing an additional phase or to development of a new, yet similar program.

- Offering electricity discounts as a means of retaining or attracting jobs is an important economic development tool.

- Efforts should continue to be made to forge State and private business partnerships to grow New York's economy in an environmentally-sound manner.

- Energy prices need to be brought more in-line with other states to compete more effectively for economic opportunities.

Energy and the Environment

- The generation and use of energy results in impacts on the environment, including the release of pollutants into the air and impacts on aquatic resources.

- Since the 1998 State Energy Plan was released, the State has made significant gains in reducing the environmental impacts associated with energy generation and consumption. Emission standards on new motor vehicles have been strengthened, as have the requirements on electricity generating plants and other stationary sources of air pollution. The impacts of energy generation on the State's aquatic resources are analyzed and addressed through existing regulatory programs. New electricity generating plants are required to use much less water than existing facilities, and the impacts on fish and other aquatic organisms must be minimized to the greatest extent possible.

- The State has become a national leader in developing new technologies to reduce emissions from diesel-powered trucks and buses and has created a market for clean-burning low sulfur fuels. These programs will help ensure that New York, already one of the most energy efficient states in the nation, produces and consumes energy with the lowest possible impacts on the environment.

- New York State has made great progress in meeting its air quality goals, currently meeting the National Ambient Air Quality Standards for five of the six federal criteria pollutants. The New York metropolitan area has not yet attained the current National Ambient Air Quality Standard for ozone (one-hour) and is not likely to be designated as meeting the pending standards for ozone (eight-hour) or fine-particulates ($PM_{2.5}$). Meeting these standards will require additional emission reductions from all sectors.

- New York has adopted the most stringent tailpipe emission standards for new motor vehicles in the nation and continues to develop new strategies to reduce emissions from mobiles sources such as cars and trucks.

- The State has made significant progress in reducing emissions that cause acid deposition and will soon adopt stringent new standards on power plants to further reduce these emissions. Scientific data indicates that many water bodies and forested regions in the State are still adversely affected by acidic deposition, and that there is a need for additional national efforts to address these impacts.

- Public transportation has the potential to reduce significantly the impacts of energy used in the transportation sector, particularly through the decrease in single occupant vehicles on the State's roadways.

- The fuel additive methyl tertiary butyl ether (MTBE), added to gasoline to meet federal oxygenate requirements, has negatively affected surface and ground waters in New York State and across the nation. New York has enacted a legislative ban on MTBE beginning in 2004.

- Environmental Justice (EJ) has become significant issue in the siting of new power plants and other facilities. The State is working to develop a comprehensive policy on how EJ issues will be addressed.

Energy and Transportation

- New York has the most energy-efficient transportation sector in the United States due to its high-per-capita-use of transit. One-third of all national transit trips are in New York. The use of public transportation is experiencing unprecedented growth, averaging about by 5% annually.

- Statewide, vehicle miles traveled (VMT) and congestion (especially urban congestion) continue to increase, but VMT should grow at a slower rate in the future. Transportation system management, technology improvements, and capital construction projects are underway to reduce the growth in congestion. Freight truck traffic increases are of concern.

- Bicycle and pedestrian initiatives, passenger ferry service, intermodal freight capabilities, and high-speed rail efforts are important measures to increase the energy efficiency of New York's transportation sector.

- New York has made a significant commitment in alternative fuel vehicle (AFV) technology. More than 1,400 State-owned AFVs and over 50 commercial compressed natural gas (CNG) stations are in use. Executive Order 111 requires State agency purchases of light-duty vehicles to be 100% AFV by 2010.

- Progress in reducing the transportation sector's energy use and air emissions is ongoing and will continue in the future through measures such as Commuter

Choice, Ozone Action Days, and traffic signal coordination. Quantitative build and no-build energy and emissions analyses of transportation plans and programs would facilitate continued energy and environmental benefits.

- Energy efficiency can be enhanced by actions at the federal level. Reauthorizing federal surface transportation legislation can substantially affect New York's status as the most transportation-energy-efficient state by providing for transportation programs that enhance energy efficiency and reduce emissions.

- Fuel economy standards for vehicles have the potential to be the most significant action to conserve energy in the transportation sector. Fuel economy standards for passenger cars have been frozen since 1985 and for light duty trucks since 1996. Fuel economy, generally, has worsened between 1990 and 2000.

<u>Preserving Energy-Related Public Benefits Programs</u>

- Government interventions to assist in energy market development are necessary to align public and private interests, particularly in situations where markets are not allocating resources efficiently or fairly.

- Energy customer protections must be continued with the same vigor as they have been afforded in the past. This becomes increasingly important as energy markets become more competitive and customer choice in service providers increases.

- Public benefits programs have contributed to energy and cost savings for residential, low-income, small business, and municipal and institutional customers. These programs also provide environmental benefits, including cleaner air and water, for all of New York's energy customers.

- Opportunities for further coordination among State agencies with roles in sponsoring and providing low-income energy assistance and other public benefits programs are beneficial to program participants and should be fostered.

- Public benefits programs directed toward research and development have significantly contributed to developing, demonstrating, and providing strategic energy technologies, including the advancement of renewable energy technologies, while encouraging and promoting environmental safeguards and protection.

ENERGY SUPPLY ASSESSMENTS FINDINGS AND CONCLUSIONS

In addition to the Issue Reports, a number of critical energy supply assessments are included, as required by Article 6 of the Energy Law. These include supply assessments for:

1. Energy Demand and Price Forecasts

2. Energy Efficiency

3. Renewable Energy Resources

4. Electricity

5. Natural Gas

6. Petroleum

7. Coal

Following are the key findings of these Issue Reports.

<u>Energy Demand and Price Forecasts</u>

- Demand and nominal prices for all fuels are forecast to increase at different rates over the forecast period; however, real prices (accounting for inflation) decline for all fuels over the forecast period.

- New York's aggregate demand for petroleum products is projected to rise moderately over the forecast period, with increases projected for motor gasoline and decreases for residential heating oil. Increased world demand is expected to exert upward pressure on prices, even given stable supplies. Over the forecast period, demand for motor gasoline is projected to increase 21.1%. Year 2000 prices were unusually high, 158.8 cents per gallon, so prices are expected to drop 8.0% from this level, to 146.1 cents per gallon in 2021.

- Natural gas supply availability, being predominately domestic, is expected to be fairly stable. Natural gas prices rose sharply in 2000. This increase was due to tight natural gas supplies both in production and storage. A result of this price increase was greater U.S. exploration and drilling, increases in inventory levels, and hence, lower real prices over the forecast period. Demand growth will be strong in New York, with 73.4% projected growth over the forecast period. This is primarily due to a 172.5% increase in natural gas demand for electric power generation. Real natural gas prices are expected to decrease an average of 0.26% annually, from $5.61 per dekatherm to $5.31 per dekatherm.

- Total electricity use in New York is expected to grow 16.5% over the forecast period, while prices in real terms decline. Real electricity prices are forecast to decline 25.0% over the forecast period due to increased competition among suppliers and lower fuel prices. Peak megawatt demand is forecast to grow at a slightly slower rate than total electricity requirements (15.4% versus 16.5%) over the forecast period.[1]

- Coal demand is expected to rise moderately, by a total of 24.1% over the forecast period. Customer coal prices decline over the forecast period along with mine-mouth coal prices. Productivity increases continue to result from technology enhancements, economies of scale, and better mine design. As a result, real coal prices are forecast to decline 14.5% over the forecast period.

Energy Efficiency

- New York is the most energy-efficient state in the continental U.S., on a per-capita basis, with 7% of the nations's population and accounting for only 5% of the nation's primary energy use. New York is the third most energy-efficient state in the U.S. on an energy intensity basis, measured as British thermal units per dollar of Gross State Product.

- Over the past decade, energy efficiency programs in New York have evolved in terms of their depth, breadth, and focus. The State now offers a diverse portfolio of programs that better captures available energy efficiency potential where past efforts could not.

- Over the past decade, the State has spent nearly $2.8 billion on energy efficiency programs, even while total annual spending declined between 1990 and 2000 from a high in the early 1990s of more than $400 million per year. Annual energy efficiency spending has been increased through 2006 due to the continuation and expansion of the State's System Benefits Charge (SBC) program, and the anticipated spending of the New York Power Authority (NYPA) and the Long Island Power Authority (LIPA) on public benefits programs.

- Between 1990 and 2000, the State's major energy efficiency programs have saved 50,160 GWh of electricity and have reduced summer peak demand by nearly 1,600 MW. Cumulative annual savings in 1999 were 6,519 GWh, or about 5.1% of the 127,998 GWh of electricity sales to ultimate consumers. Natural gas and oil savings of approximately 40 TBtus have also been achieved over this period.

- The cumulative total electricity savings over the period from 1990 to 2000 are estimated to have led to emission reductions of about 37,600 tons of nitrogen oxide (NO_X), 75,700 tons of sulfur dioxide (SO_2), and 22 million tons of carbon dioxide (CO_2). Cumulative natural gas and oil savings add an additional 2,000

[1] The loss of load in New York City resulting from the terrorist attack on the World Trade Center is not factored into the forecast. This load is expected to be restored gradually during rebuilding efforts and completely restored once rebuilding is finished. Load is expected to be fully restored sometime in the early half of the forecast period.

tons of NO_x, 840 tons of SO_2, and 2.5 million tons of CO_2 reductions. Approximately 14,500 jobs were created or sustained as a result of these programs. These jobs will be sustained for the life of the energy efficiency equipment installed.

Renewable Energy Resources

- The State has abundant untapped renewable energy resource potential for additional wind, photovoltaic (PV), and biomass, as well as more efficient hydropower at existing dams, passive solar, solar heating, and geothermal energy development.

- Higher prices for renewable energy will continue to be a barrier to widespread adoption of renewable energy technologies. To foster greater investment in renewable energy-based distributed generation technologies, interconnection rules need to be monitored and periodically reevaluated with the goal of easing interconnections without compromising reliability and system protection, and stand-by rates need to be fair and equitable.

- The cost of renewable energy technologies will continue to be dependent on national and global renewable market development activities. Commercialization efforts, and hence, product prices are currently driven by national and worldwide demand for renewable energy. As a consequence, it is important for the State to collaborate with other states and the Federal government to develop policies that support renewable energy technology and industry development.

- The State is making significant progress compared to other states in the promotion of renewable energy. By November 2001, New York will have 48 megawatts of installed wind capacity, the highest capacity in any Northeastern state. The State is continuing to build a sustainable renewable energy industry by promoting growth in consumer demand, supporting consumer education, constructing and operating renewable energy facilities, and reducing regulatory barriers that might hinder greater development of renewable energy resources in the State.

- The State's continued support for renewable energy is necessary to increase consumer interest, advance the development of renewable energy technologies, and achieve widespread commercialization and use.

Electricity

- New York is a national leader in restructuring its electricity industry. More than 15% of customer load has switched from local utility to new retail service providers. Most switching in retail service providers has occurred in the commercial and industrial sectors with considerable variability throughout the State. More progress in increasing customer choice can be expected, especially when more supplies and demand reducing options become available.

- The initial years of wholesale electricity market operations in New York coincided with periods of high fuel prices, significant transmission congestion, and tight supply conditions. Wholesale electricity prices reflected these conditions, but they have begun to moderate, although not in a uniform pattern, across the State. Wholesale electricity prices are forecast to decline in real terms, as are retail prices, over the planning period. This expectation is strongly conditioned on new demand and supply resources being added, especially at critical locations that will serve to reduce transmission congestion.

- Electricity peak demand is forecast to grow at annual average rates ranging from 0.32% to 1.05%, with a mid-range value of 0.68%. The loss of load in New York City resulting from the terrorist attack on the World Trade Center is not factored into the forecast. This load is expected to be restored gradually during rebuilding efforts and completely restored once rebuilding efforts are finished. Load is expected to be fully restored sometime in the early half of the forecast period.

- Reserve margins, representing one measure of system reliability, are expected to exceed the current requirement of 18% throughout the planning period. A higher peak demand growth rate than expected, however, will require more new resources than are currently expected, especially in the later years of the planning period.

- In the near-term, additional single-cycle gas turbines and demand reduction programs will be used to address growth in peak electricity demand. Over the longer-term, gas-fired combined-cycle base-load units will be added to the system. As of December 2001, five generating projects which total approximately 3,490 MW have been approved under the Article X of the Public Service Law. Another 19 projects are in the regulatory review process or have been publically announced.

- The State's transmission system is generally adequate to provide reliable electricity service; however, there are limitations in the use of the transmission system in moving power between regions of the State for economic reasons. The siting of new generating facilities can reduce price impacts attributed to economic congestion of the transmission system. This finding is consistent with the Planning Board's recent *"Report on the Reliability of New York's Electric Transmission and Distribution Systems."*[2] Some local transmission reinforcements might be necessary in the New York City and Long Island areas.

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[2] Report of the New York State Energy Planning Board as mandated by Chapter 636 of the Laws of 1999.

- A Northeast regional transmission organization (RTO) offers possibilities for enhanced market efficiencies and economic benefits for most participants. The RTO structure may also offer a vehicle for developing new transmission lines to increase power transfers across New York's borders. There are certain principles for RTO formation that should be followed to ensure benefits are realized by New York consumers.

- New York will increase significantly the share of electricity generation fueled by natural gas. This trend is consistent with other regions of the Northeast. A major force behind this trend is the decisions of merchant generators to select natural gas as the preferred fuel of choice. The choice is also influenced by environmental factors that recognize the relatively clean air emission profile of natural gas generation. This shift in primary fuel requirements for electricity will result in diminished diversity in the fuel requirements for electricity generation. Reduced fuel diversity increases risk exposure to fuel supply disruptions and price swings.

- Air pollutant emissions from electricity generation in the State are expected to decrease over the planning period. Increased use of natural gas for electricity generation, increased electricity trading among regional electric systems, and full implementation of the Governor's Acid Deposition Initiative all serve to drive SO_2 emissions to levels that are one-half that mandated by the Federal Clean Air Act and extend summertime NO_X controls year-round.

<u>Natural Gas</u>

- The demand for natural gas is expected to expand significantly over the planning period, particularly in the near-term, with the greatest increase in the use of gas for power generation.

- More pipeline capacity will be needed to meet the increased demand for natural gas. Interest in expanding interstate pipeline delivery capacity to the Northeast and New York continues to be strong. The local distribution company (LDC) systems will also have to be expanded to meet these increased needs.

- The Federal Energy Regulatory Commission (FERC) recently approved five natural gas pipeline projects to serve the Northeast, and another 13 projects have been proposed.

- Natural gas prices will decrease slightly in real dollars over the long-term and are likely to remain somewhat volatile.

- There is a general need to continue LDC system integrity and safety programs as well as to continue research and development efforts to develop cost savings techniques to maintain and upgrade the existing distribution system.

Petroleum

- U.S. production of crude oil continues to decline. As a consequence, both U.S. and New York State continue to increase their dependance on foreign sources of crude oil and refined petroleum products to meet consumer demand.

- In-State petroleum terminal storage capacity for distillate fuels, gasoline, and residual fuel continues to decline. Reasons for this decline include land use concerns associated with storage, costs associated with properly maintaining facilities, increased insurance costs, lack of market incentives to construct new facilities, and the costs of holding large volumes of fuel.

- Lower inventory storage can result in degradation of the operational flexibility needed to satisfy consumer demand, greater supply uncertainty, and greater short-term price volatility.

- If the natural gas fueled electric generation facilities with interruptible gas contracts are unable to acquire their primary fuel and are forced to switch to distillate fuel, they will use significant quantities of distillate over a very short period of time. This could strain the ability of the petroleum infrastructure to respond to this need.

- Electricity generation facilities burning distillate fuel as a backup when natural gas is interrupted, have the potential to disrupt the delivery of electricity in cases where such facilities are being relied upon to meet peak demand and where availability of distillate fuel is limited. In addition, a sudden, large increase in petroleum use in electricity generation could potentially have negative impacts on air quality.

Coal

- Coal is America’s most abundant indigenous fossil fuel resource, accounting for 95% of the nation’s fossil energy reserves. The United States has a 250-year supply of coal.

- The U.S. is second only to China among world coal producers. In 2000, over one billion tons of coal were produced in the United States, mined in 25 coal-producing states.

- Approximately two-thirds of all coal mined in the United States is transported by rail, making coal the largest single source of freight revenue for United States railroads.

- In 2000, nearly 12.1 million tons of coal were used in the State, representing less than 1% of the nation's coal demand. While coal use represents 8% of the State's total primary fuel mix, most of the coal (80%) was used to produce electricity.

- New York has 46 coal-fired electricity generation units located in the State, representing nearly 4,000 MW of net summer capability for the State's electricity grid.

- A major consideration in the use of coal as a fuel in electricity generation is the emission of sulfur dioxide, nitrogen oxides, particulate matter, and carbon dioxide. Clean coal technologies offer utilities options for making substantial reductions in acid rain and greenhouse gas emissions, while providing health-related benefits as the result of improved air quality.

- Clean coal technology can play a role in helping the State to achieve its energy, economic, and environmental goals.

SECTION 1.3

ENERGY POLICY OBJECTIVES AND RECOMMENDATIONS

INTRODUCTION

The Draft Energy Plan provides broad Statewide energy policy direction rather than recommending specific government agency actions. The Energy Planning Board's strategies for putting New York on a path toward greater energy self-sufficiency and supporting a flexible and market-based approach to growing the State's economy, improving the environment, and improving transportation systems are outlined in this Section. These strategy recommendations are grouped according to the primary objective that the recommendations most directly support. Clearly, several of the strategy recommendations support multiple objectives. For example, several recommendations have emerged from the Governor's Greenhouse Gas Task Force (Task Force) and are identified as such in the Draft Energy Plan. Several other recommendations support greenhouse gas emission reductions but are grouped under the objective that they most directly support, whether or not they have been recommended by the Task Force.

The strategy recommendations that follow are intended to achieve the public policy objectives of the Draft Energy Plan. Moving forward, however, more analysis will be required on some of the recommendations prior to their implementation, giving due consideration to such factors as energy cost impacts, security and diversity of energy supplies and electricity generation technologies, protection of public health and safety, beneficial and adverse environmental impacts, and the State's ability to compete economically.

1. <u>Supporting the continued safe, secure, and reliable operation of the State's energy and transportation systems infrastructure.</u>

A. The State should initiate a study of the security of New York's energy infrastructure for production, storage, and delivery, including a risk and vulnerabilities assessment and recommendations for appropriate actions. This study should be conducted cooperatively with the Office of Public Security, the Energy Planning Board agencies, and major energy suppliers.

B. The State should support investments in utility natural gas and electricity distribution system maintenance, supporting multiple redundancies, shared design practices, shared inventories, and flexibility necessary to ensure continued safe and reliable system operation.

C. State agencies and authorities should encourage the New York Independent System Operator (NYISO) to consider the certainty and availability of primary and back-up fuels as factors in the valuation of capacity from electricity generators, to ensure that the reliability of the electricity, natural gas, and petroleum supply and delivery infrastructures are not adversely affected if generator fuel supplies are disrupted.

D. The State should support energy diversity in all sectors of the economy through investments in, and infrastructure development assistance for, indigenous and renewable fuels, and energy efficiency, to reduce the risks associated with single fuel dependency and price volatility.

E. The State should continue its efforts to reduce traffic congestion and delays, and increase energy efficiency in transportation through a complement of actions that include public transit, transportation management, intelligent transportation systems, and capital construction.

1. The State should ensure that transportation planning and construction is compatible with current and planned community development.

2. The State should reduce transportation sector energy use by promoting inter-modal freight capabilities.

3. The State's emphasis on maintaining the existing transportation infrastructure, through its capital construction programs, should be continued.

4. The State should work more closely with utility companies to better identify, and, if possible, design project work around utility facilities. The State should work in partnership with municipal governments to accomplish this objective for municipal projects.

2. <u>Stimulating sustainable economic growth through greater reliance on market forces to spur technological innovation and job growth in the State's energy and transportation sectors.</u>

A. The State should reauthorize Public Service Law (PSL) Article X relating to the siting of new major electric generating facilities, scheduled to expire on January 1, 2003. As part of this process, the following issues should be considered.

   1. The State should continue to encourage public participation in the Article X siting process. State agencies should continue their pre-application information programs and training workshops for prospective applicants and affected communities. The State should also evaluate the effectiveness of current statutory language providing for intervenor funding.

   2. The State should examine whether provisions requiring expedited proceedings for facilities meeting environmental performance standards should be modified or expanded to include facilities that would further other public policy goals.

   3. The State should evaluate the appropriateness of developing specific procedures with respect to the expansion, modification, or repowering of existing major generating facilities.

   4. The State should consider additional modifications and measures to Article X's procedural requirements that would enable the Siting Board to streamline its review where interested parties, including affected community groups, have reached consensus as to the specific issues presented by an Article X application.

   5. The State should consider adding the New York State Department of State and the New York State Office of Parks, Recreation, and Historic Preservation as statutory parties to Article X proceedings in order to coordinate State review of Article X applications.

   6. The State should consider whether a Certificate of Environmental Compatibility and Public Need issued pursuant to Article X should, in appropriate cases, include conditions and requirements that are intended to promote improved energy systems reliability and ensure that peak electricity demand requirements are met.

B. The State should reauthorize, with modifications, Article 6 of the Energy Law, for Statewide energy planning, scheduled to expire on January 1, 2003. Modifications should include reducing the forecasting period for energy demand and prices from 20 years to 10 years and changing statutory language to reflect changes in the electricity industry. In addition, to statutory modifications, the following administrative steps should be taken.

1. The State Energy Planning Board should meet annually to coordinate development and implementation of energy-related strategies and policies, receive reports from the agencies' staffs on the compliance of major energy suppliers with its information filing requirements, and receive summary reports on the information filed.

2. The information filing regulations of the Planning Board should be modified to recognize new entrants into the energy marketplace and the need for certain information and data.

C. The State should support and work expeditiously toward establishing a regional transmission organization (RTO), merging the operations of the NYISO, the New England Independent System Operator, and the Pennsylvania, New Jersey, and Maryland (PJM) Independent System Operator.

1. The State should continue to participate in RTO negotiations to ensure that integration of the New England ISO, the Pennsylvania, New Jersey, and Maryland ISO, and NYISO incorporates the best practices of each existing ISO and provides fair representation within the RTO's governance structure.

2. Any system developed for merging the NYISO into a larger RTO must be designed to incorporate local reliability requirements and ensure that short-term economic pressures do not shortchange the reliable operation of New York's integrated electric system.

D. The State should move expeditiously to a fully-competitive retail electricity marketplace while maintaining appropriate customer service protections.

1. The State should complete the unbundling of electricity services and implement Statewide competitive services for metering, billing, and other services for which competition is expected to lower costs and improve service quality.

2. The State should support the use of interval meters, where appropriate, to enable customers to respond to real-time electricity prices.

E. The State should coordinate rebuilding efforts in New York City among affected State agencies, and provide technical and design assistance and financial incentives, to ensure that these efforts maximize the use of energy-efficient and environmentally-sound design and construction practices to reduce energy use and costs, reduce pollutant emissions, and improve indoor air quality.

3. **Increasing energy diversity in all sectors of the State's economy through greater use of energy efficiency technologies and alternative fuels.**

A. The State should significantly increase energy resource diversity in electricity generation and transportation energy use, through greater reliance on indigenous and renewable energy resources.

1. The State should competitively solicit 60 to 120 MW of renewable electricity generation to meet the requirements of the Governor's Executive Order No. 111 that calls for up to 10% of State facilities' electricity needs to be provided from renewable resources by 2005 and 20% by 2010.

2. The New York Power Authority (NYPA) should competitively solicit bids for long-term contracts for the purchase of electricity from renewable energy resources, with a particular emphasis on wind generation in upstate areas and photovoltaic generation in the New York City Metropolitan area.

3. The Long Island Power Authority (LIPA) should competitively solicit bids for long-term contracts for the purchase of electricity from renewable energy resources, with a particular emphasis on wind generation on Long Island.

4. The State should examine and report on the feasibility of establishing a Statewide renewable portfolio standard (RPS) for electricity generation and a Statewide energy efficiency standard, and assess the economic impacts of such standards and analyze whether an RPS and an energy efficiency standard can be harmonized with a restructured and competitive electricity market.

5. The State should encourage greater use of indigenous fuels and renewable-based electricity generation by removing regulatory barriers, expanding net-metering programs, effectively enforcing interconnection

standards, consolidating and enhancing tax incentives, and supporting development of a renewable fuels industry in New York.

6. The State should support clean coal technology research, demonstration, and commercialization, and work closely with industry to retrofit existing coal-fired electricity generating facilities in the State to reduce harmful pollutant emissions and improve the State's energy diversity. To this end, the State should expand its research, development, and demonstration of clean-coal technology through the collaborative efforts of the New York State Department of Environmental Conservation (DEC), the New York State Energy Research and Development Authority (NYSERDA), NYPA, LIPA, and private developers. The State should support joint demonstration projects at existing coal-fired facilities in the State.

7. The State should expand bio-fuels research and development activities with the goal of creating a self-sustaining private sector bio-fuels industry in the State within the next five to 10 years. The State should, possibly working in cooperation with other states, develop a specific plan for producing, refining, and marketing biomass fuels derived from waste, soybean, and corn oils, and from paper sludge, municipal solid waste, and other cellulose sources. The State should support the commercialization of bio-fuels technology and use of bio-fuels as vehicle fuel, heating fuel, emergency electricity generation fuel, and in marine applications.

B. The State should encourage the development and use of distributed generation (DG) and combined heat and power (CHP) technologies at customer sites, with the goal of becoming a national leader in the deployment of distributed generation technology. Primary focus should be on applications where such technologies can be shown to reduce energy costs, improve electricity system reliability, and reduce harmful pollutant emissions.

1. The State should continue its research and development support for DG and CHP technologies and applications, supporting, in particular, clean and renewable energy-based DG and CHP technologies.

2. The State should coordinate agencies' efforts to facilitate the interconnection of DG and CHP resources into the electricity system and increase the use of DG and CHP resources in the State.

3. The State should consider offering investment tax credits to spur private sector investment in environmentally-sound and cost-effective DG and CHP technologies.

C. The State should maintain fuel neutrality in its support for alternate-fueled vehicle technology.

1. The New York Alternate Fuels Tax Credit program, scheduled to expire on February 28, 2003, should be extended and consideration given to enhancing it by including all types of alternate fueled light-, medium-, and heavy-duty vehicles. Incentives should also be extended to fuel providers to continue the development of an alternative fuels infrastructure in New York.

D. The State should support federal surface transportation legislation that leads to more energy-efficient transportation. Specific elements should include increased federal funding for transit, retention of the Congestion Mitigation and Air Quality program, continued funding for intelligent transportation systems and transportation systems operations, and modification of the Federal Transportation Equity Act for the 21st Century (TEA-21) programs to improve rail service.

E. The State should encourage the Federal government to adopt new corporate average fuel economy standards (CAFÉ) for vehicles to address vehicle energy efficiency in a way that protects driver and passenger safety.

4. Promoting and achieving a cleaner and healthier environment.

A. The State should proceed to phase-out the use of methyl tertiary butyl ether (MTBE) as an oxygenate additive in motor gasoline as required by State law. At the same time, the State should seek relief in the form of a waiver from the U.S. Environmental Protection Agency (U.S. EPA) from the oxygenate requirement. The State should begin supporting infrastructure development for an indigenous and renewable-based substitute for MTBE in the event that a waiver is denied. The State should recommend strategies for building and supporting such an infrastructure and industry in New York.

B. The State should review the recommendations of the Governor's Greenhouse Gas (GHG) Task Force and implement appropriate recommendations in a timely manner. In addition to considering other recommendations upon development of a final report from the Center for Clean Air Policy with input from GHG Task Force, the State should:

1. Commit to a Statewide greenhouse gas (GHG) emission target with near-term (*e.g.*, 2010), mid-term (*e.g.*, 2020), and long-term (*e.g.*, 2050) stages.

2. Develop an annual GHG emission inventory and sequestration registry for carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), perfluorocarbons (PFCs), hydrofluorocarbons (HFCs), and sulfur hexafluoride (SF_6), and report on progress made to reduce these emissions against State and sectoral targets and goals by public and private entities. The State should support the prospect of tradeable credits for actions already taken, in the event that enforceable carbon limits are established nationally.

3. Incorporate energy-efficient technologies, sustainable transportation services, and site design features into the reconstruction of the World Trade Center in New York City.

4. Emphasize the greenhouse gas emission reduction potential, most notably of carbon dioxide (CO_2), as a criterion in developing new program initiatives in the State's public benefits programs.

5. Expand the State's efforts to improve the efficiency of energy generation and encourage use of indigenous and renewable energy resources.

    a. Significantly increase the amount of indigenous renewable energy resources in the State's energy mix, including solar, wind, hydroelectricity expansions, waste methane, geothermal, and sustainable biomass.

    b. Maximize the development and use of cost-effective combined heat and power and other forms of clean, efficient distributed generation, by providing technical and financial assistance to qualifying projects; developing performance-based emission and certification standards for new distributed generation that encourages technological improvements and reduced emissions; and eliminating disincentives for distributed generation.

c. Adopt a specific plan to develop an indigenous bio-fuels industry in New York to produce, refine, and market transportation and other fuels from indigenous biomass resources.

6. Develop a program that allows businesses to enter into voluntary agreements to meet certain energy efficiency targets and reduce greenhouse gas emissions. To assist businesses in meeting such voluntary agreements, the State should offer technical assistance, public recognition, expedited regulatory permit review, and financial incentives, as appropriate or necessary.

7. Redirect transportation funding toward energy-efficient transportation alternatives, including public transportation, walking, and bicycling, and provide incentives to encourage greater use of related alternatives that improve transportation efficiency.

8. Include in the State Environmental Quality Review Act (SEQRA) analysis and State transportation planning processes, consideration of CO_2 production and mitigation strategies, as appropriate.

9. Target open space funding to prevent suburban sprawl, promote Quality Communities, reduce vehicle miles traveled, and support, adopt, and enhance transportation measures that reduce energy use and pollutant emissions.

10. Support, adopt, and enhance transportation measures that reduce energy use and pollutant emissions, such as Commuter Choice, Ozone Action Days, diesel vehicle retrofits, improved traffic signal coordination with light emitting diode (LED) replacement technology, transportation system management, and other similar actions.

11. Encourage low-cost, passive building efficiency measures, such as white roofs, passive solar design, and improved foundation membranes, and incorporate such measures in the State's building construction codes. In addition, the State should support local building and development projects that include funding for open space conservation and urban forestry and that reduce the need for air-conditioning in urban "heat islands."

12. Expand research, development, and demonstration (RD&D) of energy and GHG-efficient vehicle technologies, add GHG goals to vehicle tax credits and incentives, and coordinate with other states to encourage improvements in vehicle fuel economy.

13. Working with regional and local planning organizations, analyze and quantify the energy use and air pollution emissions expected to result from transportation plans and programs.

14. Support the design and construction of energy-efficient and environmentally-friendly "green buildings" through financial incentives, technical assistance, and related program initiatives.

15. Implement the Governor's Acid Deposition Reduction Initiative, which is expected to significantly reduce GHG emissions and the acid rain precursors SO_2 and NO_X.

5. Ensuring fairness, equity, and consumer protections in an increasingly competitive market economy.

A. The State should examine the feasibility of effectively aligning public policy interests in energy efficiency, combined heat and power, and indigenous and renewable-based electricity generation, with the financial interests of utility shareholders and ratepayers.

B. The State should expedite efforts to have electricity transmission, distribution, and customer service prices to consumers reflect the true cost of service and eliminate inter-class and intra-class subsidies, to the extent practicable.

C. The State should review forthcoming recommendations from the Department of Environmental Conservation's Environmental Justice Advisory Group and implement appropriate recommendations in a timely manner.

D. The State should consider the effectiveness, efficiency, and coordination of its low-income energy assistance programs, including the **New York Energy $mart℠** program, the Weatherization Assistance Program (WAP), the Low-Income Home Energy Assistance Program (LIHEAP), and other State programs that offer incentives, assistance, or information services to improve the efficiency of energy use and reduce the energy burden of low-income households. The State should consider consolidating programs where opportunities exist to improve administrative efficiency and customer service.

Section 2

ISSUE REPORTS

SECTION 2.1

PROMOTING ENERGY INDUSTRY COMPETITION

INTRODUCTION

The pursuit of effective competition, wherever practicable, in the provision of natural gas and electricity services is the policy of the State of New York. Such competition has the potential to reduce energy costs over the long term, increase customer choices and satisfaction, provide economic development advantages, enhance system reliability, promote technological changes and improvements, and improve environmental quality. The 1994 State Energy Plan introduced the potential for energy competition in New York State, and the 1998 State Energy Plan identified New York's vision and the State's actions and plans for achieving that vision. This 2002 Draft State Energy Plan (Draft Energy Plan) reflects on the achievements made to date in opening energy markets to greater competition and considers whether any changes should be made in the State's vision for the future.

In the wake of recent developments in energy markets, particularly in the western region of the country, many people question whether customers are better off today than they were under full regulation of utility services. To answer that question, several key areas should be considered: price, reliability, economic development, adequacy of supply and delivery capability, and environmental impact. Each of these were discussed in the 1998 Energy Plan and findings were made. This section of the Draft Energy Plan will discuss those areas, relating the 1998 Findings to current conditions, and then will present and discuss several specific issues that are currently facing New Yorkers. The Electricity and Natural Gas Resource Assessments, found elsewhere in this Draft Energy Plan, provide a more detailed review of the state of the competitive markets, as well as the state of the infrastructures available to support those markets.

STATUS OF COMPETITION

Price

The 1998 State Energy Plan noted that the natural gas and electric industries were in transition to retail competition. Prior to reaching the end-state, however, the 1998 State Energy Plan concluded that customers would still be able to experience reduced prices because of multi-year rate plans that had been authorized by the New York State Public Service Commission (PSC) and because customers would now begin to have the ability to choose suppliers. In particular, the 1998 State Energy Plan projected that electric rates could be expected to decrease statewide by an average of 9.7% through 2002 even though modest increases in the prices of fuels used to generate electricity could be expected. The 1998 State Energy Plan also found that restructuring the gas and electric industries would provide consumers with competitive energy prices and services, stimulate economic growth, and improve the job market.

From 1998 until recently, the State has experienced significant economic growth, job markets have improved, and energy delivery rates have declined, as anticipated. In addition, those customers that have opted to seek competitive suppliers have been able to receive lower commodity prices than they might have received through their utility company as full service customers. Wholesale commodity prices for both natural gas and electricity, however, increased significantly in 2000 due to factors mainly unrelated to industry restructuring, which in turn has had significant impacts on the overall prices that customers pay for their utility services. Of these factors, the most significant was the sharp increase in the wholesale price of natural gas from the second quarter of 2000 to the second quarter of 2001 (see the Natural Gas Assessment for a discussion of this increase).

In recent months, wholesale natural gas prices have receded toward the level prior to the dramatic run-up in 2000. Electricity prices have also fallen back to earlier levels. In the long-term, wholesale natural gas prices (which are beyond the State's control), are forecast to decline in real terms through 2010 and then increase slowly until the end of the planning period, but they are not projected to exceed the real price experienced in 2000. Retail natural gas prices are forecast to follow a similar trend, as discussed in the Natural Gas Resource Assessment. With regard to electricity prices, the Electricity Resource Assessment presented in this Draft Energy Plan projects that retail prices will likely decline in real terms throughout the planning period because of the use of more efficient generation and increased use of demand reduction programs.

Reliability

The 1998 State Energy Plan found that electric system reliability can be maintained or enhanced in a competitive market. Indeed, since the transition to wholesale electric competition began, the State has continually met or exceeded all of the reliability criteria established by both the Northeast Power Coordinating Council and by the New York State Reliability Council. While bulk electric resources have been strained at time, the criteria have not been violated. As new generation and demand reduction resources become available over the next few years, bulk electric system reliability should continue to improve. With regard to electric distribution system resources, reliability has also generally remained stable, although pressures have increased for utility managers to minimize costs.

Economic Development

The 1998 State Energy Plan held that using some of the benefits of restructuring the electric and natural gas utility industries to maximize economic development is sound policy for New York. Industrial and large commercial customers have taken advantage of the opportunities available to them to choose their energy suppliers through the competitive markets, and they have also benefitted from reduced delivery charges that became available through the regulatory process. Innovative programs, such as the new demand response and load bidding programs recently established by the utilities and the New York Independent System Operator (NYISO), are also important opportunities that can help these classes of customers manage their utility budgets effectively.   As new electricity generation and additional gas transportation capability become available, the benefits of competition will expand and so will the potential for greater economic development.

Adequacy of Supply and Delivery

The 1998 State Energy Plan held that energy supplies should continue to be adequate throughout the planning period, but new facilities would be needed. It predicted that new electricity resources would be needed sometime within the 2001 and 2005 time frame. Recent events have shown that the 1998 prediction was accurate, although the need for the new resources arrived somewhat earlier in the period than was projected due to economic and load growth at the upper bound of the range that had been forecast. Fortunately, the State's policies put in place to facilitate competition in New York have set the stage for new baseload generation to be built and operational in the near future and for demand reduction programs to be developed. Prior to the summer of 2001, the New York Power Authority (NYPA) "Power Now!" projects installed 450 megawatts (MW) of new gas turbines in the New York City area, and public and private sector utilities and the NYISO developed and initiated demand reduction programs that enabled the State to maintain a reliable electric system as the new baseload generation and further growth in demand reduction programs are pursued. The Electricity Resource Assessment, presented later in this Draft Energy Plan, provides a more in-depth assessment of the electricity infrastructure and shows that electric system reliability can be maintained as competitive markets develop.

With regard to the siting of major electric facilities under Article X of New York's Public Service Law (PSL), the 1998 State Energy Plan held that certification may be premised on a determination that the proposed facilities would promote or contribute to a competitive market for wholesale or retail electricity. Eleven complete applications for major electric facilities under Article X have been filed[1] based on the stated determination that they will promote or contribute to a competitive market, and five projects so far have been approved as contributing to competitive markets. The process for review of all these projects has addressed the same environmental issues that would be addressed in a fully regulated electric utility environment. With regard to natural gas, additional delivery system facilities are needed, and several are pending before the Federal Energy Regulatory Commission (FERC) or have recently been authorized. An in-depth study is now underway to assess the interrelationships between natural gas and electricity, as well as the interrelationship with petroleum products. Preliminary findings of that study support the need for new natural gas pipeline facilities.

Environmental Impacts

The 1998 State Energy Plan maintained that increased competition in the energy markets would not have an undue adverse impact on the environment, as compared with traditional industry regulation, because environmental oversight would continue and mitigation measures would be implemented as necessary. Most of the Article X applications filed to date are for efficient, gas-fired combined cycle generation units; several are simple cycle installations. All use state-of-the-art clean technology, and several will result in the repowering of existing, inefficient, and more polluting generation. Models for these proposed power plants project reduction in air pollution in the State by displacing older, more polluting, electricity generation, and the analyses performed for the Electricity Resource Assessment in this Draft Energy Plan support this finding. Of equal importance to the addition of new supplies are the new programs that are designed to reduce customer energy demand, increase the efficiency of generation technologies, and promote indigenous and renewable resource development.

All Article X applicants and non-Article X power project developers must apply for applicable air and water quality permits from the New York State Department of Environmental Conservation (DEC). The permits are based on compliance with all applicable State and federal air and water quality regulations and requirements, including Prevention of Significant Deterioration (PSD), New Source Review (NSR), and

[1] Three other applications have been filed, but they have not yet been deemed complete. In addition, nine other proposals are in various stages of the "pre-application" process for Article X.

Maximum Achievable Control Technology (MACT). Many Article X applicants have proposed air-cooled condensers (dry cooling), which use very little water compared to wet evaporative cooling or once-through cooling technologies. Additionally, depending on site locations, other environmental mitigation measures have been imposed by the Article X Siting Boards.

The events of the past four years continue to support the validity of the 1998 State Energy Plan findings. In all the key areas (price, reliability, economic development, adequacy, and environmental impact), the evidence shows that competition has been beneficial, but greater benefits can be achieved. The transition to competitive energy markets is still underway, so the State must remain vigilant and flexible to resolve issues as they arise.

COMPETITIVE ISSUES FOR THE FUTURE

The Electricity and other Resource Assessments presented in this Draft Energy Plan provide assessments of both the state of the energy infrastructures and the markets that are supported by this infrastructure. The Assessments identify issues and barriers that confront the implementation of competitive markets and the strategies and efforts that are currently underway to address those issues and overcome the barriers. With the background provided by the Assessments, this section addresses in more detail a few of the critical issues affecting competition.

Policy Framework

The rigid, statutory-based approaches used for restructuring the utility industries in some other regions of the country have led to significant problems and have caused some advocates of competition to reevaluate their positions. Consequently, some states have retreated to "wait and see" positions, and some have even considered reversing course. In contrast, New York State's approach to restructuring is designed to provide the flexibility needed so that adjustments can be made as lessons are learned, competitive barriers are revealed, and progress is made.

For example, most stakeholders agree that a primary barrier today to achieving effective wholesale competition in the energy industries is the lack of adequate resources where they are needed most. This translates to a need both for additional supply resources (both commodity and delivery resources) and demand-reduction techniques. The lack of adequate natural gas delivery and storage infrastructure in some areas puts strains on the market, which, in turn, leads to more volatile prices (a further discussion of the issues surrounding the State's growing reliance on natural gas is presented later in this section). For electricity, additions to the delivery system and/or added generation and reduced demand in certain areas of the State are needed today. In response, the State has advocated increasing gas and electric transmission into constrained areas, and it has taken steps to install small gas-powered peaking facilities in New York City and on Long Island.

The Electricity Resource Assessment and the Natural Gas Resource Assessment in this Draft Energy Plan each describe the state of competition for their sectors and discuss the remaining impediments to fully competitive markets and, thus, competitive prices and more choices for customers. The Assessments then identify the many initiatives and actions that have been taken and are in progress. As these initiatives and actions unfold, the impediments identified are being addressed and the State will endeavor to make any modifications that might be necessary for those issues that fall under its purview.

As described in the Assessments, the regulation of wholesale electricity and natural gas is primarily under the jurisdiction of the FERC. Consequently, the State has little direct control over the wholesale price of energy, but does take an active advocacy role in support of maintaining system reliability and truly competitive markets. Over the next several years, developments will continue to unfold in wholesale markets, the NYISO will continue to improve its operations, the FERC will continue its deliberations on regional transmission operations, and the U.S. Congress will continue to consider nation-wide industry restructuring legislation. New York will monitor these activities and provide input where necessary to ensure that the State's interests are protected, especially with regard to energy systems security and reliability, and the ability of consumers to seek the lowest possible commodity prices.[2]

Power Plant Siting

PSL Article X authorizes the Siting Board to issue a Certificate of Environmental Compatibility and Public Need prior to construction and operation of an electric generating facility with a capacity of 80 MW or more. Article X, enacted July 24, 1992,

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[2] The State supports development of a single, regional transmission organization (RTO), subject to certain principles described in the Electricity Resource assessment. Similarly, as discussed later in this issue paper, the State supports federal legislation to remove some of the current barriers to effective competition in the utility industries.

expires on January 1, 2003. It remains operative and effective with regard to applications filed on or before December 31, 2002.[3]

Article X provides for a pre-application process to allow early public involvement and to attempt to obtain agreement of the affected agencies and others on the scope of studies and analyses necessary to complete an application. Intervenor funding up to $300,000 is available to municipal and local parties to fund expert witnesses and consultants once an application is filed. The Siting Board is required to render a final decision within twelve months of notice of a complete application, or within six months for facilities that involve replacement or repowering of existing facilities and reduce water use and certain air pollutants. The Siting Board is required to make specific findings in its decisions on applications. It is authorized to refuse to apply any local law upon certain findings (PSL § 168 (2) (d)).

While the effective date of Article X was in 1992, the statute and process has been modified and streamlined in several ways. In 1999, the State enacted amendments to Article X that authorize DEC to issue air and water permits for proposed facilities. The amendments were necessary to ensure continued federal delegation for air and water permits. The New York State Department of Public Service (DPS) and DEC are working together cooperatively to coordinate their respective responsibilities in the Article X process. The 1999 amendments also increased intervenor funding and strengthened the agencies' mandate to have applicants implement appropriate public involvement programs and to increase public awareness and involvement in the process. In 2001, Article X was further amended to provide a shortened certification period for certain projects at existing generation sites, provided that emissions into the air will be reduced by 75% and water usage will be reduced dramatically.

The State agencies administering Article X and the air and water permitting have also undertaken measures to streamline the process and to provide opportunities for participation. Intervenor funding is initiated soon after an application is filed, and the DPS web site was expanded to provide ready access to case documents, status reports and an easily understood guide to Article X. The agencies have conducted workshops to explain the process and filing requirements to applicants and conducted forums to

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[3] Before enactment of Article X, PSL Article VIII established requirements relating to siting of major steam electric generating facilities. Article VIII was first enacted as Chapter 385 of the Laws of 1972; it expired in 1978. Article VIII was then reenacted as Chapter 708 of the Laws of 1978; it expired in 1988. An interruption in the PSL certification process occurred from January 1, 1989 to January 20, 1993. The State Environmental Quality Review Act applied to developers of major generating facilities during the interruption.

explain the Article X process to the public. The agencies also conduct one-on-one meetings with potential applicants and public interest groups to disseminate Article X material. These measures, consequently, helped the Article X certification process mature into a smoother and more expeditious process, while enhancing public participation, without sacrificing its fair and comprehensive intent.

The 1080 MW Athens Generating Plant, now under construction in Greene County, was the first generating facility certified under Article X. It received certification on June 15, 2000. As of December 1, 2001, 14 applications had been submitted, and Article X Siting Boards had certified five combined cycle, gas-fired, electric generating facilities that will add over 3,300 MW.[4] Nine other proposals were in the Preliminary Scoping Statement or Pre-application stages.

Written and oral comments were received about the effectiveness of Article X in response to the State Energy Planning Board's (Planning Board) request for comments on the scope of this Draft Energy Plan. In general, the comments call for extending Article X for five years. Recommendations for improving Article X included proposals for:

- Streamlining Article X procedures, including conducting more expeditious proceedings;
- Giving priority to brownfield and repowering facilities;
- Exempting mini power plants (a single turbine or pairs of turbines with a nameplate rating of over 80 MW but an actual output to the electric system of under 80 MW);
- Providing more and earlier public involvement;
- Requiring cumulative power plant and neighborhood impact (environmental justice) analyses;
- Evaluating health issues associated with fine particulates ($PM_{2.5}$) and non-ammonia technologies;
- Coordinating reviews by State and federal agencies;

[4] The five certified facilities are: the 1080 MW Athens Generating Project; the 800 MW Heritage Project; the 360 MW East River Repowering Project (196 MW net increase); the 250 MW Ravenswood Cogeneration Project; and the 1000 MW Astoria Project.

- Locating generating facilities closer to the loads they are intended to serve; and
- Ensuring reliability of supply.

Since the filing of public comments, several important events advanced the interests noted in the comments. Also, Article X was amended in 2001 (Chapter 222 of the Laws of 2001) to require Siting Board action within six months for applications that replace or repower existing generating facilities and result in decreased water use and decreased emissions of certain air pollutants. The Article X amendments, in effect, prioritize applications for replacing or repowering facilities that meet certain air standards. Consideration, however, might now be given to developing specific procedures for such facilities and also to requiring expedited proceedings for facilities that meet other public policy goals.

The manufacturers of gas turbines often produce standard size turbines. The turbines may have a name-plate rated capacity of more than 80 MW. Owners and operators who make a legally binding commitment to operate the plants with a total output of less than 80 MW are not subject to Article X review.[5] Nonetheless, power plants that are not subject to Article X are required to comply with the State Environmental Quality Review Act, Environmental Conservation Law air and water permit provisions, and Public Service Law § 68 certification provisions.

Some commentors propose streamlining Article X to shorten the process. In addition, citizen and environmental groups and local governments request more meaningful public participation. These two objectives might be addressed through evaluation of the effectiveness of the current statutory language for intervenor funding and continuation/expansion of State agencies' pre-application information programs and training workshops for prospective applicants and others interested in the process. In addition, the Article X procedural requirements might be modified to enable Siting Boards to streamline reviews where interested parties, including affected community groups, reach consensus on specific issues presented by an Article X application.

In addition, when warranted, several applicants have included comparative studies involving proposed facilities in specific cases. Because each Article X application is reviewed by its own separately-constituted Siting Board, which results in Article X

[5] The Appellate Division, Second Department, has upheld the Siting Board Chairman's definition of major electric power plants. Several parties have moved for leave to appeal to the Court of Appeals on this issue.

applicants having different Siting Boards,[6] some commentors suggested that it may be desirable to change the Article X statute to allow Siting Boards to share information, to make comparative analyses of competing applications, and to prioritize or select among the proposed facilities. For example, if competing proposals are under consideration in separate proceedings and only one of the proposed facilities can reasonably be built and operated, the Siting Boards could select the one that best meets the public interest, including environmental and electrical system impacts and customer benefits. Currently, however, Article X sets forth a process and schedule for each case individually that might limit such comparative analyses.

Several parties have raised issues relating to studies of the health issues associated with fine particulates ($PM_{2.5}$). The Appellate Division, Second Department held that the NYPA's analysis of potential adverse environmental impacts of certain small gas turbine power projects under the State Environmental Quality Review Act (SEQRA) was not sufficiently detailed as to $PM_{2.5}$ emissions. The court remanded the matter to NYPA with a requirement that NYPA prepare an environmental impact statement on the issue. NYPA moved for leave to appeal to the New York State Court of Appeals, which motion was denied. Article X applicants typically include a $PM_{2.5}$ analysis. Rulemakings to regulate $PM_{2.5}$ by the United States Environmental Protection Agency (U.S. EPA) and DEC will provide further guidance for future Siting Boards.

In addition to Article X certification, construction of proposed generating facilities is subject to other federal and State requirements. Some groups call for more coordination between the Article X review process and the investigations conducted by other State and federal agencies. Applicants could improve coordination by filing applications earlier with the other State and federal agencies and providing regular reports to the Siting Board on the other regulatory review processes. In addition, the State could consider amending Article X to designate as statutory parties other State organizations with responsibilities relating to siting electricity generating facilities.[7] Statutory parties are required to submit expert testimony if they determine that a proposed facility impacts a resource under their jurisdiction.

It is expected that economic incentives in the marketplace will in most cases attract new generation facilities to locate where they will be most beneficial. Consideration might

[6] Two ad hoc members, one a resident of the judicial district and one a resident of the county where the facility is proposed to be located, are appointed to each Board.

[7] The New York State Department of State has been delegated responsibility for coastal zone management, and the Office of Parks, Recreation, and Historic Places has been delegated certain responsibilities with regard to national historic places and parks.

also be given, however, for providing Article X certificates that include conditions and requirements to promote improved energy system reliability and ensure that peak electricity demand requirements are met.

Natural Gas and Electricity Interrelationships

Natural gas is the fuel of choice for new power generation projects (see Electricity Resource Assessment). Plans to build about 15,000 MW of new gas-fired generation capacity have been announced, with about 70% of these to be located in an area extending from Orange and Rockland counties through Long Island. These proposed plants will require very large quantities of natural gas. For example, if electric system demand and capability were to expand greatly and all of the proposed plants were built and operated at full capacity, they would require about 2,500 thousand dekatherms of natural gas per day (MDT/D). To deliver that amount of gas would require about a 40% increase in current delivery capacity to New York State. The natural gas delivery capacity that exists today, however, was built to serve the winter peak needs of core (residential, commercial, and industrial) customers. In essence, it is now operating at maximum capacity during peak periods. It is not clear which and how many of these plants actually will be built or when they will be built. Furthermore, for the plants that are built, it is not clear whether they will operate year-round or perhaps just on a seasonal basis. In addition, the sponsors of some of these proposed plants are seeking permits to burn oil as an alternate fuel and have proposed to install oil storage facilities. Other proposed generators would be natural gas-only plants. These new plants will compete against other generators and may well displace natural gas now used in older, less efficient power plants.

Some project sponsors have signed agreements for capacity on proposed pipeline projects, at least to meet some of their requirements. However, others have not and or plan to rely on wholesale marketers to provide them with natural gas. Some wholesale marketers have contracted for capacity on proposed new pipeline expansion projects, but that capacity would not necessarily be dedicated to particular power plants.

A study has been initiated by the New York State Energy Research and Development Authority (NYSERDA) and the NYISO to better understand power generation natural gas requirements. The study will evaluate power dispatch scenarios with additional levels of generation and fuel supply assumptions. It will also assess power generation sector use of petroleum and thus provide information on fuel diversity and the market infrastructure in this sector. In addition, the study will assess the adequacy of natural gas delivery capacity in light of these requirements and explore contingency issues associated with increased interdependence between gas and electricity. Final results from the study are expected by early summer 2002.

One particular contingency situation bears careful study. Electric generator gas customers that rely on interruptible natural gas may choose, when natural gas is curtailed, to enter the petroleum market for fuel oil or shut down operations entirely.[8] The study will evaluate these circumstances so that appropriate measures can be considered by the State. In the interim, State agencies and authorities should encourage the NYISO to consider the certainty and availability of primary and back-up fuels as factors in the valuation of capacity from electric generators to ensure that the reliability of the electric, natural gas, and petroleum supply and delivery infrastructures are not adversely affected when generator fuel supplies are disrupted.

During the initial phase of the study, simulation modeling of the electricity system was used to quantify the potential demand for gas to generate electricity between the year 2002 and the year 2005 under various scenarios. This change is measured between what the existing generating system would use in the year 2002 and how much gas would be used under several cases for new capacity additions. In the base case, new generation capacity additions are assumed to be limited to approved projects, plus 50% of the capacity of those projects with completed Article X applications, and a generic 600 MW of capacity to represent likely additions on Long Island. In another case, new generation capacity additions are assumed to include all Article X projects that had been approved or had complete applications at the time of the study. These cases provide an indication of the amount of gas required for electricity generation assuming no restrictions on gas availability. Two other cases were also examined: a case in which it was assumed that no new plants would be built; and a case in which gas availability was restricted (achieved by setting gas prices higher than oil prices). All cases were examined for both a summer and a winter peak day.

On a Summer peak day in the study, gas demand increases by 546 MDT/D in the base case between 2002 and 2005. When nearly 3,860 MW more generation capacity is assumed (the more-plants case), however, the increase in gas is actually less than the base case (331 MDT/D). This is because these new, efficient plants displace older, less efficient gas plants and can use the gas that the older plants would otherwise have used.

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[8] This situation can have adverse consequences for gas system reliability if the generators refuse to discontinue use of natural gas; can have adverse consequences for the petroleum market if many such generators enter the market to purchase supplies at the same time (*i.e.*, if they don't have adequate petroleum reserves in dedicated storage); or can have adverse consequences on the electric system if the generator operators choose to reduce output or shut down.

In the case where no new plants are added, the increase in gas use is much less at 153 MDT/D, and when gas availability is restricted, gas use is nearly identical to the base case.

On a winter peak day in the study, gas demand increases by 413 MDT/D in the base case, increases by 585 MDT/D when more generation is added, and is nearly identical to the base case when gas availability is restricted. When no new generation facilities are added, gas demand decreases by 6 MDT/D.

Once the final report is issued, the New York State Energy Planning Board will be better positioned to address this important issue. From the information presented in the Electricity and Natural Gas Assessments, however, it seems clear at this time that the State is moving toward greater dependency on natural gas and additional emphasis must be given to the development and deployment of alternatives to the use of natural gas and petroleum (*e.g.,* demand reduction, renewable energy resources, energy efficiency improvements, clean coal technology).

Federal Competitive Agenda

There are several actions that the U.S. Congress can take to assist New York State in its energy industry restructuring efforts. These include: repeal of the mandatory purchase of power from qualified generating facilities by utilities under the Public Utility Regulatory Policy Act (PURPA); reform of the Public Utility Holding Company Act (PUHCA), which would allow utilities to diversify their operations in ways that could enhance competition; and establishment of national mandatory reliability rules for the bulk power system (while allowing states to continue to set more rigorous standards when it is in the public interest).

FINDINGS AND CONCLUSIONS

- The findings of the 1998 State Energy Plan related to the introduction of competition in the electricity and natural gas industries remain valid today.
- The State must remain vigilant and flexible, and it must resolve issues as they arise, in order for the competitive energy markets in New York State to reach their true potential and for New Yorkers to realize the full benefits of restructuring.
- The State's administrative approach to restructuring its energy industries was premised on input from stakeholders and experts, and designed to provide

flexibility to make adjustments, as necessary, as competitive barriers were revealed and competitive markets developed. This approached has served New York State well.

- The primary barrier to achieving effective wholesale competition in the energy industries is the lack of adequate resources (energy commodity, delivery infrastructure, and demand reduction techniques) where they are needed.

- The Article X Power Plant Siting Process in New York State has benefitted the State and provided protection for its environment.

- The natural gas delivery system, built to serve the winter peak needs of residential, commercial, and industrial customers, is now fully used during peak periods. The competitive electricity generation market is moving toward a greater dependency on natural gas. Such a greater dependency on natural gas suggests a need to expand the natural gas infrastructure; use resources that will reduce our dependency on natural gas, such as greater use of renewable energy resources; implement further electricity demand reduction techniques; continue safe operation of nuclear power plants; and apply clean coal technologies, where viable.

- The U.S. Congress can assist New York by repealing the mandatory purchase of power from qualified generating facilities required of utilities under the PURPA, by reforming the PUHCA to allow utilities to diversify their operations in ways that could enhance competition, and by establishing national mandatory reliability rules for the bulk power system (while allowing states to continue to set more rigorous standards when it is in the public interest).

SECTION 2.2

ENERGY AND ECONOMIC DEVELOPMENT

INTRODUCTION

Policies that promote a secure, competitive, and reasonably priced energy supply will help attract, retain, and expand businesses in New York State. These include policies that support the reduction of energy costs to consumers, the reliability of the State's energy supply and infrastructure, and the development of energy-related industries in New York. In addition, promotion of cost-effective energy efficiency technologies, indigenous and renewable energy resources, and alternative-fueled vehicles stimulates in-State job creation, particularly when these technologies or their components are manufactured in New York.

A secure and reliable energy supply will provide businesses with the confidence necessary to invest in New York State. The increase in business profitability and consumer purchasing power that results from lower energy costs will further stimulate business investment, consumer spending, and employment growth within the State.

ENERGY SUPPLY

With the growth in electricity demand that has occurred over the last five years, adequate and reliable energy supplies are critical to the State's continuing economic prosperity. New York State has added 802,000 private sector jobs since 1995, leading all other Northern industrialized states in the rate of job creation. From 1999 to 2000, the State ranked tenth among all states for private sector job growth. The continuation of this economic growth will depend, in part, on the State securing additional electricity generating capacity, energy resources, and infrastructure.

The State has taken a number of actions to ensure that electricity supply is adequate to meet demand. In the near-term, the New York Independent System Operator (NYISO) has implemented the Emergency Demand Response and Day-Ahead Demand Bidding programs, the New York Power Authority (NYPA) has installed new generators in the metropolitan New York City area, and the New York State Energy Research and Development Authority (NYSERDA) and utilities have implemented new programs to assist businesses in reducing demand and becoming more energy-efficient. In the long-term, the siting of new base load plants will help ensure reliability and support more stable pricing. In addition to new generation resources, the State is promoting greater investment in energy efficiency, indigenous and renewable resources, and distributed generation.

ROLE OF ENERGY PRICES IN BUSINESS LOCATION AND EXPANSION

Geographic variation in energy prices gives businesses some degree of control over the prices they pay, but only to the extent that they are able to easily relocate. As a result, energy prices tend to be important factors in business location and expansion decisions, particularly for energy-intensive businesses. Other considerations of varying importance, depending on the type of business, include availability and reliability of energy supply, taxes, availability of raw materials and other process inputs, access to capital, proximity to transportation systems and markets, availability of a skilled workforce, labor costs, government regulation, and environmental policies.

In a national survey of businesses that primarily included manufacturers, 81% of respondents considered energy cost and availability to be either an important or very important site-selection factor.[1] Given the relative cost of energy in New York, manufacturers in the State regard energy costs as being even more significant than is indicated by the national survey. For most businesses in New York, the cost of energy represents less than 5% of total product cost; however, energy prices can have a substantial impact on profits. In many industries, profit margins are extremely thin, representing less than 5% of gross sales.[2] An energy cost reduction, therefore, can have a substantial effect on a business's profitability. Moreover, facilities in New York compete with other companies within the State and with facilities within the same company located in states with lower operating costs. In some cases, same-company facilities compete for additional capacity and jobs; in other cases, they compete to remain in operation. Corporations routinely favor locations that have the greatest profit potential. Less profitable facilities will, at best, not be expanded. At worst, they will be closed, with a resultant loss of jobs.

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[1] *Area Development, Sites and Facility Planning,* "Corporate Survey," December, 1997.

[2] Glen Weisbrod (Hagler Bailly Consulting, Inc.) and Howard Friedman (DynCorp), *Economic Competitiveness Impacts of Utility Rates and Programs*, April 1, 1996, p.8.

ECONOMIC DEVELOPMENT PROGRAMS

To overcome relatively higher energy costs, various programs, policies, and initiatives have been developed to attract and retain businesses in the State. Both of the State's public power authorities, the Long Island Power Authority (LIPA) and NYPA, have economic development programs to attract and retain businesses in New York. NYPA also administers the Power for Jobs program. NYSERDA offers a variety of programs to encourage business growth, and the State's investor-owned utilities offer flexible rates and fixed discount programs to businesses that meet strict eligibility criteria.

New York Power Authority

NYPA provides low-cost electricity to businesses through programs designed to promote economic development. In 2001, NYPA provided more than 1,500 megawatts (MW) to 990 employers, ranging from heavy manufacturing and financial services to health care facilities and cultural institutions. NYPA's low-cost power supports more than 450,000 jobs Statewide. It operates two major hydroelectric power projects (Niagara and St. Lawrence-FDR), a pumped storage hydro power project (Blenheim-Gilboa), five small hydroelctric plants, two fossil fuel power projects (Poletti and Flynn) and 11 small natural gas-fired turbines. In 2000, these facilities generated 22,710,360 megawatthours (MWh) of electricity. That figure does not include the electricity produced by the FitzPatrick and Indian Point 3 nuclear facilities, which were sold to Entergy in November 2000. The output of the nuclear facilities is purchased by NYPA under a long-term agreement. Besides providing electricity, NYPA provides energy efficiency assistance and other customized services to assist its customers and other public entities to lower energy costs.

NYPA's programs to assist economic growth include two programs using low-cost hydro power from its Niagara Power Project. The Expansion Power program provides 250 MW earmarked under State law for job creation and retention in New York's three westernmost counties. The Replacement Power program provides 445 MW designated by federal law for industries located in the Niagara Mohawk service territory within 30 miles of the Niagara Power Project. Under both programs, the contracts for the power allocations include customer commitments to sustain agreed-upon levels of employment.

NYPA's sales of low-cost power to the State's 51 municipal electric systems and rural cooperatives also benefit many businesses located within these service areas. The Economic Development Power (EDP) program provides for job creation and business revitalization throughout the State. Electricity for this program is supplied by the FitzPatrick Purchased Power and Energy Agreement with Entergy. To receive EDP, companies must commit to maintain a specific level of jobs and, in the case of business retention, invest in real property improvements. The State EDP Allocation Board, created by the State Legislature, evaluates applications and makes recommendations to NYPA's trustees. New York's businesses also benefit from NYPA's Municipal Distribution Agency (MDA) power, another designated portion of the FitzPatrick nuclear power that is sold to downstate local municipal distribution agencies.

The Power for Jobs program was signed into law in July 1997. This program provides low-cost electricity to assist New York State employers at risk of reducing or closing their operations or moving out of State, or who were willing to expand job opportunities in the State. The program authorizes NYPA to allocate 450 additional MW of low-cost electricity to New York businesses that commit to preserve or create jobs, with up to 100 MW set aside for small businesses and not-for-profit corporations. Applications are recommended by the EDP Allocation Board to the NYPA trustees. One-half the electricity provided under the Power for Jobs program is produced at the FitzPatrick Nuclear Power Plant and the remainder is purchased by NYPA under a competitive procurement process. Allocation of the power available under the first three phases of the program was completed by March 28, 2000. In 2000, NYPA was authorized to provide a fourth phase of the Power for Jobs program, making 300 MW available beginning January 1, 2001. Allocation of power available under Phase Four of the program was completed by July 1, 2001.

In October 2001, legislation was signed into law containing an array of measures to address New York State's economic recovery in the wake of the events of September 11, 2001. Among the provisions of the legislation was authorization for NYPA to sell up to 80 MW to assist in the economic recovery of New York City. NYPA had previously provided 80 MW of electricity to the Port Authority of New York and New Jersey for the World Trade Center. The New York City Economic Recovery Power program will provide low-cost electricity to former tenants of the World Trade Center and other businesses located in, or intending to locate in, the Liberty Zone and Resurgence Zone, as designated by the legislation.

New York State Energy Research and Development Authority

NYSERDA is a public benefit corporation created by the State Legislature in 1975. It provides technical and financial assistance for the development and deployment of innovative technologies that improve energy efficiency and reduce energy-related environmental impacts for businesses, municipalities, and residents.

In January 1998, the New York State Public Service Commission (PSC) designated NYSERDA the administrator of the public benefits program. This program, known as **New York Energy $mart**K, supports activities that are not expected to be adequately carried out during the transition to a more competitive electricity market. Activities supported by the public benefits program include energy efficiency deployment, low-income assistance programs, research and development, and environmental monitoring and protection. A total of $174 million was made available to NYSERDA to develop and implement a variety of programs for the initial three-year period from July 1, 1998 to June 30, 2001. In January 2001, the PSC extended and increased the amount of public benefits program funding to approximately $150 million per year through June 2006. The extended programs continue to address market barriers, but will also expand peak load reduction and price-sensitive load initiatives, including non-electric energy efficiency measures to promote fuel-switching, and expand the Statewide coverage of the programs.

NYSERDA’s research, development, and demonstration (RD&D) program focuses on developing high-value-added energy and environmental products, addressing energy-related environmental concerns when there is insufficient private-sector incentive to do so, assisting customers, and providing objective technical analysis. The program has five main areas: Industry, Buildings, Energy Resources, Environment, and Transportation and Power Systems. Funding for this program reaches about $16.5 million per year and funds approximately 150 projects each year with businesses, municipalities, institutions, and universities. Since 1991, NYSERDA’s RD&D program has stimulated new product sales of $200 million for New York companies, created 1,174 permanent jobs, developed 141 new products, processes, or services for commercial use, and leveraged nearly $2 of funding from outside sources for every dollar invested by NYSERDA.

NYSERDA’s energy efficiency deployment program complements its RD&D program by aiding in the commercialization of new technologies and encouraging their use. The program targets five areas: small business, institutions and government, residential, low-income, and vehicle fleets. It focuses on stimulating markets and promoting competition for energy-efficient and environmentally clean products, removing barriers to market adoption of proven technologies and practices, and building manufacturing and sales infrastructure to make energy-efficiency products available to customers. Value-added services and technical economic assistance are provided to help small customers stay competitive. Since 1991, NYSERDA's programs have saved $277 million in energy and other costs for New York's businesses, municipalities, and institutions.

NYSERDA’s newly created Economic Development Program strives to improve the State’s business climate through strategic partnerships and product development. The

Economic Development Program provides assistance to companies concerned with energy and environmental efficiency, innovative product development, and product commercialization to help these companies create, enhance, and retain jobs. Using both internal and external sources of funding to enhance its efforts, NYSERDA works to forge strategic partnerships with a variety of organizations (both public and private) to be able to provide expertise in marketing, financing, and business development to its constituents. The types of assistance pursued by NYSERDA include federal and State grants, loans, bond financing, venture capital, and technical services.

In August 2001, NYSERDA announced the creation of the Saratoga Energy Technology Park, specifically devoted to promoting the development of new, clean energy technologies. NYSERDA, working jointly with the University at Albany and the Saratoga Economic Development Corporation (SEDC), hopes to attract between 1,000 and 1,500 jobs to the Capital Region when emerging, environmentally-friendly energy companies take advantage of the park's resources.

NYSERDA is forging other partnerships with many public and private organizations to work on the following projects:

1. Promotion of NYSERDA's core programs to support the State's revitalization efforts in the Niagara Falls area has led to the investment of $4 million in various energy and environmental programs and projects.

2. Working to establish partnerships with local businesses, government, and developers to build wind farms in Western New York. A 30-megawatt wind farm power project is being developed in the Town of Fenner.

3. Examining the potential development of Power Quality Parks. Such parks, if developed, will feature industrial sites with reliable power sources to help attract new businesses.

4. Working with the Rensselaer Polytechnic Institute (RPI) and its Venture B Series Program to find venture capital for businesses. NYSERDA is also a member of the Tech Valley Angel Network (TVAN) as a partner in this program. NYSERDA serves as a link between entrepreneurs and investors in northeastern New York to facilitate access to venture capital.

Department of Public Service

Staff of the Department of Public Service (DPS) assist businesses in learning about economic development programs, resolving disputes between businesses and utilities about economic development issues, working with State and local government in retaining, attracting and expanding businesses, and participating in the Power For Jobs program.

DPS staff have participated with parties in several recent utility restructuring, rate, and merger proceedings to improve the utilities' ability to assist in economic development. For example, as a result of the PSC's decision in a recent Central Hudson Gas & Electric Corporation case, a collaborative effort among the utility, DPS, Empire State Development, State and local governments, and other interested parties has been initiated to design new, more effective economic development programs, including electricity discounts, suited to the needs of the utility's customers.

The PSC's electricity cost and pricing policies are changing to reflect the restructuring of investor-owned utilities, the transition to competitive markets, and the need for more service unbundling. These policies are pointing in the long-term to separating the delivery function from commodity sales. Such policies will be especially beneficial to businesses by reducing delivery costs of electricity, and facilitating the ability of businesses to shop for electricity. During the transition to competitive markets, there is a continuing need to maintain economic development incentives and discounts that will ensure that the State will have the ability to retain, expand, and attract businesses.

Utility Flexible Rates and Fixed Discount Programs

Since 1983, New York State's electric and gas utilities have encouraged economic growth by filing tariffs with the PSC that provide discounted rates to qualified commercial and industrial customers, including incentive rates for businesses that are certified as eligible for Economic Development Zone (Empire Zones) benefits pursuant to State law. Utilities have designed economic development programs to suit the needs of their particular regions by offering varying terms and levels of discounts from the standard tariff rates. Among other things, such programs include: *Flexible Rates*, designed to allow individually negotiated contracts with customers who have competitive energy alternatives to standard utility service; *Business Incentive Rates*, designed to bring in new businesses or expand existing commercial or industrial load in a utility's service territory; *Economic Revitalization* rate programs, designed to retain customers by helping them regain economic competitiveness; and *Economic Development (Empire Zone) Rates*, designed to attract businesses to locate in specially designated areas.

The Empire Zones Program was developed to encourage economic development, with a mission to assist in the revitalization of economically distressed geographic regions within New York characterized by "persistent and pervasive poverty, high unemployment, limited new job creation, a dependence on public assistance income, dilapidated and abandoned industrial and commercial facilities, and shrinking tax base." Currently, there are 59 Empire Zones in New York. Among the incentives applicable to businesses locating within these zones are capital investment credits, wage tax credits, sales and local tax relief, and low cost power contractual agreements with utilities, usually with ten-year terms. Since the start of the program, over 125,000 New Yorkers have been employed at more than 2,600 certified businesses, attracting over $3.7 billion in private investment.

The discount programs offered by utilities are designed to encourage business retention and expansion, as well as to encourage new businesses to expand or locate in economically depressed areas, while preventing rate increases for remaining customers that might otherwise be necessary if the participating customers were to leave the utility system. Utility economic development programs provide an estimated $85 million in discounts annually. In today's newly competitive era, however, the issue of how to appropriately fund such electricity discounts needs consideration.

Energy Programs and Policies to Promote Economic Development

Between 1985 and 1994, the State lost more than 342,634 (or nearly 26%) of its manufacturing jobs.[3] The State, however, has been able to add more than 802,000 private sector jobs since 1995. These data highlight the importance of job growth and retention in the State's industries that drive economic activity, including manufacturing and other higher-wage industries that export services from the State. Industries that drive economic activity, typically large, higher-wage industrial and commercial firms, support a variety of other industries that provide intermediate inputs to production of goods and services, as well as numerous service industries and retail establishments. The State has taken a

[3] NYS Department of Labor Employment Review, December 1996, p. 7.

number of steps to attract business, including reducing State taxes, providing incentives to municipalities to lower local taxes, reducing workers' compensation costs, and modifying or removing regulations that hinder business productivity and economic growth.

The cost of energy, however, remains an obstacle to overcome in New York's efforts to retain, expand, and attract businesses. New York's success in working with businesses that could relocate to other states frequently depends on the availability of discounted, low-cost energy and incentives offered through various State and local government and utility-sponsored programs. Even though a competitive electricity market is expected to result in lower prices, New York's energy prices may remain somewhat higher than those of most other states in the short-term. Therefore, effective energy-related economic development programs for businesses will continue to be necessary to help preserve and expand the State's economic base.

ECONOMIC DEVELOPMENT POTENTIAL OF REDUCING ENERGY COSTS

Reducing energy costs will make the State's businesses and industries more competitive with other states and regions of the country. In addition, lower energy costs will position New York to attract new businesses and retain and expand existing businesses. Moreover, lower energy costs will increase business profitability and consumer purchasing power, which, in turn, will stimulate business investment and consumer spending and contribute to continued job growth.

An economic analysis, using the REMI Statewide economic model, demonstrates the importance of energy cost reductions as a means to stimulate economic growth.[4] Important indicators of economic development potential include: *gross output*, or total sales value of goods and services produced, which is an indicator of total economic activity in the State; *personal income,* which measures the aggregate wages, salaries, and proprietors' income earned by in-State workers; and *employment*, which is the number of in-State jobs. The analysis reflects the expected effects on economic activity of increased business profits and consumer spending that result from lower energy costs. The analysis

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[4] The REMI Economic and Demographic Forecasting Model, developed by Regional Economic Models, Inc. of Amherst, MA., is a 53-sector dynamic structural model of the New York State economy that is linked to a U.S. economic model. The model simulates inter-industry transactions and trading flows into and out of the State, based on the costs of doing business. The relative cost of doing business is built up for each industry based on wages, costs of intermediate inputs, fuel costs, and taxes.

estimates that a permanent energy price reduction of $100 million per year would stimulate, over a ten-year period, the development of approximately 1,600 jobs in New York, increase the State’s gross output of goods and services by about $119 million, and increase personal income by about $105 million. Incremental output of goods and services, personal income, and jobs created as a result of lower energy prices would generally be sustained over time because the incremental business profits and consumer purchasing power would be available in each subsequent year, resulting in a continued higher level of business investment and consumer spending.

EMPLOYMENT IMPACTS OF ENERGY EFFICIENCY IMPROVEMENTS

While the State is the fourth largest energy user among all states, only an estimated 11% of New York's total end-use energy requirements are met from indigenous resources, of which 55% is hydroelectric power and 41% is from bio-fuels. In 2000, New Yorkers spent $38 billion on energy, consisting of $15.7 billion for electricity, $5.9 billion for natural gas, $16.3 billion for petroleum products, and $0.1 billion for coal. Petroleum products include distillate and residual fuel oil, motor gasoline, aviation fuels, kerosene, and propane.

Because the State imports most of its primary energy supplies from other states and foreign sources, a large portion of the $38 billion annual energy expenditure flows out of the State to pay for imported energy. While imported energy supplies contribute to some economic activity within the State, investment in cost-effective energy efficiency reduces economic leakage, as more dollars are retained in the State, thereby increasing discretionary income. In addition to the jobs created by in-State spending of energy savings, jobs are created by the purchase and installation of new equipment, to the extent that the equipment or its components are manufactured in New York, purchased from in-State suppliers, and installed by in-State labor. The precise number of jobs created is site- and industry-specific and is sensitive to business and consumer spending patterns, payback periods, and useful life-spans of the technologies installed.

NEW YORK’S ENERGY PRICES COMPARED TO U.S. AVERAGES

This section compares New York's retail energy prices to U.S. averages. The energy prices analyzed include electricity, natural gas, heating oil, gasoline, and diesel fuel. Figure 1 compares New York’s end-use energy prices for selected fuels to U.S. average prices for comparable fuels in 2000. New York's retail energy prices are generally higher than national average prices for comparable fuels and customer sectors. Figure 2 shows, for each fuel, the rate of change in price from 1996 to 2000 for New York compared to the U.S.

Figure 1

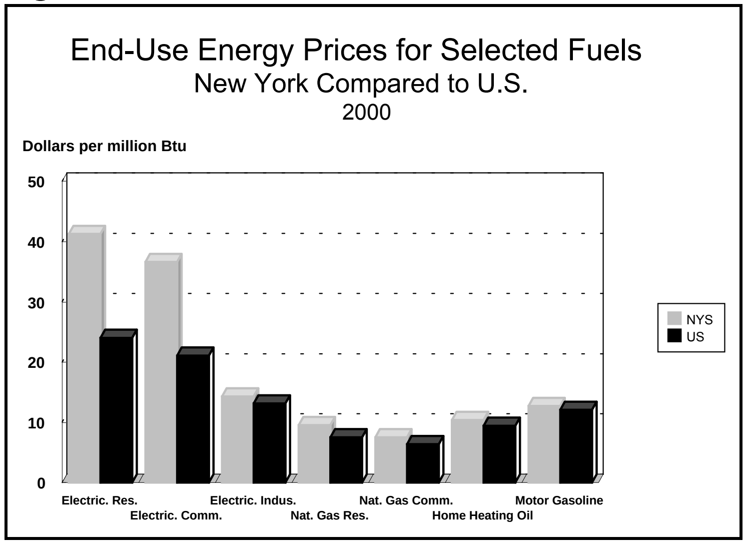
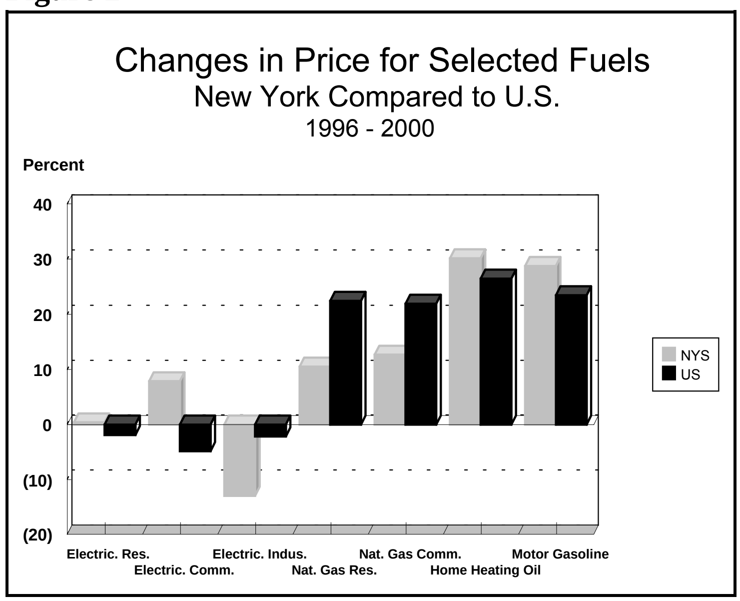


Figure 2



Since 1996, improvements in the price differential between New York and U.S. prices have been observed for industrial electricity, residential natural gas, and commercial natural gas. In contrast, the differentials between New York and U.S. prices in 2000 were somewhat greater than in 1996 for residential electricity, commercial electricity, home heating oil, and motor gasoline. It should be recognized that use of year 2000 prices for comparative purposes presents an incomplete picture of energy prices because of the unusual short-term run-up in natural gas prices that year, which have since returned to lower levels. Year 2000 prices, however, are the most recent available and are used in the comparisons that follow.

NEW YORK’S ENERGY PRICES COMPARED TO SELECTED STATES

This section compares New York's retail energy prices to prices paid in other states that compete with New York in attracting business. To the extent possible, the analysis includes component analyses of retail energy prices for the eleven states studied. These states include two New England states (Massachusetts and Connecticut), two Mid-Atlantic states (Pennsylvania and New Jersey), one Midwestern state (Ohio), three Southeastern states (North Carolina, South Carolina, and Florida), and one South Central state (Texas). Two West Coast states (California and Washington) are also included to present a wider perspective.

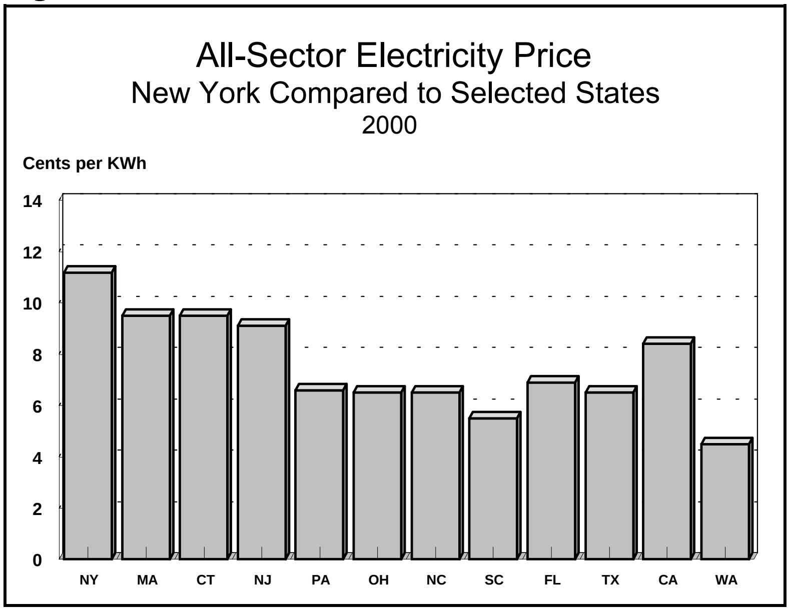
This analysis of the various fuel types considers property taxes and State and federal income taxes, where applicable, as components of distribution costs. Data are not available to estimate the specific amounts of these types of taxes for electricity, natural gas, and petroleum products. As a result, the tax components shown for these fuels reflect only taxes that are easily isolated and are specifically added to the retail price of fuel, such as the Gross Receipts Tax, franchise tax, Petroleum Business Tax, excise tax, and state sales tax. Local sales tax is not included due to the variability between states and localities within states.

New York State has historically taxed energy products and services to a greater degree than other states. In an effort to reduce energy costs, the State has initiated the phase-out of the Gross Receipts Tax (GRT) on energy and telecommunication utilities, as well as the sales tax on transmission and delivery of electricity and natural gas for industrial and commercial consumers. When fully effective on January 1, 2005, elimination of the GRT is expected to save approximately $330 million per year, and it is anticipated that the sales tax phase-out will save approximately $150 million per year when fully effective on January 1, 2004. Phase-out of the GRT, collected by utilities but paid by both businesses and consumers, was initiated in 1998 and will continue in stages, ultimately resulting in total elimination by 2004. Also, the Petroleum Business Tax (PBT), a business tax surcharge, will be reduced on oil used by commercial and industrial customers by up to eight cents per gallon. The PBT was, in essence, a “tax on a tax” that added approximately 15% to the amount of GRT collected from all customers. Effective in 1997, the net PBT on commercial heating and railroad fuel was reduced, and the manufacturing fuel oil PBT was eliminated. Also, the net PBT on diesel fuel was reduced.

Electricity

Figure 3 compares New York’s average electricity price in 2000 with the average electricity prices in eleven other states. With the advent of restructuring, data to perform a complete analysis of the various components of electric prices are no longer available. This is because certain market participants are no longer required to file data with the Federal Energy Regulatory Commission. Nevertheless, the primary factors that contribute to New York's high electricity prices relative to other states are well known. As documented in the 1998 State Energy Plan, these factors include: higher State and local taxes on electricity and on equipment and property used to generate, transmit, and distribute electricity; the cost of power purchased by utilities under contract (as mandated by State and federal laws); the costs associated with two large nuclear projects; and the higher costs, in wages and operations and maintenance, of doing business in New York.

Figure 3



The State has taken steps to address each of these factors:

- In addition to the State tax reform initiatives described earlier, the new owners of divested utility generating plants have in many cases negotiated reductions in local property taxes. These lower tax levels can be expected to be passed along to customers in the form of lower wholesale prices, as generators lower the prices charged for their output.

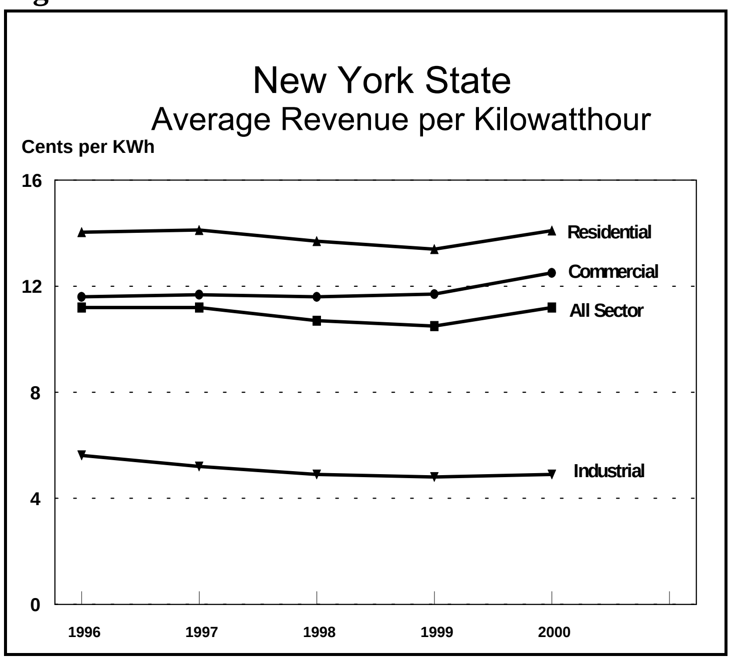
- Since the repeal in 1992 of the mandatory minimum six-cent per kilowatt-hour purchase price for power produced by cogenerators and other qualifying facilities, utilities have generally lowered the costs for purchased power to market-based levels. In addition, some utilities have been successful in renegotiating long-term power purchase contracts to obtain a lower price. Still, the legacy of the six-cent law and contract prices based on administratively-determined long-run avoided costs continue to be a major cost driver in New York's electricity prices.

- The State has been more successful in reducing the costs associated with the Shoreham and Nine Mile Point Two nuclear plants. LIPA, as part of the takeover of the electric system on Long Island, refinanced the debt associated with Shoreham, decreasing rates significantly on Long Island. More recently, nearly all of the remaining debt associated with the Nine Mile plant has been eliminated in the process of the sale of that plant to an independent firm, Constellation Energy.

- Finally, after more than a decade of price caps and other incentive plans to reduce rates, utilities have significantly reduced wage and operation and maintenance costs.

As shown in Figure 4, New York's Statewide electricity price (average revenue across all sectors) fell 6.3% from 1996 to 1999, a direct result of the above-described efforts and rate restructuring orders issued by the PSC. Despite the reduction in rates for the portion of utility services that remain regulated after restructuring, the dramatic increase in natural gas prices starting in the second quarter of 2000, and persisting into the second quarter of 2001, had the effect of increasing retail electricity prices, particularly downstate, during that time period.[5] In particular, customers of Consolidated Edison and Orange and Rockland endured steep increases in the price for power, associated with natural gas-fired generation setting the wholesale market clearing price for power. Because these utilities purchase much of their power directly in short-term markets, and pass fuel and purchased power costs through to customers every month, bills

Figure 4



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[5] In a study presented to the New York ISO, the ISO's market advisor concluded that the increase in natural gas and oil prices and the sustained outage of the Indian Point 2 nuclear plant in Buchanan were the primary factors in the run-up in wholesale electricity prices in 2000 (New York Market Advisor Annual Report on the New York Electric Markets for Calendar Year 2000).

for electric service from these utilities increased by about 16% in 2000. Although most of the other utilities in the State had capped rates in 2000, the increase in downstate bills was enough to cause Statewide average retail prices to increase approximately 6%, temporarily reversing the gains of the previous three years.

Utilities in the other states used for comparison either are less dependent on natural gas and oil for electricity generation, or had to wait for the outcome of regulatory proceedings before passing through increased power costs to their customers. Therefore, the gap between New York electric prices and the other states compared widened in 2000.[6]

Since the second quarter of 2001, natural gas prices have dropped to previous levels. Electric prices have also declined, and the most recent bills for Consolidated Edison and Orange and Rockland customers have moderated significantly from 2000 levels.[7] In addition, in 2001, the PSC significantly lowered distribution rates for customers of Consolidated Edison, Rochester Gas & Electric, and Central Hudson Gas and Electric. Niagara Mohawk's distribution rates were reduced 8% (largely offsetting earlier approved increases in commodity prices) with the approval of its merger with National Grid, and many parties are supporting even greater reductions in New York State Electric and Gas' distribution rates. The trend in lower distribution rates, with decreasing, but perhaps volatile, commodity prices, is expected to continue in the future (see the Electricity Resource Assessment).

Residential Natural Gas

New York's average natural gas price, after taxes, for residential customers in 2000 was $10.51, lower than Connecticut and Florida but higher than the other states studied, as shown in Figure 5. The wellhead price component for natural gas is identical for all states because this price is determined by North American market conditions rather than by actual production costs.

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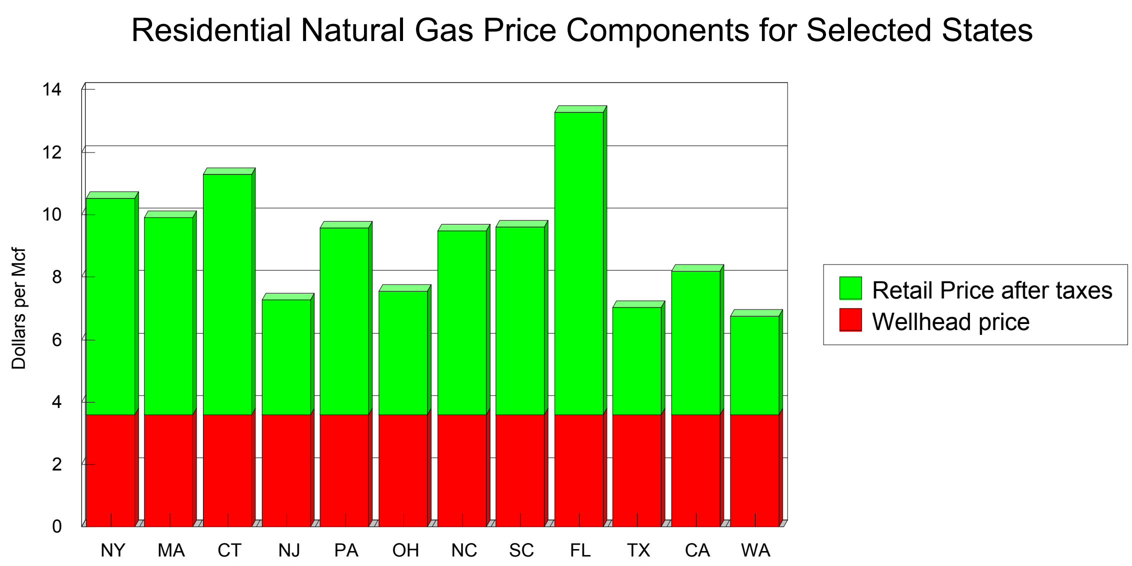
[6] A comparison of New York's average price in the first seven months of 2001 to that of MA, PA, FL, TX and CA shows the difference in prices to be much reduced from what it was in 2000, as utilities in these other states gained approval to increase retail rates in response to increased power costs.

[7] For example, the October 2001 bill for the typical Consolidated Edison residential customer was $50.87 or 17.0 cents per kWh, compared to $56.88 or 19.0 cents per kWh in October 2000.

The largest price component is "processing, transportation, and distribution." *Processing* refers to any cleaning or liquid removal that occurs after the natural gas is removed from

Figure 5



Source: Based on 2000 average annual prices; Natural Gas Monthly 7/01 issue; prices include state taxes (e.g., gross receipts tax); exclude state and local sales taxes

the wellhead. *Transportation* refers to moving the natural gas from the wellhead to the entry point of the local distribution carrier's network. *Distribution* refers to moving the natural gas through the local distribution carrier's network and delivering the product to end-users. Besides the direct costs of installing, maintaining, and repairing the natural gas distribution system itself (*e.g.*, materials, wages, workers' compensation premiums, etc.), distribution costs include, for example, local property taxes, income taxes, and return on equity.

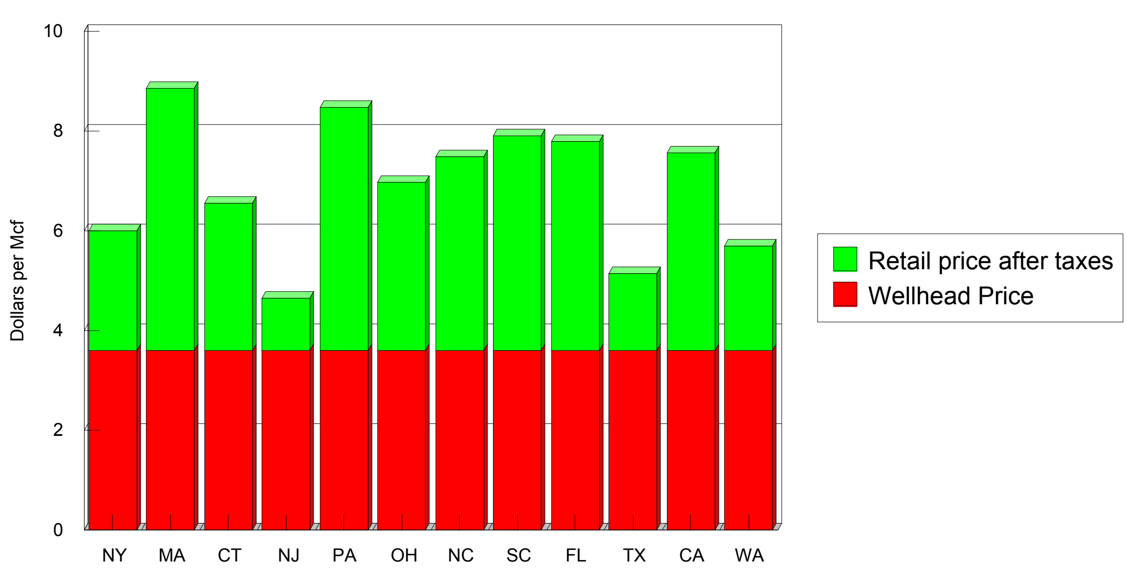
Many other states assess taxes on residential natural gas sales that are comparable to New York's. While New York does not collect general sales tax on residential natural gas sales, the residential retail price does include a GRT of 2.5%, equivalent to about 21 cents per thousand cubic feet (Mcf). Tax legislation enacted in 1997 reduced the GRT on residential natural gas from 3.5% to 2.5%. This tax will be completely phased-out by January 1, 2005, and is expected to improve New York's price position relative to other states.

New York's average price for residential natural gas is higher than the average price of the other states studied, primarily due to the processing, transportation, and distribution components of the price. Distribution costs, which comprise the major portion of this component, are higher in New York than in most other states. This is largely due to the higher costs of installing, maintaining, and repairing natural gas distribution facilities in the densely populated New York City metropolitan region. For example, the low-cost trenching techniques used for most natural gas systems cannot be used in New York City. Distribution costs in the downstate region are further increased by programs to replace aging cast iron natural gas pipes. New York's higher natural gas price compared to states to its south and west is also partially due to the State's location near the end of the interstate pipeline distribution system.

Commercial Natural Gas

The relationship of New York's average commercial natural gas price to those of other states studied is similar in most respects to that of the residential natural gas price, as shown in Figure 6. In 2000, New York's average price was $6.00 per Mcf which is lower

Figure 6

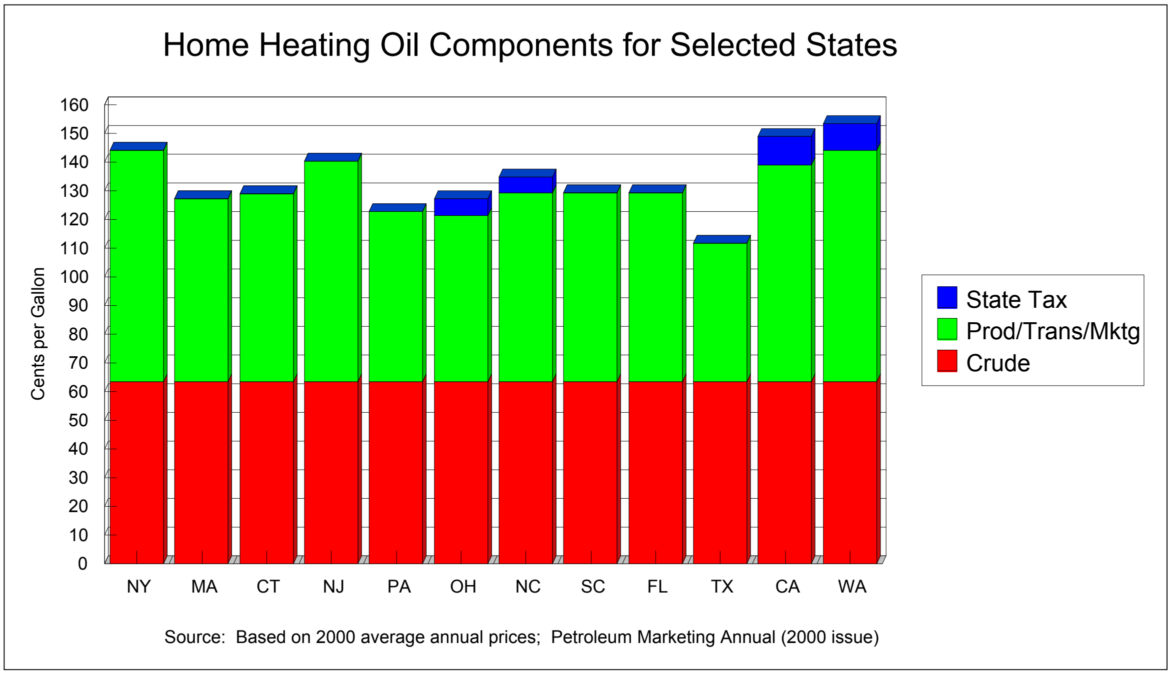


Source: Based on 2000 average annual prices; Natural Gas Monthly 7/01 issue; prices include state taxes (e.g., gross receipts tax); exclude state and local sales taxes than in eight of the eleven states studied. Only Texas, Washington, and New Jersey had lower prices. Many other states assess taxes on commercial natural gas sales that are comparable to New York's. New York's retail commercial gas price includes a GRT of 2.5% (about 15 cents per Mcf), as well as State sales tax of 4% (about 24 cents per Mcf). As with residential natural gas sales, the differences in average prices from state to state are largely due to variation in distribution costs.

Home Heating Oil

New York's average price for home heating oil in 2000 was $1.44 per gallon, which was three to 32 cents higher than the average price in most of the other states studied. Home heating oil prices have increased in all states for which data is available. The two West Coast states had average prices higher than New York, as shown in Figure 7. Of the states studied, California, North Carolina, Ohio, and Washington tax the use of home heating oil; New York State does not. New York's higher-than-the-national-average home heating oil price is largely a result of higher costs of doing business, particularly downstate, which include higher local property taxes, wages, workers' compensation premiums, and State income taxes.

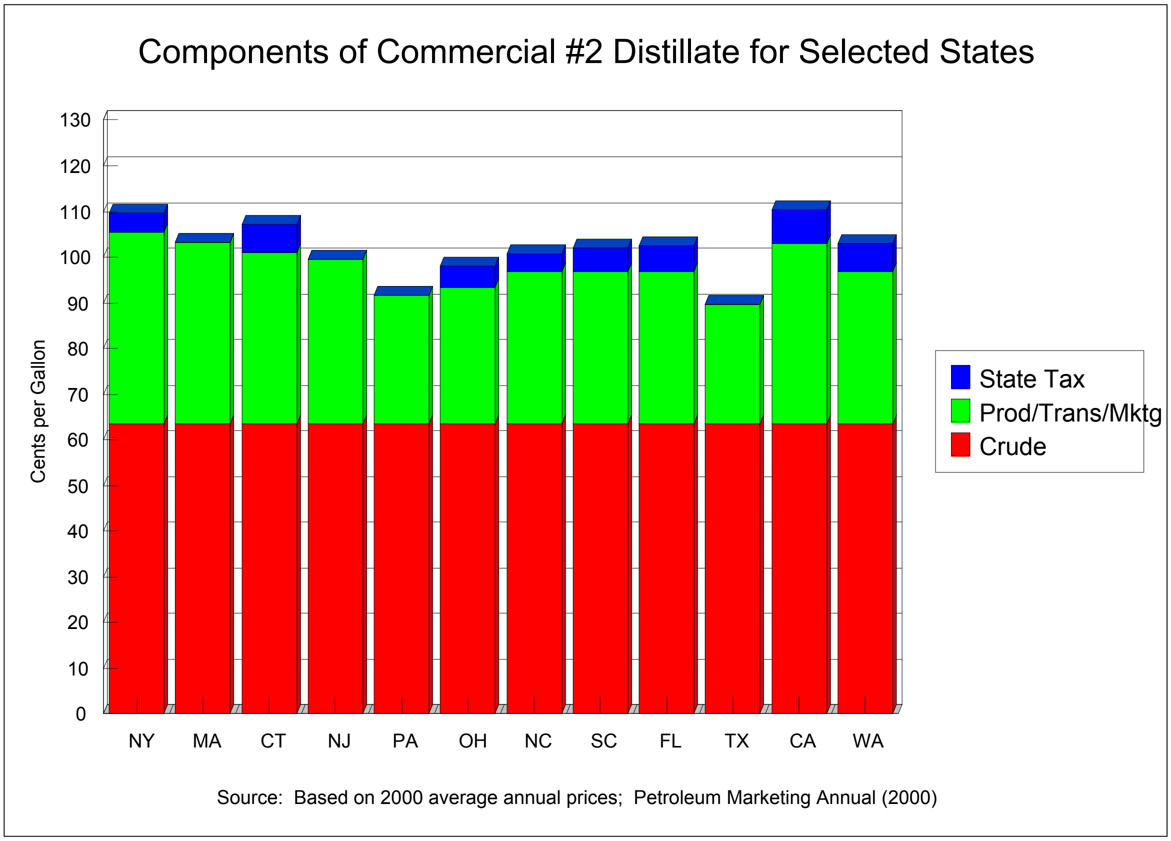
Figure 7



Commercial Distillate Oil

New York's 2000 average distillate oil retail price for commercial customers was $1.10 per gallon, which was two to 22% higher than the average price in each of the other states studied, except California, as shown in Figure 8. The states with average prices closest to New York's were California, which was virtually equal, and Connecticut, which was three cents per gallon lower. Most of the studied states' average prices were two to 22 cents per gallon lower than New York's. Many of the states studied, like New York, collect some sales tax on commercial distillate oil, but no other state collects a Petroleum Business Tax (PBT) or other oil tax comparable to New York's. The PBT increases New York's average commercial distillate oil price by approximately 7.3 cents per gallon.

Figure 8

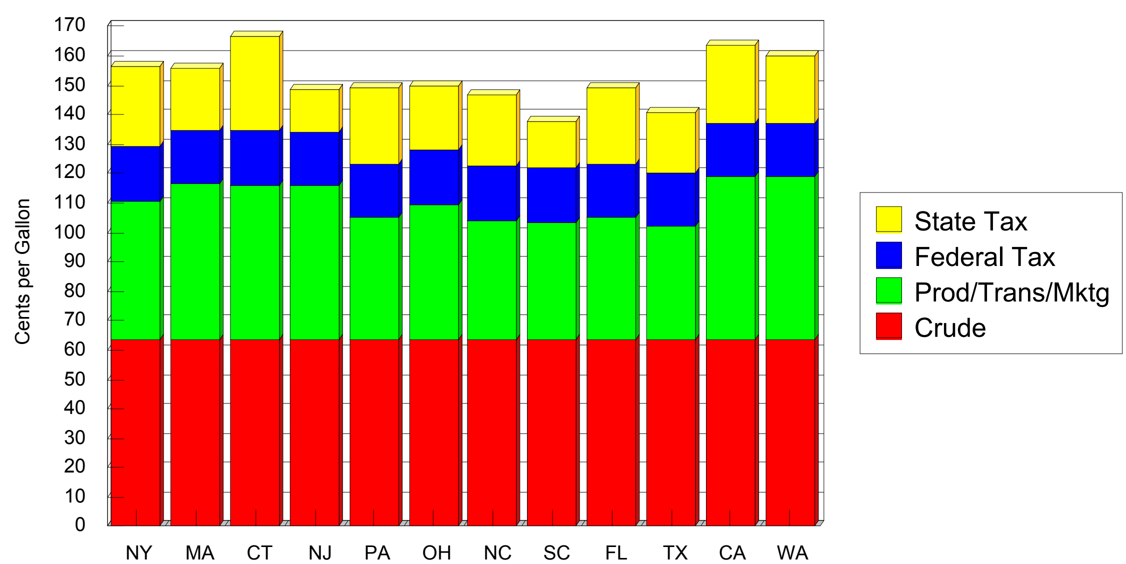


Gasoline

New York's 2000 average gasoline price for all grades of gasoline was $1.56 per gallon (excluding local sales taxes), as shown in Figure 9. This price was higher than that in seven of the states studied, but it was lower than Connecticut, California, and Washington. Connecticut's average price was 10 cents per gallon higher than New York's, due primarily to higher state taxes. Washington's average price was higher than New York's, due primarily to the longer transport distance to retail outlets. Average gasoline prices in New Jersey and South Carolina were lower than in New York as a result of lower state taxes. Average gasoline prices in the remaining states studied were between six and 18 cents per gallon less than in New York.

Gasoline prices vary from state to state largely as a result of differences in state tax policies and regional differences in costs of doing business. Refiner acquisition costs of crude oil are identical for all states because crude oil commodity prices are determined by world markets. Similarly, the federal gasoline tax of 18.4 cents per gallon is the same for all states. Most of the states studied, with the exception of Connecticut, New Jersey, and

Figure 9



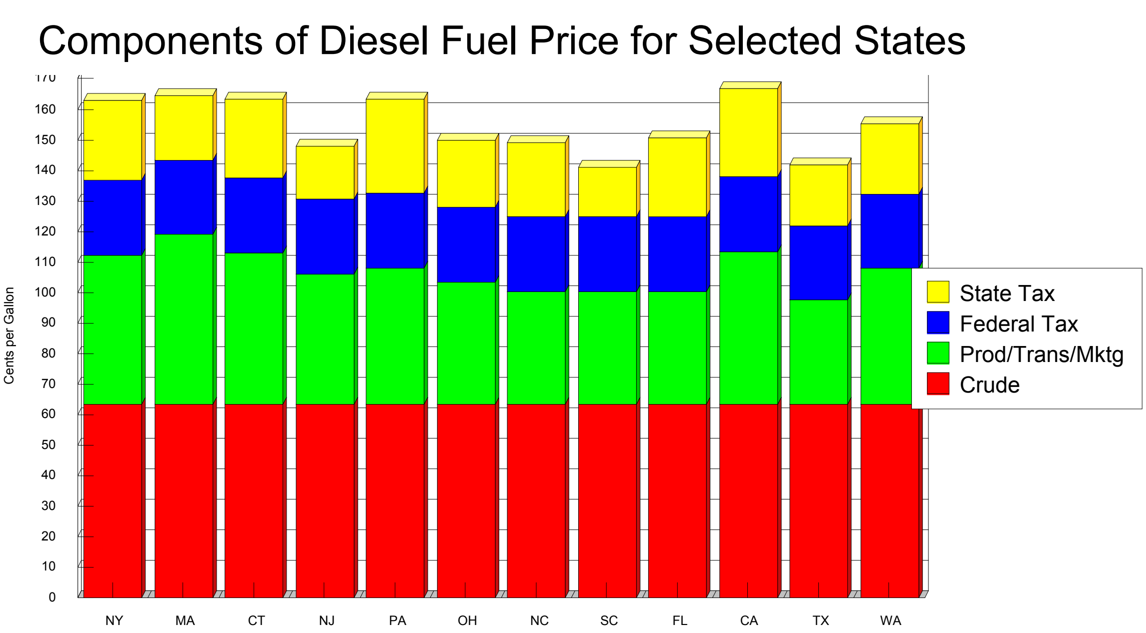
Source: Based on 2000 average annual prices; Weighted average of all grades; Petroleum Marketing Annual (2000).
State tax component includes state sales tax; local sales tax not included.

South Carolina, impose a combination of excise or other taxes on gasoline. The combined effect of these taxes on retail price is comparable to that of New York's excise tax and PBT. For example, New York's excise tax and PBT are 22 cents per gallon; similar state taxes in Massachusetts, Pennsylvania, and Ohio are 21, 26, and 22 cents, respectively. New York's average price appears to be higher than those of the other states studied largely due to the fact that it collects general State sales tax on gasoline. Of the study group states, New York and California are the only states to assess a sales tax on gasoline.

Diesel Fuel

As shown in Figure 10, New York's 2000 average price for diesel fuel was $1.63 per gallon (excluding local sales tax). This price was higher than that in many of the other states studied. New York's average price appears to be higher largely because it collects general State sales tax on diesel fuel. States with the lowest diesel fuel prices are New Jersey, South Carolina, and Texas, which have relatively low state taxes as well as low refining, transportation, and distribution costs.

Figure 10



Source: Based on 2000 average annual prices; Petroleum Marketing Annual (2000) includes state sales tax; local sales tax not included.

FINDINGS AND CONCLUSIONS

- Businesses need secure and reliable energy supplies that are reasonably priced to expand operations and grow in the State. Policies promoting greater energy supply certainty will lead to greater private sector investment in New York State.

- Low-cost power programs have been successful to date in retaining and expanding employment opportunities in the State. The development of joint State and utility economic development programs has been successful in supporting economic development.

- Power for Jobs has been successful and consideration should be given to authorizing an additional phase or to development of a new, yet similar program.

- Offering electricity discounts as a means of retaining or attracting jobs is an important economic development tool.

- Efforts should continue to be made to forge State and private business partnerships to grow New York's economy in an environmentally-sound manner.

- Energy prices need to be brought more in-line with other states to compete more effectively for economic opportunities.

SECTION 2.3

ENERGY AND THE ENVIRONMENT

INTRODUCTION

The technologies we employ to generate, distribute, and use energy all have clear impacts on the environment. This issue report examines recent trends in air and water quality, and summarizes some of the programs created to identify and mitigate the impacts energy generation and use have on the environment. Some of these programs address environmental impacts from cars, trucks, and other mobile sources, while others are aimed at reducing air emissions from stationary sources such as power plants and factories. The report will also examine the impacts of energy generation on water quality and aquatic life. Finally, this issue report will discuss new efforts to understand how environmental impacts from energy use affect different social-economic groups in the State.

TRENDS IN NEW YORK STATE AIR QUALITY

The 1990 amendments to the federal Clean Air Act requires states to monitor ambient levels of six pollutants in the atmosphere. These contaminants, called "criteria pollutants," include lead, sulfur dioxide, nitrogen dioxide, carbon monoxide, and particulate matter measuring less than 10 microns in diameter (PM_{10}).

The New York State Department of Environmental Conservation (DEC) operates an extensive network of air quality monitors designed to provide accurate information about ambient air quality in New York State. This network, which is designed, sited, and maintained to meet strict federal guidelines, provides the data necessary to determine whether air quality in the State meets the National Ambient Air Quality Standard (NAAQS) for the six criteria pollutants. The allowable concentrations for each of these pollutants is established by the U.S. Environmental Protection Agency (USEPA) as required by the federal Clean Air Act. The criteria pollutants are regulated because health experts and scientists have identified them as posing a large threat to public health and the environment. In addition to these federal requirements, New York State also monitors ambient concentrations of 39 toxic volatile organic compounds (VOCs). In addition to being toxic to humans, many of these VOCs are also precursors to ground-level ozone (smog), and measuring for them can often provide data as to the source of the pollution.

For the purposes of air quality compliance monitoring, the State is divided into two main regions: the downstate region, consisting of New York City, Long Island, and Westchester, Rockland Putnam and lower Orange Counties; and the upstate region, consisting of the remainder of the state. All regions of New York have attained the NAAQS for lead, sulfur dioxide, and nitrogen oxide. Portions of New York State have been found to be in non-compliance with the standards for carbon monoxide, ozone, and PM_{10}, although USEPA recently announced that the entire state is now in compliance with the standard for carbon monoxide.

The following is a description of the NAAQS for each of the five criteria pollutants, and number of days from 1996 to 2000 that the standard was violated for each of the two regions. Air quality data for 2001 is available on DEC's website at www.dec.state.ny.us.

1. Carbon Monoxide. NAAQS - 1 hour: 35 ppm; 8 hour: 9 ppm. Upstate - no violations during time period. Downstate - no violations during time period.

2. Lead. NAAQS - quarterly average: 1.5 µg/m3. Upstate - no violations during time period. Downstate - no violations during time period.

3. Nitrogen Dioxide. NAAQS - annual average: 0.05 ppm. Upstate - no violations during time period. Downstate - no violations during time period.

4. PM_{10}. NAAQS - 24 hours: 150 µg/m^3; annual average 50 µg/m^3. Upstate - no violations during time period. Downstate - no violations during time period.

5. Sulfur Dioxide. NAAQS - 3 hour: 0.5 ppm; 24 hour: 0.14 ppm. Upstate - no violations during time period. Downstate - no violations during time period.

USEPA proposed a new NAAQS for particulate matter measuring less than 2.5 microns in diameter ($PM_{2.5}$) in 2000. Since that time, an industry organization has challenged USEPA's statutory authority to create the new standard, and a federal court asked for more information supporting the new NAAQS. Federal law requires that three years worth of monitoring data be collected before a given region can be designated as being in compliance or non-compliance with a NAAQS. Since monitoring has not been completed for three years, no region of the State has yet been designated as being in violation of the standard for annual averages. The NAAQS for $PM_{2.5}$ is as follows: 24 hours - 65 µg/m^3; annual (average over 3 years) - 15 µ g/m^3. Data collected to date in New York is as follows: Upstate - no values > 65 µg/m^3 ; one site > 15 µg/m^3 annual average in 2000. Downstate - One value > 65 µg/m^3; seven sites > 15 µg/m^3 annual average in 2000.

In addition to the existing NAAQS for ozone, which measures concentrations of the pollutant over a one hour period, USEPA recently proposed a new eight-hour ozone standard. Scientists felt that the eight-hour standard would provide better information about long-term exposure to the contaminant. As with the new standard for $PM_{2.5}$, the new ozone NAAQS was challenged by an industry organization and remanded by a federal court back to USEPA for additional supporting information. DEC has nevertheless installed the equipment needed to monitor both the one-hour and eight-hour ozone standards. The NAAQS for ozone is as follows: 1 hour - 0.12 ppm; 8 hour - 0.08 ppm (average of fourth highest daily value for past three years). Table 1 indicates the number of days ozone levels exceeded the standard.

Table 1. Ozone Level Exceedance in New York (Number of Days)

	Downstate		Upstate	
Date	**8 Hour**	**1 Hour**	**8 Hour**	**1 Hour**
1996	15	3	14	2
1997	25	9	15	0
1998	19	3	28	0
1999	27	9	28	5
2000	11	1	9	0
2001 (1/1/-8-13)	13	4	23	3

RECENT AIR QUALITY IMPROVEMENT PROGRAMS

New York State has established itself as a national leader in the development and implementation of programs to reduce air pollutant emissions into the atmosphere. These include a number of approaches to reducing air pollution, including emissions testing for light and heavy duty vehicles, adoption of the California Low Emission Vehicle standards for new cars and trucks, clean fuels, and advanced technologies to reduce soot emissions from trucks. The state has implemented a number of control strategies for stationary sources like power plants and factories to reduce acid rain and ground-level smog. In addition, strategies to reduce emissions of greenhouse gases are being developed by the Governor's Greenhouse Gas Task Force.

California Low Emission Vehicle Program

Although many people often identify air pollution as coming from factories and power plants, automobiles and other motor vehicles are a significant part of the inventory. In the greater New York City area, these mobile sources account for about half of the emissions of volatile organic compounds and nitrogen oxides, and virtually all of the carbon monoxide emitted into the air.

In recognition of the large contribution of mobile sources to air pollution, the 1970 federal Clean Air Act authorized the USEPA to create emission standards for new cars and light trucks. Prior to this, there were no restrictions on the emissions motor vehicles could release into the atmosphere with the exception of vehicles sold in California, which had implemented its own new vehicle standards in the early 1960's. As a result, the Clean Air Act allowed California to continue to set its own emission standards, but prohibited other states from creating their own. Amendments to the Clean Air Act passed in 1977 allowed other states the option of using the federal standards or opting into the California program. In 1993, New York became the first state in the nation to adopt the more stringent California standards.

As emissions control technologies have matured, California has continued to increased the stringency of its standards and recently implemented a second round of its Low Emission Vehicle program, referred to as LEV-2. New York has since followed suit, formally adopting the LEV-2 program in 2000 and implementing the California standards for medium-duty vehicles weighing up to 14,000 pounds. In this manner, new vehicle sales of Sport Utility Vehicles in New York are now covered by the more stringent standards. Because most of these vehicles are built on truck-based platforms, many were exempt from emission standards for passenger cars. This is no longer the case.

Diesel Particulate Filters

Although light-duty cars make up the majority of vehicles on the road, trucks, buses and other heavy-duty vehicles are also significant contributors to air pollution. Because most of these vehicles are powered by diesel engines, the contaminants they release are different from those that are emitted by gasoline powered cars and light trucks. For instance, diesel powered vehicles tend to be high emitters of fine particulates. The New York City metropolitan area boasts one of the largest mass transit systems in the world. Along with subways and commuter trains, this system includes over 4,000 transit buses. Although mass transit results in lower total emissions than single-occupant vehicles, the fine particulate and soot emissions from diesel-powered buses are a considerable source of air pollution. In an effort to address this pollution, the New York Metropolitan Transportation Authority (MTA) working in conjunction with the DEC developed and now uses a new generation of technology, called Diesel Particulate Filters, which has been demonstrated to make diesel-powered buses as clean as those powered by alternative fuels such as compressed natural gas. Initial testing of this technology, conducted on four transit buses in service in New York City, and at a Canadian emissions laboratory in Ottawa, Ontario, is so promising that MTA has committed to using filters on its entire diesel-powered fleet. Although alternative fuel technology is beginning to make in-roads into the heavy-duty vehicle market, it is clear that diesel engines will dominate this sector for the foreseeable future. The New York project was the first of its kind in the nation to demonstrate that significant emission reductions can achieved from diesel trucks and buses. As a result, a number of cities and states across the country are implementing their own programs patterned on the New York model.

Low-Sulfur Fuels

One obstacle to utilizing Diesel Particulate Filters has been that the technology requires the use of ultra-low sulfur diesel fuel, which had not been readily available in the United States. Sulfur levels in such fuel is below 30 parts per million (ppm), compared to 500 ppm or more found in regular diesel fuel. Although such fuel is necessary to use the diesel particulate filters, there is evidence that lower sulfur levels provide some environmental benefits in standard diesel engines, as well. An arrangement was worked out for special delivery of the required fuel for the four-bus demonstration project, but much larger quantities were required before MTA's entire fleet could be converted to use the new technology. As a result of the State's action, refineries are now producing the low sulfur fuel in the quantities needed to supply MTA's entire fleet. The program has generated technical evidence to support USEPA's efforts to reduce sulfur levels in diesel fuel and gasoline nationwide.

Status of Acid Deposition Initiative

Both the 1984 State Acid Deposition Control Act and the 1990 federal Clean Air Act included provisions intended to reduce the devastating impacts of acid deposition on New York's natural resources.   Although tremendous progress has been made, there is still strong evidence that the problem of acid deposition has not yet been adequately addressed, especially in the sensitive forests and water bodies of the Adirondack Mountains.   The National Acid Precipitation Assessment Program estimates that 24% of Adirondack Lakes are seriously acidic. A 1995 USEPA study found that, even with the emission reductions required by the federal Clean Air Act, the number of acidic lakes in the Adirondacks will double by 2040 and that 100% of its rivers and streams will be too acidic to support life during spring snow melts. The report called for additional reductions of sulfur dioxide (SO_2) and nitrogen oxides (NO_x) of 40 to 50%.

Because so much of the emissions that result in acid deposition come from power plants and other facilities located upwind from New York, the State has continued to lobby Congress to adopt legislation that would address the problem on a national level. New York has also taken steps to reduce emissions from sources located within the state.

The Acid Rain Initiative (ARI) announced by Governor Pataki in October of 1999, calls for two measures to reduce emissions that cause acid deposition. First, DEC must act to limit emissions of sulfur dioxide (SO_2) from electricity generating units generating 25 MW or more to a level that is 50% of the quantity of emissions (in tons) that would otherwise be allowed under the federal acid rain program established in Title IV of the federal Clean Air Act. Second, DEC must act to limit emissions of nitrogen oxides (NO_x) from electricity generating units during the non-ozone season (October 1 - April 30) to a level that corresponds to the emissions level allowed during the ozone season (May 1 - September 30).

DEC is promulgating regulations that would establish emissions "cap and trade" programs. These regulations are patterned after the existing ozone-season NO_x cap and trade program. DEC developed the program to comply with the federal NO_x control requirements and the State's commitment to reduce NO_x emissions under a 1994 agreement among Northeastern states, referred to as the "Northeast Ozone Transport Commission NO_x Memorandum of Understanding." Part 237 would implement a new NO_x cap and trade program that would operate throughout the year. As with the existing NO_x cap-and-trade program, the statewide NO_x emissions cap is calculated based on an average NO_x emissions limit of 0.15 lb/MMBtu. Each subject unit would be allocated NO_x allowances based on a allocation methodology crafted by DEC. Each allowance represents a limited authorization to emit one ton of NO_x during the non-ozone season. The number of tons of permissible emissions from each subject unit for a particular non-ozone season is limited to the number of allowances that the unit has in its "allowance tracking account" for that time period. As with Part 204, the administration of the allowance and emissions tracking systems for the regulatory program would be administered by USEPA. The program will begin on October 1, 2004.

A new SO_2 cap and trade program would also apply year round. The regulation would cover the same units that are subject to the federal acid rain program. The SO_2 emissions cap would be set at approximately 130,000 tons annually (about half of the number of federal SO_2 allowances annually allocated to the subject sources). As with the NO_x programs, the new SO_2 program would maintain the emissions cap by use of allowances which will be allocated pursuant to a methodology developed by DEC. USEPA will administer the allowance and emissions tracking systems. The program will take effect starting in January 2005 with implementation of 25% of the total emissions reduction for the program. Full implementation would be achieved by January 2008.

DEC issued preliminary drafts of the proposed regulations to representatives of the electricity generating industry on January 18, 2001. A stakeholders working group, with representation from the generating industry, the environmental community, and other interested parties, was created to develop the regulatory tools necessary to implement the ARI. Elements of the energy industry has expressed some concerns about portions the program, and these concerns will be addressed in the formal rule-making process.

Energy Efficiency and Renewable Set-Aside Component of NO_x Budget Trading Program

Established by the adoption of 6 NYCRR Part 204, the program provides incentives to implement electric end-use energy efficiency and renewable generation projects by allocating 3% or about 1,200 tons of New York's ozone-season NO_x allowance budget to eligible projects beginning in 2003. A pilot program under which 115 tons of NO_x allowances are available for end-use efficiency projects has been in place since 1999. Projects are certified as tradeable emission allowances which can be bought and sold on the open market.

NO_x allowances are accredited at the rate of 0.0015 lb per kWh, or one ton per 1,333,333 kWh reduced during the five-month ozone season. This rate approximates the heat input-based rate of 0.15 lb per MMBtu used to allocate the Ozone Transport Region NO_x Budget among individual states for the 2003 control period forward. Certifiable kWh reductions from energy efficiency projects are based on the International Performance Measurement and Verification Protocol (IPMVP), developed jointly by the U.S. Department of Energy (DOE) and a consortium of public and private organizations for the purpose of establishing the industry standard for measuring and evaluating the outcome of investments in energy efficiency.

The Set-Aside Program recognizes that emission reductions needed to meet air quality objectives can be achieved by implementing end-use electric energy efficiency measures and renewable energy projects as well as by installing control devices on fossil fuel-fired electricity generation sources. Ancillary environmental benefits of the program include year-round reductions of NO_x emissions, thereby contributing to reducing acid deposition in the sensitive receptor areas of the Adirondacks, as well as reducing eutrophication (*i.e.* nutrient-loading) of water bodies such as the Long Island Sound. Furthermore, energy efficiency measures and renewable energy projects contribute to reducing emissions of carbon dioxide, the primary greenhouse gas, thereby providing long-term climate change benefits.

<u>Status of Governor's Greenhouse Gas Task Force</u>

In June 2001, Governor Pataki announced the formation of a Greenhouse Gas (GHG) Task Force comprised of representatives from the business community, environmental organizations, State government, and universities. The GHG Task Force is charged with advising the Governor on specific actions and policies to achieve major GHG reductions across all sectors of the State's economy, and to position New York State as a national leader in addressing these issues.

The GHG Task Force was formed in direct response to the national and international policy concern that increasing concentrations of carbon dioxide and other GHGs are causing long-term changes in global climate by trapping more of the sun's heat within the atmosphere. Increasing average global temperatures and severity of weather patterns over the next century could cause the world's oceans to rise, damage forests and other ecosystems, disrupt agriculture, and increase health risks, posing risks to large numbers of inhabitants and businesses, as well as to infrastructure such as roads and bridges,.

The GHG Task Force has convened twice, and is working toward its objectives through five sector-specific Working Groups: electricity generation, buildings and industry, transportation, agriculture and forestry, and emissions trading. Preliminary recommendations for actions and policies from each Working Group have been vetted by the Task Force and are included in "Energy Plan Findings and Recommendations" (Section 1.2). Recommended actions include establishing a Statewide target for GHG emission reductions relative to 1990 levels, promoting renewable energy resources, optimizing use of combined heat and power, improving the mass transit infrastructure, developing an indigenous bio-fuel industry, developing programs to encourage more efficient use of oil and natural gas at customer sites, and establishing a GHG registry to document baseline emissions and voluntary emissions reductions for participating customers. The GHG Task Force will result in a Final Report, to be completed by March 2002.

GREEN BUILDING TAX CREDIT PROGRAM

A Green Building Tax Credit was enacted in Chapter 63 of the Laws of 2000 that provides tax credits to building owners and tenants of eligible buildings and tenant spaces which meet certain "green" standards which, among other things, increase energy efficiency, improve indoor air quality, and reduce the environmental impacts of large commercial and residential buildings in New York State. New York is the first state in the nation to implement a tax incentive program for the construction of environmentally-friendly green buildings. The State provides up to $25 million in tax breaks for such things as green buildings that meet requirements for energy efficiency, indoor air quality, and use of recycled materials and wood resulting from sustainable forestry practices. Regulations have been proposed to implement the program, which were crafted with input from the DEC, the Departments of Health (DOH), Tax and Finance, and NYSERDA, as well as experts in the building trades, real estate, and environmental communities. It is expected that the regulations will be in effect in January, 2002.

METHYL TERTIARY BUTYL ETHER (MTBE)

Metyl tertiary butyl ether (MTBE) was approved by USEPA for use in gasoline in 1979 as an additive to boost the octane rating of motor fuel as it required phasing out of earlier octane enhancers, such as tetra-ethyl lead and benzene. In the mid 1980s it was discovered that adding oxygen to motor fuel promoted more complete combustion and reduced pollutant emissions. Early programs in Colorado and elsewhere reported approximately 10% reductions in carbon monoxide emissions, as well as reductions in volatile organic compounds (VOCs). As a result of these early programs, the 1990 amendments to the federal Clean Air Act required the use of "reformulated gasoline" (RFG) in areas that failed to comply with national ambient air quality standards for ozone specifying, among other things, that 2% of the fuel be comprised of oxygen.

Fuel providers had two primary options to meet the oxygen requirement: ethanol, an alcohol made primarily from corn and other biomass, and MTBE, generally made from natural gas. During the 1970s, the federal government and many states (including New York) conducted pilot programs to evaluate the potential of ethanol to extend fuel supplies. New York's program, like most others, ended in failure due to the tendency of ethanol to dissolve fuel lines and gasket materials, and because its use resulted in significantly higher emissions of VOCs through increased evaporation of the fuel. Auto makers have since employed new materials that eliminate the fuel line and gasket corrosion, but the volatility problem of ethanol remains.

The other primary option to meet the oxygen requirement is MTBE. MTBE has several chemical properties that make it an excellent fuel additive, including its relatively low toxicity (compared to lead or benzene), its octane enhancing ability, and its relatively low volatility. Unfortunately, it also has some unique hydro-geologic properties that make it a threat to groundwater. It is highly soluble in water, so that if spilled it tends to migrate further and be more difficult to remediate than the other gasoline additives. It also has a strong turpentine-like smell that makes it easy to taste and smell at low concentrations (levels below 50 ppb).

Until recently, concentrations of MTBE in groundwater were not specifically regulated in New York, although DEC did use the DOH drinking water value of 50 ppb (for MTBE as an unspecified organic contaminant) as a cleanup goal. DEC recently finalized an ambient water quality guidance value of 10 ppb for MTBE, the lowest allowable concentration in the nation. It is anticipated that DOH will shortly finalize similar standards for drinking water. In February, 2000, the Division of Remediation issued a memorandum evaluating the extent of MTBE contamination in New York. The memo stated that of 5,262 spills, 1706 (32%) were identified to have MTBE impacts to groundwater. In addition, 866 private wells and 47 public water supplies were found to be impacted by MTBE. These numbers have continued to climb over the ensuing year, and it is clear that MTBE poses a severe threat to New York State's groundwater and drinking water.

Because of these impacts, several Northeast states and California have taken steps to reduce the harmful effects of MTBE. States including New York have enacted legislative phase-outs of MTBE. New York's action will take effect in 2004. In addition, several states (including Maine, and California) have requested USEPA to waive the oxygenate requirement as provided for in Clean Air Act. USEPA recently notified California that it will not approve the oxygenate waiver. Because California (like New York) has a pending ban on MTBE, and no other readily available additive has been tested and determined to be acceptable, USEPA's decision effectively becomes a mandate for the use of ethanol to meet the oxygenate requirement.

Use of ethanol, however, raises new concerns such as the potential for higher VOC emissions. Also, there is currently little if any ethanol production capacity in the Northeast. Ethanol is hydroscopic, absorbing moisture from the air, thus making it difficult to ship gasoline containing ethanol via pipeline. As a result, ethanol would most likely have to be trucked separately from production sites and "splash-blended" at gasoline distribution centers. Additionally, it is unlikely that the national ethanol production capacity exists to replace MTBE any time soon. MTBE accounts for approximately 10-12% of the fuel supply in greater New York City. There is currently insufficient ethanol production capacity in the Northeast to replace the portion of the fuel supply currently made up of MTBE.

Removing MTBE from gasoline and replacing it with ethanol could have several negative effects. Ethanol has unique characteristics of its own that could have impacts on water and air quality. Ethanol may be as difficult to remove from groundwater as MTBE, and it has been found to cause damage to the structures used to contain spills at fuel storage and distribution facilities. As mentioned previously, ethanol has been shown to dissolve gaskets and hoses in older cars, and may cause similar problems in off-road equipment like lawnmowers, chain saws, and older outboard engines.

From an air quality perspective, substitution of ethanol for MTBE will most likely result in increased evaporative emissions from fuel tanks. Fuel companies are already seeking permission to raise the volatility of gasoline to allow for the use of ethanol. Along with its role as a source of oxygen, MTBE also increases the octane rating of fuels. Additives used to replace the octane lost with the elimination of MTBE could potentially increase the toxicity of fuels.

If ethanol were used in New York as a substitute for MTBE to comply with the 2.0%-by-weight oxygen requirement of federal reformulated gasoline, it is likely that ethanol would be used at about 5.7% by volume to comply with the requirement. The Energy Policy Act of 1992 includes provisions granting a partial excise tax exemption for ethanol used in gasoline. The excise tax exemption is 54 cents per gallon (cpg) of ethanol, which translates to 5.4 cpg for 10% by volume blends and 3.08 cpg for 5.7% by volume blends.

New York State uses roughly 350,000,000 gallons of MTBE annually. Because ethanol has a higher oxygen content than MTBE it would take about 180,000,000 gallons of ethanol to replace the MTBE. Substitution of ethanol for MTBE in New York would

therefore result in over $100,000,000 a year in losses to New York's contribution to the Highway Trust Fund.

ENVIRONMENTAL JUSTICE ISSUES

Environmental Justice is meant to ensure the 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. In order to effect fair treatment and meaningful involvement of all people, environmental justice efforts focus on under-served communities and seek to address disproportionate adverse environmental effects on minority and low-income populations.

The DEC's Office of Environmental Justice was created in 1999 to address environmental justice concerns and ensure community participation in DEC's environmental permitting process. The Office of Environmental Justice is tasked with development of environmental justice policy and oversight of its integration into DEC's policies, programs and activities.

The DEC received a U.S. EPA State and Tribal Environmental Justice Grant to assist in development of comprehensive environmental justice programs and policies. Pursuant to the grant specification, the New York State DEC Environmental Justice Advisory Group (Advisory Group) was formed in January 2000 comprising representatives from state, local, and federal government, community groups, environmental groups, and businesses. The Advisory Group is tasked with developing recommendations for a DEC environmental justice permit policy and other elements to be included in a strategic environmental justice plan. The Advisory Group is currently drafting recommendations to be presented to the DEC Commissioner. The draft recommendations include: recommendations to address environmental justice concerns in the permit process; recommendations for incorporating environmental justice concepts into the State Environmental Quality Review Act; and recommendations relative to Native American environmental justice issues, green benefits, enforcement, and more.

DEC will continue to address the environmental justice issues and incorporate environmental justice concepts into a variety of DEC programs.

CLEAN WATER/CLEAN AIR BOND ACT UPDATE

The Clean Water/Clean Air Bond Act authorizes $230 million for projects to improve the State's air quality. These funds support programs that use innovative and modern technologies to provide the State's citizens with a healthier and cleaner environment. This portion of the Bond Act provides funding for the following program categories related to energy use: the Clean Air for Schools Program; Clean Transportation projects, which includes funding for clean-fueled buses and vehicles; and other air quality improvement projects. As of September 1, 2001, $224 million has been appropriated from the Bond Act for air quality improvement projects, with more than $175 million committed to specific air quality initiatives.

Clean Air for Schools Program

The Clean Air for Schools Program, administered by the New York Power Authority (NYPA), is making dramatic progress to ensure that New York's children have a clean and healthy environment in which to learn and grow. The Bond Act authorizes $125 million for this program to replace aging coal-fired furnaces at public schools with modern boilers that use cleaner-burning fuels.

Through September 1, 2001, $117 million has been appropriated and fully committed to projects at 74 schools in New York City, Buffalo, and Long Island. The projects are producing real and measurable benefits in the air quality of these schools and surrounding neighborhoods. As a result, emissions of air pollutants, such as sulfur dioxide, nitrogen oxide, and particulate matter have been significantly reduced and students, teachers, and community residents are breathing cleaner air. This program has resulted in the elimination of use of coal-fired boilers in school buildings, and a large reduction of pollutants. NYPA estimates that the project has resulted the annual reduction of 31,000 tons of pollutants, including 30,400 tons of carbon dioxide.

Clean-Fueled Bus Program

The Bond Act also supports the State's Clean-Fueled Bus Program, which has had tremendous benefits for State's environment and economy. The Program, administered by NYSERDA, has assisted municipalities and transportation authorities in replacing dirty diesel-powered buses with buses using cleaner energy sources, while also promoting the manufacture of clean technologies in New York State. Under the Program, Bond Act funds are awarded for up to 100% of the incremental cost of a clean-fueled bus, infrastructure related to refueling or recharging clean-fueled buses, and any required depot conversions. Clean-fueled buses are defined as motor vehicles with a seating capacity of 15 or more passengers that are used for transportation on public highways, and are powered by compressed natural gas, propane, methanol, hydrogen, ethanol, or electricity, including electricity from solar energy. Eligible applicants include municipalities, school districts, State agencies, and public authorities.

Four rounds of funding have been awarded to date, which have resulted in the purchase of 300 buses powered by compressed natural gas, 67 hybrid electric buses, and 11 battery electric buses. NYSERDA estimates that these buses will result in reductions of 10,000 tons of NO_x, 560 tons of particulate matter, and 1.3 million tons of carbon dioxide over the lifetime of the buses.

Projects are selected for Bond Act funding by NYSERDA after completion of a competitive application process. Priority is given to projects that result in the greatest emissions reduction per dollar invested; are located in areas where air quality improvements are needed; provide the greatest economic benefits to the State; leverage additional funding from the applicant or other sources; support emerging technologies; and are consistent with other clean-fuel vehicles activities.

As of September 1, 2001, $16 million in Bond Act funding has been committed to the purchase of 376 clean-fueled buses for operation in New York City, Long Island, Onondaga County, the City of Rochester, and the City of Ithaca, as well as funding for two fueling infrastructure projects in New York City. The buses being purchased include a combination of electric, hybrid-electric diesel and compressed natural gas.

State Clean-Fueled Vehicles Program

Funding from the Bond Act also supports the State Clean-Fueled Vehicles Program. The Program, administered by the Office of General Services (OGS), is a coordinated effort to assist New York State agencies, public authorities, and the State University of New York in acquiring and using alternative fueled vehicles. OGS also serves as the Chair of the Clean-Fueled Vehicles Council, a working group of State agencies and authorities that guides the State's efforts to acquire clean-fueled vehicles and develop the fueling infrastructure to support the vehicles.

Through September 1, 2001, $16 million was appropriated from the Bond Act for the State Clean-Fueled Vehicles Program. The program finances the incremental costs associated with the State's acquisition of clean-fueled vehicles, as well as costs for related refueling and recharging facilities. To date, State agencies have acquired or committed to purchase nearly 1,000 electric and alternative fueled vehicles for use in their daily operations. A number of agencies have received funding from the Bond Act under this program, including: the Departments of Transportation, Motor Vehicles, and Correctional Services; DEC; OGS; Office of Mental Health; Thruway Authority; Olympic Regional Development Authority; and the State University of New York (SUNY) campuses at Albany and Buffalo.

Bond Act dollars are also being used to develop a comprehensive plan to provide conveniently located fueling sites for State agencies' clean-fueled vehicles. The first phase of the plan calls for construction of 30 new compressed natural gas fueling stations to supplement 52 existing stations across the State. The first site, located off of I-87 in Latham, Albany County, opened in the spring of 2000, and the second site, in Hudson Falls, Washington County, is also in operation. The remaining sites are expected to be operating soon. The second phase of the infrastructure plan includes establishing 18 high-volume compressed natural gas fueling stations that will be easily accessible and located in major metropolitan areas along high-profile travel corridors, including the State Thruway between Albany and New York City. Bond Act funding will also be used to address the need for other alternative fuels, and will include a network of electric vehicle charging sites.

Other Air Projects

The Bond Act provides up to $20 million for projects which enhance the quality of the State's environment and the State's air quality. To date, funding from this category has supported a total of four programs. The newest program funded under this category is the Heavy-Duty Vehicles Inspection and Maintenance Program. Other programs supported under this category include: the Ultra-Clean Power Generation Technologies Program, the Clean Diesel Vehicle Program, and the Vehicle Inspection and Maintenance assistance program.

Heavy-Duty Vehicles Inspection and Maintenance Program

In 1998, the State required emissions testing for heavy-duty diesel vehicles. The law requires that diesel-powered vehicles of 8,500 pounds or more be tested annually to determine if they meet federal emissions standards for particulates or smog. These new requirements will reduce pollution from diesel vehicles, improve air quality, and protect public health.

To facilitate implementation of the new testing requirements, Bond Act funding has been committed for a Heavy-Duty Vehicle Inspection and Maintenance State Assistance Program. The Program, administered by the Environmental Facilities Corporation (EFC), will provide resources to eligible service station owners and other eligible participants toward the purchase of certified equipment to test emissions from heavy-duty diesel vehicles.

Under the program, state assistance payments of $1,000 to $2,000 per project will be made available to eligible facilities throughout the State that perform heavy-duty vehicle emissions tests for the public and to municipalities that purchase equipment necessary to test emissions from heavy-duty diesel vehicles. To date, $1.15 million in Bond Act funding has been set aside for this program.

Ultra-Clean Power Generation Technologies

A total of $5.6 million in Bond Act funding has been awarded under this program for ultra-clean power generation technologies that demonstrate improvements to air quality. This competitive program, administered by the NYSERDA, has provided funding to projects that improve air quality by accelerating the widespread use of ultra-clean, innovative and advanced power generation technologies. Projects must also provide air quality, energy, and economic benefits to New York State.

Clean Diesel Vehicle Program

Under this program, administered by DEC, proposals were sought for projects to demonstrate technologies with the potential for reducing emissions from diesel-powered vehicles. A total of $1 million was awarded to New York City Transit for a project to demonstrate a specific technology designed to reduce air pollutants from diesel-powered buses. Under the project, diesel buses operating in Manhattan and the Bronx are being retrofitted with Continuously Regenerating Technology (CRT) devices. The device captures and burns pollutants before emission. This demonstration project will verify the emissions reduction benefits of the technology, as well as the durability of the technology on buses operated in a rigorous urban duty cycle.

The project is also an important element of the Metropolitan Transportation Authority's (MTA) new capital plan. The unprecedented, multi-part plan ensures that MTA will have the cleanest bus fleet in the world. As part of the initiative, MTA will step up the purchase of clean-fueled buses, retrofit diesel buses, phase-out older and dirtier buses from its fleet, use low-sulfur fuels, and develop depots with alternative fueling capabilities. These strategies will significantly reduce emissions and greatly improve air quality.

Enhanced Vehicle Inspection and Maintenance Assistance Program

Funding has been provided from this portion of the Bond Act for grants to service station owners in New York City, as well as larger stations outside the City, that are participating in the State's Enhanced Vehicle Inspection and Maintenance Program. These facilities were not eligible for funding under the Small Business Environmental Compliance section of the Bond Act. The Environmental Facilities Corporation is administering this program which provides $5,000 to eligible service stations toward the purchase of the required testing equipment. Through September 1, 2001, approximately $6.2 million was provided to 1,250 participating service stations in New York City, Westchester, Nassau, and Suffolk Counties.

MITIGATING THE AQUATIC IMPACTS OF ELECTRIC GENERATION

Construction, operation, and maintenance of energy developments projects can produce negative environmental impacts on associated water bodies as well as other media such as air quality, terrestrial habitat and wetlands. However, with appropriate mitigation measures, electric generation can have minimal environmental impacts. DEC has achieved great success in reducing the impacts of existing projects and preventing negative impacts from new projects while simultaneously ensuring the development of cleaner energy projects.

Steam-Electric Power

Most steam-electric projects use water to condense steam, although many new plants are using dry condenser (air) cooling, a form of closed-cycle cooling. Environmental impacts to aquatic life can be significantly reduced or eliminated through the use of closed-cycle cooling where water use is greatly reduced by recycling. There are numerous examples of operating steam-electric plants of various sizes that have virtually no fish impact, as well as several recently permitted low impact closed-cycle plants. Similar energy projects are either under consideration in hearings or in the application process.

Many older steam plants do not recycle water in closed-cycle systems, but rather use significant quantities of water to cool the steam condensers with once-through cooling systems. In fact, energy projects are among the largest water users of the State. As a consequence of using this amount of water, fish and other aquatic life may be drawn into the plants and be impinged on the intake screens (designed to keep debris in the water from entering the plant), or passed through the screen mesh and into the station (a process called entrainment). Entrainment usually results in 100% mortality to the eggs and larvae; small adult fish are also entrained. Impingement may damage or cause mortality to fish. Adverse impacts to aquatic life can also occur through the discharge of thermal pollution (heated cooling water) back to the lake or river. Thermal pollution can kill fish directly, block fish migrations, and cause the growth of nuisance species.

DEC has been and continues to be a national leader in finding ways to mitigate the impacts of these older plants without adverse impacts on power production. Some mitigation measures, like variable speed pumps, fish return systems, and chlorine minimization studies, have saved money and improved plant efficiency. New York was also the first to successfully employ new technologies to substantially reduce fish mortality while permitting once-through cooling to continue without de-rating plant generation. Examples are filter fabric aquatic life exclusion systems around intake pipes and high-power, high-frequency sonar repulsion system for alewives (herring). Conversion of older plants to closed-cycle cooling to mitigate significant impacts may also be used where appropriate. Under legislation signed into law by Governor Pataki in November 2001, applicants seeking an expedited, six-month approval process for modifying or siting of major electric generating facilities in New York must install air-cooled condensers or evaporative cooling water intake systems that use no more than 15 gallons of water per minute per megawatt of total plant generating capacity. Several pending applications for re-powering have proposed reducing aquatic impacts to 1% of current levels, while increasing energy output and nearly doubling energy production efficiency. Conversion of existing once-through plants to closed-cycle cooling is also possible, but will result in some lost energy production. For example, to produce a 95% reduction in water use and fish entrainment mortality using closed cycle cooling, a 1200-MW fossil-fueled plant might typically be de-rated 35 MW summer (2.9%) and 17 MW non-summer (1.4%) .

Hydropower

The manner in which a hydroelectric project is operated can also dramatically affect fish and wildlife resources. DEC has been a national leader in getting projects licensed, re-licensed, or permitted through exemption, while restoring water quality and minimizing associated environmental impacts without causing significant energy losses. This has been accomplished through:

- Restoring adequate base flows in rivers within project operating limitations. This ensures navigation and dampens the impact to aquatic organisms, vegetation, and wetlands of pulsed generation that may be permitted.

- Restoring minimum river flows and fish passage flows in main stem reaches that are bypassed by penstocks or power canals. This eliminates water quality violations and restores an acceptable (though impacted) aquatic ecosystem.

- Reducing impoundment fluctuations to acceptable levels, especially during fish spawning seasons. Often more liberal fluctuations are permitted outside ecologically critical times.

- Reducing fish impingement and entrainment mortality through appropriately sized trash racks and fish bypass systems. If trash rack replacement is necessary to protect fish it is often scheduled for a year when routine wear-and-tear replacement is scheduled. And fish bypass flows are often integrated with minimum flows required to maintain water quality standards.

DEC has also been a leader in using Federal Energy Regulatory Commission's collaborative Alternate Licensing Process where the developer and stakeholders cooperate in a streamlined licensing process. It has been successfully used in re-licensing facilities on the Hudson River. Governor Pataki announced in October 2001 that NYPA had submitted its application to FERC for a new 50-year license to operate the 800 MW St. Lawrence-Franklin D. Roosevelt Power Project in Massena. The current license expires in 2003. The Governor said that the application, which was developed using the alternative licensing process, achieved "an unprecedented level of community support." The FERC license for the largest project in the State, the NYPA's 2,400 MW Niagara Power Project on the Niagara River, expires in 2007. It is anticipated that NYPA will seek FERC approval for use of an alternative licensing procedure for the new license.

FINDINGS AND CONCLUSIONS

Since the 1998 State Energy Plan was released, the State has made significant gains in reducing the environmental impacts associated with energy generation and consumption. Emission standards on new motor vehicles have been strengthened, as have the requirements on power plants and other stationary sources of air pollution. The impacts of energy generation on the state's aquatic resources have been addressed. New power plants must consume much less water than older facilities, and the impacts on fish and other marine organisms must be minimized to the greatest extent possible. Other programs have been developed to address the concerns of the Environmental Justice Community.

- The generation and use of energy results in impacts on the environment, including the release of pollutants into the air and impacts on aquatic resources.

- Since the 1998 State Energy Plan was released, the State has made significant gains in reducing the environmental impacts associated with energy generation and consumption. Emission standards on new motor vehicles have been strengthened, as have the requirements on electricity generating plants and other stationary sources of air pollution. The impacts of energy generation on the State's aquatic resources are analyzed and addressed through existing regulatory programs. New electricity generating plants are required to use much less water than existing facilities, and the impacts on fish and other aquatic organisms must be minimized to the greatest extent possible.

- The State has become a national leader in developing new technologies to reduce emissions from diesel-powered trucks and buses, and has created a market for clean-burning low sulfur fuels. These programs will help ensure that New York, already one of the most energy efficient states in the nation, produces and consumes energy with the lowest possible impacts on the environment.

- New York has made great progress in meeting its air quality goals, currently meeting the National Ambient Air Quality Standards for five of the six federal criteria pollutants. The New York metropolitan area has not yet attained the current National Ambient Air Quality Standard for ozone (one-hour), and is not likely to be designated as meeting the pending standards for ozone (eight-hour) or fine-particulates ($PM_{2.5}$). Meeting these standards will require additional emission reductions from all sectors.

- New York has adopted the most stringent tailpipe emission standards for new motor vehicles in the nation, and continues to develop new strategies to reduce emissions from mobiles sources such as cars and trucks.

- The State has made significant progress in reducing emissions that cause acid deposition, and will soon adopt stringent new standards on power plants to further reduce these emissions. Scientific data indicates that many water bodies and forested regions in the state are still adversely impacted by acidic deposition, and that there is a need for additional national efforts to address these impacts.

- Public transportation has the potential to significantly reduce the impacts of energy used in the transportation sector, particularly through the decrease in single occupant vehicles on the State's roadways.

- The fuel additive methyl tertiary butyl ether (MTBE), added to gasoline to meet federal oxygenate requirements, has negatively impacted surface and ground waters in New York State and across the nation. New York has enacted a legislative ban on MTBE beginning in 2004.

- Environmental Justice (EJ) has become significant issue in the siting of new power plants and other facilities. The State is working to develop a comprehensive policy on how EJ issues will be addressed.

SECTION 2.4

ENERGY AND TRANSPORTATION

INTRODUCTION

This issue report examines the relationship between meeting New York's transportation needs and the complementary goals of fostering economic growth, preserving and enhancing the environment for an improved quality of life, and increasing energy efficiency. The success in meeting transportation needs is an important determinant in successfully achieving these other important goals.

The 1998 State Energy Plan laid the foundation for many of the State's transportation policies with regard to energy-efficient travel. The themes, policies and objectives identified in the 1998 State Energy Plan remain valid today. Many of the strategies and implementation steps discussed in that Plan are continuing. In addition to the importance of establishing energy related goals and objectives for the State, the State Energy Plan is valuable because it also facilitates the integration and coordination of important policy decisions by the State. The State Energy Plan is coordinated with the Statewide Master Transportation Plan and the State Implementation Plan for air quality.

This issue report stresses several broad themes, in the context of energy-efficient transportation, as follows:

- Trends in transportation and travel;
- How State, regional and local transportation providers can effectively enhance and encourage efficient transportation;
- Innovation in transportation technology for improving energy efficiency in the transportation sector;
- Activities and programs that enhance the use of alternative fuels and alternative fuel technology and infrastructure to reduce the transportation sector's overwhelming dependence on conventional fuels; and,
- Role of energy-efficient transportation measures for meeting federal and State air quality goals.

TRANSPORTATION PATTERNS AND TRENDS - AN OVERVIEW

Highways

Highway travel (in daily vehicle miles traveled [DVMT]) on New York roadways from 1990 to 2023 is presented in Figure 1. Travel on New York roadways is currently about 352 million vehicle miles per day. This traffic volume results in an annual total of 128.7 billion VMT. Historically, vehicle travel in New York has grown by approximately 2.5% to 3% per year or more since 1950. However, the 1990's have shown slower growth in vehicle miles traveled, about 2% per year. While DVMT is expected to grow throughout the 20-year forecast period, the rate of growth is expected to decline slightly with a 10- year growth rate of around 1.4% per year for 2000 to 2010, and 1% per year for 2010 to 2020. Nonetheless, if current trends continue, DVMT on New York roadways are forecasted to increase by 30% in the next 20 years.

FIGURE 1
New York State Existing & Forecasted Daily Vehicle Miles Traveled (DVMT)

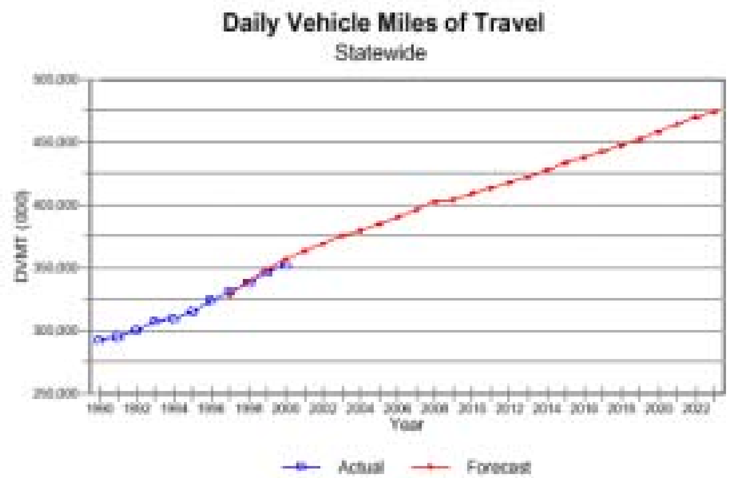
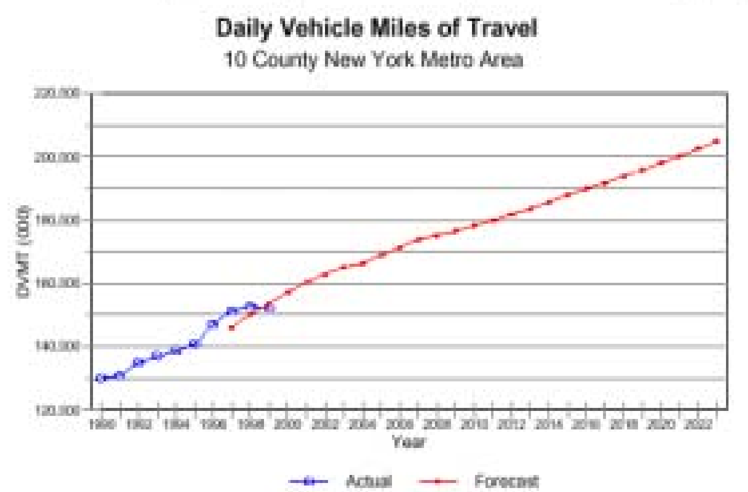


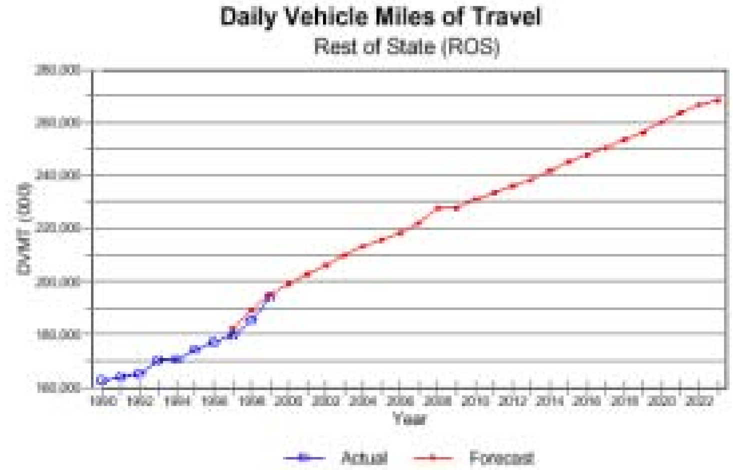
FIGURE 2
New York Metro Region Existing & Forecasted Daily Vehicle Miles Traveled (DVMT)



The existing and forecasted travel trends for the downstate New York metropolitan region is shown in Figure 2, and Figure 3 depicts travel in upstate

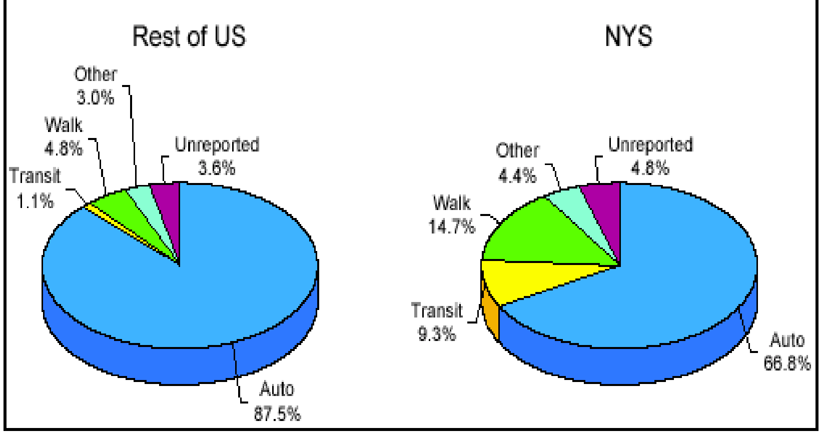
New York. The forecasted increase in travel in the downstate New York City region is at a slightly lower percentage than the remainder of the State. The higher use of regional public transit in the downstate metropolitan region provides a restraint on increasing DVMT compared with upstate New York, where development patterns continue to result in increasing travel as household discretionary travel and work trip distances both increase, and related truck delivery trips also rise.

FIGURE 3
ROS Existing & Forecasted Daily Vehicle Miles Traveled (DVMT)



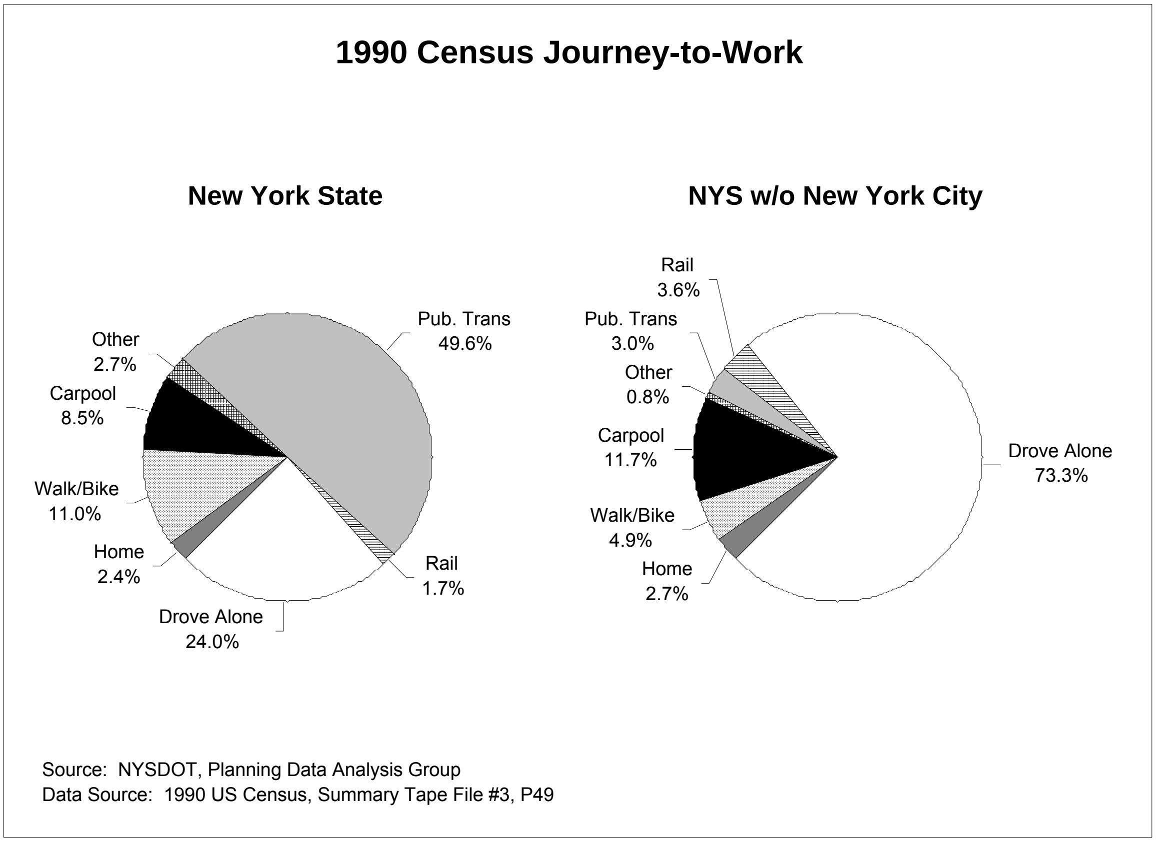
<u>Transit</u>

Figure 4
Daily Person Trips
1995 Nationwide Personal Transportation Survey



New York has the most energy-efficient transportation sector in the nation, owing to the high per capita use of transit alternatives including buses, subways, commuter rail, and ferries. More than one-third of all national transit passengers are in New York. The percentage of all daily person trips by travel mode for all travel purposes reported in the 1995 National Personal Transportation Survey (NPTS) is shown in Figure 4, with New York having a much larger percentage of transit trips than the rest of the U.S. (9% vs. 1%). Examining journey-to-work trips, Figures 5 and 6 clearly delineate the impact of 50% transit use for the New York City metropolitan area compared to the overall State travel picture and the

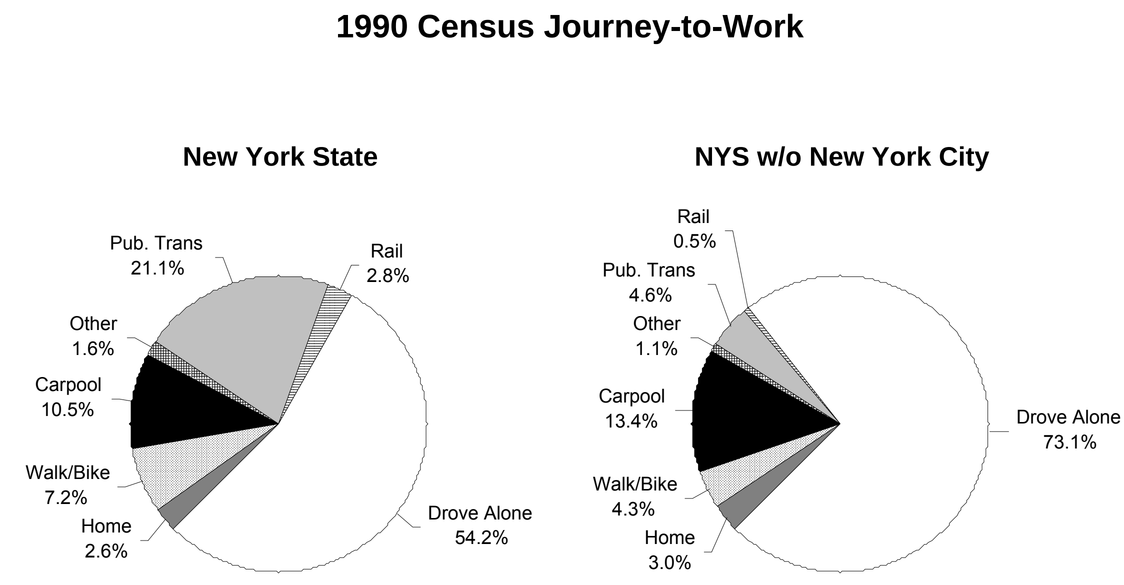
Figure 5



rest of the nation, respectively. New York leads the nation with the lowest fuel consumption per capita of any state. Also contributing to low-per-capita fuel consumption is that the number of New York residents working at home has increased dramatically in the past decade, rising from 2.6% of all workers in 1990 to 5.1% in 1995, as reported by the 1995 NPTS.

The Statewide Master Transportation Plan emphasizes maintaining transit infrastructure and providing operating improvements that will continue to improve the energy efficiency of travel in New York. The significant continuing investment in Intelligent Transportation Systems (ITS) Statewide is also expected to have a positive effect on future energy use. Were it not for New York's investment in public transit service, resulting in a more energy-efficient transportation system, the diversion of those riders to single-occupant vehicles would increase annual vehicle miles traveled by 25 billion miles.

Figure 6



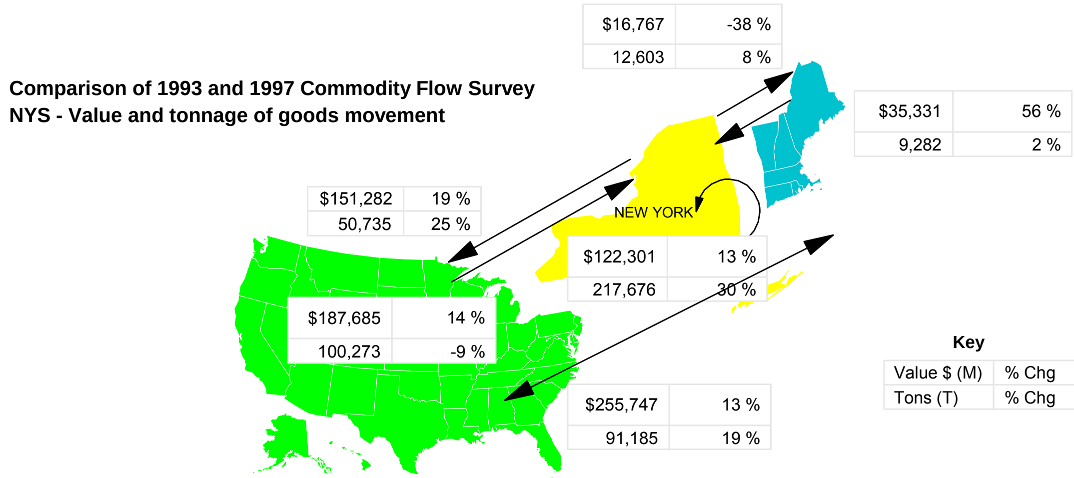
Source: NYSDOT, Planning Data Analysis Group
Data Source: 1990 US Census, Summary Tape File #3, P49

<u>Freight</u>

There is evidence of the recent growing importance of freight truck traffic on New York's roadways. Truck traffic showed increases of 20% to 37% on six of the eight bridge crossings between New York and Canada from 1996 to 2000. Clearly, the North Atlantic Free Trade Agreement (NAFTA) has had an impact on truck travel in the State, as the number of trucks traveling through New York to and from Canada, as well as to and from destinations in New York, have led to this increase. In the New York City metropolitan area, while auto traffic dominates in terms of the overall number of vehicles, on a percent basis, the increases in truck traffic on bridge crossings is also substantially higher than increases in auto traffic. This represents significant future challenges for infrastructure repair, congestion, economic development, and air quality goals.

Trends in freight travel are presented in Figure 7, which compares the value and tonnage of goods movement between New York and destinations in the rest of the U.S. in 1993 and 1997, with the New England states also included as a subcategory of trade. Based on

Figure 7



Shipment Direction	Value $ (000,000) 1993	Share	Value $ (000,000) 1997	Share	% Chg	Tons (000) 1993	Share	Tons (000) 1997	Share	% Chg
Originating In NYS										
To Other States	154,081	23 %	168,049	22 %	9 %	52,369	13 %	63,338	13 %	21 %
To Within NYS	107,813	16 %	122,301	16 %	13 %	167,403	42 %	217,676	45 %	30 %
Total	261,894	39 %	290,350	38 %	11 %	219,772	55 %	281,014	58 %	28 %
Originating Outside NYS										
To NYS	187,014	28 %	223,016	29 %	19 %	119,080	30 %	109,555	23 %	-8 %
Total NYS	448,908	67 %	513,366	67 %	14 %	338,852	84 %	390,569	81 %	15 %
Through NYS	226,039	33 %	255,747	33 %	13 %	63,799	16 %	91,185	19 %	19 %
Net NYS	674,947	100 %	769,113	100 %	14 %	402,651	100 %	481,754	100 %	20 %

Source: 1997 Economic Census, Commodity Flow Survey

the Census Bureau's 1997 Economic Census' Commodity Flow Survey, the value of goods shipped to New York is increasing while the total tonnage of these goods is decreasing. This underlines the fact that heavy raw materials, which tend to have higher tonnage and lower value, relative to higher-value goods (*e.g.* computer software and electronic retail goods) are a declining percentage of freight travel to New York, while the lighter, high-value freight shipments are increasing. Note also the summary table of total commodity flow in Figure 7 indicates that New York is a net importer of freight shipments, as both the value and tonnage originating outside New York is greater than the amount New York ships to the rest of the nation.

Trucking is the predominant mode of freight transportation in New York. Rail carries a substantial amount also; in 1997 over 7 million tons of freight were exported from New York. Waterborne freight exports accounted for nearly 20 million tons. These freight travel trends have implications for future energy use. The increase in the professional service sector has also spawned an increase in overnight deliveries of letter packages because smaller trucks (*e.g.*, Federal Express, United Parcel Service) comprise a higher portion of goods movement in New York than previous years. The New York City metropolitan region, a large market with excess disposable income resulting in deliveries of high-end value goods, disproportionately contributes to increases in truck traffic. Traditional heavy-duty, long-haul trips still make up a significant portion of the travel and resulting congestion in New York, but are not growing as fast as the short-trip deliveries of high-value goods for New York's retail and business markets and consumers.

Personal Travel Trends

The National Personal Transportation Survey (NPTS) household travel trends provides a breakdown of personal travel throughout the State by trip purpose, travel mode and vehicle type. The NPTS trends provide an estimate of how changing travel patterns impact energy use, taking into account estimates of fuel use by vehicle type. The United States Department of Transportation's (USDOT) Federal Highway Administration also provides national reports on the entire NPTS that are valuable for judging regional and interstate travel trends, which are growing in importance for examining future transportation energy impacts.

The personal travel trends identified by New York's portion of the NPTS follows the national trends in several key categories that impact energy use. The 1995 results showed that the number of persons per household continues to decline, while the number of vehicles and workers per household continues to increase and the average trip length continues to grow. These trends combine to increase DVMT even with a stable population base. In addition, the 1995 NPTS showed that the number of trips per household and the miles traveled to work both continued to increase compared with previous survey years. Another NPTS is currently underway, so that it will be possible to see if these trends are continuing. For now they lead to the conclusion that the personal travel portion of New York's DVMT will likely continue it's upward trend, with the resulting total Statewide DVMT also impacted by the general business cycle for the remaining portion of business travel.

The policies and objectives set forth in this Draft Energy Plan provide many areas where efforts to improve the efficiency of the transportation system are aligning with these new travel trends, such as the Statewide ITS program, passenger rail and bus infrastructure upgrades, promotion of new pedestrian and bicycle facilities, intermodal freight access improvements, and the New York High Speed Rail Initiative.

Enhancing and Encouraging Energy Efficient Transportation

Energy use in the transportation sector is derived from the amount of travel, expressed as vehicle miles of travel (VMT), and fuel economy, expressed as miles per gallon (MPG). Increasing energy efficiency in the transportation sector can be accomplished by reducing VMT, increasing the fuel economy of the vehicles used for travel, or by reducing congestion and vehicle delays. Reducing VMT can be achieved in a number of ways, from an absolute reduction in travel to increasing the occupancy of each vehicle to move the same or more travelers in fewer vehicles (shifting from single-occupant vehicles [SOVs] to high-occupancy vehicles [HOVs], which include carpools, vanpools, and transit vehicles).

As travel has increased, the level of congestion, often expressed as vehicle hours of delay (VHD), on many roads has also increased. A major impact of congested travel is an increase in the amount of fuel used to make a trip. For 2000, it is estimated that travel delays on the State highway system resulted in almost 285 million gallons of wasted fuel. If nothing is done to address congestion, the amount of wasted fuel would rise to over 400 million gallons by 2006, an increase of 40%. Across the State, many actions have been taken to reduce the worsening congestion on New York's highways, but it remains a major challenge, especially in urban areas. New York is proposing and implementing a number of congestion mitigation measures as part of its capital and operating programs. Estimates from the most recent capital program update in 2000, for the 5-year period from State fiscal year (SFY) 2001/2002 through SFY 2005/2006, indicate that these congestion mitigation measures would reduce the growth of VHD by almost 120,000 hours per day, resulting in estimated fuel savings of 45 million gallons annually, a savings of over 10% compared to the fuel wasted under the "no build" projection. As congestion decreases, air pollutant emissions and energy use also decline. The following sections describe some of the actions undertaken by New York that enhance mobility within the State through congestion mitigation and have a positive impact on energy usage and efficiency in the transportation sector.

Reducing Person Hours of Delay And Vehicle Miles Traveled

The cost of congestion to New York residents is exceedingly high, including unnecessary extra vehicle wear and tear, lost time, increased fuel use, and increased delivery costs. Using current information on traffic flows and roadway facilities, the New York State Department of Transportation (DOT) estimates that congestion on State-owned highways alone cost New Yorkers almost $5 billion in 2000. Assuming nothing is done to ease congestion, and assuming typical traffic growth rates and current fuel prices, this figure grows to just under $7 billion in 2006, a 40% increase. These figures do not include travel and delays on roads owned by local governments, which generally have lower traffic volumes.

The primary methods to reduce congestion and its impacts are by decreasing vehicle hours of delay and total vehicle miles of travel. Every action undertaken by the State or local transportation agencies to mitigate the growth of congestion attempts to accomplish one or both of these objectives. These actions by nature are multi-modal, covering highway construction and operating projects, transit capital projects and operating policies (*e.g.*, fare incentives), and motor carrier and rail freight services. As an example of the scope and range of activities, the following international border crossing projects and initiatives have been implemented or are being implemented at New York's international border crossings to help reduce congestion and reduce energy use:

- Deploying two Intelligent Transportation Systems and Commercial Vehicle Operations (ITS/CVO) units at the Peace Bridge, which are expected to improve the efficiency and flow of traffic and trade across the border by reducing the time for processing commercial vehicles and reducing the number of required secondary inspections.

- Developing a strategic plan with the Niagara Falls Bridge Commission(NFBC) to address the traffic queuing and safety concerns within the plaza and along the approaches to the Lewiston/Queenston bridge, including installing cameras within the plaza, and variable message signing and pavement sensors on the approaches and connecting highway that will be tied to a transportation management center.

- Modernizing the Interstate Route 87/Champlain Inspection Plaza to increase its capacity and reduce traffic queues.

Carefully selected highway construction and operating projects can enhance mobility, reduce traffic congestion, increase travel speeds, and decrease energy use. Highway and bridge construction projects can improve traffic conditions and travel speeds that lead to energy savings.

Examples of highway capital projects that decrease energy use through mobility improvements include the following:

- Rebuilding State Route 17 into a four-lane, controlled-access facility for designation as Interstate Route 86. This will result in increased safety and economic development along the Southern Tier and in Western New York, and will reduce delays along this corridor.

- Expanding the HOV lane network along the Long Island Expressway in Nassau and Suffolk counties.

- Reconstructing the Interstate Route 684, State Route 120, and State Route 22 interchange in Westchester County.

- Widening State Route 22 from Interstate Route 84 to County Road 65 in Putnam County.

In addition to capital improvements to the highway system, New York addresses the operating efficiency of the network through the use of Transportation Demand Management (TDM) actions and Transportation System Management (TSM) measures. TDM actions alleviate traffic problems through improved management of vehicle trip demand. These actions are primarily directed at commuter travel and are structured to reduce the dependence on and use of single-occupant vehicles, or to alter the timing of travel to other, less-congested times outside the peak periods.[1] TSM measures are focused on increasing the efficiency of the transportation system through measures such as ITS techniques, traffic signal improvements and coordination, incident management, and providing traveler information through Variable Message Signs (VMS). It is important to recognize that there are two kinds of delay that must be addressed. Recurring delays occur when traffic volumes exceed the roadway capacity and tend to happen on a regular basis. Actions to reduce recurring delay include most of the TDM strategies and TSM actions such as signal coordination and ITS. Incident, or non-recurring, delay is caused by incidents on the roadway that reduce traffic flow. Incidents include accidents, vehicle breakdowns, debris in the travel lanes, or special events. Most incident delays are random, unpredictable events. Incident management strategies specifically target the congestion resulting from traffic incidents.

All TDM and TSM measures have the potential to save substantial amounts of fuel by reducing VMT or reducing delay. A wide variety of TDM and TSM actions are targeted at reducing the growth of congestion in the State. Some examples of these TSM and TDM actions include the following:

- Implement a Highway Emergency Local Patrol (HELP) program to decrease highway delay caused by incidents, such as accidents and breakdowns. HELP

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[1] TDM focus areas included the monitoring, program funding, and evaluation of voluntary TDM programs; TDM incentive and grant programs to facilitate participation in alternative commute modes; TDM integration with other mobility and capital programming initiatives; TDM modeling and evaluation mechanisms; commuter choice/employer issues; employer based technical assistance services; and development of TDM partnerships.

trucks are currently operating in several areas across the State, including New York City, Long Island, the Lower Hudson valley, and the Capital District. An additional program is planned for Buffalo.

- Coordinate traffic signals, which reduces delay at intersections and increases travel speeds on arterial streets.

- Develop and/or expand express bus and vanpool/shuttle services in the Cross Westchester Expressway and Long Island Expressway transportation corridors.

- Develop and/or expand park-and-ride lots, primarily in the lower Hudson Valley and Long Island.

- Install TDM signs to promote carpooling opportunities on the Staten Island Expressway.

- Provide grants to assist private employers on Long Island and in the lower Hudson Valley to develop alternative commuter transportation services at work sites.

ENCOURAGING ENERGY-EFFICIENT ACTIONS BY TRANSPORTATION PROVIDERS

Governments at all levels provide transportation infrastructure by constructing, maintaining, and operating roads, bridges, and other facilities. This infrastructure is used by travelers and public and private transportation providers such as public transit authorities, intercity bus companies, and the trucking industry. Government agencies need to work with these public and private transportation providers to encourage them to adopt programs and policies that meet traveler needs and contribute to improving energy efficiency. Government agencies can encourage energy-efficient actions by transportation providers through pricing structures, taxing methods, subsidies, and regulations. In addition, government transportation providers must carefully apportion transportation resources between existing facilities and the need to expand the network to satisfy unmet demand. Using the majority of scarce resources to keeping transportation facilities in a state of good repair continues to be an essential element of good energy policy. Inadequate infrastructure investment increases direct and indirect costs to businesses and consumers. A deteriorated highway and bridge network increases direct economic and energy-related costs, including unnecessary fuel consumption, motor vehicle depreciation, labor costs, and accidents.

In 1995, the Governor developed a five-year capital program to address the infrastructure

needs of the State's highways and bridges. The goal of the program was to stabilize the condition of the State's roads, improve the condition of the State's bridges, and facilitate economic expansion through the implementation of capital and preventive maintenance work. During the five year period between SFY 1996/97 and SFY 2000/01, DOT received bids on nearly $6 billion worth of construction. Fully 88% of those projects, at a cost of over $5 billion, were infrastructure projects. It is expected that over the next five years this percentage will climb to 92%. In addition, capital projects include energy-saving improvements such as new or improved traffic signals and other intersection improvements. These activities improve traffic flow, reduce travel time, and increase mobility. DOT employs night-time construction on its most heavily-traveled roadways to make infrastructure repairs under low-traffic conditions, while still moving the majority of people and goods during the day in an effective and energy-efficient manner.
A sizeable portion of this construction work may involve relocation of utility facilities. Currently, under existing law, most relocation costs are not reimbursed to the affected utilities. The utility industry has asked DOT to review the existing legislation and related policy regarding utility relocation. The industry seeks relief from the expenses they incur when they are required to move their facilities because of a DOT project. DOT has had a long standing policy that it views as fair: access is provided to the right-of-way without any fees and while the purpose of the highway infrastructure is mainly for its customers, the traveling public and business, every effort is made to accommodate the needs of and the costs to the utilities. DOT continues to seek ways to reduce overall project costs, including utility relocation, and has modified its policies and procedures, consistent with existing state law, regarding when and how utilities are reimbursed. DOT continues to work with the utilities to make the process more efficient and reduce costs by developing projects more closely with the utility industry, precisely identifying the locations of utilities and, if possible from a highway and safety standpoint, designing around them. This approach is becoming more critical as the demand for use of the right-of-way expands with new technology. DOT is willing to share its successful approach with interested municipalities on their projects, which constitute the largest number of relocations.

Encourage Use of More Fuel-Efficient Vehicles

Efforts to encourage energy efficiency in transportation have traditionally focused on encouraging the shift from SOVs to multi-occupant vehicles. While the fuel efficiency of the vehicle is unchanged, the multi-occupant vehicle trip is many times more energy-efficient than a SOV trip. Some government programs promote the purchase of more fuel-efficient vehicles, require stricter fuel economy standards on manufacturers (see later section on CAFE standard), and offer tax rebates for the purchase of alternate-fuel vehicles. Each of these measures will provide some incentive for the traveling public to buy and use more fuel-efficient vehicles.

<u>The Quality Communities Initiative</u>

The Governor's Executive Order #102 created an interagency Quality Communities Task Force that was charged with studying community growth in New York and assisting communities in implementing effective land development, preservation, and rehabilitation strategies that promote both economic development and environmental protection. The Task Force's report, *State and Local Governments Partnering for a Better New York,* identified elements critical to Quality Community development and defined the challenges inherent in that development. Among the seven quality community principles recommended to improve the quality of life for the citizens of New York were enhanced transportation choices, more liveable neighborhoods, and sustainable development.

DOT's participation on the Task Force reinforced the need to ensure that transportation planned for the community is compatible with current and future community development. A number of programs have been implemented or expanded that will better address community objectives and, at the same time, result in more cost-effective delivery of energy or reduced transportation sector energy demands. These include: implementing new and enhanced rural public transportation in the North Country and countywide coordinated transit services in Sullivan County; planning for passenger intermodal transportation centers[2] in Binghamton, Jamaica, New Rochelle, Poughkeepsie, Saratoga Springs, Rochester, Utica and Tompkins County; and, developing a freight intermodal terminal on Long Island. Successfully implementing these and other principles will result in less VMT, reduced congestion, and improved traffic flow, all leading to less fuel use and improved energy efficiency.

DOT's Main Street Initiative, where state highways traversing villages are reconstructed in ways that enhance the quality of life for residents and support the economic framework of rural "Main Streets," is underway across the State. Sidewalks, bicycle travel ways, and better transit access are all potential components of a Main Street initiative and encourage a more energy-efficient local transportation system.

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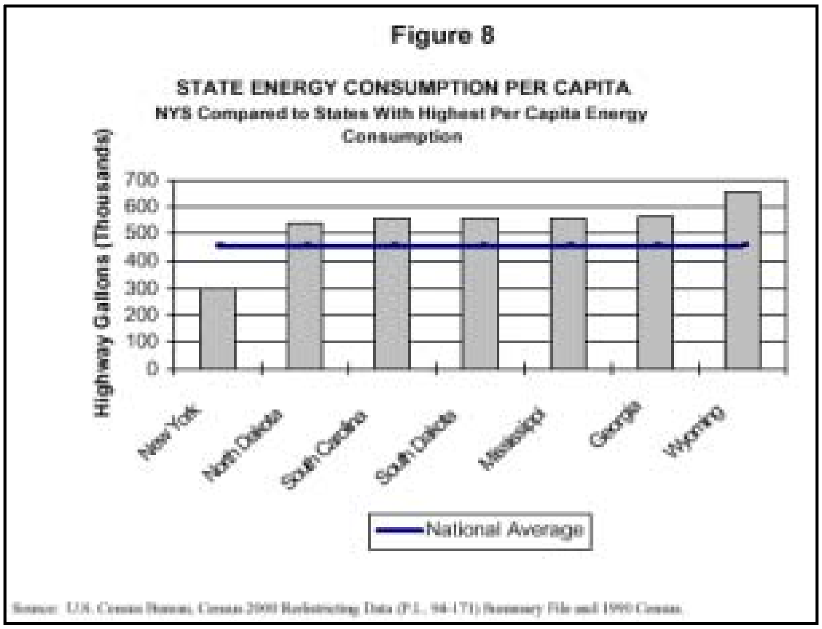
[2] Passenger intermodal transportation centers are locations where travelers can switch from one mode of travel to another. Examples include subway or rail stops at airports and bus terminals co-located at passenger railroad terminals

Public Transportation

An efficient, safe, and environmentally sound public transit system is essential to moving people in both rural and urban areas and is a fundamental part of the State's multi-modal transportation infrastructure. The State's extensive public transportation network provides mobility alternatives for residents in the State's urban areas that are essential to the health of New York's economy. Public transit also provides mobility for rural and elderly residents in the State's small towns and villages, without access to other modes of transportation, to travel to medical, social service, and other necessary services. A direct result of New York's extensive support for public transportation is the fact that the State has the lowest per capita energy use for transportation of any state in the nation. Energy consumption for transportation purposes in New York is approximately two-thirds the national average (Figure 8).

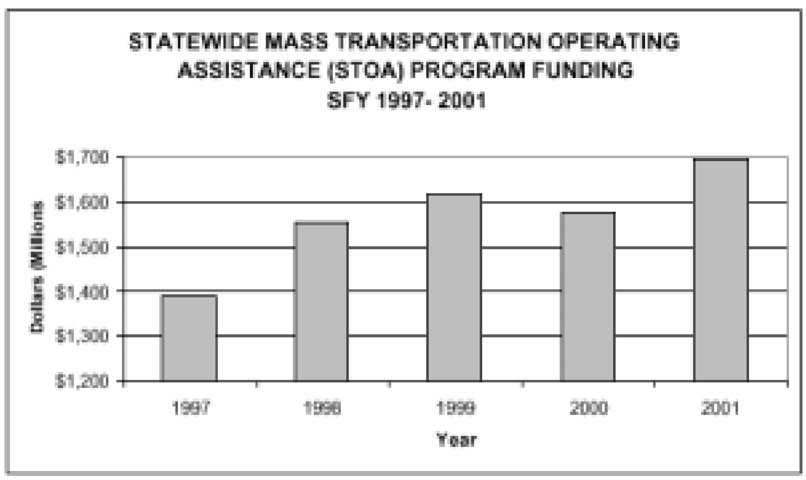


New York continues to experience an unprecedented increase in using public transportation. Transit ridership in New York not only accounts for one-third of the nation's ridership, but in 2000, more than 50% of the increase in national transit ridership occurred within the State. Much of the resurgence of public transit within the State can be attributed to the State's fiscal and fare policies (as discussed below). Based on analysis provided by the American Public Transportation Association (APTA), the average commuter who uses public transportation conserves approximately 200 gallons of gasoline annually when compared to driving alone. Based on this estimate, it is projected that the availability and convenience of public transportation in New York results in the conservation of more than 875 million gallons of gasoline or the equivalent of nearly 21 million barrels of oil annually.

State Public Transportation Assistance

Under the Governor's leadership, the State has made and will continue to make important capital and operating investments to improve New York's transportation system. New York provides $1.7 billion in operating assistance annually for public transportation, more than any State in the nation. Not only does public transportation support economic and environmental policies, the State's significant financial assistance helps create energy efficiencies while at the same time mitigates traffic congestion in the State's major urbanized areas. Including the Governor's 2001-02 budget recommendation, State support for public transportation operating assistance has increased by approximately 22% since 1997 (Figure 9). The increases in State funding has allowed transit systems to maintain and enhance public transportation services as well as enable the State and transit systems to support emerging public transportation needs, including the following: suburban mobility, welfare-to-work, special needs of the elderly, and accessibility for persons with disabilities. This strong support has enabled transit systems in the State's urbanized and rural areas to maintain fares at or below the national average making transit a viable and affordable transportation alternative. Assuming current funding levels, it is anticipated that the State will provide more than $8.5 billion in operating assistance over the next five year period, resulting in the conservation of more than 4.4 billion gallons of gasoline.

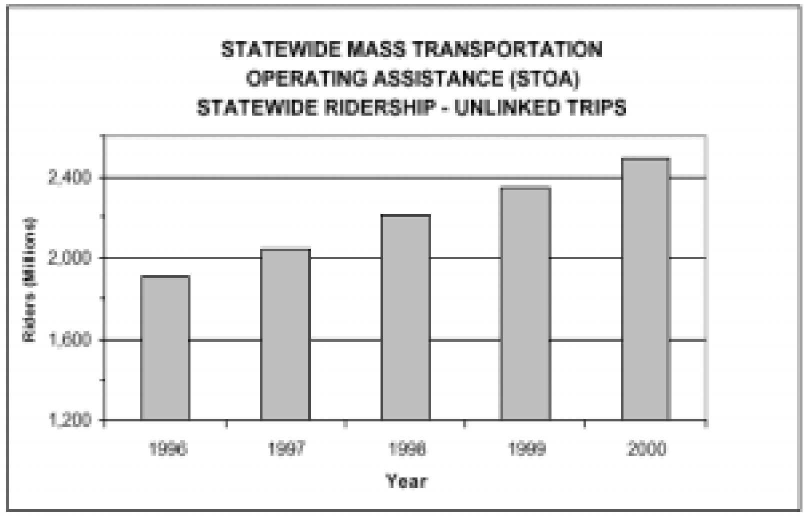
Figure 9



Source: New York State Department of Transportation

In addition, the Governor's multi-year capital program has identified nearly $2.2 billion in State funding for the Metropolitan Transportation Authority's (MTA) capital program for the 2000-2004 period. For systems other than the MTA, the multi-year program includes $146.0 million in capital assistance during this period. These new funds will be used for bus acquisition, maintenance facility improvements, and other regionallysignificant capital projects that are expected to have a positive energy impact within the State.

Figure 10

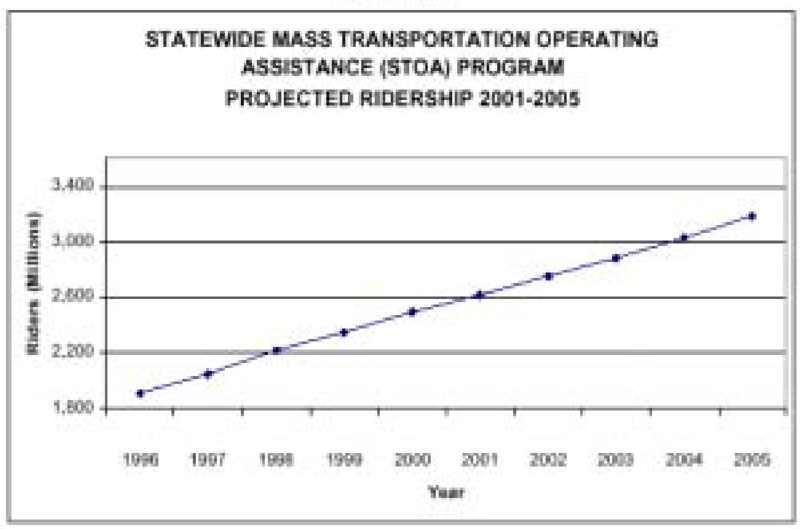


Source: New York State Department of Transportation

<u>Return on Investment</u>

The return on State investment in public transportation is clear. In 2000, ridership on services receiving Statewide Mass Transportation Operating Assistance (STOA) increased by 7% to 2.4 billion trips annually - the largest ridership level since the program was authorized in 1974. Additionally, over the past five years, ridership Statewide has increased by 31% (Figure 10). It is estimated that more than 70% of these trips are work-related, significantly supporting the State's economic growth. Assuming that current growth continues for the national and State economies, no major changes in local fare policies, and increased roadway congestion, it is estimated that State transit ridership will continue to increase over the next five years by approximately 5.0% annually to a level of 3.2 billion trips annually (Figure 11).

Figure 11



Source: New York State Department of Transportation

MetroCard Fare Policies/Incentives

Direct State support of public transportation has enabled transit systems in the State's urbanized and rural areas to maintain fares at or below the national average. In addition, the Governor has championed one of the most aggressive fare incentive policy programs in the nation within the New York City metropolitan area. In July 1997, MTA began implementing the MetroCard program on a system-wide basis for its operating services, for private bus services sponsored by the New York City Department of Transportation (NYCDOT), and for suburban bus service operated in Nassau County by MTA Long Island Bus (MTA-LIB). The MetroCard program, a series of fare discounts offered by MTA, has proven beneficial in terms of increasing transit ridership thereby mitigating highway congestion and automobile pollution as well as increasing the State's overall energy efficiency.

The following are the fare discounts/incentives implemented under the MetroCard program since 1997**:**

- Free bus-to-subway or subway-to-bus transfer -- effectively eliminating the two-fare zone;
- Eliminated the fare for pedestrian passengers on the Staten Island Ferry;
- Established an 11-for-10 discount program whereby an individual who purchases 10 rides will automatically get the 11th ride for free;
- Reduced express bus fares by 25% (from $4.00 to $3.00); and,
- Implemented 30-day, 7-day, and 1-day fun passes, which provide unlimited use for those time periods.

As a result of fare incentives, ridership has dramatically increased on participating systems. For example, comparing the first half of 1997, before the MetroCard fare incentives went into effect, with the first half of 1999, after all the MetoCard fare incentives went into effect, finds that subway and bus ridership in New York City increased 19%. Nearly 5% of that increase can be explained by the increase in the number of jobs created in New York City. The remaining 14% can be explained by the fare incentive program. Similar ridership increases occurred on NYCDOT private bus and MTA-LIB services. Comparing 1996 annual ridership with 2000 annual ridership finds that NYCDOT ridership increased 33.8% and MTA-LIB ridership increased 16.6%. The State, through its Master Links initiative, is reviewing opportunities to extend

MetroCard to all public transit services within the immediate New York City Metropolitan area.

Commuter Choice

The Governor has proposed a new transit initiative to reduce the need for individual commuting by New York State employees and further stimulate ridership for transit systems around the State. This new initiative will allow employees to set aside up to $780 annually in pre-tax income to pay for public transportation and/or other eligible commuter expenses. The pre-tax transit benefit will apply to most forms of public transportation services, including buses, trains, ferries, and vanpools.

Legislation is already in place that allows employers, including New York State, to establish pre-tax programs for implementing Commuter Choice programs. Commuter Choice offers the opportunity for New York's already energy-efficient transportation system to become even more energy-efficient (see the discussion on the transportation/energy/air quality connection).

Ferries

Over the past several years there has been a resurgence in the use of ferries in New York. This resurgence has been especially noticeable in the New York City area, where 15 ferry routes are operated carrying approximately 100,000 passengers daily. The publically-owned-and-operated Staten Island Ferry is by far the largest and serves 65,000 daily passengers free-of-charge. The remaining private operators, which started service after 1986, currently provide daily service to approximately 35,000 commuters. Ferries are one of the most energy efficient means of transporting people.[3] Accordingly, the presence of this ferry service has energy benefits not only because of its relatively low fuel consumption but also because of its ability to divert passengers from longer and more congested automobile trips.

Bicycle and Pedestrian Initiatives

Pedestrian and bicycle travel provides many benefits for the community. These include improved mobility, public health, and environmental quality, while at the same time

[3] Again using the Staten Island Ferry as an example, its large Kennedy Class boats can carry upwards of 6,000 persons per trip. The Staten Island Ferry takes a significant percentage of potential automobile commuters from extremely congested highways and bridges that connect Staten Island with Manhattan.

reducing vehicle congestion, emissions, and energy consumption. The State, through its Bicycle and Pedestrian Program at DOT, promotes the benefits of bicycling and walking as an alternative to the continued-reliance on motorized vehicles for all trips. DOT recognizes engineering, encouragement, and education as the keys to making the State more walkable and bikeable, and therefore, more energy efficient.

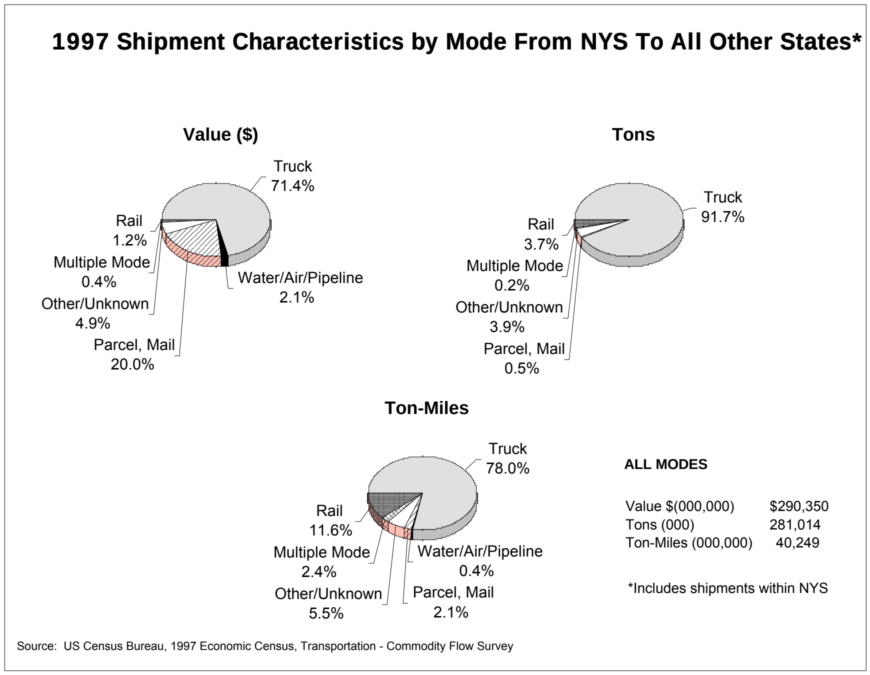
According to the 1995 NPTS statistics for New York, 14.7% of all trips in the State are made by bicycling or walking, accounting for 1.2% of all personal miles traveled or 1.1 million miles annually. Statistics from the 1994 National Bicycling and Walking Study indicate that replacing automobile trips with non-motorized, energy- efficient bicycling or walking trips would save between $.05 and $.22 for every automobile mile displaced, or between $55 millon and $242 million annually. To promote walking and bicycling, the State has created or sponsored thousands of miles of on-road bicycle facilities (including over 1,200 miles of state bicycle routes), tens of thousands of miles of sidewalk, and over 16,000 miles of shared use and special use paths.

An important aspect of encouraging walking and cycling in New York State is to have seamless linkage between walking and bicycling, and public transportation trips. National surveys have shown that many persons would walk or ride their bicycles to get to public transportation, if appropriate facilities were provided. Bicyclists would be more willing to use public transportation if provided with: (1) suitable bicycle parking facilities where cyclists can store their bicycles, protected from the weather, theft, and vandalism; and, (2) bicycle racks on buses, thereby expanding the range that cyclists may practically use their bicycles. For pedestrians, the facilities needed include: (1) a secure, well maintained shelter; and, (2) access to bus stops provided through designated paths or walkways and effective street crossings that provide a direct linkage between their home or work, and the transit stop.

Intermodal Transportation

The trend in the movement of both passengers and freight is toward intermodal transportation. Intermodal transportation entails the use of multiple modes (*e.g.,* highway, rail, air, waterborne) of transportation to take advantage of the efficiencies and flexibility of each mode for specific portions of a trip. Figure 12 shows the distribution of freight shipments in New York by various modes. Freight shipments from New York were valued at nearly $300 billion in 1997, the latest year for which data are available, representing over 280 million tons. This is up significantly from 1993 levels of over $260 billion and 220 million tons. Freight shipments by truck were the predominant mode of shipping, representing about three-fourths of all freight shipments. The advantages of developing multi-modal or intermodal alternatives include cost-efficiency through increased competition, increased transportation capacity through non-highway modes, and, energy savings due to the energy efficiencies of modes other than personal passenger cars or trucks used for intercity freight movement.

Figure 12



Technologies for truck and rail intermodal transportation effectively reduce energy use. Container-on-flatcar (COFC) and trailer-on-flatcar (TOFC) and bulk cargo transfer technologies are both cost and energy efficient. To date, New York has not been able to take full advantage of these intermodal technologies because of vertical clearance restrictions on rail lines serving some major markets, such as New York City and Long Island, and because of the lack of intermodal transfer facilities. The State, in partnership with the Canadian Pacific Railroad, is working to address these physical constraints to enable full intermodal freight access to all areas of the State. Specific initiatives underway or in the planning phase to better use existing rail and highway capacity, as well as reduce energy usage include the following:

- Initiating a bridge-over-rail program that provides a minimum clearance of 17'-6" for TOCF and COFC trains and subsequently 20'-6" of clearance for all structures between Montreal and New York City.

- Expanding the number of rail car barges and improving the rail infrastructure at the New York Harbor to provide direct rail access from either Staten Island or New Jersey to Brooklyn and other points in the New York City and Long Island area. This will divert truck traffic to rail and also eliminate the need for New York City rail traffic originating in the southern U.S. to be routed via Albany.

- Continuing development of a proposed freight intermodal center at the Pilgrim State Hospital site in Islip, Long Island. This intermodal center will become a key facility for freight movement onto Long Island.

- Continuing ongoing work with other New York City-based agencies to identify and implement improved rail access and intermodal facilities. Initiatives under study include a rail tunnel between Staten Island or New Jersey and Brooklyn, improved freight port facilities in Brooklyn, and establishing a major freight intermodal facility at Maspeth, Queens.

In addition to these specific initiatives, the State is working with the major railroads to identify projects in New York that can increase rail capacity, promote intermodal transportation, and provide improved rail access for economic development.

INNOVATION AND NEW TRANSPORTATION TECHNOLOGIES

As in telecommunications and many other arenas, the use of new technologies and development of innovative applications of existing technologies to transportation serves to advance the state of practice and also makes the transportation system more energy-efficient. Innovative approaches to congestion and ridership patterns enable the transportation system to meet basic transportation needs of the public within the context of the current network.

Intelligent Transportation Systems

New advances in this technology are allowing even faster speeds through toll plazas, further reducing fuel use at these sites. A prime example is the E-Z Pass system, which has seen significant growth in use due to its ability to reduce delays at toll barriers. Figure 13 shows the trends in the numbers of vehicles using E-Z Pass tags.

ITS applies advanced technologies, such as information processing, communications, computer controls and electronics to implement new management, control, and information systems that improve transportation safety and energy efficiency, reduce congestion, enhance mobility, minimize adverse environmental impacts and promote economic productivity.

DOT is advancing a statewide ITS program called NY MOVES. Strategic deployment plans for this program have been developed for each of the major metropolitan areas of the State (New York City, Long Island, Hudson Valley, Albany, Rochester and Buffalo are complete - Syracuse is still being developed), as well as the small urban and rural areas.

The following sections summarize some of the key elements of ITS that are expected to significantly reduce energy use in the state:

<u>Traffic Management Systems</u>

Traffic Management Systems involve deploying sensors and traffic control devices to quickly detect and respond to traffic incidents. They facilitate improved real time management of traffic on freeways and arterials, alert incident management patrols that assist motorists, and improve traffic signal timing and operations. Also included are automated systems that can expedite traffic flow at international border crossings. Table 1 highlights the energy benefits of these type of projects. By 2006, ongoing and planned ITS projects are expected to reduce vehicle delay by about 42,000 hours daily.

<u>Traveler Information Systems</u>

Providing timely, accurate information on routing and current travel conditions allows travelers to make smart choices on the best route, time, and mode, allowing motorists to travel more efficiently and save fuel. A study of Long Island's INFORM system[4] showed a doubling of reported diversions to avoid delay when active messages providing specific routing information(such as *Delay Ahead - Choose X Alternate Route*) were used rather than passive messages that provided general information (such as *Delay Ahead - Choose Alternate Route*).

TABLE 1
Energy Benefits of ITS Projects

	Reduced Delay/Travel Time	Reduced Fuel Consumption
Freeway Management Systems:	30% reduction in travel time for recurring delay, 60% for non-recurring delay	Up to 41% during congestion periods
Incident Management Programs:	Time to detect and clear incidents on the Gowanus Expressway reduced for 90 minutes to 31 minutes (61%) with breakdowns reduced to 19 minutes	Predicted fuel reduction of 41.3 million gallons (42%)
Traffic Signal Systems:	17 - 37%	6 - 12%

<u>Public Transportation and Multimodal Traveler Information Systems</u>

Sustaining the high levels of transit ridership that account for New York's uniquely energy-efficient transportation network requires careful attention to the needs of the transit rider. Providing reliable, convenient, comfortable, and easy-to-navigate service, is essential to sustaining ridership among customers with transportation choices.

Transit ITS systems are becoming increasingly popular among New York's transit providers. Transit ITS has three major emphasis areas:

- Increasing the efficiency and reliability of transit service by managing the fleet based upon real-time performance information;
- Improving customer access to service information such as customized itineraries that permit them to navigate the transit system from door to door, or next-bus arrival information at bus stops to improve the customer's confidence in the reliability of the service; and,

[4]USDOT Report No. FHWA/TX-99/1790-3 "ITS Benefits: Review of Evaluation Methods and Reported Benefits" October 1998.

- Improving the convenience of transit use by providing more options and ease in fare payment.

Nearly all the major urban transit systems in New York have or are procuring automated vehicle location (AVL) systems. These systems provide dispatching and control centers with real time information on bus location and on-time performance information.

ITS Research and Development

The State actively participates the national ITS Automated Highway System program. This is a long-term program that is assessing and developing prototype systems to automate the vehicle/driver operation so that vehicles can safely travel at high speeds and close headways. This system has the potential to double the capacity of each highway lane, significantly reducing congestion and accruing the associated energy benefits of more consistent speeds, fewer stops, and less time idling. While an automated highway system is estimated to be at least 20 years from becoming fully-operational, this research should lead to incremental improvements in the vehicle, accruing benefits within the next few years. A prototype system was tested in San Diego, California in 1997.

High Speed Rail Program

The State and Amtrak are advancing a $200-million program to bring high-speed rail service from New York City, through Albany and on to Buffalo (the Empire Corridor). The program includes the re-manufacturing of seven high-speed turboliner trainsets as well as track and signal improvements. The High Speed Rail Program will reduce travel time, offer more frequent and reliable service, and improve passenger amenities, resulting in an expected increase in ridership along the Empire Corridor by as much as 150 percent. This ridership increase means less automobile travel, resulting in substantial time and energy savings.[5] Rail infrastructure projects include safety improvements at both public and private grade crossings, new track, bridge rehabilitation, curve straightening, and signal improvements.

DOT is also testing the feasibility of new military propulsion technology to improve the third rail propulsion systems on the trainsets. The new technology involves light-weight,

[5] The new turboliners will have two-1600 horsepower diesel turbine power units -- one in each of the two locomotives, which will be located at opposite ends of the train. The diesel power units are quieter, cleaner, more fuel efficient and less polluting than other passenger train equipment. Each trainset is also equipped to operate on third rail electricity.

high-speed motors and control systems recently developed for the military and now available for civilian applications.

ALTERNATIVE FUELS AND ALTERNATIVE FUEL TECHNOLOGIES

One of the most prominent and significant developments in recent years has been alternate-fueled vehicles (AFVs) and the technology and infrastructure associated with them. This technology is a highlight example of innovation and application of new (as well as existing) technology in the transportation sector.

Alternate Fuel Vehicles

Governor Pataki's 1996 Clean Water/Clean Air Bond Act stipulated creating a clean-fueled vehicle program by the Office of General Services, for the purpose of acquiring clean-fueled vehicles for State use and testing, and for evaluating clean-fueled vehicle technologies. The driving force behind this program is the Clean-Fueled Vehicles Council (Council), established in 1998.[6] The Council ensured that State government would move quickly in a coordinated approach to using AFVs in their daily operations. In mid-1999, the Council began formulating a comprehensive fueling infrastructure plan to accommodate the State's growing fleet of AFVs. In formulating an overall Statewide infrastructure plan, compressed natural gas (CNG) was determined to be the most suitable fuel at this time.

When fully implemented, a two-phase plan will double the number of existing CNG fueling stations in the State. Phase I calls for 30 low-volume FuelMaker CNG sites at DOT facilities across the State. These sites are open to State vehicles only, and are capable of producing up to 100 gallons of CNG per day. The first station was opened in June 2000 and since then, 29 more have opened. Phase II calls for up to 16 high-volume CNG stations capable of dispensing a minimum of 500 gallons per day under a joint

[6]The Clean Fueled Vehicles Council includes the following members:

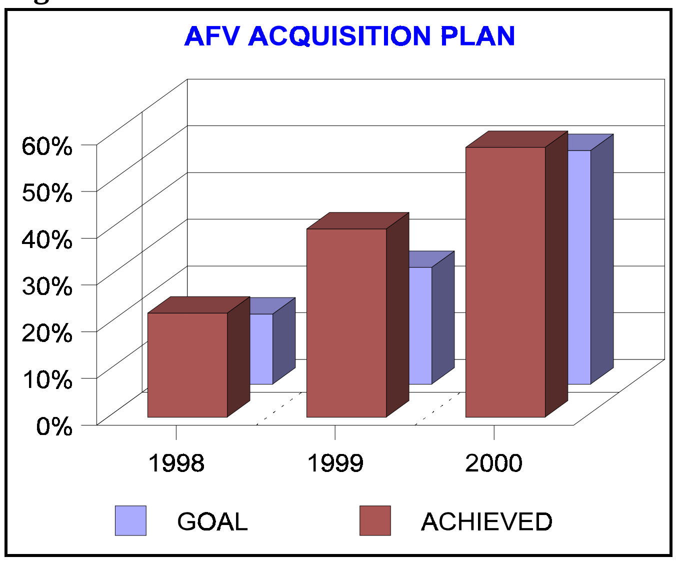
Department of Agriculture and Markets
Department of Correctional Services
Department of Environmental Conservation
Department of Motor Vehicles
Department of Transportation
Division of the Budget
Empire State Development Corporation
New York Power Authority
New York State Energy Research and Development Authority
New York State Thruway Authority
Office of Children and Family Services
Office of General Services
Office of Mental Health
Office of Mental Retardation and Developmental Disabilities
Office of Parks, Recreation and Historic Preservation
State University of New York
Department of Taxation and Finance

public/private partnership. State agencies provide the land and the private-sector constructs and operates the fueling stations. These fast-fill CNG stations, installed strategically around the State at DOT, New York State Thruway, Office of General Services, and Corrections facilities will be commercially-operated and open to the public.

The fuel infrastructure plan also addresses the need for other alternative fuels, and includes installing a number of electric vehicle charging sites. As an initial step, seven charging stations have been installed at the Empire State Plaza in Albany to accommodate visitors. In addition, the feasibility of establishing ethanol and propane fueling stations is being addressed.

The Federal Energy Policy Act of 1992 (EPAct) requires state agencies to acquire AFVs in increasing annual percentages of their fleet light-duty vehicle purchases, beginning in model year 1997. EPAct further requires annual reporting to the U.S. Department of Energy (U.S. DOE). As shown in Figure 14, New York has exceeded federally-mandated acquisition requirements under EPAct for the past three years as follows:

Figure 14



1998 Goal 15%; NewYork achieved 22.25%
1999 Goal 25%; New York achieved 40.26%
2000 Goal 50%; New York achieved 57.70%

New York expects to continue to meet or exceed EPAct goals, which increase to 75% for 2001 and thereafter. As of July 1, 2001 New York has acquired 1416 AFVs. In calendar year 2000, New York purchased 200,000 gasoline-gallon equivalents of CNG. In calendar year 2001, this figure jumped to 750,000 gasoline-gallon equivalents.

New York is working with the Northeast states in a united effort to influence the direction of alternate fuel programs. The principal features of New York’s clean-fueled vehicle program model - creative planning, multi-agency participation, and promoting favorable manufacturer relations - are strategies that can be easily adapted by other states.

To underscore the importance of AFVs in meeting New York's transportation, energy, and environmental goals, Governor Pataki, in Executive Order 111, directed that, by 2005, at least 50% of State agencies' light-duty vehicle purchases must be AFVs. By 2010, this percentage increases to 100%. The Executive Order covers all agency vehicles, regardless of the number of vehicles in the agency's fleet or where they are assigned.

New York Power Authority Electric Transportation Program

The NYPA Electric Transportation Program is actively engaged in initiatives that employ electricity as a transportation fuel to address concerns about clean air, noise pollution, and traffic congestion.

NYPA is the nation's largest supplier of electricity for mass transit, powering the subway and commuter trains of metropolitan New York City. In addition, NYPA has put into service several hundred electric cars, light trucks, buses, vans, and other vehicles for use by its customers and at its own facilities. In 2000, those vehicles achieved the 'million mile mark' for combined AFV-mileage, making NYPA the first utility in the Northeast to achieve this milestone.

The array of NYPA electric vehicle projects includes hybrid-electric transit buses, station/commuter cars, all-electric school buses and shuttles buses, small urban electric vehicles and electric delivery vans and trucks. In October 2001, NYPA and Ford Motor Company's electric vehicle group, TH!NK Mobility, launched the "Clean Commute" commuter station car demonstration in cooperation with MTA, NYSERDA, the Long Island Power Authority, DOT, New York City Department of Transportation, and U.S. DOE. The demonstration program will lease 200 electric vehicles to passenger rail commuters in the metropolitan New York City region.

Alternative Fuel Technology for Transit

New York is a national leader in combining transportation improvements with environmental benefits and new energy technologies. In 1991, the State sponsored a consortium of transit systems interested in alternative fuel development. As a result of the initial consortium pilot, several transit systems around the State have committed to mainstreaming AFVs into their urbanized-area fleets. Most transit systems currently use CNG-powered buses and MTA-New York City Transit is also making a significant commitment to utilizing hybrid-electric buses. Incorporating alternative-fuel buses into transit fleets has steadily increased, from 31 in 1991 to more than 2,300 programmed through 2004. In addition, MTA-New York City Transit has stated that all its purchases of standard-sized buses after 2004 will be as clean as AFVs. Relatedly, bus depots are being converted to facilities that can store and refuel these buses.

The most significant impediment to further expanding the use of AFV technology is its incremental cost and the associated infrastructure. To mitigate the impact of cost associated with AFV deployment, NYSERDA, in cooperation with DOT, has been providing competitive awards from the Clean-Fueled Bus Program (authorized under the 1996 Clean Water/Clean Air Bond Act) for the purchase of alternative fuel buses. The Clean Fueled Bus Program makes funding available annually to cover the incremental cost of procuring alternative-fuel transit buses and infrastructure.

Alternative Fuel Technology for the Private Sector

To promote fuel diversity and efficiency, it is important that private sector fleets begin to adopt alternative fuel technologies. Progress is being made in this area, primarily as a result of government incentives. NYSERDA is using approximately $6 million of federal Congestion Mitigation and Air Quality Program (CMAQ) funds to support introduction of natural gas, electric, and hybrid-electric vehicles in New York City, including heavy-duty trucks, delivery vehicles, and taxis. A similar program is operated on Long Island through the local Clean Cities organization. Other federal funds awarded to New York are used for projects to develop the necessary fueling infrastructure to support further introduction of alternative fuel vehicles in all sectors.

The New York Alternate Fuels Tax Credit program for placing these vehicles sunsets in 2002; the tax credit for manufacturers sunsets in 2003. The alternate fuel incentives described above have been a success. A program that includes: all types of alternate-fuel, light-duty vehicles; medium- and heavy-duty vehicles for the same vehicle technology; and incentives for alternative fuel providers to encourage their availability (such as a credit for every gallon of gasoline equivalent provided and/or a credit for installation costs of alternate fuel infrastructure) is expected to induce even greater penetration of these vehicles into fleets.

Energy Research Program

New York is committed to investigating and testing the economic, energy, and environmental factors aggressively for all emerging alterative-fuel technologies, and to advance the most appropriate technologies and combinations of technologies that address and support the State's needs. Based on viability and cost effectiveness, CNG and liquefied natural gas (LNG) are currently the focus of short-term and long-range planning. New York promotes the research, development, deployment, and use of all fuels and technologies designed to improve air quality and reduce the reliance on conventional energy sources.

The Clifton Park Rest Area on Interstate Route 87 was selected by NYSERDA to demonstrate fuel cell technology. Three 7.5-kW-rated fuel cells are being tested there, and three additional fuel cells were recently installed at a Saratoga County maintenance facility. Funding was provided from the 1996 Clean Water/Clean Air Bond Act. In collaboration with other State agencies, authorities, universities, and private industry, the DOT State Planning & Research Program (SPR), makes funding available for research projects, many of which will reduce the demand for transportation-sector energy.

THE TRANSPORTATION/AIR QUALITY/ENERGY CONNECTION

New York continues to be a national leader in meeting the challenges of improving air quality to healthful levels in all parts of the State. Although New York's air quality continues to steadily and dramatically improve, there is still much to be done, especially in the New York City metropolitan area. Transportation has a role in achieving air quality goals through more energy-efficient transportation systems.

Lead emissions and concentrations have been reduced to the point where lead is no longer considered a transportation-related air pollutant. Carbon monoxide levels and particulate matter less than 10 microns (PM10) have also improved to such an extent that attaining National Ambient Air Quality Standards is anticipated soon. Meeting the one-hour ozone, eight-hour ozone, and particulate matter less than 2.5 microns standards, however, will require more effort.

A list of transportation measures that are under consideration to reduce emissions of ozone precursors and, thereby, help lower ozone concentrations is shown in Table 2. The list includes measures that have been considered previously in New York or elsewhere in the nation. It also includes measures that have not been traditionally considered as transportation actions available to reduce emissions (*e.g.* construction and maintenance equipment). Each measure also has costs to government or industry that affect its feasibility as an emissions reduction alternative.

The measures in Table 2 are being considered in a three-phased approach. The first phase has DOT taking actions to improve air quality. Given the size and importance of its capital programs, DOT can influence other transportation agencies to take similar steps. The second phase includes the federal government and other regional and local governments. Collectively, these governments can provide substantial air quality benefits through coordinated implementation efforts. The last phase carries this effort to include the private sector in the metropolitan areas, which can yield maximum emissions reduction benefits.

For improving air quality, the more effective measures include the following: limiting emissions from construction and maintenance equipment; implementing Commuter Choice and Ozone Action Day programs; limiting emissions from bridge painting and traffic marking operations; coordinating traffic signals; and retrofitting diesel equipment. Some measures that improve air quality also reduce energy use. The Commuter Choice and Ozone Action Day programs are effective in reducing transportation energy use. For energy considerations, replacing standard traffic signal light bulbs with energy-efficient light emitting diodes (LEDs), enhancing transportation system management measures (such a carpooling, van pooling, *etc.*), and enforcing speed limits can provide substantial energy benefits. The last two measures are not particularly effective in reducing ozone precursor emissions. The measures listed in Table 2 are shown in Table 3 for ozone precursor reductions and in Table 4 for energy reductions. Tables 3 and 4 also include information on program costs and cost-effectiveness. A measure that reduces ozone precursor emissions may not save energy.

New York is committed to operating an energy-efficient and low-polluting transportation system. Examining and analyzing the transportation system's energy consumption and air emissions when long-range plans and Transportation Improvement Programs are adopted would enhance this commitment. This examination could be on a build/no build basis and include public review. If a plan or a program increases air emissions or uses more energy than doing nothing at all, additional measures or modifications to the plan or program could be considered to minimize the increases as much as practicable. This review would be in addition to existing federal and State requirements to address transportation conformity regulations in air quality non-attainment and maintenance areas.

TABLE 2

Possible Transportation Actions to Reduce Emissions

Possible Actions	
Construction equipment: limit/avoid use of heavy duty off-road equipment. Continue and expand nighttime construction. Limit use of equipment to p.m. periods and/or Ozone Action Days.	Enhance bicycle/pedestrian programs e.g bike racks on busses, bike lanes, pedestrian crossings, and connections.
Maintenance equipment: limit/avoid use of small and medium engine equipment such as lawn mowers/tractors, chainsaws, and weedwackers. Limit use of equipment to p.m. periods and/or Ozone Action Days.	Alternate fuels: private, transit, state, local fleets conversions to alternate fuels, promote/reward use of alternate fuels, clean engines in construction/maintenance equipment.
Ozone Action Days: continue Ozone Action Days. Extend public education/outreach to encourage alternative travel and avoid actions that pollute.	ITS: improved incident response, corridor management with optimized signals.
Commuter Choice, Parking Cash-out programs.	Speed limit reduction and enforcement.
Architectural coatings: limit bridge painting to p.m. periods and/or Ozone Action Days.	Programs for improved public transit: expand and enhance service, discounts tied to Ozone Action Days and employer incentives.
Replace fixed-time and semi-actuated traffic signals with fully actuated signals to reduce delay and idling.	Congestion pricing measures at tolled facilities to reduce vehicle usage, perhaps tied to Ozone Action Days.
Replace bulbs with LEDs in traffic signals.	Increase HOV requirement to 3+.
Maximize coordination of traffic signals.	Increase park and ride facilities.
Transportation management plans for employers to encourage ridesharing, vanpooling, telecommuting, flex time, and guaranteed ride home.	Aircraft and ground support operational and maintenance controls.
Freight improvement projects, convert freight carried by truck to other modes.	Limitations and enforcement on idling.
Retrofit of existing engines with catalytic converters, particulate traps, etc to reduce emissions.	

Table 3. Potential Ozone Precursor emission reductions from transportation actions

		Tons/Day		Annual Program Costs for Maximum Benfits		Dollars/Ton/Day Reduced for Maximum Benefits	
		NOx	VOCs	NOx	VOCs	NOx	VOCs
1 Construction							
	Total Metropolitan Area	5.3 - 29	1 - 6.2	$5,257,643	$10,000,000	$500	$4,386
	Government Component	0.9 - 5	0.1 - 2.3	$841,223	$5,000,000	$500	$5,839
	NYSDOT Component	0.1 - 0.7	0.02 - 0.4	$136,699	$1,000,000	$500	$6,387
2 Maintenance							
	Total Metropolitan Area	0.02 - 0.03	1.4 - 4.4	$1,051,529	$2,000,000	$83,504	$1,247
	Government Component	0.001 - 0.007	0.03 - 0.5	$168,245	$1,000,000	$69,828	$5,543
	NYSDOT Component	0.0002 - 0.001	0.005 - 0.09	$27,340	$200,000	$68,082	$5,912
3 Ozone Action							
	Total Metropolitan Area	4.3	3.0	$1,500,000	$1,500,000	$945	$1,391
	Government Component	4.3	3.0	$1,500,000	$1,500,000	$945	$1,391
	NYSDOT Component	4.3	3.0	$1,500,000	$1,500,000	$945	$1,391
4 Commuter Choice							
	Total Metropolitan Area	0.5 - 6.9	0.4 - 4.6	$123,750,000	$123,750,000	$49,136	$73,705
	Government Component	0.5 - 6.9	0.4 - 4.6	$123,750,000	$123,750,000	$49,136	$73,705
	NYSDOT Component	0.0	0.0	NA	NA	NA	NA
5 Coating							
	Total Metropolitan Area	0	0.03 - 3.9	NA	$3,489,714	NA	$2,452
	Government Component	0	0.03 - 0.56	NA	$542,844	NA	$2,656
	NYSDOT Component	0	0.03 - 0.5	NA	$92,284	NA	$506
6 Signals-replace fixed time with Actuated							
	Total Metropolitan Area	0.154	0.463	$4,671,875	$4,671,875	$83,012	$27,671
	Government Component	0.154	0.463	$4,671,875	$4,671,875	$83,012	$27,671
	NYSDOT Component	0.020	0.061	$703,125	$703,125	$95,506	$31,835
7 LED							
	Total Metropolitan Area	0.04	0.01	-$15,923,561	-$15,923,561	NA	NA
	Government Component	0.04	0.01	-$15,923,561	-$15,923,561	NA	NA
	NYSDOT Component	0.005	0.001	-$2,396,523	-$2,396,523	NA	NA
8 Signals-coordinate							
	Total Metropolitan Area	0.23	0.69	$1,495,000	$1,495,000	$20,375	$6,792
	Government Component	0.23	0.69	$1,495,000	$1,495,000	$20,375	$6,792
	NYSDOT Component	0.03	0.09	$225,000	$225,000	$20,375	$6,792
9 TransMgmt							
	Total Metropolitan Area	0.26	0.19	$27,500,000	$27,500,000	$288,302	$388,188
	Government Component	0.26	0.19	$27,500,000	$27,500,000	$288,302	$388,188
	NYSDOT Component	0.18	0.07	$7,500,000	$7,500,000	$116,485	$290,225
10 BikePed							
	Total Metropolitan Area	0.036	0.02	$4,345,511	$2,437,726	$327,090	$327,090
	Government Component	0.036	0.02	$4,345,511	$2,437,726	$327,090	$327,090
	NYSDOT Component	0	0	NA	NANA	NA	
11 AltFuels							
	Total Metropolitan Area	27.4	-0.19	$126,147,408	NA$12,610	NA	
	Government Component	7.6	-0.05	$35,000,000	NA	$12,610	NA
	NYSDOT Component	0.01	0	$40,000	NA$10,959	NA	
12 ITS							
	Total Metropolitan Area	-0.01	0.077	Net Savings	Net Savings	NA	NA
	Government Component	-0.01	0.077	Net Savings	Net Savings	NA	NA
	NYSDOT Component	-0.01	0.077	Net Savings	Net Savings	NA	NA
13 SpeedLim							
	Total Metropolitan Area	0.68	0.087	$14,040,000	$14,040,000	$56,872	$440,662
	Government Component	0.68	0.087	$14,040,000	$14,040,000	$56,872	$440,662
	NYSDOT Component	0	0	NA	NANA	NA	
14 PubTrans							
	Total Metropolitan Area	0.12	0.37	$2,500,000	$2,500,000	$57,078	$18,512
	Government Component	0.12	0.37	$2,500,000	$2,500,000	$57,078	$18,512
	NYSDOT Component	0	0	NA	NANA	NA	
15 Cong Pricing							
	Total Metropolitan Area	0.2	0.3	$52,328,065	$52,328,065	$645,161	$444,444
	Government Component	0.2	0.3	$52,328,065	$52,328,065	$645,161	$444,444
	NYSDOT Component	0	0	NA	NANA	NA	
16 HOV increase							
	Total Metropolitan Area	0.01	0.01	$750,000	$750,000	$205,479	$205,479
	Government Component	0.01	0.01	$750,000	$750,000	$205,479	$205,479
	NYSDOT Component	0.01	0.01	$750,000	$750,000	$205,479	$205,479
17 ParkRide							
	Total Metropolitan Area	0.033	0.029	$13,500,000	$13,500,000	$500,739	$563,331
	Government Component	0.033	0.029	$13,500,000	$13,500,000	$500,739	$563,331
	NYSDOT Component	0.08	0.03	$9,000,000	$9,000,000	$306,686	$727,361
18 Aircraft Support							
	Total Metropolitan Area	7.83	1.5	$12,800,000	$12,800,000	$82,295	$82,295
	Government Component	0.23	0.036	$12,800,000	$12,800,000	$82,295	$82,295
	NYSDOT Component	0.01	0.01	$252,000	$252,000	$69,041	$79,674
19 Idling							
	Total Metropolitan Area	0.02	0.03	$14,040,000	$14,040,000	$1,966,493	$1,433,416
	Government Component	0.02	0.03	$14,040,000	$14,040,000	$1,966,493	$1,433,416
	NYSDOT Component	0	0	NA	NA	NA	NA
20 Retrofit							
	Total Metropolitan Area	0	0.54	NA	$5,250,000	NA	$52,798
	Government Component	0	0.54	NA	$5,250,000	NA	$52,798
	NYSDOT Component	0	0.27	NA	$2,625,000	NA	$26,556
21 Freight							
	Total Metropolitan Area	0.6	0.1	$254,200,000	$254,200,000	$1,151,812	$4,730,850
	Government Component	0.6	0.1	$254,200,000	$254,200,000	$1,151,812	$4,730,850
	NYSDOT Component	0.6	0.1	$254,200,000	$254,200,000	$1,151,812	$4,730,85
TOTALS:							
	Total Metropolitan Area	5.9 - 77.7	2.7 - 26.4	$643,953,469	$530,328,818		
	Government Component	1.4 - 26.1	0.6 - 13.9	$547,506,357	$521,381,949		
	NYSDOT Component	0.1 - 6.0	0.1 - 4.7	$271,937,641	$275,650,886		

NA - indicate no cost is applicable because no reduction of the corresponding pollutant is calculated.

Table 4. Potential energy reductions from transportation actions

		Emission Benefit (Btu/Day) Energy	Annual Program Costs for Maximum Benfits Energy	Dollars/Million Btu/Day Reduced for Maximum Benefits Energy
1 Construction				
	Total Metropolitan Area	15,479,820 – 29,421,422	TBD	TBD
	Government Component	4,707,427 – 13,947,933	TBD	TBD
	NYSDOT Component	764,957 – 2,549,857	TBD	TBD
2 Maintenance				
	Total Metropolitan Area	TBD	TBD	TBD
	Government Component	TBD	TBD	TBD
	NYSDOT Component	TBD	TBD	TBD
3 Ozone Action				
	Total Metropolitan Area	18,223,885,116	$1,500,000	$0.23
	Government Component	18,223,885,116	$1,500,000	$0.23
	NYSDOT Component	18,223,885,116	$1,500,000	$0.23
4 Commuter Choice				
	Total Metropolitan Area	54,237,488,333	$123,750,000	$6
	Government Component	54,237,488,333	$123,750,000	$6
	NYSDOT Component	0	NA	NA
5 Coating				
	Total Metropolitan Area	0	NA	NA
	Government Component	0	NA	NA
	NYSDOT Component	0	NA	NA
6 Signals-replace fixed time with Actuated				
	Total Metropolitan Area	551,875,988	$5,375,000	$27
	Government Component	488,034,293	$4,671,875	$26
	NYSDOT Component	63,841,695	$703,125	$30
7 LED				
	Total Metropolitan Area	939,257,600,000	-$18,320,083	NA
	Government Component	816,389,600,000	-$15,923,561	NA
	NYSDOT Component	122,868,000,000	-$2,396,523	NA
8 Signals-coordinate				
	Total Metropolitan Area	827,813,983	$1,720,000	$6
	Government Component	732,051,440	$1,495,000	$6
	NYSDOT Component	95,762,543	$225,000	$6
9 TransMgmt				
	Total Metropolitan Area	1,385,482,207	$29,000,000	$57
	Government Component	827,151,227	$21,500,000	$71
	NYSDOT Component	558,330,980	$7,500,000	$37
10 BikePed				
	Total Metropolitan Area	167,679,528	TBD	TBD
	Government Component	167,679,528	TBD	TBD
	NYSDOT Component	0	NA	NA
11 AltFuels				
	Total Metropolitan Area	0	NA	NA
	Government Component	0	NA	NA
	NYSDOT Component	0	NA	NA
12 ITS				
	Total Metropolitan Area	126,059,950	TBD	TBD
	Government Component	126,059,950	TBD	TBD
	NYSDOT Component	126,059,950	TBD	TBD
13 SpeedLim				
	Total Metropolitan Area	2,140,778,937	$14,040,000	$18
	Government Component	2,140,778,937	$14,040,000	$18
	NYSDOT Component	0	NA	NA
14 PubTrans				
	Total Metropolitan Area	379,816,993	$380,000,000	$2,741
	Government Component	379,816,993	$380,000,000	$2,741
	NYSDOT Component	0	NA	NA
15 Cong Pricing				
	Total Metropolitan Area	660,478,427	$134,047	$1
	Government Component	660,478,427	$134,047	$1
	NYSDOT Component	0	NA	NA
16 HOV increase				
	Total Metropolitan Area	0	NA	NA
	Government Component	0	NA	NA
	NYSDOT Component	0	NA	NA
17 ParkRide				
	Total Metropolitan Area	512,523,586	$22,500,000	$120
	Government Component	258,046,200	$13,500,000	$143
	NYSDOT Component	254,477,386	$9,000,000	$97
18 Aircraft Support				
	Total Metropolitan Area	TBD	TBD	TBD
	Government Component	TBD	TBD	TBD
	NYSDOT Component	TBD	TBD	TBD
19 Idling				
	Total Metropolitan Area	56,711,587	$14,040,000	$0
	Government Component	56,711,587	$14,040,000	$0
	NYSDOT Component	0	NA	NA
20 Retrofit				
	Total Metropolitan Area	0	NA	NA
	Government Component	0	NA	NA
	NYSDOT Component	0	NA	NA
21 Freight				
	Total Metropolitan Area	617,500	$254,200,000	$1,127,836
	Government Component	617,500	$254,200,000	$1,127,836
	NYSDOT Component	617,500	$254,200,000	$1,127,836
TOTALS:				
	Total Metropolitan Area	1,018,558,233,557	$827,938,964	
	Government Component	894,702,347,464	$812,907,361	
	NYSDOT Component	142,193,525,027	$270,731,603	

TBD - To be determined
NA - indicate no cost is applicable because no reduction of the corresponding pollutant is calculated.
Numbers in parentheses ( ) are negative cost values.

ENERGY ISSUES RELATED TO TRANSPORTATION ENERGY AT THE FEDERAL LEVEL

The Federal Transportation Equity Act for the 21st Century (TEA-21) provides funding for highways and transit. TEA-21 expires on September 30, 2003. Work has already begun to reauthorize TEA-21. The reauthorized TEA-21 would help New Yorkers conserve energy and reduce pollution while enhancing the mobility and safety of goods and people to expand the regional economy.

Increase Federal Funding For Transit

New York has one-third of the nation’s transit users. As a result of this heavy transit use, New York has the lowest-per-capita gasoline consumption in the nation. Transit ridership is growing at record rates nationwide, but especially in New York. The core capacity of New York’s transit system is inadequate to meet this new demand for service. Increased federal transit funding is needed to maintain the existing system and increase its capacity.

Communities across the nation are constructing new transit systems. The TEA-21 New Starts program provides funds to extend existing rail and subway systems or build new systems. Currently, 190 New Starts projects are authorized for development nationwide with a total value estimated at $ 75 billion. TEA-21 has made only $ 3.7 billion available to develop these projects. In New York, the authorized New Starts projects that have received federal funding are listed in Table 5. To meet the current demand for new transit service, Congress must increase New Starts funding in the next surface transportation act.

Retain the Congestion Mitigation And Air Quality Program

The CMAQ program provides funds to implement transportation projects that reduce air pollution in air quality non-attainment areas. Many of these projects not only reduce air pollution, but also reduce fuel consumption. For instance, CMAQ funds have been used to fund rail freight projets and an electric station car pilot project in the New York City metropolitan area, and other transit projects in communities across the State. CMAQ funding is also an important source of funding for Governor Pataki’s High Speed Rail Plan. The CMAQ has a vital role in New York’s energy conservation strategy.

Continue Funding for ITS and Transportation System Operations

Information technology is an important tool for improving the energy efficiency of the transportation system. TEA-21 provides funds to deploy ITS technologies that provide traveler information, help manage traffic incidents, manage traffic flow, improve the movement of freight, ease the connections between modes, and provide data on the system’s condition and performance. Continued Federal funding for ITS will help make the transportation system operate more efficiently and save energy.

TABLE 5
New York TEA-21 New Start Projects with Funding Authorizations

Project	FFY 1998-2003 Authorization	Appropriations To Date	% of Authorization
Long Island Rail Road East Side Access	$353.0	$53.6	15.2%
Second Avenue Subway	$5.0	--	--
Staten Island - Whitehall Intermodal Terminal (1)	$40.0	$6.9	17.3%
Nassau Hub	$10.0	$0.5	5.0%
St. George's Ferry Intermodal Terminal	$20.0	$2.5	12.5%
Midtown-West Ferry Terminal	$16.3	--	--
Total Authorization/Appropriation	$444.3	$63.6	14.3%

(1) FFY 2001 appropriation allocated to Whitehall/St. George.

Modify TEA-21 Programs To Improve Rail Service

Freight traffic is expected to double in the next twenty years. The highway system cannot absorb this traffic growth. The Northeast Association of Transportation Officials (NASTO) is leading an effort of to prepare a strategic multimodal international freight investment plan for the Northeast trading bloc, which extends from Halifax, Nova Scotia to Norfolk, Virginia to Chicago, Illinois. The plan will identify major bottlenecks in the existing freight transportation system and recommend strategic capital and operating improvements for the regional system.

Although TEA-21 is primarily aimed at providing Federal funding for the highway and transit systems, there are some elements of TEA-21 are designated for improving rail service. The Transportation Infrastructure and Innovation Act of 1998 (TIFIA) provides loan guarantees and credit enhancements for major rail transportation projects. While TIFIA could be a powerful tool for promoting investment in energy-efficient rail projects, the project threshold size of $100 million limits the usefulness of the program. TEA-21 also established the Railroad Rehabilitation and Improvement Financing (RRIF) program, which provides credit enhancements to fund investments in regional and shortline railroads. Providing Federal funds to underwrite the risk premium on loans to shortline and regional railroads will help ensure that rural New York will continue to have access to energy-efficient rail freight transportation.

Corporate Average Fuel Economy Standards

Since the initial oil crisis in 1973 and throughout subsequent episodes in the late 1970s, passenger automobile fuel economy has been a significant transportation energy issue. The authority to administer a program for regulating new passenger and light-truck fuel economy standards was delegated to the Secretary of Transportation by the Motor Vehicle Information and Cost Savings Act of 1972. In 1975 the Energy and Conservation Act established Corporate Average Fuel Economy (CAFE) standards that were initially implemented for all passenger cars in 1978 and for light-duty trucks in 1979. CAFE standards for passenger cars were established at a minimum level of 27.5 miles-per-gallon for model year (MY) 1985 and have been frozen at that rate through MY 2002. Light-duty truck standards have been frozen at the 1996 rate of 20.7 miles-per-gallon through MY 2002. Increasing the CAFE standards for passenger cars and light-duty trucks for model years beyond 2002 will conserve needed energy.

Given the most recent national VMT projections, which assume that annual highway investment will stay at the 1997 funding level for the next 20 years, urban VMT can be expected to increase at an annual average rate between 1.78% and 1.83%. Rural VMT can be expected to increase at an annual average rate between 2.68% and 2.72%. Conversely, vehicle fuel economy performance for passenger cars and light-duty trucks has decreased by 1% over the 10-year period from 1990 to 2000. Fuel economy performance for the entire fleet was 25.4 mpg in 1990 and at 25.2 mpg in 2000.

FINDINGS AND CONCLUSIONS

- New York has the most energy efficient transportation sector in the United States due to its high-per-capita-use of transit. One-third of all national transit trips are in New York. The use of public transportation is experiencing unprecedented growth, averaging approximately 5% annually.

- Statewide, VMT and congestion (especially urban congestion) continue to increase, but VMT should grow at a slower rate in the future. Transportation system management, technology improvements, and capital construction projects are underway to reduce the growth in congestion. Freight truck traffic increases are of concern.

- Bicycle and pedestrian initiatives, passenger ferry service, intermodal freight capabilities, and high-speed rail efforts are important measures to increase the energy efficiency of New York's transportation sector.

- New York has made a significant commitment in AFV technology. More than 1400 State-owned AFVs and over 50 commercial CNG stations are in use. Executive Order 111 requires State agency purchase of light-duty vehicles to be 100% AFV by 2010.

- Progress in reducing the transportation sector's energy use and air emissions is ongoing and will continue in the future through measures such as Commuter Choice, Ozone Action Days, and traffic signal coordination. Quantitative build and no-build energy and emissions analyses of transportation plans and programs would facilitate continued energy and environmental benefits.

- Energy efficiency can be enhanced by actions at the federal level. Reauthorizing federal surface transportation legislation can substantially affect New York's status as the most transportation-energy-efficient state by providing for transportation programs that enhance energy efficiency and reduce emissions.

- Fuel economy standards for vehicles have the potential to be the most significant action to conserve energy in the transportation sector. Fuel economy standards for passenger cars have been frozen since 1985 and for light duty trucks since 1996. Fuel economy generally, has worsened between 1990 and 2000.

SECTION 2.5

PRESERVING ENERGY-RELATED PUBLIC BENEFITS PROGRAMS

INTRODUCTION

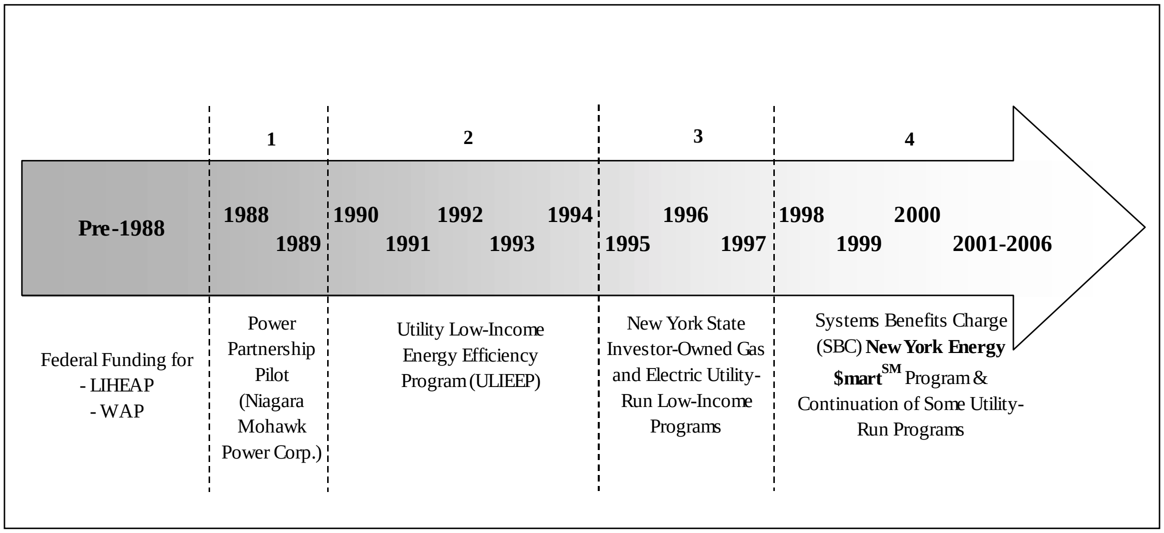
New York's support for open and competitive energy markets includes, as a component, continuing public benefits programs that serve the State's residents and businesses. It also requires maintaining necessary and appropriate consumer safeguards against market abuse, while promoting the benefits of retail competition. Public benefits programs provide energy efficiency and related services to smaller customers and low-income households, support development of markets for energy-efficient product manufacturing, stocking and sales, and support research and development (R&D) activities in renewable energy development, new product development and applications, and environmental protection. This Section identifies and reviews the public benefits programs offered by New York State, assesses their effectiveness in meeting public policy goals, and reports on additional efforts that might be required to continue to balance competitive energy markets with continuing public needs.

HISTORY OF PUBLIC BENEFITS: PROGRAMS AND GOVERNMENT'S ROLE

Prior to the beginning of electric utility restructuring in New York, public benefits programs were provided by utilities, local, state and federal governments, and not-for-profit and community-based organizations (CBOs). Over the past 12 years, there have been at least four major transformations in the programs. Figure 1 presents these transformations chronologically.

With respect to low-income customers, the earliest investor-owned utility public benefit program in New York State was approved by the Public Service Commission (PSC) in 1988. The program, a pilot project entitled the Power Partnership Pilot, was administered by the Niagara Mohawk Power Corporation. The design of this program, which tested the utility company's ability to provide comprehensive energy efficiency services to low-income customers, influenced the design of future programs. Prior to 1988, low-income public benefits funding in New York State was provided by federal sources for programs such as the Low-Income Home Energy Assistance Program (LIHEAP) and through the Weatherization Assistance Program (WAP), both administered by the New York State Department of State.

Figure 1. Transformation of Utility and Government-Based Low-Income Programs in New York State



The first statewide comprehensive program targeting low-income customers was implemented shortly after the Niagara Mohawk pilot, and was named the Utility Low-Income Energy Efficiency Program (ULIEEP). This program was established by a June 1991 Public Service Commission (PSC) order. Through the ULIEEP program, gas and electric utilities in New York were directed to provide energy efficiency services, including weatherization services, to low-income customers for approximately three years. As the State began to restructure the electric industry, and as competitive market forces began to exhibit a presence, the role of government in providing services to low-income and other energy customers lacking market influence, increased. Mindful that a competitive energy market might reduce services targeting these energy customers, the Systems Benefits Charge (SBC) public benefits program was established.

Continuing Energy Public Benefits Programs

In New York, there continues to be a subset of energy customers who either lack market status, representation, and influence, or are limited in their ability to make informed energy decisions. These customers can include: residential and low-income customers, small business customers, and municipal and institutional (including educational and healthcare) customers. Some of these energy customers pay a larger percentage of their income for energy costs than higher income customers, which can be exacerbated by the inability of these customers to overcome market barriers to improving energy efficiency and reducing energy use and bills. These market barriers include, lack of information, limited financial resources, and high transaction costs associated with energy-efficient goods and services. All of these barriers contribute to reduced market influence and reduced ability to realize the full potential of competitive energy markets for these energy customers.

<u>Residential, Including Low-Income, Energy Customers.</u> New York has 3.7 million residential buildings, which account for 17% of the State's total energy use, including electric generation. By fuel type, the residential sector used 33% of the electricity, 26% of the natural gas, and 12% of the petroleum used in the State. The residential sector accounts for approximately one-third of the total annual State energy expenditures, approximately $10.9 billion per year, more than any other sector in the State.[1]

New York State has an estimated 550,000 units of publicly-assisted low- and moderate-income multifamily housing, many of which are heated with electricity. The State has spent over $800 million annually to assist low-income residents in multifamily public housing to reduce their energy burden. Even with such a large investment, energy efficiency measures have been difficult to implement in this sector because of barriers, such as limited access to financing by low-income tenants, and disincentives to non-owner occupied buildings and tenant conversions.

More than 3 million New Yorkers[2] live below 125% of the poverty level, and are considered low-income residents on this basis.[3] The energy burden for low-income customers, defined as the ratio of energy costs to income, ranges between 25 - 30%, compared to 3 to 8% for higher-income households. Additionally, the private residential housing stock for low-income households is generally poor and energy inefficient. Much of New York's publicly assisted housing has high energy costs as a result of using electric-resistance heat in poorly insulated buildings. The combination of poor housing stock, high energy costs, and New York's cold winter climate results in low-income households facing serious energy hardships. The potential for improved energy efficiency in public housing and for the low-income sector is estimated to range between 12-30%.

<u>Small Business Energy Customers.</u> Small business customers in New York State face several barriers to reducing their energy costs and becoming more energy-efficient. For

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[1] New York State Energy Research and Development Authority. *System Benefits Charge: Proposed Operating Plan for the New York Energy $mart* ℠ *Programs (2001-2006)*, February 15, 2001.

[2] This represents 16.7% of New York State's total resident population.

[3] Statistical Abstract of the United States, The National Data Book. U.S. Department of Commerce, 120th Edition, 2000, p. 477.

example, small businesses often do not take advantage of energy efficiency improvements simply because they are more focused on their core mission and do not have the in-house technical expertise to identify, evaluate, and implement these types of improvements. Additionally, small businesses are often faced with higher transaction costs to develop their knowledge base, retain private-sector energy efficiency services, and participate in government sponsored programs.[4]

Since profit margins and opportunities for replication are lower in this sector for energy service companies (ESCOs), industry hesitates to develop services for small-and medium-sized customers or for business processes that are more complex than simple building systems. Consequently, small-and medium-sized businesses have a difficult time finding technical services or financial assistance to improve their operational efficiency. Once energy efficiency opportunities are identified by service providers, business owners are skeptical of the energy-savings claims, and lack the financial resources to implement the suggested energy efficiency improvements.

The amount of electricity used to operate motors and lighting is about 60% of New York's commercial and industrial electric energy use and 40% of the State's total electric energy use. Office, retail, and restaurant space have a high turnover rate each year, resulting in frequent remodeling and renovation projects. Renovation projects, as well as new building construction, often do not include cost-effective energy efficiency measures. Motors are integral to facility operations such as powering fans, machine drives, and pumps in small and medium-sized businesses, including light manufacturing and product-assembly facilities where process energy is a major energy concern. Reducing the energy costs of small businesses, through energy efficiency improvements in end-uses such as motors and lighting, can help to lower their product and service costs. Reduced energy costs have been shown to assist small businesses in creating and retaining jobs.

<u>Municipal, Institutional, and Educational Energy Customers.</u> Across the State, municipal and institutional buildings (including educational, government, not-for-profit, and hospital) use large amounts of energy while investing very little to improve energy efficiency. For example:

- The State owns and operates more than 8,000 buildings, with energy costs that total nearly $300 million annually. Over the past ten years, the limited capital

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[4] New York State Energy Research and Development Authority. *System Benefits Charge: Proposed Operating Plan for the New York Energy $mart ℠ Programs (2001-2006)*, February 15, 2001.

that has been invested in energy improvements in State-owned buildings has been used for short payback improvements, such as high-efficiency lighting.

Institutions face similar barriers as those experienced by State and local governments. For example:

- The 711 public K-12 school districts in New York spend nearly $400 million annually on energy, which is more than what is spent for books and computers combined. School districts often lack the capital or expertise to reduce their energy use.

- New York State has more than 200 hospitals and health-related facilities representing more than 300 million square feet of floor space. Health care administrators and facility managers struggle to improve patient care and comfort while reducing operating costs in their facilities. The size of health care facilities and the nature of the services they provide result in higher unit energy costs than all other institutional buildings.

The energy needs and requirements of municipal and institutional energy customers can be met through market-based, as well as government sponsored programs. In June 2001, Governor George Pataki issued Executive Order 111 requiring that all State agencies, departments, and authorities seek a 35% reduction in energy use by 2010, relative to their energy use in 1990. In addition, each agency, department, and authority is directed to purchase 10% of their energy from renewable energy sources by 2005, increasing to 20% by 2010. Compliance with the Order by local governments and school districts is being actively encouraged. By seeking to reduce its own energy use, improve its energy efficiency, and improve its environment, New York is striving to eliminate barriers to energy efficiency and become a national leader in energy efficiency.

<u>Research and Development, Including Renewable Energy Efforts.</u> In New York, public benefits funding for research and development (R&D), including renewable energy programs, is being provided to build a sustainable market for the production and sale of strategic and renewable energy technologies and for the development of “green” energy markets. These programs provide energy security within the State by helping to establish a more balanced and strategic portfolio of energy resources and support technologies.

Opportunities still exist to promote strategic and environmental R&D as well as renewable energy programs in the State. For example:

- Generating electric power with renewable energy technologies offers the opportunity to reduce air emissions associated with power generation and bring power production closer to the consumer.

- The use of photovoltaic (PV) technology to offset peak power demand is one example of the value of renewable energy. During the July 1999 New York City power shortage, the photovoltaic energy potential was coincident with the peak power demand and was at 93% of the maximum achievable on a clear, cloudless day.

- States bordering New York will allocate a total of $68-$102 million annually to support renewables. Coordination within the region is necessary to foster the development of critically needed regional green markets and to insure that New York continues to promote its renewable energy industry.

- Electricity generation is a major source of nitrogen and sulfur oxides, volatile organic compounds, fine particles, air toxins such as mercury, and greenhouse gases. These pollutants are associated with environmental and public health problems including acid deposition, smog, visibility degradation, climate change, and increased human mortality and morbidity. These pollutants also impose considerable economic burdens by increasing health costs, degrading building materials, and reducing the value of fishing, tourism, recreational, and scenic resources.

- Research and monitoring data are necessary to formulate effective and equitable public policies. There are no market incentives to spur private investment in ecosystem monitoring and assessment, given that the benefits are diffuse and cannot be captured by any one private investor. With utility restructuring, utilities have stopped sponsoring environmental field programs, leaving a gap in funding.

- Emerging distributed generation (DG) technologies offer the potential to self-generate electric power at efficiencies and with lower emissions than central station generators. When heat is recovered for useful purposes, (*i.e.*, cogeneration or CHP), these options can provide the consumer with a highly-efficient and reliable energy supply option at prices competitive with the grid while reducing emissions. The DG/CHP systems can exceed 80% fuel-use efficiency and can significantly reduce NOx and other air pollutant emissions.

- New York's deregulated electricity market furthers the potential for DG/CHP growth in the long-term, but faces hurdles, such as utility interconnection, exit fees, and standby/backup charges in the near-term. Use of DG/CHP offers a means to enhance a customer’s power quality and reliability, alleviate load pocket constraints, and provide customers with an option for load shedding, in addition to energy-efficiency and air quality benefits. Therefore, DG/CHP represents an opportunity to improve energy-efficiency and to reduce environmental impacts associated with power generation and use.

The responsibility for preserving public benefits for residential, low-income, small business, municipal, institutional, and educational energy customers during the transition to a competitive energy market lies with many energy industry participants, including government, energy providers, energy service companies, and not-for-profit organizations. While each participant's role is instrumental to successfully serving the needs of these energy customers, government's role is multi-faceted and occurs on many levels. Government acts to ensure that energy markets are operating efficiently and that each energy consumer has equal and open access to equitable energy options.

<u>Public Benefit Programs and the Role of Government</u>

New York State government plays an objective and active role in administering public benefits programs. The State studies the patterns, trends, and behaviors of energy customers lacking market influence, such as low-income households, looking for cost-effective opportunities to better serve their needs. The common goals that the State uses as guidelines to build its network of public benefits programs is presented in Table 1.

Table 1. New York State's Public Benefits Program Goals

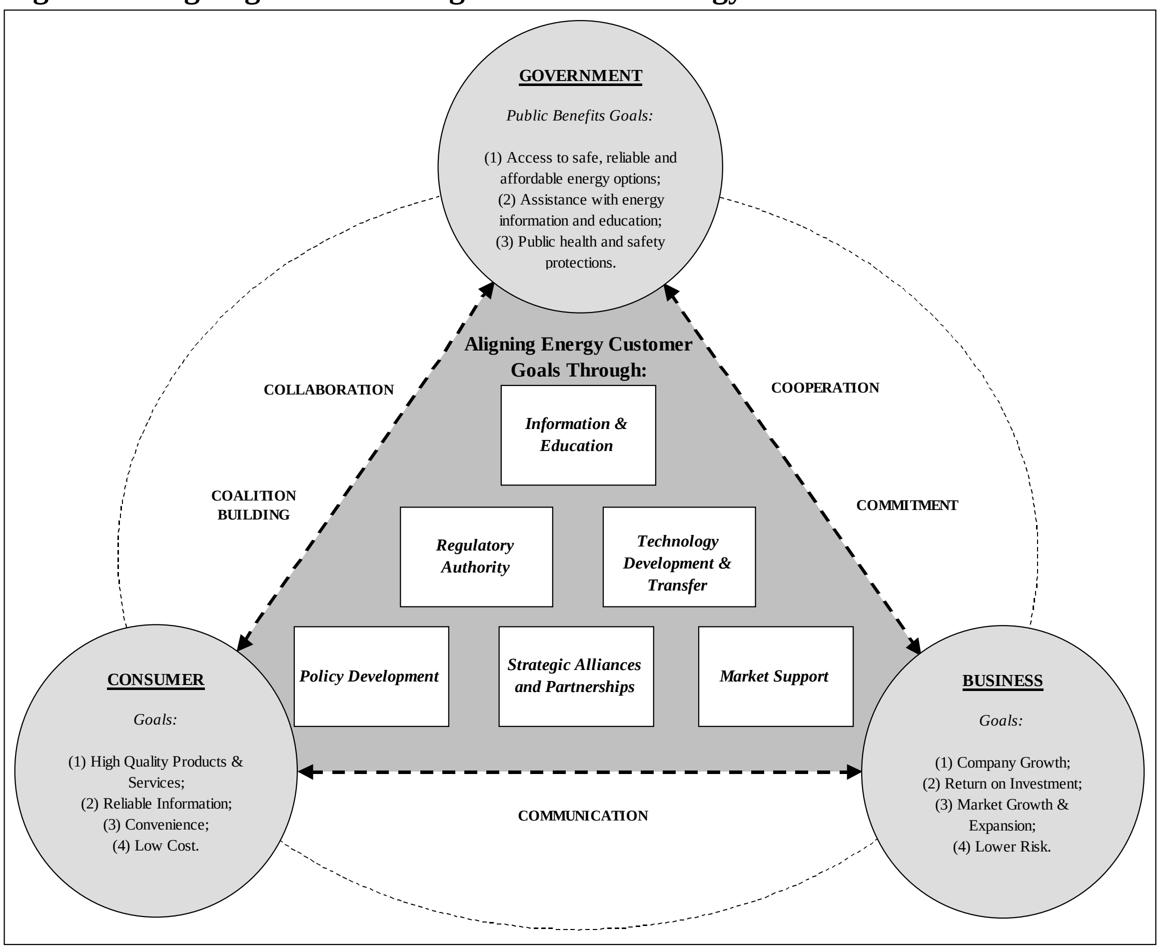
1. Improve access to energy efficiency initiatives.
2. Improve energy customer access to energy options (*e.g.,* renewable resources, "green" power).
3. Reduce the environmental impacts of energy production and use via energy efficiency and R&D initiatives.
4. Facilitate competition for energy efficiency and energy options to benefit a larger number and variety of end-users.
5. Improve system-wide electricity reliability, energy efficiency, and environmental benefits through end-user actions.
6. Facilitate the provision of affordable energy, including affordable rates and other payment related assistance, for low-income customers.

To address the energy needs of energy customers, it is necessary to understand how these customers are currently being served by public benefits programs. The State coordinates public benefits efforts by balancing and aligning the interests, needs, and goals of residents and businesses. Aligning goals requires the State to support: (1) technology development and transfer; (2) information and education; (3) policy development and analysis; (4) market support, including infrastructure development; and (5) collaboration through the formation of strategic public and private alliances while facilitating stakeholder interests. Figure 2 summarizes this interaction.

Energy customers in New York with less market influence require government assistance largely because competitive market forces have not yet addressed their energy needs. These energy needs include: access to safe, reliable, and affordable energy options; assistance with energy information and education; and enhanced public health and safety protections. Numerous market barriers exist and must be addressed and overcome for these customers to have greater market representation. Market barriers that are faced by these energy customers, and that provide the justification for government assistance include:

- Lack of market influence;
- Insufficient market and technology information available to energy customers;
- Lack of awareness of energy service options, available technology choices, and energy savings potential and opportunities;
- A high energy burden (the proportion of income devoted to energy costs);
- Lack of interest on the part of energy efficiency services providers; and,
- Energy-efficient products in retail stores are in short supply or are not promoted.

Figure 2. Aligning and Balancing the Goals of Energy Customers



Public Benefits and Government Coordination

While many low-income public benefits programs across the State are interrelated, there remain opportunities to coordinate and comprehensively deliver public benefits to energy customers through greater cooperation among public benefits providers. The benefits of low-income programs, for example, could be maximized if the services of several programs were coordinated and a common strategy was established. Many programs are trying to achieve similar goals, but rigid program designs, lack of coordination, different eligibility criteria, and jurisdictional conflicts among programs inhibits the ability to achieve desired results. These structural inadequacies can, over time, create inefficiencies in program delivery, unnecessary overlap of services, and confusion on the part of customers (*e.g.*, mixed messages, overload of inconsistent information, inability to choose between program offerings).

Government has been regarded by energy customers and energy industry participants as having a leadership role in facilitating market development, coordinating program design and delivery, and providing public benefits to low-income and other energy customers. In December 2000, the Center for Research and Public Policy (CRPP) issued a final report[5] to NYSERDA that presented results of a *New York State Energy Competition Study*. The findings of this report provided input on New York's competitive energy markets, including the roles and need for continuance of public benefits programs. As part of the study's focus, energy customers were provided with a definition of public benefits programs and then asked to rate the importance of each program. Over 90%, of energy customers[6] surveyed rated programs to help low-income residents afford energy and programs for other energy customers such as elderly, blind and disabled as very important or somewhat important. When asked who should pay for such programs, energy customers identified: (1) government, (2) local utilities, and (3) competitive energy suppliers. Government was selected by a majority (over 50%) of energy customers, as the most appropriate to pay for both of these types of programs.

Another recent study, conducted by the American Council for an Energy-Efficient Economy (ACEEE), examined the role of private market actors (*e.g.*, ESCOs, electricity

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[5] The Center for Research and Public Policy. *New York State Energy Competition Study*; prepared for the New York State Energy Research and Development Authority. December 2000.

[6] Energy customers targeted through the survey included: general customers; African Americans; Hispanics; Switchers (customers who have switched energy suppliers); and Business.

commodity providers, and distribution utilities) in providing energy efficiency services.[7] In a study of nine key states,[8] ACEEE found that:

> (1) There are major gaps in the market segments served by private market actors. In particular, they generally have demonstrated little interest in serving the residential and small commercial customer markets.
>
> (2) The ESCO industry is intricately involved with, and supported by, existing government and regulatory policies and funding programs. Such programs have been a substantial influence on the creation of the ESCO industry and continue to play a major role in sustaining ESCO projects today.

The CRPP study found that consumers rate government as the most appropriate provider of energy efficiency public benefits, especially to residential customers. The ACEEE study affirms private market actors' recognition that the role of government as the vehicle for delivering energy efficiency programs, especially to residential and small commercial customers, is beneficial to their sustained business practices.

New York is working to overcome barriers associated with the limitations of energy markets, as well as those associated with program design and implementation, in effectively serving energy customer needs. The State also leverages its efforts with community-action groups, businesses, and other stakeholders through the use of strategic partnerships. Partnerships provide additional resources, as well as a longer-term commitment toward reducing or overcoming market barriers.

In 1997 New York began a statewide dialogue on low-income energy affordability issues. The Low-Income Forum on Energy (LIFE) serves as a medium for exchanging information on best practices in program delivery and identifying problems and solutions, to providing services to the low-income sector. The LIFE forum has attracted energy market participants who have an interest in serving low-income customers and in solving the problems associated with doing so. Representatives from New York State agencies, utility companies, energy service companies, not-for-profit and consumer advocate

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[7] Kushler, Martin. Ph.D., and Patti Witte M.A. September 2001. *Can We Just "Rely on the Market" To Provide Energy Efficiency? An Examination of the Role of Private Market Actors in an Era of Electric Utility Restructuring.* American Council for an Energy Efficient Economy.

[8] These states are: Arizona, California, Connecticut, Illinois, Massachusetts, Michigan, New York, Pennsylvania, and Rhode Island. These states were selected by ACEEE for their study because they were early implementors of electric restructuring. These states were also selected by ACEEE because they provide geographic diversity and a wide range of restructuring policies in terms of "public benefit" funding for energy efficiency.

groups, independent living centers, energy cooperatives, credit unions, State Assembly and Senate representatives, and community action agencies, among many others, have participated in LIFE conferences and dialogue. All of these organizations have designed their programs to produce benefits to low-income residents; however, the lack of a concerted program design and evaluation effort inhibits the realization of these benefits and actually furthers the energy burden of lower-income residents. This situation has been recognized by low-income service advocates and leaders in New York and in other States wanting to better serve low-income energy customers.[9]

The following lessons and recommendations resulted from the November 2000 LIFE Conference in Albany, New York:[10]

- Existing agency relations and activities should be coordinated and centralized.
- There should be a centralized database of information on low-income programs and services in the State that can be accessed by workers to more effectively refer low-income customers to programs and services for which low-income customers and clients are eligible.
- Consistent information regarding customer protection issues, reliability issues, and energy bill arrearages, is needed from regulators, agency networks, and utilities that delivers an accurate message to customers.
- To promote aggregation, additional outreach is essential to inform municipalities, not-for-profits, and county governments.
- Involvement by community-based organizations is necessary for programs to succeed.

NEW YORK'S PUBLIC BENEFITS PROGRAMS

Nationally, public benefit funding for energy efficiency programs is underway in over two dozen states. The purpose of these programs is to ease the transition to full electric retail competition by continuing to support energy efficiency, environmental protection, renewable resource development, and public benefit R&D. In New York State, public benefits programs are provided by public and private entities including: investor-owned utilities, not-for-profit organizations, public benefits corporations, and corporate

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[9] Colton, Roger D., Fisher, Sheehan & Colton; Public Finance and Economics. September 2000. "Outreach Strategies for Iowa's LIHEAP Program: Innovation in Improved Targeting". Prepared for: Iowa Department of Human Rights, Des Moines, Iowa.

[10] Low-Income Forum on Energy (LIFE) 2000 Fall Conference. November 16 and 17, 2000. Albany, New York. *LIFE Work Groups Summary of Recommendations.*

instrumentalities of the State. Funding for public benefits programs comes from federal, State, and private sources. In New York, these programs are working to support the development of the market for energy-efficient goods and services and are supporting R&D activities directed toward renewable energy development, new product development and applications, and environmental protection.

Public and Private Utility-Sponsored Programs

Low-income public benefits programs in New York are provided by public authorities, utilities, and State agencies. Some of New York's utilities continue to offer arrearage reduction programs to low-income customers while also contributing to the State SBC program. Table 2 displays the utility-sponsored public benefits programs in New York targeted to low-income customers.

Table 2. Public and Private Utility Sponsored Public Benefits Programs in NYS

Utility-Run Low-Income Program	Targeted Customers/ Typical Services Provided
Consolidated Edison Company of New York, Inc. Total funding: *$6.4 million annually*	Consolidated Edison Company of N.Y., Inc. Low-Income Plan. Targets electric customers. The program objective is to reduce energy bills and promote energy efficiency for low-income customers. RESULTS. The Low-Income Plan program has saved an estimated $1.8 million on electric bills for Direct Vendor customers since program inception in April 1996. As of May 31, 2000: • 21,473 Direct Vendor customers were participating; • 1,521 refrigerators have been replaced for SSI or HEAP customers; and, • Over $950,000 has been spent through the refrigerator replacement program.
Keyspan Energy Total funding: *$2 million annually*	Residential Reduced Rate (RRR). Program targets natural gas customers. The objective is to increase the affordability of natural gas customers. In addition, the program provides a benefit to all ratepayers by reducing the uncollectible balances and associated costs. RESULTS. There are 20,000 active participants in the RRR program.
National Fuel Gas (NFG) Total funding: *$2 million annually*	Low Income Residential Assistance (LIRA). Targets natural gas customers. The program objective is to change the payment behavior of participants and to provide benefits to all ratepayers by reducing the uncollectible balances and associated costs. RESULTS. The LIRA program has 1,874 active participants of which 69% are currently paying their bills on time. Debt forgiveness for the program has exceeded $2 million and conservation credits exceed $80,000.
National Fuel Gas (NFG) *Cont.*	Public Assistance Cooperative for Energy (PACE). Targets natural gas customers. The objective of the program is to provide the benefits of competition to low-income, payment-troubled customers by offering the opportunity to reduce energy costs. RESULTS. Program has saved Erie, Chautauqua, and Niagara counties in excess of $1.4 million.`

Table 2. Public and Private Utility Sponsored Public Benefits Programs in NYS	
Utility-Run Low-Income Program	**Targeted Customers/ Typical Services Provided**
National Fuel Gas (NFG) *Cont.*	Elderly, Blind or Disabled Payment Troubled Residential Assistance (EBDPTRA). Program targets natural gas customers. The objective of the program is to change the payment behavior of participants and to ensure the health and safety of "under-served" customers. In addition, the program provides benefits to all ratepayers by reducing the uncollectible balances and associated costs. RESULTS. The EBDPTRA program has: • 265 active participants of which 91% are paying on time; • Spent over $84,000 on energy audits, large dial thermostats, heating repair/replacement, and insulation of participant residences.
New York State Electric and Gas Corp. (NYSEG) Total funding: *$6.25 million annually ($1.25 million capped for the Gas Affordable Energy Program)*	Power Partner Program. NYSEG offers its 'Power Partner' program to low-income and elderly energy customers throughout their service territory who want to reduce their energy bills, thereby becoming more financially self-reliant. RESULTS. NYSEG anticipates serving 22,500 customers through its Power Partner program. As of May 31, 2000: • 16,067 customers enrolled in Power Partner; • 1,817 received new refrigerators; • 596 had their water heater replaced or converted; • 668 received energy audits; and, • 1,019 had their heating systems upgraded.
New York State Electric and Gas Co. *Cont.*	NYSEG Gas Affordable Energy Program. The program objective is to make natural gas more affordable for customers. Offers a reduced service charge to all participants. Participants pay a $6.40 per month service charge whereas sales service non-participants will have minimum charges of $10.00 or $14.00 per month, and aggregation non-participants will have a minimum charge of $13.00 per month. RESULTS. Program is fully subscribed, and is anticipated to serve 13,500 customers.
Niagara Mohawk Power Corp. (NMPC) Total funding:*$5 million annually*	The Affordability Program. Targets electric and gas customers who are not on temporary assistance who have a documented "inability to pay" for their full energy costs. The program provides participants with a negotiated maximum monthly partial payment, energy use management education, and arrears forgiveness (50% up to a maximum of $250 annually). Energy efficiency services may also be provided, depending upon customer need. Services include: weatherization services, refrigerator replacement, waterbed mattress replacement, installation of energy-efficient fluorescent fixtures, electric hot water tank, and/or clothes dryer fuel switching.
Niagara Mohawk Power Corporation, *Cont.*	Onondaga County DSS Gas Aggregation Project. Targets natural gas customers. The project seeks to make energy more affordable for participants by obtaining supply at lower cost and by packaging energy efficiency services to lower overall customer use and cost.
Niagara Mohawk Power Corporation, *Cont.*	County Gas Aggregation Grant Program. Targeted to natural gas customers. The objective of the program is to encourage the aggregation of low-income consumers within NMPC service territory by providing funding to counties for consultant services and other assistance to develop gas aggregation initiatives that target low-income customers. RESULTS. Not Available.

Table 2. Public and Private Utility Sponsored Public Benefits Programs in NYS	
Utility-Run Low-Income Program	**Targeted Customers/ Typical Services Provided**
Orange and Rockland Utilities, Inc. Total funding: *$0.4 million annually*	Orange and Rockland Utilities, Inc. Energy Saving Partners. Targets gas and electric customers in the 12771 zip code. The program objective is to reduce energy bills and promote energy efficiency for low-income customers. The program achieves this through its refrigerator replacement and arrears forgiveness efforts. RESULTS. The ORU Energy Saving Partners program has: • Installed 51 refrigerators; and • Provided arrears forgiveness and/or weatherization for 40 customers. ORU also operates an aggregation program.
Rochester Gas and Electric Corp. Total funding: *$0.5 million annually*	Low-Income Assistance Partnership Program. Provides customers assistance (lowered monthly payments, arrears forgiveness, and budget and energy efficiency counseling). Also provides a weatherization grant program.
TOTAL $23.1 million annually	**Estimated Annual Expenditure From Utility-Run Low-Income Program in New York State.**

Local, State, and Federal Public Benefits Offerings in New York State

New York State Systems Benefit Charge. The System Benefits Charge (SBC) program in New York State was established in 1996 by the Public Service Commission (PSC).[11] In January 1998, NYSERDA was designated as the administrator of New York's public benefits program. NYSERDA has designed, developed, and implemented a broad portfolio of programs, collectively named the **New York Energy $mart**℠ Program, to administer public benefits including energy efficiency, low-income services, R&D, and environmental protection during the State's transition to electric retail competition.[12]

In February 2001, the PSC affirmed the continuation of the SBC program, with additional provisions, for a period of five years. Funding was set at approximately $150 million per year. Of this annual budget, approximately 14.1% will be allocated to low-income program offerings, 8.7% to residential customers, 3.6% to municipal and institutional customers, and 3.0% to small business customers. In addition to these programs, 2.9%

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[11] New York State Public Service Commission. Cases 94-E-0952 *et al.* In the Matter of Competitive Opportunities Regarding Electric Service, Opinion No. 96-12, *Opinion and Order Regarding Competitive Opportunities for Electric Service.* Issued and effective May 20, 1996.

[12] New York State Public Service Commission. Cases 94-E-0952 *et al.* In the Matter of Competitive Opportunities Regarding Electric Service, Opinion No. 98-3. *Opinion and Order Concerning System Benefits Charge Issues.* Issued and effective January 30, 1998.

was allocated to energy efficiency and strategic research and development (R&D) initiatives, 1.9% was allocated to environmental monitoring and analysis efforts, 9.1% was allocated to renewable energy technologies, and 9.1% was allocated to distributed generation and combined heat and power energy applications. Table 3 details these allotments. The SBC program was continued, in part, because it was recognized that market inefficiencies, including the inequitable distribution of electricity and load constraint issues, require government assistance in the form of public benefits initiatives. The success of the SBC program in New York helped to confirm that public benefits programs can be implemented in a cost-effective manner. Results have shown that the SBC program is filling what would otherwise be a void for those energy customers in New York State that have less market influence and unique energy needs.[13]

The **New York Energy $mart**K Programs and initiatives that directly support these types of energy customers are outlined in Table 3.

Table 3. SBC Program Funding (2001 through 2006) by Targeted Program[14]

Public Benefit Program	Total 5-Year Funding	Percent of Total 5-Year SBC Budget
Low-Income Program	$103.5 million	14.1%
Residential Program	$63.9 million	8.7%
Municipal and Institutional Program	$26.6 million	3.6%
Small Business Program	$22.2 million	3.0%
Energy Efficiency and Strategic R&D Program	$21.1 million	2.9%
Environmental Monitoring and Analysis Program	$14.4 million	1.9%
Renewable Technologies Program	$67.0 million	9.1%
Distributed Generation and Combined Heat and Power Program	$67.0 million	9.1%
Total	$385.7 million	52.5%

Source: New York State Energy Research and Development Authority

The **New York Energy $mart**K Program, through its portfolio of Energy Efficiency,

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[13] New York State Energy Research and Development Authority. *New York Energy $mart*K *Program Evaluation and Status Report: Report to the System Benefits Charge Advisory Group.* September 2000.

[14] The total five-year SBC budget percentages do not add to 100% because the table does not list every program provided through the **New York Energy $mart**K Program, funded through the System Benefits Charge. In total, Table 3 addresses 52.5% of the five-year SBC program budget that is administered by NYSERDA.

Low-Income, and Research and Development programs, has achieved 846 million kWh in annual electricity savings. These energy savings translate into emissions reductions of: 800 tons of NO_x; 1,364 tons of SO_2; and 574,607 tons of CO_2, respectively. Additionally, 219 MW of summer peak demand reduction has been achieved by the Program. The Program has also achieved an annual bill reduction of $97.1 million for New York's energy customers.[15] These results[16] of the **New York Energy $martK** Program benefit all energy customers, but especially those who have less market influence or who have more specialized energy needs.

New York Energy $martK Residential Program. The purpose of the residential public benefits program is to improve the affordability of energy and the efficiency of its use by residential customers. Residential customers are generally unfamiliar with new energy-efficient products and their energy savings potential. Residential energy efficiency programs have spurred customer demand for energy-efficient products and services by promoting ENERGY STAR® products while ensuring access to financing and the availability for these products. Approximately $63.9 million has been allocated for Residential **New York Energy $martK** energy efficiency programs between 2001 to 2006. Funding will be spent on:

- ENERGY STAR® Public Awareness Program. This program is increasing the supply, promotion, and sales of ENERGY STAR® - qualifying residential products and homes by providing assistance, tools, consumer incentives and support to retailers, contractors, remodelers, multifamily building owners, and product vendors who are in a position to influence purchasing decisions.

- Home Performance with ENERGY STAR® Program. This program is developing a network of building performance services (*e.g.*, HVAC and insulation contractors, remodelers, building performance contractors, home energy raters, and trade groups) that evaluate and make energy efficiency improvements to 1-4 family dwellings.

- Residential Financing. This effort is leveraging private investment in energy efficiency and renewable technologies while reducing barriers to energy financing in markets where energy service companies are least likely to participate.

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[15] New York State Energy Research and Development Authority. *New York Energy $martK Program Evaluation and Status Report: Quarterly Report to the System Benefits Charge Advisory Group.* June 2001.

[16] Results are based on **New York Energy $martK** funds awarded through March 31, 2001. Energy savings include clean generation from wind and PV generation sources.

To date the following results have been achieved:

- Home Performance with ENERGY STAR® Program has assisted in certifying over 120 contractors with the Building Performance Institute. The Program has 30 active contractors. Over 124 homes have received services (valued over $1 million), while over 180 homes are anticipated to receive services (valued over $2 million).

- ENERGY STAR® Homes Program has over 40 builders enlisted. Builders have committed to building more than 100 ENERGY STAR® homes, while 35 homes have already been certified as ENERGY STAR® homes.

It is estimated that over 265,000 multi-family and single-family households will have participated by the end of the program, achieving an estimated 200 million kWh in energy savings per year. Over 700 retailers and 500 contractors and remodelers are anticipated to participate by program end.

New York Energy $martK Low-Income Program. Table 4 provides a brief summary of the low-income initiatives provided through the **New York Energy $martK** Low-Income Program. Approximately $103.5 million has been allocated for the Low-Income Program between 2001 to 2006. The Direct Installation Program has provided services to over 400 units during its implementation period. Participating households typically achieve a 25% reduction in their electric energy costs. Through July 2001, the Direct Installation program has contributed to the installation of 2,868 refrigerators and 19,705 compact fluorescent bulbs in over 7,800 small homes and over 43,400 multifamily units. The program has achieved an estimated 5.6 million kWh in electricity savings, accounting for over $1.1 million in electricity bill savings for low-income customers.[17] In addition, it has been estimated that this funding has leveraged an additional $10.2 million from private sources. Based upon the estimated kWh savings, the Direct Installation program has effectuated the reduction of: 4.2 tons of nitrogen oxides (NO_x); 8.5 tons of sulfur dioxide (SO_2); and 2,470 tons of carbon dioxide (CO_2); per year.

Low-income programs, including the Direct Installation Program, have also contributed to increasing the awareness of energy efficiency and conservation options by low-income building owners and tenants. In fact, it is estimated that over 150 building owners and

[17] Bill savings of $1,125,748 are based upon the total kWh savings achieved from program inception (April 1999, with SBC 1 funding) through July 2001. Savings were calculated based upon an electricity rate of 21¢ per kWh for the Consolidated Edison Company of New York territory, where the majority of measures have been installed.

over 6,700 low-income residents have received education on electric energy use.[18]

Table 4. SBC Funded Low-Income Initiatives	
Low-Income Public Benefits Programs	**Public Benefit Services Offered**
New York Energy $martK Direct Installation Program	Extends the existing service infrastructure of the federal Weatherization Assistance Program (WAP) by offering electric reduction measures including energy efficient lighting, appliances, and electric-to-gas conversions for low-income customers. The goal is to reduce the energy burden of low-income households, while providing information and related services to the low-income community regarding energy use and efficiency.
New York Energy $martK Affordable Assisted Housing Program	The program has established an incentive pool to write down the incremental costs associated with energy efficiency measures and electric heat conversions in the Division of Housing and Community Renewal (DHCR) and Housing and Urban Development (HUD) publicly-assisted housing portfolios.
New York Energy $martK Low-Income Aggregation Program	The program improves the energy affordability of low-income customers by aggregating these customers to secure lower prices through the bulk purchase of electricity, natural gas, fuel oil, and propane. The program also supplies energy efficiency services to low-income customers in an effort to reduce electric demand.
New York Energy $martK Low-Income Public Awareness Program	This program informs low-income persons, communities, and State and community-based service providers of the energy services and options available to them under the Low-Income Energy Affordability program. This program also provides consumer and energy education and referrals to existing credit and budget counseling services locally available, as well as information on the changes taking place in the newly deregulated marketplace to energy customers. The program also supports the Low-Income Forum on Energy (LIFE).
New York Energy $martK Technical Assistance for Publicly-Assisted Housing Program	This program increases the affordability of public housing available to lower-income residents by improving the energy efficiency and energy management operations of the State's publicly-assisted housing stock. The program is achieving this by: (1) using new replacement technologies for electric resistance heat; (2) improving the efficiency of boiler plants by training boiler mechanics responsible for large heating plants; (3) purchasing energy-efficient appliances in bulk; and (4) utilizing innovative financing mechanisms to fund energy efficiency upgrades and investments.
TOTAL	**Low-Income Program ($103.5 million over 5-years)**

New York Energy $martK Small Business Program. The purpose of the small business public benefits program provided through **New York Energy $martK** is to improve the affordability of energy and the improved efficiency of its use by businesses by advising them of cost-reduction opportunities via load management, rate analysis, aggregation, capital improvements, and operating improvements. Approximately $22.2 million has been allocated for Small Business **New York Energy $martK** Programs between 2001 to 2006. Funding will be spent on:

- Technical Assistance Program. This effort is providing on-site engineering

[18] New York State Energy Research and Development Authority. *New York Energy $martK Program Evaluation and Status Report: Report to the System Benefits Charge Advisory Group; Interim Report.* September 2000.

services including: (1) energy audits, to identify missed energy improvements; (2) targeted technical studies, to address critical sectors or technologies; and (3) custom studies, to identify a specific customers energy efficiency needs and opportunities available.

- Peak Load Reduction Program. This program is providing financial incentives to accelerate the implementation of: (1) demand reduction measures; (2) productivity improvements; (3) direct load-control measures; and (4) energy management and demand monitoring technologies.

- Loan Fund. This program is providing reduced-cost financing for demand-saving and energy-efficient capital improvements for small businesses, through a Statewide network of financial institutions.

The initial three-year SBC funding allocation helped to establish the **New York Energy $mart**K Technical Assistance and Loan Fund Programs. The Technical Assistance Program has approximately 260 participants from commercial and industrial sectors. The Loan Fund Program has built a network of 25 lenders, and is offering reduced interest loans to small commercial customers.

The Small Business Program is expected to have over 4,000 participants by program end. These participants are expected to yield over 400 million kWh in energy savings per year. Potential exists for over $270 million to be leveraged by the Small Business Program during the implementation of the program.

<u>**New York Energy $mart**K Municipal and Institutional Program.</u> The purpose of the municipal and institutional public benefits programs is to improve the affordability of energy and the efficiency of its use by municipal and institutional customers. The program provides technical assistance to schools, hospitals, and government units. The program provides financial incentives, including standard performance contracting arrangements and equipment leases and loans to these customers. Approximately $26.6 million has been allocated for Municipal and Institutional **New York Energy $mart**K Programs between 2001 to 2006. Funding will be spent on:

- Energy Management Program. This program is targeted to public and private K-12 schools, and the healthcare sector. The program is reducing energy use and electric demand while spurring price-sensitive load strategies for these vulnerable customers. The program provides: (1) internet-based monitoring of electric loads via advanced metering technologies; (2) outreach; (3) technical assistance; (4) educational materials; (5) targeted recognition programs; and (6) construction incentives for renovation projects too small for energy performance contracting.

- Municipal and Wastewater Initiative. This program is accelerating the use of energy-efficient and innovative technologies by municipal water and wastewater systems in New York. The program provides risk reduction, demonstration, and education through (1) technical assistance; (2) energy efficiency audits and electricity submetering; (3) demonstrations of new energy-efficient technologies; and (4) deployment of proven, energy-efficient technologies and processes.

New York Energy $martK Energy Efficiency and Strategic R&D Program. The purpose of the Energy Efficiency and Strategic R&D public benefits program is to increase the efficiency of end-use electric energy consumption and reduce the demand for electricity in New York State. Approximately $21.1 million has been allocated for Energy Efficiency and Strategic **New York Energy $mart**K Programs between 2001 to 2006. Program projects address developing energy-efficient technologies that could be manufactured in the State, if the public benefit is compelling and near-term private return is adequate to spur R&D investment. Projects occur in the major electric end-use sectors of the State (*i.e.*, residential, commercial, industrial, and municipal).

Several lighting projects aimed toward energy customers lacking market influence have been funded through the Energy Efficiency R&D Program. The projects cover an array of technologies and span from product development, to demonstration, to information dissemination. Examples include:

- New York State companies that are developing an energy-efficient high intensity discharge (HID) wallpack and floodlight for commercial and multifamily buildings. The project is focused on developing a high-quality, low-cost fixture that will make the HID technology economically attractive for residential and commercial customers.

- The Lighting Research Center at Rensselaer Polytechnic Institute has partnered with the Energy Center of Wisconsin to demonstrate how proven CoolDaylighting™ techniques can reduce energy costs by as much as one-half within New York State classrooms. This project aims to overcome technical, economic, and institutional barriers to the use of daylighting in schools.

- Several funded projects have focused on disseminating lighting information. One project utilizes a two-pronged approach toward overcoming barriers that inhibit the adoption of energy-efficient lighting in residential, commercial, and industrial markets. The project provides financial support for the National Lighting Product Information Program (NLPIP). In addition, funding has been provided to the Lighting Research Center to help companies evaluate product designs and catch potential deficiencies early in product development.

Other sectors and technologies have benefitted from the Energy Efficiency and Strategic R&D Program, including:

- A project, funded through the Energy Efficiency R&D Program, with Saint Vincent's Hospital and the Harvard Medical School, is demonstrating and evaluating the use of ultraviolet light for air disinfection to control the transmission of infectious disease. The project is part of a six-city, multi-year field trial to study the efficacy of ultraviolet germicidal irradiation (UVGI) in controlling tuberculosis (TB) spread in homeless shelters. Results from existing studies show that significant energy savings and environmental benefits are associated with UVGI air treatment as compared to traditional multiple air change methods.

- A project, funded through the Strategic R&D Program with the Eaton Commercial Mixed-use Center and the New York State Electric and Gas Corporation (NYSEG), investigated the potential for using combined heat and power (CHP) for the site. The Eaton Center, located in Norwich, NY, contains 11 buildings occupied by several small businesses. The study indicated that the CHP system would be technically and economically viable for reducing utility grid consumption and supplying hot water and heating for the site. The project has helped reduce barriers to the use of CHP technologies thereby aiding small businesses in an area of energy use where they may otherwise not consider.

<u>**New York Energy $mart**K Environmental Monitoring and Analysis.</u> The purpose of the Environmental Monitoring and Analysis public benefits program provided through **New York Energy $mart**K is to provide objective and scientifically credible information on the environmental impacts of energy systems to assist policy makers. The initial three-year SBC funding helped fund 17 research projects covering environmental issues such as acid rain, fine particles, mercury deposition, and ozone. The program has leveraged over $4 million in national co-funding, and is helping to sustain the environmental research infrastructure of New York State. For example:

- In collaboration with the New York State Department of Environmental Conservation (DEC), the Environmental Monitoring and Analysis program is providing support to the Adirondack Lake Survey Corporation to sample water quality in 52 lakes in the Adirondack Park. This data is being used to evaluate the effectiveness of our nation's acid rain control strategies on protecting sensitive ecosystems in New York.

Approximately $14.4 million has been allocated for Environmental Monitoring and Analysis of **New York Energy $mart**K initiatives between 2001 to 2006. Program funding will be spent on:

- Developing emission characteristics for fine and ultra-fine particles from existing and emerging combustion technology so that accurate emission inventories can be developed;

- Increasing the understanding of the role of local as opposed to regional sources of air pollution so that more equitable control strategies can be developed; and

- Improving the scientific understanding of the cycling, co-pollutant interactions, and the impacts in New York of primary and secondary pollutants related to energy production and use so that policy makers can identify more effective public protection strategies.

New York Energy $martK Renewable Technologies Programs. The purpose of the renewable energy public benefits program provided through **New York Energy $martK** is to build a sustainable market for the production and sale of renewable energy technologies and for the development of "green" energy markets.

With the financial support of SBC funds, the first merchant wind power plant was constructed in Madison County, New York, and two other wind farms are expected before the end of 2001. Additional wind sites are in the process of being identified and developed. Approximately 1 MW of photovoltaic (PV) energy systems will be installed through renewable technology programs, including upwards of 250 residential PV installations, and numerous commercial and institutional building installations. Over 350kW of the PV will be located in New York City. In addition, the Tompkins County Library now has a 150kW PV roof installation.

Approximately $67 million has been allocated to support the Renewable Energy Technologies **New York Energy $martK** initiatives between 2001 to 2006. Program efforts will focus on supporting and continuing to build the end-use and wholesale markets for renewable technologies. The end-use aspect will focus on performance-based installer/customer activities for residential, municipal, and commercial customers to encourage the use of photovoltaic systems, and small-scale wind and biomass applications. The wholesale market effort will support renewable-based distributed generation (*i.e.*, large wind, bioenergy, low-impact hydropower) through risk-sharing of deployment and resource cultivation. Program funding will be spent on:

- Providing training for individuals involved in designing, installing and inspecting systems and, long-term efforts to educate the marketplace in the use and value of renewable energy technologies. This may include activities to bring renewable energy technology and curriculum to schools around New York;

- Supporting projects to evaluate the performance of systems in the field and develop, as necessary, tools that might increase renewable technology effectiveness;

- Expanding on efforts to identify viable wind sites across New York by sharing risk with developers, and other stakeholders; and,

- Including market-pull strategies for either green power or green power attributes.

New York Energy $martK Distributed Generation and Combined Heat and Power Program. The purpose of the distributed generation and combined heat and power (DG/CHP) public benefits program provided through **New York Energy $mart**K is to demonstrate and promote the use of distributed generation (DG) technologies and combined heat and power (CHP) applications. These technologies will be demonstrated in industrial, municipal, institutional, and building applications. The demonstration of system/application viability, cost-effectiveness, reliability, and replicability will be emphasized by the program.

Over the past decade NYSERDA's statutory research program has sponsored micro-generation technology development in the areas of fuel cells and micro-turbines. Over 60 field tests and demonstrations are being undertaken to validate various DG technologies. In 2000, NYSERDA's first ever SBC CHP solicitation attracted thirty-five proposals offering to reduce peak electricity demand by 11 MW by year 2002. These proposals resulted in the offering of sixteen projects to reduce demand by nearly 2 MW in 2001 and an additional 2.8 MW in 2002, with $4 million in funding. Projects are expected to result in economic and environmental benefits associated with improved fuel-use efficiency. Projects such as these also provide greater energy security for project-customers, and for the State.

Approximately $67 million has been allocated to support the DG/CHP public benefits program provided through **New York Energy $mart**K between 2001 to 2006. DG/CHP generating options through the program include turbines (steam, combustion, micro), reciprocating engines (diesel, natural gas), and fuel cells (phosphoric acid, molten carbonate, solid oxide, alkaline, proton exchange membrane). These systems offer a wide range of capacity, from 2kW for a PEM fuel cell to 25 MW gas turbine. Program efforts will focus on:

- Demonstrating and promoting DG and CHP technologies and applications in industrial, agricultural, municipal, institutional, and building applications;
- Developing and testing advanced DG and CHP systems;

- Developing equipment and installation codes and standards for emerging micro-generation products and inspector and installer training;

- Testing small fuel cell, micro-turbine and other clean micro-generation and energy storage products for different end-use applications such as load peaking, load following, and base load and power quality functions; and,

- Demonstrating and evaluating opportunities for system aggregation os systems and impacts on utility interface, regulatory issues, distribution system reliability and power quality.

<u>Other NYSERDA Administered Public Benefit Programs.</u> The **New York Energy $mart K** programs already identified specifically target residential or economically disadvantaged energy customers, or the environmentally-related benefits that affect these customers, and have budgets allocated for this purpose. There exists, however, other NYSERDA administered public benefits programs that serve these energy customers. Table 5 displays these additional public benefits programs.

Table 5. NYSERDA Administered Public Benefits Programs to Energy Customers *(Both SBC and Non-SBC Funded)*	
Residential Customer Program	
*Communities Program**	This program is building upon the existing community structure to perform outreach, education and coordination on broad program objectives, community-wide initiatives, and segments of the community special needs, by other programs.
*Residential Photovoltaic (PV) Program**	This program is building the infrastructure for PV system installers and provides incentives for the installation of PV systems in new construction.
Residential Oil Heat Research	Nearly 3 million households and 40% of the State's population use oil heat which represents 25% of the national market for heating oil. The Buildings R&D program, administered by NYSERDA, is preserving the State's fuel diversity by improving efficiency, reducing emissions, and eliminating competitive barriers through its collaboration with the Brookhaven National Laboratory Oil Heat Research program and the New York affiliates of the National Association for Oil Heat Research and Education. The program is: • Demonstrating and assessing the impact on maintenance and energy cost savings through the use of low-sulfur fuels rather than conventional quality fuel oil; and, • Developing variable output oil burners and ancillary equipment (*e.g.*, pumps, blowers) with ultra-low electric load requirements.
Small Business Customer Programs	
***New York Energy $mart K** Choices Program**	This program is expanding the pre-qualified equipment replacement incentives offered through the New Construction Program. The program is an equipment replacement program specifically for smaller end-users and smaller scale renovation projects. Eligible market sectors include commercial, industrial, agriculture, educational, government, and multifamily. Incentives provide 50% of the incremental costs of the higher efficiency upgrades, and are expected to yield 1 kW of demand savings for every $1,000 of incentives.
Municipal and Institutional Customer Programs	

Table 5. NYSERDA Administered Public Benefits Programs to Energy Customers *(Both SBC and Non-SBC Funded)*	
State En Vest Program	This program is using energy service contractors to design and install efficiency measures and energy-related capital improvements. This program is funded by third-party financing in the form of tax-exempt municipal leases. Through 2004, the State En Vest Program is expected to result in $200 million in projects with an estimated $30 million in annual energy savings.
Energy Conservation for Healthcare Organizations	This program delivers technical assistance to the healthcare sector to assess the feasibility of implementing energy efficiency measures or developing energy performance contracts. This program is coordinated between NYSERDA and the New York State Dormitory Authority to assist in providing tax-exempt financing for energy efficiency projects.
New York School Assistance Program	This program provides assistance to staff and design teams working in K-12 schools. This program leverages its funding with the **New York Energy $mart**K Standard Performance Contract, New Construction, and Buildings R&D programs.
High-Efficiency Public Street Lighting Project	This project provides resources and information on the benefits of energy-efficient street lighting to local government officials, street lighting designers, engineering professionals, and planning officials. The objective of the project is to ensure that key decision makers are informed of the technologies and design considerations that can deliver energy cost savings.
LED Traffic Signal Project	This project is transforming the market for traffic signals by providing purchasers, equipment specifiers, and installers with information and tools that will enable them to assess the availability, cost-effectiveness, and other benefits of LED traffic signals. The project is: • Working with electric utilities and ESCOs in New York to overcome both informational and cost barriers experienced by end-users; • Pursuing opportunities for promoting the adoption of LEDs through manufacturers.
Energy-Efficient Product Procurement Project	This project provides information on the benefits of ENERGY STAR® office equipment to the local government sector. The project is: • Creating a centralized website for purchasers, a procurement guidebook, and workshops for county officials to increase the purchase of qualified equipment by 15% over the next two years (2001 to 2003) with a goal to yield annual savings of $1.5 million; • Providing training and resources to procurement officials on available equipment and proper operation; and, • Expanding the number of energy-efficient products promoted to include additional
Appliance and Equipment Efficiency for State Purchasing Program	NYSERDA is working with the New York State Office of General Services to establish minimum energy efficiency standards for equipment purchased by or for the State. This program is changing State purchasing practices, and result in lower energy use and reduced air emissions, while building market share for energy-efficient equipment. Between 2001-2004 the program will: • Establish minimum efficiency standards for 18 products and equipment including lighting, HVAC, motors, refrigerators, freezers, and other appliances; and, • Evaluate and set standards appropriate for additional products including exit signs, traffic signals, and office equipment.

* Signifies that the Program is Funded Through the System Benefit Charge.
Source: New York State Energy Research and Development Authority. *NYSERDA, Envisioning the Future: A Three-Year Plan for New York State's Energy, Economic, and Environmental Future (2001-2004).*

New York Power Authority (NYPA). The New York Power Authority (NYPA), created in 1931, serves New York as a non-profit, public benefit energy corporation. It provides low-cost electricity to government agencies; municipally owned electric systems and rural electric cooperatives; job-producing companies and non-profit institutions; private utilities for resale without profit to their customers; and, neighboring states under federal requirements. In 2000, NYPA supplied 22% of New York's electricity. NYPA does not use tax revenues or State credits. It finances it projects through bond sales to private investors.

NYPA's public benefit programs include energy services that assist consumers to enhance their energy efficiency. NYPA's Energy Services Programs (ESP) began a decade ago. By 2001, NYPA had completed more than 1,000 energy efficiency projects in public schools, colleges and universities, and governmental facilities across the State. These projects produce annual energy bill savings of more than $70 million. They reduce electricity consumption by nearly 720,000 MWh each year and lower peak load demand by 166 MW. NYPA's energy services projects also help to avoid the production of nearly 500,000 tons of greenhouse gas emissions annually.

Among NYPA's energy efficiency projects is its Refrigerator Replacement Initiative partnership with the New York City Housing Authority (NYCHA), cofunded by NYSERDA, U.S. DOE, and the Consortium for Energy Efficiency (CEE). The program has annually replaced 25,000 refrigerators with models that use half the electricity. NYPA estimates that by 2002, the program will replace 181,000 old refrigerators with new energy-efficient models.

NYPA also administered the Clean Air for Schools Program, funded with $125 million from the Clean Water/Clean Air Bond Act of 1996 and $12.5 million in NYPA funds. The program replaced coal-burning furnaces in New York City public schools with cleaner natural gas and oil-fueled boilers, resulting in the elimination of over 911,200 pounds of emissions annually.[24]

Long Island Power Authority (LIPA). The Long Island Power Authority (LIPA) was created in 1986 as a corporate municipal instrumentality of the State. It was established to provide lower utility rates on Long Island and to assume decommissioning responsibility for the Shoreham Nuclear Power Plant. LIPA provides a portfolio of energy efficiency programs to electricity customers on Long Island through its Clean

[24] The 911,200 pounds of air emission reductions constitute: 576,000 pounds of SO2; 106,400 pounds of NOX; 225,800 pounds of particulate matter (PM) and 3,000 pounds of volatile organic compound (VOC).

Energy Initiative (CEI).[25] The CEI began in 1999 and is a five-year, $170 million effort targeted at achieving energy and capacity savings for LIPA, delivering electric bill savings to customers, and providing environmental benefits to society. The CEI program funds residential and non-residential programs geared toward addressing energy efficiency, peak load reduction, clean distributed generation, and renewable energy technologies. In 2000, the CEI program achieved: 51,781 MWh in total energy savings, a 70 MW reduction in peak energy needs; $5.5 million in energy bill savings for 145,000 program participants; and emission reductions of: 184.7 tons of NO_x; 46.5 tons of SO_2; and 54,179.8 tons of CO_2.[26]

LIPA administers a Residential Energy Affordability Partnership (REAP) program through the CEI program. LIPA's REAP program is dedicated to improving energy affordability for low-income households through the direct installation of a comprehensive set of cost-effective energy efficiency measures, extensive energy education and counseling, and an energy bill arrearage reduction plan. LIPA's REAP program funding averages $2.25 million annually.[27] In 2000 the REAP program achieved 232 kW of coincident peak reduction and achieved 2,414 MW in annual energy savings.[28] Refer to Section 3.2, Energy Efficiency Assessment, for further detail on LIPA's CEI program.

<u>Weatherization Assistance Program (WAP).</u> The WAP program is federally authorized and funded through the DOE. Funding is used to assist low-income persons, particularly the elderly, handicapped, and families with young children and to reduce energy consumption, while minimizing the impact of higher fuel cost on low-income families. In New York, the Office of Temporary and Disability Assistance (OTDA) receives an allocation from the U.S. Department of Health and Human Services to fund the WAP program statewide. The WAP program is administered by the NYS Department of Housing and Community Renewal (DHCR). Weatherization services provided through the WAP program are identified by on-site energy audits that includes a life-saving health and safety test and an analysis of fuel consumption and lifestyle.

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25 Long Island Power Authority. *Clean Energy Initiative: As Approved by the LIPA Board of Trustees.* May 3, 1999.
26 These results are based upon an Clean Energy Initiative program expenditure of $29.8 million through December 2000.
27 The $2.25 million average annual budget for LIPA is based upon an average for their 1999 and 2000 annual budgets. In 1999 LIPA afforded $1.37 million to their REAP program, and in 2000 $3.12 million was allocated.
28 Long Island Power Authority. *Clean Energy Initiative, Draft Biennial Report.* June 2001.

Since its inception in 1977, the WAP program has weatherized more than 400,000 dwellings or 26.7% of the estimated eligible units. It has been estimated that 1.5 million dwelling units are eligible for the WAP program. Servicing these could result in vast energy savings and environmental benefits, plus more affordable energy to those who occupy the dwellings. Between 1990-2000, the WAP allocated over $429 million to sub-grantees of the program. Over this time period, the WAP achieved 40 TBtu of cumulative annual energy savings in one-to-four family and multi-family dwellings.

For the 2001 program year, an estimated $45.4 million[29] will be available for the New York WAP Program. Estimated energy savings for the 2001 WAP program year have been estimated to be 29.4 MMBtu (average annual energy savings per unit in multi-family buildings). One-to-four family buildings have been projected to achieve an average annual energy savings of 45.5 MMBtu per unit. Table 6 presents an estimated savings summary for WAP housing in NYS for the 2001 program year.

Table 6. WAP Savings Summary, 2001 Program Year

Savings Summary	Housing Type		Total
	Multi (>4 Units)	1-4 Units	
average savings / unit heating	29.4 MMBtu	45.5 MMBtu	
average savings / unit electric	615 kWh	1230 kWh	
units to be weatherized in 2001 program year	2,718	3,323	6,041
average savings / unit[a] heating and electric	$1.14 million	$2.29 million	$3.43 million
savings[b] after 15 years heating and electric	$17.1 million	$34.35 million	$51.45 million
average WAP cost per unit	$2,000	$2,250	$2,125
savings per unit of life of installed measures[c]	$6,300	$10,320	
benefit/cost savings to investment ratio	3.15	4.59	

[a] Based on an estimate of $11.50/MMBtu average for the fuel mix in NYS; and $0.134/kWh average electric rate.
[b] In 2000 dollars.
[c] Actual life of individual measures varies from two to twenty-five years.

Source: NYS Division of Housing and Community Renewal, Energy Services Bureau. *Weatherization Assistance Program; State Plan: 2001 Program Year, April 1, 2001 - March 31, 2002.*

State Regulation and Consumer Protections

New York State residential and low-income customers are also protected from monopolistic and anti-competitive market behavior through regulatory protections.

[29] These 2000 and 2001 WAP Program figures include carry-over funds from prior years.

These protections perform a different function than the more intimate actions of energy efficiency public benefits programs, which protect consumers from unfair business practices and ensure that customers have access to adequate electricity and energy resources so that health and safety are not jeopardized. As energy competition in the State advances, and as the State furthers deregulation activities, ongoing preservation and evaluation of existing consumer protection laws and regulations will be required. The Home Energy Fair Practices Act is one example of how consumers may continue to be protected.

Home Energy Fair Practices Act (HEFPA). The HEFPA provisions of the New York State Public Service Law are designed to provide protections to energy customers in their relationships with utilities, which until recently were the sole providers of electricity and gas services. The Act "...establishes as State policy that the continued provision of gas, electric and steam service to residential customers without unreasonable qualifications or lengthy delays is necessary for the preservation of the health and general welfare and is in the public interest."[30] The Act was signed into law in 1981 and was permanently approved by the PSC in 1982. The HEFPA affords consumer protections through its provisions regarding termination and restoration of utility service, as well as on payment agreements between an energy customer and utility. The Act specifies the circumstances in which protections shall be provided by utilities to energy customers.

The emergence of a competitive energy market, including the entrance and influence of new market participants such as ESCOs, warrant a review of the language and provisions of HEFPA. As energy service providers, ESCOs operate under the rules of a competitive energy market and may replace the traditional roles of incumbent utilities. This coupled with their role as providers of last resort (POLR) under the rules and regulations of HEFPA, also warrants review.

FINDINGS AND CONCLUSIONS

The issues and public benefits programs addressed by this report lead to the following general conclusions:

- Government interventions to assist in energy market development are necessary to align public and private interests, particularly in situations where markets are not allocating resources efficiently or fairly.

[30] Home Energy Fair Practices Act, Rules. Part 11. Public Service Law, art. 2 §§§4(1), 30-51, 66, 80(1)).

- Energy customer protections must be continued with the same vigor as they have been afforded in the past. This becomes increasingly important as energy markets become more competitive and customer choice in service providers increases.

- Public benefits programs have contributed to energy and cost savings for residential, low-income, small business, and municipal and institutional customers. These programs also provide environmental benefits including cleaner air and water, for all of New York's energy customers.

- Opportunities to further coordination among State agencies that have roles in sponsoring and providing low-income energy assistance and other public benefits programs are beneficial to program participants, and should be fostered.

- Public benefits programs directed toward research and development have significantly contributed to developing, demonstrating, and providing strategic energy technologies, including the advancement of renewable energy technologies, while encouraging and promoting environmental safeguards and protection.

Section 3

ENERGY RESOURCE ASSESSMENTS

SECTION 3.1

FORECAST SUMMARY

INTRODUCTION

Forecasts of energy demand and prices for electricity, natural gas, petroleum, and coal were developed for the Draft 2002 State Energy Plan (Draft Energy Plan) over the 2000 to 2021 time period. The base year for forecasting is 1999. Actual 2000 data are used, where available. Forecasts include: (1) an Outlook Case bounded by (2) a High Economic Growth Case and (3) a Low Economic Growth Case for a total of three forecast scenarios. Forecasting methodologies and more detailed forecast information are provided in the Draft Energy Plan Appendix.

The Draft Energy Plan forecasts are consistent with and derived from the Energy Information Administration's (EIA) *Annual Energy Outlook (AEO) 2001*. The Mid-Atlantic AEO 2001 forecast, which includes the states of New York, Pennsylvania, and New Jersey, serves as the basis for the Draft Energy Plan.

FORECAST METHODOLOGY

New York projections were derived from the EIA Mid-Atlantic[1] Region all fuels demand and price forecasts. EIA produces regional forecasts under various economic and price scenarios. EIA uses the National Energy Modeling System (NEMS)[2] energy market projections of the *Annual Energy Outlook 2001*.

The purpose of the Draft Energy Plan forecast is to generate a reasonable range of possible future energy demand and prices as a basis for assessing energy markets and market needs.[3] Macroeconomic variables, used by EIA for its Outlook, High, and Low

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[1] The Mid-Atlantic Region includes New York, New Jersey, and Pennsylvania.

[2] NEMS is a computer-based, energy-economy modeling system for U.S. energy markets, using an integrated modular approach to represent macroeconomic activity, international energy supply availability, and end-use consumption sectors. For each fuel and consuming sector, the model balances energy supply and demand while accounting for competition among various energy fuels and sources. NEMS projects the production, importation, conversion, consumption, and consumer prices of energy based on macroeconomic and financial factors, world energy markets, resource availability and costs, market behavior, cost and performance of technologies, and demographic assumptions.

[3] Of the many scenarios simulated by NEMS, three forecasts, each featuring a different rate of economic growth, were chosen. These scenarios included the EIA Outlook Case forecast and projections based on high and low economic growth to reflect the uncertainties inherent in forecasting future economic activity.

Economic Growth Cases, influence capital investment, productivity gains, and technology and market development. Growth rates for key economic variables determine energy demand growth in both the EIA national and New York's forecasts. They are provided in Table 1.

Table 1.
Annual Average U.S. EIA Growth Rates (1999-2021) of Economic Variables

	High Case	Outlook Case	Low Case
Productivity	2.3%	2.1%	1.8%
Labor Force	1.2%	0.9%	0.7%
GDP	3.5%	3.0%	2.5%
World Oil Price	2.3%	1.2%	-0.6%

The national economic variables were estimated by EIA for each of the ten census divisions of the United States. The High Economic Growth Case incorporates population, labor force, and productivity growth rates that are higher than the Outlook Case. Productivity gains result in lower inflation and interest rates. The Low Economic Growth Case assumes lower population, labor force, and productivity gains than the Outlook Case, with higher interest and inflation rates.[4]

Method Overview

The New York forecasts were derived from EIA's regional fuel demand and price forecasts, by determining the historic relationships between fuel demand and prices in New York and those of the Mid-Atlantic region. Few changes in the relationships between New York and the Mid-Atlantic region were found, *i.e.,* New York's energy use as a percentage of Mid-Atlantic energy use has remained fairly stable over time. Twenty-eight years (1970-1997) of New York fuel use, expressed as a percentage of the Mid-Atlantic region's fuel use, defines the historic relationship between the two, by end-use sector. The demand and price relationships were projected into the future using a

[4] EIA/ Assumptions to the Annual Energy Outlook 2001, pg 14

univariate time series forecast. The forecasted percentages were then applied to the base year, 1999, of the EIA Mid-Atlantic regional forecasts to obtain a New York base year.

The 1999 New York forecasted data were then compared to actual data reported in NYSERDA's *Patterns and Trends 1999*. The Mid-Atlantic regional forecasted growth rates were then applied to the actual 1999 data where the 1999 data were typical of historical data. Where 1999 data did not fit, the forecast was based on the 1999 New York forecasted base year determined with historical data in the SYSTAT® 9.0 program. New York fuel demand and price forecasts were derived using this analytical process. SYSTAT® 9.0 for Windows® was used to generate the parameters of the univariate time-series model used to describe historic relationships between Mid-Atlantic regional and New York variables. The SYSTAT® program ran a projection using an Auto Regressive Integrated Moving Average (ARIMA) model[5] to determine New York's growth trend in relation to that of the Mid-Atlantic region. The historical data series used to generate New York demand and price forecasts for electricity, natural gas, petroleum, and coal satisfied standard statistical tests, and were deemed to sufficiently capture the relationship between New York energy demand and prices and those of the Mid-Atlantic region.[6]

Table 2 shows New York forecasts by sector and fuel. Forecasts for each of the listed fuel sectors can be found in the Draft Energy Plan Appendix.

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[5]ARIMA models use either past values (the autoregressive model), past errors (the moving average model), or combinations of past values and past errors to create an accurate projection. A Box-Jenkins univariate time series model is the specific ARIMA model used. The Box-Jenkins ARIMA modeling process occurs in three stages: Identification, Estimation, and Diagnosis. With SYSTAT®, models are identified with Transform, Case series plot, ACF –Autocorrelation plot, and PACF Partial Autocorrelation plot functions, differenced to create a stationary data series, estimated with ARIMA and diagnosed to determine their adequacy with more plots.

[6]The autoregressive (AR) model addresses serial correlation of errors. For example, a residual from our model reveals an autocorrelation statistic of .953. Correlation coefficients can be squared to reveal the proportion of variance, or in this case, the variation in error terms. This means that over 89% of the variation in error from predicting New York's percentage of Mid-Atlantic in one year can be accounted for by the error in predicting the previous year's percentage. Where serial correlation was found in plotted residuals, the appropriate number of AR parameters were added to eliminate their influence on the forecast.

Table 2. New York State Forecasts (2000-2021)						
	Residential	**Commercial**	**Industrial**	**Electric Generation**	**Transportation**	**Total**
Petroleum tBtu	Distillate; Demand and Price	Distillate, Residual; Demand and Price	Distillate, Residual; Demand and Price	Distillate, Residual; Demand and Price	Distillate, Motor Gasoline; Demand and Price	Demand and Price
Electricity GWh	Demand and Price	Demand and Price	Demand and Price			Demand, Price, Peak Demand (MW)
Natural Gas mmdt	Demand and Price	Demand and Price	Demand and Price	Demand and Price		Demand and Price
Coal				Price		Demand

NEW YORK STATE ENERGY DEMAND

A summary of Statewide energy demand forecasts is shown in Table 3.

Table 3. Energy Demand in New York State							
	Actual*	**Outlook**	**Outlook**	**Average Annual Growth**			**Total Growth**
	2000	2006	2021	2000-2006	2006-2021	2000-2021	2000-2021
Demand							
Electricity, GWh	155,681	165,159	181,428	0.99%	0.63%	0.73%	16.54%
Peak, MW	30,200	31986	34851	0.96%	0.57%	0.68%	15.40%
Natural Gas, tBtu	1,200	1,563	2,081	4.51%	1.93%	2.66%	73.42%
Residential	367	420	443	2.27%	0.36%	0.90%	20.80%
Petroleum, tBtu	1,725	1,831	2,000	1.00%	0.59%	0.71%	15.94%
Home Heating Oil, tBtu	197	167	140	-2.72%	-1.17%	-1.61%	-28.93%
Gasoline, tBtu	697	780	844	1.90%	0.53%	0.92%	21.14%
Coal, tBtu	311	370	386	2.91%	0.29%	1.03%	24.09%

*2000 electricity and natural gas values are weather adjusted

The forecasts highlight the demand for electricity, total and residential natural gas, total petroleum, home heating oil, gasoline, and coal over the forecast period for the Outlook Case. The Outlook Case features 3.0% average annual economic growth.

The electricity forecasts represent the electricity requirements for retail customers. Using a weather-adjusted base, an average annual growth rate of 0.73% for total electricity requirements, measured in gigawatt-hours (GWh), is predicted during the forecast period. The Outlook Case is bounded by Low and High Economic Growth Case forecast rates ranging from 0.4% to 1.1% per year. Peak demand growth, measured in megawatts (MW), lags behind projected growth in total electricity requirements. A variety of demand-side management programs reduces peak demand on extreme-weather days. Peak electricity demand is expected to grow at an average annual rate of 0.68%. The Low and High peak demand forecasted growth rates are 0.3% and 1.1% per year, respectively, over the forecast period.

Total natural gas demand is expected to increase at an average annual rate of 2.67% in the Outlook Case, over the forecast period. The Low and High Economic Growth Case forecasted rates for total natural gas are 2.2% and 2.7% per year, respectively. All sectors, electric generation, residential, commercial, and industrial, exhibit projected increases in demand for natural gas. Despite a recent trend of contracting demand, downstate[7] demand for natural gas has historically been stronger than upstate[8] demand, particularly for the residential sector. Forecasted downstate growth may be further slowed due to the World Trade Center disaster. The increases in total gas demand for the High and Outlook Economic Growth Cases, 2.71% and 2.66%, respectively, are largely attributable to projected fuel requirements for electricity generation.

The predicted slowing of growth in demand for petroleum (1.0% average annual growth from 2001-2006 and 0.59% average annual growth from 2006 to 2021) is largely driven by declining use of distillate and residual oil for electric generation. In the Outlook Case, residual oil-fired generation decreases by 95.6% and distillate oil-fired generation declines by 78.2% over the forecast period. Home heating oil use decreases approximately 29% over the forecast period. Average annual declines range from 1.57%

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[7] Downstate comprises these utility areas: Central Hudson Gas & Electric Corp., Consolidated Edison Co. of N.Y., Inc., Keyspan New York, Keyspan Long Island, and Orange & Rockland Utilities, Inc.

[8] Upstate comprises these utility areas: Corning Natural Gas Corp., National Fuel Distribution Corp., New York State Electric and Gas Corp., Niagara Mohawk Power Corp., Rochester Gas & Electric Corp., and St. Lawrence Gas Company, Inc.

per year in the Low Economic Growth Case to approximately 1.6% per year in the Outlook and High Economic Growth Cases. The Draft Energy Plan forecast results indicate robust growth in distillate requirements for the industrial and transportation sectors, increasing an average of 1.6% and 2.1% per year over the forecast period, respectively. Average annual distillate use is projected to decrease in the residential, commercial, and electric generation sectors, by 1.6%, 0.4%, and 7.0% per year, respectively, during the forecast period. Average annual residual oil requirements are forecasted to decline 0.9% in the commercial sector, 0.0% in the industrial sector, and 14% in the electric generation sector over the forecast period. Demand for motor gasoline is expected to increase 21.1% during the 2000-2021 forecast period. Demand for motor gasoline in the transportation sector is expected to grow between 0.6% and 1.2% per year, with most of the growth projected over the first ten years of the forecast.

Total coal use in New York is expected to grow moderately over the forecast period. Average annual growth in the Outlook Case is forecasted at 1.0% and total growth is projected at 24.1% over the forecast period. A decrease in coal use is forecasted from 2005 to 2010. After this slowdown, growth is predicted to rebound as rising natural gas wellhead prices and nuclear power plant retirements are projected to cause increasing demand for coal-fired baseload capacity in the electric generation sector.[9] Coal demand is forecasted to grow between 0.9% and 1.6% annually in the Low and High Economic Growth Cases, respectively. The High Economic Growth Case favors coal burning in the electric generation sector. In that case, total coal use is projected to grow by 38.5% over the forecast period.

NEW YORK STATE ENERGY PRICES

Statewide average end-use electricity prices (including those of the New York Power Authority) are projected to decrease at an average annual rate of approximately 1.4% in constant 2000 dollars over the forecast period. The Low and High Economic Growth Case price forecast projects that electricity prices will decrease an average of 1.7% and 1.4% per year, respectively, over the forecast period.

In the Outlook Case, Statewide average natural gas prices for the residential sector are projected to decrease at an average annual rate of approximately 1.0% from 2000 to 2021.

In the Low Economic Growth Case, the average prices are projected to decrease at an

[9] EIA Annual Energy Outlook 2001, pg. 95

annual rate of 1.3%, while in the High Economic Growth Case, an average annual price decrease of 0.6% is projected.

Home heating oil prices Statewide are projected to decrease for the residential sector by 16.1% over the forecast period. The Outlook Case, which projects moderate demand, predicts the smallest average price decline, about 0.8% per year. This is higher than the High Economic Growth Case, which predicts abundant supply and slackened residential demand, resulting in a 1.3% annual decrease in prices.

The Statewide coal price is projected to decline at an average annual rate of approximately 0.7%, or a total of 14.5% over the forecast period. Both the Low and High Economic Growth Cases predict an average decline in coal price over the forecast period of 0.8% per year.

Projected Statewide energy prices are shown in Table 4 in constant 2000 dollars. Average prices for each fuel (shaded) are weighted by demand within their respective customer sectors.

Table 4. Energy Prices in New York State

Price	Actual 2000	Outlook 2006	Outlook 2021	Average Annual Growth 2000-2006	2006-2021	2000-2021	Total Growth 2000-2021
Electricity, cents/ kWh	11.34	8.50	8.50	-5.03%	0.00%	-1.36%	-25.04%
Residential, cents/ kWh	14.10	11.90	12.50	-2.79%	0.33%	-0.57%	-11.35%
Commercial, cents/ kWh	12.50	8.20	8.00	-6.79%	-0.16%	-2.10%	-36.00%
Natural Gas,$/dt	5.61	5.50	5.31	-0.33%	-0.23%	-0.26%	-5.35%
Residential $/dt	10.20	8.56	8.32	-2.88%	-0.19%	-0.97%	-18.43%
Petroleum, $/gallon	1.37	1.21	1.25	-2.05%	0.19%	-0.45%	-9.12%
Home Heating Oil, cents/gal	152.56	116.76	127.93	-4.36%	0.61%	-0.83%	-16.14%
Gasoline, cents/gal	158.80	148.11	146.06	-1.16%	-0.09%	-0.40%	-8.02%
Electric Generation Residual Oil, $/bbl	24.99	21.59	22.99	-2.41%	0.42%	-0.40%	-8.00%
Coal, $/ ton	39.11	36.34	33.45	-1.22%	-0.55%	-0.74%	-14.47%

All prices are expressed in constant 2000 dollars. Average petroleum price based on average of all fuels Btu

FINDINGS AND CONCLUSIONS

- Demand and nominal prices for all fuels are forecast to increase at different rates over the forecast period; however, real prices (accounting for inflation) decline for all fuels over the forecast period.

- New York's aggregate demand for petroleum products is projected to rise moderately over the forecast period, with increases projected for motor gasoline and decreases for residential heating oil. Increased world demand is expected to exert upward pressure on prices, even given stable supplies. Over the forecast period, demand for motor gasoline is projected to increase 21.1%. Year 2000 prices were unusually high, 158.8 cents per gallon, so real prices are expected to drop 8.0% from this level, to 146.1 cents per gallon in 2021.

- Natural gas supply availability, being predominately domestic, is expected to be fairly stable. Natural gas prices rose sharply in 2000. This increase was due to tight natural gas supplies, both in production and storage. A result of this price increase was greater U.S. exploration and drilling, increases in inventory levels, and hence, lower real prices over the forecast period. Demand growth will be strong in New York, with 73.4% growth over the forecast period. This is primarily due to a 172.5% increase in natural gas demand for electric power generation. Real natural gas prices are expected to decrease an average of 0.26% annually, from $5.61 per dekatherm in 2001 to $5.31 per dekatherm in 2020.

- Total electricity use in New York is expected to grow 16.5% over the forecast period, while prices in real terms decline. Real electricity prices are forecast to decline 25.0% over the forecast period due to increased competition among suppliers and lower fuel prices. Peak megawatt demand is forecast to grow at a slightly slower rate than total electricity requirements (15.4% versus 16.5%) over the forecast period.[10]

- Coal demand is expected to rise moderately, by a total of 24.1% over the forecast period. Customer coal prices decline over the forecast period along with mine-mouth coal prices. Productivity increases continue to result from technology enhancements, economies of scale, and better mine design. As a result, real coal prices are forecast to decline 14.5% over the forecast period.

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[10] The loss of load in New York City resulting from the terrorist attack on the World Trade Center is not factored into the forecast. This load is expected to be restored gradually during rebuilding efforts and completely restored once rebuilding is finished. Load is expected to be fully restored sometime in the early half of the forecast period.

SECTION 3.2

ENERGY EFFICIENCY ASSESSMENT

INTRODUCTION

This Energy Efficiency Assessment provides information on New York's energy use and its efficiency of energy use, a history of the State's energy efficiency initiatives, and descriptions of current program offerings with funding levels and achievements to date. This report also discusses the benefits of energy efficiency, as well as the potential for, and the barriers to, further improvements in energy efficiency. For the purposes of this assessment, energy efficiency is defined as providing permanent reductions in energy use while maintaining equal or greater quality of services.[1]

OVERVIEW OF ENERGY USE TRENDS IN NEW YORK STATE

With 7% of the nation's population, New York is the most energy-efficient state in the continental United States on a per-capita basis, accounting for less than 5% of the nation's primary energy use.[2] New York State has the third lowest energy intensity (defined as British thermal units [Btus] used to produce one dollar of Gross State Product [GSP]), below only Connecticut and Hawaii, despite being the fourth largest energy user among the fifty United States.[3] Lower energy intensity generally indicates higher energy efficiency. In 1999, New York used 7,388 million Btus per dollar of GSP, a figure that is 44% below the national average.[4] Figure 1 shows the 20-year trend in New York's primary energy use per dollar of GSP.[5] The significant decline in energy intensity in the State, shown in Figure 1, is due to a general shift from a manufacturing economy to a service-based economy, as well as energy efficiency improvements resulting from a

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[1] Discussion of energy efficiency does not include temporary load curtailment or price responsive load management activities, which are discussed in the Electricity Assessment.

[2] Department of Energy, Energy Information Administration, *State Energy Data Report, 1999.*

[3] Department of Energy, Energy Information Administration, *State Energy Data Report, 1999* and U.S. Bureau of Economic Analysis, *Survey of Current Business, June 2000.*

[4] Department of Energy, Energy Information Administration, *State Energy Data Report, 1999* and U.S. Bureau of Economic Analysis, *Survey of Current Business, June 2000.*

[5] Primary energy is energy used by the four major sectors (transportation, industrial, commercial and residential) and includes all fuels used to generate electricity.

range of programs and price-induced activities.

Primary energy use as compared to GSP over the same 20-year period is shown in Figure 2. This figure shows that GSP has risen despite relative stability in primary energy use.

Figure 1

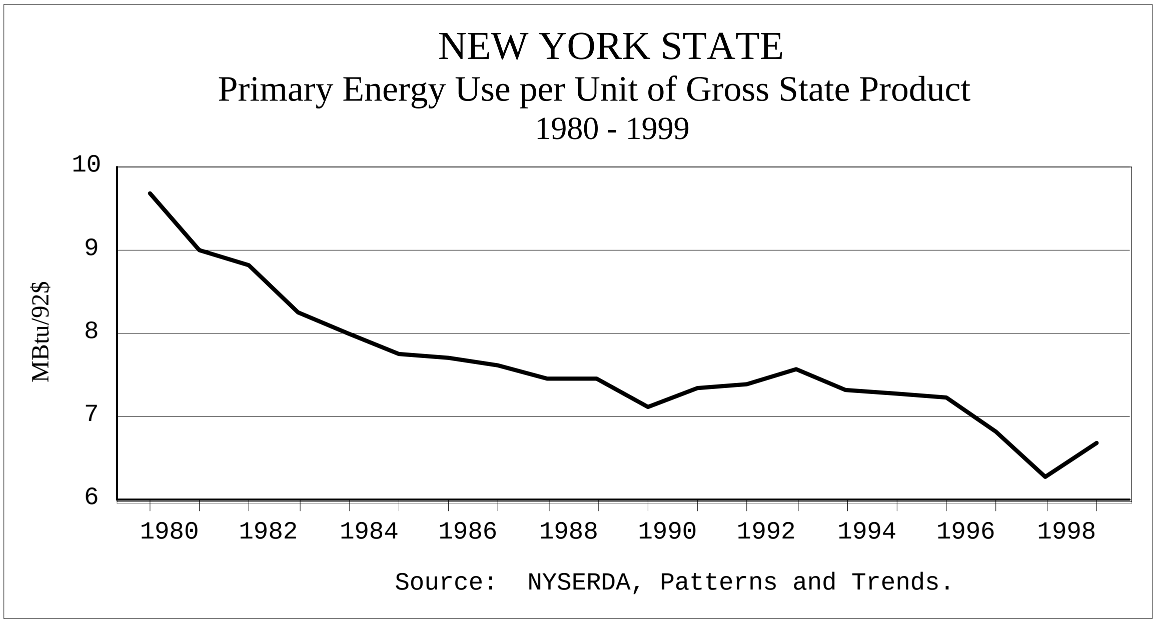
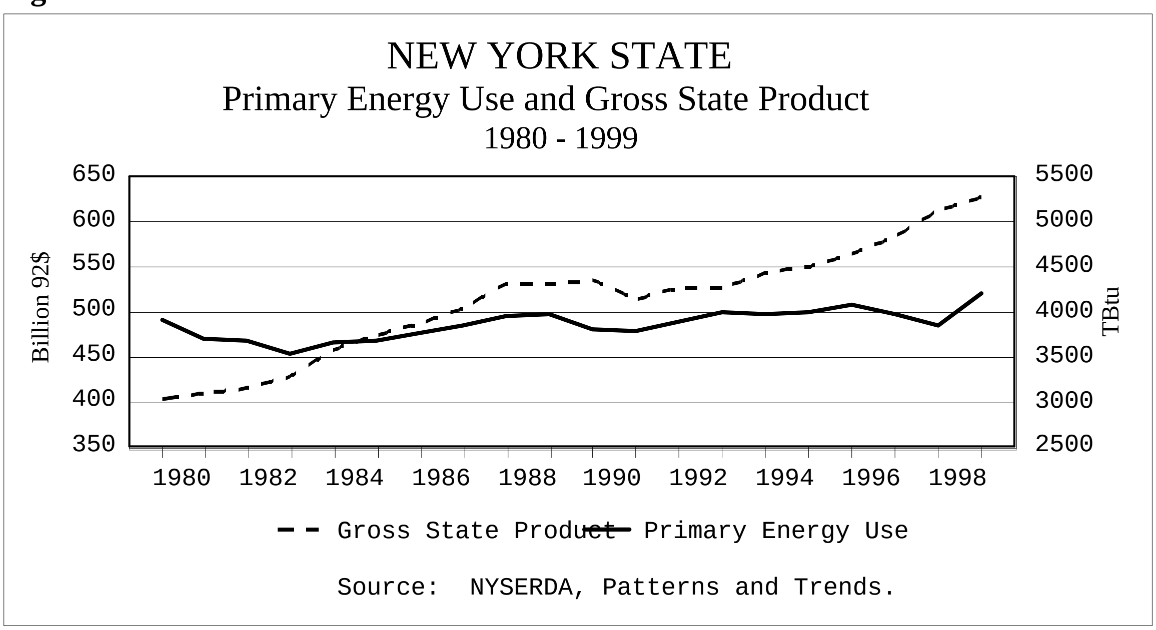


Figure 2



Over this period, GSP grew by 55.7%, while energy use increased by only 7.6%. New York's total primary energy use in 1999 was 4,207 trillion Btus (TBtus), compared to 3,909 TBtus in 1980.

Over the past 20 years, energy use in New York State has declined significantly among all of the major end-use sectors. Average annual energy use by sector and the percent change over the 20-year period is shown in Table 1. The most significant improvements in energy usage have occurred in the industrial and transportation sectors, respectively.

Table 1: New York State Average Energy Use by Sector: 1980 and 1999

Sector	1980	1999	% Change
Residential (MMBtu per household)	123.8	107.4	-13.2%
Commercial (MMBtu per capita non-manufacturing employment)	93.4	76.4	-18.2%
Industrial (MBtu per total GSP)	1.5	0.6	-60.0%
Transportation (Btu per Vehicle Mile Traveled)	13,353	9,204	-31.1%
MMBtu = million Btus MBtu = thousand Btus			

Improvements in energy use per unit of GSP in the industrial sector are largely due to a decrease in heavy manufacturing in New York. Industrial sector efficiency improvements can also be credited, to some extent, to programs designed to improve production efficiency. Transportation sector improvements, as measured in Btus per vehicle mile traveled (VMT), are largely due to federally-mandated improvements in fuel economy, as well as the use of lighter materials on passenger vehicles. The Corporate Average Fuel Economy (CAFE) standards, established by the Energy Policy Act of 1975, dictate the average miles per gallon that passenger cars and light-duty trucks sold in the Unites States must attain.[6] New light vehicle fuel economy improved fleet-wide from the mid-1970s through the late-1980s.[7] Transportation sector improvements are also due, to some extent, to programs promoting more efficient alternatively-fueled vehicles, such as those that are electric or hybrid-electric powered. The residential and commercial sectors

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[6] According to the U.S. Environmental Protection Agency, Office of Air and Radiation, *Fuel Economy Program Fact Sheet*, the 1996 - 2003 CAFE standards are 27.5 miles per gallon (mpg) for domestic and imported passenger cars, and 20.7 mpg for light-duty trucks.

[7] U.S. Environmental Protection Agency, *Light Duty Automotive Technology and Fuel Economy Trends, 1975 Through 2001*, September 2001.

have experienced the smallest declines in energy use. The improvements that have occurred are largely the result of enhancements in building design and construction, advances in energy-using appliances, products and equipment, and energy efficiency programs offered to these sectors.

ENERGY EFFICIENCY IN NEW YORK STATE

This section describes the evolution of energy efficiency programs in New York, including funding levels for major efficiency initiatives over the past ten years.

Evolution of Energy Efficiency Programs

The nature of the State's energy efficiency programs has changed substantially over the past twenty years. The most significant early investments in energy efficiency programs occurred under the demand-side management (DSM) programs offered by the State's investor-owned utilities. In 1984, the Public Service Commission (PSC) required investor-owned utilities (IOUs) to develop pilot DSM programs to improve energy efficiency and load management. At the PSC's direction, funding for these programs was initially set at about $25 million per year.

After a three-year period, the PSC determined that DSM programs represented a viable option for helping to meet future electricity needs in the State, and the IOUs were directed to develop annual and long-range plans for continuing and expanding such programs. During the period from 1987-1989, utility DSM programs were largely focused on load management. Then, regulatory actions in the early 1990s caused programs to shift toward energy efficiency. In 1992, IOU expenditures on DSM programs reached a peak of $286 million. At this point, program offerings were quite diverse, ranging from rebates for residential customers to financial incentives for installing high-efficiency measures in industrial facilities. In 1994, DSM expenditures began to decline in part due to the escalating effect of DSM spending on electricity rates, coupled with low prevailing energy prices. Large reserve margins and the economic recession were also factors. DSM expenditures continued to decline through 1996 until the PSC established New York's System Benefits Charge (SBC).

New York's SBC was established in May 1996 by PSC Opinion No. 96-12[8] to fund public benefit programs during the State's transition to a competitive retail electricity

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[8] Cases 94-E-0952 *et al.*, *In the Matter of Competitive Opportunities Regarding Electric Service*, Opinion No. 96-12, Opinion and Order Regarding Competitive Opportunities for Electric Service (issued and effective 20 May 1996).

market. The SBC is designed to fund public policy initiatives in areas not expected to be adequately addressed by competitive markets: energy efficiency (including load reduction efforts), low-income energy affordability, research and development (R&D), and environmental monitoring and mitigation. SBC funding levels were originally established in individual electric utility settlement agreements[9] and funds are collected through a non-bypassable charge on electric utility transmission and distribution systems. The PSC capped SBC funding at one mill[10] per kilowatt-hour (kWh) during the initial phase of transition, based upon 1995 utility expenditures for demand-side management programs. Total funding for the three-year SBC program was $234.3 million. The New York State Energy Research and Development Authority (NYSERDA) was designated as the administrator of the Statewide public benefits program, pursuant to a January 30, 1998 order by the PSC.[11] The SBC program began operation on July 1, 1998. The PSC allocated $172 million of SBC funds to NYSERDA, and the IOUs retained the remainder of this funding to meet existing obligations and to continue some low-income programs.

With the advent of the SBC, energy efficiency programs in New York made a transition from rebate-driven offerings to market development initiatives. The **New York Energy $mart**K public benefits program, offered by NYSERDA, combines infrastructure development, awareness activities, and targeted incentive offerings in order to transform markets. Whereas the DSM programs were primarily based on one-time transactions or rebates to end-users, the SBC market development programs establish long-term relationships with participants and networks of trade allies in order to support sustained changes in markets and consumer behavior.

After two and one-half years of SBC program implementation and evaluation, the PSC directed that these programs should be extended with increased funding. In its January 26, 2001 Order[12], the PSC extended SBC programs through June 30, 2006 and increased funding from $78.1 million to $150 million annually. Continuing the SBC programs is intended to help sustain momentum for the State’s efforts to promote competitive markets for energy efficiency, offer low-income services, conduct research and

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[9] Cases 94-E-0952 *et al., In the Matter of Competitive Opportunities Regarding Electric Service*, Opinion No. 98-3, Opinion and Order Concerning System Benefits Charge Issues (issued and effective 30 January 1998).

[10] A mill is one tenth of a cent.

[11] New York State Public Service Commission. *Opinion and Order Concerning System Benefits Charge Issues*. Issued and effective, January 30, 1998.

[12] New York State Public Service Commission. *Order Continuing and Expanding the System Benefits Charge for Public Benefits Charge for Public Benefits Programs*. Issued and effective, January 26, 2001.

development, protect the environment, and provide direct economic and environmental benefits to New Yorkers. Energy efficiency programs are also being recognized for their role in helping ensure system reliability and securing adequate power to meet summer peak conditions.

The collective energy efficiency expenditures, including utility DSM, SBC, and other government programs, over the past ten years is shown in Table 2. The total investment of these programs over the ten-year period is more than $2.7 billion. Spending declined after DSM investments reached a high in 1992. The low reached in 1998 reflects the transition from the utility-sponsored programs to the SBC program. From 1998 through 2000, spending was on an upward trend as SBC programs and other energy efficiency programs (*e.g.*, the Long Island Power Authority's [LIPA] Clean Energy Initiative) began. The following section of this assessment provides more detailed summaries of key energy efficiency programs and their individual achievements.

Table 2: Energy Efficiency Spending in New York State: 1990-2000 ($Millions)

Year	IOU DSM/SBC Programs(1)	IOU HIECA(2)	NYSERDA Programs(3)	LIPA(4) Programs	NYPA(5) Programs	Other Efficiency Programs(6)	Total(7)
1990	$99	$19	$9.6	-----	$2	$94.5	$224.1
1991	$198	$18	$9.6	-----	$12	$61.5	$299.1
1992	$286	$18	$9.6	-----	$22	$49.9	$385.5
1993	$280	$15	$9.6	-----	$50	$69.8	$424.4
1994	$188	$11	$9.6	-----	$38	$80.7	$327.3
1995	$106	$10	$10.9	-----	$54	$69.0	$249.9
1996	$73	$5	$12.1	-----	$76	$49.6	$215.7
1997	$48	-----	$12.4	-----	$72	$44.8	$177.2
1998	$12.4	-----	$13.1	-----	$73	$28.2	$126.7
1999	$9.5	-----	$12.5	$2.9	$92	$30.8	$147.7
2000	$12.7	-----	$35.9	$14.6	$98	$42.0	$203.2
Total(7)	$1,312.6	$96	$144.4	$17.5	$589	$620.8	$2,780

Spending, in many cases, is less than actual contracted or encumbered funds. Spending includes administration and overhead.
(1) Source: Department of Public Service.
(2) Home Insulation and Energy Conservation Act. Source: DPS.
(3) Includes energy efficiency and select low-income and research and development (R&D) SBC programs, federally-funded State Energy Programs, and statutory R&D initiatives in the energy efficiency area. Source: NYSERDA.
(4) Long Island Power Authority. Excludes Clean Energy Initiative peak load management and renewable programs. Source: LIPA.
(5) New York Power Authority. Source: NYPA.
(6) Includes the federally-funded Weatherization Assistance Program (Source: New York State Division of Housing and Community Renewal), and the portion of Petroleum Overcharge Restitution Act funds for energy efficiency programs not administered by NYPA (Source: NYSERDA).
(7) Totals may not sum due to rounding.

DESCRIPTION OF MAJOR ENERGY EFFICIENCY PROGRAMS

This section describes the achievements of several major energy efficiency programs delivered over the past ten years and major energy efficiency programs currently offered.

Utility Demand Side Management and Public Benefit Programs

In response to industry restructuring in the late 1990s, utilities redirected their efforts from DSM programs to market development activities. Starting in 1998, continuing utility DSM efficiency programs were funded by the SBC.[13] Energy efficiency expenditures for utility DSM and SBC programs are shown in Table 3 along with actual and projected electricity and summer peak demand reductions achieved between 1990 and 2006.[14] The *italics* in Table 3 signify *projected* spending and achievements. Select utility energy efficiency activities are described in Table 4.

Table 3: Utility DSM/SBC Spending with Actual and Projected Achievements (1990-2006)

Year	Annual Spending (Millions)	Cumulative Annual Electric Reductions (GWh)	Cumulative Annual Peak Demand Reductions (Summer MW)
1990	$99.0	325	85
1991	$198.0	1,082	264
1992	$286.0	2,289	537
1993	$280.0	3,620	853
1994	$188.0	4,632	1,105
1995	$106.0	5,349	1,269
1996	$73.0	5,796	1,377
1997	$48.0	5,796[(1)]	1,377[(1)]
1998	$12.4	5,817[(1)]	1,382[(1)]
1999	$9.5	5,824[(1)]	1,382[(1)]
2000	$12.7	5,834[(1)]	1,382[(1)]
2001	*$11.7*	*5,519*[(2)]	*1,297*[(2)]
2002	*$10.3*	*4,772*[(2)]	*1,118*[(2)]
2003	*$10.2*	*3,575*[(2)]	*845*[(2)]
2004	*$10.3*	*2,254*[(2)]	*529*[(2)]
2005	*$10.3*	*1,243*[(2)]	*277*[(2)]
Jan/June 2006	*$5.2*	*536*[(2)]	*113*[(2)]
Total	*$1,370.6*	*64,263*	----

(1) A large portion of spending from 1997 through 2000 went toward existing DSM bidding projects. Savings for these projects were counted in prior years. Additional savings from utilities with the most significant achievements (Consolidated Edison Company of New York, Inc., New York State Electric and Gas Corporation and Niagara Mohawk Power Corporation) are included.
(2) Declining cumulative values shown in projections are due to an assumed 10-year measure lifetime.

[13] Some utilities retained SBC funding for low-income programs. These programs generally focus on arrearage reduction, and are not included in this discussion.

[14] Cumulative annual savings associated with pre-1990 spending are 157 GWh and 246 MW.

Table 4: Current Utility Energy Efficiency Activities

Company Name	Program Name	Program Description
Central Hudson Gas & Electric Corporation	Residential Energy Solutions	Information on electric technologies, rebate program for high-efficiency heat pumps and central air conditioning, and leasing of high-efficiency electric water heaters.
	Commercial/Industrial (C/I) Energy Solutions	Services to assist C/I customers in using energy more efficiently (*e.g.*, low-cost financing, free on-site energy audits).
Consolidated Edison Company of New York, Inc.	Energy Saving Tips	Information for residential customers and tips on saving energy.
KeySpan Corporation	Home Energy Services	Heating and air conditioning services for residential customers.
	Energy Conservation Information	Includes Consumer Update newsletters with tips on saving energy in the home.
	C/I Services	Energy management for C/I customers.
	RD&D	Projects test combined heat and power systems that reduce electric load and provide waste heat to power applications such as refrigeration system absorption chillers.
New York State Electric & Gas Corporation	Appliance Calculator	Residential customers can calculate annual energy use of different appliances on-line.
	Energy Profiler Online™	On-line C/I customer information on energy usage, including benchmarking information.
Niagara Mohawk Power Corporation	Energy & Your Home Home Energy Analysis	On-line energy analysis and energy saving practices for the home.
	Business Energy Analysis Business Technologies Facility Energy Information	On-line energy analysis and information on advanced end-use technologies.
Orange & Rockland Utilities, Inc.	Household Energy-Saving Tips	Tips for residential customers on saving energy.

Adapted from: Edison Electric Institute. *New York State EEI Member and Non-Member Residential/Commercial/Industrial Efficiency and Demand Response Programs for the Summer of 2001*. Updated May 30, 2001.

NYSERDA-Administered SBC Programs

The NYSERDA-administered **New York Energy $mart**℠ SBC program commenced by order of the PSC on July 1, 1998, and will run through June 30, 2006. Table 5 shows spending and achievements from the first three years of the **New York Energy $mart**℠ program (SBCI) along with projected spending and achievements for the remaining five years (SBCII). The *italics* in Table 5 signify *projected* spending and achievements. The major **New York Energy $mart**℠ commercial/industrial and residential energy efficiency programs are described in Tables 6 and 7, respectively. Results provided in Tables 6 and 7 are associated with funds awarded through March 2001, unless otherwise noted. In addition to the programs listed in Tables 6 and 7, **New York Energy $mart**℠ also includes energy efficiency R&D projects focusing on innovative end-use energy-efficient and energy-saving technologies and systems applicable to New York markets.

Table 5: NYSERDA-Administered SBC Energy Efficiency Spending with Projected and Actual Achievements (1998-2006)

Year	Annual Spending (Millions)	Cumulative Annual Electric Reductions (GWh) (3)	Cumulative Annual Peak Demand Reductions (Summer MW) (3)
1998	$1.2(1)	0	0
1999	$2.6(1)	81	17
2000	$26.3(1)	243	52
2001	*$134.5(2)*	*486*	*104*
2002	*$185.1(2)*	*1,183*	*348*
2003	*$112*	*1,772*	*440*
2004	*$112*	*2,198*	*481*
2005	*$112*	*2,623*	*622*
2006	*$56*	*3,069*	*858*
Total	*$741.7*	*11,655*	-----

Sources: ***New York Energy $mart***℠ evaluation and financial reports and the *System Benefits Charge Proposed Operating Plan for **New York Energy $mart**℠ Programs (2001 - 2006)*, February 15, 2001.

Spending and achievements include Energy Efficiency (exclusive of peak load management activities), Low-Income, and energy efficiency and strategic R&D. Total spending for SBCI programs is approximately $157.7 million and total spending for SBCII is approximately $584 million.

(1) Due to the ramping up of the SBC programs, spending is significantly less than funds encumbered (contracted). Encumbered funds were $1.9 million in 1998, $30.8 million in 1999, and $39.6 million in 2000. Cumulative encumbered funding by December 31, 2000 was $72.3 million.
(2) SBCI and SBCII expenditures are projected to occur in these years.
(3) Reductions reported here are for completed work under the identified subset of **New York Energy $mart**℠ programs, and therefore, will differ from total reductions reported in the sources cited above.

Table 6: Major New York Energy $mart K Commercial and Industrial Energy Efficiency Programs

Program Name	SBC Budget(1) (Millions)	Program Description	Select Results/Status (based on awarded funding)
Commercial and Industrial Performance	$40.0	Fosters growth of the energy services industry through performance-based incentives to energy efficiency service providers. Leverages private capital investments in electric efficiency and demand saving measures.	$40 million awarded for 140 projects. Expected savings of 247 million kWh and 54 MW.
New Construction	$17.1	Provides financial incentives to building owners and technical assistance to building designers in an effort to change standard building design and construction practices.	$20 million awarded for 380 projects saving 60 million kWh and 22 MW.
Smart Equipment Choices	N/A	Provides financial incentives for the purchase and installation of cost-effective, high efficiency equipment (*i.e.*, lighting, motors, and HVAC).	Until 2001, this offer was part of New Construction.
Technical Assistance	$9.9	Provides cost-sharing of studies conducted by qualified professionals to help end users identify efficiency improvements in their facilities. Services include energy audits, energy operations management, rate analysis and aggregation, and other services.	$9.1 million awarded to 730 projects. Expected savings are 227 million kWh, 60 MW and 3 TBtus of gas and oil.
Premium Efficiency Motors	$1.5	Designed to induce lasting structural change in the motors market. Offers incentives to participating vendors for the sale of Consortium for Energy Efficiency-qualified premium efficiency motors.	$1 million in total awards for 1,364 motors, with savings of 1.1 million kWh and 0.2 MW.
Commercial HVAC	$1.7	Designed to increase availability, promotion and sale of energy-efficient HVAC products and services. Projects promote commissioning and purchase of high efficiency unitary HVAC.	The program recently began. The goal for electricity savings is 6,000 MWh.
Small Commercial Lighting	$3.8	Promotes effective, energy efficient lighting in small commercial spaces by offering incentives to contractors and multi-site end users. Also offers contractor training incentives.	Contractor training is in progress and the first lighting project is expected soon.
Loan Fund	$6.0	Through more than 50 participating lenders, the Loan Fund offers a 4.5% reduction from participating lenders rates for energy efficiency improvements and renewable technology projects up to $500,000.	$0.9 million awarded for 47 loans with savings of 3.5 million kWh and 1.2 MW.

Source: NYSERDA.
(1) Budgets are for the first three-years.

Table 7: Major New York Energy $martK Residential and Low-Income Energy Efficiency Programs

Program Name	SBC Budget(1) (Millions)	Program Description	Select Results/Status (based on awarded funding)
Residential Appliances & Lighting and ENERGY STAR® Awareness	$19.0	Designed to increase awareness of ENERGY STAR® and sale of these products. The Residential Appliances & Lighting program works with retailers to improve promotion and sales while the ENERGY STAR® Awareness effort provides a multi-media campaign to increase consumer awareness, understanding, and purchases.	Increased consumer awareness (34% to 43%). Market share increases for ENERGY STAR® appliances (up 119%), lighting (up 114%), and home electronics (up 7%).
Keep Cool	$4.1	Designed to reduce peak demand. Residents and building owners turn in old room air conditioners (RACs) and receive $75 upon purchase of a new ENERGY STAR® RAC. Old RACs are recycled. In 2001, the Long Island Power Authority (LIPA) and New York Power Authority (NYPA) joined NYSERDA to offer an expanded program.	About 39,000 RACs turned in from NYSERDA, LIPA, and NYPA areas. Estimated savings are 8.5 million kWh and 11.7 MW.
ENERGY STAR® Homes	$2.4	Provides technical assistance and financial incentives encouraging participating builders to construct ENERGY STAR® Homes that use 30% less energy than the Model Energy Code.	The program began in June 2001.
Home Performance with ENERGY STAR®	$7.0	Designed to enhance the existing capacity for delivering energy efficiency services to one- to four-family residences. Consumer protection is fostered by training and qualifying building performance contractors, home energy raters, and contractors providing energy efficiency services.	The program is in its early stages. Eight contractors have been certified and 16 homes have received assessments.
Low Income Direct Installation Program	$9.9	Builds on the federal Weatherization Assistance Program to reduce low-income energy burdens. Offers energy efficiency measures (*i.e.*, lighting, refrigerators) and information on energy use and efficiency.	Reviewed 5,432 units to date. Savings are estimated at 6.6 million kWh and nearly 1 MW.
Publicly-Assisted Housing Program	$3.8	Increase affordability of public housing for low-income residents by incorporating energy efficiency into the design, selection, and installation of equipment in the State's portfolio of publicly-assisted housing. Incentives write down the cost of high efficiency measures.	60 buildings have entered the program and three audits are complete. Incentives will range from 5-50% of total costs.

Source: NYSERDA.
(1) Budgets are for the first three-years.

Public Power Energy Efficiency Programs

The Long Island Power Authority's Clean Energy Initiative. In May 1999, LIPA's Board of Trustees approved a five-year, $170 million Clean Energy Initiative. This initiative includes energy efficiency programs and research and development efforts. Table 8 depicts the spending and achievements of LIPA's key energy efficiency programs for 1999 and 2000, as well as projected spending and achievements for the remaining years of the initiative. The *italics* in Table 8 signify *projected* spending and achievements. These key energy efficiency programs are then summarized in Table 9.

Table 8: LIPA Clean Energy Initiative Actual and Projected Spending and Achievements for Energy Efficiency Programs (1999-2004)

Year	Annual Spending[1] (Millions)	Cumulative Annual Electric Reductions (GWh)	Cumulative Annual Peak Demand Reductions (Summer MW)
1999	$2.9	6.8	3.5
2000	$14.6	51.0	15.0
2001	*$20.2*[2]	*112.4*	*32.7*
2002	*$21.5*[2]	*183.5*	*54.7*
2003	*$22.3*[2]	*261.9*	*79.2*
2004	*$12.5*[2]	*307.5*	*92.0*
TOTAL	*$94*[2]	*923.1*	-----

Source: LIPA, *Clean Energy Initiative Draft Biennial Report*, June 2001.

(1) Spending on energy efficiency is only a portion of the total Clean Energy Initiative spending. Remaining funds earmarked for renewables and peak load management programs are not included.
(2) Projected spending is subject to change based on program evaluations and customer needs.

Table 9: Major LIPA Clean Energy Initiative Energy Efficiency Programs

Program Name	Yr. 2000 Spending (Millions)	Program Description	Yr. 2000 Select Results
Residential Lighting and Appliances	$5.8	Aims to increase ENERGY STAR® lighting and appliance sales through more than 200 participating retailers. Offers rebates and reduced costs for high efficiency measures.	More than 450,000 participants achieving savings of 32,283 MWh and 3.7 MW.
Residential HVAC Efficiency	$3.3	Customer incentives offset the incremental cost of high efficiency HVAC. Contractor incentives are provided for proper equipment sizing. Contractors are also trained in home safety, health, and comfort issues.	More than 8,000 participants, with electricity and demand savings of 3,740 MWh and 5.6 MW.
Residential Energy Affordability Partnership	$1.7	Works with federal WAP to provide free installation of cost-effective air sealing, insulation, HVAC repairs, lighting, and other measures to low-income customers.	Visited more than 2,800 dwellings with savings of 2,400 MWh and 0.2 MW.
Residential Information and Education	$0.4	Provides efficiency information through advertising, the LIPA website, energy audits, and other methods.	Savings of 2,568 MWh and 0.9 MW.
Commercial Construction	$1.0	Promotes the application of a broad range of energy-efficient electric technologies and design assistance. The program offers prescriptive, custom and whole-building components.	The 36 projects involved to date contribute 1,389 MWh and 0.2 MW of savings.
Regional Premium Efficiency Motors	$0.1	Offers customer incentives and information and technical assistance for customers, manufacturers, vendors, designers, and engineerings. Uses the Northeast Energy Efficiency Alliance's MotorUp program.	75 participants with savings of 133 MWh and 0.027 MW.
High-Efficiency Unitary HVAC	$0.2	Offers incentives for commercial central air conditioners and air and water source heat pumps. Uses the NEEP program concept.	Rebates for 110 units, with savings of 273 MWh and 0.18 MW.
Resource Conservation Manager Program	$0.1	Underwrites the salaries of resource conservation managers employed by schools and municipalities. With proper training, it is expected that these individuals will help end-users reduce resource use and costs.	Three RCM projects are underway.
Customer-Driven Efficiency	$0.4	Offers residential and commercial incentives, audits, and assistance for efficiency measures not covered by LIPA's other programs.	855 participants with savings of 1,430 MWh and 0.63 MW.

Sources: LIPA, *Clean Energy Initiative Draft Biennial Report*, June 2001 and LIPA, *Clean Energy Initiative Annual Report 2000*.

New York Power Authority Energy Efficiency Programs. The New York Power Authority's (NYPA) Energy Services program began in 1990 as a service to NYPA's government customers in New York City and Westchester County. Since its inception, Energy Services has been expanded to serve State-operated facilities, public schools, community colleges, and county and municipal governments across the State. In most cases, NYPA finances the identification, design, and installation costs for upgrades to energy-using equipment and recovers these costs by sharing in the resulting electric bill savings. The participants retain all the energy savings once NYPA's loan is repaid, usually within ten years or less. Table 10 shows actual and projected investments and results for NYPA's major energy efficiency programs. The *italics* in Table 10 signify *projections*. NYPA's major energy efficiency programs are described in Table 11. In addition to the efficiency programs listed in Table 11, NYPA is preparing to begin a combined heat and power program in 2002.

Table 10: NYPA Energy Efficiency Programs Actual and Projected Investment and Results (1990 - 2004)

Year	Annual Spending (Millions)	Cumulative Annual Electric Reductions (GWh)	Cumulative Annual Peak Demand Reductions (Summer MW)
1990	$2	1	0.6
1991	$12	22	5.6
1992	$22	66	18.6
1993	$50	152	37.6
1994	$38	233	56.6
1995	$54	286	69.6
1996	$76.0	360	86.6
1997	$72.0	465	111.6
1998	$73.0	556	130.6
1999	$92.0	607	139.6
2000	$98.0	667	149.6
2001	*$100*	*723*	*162.6*
2002	*$100*	*779*	*175.6*
2003	*$100*	*835*	*188.6*
2004	*$100*	*891*	*201.6*
TOTAL	*$989*	*6,643*	-----

Source: NYPA.

Table 11: Major NYPA Energy Efficiency Programs

Program Name	Spending (Millions)	Program Description	Select Results/Status
High Efficiency Lighting Program(1)	$312.2	Finances installation of efficient lighting, as well as motors, energy management systems, and sensors.	573,117 MWh and 118 MW.
Watt Busters(2)	$5.4	Provided home energy audits and weatherization to residential customers served by NYPA's municipal and cooperative system customers.	37,692 MWh and 15.4 MW.
Public Housing	$47.1	Replaces old refrigerators in New York City Housing Authority buildings with new units using half the energy and a more environmentally-benign refrigerant. The project has served as a model for more than 100 other public housing authorities and utilities.	69,986 MWh and 8.7 MW. NYPA projects 180,000 replacements by 2003.
New Construction(2)	$2.9	Provided rebates to public entities purchasing NYPA power for installation of high-efficiency lighting and motors in new facilities.	23,611 MWh and 4.3 MW.
Energy Services	$20.2	Provides audits and efficiency measures, including lighting, boilers, and motors, to public entities.	15,032 MWh and 4.3 MW.
Electro-technologies	$49.9	Provides NYPA customers with financing, technical services, and installation for energy-efficient electric technologies, such as chillers and water purification.	2,902 MWh and 3.1 MW.
Industrials Program	$6.8	Provides financing to NYPA's industrial customers for installation of energy efficiency improvements including lighting, HVAC, and motors.	6,688 MWh and 1 MW.
Energy Plus Oil Heat Rebate Program(2)	$6.9(4)	Provided nearly 38,300 rebates for the installation of new, high-efficiency residential oil-fired boilers, and warm-air furnaces.	4.4 million gallons of oil(4)
Non-Electric End Uses	$19.0	Assists public entities that purchase NYPA power in improving the efficiency of non-electric measures such as domestic water systems and boilers.	Reduced total energy budgets.
Clean Air for Schools	$74.1	Replaced coal-fired heating in public schools with new systems fired by oil or gas. This program was funded by the 1996 Clean Water/Clean Air Bond Act.	20 tons greenhouse gases
Climate Controls	$5.3	Through funding from the New York City Board of Education, NYPA helps to improve air compressors, steam distribution, and thermostat controls in schools.	The program began in 1999.
Coal Pilots(3)	$14.0	Provided funds to replace New York City public school coal boilers with cleaner gas-fired equipment.	Assisted 12 schools.

Source: Data provided by NYPA with the exception of the Energy Plus Oil Heat Rebate Program.
All spending and results are to date since program inception.
(1) Includes County and Municipal, Long Island, Public Schools, Southeastern New York, and Statewide High Efficiency Lighting Programs.
(2) Program has concluded.
(3) Includes $5.5 million in Petroleum Overcharge Restitution (POCR) funding for two rounds prior to NYPA administration. NYPA received approximately $1.4 million to offer the third and final round of the program.
(4) Results include NYPA's program plus the two prior rounds.

Other Energy Efficiency Programs

This section discusses other energy efficiency initiatives including executive and legislative programs, federally-supported programs, such as the Weatherization Assistance Programs (WAP) and State Energy Programs (SEP), as well as statutory programs currently being administered by NYSERDA.

Governor Pataki's Executive Order 111. In June 2001, Governor Pataki signed Executive Order 111 aimed at improving the energy efficiency of all State agencies, departments, public benefit corporations, and public authorities. As required in the Order, all affected entities shall seek to achieve a reduction in energy use in leased, operated, or owned buildings of 35% by 2010, relative to 1990 levels. Annual State energy use for 1989-1990 was about 35 TBtus.[15]

Affected entities are directed to establish agency-wide reduction targets and schedules for reaching the targets. They must also establish peak electric demand reduction targets for 2005 and 2010. NYSERDA has already established a task force and will work with NYPA and LIPA to ensure that all agencies have access to the resources they need to establish energy use baselines and develop cost-effective strategies for reducing energy use.

The Executive Order specifies the following practices for existing and new buildings, renovations, and procurement of products and vehicles:

- Existing buildings are required to implement energy efficiency practices with respect to operation and maintenance. Practices could include inspecting and recommissioning, re-tuning heating, ventilation, and air conditioning (HVAC) equipment, and striving to meet the ENERGY STAR® building criteria for energy performance and indoor air quality to the maximum extent practicable.

- New buildings or substantial renovations of existing buildings are required, to the maximum extent practicable, to follow guidelines for the construction of "Green Buildings" including guidelines set forth in Tax Law §19, which created the Green Buildings Tax Credit and the U.S. Green Buildings Council's LEED™ rating system. State agencies engaged in new construction shall achieve at least a 20% improvement in energy efficiency performance relative to levels required by the State's Energy Conservation Code (as amended). For substantial renovation, agencies shall achieve at least a 10% improvement.

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[15] *Report on 1994 State Agency Energy Plans.* March 1995.

- When procuring new products, State agencies are required to select ENERGY STAR® products. NYSERDA will adopt guidelines designating target energy efficiency levels for those products not included in the federal government's program.

- When procuring new vehicles, State agencies must obtain increasing percentages of alternative-fuel vehicles. By 2005, at least 50% of new light-duty vehicles acquired by each agency shall be alternatively fueled. By 2010, 100% must be alternatively fueled. For medium and heavy duty vehicles, State agencies must implement strategies to reduce petroleum use and emissions, using alternative fuel vehicles wherever possible.

New York State Energy Conservation Construction Code. The New York State Energy Conservation Construction Code (Energy Code), which became effective in 1979, sets minimum standards for the design and construction of all new buildings and the substantial renovation of existing buildings in New York. The Energy Code has not been substantially revised since 1989, and it is generally recognized that much new construction and substantial renovation of buildings exceeds current Code requirements in terms of energy efficiency.[16] Therefore, the Energy Code is no longer stimulating the significant energy savings that it had in the past.

Since a great deal of the building equipment covered by the Energy Code can last 20 to 30 years (*e.g.,* HVAC equipment, lighting systems, windows, and insulation materials), there is great opportunity to achieve lasting improvements in buildings through the Energy Code mechanism. New York State is currently in the process of amending the Energy Code, and is considering several enhancements including adopting standards for National Electrical Manufacturers Association (NEMA) Standard ENERGY STAR®/TP-1 transformers, adopting recommendations on building commissioning, and retaining higher building envelope requirements for electrically-heated homes. The Energy Code amendments currently under consideration are expected to lead to significant energy and cost savings, as well as environmental benefits. If these amendments are adopted, New York's building energy codes will be among the most progressive in the country. The low- and high-end estimates for energy savings and emission reductions are provided in Table 12.

[16] NYSERDA uses 5% above Energy Code as the standard practice, or baseline, for New Construction and other programs. This reflects improvements in equipment since the current Energy Code standards were adopted.

Table 12: Expected Annual Energy Savings and Air Emission Reductions from Energy Code Amendments

	Low Estimate	High Estimate
End-user electricity savings	276 million kWh	444 million kWh
Other fuel savings (including oil and natural gas)	1.1 TBtus	1.7 TBtus
Cost savings to building owners, operators and tenants (from reduced electricity and other fuels)	$50 million	$80 million
Approximate carbon dioxide (CO_2) emission reductions	323,000 tons	517,000 tons
Approximate nitrogen oxide (NO_x) emission reductions	181 tons	289 tons
Source: NYSERDA.		

Clean Water/Clean Air Bond Act. The 1996 Clean Water/Clean Air Bond Act included $55 million for clean-fueled buses. The Clean-Fueled Bus Program, administered by NYSERDA, provides funds to State and local transit agencies, municipalities, and schools for up to 100% of the incremental cost of new alternative fuel buses and supporting infrastructure. A total of $20.8 million has been awarded in four rounds of the program. This funding will support the purchase of 378 buses including compressed natural gas (300), battery electric (11), and diesel hybrid-electric technology (67).

The hybrid-electric bus, promoted through the Clean-Fueled Bus Program, was developed under a NYSERDA Research and Development initiative. Electric and hybrid-electric technologies offer many benefits including significant fuel efficiency gains and the resultant reduction in emissions and dependence on imported oil. Efficiency improvements on the order of 25-30% have been achieved in New York City by switching to electric or hybrid-electric buses. These efficiency improvements are largely the result of the regenerative braking system and the significant decrease in energy use during idling, especially in city traffic. The 10 diesel hybrid-electric buses which are currently on routes in New York City are expected to save approximately 35,630 gallons of diesel fuel (representing approximately 4,900 MMBtu) per year in regular use. Monitoring of these vehicles will be required to measure the level of performance in future years. For more information on clean fuels and technologies, refer to the Energy and Transportation issue report (Section 2.3).

New York State Alternative Fuel (Clean Fuel) Vehicle Tax Incentive. New York recently enacted tax incentive legislation for electric vehicles, clean-fuel vehicles, and clean-fuel vehicle refueling properties. Federal tax credits also exist for these technologies. The State tax incentive program applies to vehicles and refueling properties placed into service after January 1, 1998. The incentive period is set to expire on February 28, 2003. Eligible clean fuels include: natural gas, liquefied petroleum gas, hydrogen, and electricity.[17] The New York State tax credit for electric vehicles is equal to 50% of the incremental cost (up to a maximum of $5,000 per vehicle) of a comparably-sized and styled gasoline vehicle. For more information on clean fuels, refer to the Energy and Transportation issue report (Section 2.3).

<u>New York State Green Building Tax Credit</u>. In an effort to promote green building initiatives in New York, the State approved a $25 million tax credit as part of the fiscal year 2000-2001 budget. The credit offered under this legislation is intended to encourage building owners and developers to use advanced materials and technologies in construction and renovation projects. These financial incentives will help to increase the number of energy-efficient commercial and residential buildings in the State. Specific energy efficiency requirements stipulate that:

- Buildings being newly constructed may use no more than 65% of the energy allowed under the Energy Code; and

- Buildings being rehabilitated may use no more than 75% of the energy allowed under the Energy Code.

Eligible taxpayers include corporations, utilities, banks, insurance companies, and individuals. Eligible buildings include certain hotels, office buildings, and residential multifamily buildings.

<u>Energy Efficiency Standards for State Purchasing</u>. Legislation enacted in 2000[18] calls for minimum energy-efficiency standards for appliances and other products purchased by or for the State or any of its agencies. The law requires NYSERDA to design these standards, in consultation with the Office of General Services, to optimize cost-effective savings, while taking into account market availability. A minimum of 18 products and appliances have already been identified and regulations must be promulgated between April 2002 and April 2003. NYSERDA has issued a competitive solicitation and hired a contractor to assist with developing these standards.

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[17] The incentive does not cover hybrid electric/gasoline powered vehicles.

[18] New York State Energy Law Article 5, Section 5-108-a.

Weatherization Assistance Program. The federally-funded Weatherization Assistance Program (WAP), administered by the New York State Division of Housing and Community Renewal (DHCR), weatherizes low-income residences in an effort to reduce energy consumption and minimize energy costs. Services provided are determined by an on-site energy audit that includes health and safety considerations. Between 1990 and 2000, more than $429 million was spent on weatherization measures. Cumulative annual energy savings in 2000 was approximately six TBtus. Cumulative energy savings from 1990 through 2000 amount to approximately 40 TBtus. The WAP is discussed in more detail in the issue report entitled New York's Public Benefit Programs.

NYSERDA-Administered State Energy Program. NYSERDA receives Federal grant funding from the United States Department of Energy to administer the State Energy Program (SEP). This program includes, but is not limited to, the following energy efficiency initiatives:

- Residential Technical Assistance (ResTech) helps improve the operation of multifamily buildings in New York by identifying and encouraging the implementation of cost-effective energy-efficiency measures. A variety of technical assistance services are provided, including computer-assisted building modeling, commissioning and implementation assistance. The first ten studies completed by ResTech will achieve average energy savings of approximately 154 MMBtus per year if all of the recommended measures are implemented.

- State EnVest enables energy-efficiency upgrades to State facilities using energy service contractors to design and install efficiency measures and energy-related capital improvements, and to develop performance contracts on behalf of the customer. The program is supported by third-party financing in the form of tax-exempt municipal leases, and project financing is arranged such that the annual costs will be less than the energy savings realized from the project. Through 2004, State EnVest is expected to result in $200 million in projects with $30 million in annual energy savings.

NYSERDA Statutory Energy Efficiency Research and Development. NYSERDA administers statutory funding for energy efficiency Research and Development in the following program areas:

- Buildings programs work with developers, designers, contractors, and building equipment manufacturers to develop and demonstrate innovative, energy-efficient products in the areas of lighting, heating, ventilation, air conditioning, and building controls.

- Industry programs assist businesses in developing, demonstrating, and commercializing energy-efficient technologies and long-term solutions to reducing energy costs. Examples of technologies targeted under this program include superconducting transformers, advanced cooling equipment, furnaces, and boilers.

- Transportation programs provide support to New York State firms for developing and commercializing advanced technologies. Examples include developing an electric postal van for the U.S. Postal Service, electric light-duty carrier route vehicles, and hybrid-electric city buses.

New York State Involvement in Regional and National Collaboratives

Many New York organizations involved in the energy field are members of regional or national collaboratives that promote energy efficiency. Getting involved in these collaborative efforts allows New York to leverage other member activities and benchmark their best practices against others in the nation. Examples of New York's involvement in these regional and national collaboratives include:

Consortium for Energy Efficiency. The Consortium for Energy Efficiency (CEE) has more than 50 member organizations that support its mission to promote the manufacture and purchase of energy-efficient products and services. CEE is a national, not-for-profit public benefit corporation with the goal of inducing lasting structural and behavioral change in the marketplace and increased adoption of energy efficient technologies. In today's restructured utility markets, CEE provides a forum for the exhange of information and ideas. CEE also partners with manufacturers, retailers, and government agencies including the U.S. Environmental Protection Agency. New York members of CEE include LIPA, NYPA, and NYSERDA.

Northeast Energy Efficiency Partnerships. Northeast Energy Efficiency Partnerships, Inc. (NEEP) is a not-for-profit regional organization founded in 1996. NEEP aims to steadily increase energy efficiency levels in homes, buildings, and industries throughout the Northeast region of the United States. New York members of NEEP include the New York State Department of State (Codes Division) and NYSERDA. Both LIPA and NYSERDA coordinate their residential appliances, lighting, and HVAC programs and commercial motors program with NEEP.

ENERGY EFFICIENCY BENEFITS AND BARRIERS

Product and Service End-User Benefits

Benefits to the Commercial/Industrial Sector. In a time of increased business competition and tightening environmental regulations, energy efficiency can help the commercial and industrial sectors to reduce costs and emissions. Energy efficiency improvements often provide ancillary benefits including productivity improvements, increased production, better workplace conditions, and reduced maintenance and other costs. For example, an evaluation of energy-efficient lighting in retail applications found that new lighting stimulated significantly increased sales.[19]

Benefits to the Residential Sector. Residential customers throughout the State have the opportunity to implement energy efficiency improvements that reduce the amount of electricity, natural gas, and fuel oil consumed within single-family and multifamily residences. Significant reductions can often be achieved by implementing efficiency improvements to cooling systems and water and space heaters. However, savings can also accrue from upgrading to higher-efficiency appliances, lighting, and home electronics. The **New York Energy $mart**℠ Home Performance with ENERGY STAR® program and other residential financing programs offer home energy assessments and reduced-rate loans to consumers in an effort to help identify and implement energy efficiency improvements that can be made in all of these areas. The Home Performance with ENERGY STAR® program is expected to result in average electricity savings of more than 700 kWh per year for participating single-family homes. The electricity savings will lead to bill reductions of more than $80 per household each year.[20] Over the next five years, this program is expected to serve approximately 265,000 households. This equates to electricity savings of nearly 200 million kWh annually and $22 million in bill reductions per year. Additional natural gas and oil savings are also expected to accrue from the Home Performance with ENERGY STAR® program, leading to further energy bill reductions for participants.

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[19] Over a five-month period, actual sales in one store exceeded expected sales by 35%. Cuttle, C. and Brandston, H. Evaluation of Retail Lighting, *Journal of the Illuminating Engineering Society.* Summer 1995.

[20] The bill reduction estimate assumes an average Statewide electricity rate of $0.12 per kWh for residential customers.

Benefits to the Low Income Sector. Most of the energy-efficiency programs that are offered to low-income customers in the State have as the primary goal improving the affordability of energy. Improvements in energy efficiency are a proven and effective means to increase affordability. Providing more affordable energy can reduce payment problems and the need for other assistance programs.

Overarching Societal Benefits

Energy efficiency improvements deliver direct benefits to the businesses and homes that implement them. Energy efficiency improvements also the have more far-reaching societal benefits described in the following section.

Cost Savings. The most obvious cost savings from energy efficiency improvements accrue directly to the facilities or households that implement them. Beyond this, however, there are also benefits to energy users in general. Benefits to energy users will accrue if energy providers are able to invest in energy efficiency and thus avoid more costly capital investments in new facilities. Energy efficiency is a proven component of a balanced approach to supply alternatives. When efficiency is less costly than constructing a new electric generation facility, it should be implemented. The cost and relative value of energy efficiency and new facilities must be considered in the context of the retail price of electricity of a given geographic area. Where prices are higher, such as in Downstate New York, the payback period for energy efficiency measures is shorter and the resulting cost savings are greater in the long run. Therefore, the relative value of energy efficiency varies by geographic area. An upcoming study by NYSERDA on the potential of energy efficiency will help to identify the value of various energy efficiency measures by geographic area. NYSERDA plans to complete this study in Spring 2002.

Economic Development. Aside from the direct energy cost savings that result from efficiency improvements and reduced energy use, there are additional economic development benefits of energy efficiency. One of the most significant economic development benefits is creating jobs. Every dollar that is saved when businesses or households operate more efficiently is funneled into other investments, such as products or services that might not have been purchased otherwise. For example, energy savings of 730 million kWh and 3.2 TBtus of gas and oil under the **New York Energy $mart** K program[21] are estimated to lead, both directly and indirectly, to the creation of more than

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[21] NYSERDA. ***New York Energy $mart*** *K Program Evaluation and Status Report.* Quarterly Report. June 2001. These savings are expected from funds *awarded* through March 2001 and, therefore, do not match the savings presented earlier for installed and completed measures.

2,100 jobs in New York's service and retail trade sectors. These jobs will be supported annually for as long as the implemented energy efficiency measures remain in effect. Energy efficiency goods and services sectors will also continue to grow in New York State as a result of higher demand for energy efficiency products and services (*e.g.* energy services companies, appliance retailers, contractors, manufacturers, and lenders). Existing businesses can become more profitable by offering energy efficiency as a value-added service to their clientele.

Environmental. Improvements in electric energy efficiency will ultimately reduce the amount of electricity that is required from generating facilities, including fossil-fuel plants. Reducing generation from such facilities leads to a concurrent reduction in environmental emissions, such as nitrogen oxides (NO_X), sulfur dioxide (SO_2), and carbon dioxide (CO_2), from those plants. Efficiency improvements in the use of natural gas and oil have similar effects. For instance, savings of 730 million kWh and 3.2 TBtus of natural gas and oil from the SBC programs administered by NYSERDA[22] are expected to result in emission reductions of 714 of tons of NOx, 1,189 tons of SO_2, and more than 523,700 tons of CO_2. The CO_2 reductions alone are equivalent to removing more than 100,000 automobiles from New York's roadways for one year. By early 2002, electricity customers in New York State will receive in their electric bills a statement on the environmental attributes of the electricity they use. These environmental statements are the result of the New York Environmental Disclosure program established by the Public Service Commission and funded by the SBC. Efficiency improvements to gas and oil combustion equipment and appliances will also lead to a decrease in harmful gases released into the environment. Energy efficiency in the transportation sector, for instance, has the potential to decrease Btu use per vehicle mile traveled. This has the environmental benefit of decreasing the amount of greenhouse gases, particularly CO_2, entering the atmosphere.

Fuel Diversity and Energy Security. Efficiency improvements can also be viewed as an alternative means to meet the growing demand for energy in New York. Increased energy efficiency, in effect, reduces the State's need for energy generated from coal, oil, natural gas, and other energy sources. By helping to reduce the State's need for foreign fuels, energy efficiency also has a role in increasing New York's self-sufficiency and improving energy security.

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[22] NYSERDA. ***New York Energy $mart*** *K Program Evaluation and Status Report.* Quarterly Report. June 2001. These savings are expected from funds *awarded* through March 2001 and, therefore, do not match the savings presented earlier for installed and completed measures.

Energy Generation Facility Siting and Electric System Reliability. Energy efficiency improvements can also help ameliorate the immediate need to site new power generation, transmission and distribution facilities. Energy efficiency and peak load reduction can be targeted geographically to address pressing supply and transmission constraints. Reliability initiatives in New York consider efficiency, demand reduction[23], and new facility siting alternatives, and ultimately select the balance which will result in lower costs to ratepayers.[24]

Barriers to Energy Efficiency

Through years of implementing DSM and SBC programs in New York, a wealth of knowledge has been amassed with respect to barriers preventing more widespread adoption of energy efficiency improvements by various sectors. Barriers are both monetary and non-monetary in nature. Table 13 summarizes barriers found to be important through recent market research.

The barriers listed in Table 13 generally apply to the commercial, industrial, and residential sectors. Several of these barriers also apply to the low-income sector. Although programs exist to help this under-served population, there are still barriers to their participation including income level (the working poor may have higher incomes and not be eligible), and lack of awareness of programs offered. Barriers faced by the low-income and under-served populations are discussed in more detail in the Public Benefits issue report.

[23] Demand response programs are discussed in the Electricity Assessment, Section 3.4.

[24] A recent study found that many market transformation programs cost the sponsors less than $0.01/kWh saved. (Nadel, and Latham. 1998. *The Role of Market Transformation Strategies in Achieving a More Sustainable Energy Future.* Washington, DC: American Council for an Energy-Efficient Economy).

Table 13: List of Key Barriers to Energy Efficiency

Low awareness and understanding of energy efficiency products and services among end-users and product and service providers
Higher initial cost to purchase energy efficiency products and services
Perceived or actual higher costs for maintaining energy efficient products or equipment
Lack of infrastructure of qualified energy efficiency service professionals
Low stocking, promotion, and availability of energy efficiency products and services
Lack of credible information on energy savings that can accrue from energy efficiency products and services
Reluctance to try new technologies
Perception of poor performance of energy efficient products
Perceived or actual risk associated with new energy efficiency products and services
Energy efficiency conflicts with other important product design criteria

ENERGY EFFICIENCY POTENTIAL AND STATEWIDE ACHIEVEMENTS

1989 Energy Efficiency Potential Study

New York's energy conservation potential was last examined in 1989.[25] This analysis included the potential for electricity savings and peak demand reductions in the then-current equipment and building stock in the State. The study provided estimates of the technology-cost potential savings[26] for electricity and peak demand, which fell below the cost-effectiveness threshold from the consumer, utility, and societal perspectives.[27] For each of these perspectives, results were provided with respect to the residential, commercial, and industrial sectors.

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[25] American Council for an Energy Efficient Economy. *The Potential for Electricity Conservation in New York State*, September 1989. Prepared for the New York State Energy Research and Development Authority, Niagara Mohawk Power Corporation, and the New York State Energy Office.

[26] Since the cost effectiveness analysis is based only on technical costs (equipment and installation) of the energy efficiency measures, the total savings potential which falls below the cost effectiveness threshold is referred to as the technology cost potential savings.

[27] Cost effectiveness was evaluated from the consumer, utility, and societal perspectives by varying the explicit discount rate that is used to calculate the cost of saved energy and the cost of reduced peak demand.

Measures that offered particularly large potential for cost-effective electricity savings included:

- High-efficiency residential refrigerators and freezers;
- Reflectors in fluorescent light fixtures; and
- Variable-speed drives on fan and pump motors in commercial buildings.

Measures that offered the largest potential for cost-effective reductions in summer peak demand included:

- Reflectors in fluorescent light fixtures;
- High-efficiency residential refrigerators and freezers; and
- Variable air volume systems in commercial buildings.

The findings of the 1989 study indicated that there was significant potential for electricity savings and peak demand reductions in New York's existing building stock and equipment. Many of the higher-potential opportunities have been at least partially addressed by utility, SBC, and other energy efficiency programs offered in New York.

<u>Statewide Achievements Since 1990</u>

Between 1990 and 2000, cumulative savings of 50,160 GWh of electricity and 1,598 MW of summer peak demand have been achieved by all the major programs discussed in this assessment. Cumulative annual savings in 1999 were 6,519 GWh, or about 5.1% of the 127,998 GWh of electricity sales to ultimate consumers during that year. Table 14 provides a compilation of these savings as presented in earlier tables of this assessment. Additional natural gas and oil savings have also resulted from these programs. For example, the Weatherization Assistance Program reports about 40 TBtus of cumulative savings from 1990 through 2000. However, there are significant remaining opportunities to improve energy efficiency in the State.

The electricity, natural gas, and oil saved over the past ten years has produced significant environmental and economic benefits. Table 15 shows the estimated emission reductions and job creation resulting from these savings.

Table 14: Statewide Cumulative Electric and Summer Peak Demand Reductions (1990 - 2000)

	IOU DSM/SBC		**NYSERDA SBC**		**LIPA**		**NYPA**		**TOTAL(1)**	
Year	GWh	MW	GWh	MW	GWh	MW	GWh	MW	GWh	MW
1990	325	85	---	---	---	---	1	0.6	326	86
1991	1,082	264	---	---	---	---	22	5.6	1,104	270
1992	2,289	537	---	---	---	---	66	18.6	2,355	556
1993	3,620	853	---	---	---	---	152	37.6	3,772	891
1994	4,632	1,105	---	---	---	---	233	56.6	4,865	1,162
1995	5,349	1,269	---	---	---	---	286	69.6	5,635	1,339
1996	5,796	1,377	---	---	---	---	360	86.6	6,156	1,464
1997	5,796(2)	1,377(2)	---	---	---	---	465	111.6	6,261	1,489
1998	5,817(2)	1,382(2)	---	---	---	---	556	130.6	6,373	1,512
1999	5,824(2)	1,382(2)	81	17	6.8	3.5	607	139.6	6,519	1,542
2000	5,834(2)	1,382(2)	243	52	51.0	15	667	149.6	6,795	1,598
Total(1)	46,364	-----	324	-----	57.8	-----	3,415	-----	50,161	-----

(1) Totals may not sum due to rounding.
(2) A large portion of utility spending from 1997 through 2000 went to meet obligations on existing DSM bidding projects. The savings for these projects were counted in prior years. Additional savings, which are expected to accrue from utility SBC programs, are included for Consolidated Edison, New York State Electric and Gas and Niagara Mohawk Power Corporation, as these utilities have the most significant achievements for those years.

Table 15: Cumulative Air Quality and Economic Benefits from Statewide Energy Savings (1990 - 2000)

Estimated Emission Reductions (from electric savings)	37,600 tons NO_X
	75,700 tons SO_2
	22 million tons CO_2
Estimated Emission Reductions (from gas and oil savings)	2,000 tons NO_X
	840 tons SO_2
	2.5 million tons CO_2
Total Estimated Emission Reductions (from electric, gas and oil savings)	39,600 tons NO_X
	76,540 tons SO_2
	24.5 million tons CO_2
Cars Equivalent for CO_2 Emission Reductions	4.9 million cars removed from the road for one year
Estimated Jobs	14,500
Source: NYSERDA.	

Future Energy Efficiency Potential

In the 12 years since the last energy efficiency potential study, a great deal has changed in terms of available energy efficiency equipment and the base-case electricity use in the State's building stock. Therefore, there is an immediate need to update the 1989 assessment. In October 2001, NYSERDA issued a Request for Proposals (RFP 628-01) to procure contractor assistance in evaluating the status of, and potential for, energy efficiency in New York State. This study is expected to be completed in Spring 2002, and any available data will be considered in the final State Energy Plan. Major tasks for this study include:

- Determining the list of individual and bundled measures to be analyzed;
- Establishing the base case level of technology and associated electricity use in the State's current building stock;
- Evaluating potential savings in electricity use and peak demand resulting from implementing the efficiency measures;
- Determining the technical, economic, and market potential of these technologies;

- Determining the cost of saved energy and the benefit/cost ratio for each measure; and

- Ranking energy efficiency measures based on the above analysis, along with the technical, institutional, policy, and market barriers.

Another initiative currently underway will evaluate and quantify the aggregate energy and economic potential for a wide range of combined heat and power (CHP) technologies in New York's commercial, institutional, and industrial sectors. The project will include analysis of the regulatory, legal, and institutional barriers to CHP, and will develop policy options and market strategies that could be implemented to accelerate market adoption of CHP. The study is being conducted by Energy Nexus Group and the Pace Energy Project. Any available data will be considered in the final State Energy Plan.

FINDINGS AND CONCLUSIONS

This information and analysis presented in this assessment leads to the following findings and conclusions:

- New York is the most energy-efficient state in the continental U.S., on a per-capita basis, with 7% of the nation's population and accounting for only 5% of the nation's primary energy use. New York is the third most energy-efficient state in the U.S. on an energy intensity basis, measured in British thermal units per dollar of Gross State Product.

- Over the past decade, energy efficiency programs in New York have evolved in terms of their depth, breadth, and focus. The State now offers a diverse portfolio of programs that is designed to better capture available energy efficiency potential where past efforts could not.

- Over the past decade, the State has spent nearly $2.8 billion on energy efficiency programs, even while total annual spending declined between 1990 and 2000 from a high in the early 1990s of more than $400 million per year. Annual energy efficiency spending has been increased through 2006 due to the continuation and expansion of the State's System Benefits Charge (SBC) program, and the anticipated spending of NYPA and LIPA on public benefits programs.

- Between 1990 and 2000, the State's major energy efficiency programs have saved 50,160 GWh of electricity and have reduced summer peak demand by nearly 1,600 MW. Cumulative annual savings in 1999 were 6,519 GWh, or about 5.1%

of the 127,998 GWh of electricity sales to ultimate consumers in that year. Natural gas and oil savings of approximately 40 TBtus have also been achieved over this period.

- The cumulative total electricity savings over the period from 1990 to 2000 are estimated to have led to emission reductions of about 37,600 tons of NO_X, 75,700 tons of SO_2, and 22 million tons of CO_2. Cumulative natural gas and oil savings add an additional 2,000 tons of NO_X, 840 tons of SO_2, and 2.5 million tons of CO_2 reductions. Approximately 14,500 jobs were created or sustained as a result of these programs. These jobs will be sustained for the life of the energy efficiency equipment installed.

SECTION 3.3

RENEWABLE ENERGY ASSESSMENT

INTRODUCTION

Renewable energy is defined as energy from resources that are not depletable or are naturally replenished when used at sustainable levels. This definition excludes fossil fuels and nuclear fission. Renewable energy resources included in this assessment are hydropower, solar, wind, biomass, geothermal, ocean, and landfill gas. In addition to these renewable resources, fuel cell technology is included in this assessment due to its potential for using renewable energy such as hydrogen and bio-gas. Moreover, like renewables, fuel cells provide potentially significant, long-run environmental and economic benefits to the region, need support for commercialization, and face similar market barriers.[1]

BENEFITS OF RENEWABLE ENERGY

Use of renewable energy provides a number of benefits. These can be broadly defined as:

- Increased energy diversity and security;
- Reduction in air emissions;
- Greenhouse gas reduction;
- Economic development opportunities; and
- Onsite power generation.

Dependence on a limited number of energy resources creates reduced energy security arising from fuel supply interruptions and greater price volatility. Energy from renewable resources such as wind and solar is not fuel-dependent, and therefore is not subject to the effects of natural and artificial fuel supply constraints.

Power plant air emissions are responsible for approximately one-third of nitrogen oxide

[1] Characterizations of specific renewable energy resources and technologies are presented as part of the technology assessment at the end of this chapter.

(NO_x) emissions, two-thirds of sulfur dioxide (SO_2) emissions, and one-quarter of carbon dioxide (CO_2) emissions, nationally. In New York State, each MWh of electricity generation, given the State's mix of generation sources, produces 1.5 pounds of NO_x emissions, 3 pounds of SO_2 emissions, and 882 pounds of CO_2 emissions, annually. Power generation using renewable energy resources, such as wind, results in no air, water, or waste impacts.[2]

Combustion of fossil fuels results in the release of CO_2, a significant contributor to global warming. Power from renewable resources avoids CO_2 emissions.[3] Methane, the main energy component of landfill gas, is a particularly potent "greenhouse" gas, having roughly 21 times the global warming effects of carbon dioxide. In many parts of the country, cities and counties are using landfill gas to produce electricity, heat, or steam for industrial use. These projects consume gases that, if not collected, pose serious odor, safety, and environmental hazards.

In-state manufacturing of renewable energy equipment, such as PV modules, could lead to new industries with high export potential, leading to job creation. Deployment of renewable energy technologies can also lead to new jobs. For example, biomass plants require labor to maintain the equipment and to grow, harvest, and transport the fuel. From the point of view of the State economy, much of the revenue for manufacturing, installing, fueling, and operating renewable power equipment can be retained instead of leaving the State to pay for imported fuels.

A number of benefits result from onsite power generation using renewable technologies. These include:

- Reduction in customer electricity load and demand charges;
- Customer avoidance of distribution charges;
- Increased electricity system reliability;
- Avoidance of investments in transmission and distribution infrastructure;
- Waste heat recovery and avoided transmission losses; and
- Availability of power in remote locations.

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[2] No energy source is completely environmentally benign. For example, potential wind energy impacts are land use, aesthetics, bird collisions, noise, and communication interference.

[3] Burning of biomass results in CO_2 emissions that are offset by CO_2 consumption during plant growth.

The following benefits are specific to individual technologies:

- Fuel cells improve power quality for industrial processes.
- Electricity from small-scale wind can help meet winter electricity demand peaks.
- PV can be used to meed demand peaks during hot sunny days by generating power to meet air conditioning loads.

BARRIERS TO RENEWABLE ENERGY DEVELOPMENT

The more common barriers to the development and widespread use of renewable energy technologies can be broadly categorized as:

- Price-related (premium);
- Infrastructure-related (lack of infrastructure for the manufacture, sales, and service);
- Value-related (not fully understanding or quantifying the true value of renewable energy resources based on the fuels they displace); and
- Educational (lack of customer familiarity with, and acceptance of, renewable energy alternatives).

Currently, using renewable energy technologies to produce power is typically more expensive than producing power from fossil fuels. For bulk power producers, the high cost results in increased project risk and raises the cost of financing. For onsite generation, the low cost of grid-connected power results in long payback periods. However, the impact of the premium is less for equipment located at the customer side of the meter because of other costs, such as distribution, included in electricity rates. Once demand for renewable energy reaches significant levels, research and greater manufacturing economies of scale are expected to significantly decrease the cost of renewable energy technologies. Until that time, renewable energy technologies will need continued public support.

Development of renewable resources in New York State will require new industry infrastructures that include a workforce skilled in renewable technologies, renewable energy suppliers, and customer demand for renewable energy. In addition, less costly access to the electricity grid and more streamlined environmental and local permitting procedures are likely to improve both the supply and demand for onsite generation using renewable resources.

The value of public benefits are difficult to quantify and therefore are often ignored. For example, currently, the impact of distributed generation on electricity system reliability is not valued, resulting in high stand-by power charges that limit the deployment of distributed generation technologies. Also, when making comparisons between energy alternatives, economic and environmental costs associated with the entire fuel cycle, from fuel extraction to energy generation to waste disposal, are currently not considered.

The public has limited knowledge and understanding of renewable technologies. Customer education and successful demonstration of renewable energy systems will be important to reduce perceived risks and increase public acceptance.

RENEWABLE ENERGY USE IN NEW YORK STATE

New York State's primary energy use is presented in Table 1. Primary use includes energy used in all sectors including electricity generation, transportation, residential, and industrial and commercial uses. Compared to the Unites States as a whole, New York uses relatively more hydroelectric power compared to the U.S. as a whole.

Table 1: Primary Energy Use (Trillion Btu) in 1999 in New York State and in the U.S.

	New York State	United States
Petroleum	1,653 (38.6%)	37,960 (39.7%)
Natural Gas	1,251 (29.2%)	22,294 (23.3%)
Coal	188 (4.4%)	20,498 (21.4%)
Nuclear	393 (9.2%)	7,736 (8.1%)
Hydroelectric Power	265 (6.2%)	3,449 (3.6%)
Wood and Waste	174 (4.1%)	3,101 (3.2%)
Other (includes electricity generated from geothermal, wind, photovoltaic, and solar thermal energy)	1 (0%)	493 (0.5%)

Source: U.S. DOE. *State Energy Data Report*. 1999.

The current grid-connected electricity generation capacity using renewable energy sources is shown in Table 2. New York State's renewable energy electricity generation capacity, based on currently operating and planned sites, was estimated to be approximately 4,788 MW.

Table 2: Contribution of Renewable Energy Sources to New York State Electricity Supply (2001)

	Size Range (kW per Site)	No. of Installations	Median Size (kW)	Capacity (MW)	% of total
Hydroelectricity (excluding pumped storage)[4]	10 to 2,550,000	347	1,236	4,442.7	91.7%
Biomass					
Municipal Solid Waste[4] (MSW)	200 to 69,600	13	14,850	265.9	5.5%
Wood and Wood[4] Waste	300 to 19,800	4	9,625	38.5	0.8%
Agricultural Residue[5]	3 to 150	4	65	0.3	0.0%
Landfill Gas[6]	1,000 to 5,500	19	2,000	46.0	0.9%
PV[5]	.3 to 300	47	7.7	1.2	0.0%
Wind[4]	1 - 11,000	27	4.5	48.3	1.0%
Total		*461*		*4,788.3*	*100.0 %*

Note: The estimated capacity for wind includes the planned 30 MW Fenner Wind Project in Madison County.

Conventional hydroelectricity capacity of 4,442 MW represents almost 92% of the renewable energy capacity. The total conventional hydroelectricity includes the 2,550 MW Niagara Power Project and the 780 MW St. Lawrence-FDR Power Project. It also includes over 340 small hydro projects throughout the State with a median size of 1.2 MW. The next highest category is municipal solid waste (MSW) which represents 5.5%

[4] New York State Independent System Operator. *2001 Load and Capacity Data*. 2001.

[5] National Renewable Energy Laboratory. *REPiS: The Renewable Electric Plant Information System.* 1999.

[6] *NYSERDA Internal Working Survey of Landfill Gas-to-Energy Projects in New York State*. 2001.

of all renewable energy sources, followed by landfill gas (0.9%), wood and wood waste (0.8%), and wind (1.0%).

According to a recent study conducted for NYSERDA by Sustainable Energy Associates,[7] the New York State generation of electricity from renewable sources is expected to increase from 407 GWh in 2002 to 1,421 GWh in 2011, an increase of 350%. The basis of this forecast includes (1) the expected increase in demand for clean energy resulting from Governor Pataki's Executive Order No. 111; (2) renewable power demand arising from renewable portfolio requirements in New Jersey and Connecticut, and (3) demand for green power resulting from System Benefits Charge (SBC) funded initiatives.

U.S. DEPARTMENT OF ENERGY FORECASTS

Grid-Connected Electricity Generation From Renewables

For the period 2000 to 2020, the U.S. Department of Energy's (U.S. DOE) projections for renewable energy use in central station grid-connected U.S. electricity supply are mixed. During the 20-year forecast:

- Total U.S. grid-connected electricity generation from conventional hydropower is expected to remain stable over the next 20 years (see Figure 1);

- The expected net addition of 600 MW of new hydro-power capacity is not expected to offset the projected decline in generation from existing hydroelectric facilities;[8]

- Grid-connected electricity generation from non-hydro resources is projected to increase from 77 billion kWh in 1999 to 146 billion kWh in 2020, representing a 90% increase (see Figure 1).

Most of the projected growth in non-hydro renewable electricity generation is from biomass, landfill gas, geothermal energy, and wind power. As shown in Figure 2:

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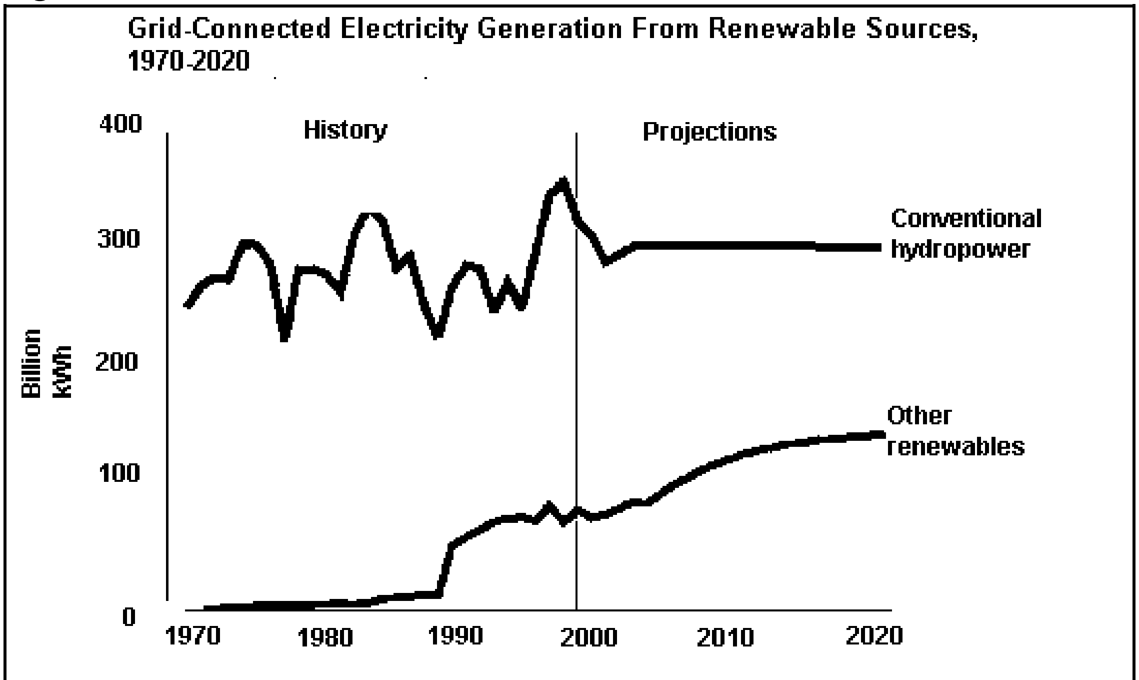
[7] Grace, Robert C. *Cost Estimate of N.Y. Executive Order 111 Renewable Energy Purchase Provisions.* Sustainable Energy Advantage, LLC. October 19, 2001.

[8] Under current law, the Federal Energy Regulatory Commission is required—when issuing a new license—to balance power generation needs with environmental and other factors, leading to mandates to curtail hydro production as a condition of relicensing. Approximately two-thirds of all hydro projects relicensed since 1986 lost generation capacity.

Figure 1



Source: U.S. DOE Annual Energy Outlook 2001.

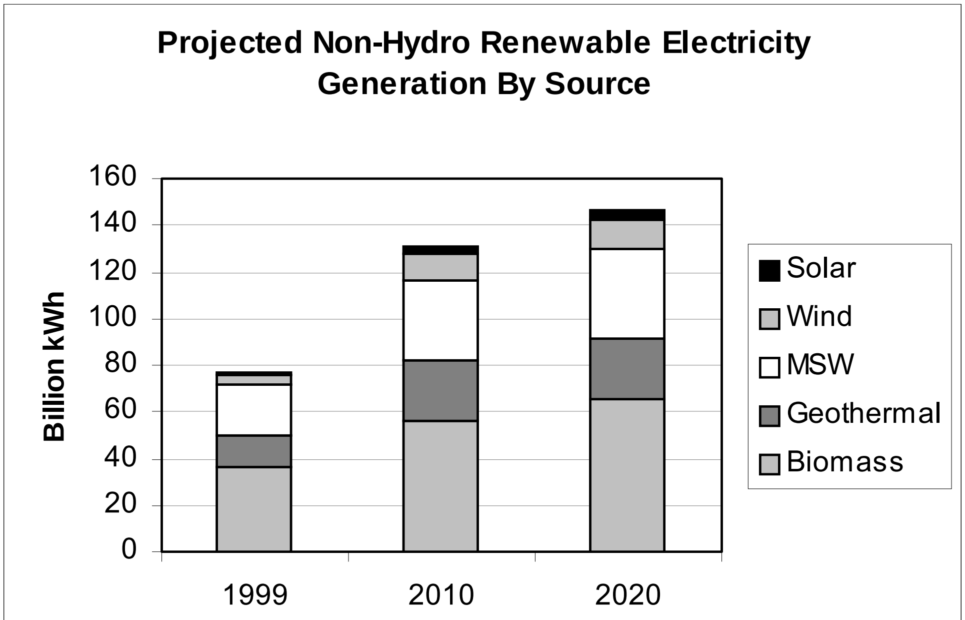
Electricity from biomass is projected to grow from 36 billion kWh in 1999 to 65 billion kWh in 2020 (80% increase). Combined heat and power facilities account for more than one-half of the expected growth in biomass-based generation. Dedicated biomass plants and co-firing in coal plants account for the remainder.

- Electricity from municipal solid waste, which includes direct firing and landfill gas, is projected to increase by 15.9 billion kWh between 1999 and 2020. No new capacity additions are projected for direct firing but landfill gas capacity is projected to grow by 2.1 GW.

- Electricity capacity from geothermal energy is projected to increase by 1.5 GW in the forecast, adding 12.8 billion kWh of baseload generation by 2020.Total wind capacity is projected to grow 36% by 2001 and to more than double by 2010. Capacity additions are expected to decline after 2010 unless additional incentives are made available. As installed wind capacity increases, intermittent availability and lower output per kW at marginal sites and are expected to disadvantage wind power relative to conventional generating technologies.

- Grid-connected PV is projected to add nearly 900 MW but remain small contributors to overall electric power supply. Off-grid PV, which is not included in the projections, is expected to continue to increase rapidly.

Figure 2



Source: *U.S. DOE Annual Energy Outlook 2001*.

The U.S. DOE's Annual Energy Outlook 2001(AEO 2001) assumes rapidly increasing state requirements for investments in renewable energy technologies. Requirements differ from state to state, reflecting varying renewable resource potential, supporting industries, and supply alternatives. For AEO 2001, it was assumed that state mandates will require total additions of 5,065 MW of central station renewable generating capacity between the years 2000 and 2020. Mandated additions are expected to result in:

- 2,900 MW of wind capacity,
- 1,145 MW of landfill gas capacity,
- 840 MW of biomass capacity,
- 117 MW of geothermal capacity, and
- 64 MW of central station solar (photovoltaic and thermal) capacity.

RENEWABLE ENERGY PROGRAMS

National Initiatives

Hydropower is the most significant source of renewable energy. After the 1973 oil crisis, changes in federal policy spurred the development of renewable technologies other than hydropower. In 1978, Congress passed the Public Utility Regulatory Policies Act (PURPA), which required utilities to purchase electricity from renewable generators and from co-generators (using combined heat and power). Some states, particularly California and those in the Northeast, required utilities to sign contracts for purchase of electricity from renewable sources whenever electricity from those sources was expected to be less expensive over the long term than electricity from traditional sources. Over 12,000 MW of non-hydro renewable generation capacity came on line under PURPA. This development enabled renewable technologies to develop commercially. Wind turbine costs, for example, decreased by more than 80%.

Federal financial incentives for renewable energy include tax credits and production incentive payments. The Energy Policy Act of 1991 established a permanent 10% business energy tax credit for investments in solar and geothermal equipment. As of 1999, new electricity generating facilities that use wind, biomass crops grown for energy, or poultry litter were eligible to receive a tax credit of 1.7¢ per kWh for 10 years. This credit, which will otherwise expire on January 1, 2002, is the focus of a bill passed by the U.S. House of Representatives that extends the tax credit through 2006.[9] The bill also expands eligibility to include facilities that use landfill gas and additional forms of biomass including organic wastes.

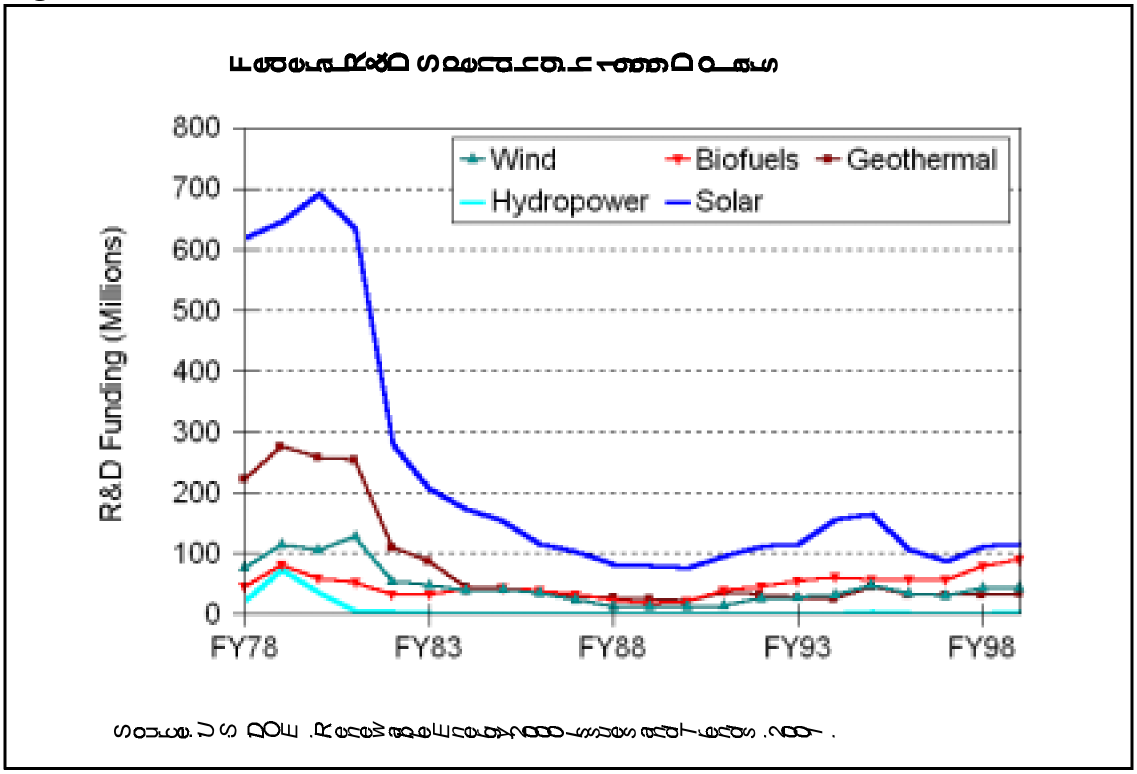
As shown in Figure 3, the U.S. DOE has consistently provided more financing for solar (including solar thermal, passive solar, and photovoltaic) R&D efforts than for other renewable energy resources. However, compared to 1997, funding for 1999 R&D spending for biomass energy systems (including both electric and transportation applications) increased by 64%. In 1999, more than 35% of biomass energy system R&D was used for ethanol-related projects.

U.S. DOE's interest in ethanol can be traced to the Clean Air Act Amendments (CAAA) of 1990, which directed regions in severe non-attainment status for ground-level ozone to use oxygenated gasoline. Currently, there are two primary options for meeting the

[9] U.S. Senate action is anticipated.

oxygen requirement. Ethanol, widely used by fuel manufactures in the Midwest, is made from corn and other biomass. The second option, methyl tertiary butyl ether (MTBE), is a petroleum-derived oxygenate. Approximately 25% of the gasoline sold today contains MTBE. However, as a result of surface and groundwater contamination, 13 states, including New York, have moved to discontinue the use of MTBE. The replacement of MTBE by ethanol will substantially increase demand for ethanol.

Figure 3



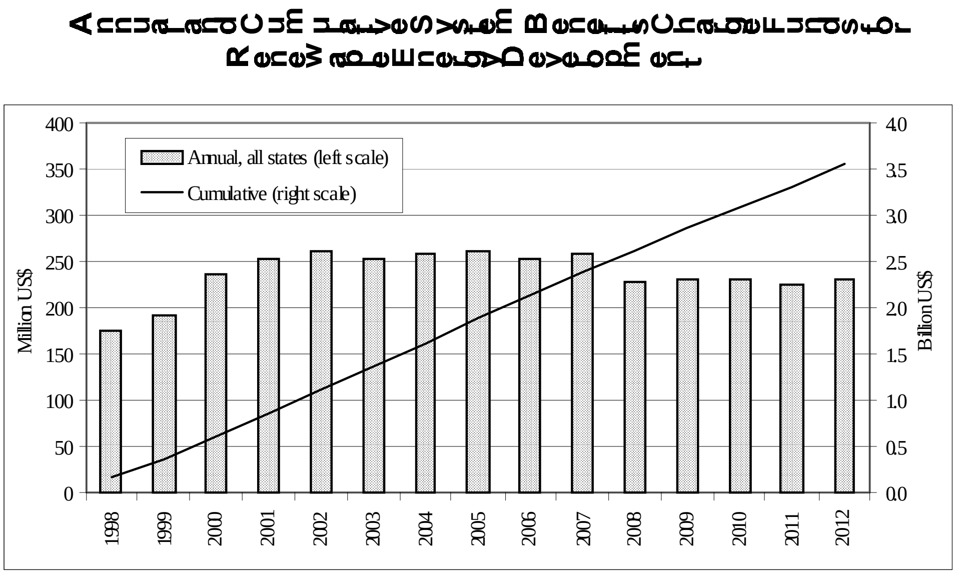
State Initiatives

The Database of State Incentives for Renewable Energy (DSIRE), established in 1995, is an ongoing project to summarize state incentives, programs, and policies regarding renewable energy.[10] The project is funded by the U.S. DOE's Office of Power Technologies and is managed by the North Carolina Solar Center on behalf of the

[10] www.dsireusa.org

Interstate Renewable Energy Council. Selected DSIRE programs and policies are presented in Appendix A at the end of this chapter. As of October 2001, the database showed that many states have adopted laws in support of renewable energy. For example, 35 states have adopted net metering regulation, 15 states provide corporate tax incentives, and 13 states provide personal income tax incentives. Environmental Disclosure Rules, requiring load serving entities (LSE) to provide their customers with information on the fuel mix and the resulting emissions from the electricity supplied by the LSE, have been adopted by 18 states.

Figure 4



Source: Lawrence Berkeley National Laboratory. *Clean Energy Funds: An Overview of State Support for Renewable Energy*. 2001.

Between 1998 and 2012, approximately $3.5 billion will be collected for renewable energy development by 14 states with SBC funds (See Figure 4). The average annual funding is $233 million over the next decade. In comparison, the federal fiscal year 2001 renewable energy budget was $376 million. Except for California, Connecticut, Illinois, Montana, New York, Pennsylvania, Rhode Island, and Wisconsin, states still are in the early stages of obligating SBC funds allocated for renewable energy.   The most popular programmatic elements to date are financial incentives for large-scale renewable generation projects, customer-sited distributed generation programs, and renewable energy marketing (*i.e.*, efforts to develop a market with multiple energy suppliers providing energy generated from renewable sources).

RENEWABLE ENERGY SUPPORT ACTIVITIES IN NEW YORK STATE

New York State Energy Research & Development Authority

Between July 1998 and June 2001, NYSERDA, the administrator of New York's public benefits program, invested over $14 million in renewable energy programs. The programs provided financial incentives for wind, PV, and biomass. For the period July 2001 to July 2006, NYSERDA will invest over $77.5 million of SBC funds to develop renewable energy in the State. Funding allocations and goals of the renewable program are shown in Table 3. The program will target both end-users and wholesale market development.

Table 3: 2001-2006 New York System Benefits Charge Funding for Renewable Energy

	Funds allocated	Goals
End-use renewable market development (PV, small wind, small biomass)	$24 million	• Provide training for individuals involved in designing, installing, and inspecting renewable technology systems • Educate the marketplace on use and value of renewable energy • Ensure reliability of renewable technology system installations
Wholesale renewable market development (large wind, biomass, low-impact hydro)	$46 million	Develop wholesale market through: • Green marketing incentives • Renewable energy credit trading program • Green power auctions
Various uses	$7.5 million	
Total	***$77.5 million***	

To date, NYSERDA has funded a number of renewable energy projects. The following are some highlights:

Wind. NYSERDA-sponsored efforts to promote wind power in New York State include:

- Site Development: NYSERDA is speeding up wind development in the State by sharing the cost of site development. These costs include those associated with locating desirable sites, collecting site-specific wind data, and conducting preliminary environmental impact reviews.

- Wind Map: NYSERDA has developed wind maps to provide preliminary information to developers interested in wind power. These maps show historical long-term wind conditions for each season and year, display wind resource characteristics at three representative heights above ground, along with administrative boundaries, major roads, and other reference information.

- Wind Forecasting: With NYSERDA's assistance, a New York State company is creating a wind forecasting model with the ability to predict wind speeds with useful accuracy at any location up to 48 hours in advance. Forecasting ability may increase the value of the energy produced by wind power plants.

- Wind Farms: By the end of 2001, NYSERDA will have supported the construction and operation of 41.5 MW of in-State wind energy generation.[11] NYSERDA provided $2 million in funding to the Madison Wind Power Project, located in Madison County, which became operational in October 2000. NYSERDA provided $5 million in funding to another Madison County wind project in Fenner, about 25 miles east of Syracuse. This 30-MW project will be operational by November 2001. NYSERDA expects to provide support for upwards of 210 MW of installed wind capacity by 2006.

- Small Wind: NYSERDA is supporting small wind installations under 100 kW for the agriculture, municipal, and commercial sectors.

- Transmission Access Study: NYSERDA is co-funding a study to investigate and evaluate transmission solutions for interconnecting wind power plants. The study will address permits required for installing transmission lines, interconnection procedures, contractual arrangements with transmission owners, and transmission and capacity pricing options.

Building-Integrated PV Program. Widespread acceptance of PV will require dissemination of information to potential end-users and other market participants such as architects, builders, developers, building code inspectors, as well as officials in the insurance industry. To foster installation of PV on commercial, industrial, and institutional buildings, NYSERDA is supporting projects that demonstrate innovative PV technologies and applications. The objectives of the program are to:

- Familiarize mainstream architects, builders, and developers with PV-integrated building design;

[11] Another 6.6 MW wind facility, constructed by the Niagara Mohawk Power Company using SBC funds, is located in Wethersfield, Wyoming County.

- Demonstrate the long-term performance and reliability of building-integrated PV systems;

- Document installation and operating costs of building-integrated PV systems;

- Lower customer's net cost; and

- Reduce other barriers to the installation of building-integrated PV systems.

Residential PV Program. The goal of the residential PV program is to stimulate the residential PV market in New York State. Near-term objectives of the program are: (1) to demonstrate the safety and reliability of grid-connected residential PV systems; (2) to reduce barriers to installing PV systems; and (3) to build market demand for residential PV.

Solar Energy Center at SUNY Farmingdale. This Nassau County campus is the site of one of the largest PV systems on Long Island. Over the past decade, NYSERDA has provided over $1 million in funding and technical assistance to install and maintain the 92-kW system.

Solar Electric and Wind Product Development. This program aims to develop in-state manufacturing capabilities for solar-electric and wind products to meet the growing State and worldwide demand for renewable energy. The program solicits proposals for solar electric and wind devices, components, products, and improved manufacturing methods for equipment that will be manufactured in New York State and targets technologies that will be commercialized within five years. Between 1996 and 1999, NYSERDA awarded $4.2 million to 14 companies to develop 18 products.

Fuel Cells.[12] Beginning in 1992, NYSERDA began partnering in proton exchange membrane (PEM) fuel cell technology development with several New York State companies including Mechanical Technology Incorporated (predecessor of Plug Power, LLC). Between 1992 and 1997, NYSERDA invested over $3 million in fuel cell development and demonstration including projects that developed a 50-kW PEM fuel cell for passenger cars fueled by hydrogen. Cooperating with the New York Power Authority, NYSERDA also helped demonstrate a 200-kW phosphoric acid fuel cell operating on bio-gas from a wastewater treatment plant in Yonkers, Westchester County. These early projects helped document the environmental benefits of fuel cells.

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[12] Although some fuel cells use fossil fuel as energy, fuel cell technology has been included in this assessmement due to its environmental benefits and potential to use hydrogen and bio-gas as a fuel source.

Currently, NYSERDA is administering a $6-million project, funded by the Clean Air/Clean Water Bond Act and Plug Power, LLC, to demonstrate 50 7-kW PEM fuel cells at 10 New York State-owned sites. Other anticipated NYSERDA projects include:

- Installation and demonstration of a 250-kW fuel cell at Brookhaven National Laboratory on Long Island;
- Implementation of test fuel cells at a remote telecommunications site with a 5-kW load;
- A project to identify process and issues surrounding installation of fuel cells for residential applications, including grid interconnection approval, site selection, site preparation, and operation and maintenance; and
- A project to develop a process for low cost, integrated manufacturing of fuel cells.

Biomass. NYSERDA has historically supported biomass as a fuel supply and is currently involved in the following areas:

- Agricultural Sector: NYSERDA has current commitments for over $3.1 million[13] to fund 18 projects that will use anaerobic digester gas from farm wastes for co-generated electricity and heat. The total capacity from these projects will be approximately 1.6 MW.
- Willow Development: Since 1996, NYSERDA has been partnering with the Salix Consortium to spur the commercial harvesting of willows to be used as a sustainably managed fuel source. NYSERDA has invested $1.4 million[14] to this project. Approximately 500 acres of willow have been planted to date, enough material to generate about .75 MW of electricity. The first commercially harvested willow, expected to be available in the winter of 2001-2002, is planned to be co-fired with coal at the Dunkirk power plant in Western New York.
- Since 1999, NYSERDA has invested $850,000[15] in projects that seek to reduce dependence on petroleum by substituting bioresources for petroleum-based products, components, or processes. Examples of projects include improved enzyme production technology, bio-pesticides, polymers, and gasification of willow feedstock.

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[13] Total project cost is $8.8 million.

[14] Total project cost is $14.8 million.

[15] The total project cost is $2.3 million.

Geothermal Technology. NYSERDA is supporting 32 different businesses and organizations in implementing geothermal technology for heating and cooling. The anticipated annual energy savings from these projects are 129,000 mmBTU of natural gas and 3,000 mmBtu of oil, leading to energy cost savings of $780,000 annually.[16]

Other Incentives. Several of NYSERDA's program, funded by the SBC, provide incentives to end-users for renewable technologies:

- Commercial/Industrial New Construction Program: The program provides incentives of up to $300,000 per project for design and installation of building-integrated PV and advanced solar and daylighting technologies. Advanced solar technologies include thermal storage systems, solar preheating systems, and flat plat solar collectors. Incentives are capped at 70% of the incremental cost of the design and installation.

- Peak-Load Reduction Program: The program provides incentives for PV systems that reduce summer peak demand. In 2001, incentives ranged from $4 to $6 per Watt AC for systems in the Consolidated Edison Service Territory and $3 to $5 per Watt AC for systems outside of Consolidated Edison service territory.

- Loan Fund Program: This program provides loans with interest rates reduced by 4.5% below the lender's usual rate.

Long Island Power Authority

LIPA is providing support for various renewable technologies through its Clean Energy Initiative. The implementation status of the renewable energy marketing and research and development programs was released in June 2001. The following are a few highlights:

Solar/Photovoltaics

- Through the Solar Pioneer Program, LIPA is offering residential homeowners and small commercial customers a $3.00/watt rebate for grid-connected systems, with a maximum rebate of $15,000 per installation. The program also provides a LIPA-subsidized 6% loan to finance PV systems. During 1999 and 2000, 32 PV systems, 0.5 kW each, were installed.

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[16] Assuming 1998 natural gas and oil prices.

- LIPA is participating in the Million Solar Roofs Initiative and has committed to install 10,000 solar roofs on Long Island by the year 2010. To support this goal, LIPA is working to develop a certification process for PV installers.

- LIPA helped establish the Farmingdale Solar Energy Center at SUNY Farmingdale and is providing 70% co-funding for public information seminars and three-day workshops for electricians interested in installing photovoltaic systems.

- LIPA installed a 20-kW Atlantis Energy Sunslate photovoltaic grid parallel system (consisting of individual roof tiles each having a photovoltaic cell) and a geothermal heat pump system at the newly renovated New York State Nature Center located at Jones Beach State Park.

- LIPA installed a 15.5-kW photovoltaic system installation at the New York Institute of Technology. The 48 roof-top mounted solar panels use Omnion inverters to convert the DC power they produce to AC power. Extensive monitoring equipment provides information on environmental conditions (wind speed and temperature), thereby allowing the correlation of this information with the amount of electricity produced.

Wind Energy

- A feasibility study was conducted to site three 50-kW wind turbines in Montauk. However, due to deed restrictions at the proposed Camp Hero site, the project was later canceled.

- Wind feasibility studies were also proposed and/or conducted in the Towns of Babylon, Hempstead, and Brookhaven: (1) In Babylon, a contractor was engaged to conduct meteorological studies as well as the environmental and economic feasibility of siting wind turbines at the former Babylon landfill; (2) In Hempstead, the Phase I analysis examined four potential sites for wind generation within the Town, including the former Oceanside and Merrick landfills, and two sites in the Point Lookout area; and (3) In Brookhaven, a site inspection was conducted at the landfill in preparation of a written proposal for a feasibility study on the installation of wind turbines and/or solar panels at the closed portion of the landfill site.

Other

- An advanced technology geothermal heat pump will be developed for facilitating growth of the geothermal market on Long Island and elsewhere. Specifically, an advanced direct exchange geocolumn heat exchanger will be developed, designed, installed, monitored and analyzed at one or more Long Island customer sites.

New York Power Authority

In addition to hydroelectricity provided by the Niagara River Power Project, the St. Lawrence-FDR Power Project, and five small hydropower projects across the State, NYPA is supporting a wide range of renewable energy technologies. As of 2001, NYPA had installed over 576 kW of PV at various municipalities at a cost of about $4.9 million. It had also completed four fuel cell projects totaling 800 kW at a cost of $3.2 million. NYPA is currently working on a project to install eight more 200-kW fuel cells at wastewater facilities in New York City at a cost of $14 million. These fuel cells are part of an effort to offset the emissions from the Authority’s PowerNow! gas turbine plants constructed in 2000 - 2001.

NYPA's plans for 2002 to 2004 include the following renewable energy technologies:

- Anaerobic digester gas fuel cells;
- Other fuel cells/microturbines;
- Landfill gasses;
- PV; and
- Wind power.

NYPA is actively engaged in efforts to preserve and protect the renewable power generated by New York State's two largest hydroelectric projects. The 800 MW St. Lawrence-FDR project has been operating with original equipment in the project powerhouse since 1958. The turbines will reach the end of their design life within the next 15 years and other equipment will require renovation or replacement in that time period. To address these concerns, NYPA, in1998, initiated a $254 million program to extend the life and modernize the generation equipment at St. Lawrence-FDR. Modernization of the first of the sixteen turbines has been completed and work on all the turbines is planned to be completed by 2013. The federal license for St. Lawrence-FDR expires in 2003. NYPA submitted an application for a new 50-year license to FERC in October 2001, employing a collaborative alternative licensing process.

The 2,400 MW Niagara Power Project, which first generated power in 1961, includes the Robert Moses Niagara Power Plant and the Lewiston Pump-Generating Plant. NYPA is upgrading and modernizing the thirteen turbines at the Moses plant. The upgrade of eight units has been completed. The $293 million program, scheduled to be completed by 2006, will permit increased power production during periods of peak demand, but will not increase the project's overall output. The federal license for the Niagara project expires in 2007. Preliminary work on relicensing has begun.

Legislative and Regulatory Initiatives

Executive Order No. 111. Governor Pataki’s Executive Order No. 111, issued in 2001, directs State agencies and other affected entities to seek to increase their purchase of energy generated from specific renewable technologies to meet 10% of their energy requirements by 2005, and to increase that share to 20% by 2010. The specified renewable technologies are: wind, solar thermal, PV, sustainably-managed biomass, tidal, geothermal, methane waste, and fuel cells. Currently, State agency representatives are developing the necessary procedures to implement the Executive Order.

Net Metering Law. New York's net metering law (The Solar Choice Act of 1997, L. 1997, Ch. 339), allows residential electricity customers to offset their electricity use with power they send into the grid using PV equipment owned by the customer. New York’s net metering legislation includes a 25% tax credit for the purchase and installation cost of a qualifying PV system, not to exceed $3,750. The maximum capacity allowed per customer is 10 kW. The law requires each utility to connect residentially-operated PV facilities until such connected power equals at least 0.1% of that utility's 1996 peak demand. Based on the 1997 filings made by the New York investor-owned utilities, total net metering capacity allowed under the law will be 23.4 MW. The capacity limit will be reviewed by the New York State Public Service Commission (PSC) in 2005 to determine whether it should be increased.

The PSC has developed uniform interconnection rules for net metered systems. Systems must use type-tested inverters to be approved for interconnection. As of 2001, 17.3 kW of PV systems had been installed under the net metering regulation; 16 kW through LIPA’s lottery program in Long Island. An additional 20 kW are underway.

New York Environmental Disclosure Program. In 1998, the PSC adopted a plan to implement an environmental disclosure program to encourage demand for environmentally clean electricity. The program requires LSEs in the State to provide customers with data on the fuel mix and average emission rates for the fuel sources used to meet the LSE's electricity supply requirements. The information will be derived from generation and consumption data provided by the NYISO and by environmental emission data provided by the U.S. Environmental Protection Agency (EPA), the New York State Department of Environmental Conservation (DEC), and other sources. The program is funded at $3.5 million from the SBC.

Solar Easements. New York's real property law provides property owners the ability to create an easement for the purpose of preserving the exposure of a solar energy device. Any easement obtained in writing is subject to the same conveyance and instrument recording requirements as any other easements. New York General City codes allow local zoning boards to create rules regarding solar access.

Green Buildings Tax Credit. The Green Buildings Tax Credit Law, enacted in May 2000, contains provision for fuel cells and PV arrays.[17] The law applies to property placed in service or that has received a final certificate of occupancy in taxable years beginning on or after January 1, 2001. An eligibility certificate from an architect or professional engineer, certifying that the building space remains green and that any fuel cells and PV modules for which a credit is being claimed also remain qualified, is required annually.

The fuel cell component provides a 30% credit (6% per year over 5 years) for the capitalized cost of each fuel cell. The fuel cell must be serving green space and must use a qualifying alternative energy source. There is a cap of $1,000/kW multiplied by the direct-current (DC) rated capacity.

The PV component provides a 100% credit (20% per year over 5 years) for the incremental cost of building-integrated PV modules and a 25% credit (5% per year over 5 years) for the incremental cost of non-building-integrated PV modules. The system must be serving green space to qualify. There is a cap of $3/Watt multiplied by DC-rated capacity.

[17] http://www.dec.state.ny.us.

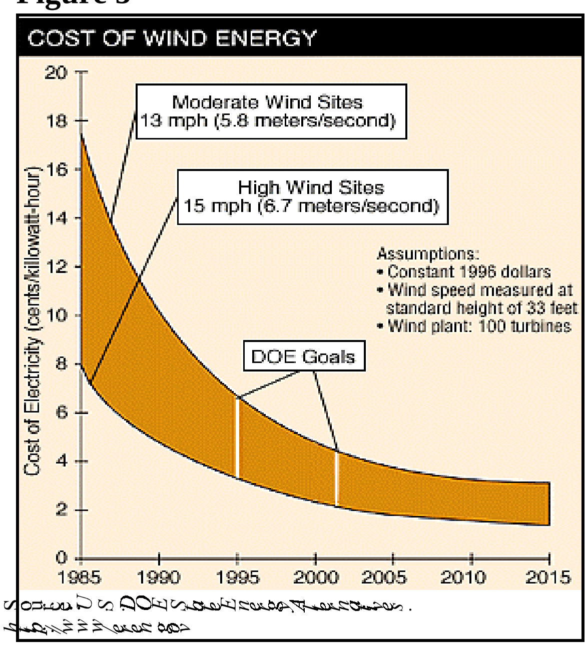
TECHNOLOGY AND RESOURCE ASSESSMENT

In October 2001, NYSERDA undertook a renewable technology and resource assessment. The primary purpose of this assessment is to address the potential role of renewable energy resources in the State's energy future. This assessment will compare the cost/kWh of renewables with conventional energy for the next 3, 5, 10, and 20 years. Preliminary estimates of the technical, economic, and market potential for renewable energy is scheduled to be available at the end of January 2002. A final report is scheduled to be released in April 2002. Technology characterization and some cost information is presented here at this time but information from the assessment will be used to provide a comprehensive analysis.

Wind

The installed wind capacity in the U.S. as of 2000 was 2,760 MW.[18] Wind energy is one of the most cost-competitive renewable energy technologies. Due to the efforts of the wind industry and the U.S. DOE's Wind Energy Program, the cost of electricity from wind power plants has dropped from 35¢/kWh in 1980 to less than 5¢/kWh today at high wind sites (see Figure 5). The cost of wind in New York State is higher than 5¢/kWh due to lower average wind speeds and smaller project sizes. Currently in New York State, the largest wind farm is sized at 30 MW. However, at a limited number of site areas in New York State, project size could approach 50 to 100 MW. Off-shore wind[19] projects are expected to be in the 100 to 300 MW range.

Figure 5



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[18] DOE. *Annual Energy Outlook 2001*.

[19] Potential for off-shore wind projects exists on Long Island.

Several initiatives adopted by the New York State Independent System Operator (NYISO) promote wind development, as well as other renewable technologies. These include the following rule changes specifically adopted for intermittent electricity generation:

- Increased the total amount of intermittent capacity allowed to participate in the statewide installed capacity (ICAP) market from 50 MW to 500 MW;

- Waived financial penalties for intermittent generators. Intermittent generators can participate in the Hour-Ahead market, selling electricity at the real-time clearing price without paying for regulation service charges.

In addition, the NYISO waived its requirement for a System Reliability Impact Study for generation projects of 10 MW or less, or for projects less than 80 MW if connected to the electricity system at voltage levels at or below 115 kV. This waiver applies to most renewable energy generation facilities, easing some of the financial impact associated with development costs.

Hydropower

Before the 1980s, the only widely-used renewable electricity technology was hydropower. Hydropower is still the most significant source of renewable energy, producing 20% of the world's electricity and 10% of that of the United States.[20] In 1999, hydropower represented 13.7% of the State’s electricity generation.

The main advantages of hydropower are:

- Power is usually continuously available on demand;

- No fuel requirements or fuel-related environmental impacts;

- Limited maintenance; and

- Long-lasting and robust technology; systems can last for 50 years or more without major new investments.

The main disadvantages are:

- It is a site-specific technology. Sites that are well-suited to the harnessing of water power are not likely to be close to locations where the power can be economically exploited.

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[20] Department of Energy, Energy Information Administration, State Energy Data Report. 1999.

- There is a maximum useful power output available from a given hydropower site, limiting the expansion of activities which make use of the power.

- River flows often vary considerably with the seasons, limiting the firm power output to a small fraction of the possible output.

- The current technology poses potential aquatic ecology and aesthetics/water use impacts.

Nationally, the average cost for hydropower is 2.4¢ per kWh. Other cost characteristics are shown in Table 4.

The Hydropower Evaluation Software (HES), developed by the U.S. DOE and the Idaho National Engineering and Environmental Laboratory, has been used to perform a resource assessment of conventional hydropower potential in over 40 states. The software uses environmental attribute data to generate an overall project environmental suitability factor (PESF) between 0.1 and 0.9, where 0.9 indicates the highest likelihood of development. The estimated hydropower potential capacity for New York State is presented in Table 5. Potential is provided for three categories: (1) additional potential at developed sites with current power generation; (2) potential at developed sites without current power generation; and (3) potential at undeveloped sites. As of 1998, the projected additional potential totaled over 1,300 MW consisting of 162 MW at currently operational sites, 496 MW at developed sites without power, and 652 MW at undeveloped sites.[21]

Table 4: Hydroelectric Plant and Operating Costs

Capital cost	$1,700-2,300/kW
Operation cost/kWh	3.88 mills (0.4¢)
Maintenance cost/kWh	2.89 mills(0.3¢)
Total cost/kWh	23.67 mills (2.4¢)
Operating life	50+ years
Capacity factor	40-50%
Average size:	31 MW

Source: http://hydropower.inel.gov

[21] Idaho National Engineering and Environmental Laboratory. *U.S. Hydropower Resource Assessment for New York*. August 1998. Available at http://hydropower.inel.gov.

Table 5: New York Hydropower Capacity Summary

Category	Number of Projects	Name-Plate Capacity (MW)	HES-Adjusted Capacity (MW)
Potential at Developed Sites with Power	44	286	162
Potential at Developed Sites W/O Power	212	754	495
Potential at Undeveloped Sites	96	1,079	652
Total	***352***	***2,119***	***1,309***

Biomass

Next to hydropower, more electricity is generated from biomass than any other renewable energy resource in the United States. Biomass used for energy purposes includes:

- Leftover materials from the wood products industry;
- Wood residues from municipalities and industry;
- Forest debris and thinnings;
- Agricultural residues (including animal manures); and
- Fast-growing trees and crops.

Benefits of power generation from biomass include:

- Fewer air emissions compared to power generated from conventional fossil fuels;
- Creation of new processing, distribution, and service industries in rural communities, providing employment for farmers and foresters;
- Dispatchable power (like fossil fuels, the energy has been stored by nature in the biomass until it is needed);
- Technologies that can generate electricity at scales small enough to be used on farms or large enough to power small cities;
- Biomass gasification broadens the range of biomass fuels and also allows biomass to be used in efficient combined-cycle power generation systems. Biomass gasifiers breaks down biomass to form a bio-gas, generally hydrogen or methane,

that can be cleaned and filtered to remove problematic chemical compounds before it is burned, providing environmental benefits.

Approximately 80% of the biomass power in the United States is generated in the industrial sector, primarily in the pulp and paper industry. The biomass power industry is primarily located in the Northeast, Southeast, and West Coast regions, representing a $15 billion investment and 66,000 jobs. In the future, the continued need for onsite industrial power, waste reduction, stricter environmental regulations, and rising consumer demand for renewable energy will provide the main impetus for the industry's growth.

The cost to generate electricity from biomass varies depending on the type of technology used, the size of the power plant, and the cost of the biomass fuel supply. In the year 2000, the most economically attractive technology for biomass is co-firing at power generation facilities using coal. These projects require small capital investments per unit of power generation capacity. Co-firing systems range in size from 1 MW to 30 MW of biomass power capacity. When low-cost biomass fuels are used, co-firing systems can result in payback periods as low as two years.

In today's direct-fired biomass power plants, generation costs are about 9¢/kWh. In the future, advanced technologies such as gasification-based systems could generate power for as little as 5¢/kWh. For comparison, a new combined-cycle power plant using natural gas can generate electricity for about 4¢ -5¢/kWh at Fall 2000 gas prices.

A July 1991 report by NYSERDA[22] concluded that New York State has enough wood resources to produce 400 to 800 MW of electricity. With the use of conventional forest materials and clean waste wood, enough resources may be available to generate 2,800 MW of electric power. The NYISO's *2001 Load & Capacity Report* lists four wood and wood waste facilities: Chateaugay Power, Cowee, Burrows-Lyonsdale, and Harden Furniture. The total capacity of these plants is 38.5 MW. In addition, two New York State paper mills, Finch Pruyn and International Paper, have electricity generation capacity totaling 68 MW.[23]

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[22] NYSERDA. *Wood Energy Technology Assessment.* 1991.

[23] National Renewable Energy Laboratory. *REPiS: The Renewable Electric Plant Information System.* 1999.

Landfill Gas

The U.S. EPA regulations require landfills to control gas emissions resulting from decomposing garbage. Conversion of landfill gas to energy not only meets regulations but also creates energy and revenue for local governments.

Landfill gas has a medium-Btu rating, approaching that of natural gas, and with minimal cleaning, can be used directly in boilers to create steam for industrial uses. This application reduces dependency on fuel oil, which is a standard fuel for boilers. Direct use does not require large capital investments for equipment, such as generators, and is probably the most cost-effective application of landfill gas.

NYSERDA is currently conducting a study to determine ways to maximize the use of landfill gas to generate electricity and for direct-use applications. Objectives of the study are to:

- Quantify the energy potential of current landfill gas-to-energy projects;
- Estimate the energy potential of landfills that do not have existing landfill gas-to-energy projects but are economically viable; and
- Identify landfills that are potentially economically viable for a gas-to energy project with assistance.

To date, the study has identified 16 currently operational sites. Two of these sites use the methane from the landfill for direct use applications such as heating. The electricity generation capacity at the remaining 14 sites total 46 MW. The study also showed suggested that an additional 18 MW may be economically developed at this time.[24]

Photovoltaics

Currently, the largest world-wide market for PV is the off-grid market, which takes advantage of PV's ability to function as a complete stand-alone electrical system. Telecommunications and transportation construction signage are the two largest segments of the off-grid market. PV modules that take the place of building material, called building-integrated PV, are being successfully deployed in New York State, as well as a number of residential PV systems.

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[24] *NYSERDA. Internal Working Survey of Landfill Gas-to-Energy Projects in New York State*. 2001.

PV requires capital investment in the range of $5 to $12 per Watt, but initial costs are offset by low operating costs. The 20-year life-cycle cost range from 20¢ to 50¢ per kWh. A home installation may need 2 to 5 kilowatts of power, and at $12 per watt, the cost ranges from $24,000 to $60,000. However, combined with the high cost of a rural distribution line and lower land costs in remote areas, PV may be an economic alternative to grid-connected power.

According to one source, placing PV on even 1% of New York State's real estate would add significantly to the State's electricity supply.[25] The land area of the State is approximately 125,000 square kilometers. The amount of "raw" solar power received by 1% of this area on a clear summer day at noon is 1,250 GW. After accounting for the 10% solar-to-electric conversion efficiency, 1% of the state would provide a peak PV power production of 125 GW, which represents an yearly energy output of 150,000 GWh. This figure is comparable to the 1999 annual electricity usage in New York State. New York City, with its high air-conditioning load, is likely to benefit greatly from widespread adoption of PV.

Solar Heating

Solar energy can be used to heat water and air in commercial and residential buildings. Unlike photovoltaic cells, these technologies do not produce electricity.

Heating Water. Solar energy can be used in most climates to heat water. A typical residential system will reduce the need for conventional water heating by about two-thirds. In colder climates, more energy is required to heat incoming ground water, so using solar energy in these conditions can have a dramatic effect on utility bills. Installed costs vary widely, from $1500 to more than $3000.

Solar Pool Heaters. Approximately 25,000 solar pool-heating systems were sold in the United States in 1999. This number represents about one-fifth of all pool heaters sold annually. Prices of solar pool heating systems range from $2,500 to more than $5,000. When systems are installed to replace a conventional gas or electric swimming pool heater, the initial investment can usually be recovered in approximately 3 years.

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[25] Personal correspondence with Richard Perez, Associate Editor for Solar Radiation in Journal of Solar Energy.

Heating Air. Transpired air collectors are used to heat building spaces that require large quantities of heated ventilation air such as warehouses and apartment buildings. The price of these systems for new construction is about $6-$10 per square foot. By reducing energy costs, they could pay for themselves in 3 to 12 years. A New York State firm, Conserval Systems, Inc., manufactures a product called Solarwall which pre-heats ventilated air using solar energy. In 1997, NYSERDA helped the firm obtain U.S. DOE funding to establish its manufacturing facilities in Buffalo, New York.

Passive Solar

Passive solar refers to the use of the sun's energy without installing mechanical devices. Buildings designed for passive solar incorporate design features such as large south-facing windows and building materials that absorb and slowly release the sun's heat. The three type of passive applications are:

Passive Solar Heating. The simplest passive design is the direct gain system in which the sun shines directly into a building, thereby providing heat. The sun's heat is stored by the building's inherent thermal mass in materials such as concrete, stone floor slabs, or masonry partitions that hold and slowly release heat. Incorporating passive solar designs can reduce heating bills as much as 50%.

Passive Solar Cooling. Many passive solar designs include natural ventilation for cooling. By installing casement or other operable windows for passive solar gain and adding vertical panels, called "wing walls," perpendicular to the wall on the windward side of the house, the natural breeze in the interior is accelerated. Another passive solar cooling device is the thermal chimney, which can be designed like a smoke chimney to vent hot air from the house through the roof.

Daylighting. Daylighting is using natural sunlight to light a building interior. In addition to south-facing windows and skylights, clerestory windows, which are rows of windows near the roofline, can let light into north-facing rooms and upper levels. An open floor plan allows the light to reach throughout the building. Daylighting in businesses and commercial buildings can result in substantial savings on electric bills. Furthermore, natural light provides high-quality lighting that can improve productivity and health. Studies have shown that daylighting in schools can improve student grades and attendance.

Geothermal Heat Pumps

Two applications of geothermal energy are: (1) generation of electricity using hydrothermal fluids and (2) geothermal heat pumps that use heat contained in soil and rocks at shallow depths to heat and cool buildings. New York State does not possess hydrothermal resources capable of generating electricity. However, heat necessary for geothermal heat pumps is available throughout the State. NYSERDA is currently funding geothermal applications at 35 commercial and institutional facilities.

Nationally, about 500,000 geothermal heat pumps, also called ground-source heat pumps, are being used for heating and cooling in residential, commercial, and government buildings, including more than 500 schools. This equates to about 4,000 MW-thermal of contribution to the nation's energy needs. Geothermal heat pumps have low operating and maintenance costs, and usually, low life-cycle costs.[26] Consumption of electricity is 30% to 60% less than traditional heating and cooling systems, allowing a payback of system installation in 2 to 10 years.

Ocean

Ocean energy is available from tides, waves, and surface heat. Tides are the product of the gravitational attraction of the sun and moon together with the rotation of the earth. Areas with dramatic tidal changes within a bay offer the best potential for tidal power (such as the Bay of Funday, Canada and Britain's Severn Estuary). Despite a relatively small ocean shore line, Long Island may possess the potential for ocean power. The merit of investigating wave energy is that in New England, it is a much more energy-dense resource than either solar or wind energy. Seawater has a higher density than air so that currents of 5-8 knots can generate as much energy as winds of much higher velocity.

Fuel Cells

A fuel cell generates electricity by a chemical reaction using hydrogen which reacts with oxygen in the air. Fuel cells are used in automobiles, buses, commercial and residential power generation, and for portable power such as in a laptop computer. Scientists and inventors have designed many different types and sizes of fuel cells in the search for

[26] Life-cycle cost is the total cost of the equipment plus operating and maintenance costs, spread over the useful life of the equipment.

greater efficiency, and the technical details of each kind vary. Each type of fuel cell has advantages and drawbacks compared to the others, and none is yet cheap and efficient enough to widely replace traditional power generation.

At the moment, there are four promising fuel cell technologies:

- Phosphoric acid fuel cells (PAFC);
- Proton exchange membrane (PEM);
- Molten carbonate fuel cells (MCFC); and
- Solid oxide fuel cells (SOFC).

PAFC represents the most mature of the technologies. They were first developed in the late 1970s and have been on the market since 1991. Since then, more than 220 200-kW phosphoric acid fuel systems have been sold by International Fuel Cells, South Windsor, Connecticut. PEM fuel cells use a relatively new technology, but they have received attention from many vendors, including Plug Power in Latham, New York. One of the benefits of PEM fuel cells is a low operating temperature which makes it easier to instantly turn them on without having to wait for the unit to heat up.

In the long run, SOFC technologies may hold the most promise. The U.S. DOE recently announced the Solid State Energy Conversion Alliance (SECA), a $500-million government and industry initiative to achieve mass production of low-cost solid oxide fuel cells within 10 years. Solid oxide technology was chosen because it has the highest projected power density, leading to the creation of the smallest and lightest fuel cells. The U.S. DOE has already selected four projects for the first stage of this program. If all projects proceed as planned, the department will provide about $271million over the next 10 years. The project team members will finance approximately $226 million. Each project will be divided into three phases. In the first phase, lasting four years, the teams will aim toward an $800/kW cost goal; in the next two phases, each lasting three years, the teams hope to trim costs to $600 and then to $400/kW or less. Additional information on the different types of fuel cells are presented in Table 6.

Fuel cells will also play a role in the U.S. DOE Vision 21 concept for future power which includes power plants that can use coal, gas, biomass, petroleum, or municipal waste, depending on the fuel cell modules installed. As part of its Vision 21 Program, the DOE has funded five fuel cell/turbine hybrid research projects with various fuel cell manufacturers. The goal of these projects is to develop hybrid systems with an electrical efficiency of 70% by 2010. The DOE believes that fuel cell/turbine hybrids could realize a 25% increase in efficiency and 25% reduction in cost for a comparably sized fuel cell.

Table 6: Different Types of Fuel Cells

Type	Efficiency, %	Power output, kW	Vendors
PEM	38	3-250	H Power, Plug Power
Phosphoric acid	40	200-1000	International Fuel Cell
Molten carbonate	48-55	250-3000	FuelCell Energy
Solid oxide	48-55	1-3000	Siemens-Westinghouse
Source: Electric Power Research Institute			

The projected conversion efficiencies for fuel cell technology is expected to approach 50% by 2015 (Figure 6). Furthermore, the projected installed cost for fuel cells is expected to approach that of traditional distributed generation technologies in 2015 (Figure 7).

Advantages of fuel cells include:

- Fuel cells could provide a cost-effective alternative to upgrading or expanding the distribution network. Instead of laying new wires, fuel cell powerplants could be located within electricity-constrained areas, increasing electricity system reliability.

- Fuel cells are quiet and have very low air emissions due to the fact that power is generated through an electrochemical reaction, instead of combustion.

- As development continues, electrical efficiency could reach reach 80% by capturing the waste heat.

- Fuels cells are small in size and modular, allowing flexibility of use.

- Fuel cells enhance power quality and reliability.

The major drawbacks to fuel cells at this time include:

- High capital costs due to low production volumes;

- Lack of infrastructure needed to support coordinated installation and operation of fuel cells;
- Limited operating track record in a real world situation to confirm the technology's reliability and durability; and
- Issues surrounding interconnection, local permitting, insurance, and building code compliance.

Figure 6

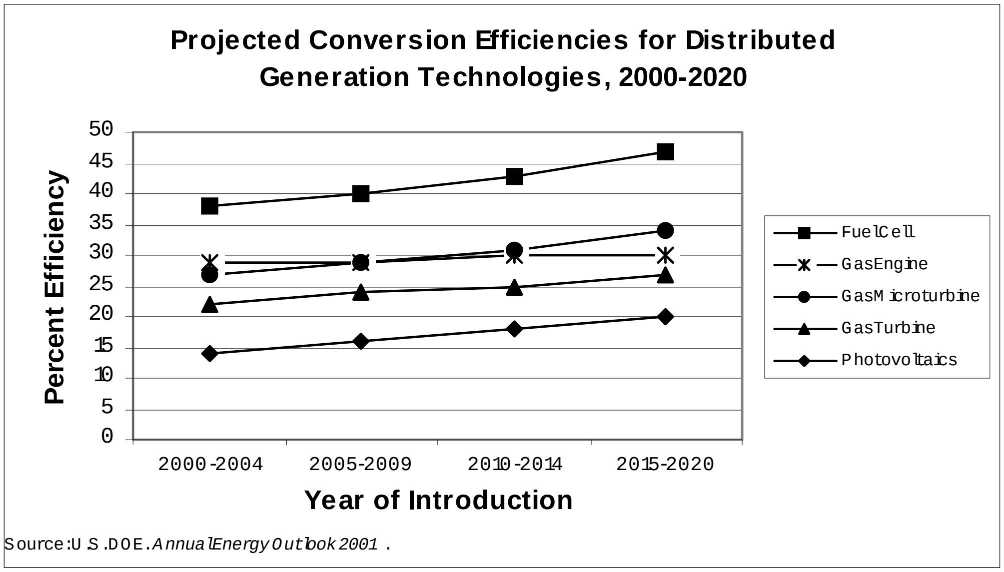
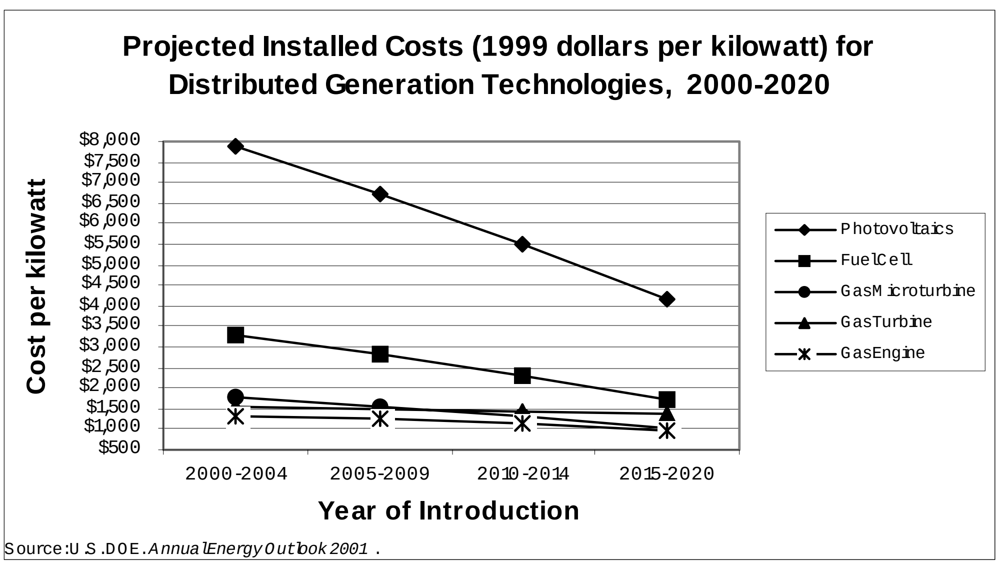


Figure 7



FINDINGS AND CONCLUSIONS

- The State has abundant untapped renewable energy resource potential for additional wind, photovoltaic (PV), and biomass, as well as more efficient hydropower at existing dams, passive solar, solar heating, and geothermal energy development.

- Higher prices for renewable energy will continue to be a barrier to widespread adoption of renewable energy technologies. To foster greater investment in renewable energy-based distributed generation technologies, interconnection rules need to be monitored and periodically reevaluated with the goal of easing interconnections without compromising reliability and system protection, and stand-by rates need to be fair and equitable.

- The cost of renewable energy technologies will continue to be dependent on national and global renewable market development activities. Commercialization efforts, and hence, product prices are currently driven by national and worldwide demand for renewable energy. As a consequence, it is important for the State to collaborate with other states and the Federal government to develop policies that support renewable energy technology and industry development.

- The State is making significant progress compared to other states in the promotion of renewable energy. By November 2001, New York will have 48 megawatts of installed wind capacity, the highest capacity in any Northeastern state. The State is continuing to build a sustainable renewable energy industry by promoting growth in consumer demand, supporting consumer education, constructing and operating renewable energy facilities, and reducing regulatory barriers that might hinder greater development of renewable energy resources in the State.

- The State's continued support for renewable energy is necessary to increase consumer interest, advance the development of renewable energy technologies, and achieve widespread commercialization and use.

Appendix A: Summary of Selected State-Level Initiatives

Initiative	Description	Number of States Providing Incentive	Available in New York State
Corporate Tax Incentives	Allow corporations to receive credits or deductions ranging from 10% to 35% against the cost of renewable energy equipment.	15	Yes
Personal Income Tax Incentives	Tax credits or deductions to cover the expense of purchasing and installing renewable energy equipment.	13	Yes
Property Tax Provisions	Provides that the added-value of the renewable device to be excluded from the valuation of the property for taxation purposes.	15	No
Sales Tax Incentives	Exemption from the state sales tax for the cost of renewable energy equipment.	14	Yes
Contractor Licensing	Licensing of renewable energy contractors	12	No
Equipment Certifications	Statutes requiring renewable energy equipment to meet certain standards	12	No
Environmental Disclosure Rules	Requirement that utilities provide their customers with information on fuel mix and emissions statistics.	18	Yes, as of Dec. 2001
Line Extension Analysis	Requires utilities to provide their customers with information on on-site renewable options when a line-extension is requested.	5	Yes
Net Metering Rules	For those consumers who have their own electricity generating units, net metering allows customer to use the excess generation to offset electricity that would have been purchased at the retail rate.	35	Yes
Solar and Wind Access Laws	Statutes providing for solar or wind easement rights.	33	Yes
Source: Database of State Incentives for Renewable Energy (DSIRE).			

SECTION 3.4

ELECTRICITY RESOURCE ASSESSMENT

INTRODUCTION

This Electricity Resource Assessment evaluates the electric system infrastructure in New York State within the context of changes occurring in the structure of the industry. The Assessment begins with a review of the status of retail and wholesale competition in the State. It then later assesses the current electricity system infrastructure and how the system might change during the planning period. Finally, this Assessment concludes with a description of how prices and loads might change over the planning period.

STATUS OF COMPETITIVE ELECTRIC MARKETS

New York State Retail Market

Customer Choice Programs. The State's retail electric industry is open to increasingly greater customer choice of energy service providers. Changes in the electric market allow customers in most areas of the State to choose their supplier of electricity, while the delivery of electricity to homes and businesses remains the function of the local utility. The transition toward retail competition has been evolving for several years, and further evolution will occur. Most experts in energy policy agree that competition can produce innovations and bring forth technologies and new services that will result in customer benefits.

According to the Center for the Advancement of Energy Markets (CAEM), an independent, nonprofit group in Washington, DC, New York State has consistently ranked among the top states in its efforts to deregulate the electric industry.[1] Among the 22 attributes where New York scored high are the following: overall deregulation plan, percentage of customers eligible, safeguards to prevent utility/affiliate favoritism, competitive metering and billing choices, generation market structure, treatment of stranded costs, customer education programs, appropriateness of default rates, and distributed generation interconnection policies. The percentage of load switched so far to competitive suppliers is about 15%, which is relatively high compared to other states (currently, the third highest).

[1] Other states ranked high by the Center include Pennsylvania, Texas, and Maine, while California is ranked relatively low among those states that have attempted electric industry deregulation.

<u>Customer Participation</u>. Based on customer awareness surveys conducted annually by the New York State Public Service Commission (PSC), about 60% of the State's electric consumers are now aware of electric competition. Overall, 4% of customers, representing over 15% of load, had switched from their local utilities to retail service providers as of the beginning of November 2001. Significantly, however, almost 22% of the load in the non-residential sector, but only 4.5% of the residential load, had switched as of that date, as shown in Table 1.

TABLE 1

RETAIL ACCESS PENETRATION IN NEW YORK STATE, NOVEMBER 1, 2001			
Service Area	**Number of Participants Currently Switched**	**Percent of Participants Switched**	**Percent of Electric Energy Load Switched**
Statewide	**302,758**	**4.3%**	**15.3%**
Residential	253,040	4.1%	4.5%
Non-Residential	49,718	5.8%	21.6%
Central Hudson	**232**	**0.4%**	**0.1%**
Residential	128	0.2%	0.0%
Non-Residential	104	1.8%	0.1%
Con Edison	**106,968**	**3.6%**	**23.0%**
Residential	91,291	3.5%	4.2%
Non-Residential	15,677	3.8%	29.8%
NYSEG	**29,800**	**3.5%**	**15.8%**
Residential	22,117	2.9%	4.5%
Non-Residential	7,683	7.2%	25.4%
Niagara Mohawk	**48,710**	**3.1%**	**10.6%**
Residential	39,678	2.8%	3.6%
Non-Residential	9,032	5.8%	14.1%
O&R	**41,134**	**19.7%**	**25.1%**
Residential	35,934	20.0%	23.0%
Non-Residential	5,200	17.9%	26.1%
RG&E	**37,425**	**11.6%**	**28.1%**
Residential	29,722	10.2%	13.0%
Non-Residential	7,703	25.3%	36.5%
LIPA	**38,489**	**3.6%**	**5.3%**
Residential	34,170	3.6%	4.3%
Non-Residential	4,319	3.7%	6.3%

Three utility retail access programs have had substantially better participation than the others: Orange and Rockland (O&R) (25% of the load and 20% of customers have switched); Rochester Gas & Electric Corporation (RG&E) (28% of the load and 12% of customers have switched); and Con Edison (23% of the load and about 4% of the customers have switched). The switches in the RG&E and Con Edison territories were primarily among nonresidential customers, where customer savings would be expected to be greater and costs for energy service companies (ESCOs) to serve them might be less. The O&R program, in contrast, has been highly successful with regard to switches of residential customers (20% of residential load has switched). The success for O&R might be particularly attributable to its consolidated billing for ESCOs. O&R has also reduced barriers to customer switching through its "Switch n' Save Program" where retail access customers that contact O&R are provided opportunities to switch to ESCOs and are guaranteed 7% savings for two months. Another important element might be that ESCOs in O&R's territory have conducted aggressive marketing campaigns, including telemarketing campaigns, direct mailings to customers, and door-to-door marketing.

Con Edison also has historically offered a consolidated billing option for ESCOs to use, albeit one in which the ESCO instead of the utility issues the consolidated bills. Con Edison's version of consolidated billing, however, has proved to be somewhat more difficult and costly to implement than most ESCOs have been willing to accept. While there are significantly more residential customers enrolled in Con Edison's program than in any of the other utility programs, they represent only 3.5% of the company's residential customers, in contrast to the 20% of residential customers switched in O&R's program.

Marketer Participation. There are 22 ESCOs currently selling electricity to retail customers in New York State, including five that are affiliates of incumbent utilities (15 of the 22 provide service in Con Edison's service area). Several of the ESCOs tend to dominate in some service areas, while only one ESCO currently serves customers in Rochester Gas and Electric Company's area, and only two serve customers in Central Hudson Gas and Electric's (Central Hudson) territory. Further, some of the ESCOs limit their services to specific customer classes, with some providing no service for residential consumers. Clearly, the ESCO interest and activity in the State is not evenly dispersed.

Improvement Opportunities. Retail competition stakeholders report that obstacles to switching to retail access for customers (especially residential and small business customers) and obstacles to ESCO participation are numerous. Specifically, these perceived obstacles include: utility rates that are not fully or properly unbundled; the lack of consolidated billing availability throughout the State; high financial security requirements; the volatility of the wholesale market; the continuation of utilities in some competitive functions; and the small size of the available profit margins. Many of these barriers are being encountered in other states. Discussed below are initiatives underway in New York to address each of these concerns.

<u>State Policies and Programs to Enhance Retail Electricity Competition</u>[2]. The State has taken a number of actions to promote competition in retail electricity markets. The PSC has opened electric metering in the regulated utility service areas to competition by ESCOs and competitive meter service providers (MSPs) and meter data service providers (MDSP). Moreover, billing will be open fully to competition as soon as the PSC completes work on Electronic Data Interchange (EDI) standards. Uniform Business Practices have been adopted to govern interactions between utilities and competitive suppliers, and modifications are being considered as the need arises. One of the more important barriers to retail competition has been the fixed backout credits for commodity service provided by competitors that were incorporated into the rate and restructuring agreements of several utilities. The PSC has since directed that the fixed credits be replaced by market-based credits. Identified below are some of the other initiatives and programs that are now underway to enhance retail electricity competition.

- **Competitive Retail Electric Markets Case[3].** On March 21, 2000, the PSC instituted a proceeding to consider the next steps that should be taken to develop retail energy competition further, including the future role of regulated utilities in providing the energy commodity and other competitive or potentially competitive services. Also being examined are the utilities' future role with respect to various public benefit programs (*e.g*., low-income assistance, energy efficiency, research and development) and the utilities' responsibilities as providers of last resort (POLR). The PSC directed that a collaborative process be undertaken to examine these issues, that comprehensive public input be sought, and that a complete range of policy options be delivered in either a consensus report by the parties or a recommended decision.

  On July 13, 2001, the Administrative Law Judges issued a recommended decision (RD). At issue are the future role of the regulated energy utilities in the end-state competitive markets, the actions needed during the transition to foster the development of such markets, and the future of system benefits programs. The RD recommends that the Commission first adopt three overarching goals or principles to be used in guiding the development of competitive markets and as a basis for determining an appropriate end-state competitive model. Those goals are as follows:

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[2] The discussion in this section relates primarily to policies and programs authorized by the PSC for the regulated utilities. The Long Island Power Authority is also considering initiatives to enhance its retail access program.

[3] Case 00-M-0504, <u>Proceeding on Motion of Commission Regarding Providing Last Resort Responsibilities, the Role of Utilities in Competitive Markets, and Fostering the Development of Retail Competition Opportunities.</u>

1. The provision of safe, adequate, and reliable gas and electric service at just and reasonable rates should be the primary goal, having priority above all others.

2. Where possible all services and products should be provided by competitive markets and not by regulated utilities.

3. The regulation of rates, services, and competitive market activities should be appropriate for the status of the transition (with greater scrutiny being exercised at the outset, and less as the dominant players lose the ability to exercise market power) and for the status of the service provider (with greater scrutiny being exercised over those with greater market power).

Based on these principles, the RD recommends that the PSC adopt as its end-state vision of the competitive markets one in which the utilities no longer provide gas and electric commodity service and are removed from any other market that becomes workably competitive. Before any utility is removed from any market, however, certain preconditions should be met, including a determination that the wholesale and retail markets are operating without the exercise of market power. As a general matter, the judges recommended that a utility not be removed from any market until multiple suppliers offering a variety of products are available for the entire customer class throughout the utility's service territory. The PSC is now considering the case. The Final Energy Plan will reflect the PSC's decision.

- **Unbundling[4].** For retail competition to proceed effectively, utility rates must be unbundled[5] appropriately to identify costs that can be avoided through the transfer of functions to competitive suppliers. By order issued March 29, 2001, the PSC instituted a formal "unbundling track" as an extension of the Competitive Markets Case for the explicit purpose of establishing guidelines and principles for the utilities to follow in conducting updated cost of service studies that will eventually result in the establishment of fully unbundled, cost-based rates for electricity and gas services. On November 11, 2001, the PSC directed the jurisdictional utilities to file embedded cost studies by March 15, 2002, and within 90 days thereafter to file tariff amendments that provide unbundled rates.[6]

- **Electronic Data Interchange[7].** The accurate and timely interchange of information is necessary for retail competition to proceed effectively. In an Order issued April 12, 2000, the PSC required that Electronic Data Interchange (EDI)

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[4] Case 00-M-0504, SUPRA, Order Directing Expedited Consideration of Rate Unbundling.
[5] Unbundling is the breaking apart of the utility rate into its components.
[6] Case 00-M-0504, SUPRA, Order Directing Filing of Embedded Cost Studies.
[7] Case 98-M-0667, In the Matter of Electronic Data Exchange.

systems[8] be implemented Statewide to facilitate the exchange of retail access data between ESCOs and utilities.

- **Uniform Business Practices**[9]**.** Most of the participants in retail competition have recognized the need for standardization of business practices among the utility service areas. The PSC, consequently, put in place a set of business practices that most of the participants in retail access in New York State must follow. During 2000, utilities, ESCOs, and regulators from across the nation undertook a similar effort to create uniform business practices for the entire country. Staff of the New York PSC assumed a leadership role, participating in a lengthy series of meetings held throughout the country that culminated in a national document for retail access business practices and electric metering. The PSC is now in the process of harmonizing New York's business practices with the national consensus document. It has also indicated that it will revisit the practices from time-to-time as more experience is gained.

- **Competitive Billing**[10]**.** Consumers have expressed a strong preference for the convenience of a single or consolidated bill for their utility services rather than having to pay separate bills for each service received. This preference, coupled with the PSC's commitment to push for competition wherever practicable, led the PSC on March 22, 2000, to order the major electric and gas utilities to file tariff amendments to accommodate the wishes of retail access customers who prefer to receive single bills from either their utility company or from their ESCO. Then, on April 25, 2001, the PSC adopted a set of uniform billing and payment processing practices to be incorporated into the utility tariffs, operating procedures, and billing service agreements of the large electric and gas distribution utilities in the State. The practices were based on recommendations of a national working group, as well as practices developed individually by the utilities and feedback from interested parties. The PSC also adopted individual billing backout credits[11] and billing service charges representing prices that utilities could charge ESCOs if they were asked by ESCOs to issue the consolidated bills.

- **Competitive Metering**[12]**.** Metering and metering services represent potentially competitive services that historically have been performed only by utilities. On June 16 and September 15, 1999, the PSC issued Orders requiring that

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[8] EDI is the computer-to-computer exchange of routine business information in a standard form. In a retail access environment, examples of "routine" transactions include switching customers from one supplier to another and the exchange of customer history, usage, and billing data.
[9] Case 98-M-1343, In the Matter of Retail Access Business Practices.
[10] Case 99-M-0631, In the Matter of Customer Billing Arrangements.
[11] "Backout credits" are the amounts by which utility charges for a service are to be reduced as customers procure that service from competitors instead of from the utility. These amounts are "backed out" of the utility charges.
[12] Case 94-E-0952, Competitive Opportunities Regarding Electronic Service, Order Providing for Competitive Metering.

competitive metering services be made available for about 40,000 large New York State customers with peak demands of at least 50 kW. It also directed utilities to unbundle metering and provide a backout credit to participating customers. The tariffs have now been approved, and five competitive entities have so far received approval as meter data service providers (MDSP) in New York State.

- **Environmental Labeling**[13]. Electric ESCOs will soon be able to differentiate the commodities or products they offer according to the sources of their generation, which will further enhance retail competition. Opinion 98-19, issued December 15, 1998, approved an environmental disclosure mechanism that will provide customers with verified data on the fuel mix sources and average emissions rates for the generation sources that their suppliers have used to meet their energy supply requirements. The first environmental labels are expected to be included in customer bills by the beginning of 2002.

- **Photovoltaic Law and Net Metering.** In August of 1997, the New York State legislature amended the Public Service Law to add a new Section 66-j requiring utilities to provide for net metering of residential photovoltaic (PV) systems with a generating capacity of 10 kW or less. Subsequently, in February 1998, the PSC instituted uniform interconnection standards for these systems and ordered the utilities to file tariffs implementing the requirements of the statute. Customers can also obtain tax credits for a portion of the cost of installing a PV system.

- **Distributed Generation.** Distributed generation, including combined heat and power (CHP) applications, offers customers the promise of increased electric reliability, power quality, efficiency, and affordability, while potentially downsizing supply and distribution costs. During 2001, NYSERDA, the PSC, and the U.S. Department of Energy hosted a CHP workshop in Albany for the purpose of providing a perspective on the economic and environmental benefits of the concurrent production of electrical and thermal energy, and identifying the barriers the CHP industry faces. Key governmental and private sector officials participated in the workshop. The PSC also extended and expanded the system benefits charge (SBC) in 2001, providing funding of nearly $57 million over the next five years to improve the viability of distributed generation and CHP as economic energy options in New York State.

  The PSC's proceeding to investigate generic principles for designing equitable stand-by service delivery rates for customers with interconnected wholesale and distributed generation facilities has recently concluded. The decision approved a protocol for special "standby rates." Such rates will apply to distributed generation customers who remain connected to their local utility system for

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[13] Case 94-E-0952, SUPRA, Opinion and Order Adopting Environmental Disclosure Requirements and Establishing a Tracking Mechanism.

backup power. The guidelines rely on a more cost-based approach to charging for distribution service than rates that has previously applied to standby customers.

In a related proceeding, the PSC authorized a three-year distributed generation pilot program to begin in 2001. Its purpose is to provide for the objective and timely consideration of distributed generation projects as a resource in the distribution system planning processes. The decision establishes a process for utilities to award a set number of contracts for distributed generation projects that could take the place of distribution system construction.

- **Interconnection Standards.** In December 1999, the PSC issued Standard Interconnection Requirements to streamline and facilitate the process for installation of distributed generation of 300 kW or less operating in parallel with radial distribution systems. The standards were formally revised in November 2000 and another revision is planned for the near future. Contained in the standards is a "type testing" procedure to allow manufacturers to submit their equipment for testing. This will classify equipment as utility grade and thus acceptable for use at the grid interface point. Several units have now been listed as type tested, most of which are inverters for use in photovoltaic systems. It is intended that the standards will promote an increase of on-site generation through a simple, quick, and well-defined application process and will allow applicants to purchase units from the list of "type tested" equipment.

- **Public Outreach and Education.** The PSC's statewide public education program, "**Your Energy. . .Your Choice**", is a critical element in the Commission's efforts to introduce retail competition. The goal of the program is to establish and maintain a high level of awareness and understanding so that consumers can make an affirmative decision regarding the new choices available to them.

  The program has used nearly every communications tool available and has delivered its message through: (1) an aggressive PSC staff-directed program integrating a broad-based media campaign with a wide variety of grass-roots educational initiatives; and (2) a concerted effort to encourage active utility customer education programs. Particularly important to these efforts have been numerous partnerships combining the efforts of State and local government agencies, utilities, energy service companies, business and consumer groups, and service providers.

  The PSC has also conducted annual surveys of residential and business customers to monitor awareness, understanding, attitudes and informational needs. General awareness of retail competition has remained fairly steady at approximately 60% of those surveyed, but an equal percentage imply that they do not yet have enough information on which to make a choice. Despite the continuing need for more information, most consumers believe they will benefit from competition.

In summary, important steps have been taken and the mechanisms have been established to support greater retail choice in New York State. As new supplies become available in 2004 and 2005, as is now projected, and as the initiatives discussed above progress, competition should become more viable for both customers and ESCOs.

New York State Wholesale Market

The Transition. In the mid-1990s, New York State developed a framework for restructuring the wholesale electric market. In the restructuring plans developed by the individual utilities, the utilities agreed to divest most of their generating stations, selling them through an auction process. The parties also agreed to create an Independent System Operator (ISO) to supersede the then-existing New York Power Pool. The ISO would be a not-for-profit organization with responsibility for administering the State's wholesale energy markets and operating the State's high-voltage electric transmission system. The Federal Energy Regulatory Commission (FERC) eventually adopted these proposals, with modifications, and on November 18, 1999, the New York Independent System Operator (NYISO) began operations.

In 2000, Staff from the Department of Public Service (DPS) interviewed parties that deal routinely with the NYISO, reviewed the NYISO's operations, and subsequently developed a series of recommendations to help the NYISO operate more efficiently and effectively. The NYISO has implemented many of the recommendations and is developing solutions for other identified problems as well.

The first years of operation of the competitive wholesale market in New York State have been marked by sharp increases in the prices of fuel and tight supply conditions in some regions of the State, largely resulting from transmission congestion and a lack of construction of new generation in the previous years, and an unanticipated increase in demand (during this time, New York's economy was expanding rapidly). Adding new generation, upgrading transmission capacity, using energy more efficiently, enhancing customers' ability to respond to price changes, and improving the efficiency of NYISO operations are the keys to lowering wholesale electric prices. All of these issues are being addressed currently.

Controlling Market Power. Market power is the ability of a single firm, or a group of firms acting jointly, to raise prices or restrict output beyond levels likely to result in a fully competitive market. To prevent the exercise of market power, the State has encouraged ownership of generation by multiple organizations. Utilities in New York State have now sold most of their generating stations. A tool known as the Herschmann-Hierfandahl Index (or HHI), which measures the concentration of players in an industry, is one tool used to measure market power (scores over 1,000 are considered to be a potential problem; scores of over 1,800 are considered to be a potentially serious problem). New York's wholesale electric market's HHI value is less than 1,000 (for the entire State as a single theoretical market), which reflects the existence of acceptable competition potential. New York, however, does have pockets where concentration of ownership is an issue, either on a geographic or temporal basis. This is especially true in the New York City area. Consequently, the NYISO has established specific in-City market power mitigation rules that govern the New York City generators previously owned by Con Edison. These rules attempt to prevent new generation owners in New York City from taking advantage of the limits on transmission of outside power into the metropolitan areas to exert market power on wholesale electricity markets.

The NYISO has also developed automated procedures (Automated Mitigation Procedures, or AMP) to prevent market abuse during times when day-ahead energy prices rise above $150/MWh. At such times, suppliers' bids are automatically reviewed to determine whether they are: (1) $100 or 300% higher than an energy reference price;[14] or (2) in the case of start-up cost bids, if they are 200% higher than the start-up cost reference and, in addition, the "economic withholding" could cause a price impact of $100 or more. While the AMP mechanism does not eliminate price spikes due to scarcity, it does address opportunities for economic withholding in an attempt to exert undue market influence.

Wholesale Prices.[15] In New York State, electricity demand is greatest during the summer as customers rely on electrical air conditioning equipment for cooling. When demand is lower during other times of the year, only the most efficient, and thus cheapest to operate, generators will typically be used. As demand increases, less efficient, and thus more expensive to operate, generators will then be required. The result is that, on average, wholesale prices will typically be greatest during the summer months. On an hourly basis, the highest peak prices can be expected at certain hours in the summer.

Prior to the November 1999 start-up date for the NYISO, and the power exchange operated by the NYISO, the wholesale electricity market consisted generally of bilateral contracts of varying lengths. The wholesale prices set by these contracts were not posted

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[14] Reference prices are computed based on the lower of the mean or median of the previous 90 days of accepted bids and are adjusted for fuel price changes. In instances where the AMP determines that a unit is economically withholding electricity in the day-ahead market, the unit's bid price is subject to being changed to its day-ahead reference price.

[15] The data presented here is for wholesale spot prices in New York State. Transition contracts and other bilateral wholesale contracts are not presented. The intent of this section is to show trends in the spot market.

in any one place, were sometimes confidential, and were not easy to interpret or compare, especially if the contracts included delivery or other services. In addition, most of the generation in New York State was owned by the utility companies or the New York Power Authority and supplied directly to customers at the utilities' regulated rates, which did not necessarily represent true wholesale market costs. As such, there were no formalized wholesale clearing prices to compare with the wholesale prices now available. However, it is clear that, because of the sudden increase in 2000 in the price of natural gas used by many generators and the unavailability of the Indian Point 2 Nuclear Plant, the wholesale spot market prices in the summer of 2000 were significantly higher than would have been visible if a power exchange had existed in prior years. Consequently, while the year 2000 wholesale prices may not have been typical, they are the only factual data available to use as a starting point for an analysis of future trends. As will be shown below, wholesale electricity prices have decreased from the higher year 2000 levels, and the projections of this Draft Energy Plan are that they will continue to decrease.

Wholesale spot market prices for summer 2001, on average, decreased compared with the summer of 2000 in the New York City and Capital District areas, but increased in the western part of the State, as shown in Table 2 below.

TABLE 2

WHOLESALE PRICE CHANGES IN NEW YORK STATE			
Region	**Summer 2000**	**Summer 2001**	**% Change**
New York City	$57.6/MWH	$52.6/MWH	9% decrease
Capital District	$54.0/MWH	$45.2/MWH	17% decrease
Western NY	$32.5/MWH	$39.1/MWH	19% increase

DPS Staff have analyzed these data to determine the extent to which these changes are due to fuel prices, changes in load level, or the availability of generation. Differences between the conditions present for the two summers that caused price decreases in the New York City and Capital District areas were: a decrease in natural gas prices (17% decrease on average); the availability of generation from Indian Point 2 nuclear plant during the summer of 2001after being unavailable the previous summer; the addition of about 450 MW of gas turbines installed by the New York Power Authority (NYPA) for the summer of 2001; an increase in the rating of LIPA's cross-sound cable to Long Island; and implementation and use of demand reduction programs during the summer of 2001. Increases in the Western New York area were generally due to two factors: increased loads caused by hotter weather, which resulted in fewer than normal hours in which coal generation was on the margin to set energy prices; and more hours in 2001, as compared with 2000, in which the central-east transmission system interface was not constrained,[16] which for many hours caused the Western New York area to be pooled with the Eastern New York area into one big market that governs the geographic area north of New York City. The result, as can be seen from the data above, was that the difference in wholesale prices between Western New York and the Capital District area narrowed between 2000 and 2001 (lowering the Capital area prices and increasing the Western New York area prices). During the same period, coal prices also increased significantly, which also may have affected Western New York prices because a high percentage of the supply in that region is generated by coal plants.

While no one can accurately predict wholesale electricity prices over the planning period, use of a production simulation model can provide some insights. Based on the "Reference Resource Case" assumption and the "Forecast" described later in this Assessment, this Plan forecasts that the running cost of generation statewide should generally decline in real terms over the 20-year planning period, which should similarly influence wholesale prices. Table 3 provides an indication of the relative wholesale electricity real price changes one might expect over the planning period, relative to 2002, under the Reference Resource Case scenario.[17]

As Table 3 shows, the real price decreases in wholesale electricity commodity prices occur in all transmission zones of the New York electricity system.[18] The most significant decreases occur in the near term (through 2005) when significant capacity additions are projected to occur in the southeastern portion on the State. In the later years of the planning period, real price declines continue, with the eastern portion of the New York realizing the most significant reductions. On the other hand, wholesale prices for the Long Island area should be relatively stable over the planning period.

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[16] NYPA's installation of the first phase of its convertible static compensator (CSC), a flexible alternating current transmission system (FACTS) at its Clark Energy Center in Marcy, was instrumental in reducing the constraint. Completion of the second phase in 2002 will further ease the constraint.

[17] The wholesale price decreases occur primarily because of the introduction of new efficient gas-fired generation facilities. To the extent that competitive, cost-effective and environmentally acceptable alternatives are developed and deployed, the downward price trend should continue.

[18] The average retail prices for electricity (commodity and delivery), presented later in this Assessment, are consistent with this trend.

TABLE 3

REFERENCE RESOURCE CASE RELATIVE PROJECTED WHOLESALE PRICE INDEX[19]								
Transmission Zone	**2002**	**2003**	**2004**	**2005**	**2008**	**2012**	**2016**	**2020**
West	1.00	0.96	0.91	0.90	0.86	0.84	0.82	0.83
Genesee	1.03	0.99	0.93	0.91	0.87	0.85	0.82	0.83
Central	1.04	1.00	0.94	0.91	0.87	0.85	0.82	0.82
Mohawk	1.06	1.02	0.96	0.92	0.87	0.85	0.82	0.82
North	1.06	1.02	0.96	0.92	0.87	0.85	0.82	0.82
Capital	1.08	1.05	0.97	0.93	0.88	0.85	0.82	0.82
Hudson	1.11	1.07	0.99	0.95	0.89	0.86	0.83	0.82
Millwood	1.12	1.08	0.97	0.94	0.89	0.86	0.83	0.82
Dunwoodie	1.15	1.10	1.10	0.99	0.91	0.87	0.85	0.83
NYC	1.13	1.08	1.03	0.96	0.89	0.86	0.83	0.82
Long Island	1.26	1.24	1.23	1.27	1.24	1.21	1.16	1.11

Market Rules and Procedures. Participants in New York's wholesale electric market have identified a number of inefficiencies resulting from the way rules and procedures had been written and from less than optimal software implementation. The NYISO and other parties have been working to correct these problems. For example, the NYISO began offering virtual bidding in November 2001. Virtual bidding gives marketers that do not have physical generation or load in New York the ability to buy and sell energy on the NYISO's day-ahead and real-time markets. This practice is expected to increase market liquidity and bring real-time and day-ahead market prices closer together as buyers obtain increased ability to arbitrage differences in time and location.

Among the more intractable problems identified so far are "seams issues," which refer to problems created by differences in the scheduling and dispatch rules between neighboring ISOs. Some generators took advantage of these discrepancies to increase their profits. The most egregious of these problems, however, have now been corrected.

[19] Index is based on year 2000 constant dollars with the index fixed relative to the NYISO West transmission zone in the year 2002. The current eleven transmission zones used in NYISO operations are displayed in this table.

Having separate, adjoining ISO territories, as is now the case, can also lead to inefficiencies in each ISO's internal scheduling. For example, in some cases, due to loop flows of electricity, the best solution to a congestion problem would be to start up or adjust the schedule of a generator in an adjoining ISO territory. The ISOs in the Northeast have been looking into ways to work together more cooperatively to deal with this type of situation.

FERC has also suggested that competitive market efficiencies might be enhanced if markets could be combined to eliminate the seams between them. Further centralized scheduling of transactions, and the ability to share reserves among ISOs, have the potential to make the electrical system operate more efficiently. Consequently, in July 2001, FERC issued an Order to begin a process to develop a single Northeast Regional Transmission Organization (RTO) that would include the New York, New England, and the Pennsylvania- New Jersey- Maryland (PJM) ISOs . The ISOs, the states, and interested parties are now actively evaluating options to respond to the RTO Order.

New York State supports FERC's attempt to establish a single RTO to run the daily power markets and oversee the flow of electricity in the Northeastern United States. While states in the Northeast have previously been working to resolve "seams" issues that prevent economic exchanges of power, the FERC Order should expedite that process and hasten the resolution of those issues. Over time, the RTO approach will strengthen the reliability of the system, promote better transmission planning, and result in efficient wholesale prices for electricity.

In the process to develop a Northeast RTO, New York State proposes that certain principles be established. Those principles include:

- System reliability is a paramount concern for state regulators. The new system must be designed to incorporate local requirements and to ensure that short-term economic pressures do not shortchange the reliable operation of the system. Until a more optimal system is developed, the current configuration of three physical control areas should be maintained.

- Consumers must be protected through effective market monitoring and mitigation in those areas where competition does not exist.

- A body fully empowered to act by the three regions should quickly work to identify the "best practices" of these markets so that uniform, regional rules can be in place as quickly as possible, consistent with the need for a safe and reliable transition.

- The on-going work to improve efficient commerce across the Northeast, which began in 1999, must continue during the transition to an RTO.

- There should be a single, independent governing body that receives effective input from all of the stakeholders while maintaining the independence to act in the public interest.

- State regulators should have a meaningful role in the development and operation of an RTO that reflects their responsibilities in siting of generation and transmission, local reliability, market monitoring, and protection of consumer interests.

Expected Resources. As previously noted, wholesale market prices in real terms should decline as new resources are added to the system. Below is a discussion of the various options available for adding new resources.

- **Article X Projects.** Major electric generating facilities of 80 MW or greater must be authorized by the New York State Board on Electric Generation Siting and the Environment (Siting Board) under Article X of the Public Service Law. The first Article X proceeding began in 1998 with the filing of an application for the Athens Generating Plant. As of November 1, 2001, 23 Article X power plant projects have been announced formally, for a total of over 15,000 MW (see Table 4).

  Article X Siting Boards have approved five projects that will add a net total of 3,326 MW to the New York system. Decisions on at least another five projects that could add about 2,700 MW should occur in 2002. The first certified projects that may be completed are to be located in New York City (the East River Repowering and the Ravenswood Cogeneration Projects). They could be operational for the summer of 2003. The Athens project is scheduled to be operation by September 2003. The other approved projects, and those projects currently under active review, if approved and carried forward, would probably become operational during 2004 and 2005.

  The Article X power plant siting law remains in effect until January 1, 2003.

TABLE 4

ARTICLE X PROJECT STATUS
(as of 11/20/01)

Project	Location	Capacity	Projected Earliest in Service	Status
Applications Filed				
East River	Manhattan	360 MW*	4 Q 2002	Certified
Ravenswood	Queens	250 MW	2003	Certified
Athens	Greene Cty.	1080 MW	3 Q 2003	Certified
Heritage	Oswego Cty.	800 MW	4 Q 2004	Certified
Ramapo	Rockland Cty.	1100 MW	2 Q 2004	Hearings
Bowline	Rockland Cty.	750 MW	2 Q 2004	Hearings Complete
Bethlehem	Albany Cty.	750 MW**	2 Q 2004	Hearings
Astoria	Queens	1000 MW	3 Q 2004	Certified
Poletti	Queens	500 MW	3 Q 2004	Hearings Complete
Brookhaven	Suffolk CTY.	580 MW	2004	Hearings
Wawayanda	Orange CTY.	540 MW	2004	Hearings
Orion Astoria	Queens	1816 MW***	2005	Application Stage
Sunset	Brooklyn	520 MW	Unknown	Application Stage
Torne Valley	Rockland CTY.	827 MW	Unknown	Application Stage
Pre-Application Reports Filed				
Grassy Point	Rockland CTY.	550 MW	Unknown	Pre-App Report
Twin Tier	Tioga CTY.	520 MW	Unknown	Pre-App Report
Preliminary Pre-Application Scoping Statements Filed				
Besicorp	Rensselaer Cty.	510 MW	3 Q 2004	Scoping Statement
Kings Park	Suffolk Cty.	300 MW	3 Q 2004	Scoping Statement
Spagnoli Road	Suffolk Cty.	250 MW	2004	Scoping Statement
Caithness	Suffolk Cty.	750 MW	Unknown	Scoping Statement
Glenville	Schenectady Cty.	520 MW	Unknown	Scoping Statement
Oak Point	Bronx	1075 MW	Unknown	Scoping Statement
TransGas	Brooklyn	1100 MW	Unknown	Scoping Statement

Notes:
*less 164 MW replaced yields 196 MW net increase
**less 400 MW replaced yields 350 MW net increase
***less 1254 MW replaced yields 562 MW net increase

- **Non-Article X Supply Options.** In the near term (2002 and 2003), until new base load combined-cycle generation comes into service, the State will have to rely primarily on additional simple-cycle gas turbine generation under 80 MW to satisfy incremental peak load growth in transmission constrained areas of the State. Most of the immediate need for generation capacity is on Long Island.

  In September 2000, the PSC established the Pricing and Reliability Task Force (P&R Task Force) within the DPS to ensure that our State will have reliable supplies of electricity at reasonable prices. The P&R Task Force consists of three specialized teams – the Independent System Operator (ISO) Pricing Team, the Demand and Supply Team, and the Article X Team.

  The Demand and Supply Team's responsibility is to ensure that adequate supplies of electricity will be available until significant new base load generation can be built. The program's focus to meet the 2001 summer peak was satisfied by new generation resources in New York City, including the New York Power Authority's installation of approximately 450 MW of small gas turbine capability (less than 80 MW at a given site) in New York City and on Long Island. In addition, peak demand was reduced through the ISO's Demand Reduction response programs. These programs enabled the State to operate during the summer of 2001without blackouts or brownouts. They also helped to hold down wholesale electricity prices in the State.

  A similar Demand and Supply initiative is underway to meet the State's reliability requirements for the summer of 2002. To meet 2002 summer peak demand, PSC staff are working with LIPA, other State agencies and power developers to facilitate the installation of small electric generation units in the State, primarily on Long Island, and to continue to enhance demand reduction programs.

  Distributed generation and renewable energy resources are also being added to the State's generation energy mix. As noted previously in "New York State Retail Market" section, the State has developed initiatives and incentives to encourage the development of these technologies, has developed interconnection standards for distributed generation, has established guidelines for standby rates for on-site generators, and has required all transmission and distribution owners to include distributed generation in their delivery system expansion evaluations.

  With respect to renewable technologies, Governor Pataki has required all State agencies to obtain at least 10% of their power requirements from renewable resources by the year 2005 and 20% by the year 2010. NYSERDA has funded significant research and development work in the area of fuel cells, PV, wind power, biomass, *etc*. While such facilities currently make up only a small portion of New York's generation capacity, more will certainly be installed over time.

- **Demand Reduction Options.** In March 2001, the PSC approved several electric demand response programs designed to reduce demand for electricity in Con Edison's service territory during peak times, improve the overall reliability of the electric system, and moderate prices in New York City. The PSC also directed all of the State's investor-owned utilities to submit plans to implement a customer-incentive program to reduce peak demand, expand the available supply of electricity, and moderate pricing of wholesale electricity in the State. The PSC subsequently approved the programs and tariffs to implement them. These actions allowed utility supply customers, in addition to ESCO customers, to take advantage of new demand reduction programs offered by the NYISO. By the end of August of 2001, approximately 680 MW of demand reduction had registered in the ISO's Emergency Demand Response Program, which provided as much as 475 MW of demand reduction during system emergencies in 2001. The NYISO's Day Ahead Demand Response Bidding Program similarly provided opportunity for relief during the 2001 Summer, with as much as 375 MW of reduction available in a given hour from parties registered to participate in this program. In addition, the System Benefits Charge programs implemented by NYSERDA reduced demand by about 80 MW. Additional savings resulted from public appeals, plans developed to reduce government energy usage during peak periods, and other utility programs. The PSC also required utilities to prepare detailed public awareness plans describing each company's steps to raise awareness and educate customers regarding the load and capacity situation and outlining action consumers can take to control their energy use. Particular emphasis was directed toward the business community because that is where the greatest results might be expected in the shortest amount of time.

- **Transmission Options.** Transmission additions and modifications can also impact the wholesale market. The installation of the flexible alternating current transmission system equipment at Marcy, mentioned later in this Assessment, has already resulted in reduction of transmission constraints. Other such installations might be considered in the future where justified. Installation of new transmission lines can also impact the wholesale market. Where new generation is being installed, new lines or interconnections are needed, but new merchant lines from other areas are also being considered. Currently, only one such project, the Transenergie Cross-Sound Line from Connecticut to Long Island, has been authorized by New York State, but several more are being considered (See the "Transmission" section later in this Assessment).

STATUS OF UTILITY STRUCTURES/MERGERS

Since 1994, most of the major electric and gas utility companies in New York State have been allowed to enter into holding company structures. This permission was granted as part of the proceedings conducted to open the electric business to competition. These cases also produced extended rate plans wherein rates were either frozen or decreased over several years.

The Commission policy toward mergers and acquisitions, consistent with the controlling statute, has long been that the merger must be determined to be in the public interest before it can be approved. In past mergers, this has generally meant that the ratepayer must be held harmless in the transaction and also that they should share in any synergy savings resulting from the merger.

The first merger between major electric utilities in New York since the 1940's occurred in 1997. In this transaction, Con Edison acquired Orange & Rockland. As part of the regulatory approval, the rates in the Orange & Rockland service territory were reduced and the company was required to refrain from requesting new rates for an additional two years beyond what it had previously accepted as part of its restructuring plans. Orange & Rockland and Con Edison's gas rates were reduced while cost savings attributable to Con Edison's electric and steam operation were deferred until the next rate proceeding.

Recently, two additional mergers involving New York electric and gas companies were announced. In September 2000, Niagara Mohawk Holdings, the parent of Niagara Mohawk Power Corporation, entered into a merger agreement with National Grid, whereby it would become a wholly owned subsidiary of National Grid. National Grid's principal subsidiary, The National Grid Company, plc., owns and operates the high voltage transmission system in England and Wales. National Grid, through another subsidiary, National Grid USA, also has substantial transmission and distribution operations in the United States following its acquisitions of New England Electric System and Eastern Utilities Associates in early 2000.

The combination of Niagara Mohawk and National Grid more than doubles the size of National Grid's US operations with an electric customer base of approximately 3.3 million. On November 28, 2001, the merger moved closer to consummation when the PSC granted its approval. The Securities and Exchange Commission must now reach a separate decision.

The merger conditions adopted by the Commission include a reduction in Niagara Mohawk's annual electric delivery rates of about $152 million (approximately 8%) a year. This delivery rate reduction is distinct from the price of electricity itself (the supply cost). For a residential customer receiving both delivery and supply from Niagara Mohawk, the proposed 8% delivery rate reduction will result in an overall bill reduction of about 4.6% on average based on the current supply price of electricity. The new rates will take effect following the completion of the merger.

Further, the lower electricity delivery rates will be stabilized under the merger plan for 10 years, subject to limited re-openers and adjustments for external events such as changes in statutory, tax or accounting requirements, of extraordinary events. The supply costs of electricity provided by the utility to residential and small commercial customers will be stabilized through contracts that hedge the price of electricity.

Other conditions of the merger include the extension of a gas delivery rate freeze, originally approved in 1996, through December 31, 2004, and expansion of gas and electric low-income customer services through the creation of a low-income rate discount program for qualifying customers. Economic development will be encouraged by providing discounts, incentives and other programs to small commercial and industrial customers designed to attract, expand and retain businesses in Niagara Mohawk's service territory.

National Grid will also implement a program to encourage marketing of renewable energy, and the rules will be modified to facilitate development of distributed generation. A comprehensive service quality assurance program will be established to ensure that Niagara Mohawk maintains quality customer service and service reliability. The rights of Niagara Mohawk's union employees will be preserved under the merger and the rights of the union to represent employees in future negotiations will be recognized. Under the Joint Proposal, all existing and legal and contractual protections of retiree's current pension and benefit programs remain in place.

On February 20, 2001, Energy East Corporation and RGS Energy Group, Inc. announced that their boards of directors have unanimously approved a merger agreement, under which all of the outstanding shares of RGS Energy would be exchanged for a combination of cash and Energy East stock. If approved, the combined company would be one of the largest, most diversified energy providers in the Northeast, serving nearly 3 million customers, including approximately 1.8 million electric customers, almost one million natural gas customers, and approximately 200,000 other retail energy customers. The combined company would have annual revenues of approximately $5 billion and nearly $10 billion in assets. Together, Energy East and RGS Energy, through their operating subsidiaries, would serve half of upstate New York.

STATUS OF ELECTRICITY INFRASTRUCTURES

Transmission

The 2001 Load & Capacity Report submitted by the NYISO indicates that there are 10,805 miles of transmission facilities in New York State.

These facilities are generally adequate to provide reliable electric system operations now and in the immediate future, but local transmission reinforcements may become necessary in the New York City and Long Island areas. In addition, there are system constraints that limit the amount of electric power that can be transmitted between regions within the State. In particular, there are limitations on the amount of power that can be moved from upstate to downstate, and into either New York City or onto Long Island from surrounding areas. Because the system is operated in such a manner that these constraints are not violated, reliability is not jeopardized by these constraints, but there are economic impacts as evidenced by the normally higher prices in downstate regions compared to upstate/western areas. New York's existing transmission system facilities, delineated by voltage class and circuit miles, are shown in Table 5. The internal interface limits within New York State are shown in Table 6.

TABLE 5

EXISTING TRANSMISSION LINE VOLTAGES (kV) AND CIRCUIT MILES						
Voltage	115 kV	138 kV	230 kV	345 kV	500 kV	765 kV
Miles	6023	711	1090	2660	5	314

TABLE 6

MAJOR INTERFACE LIMITS	
CENTRAL EAST	3,100 MW
DYSINGER EAST	2,850 MW
TOTAL EAST	6,500 MW
UPNY CONED	5,100 MW
WEST CENTRAL	2,350 MW
SPRBROOK/DUN SOUTH	4,700 MW

While the 2001 Load & Capacity Report mentioned only one new transmission line (a direct current line from Connecticut to Long Island) and the re-building of one 69- kV line to 138-kV operation (near Middletown), various other transmission projects are in the planning stages. While many of them would be for the sole purpose of connecting a new generator to the existing transmission system, many developers are proposing to build new merchant transmission lines that could provide new links to New York from New Jersey and other areas, including locations in the Canadian Maritime Provinces.[20] Studies of the impact of such facilities on the New York State and Northeast transmission grids are performed by power system engineers and reviewed by the NYISO for acceptability. After approvals are obtained following the NYISO procedures, developers can apply to the PSC for approval under Article VII of the Public Service Law. Whether or not such lines are built will depend in large part on assessments of the likely economic opportunities associated with such ventures and on the engineering and environmental reviews necessary under Article VII. The Article VII process continues to be an effective mechanism for ensuring that such projects are compatible with the environment and meet public needs.

New York State is electrically connected with surrounding states (Pennsylvania, New Jersey, Connecticut, Massachusetts, Vermont) and Canadian provinces (Ontario and Quebec). Because peak loads occur in winter in Quebec and to a lesser extent in Ontario, and in summer in New York State (and New England and PA-NJ), significant amounts of power frequently flow from Canada to New York in the summer and in the opposite direction in the winter. There are frequently significant power flows between New York and PA-NJ for a variety of reasons, including economic transactions (in both directions) and local area support (in both directions). Lesser amounts of power move back and forth with New England for those same purposes. Depending on the construction of new generating plants and new transmission lines in parts of the Northeast, changes in rules set by the FERC, and the possible development of a Northeast RTO (under FERC orders/approvals), it is likely that New York State will see increasing amounts of power transfers across its borders. Such increases would undoubtedly produce economic benefits to all concerned and should maintain or increase levels of reliability throughout the Northeast region. Table 7 provides information from the 2001 Load & Capacity Report on transmission capabilities between New York and its neighbors.

Efforts are underway to examine ways to increase the transfer limits both within New York State and with its neighbors. For example, NYPA has installed the Convertible Static Compensator (CSC), one of the world's most advanced transmission control devices, at its Clark Energy Center in Marcy (Oneida County). Completion of the first phase of project in 2001 increased transmission capacity by 60 megawatts on the heavily used lines between Utica and Albany and by 114 megawatts statewide. When fully

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[20] One such project, an underwater cable from Connecticut to Long Island, has been approved by the PSC, and a formal application for another cable, from New Jersey to Manhattan, has recently been filed.

operational in the summer of 2002, the CSC is expected to permit total increases, including those already achieved, of 120 megawatts on the Utica-Albany lines and 240 megawatts. NYPA is investing $35 million in the CSC, with additional funding for the $48 million project from EPRI, the electricity industry's science and technology development organization; Siemens Transmission and Distribution and about 30 electric utilities and independent system operators in the U.S., Canada and New Zealand. The CSC is the latest in a series of transmission control technologies known as FACTS (Flexible Alternating Current Transmission Systems) that have been developed by EPRI in cooperation with several electric utilities, including the Power Authority

Other efforts are underway to examine existing transmission lines and identify those that are good candidates for replacement of limiting elements that could increase their ratings. Because numerous in-state transfer limits are in a linear path from upstate to downstate, reinforcement of a single transmission interface may provide only marginal benefit because the next interface on that path will become the next most limiting element for power transfers. Therefore, to move more power from upstate to downstate may require reinforcements over most of the path, not just reinforcing a single weakest link. Nevertheless, there may be some efforts that will include new transmission line construction (whether overhead or underground). This would be both difficult and expensive and would have to be weighed against the advantages of building new generators in Metropolitan New York City instead.

TABLE 7

INTERPOOL INTERFACES TRANSFER CAPABILITIES	
OH-NYISO	2,325 MW
NYISO-OH	1,300 MW
PJM-NYISO	3,150 MW
NYISO-PJM	325 MW
NEPOOL-NYISO	1,600 MW
NYISO-NEPOOL	1,425 MW
HQ-NYISO	2,470 MW
NYISO-HQ	1,000 MW

Generation[21]

The landscape of power generation in New York State, and the country as a whole, has shifted dramatically in recent years - from a preponderance of generation owned by investor-owned utilities to the present situation where most of the generation in the State is privately owned. Generators now compete directly with each other to supply power. Those generators with access to inexpensive fuels and low cost, efficient technology will compete successfully. Older, inefficient technologies will likely be driven out of the market.

New York has also gone from an energy sector that was heavily dependent on coal and oil to a sector that is becoming increasingly dependent on natural gas. Almost all of the new generation proposed to be built in New York State is to be fired with natural gas. In addition, air quality requirements are reducing the operation of existing coal and oil facilities and leading to the retirement of some coal and oil plants. Most of the new combined-cycle gas fired power plants can achieve efficiencies of greater than 50%, as compared to approximately 33% for existing generation. In some applications, older gas and oil steam plants may be repowered into more efficient combined-cycle plants. While these higher efficiencies can mitigate, to some degree, the excessive demand for natural gas, a significant increase in the use of natural gas for electricity generation can still be expected.

Nuclear and hydro power generation, through license renewals, could remain available in terms of installed capacity and energy production over the planning period. On average, nuclear and hydro power generation combined account for over 30% of the State's total electricity requirements. The remaining 70% of the State's electric energy requirements would come mostly from coal, oil, and as previously noted, natural gas, with at least half coming from natural gas.[22]

The existing generation capacity mix, by fuel type, currently available in 2001 in New York State is shown in Table 8. As indicated, the current mix is balanced among many resources, but generally divided somewhat equally between the major sources--natural gas, oil, coal, and nuclear. Comparing the existing capacity fuel mix to what may exist in year 2021, also shown in Table 8, illustrates the likelihood of a significant shift toward natural gas. Almost all the new capacity will likely be fueled by natural gas unless

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[21] The status and expectations for additional generation were presented above in the "New York State Wholesale Market" section of this Electricity Resource Assessment.
[22] The capability assumptions used in this section of the Electricity Resource Assessment are described later in the "Load and Capability Analyses" section.

circumstances change significantly.[23] It is also important to note that most of the natural gas/oil generating facilities rely primarily on natural gas, as can be seen in Table 9.

TABLE 8

FUEL MIX CHANGES BASED ON CAPACITY OF INSTALLED UNITS		
Generation Fuel	**2001**	**2021**
Natural Gas	17%	30%
Oil	12%	10%
Natural Gas/Oil	31%	25%
Coal	10%	8%
Nuclear	14%	12%
Hydro	15%	13%
Other	1%	2%
TOTAL	100%	100%

Table 9 identifies the generation "energy mix" by fuel types. Both projected generation in gigawatt hours (GWh) and relative shares are shown in this table. It illustrates the State's growing reliance on natural gas as new combined-cycle units are installed to meet increased electric load demands. In 2002, 15.2% of the State's electric energy requirements are projected to be met by natural gas. In 2020, the use of natural gas is projected to reach 48% under the Reference Resource Case scenario described later in this Electricity Resource Assessment (unless competitive, economic and environmentally acceptable alternatives are developed and deployed in the interim). That percentage will likely increase if further gas-fired generation is installed or if additional existing non-gas-fired facilities are retired. The impact of this increasing dependence is discussed in the "Promoting Energy Industry Competition" issue paper. The Reference Resource Case also projects that generation from coal and oil sources will drop by one-half from

[23] The figure is based on the assumptions contained in the "Reference Resource Case" described later in the "Load and Capability Analyses" section of this Electricity Resource Assessments. If additional generation beyond the reference assumptions is built, one may assume that natural gas would be the fuel of choice based on current technology and fuel price considerations. Consequently, the mix would be shifted even further toward natural gas. These shifts toward dependency on natural gas raise significant issues that need to be addressed through the development and deployment of competitive, economic and environmentally acceptable alternatives (see "Promoting Energy Industry Competition" issue paper).

projected 2002 levels due in major part to New York's Acid Deposition Initiative program.

TABLE 9

REFERENCE RESOURCE CASE GENERATION BY FUEL TYPE FOR THE NEW YORK ELECTRICITY SYSTEM In GWh								
Generation Fuel	**2002**	**2003**	**2004**	**2005**	**2008**	**2012**	**2016**	**2020**
Natural Gas	24,706	25,628	34,115	54,902	63,684	72,844	79,818	88,129
Oil	24,774	24,509	19,212	9,384	6,388	5,612	4,482	4,280
Coal	29,380	29,295	28,030	17,934	17,271	17,131	16,698	16,858
Nuclear	32,563	32,559	32,662	32,558	32,657	32,666	32,659	32,649
Hydro	29,109	29,090	29,111	29,011	29,194	29,199	29,425	29,519
Other	2,866	3,004	3,150	3,283	3,429	3,430	3,429	3,430
Net Imports	18,799	19,463	18,747	19,371	18,311	17,018	14,723	8,165
TOTAL	162,207	163,549	165,028	166,442	170,934	177,543	181,234	183,030
REFERENCE RESOURCE CASE GENERATION BY FUEL TYPE FOR THE NEW YORK ELECTRICITY SYSTEM In % of Total								
Generation Fuel	**2002**	**2003**	**2004**	**2005**	**2008**	**2012**	**2016**	**2020**
Natural Gas	15.2%	15.7%	20.7%	33.0%	37.3%	40.8%	44.0%	48.2%
Oil	15.3%	15.0%	11.6%	5.6%	3.7%	3.2%	2.5%	2.3%
Coal	18.1%	17.9%	17.0%	10.8%	10.1%	9.6%	9.2%	9.2%
Nuclear	20.1%	19.9%	19.8%	19.6%	19.1%	18.4%	18.0%	17.8%
Hydro	17.9%	17.8%	17.6%	17.4%	17.1%	16.4%	16.2%	16.1%
Other	1.8%	1.8%	1.9%	2.0%	2.0%	1.9%	1.9%	1.9%
Net Imports	11.6%	11.9%	11.4%	11.6%	10.7%	9.6%	8.1%	4.5%
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Based on these and alternative projections of future capacity, and through the use of an electricity production simulation model, the inference is that, over time, the environmental impact of emissions from generation in New York State will significantly decline.[24] Table 10 presents the projected SO_2, NO_x, and CO_2 emissions that may be expected over the planning period, using the Reference Resource Case described later in this Assessment.

TABLE 10

NEW YORK ELECTRICITY SYSTEM PROJECTED EMISSIONS FOR THE REFERENCE RESOURCE CASE								
Emission (000's tons)	**2002**	**2003**	**2004**	**2005**	**2008**	**2012**	**2016**	**2020**
Annual $S0_2$	401.6	400.0	365.9	163.4	137.8	134.2	126.5	127.0
Annual $N0_x$	116.3	113.9	95.9	48.9	44.3	48.2	51.2	55.7
5-Month $N0_x$	45.9	43.7	38.4	22.7	21.6	23.9	25.1	26.4
Annual $C0_2$	68,293	68,565	65,617	52,370	52,437	55,836	58,016	61,557

The projected drop in SO_2 and NO_X emission between 2004 and 2008 is due to the full implementation of the State's Acid Deposition Initiative program, which seeks to limit sulfur emissions to one-half of levels currently authorized under the Federal Clean Air Act and also reduce NO_X emissions to annual rates specified as expected five month targets rates under the Ozone Transport Region control program. SO_2 emission targets are substantially achieved in the Reference Resource Case. NO_X is more significantly reduced. The attainment of emission goals is very dependent upon new gas-fired combined-cycle units being added to the New York electricity system and trading among regional electric systems. Further, results are strongly dependent on adequate supplies of natural gas to fuel these new units as well as existing units that increase their use of natural gas as an emission compliance strategy.

Table 11 refines the Statewide emission data for the Reference Resource Case to show emission values for three ozone regions established for the Northeast Ozone Transport Program within New York. Of particular interest in Table 11 is the change in CO_2 emissions (which is a direct function of the quantity of fossil fuel consumed to produce electricity) between 2002 to 2020, revealing the extent that generation within the State has shifted from the upstate to the downstate region. This emission shift reflects the current preference for new generation to seek locations close to load centers in order to avoid transmission congestion associated with a more remote site.

[24] The Article X and SEQRA processes for new generation proposals will examine environmental impacts to ensure that all are minimized or mitigated. To the extent that alternatives to use of natural gas and oil are developed and deployed, the emissions should likewise decline, assuming the alternatives provide equivalent or better environmental characteristics.

TABLE 11

NEW YORK ELECTRICITY SYSTEM PROJECTED EMISSIONS BY OZONE REGION						
	Inner Zone (Downstate)		Outer Zone (Upstate)		Northern Zone (Northern NY)	
Emission (000's tons)	**2002**	**2020**	**2002**	**2020**	**2002**	**2020**
Annual SO_2	85.1	8.5	315.9	117.0	0.0	0.0
Annual NO_x	41.8	25.0	73.2	28.9	1.2	1.2
5 Month NO_x	18.7	12.2	26.6	13.6	0.5	0.5
Annual CO_2	30,664	35,032	36,826	25,532	694	708

The analyses presented here indicate that sufficient generation will likely be available to meet reliability needs throughout the planning period, but additional generation and load reduction would be beneficial. Absent a substantial change in fuel mix or technology, however, the State will likely become more and more dependent on natural gas, which is a critical issue that needs to be addressed. The next three subsections examine the direction and magnitude of change that could occur if some elements of the Reference Resource Case are modified. Three alternative sensitivity scenarios are presented.

Low Load Sensitivity Scenario. This sensitivity scenario alters the load input by utilizing the "Low Load" forecast rather than the "Outlook" forecast (See "Electricity Load and Price Forecasts" section). The "Low Load" forecast has energy requirements that are 1% to 4% below the "Outlook" forecast during the first half of the assessment period and 4% to 6% below the "Outlook" forecast in the final ten years of the assessment period. All supply assumptions in the Reference Resource Case remain unchanged. This sensitivity is not meant to identify a specific cause of lower electric demand, but it acknowledges the potential for lower electricity grid consumption, due to: reduced economic activity; a higher level of distributed generation penetration; and/or enhanced energy efficiency activities.

- **Wholesale Prices.** Relative wholesale prices (LBMPs in the NYISO lexicon) for electricity parallel those for the Reference Resource Case in all but one zone for all years in the sensitivity analysis. In operation of the system, the NYISO chooses the most economical mix of generation to meet projected demand. The last MW of generation accepted is the most expensive and establishes the price paid per MWh (the LBMP price). As load declines, wholesale prices would be expected to decline as the NYISO is able to meet demand with less expensive generation resources. Figures 1 and 2 depict the differences in relative prices between the Reference Resource Case and the Lower Load Sensitivity for both the West Zone and the Long Island Zone. In these figures, the LBMP values for the Lower Load Sensitivity are indexed, in constant year 2000 dollars, to the annual average price for the "West" zone established for the Reference Resource Case. The gap between prices in the Long Island Zone becomes more pronounced in later years as reduced on-Island load contributes to decreases in transmission congestion and provides more access to cheaper off-Island electricity sources. Lower demand for electricity would be expected to benefit consumers through lower wholesale prices, and negatively impact electric generation operators through lower electric sales revenues, especially New York State generation. This is because about 90% of the reduced electric consumption is accounted for through reduced in-State electric generation.

Figure 1

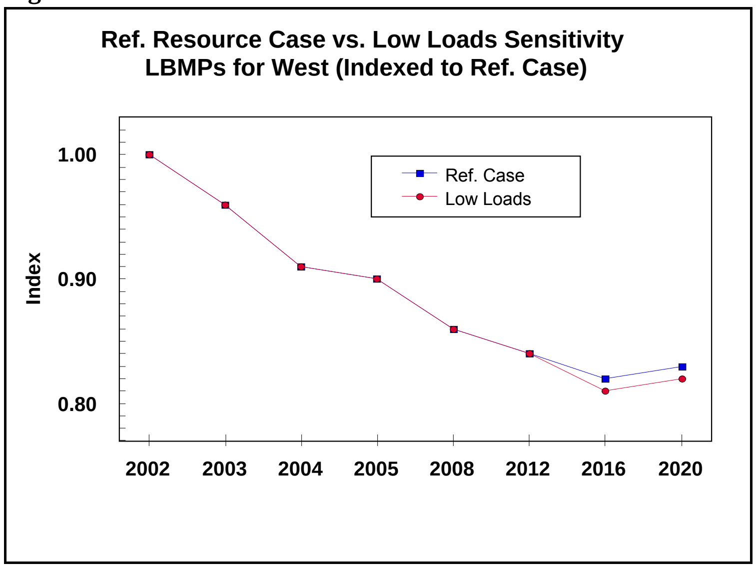
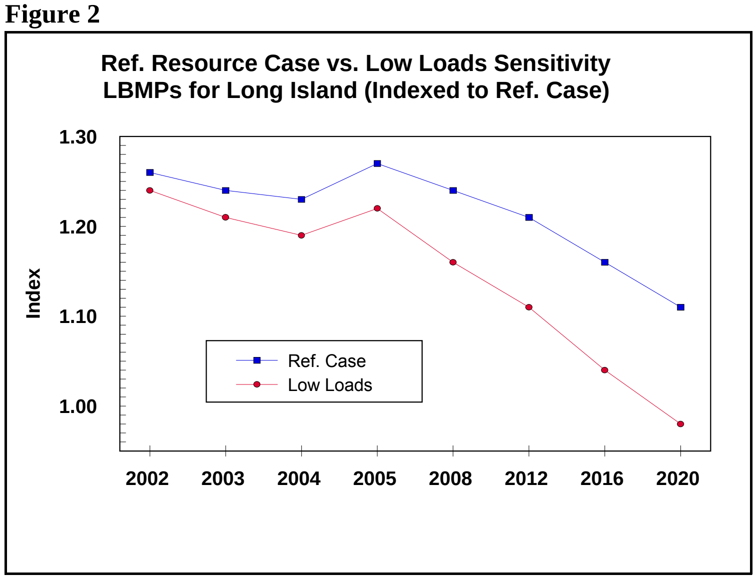


Figure 2



- **Generation Mix.** Table 12 compares the generation mix in the New York system between the two cases for the years 2002, 2008, and 2020. Reductions in the use of natural gas for electric generation accounts for the bulk of the decreased in-State generation.

Table 12

Comparison of Generation Mix Between the Reference Resource Case and the Lower Load Sensitivity						
Generation Fuel (in GWh)	2002		2008		2020	
	Ref. Case	Low Load	Ref. Case	Low Load	Ref. Case	Low Load
Natural Gas	24,706	23,501	63,684	60,566	88,129	80,691
Oil	24,784	24,181	6,388	5,295	4,279	2,396
Coal	29,380	29,328	17,271	17,160	16,858	16,492
Nuclear	32,563	32,563	32,657	32,657	32,649	32,649
Hydro	29,109	29,139	29,195	29,178	29,519	29,564
Other	2,866	2,866	3,429	3,429	3,430	3,430
Net Imports	18,799	18,617	18,311	18,189	8,165	6,201
Total	162,207	160,195	170,935	166,474	183,029	171,423
In % of Total						
Generation Fuel (in %)	2002		2008		2020	
	Ref. Case	Low Load	Ref. Case	Low Load	Ref. Case	Low Load
Natural Gas	15.2	14.7	37.3	36.4	48.2	47.1
Oil	15.3	15.1	3.7	3.2	2.3	1.4
Coal	18.1	18.3	10.1	10.3	9.2	9.6
Nuclear	20.1	20.3	19.1	19.6	17.8	19.0
Hydro	17.9	18.2	17.1	17.5	16.1	17.2
Other	1.8	1.8	2.0	2.1	1.9	2.0
Net Imports	11.6	11.6	10.7	10.9	4.5	3.6
Total	100.0	100.0	100.0	100.0	100.0	100.0

- **Emissions.** This decrease in New York State generation associated with the Lower Load Sensitivity results in decreased in-State emissions of NO_x, SO_2, and CO_2 as displayed in Figures 3, 4 and 5. The differences are not dramatic, although emissions reductions are more pronounced in later years.

Figure 3

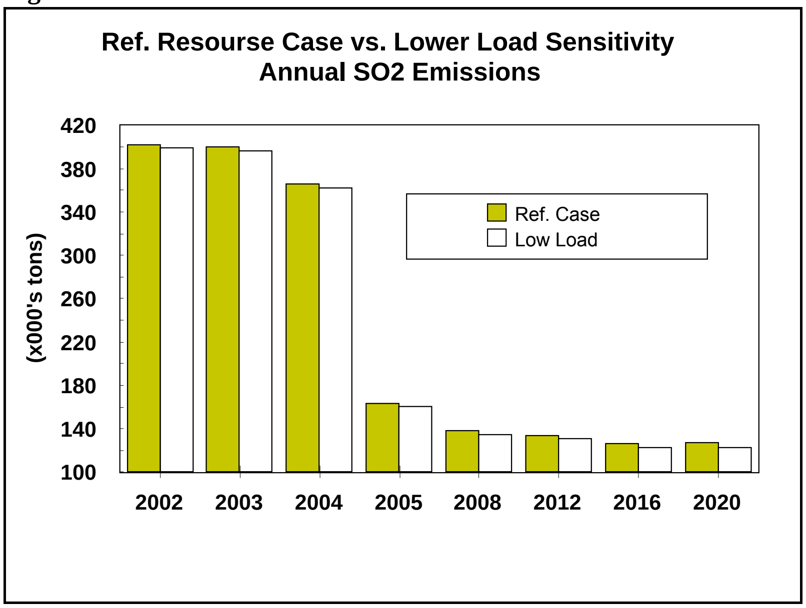
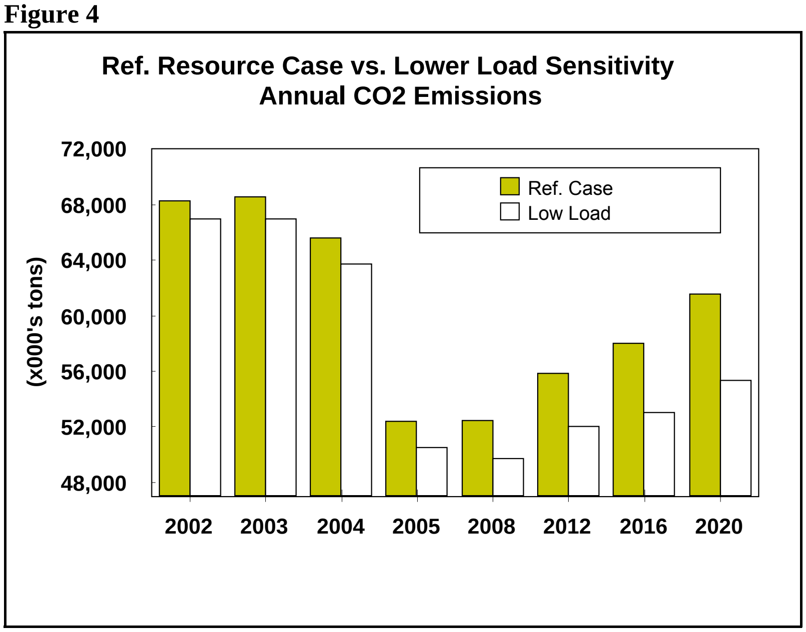
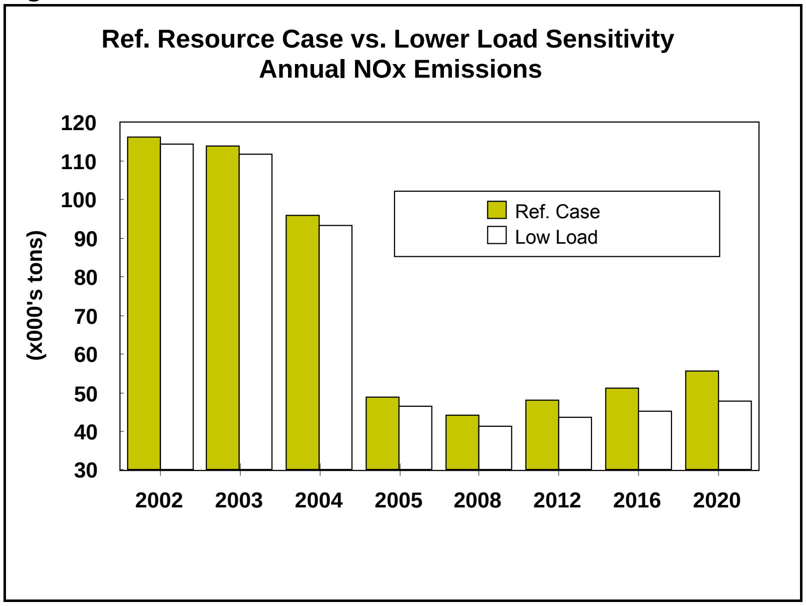


Figure 4



More Generation Sensitivity Scenario. The More Generation sensitivity scenario is used to evaluate the effects of more new generating capacity being added to the New York electricity system than anticipated in the Reference Resource Case. Overall, this scenario strives to add capacity at the pace needed to reach a reasonably high reserve margin[25] level (30%) for the New York electricity system. The More Generation sensitivity assumes 9,671 MW of new generation, which includes the 5,171 MW of new Article X capacity included in the Reference Resource Case and another 4,500 MW of new Article X capacity to be added at a pace that produces system reserve margins at approximately 30%.

Figure 5



Most of the new generating capacity (7,371 MW) is assumed to be added in the Hudson River region and in southeastern New York. This area is east of the current constraining transmission interfaces in upstate New York. The remainder (2,300 MW) is assumed to be added in upstate New York, west of the constraining interfaces. Specifically, for the More Generation sensitivity, one third of the additional 4,500 MW of new generation is added in the upstate New York area, another third is added in the Mid-Hudson/NYC area, and one third is added in the Long Island area.

- **Wholesale Prices.** Wholesale prices for the Reference Resource Case and the More Generation sensitivity are the same up to 2005 because total generating capacity is identical. Starting in 2005, the addition of new capacity causes wholesale prices to decline. By 2020, the price indexes have declined by about

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[25] Reserve margins requirements (also known as installed reserve margin or system reserve margin requirements) are established by the New York State Reliability Council. The purpose of the reserve margin is to ensure reliability within the control system, that is, a system in which the probability of a customer outage due to lack of supply will be no greater than once in any 10-year period. The reserve margin is determined annually on February 1st, 90 days before the capability year beginning May 1. The reserve margin is defined as the ratio of required excess generation capacity to projected peak load demand within the control area. Currently, the reserve margin requirement for the New York Control Area has been established at 18%.

5% for all transmission zones other than the Long Island area. For the same period, however, the Long Island area experiences a significant wholesale price index decrease which by 2020 is approximately 21% below Reference Resource Case levels. These trends are displayed in Figures 6 and 7 for the Western and Long Island transmissions zones. Historically, Long Island has had the highest average wholesale prices in New York State. The additional generating capacity for this sensitivity scenario lowers the Long Island wholesale price through the combined effects of more on-Island supply and reduced transmission congestion to the Long Island area, which allows cheaper imports to flow into the on-Island market.

Figure 6

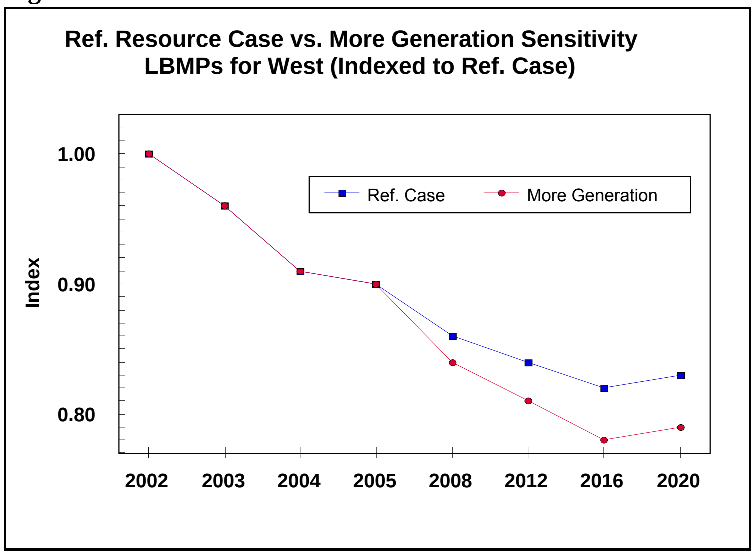
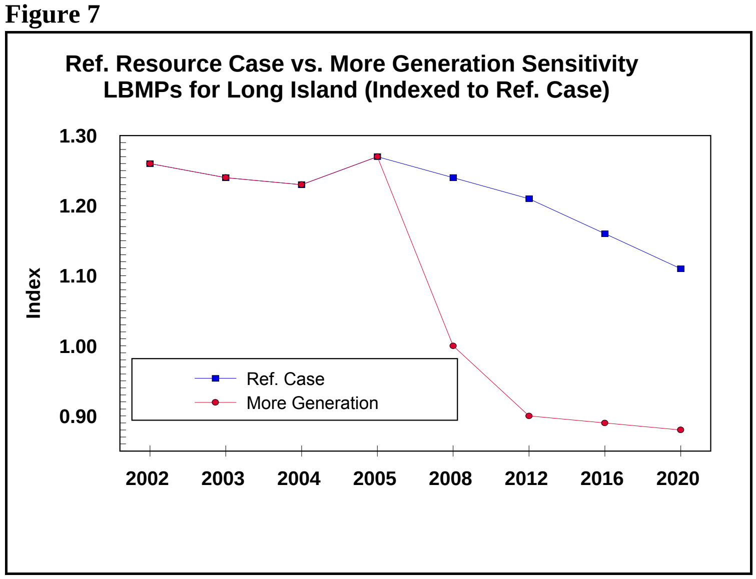


Figure 7



- **Generation Mix.** Table 13 summarizes the generation mix from 2008 - 2020 for both the Reference Resource Case and the More Generation sensitivity. The More Generation scenario shows a greater reliance on natural gas. By 2020, for the More Generation Scenario Case, 55% of New York's generation would be from natural gas, compared to a 48% dependency for the Reference Resource Case. Additionally, the More Generation sensitivity results in significantly reduced imports of electricity from near-by systems. In 2020, the More Generation sensitivity has lower coal and residual oil-based generation than the Reference Case, with a decrease of 10% and 67%, respectively.

Table 13

Comparison of Generation Mix Between the Reference Resource Case and the More Generation Sensitivity For Select Years								
Generation Fuel (in GWh)	2008		2012		2016		2020	
	Ref. Case	More Gen.	Ref. Case	More Gen.	Ref. Case	More Gen.	Ref. Case	More Gen.
Natural Gas	63,684	68,471	72,488	81,711	79,818	91,705	88,129	100,439
Oil	6,388	3,872	5,612	1,974	4,482	1,137	4,280	1,416
Coal	17,271	16,924	17,131	16,158	16,698	15,191	16,858	15,158
Nuclear	32,657	32,657	32,666	32,666	32,659	32,659	32,649	32,649
Hydro	29,194	29,439	29,199	29,664	29,425	29,849	29,519	29,871
Other	3,429	3,430	3,430	3,428	3,429	3,429	3,430	3,430
Net Imports	18,311	16,142	17,018	11,941	14,723	7,263	8,165	66
Total	170,934	170,934	177,543	177,543	181,234	181,234	183,030	183,030
In % of Total								
Generation Fuel (In %)	2008		2012		2016		2020	
	Ref. Case	More Gen.	Ref. Case	More Gen.	Ref. Case	More Gen.	Ref. Case	More Gen.
Natural Gas	37.3	40.1	40.8	46.0	44.0	50.6	48.2	54.9
Oil	3.7	2.3	3.2	1.1	2.5	0.6	2.3	0.8
Coal	10.1	9.9	9.6	9.1	9.2	8.4	9.2	8.3
Nuclear	19.1	19.1	18.4	18.4	18.0	18.0	17.8	17.8
Hydro	17.1	17.2	16.4	16.7	16.2	16.5	16.1	16.3
Other	2.0	2.0	1.9	1.9	1.9	1.9	1.9	1.9
Net Imports	10.7	9.4	9.6	6.7	8.1	4.0	4.5	0.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

- **Emissions**. The fuel shifts between the two cases resulted in reduced air emissions which is summarized in Figures 8, 9, and 10. By 2020, the annual SO_2, NO_x, CO_2, and 5-month NO_x have been reduced by 13%, 35%, 5%, and 31%, respectively. Within the New York electricity system, there is a shift in the regional nature of emissions into the air, with southeastern New York realizing significant reductions in all the emissions categories.

Figure 8

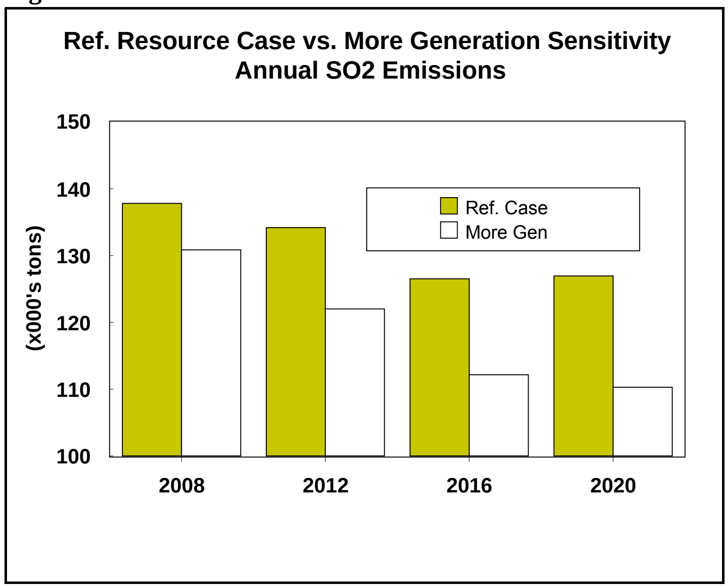
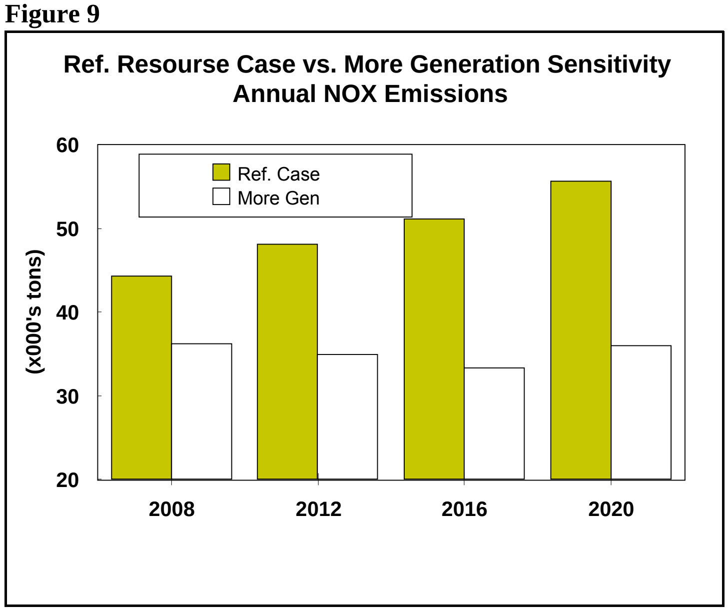


Figure 9



Lower Trade Sensitivity Scenario. The Reference Resource Case assumes that the New York electricity system participates in a robust regional electricity trading program with other near-by electricity systems. The high level of electricity trading among systems is reflecting one of the primary objectives of electricity deregulation efforts and, potentially, the benefits that will be enhanced through development of an appropriately structured RTO. This sensitivity scenario explores the consequences of decreasing significantly the level of inter-regional trading among the three major electricity systems in the Northeast. The objective of this sensitivity is to identify the value to the New York electricity system of enhanced and unimpeded electricity transactions with other supply systems.

- **Wholesale Prices.** Average annual customer wholesale price indexes rise significantly in every year and each zone in this sensitivity scenario relative to the Reference Resource Case. Price increases are most extreme in the early years, but the differences narrow in the later years of the assessment period. Figures 11 and 12 display the price differences in the "New York City" and "West" zones between the Reference Resource Case and the Lower Trade scenario.

  New York State electric consumers should experience lower wholesale electric prices due to increased regional electricity trading. Conversely, owners of in-State generation resources would gain higher revenues from electric sales if transactions from outside the State are reduced. In this sensitivity, LBMP values in New York increase and prices in the Pennsylvania-New Jersey-Maryland and New England systems decrease.

Figure 10

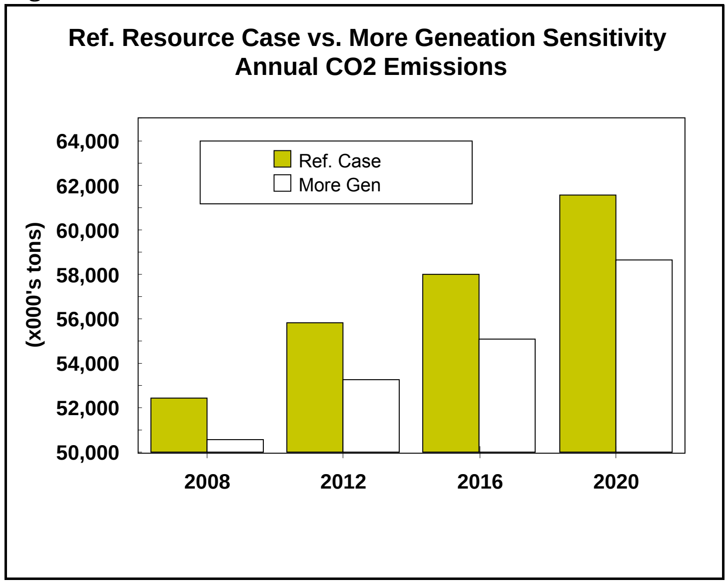
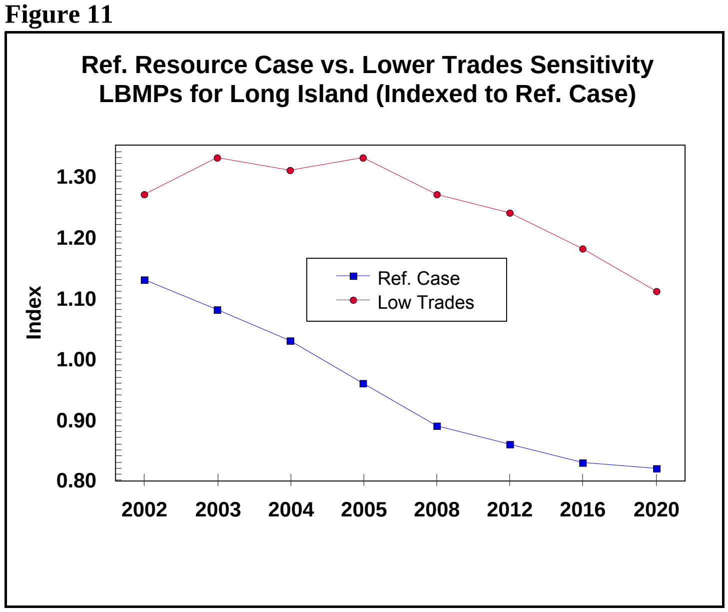


Figure 11



- **Generation Mix.** Due to the constraint on outside electricity supply in this sensitivity, in-State generating resources produce 15,192 additional GWhs of electricity in 2002 in this sensitivity compared to the Reference Resource Case. Most of the additional electric generation in this sensitivity is provided by natural gas and residual oil in the early years and then primarily by natural gas in the later years. Table 14 compares the generation mix in New York State for the two cases for the years 2002, 2008, and 2020. Differences in the figures are accounted for in the differences in net imports between the two cases, because load is held constant.

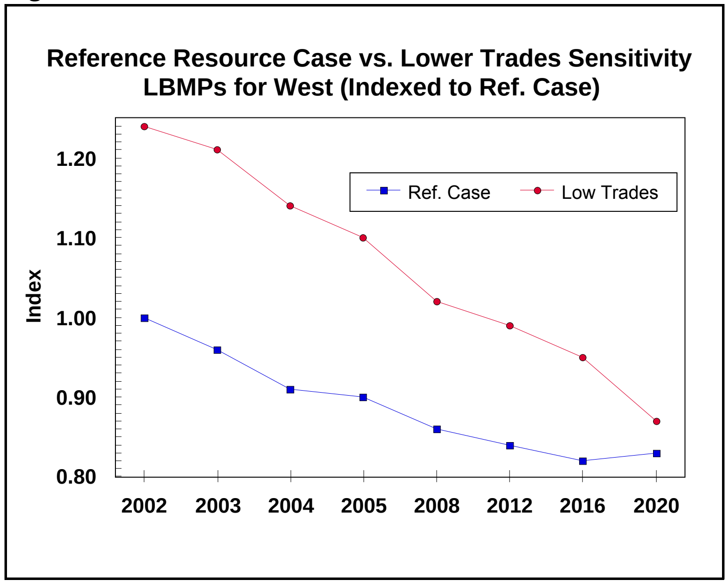
Table 14

Comparison of Generation Mix Between the Reference Resource Case and the Lower Trades Sensitivity						
	2002		**2008**		**2020**	
Generation Fuels	**Ref. Case**	**Low Trades**	**Ref. Case**	**Low Trades**	**Ref. Case**	**Low Trades**
Natural Gas	24,706	31,134	63,684	76,286	88,129	90,738
Oil	24,784	32,912	6,388	7,424	4,279	4,319
Coal	29,380	30,017	17,271	18,954	16,858	17,210
Nuclear	32,563	32,563	32,657	32,657	32,649	32,649
Hydro	29,109	29,107	29,195	29,195	29,519	29,519
Other	2,866	2,866	3,429	3,429	3,430	3,430
Net Imports	18,799	3,607	18,311	2,990	8,165	5,165
Total	162,207	162,207	170,934	170,935	183,029	183,030
In % of Total Generation						
	2002		**2008**		**2020**	
Generation Fuels (in %)	**Ref. Case**	**Low Trades**	**Ref. Case**	**Low Trades**	**Ref. Case**	**Low Trades**
Natural Gas	15.2	19.2	37.3	44.6	48.2	49.6
Oil	15.3	20.3	3.7	4.3	2.3	2.4
Coal	18.1	18.5	10.1	11.1	9.2	9.4
Nuclear	20.1	20.1	19.1	19.1	17.8	17.8
Hydro	17.9	17.9	17.1	17.1	16.1	16.1
Other	1.8	1.8	2.0	2.0	1.9	1.9
Net Imports	11.6	2.2	10.7	1.7	4.5	2.8
Total	100.0	100.0	100.0	100.0	100.0	100.0

- **Emissions.** The increased in-State generation associated with the Lower Trade Sensitivity causes increased in-State emissions of NO_x, SO_2, and CO_2. Figures 13, 14, and 15 contrast the cases for SO_2, NO_x, and CO_2 emissions.

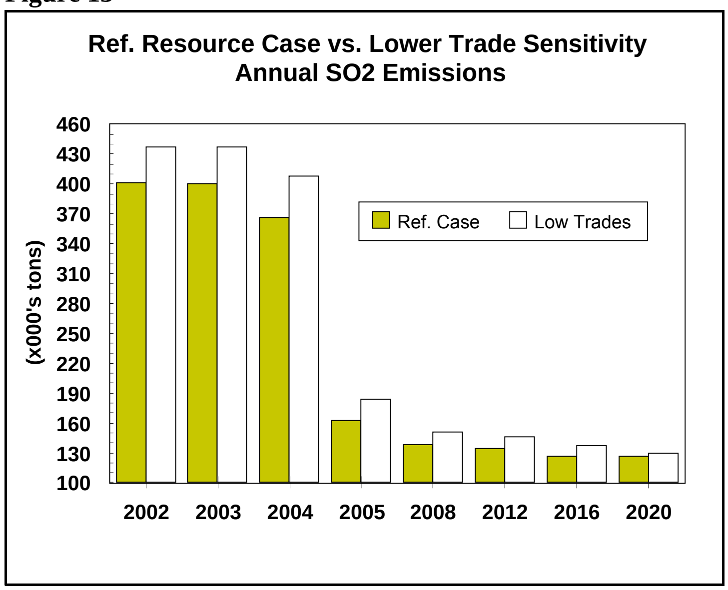
In the Lower Trade Sensitivity, the New York system experiences difficulty in meeting SO_2 emission reduction objectives outlined in the Acid Rain Deposition Reduction Initiative. A review of all three Northeast electricity system emission profiles, however, indicates that the overall combined regional air emissions are essentially identical for the Reference Resource Case and the Lower Trade sensitivity.

Figure 12



<u>System Operations</u>

Figure 13

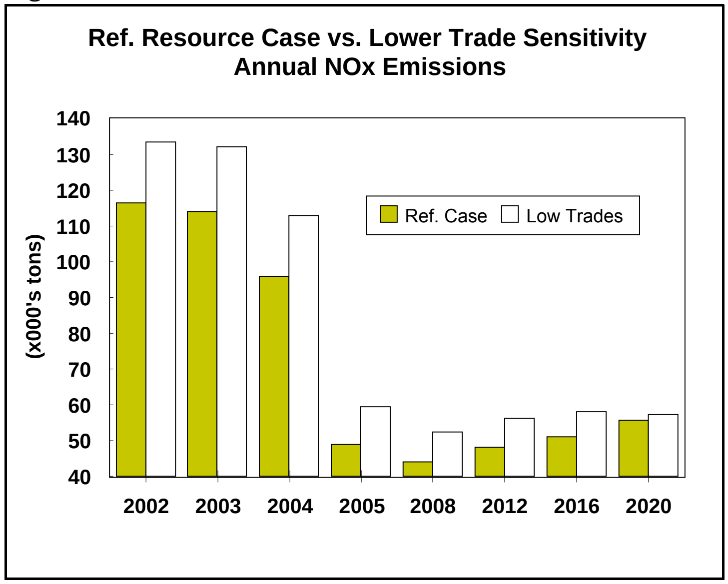


The NYISO has the responsibility for the reliable and lowest cost operation of the New York State power system. The NYISO operates the system according to rules and procedures approved by the FERC, which allow it to receive bids from generators and loads and to schedule generators according to the lowest cost combination for the State. This least cost scheduling is done both for a day-ahead commitment of generators and for the real time operation of the system within the constraints of maintaining system reliability at all times.

The NYISO continuously coordinates its operations with each of its neighboring control areas, including New England, PJM (Pennsylvania, New Jersey, Maryland), Quebec, and Ontario. Power flows are scheduled in advance to accommodate economically desirable transactions, and adjustments are made in real time to maintain reliability.

Reliability criteria for the operation of the New York State system are developed and monitored by the New York State Reliability Council. This organization has representatives from each of the transmission owning utilities, other market participants, and independent members. Each of the local reliability rules must be approved by this Council, which also has statewide reliability responsibilities, such as determining the statewide installed generation reserve margin necessary to meet nationally accepted reliability criteria.

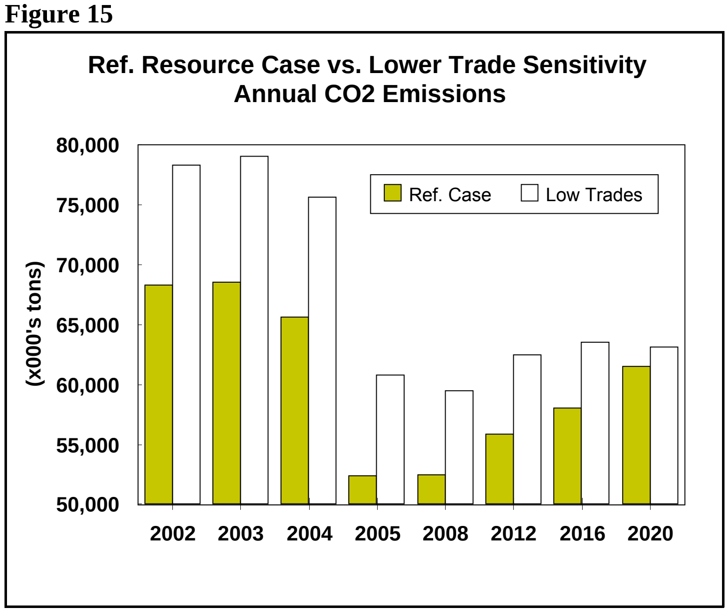
Figure 14



<u>Infrastructure Security</u>.

Governor Pataki created the Office of Public Security in October 2001. That office is charged with developing a comprehensive statewide anti-terrorism strategy, including an assessment of the vulnerability of critical infrastructures to terrorist attack. That vulnerability assessment will include nuclear and other power plants, telecommunication systems, gas pipelines, and water systems. Strategies designed to protect these facilities from attack will be developed, and plans will be augmented to provide rapid restoration of utility service in the event of terrorist attack.

Figure 15



Concurrently, the Department of Public Service established the Security Assessment Team to assess regulated utility efforts to maintain system reliability and security. This team is coordinating its activities with the Office of Public Security. The objective of the Department's team is to analyze each utility's security plans, policies, and procedures relating to the vulnerability and protection of critical utility operational and administrative facilities. The team will also be reviewing longer-term security plans and strategies, and the utilities' abilities to accomplish timely restoration, especially in the presence of biological and chemical agents.

Load and Capability Analyses

Load and capability analyses are basic tools used in long-range electric system planning to relate the projected customer peak load each year during a given planning period to the resources (both supply and demand reduction techniques) expected to be available.[26] To the extent projected resources exceed forecast peak load requirements, excess resources provide a reserve margin to cover equipment outages and failures that might occur during the system peak period. The New York State Reliability Council reviews the New York system annually to determine the necessary size of the reserve margin to maintain a reliable system, that is, a system in which the probability of a customer outage due to lack of supply will be no greater than once in any 10-year period. Currently, the reserve margin is set at 18%. While such a resource margin does not guarantee system reliability (or that there will not be problems in specific regions of the state), the greater the margin, the less the chance of outages. The smaller the margin, the greater the need for system operators to monitor the system closely and use procedures available to them to maintain system integrity. The greater the margin, the smaller the concern for system reliability and the greater the competitive pressures on generation owners to operate efficiently. From a competitive wholesale market perspective, as reserves diminish or cease to exist, wholesale prices will tend to increase. Conversely, as reserves increase, supply will exceed the required demand and wholesale prices will tend to decline.

Table 15 shows the results of a statewide load and capacity analysis based on the assumption that no new generation will be added to the system throughout the planning period beyond that already being planned for the 2002 summer period and the 210 MW of renewables to be installed through the System Benefit Charge programs over the next several years. As the table indicates, system capability would likely exceed demand throughout the planning period, as some reserves would exist, but after 2003 they would

[26] The statewide analyses presented in this section do not attempt to address reliability issues on a zonal basis or within load pocket areas.

not be sufficient to meet the 18% level currently deemed appropriate for ensuring reliability, nor would they ensure that economic service could be provided in the State. The 1998 State Energy Plan projected that new resources would be required sometime in the 2001-2005 time frame to maintain system reliability. While the reserve requirement was set at 22% at that time, rather than the current 18%, this updated analysis results in a finding that additional resources are needed for Statewide system reliability purposes.

TABLE 15

PROJECTED RESERVE MARGINS WITH NO NEW RESOURCES										
2001	**2003**	**2005**	**2007**	**2009**	**2011**	**2013**	**2015**	**2017**	**2019**	**2021**
19.5%	17.7%	13.6%	13.2%	9.8%	7.7%	5.6%	4.8%	4.9%	4.2%	4.1%

A more likely scenario is that some new generation will be built during the next few years to raise the margin above 18%. Accordingly, Table 16 below provides the results of a statewide load and capability analysis using a more reasonable set of minimum resource assumptions and three different forecasts of peak system loads (low-. mid-, and high-range forecasts, as set forth in the "Electricity Load and Price Forecasts" section in this Electricity Resource Assessment). The resources assumed in this analysis are those that currently exist or might reasonably be expected to be available as a minimum during the planning period. Of course, many other resource scenarios might also be considered, and several such alternatives are discussed later. Further, the existence of an appropriate statewide reserve level does not necessarily ensure that adequate resources exist in every area of the state. It is clear, however, that the greater the supply of generation in relation to demand, within a reasonable range, the better off consumers will likely be in terms of both price and reliability.

TABLE 16

PROJECTED RESERVE MARGINS WITH NEW RESOURCES											
Forecast	**2001**	**2003**	**2005**	**2007**	**2009**	**2011**	**2013**	**2015**	**2017**	**2019**	**2021**
Low-Range	20.9%	21.3%	32.3%	33.0%	29.8%	28.3%	26.6%	26.6%	27.7%	27.8%	28.7%
Mid-Range	19.5%	19.5%	29.7%	29.7%	25.8%	23.5%	22.1%	20.2%	20.3%	19.5%	19.3%
High-Range	17.7%	17.3%	26.1%	25.4%	21.0%	18.1%	15.2%	13.7%	13.1%	11.5%	10.6%

As can be seen in Table 16 above, the reserve margins over the planning period might be as low as 10.6% or as high as 33%, depending on the load forecast assumed. The data based on the mid-range (or “outlook”) forecast, using the Reference Resource Case, shows that reserve margins throughout the planning period will likely exceed the 18% level. Reserves might even approach the 30% level in the 2005 – 2007 time period, but they would decline over time as load increases and no new generation or additional load reduction occurs under this specific scenario.

Higher reserve levels might be achievable if additional generation or load management resources become available or if the peak load tends toward the low-range forecast. Lower reserve levels might occur if the generation assumed in the reference capability case is not constructed or if peak loads tend toward the high-range forecast.

As previously noted, the Reference Resource Case used here is based on current conditions and a set of future expectations that one could reasonably make at this time. In particular, the reference case assumes:

1) Demand reductions described in the forecast section of this Assessment will occur;

2) Most of the plants previously certified under Article X of the Public Service Law will be built and placed into operation (2,326 MW net). It should be noted, however, that the existence of a certificate to construct and operate a generation plant does not guarantee that the plant will in fact be built and operated.

3) All other plants that have not been certified that have complete Article X applications and that are proposed to be built at existing sites and that are coupled specifically with retirement of less efficient, more polluting equipment, will be built and placed into operation (increases of 710 MW in 2005, and 170 MW in 2006, for a total of 880 MW net). This assumption should not be interpreted as any prejudgment of the Article X process; it is simply an assumption for the reference resource case.

4) Approximately 2,000 MW of capacity will become available from some, but not all, of the other Article X projects with completed applications (about 950 MW in 2004 and about 1,050 MW in 2005; again, no prejudgment is intended here as to which of the proposals will be approved, if any).

5) Approximately 630 MW of capacity from miscellaneous non-Article X generation will become available in 2002 and 2003 (500 MW in 2002 and 130 MW in 2003).

6) Approximately 210 MW of additional renewables will be added between 2002 and 2006 through use of the System Benefit Charge program.

7) Retirements or deactivation of 60 MW of generation in 2004 and 570 MW in 2005 will occur.

8) Relicensing of all operating nuclear units will occur.

9) Firm purchases and sales, as described in the ISO's 2001 5-112 filing with the New York State Energy Planning Board, will take place.

10) Other additions, especially renewable generator and demand reductions, are probable but are not assumed in this conservative case.

Other cases might also be considered to evaluate alternative assumptions. Table 17 shows the projected reserve margins over the planning period for the several alternative load and capability cases described below, all based on the mid-range peak load forecast.

Alternative Load and Capability Case 1. – Same as the reference resource case except assumes that all Article X projects with completed applications are approved and built (this case adds 925 MW more in 2004 and 1,040 MW more in 2005). In this scenario, the reserve margin would reach as much as 36% by 2006 and would gradually decline to about 25% at the end of the planning period.

Alternative Load and Capability Case 2. – Same as the reference case except assumes retirement of nuclear units at the ends of their current license periods. (Reserve margins

would drop below the desired 18% level in 2013 such that over the planning period about 3,400 MW of additional resources would be needed to maintain reliability.)

Alternative Load and Capability Case 3. – Same as the reference case except assumes retirement of about 4,500 MW of additional generation during the planning period.

Alternative Load and Capability Case 4. – Same as the reference case except assumes retirement of about 8,400 MW of additional generation by the end of the planning period.

TABLE 17

PROJECTED RESERVE MARGINS FOR ALTERNATIVE SCENARIOS

Scenario	2001	2003	2005	2007	2009	2011	2013	2015	2017	2019	2021
Case 1	19.5%	19.5%	35.8%	35.8%	31.8%	29.3%	26.8%	25.8%	26.0%	25.1%	25.0%
Case 2	19.5%	19.5%	29.7%	29.7%	24.0%	20.2%	17.8%	11.8%	9.0%	8.3%	8.2%
Case 3	19.5%	19.5%	29.5%	29.5%	25.4%	22.0%	18.2%	15.3%	14.1%	10.2%	7.0%
Case 4	19.5%	19.5%	29.5%	29.5%	23.5%	18.7%	14.9%	6.9%	2.9%	-0.9%	-4.1%

The data in Tables 16 and 17, and the load and capability analyses supporting them, show that under the mid-range forecast, system reliability (*i.e.*, assuming continuation of the 18% requirement) can generally be maintained on a statewide basis throughout the planning period if the assumptions of the reference case are fulfilled and especially if any unit retirements are replaced by new resources. This means that at least 4,800 MW of added capability, including capability from generating plants already approved and new resources from plants not yet approved and/or permanent load reduction, is required after 2002.[27] If existing generation, above the 570 MW assumed in the Reference Case, is retired, corresponding additions or peak load reduction would also be needed at some time during the planning period (for example, see Alternate Load and Capability Cases 2, 3, and 4). Also, if load grows at a higher rate than assumed by the mid-range forecast, the additional resources will be needed sooner. On the other hand, if load grows at a slower rate (for example, see Alternate Load and Capability Case 1), resources beyond those already approved may not be required for reliability purposes, except as replacements when retirements occur, as necessary, or to address market power concerns.

ELECTRICITY LOAD AND PRICE FORECASTS

Approach

The long-range forecasts (*i.e.*, through 2020) of electricity demand and prices were developed from forecasts prepared by the Department of Energy's Energy Information Administration (EIA) and captured in its *Annual Energy Outlook 2001*. New York electricity demand and price forecasts were generated by applying growth rates from EIA's Middle Atlantic regional forecasts to base New York State and EIA numbers. The methodologies used to develop the State Energy Plan projections of demand and prices for electricity are described in greater detail in the Forecast Summary (Section 3.1).

Load

Growth in peak demand, depicted in Figure 16, is projected to be between 0.32% and 1.05% per year, with an Outlook Case growth rate of 0.68% per year.
Growth in total electricity requirement, depicted in Figure 17, is projected to be between 0.37% and 1.10% per year, with an Outlook Case growth rate of 0.73% per year.

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[27] As previously noted, the Reference Resource Case assumes that at least 5000 MW of new generation can reasonably be expected to be added between 2003 and 2006.

Retail Prices (Delivery and Commodity)

During the past several years, the State's electric and gas customers have received the benefits of significant reductions in their electric and gas delivery rates. Since 1996, the New York Public Service Commission (PSC) has issued orders that have so far resulted in cumulative customer rate reductions of about $3.4 billion, with at least that same amount of further cumulative savings to be available over the next several years. The Long Island Power Authority has similarly provided rate reductions for its customers in the amount of about $2 billion through 2001. In addition, further customer savings ($152 million per year) will result from the recent PSC Order determining electric revenue requirements for the Niagara Mohawk Power Corporation, and customer savings might also result when the on-going New York State Electric and Gas Corporation/Rochester Gas and Electric merger proceeding is completed.

Figure 16

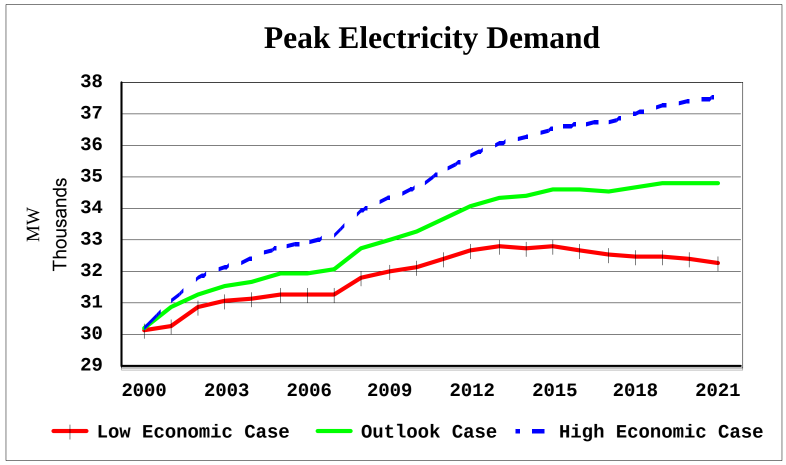
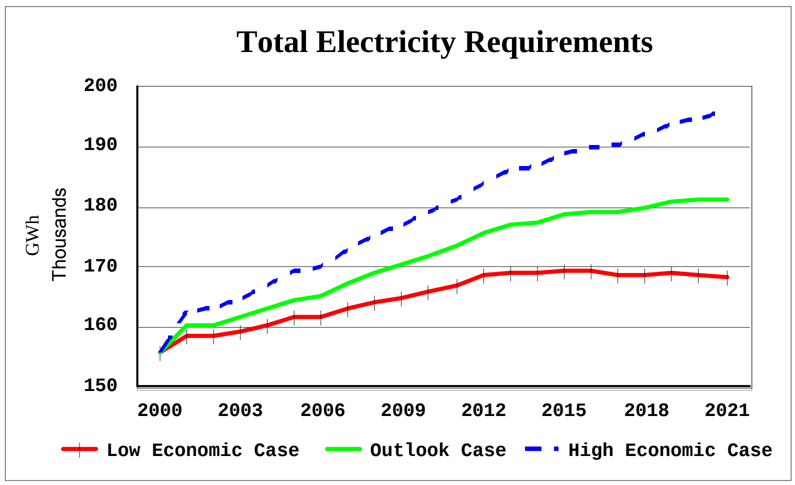


Figure 17



This section of the Electricity Resource Assessment forecasts average electricity prices over the planning period for both the regulated delivery and competitive commodity components of customer bills.

Near-term average electricity prices, depicted in Figure 18, are projected to decrease by 5.30% per year in the Low Economic Case, 5.03% per year in the Outlook Case, and 4.85% per year in the High Economic Case, in constant 2000 dollars, for the next five years.

Long term average electricity prices, depicted in Figure 19, are projected to decrease in constant 2000 dollars by 1.71% per year in the Low Economic Case, 1.36 % per year in the Outlook Case, and 1.42% in the High Economic Case.

Figure 18

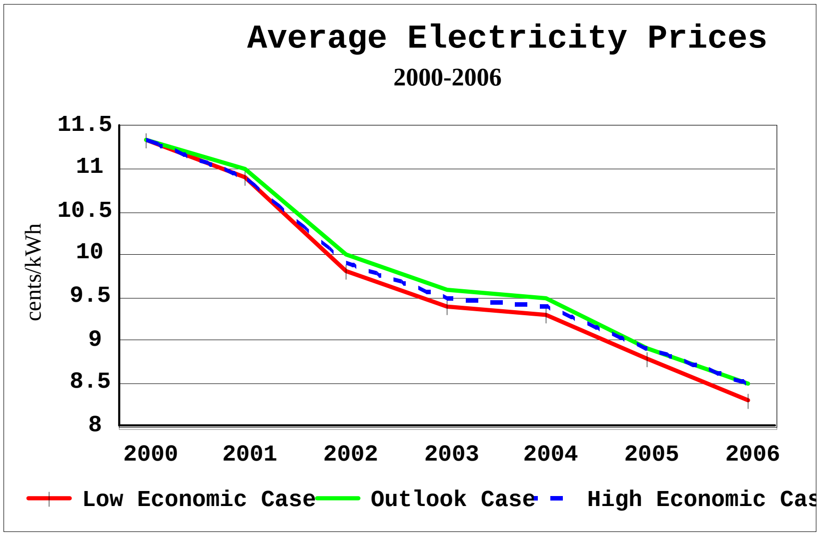
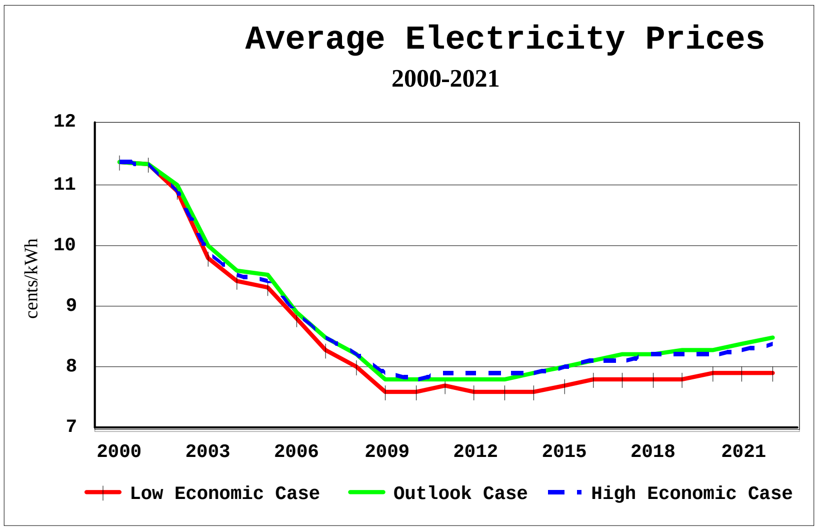


Figure 19



FINDINGS AND CONCLUSIONS

- New York is a national leader in restructuring its electricity industry. More than 15% of customer load has switched from local utility to new retail service providers. Most switching in retail service providers has occurred in the commercial and industrial sectors with considerable variability throughout the State. More progress in increasing customer choice can be expected, especially when more supplies and demand reducing options become available.

- The initial years of wholesale electricity market operations in New York coincided with periods of high fuel prices, significant transmission congestion, and tight supply conditions. Wholesale electricity prices reflected these conditions, but they have begun to moderate, although not in a uniform pattern, across the State. Wholesale electricity prices are forecast to decline in real terms, as are retail prices, over the planning period. This expectation is strongly conditioned on new demand and supply resources being added, especially at critical locations which will serve to reduce transmission congestion.

- Electricity peak demand is forecast to grow at annual average rates ranging from 0.32% to 1.05%, with a mid-range value of 0.68%. The loss of load in New York City resulting from the terrorist attack on the World Trade Center is not factored into the forecast. This load is expected to be restored gradually during rebuilding efforts and completely restored once rebuilding efforts are finished. Load is projected to be fully restored sometime in the early half of the forecast period.

- Reserve margins, representing one measure of system reliability, are projected to exceed the current requirement of 18% throughout the planning period. A higher peak demand growth rate than projected, however, will require more new resources than are currently projected, especially in the later years of the planning period.

- In the near-term, additional simple-cycle gas turbines and demand reduction programs will be used to address growth in peak electricity demand. Over the longer-term, gas-fired combined-cycle base-load units will be added to the system. As of December 2001, five generating projects which total approximately 3,490 MW have been approved under the Article X of the Public Service Law. Another 19 projects are in the regulatory review process or have been publically announced.

- The State's transmission system is generally adequate to provide reliable electricity service, however, there are limitations in the use of the transmission system in moving power between regions of the State for economic reasons. The siting of new generating facilities can reduce price impacts attributed to economic congestion of the transmission system. This finding is consistent with the Planning Board's recent *"Report on the Reliability of New York's Electric Transmission and Distribution Systems."*[28] Some local transmission reinforcements might be necessary in the New York City and Long Island areas.

- A Northeast RTO offers possibilities for enhanced market efficiencies and economic benefits for most participants. The RTO structure may also offer a vehicle for developing new transmission lines to increase power transfers across New York's borders. There are certain principles for RTO formation that should be followed to ensure benefits are realized by New York consumers

[28] Report of the New York State Energy Planning Board as mandated by Chapter 636 of the Laws of 1999.

- New York is projected to increase significantly the share of electricity generation fueled by natural gas. This trend is consistent with other regions of the Northeast. A major force behind this trend is the decisions of merchant generators to select natural gas as the preferred fuel of choice. The choice is also influenced by environmental factors that recognize the relatively clean air emission profile of natural gas generation. This shift in primary fuel requirements for electricity will result in diminished diversity in the fuel requirements for electricity generation. Reduced fuel diversity increases risk exposure to fuel supply disruptions and price swings.

- Air pollutant emissions from electricity generation in the State are forecast to decrease over the planning period. Increased use of natural gas for electricity generation, increased electricity trading among regional electric systems, and full implementation of the Governor's Acid Deposition Initiative all serve to drive SO_2 emissions to levels that are one-half that mandated by the Federal Clean Air Act, and extend summertime NO_X controls year-round.

SECTION 3.5

NATURAL GAS ASSESSMENT

INTRODUCTION

New York State currently uses approximately 1,200 million dekatherms (MMDT) of natural gas per year, making it the fourth largest gas consuming state in the nation behind Texas, California, and Louisiana.[1] The State has approximately 4.6 million natural gas customers[2] served by eleven local gas distribution companies (LDCs).[3] These LDCs depend on major interstate and intrastate pipeline systems for access to domestic and Canadian gas supplies.[4] Domestic gas, primarily from the Gulf Coast area, accounts for approximately 62% of the gas consumed in New York with nearly all of the remainder from Canadian sources.[5] Gas production within New York is growing and currently meets about 2% of the State=s annual gas use.

Competitive forces have changed the gas industry dramatically and will likely continue to do so. As explained below, federal and State policies to enhance competition have been adopted and are being expanded.

Natural gas demand is expected to increase significantly, especially to generate electricity. Plans to build about 15,000 MW of new gas fired generation have been announced in New York. These plants combined, would require about 2,500 thousand dekatherms of gas per day (MDT/D) if operated at full capacity. Current pipeline delivery capacity to New York is roughly 6,000 MDT/D, and this capacity is needed to meet existing core market (residential, commercial, and industrial) demand on a peak

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[1] The New York State breakdown of the volumes by sector: residential 35%; commercial/ industrial 30%; power generation 35%.
[2] The New York State breakdown by sector is: 4.2 million residential customers (including 1.7 million customers who use gas only for cooking or water heating) and 0.4 million commercial/industrial/power generation customers.
[3] Central Hudson Gas & Electric Corporation (CHG&E), Consolidated Edison Company of New York, Inc. and Orange & Rockland Utilities (Con Edison/O&R), Corning Natural Gas Company (Corning), KeySpan Energy Delivery of New York and KeySpan Energy Delivery of Long Island (KeySpan), Niagara Mohawk Power Corporation (Niagara Mohawk), New York State Electric and Gas Corporation (NYSE&G), Rochester Gas & Electric (RG&E), National Fuel Gas Distribution Company (NFGD), and St. Lawrence Gas Company (St. Lawrence).
[4] These pipelines are: Algonquin Gas Transmission Co. (AGT), Columbia Gas Transmission Corp.(Columbia), Dominion Transmission, Inc. (DTI), Empire State Pipeline Co. (Empire), Iroquois Gas Transmission System (IGTS), National Fuel Gas Supply Corp. (NFGS), North Country Pipeline, Tennessee Gas Pipeline Co. (Tennessee), Texas Eastern Pipeline Co. (TETCO), Transcontinental Gas Pipe Line Corp. (TRANSCO), and TransCanada Pipelines, Ltd. (TransCanada).
[5] Natural Gas Annual 1999, EIA, issued October 2000.

winter day. In addition, the use of gas in core markets continues to grow, especially in the downstate (New York City-Long Island) area. Additional pipeline capacity as well as expansion of distribution system capacity will be needed to meet the anticipated increase in gas use. A number of projects have been proposed to expand pipeline capacity to New York State.

As explained below, gas prices increased to unprecedented levels during the 2000-2001 winter due to a combination of factors and have since returned to more historic levels. However, gas prices will likely remain volatile.

Finally, the security of gas delivery facilities has not been a problem historically. However, in light of the September 11, 2001 terrorist attacks, Governor Pataki has created the Office of Public Security to assess the vulnerability of critical infrastructures to terrorist attack and develop a comprehensive, Statewide anti-terrorism strategy. Concurrently, the Department of Public Service has established the Security Assessment Team to assess utility efforts to maintain system reliability and security.

NATURAL GAS COMPETITION

Status of the New York State Retail Market

Large-volume natural gas customers in New York have been able to choose from non-utility suppliers since the mid-1980s. In 1996, the Public Service Commission (PSC) extended the opportunity to purchase gas from non-utility suppliers to all customers. As of April 2001, nearly 300,000 residential and smaller non-residential customers had switched to non-utility suppliers. These customers use approximately 90 MMDT of natural gas per year, or about 9.5% of the total volumes delivered to customers by the LDCs. Most large volume customers switched to a non-utility gas supplier years ago. In total about 50% of the gas consumed in New York is gas purchased from non-utility suppliers. There are about 25 active marketers in the downstate area, and about 15 in upstate New York. The retail gas market in New York is approximately a $7.5 billion per year market.[6]

Status of the Wholesale Natural Gas Market

Natural gas commodity prices have been completely deregulated for over ten years. The New York Mercantile Exchange (NYMEX) futures price is the benchmark price for

[6] Customer costs for LDC sales and transportation services are about $5 billion per year and payments to non-utility suppliers are roughly $2.5 billion per year.

natural gas nationwide, with futures contracts quoted at, and deliverable to, the Henry Hub, in Katy, Louisiana. Several market area hubs or liquid trading points[7] have emerged, including Dawn, Ontario, the Columbia pool, and DTI Southpoint. The establishment of additional market area hubs/liquid trading points is critical to the development of a competitive wholesale natural gas market closer to market demand.

Policies to Enhance Competition

New York State. In 1998 the PSC issued a Policy Statement establishing its vision for the future of the natural gas industry in New York.[8] The essence of that vision is that the most effective way to establish a competitive retail market in gas supply is for LDCs to cease selling gas.[9] The Policy Statement requires LDCs to hold new upstream pipeline capacity contracts to the absolute minimum necessary for system operation and reliability purposes and eliminates the LDCs right to assign its capacity to migrating customers, except where specific operational and reliability requirements warrant. This encourages LDC's to relinquish capacity as contracts expire to make it available for marketers. A transition process consisting of three elements was established:

$ Discussions with each LDC on an individualized rate and restructuring plan;

$ Collaboration among stakeholders on the key generic issues of system reliability and market power; and

$ Coordination of issues that are also faced by electric utilities, including provider-of-last-resort and competition in areas such as metering, billing, and information services.

Multi-year rate and restructuring plans have been approved for Niagara Mohawk, RG&E, CHG&E, and O&R, and proposed for KeySpan. Discussions with Con Edison and NFGD are underway to achieve multi-year agreements. Generally, these plans freeze or reduce retail rates, establish back-out rates applicable when marketers replace certain LDC functions, establish or refine balancing services for marketers, incorporate gas capacity portfolio changes, and promote development of the competitive market through customer information programs.

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[7] Generally defined as points where gas is readily available.

[8] Case 93-G-0932, Proceeding on Motion of the Commission to Address Issues Associated with the Restructuring of the Emerging Competitive Natural Gas Market; Case 97-G-1380 In the Matter of Issues Associated with the Future of the Natural Gas Industry Need and the Role of Local Gas Distribution Companies, Policy Statement Concerning the Future of the Natural Gas Industry in New York State and Order Terminating Capacity Assignment, (issued November 3, 1998).

[9] In this vision marketers would sell gas to customers and LDCs would deliver that gas to them.

A Reliability Collaborative was established in December 1998 to implement the Policy Statement=s goal of maintaining the reliability of gas deliveries. Based on recommendations developed through this collaborative, the PSC requires marketers serving firm loads to have firm, primary delivery point capacity for the months of November through March, with a limited exception for KeySpan.[10] LDCs were also required to develop Gas Transportation Operations Manuals to codify all procedures that marketers must follow. A Reliability Advisory Group has been established to continue to address both short- and longer-term reliability issues.

Upstate LDCs (NFG, NYSE&G, Niagara Mohawk, and RG&E) have been able to relinquish capacity on upstream pipelines as contracts expire, resulting in net capacity cost savings of about $55 million per year to New York gas customers. Downstate LDCs (KeySpan and Con Edison /O&R) relinquished a small amount of capacity to their city-gates when the contracts expired on November 1, 2000, in anticipation of retail marketers acquiring this capacity. However, a wholesale marketer affiliated with an electric generation company acquired that capacity. Wholesale marketers with power generation interests recently acquired available capacity in the broader downstate market for periods of up to ten years.

The downstate capacity market has become tight, and marketers that acquire capacity at market prices cannot compete with the LDCs weighted-average cost of capacity. In response, the downstate LDCs have developed programs under which they will acquire the resources needed to meet market requirements on a year-to-year basis and make capacity available to marketers at their average cost of capacity over the next three years.[11]

Finally, the 2000-2001 winter led to a marketer bankruptcy and the withdrawal of a marketer from the residential market in Western New York. These failures were caused by cash flow problems associated with high gas costs and the lack of marketer action to manage price risk. Most of the customers served by these marketers were returned to the LDC who was able to acquire the capacity needed to serve them.

Several issues common to gas and electric that impact the development of the competitive market are being addressed in a coordinated fashion. These issues include provider-of-last-resort, billing and metering, electronic data interface, uniform business

[10] Due to the structure of its supply and capacity portfolio KeySpan was able to allow marketers to use non-primary capacity to meet a portion of their requirements.
[11] Case 97-G-1380, In the Matter of Issues Associated with the Future of the Natural Gas Industry Need and the Role of Local Gas Distribution Companies, (untitled Order dated July 27, 2001).

practices, and unbundling of costs. The Electricity Assessment contains a detailed discussion of these issues.

<u>Federal</u>. In the mid-1990s the Federal Energy Regulatory Commission (FERC) eliminated the merchant role of interstate pipeline companies and transferred responsibility for gas supply acquisitions to LDCs and customers. FERC issued Orders 637 and 637-A in 2000, waiving price ceilings for short-term released capacity for a two-year period, permitting use of peak/off-peak and term differentiated rate structures, allowing capacity segmentation, revising scheduling procedures, narrowing the right of first refusal and improving reporting requirements and penalty provisions. These changes are intended to improve the efficiency of the interstate pipeline capacity market.

Pipeline companies were required to file Order 637 tariffs beginning in the fall of 2000, on a staggered basis. The DTI and Tennessee proposed tariffs have been approved by FERC. The tariffs of Transco, NFGS, and IGTS are presently pending before the FERC. Texas Gas, AGT, TETCO, and Columbia have filed compliance plans.

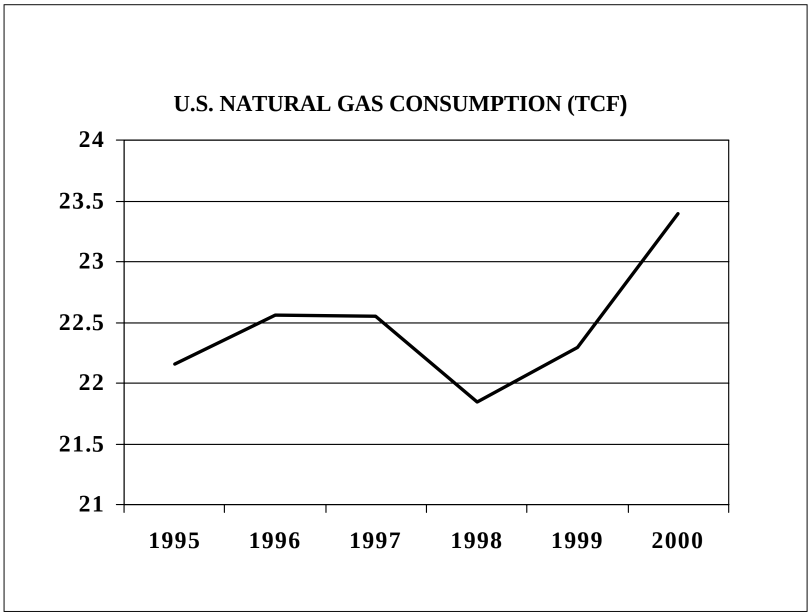
One of the common issues among the pipelines is the cash-out mechanism for customer imbalances. With new services and new information systems now available, there is less reason for customers to remain out of balance between their daily nominations and daily takes. Weekly rather than monthly cash-out of imbalances have been proposed by two pipelines.

The changing nature of the natural gas market has resulted in the development of new pipeline service offerings. One such development is the opportunity for shippers to make intra-day nominations, providing more flexible use of pipeline capacity to meet changes in system demand. Another is the introduction of increased hourly delivery quantity flexibility, a service specifically designed for electric generators. Another example, which is being used in the retail access programs in New York, is the development by DTI of its Delivery Point Operator/Customer Swing Service. This essentially allows marketers access to no-notice services with the LDC acting as the delivery point operator thereby administering a program to account for each marketer=s use of such services to meet daily swings.

NATURAL GAS MARKET DEVELOPMENTS

<u>Natural Gas Demand</u>. Lower oil prices resulted in a decline in United States (U.S.) gas demand in 1998. However, gas demand recovered somewhat in 1999 and increased another 5% in 2000, the result of a strong national economy and the increased use of gas for power generation (see Figure 1). U.S. gas demand is expected to increase significantly to 31.6 trillion cubic feet (TCF)[12], a 38% increase, by 2015. [13]

Figure 1



In New York, demand for gas in core markets (residential, commercial, and industrial) continues to grow, especially in the downstate area where the saturation of gas use is relatively low and there is a large potential conversion market. The most significant increase in gas use will be for power generation as about 15,000 MW of new gas-fired generation capacity has been proposed in New York. Of this amount, about 70% is proposed in the area from Rockland and Orange counties through Long Island. In addition, the Governor's Clean Air Act Initiative, discussed in the Environment and Energy report in this Plan, will likely result in increased use of gas for power generation. Finally, the use of gas may increase in two other markets: the distributed generation market and the use of compressed natural gas (CNG) as a transportation fuel. The increased use of gas in these markets could require improvements to gas distribution systems.

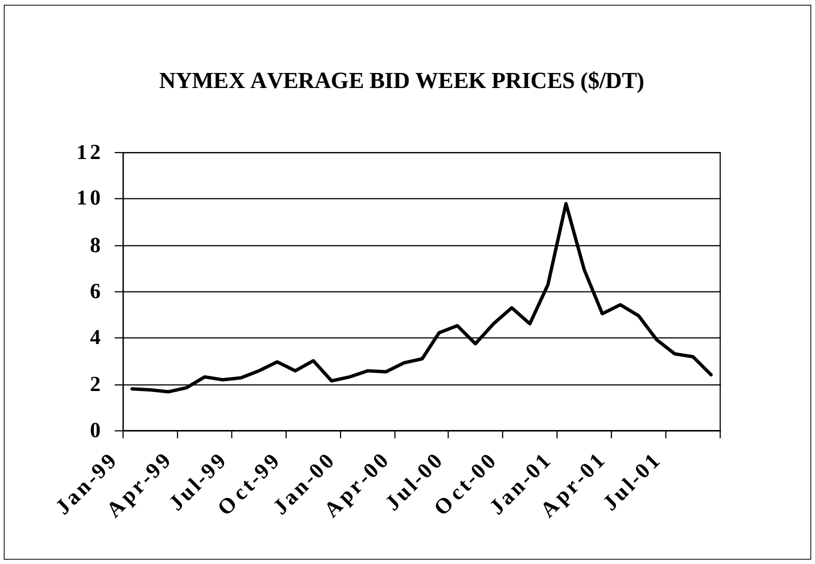
Natural Gas Commodity Prices

Natural gas commodity prices soared to unprecedented levels during the 2000-2001 winter. Several factors contributed to this increase. A sustained period of relatively low gas prices in the 1990's led to a substantial reduction in gas drilling, constraining domestic productive capacity. This set the stage for the price increase, but two factors that suppressed gas demand concealed the significance of the problem. First, low oil prices in 1998 and 1999 reduced gas demand through fuel switching to oil. Second, prior to last winter there were three warm winters in a row, masking the underlying level of gas demand. U.S. natural gas consumption declined by 3% in 1998, grew by 2% in 1999,

[12] A TCF is equal to approximately 1,025 MMDT.
[13] Annual Energy Outlook 2001, Energy Information Administration, December 2000.

and grew by another 5% in 2000, as a result of a strong national economy, rising oil prices, and increased use of gas to generate electricity. In the spring of 2000, prices were still at a level of about \$2.50-\$3.00/DT. However, the summer of 2000 was unusually warm in the Southwest where substantial air conditioning load is met through gas-fired generation. Gas prices started rising steadily in response to the increased summer gas demand and the competing need to fill gas storage. By the beginning of the 2000-2001 heating season, prices were already at record high levels and storage inventories were still relatively low. The sustained cold weather in November and December 2000 (the 2nd and 7th coldest ever recorded, respectively) in combination with market nervousness due to low gas storage levels, caused gas prices to increase dramatically, to nearly \$10/DT. The balance of the 2000-2001 winter was mild, drilling for gas increased in response to higher gas prices, the national economy slowed, and storage has been refilled at record levels. As a result, gas prices have returned to more familiar levels (see Figure 2). However, gas prices will likely remain volatile.

Figure 2



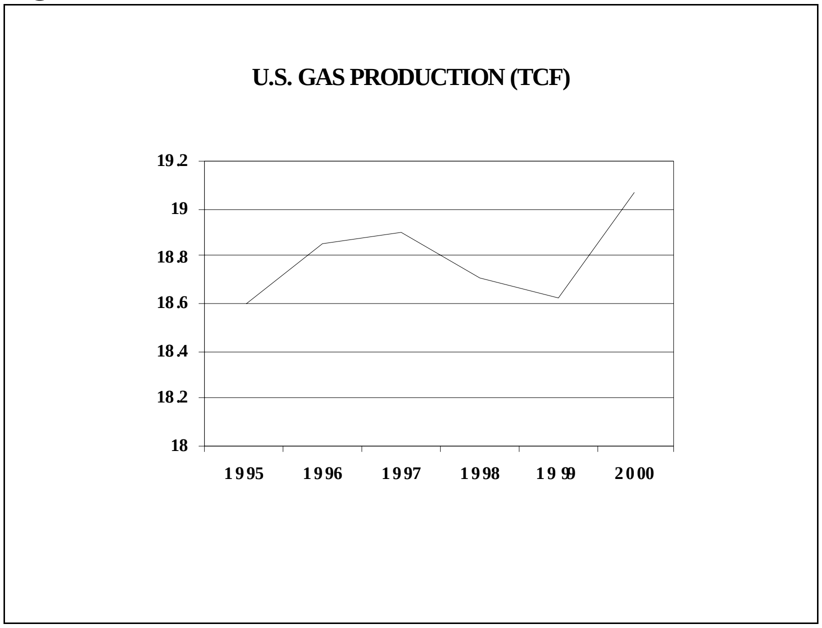
In 1998, the PSC issued a Policy Statement on LDC gas purchasing practices.[14] While the PSC did not direct any particular mix of portfolio options, it stated that volatility of customer bills is one criterion along with other factors such as cost and reliability, that LDCs should consider in their gas supply portfolio strategies. The PSC stated that excessive reliance on any one gas pricing mechanism or strategy does not appear to reflect the best management of the gas portfolio and any LDC without a diversified gas pricing strategy will have to meet a heavy burden to demonstrate that its approach is reasonable.

[14] Case 97-G-0600, In the Matter of the Commission's Request for Gas Distribution Companies to Reduce Gas Cost Volatility and Provide for Alternative Gas Purchasing Mechanisms, Statement of Policy Regarding Gas Purchasing Practices, (issued April 28, 1998).

Natural Gas Supplies

Domestic Gas. U.S. gas production in 2000 was 19.1 trillion cubic feet (TCF), a 2.4% increase over 1999. However, production in 1999 was the lowest since 1995 (see Figure 3), the result of several years of relatively low gas and oil prices.

Figure 3



Weakening gas prices in the late 1990's led to a reduction in gas drilling activity from 657 rigs in December 1997 to 362 rigs in April 1999. Gas rig activity began to reverse its downward trend during 1999, reaching 854 rigs by December 2000, and 1050 rigs in June 2001 (see Figure 4). This growth in gas rig activity is correlated with the increase in gas prices.

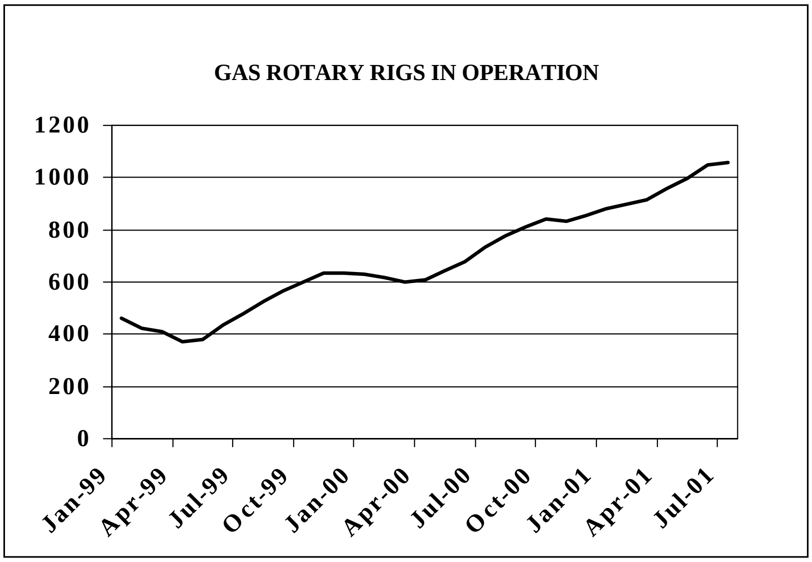
Proven natural gas reserves[15] for the lower 48 states totaled 172 TCF at the end of 1999. The amount of proven reserves has held fairly steady at about this level for the last ten years as cumulative production of 187 TCF over the last decade was offset by reserve additions. Potential gas reserves[16] are currently estimated at 1,206 TCF for the lower 48 states.

In addition, Alaska has 10 TCF of proven reserves and 34 TCF of potential reserves from conventional sources. Further, Alaska has about 210 TCF of reserves from unconventional sources, such as oil shale and coal-bed seams.

[15] Proven natural gas reserves are those which analysis of geologic and engineering data demonstrates with reasonable certainty to be recoverable from known reservoirs, under existing economic and operating conditions.
[16] Potential resources include all the undiscovered gas resources plus that part of the discovered resource that is not included in proven reserves.

Two pipeline route alternatives are being considered to bring Alaskan gas to the lower 48 states. The "southern" route would parallel the Trans-Alaska oil pipeline and then follow a route parallel to the Alaskan Highway through the Yukon Territory and British Columbia, to connect with existing pipelines in Alberta. This alternative would be about 2000 miles long and cost about $10 billion. The "northern" route would extend east from the Alaskan North Slope to Canada's Mackenzie River delta where it would access additional gas supplies, and then south along the Mackenzie valley into Alberta. This alternative would be about 1,650 miles in length and cost about $8 billion.

Figure 4



<u>Canadian Gas</u>. Imports of Canadian gas historically have been from Canada's Western Sedimentary Basin. On December 31, 1999 Canadian gas imports began from offshore Nova Scotia (Scotian Shelf area) through the Maritimes & Northeast Pipeline (M&NE). Canadian imports into the U.S. totaled 3.5 TCF during 2000, an increase of about 5% over 1999.

Imports of Canadian gas have increased steadily since 1995. The U.S. imported roughly 15% of its total requirements from Canada during 2000. In New York, about 38% of the gas volumes coming into the State originate in Canada,[17] however, some of this gas continues on to New England.

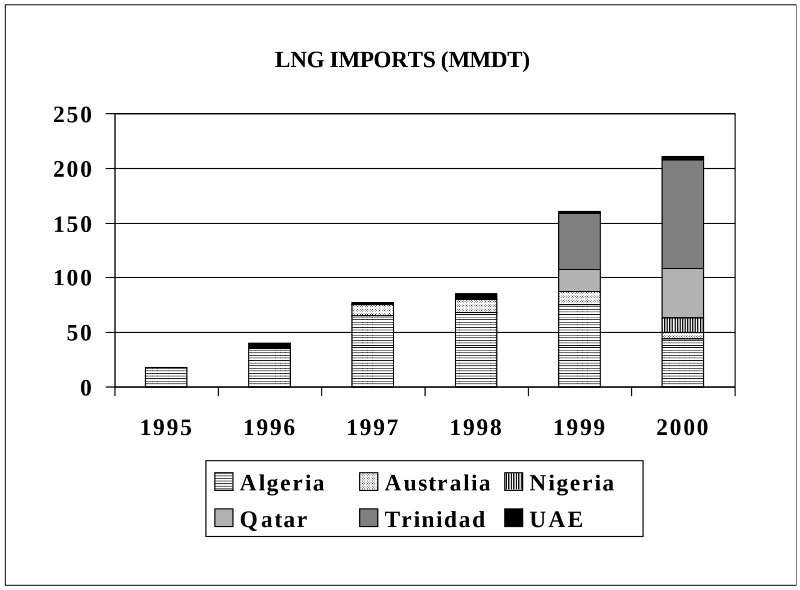
Western Canadian Sedimentary Basin proven reserves totaled 63.9 TCF as of January 1, 2000. The Scotian Shelf area contains 3 TCF of established reserves (proven reserves that are connected to pipelines), 2 TCF of discovered resources (proven by drilling but not yet connected to pipelines), and 13 TCF of undiscovered potential reserves.[18]

[17] Source: Natural Gas Annual 1999, EIA (issued October 2000).
[18] Canadian Natural Gas: Review of 1999 & Outlook to 2010, May 2000

<u>LNG</u>. Liquefied natural gas (LNG) imports have risen dramatically over the last several years (see Figure 5). After nearly doubling in 1999, LNG imports continued their growth in 2000 to a total of 223 MMDT, a 35% increase over 1999. Trinidad and Tobago and Qatar surpassed Algeria for the first time as suppliers of LNG to the U.S. in 2000.[19]

There are two operational LNG receiving terminals in the U.S. located at Everett, MA, and Lake Charles, LA. Imports into Everett totaled 99 MMDT in 2000, an increase of 3% over 1999.[20] Following the terrorist attacks of September 11, 2001, the U.S. Coast Guard banned LNG deliveries to Everett, MA, but has since lifted the ban.

Figure 5



Expansion of LNG imports is expected in the future. TRANSCO has filed an application with the FERC to reactivate import capability at its Cove Point, MD, LNG facility by 2002, which has not received any imports since 1980. The Elba Island terminal near Savannah, GA has received FERC approval to resume LNG imports and is expected to begin receiving shipments in 2002. In addition, about a dozen other LNG projects have been announced. Several are proposed in Texas, and would use either existing pipelines or build new ones to deliver re-gasified LNG for electricity generation customers. On the East Coast, expansion of the Everett, MA facility is planned to fuel a new 1,550 MW power plant currently being built nearby. A new plant is planned for Radio Island, NC to serve markets that are too distant from large pipelines.

In New York, LNG plays a critical role in meeting peak winter requirements. Instead of imports, this use of LNG involves liquefying pipeline gas during the summer, storing that

[19] Trinidad supplied 96 BCF of LNG, or 44% of total LNG imports in 2000 and Qatar supplied 46 BCF of LNG or 21 percent. Algeria continued to be a major supplier of LNG accounting for 44 BCF or 20% of all LNG imports.

[20] Almost 81% of the imports received in Everett came from Trinidad, primarily under long-term arrangements. The Lake Charles facility received 124 BCF, an increase of almost 85% over 1999.

LNG in insulated tanks, and re-gasifying it to meet peak day requirements.[21]

New York State Resources

The first natural gas well in the U.S. was drilled in Fredonia, NY in 1821. Historically, most wells in New York were drilled to sandstone formations at depths of 1,000 to 4,500 feet, and produced relatively small amounts of gas (up to 100 DT/D) for many years. Today there are approximately 6,600 gas wells in New York that produce a total of about 18.5 MMDT.

Over the last three years, exploration and development of the Trenton and Black River Group has intensified. This is a prolific and deep play (7,000 to 11,000 feet), with some wells producing as much as 10,000 DT/D. It has been under development in Canada and other states for some time. During 2000, natural gas was produced from the Trenton and Black River in Steuben and Chemung Counties. Production from 23 such wells totaled 5.3 MMDT, or about 30% of total Statewide natural gas production of about 18.5 MMDT (from less than 1% of the total number of wells). The New York State Department of Environmental Conservation staff expects that between five and ten additional wells will be placed into production during 2001, and that production from just the Trenton and Black River Group may reach 12 MMDT or more. Drilling is most active in the southern Finger Lakes area of Steuben, Schuyler, and Chemung Counties, but wells have been drilled as far west as Cattaraugus County and as far east as Cortland County.[22]

In an effort to expand natural gas production in New York, the New York State Energy Research Development Authority (NYSERDA) is working with exploration companies to improve the identification of carbonate reservoirs and increase the geographic distribution of production. Along with the Trenton and Black River groups, other carbonates under investigation include the Beekmantown Group and the Onondaga Formation. NYSERDA is also researching improved detection mechanisms to reduce the dry hole ratio. Some NYSERDA projects are located in areas that currently have little or no production, such as the Tug Hill Plateau and Otsego County.

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[21] The 1998 *Report on Issues Regarding the Existing New York Liquefied Natural Gas Moratorium*, by the State Energy Planning Board, led to legislation that lifted the then-existing moratorium on siting new LNG facilities, except in New York City.

[22] From 1995 to 2000, 75 wells were drilled to explore for and develop Black River gas reserves. Drilling on 22 of these wells were began in 2000. By August 1, 2001, 35 applications had been received for Black River wells, a 46% increase over the number of applications received by the same time in 2000.

MERGERS AND ACQUISITIONS

New York LDCs

Mergers and acquisitions continue to reshape the way in which LDC services are provided. KeySpan Corporation acquired three New England gas utilities (Boston Gas, Colonial Gas, and Essex County Gas); Con Edison acquired Orange and Rockland Utilities; and Energy East (the parent of NYSE&G) acquired Berkshire Gas, a Massachusetts gas utility, Connecticut National Gas Corporation and Southern Connecticut Gas Company, established the Maine Natural Gas Company. A merger between Niagara Mohawk and National Grid Corporation has been approved and Energy East's acquisition of RGS Energy Group, Inc., the parent of RG&E, is pending.

Interstate Pipelines

Three major mergers have been completed involving interstate pipeline companies that serve New York. Dominion Resources (an electric utility based in Virginia) acquired CNG Transmission Corporation and it became Dominion Transmission, Inc. (DTI). Columbia Gas Transmission was acquired by NiSource a Merrillville, IN-based holding company. Finally, El Paso Corp., owner of Tennessee, acquired the Coastal Corporation. El Paso now owns and operates the largest pipeline system in the country, extending from California to Texas, and from Texas to Massachusetts and Illinois. Finally, Duke Energy recently announced that it is acquiring Westcoast Energy. Duke is a diversified energy company headquatered in Charlotte, NC, and is parent of TETCO and AGT as well as part owner of the M&NE Pipeline. Westcoast is a leading Canadian natural gas company based in Vancouver, BC and is parent of Union Gas, Empire State Pipeline, the Westcoast Pipeline (which serves CA), as well as part owner of M&NE.

Analysis of Natural Gas Market Developments

Competition for available capacity is developing between the core market and the electricity generation market. The use of gas to generate electricity has increased, because of the increased demand for electricity. Further, there is an expectation that the use of gas for electricity generation will increase significantly as a result of the availability of 15,000 MW of proposed new gas-fired generation facilities.

Retail marketers to-date have not acquired the capacity necessary to serve their customers. Many factors have contributed to this situation such as the tightness in the capacity market, commodity cost volatility, and access to competitively priced capacity.

It is not clear whether retail marketers will ever be willing to make capacity commitments or whether the role of holding capacity will be filled by wholesale marketers. Meanwhile, wholesale marketers have begun to acquire capacity, ostensibly to serve the power generation market. Thus, electric market developments are increasing competition for available pipeline capacity and changing the dynamics of the gas capacity market.

INFRASTRUCTURE ISSUES

Current Interstate Pipeline Delivery Capacity

Interest in expanding interstate pipeline delivery capacity to New York and the Northeast continues to be strong. Three major projects have recently been completed to increase delivery of Canadian gas to the Chicago market area. The new Alliance Pipeline,[23] which extends 1,860 miles from Alberta, Canada to the Chicago, IL area, began service on December 1, 2000, and has a capacity of 1,325 MDT/D. The new Vector Pipeline,[24] which extends from Chicago to Dawn, Ontario, also began service on December 1, 2000, with an initial capacity of 700 MDT/D. The existing Northern Border Pipeline was extended from Harper, IA to Manhattan, IL and its delivery capacity increased by 700 MDT/D beginning in December 1998. In the East, the Maritimes & Northeast Pipeline (M&NE), which extends from Sable Island, through Nova Scotia and New Brunswick, Maine and New Hampshire to the Boston, MA area, began service at the end of 1999. It has delivery capacity of 440 MDT/D, and "back feeds" the existing gas delivery systems serving the Northeast with a new competitively priced and sizable gas supply. Several of the projects proposed to serve the Northeast would expand access to these Canadian gas supplies.

Approved Projects

The FERC has approved the following projects to increase capacity to New York and the Northeast:

MarketLink Phase I & II. Will expand capacity of the existing TRANSCO Leidy line, which extends from storage facilities in Leidy, PA to the New York City market, in two phases. Phase I will increase capacity by 166 MMCFD to New York City by November 1, 2001. Phase II will increase capacity by 130 MMCFD to New Jersey and

[23] The sponsors of Alliance are Fort Chicago Energy Partners 26%, Westcoast 23.6%, Enbridge 21.4%, Williams 14.6%, and Coastal 14.4%.
[24] The sponsors of Vector are Enbridge, Westcoast, and the MCN Energy Group.

Pennsylvania by November 1, 2002. These expansions will be accomplished through pipeline looping[25] and added compression within the existing pipeline right-of-way. MarketLink was proposed as the final link to bring Western Canadian and Midwestern gas supplies to the East Coast. The Independence Pipeline in combination with an upgrade of the ANR Pipeline (described below) would link MarketLink with the Chicago market area.

Independence Pipeline. A proposed 36-inch diameter pipeline that would extend 370 miles from Defiance, OH to TRANSCO's facilities at Leidy, PA, and have a capacity of 916 MDT/D.[26] Independence has a proposed in-service date of summer 2003. ANR Pipeline's SupplyLink Project will expand its existing ANR pipeline between Sandwich, IL and Defiance, OH by 750 MDT/D through a combination of added compression and looping to feed the Independence Project with a targeted in-service date of summer 2003. FERC has approved both of these projects, subject to certain conditions.

Stagecoach. This project involves development of new 12 MMDT storage facility in Tioga, NY and Bradford, PA.[27] In addition, Tennessee would construct a new a 23.7 mile, 30 inch diameter pipeline connecting this storage field to its "300 line" in PA and a new 4.7 mile, 12-inch diameter lateral would be built from this storage facility to the proposed Twin-Tier power plant in Owego, NY. Tennessee's new pipeline has a planned in-service date of December 2001. The storage facility would have withdrawal rates of up to 500 MDT/D and injection rates of up to 250 MDT/D. Tennessee would also expand capacity on that line to NJ by 100 MDT/D with a planned in-service date of December 2001. One company[28] has contracted for 400 MDT/D of capacity on the lateral (out of 500 MDT/D) and 90 MDT/D (out of 100 MDT/D) on Tennessee's "300 line" for 10 years.

Hanover Compressor. AGT and TETCO filed a joint application that would increase the ability of TETCO to deliver gas to New York City by 135 MDT/D. This would be accomplished by adding compression to AGT's existing compressor station in Hanover, NJ, allowing TETCO to shift some of its existing deliveries to AGT from the Lambertville, NJ interconnect. FERC approved this project on July 26, 2001; the expected in-service date is November 1, 2001.

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[25] The addition of pipeline segments parallel to an existing pipeline to increase its capacity.
[26] The sponsors of Independence are ANR Pipeline Co., TRANSCO and National Fuel Gas Supply Corp.
[27] The sponsor of this storage project and the pipeline lateral is Central NY Oil & Gas Company.
[28] ECORP a marketing affiliate of Central NY Oil & Gas.

Leidy East. The Leidy East project involves looping and added compression in PA and NJ to expand the capacity of TRANSCO's Leidy line by 130 MMCFD.[29] Construction is scheduled to begin in April 2002 and the proposed in-service date is November 2002.

Dracut Expansion. Tennessee's Dracut Expansion Project will increase its ability to move gas from Dracut, MA to the west by 200 MDT/D. The project involves replacing 12 miles of 16-inch diameter pipe with 24-inch diameter pipeline. This project was filed at FERC in May 2001, and has an expected in-service date of fall 2002.

Proposed Projects

Several pipeline projects had been proposed for completion in the 2000-2002 timeframe, but delays in the review and approval process have pushed the startup dates back. Since some of these projects compete with each other, it is likely that not all of these pipelines will be built.

The Millennium Pipeline[30]. A proposed new 36-inch pipeline that would extend 424 miles from a new interconnection with TransCanada Pipelines in Lake Erie to a termination point in Mt. Vernon, NY where it would interconnect with Con Edison facilities. Most of the route would follow the existing Columbia right-of-way. Millennium would provide access to Canadian gas and the Chicago market area through Union Gas as well as access to storage in Michigan and Ontario. The capacity of Millennium would be 700 MDT/D, of which 350 MDT/D would be for the New York City area. This project has been filed at FERC and a supplemental draft environmental impact statement has been issued by FERC for the project. Sponsors of the Canadian portion of the project recently withdrew their applications filed at the Canadian National Energy Board (NEB). They attribute this action to delays in receiving U.S. regulatory approvals for Millennium and pledge continuing support to the project and say that they intend to re-apply for NEB approval at an appropriate time. At this point, the proposed November 2002 in-service date is no longer feasible.

Iroquois' Eastchester Expansion. Involves construction of 32 miles of 24-inch pipe from the existing Iroquois mainline at Northport, Long Island to the Bronx, New York where it will interconnect with the Con Edison system. This project will increase capacity by 230 MDT/D, primarily for electric generation customers, with an expected in-service date of November 2002. Iroquois received FERC's preliminary approval on

[29] This project is a replacement for the previously proposed phase III of MarketLink which was rejected by FERC because TRANSCO failed to secure precedent agreements with customers for the total volumes proposed for this phase of the project.
[30] Millennium is sponsored by Columbia Gas, TransCanada, Westcoast and MCN Energy Group.

non-environmental matters in June 2001. FERC has also issued a draft Environmental Impact Statement for the project. Iroquois' will have to build new compressor stations in Boonville and Dover, NY, and modify the existing Croghan, Wright, and Athens, NY compression stations to support the proposed deliveries through Eastchester.

Islander East Project[31]. One of three projects proposed to connect existing interstate pipelines to basically the same point on eastern Long Island. Islander East would consist of approximately 45 miles of new 24-inch diameter pipe from a point near Cheshire, CT, where it will interconnect with the existing AGT mainline, across the Long Island Sound to the town of Brookhaven, NY. Islander East will have an initial capacity of 285 MDT/D. The project has been filed at FERC with a proposed in-service date of November 2003.

Connecticut-Long Island Lateral Project. Would consist of approximately 50 miles of new pipeline connecting the existing Tennessee pipeline near Agawam, MA, to Long Island.[32] This project has been announced but not yet filed at FERC. The proposed in-service date is November 2003 and the proposed capacity is 450 MDT/D.

Iroquois' Shoreham Lateral. Would consist of approximately 20 miles of submarine pipe under Long Island Sound from Iroquois' existing mainline in Milford, CT, to Shoreham, Long Island. The proposed capacity is 175 MMCFD and the proposed in-service date is November 2003. The project has been announced but not yet filed at FERC.

Texas Eastern Incremental Market Expansion. TETCO has held an open-season for increasing its system capacity to the Mid-Atlantic and Northeast markets by as much as 300 MDT/D.

Maritimes & Northeast Expansion, Extension and Hubline. Three projects are planned to increase capacity to deliver Scotian Shelf gas to the Northeast. A 400-MDT/D expansion of the capacity of the existing M&NE pipeline has been proposed for service in the 2004, but not yet filed at FERC. In addition, M&NE has filed with FERC to construct a new 25 mile pipeline extending M&NE from Methuen to Beverly, MA with a proposed in-service date of November 2002. This line would interconnect with AGT's proposed HubLine pipeline, a new 29 mile, 24-inch diameter pipeline extending from Beverly, MA across Boston Harbor to an onshore interconnection with AGT's existing facilities in Weymouth, MA. Hubline's proposed capacity is 300 MDT/D. The

[31] The Islander East Project is sponsored by Duke Energy (50%) and KeySpan (50%).
[32] The sponsor of this project is Tennessee.

project has been filed at FERC with a proposed in-service date of November 2002.

Cove Point Maryland LNG. TRANSCO has filed with FERC to reactivate the import capability of its Cove Point, MD, LNG facility and expand its storage tank capacity by 850,000 barrels (BBLs). Cove Point was originally built with an import terminal, which was last used in 1980 and has since been dismantled. The proposed in-service date is April 2002, with initial tanker delivery capability of 750 MDT/D. The terminal will continue to provide 3, 5, and 10-day peaking services under existing tariffs.

ConneXion Project. Tennessee's ConneXion project involves expanding storage capacity in Pennsylvania and expanding its delivery capacity from those storage areas to New York City by about 500 MDT/D. Tennessee plans to file an application at FERC in the fall/winter of 2002 and expects the facilities to be in-service by November 2004.

Northwinds Pipeline. Would be a new 215 mile, 30-inch pipeline extending from Kirkwell, Ontario, cross the U.S. near Buffalo, NY and follow a southerly route to the Ellisburg-Leidy storage area in Pennsylvania.[33] It would have an initial capacity of 500 MDT/D and provide shippers access to the Dawn, Ontario hub and storage facilities. Northwinds plans to file for regulatory approvals in the spring of 2002, with a target in-service date of late 2004.

Blue Atlantic Project. El Paso Corporation has announced plans for a new 750$^+$ mile, 36-inch pipeline from offshore Nova Scotia to Long Island. It would have an initial capacity of 1000 MDT/D and is estimated to cost between $1.6 billion and $1.8 billion. El Paso anticipated filing for approvals in late 2002, with a targeted in-service date of late 2005.

LDC Distribution System Capacity

Distribution system improvements will be needed to serve the power generation market as well as expanded core markets. Since several of the proposed power generation projects would be located in and around the Con Edison gas service territory, the company has an ongoing effort to work with project sponsors to identify their needs and to determine what distribution system improvements will be needed.

Further, the LDC system infrastructure is aging and to ensure safe operations there is a need to continue priority replacement programs on portions of the distribution system as well as to verify LDC transmission system integrity. The LDCs and Department of

[33] The sponsors are TransCanada Pipelines and National Fuel Gas Company.

Public Service (DPS) staff have been engaged in a collaborative effort to address the integrity of transmission systems. That effort involves the development of a risk assessment model to calculate and prioritize the relative risk of transmission pipeline segments and to work to reduce the highest risks to the pipelines. Both LDCs and operators of interstate pipelines, which deliver gas to the State, will need to verify transmission line integrity. Coordination of integrity verification efforts by both LDCs and interstate pipelines will be needed to prevent adverse impacts on continuous gas deliveries. The federal Department of Transportation is expected to issue a notice of proposed rulemaking on pipeline integrity for gas operators by the end of 2001. There is a need for continued research and development (R&D) activities to develop new methods of verifying transmission system integrity as well as to develop cost-effective techniques to maintain and upgrade the existing distribution system.

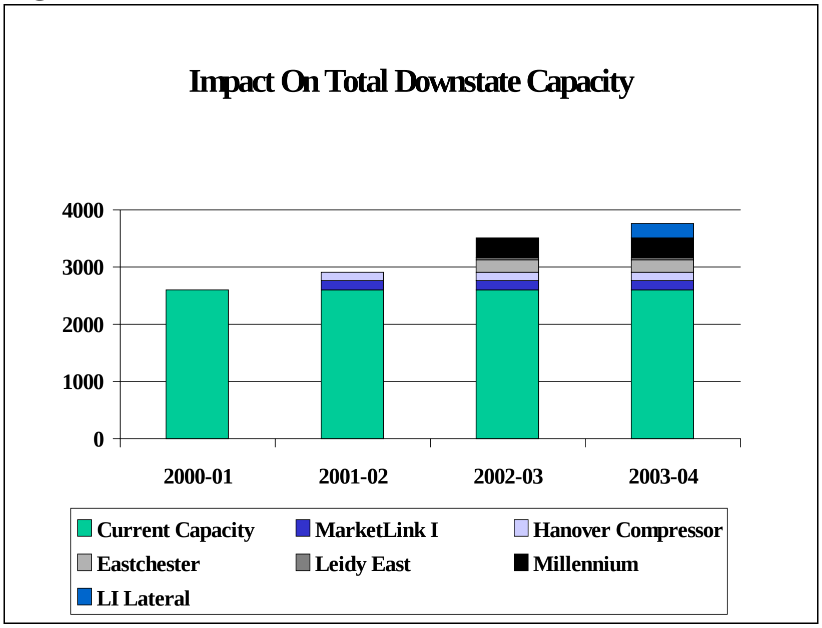
Infrastructure Security

Interstate pipelines are periodically patrolled by helicopter, and routinely inspected and maintained. Major gas facilities, such as gas processing plants, LNG plants, and compressor stations are fenced and typically guarded. The security of gas delivery facilities has not been a problem historically. However, in light of the September 11, 2001 terrorist attacks, Governor Pataki created the Office of Public Security to assess the vulnerability of critical infrastructures to terrorist attack and to develop a comprehensive Statewide anti-terrorism strategy. Concurrently, the Department of Public Service has established the Security Assessment Team to assess utility efforts to maintain system reliability and security.

Analysis of Infrastructure Issues

It is clear that additional capacity will be needed to meet anticipated increases in natural gas demand in the State. However, because of uncertainties regarding the timing of new merchant power plants and their impact on the operation of existing gas-fired generators, the extent and timing of that need are less clear. Further, some of the proposed projects to expand pipeline capacity have contracts with specific customers and are far along in the regulatory review process, while other projects are at an early stage in their development. Most of the more advanced pipeline projects target the area from Rockland and Orange counties to Long Island where some 11,000 MW of new generation capacity have been proposed. If all of these generation projects were built and operated at full capacity on an incremental basis (not a likely scenario) they would require about 1850 MDT/D of gas. An illustration of the impact of completion of proposed pipeline projects to serve this market is shown in Figure 6. As can be seen, if all of these projects are completed, capacity to deliver gas will increase by about 1080 MDT/D.

Figure 6



FUTURE NATURAL GAS DEMAND, SUPPLY, AND PRICE

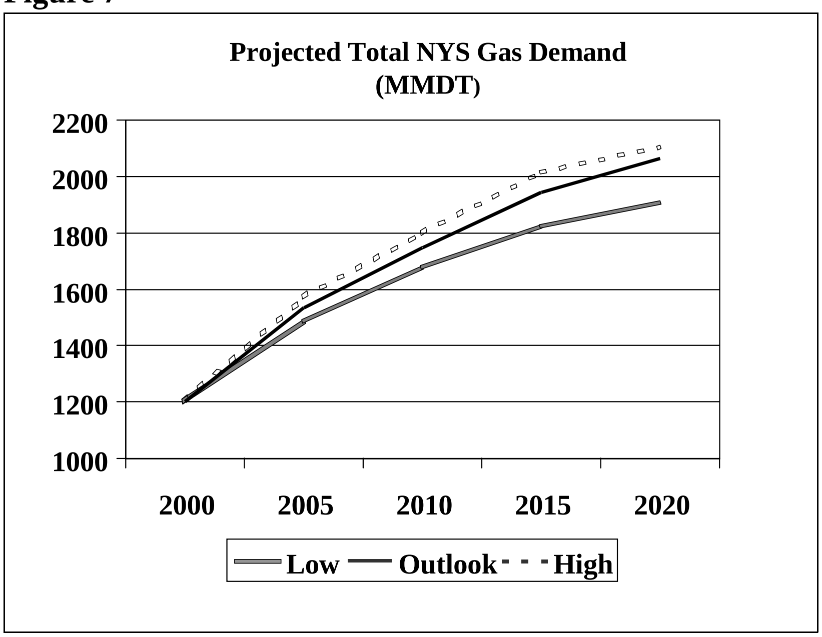
Approach

Future natural gas demand, supply, and price are especially difficult to project due to the dynamic changes taking place in the gas and electric industries and rapidly changing market conditions. These forecasts were developed from the *2001 Annual Energy Outlook* projections prepared by the federal Energy Information Administration (EIA). Considering the market uncertainties, a range of possibilities was examined.

Natural Gas Demand

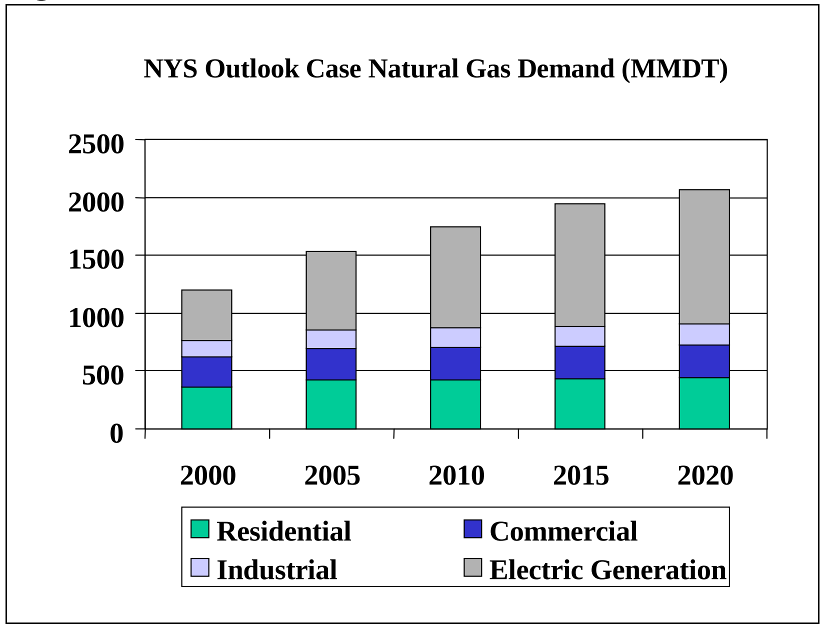
On a Statewide basis, the projected range of overall demand growth is expected to be 2.3% per year in the low case, to 2.66% per year in the high case, with the Outlook Case at 2.7% per year, as shown in Figure 7. Figure 8, shows the breakdown by sector of the Outlook Case demand projection.

Figure 7



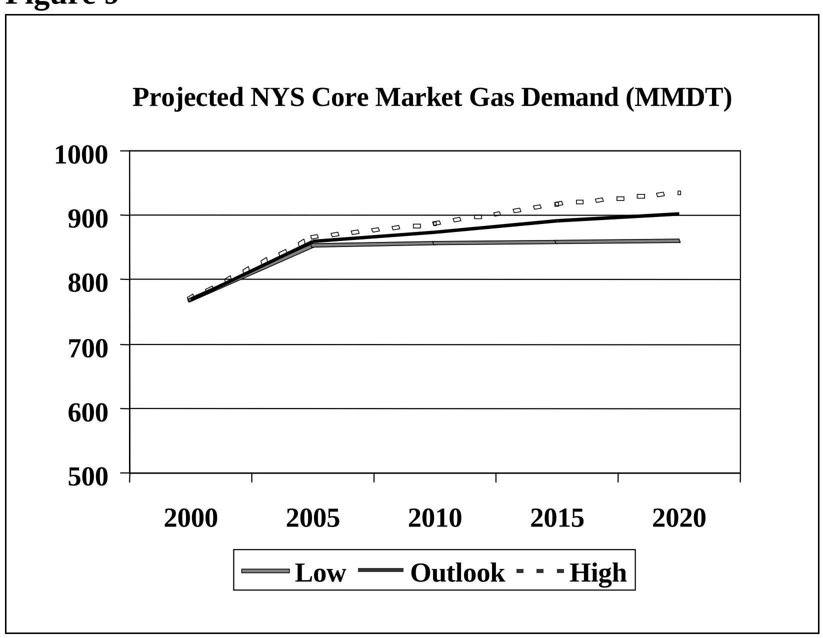
On a Statewide basis, the projected range of core market demand growth is expected to be 0.6% year in the low case, to 1.0% per year in the High Case, with the Outlook Case at 0.8% per year, as shown in Figure 9.[34]

Figure 8



The largest increase in gas use in New York is expected to be for power generation. However, this expectation is subject to the greatest uncertainty because there is no way of knowing precisely how many new power plants will be built, how and when they will operate, and how their operation will impact the operation of existing generation stations.

Figure 9



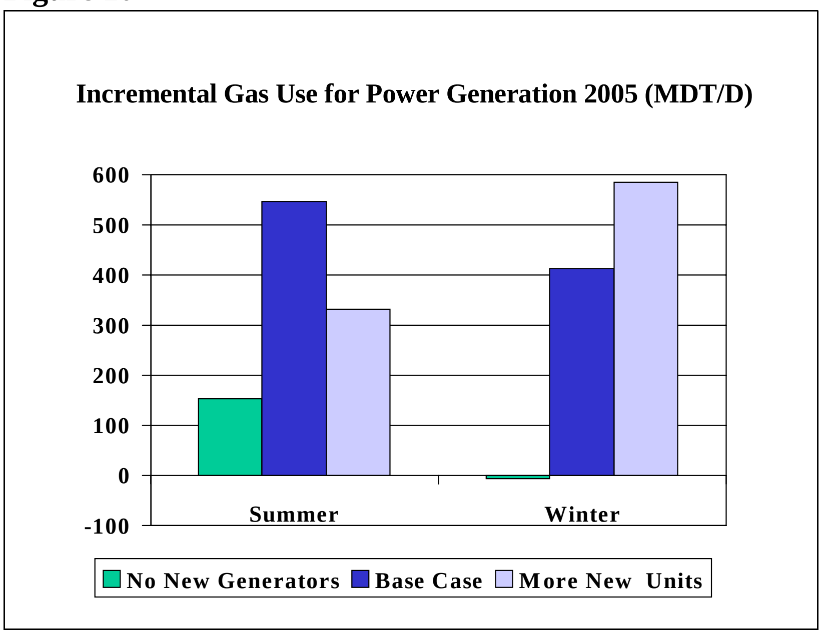
NYSERDA-NYISO has initiated a study to better define power generation gas requirements. The study will also assess power generation sector use of petroleum and thus provide information on fuel diversity in this sector. In addition, the study will assess the

[34] It should be noted that these forecasts are for annual requirements and peak-day requirements (which determine capacity requirements) are expected to increase at a faster rate.

adequacy of natural gas delivery capacity in light of these requirements and explore contingency issues associated with increased interdependence between gas and electricity.

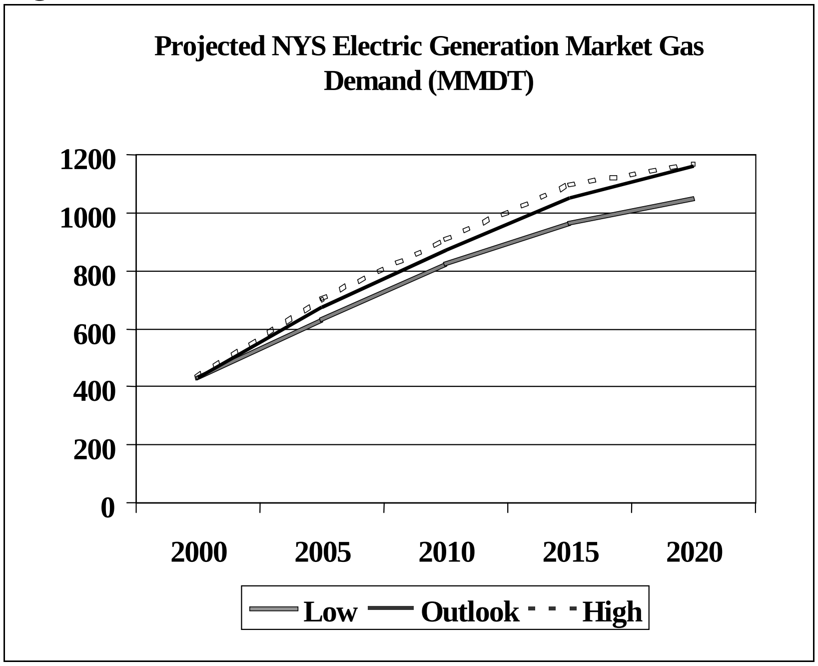
During the initial phase of the study, simulation modeling of the electricity system was used to quantify the potential change in the demand for gas to generate electricity between the year 2002 and the year 2005 under various scenarios. This change is measured between what the existing generating system would use in the year 2002 and how much gas would be used under several cases for new capacity additions. In the base case, new generation capacity additions are assumed to be limited to approved projects and a generic 600 MW of capacity to represent likely additions on Long Island. In another case, new generation capacity additions are assumed to include all approved projects and all projects with completed Article X applications. These cases provide an indication of the amount of gas required for electricity generation assuming no restrictions on gas availability. All cases were examined for both a summer and a winter peak day.

Figure 10



As shown in Figure 10, on a summer peak day gas demand is expected to increase by 546 MDT/D in the base case between 2002 and 2005. However, when nearly 3861 MW more of new plants are added (the more plants case), the increase in gas is actually less at 331 MDT/D. This is because these new, efficient plants displace older less efficient plants and can use the gas that they would have used to generate more electricity to meet electricity demand. When no new plants are added the increase in gas use is smaller at 153 MDT/D. On a winter peak day, gas demand is expected to increase by 413 MDT/D in the base case, by 585 MDT/D when more generation plants are added, and is nearly identical to the base case when gas availability is restricted. When no new plants are added gas demand is expected to decrease by 6 MDT/D. Final results from this study are expected in the early summer of 2002.

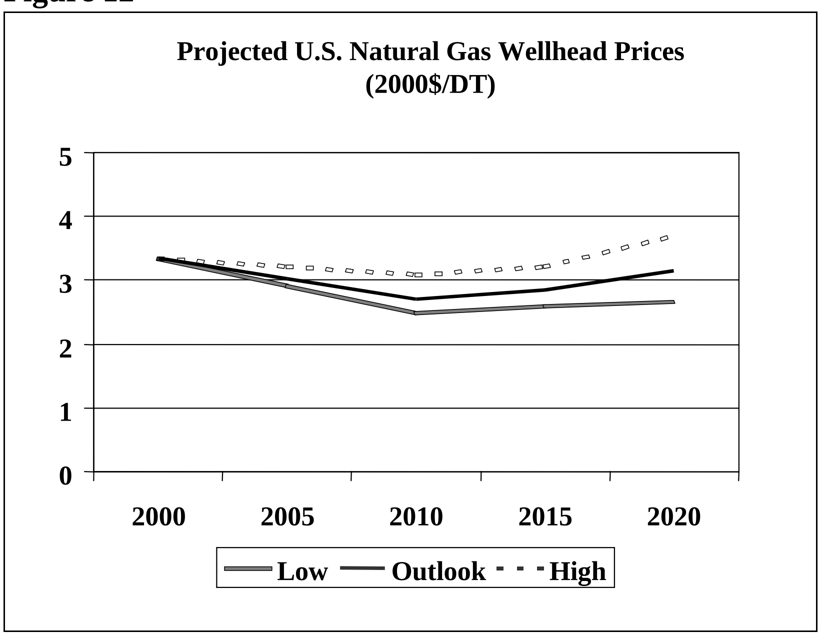
Figure 11



In this plan, over the long-term on a Statewide basis, the projected range of power generation demand growth is expected to be 4.5% per year in the Low Case, to 5.1% per year in the High Case, with the Outlook Case at 5.1% per year, as shown in Figure 11.

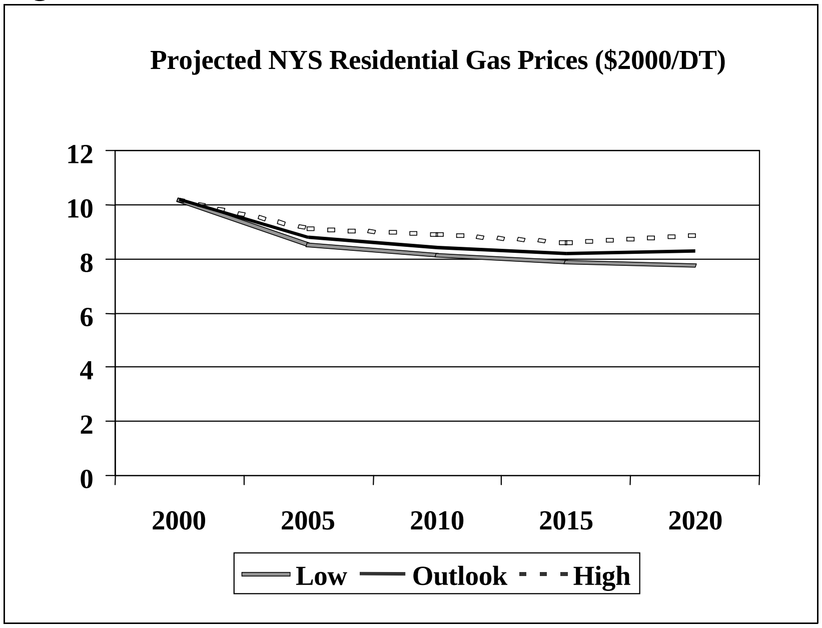
__**Natural Gas Price**__

Figure 12



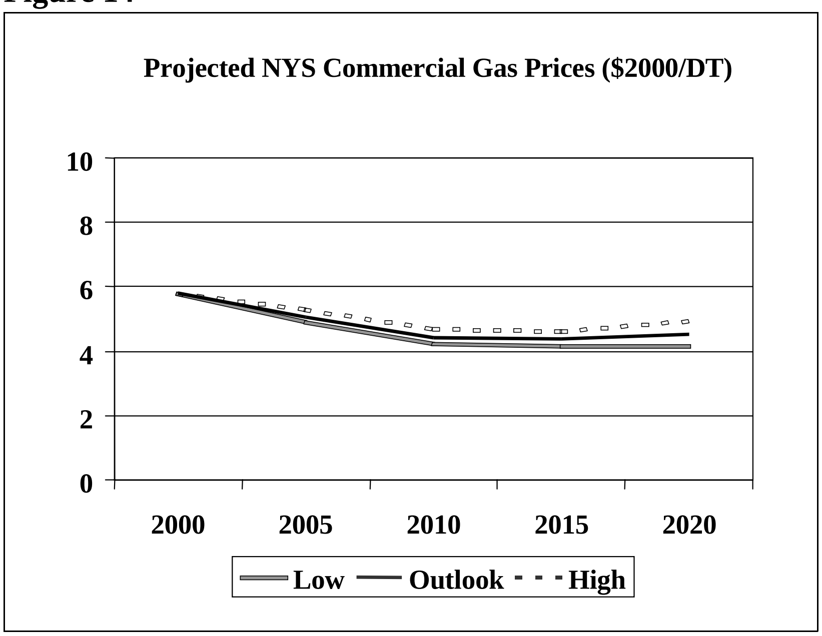
It is especially difficult to project future natural gas prices due to uncertainties and rapid changes in natural gas markets. Early in the year 2000, no industry analysts predicted that gas prices would reach anywhere near $10/DT during the 2000-2001 winter. Similarly, no one predicted that gas prices would fall below $2.50/DT before the 2001-02 winter. Further, long-term price projections are not intended to and do not reflect short-term price variations observed in the market. However, such price volatility will likely be a permanent feature of the competitive gas market.

Figure 13



EIA projections show Outlook Case natural gas wellhead prices trending down and then gradually increasing (see Figure 12). Retail core market prices are expected to decrease slightly in real terms over the forecast period. This is because, in addition to anticipated decreases in commodity cost, there are also anticipated reductions in transmission and distribution system costs. Figures 13, 14, and 15 show the range of core market prices for the residential, commercial and industrial sectors, respectively.

Figure 14



Retail prices of gas for power generation are also expected to decrease slightly and then increase slightly, essentially remaining flat over the forecast period. Figure 16 shows the range of gas prices for the power generation sector.

Natural Gas Supplies

According to EIA's projections, there will be adequate supplies of natural gas at all forecast levels of demand and price. The largest increase in supply will come from domestic sources along with increased dependence on Canadian gas, and LNG imports. New York State gas production will likely increase significantly. However, since demand is expected to grow significantly, the portion of the State's needs met with indigenous gas is not likely to change much.

Figure 15

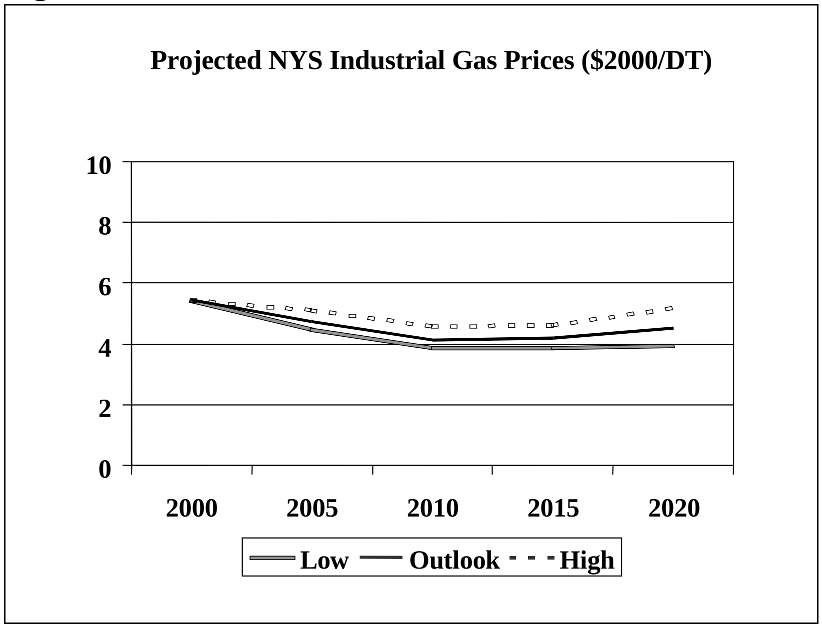
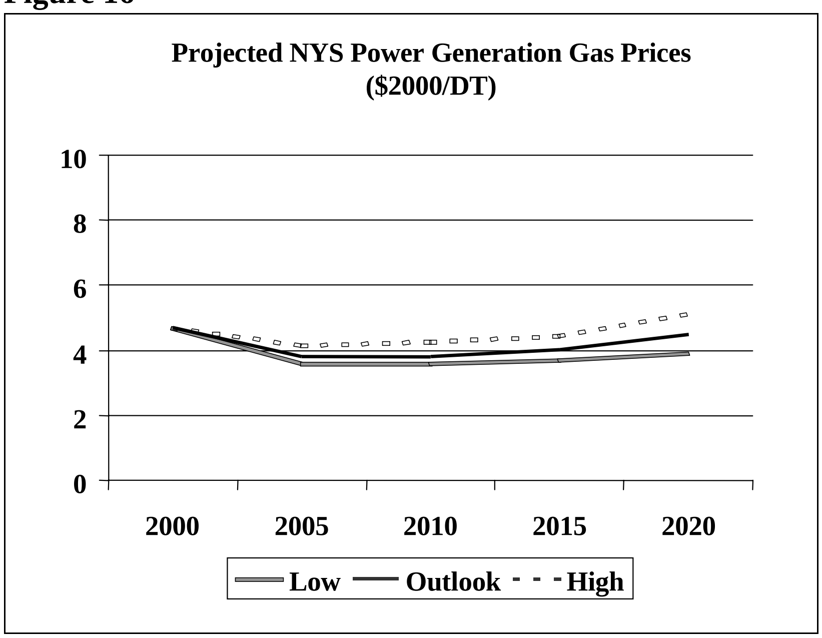


Figure 16



FINDINGS AND CONCLUSIONS

- The demand for natural gas is expected to expand significantly over the planning period, particularly in the near-term, with the greatest increase in the use of gas for power generation.

- More pipeline capacity will be needed to meet the increased demand for natural gas. Interest in expanding interstate pipeline delivery capacity to the Northeast and New York State continues to be strong. The LDC systems will also have to be expanded to meet these increased needs.

- The Federal Energy Regulatory Commission (FERC) recently approved five natural gas pipeline projects to serve the Northeast; and another 13 projects have been proposed.

- Natural gas prices will decrease slightly in real dollars over the long-term and are likely to remain somewhat volatile.

- There is a general need to continue LDC system integrity and safety programs as well as to continue research and development efforts to develop cost savings techniques to maintain and upgrade the existing distribution system.

SECTION 3.6

PETROLEUM RESOURCE ASSESSMENT

INTRODUCTION

New York State is a major consumer of petroleum fuels such as motor gasoline, home heating oil, diesel fuel, propane, and residual oil. The State is the fourth largest petroleum fuel market in the U.S., exceeded only by Texas, California, and Florida. In 2000, total Statewide expenditures on all petroleum fuels by all economic sectors equaled $16.3 billion. The transportation sector accounted for $12.3 billion, or 75% of the total. To meet this demand, numerous multi-national, national, and independent companies supply refined petroleum products to the State through an extensive distribution system. The Port of New York, with large petroleum storage terminals located on both the New York and New Jersey sides of the port, is an important component of this system. These deep water terminals receive a steady flow of refined petroleum products and crude oil into the New York area from domestic and foreign sources. Crude oil is used by refineries located in the mid-Atlantic region to produce refined products for the Northeastern U.S. Once refined fuels arrive at these facilities, they are distributed by barge and truck transport to smaller coastal and inland terminals for further redistribution to customers. New York State 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.

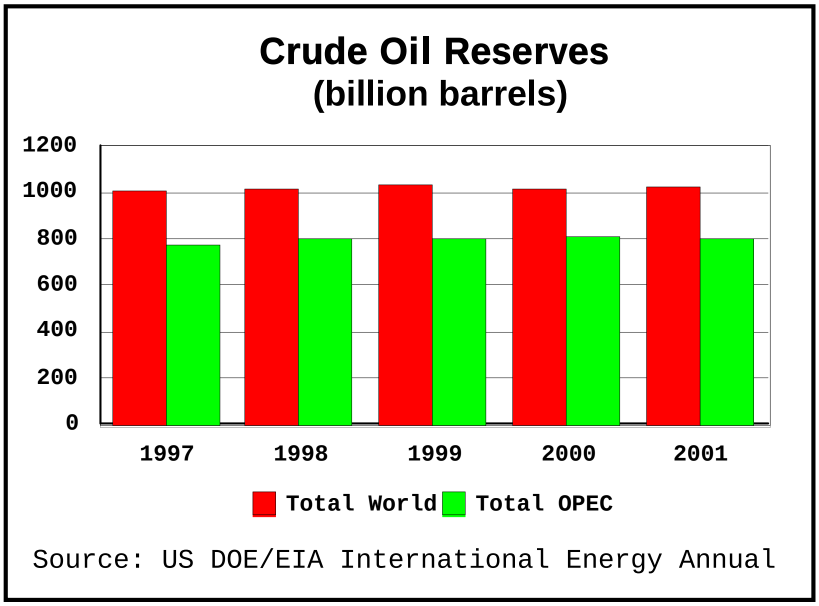
PETROLEUM SUPPLY OVERVIEW

Crude Oil Reserves

Geographic location is as important a consideration as the quantity and quality of crude oil. The amount of proven world crude oil reserves varies annually with new discoveries and improved extraction techniques. In recent years, world crude oil reserves have remained relatively stable as new discoveries have effectively offset depletion of existing reserves. Between 1997 and 2001, estimated worldwide reserves remained steady at approximately one trillion barrels, as shown in Figure 1. While there are a number of important crude oil producing regions around the world, one of the most vital is the Middle East, home to many member nations of the Organization of Petroleum Exporting

Countries (OPEC)[1]. Current OPEC crude oil reserves equal approximately 800 billion barrels and accounted for 77% to 80% of total world reserves between 1997-2001. As a comparison, United States crude oil reserves for this same period averaged about 22 billion barrels, slightly more than 2% of the total world-wide.

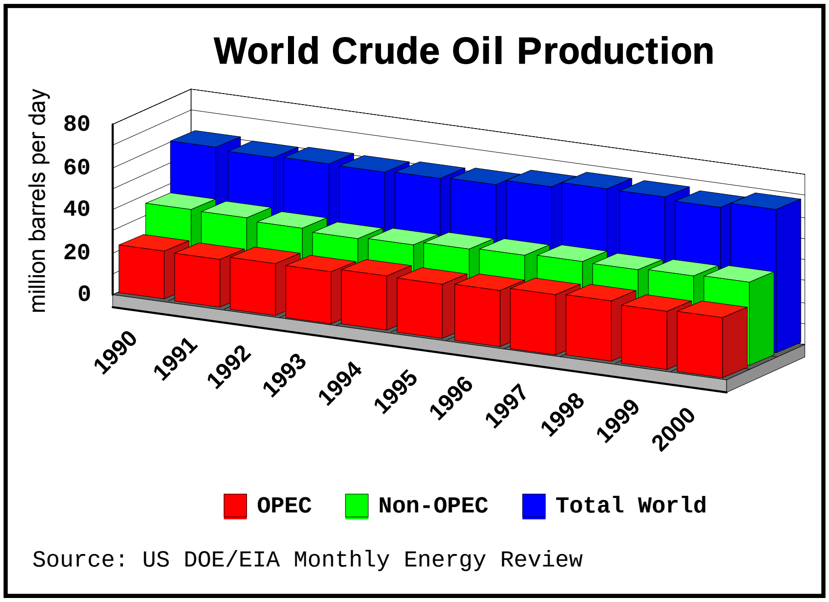
Figure 1



World Production Trends

In general, world crude oil production has increased steadily to meet growing world demand. This gradual trend is occasionally interrupted by periods of inventory draw- downs and short duration reductions in demand resulting from reduced economic activity. World crude oil production, as shown in Figure 2, fell slightly from 60.6 million barrels per day (mmb/d) in 1990 to an average of 60.2 mmb/d for the 1991-1993 period, a decline of 0.7%. During the 1994-1998 period however, world

Figure 2



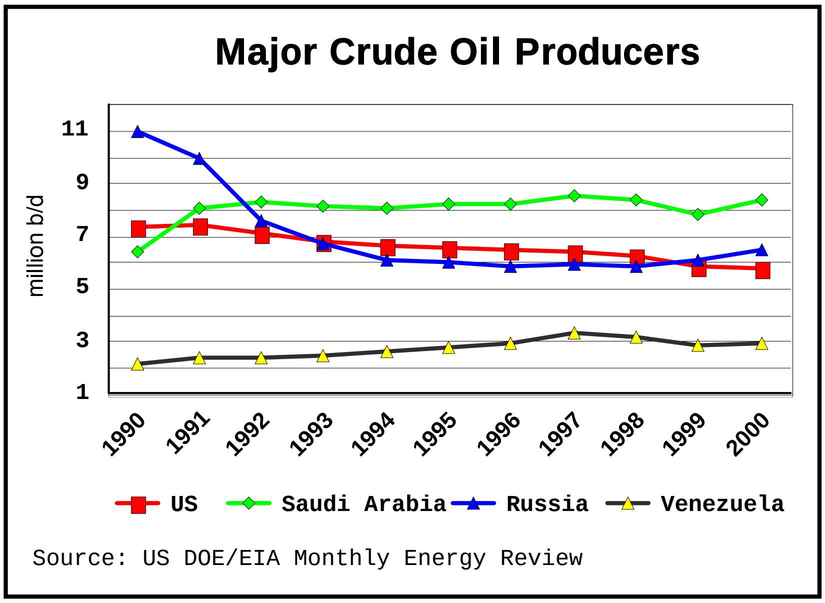
[1] Member nations include Algeria, Indonesia, Iran, Iraq, Kuwait, Libya, Nigeria, Qatar, Saudi Arabia, the United Arab Emirates, and Venezuela. Ecuador withdrew in 1992 and Gabon withdrew in 1994.

demand continually moved higher and reached 67.0 mmb/d by 1998. A small reduction of 1.6% occurred in 1999, but this was offset by an increase of 3.5% in 2000 as total world production reached 68.2 mmb/d and petroleum fuel use rose in response to a growing world economy.

Over the past ten years, the percentage of world crude oil production attributed to OPEC member nations has climbed steadily, rising from 38.3% in 1990 to 42.7% in 2000. This upward trend was briefly interrupted in1996 and 1999. In 2000, the OPEC percentage share was at its highest level since 1980 when the 44.6% level was reached. OPEC's all time highest percentage share of 55.0% occurred in 1973.

Figure 3 presents the annual crude oil production volumes of several major producers between 1990 and 2000. The four countries, Venezuela, Russia, Saudi Arabia, and the United States, accounted for 34.6% of world production in 2000, down from 44.3% in 1990. The reduction in combined market share by these countries is primarily the result of production declines in Russia[2] and the United States. U.S. crude oil production fell from 7.4 mmb/d in 1990 to 5.8 mmb/d by 2000, a 20.8% decline. During the same period Russian production fell from 11.0 mmb/d to 6.5 mmb/d, a 41.0%[3] decline as that country dealt with the breakup of the Soviet Union. While U.S. production continues on a downward trend, production in Russia has rebounded in recent years from a low of 5.9 mmb/d in 1996 to 6.5 mmb/d in

Figure 3



[2] Data for Russia from 1990-1991 consists of the volumes for the 15 republics that made up the Union of Soviet Socialist Republics (USSR). The USSR ceased to exist on December 31, 1991.

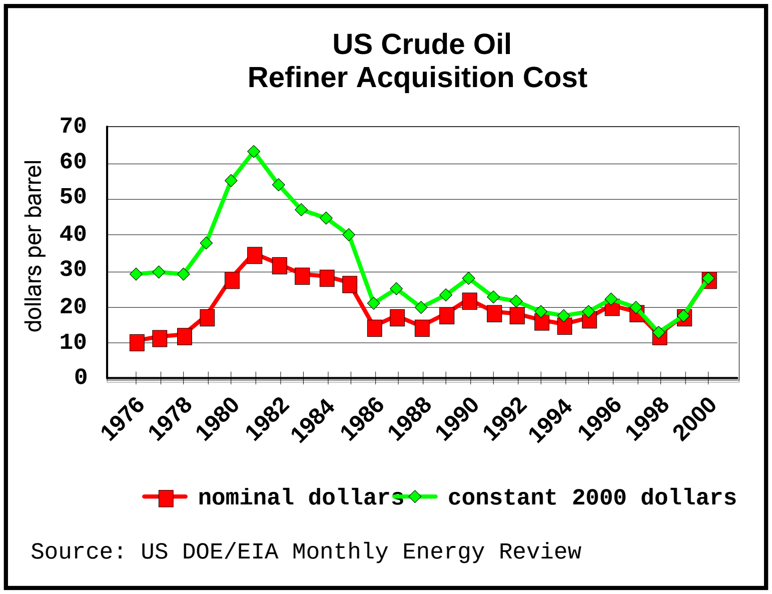
[3] In 1992 Russia accounted for approximately 90% of total USSR production. Data from 1992 onward does not include the remaining 14 former USSR republics.

2000, an increase of 10.2%. Increases in production from Saudi Arabia and Venezuela partially offset the declines recorded by the U.S. and Russia. Between 1990 and 2000 production from Saudi Arabia rose from 6.4 mmb/d to 8.4 mmb/d, a 31% increase. Similarly, production in Venezuela increased from 2.1 mmb/d to 2.9 mmb/d, a gain of 38%.

Petroleum Price Review

A review of the refiner acquisition cost (RAC) of crude oil, the average price paid by U.S. refiners for crude oil processed at domestic refineries, in both nominal and constant year-2000 dollars, is presented in Figure 4. The nominal dollar line shows the average price paid by a U.S. refiner for a barrel of crude oil in that year. The constant year-2000 line indicates the price that a refiner would have paid in year-2000 dollars during a given year. In 1981, on a nominal basis, RAC prices reached a high of $35.24 per barrel (bbl) as the Iranian revolution disrupted the world petroleum markets. As high as this price seems, in terms of constant year-2000 dollars, the price of crude oil actually reached an estimated $63.28/bbl.

Figure 4

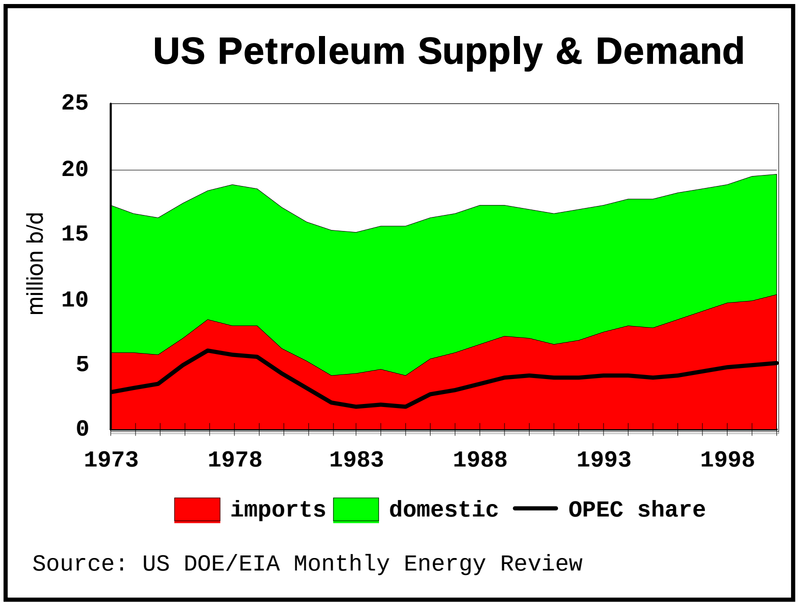


Since the mid-1980s, nominal RAC prices have generally remained within the $15/bbl to $25/bbl range. Even significant events such as the Persian Gulf War in 1990 only temporarily interrupted the relative stability of crude oil prices. More recently, OPEC member nations, as well as some large non-OPEC producers including Mexico, Norway, Oman, and Russia, have sought greater control over crude oil prices internationally by restricting production. The restriction in the amount of crude oil available on world markets has forced RAC prices upward from a 1998 low of $12.52/bbl to $28.23/bbl in 2000, an escalation of $15.71/bbl or about 125%.

U. S. Petroleum Supply and Demand

U.S. demand for petroleum products has grown steadily over the past nine years, as illustrated in Figure 5. Petroleum demand increased from 16.7 mmb/d to 19.7 mmb/d between 1991 and 2000, an increase of 3.0 mmb/d or approximately 18%. During this same period U.S. domestic production, see Figure 3, fell from 10.1 mmb/d to 9.3 mmb/d, a reduction of 7.9%. To offset both the decline in U.S. production and to meet the rise in domestic consumption, imports rose from 6.6 mmb/d to 10.4 mmb/d, a gain of 57.6%. On a percentage of total supply basis, by 1998 imports of crude oil and refined products passed the 50% level for the first time, equaling 51.6%. For the most recent year, 2000, imports achieved a U.S. market share of approximately 53%. For comparison, the 1990 import share was 42% and in 1980 it was 37%.

Figure 5



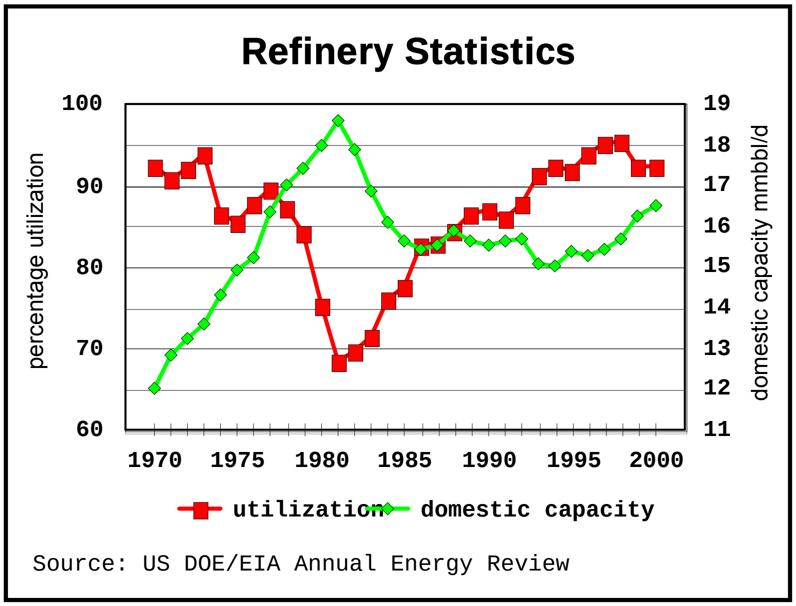
OPEC's share of total U.S. petroleum product imports exceeded 50% for the first time in 1974 when OPEC supplied 55.7% of total import demand. The percentage share moved steadily higher until 1977, when an all time high of 72.3% of total imports were supplied by OPEC members. During the 1978 to 1985 period, the Arab oil embargo and sharply higher world crude oil prices pushed the OPEC share down to 42.7% by 1985. Since that time, OPEC's share of the U.S. market has remained in the 50 to 60% range.

Refining Industry Profile

The domestic refining industry has undergone significant changes over the past 30 years. During the 1970s and early 1980s, domestic refining capacity climbed from approximately 12 mmb/d to 18.6 mmb/d, a 55% gain, as the number of refineries increased from 276 to 324 by 1981. This increase in refinery capacity occurred in response to rising domestic demand. However by 1978, petroleum demand had reached a peak of 18.8 mmb/d, and as a result of higher energy prices stimulating conservation initiatives, U.S. use began to decline.

As domestic capacity rose, see Figure 6, the percentage utilization rate for domestic refineries began to fall from the 1973 peak of 93.9%. In effect, capacity additions were occurring at a faster rate than the growth in demand. This caused utilization rates to decline. The combination of rising capacity and falling demand pushed refinery utilization rates sharply downward until they reached a low of 68.6% in 1981. As a result, between 1981 and 2000, the number of domestic refineries fell from 324 to 158, a 51% decline. The corresponding reduction in capacity from 18.6 mmb/d to the current level of 16.5 mmb/d, a decrease of 11.3%, resulted in increased utilization rates in the mid-90% range for the remaining refineries during the 1990s. While this consolidation effort has increased the utilization rate of the remaining refineries, it has made the industry more susceptible to equipment breakdowns and outages as facilities have been required to operate closer to their maximum design capacity over longer durations. One result of this consolidation effort is that regions of the country once served by a number of different companies and facilities now must depend on fewer refineries. When operational problems occur at one of the remaining facilities, a region may experience supply disruptions and price surges until adequate replacement volumes find their way to the affected markets.

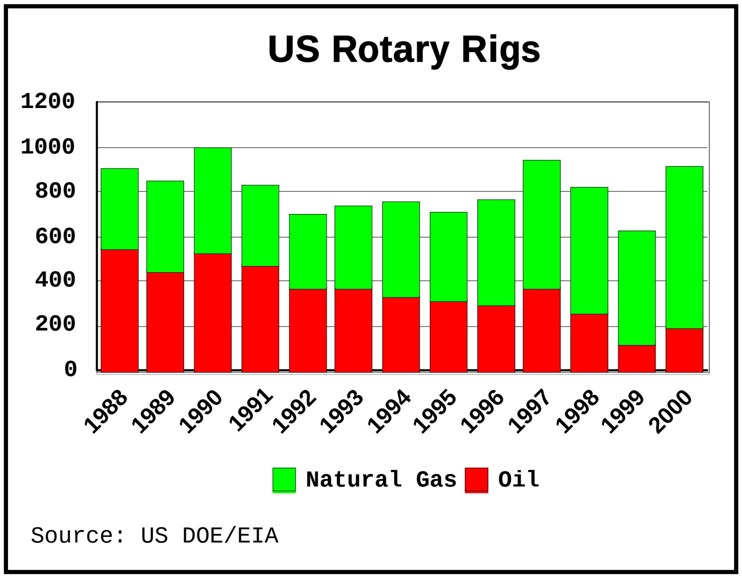
Figure 6



Since 1995, domestic refining capacity has increased even as the number of refineries continues to decline. While financial, environmental, and legal considerations make it difficult for new refineries to be built in the U.S., many facilities have added capacity as various existing processing units are upgraded or expanded. Refiners are also altering processing units to maximize the production of higher value “light products” such as gasoline, distillate, jet fuel, and liquified petroleum gases at the expense of residual fuel which has seen its market share decline for many years.

<u>Exploration Industry Profile</u>

Figure 7



The amount of exploratory drilling and development drilling undertaken by the industry relies heavily on the prices of crude oil and natural gas as well as on drilling costs. Data showing the number of rotary rigs operating in the U.S. for natural gas and oil exploration over the past 13 years are presented in Figure 7. The direct correlation between oil prices and the number of rigs in operation was most pronounced in 1990 and 2000. By referring back to Figure 4, it can be determined that crude oil prices were relatively high during those two years. Correspondingly, Figure 7 shows that the number of rotary rigs exploring for oil also increased. Between 1999 and 2000 the number of rigs exploring for oil increased from 128 to 197, a rise of almost 54%. This escalation in activity follows a two year upturn in crude oil RAC prices from $12.52/bbl in 1998 to $28.23/bbl in 2000, a gain of $15.71/bbl, or 125%. The rise in drilling activity in 1990 also followed a two year gain equaling $7.55/bbl, or 51.5%. Additionally, the 2000 data indicates that higher prices greatly stimulated natural gas exploration activities. The number of rotary rigs exploring for natural gas climbed from 496 in 1999 to 720 in 2000, a gain of 224 rigs or 45.2%, as natural gas prices surged to record highs.

As important as the raw prices of crude oil and natural gas are, the productivity of drilling operations is also critical. As the cost of operations and activities, such as data acquisition and processing, and the display and integration of seismic data with geologic data, continue to fall, the costs of drilling become more affordable. Additional factors, such as powerful computers and the general increase in knowledge and experience, continue to exert downward pressure on drilling costs and help stimulate exploration.

NEW YORK STATE OVERVIEW

Infrastructure and Distribution Network

Meeting New York's future petroleum demands requires both an adequate supply of refined products and an efficient distribution network to move the various fuels from refining centers to end users. However, the reliability and efficiency of the present petroleum distribution system will be continually challenged by changing circumstances, such as stricter environmental requirements, land use issues, and the general aging of the infrastructure throughout the forecast period.

The petroleum supply industry in New York has adapted over time in response to ever greater dependence on imported oil. As domestic sources of crude oil and refined products became less plentiful, the Port of New York developed into a ready entry point for petroleum products. As tanker shipments of petroleum products from foreign and distant Gulf Coast refineries increased, many terminal companies established large supply operations along the New York and New Jersey sides of the Port. Today, these primary oil storage facilities are vital mechanism's for redirecting bulk deliveries of imported and domestic products to end users across the State and throughout the Northeast.

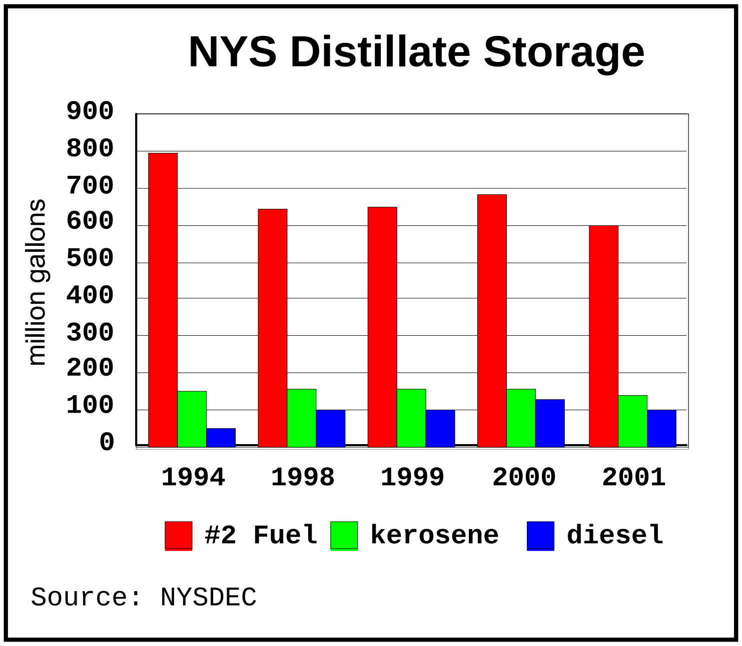
A diverse distribution network has developed over the years to transport petroleum products into and throughout New York State. Several pipeline systems connect New York consumers to the major refining centers located along the Gulf and East Coasts. Waterways, consisting of coastal channels, rivers, and canals, allow barges and coastal tankers to move supplies of refined products to end users Statewide. These water routes also provide an alternative means for shipping fuels from domestic refineries located outside the State. Highway transport vehicles deliver supplies from New Jersey, Pennsylvania, and Canada across the southern and northern regions of the State. Rail shipments are not as common as other modes of transportation and generally are confined to interstate movements of bulk quantities of fuel. Refined products often are placed in interim locations, such as major regional terminal centers, for later truck or barge distribution to retail outlets and end users.

Statewide Storage Capacity

In recent 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. They note that this reduction has impaired the operating flexibility needed to satisfy consumer oil demand. Petroleum storage terminal facilities face many of the same environmental, land use, and economic pressures that affect the refining sector. Operators note the high costs associated with meeting more stringent environmental regulations, increased insurance costs, greater carrying costs associated with holding petroleum products, and the lack of market incentives to build new facilities as impediments to adding storage capacity in the State.

Statewide distillate fuel storage capacity, which includes volumes of #2 home heating oil, kerosene, and diesel fuel, is shown in Figure 8. Operational storage capacity of #2 home heating oil has declined from 794 million gallons in 1994 to 600 million gallons by 2001, a reduction of 194 million gallons or 24.4%. However, over the same period, Statewide demand for this fuel by the residential, commercial, industrial, and electricity generation sectors has increased 4.3%. This indicates that while terminal capacity is being used more efficiently to meet normal everyday demand, there is less capacity to meet atypical demand surges associated with cold weather. This creates marketplace supply uncertainty and contributes to greater short-term price volatility. In effect, consumers have become more dependent on the ability of the petroleum transport industry (tugboats, barges, and tankers) to resupply the remaining terminals during peak demand periods.

Figure 8

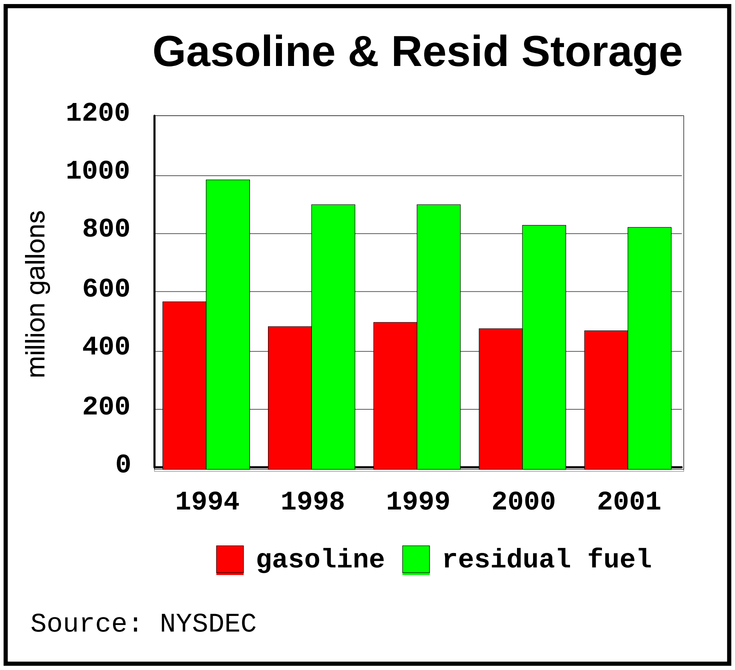


Kerosene is an important fuel used to meet heating needs and as a blending agent to prevent cold weather gelling in diesel fuel. Statewide storage capacity of this fuel has remained steady at approximately 150 million gallons between 1994 and 2000. It was only in the most recent year that capacity declined to 136 million gallons, a reduction of 13.2% from 2000.

Storage capacity of diesel fuel increased steadily from 48 million gallons in 1994 to 127 million gallons by 2000, a gain of 79 million gallons or 165%. However, a significant decline in capacity occurred in 2001 as the total Statewide volume equaled 99 million gallons, a fall of 28 million gallons, or 22%.

Statewide motor gasoline and residual fuel storage capacities, presented in Figure 9, indicate the same declining capacity trend discussed for distillate fuels. Between 1994 and 2001, gasoline capacity fell from 571 million gallons to 471 million gallons, a drop of 17.5%. Again, while capacity decreased, demand for gasoline over the same period increased from 5.5 billion gallons to 5.8 billion gallons, a gain of 4.2%. Similarly, the capacity of residual fuel, a fuel used by the electricity generation sector and in large industrial, commercial, and residential boilers, saw capacity move downward from 981 million gallons in 1994 to 823 million gallons in 2001, a decline of 158 million gallons, or 16%.

Figure 9

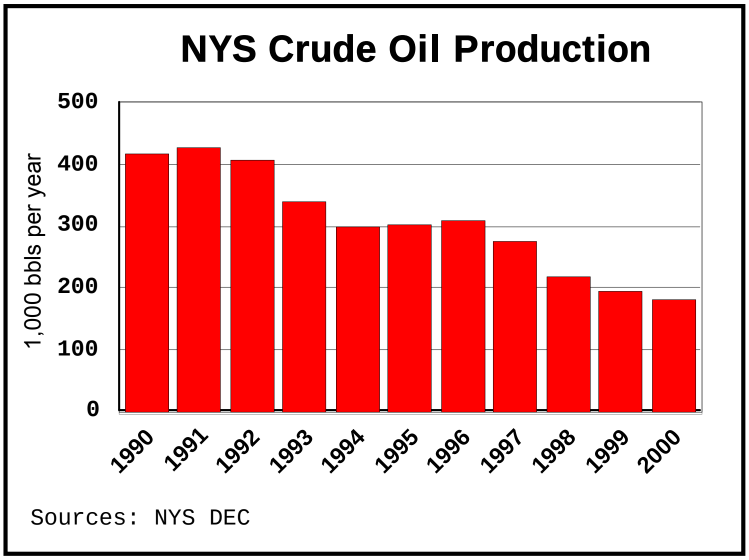


Exploration Activities

Historic Industry. New York's first commercial oil well began production in 1865, and Statewide production peaked in 1882 at 6.8 million barrels per year. This initial oil boom was short lived, and by 1893 production was down to one million barrels per year. New York's second oil boom occurred with the invention of water flooding, the first enhanced oil recovery technique. The technique led to a second peak of 5.4 million barrels in 1943. Since then, Statewide oil production has steadily declined. The last major oil find occurred in 1981 when the "Bass Island Trend" was discovered in Chautauqua County. This geographic formation proved to hold a significant amount of oil and has produced over 1.5 million barrels of oil and significant volumes of natural gas.

Current Production Trends. According to the Energy Information Administration, New York ranked 29th out of 31 oil producing states in the year 2000. New York's oil production comes from two distinct regions: 1) the historic areas of Allegany, Cattaraugus, and Steuben counties, and 2) from the Bass Island Trend in Chautauqua County. Oil production in 2000 totaled 180,590 barrels, less than 0.1% of annual demand, and a 57% decline from 1990 as shown in Figure 10. By the end of 2000, there were 2,803 active oil wells and another 1,906 not reporting any production. Active wells in the State produce a yearly average of 64 barrels per well. New York's historic oil fields in Allegany, Cattaraugus, and Steuben counties accounted for 87% of reported production, reflecting the rapid decline of the Bass Island Trend in Chautauqua County.

Figure 10



From 1990 to 2000, oil well completions ranged from a high of 71 in 1992 to a low of 7 in 1998. Completions rebounded slightly to 25 in 1999 and 17 in 2000. This modest rebound in new wells can be partly attributed to a 125% increase in average crude oil prices from 1998 to 2000. In 1997, the only wildcat[4] well drilled in New York in the last ten years led to the discovery of a small field in northern Cattaraugus County. The field, named Bixby Hill, continues to produce approximately 3,000 barrels of oil per year.

Crude Oil Production Outlook. New York's decreasing oil production can be attributed to the lack of new discoveries, declining Bass Island production, and the continued plugging of both oil and injection wells caused by increased environmental compliance costs. Though low product prices have been blamed as a factor for declining production in the past, increased prices in 1999 and 2000 only stimulated a moderate drilling increase that did not alter the downward trend in Statewide production.

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[4] An exploratory well drilled in unproven territory.

Yet, the remaining resource base is substantial. In an extensive geological study of the State's resource base done in the 1980s, original oil-in-place was estimated at 1.118 billion barrels.[5] Cumulative production through 2000 totaled approximately 244 million barrels. This represents an estimated recovery rate of approximately 22%. Primary production can usually recover a maximum of 30% with another 15% possible from water flooding. Using this very optimistic 45% maximum recovery factor, total New York production from primary and secondary methods may total 600 million barrels with 356 million barrels yet to be recovered. In reality, any significant recovery of this resource requires new and expensive technologies, such as tertiary recovery methods and horizontal drilling.

The New York State Energy Research and Development Authority (NYSERDA) has funded projects that demonstrate horizontal drilling and enhanced recovery techniques in New York's oil fields. A particular success was the Maring 3-B horizontal well recompletion drilled in the Bass Island Trend. The well was completed in August 1998 with flow rates in excess of 250 barrels of oil per day with associated gas. A second horizontal well is planned for 2001.

Without renewed commercial interest, discovering any new major geologic target may be difficult. If business conditions improve, the application of new technologies, such as horizontal drilling and tertiary recovery methods, may help slow the State's production decline. Otherwise, the outlook for crude oil production is a continued decline of 5 to 10% per year.

Petroleum Share of New York Sector Demand

Petroleum fuels are vital to the State's economy and remain the single largest source of energy consumed in the State. As of 1999, petroleum supplied approximately 40% of New York's total demand. While this is well below the 65% level recorded in 1975, it is greater than the 31% figure for natural gas in 1999. Petroleum fuels provide energy for each of the State's economic sectors, as shown in Figure 11. The electric sector has posted the sharpest decline, falling from about 47% in 1975 to the current rate of 7.9%. Since the early 1990's, the electricity sector has steadily turned to natural gas to satisfy the State's increased electricity demand. However, petroleum products such as residual fuel continue to supply a number of large baseline generating units. Distillate fuels serve

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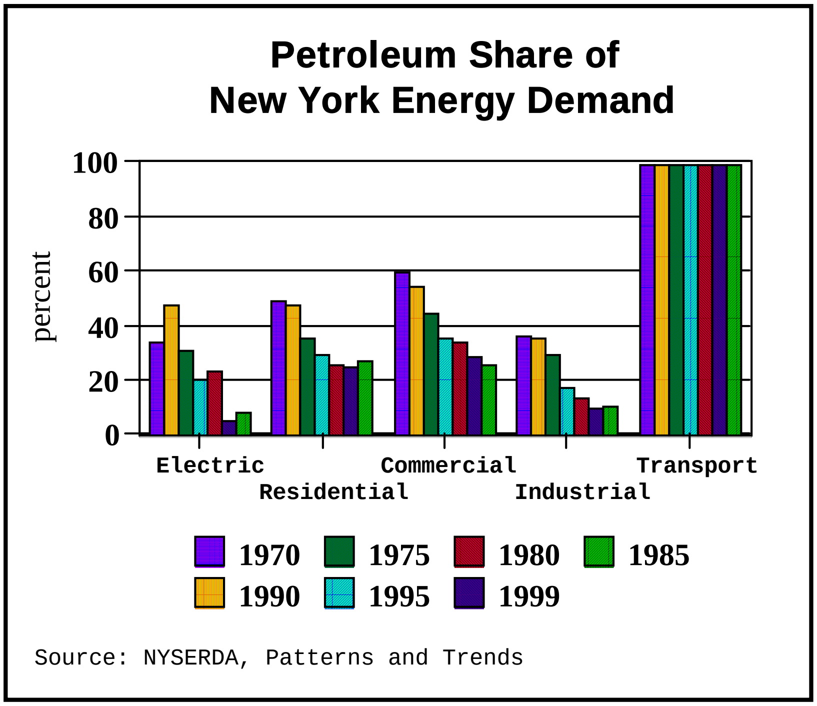
[5] Reed, C. ed., 1989. *New York State Oil and Gas Drilling and Production 1988.* New York State Department of Environmental Conservation - Division of Mineral resources, p. 59.

the dual purpose of fueling electricity generation peaking units and providing backup fuel capability at some generation facilities during periods when natural gas is unavailable. Finally, in the transportation sector, gasoline and diesel fuel still account for over 99% of energy supplies.

Figure 11



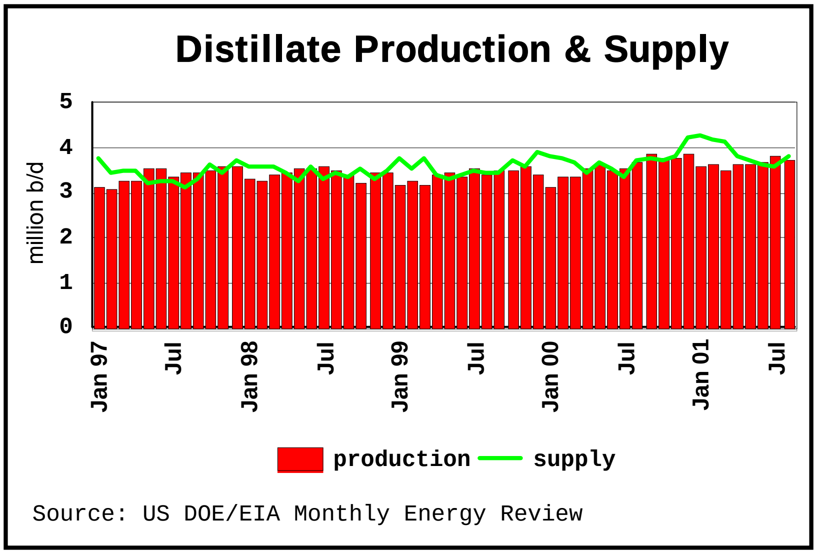
In the residential sector demand for all petroleum fuels, including home heating oil, kerosene, and propane fuel, declined as higher prices in the 1970s and early 1980s encouraged homeowners to convert to natural gas, increase home insulation, lower thermostats, and purchase high efficiency furnaces. Similar end-user sentiment in both the commercial and industrial sectors acted to reduce petroleum's share of total energy supply. A limited amount of dual-fuel capability exists in large apartment buildings in the residential sector and in both the commercial and industrial sectors. Dual-fuel equipment allows end-users the option to switch between natural gas and distillate fuels when the price for one makes it an economic advantage to do so. As a result, if a sufficient amount of fuel switching occurs, petroleum use may increase from year to year. This occurred in both the residential and industrial sectors between 1995 and 1999.

REFINED PRODUCT REVIEW

<u>Distillate Supply and Demand</u>

Monthly total U.S. distillate fuel production and supply is presented in Figure 12. In this analysis, supply is used as a surrogate measure for demand. As the graph illustrates, there are a number of months during the winter period when demand outstrips the production capacity of domestic refiners. It is during these times that inventories and product imports become critical to meet consumer needs. A review of the graph shows that the spread between domestic production and demand has widened over the past four winter seasons. During the October 1997 through March 1998 winter period, the demand to production spread averaged 153,000 b/d. The following year the spread increased to 295,000 b/d, a gain of 142,000 b/d, or 93%. Over the next two winter periods the spread climbed to 371,000 b/d in 1999-2000, and finally to 375,000 b/d in 2000-2001.

Figure 12



New York Distillate Fuel Focus

New York State is a major user of distillate fuel[6] with an estimated 2.9 million households (representing nearly one-half of the population) using home heating oil and kerosene for heat. The three distillate fuels are utilized in each of the economic sectors of the State and account for approximately 25%[7] of total petroleum fuel used in New York. New York consumers use approximately 20% of the nation's total distillate supply, with the residential sector accounting for the majority of the use within the State. New York uses more heating oil than any other state in the nation. The residential, commercial, industrial, and electricity generating sectors use an average of 11 million gallons of distillate fuel per day over the four-month November through February winter period. This figure does not include diesel volumes used in the transportation sector.

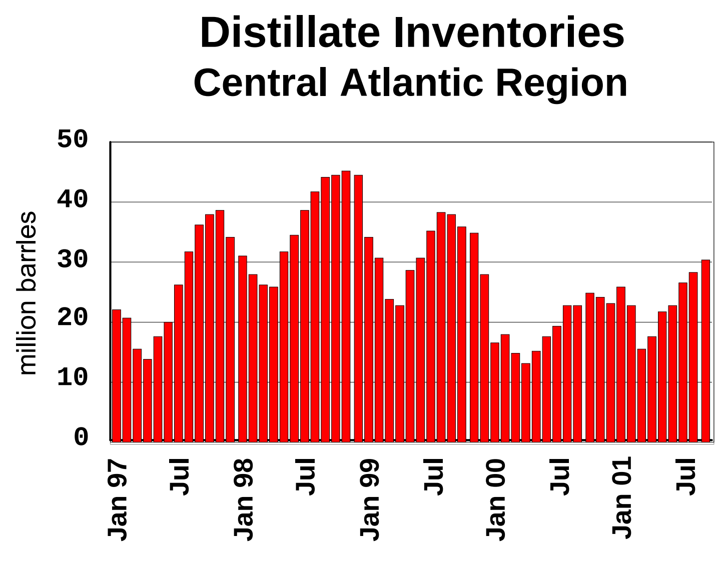
[6] Distillate fuel is defined as home heating oil, kerosene, and diesel fuel.
[7] NYSERDA, *Patterns and Trends 1999*.

Distillate Inventory Trends

Inventory volumes are important components of the distillate fuel supply system and at the regional level act as critical buffers to meeting demand during the winter months. Monthly distillate fuel quantities for the Central Atlantic Region[8] of the U.S. are presented in Figure 13. Regional analysis is important because New York's fuel needs, as well as those of neighboring states, are met from terminals located both within and outside the State. Correspondingly, some fuel inventories in New York Harbor and northward along the Hudson River supply neighboring New England and Central Atlantic states.

Figure 13 illustrates an important development that has emerged in recent years concerning distillate inventories; it appears the petroleum industry is maintaining progressively lower volumes of distillate fuel each year in the Central Atlantic Region. The data show that distillate fuel inventories in 1998 peaked at 45.2 million gallons in November. The following year a peak of 38.4 million gallons occurred in August, 6.8 million gallons, or 15% lower than the previous year. By 2000, inventory volumes only reached the 24.9 million gallon level at the October highpoint, 35% less than the year earlier and 45% below the 1998 level.

Figure 13



Source: US DOE/EIA Monthly Energy Review

This three-year pattern of lower inventories reflects the industry's movement to a practice known as "just-in-time" inventory resupply. Just-in-time inventory practices have been undertaken because there are significant costs incurred by petroleum terminal operators and distributors in storing large volumes of fuel over extended periods of time. The

[8] Includes Delaware, District of Columbia, Maryland, New Jersey, New York, and Pennsylvania.

industry now relies on the petroleum supply chain to deliver fuel to satisfy market requirements. While this management practice reduces inventory carrying costs, it exposes the petroleum distribution chain to a greater level of vulnerability should supply disruptions occur anywhere, or for any reason, along the distribution chain.

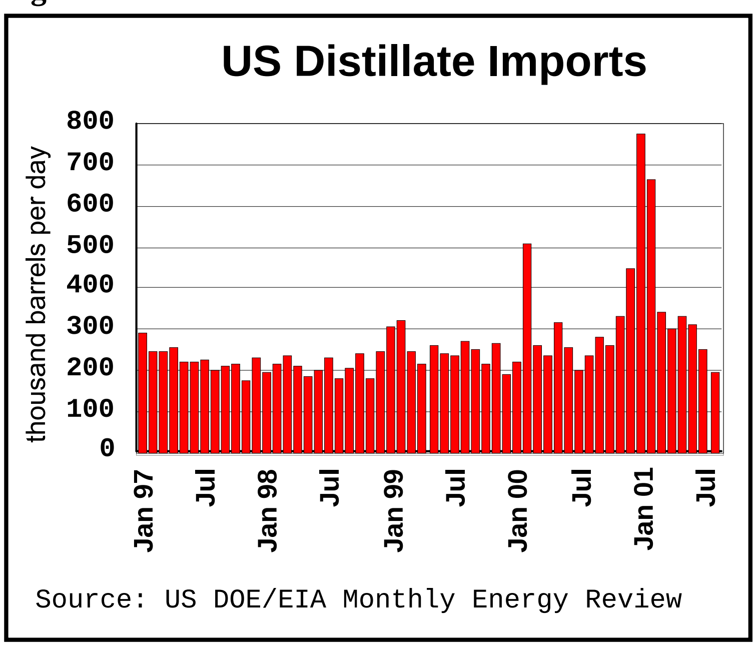
Northeast Home Heating Oil Reserve

In response to the distillate fuel shortfalls that occurred during the 1999-2000 winter season, the U.S. Department of Energy (US DOE) established the Northeast Home Heating Oil Reserve in the summer of 2000. This reserve consists of two million barrels of government-owned heating oil. The reserve is intended to provide insurance against lower than normal inventories, supply shortfalls, and delivery interruptions. In the initial year of operation, reserves of 500,000 barrels each were held at Equiva's Motiva Terminal and Morgan Stanley's Williams Terminal, both in New Haven, Connecticut, and one million barrels were held at the Hess Terminal in Woodbridge, New Jersey. In the summer of 2001, US DOE approved the relocation of 150,000 barrels of the Reserve from New Haven to Providence, Rhode Island. There is also an option to expand this Rhode Island volume to 250,000 barrels in the future. This third location enhances the distribution capabilities by increasing truck and marine loading options. States covered by the reserve are New York, Connecticut, Maine, New Hampshire, Rhode Island, Vermont, Massachusetts, Pennsylvania, and New Jersey.

Distillate Imports

In response to lower inventory levels and relatively steady domestic production trends, the petroleum industry has increased imports of distillate fuel to meet the surge in demand that occurs during peak periods. Monthly total U.S. distillate fuel imports are shown in Figure 14. The graph illustrates that, as inventory volumes declined over the past three years, the petroleum industry satisfied

Figure 14



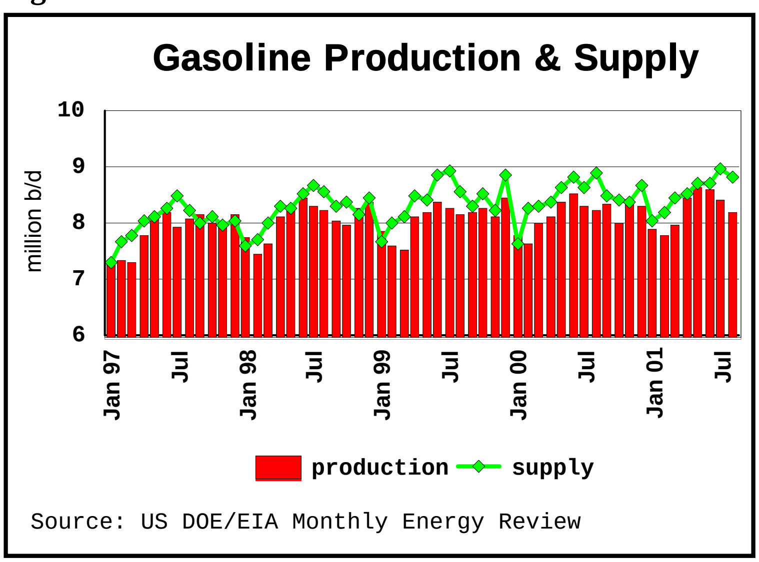
demand with increasingly larger quantities of imports. In February 1999, the industry imported a high of 322,000 barrels per day (b/d), 85,000 b/d or 36% more than the previous year. By February 2000, the total had climbed to 510,000 b/d, 188,000 b/d or 58% above the year earlier level. Finally in 2001, the petroleum industry imported record volumes for two consecutive months, 778,000 b/d and 668,000 b/d, respectively for January and February.

With import volumes of this magnitude, there is concern whether the distribution system, including barges and tankers, can satisfy the future requirements of the region. Also, potentially significant increases in demand for distillate products used as backup fuel for natural gas in the electricity generation sector add to the concern. Lower storage tank capacities and quantity of fuel stored increase the likelihood that supply disruptions caused by winter storms or heavy ice conditions could adversely affect New York end users in all economic sectors.

Gasoline Supply and Demand

Monthly total U.S. gasoline production and supply are presented for the January 1997 to August 2001 period in Figure 15. Once again, supply is used as a surrogate measure for demand. The clear pattern that emerges from the data is that, for numerous months of the year, the U.S. depends on imported gasoline to meet every day demand. This is particularly true during the summer months and again highlights the importance of maintaining adequate inventories. On an annual basis the data indicate that from 1997 to 1999 the difference between domestic production and demand increased from 147,000 b/d to 320,000 b/d, an increase of 173,000 b/d or about 118%. For 2000, this difference declined to 286,000 b/d, a decrease from 1999 of 34,000 b/d or 11%. The greatest individual monthly difference since 1997 occurred in August 2000, when demand surpassed domestic production capacity by 670,000 b/d.

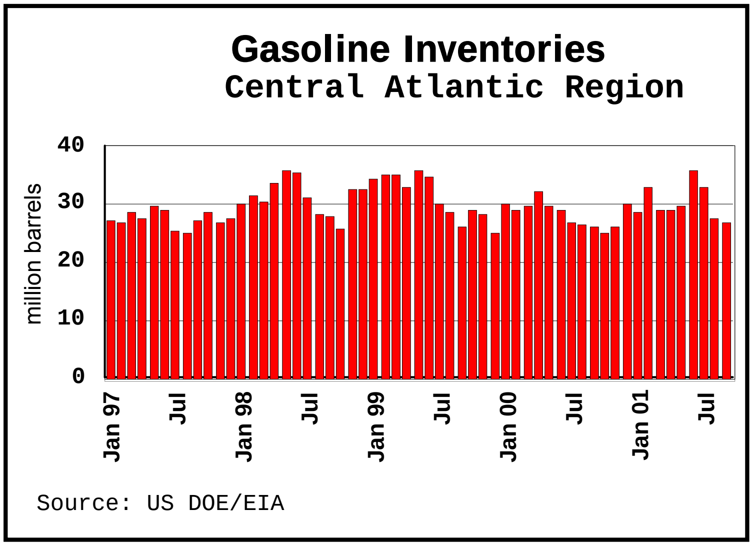
Figure 15



Gasoline Inventory Trends

Like distillate fuel inventories, gasoline inventories play critical roles in ensuring adequate supplies of motor gasoline, particularly during the peak summer driving season. Total gasoline inventories for both conventional and reformulated gasoline are presented in Figure 16. Unlike distillate fuels, which show a downward trend in total volume, seasonal gasoline inventories have remained relatively stable since January 1997. In general the petroleum industry increases stock levels during the spring in anticipation of higher demand during the summer driving season. During 2000, inventories on average were below the previous two years but in 2001 they once again moved to a higher level.

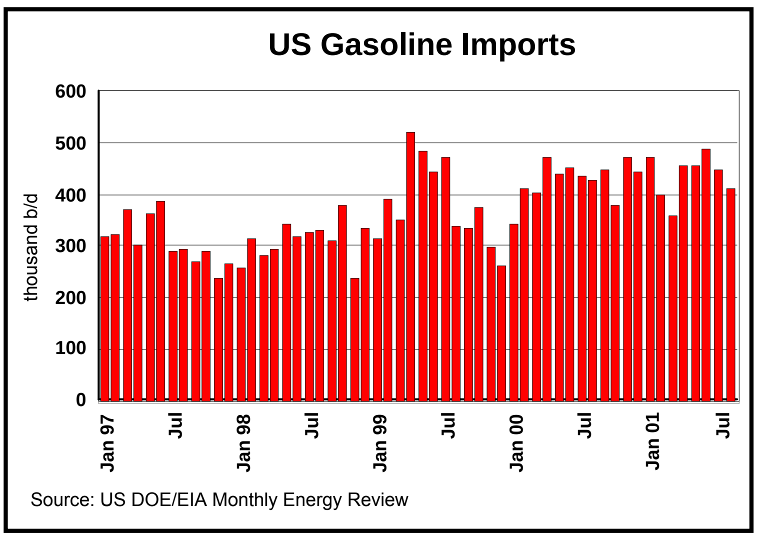
Figure 16



Gasoline Imports

Since the increase in domestic gasoline production has not kept pace with the rise in demand, volumes of imported fuel have been on an upward trend. Monthly total U.S. gasoline imports are shown in Figure 17. As the graph illustrates, since 1997 the quantity of gasoline imports has been rising. In 1997, imports averaged 309,000 b/d. By 2000, the volume had risen to 427,000 b/d, an increase of 118,000 b/d or approximately 38%. During the 1997 to 2000 period, U.S.

Figure 17



dependence on gasoline imports to meet domestic demand climbed from 3.8% of total supply in 1998 to 5.0% in 2000. While it is expected that product imports will continue to be available, the difference in U.S. gasoline regulations compared to other areas of the world may limit supply availability in the future.

New York State Gasoline Focus

New York gasoline requirements are satisfied by either conventional grade fuel or U.S. Environmental Protection Administration (US EPA) mandated reformulated (RFG) gasoline. Gasoline retailers are required to sell RFG grade gasoline throughout the year in New York City and on Long Island, and in the counties of Westchester, Putnam, Orange, Dutchess, and Rockland. This region of the State uses an estimated 2.9 billion gallons, or approximately 50% of New York's annual gasoline demand. One of the primary components of RFG is methyl tertiary butyl ether (MTBE). This additive has been used in gasoline since 1979. Initially it was used as an octane enhancing replacement for lead and later as an oxygenate to reduce ozone, carbon monoxide, and other air pollutants. Other areas of the State use conventional gasoline.

About 50% of all gasoline delivered to New York State is produced at Gulf Coast refineries. Most of this fuel is shipped by pipeline to storage terminals in northern New Jersey and central and western New York. A small volume of this supply is transported by coastal tanker into New York Harbor. Approximately 40% of the gasoline consumed in New York is produced at Mid-Atlantic refineries, located primarily in New Jersey and Pennsylvania, and moved into New York Harbor and Long Island terminals by barge. The remaining 10% of the gasoline used in the State is imported by ocean tanker from the Caribbean area, largely from Virgin Islands and Venezuelan refineries, or by truck from Canada. Gasoline reaching New York Harbor is also barged to regional terminals along the Hudson River, north to Green Island, and east to Long Island. Tanker trucks then move the gasoline from regional terminals to neighborhood gasoline stations.

Article X Focus

Table 1 summarizes petroleum fuel information for 11 of the 22 Article X projects that have filed applications and have been approved by the New York State Board on Electric Generation Siting and the Environment, filed applications and are pending, filed pre-application reports, and/or filed preliminary scoping statements as of September 15, 2001.

Table 1

ARTICLE X PROJECTS PETROLEUM PROFILE						
Project Name	**Winter Capacity (MW)**	**Backup Fuel**	**Storage Capacity million gallons**	**Average Burn Rate Days of Storage**	**Backup Fuel Maximum Burn Rate gal./hr.**	**Backup Fuel Average Burn Rate** gal./hr.**
Athens	1080	#2 Oil	4	3.9	66,000	43,000
Astoria Energy	1000	#2 Oil	6	6.9	56,000	36,400
Bowline Pt. 3	750	#2 Oil	n/a	n/a	34,300	22,300
East River Repowering	360	#2 Oil	4.4	9.4	30,000	19,500
Ravenswood Cogeneration	250	< .04% kerosene	2	8.5	15,000	9,750
Sunset Energy	580	#2 Oil	0.25	0.5	30,528*	19,843*
Bethlehem Energy Center	750	<.04% distillate	10.5	17	39,476*	25,660*
Poletti Station Expansion	500	< .04% kerosene	6	14.6	26,318*	17,106*
Kings Park	300	#2 Oil	0.08	0.5	31,581*	20,528*
Caithness Island Power	750	#2 Oil	2.5	4.1	39,476*	25,660*
Astoria Repowering	589	#2 Oil	n/a	n/a	31,002*	20,151*
Total	6,909		35.73		399,681	259,898

Table notes:
* Calculated using a 7,300 Btu/hour heat rate.
** Based on an average burn rate of 65%.

These 11 projects have indicated plans to use petroleum distillate fuel products, such as #2 fuel oil and kerosene, as backup fuel. All the projects plan to use natural gas as the primary fuel. Of the 11 projects that have stated they plan to use distillate fuel as a backup to natural gas, three of the projects, with their winter megawatt capacity in parenthesis are: Athens (1080), Bowline Point 3 (750), and Bethlehem Energy Center (750); all are located on the Hudson River between Albany and New York City. The remaining eight projects with winter megawatt capacity are: Astoria Energy (1000), East

River Repowering (360), Ravenswood Cogeneration (250), Sunset Energy Facility (580), Poletti Station Expansion (500), Kings Park (600), Caithness Island Power (750), and Astoria Repowering (589); all are located in New York City and on Long Island. The ten projects that do not plan to utilize backup fuels are: Torne Valley (827), Ramapo (1,100), Heritage (800), Twin Tier Power (520), Grassy Point (550), Glenville Energy (520), Brookhaven Energy (580), Oak Point Energy (1075), Wawayanda Energy (540), Besicorp (510).

- Assuming a 65% average daily load factor on backup fuels, if each the 11 projects were to call upon backup distillate fuel capability at the same time, the average Statewide burn rate would be approximately 260,000 gallons per hour, or an estimated 6.2 million gallons per day. If the facilities were to use the maximum capacity burn rate, the 11 projects would consume almost 400,000 gallons per hour, or approximately 9.6 million gallons per day. To put this usage level into perspective, it is estimated that on a typical winter day New York State uses, on average, 11 million gallons. Therefore, the potential exists that these generating facilities could almost double the demand for distillate fuels were each of them to have their natural gas supply interrupted at the same time.

- With hourly use of this magnitude, adequate on site storage capacity for backup fuel is critical. While several of the projects have not yet provided complete information, a number are considering backup fuel storage capacity ranging from 4 to 15 days of supply. However, there are several projects that are proposing only very limited backup fuel capacity, some as low as less than one day. The implications of this limited capacity is that the electricity generation facilities may not be able to secure timely resupply of backup fuel and be forced to completely curtail operation.

- Whether electricity generation facilities choose interruptible or firm natural gas service will affect several sectors of the State’s economy. If interruption of gas service to these facilities should occur at the same time that the residential sector is maximizing the use of #2 heating oil to meet heating demand, there is concern whether the petroleum supply and transportation industries, including trucking, barge, and tugboats, will have the resources available to meet the increase in demand by the electricity generators. During the peak heating season, most petroleum transportation resources are fully committed to the resupply of traditional customers in the residential, industrial, and commercial sectors. Although these transportation companies also serve the electric sector during the winter, the magnitude of increase associated with the Article X generators raises important resupply questions.

- Six of the 11 Article X projects propose to be supplied by barge, three will use truck transport to receive fuel, and two have yet to specify a delivery option.

During peak demand periods much of the petroleum transport industry is already fully committed. A facility that consumes 20,000 gallons of distillate fuel per hour and does not have, or has only limited, on site storage would need enough truck transport delivery capacity to cover the actual burn rate, the time needed to cover the travel distance to and from a petroleum terminal, highway and weather delays, loading and unloading times, and delays that may be encountered at the terminal. This may require the total commitment of 6-8 trucks or more for just one of the generating facilities. If additional facilities turn to backup fuel at the same time, the unavailability of sufficient transport resources will be magnified.

- Increased reliance on #2 heating oil as a backup fuel is not exclusive to New York State electricity generators. Numerous states in the Northeast are seeing construction of electricity generation facilities using natural gas as the primary fuel and relying on distillate for backup. Whether there will be sufficient quantities of natural gas, backup fuel, and the ability to transport the backup fuel to facilities located in New York State is being examined by Charles River Associates, Inc. for NYSERDA and the New York Independent System Operator. A final report is expected by late April or early May 2002 (see Natural Gas Assessment).

FORECAST SUMMARY

As is evidenced in Table 2, the Draft Energy Plan projects total residential distillate (home heating oil) demand will decline 1.61% annually over the forecast period. Residential distillate demand is projected to decline by 57 TBtu in the reference case forecast from 197 TBtu in 2000 to 140 TBtu in 2021. However, motor gasoline is expected to increase 0.92% annually during the forecast period from 697 TBtu in 2000 to 844 TBtu in 2021.

Residential distillate fuel prices are estimated to decrease 0.84% per year over the forecast period. The Draft Energy Plan projects that New York State residential distillate prices will decline from 152.6 cents per gallon in 2000 to 127.93 cents per gallon in 2021. Similarly, gasoline prices will decrease by 0.4% over the forecast period from 158.8 cents per gallon in 2000 to 146.06 cents per gallon in 2021.

For a more detailed discussion of the various forecast assumptions and a description of the forecast methodology see the Forecast Summary section of the Draft Energy Plan.

Table 2

New York State Petroleum Demand and Price Forecast						
	Actual	Outlook	Outlook	Average Annual Growth		
	2000	2006	2021	2000-2006	2006-2021	2000-2021
DEMAND: TBtu						
Residential						
Distillate	197	167	140	-2.72%	-1.17%	-1.61%
Gasoline	697	780	844	1.9%	0.53%	0.92%
PRICE*: cents/gal.						
Residential						
Distillate	152.6	116.76	127.93	-4.36%	0.61%	-0.84%
Gasoline	158.8	148.11	146.06	-1.16%	-0.09%	-0.4%

Source: Draft Energy Plan, *Forecast Summary*.
* Petroleum prices are expressed in constant 2000 dollars.

PETROLEUM INDUSTRY AND INFRASTRUCTURE SECURITY

The events of September 11, 2001 have alerted the petroleum industry that there are numerous steps the industry can take to help protect the critical energy facilities that supply petroleum fuels to end-users. Company officials, trade associations, and federal and State government representatives are working together on the common goal of ensuring the security of critical energy infrastructure components. Just a partial list of these critical components includes: off-shore and on-shore crude oil production facilities; a vast network of crude oil and refined product pipelines; refineries; storage terminals; transportation components such as trucks, railroad tank cars, barges, and tankers; and even the local service station and convenience store. Fortunately, the petroleum industry, as well as others, addressed many security concerns and upgraded various measures in preparation for the "Y2K" event. There will be many challenges in the future and more work needs to be done. Together, the petroleum industry and government representatives need to devise a long-term strategy to ensure the security of the national energy delivery system.

Reliance on any one crude oil producing region of the world has the potential to disrupt the domestic economy in the event that supplies from that region are interrupted. Such reliance could cause price volatility and increased prices paid by consumers. To offset this reliance, greater diversity of sources of oil supply may be achieved by developing new exploration and production technologies and expanding trade and investment initiatives between consuming and producing countries. Equally important is the development of energy efficiency programs and services that offset demand and create permanent changes in the market place.

FINDINGS AND CONCLUSIONS

- U.S. production of crude oil continues to decline. As a consequence, both U.S. and New York State continue to increase their dependance on foreign sources of crude oil and refined petroleum products to meet consumer demand.

- In-State petroleum terminal storage capacity for distillate fuels, gasoline, and residual fuel continues to decline. Reasons for this decline include land use concerns associated with storage, costs associated with properly maintaining facilities, increased insurance costs, lack of market incentives to construct new facilities, and the costs of holding large volumes of fuel.

- Lower inventory storage can result in degradation of the operational flexibility needed to satisfy consumer demand, greater supply uncertainty, and greater short-term price volatility.

- If the natural gas fueled electricity generation facilities with interruptible gas contracts are unable to acquire their primary fuel and are forced to switch to distillate fuel, they will use significant quantities of distillate over a very short period of time. This could strain the ability of the petroleum infrastructure to respond to this need.

- Electricity generation facilities burning distillate fuel as a backup when natural gas is interrupted have the potential to disrupt the delivery of electricity in cases where such facilities are being relied upon to meet peak demand and where availability of distillate fuel is limited. In addition, a sudden, large increase in petroleum use in electricity generation could potentially have negative impacts on air quality.

SECTION 3.7

COAL RESOURCE ASSESSMENT

INTRODUCTION

This section assesses coal use, production, prices, transportation, reserves, and mining operations in New York State and the United States. It also addresses recent developments and trends in the coal industry, examining environmental factors, including the Governor's Acid Deposition Initiative and clean coal technologies, the U.S. Department of Energy's (U.S. DOE) Clean Coal Power Plant Improvement Initiative, and the implications of electric power restructuring on the coal industry. In addition, this assessment reports on the future outlook for coal use in New York and presents a forecast of price and demand.

UNITED STATES COAL OVERVIEW

Coal is America's most abundant indigenous fuel source, accounting for 95% of the nation's fossil energy reserves. The U.S. has a 250-year supply of coal based on current usage levels. One quarter of the world's known coal supplies are in the United States. U.S. coal production is second only to China's among world producers. In 2000, over one billion tons of coal were produced in the U.S., mined in 25 coal-producing states. Wyoming is the largest coal producer, with 339 million tons mined in 2000, representing 31% of U.S. production. Approximately two-thirds of U.S. coal production is surface mined. Nearly all of U.S. coal production is used domestically.

As shown in Table 1, over one billion tons of coal were used in the U.S., with more than 90% used in the electric power sector. Coal power plants account for 57% of all U.S. electricity generation, and over 80% of electricity generation in twelve states in the Midwest, Southwest, and West.

Table 1

2000 United States Coal Production, Use, and Prices
(Million Tons and Nominal Dollars)

Production by Region	**mmtons**	**%**
Appalachian	420.9	39.1
Interior	144.7	13.5
Western	509.9	47.4
Total	**1,075.5**	
Use by Sector	**mmtons**	**%**
Electric Power	979.9	90.8
Coke Plants	29.5	2.7
Other Industrial Plants	65.4	6.0
Residential/Commercial Users	4.9	0.5
Total	**1,079.7**	
Average Delivered Price	**$/ton**	
Electric Utilities	$23.83	
Coke Plants	$44.43	
Other Industrial Plants	$31.59	

Source: U.S. DOE, Energy Information Administration, *U.S. Coal Supply and Demand: 2000 Review* *Annual Energy Review, 2000*

Coal is by far the least expensive fossil fuel on a dollar per British thermal unit ($/Btu) basis, averaging less than one-half the prices in 2000 of petroleum and natural gas. The delivered price of coal continues to decline, in keeping with a trend that started more than two decades ago. Approximately two-thirds of all coal mined in the U.S. is transported by rail. Hauling coal is the largest single source of freight revenue for U.S. railroads. Coal is also the largest freight revenue commodity moved by barges on the nation's inland waterways.

United States Coal Production

During the past seven years, U.S. coal production continued to grow at an annual rate of nearly 2%. This growth occurred because, in spite of the closing or consolidation of mines, the average size and productivity of the remaining mines increased. The 20 largest coal producing companies now account for more than 70% of U.S. production.

In 2000, coal production in the U.S. totaled 1,075.5 million tons from the Appalachian, Interior, and Western coal supply regions. As shown in Table 2, coal production in the Appalachian Region was 420.9 million tons in 2000. West Virginia is the largest coal producing state in the Appalachian Region, followed by Kentucky and Pennsylvania. Coal production in the Interior Region was 144.7 million tons in 2000. Texas is the largest coal producing state in the Interior Region, followed by Illinois and Indiana. In 2000, a total of 509.9 million tons of coal was produced in the Western Region, dominated by

Table 2

2000 United States Coal Production by Coal-Producing State

Region and State	Number of Mines	Production (Million Tons)
Appalachian Region	**1392**	**420.9**
Alabama	47	19.2
Kentucky, Eastern	421	105.1
Maryland	15	4.3
Ohio	79	22.2
Pennsylvania	339	75.1
Tennessee	24	2.7
Virginia	161	32.8
West Virginia	306	159.8
Interior Region	**125**	**144.7**
Illinois	23	33.4
Indiana	34	28.0
Kansas	2	0.2
Kentucky, Western	37	27.0
Louisiana	2	3.7
Mississippi	1	0.9
Missouri	2	0.4
Oklahoma	10	1.6
Texas	14	49.6
Western Region	**71**	**509.9**
Alaska	1	1.6
Arizona	2	13.1
Colorado	12	29.1
Montana	6	38.4
New Mexico	7	26.2
North Dakota	4	31.3
Utah	15	26.7
Washington	2	4.3
Wyoming	22	339.3

Source: U.S. DOE, Energy Information Administration, *U.S. Coal Supply and Demand: 2000 Review*

Wyoming, which accounted for two-thirds of the regional production and nearly one-third of the U.S. production. The state of Wyoming produced 339.3 million tons of coal, which represents nearly the sum of the next three largest coal-producing states combined. Coal production has grown in the Western Region in recent years and is now nearly 50% of U.S. production. The Appalachian Region continues to be the principal source of bituminous and anthracite coal. The Western Region coal includes some bituminous coal, but primarily subbituminous coal and lignite.

The classification of coal is based on its fixed carbon, volatile matter and moisture content, and on its heating value. Lignite, also called brown coal, is ranked lowest in quality, and has a high moisture content, as much as 45% by weight. Its heating values range from 9 to 17 million Btu per ton, with an average of about 14 million Btu per ton. Subbituminous coal, or black lignite, contains 20% to 30% moisture and has a heating values that ranges from 16 to 24 million Btu per ton. Subbituminous coal's heating values average about 18 million Btu per ton. Bituminous coal, or soft coal, is the most commonly mined. Its moisture content usually is less than 20% and the heating values range from 19 to 30 million Btu per ton for an average of 24 million Btu per ton. Anthracite, or hard coal, is ranked highest in quality. With a moisture content generally less than 15%, its heating values range from 22 to 28 million Btu per ton and average about 25 million Btu per ton. This coal is found only in Pennsylvania and is used mostly for space heating and limited electricity generation. Table 3 provides U.S. coal production statistics by classification of coal, mining methods, and origin.

Table 3

United States Coal Production, 2000
(Million Tons)

Classification	**mmtons**	**%**
Bituminous Coal	548.5	51.0
Subbituminous Coal	433.8	40.4
Lignite	88.7	8.2
Anthracite	4.5	0.4
Mining Method	**mmtons**	**%**
Underground	382.9	35.6
Surface	692.6	64.4
Origin	**mmtons**	**%**
West of the Mississippi	566.2	52.6
East of the Mississippi	509.3	47.4

Source: U.S. DOE, Energy Information Admin., *Annual Energy Review, 2000*

United States Coal Use

In 2000, the use of coal in the U.S. reached an all-time peak of 1,079.7 million tons. More than 90% of all coal was used by the electric power sector. In 2000, coal was used to produce 57% of all electricity generated in the United States. The 991.3 million tons of coal used in the electric power sector does not include coal used by distributed cogeneration facilities. Use of coal for cogeneration is included in industrial and commercial sector figures reported by U.S. DOE, Energy Information Administration (U.S. DOE/EIA), so actual contribution of coal to electricity generation is slightly higher.

In 2000, New York State ranked thirty-fifth among U.S. states in coal use; Texas, Indiana, Ohio, Alabama, and West Virginia, respectively, were the top five.

United States Coal Reserves

As of January 1, 1997, the demonstrated reserve base (DRB) of coal resources in the U.S. exceeded 500 billion tons (estimated by U.S. DOE/EIA), nearly half located in the Western Region. The DRB is the estimated quantity of in-ground coal resources in the U.S. that meet minimum criteria. Although the DRB is approximately 500 times the U.S. annual coal production rate, all coal in the DRB is not recoverable. Almost half of the DRB is either inaccessible or likely to be lost in the mining process. The estimated recoverable reserves of coal in the U.S. (the portion of DRB that can be recovered economically with the application of current extraction technologies) total 275 billion tons. The estimated recoverable reserves for low (0.60 pound of sulfur per thousand Btu or less), medium (0.61 to 1.67 pound of sulfur per thousand Btu), and high (1.68 pound of sulfur per thousand Btu or higher) sulfur coal are relatively similar, as shown in Table 4.

Table 4

Estimate of Recoverable Reserves of Coal in United States
(as of January 1, 1997) - (in billion tons)

Region	Low Sulfur	Medium Sulfur	High Sulfur	Total
Appalachian	12	20	23	55
Interior	1	10	58	69
Western	88	55	9	151
U.S. Total	**100**	**85**	**90**	**275**

Source: U.S. DOE, Energy Information Administration, *U.S. Coal Reserves: 1997 Update*

The amount of recoverable reserves at active mines in the U.S. is estimated at 19.3 billion tons, based on information from mine operators for each active property. The majority of active recoverable reserves are in the Western Region (13 billion tons), followed by the Appalachian Region (4.7 billion tons), and Interior Region (2.6 billion tons).

United States Coal Mining

The U.S. coal mining industry has undergone considerable change in the past several decades that has resulted in a significant decrease in the total number of coal mines, while at the same time mining productivity has increased. Coal mine productivity, in tons of coal produced per miner hour, improved both in underground and surface mines in all three coal-producing regions. Between 1995 and 2000, as labor productivity improved from 5.4 to 6.5 tons per miner hour, the average number of miners working daily declined from 90,000 to 78,000. See Table 5 for additional U.S. coal mining statistics.

Table 5

United States Coal Mining Statistics	1995	2000
Production (in million tons)		
Underground	396	383
Surface	637	693
Total	1,033	1,076
Number of mines (active)		
Underground	977	839
Surface	1,127	749
Total	2,104	1,588
Number of miners (in thousands)		
Underground	58	46
Surface	32	32
Total	90	78
Productivity (tons per miner hour)		
Underground	3.4	3.9
Surface	8.5	10.3
Average	5.4	6.5

Source: U.S. DOE, Energy Information Admin.,
Annual Energy Review, 2000
Coal Industry Annual, 1999

The U.S. coal mining industry has adopted a number of technological changes to improve the productivity and cost-effectiveness of mining operations. Examples of such changes include improved mining equipment, better material handling techniques, and enhanced automation of equipment monitoring.

United States Coal Price

Coal prices declined in 2000, continuing the downward trend of the past twenty-five years. In 2000, the annual average price of coal delivered to utilities was $24.28 per ton. As reported by the U.S. DOE/EIA in the *Annual Energy Review - 2000*, the 1999 national average prices for coal by class were $38.94/ton for anthracite, $23.88/ton for bituminous, $11.04/ton for lignite, and $7.02/ton for subbituminous.

Because of differences in shipping distance and transportation mode, transportation costs vary greatly for different regions and sources of coal. Appalachian and Interior Region coal is costlier at the minemouth, but its transportation costs are lower, involving relatively shorter hauls to consumers by rail and barge. Low-cost Western Region coal is shipped primarily by rail over great distances, thus incurring higher transportation costs than Appalachian and Interior Region coal. Coal transportation costs on average represent 50%, 20%, and 12% of the delivered price for Western, Appalachian, and Interior coal, respectively.

United States Coal Transportation

Coal is an important commodity carried by rail. In 2000, railroads received $7.8 billion, in excess of 20% of their revenues, from transporting coal, and coal comprised 758 million tons, or over 40%, of the total tons of freight hauled by rail. Over the past ten years, the rail industry's share of coal transportation has increased, primarily to satisfy increased demand for low-sulfur western coal. About 74% of U.S. low-sulfur coal reserves are located in Montana and Wyoming. Domestic railroads carried 68 percent of the nation's coal, transporting an average of 14.4 million tons of coal per week in 2000. Coal is also moved by barges, ships, and trucks, where the modes of transportation are economical. A few electricity-generating facilities are located near coal mines and receive their coal directly by conveyor or coal-slurry pipeline.

Average coal rail hauls are getting longer, reflecting the increased penetration of western coal carried by rail into southern and eastern U.S. markets. The average haul of coal by rail grew by 33% from 485 miles in 1979 to 643 miles in 1995. Railroads continually adopt technological innovations that offer customers greater flexibility. One example is the "coaltainer", a container designed especially for transporting coal by rail and by truck. Another innovation for transporting coal by rail is the use of real-time satellite monitoring and computerized traffic management systems to improve the scheduling and routing of trains. These electronic traffic management systems will become increasingly important as more electricity generators move toward "just-in-time" inventory management.

NEW YORK STATE OVERVIEW

New York used 311 trillion Btu of coal in 2000. This figure represents 8% of the State's total primary energy use of 4,094 trillion Btu. New York has no coal mining activity and no known coal reserves. In 2000, the cost of coal delivered to New York electricity generators was $39.11 per ton, over 60% higher than the national average of $23.83 per ton.

Coal Use in New York State

In 2000, nearly 12.1 million tons of coal were used in New York State, representing 1% of the nation's demand. About 80% of this coal was used to produce electricity; the industrial sector accounted for 18%; residential and commercial use accounted for the remaining 2%. Over the past several years, the amount of coal used for electricity generation has remained relatively stable, accounting for 16% (24,520 gigawatt-hours) of electricity generated in the State in 2000, while coal use by the other end-use sectors (residential, commercial, and industrial) has declined.

<u>New York State Coal-Fired Generating Units</u>

New York has 46 coal-fired electricity generation units located in sixteen areas of the State. These coal-fired electricity-generation units, listed in Table 6, represent nearly 4,000 megawatts of net summer capability for the New York electricity grid. These stations are all located outside of the metropolitan New York City area; the greatest concentration is in Western New York.

Table 6

Coal-Fired Generating Units in New York State
(net summer capability in megawatts)

Company and Plant Name	County	Units	Summer Capability
1. AES - Hickling	Steuben	2	63.0
2. AES - Greenidge	Yates	2	124.9
3. AES - Jennison	Chenango	2	54.0
4. AES - Milliken	Tompkins	2	307.0
5. AES - Somerset - Kintigh	Steuben	1	674.8
6. AES - Westover	Broome	2	106.9
7. Black River - Fort Drum	Jefferson	1	46.3
8. Central Hudson	Orange	2	363.6
9. CH Resources - Niagara	Niagara	1	51.9
10. Eastman Kodak	Monroe	12	186.4
11. Fibertex Energy	Onondaga	1	84.0
12. Jamestown, City of	Chautauqua	2	50.0
13. Mirant - Lovett	Rockland	2	376.8
14. NRG - Huntley	Erie	6	684.0
15. NRG - Dunkirk	Chautauqua	4	504.0
16. Rochester Electric & Gas	Monroe	4	252.0

Source: U.S. DOE, Energy Information Administration,
Inventory of Nonutility Electric Power Plants in the United States 1999

<u>New York State Electricity Generation Coal Prices and Characteristics</u>

In the electricity generation sector, the average delivered cost of coal to New York has remained fairly stable over the past ten years, as shown in Table 7. Table 8 lists detailed average delivered cost of coal to New York State electricity generating plants for the year 2000.

The average sulfur content of coal delivered to the State's electricity generators in 2000 was 1.1% by weight, compared to the U.S. average of 0.9%. The ash content was lower, 7.1% by weight, compared to 8.8% at the national level. Because New York generators buy eastern coal, the Btu content of coal used for generation is much higher than the U.S. as a whole, 13,117 Btu per pound on average, compared to 10,115 Btu per pound nationally.

Table 7

Average Delivered Cost of Coal to New York State Electric Utility Plants		
Year	(¢/MMBtu)	($/ton)
1991	159.4	41.19
1992	148.8	38.62
1993	149.6	38.63
1994	145.2	37.63
1995	141.2	36.86
1996	142.8	37.15
1997	142.4	37.32
1998	143.4	37.44
1999	144.9	37.77
2000	149.1	39.11

Source: U.S. DOE, Energy Information Administration, *Cost and Quality of Fuels for Electric Utility Plants, 2000*

Table 8

2000 Average Delivered Cost of Coal to New York State Electric Utility Plants		
Type of Purchase	(¢/MMBtu)	($/ton)
Contract	152.2	$40.04
Spot	127.9	$32.91
Mine Type		
Surface	129.9	$32.88
Underground	150.4	$39.56
Sulfur Content		
Less than 0.5%	159.5	$40.21
0.5% - 1.0%	157.2	$41.40
1.0% - 1.5%	136.6	$34.97
1.5% - 2.0%	130.3	$33.29
2% - 3%	132.3	$34.98

Source: U.S. DOE, Energy Information Administration, *Cost and Quality of Fuels for Electric Utility Plants, 2000*

Origin of Domestic Coal Used in New York State

In 1999, domestic coal delivered to New York originated in six U.S. states. Pennsylvania and West Virginia accounted for 87%. By far the dominant mode of coal transportation into New York was rail. Coal is also moved by barge and trucks to end-users in New York. Barge transport of coal occurs primarily on Lake Erie. Table 9 lists the origin of domestic coal delivered to New York in 1999 by method of transportation.

Table 9

Origin of Domestic Coal Delivered to New York State by Method of Transportation, 1999 (thousand tons)

State:	Railroad	River	Great Lakes	Tidewater	Trucks	Total
Illinois	0	0	0	0	63	63
Kentucky	1,176	39	0	0	0	1,216
Ohio	16	0	0	0	4	20
Pennsylvania	4,227	50	465	0	634	5,376
Virginia	93	0	0	0	0	93
West Virginia	3,608	92	0	77	5	3,782
Total	**9,120**	**181**	**465**	**77**	**706**	**10,550**

Source: U.S. DOE, Energy Information Administration, *Coal Distribution Report*.

DEVELOPMENTS AND TRENDS IN THE COAL INDUSTRY

Environmental Factors

Coal mining can have significant negative effects on land and water resources. Soil subsidence and erosion are long-standing problems associated with underground and surface mining. These are addressed by the Surface Mining Control and Reclamation Act of 1977 and the Abandoned Mine Reclamation Act of 1990. Water resources are degraded by mining and coal preparation. The Federal Water Pollution Control Act of 1972 and the Clean Water Act of 1977 both contain provisions to limit water pollution and run-off from coal extraction and processing. Coal waste from mining, preparation, and combustion are regulated at the federal level by the Resource Conservation and Recovery Act of 1976 and at the State level by 6 NYCRR Part 360 Solid Waste Management Facilities regulations. Nationally, coal mining waste is used as fill for mine land reclamation projects. In New York State, coal combustion wastes have a variety of uses. Coal combustion wastes are used as an ingredient in the manufacture of cement, asphalt, roofing shingles, gypsum, calcium chloride, lightweight aggregate, lightweight block, and low-strength backfill; as a traction agent on roadways and cement; as an aggregate substitute in concrete; and as structural fill in building foundations. It is estimated by New York State Department of Environmental Conservation that 731 thousand tons of coal combustion waste were beneficially reused in 1999.

Coal combustion presents air quality and other environmental concerns due to the release of sulfur dioxide (SO_2), nitrogen oxides (NO_x), particulate matter (PM), and carbon dioxide (CO_2) into the atmosphere. SO_2, NO_x, and PM emissions are associated with health problems and acidification of water resources (acid rain), while CO_2 emissions are believed to contribute to global warming. In-State emissions of SO_2 have been reduced significantly as a result of New York's State Acid Deposition and Control Act (SADCA), and Title IV of the federal Clean Air Act (CAA) Amendments of 1990. As a result of these initiatives, SO_2 emissions from New York's electricity generation plants have been reduced by 50% from 1980 levels. NO_x emissions, which combine with volatile organic compounds (VOCs) in the presence of sunlight to form ozone (or smog), are being addressed by Title I of the federal CAA amendments. Substantial staged reductions in summer ozone season NO_x emissions from electricity generation plants were made in 1995 and 1999 (up to 55% for upstate coal-fired plants); by 2003, summer NO_x emission reductions of up to 75% from 1990 levels will be required for coal-fired plants. Issues associated with utility sector air emissions are discussed in more detail in the Energy and the Environment issue report (Section 2.3).

Governor's Acid Deposition Initiative

The Governor's Acid Deposition Initiative (ADI) announced in 1999 is expected to result in regulations that will require New York's electricity generation plants to reduce SO_2 emissions by 50% below the levels required by the federal CAA amendments of 1990. The ADI will also require such plants to implement year-round controls for NO_X, a substantial extension of the five-month summer ozone season controls required under current federal and State regulations. The first full year of fully-implemented NO_X controls is expected to be 2005, and SO_2 controls are expected to be fully phased in by January 2008.

NO_X compliance actions may include a mix of end-of-pipe emission control technologies, such as selective catalytic reduction (SCR) and selective non-catalytic reduction (SNCR). SO_2 compliance actions may include switching to lower-sulfur coal, retiring certain coal plants, and installation of flue gas desulfurization (FGD) equipment, or scrubbers, on a substantial proportion of existing coal plants. While the primary objective of the ADI is to reduce emissions of precursors of acid rain, modeling analysis indicates that emissions of CO_2, the principal greenhouse gas associated with global warming, could be reduced by up to 10%. This indirect benefit could result from shifts from coal and oil-fired generation to natural gas. The potential future decrease of coal use due to environmental initiatives will decrease rail coal traffic specifically in upstate New York. This reduction could have a direct impact on rail transport costs for other industries in the region involved.

Modeling analysis of New York's electricity system indicates that implementation of the ADI is technically feasible with respect to the proposed time frame and emission targets. However, there are some risks of higher wholesale electricity prices in certain areas as a result of the incremental costs of the emission control actions required for compliance. In addition, there could be reliability impacts if operators of certain units choose to cease or restrict operations for significant portions of the year as an emission control strategy. Further, the proposed regulations are likely to increase the State's dependence on natural gas which could result in supply problems and/or higher prices.

Table 10 shows typical emission rates for SO_2, NO_X, and CO_2 for existing coal plants in New York compared to estimated emission rates for coal plants that burn low-sulfur coal, plants with advanced emission controls, and plants that have incorporated two new clean coal technologies. Burning low-sulfur coal could reduce SO_2 emissions from an uncontrolled plant by two-thirds; installing a scrubber could reduce emissions by 90% or more. These representative emission-reduction actions could be undertaken at existing coal-fired plants to meet the emission targets of the ADI.

Table 10

Emission Rates for Coal Plants (pound per megawatthours)			
	SO_2	NO_X	CO_2
Existing Upstate Coal Plant[1]	28.4	4.7	2,310
Existing w/Low-Sulfur Coal[2]	9.5	4.7	2,310
Existing w/Advanced Controls[3]	3.0	1.6	2,412
New Clean Coal: CFB[4]	3.0	1.0	2,180
New Clean Coal: IGCC[5]	0.4	0.9	2,028

[1]Existing upstate coal plant assumes 1.8% sulfur coal with no scrubber; low-NO_X.burners.
[2]Low-sulfur coal assumes 0.6% sulfur coal; low-NO_X.burners.
[3]Advanced controls assumes 90% SO_2 reduction by scrubber and 65% NO_X reduction by selective catalytic reduction.
[4]Circulating fluidized bed.
[5]Integrated gasification combined cycle.

Source: NYSERDA

Clean Coal Technologies

Clean coal technologies include various new innovations that are more environmentally benign than the technologies in common use today. Most are the products of research conducted over the last 20 years. New pollution control devices, such as advanced scrubbers, clean pollutants from flue gases before they exit the plant's smokestack. New combustion processes, such as circulating fluidized bed (CFB) combustion, improve both efficiency and emission control. Integrated gasification combined cycle (IGCC) technology converts coal to a gaseous form similar to natural gas before being burned.

Implementation of clean coal technologies has been, and will continue to be, key to achieving the State's energy, economic, and environmental goals. In recent years, technological advancements have led to substantial reductions in the cost of controlling SO_2 and NO_X emissions. Some of the most successful advancements are low-NO_X burners, selective catalytic reduction and scrubbers. Also, clean coal technologies under development show promise of being environmentally superior to the technologies in common use today.

Advanced pollution controls installed on existing power plants or built into new facilities can provide more effective and/or lower-cost ways to reduce sulfur dioxide and nitrogen emissions. Advanced power generation technologies are complete electric power generating systems that offer superior efficiency and environmental performance over conventional coal-burning systems. Examples of these power generation technologies are atmospheric fluidized bed (AFB) combustion, circulating fluidized bed (CFB) combustion, and integrated gasification combined cycle (IGCC). As shown in Table 10, emissions of SO_2 and NO_X from coal plants using clean coal technologies are expected to be 80% to 90% lower than typical existing coal plants.

U.S. Department of Energy Clean Coal Power Plant Improvement Initiative

The U.S. Department of Energy (U.S. DOE) Clean Coal Power Plant Improvement Initiative provides funding for demonstrations of innovative technologies to improve the performance and economics of both new and existing coal-fired electric power plants. The AES-Greenidge Multi-Pollutant Project, located in New York State, has been selected by U.S. DOE for funding. The advanced emission control technologies being tested by this project are expected to reduce SO_2 by 95%, NO_X by 60%, and mercury by 90% from the existing 100 megawatt generator at a significantly lower cost than conventional retrofit technologies. It will be the first application of co-firing biomass with a dry scrubber to remove SO_2 and mercury, and selective catalytic reduction to remove NO_X. The State has supported the AES-Greenidge Multi-Pollutant Project located in Yates county.

Electric Power Restructuring

During the 1990s, coal producers began to feel the dampening effects of electricity restructuring on demand for their fuel. Electric utilities and other power producers came under pressure to shed high-cost, long-term coal supply contracts and enter into more flexible, risk-sharing supply agreements. The current movement to restructure U.S. electricity generation markets and make them more competitive may lead to changes in the financial risks and demands on the supply and transportation infrastructures of the fuels used in electricity generation. Electric power industry restructuring is expected to result in renewed pressure for cost-cutting and consolidation in the coal industry. Electric power generators will attempt to pass on market risks to coal producers and carriers. As a result, coal contracts will likely become shorter in duration and lower in price. Also, small coal-producing firms may be forced out of business, and large firms are likely to continue to grow in size through acquisitions and mergers.

COAL OUTLOOK

The nation is likely to use more coal in the future, especially as an expanding digital economy creates new demands for electricity. Future coal productivity gains will depend on additional penetration of more efficient production methods and technologies that are already available and the development and application of new technology. Continued improvements in mine productivity (which has increased on average 6.7% per year since 1979) are projected to result in declining real mine-mouth prices throughout the forecast period. There is also considerable opportunity for even greater efficiency and environmental improvements at existing and new coal-fired electricity generating plants. New computerized controls, improved burner designs, better gas cleaning systems, and high performance turbines are just a few examples of technologies that can produce more and cleaner electricity from coal. High electricity demand and low prices, in turn, are projected to increase demand for coal.

FORECAST SUMMARY

The Draft Energy Plan projects that total New York coal demand will increase 1% annually over the forecast period. New York coal demand is projected to increase by 75 trillion Btu from 311 trillion Btu in 2000, to 386 trillion Btu in 2021, as shown in Table 11. Coal prices paid by the electric generation sector are estimated to decline 0.7% per year over the forecast period, from $39.11/ton to $33.45/ton in constant 2000 dollars. For a detailed description of the forecast methodology and more discussion on the forecast assumptions, see the Forecast Summary (Section 3.1).

Table 11

New York State Coal Demand and Price Forecast						
	Actual	**Outlook**	**Outlook**	**Average Annual Growth**		
	2000	**2006**	**2021**	**2000-2006**	**2006-2021**	**2000-2021**
Demand: (TBtu)	311	370	386	2.9%	0.3%	1.0%
Price*: ($/ton)	$39.11	$36.34	$33.45	-1.2%	-0.6%	-0.7%

Source: Draft Energy Plan, *Forecast Summary*.
* Coal prices are expressed in constant 2000 dollars.

COAL INDUSTRY SECURITY

Coal is America's most abundant indigenous fuel resource. U.S. coal accounts for 95% of the nation's fossil energy reserves and 25% of the world's known coal reserves. At present, coal provides power for 57% of U.S. electricity generation and 16% of New York's electricity generation. Greater diversity in the types of fuel used for energy production could benefit all market participants, ensuring adequate fuel supplies and dampening price volatility. Technological advances in clean coal technologies could increase the use of coal for power production and thus diversify New York's fuel mix.

FINDINGS AND CONCLUSIONS

- Coal is America's most abundant indigenous fossil fuel resource, accounting for 95% of the nation's fossil energy reserves. The United States has a 250-year supply of coal.

- The United States is second only to China among world coal producers. In 2000, over one billion tons of coal were produced in the United States, mined in 25 coal-producing states.

- Approximately two-thirds of all coal mined in the United States is transported by rail, making coal the largest single source of freight revenue for United States railroads.

- In 2000, nearly 12.1 million tons of coal were used in New York State, representing 1% of the nation's coal demand. While coal use represents 8% of the State's total primary fuel mix, most of the coal (80%) was used to produce electricity.

- New York has 46 coal-fired electricity generation units located in the State, representing nearly 4,000 megawatts of net summer capability for the State's electricity grid.

- A major consideration in the use of coal as a fuel in electricity generation is the emission of sulfur dioxide, nitrogen oxides, particulate matter, and carbon dioxide. Clean coal technologies offer utilities options for making substantial reductions in acid rain and greenhouse gas emissions, while providing health-related benefits due to improved air quality.

- Clean coal technology can play a role in helping the State to achieve its energy, economic, and environmental goals.

Section 4

COMPLIANCE WITH THE STATE ENVIRONMENTAL QUALITY REVIEW ACT

SECTION 4.0

COMPLIANCE WITH THE STATE ENVIRONMENTAL QUALITY REVIEW ACT

This section is intended to correlate applicable sections of the Draft State Energy Plan (Draft Energy Plan) with the components of a Draft Environmental Impact Statement, pursuant to the State Environmental Quality Review Act (SEQRA) and its implementing regulations 6NYCRR Part 617. Notice of a Positive Declaration under SEQRA, indicating that implementation of the State Energy Plan may have a significant effect on the environment, was published in the Environmental Notice Bulletin on April 4, 2001.

The Energy Law generally requires that energy-related actions or decisions of state agencies, boards, commissions, and authorities be reasonably consistent with the forecasts and long-range energy planning objectives and strategies contained in the State Energy Plan. However, the State Energy Plan does not commit any agency, board, commission, or authority to a definite course of specific future decisions. Accordingly, each specific
energy-related action of an agency, board, commission, or authority is independently subject to applicable environmental review requirements, such as SEQRA, or Articles VII and X of the Public Service Law.

Overall, the policy objectives and strategies set forth in the Draft Energy Plan are intended to maintain and improve environmental quality. For example, energy efficiency and renewable energy sources tend to reduce air and water emissions and discharges resulting from fossil fuel combustion and other processes. Improved transportation mobility enhances air quality by reducing traffic congestion.

The Draft Energy Plan addresses the environmental impacts of its energy policy objectives and strategies. Although specific activities will need to be addressed individually (see above) these broad objectives and policies do not appear to have adverse environmental impacts. The Draft Energy Plan itself complies with the specific requirements for a Draft Environmental Impact Statement as specified in §8-0109 of SEQRA (ECL, §8-0109), as follows:

Plan Section Number	Plan's Section/Subsection Heading	Plan Page