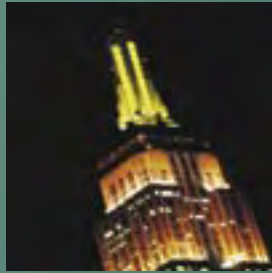




# Power Trends 2005



A report by the New York Independent System Operator  
April 2005

*A report by the New York Independent System Operator*



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# Executive Summary

In 1999, New York State moved from a traditional regulated structure of its electricity sector to one that permitted and welcomed competition at the wholesale level.

In the five years that have elapsed, a great deal of progress has been made by the NYISO staff and its stakeholders to ensure the continued safety and reliability of the bulk transmission system and the fair and efficient functioning of the electric markets.

In this fifth consecutive industry report, we review the many challenges we have faced, together with our stakeholders, over the first five years. The report concludes with a set of recommendations we believe are vital to ensure future reliability and market efficiency.

## Electric Supply Outlook – Summer 2005

New York’s electric supply outlook for this summer should be adequate, with somewhat larger reserve margins than in recent years. As the table below shows, the State

as a whole should enjoy a 1,522 megawatt (MW) margin over its minimum requirements, while New York City and Long Island, respectively, should have 330 MW and 240 MW over their minimum requirements. This report reviews the role that was played in this achievement by the New York market’s price signals, the Siting Board’s streamlining of the Article X siting process, (which has since expired), emergency construction of new generation by the New York Power Authority (NYPA) in 2001, and contracting arrangements entered into by utilities with developers in recent years. The report also shows, however, that action needs to be taken promptly if this adequacy of resources is to be maintained.

In addition to the new generation additions in recent years, a major upgrade to the downstate transmission system is nearing completion. The upgrade will accommodate the new in-city generation and increase the reliability of the delivery system. These enhancements, in conjunction with the full operation of the Cross Sound Cable this June, provide significant economic and reli-

<b>New York Load &amp; Reserve Requirements vs. Available Supply – Summer 2005</b>				
<b>Region</b>	<b>Requirement (Load + reserve or locational requirement)</b>	<b>Generation Available</b>	<b>SCRs* Summer 2005</b>	<b>Projected Surplus above Requirement Summer 2005</b>
NY State	37,715	38,340	897	+1,522
NY City	9,052	9,224	158	+330
Long Island	5,179	5,329	90	+240

*\*SCR's are a Demand Response Program that can reduce customer demand on peak load days.*

ability support for New York City and Long Island for this summer's peak usage.

In preparation for the summer, the NYISO has improved its already superior operator training and control room monitoring capabilities. However, the risks to New York from improper system operation elsewhere that resulted in the 2003 blackout still exist today. Until Congress acts to make electric reliability standards mandatory, New York, and indeed the nation, will remain vulnerable to unnecessary and life-threatening blackouts.

## **Emerging Issues The Next Five Years**

### **GENERATING CAPACITY**

New York's power plant siting law, Article X of the Public Service Law, was allowed to lapse in 2002, and the New York State Legislature has failed thus far to re-enact it. Potential investors in generating resources in the State need to know what they face in the way of licensing costs, schedules and the likelihood of success. The re-enactment of Article X will enable investors to make such assessments. We encourage the Legislature to act promptly on this important legislation. Failure to do so will result in emptying the pipeline of new generating projects that will be needed in the near future, creating a potential generation shortage.

Depending upon the progress of the already licensed projects, the pace of actual retirements, the continuing availability of imports and contributions from demand side programs, New York could be facing a sup-

ply deficiency between 2008 and 2011. In New York City and Long Island, there may well be needs prior to that time period. The NYISO's Comprehensive Reliability Planning Process will be thoroughly examining these requirements in its Reliability Needs Assessment (RNA) report to be issued in September.

### **FUELS FOR GENERATION**

In New York, as throughout the Northeast, new electric generating plants are being fueled primarily by natural gas. Investors in competitive markets have chosen natural gas because its use minimizes initial capital cost and facilitates compliance with environmental regulation.

The growing dependence on natural gas, however, raises certain concerns. The nation, in general, and the Northeast in particular, must fashion an effective fuel diversity strategy for dealing with the increasing use and dwindling domestic reserves of natural gas. Such a policy will have to include increased use of renewables, improved incentives for efficiency, and utilization of other domestic fuels.

### **CONCLUSION**

Competitive electric markets are still evolving in New York, five years after they began, but several of the questions raised by the initial restructuring have been answered. It is clear that reliability of electric service has not been affected adversely by the competitive restructuring, and that the State's power plants are being operated as well or better under the competitive regime than they were previously. New York's consumers

have not been victimized by market manipulation and New York's markets are responding well to fluctuations in supply and demand.

To continue to provide New York with reliable and cost competitive electric energy in the future, the following actions will be required by the NYISO, the industry and government:

1. The NYISO staff and its stakeholders should use the new Comprehensive Reliability Planning Process and other market mechanisms to ensure the development of needed generation, transmission, and demand-side resources when and where appropriate, especially in the New York City and Long Island areas.
2. In order to have sufficient in-state generation, New York State needs to site significant generation additions, commencing immediately, to meet its capacity requirements between the years 2008 and 2011.
3. The New York State Legislature should re-enact the Article X siting law. The Legislature should act promptly. Without a streamlined permitting process it will be very difficult for new generation to be built in a timely manner to meet future needs.
4. The nation, in general, and the Northeast in particular, must fashion an effective fuel diversity strategy for dealing with the increasing use and dwindling domestic reserves of natural gas. Such a policy will have to include increased use of renewables, improved incentives for efficiency and utilization of other domestic fuels.
5. Congress should act promptly to pass electric reliability legislation including mandatory reliability standards.







# Introduction

## The First Five Years

On December 1, 1999, the New York Independent System Operator (NYISO) opened its markets and took over operation of the State's bulk electric transmission system.

The fifth anniversary provides a milestone to evaluate the significant progress that has been made in New York's electricity markets and to assess the challenges that remain for further improvements to New York's wholesale electric markets while maintaining a safe and reliable transmission system.

Five years ago, the NYISO's challenge was to introduce wholesale competition into a system designed by and for regulated, vertically integrated, utilities that had recently sold almost all of their generating assets to independent, largely unregulated entities. Needless to say, the NYISO was expected to maintain the high reliability standards that had always been a hallmark of the New York electric system.

At the time, precedent in the United States was either lacking or unhelpful. Similar, but not identical, wholesale markets had been successfully introduced elsewhere in the northeast region where full divestiture had not occurred. In California, however, a poorly designed attempt at markets was causing chaos. The uncertainties facing the NYISO staff and its customers included whether New York's new markets would permit consumers to realize the benefits of wholesale competition without exposing them to market manipulation or unreliable electric service, whether New York's

power plants could be operated efficiently by a multiplicity of independent, entrepreneur companies and what impact, if any, the restructuring of the industry would have on retail prices.

## A Different Kind of Animal

The NYISO came into existence as a consequence of a series of orders issued by the Federal Energy Regulatory Commission (FERC) and actions by the New York State Public Service Commission (PSC). The PSC had conducted a lengthy proceeding examining the potential for restructuring New York's electric industry. These proceedings led to the creation of an "independent system operator" (ISO) to operate the State's bulk electric transmission system in an even-handed and open manner, so as to permit competition among suppliers and purchasers of wholesale electricity.

Adding to the complexity and uncertainty of New York's foray into competitive markets was the fact that the NYISO took a unique institutional form. It was to operate with a governance structure that provided for shared participation by its Market Participants, its management and its Board of Directors. Unlike those ISOs, in which the Directors represented sectors of the market, the NYISO Board would be independent of the Market Participants, and would include a broad array of specific talents, skills and experience. The Board was selected in 1998 and began to build the new organization.

## Many Different Kinds of Challenges

No sooner had the NYISO's markets opened than several difficulties began to emerge. The NYISO, its Board and staff, worked together with Market Participants to overcome those difficulties.

A few of the major issues, local and national events, and evolving market mechanisms that shaped the first five years of the NYISO are summarized below:

capacity from out-of-state resources, transmission limitations and differing regulatory and market requirements necessitated that the NYISO be conscious of its in-state resources. In addition, the NYISO recognized that demand response programs could contribute to meeting in-state electricity requirements.

The following figure illustrates the looming in-state generation shortage New York faced in the spring of 2001.

### Forecast Spring 2001

(base case - no new generation)



The above chart shows the State's looming generation shortage as projected in 2001

- The most immediate concern was an impending shortage of electric generating resources. Years of doubt about industry restructuring had led to a hiatus in investment in generating resources. Demand had increased during the late 1990s, with the last new power plant having been completed in 1996. While the NYISO markets have historically been able to purchase

Four years later, sufficient in-state generation is “on the ground” or under contract to provide for the State’s electricity. This achievement is largely a result of New York’s market design incentives to investment, centered on Locational-Based Marginal Pricing (LBMP), and the streamlining of the State’s power plant siting procedures which, unfortunately, have since expired.

Other Market Challenges included:

- The NYISO staff and its customers had to develop the means to prevent the exercise of undue power over pricing in a physical environment that had been designed for regulated monopolies. While early attempts at market manipulation were few, the NYISO moved quickly to establish a market monitoring function that has since expanded in size, efficiency and importance. More recently, an innovative, automated system of monitoring and mitigation was developed and implemented.
- A major blow to restructuring occurred when the poorly designed California markets went awry, creating huge price spikes, rolling blackouts and the bankruptcy of one of the largest electric utility companies in the United States. Although the economic damage done in California has not yet been fully repaired, vigilance on the part of the NYISO and the other three northeastern market regions permitted their markets to emerge from the California crisis unscathed.
- The financial collapse of Enron and other major market players triggered another crisis in the industry. This blow to the world of corporate finance was especially hard felt in the electric energy industry, in which it suddenly became very difficult to attract investment for energy facilities, and many generating companies came upon financial hard times. The financial fallout from the corporate crisis associated with the Enron collapse is still being felt in the electricity industry, including in New York.
- It became clear that the wholesale markets were not providing sufficient price incentives for investment in a tightening financial environment. The NYISO staff and the Market Participants developed an innovative method of providing a price incentive for new capacity by incorporating a “demand curve” into its capacity markets. In addition, the NYISO and its independent market advisor also developed a mechanism to better recognize scarcity in pricing.
- The NYISO had begun operation using software developed for other purposes by its predecessor, the New York Power Pool. It soon became clear that the old software was designed more for operation of the transmission grid and not for operating a wholesale market, requiring separate steps to bid, clear markets, dispatch and bill. An effort was begun in 2003, and was recently concluded, to develop and implement an entirely new array of software that completely integrated the market and electric system control functions and permitted greater automation, needed flexibility, compliance with the directions of the FERC, and the preferences of the Market Participants.
- The first five years included many false starts regarding potential institutional consolidation with neighboring markets. However, those efforts at consolidation made it clear that significant improvements in economic efficiency could be obtained by eliminating barriers to inter-regional transactions. Those barriers, known as “seams,” have been largely reduced or

eliminated through cooperative efforts among the northeast regions. The most significant of these, the fees charged to inter-regional transactions known as “rate pancaking,” has been eliminated between New York and New England. The NYISO will continue to pursue similar arrangements with the other contiguous ISO/RTOs and markets.

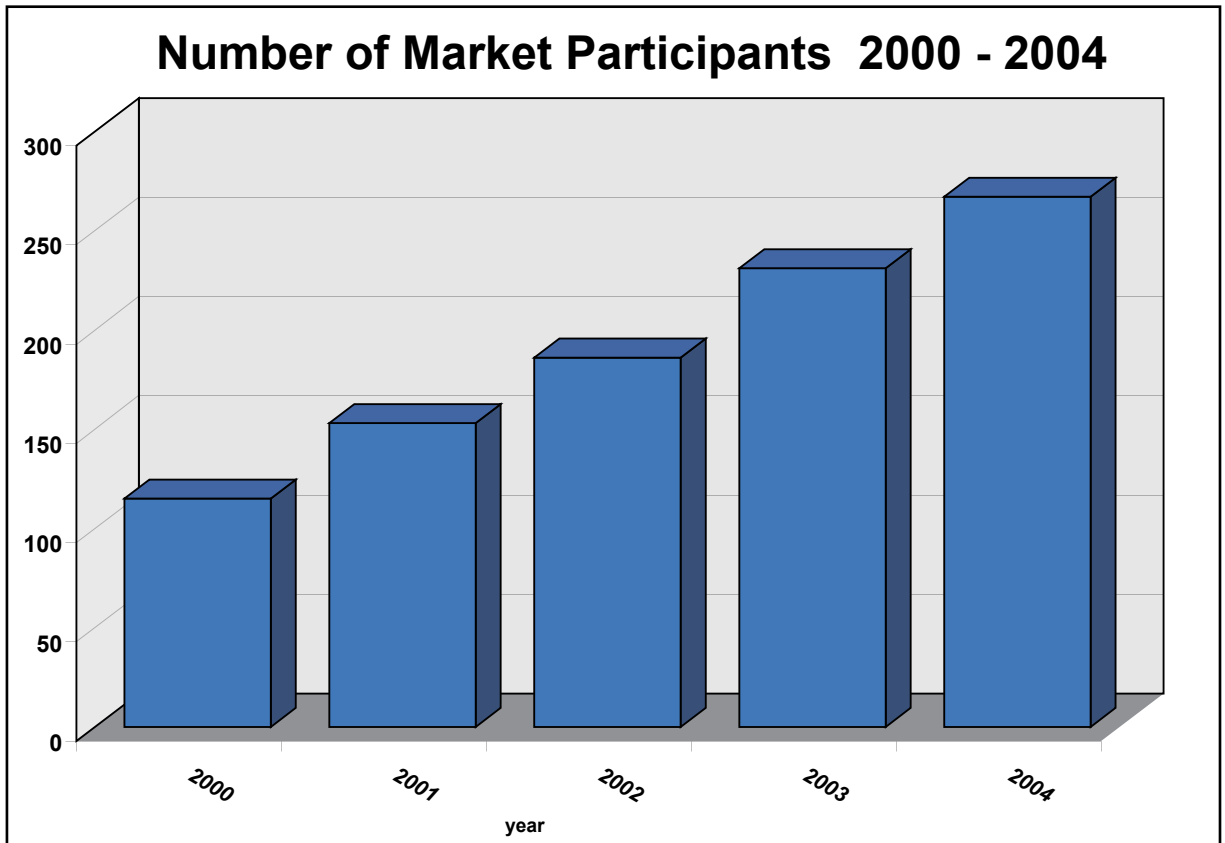
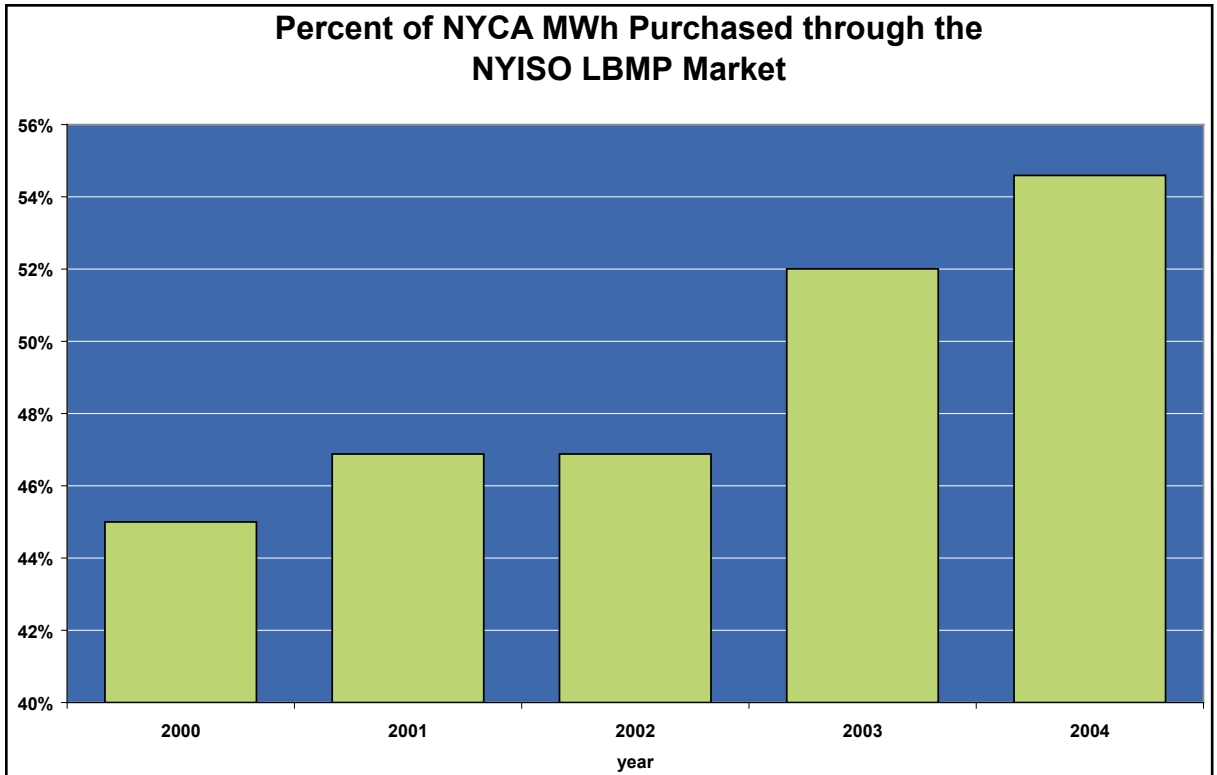
- An area of important and pioneering work done in New York has been the incorporation of demand-side resources into the economics of the market. When peak demand is expected to strain capacity, the NYISO markets have a means of buying back capacity from energy consumers both large and small. This innovation has resulted in benefits both to the market and the individual participants in the program. New York leads the nation in the use of demand response programs for both reliability and market efficiency.
- The performance of New York’s generating industry was tested under serious pressure on August 14, 2003, when a blackout, originating elsewhere, disrupted electric service in most of New York. Restoration occurred in record time in New York, with extraordinary efforts by transmission owners, generating plant owners, customers, and the NYISO staff.

## Evidence of Success

New York’s markets have been largely successful, although much remains to be done. A measure of this success can be seen below in the increase in the NYISO’s customer base and increased use of the NYISO’s markets by electricity buyers and sellers as shown on the following page.

During these first five years, generators participating in the New York markets have performed well under the new competitive regime. Competitive forces resulted in the power plants being more available when needed than ever before. New York’s generators are now available on peak 90.3 percent of the time in the summer months versus 86.5 percent prior to NYISO operation.





# Reliability

## GENERATION

The State continues to experience modest peak demand growth. Peak demand for the summer of 2005 is expected to be approximately 31,960 MW. Based on the statewide installed reserve margin requirement of 18 percent\* for the 2005 to 2006 capability year, the installed capacity requirement for the summer of 2005 is 37,715 MW. This growth in peak demand has been more than offset by an increase in expected generating capacity for the summer of 2005 that will bring the total expected installed generating capacity in New York this summer to 38,340 MW.

The chart on the following page presents the outlook for the in-state capacity reserve margin through 2015 before imports and Special Case Resources (SCRs). The SCR program pays retail customers to curtail usage during periods of high demand. By 2015, the New York Control Area peak load is expected to increase to 35,670 MW. The New York City and Long Island zone peak loads are expected to grow to 12,648 MW and 6,112 MW, respectively. Over this period, there are currently 2,038 MW of new capacity under construction with announced retirements now totaling 1,946 MW, including 1,049 MW of retirements in New York City. The chart assumes that all the units

**New York Load & Reserve Requirements vs. Available Supply – Summer 2005**

Region	Requirement (Load + reserve or locational requirement)	Generation Available	SCRs* Summer 2005	Projected Surplus above Requirement Summer 2005
NY State	37,715	38,340	897	+1,522
NY City	9,052	9,224	158	+330
Long Island	5,179	5,329	90	+240

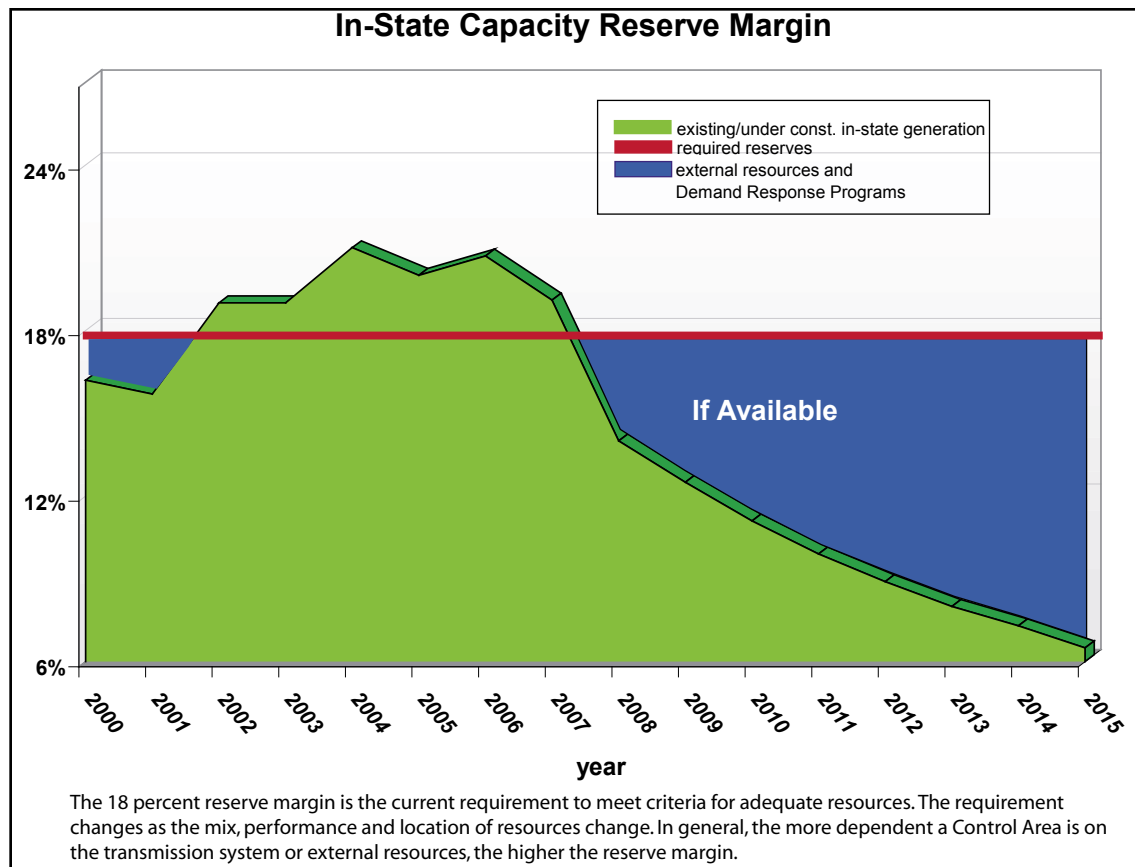
*\*SCR's are a Demand Response Program that can reduce customer demand on peak load days.*

As can be seen from the above table, New York has ample margin for the summer of 2005. Additional out-of-state energy resources that participate in the New York capacity markets may extend New York's capacity margin by another 2,500 MW, to nearly 41,000 MW.

Beyond 2005, load growth is expected to continue at a moderate pace with growth averaging about 1.2 percent per year statewide, or 1.7 percent downstate and 0.6 percent upstate per year.

under construction would be completed and operational at their scheduled dates, including the New York City units, which include East River Repowering (288 MW); the New York Power Authority project (500 MW); and the first phase of SCS Astoria (500 MW) and that announced retirements occur as scheduled. The chart does not include any other facilities with approved Article X certification that are not under construction, nor any projected plant retirements beyond those officially announced.

\* The 18 percent reserve margin is the current requirement to meet criteria for adequate resources. The requirement changes as the mix, performance and location of resources change. In general, the more dependent a Control Area is on the transmission system or external resources, the higher the reserve margin.



Statewide, the expected in-state reserve margin of 15 percent in 2008, exclusive of SCR and imports, falls short of the current installed capacity requirement of 18 percent. Therefore, the availability of SCR and out-of-state resources will be important elements in being able to meet statewide installed capacity requirements in 2008 and beyond. However, the New York City and Long Island locational capacity requirements, which are projected to fall substantially below current requirements, are clearly flashing caution. At this level of locality capacity, New York will be challenged to meet resource adequacy criteria even with the inclusion of SCR. The determination of when, and if, New York will require additional resources will be one of the key issues addressed in the Reliability Needs Assessment

(RNA), which will be conducted within the framework of the NYISO's Comprehensive Reliability Planning Process. The first RNA is scheduled to be completed by September 2005.

Although the State's Article X power plant siting process (created in 1992 to streamline the permitting and approval process for power plants over 80 MW) expired at the end of 2002, there were a number of projects that were in the licensing process or had been licensed. The table on Page 16 presents the projects that have completed the Article X process or are still pending. Absent Article X, a generating facility will need to be licensed through a combination of local and state permitting processes.

**Generation Projects Subject to Article X  
Top of the Queue**

Project Name	Owner/ Developer	Size (MW)	Connecting Utility	Date of NYISO Application	Status of Article X	Proposed In-Service
Bethlehem Energy Center	PSEG Power NY	750	NM-NG	04/27/98	Certified 2/28/02	2005
East River Repowering	Consolidated Edison of NY	288	CONED	08/10/99	Certified 8/30/01	2005
NYPA Project	NYPA	500	CONED	04/30/99	Certified 10/2/02	2005
SCS Astoria Energy Phase I	SCS Energy LLC	500	CONED	11/16/99	Certified 11/21/01	2007
<b>Under Construction - TOTAL</b>		<b>2,038</b>				
Brookhaven Energy	American National Power	540	LIPA	11/22/99	Certified 08/14/02	
Bowline Point Unit 3	Mirant	750	CONED	10/13/99	Certified 3/25/02	
Spagnoli Road CC Unit	Keyspan Energy, Inc.	250	LIPA	05/17/99	Certified 05/08/03	
Wawayanda Energy Center	Calpine Eastern Corporation	540	NYPA	06/10/99	Certified 10/22/02	
Astoria Repowering Phase I	Reliant Energy	367 net	CONED	07/13/99	Certified 06/25/03	
Astoria Repowering Phase II	Reliant Energy	173 net	CONED	08/18/00	Certified 06/25/03	
SCS Astoria Energy Phase II	SCS Energy LLC	500	CONED	11/16/99	Certified 11/22/01	
Empire State Newsprint	Besicorp/Empire State	505	NM-NG	07/14/00	Certified 09/21/04	
<b>Approved - TOTAL</b>		<b>3,625</b>				
TransGas Energy	TransGas Energy, LLC	1,100	CONED	10/05/01	Appl accepted 6/05/03	
<b>Projects with Applications Pending - TOTAL</b>		<b>1,100</b>				
<b>GRAND TOTAL MW Proposed Projects</b>		<b>6,763</b>				
<b>under construction</b>	<b>approved</b>		<b>application pending</b>			

Approved for New York City, but not under construction are the Reliant Repowering project (546 MW), Phase II of the SCS Astoria project (500 MW) and an Article VII permit for the PSEG Cross Hudson project (550 MW). Article VII is the siting mechanism for transmission lines in New York State. The Cross Hudson project was put on hold last winter by the PSEG because of cost uncertainties. The New York Power Authority has issued a Request for Proposal (RFP) for 500 MW of in-city capacity to be

in service in 2008 which can either be met by in-city capacity or transmission. Additional in-New York City capacity or equivalent will be needed beyond the RFP to ensure resource adequacy criteria can be met beyond 2010. Also, the existing Poletti unit which currently is scheduled for retirement in February 2008 can be deferred for up to two years to meet reliability needs.

It may be difficult in the short run for Long Island to meet its locational capacity requirements. However, the Long Island



Power Authority (LIPA), recognizing the urgent need for capacity on Long Island, issued a RFP for additional generating and transmission resources. Three proposals were selected to meet Long Island's future needs. These projects include a 326 MW combined cycle generating plant, a 660 MW HVDC tie to PJM in New Jersey and the construction of 100 offshore wind turbines with a nominal capacity value of roughly 150 MW. Target in-service date for these projects is 2007.

Approved Article X projects outside of New York City and Long Island include PSEG Bethlehem (net 350 MW), which is expected to come on line this summer; Mirant's Bowline 3 (750 MW) and Calpine's Wawayanda (500 MW), neither of which have commenced construction; and the Empire Newsprint Project in Rensselaer County (505 MW), which was recently certified under Article X but has not begun construction.

TransGas Energy in New York City (1,100 MW) remains the only Article X project that could still be certified. Additionally, there are numerous wind projects proposed pursuant to the Renewable Portfolio Standard.

There are a variety of measures, including legislation and market innovations that could facilitate the siting and construction of new generation resources in New York. The State Legislature has yet to re-enact Article X and, while some previously approved projects remain in the pipeline, New York lacks a clear and timely mechanism for providing the necessary permits and approvals required to build new power plants. National and international conditions in energy markets have made energy investments less attractive to investors and, while New York has

instituted changes, such as scarcity pricing to its markets, new market innovations will be required to rectify the problem. Presently, long-term contracts or other mechanisms to provide capacity payments will be required to enable developers to attract investment.

Although the capacity situation looks good for the coming summer, more work needs to be done if adequate generation is to be attracted and sited within the state to keep up with economic growth, environmental regulations and plant retirements. In order to ensure that the next generation of plants that will be required by the end of the decade will be built, the planning and siting process must begin now.

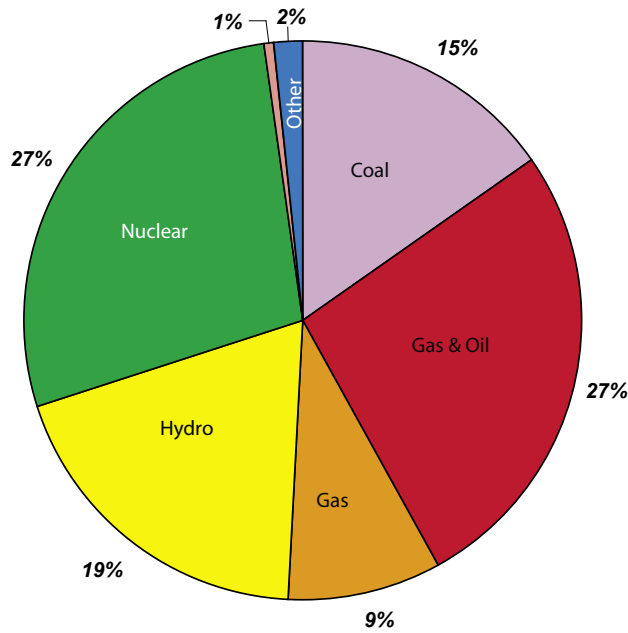
## FUELS FOR GENERATION

In New York, as throughout the Northeast, new electric generating plants are being fueled primarily by natural gas. Investors in competitive markets have chosen natural gas because its use minimizes initial capital cost and facilitates compliance with environmental regulation. The growing dependence on natural gas, however, raises certain concerns.

The charts on Page 18 show New York's generating capacity mix as of January 1, 2005, as well as fuel mix based on actual energy provided during 2004.

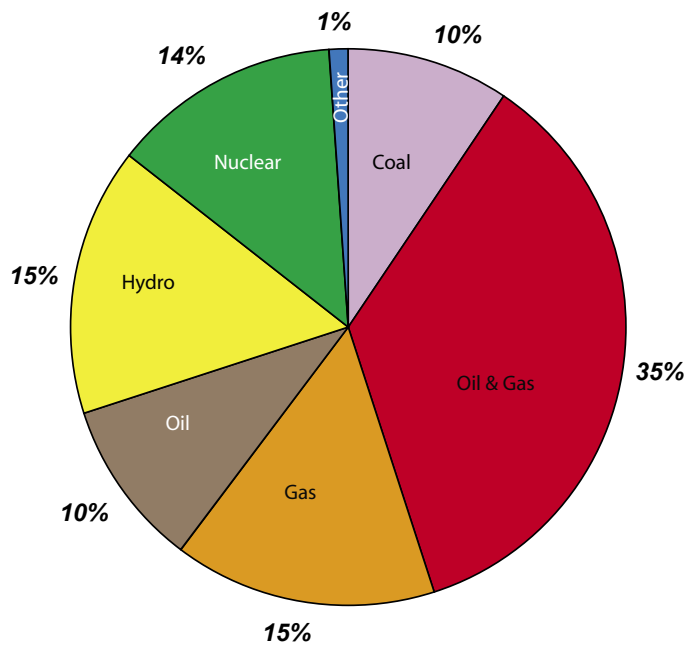
**Near Term Reliability:** At times when demand for natural gas is high, the gas pipeline infrastructure may not always permit deliverability of the very large amounts of gas needed for electric generation. This condition became serious last winter during a cold snap in New England. It highlighted the vulnerabilities of the bulk transmission system to gas deliverability issues. This condition

### Generation by Fuel Type - 2004



■ Coal ■ Gas & Oil ■ Gas Only ■ Hydro ■ Nuclear ■ Oil Only ■ Other

### New York's Generating Capacity Mix 2005



■ Coal ■ Oil & Gas ■ Gas Only ■ Oil Only ■ Hydro ■ Nuclear ■ Other

*Additional infrastructure will be needed to deliver sufficient amounts of gas for electric generation.*

suggests that additional pipeline infrastructure will be needed in the future to deliver sufficient amounts of gas for electric generation. To some extent, this problem has been ameliorated by the ability of existing gas-fired plants to run on dual-fuel. However, it is important to determine the extent of the dual-fuel supplies actually being kept at the plants and the capability of timely replenishment. A market mechanism may need to be developed to ensure that an adequate amount of New York's gas-fired generation is dual-fired.

**Fuel Diversity:** Natural gas is thought of as North America's fuel of choice for new generation, and has been relatively secure and less subject to both price and political manipulation by international cartels. Those assumptions are increasingly changing, however, as North America's sources of additional gas are proving finite. Plentiful additional supplies of gas are available from elsewhere in the world in the form of liquefied natural gas (LNG), but increased dependence on LNG raises concerns about infrastructure, cartelization, energy security and the relationship between gas and oil prices. To a great extent, natural gas will become subject to the same concerns as the country's growing dependence on imported oil. These issues are manifested in the Northeast, but require attention at the national level.

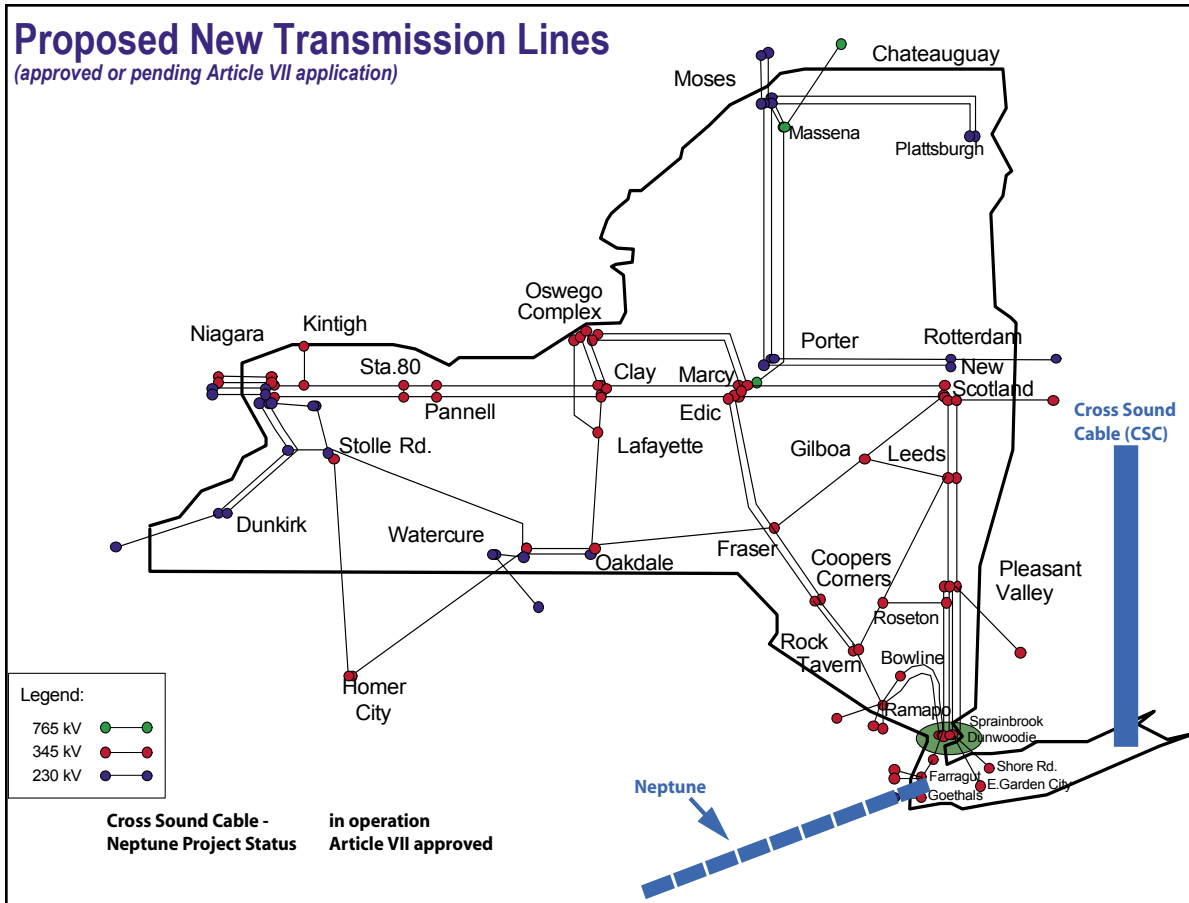
The nation in general, and the Northeast in particular, must fashion an effective fuel diversity strategy for dealing with the increasing use and dwindling domestic reserves of natural gas. Such a policy will have to include increased use of renewables, improved incentives for efficiency, and utilization of other domestic fuels.

## TRANSMISSION

The wholesale electricity marketplace has spurred interest in merchant transmission development, but a gap exists between conception and construction. Since the opening of the New York markets, only three Article VII applications have been filed to develop merchant transmission projects. Two of the three have been approved and one is in the early licensing process. Financing remains a major challenge for these merchant facilities.

The Cross Sound Cable, a 330 MW high-voltage direct current (HVDC) facility, connecting the New England grid in Connecticut with the New York grid in Long Island, is operating. The Neptune project, a 600 MW HVDC facility connecting the PJM grid in New Jersey with the New York grid in Long Island, has been licensed. Neptune was one of the successful bidders in a LIPA RFP and should be able to obtain financing on the strength of the LIPA contract.

In addition to the merchant projects, a number of regulated transmission projects have been announced. They include two major new substations in New York City; new circuits from Sprainbrook to Sherman Creek; the Rochester Transmission Project and major transmission projects on Long Island. These projects are being driven by load growth and local reliability concerns to ensure energy can be delivered to end users.



## ELECTRIC SYSTEM INFRASTRUCTURE

Since last year's *Power Trends* report was issued, the outlook for both generation and transmission infrastructure for the New York Control Area (NYCA) has changed. In the near term, LIPA announced its preferred projects; the New York Power Authority (NYPA) issued a RFP for 500 MW of generation or transmission for New York City, and the regulatory issues surrounding the operation of the Cross Sound Cable were resolved. Other significant events were the withdrawal of the proposed Empire Connection Transmission Project (1,000 MW) connecting the upper Hudson Valley to New York City and delay of the Cross Hudson Cable Project (500 MW).

There were other significant infrastructure developments, including FERC's approval of the NYISO's Comprehensive Reliability Planning Process, New York State's Renewable Portfolio Standard (RPS), and the State Department of Environmental Conservation's (DEC) consent decree with the owners of major coal burning plants in New York. The RPS, in conjunction with federal tax law incentives, has resulted in interconnection requests for wind generation projects totaling 4,300 MW. The DEC consent decree and related actions, which is the settlement of a lawsuit regarding whether certain coal plants were in compliance with new source performance standards, has resulted in 467 MW of scheduled retirements.

In addition, another 410 MW has been announced for retirement by its owner and another 289 MW is under review by its owner because the cost of emissions control significantly impacts the economic viability of these plants.

## SINCE THE BLACKOUT

A year has passed since the U.S.-Canada Power System Outage Task Force (the Task Force) issued its final report on the blackout of 2003. It followed a comprehensive, eight-month investigation and identified a number of North American Electric Reliability Council (NERC) rule violations as the root cause. The Task Force issued 46 recommendations for industry participants and regulators to help prevent another blackout of this type.

Other related investigations and audits of the blackout have shed additional light on the causes and concluded with specific recommendations. The NYISO staff and New York's Transmission Owners (TOs), with support from the State Public Service Commission, conducted its own comprehensive review of the restoration effort, and published the findings in February.



In the report, the NYISO reinforces its endorsement of the recommendations made by the Task Force and NERC, and recommends improved emergency response communications and procedures within the NYCA, as well as the expansion of restoration training.

The NYISO continues to track and report its response to the Task Force's 46 recommendations, and continues to urge Congress to pass mandatory and enforceable reliability standards.

## 2004 PROGRESS ON RELIABILITY

The NYISO staff, in conjunction with its Market Participants, and through coordinated efforts with the NERC and the Northeast Power Coordinating Council (NPCC), undertook a number of improvements for the summer of 2004 as a means of reducing the likelihood and/or severity of events such as the 2003 blackout.

Among the improvements, the NYISO has;

- ✓ Provided its Control Room with greater visibility of system conditions outside New York State;
- ✓ Participated in a readiness audit by outside reliability organizations and the FERC;
- ✓ Implemented audit findings and blackout recommendations of the NERC;
- ✓ Established defensive procedures to be implemented in the event problems develop on neighboring systems;

- ✓ Initiated improvements, wherever possible, in restoration procedures based on experience gained by the NYISO and New York's Transmission Owners during the blackout; and
- ✓ Instituted training improvements based on blackout experience; the NYISO's operator training exceeds current industry standards.

## NATIONAL MANDATORY RELIABILITY STANDARDS

While the previous actions help, they are no substitute for prevention. Today, there still are no mandatory reliability rules in place following the 2003 blackout, despite the recommendation for their establishment by experts. And while New York, New England and Ontario are obligated to follow NERC and NPCC standards by agreement and contract, failure to follow the rules by a distant system hundreds of miles away can have catastrophic consequences for New York.

Virtually all responsible parties – ISO/RTOs, utilities, independent producers, regulators and legislators in the United States and Canada – agree that the root cause of the 2003 blackout was the failure to adhere to the existing reliability rules. The NYISO believes that the rules must be made mandatory for all participants in the interconnected system. In the United States, only Congress can make the appropriate laws. To date, it has not acted.

## Making Markets Work in New York

### ENSURING PROPER PRICE SIGNALS

A key measurement of successful markets is the quality of price signals produced by the marketplace. Proper price signals send clear economic signals to the marketplace so that participants respond with economically rational behavior. Accurate price signals encourage competitive behavior and, ultimately, investment. New York has worked to ensure proper price signals, as follows:

- ✓ The focus on modeling real world constraints allows the computer software to accurately capture incremental congestion (bottleneck) costs;
- ✓ The installed capacity (ICAP) market was designed to meet local and statewide reliability requirements. The capacity spot market demand curve was added to encourage future investment;
- ✓ The implementation of virtual trading enabled the convergence of Day-Ahead and Real-Time prices and provided more accurate prices consistent with economic efficiencies;
- ✓ The co-optimization of energy, reserve and regulation allowed for the equal treatment of lost opportunity costs;
- ✓ The effective mitigation of any market power in load pockets prevented possible market price manipulation; and
- ✓ The establishment of competitive proxy bus pricing rules permitted fair trading at our borders.

The differences between Day-Ahead and Real-Time prices have decreased 11 percent over the last four years as prices converged, due in part to the introduction of virtual trading and improved modeling. In 2004, virtual load represented approximately 15 percent of actual load representing a steady increase since its inception in 2002. Annual trading across our borders is 30 million MWh, reflecting the importance of proper pricing at the boundaries.

The NYISO also ensures proper price signals by focusing on the elimination of seams issues. The term “seams issues” includes market rule differences or operating practices that result in barriers to trading energy and capacity between regions. Seams issues stifle emerging competition, create undesirable market inefficiencies and in extreme cases cause reliability problems.

The NYISO spearheaded a series of agreements with each of its neighboring markets to resolve seams issues and further enhance the competitiveness of the regional markets. Under these agreements, the NYISO, PJM, ISO-New England, and the Independent Electricity System Operator (IESO) in Ontario (formerly the IMO) have developed cross-functional teams to address a variety of market design, operational, planning and technology issues.

Probably the most significant achievement regarding seams issues is the recent elimination of rate pancaking between New York and New England. Last December, the export charges between our two control areas were removed to encourage increased liquidity and trade.

Another seams issue occurs when a system operator does not have enough resources

at hand to meet energy and reserve demands, since price signals are not providing the proper financial incentives for Market Participants to recognize and react favorably to help lessen the condition. To address this, the NYISO has put mechanisms in place to ensure that the proper price signals will emerge during scarcity conditions, thereby encouraging suppliers to deliver needed power from adjacent areas to the NYISO when it is needed most.

The NYISO has also worked with neighboring market operators to develop and implement open system data transmission protocols, which facilitate the movement of transaction related data between areas in real time. Armed with this data, the ISOs/RTOs now have a much greater ability to avoid the scheduling errors and misunderstandings that were common in the market, and which curtailed energy imports and exports.

## MARKET BEHAVIORS AND FEATURES

The success of deregulation can also be measured by market outcomes, including increases in generator availability, levels of liquidity in trading volume and other market features available to Market Participants, such as;

- ✓ Economic forces have resulted in 2,968 MW of new generation capacity investments since the NYISO start-up;
- ✓ Availability of existing power capacity in New York has increased, as evidenced by the decreases in the average forced outage rates for generators, which have been reduced by

as much as 50 percent. This increase in availability allows existing units to participate in the marketplace for longer times, increasing the level of competition during those times;

- ✓ Market Participants have the transparency of market prices across the state with more than 300 generation price points and 11 zonal load price points every hour for the Day-Ahead market and every five minutes for the Real-Time market; and
- ✓ Utilization of tie lines to our neighboring regional markets, in both Canada and the U.S., has increased, as evidenced by the increase of purchased installed capacity (ICAP) imports. This level of ICAP imports has increased by more than 1,000

MW since the inception of the NYISO.

The number of innovations that the NYISO has incorporated into the marketplace includes the Demand Response Programs, controllable tie line scheduling, virtual trading, demand curves for regulation and reserves, automated mitigation methods for Day-Ahead and Real-Time energy and Ancillary Service markets, two-settlements for reserves and regulation, 15-minute real-time unit commitment, and other advanced real-time scheduling features. Progress made thus far through the development of markets is summarized in the chart below.

<b>NYISO Market Statistics</b>	<b>2000</b>	<b>2004</b>
# Customers	112	267
Total Market Volume	\$5.27B	\$7.3B
DAM/RT Convergence (Average of absolute monthly difference)	60%	13.4%
Uplift Summer (% of total energy price)	3.7%	2.9%
Winter	3.6%	1.4%
Price Volatility DAM (Std Dev - % Average Yearly Price)	36%	27%
RT	73%	37%
TCC Market Volume		
Bid MW	107,910 MW	662,400 MW
Awarded MW	7,668 MW	26,248 MW
Virtual Bidding		
Authorized average daily MWh	105,500 MWh*	407,096 MWh
Offered/bid average daily MWh	21,173 MWh*	154,634 MWh
*2001		
Reserve Margins	14.8%	19.9%
<i>* End of Year Projection</i>		



## TECHNOLOGY INNOVATION

The successful implementation of competitive electricity markets in New York required an Information Technology (IT) infrastructure that, by computer standards, was several generations beyond the technology that supported the legacy Real-Time dispatch system. The result was an inherent difference in the way the systems viewed, and made decisions about, the economic operation of the power system.

However, even before the NYISO took control of the New York power system, these challenges had been recognized, and hardware and software solutions were being developed, not only to deal with existing challenges but also to support the NYISO's long-range IT needs.



On February 1, 2005, the NYISO introduced SMD2, a highly flexible technological foundation upon which the future electricity markets and system operation concepts will be built. It has put the New York energy markets on a common computing platform,

resulting in economic and scheduling consistency across the markets, as well as advanced market concepts such as a two-settlement system for reserves and regulation services. SMD2 allows for a more efficient real-time unit commitment process and economic signals that clearly indicate where and when shortage conditions exist. SMD2 also includes advanced system operating tools that allow for forward looking evaluations and sophisticated tools that assist the operator in responding to emergency conditions.

SMD2 also provides:

- ✓ Improved consistency between the Day-Ahead and Real-Time markets;
- ✓ Real-time automated power mitigation in New York City;
- ✓ Greater market efficiency and uplift reductions;
- ✓ More frequent scheduling and commitment of internal resources;
- ✓ A two-settlement system for Ancillary Services; and
- ✓ Demand curves for Reserve and Regulation markets.

The NYISO also has applied advanced technology to support other needs of Market Participants and the accuracy of the markets; notably:

- ✓ E-Tagging and Facilitated Check-Out, which support the vision for a seamless regional market;
- ✓ Advances in web technology, including the new web portal and web content management system, which will play a key role in replacing the manual, spreadsheet-based unforced capacity (UCAP) and transmission congestion contract (TCC) auctions

- with automated, web-based auction applications;
- ✓ Product and project management applications designed to streamline internal business processes and assist in overall project and product prioritization;
  - ✓ The Real-Time Scheduling system includes the following enhancements: scheduling and pricing on the same platform; more frequent scheduling and commitment of internal resources; and the treatment of energy, reserves and regulation in an identical fashion by using the same price responsive demand curve. It also includes a full two-settlement system for reserves, which ensures that day-ahead obligations are balanced against real-time schedules;
  - ✓ The Security Constrained Unit Commitment (SCUC) Day-Ahead market software. SCUC is a sophisticated Day-Ahead market solution which is fully integrated with Real Time Scheduling and includes ancillary services;
  - ✓ Market Information System – user interface with customers allowing batch or internet integration with the NYISO;
  - ✓ Data Warehouse – sophisticated repository for data and information required by our customers to analyze billing information and to help make better business decisions;
  - ✓ Portal – NYISO website which uses state-of-the-art technology and soon to be announced content management;

- ✓ Billing Simulator – leading edge software deployed internally to allow our business units to evaluate financial impact of required changes to business rules or to evaluate financial impact of a software change or market condition to a single or family of customers; and
- ✓ Application Server and Enterprise Integration Technology is the state-of-the-art software used to control our user interface and to integrate all applications with the same technology. It is a cost effective and flexible implementation which helps scalability and customer responsiveness.

Going forward, there is still much to be accomplished. The underlying technological infrastructure is in place to support the integration of new technologies and market advances.

## BILLING AND SETTLEMENTS

The NYISO is currently developing a Billing Simulator, which will be the foundation for a new Billing and Settlement System. This system is already producing numerous benefits as we have deployed rule-based technology that allows the NYISO to run a daily or monthly bill to evaluate changes to business rules, or to allow calculation of bill adjustments for final bill distribution. This new technology allows us to run a daily bill in seven minutes, as opposed to the previous two-and-a-half hours, providing the NYISO with significantly more time to analyze issues and quickly respond to Market Participants. The NYISO intends to use this technological foundation to build a new Billing and Settlement System in 2006.

## PLANNING

When the NYISO began operations in 1999, there was no comprehensive planning mechanism in place to identify and implement new transmission, generation or demand-side resources when needed. For the most part, the planning function dealt with projections of load growth, the interconnection of new generation and short-term reliability studies, which were needed to comply with national and regional reliability council requirements.

Today there is significant progress to report. In the summer of 2004, the NYISO Management Committee and the NYISO Board of Directors approved the initial planning report, which described how the NYISO would expand its reliability planning process over a 10-year horizon.

On December 28, 2004, FERC approved the NYISO's Comprehensive Reliability Planning Process (CRPP), providing a strong endorsement of the NYISO's market-based approach to planning for reliability needs. FERC found that the NYISO's planning process properly balances the role of market-based and regulated solutions and that it, "is certainly a substantial improvement over planning processes that traditionally have depended largely or even solely on transmission owner-developed regulated solutions."

The initial steps for the development of the first Comprehensive Reliability Plan for New York State are well underway. The NYISO expects to issue its first Reliability Needs Assessment in September of this year. The first Comprehensive Reliability Plan is expected to be issued in the summer of 2006.

The NYISO staff, in conjunction with the Electric System Planning Working Group (ESPWG), also continues to address economic planning issues. In February 2005, the Operating Committee approved a straw proposal for a NYISO Economic Planning Process. It uses a market-based approach consistent with the CRPP. This process will focus on market design enhancements as well as an expanded information role for the NYISO to allow the marketplace to make informed business decisions and take action as appropriate. The NYISO will evaluate any resulting market proposals to ensure system reliability.

On an interregional basis, the Northeastern ISO/RTO Planning Coordination protocol was executed last December by the NYISO, ISO-New England and PJM. The parties agreed to coordinate planning efforts, and the protocol received the overwhelming support of stakeholders in all regions. The IESO of Ontario and the other Canadian members of the NPCC have agreed to participate on a limited basis.

The ISOs are preparing a Northeastern Consolidated System Plan (NCSP), which will provide historical insights on joint planning activities within the Northeast, identify issues and risks based upon current area plans, and serve as a starting point for the development of a NCSP. Implementation efforts for the first NCSP are expected to begin with an interregional stakeholder meeting in the summer of 2005. The first NCSP is planned for completion in the summer of 2006.

## ENVIRONMENTAL INITIATIVES AND CONSIDERATIONS

There are a number of environmental initiatives at both the federal and State levels that impact New York's future supply situation. New requirements for nitrogen oxide and sulfur dioxide emissions at both federal and State levels, potential impacts of once-through cooling on aquatic life, and possible mercury and/or carbon dioxide emissions rules compound the uncertainty for many of New York's generators. New supply sources, primarily wind power, will be available through the State's Renewable Portfolio Standard, which will require integration with existing operations and markets. It is important that the cumulative impact of all of these initiatives, which have tended to be studied in isolation, be looked at as a whole to determine the overall impacts on reliability and the markets.

### *Renewable Portfolio Standard*

On September 24, 2004, the Public Service Commission issued its order regarding the retail RPS, which covered, among other things, the following issues:

- RPS is targeted to provide 24 percent of the energy consumed in New York by 2013, which will be a six percent increase over existing renewable generation; an additional one percent is estimated from voluntary green power marketing programs;
- Renewable resource requirements will be administered by the New York State Energy Research

and Development Authority (NYSERDA) which will fund the renewable premiums through an additional charge applied to the wires charge of all regulated retail customers; collections start in the final quarter of 2005;

- Additional aspects of the program – costs/benefits, eligible resources, delivery requirements – will be formally reviewed in 2009;
- Units commercially operational on/or after January 1, 2003, are eligible to participate; and
- The NYISO and NYSERDA recently concluded an evaluation of the potential impact of 3,300 MW of wind on the New York system. Based on the results of this study, it is expected that the system can reliably accommodate at least 10 percent of its system requirements (or 3,300 MW) of wind generation with only minor adjustments to its existing planning, operation and reliability practices. This conclusion is subject to several caveats



incorporated in the development of the study scenario:

- ✓ Individual wind farms installed in New York would require approval per the existing NYISO procedures;
- ✓ Ratings of wind farms would need to be within the capacity of local transmission facilities, or subject to local operating restrictions; and
- ✓ Wind farms would include state-of-the-art technology, with reactive power, voltage regulation and low-voltage ride-through capabilities consistent with the recommendations in the report.

### *Regional Greenhouse Gas Initiative*

The NYISO has been actively engaged in the Regional Greenhouse Gas Initiative (RGGI) process — a cooperative effort by Northeastern and Mid-Atlantic states to reduce carbon dioxide emissions. The goal of the RGGI stakeholder process is to develop a multistate program covering greenhouse gas emissions, and is initially aimed at CO<sub>2</sub> emissions from power plants. The program would establish a CO<sub>2</sub> aggregate emissions limit, with tradable allowances allocated to sources.

### *NYISO Environmental Advisory Council*

In 2004, the NYISO created an external Environmental Advisory Council to help guide it in identifying and evaluating the environmental implications of

existing or planned activities regarding such functions as market design, system operations and reliability, electric system planning and strategic planning. The council is also charged with providing the NYISO with expert opinion on national industry issues that may affect the environment in New York and elsewhere.

## MARKET RULES FOR INTERMITTENT RESOURCES

Wind generators may be less able to follow dispatch instructions and, as a result, may face more balancing obligations and under-generation penalties than other generation types.

Over the next few years, the NYISO must resolve a number of issues related to intermittent resources:

- Clarify the existing rules that exempt (up to 500 MW) wind- or solar-powered resources from balancing charges and persistent under-generation penalties; and
- Work on the end-state solution for integrating a wind power forecasting system with NYISO markets and operations.

Looking ahead, it is clear that renewable resources will play an ever-increasing role in the New York State electric supply equation. The NYISO's markets will accommodate these resources in a fair and equitable manner, recognizing the environmental benefits provided by renewable resources while providing a balanced set of market rules for all suppliers. The NYISO must also ensure that the reliability of the system is maintained as greater levels of intermittent resources are added to the system.

## DEMAND RESPONSE

The NYISO has been active in expanding existing wholesale markets to permit loads to participate in both economic and reliability-based markets. Lack of adequate demand response has been cited by FERC as a major impediment to full-functioning, efficient wholesale electricity markets. Since 2000, the NYISO staff has worked with its stakeholders to develop what many regard as the most advanced market for demand resources in the U.S. and the world.

Currently the NYISO offers three demand response programs:

- Installed Capacity (ICAP) Special Case Resources (SCR);
- Emergency Demand Response Program (EDRP); and
- Day-Ahead Demand Response Program (DADRP).

The ICAP SCR program pays retail electricity customers to provide their load reduction capability for a specified contract period. Program participants receive payments in advance for an agreement to curtail usage during times when the electric grid could be in jeopardy.

EDRP allows participants to be paid for reducing their energy consumption upon notice from the NYISO that an operating reserve deficiency or major emergency exists. The EDRP and SCR programs are called upon by the NYISO when supplies of power are tight. It was not necessary to call on EDRP and SCR last year because the summer of 2004 was cool, the ICAP demand curve had accomplished its intended effect and attracted more capacity to the NYISO markets, and because there were no major unexpected

generator or transmission line outages.

Nevertheless, its availability provided valuable insurance for system operators. DADRP allows loads to bid their total load reduction into the Day-Ahead market. If scheduled through the NYISO's Security Constrained Unit Commitment (SCUC) program, loads are paid for the scheduled demand reduction, and are also paid an incentive for any additional load reduction provided in real time.

Other initiatives being considered to facilitate participation in DADRP (as well as other NYISO markets) are an automated notification system that would inform successful bidders that their offers have been accepted. Coupled with the existing ability of participants to maintain standing bids, such a notification system could bring to DADRP the same ease of participation that has made the EDRP and SCR programs so successful.

## Conclusions and Recommendations

Competitive electric markets are still evolving in New York, five years after they began but, the NYISO has addressed the many questions raised before restructuring: Reliability has not been adversely impacted; the State's power plants are being operated more efficiently under competition; the markets are protecting consumers from manipulation; and they are responding appropriately to supply and demand swings.

The NYISO strongly recommends the following actions to ensure reliable and cost-competitive electric energy in the future:

1. The NYISO staff and its stakeholders should use the new Comprehensive Reliability Planning Process and other market mechanisms to ensure that adequate proposals are submitted for the development of needed generation, transmission and demand-side resources when and where appropriate, especially in the New York City and Long Island areas.
2. In order to have sufficient in-state generation, New York State needs to site significant generation additions, commencing immediately, to meet its capacity requirements between the years 2008 and 2011.
3. The New York State Legislature should re-enact the Article X siting law. The Legislature should act promptly. Without a streamlined permitting process it will be very difficult for new generation to be built in a timely manner to meet future needs.
4. The nation, in general, and the Northeast in particular, must fashion an effective fuel diversity strategy for dealing with the increasing use and dwindling domestic reserves of natural gas. Such a policy will have to include increased use of renewables, improved incentives for efficiency, and utilization of other domestic fuels.
5. Congress should act promptly to pass electric reliability legislation including mandatory reliability standards.



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