

Power Trends 2008



The New York Independent System Operator

The New York Independent System Operator (NYISO) is a not-for-profit corporation that is responsible for operating the state's bulk electricity grid, administering its wholesale electricity markets and providing comprehensive planning for the state's electric power system. It began operations in December 1999.

The NYISO schedules and controls the bulk power flow of more than 335 power plants on approximately 10,775 miles of transmission lines in the state and, on a minute-by-minute basis, balances the supply and demand for electricity consistent with reliability standards and market rules. As the wholesale market administrator, the NYISO conducts auctions in which companies serving retail customers bid to purchase and suppliers offer to sell electric energy. Similarly, the NYISO administers markets for capacity, transmission congestion hedges, reserves and other ancillary services which are essential for maintaining quality of service.

In addition to its reliability and market functions, the NYISO has an expanding and increasingly important planning function. The NYISO's Comprehensive Reliability Planning Process ("the Planning Process") is focused on reliability. Approved by the Federal Energy Regulatory Commission (FERC), the Planning Process consists of two separate phases and generates two distinct reports – first, the *Reliability Needs Assessment* ("the Needs Assessment") followed by the *Comprehensive Reliability Plan* ("the Reliability Plan"). The process and the findings of the 2008 *Needs Assessment* are discussed in Section IV of this document. A proposed planning process that complies with FERC's mandate to include economic planning in the NYISO's planning functions is under consideration at the FERC.

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1

Executive Summary

The energy world is now on the verge of profound changes which are poised to set New York's electric industry on another round of transformation. The growing understanding of human contribution to climate change has heralded a portfolio of environmental initiatives involving the electric power sector.

The electric industry in New York has been in a decade long transformation that was set in motion by major federal legislation and state regulations¹ which led, ultimately, to the divestiture of almost all utility-owned power plants. The state's electricity markets, once dominated by vertically-integrated electric utility monopolies, now works through organized, competitive wholesale electricity markets with numerous buyers and sellers.

The New York Independent System Operator (NYISO) administers competitive wholesale electricity markets, operates the bulk electricity grid and is responsible for comprehensive planning for the power grid. The NYISO works with its stakeholders and regulators to address many challenges as the electricity markets grow and evolve. The changes that shaped the industry over this past decade rest on the conviction that organized, competitive wholesale electricity markets can best address the reliability and economic needs of the state.

The energy world is now on the verge of profound changes which are poised to set New York's electric industry on another round of transformation. The growing understanding of human contribution to climate change has heralded a portfolio of environmental initiatives involving the electric power sector. In addition, the rapidly expanding global market for energy is affecting the supply and demand -- and thereby the price -- of natural gas and oil, two fuels upon which the state's electricity sector is heavily dependent and which have a major influence on the price of electricity. (See Figures 1.1 and 1.2) At the same time, technology is developing rapidly in the areas of renewable energy sources and demand response programs and increasing the opportunities for both simple and sophisticated energy efficiency initiatives, allowing these resources to make greater contributions to the state's energy sector.

Energy and environmental concerns are thus intersecting more and more as policy makers seek to cope with these trends. This edition of *Power Trends* contains data and some preliminary analysis of these intersecting forces as they can be seen affecting the state's electricity industry.

¹ The National Energy Policy Act of 1992, Federal Energy Regulatory Commission Orders 888 and 889 (1996) and New York State Public Service Commission Competitive Opportunities Proceedings (1997).

... the issues of climate change and urban smog have prompted two programs that promise to have a significant impact on the state's electric industry beginning as early as 2009.

STATE AND REGIONAL ISSUES

Among the array of environmental concerns that New York and neighboring states are striving to address, the issues of climate change and urban smog have prompted two programs that promise to have a significant impact on the state's electric industry beginning as early as 2009. One is the Regional Greenhouse Gas Initiative (RGGI) which is designed to limit total carbon dioxide (CO₂) emissions from power plants in ten states on the East Coast from Maryland to Maine. The other consists of the programs to control nitrogen oxides (NOx) – a major contributor to ground level smog primarily in urban areas -- which is being implemented on a regional basis through the Ozone Transport Commission (OTC).

In addition to the RGGI and OTC programs, the Governor of New York State has set an ambitious goal – to achieve a 15 percent reduction in electricity consumption from forecasted levels by 2015. Popularly known as “15 X 15”, the programmatic components of this policy initiative are now in the design phase, but energy efficiency initiatives and demand response programs are clearly expected to play key roles in meeting the state's goal.

GLOBAL ISSUES

New York State's generation supply has been, and remains, heavily dependent on oil and natural gas. Over 60 percent of the state's installed capacity burns one or both of these fuels. The prices of oil and gas have risen at stunning rates over the past decade and are unlikely to return to previous levels.

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Unlike the political developments in the Middle East that were the principal cause of the fuel price run-ups in the 1970s and 1980s, the fundamental force behind the most recent price increase in oil is the explosive growth in the economies of China and India. The *2007 World Energy Outlook*, the flagship publication of the International Energy Agency, expects that global economic development will raise global energy demands by about 50 percent in a generation, from 85 million barrels of oil a day in 2007 to about 116 million barrels a day in 2030.

Given these fundamentals, the state should expect electricity prices to rise, although the magnitude and timing of price increases is not possible to predict with certainty.

NEW YORK -- THE NEXT FIVE YEARS

Beginning in 2005, the NYISO and its stakeholders have conducted annual assessments of the adequacy and reliability of the state's bulk electricity grid. The assessment determines if, when and where New York will need additional resources in order to meet established reliability criteria. This year's base case analysis

"... The days of persistently cheap oil and natural gas are likely behind us. The good news is that, in the long run, we have options. I have already noted the scope for improvements in energy efficiency and increased conservation. Considerable potential exists as well for substituting other energy sources for oil and natural gas, including coal, nuclear energy and renewable sources such as bio-fuels and wind power. Given enough time, market mechanisms are likely to increase energy supplies, including alternative energy sources, while simultaneously encouraging conservation and substitution away from oil and natural gas to other types of energy."

Federal Reserve Chairman
Ben Bernanke
Before the Economic
Club of Chicago,
Chicago, Illinois
June 15, 2006

– contained in the 2008 Reliability Needs Assessment (the Needs Assessment),² and more fully discussed in a later section of this document -- found that additional resources will be needed in the year 2012.

When key assumptions are varied, the need date for reliability resources ranges from as soon as 2009 to as late as 2013.

The Needs Assessment is the first of two steps in the annual Comprehensive Reliability Planning Process (the Planning Process). The development of the Comprehensive Reliability Plan (the Reliability Plan), the second step, is currently underway. This is when the market responds to the identified needs by submitting proposals for generation, demand response or transmission projects that could meet those needs. The past two cycles of the Planning Process have produced more than sufficient market-based project proposals to meet the identified reliability needs and the NYISO expects that trend to continue in this year's cycle.

The time frame for the identified reliability needs – within five years at the most – and the time frame for implementation of the RGGI and OTC programs increases the urgency for reestablishing a streamlined siting process for power plants in New York. While open, nondiscriminatory access to the grid and a competitive market environment provide a foundation for power plant development to address locational electricity demand growth, the absence of a time-limited, streamlined siting process adds needless ambiguity to the development of new and replacement generation development. This is an issue that the State Legislature has deliberated since 2002, when Article X of the Public Service Law expired. Six years later, the state remains without a new version of a comprehensive siting law. Given the need for new, clean generation resources, this situation should not persist for even one more year. It is worth noting that the technology available in 2008 for new fossil-fueled power plants can produce significant environmental improvements because new plants will displace production from existing, less efficient fossil-fueled generation sources. As electricity from these new, lower-emission plants displaces electricity from the older plants, reductions in emissions will be achieved.

THE NEXUS

For the electric industry in New York State, the challenge is to chart a course that will meet environmental standards, increase the fuel diversity of the power generation sector and create opportunities for clean new generation to be built. Needless to say all of this must take place while maintaining the high standards of electric service reliability needed to secure the welfare, safety and economic prosperity of the state's residents. The likelihood is that contributions towards this goal will come from diverse sources: development and deployment of advanced metering for effective energy conservation and demand re-

² The 2008 Reliability Needs Assessment, issued on December 12, 2007, can be found at http://www.nyiso.com/public/webdocs/newsroom/press_releases/2007/RNA_and_Supporting_FINAL_REPORT_12-12-07.pdf.

sponse programs; enactment of new power plant siting legislation; effective implementation of a carbon auction model; more energy supplied by non-traditional sources of generation including renewables; and transmission when needed to accommodate new generation.

In December 2007, the New York State Public Service Commission (PSC) created an important new venue³ that will afford an opportunity to further these contributions and to meet the state's challenges. The PSC established a collaborative process to address critical issues related to the development of needed, new electricity infrastructure and to develop a long-term electricity resource plan which may stand along side the annual plans produced by the NYISO and by other planning organizations operating in the region.

As the PSC's recent action indicates, it will not be possible for one organization, a single program, or a solitary statute to adequately address the wide array of challenges and opportunities confronting the state's energy sector. The next few years must be ones of intensive collaboration among the various parties in the public, private and not-for-profit sectors that have responsibility for, or investment in, the future of electric power in New York State.

For the electric industry in New York State, the challenge is to chart a course that will meet environmental standards, increase the fuel diversity of the power generation sector and create opportunities for clean new generation to be built.

³ Case 07-E-1507 – Proceeding on Motion of the Commission to Establish a Long-Range Electric Resource Plan and Infrastructure CRPP, New York State Public Service Commission, December 24, 2007.

Figure 1.1

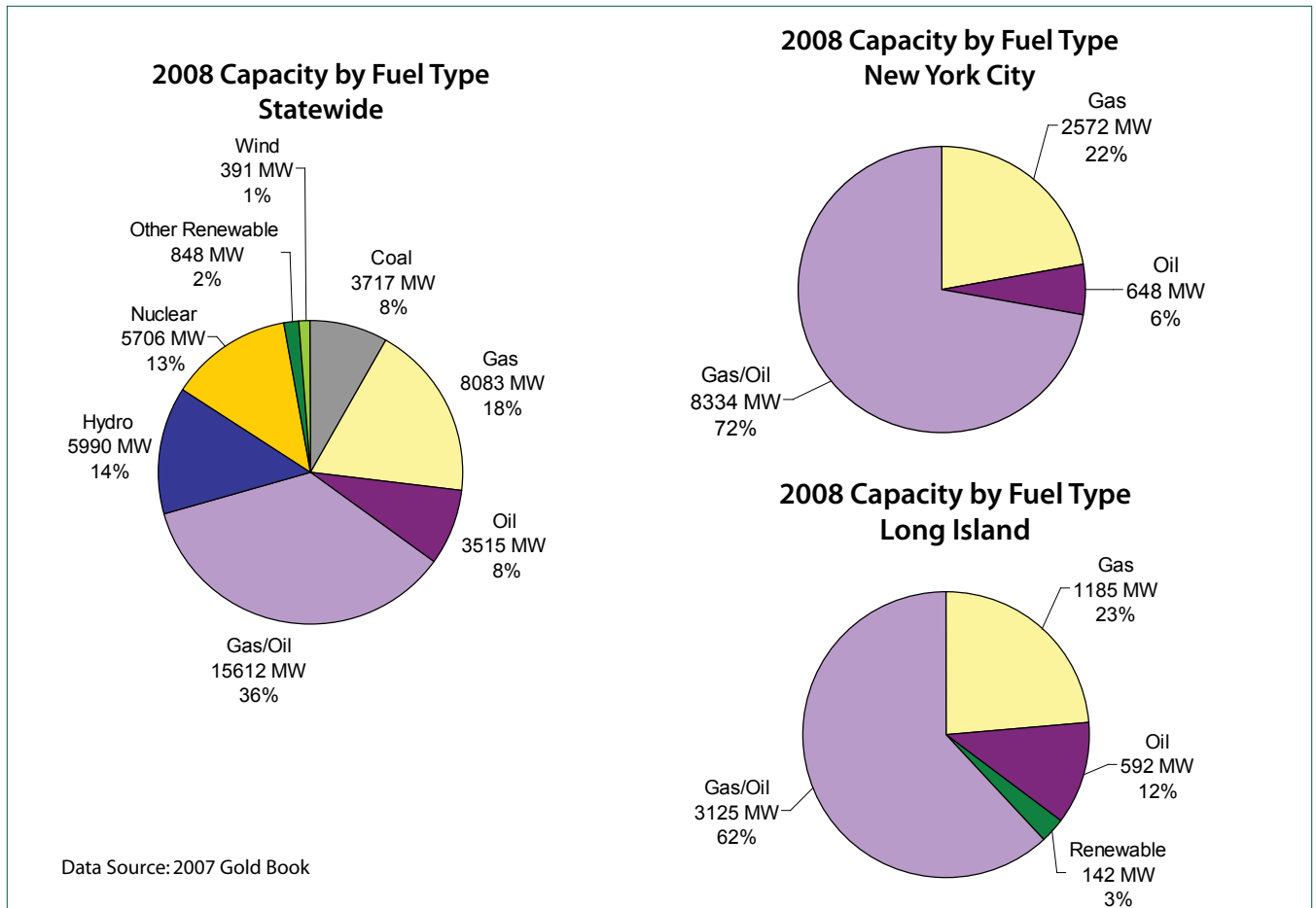
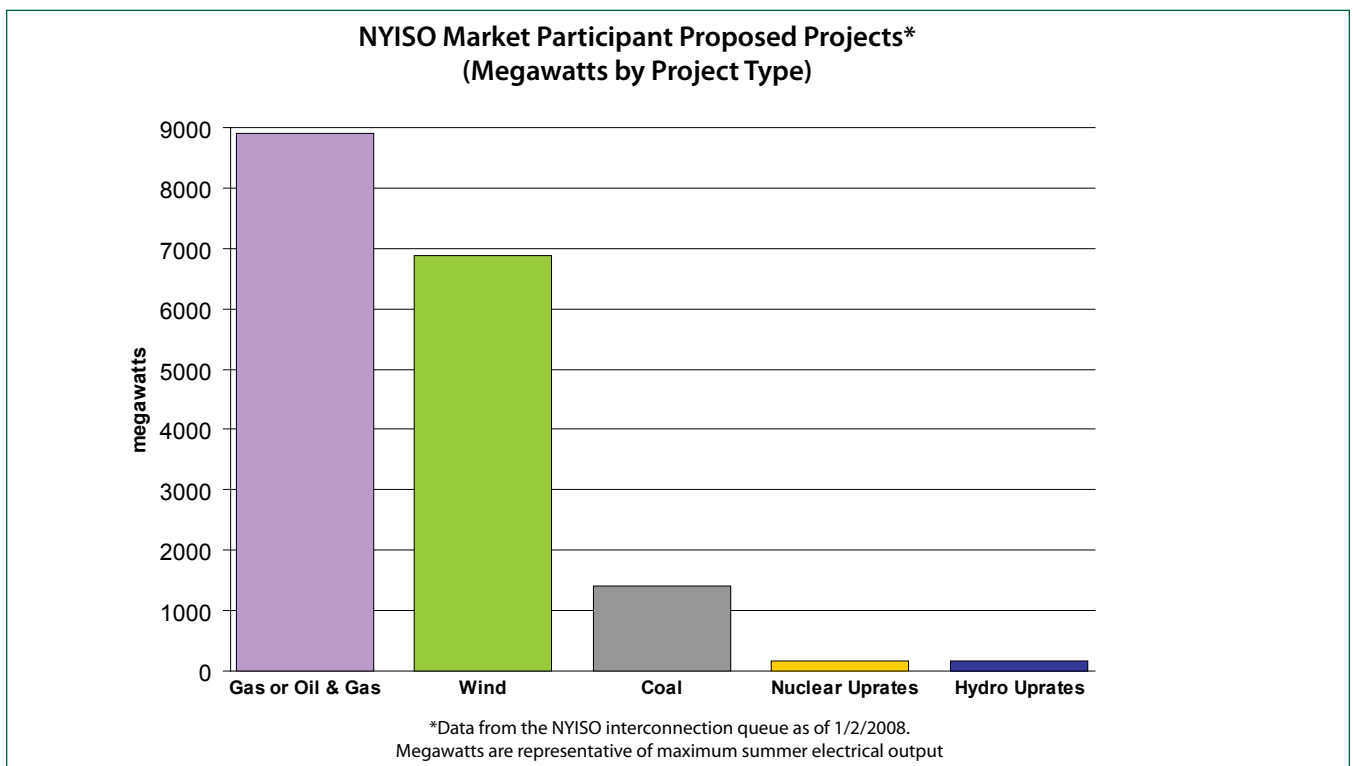


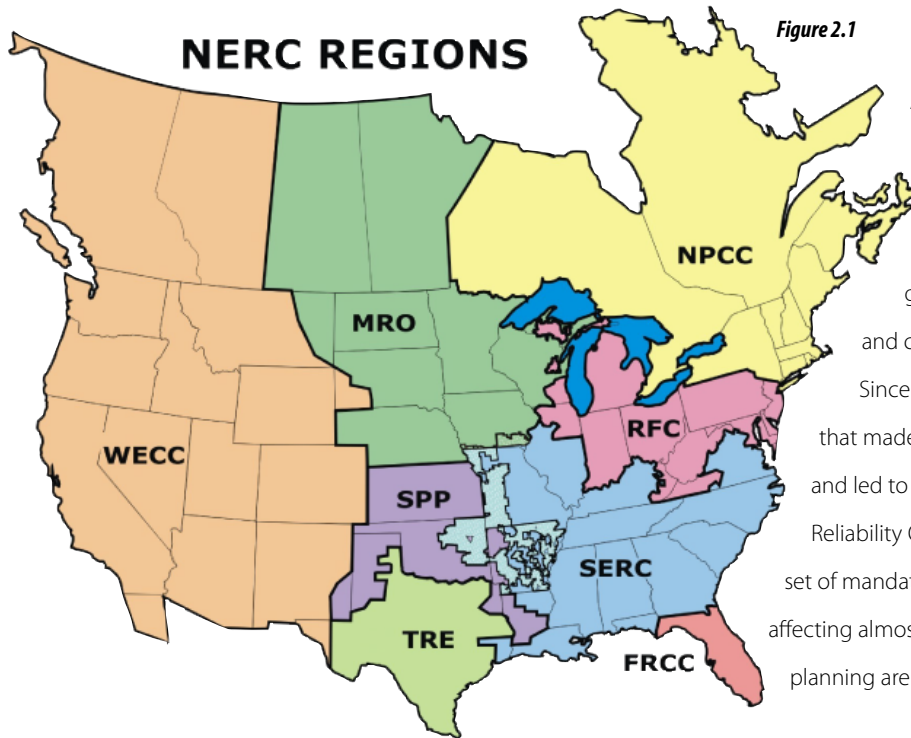
Figure 1.2



2 Electric Power in New York

The Bulk Electricity Grid

The NYISO is required to operate the state's bulk electricity grid in accordance with reliability standards and criteria set by the North American Electric Reliability Corporation (NERC), which also serves as the Electric Reliability Organization (ERO), the Northeast Power Coordinating Council (NPCC) and the New York State Reliability Council (NYSRC). (See Figure 2.1)



At the time of the blackout of August 14, 2003 (which affected much of the eastern portion of the United States and parts of Canada), compliance by grid operators with reliability standards and criteria was, for the most part, voluntary.⁴ Since passage of the Energy Policy Act of 2005 that made national reliability standards mandatory and led to the designation of NERC as the Electric Reliability Organization in 2006, a greatly expanded set of mandatory reliability standards and criteria affecting almost every aspect of grid operations and planning are now in effect on a nationwide basis.

These standards and criteria form the basis for the NYISO's secure operation of the bulk electricity grid, which means that at all times the grid is able to withstand the loss of some resources and still meet the demand for electricity.

The New York electric system is divided into eleven zones for operational and market purposes – energy prices are calculated for the day-ahead and real-time markets by zone. Based on the capability of the transmission system and the delivery of electricity to customers across the state, there are also three distinct locations with specific installed capacity requirements. These are: New York City, Long Island,

⁴ The NYISO is a member of the Northeast Power Coordinating Council (NPCC) which has had mandatory reliability standards for its members.

and New York Statewide (commonly referred to as Rest-of-State). In addition, there are certain location specific reliability rules which apply during certain system conditions in various parts of the state, particularly New York City and Long Island.

New York State Policies and Programs

"This plan ('15X15') makes us the only state to commit to actually lowering electricity consumption below current levels."

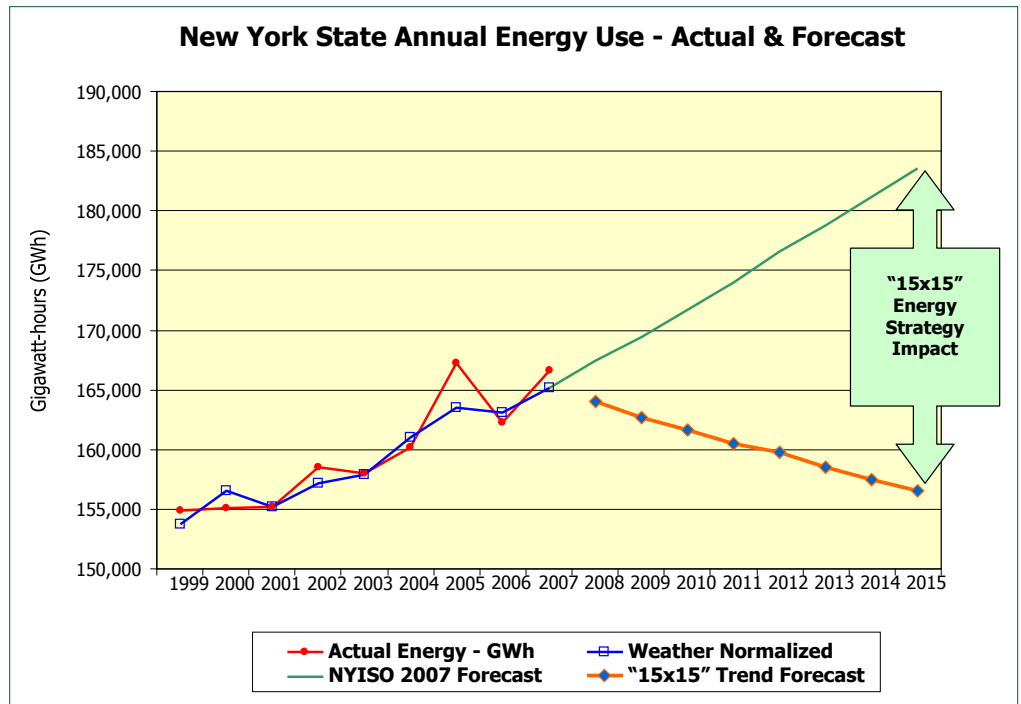
Pete Grannis,
NYS Commissioner of
Environmental Conservation,
NYISO Symposium,
"The Future is Now," June 27, 2007

15 X 15. In April 2007, Governor Eliot Spitzer set an ambitious energy goal for New York -- to reduce electricity consumption by 15 percent from the levels that were forecasted to be reached by the year 2015.

Popularly known as "15 X 15", this initiative is now the subject of state agency efforts to create programs that will meet the Governor's goal. The "15 X 15" Clean Energy Strategy, if fully realized, would produce a dramatic change in the electricity consumption patterns of all New Yorkers. (See Figure 2.2)

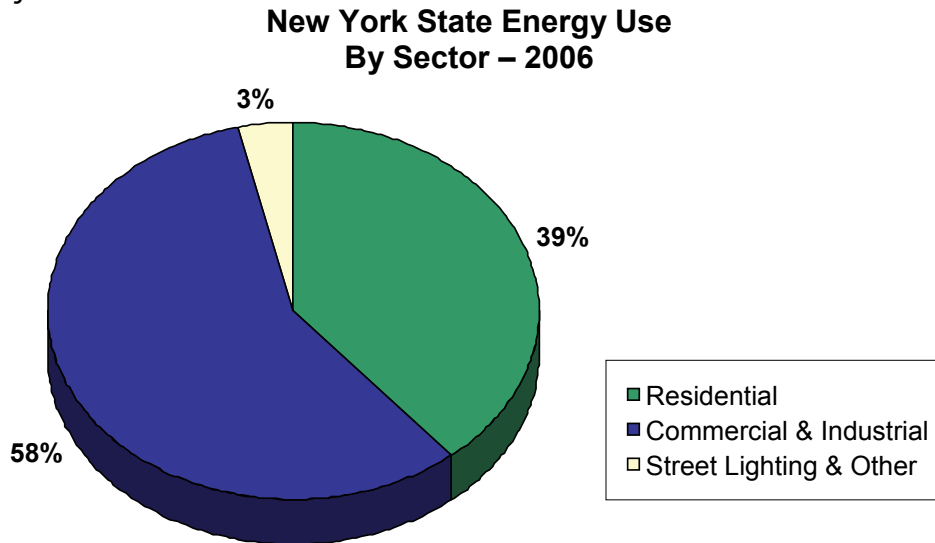
In May 2007, the New York State Public Service Commission (PSC) initiated a proceeding to design an electric and natural gas Energy Efficiency Portfolio Standard. The PSC determined that there are sufficient potential energy efficiency improvements available to reduce electric usage by 15 percent of projected levels by 2015.

Figure 2.2



It is noteworthy that commercial and industrial customers consume 58 percent of all electricity sold in New York. (See Figure 2.3) The success of "15 X 15" will depend in large measure on the ability to create or strengthen energy efficiency programs that will make a lasting difference among this diverse group

Figure 2.3



of energy consumers. In the residential sector, the expanding array of consumer electronics (home computers, flat panel televisions, etc.) will pose a continuing challenge to managing the growth of electricity demand.

There is uncertainty associated with the “15 x 15” goal. The investment in demand-side programs must be significant to support the reduction in electricity consumption by 27,000 gigawatt-hours. If demand-side programs do not achieve the targeted level, additional supply side resources will be needed.

Renewable Portfolio Standard. The state’s Renewable Portfolio Standard, established by the PSC in 2004, requires that 25 percent of the state’s electricity purchased by consumers be generated by renewable resources by 2013. In the nearly four years that have elapsed, wind-powered generation has emerged as a strong contributor to meeting that requirement.

Currently, almost 7,000 megawatts of wind generation projects are proceeding through the grid interconnection process managed by the NYISO⁵. By the end of 2007, there were five commercial wind power projects totaling 391 megawatts in operation. A 2005 study jointly sponsored by the New York State Energy Research and Development Authority (NYSERDA) and the NYISO concluded that the state’s bulk electricity grid should be able to reliably integrate about 3,300 megawatts of wind-powered generation with the addition of wind-forecasting capabilities and monitoring for possible increases in the need for regulation service and transmission reinforcements.⁶

Further development of renewable resources, depending on their location, can make a significant contribution to meeting the environmental targets of the RGGI program.

⁵ A project’s listing in the grid interconnection process is not a guarantee that it will go into service. Projects across the spectrum of technologies and fuel types can fail to reach the final development stages and become operational.

⁶ “The Effects of Integrating Wind Power on Transmission System Planning, Reliability, and Operations. Report on Phase 2: System Performance Evaluation,” Prepared for New York State Energy Research and Development Authority, Prepared by GE Energy’s Energy Consulting, March 4, 2005. www.nyserda.org/publications/wind_integration_report.pdf.

*A significant share (68%)
of New York State's electric-
ity is generated by power
plants put into service
before the 1980s.*

PSC Electricity Reliability and Infrastructure Planning Order and Proceeding. As previously noted, the PSC issued an important new order in December 2007 which established a collaborative process to address electricity infrastructure development and long-term electricity resource planning. The Order places special emphasis on facilitating the selection and development of regulated backstop project proposals that may emerge as part of the NYISO's existing annual Planning Process. (Regulated backstop project proposals are prepared by the transmission owners and may be "triggered" by the NYISO in the event that the competitive markets do not elicit projects adequate to meet reliability requirements.)⁷

The PSC correctly noted that FERC is considering filings made by the NYISO which address many of these same issues. The order reiterates that the Commission does not intend to create a process that would duplicate existing planning processes and goes on to reaffirm the state's policy of supporting competitive markets -- where feasible -- as the most efficient means to serve the public interest.

This is a promising initiative with regard to furthering needed electricity infrastructure development in New York and the NYISO looks forward to working with the PSC within the context of its collaborative process.

Power Plant Siting Law - Article X. A significant share (68%) of New York State's electricity is generated by power plants put into service before the 1980s. As power plants continue to age there will be increasing need to site and build new generating facilities. (See Figure 2.4)

For 10 years New York had a streamlined process — codified in Article X of the Public Service Law — for granting permits to locate and expand power plants 80 MW and larger. The law provided a one-stop permitting process that helped developers secure approvals in approximately 12 months and incorporated what would have otherwise been local permitting issues. Article X expired at the end of 2002. Although the legislature appeared close to an agreement on a new bill, it did not reach consensus by the end of its 2007 session.

Since December 2002, state permits for large new generation facilities must be obtained through the State Environmental Quality Review Act process, which is more complicated and lengthy than the one that existed under Article X.

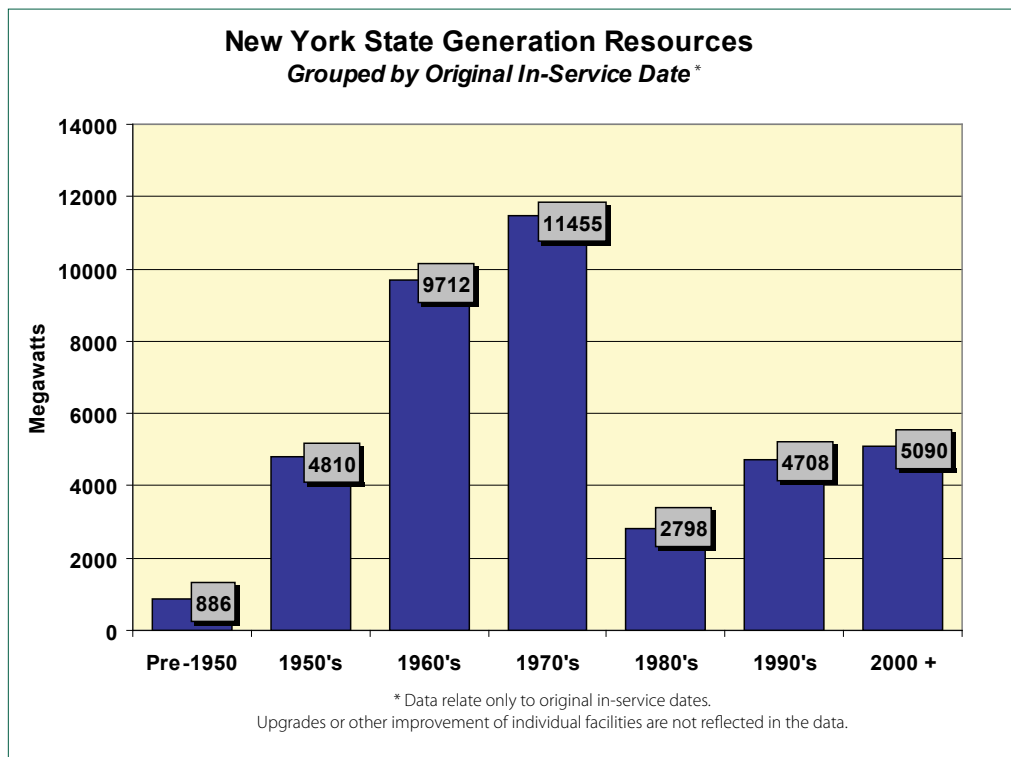
Governor Spitzer, upon taking office in 2007, recognized the importance of re-instituting a power plant siting statute and proposed the "Clean Economic Power Supply Act." This proposal sought to bring consensus to many of the issues, consistent with the Governor's ambitious energy and environmental agendas. The Governor proposed the creation of a streamlined, one-stop permitting process for

⁷ The CRPP is found in Attachment Y of the NYISO's Open Access Transmission Tariff. Section 9.4 describes the circumstances that would cause the NYISO to request a Transmission Owner to submit its proposed regulated backstop proposal to the appropriate agencies to begin necessary approval processes. This action by the NYISO is known as "triggering."

wind projects and other “zero” or “low” emission replacement, repowered, or new generating facilities contiguous to existing facilities in non-densely populated areas. The Legislature did not pass the Governor’s proposal.

As the Governor and the State Legislature deliberate this crucial issue, it is important to consider the value of a technology-neutral siting law that can provide an efficient framework for decision-making. The rapid advance of technology will necessitate continuous legislative amendment to any siting statute that too narrowly defines technical standards. Given the relatively high-cost of building new generation in the state, it is essential to keep technology options open, especially since state-of-the-art power generation will generally improve environmental quality in New York.

Figure 2.4



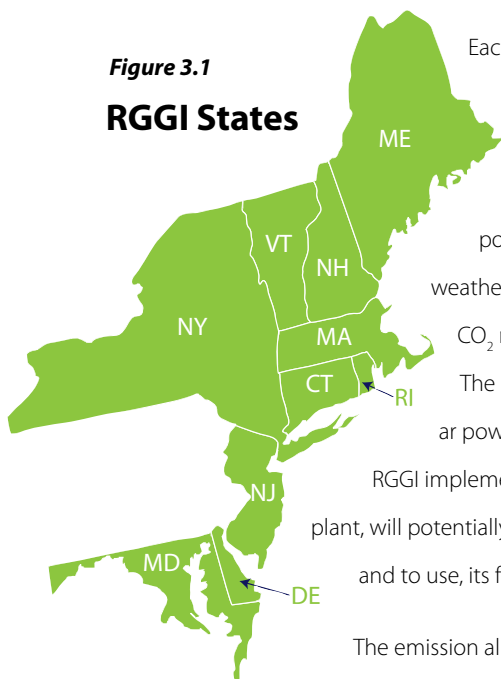
3 Environment

New York's electric power sector is expected to play a major role in the implementation of two environmental programs expected to be underway in 2008 and 2009.

The Regional Greenhouse Gas Initiative (RGGI)

RGGI is a program intended to limit the total carbon dioxide (CO₂) emissions from electric generation sources in ten member states on the east coast, from Maryland to Maine. (See Figure 3.1) The primary purpose of the RGGI program is to achieve an environmental goal – lower CO₂ emissions. This is to be accomplished by instituting a cap-and-trade program which will initially allocate emission allowances through an auction mechanism.

Figure 3.1
RGGI States

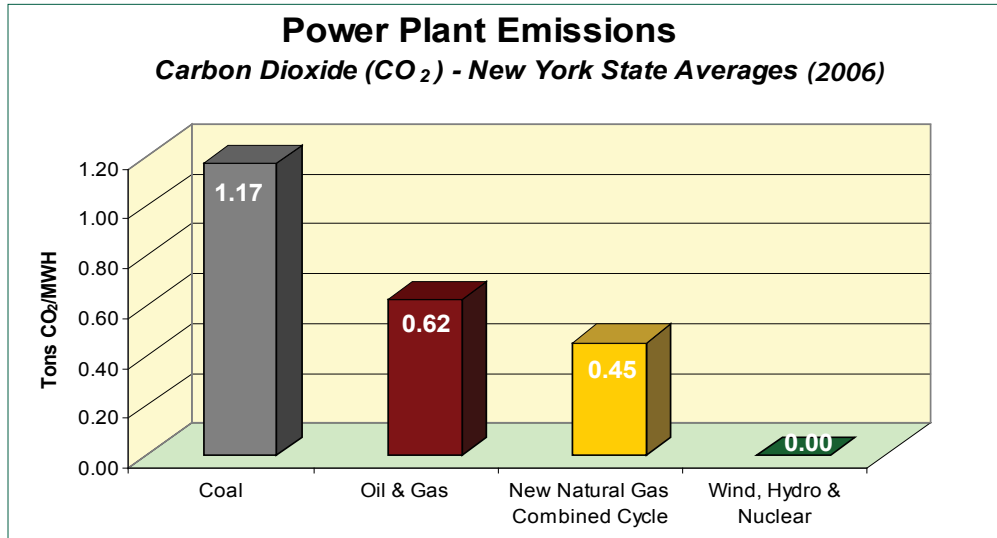


Each RGGI state has agreed to an allocation of emission allowances for a three-year compliance period – the first compliance period is 2009 to 2011. New York State's allowance cap is 64 million tons per year of CO₂. The NYISO has calculated that, given the operational characteristics of the state's current fleet of power plants and an "unremarkable" year (defined as no significant unpredicted weather, economic/political and world event), allowances equal to 52 million tons of CO₂ must be made available to generators in New York to maintain system reliability. The NYISO has further analyzed the effect of the loss of any one of the state's nuclear power plants (these are non-carbon emitting generation sources) in the context of RGGI implementation. A prolonged nuclear unit outage, or the shutdown of a nuclear power plant, will potentially push CO₂ emission levels to the 64 million ton cap, requiring the state to have, and to use, its full complement of initial allowances. (See Figure 3.2)

The emission allowances auction is entering the final design stages; as of this writing, the State of New York anticipates that the first auction will be conducted in mid-2008. Some features of the RGGI carbon market and auction are known. For instance, most carbon emitters in New York will be required to purchase their necessary allowances through the auction and non-carbon emitters will be allowed to participate in the auction.

Among the auction design features that are yet to be finalized are important and complex matters related to the regional scope of the auction and mechanisms to minimize the exercise of market power and market manipulation.

Figure 3.2



The creation of an auction-based market for carbon emission allowances and its interaction with the operation and pricing in the wholesale electricity market is an entirely new venture for the state and the nation. The RGGI implementation effort has required collaboration among numerous government agencies and regulators across the 10 affected states, including the New York State Department of Environmental Conservation (DEC) as the state's lead agency.

The NYISO and the DEC are cooperating and participating in these efforts with the goal of crafting the RGGI implementation plan to align with the competitive wholesale electricity markets and not create reliability issues for New York.

The United States Congress has discussed the possibility of creating a national cap-and-trade program. A national program, if adopted, could render RGGI unnecessary. Federal legislation has not been finalized, and it is impossible to predict if or when such a national program will ever become law.

Ozone Compliance

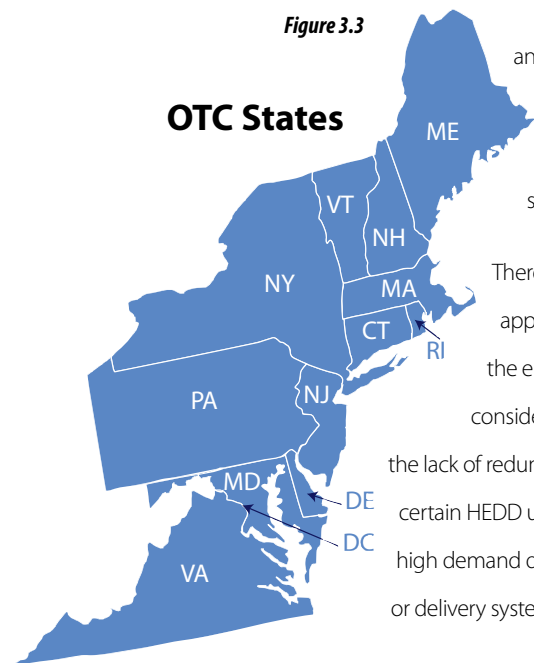
New York is a member of the Ozone Transport Commission (OTC) and participates in a multi-state effort to achieve compliance with federal ambient ozone air quality standards (See Figure 3.3). Emissions of nitrogen oxides (NO_x) from power plants and mobile sources such as cars create ground level smog in the presence of sunlight and humidity.

The primary focus of the OTC's efforts to reduce NO_x emissions is on power plants that operate infrequently but have few existing emission controls and, therefore, high emission rates. The state has indicated that it is considering signing onto the OTC target NO_x reduction goal of 50.8 tons per day on High Electric Demand Days (HEDD), a 27 percent decrease from current levels.

The power plants at issue in the ozone compliance effort are typically load following and peaking units that operate in southeastern New York on hot and hazy days when the demand for electricity is at its highest point

Figure 3.3

OTC States



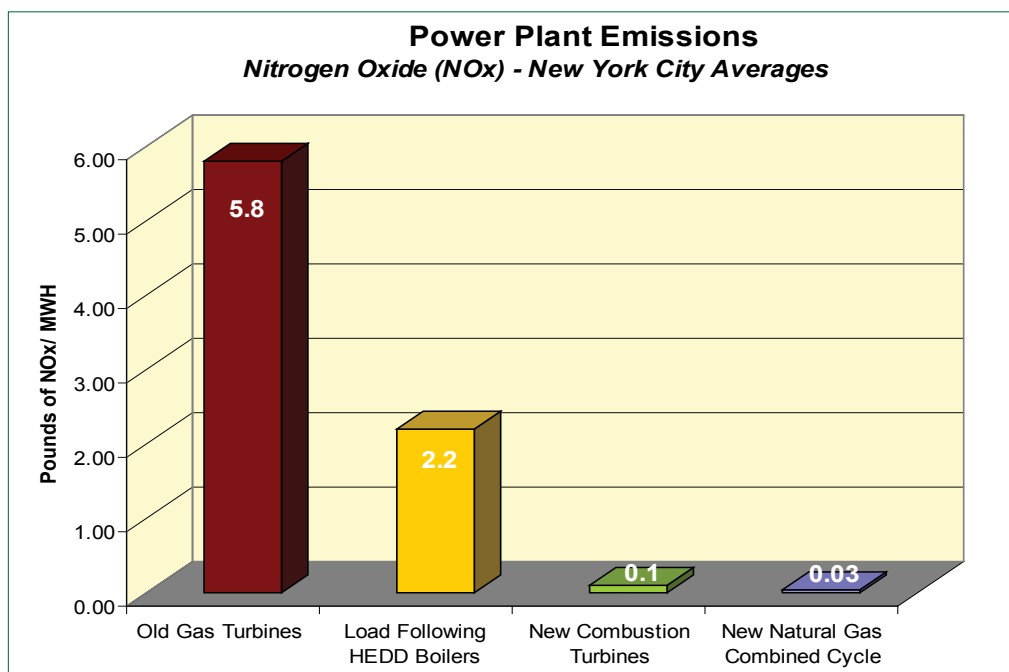
and air quality is already poor. These generators have come to be known as HEDD units. Achieving the targeted daily emissions reduction from these and other units, while maintaining power grid reliability, is a challenge confronting the state.

There are a number of complicating factors being considered by the DEC as the agency approaches an implementation plan for HEDD units. Currently, retrofit technology for the emitting units either does not exist or it is not economically feasible. An additional consideration is a New York State Reliability Council (NYSRC) rule developed to address the lack of redundancy in the local gas distribution system in New York City. This rule requires certain HEDD units and some other in-City generators with dual fuel capabilities to co-burn oil on high demand days in order to maintain electric system reliability in the event of a gas fuel supply or delivery system emergency. The required oil burns increase NOx emissions from these units.

The NYISO performed a preliminary analysis – within the context of its existing Planning Process – of the effect on the grid of limiting the capacity available from HEDD units. The scenario showed a significant impact on resource adequacy in the near term. There are a number of factors which may aggravate or ameliorate these effects that the NYISO and the DEC acknowledge as worthy of further study. The existing analysis does highlight the need for multiple strategies, implemented over several years, in order to simultaneously achieve the necessary reductions in NOx emissions from New York power plants and satisfy reliability criteria.

New gas-fired plants in NYC have substantially lower emissions rates than existing plants, and they can lower total power plant emissions by displacing production from these plants. (See Figure 3.4)

Figure 3.4



4 Planning

The Comprehensive Reliability Planning Process

Overview. The Comprehensive Reliability Planning Process (the Planning Process) is focused on maintaining the reliability of the bulk electricity grid. Reliability is defined and measured through the use of the concepts of adequacy and security.

Adequacy is the ability of the electric system to supply and deliver the total quantity of electricity demanded at any given time taking into account scheduled and unscheduled outages of system elements.

Security is the ability of the power system to withstand sudden disturbances and/or the unanticipated loss of system elements and continue to supply and deliver electricity. The NYISO's existing Planning Process includes both adequacy and security assessments.

The NYISO and its stakeholders are presently undertaking the third annual assessment of the reliability needs of the state's bulk electricity grid. The Planning Process is made up of two distinct phases, each culminating in a final report that is subject to stakeholder committee review and approval by the NYISO Board of Directors.

The first phase of the Planning Process involves a thorough assessment of the adequacy and reliability of the bulk electricity grid over a 10-year planning horizon. The report for this phase is the Reliability Needs Assessment (the Needs Assessment), which identifies potential resource adequacy and transmission security needs in New York, based upon established reliability criteria. The Needs Assessment also provides information about the amount and location of resources that could satisfy those needs to assist the marketplace in developing proposed solutions.

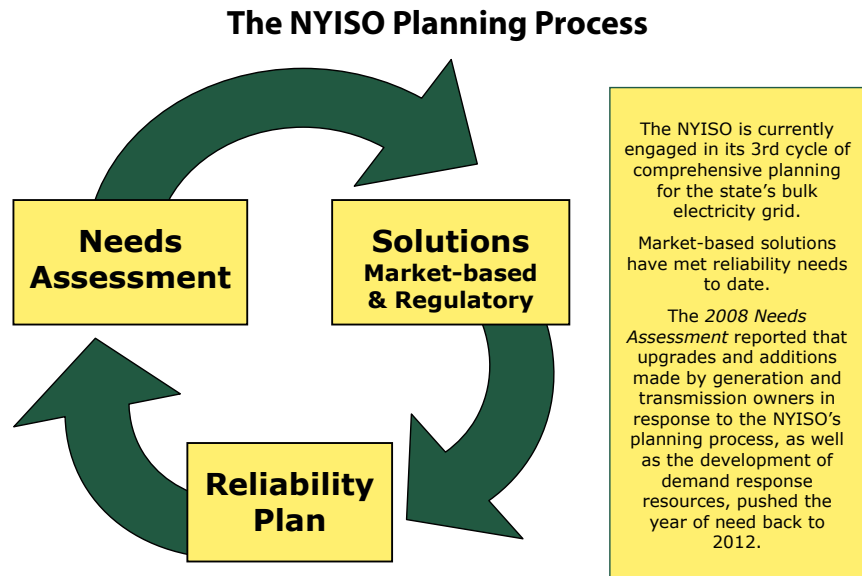
Once the NYISO Board approves the Needs Assessment, the second phase of the process begins with the solicitation of projects that could potentially meet the reliability needs identified in the Needs Assessment. Generation, transmission and demand response proposals are considered on a level playing field. Since the existing Planning Process reflects the market orientation of the New York electric industry, market-based solutions are preferred for meeting identified needs.

Transmission owners are required to submit proposals for regulated backstop solutions to the NYISO in response to the Needs Assessment. If insufficient market-based projects are proposed, the NYISO has the authority to require transmission owners to also submit these proposals to the appropriate regulatory agency so that the identified reliability needs will be met in a timely manner. It should be noted that any developer may propose an alternative regulated backstop solution for consideration.

The second phase of the NYISO's existing Planning Process concludes with the publication of the Comprehensive Reliability Plan (the Reliability Plan) which identifies solutions that the NYISO has found to be viable to satisfy needs outlined in the Needs Assessment.

The NYISO's Planning Process (see Figure 4.1) is an on-going, cyclical procedure marked by milestones.

Figure 4.1



The 2007 Reliability Plan⁸ found that the equivalent of 1,800 megawatts of resource additions would be required over the 10-year period ending in 2016. It also reported that 3,007 megawatts of viable market-based solutions which were submitted were more than sufficient to meet those needs.

To date, the NYISO has not had to call upon any regulated backstop solutions to meet reliability needs. It is important to note that the NYISO does not have the authority to license or construct projects to respond to reliability needs. The ultimate approval of those projects lies with regulatory agencies such as the FERC or the PSC, environmental permitting agencies, and local governmental authorities.

The NYISO continuously monitors the progress and continued viability of proposed market and regulated projects to meet identified needs. At this time, more than 3,000 megawatts of market-based projects submitted during the first two Planning Process cycles are moving forward on schedule.

Findings of the 2008 Needs Assessment. According to the 2008 Needs Assessment (approved in December 2007), generation and transmission resources in New York State are expected to be adequate through 2011. The study finds that a reliability need will occur by 2012, primarily in the state's southeastern region, and will become acute by 2017 if expected electricity demand increases are not met with additional resources or demand-side programs.

⁸ The 2007 Comprehensive Reliability Plan, issued on September 19, 2007, can be found at http://www.nyiso.com/public/webdocs/newsroom/press_releases/2007/crp_report_091807_final.pdf.

... generation and transmission resources in New York State are expected to be adequate through 2011. ... a reliability need will occur by 2012, primarily in the state's southeastern region, and will become acute by 2017 if expected electricity demand increases are not met with additional resources or demand-side programs.

The 2007 Needs Assessment had forecast the first reliability need year to be 2011. The new 2012 estimate in the 2008 Needs Assessment is a result of upgrades and additions made by generation and transmission owners in response to the NYISO and TO planning processes.

The 2008 Needs Assessment reports that an equivalent of 500 megawatts in New York City, or a total of 750 megawatts with 250 megawatts each in the Capital region, the mid-Hudson Valley, and New York City will be required to meet anticipated power needs in 2012.

By 2017, the equivalent of 2,750 megawatts of resources should be added and available to the state's bulk electricity grid to accommodate the anticipated retirement of existing capacity and increased electricity demand, and to meet federally mandated reliability guidelines. About half of those megawatts need to be located in New York City and Long Island, according to the report.

That increase in resource requirements is largely driven by a demand increase of more than 1,000 megawatts when compared to the 2007 Needs Assessment.

The 2008 Needs Assessment has been issued and market participants have been requested to provide generation, transmission, and demand-side solutions to meet the identified needs.

Reliability Needs: 2012-2017. New York's reliability need in 2012 is driven by load growth in excess of two percent per year in the lower Hudson Valley, New York City and Long Island as well as generator retirements, and thermal transmission constraints into these same regions. By 2012, the NYISO forecasts that about two-thirds of the state's electricity demand will be located in southeastern New York; a little more than half of the state's demand will be in New York City and on Long Island.

The retirement of several generation units, including the planned 2010 retirement of New York Power Authority's Charles A. Poletti generating facility in Queens, plays a significant role in the 2012 reliability need. The Poletti unit and the other generators set to retire – Mirant Corporation's Lovett 5 and Rochester Gas & Electric's Russell Station – account for about 1,300 megawatts. They are scheduled for shutdown between 2008 and 2010.

The system's reliability need would be pushed back to 2013 as a result of a long-term capacity contract recently approved by the LIPA Board of Trustees. This contract provides for delivery to Long Island from a resource in the PJM region over the Neptune Regional Transmission facility, a high voltage direct current line between Long Island and New Jersey.

Other analyses and scenarios. The effects of environmental standards that were analyzed and reported in the 2008 Needs Assessment are discussed in Section III of this document. The Needs Assessment also reviewed scenarios that yielded the following results:

- The addition of 500 megawatts in New York City, in response to a request for proposals by the New York Power Authority, would satisfy system resource adequacy requirements and provide

additional voltage support in 2012. That would make 2013 the first year of need in the New York Control Area (NYCA).

- Under the Needs Assessment's "External Capacity Scenario," the addition of 800 megawatts of additional capacity outside the NYCA into Upstate New York would improve system adequacy, but not enough to satisfy 2012 system resource adequacy requirements due to its location.
- Adding the Besicorp-Empire power project (635 megawatts net generation) in Rensselaer, New York would also improve system adequacy, but not eliminate the need for additional resources in 2012 due to its location.
- The system would need additional resources by 2010 under a scenario accounting for stronger-than-expected economic growth and extreme weather conditions.

Indian Point scenario. The current operating licenses for the Indian Point nuclear power facilities expire in September 2013, for Unit 2, and December 2015, for Unit 3. (Unit 1 was shut down permanently in 1974.) Indian Point's operator, Entergy Nuclear Operations, has applied for 20-year license renewals for both units to the U.S. Nuclear Regulatory Commission (NRC). In December 2007, a number of government officials intervened in the relicensing procedure to request that the NRC deny the application to renew the operating licenses. The NYISO had previously analyzed the impact that possible Indian Point retirements could have on the bulk electricity grid. Given the current circumstances, the 2009 Planning Process cycle will include scenario analyses that reflect the potential shutdown of the Indian Point nuclear facilities when their current licenses expire.

Economic Planning

Order 890, issued by FERC in February 2007, directed improvements to the Open Access Transmission Tariffs of all transmission providers, including Independent System Operators (such as the NYISO) and Regional Transmission Organizations, to include both reliability and economic planning procedures.

Under the NYISO's existing Planning Process, historic congestion data are reported to inform the stakeholders as they evaluate potential responsive proposals. In December 2007, the NYISO submitted a compliance filing in response to Order 890 which proposed changes that would allow it to respond to stakeholders' requests for economic studies that build upon the reliability planning done now. These studies would address future transmission congestion and potential means to alleviate it.

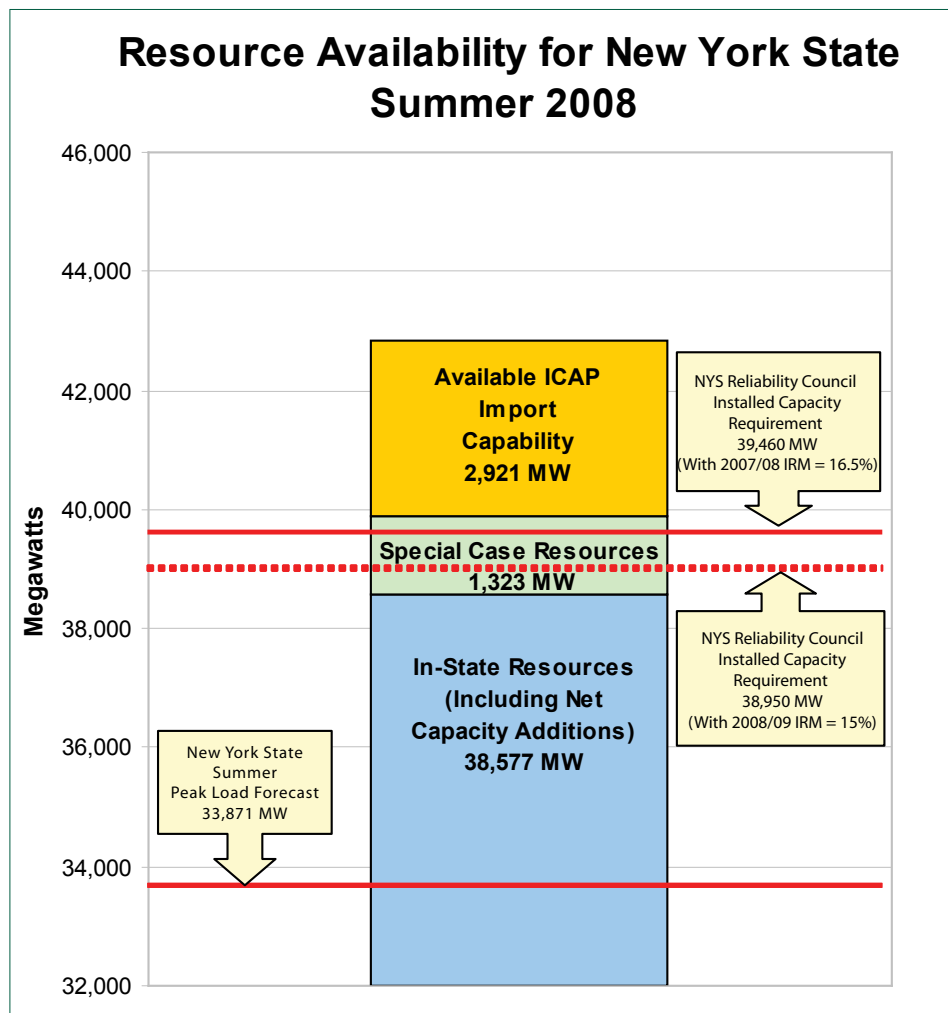
The NYISO has also proposed an economic cost allocation process that would apply to regulated economic transmission projects which meet certain criteria for cost recovery under the NYISO tariff. Pending FERC approval, implementation of economic planning could commence in the later part of 2008.

5 Reliability

Installed Reserve Margin Requirement

The standard for resource adequacy in New York State is met when the probability that electricity use will be involuntarily curtailed due to insufficient transmission and/or generation is not greater than one occurrence in ten years. The standard is used to determine the amount of installed capacity — over and above the amount that would meet forecasted peak demand -- that the New York system is required to have in order to provide for planned and unplanned facility outages.

Figure 5.1



This amount, the installed reserve margin (IRM), is determined annually by the NYSRC. In February 2007, the statewide IRM was reduced from 18 to 16.5 percent. At its Executive Committee meeting in December 2007, the NYSRC, subject to regulatory approval, lowered the statewide IRM for the 2008/2009 Summer/Winter Capability Periods to 15 percent. Based on the final IRM, the NYISO will determine the locational installed capacity requirements. For 2008, the statewide IRM may be 39,460 megawatts⁹. The total capacity available to the state is expected to be 42,821 megawatts, which includes 38,577 megawatts of net in-state generation, 1,323 megawatts of Special Case Resources (a demand response program) and 2,921 megawatts of import capability that could be used to supply capacity from neighboring regions that can be committed to New York. (See Figures 5.1 and 5.2)

The IRM stayed unchanged for decades prior to February 2000, when it was lowered from 22 to 18 percent. These reductions reflect the improved availability of the state’s fleet of power plants as they operate in a competitive market system as well as improvements in transmission capability and availability.

Plant Retirements

While it is critical to the reliability of the system that sufficient generator capacity be located within New York State, the location of those resources on the system is also extremely important. In addition to real power (measured in megawatts), power plants also produce reactive power (measured in MVARs) that support local voltage within the grid. When that support is either reduced or absent by reason of events such as plant retirements it can lead to reductions in the power transfer capability of the existing transmission system.

The NYISO will monitor carefully the effects that the scheduled plant retirements will have on the grid. If necessary, it will bring potential reliability and operational issues to the attention of its stakeholders and federal and state agencies.

Figure 5.2

2008 Available Resources by Regions (MW)							
Region	Reliability Requirement	Available Generation	Special Case Resources	New Capacity Net*	Available ICAP Import Capability	Total	Surplus (total minus requirements)
Statewide	39,460	38,917	1,323	(340)	2,921	42,821	3,361
NY City	9,580	10,019	469			10,488	908
Long Island	5,430	5,612	160			5,772	342

*New Capacity Net: 85 MW additions minus 425 MW retirements.

⁹ This assumes a 16.5 percent IRM, as previously noted, the statewide IRM may be 15 percent subject to pending regulatory approvals. At 15 percent the statewide IRM would be 38,950 megawatts. These numbers are based on the March 2007 Gold Book data.

Transmission

Increasing demands on the transmission system, in conjunction with other system changes, have and will continue to result in transfer limits based on voltage constraints. Those demands and changes consist primarily of generating unit retirements, load growth, neighboring system changes and the lack of sufficient new capacity. Effects on the transmission system are most acute in the lower Hudson Valley and New York City areas.

The result is that over time, transfers into and through southeastern New York have been limited by voltage constraints, rather than thermal constraints. These issues have been underscored in the two completed planning cycles by the NYISO and the transmission owners have responded by implementing upgrades to their systems. These improvements have brought the transmission voltage transfer limit closer to the thermal limit for the interfaces in southeastern New York. Additional work will further increase the transfer capability in this critical section of the New York bulk electricity grid.

The additions of the Cross Sound Cable from Long Island to Connecticut in 2005 and the Neptune Cable between Long Island and New Jersey in July 2007, have increased New York's access to resources located in adjacent regions by nearly 1,000 megawatts.

Several proposals to lay transmission cables under the Hudson River, connecting New Jersey and New York City, and a new 345 kV cable from Westchester to the Bronx, by 2010 are moving forward. These transmission projects will adequately address the scheduled power plant retirements in New York City.

6 Market Innovations

Shared Governance & Innovation

The NYISO has a shared governance process. A ten-member independent Board of Directors and three decision-making committees comprised of electricity market participants and other stakeholders each have important and distinct roles to play in the design and evolution of New York's electric markets and the development of tariff filings.

More than 20 specialized working groups and task forces collaborate with NYISO staff on enhancing, streamlining, and changing market design and rules. When at least 58 percent of stakeholders -- and the Board of Directors -- agree upon a new approach to the markets, a joint request is submitted to the FERC to allow the NYISO to put the new plan into practice.

Various innovations, elaborations and refinements to the New York markets have been developed as a result of the expertise exchanged in these shared governance venues. Some of those innovations are listed below.

- *In February 2005, the real-time markets were thoroughly revised through the deployment of Standard Market Design 2 (SMD2). The development and approval of these extensive revisions involved every aspect of the governance process and resulted in "the most complete and efficient set of electricity markets in the U.S.," according to the NYISO's Independent Market Advisor, Dr. David Patton.*
- *The unique needs of renewable energy providers, such as wind-powered generators, are being addressed as a result of the stakeholder process. The development of wind forecasting procedures and other market rules unique to these resources are enhancing New York's efforts to develop its renewable portfolio.*
- *Extensive work in the stakeholder process led to the development of virtual bidding which contributes to improved price convergence between the day-ahead and real-time energy markets. The resulting stabilization of prices allows buyers and sellers to more accurately hedge financial positions ultimately leading to cost savings.*
- *The stakeholder process has created the nation's most successful demand response programs. During the record-setting peaks of summer 2006, NYISO Demand Response Program participants were able to curtail over 1000 megawatts, making a significant contribution to the reliable operation of the bulk electricity grid.*

Capacity

The capacity market is intended to provide economic signals that supplement those of the energy and reserves markets so that sufficient capacity may be available to reliably meet New York's electricity demands. The NYISO conducts capacity market auctions throughout the year for buyers and sellers who wish to make purchases of one-month or six-month duration.¹⁰ Approximately one-half of the capacity that serves the New York market is traded through the NYISO auctions; the remainder is contracted for in bilateral arrangements between buyers and sellers.

New York is divided into three zones -- New York City, Long Island and the New York Statewide (commonly referred to as Rest-of-State) -- to set pricing for installed capacity due to locational reliability requirements. Substantial new capacity came into the New York market with approximately 1,000 megawatts located in the New York City zone. These investments indicate that New York electricity markets are functioning effectively.

However, as noted in the 2006 and 2007 Needs Assessments, capacity additions in the lower Hudson Valley are becoming increasingly important. The Lower Hudson Valley is included in the Rest-of-State capacity market zone.

Capacity market design varies across the Northeast region and remains the subject of on-going debate and consideration among the ISOs, RTOs and their customers. A wide range of market-based options are available to stimulate investment in the capacity market, should

¹⁰ The Installed Capacity Market provisions are discussed generally in Sections 5.9 through 5.16 of the NYISO Services Tariff. The NYISO administered auctions are described in detail in the Installed Capacity Manual which can be found at http://www.nyiso.com/public/webdocs/documents/manuals/operations/icap_manual.pdf.

A significant proportion of the renewable generation developed and proposed in New York State is wind-powered projects. However, a variety of innovative renewable and advanced energy technologies are emerging.

A significant proportion of the renewable generation developed and proposed in New York State is wind-powered projects (See Figure 6.1). However, a variety of innovative renewable and advanced energy technologies are emerging.

In May 2007, Verdant Power completed installation of its six-unit demonstration array of kinetic hydro-power turbines as part of its Roosevelt Island Tidal Energy Project in New York City's East River. The five-meter, 35 kilowatt turbines generate electricity from the ebb and flow tides of the East River. According to Verdant, the installation is the world's first grid-connected kinetic hydropower system. The company has plans to expand the project to 300 turbines and more than ten megawatts of generation.

The Mill Seat Landfill, owned by Monroe County and operated by Waste Management, went on-line with its landfill gas-to-electricity facility in July 2007. The 10,000 square foot renewable energy facility generates nearly 4.8 megawatts of energy, consuming 12,749 tons of the landfill's methane gas annually. An array of landfill gas-to-electricity systems have filed interconnection requests with the NYISO. Such projects reduce methane emissions, turning the waste gas into a fuel source for generating electricity.

In September 2007, Beacon Power Corporation filed an interconnection request application with the NYISO for a 20 MW flywheel-based frequency regulation plant in Stephentown, New York. The flywheel system is a mechanical battery that spins at high speeds to store energy that is instantly available when needed.

A report prepared for NYSERDA¹² noted that significant energy and environmental benefits could be provided by energy storage. Among the developments driving opportunities for development of electricity storage cited by the report was "increasing emphasis on locational marginal pricing (LMP), such as the use of locational based marginal prices (LBMPs) in New York."

Pricing signals from the wholesale electricity markets, combined with open access to the bulk electricity grid, can be expected to provide new and additional opportunities for the development of renewable power resources and advanced energy technologies such as:

- solar photovoltaic systems (semiconductor materials that convert sunlight to electricity),
- concentrating solar power systems (mirror configurations that convert the sun's energy into heat used to generate electricity),
- biomass projects (plant derived organic matter available on a renewable basis, including dedicated energy crops and trees), or
- geothermal projects (using heat from within the Earth to provide steam for electric generation or space heating.)

¹² Guide to Estimating Benefits and Market Potential for Electricity Storage in New York (with Emphasis on New York City). Distributed Utility Associates and E Cubed Co. LLC. March 2007.

Plug-in Hybrid Electric Vehicles

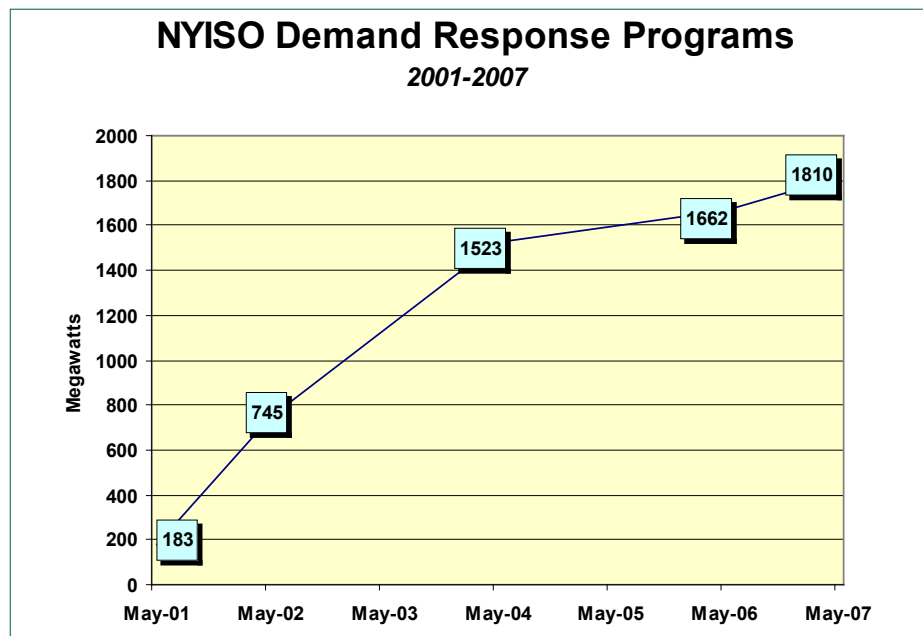
With Toyota and General Motors in an announced competition to bring plug-in electric vehicles (PHEVs) to market by 2010¹³, the combined effects of energy use in the nation's transportation and electricity sectors will become more important to understand and to manage. A recently completed study of PHEV potential in the United States over a forty year period (2010 to 2050) concluded that annual greenhouse gas emissions (in particular CO₂) could be significantly reduced as PHEV usage increases.¹⁴ Unlike conventionally fueled vehicles, PHEVs produce no emissions when run in full-electric mode. And, PHEVs are most likely to use electricity during off-peak hours, when less expensive base-load power plants are running at low capacity. PHEVs, in combination with "smart meters" have the potential to significantly improve the efficient use of the nation's electricity grid and have a positive effect on air quality.

Demand Response

In June 2007, the NYISO sponsored a symposium on the future of energy efficiency, demand response programs and advanced metering initiatives in New York's electricity markets. More than 200 participants took part in the day-long event which, among other things, highlighted the contribution that these resources are expected to make in meeting the state's "15 X 15" initiative.

The NYISO's Demand Response programs have grown ten-fold, from a total of 183 megawatts in May 2001 to 1,810 megawatts in May 2007. (See Figure 6.2) In 2007, the NYISO enhanced its demand response program by developing the capability to call upon those particular demand response providers within a zone that could relieve the immediate demand on the system which was causing the reliability condition.

Figure 6.2



¹³ "Toyota vows first plug-in hybrid car to be built by 2010," The Boston Globe, January 14, 2008

¹⁴ Environmental Assessment of Plug-in Hybrid Electric Vehicles. Volume 1: Nationwide Greenhouse Gas Emissions, Electric Power Research Institute and Natural Resources Defense Council, 2007

This improvement means that consumers will pay only for the resources that are needed in specific grid locations for limited periods of time. This improvement – the Targeted Demand Response Program -- was a joint effort of Consolidated Edison, the PSC and the NYISO.

This year, Demand Response providers will have an opportunity to participate in the ancillary services markets. The program will enable Demand Response providers to submit offers to supply reserves and regulation services in the day-ahead market.

Advanced Metering

The NYISO, in cooperation with the PSC, and other stakeholders, has been pursuing improvements in the bulk electricity grid's wholesale metering infrastructure over the past several years. The goal is to bring all affected metering systems into compliance with the standards contained in the NYISO's Revenue Metering Requirements Manual by the end of 2009. These improvements will benefit New York's electric market by significantly reducing the uncertainty associated with invoices for wholesale electric service which, up until now, rely upon estimated usage data.

Looking beyond these necessary improvements to the wholesale metering infrastructure, the NYISO and its stakeholders are also investigating the uses and benefits of "smart" meters as part of an Advanced Metering Infrastructure (AMI) initiative. Smart metering encompasses a full measurement and collection system that includes customer meters, communication networks and data management systems. AMI measures electricity use in minute increments and provides information on consumer electricity use patterns.

Ultimately, AMI will enable consumers to see and be charged time-of-use rates in real time. Electricity costs more during peak hours and less during off-peak times. With this information, customers may be better able to manage their electricity usage, reduce their energy expenses and as a consequence, help to shave the peak demand on the state's power system.

In August 2006, state and federal regulators set in motion a renewed emphasis on the importance of pursuing the many benefits offered by AMI. The NYISO and the PSC are collaborating on efforts to bring the benefits of AMI to the New York market.

Starting in 2008, several investor-owned utilities in New York will begin installing real-time retail metering with the goal of better managing electric demand by shifting portions of industrial and residential energy use to off-peak hours.

The Energy Independence and Security Act of 2007 includes "smart grid" provisions related to the modernization of the nation's electricity transmission and distribution system. Among other items, the new law requires the Department of Energy, the FERC and the states to investigate the feasibility of a transition to time-of-use and real-time electricity pricing.

7 Conclusions and Recommendations

The near-term outlook contains many challenges for the New York electric system. While the supply outlook is good through 2011 there is uncertainty associated with two important environmental initiatives that could change the picture rapidly.

The annual Planning Process undertaken by the NYISO and its stakeholders has successfully identified resource needs for reliability purposes. The market has responded with project proposals to meet those needs.

For the year ahead, the NYISO notes the following issues of interest and concern for New York:

- Circumstances have evolved which elevate the need for a streamlined power-plant siting law to one of utmost urgency. The Governor and the State Legislature should consider a technology-neutral approach to new legislation similar to Article X that will remain consistent with the state's ambitious environmental agenda.
- The extensive scope of the electric power sector's role in the implementation of various environmental initiatives requires a collaborative and coordinated effort among state and local government agencies, the NYISO and stakeholders throughout the electric industry so that environmental goals can be met in a manner consistent with the essential reliability requirements. The collaborative process recently established by the PSC in its order on electricity reliability and infrastructure planning is a timely and important venue that promises to make significant contributions in this regard.
- The NYISO's Planning Process and analytical capabilities can provide reliable, objective analyses to policy makers as they consider programs that will affect the state's electricity industry, environment, and economy.

More broadly, the intersection of global environmental and energy concerns will require enhanced energy efficiency as well as a greater emphasis on demand side resources. It will foster the deployment of new energy technologies and require a comprehensive approach to all sectors of the state's economy that rely on increasingly costly carbon fuels. The NYISO is prepared to commit its resources, in cooperation with its stakeholders and state and federal agencies, to the collective effort to successfully manage the continued transformation of the state's electricity industry.

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sive approach to all sectors

of the state's economy that

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carbon fuels.

“Restructured not Deregulated.”

The description of the restructured electric utility industry as “deregulated,” should not be interpreted to mean that competitive markets for electricity are “unregulated.”

Writing about the value and limits of markets¹⁵, Robert Kuttner observed that the restructuring of the electric utility industry created a system that is “more ‘marketlike’ than the traditional monopoly franchise system – but hardly unregulated.” He categorized it as “regulated competition.”

Federal and state legal requirements that electric rates be “just and reasonable” have not been repealed. Instead, regulators allow markets to provide “just and reasonable” electric rates in certain aspects of electric service, such as production of electricity at power plants, as a substitute for traditional cost-based regulation.

The NYISO is regulated by a variety of governmental and industry overseers, including the following:

- *United States Federal Energy Regulatory Commission (FERC)*
 - ◆ *National regulator established by U.S. Congress in 1935 (as the Federal Power Commission) with jurisdiction over interstate transmission service and the terms and conditions of wholesale power sales*
 - ◆ *Approves the tariff under which the NYISO operates*
- *New York State Public Service Commission (PSC)*
 - ◆ *State utility regulator established in 1907 with jurisdiction over generation, transmission siting, resource adequacy, compliance with NYSRC rules, and local electric distribution within New York*
 - ◆ *Regulates the NYISO as an “electric corporation” which includes approval authority for NYISO issuance of bonds or other debt instruments*
- *North American Electric Reliability Corporation (NERC) / Electric Reliability Organization (ERO)*
 - ◆ *Established in response to the 1965 blackout as an independent, self-regulatory, not-for-profit organization with the mission to improve the reliability and security of the bulk power system in the U.S., Canada and part of Mexico*
 - ◆ *Designated by FERC as the Electric Reliability Organization (ERO), as required by the Energy Policy Act of 2005, to establish and enforce mandatory reliability rules and standards*
- *Northeast Power Coordinating Council (NPCC)*
 - ◆ *One of eight Regional Reliability Councils that make up the NERC*
 - ◆ *Sets resource adequacy standards*
 - ◆ *Includes New York, New England, Ontario, Québec, and the Maritime provinces*
 - ◆ *Formed as voluntary, not-for-profit, regional reliability organization in 1966 and restructured in 2007*
- *New York State Reliability Council (NYSRC)*
 - ◆ *Not-for-profit organization established in 1999*
 - ◆ *Responsible for reliability rules specific to the New York State power system*

¹⁵ Kuttner, Robert. *Everything for Sale: The Virtues and Limits of Markets*. Chicago: University of Chicago Press, 1999.

8

Glossary

“15 x 15” Clean Energy Strategy: The proposal, announced in April 2007 by New York State Governor Eliot Spitzer, establishing the goal of reducing electricity use in New York to 15 percent below forecasted levels by 2015. The Strategy involves an array of efforts to increase energy efficiency, including instituting revenue decoupling, strengthening efficiency standards and reducing New York State government’s power usage. (Also, see Energy Efficiency Portfolio Standard.)

Adequate: A system is considered adequate if the probability of having sufficient transmission and generation resources to meet expected demand is greater than the minimum standard to avoid a blackout. A system has adequate resources under the standard if the probability of an involuntary loss of service is no greater than one occurrence in 10 years. This is known as the loss of load expectation (LOLE), which forms the basis of New York’s installed capacity (ICAP) requirement.

Advanced Metering Infrastructure (AMI): Also known as “smart metering,” AMI consists of two separate and distinct elements: (1) meters that use technology to capture the energy use information of a utility’s customer, and (2) communication systems that capture and transmit such information in real-time. Smart meters are capable of measuring and recording usage data in time differentiated registers, including hourly or such interval as is specified by regulatory authorities. They also allow electric consumers, suppliers and service providers to participate in all types of price-based demand response programs.

Article X: New York’s siting process (Article X of the state Public Service Law) for new large power plants which expired Dec. 31, 2002. Article X provided a streamlined process to review, approve and locate new generation facilities in the state.

Bulk Electricity Grid: The transmission network by which electricity flows from suppliers to local distribution systems that serve customers. New York’s bulk electricity grid includes all electric generating plants, high voltage transmission lines and interconnections with neighboring electric systems located in the New York Control Area (NYCA).

Capability Period: The Summer Capability Period lasts six months, from May 1 through October 31. The Winter Capability Period runs from November 1 through April 30 of the following year.

Cap-and-Trade: An environmental regulation mechanism that sets an overall limit on the emissions of a certain pollutant (such as CO₂), but allows emission sources to trade their emission individual allowances. In theory, “cap-and-trade” systems use the marketplace to reduce emissions in a cost-effective and flexible manner. In practice, a “cap” is established that limits emissions from a designated group of

polluters to some level below their current emissions. The emissions allowed under the new cap are then divided into individual permits – usually equal to one ton of pollution – that represent the right to emit that amount. The permits can be bought and sold bilaterally or through an auction mechanism.

Comprehensive Reliability Plan (also called, in this report, the Reliability Plan): A study undertaken by the NYISO that evaluates projects offered to meet New York’s future electric power needs, as identified in the Reliability Needs Assessment (Needs Assessment). The Reliability Plan may trigger electric utilities to pursue regulated solutions to meet reliability needs if market-based solutions will not be available by that point. It is the second step in the Comprehensive Reliability Planning Process (the Planning Process).

Comprehensive Reliability Planning Process (also called, in this report, the Planning Process): The annual process that evaluates resource adequacy and transmission system security of the state’s bulk electricity grid over a 10-year period and evaluates solutions to meet those needs. The Planning Process consists of two studies: a Reliability Needs Assessment (Needs Assessment), which identifies potential problems, and the Comprehensive Reliability Plan, which evaluates specific solutions to those problems.

Congestion: Transmission paths that are constrained, which may limit power transactions because of insufficient capacity. Congestion can be relieved by increasing generation or by reducing load.

Constraint: A transmission system restriction that limits the ability to transmit power.

Day-Ahead Market (DAM): A NYISO-administered wholesale electricity market in which capacity, electricity, and/or ancillary services are auctioned and scheduled one day prior to use. The DAM sets prices as of 11 a.m. the day before the day these products are bought and sold, based on generation and energy transaction bids offered in advance to the NYISO. More than 90 percent of energy transactions occur in the DAM.

Day-Ahead Demand Response Program (DADRP): A NYISO Demand Response program to allow energy users to bid their load reductions, or “megawatts”, into the day-ahead energy market, as generators do.

Demand Response Programs: A series of innovative programs designed by the NYISO to maintain the reliability of the bulk electricity grid by calling on electricity users to reduce consumption, usually in capacity shortage situations. The NYISO has three Demand Response programs: Day-Ahead Demand Response Program (DADRP), Emergency Demand Response Program (EDRP), and Special Case Resources (SCR).

Distributed Generation: A small generator, typically 10 megawatts or smaller, attached to the distribution grid. Distributed generation can serve as a primary or backup energy source, and can use various technologies, including wind generators, combustion turbines, reciprocating engines, and fuel cells.

Electric Reliability Organization (ERO): Under the Energy Policy Act of 2005, the Federal Energy Regulatory Commission (FERC) is required to identify an ERO to establish, implement and enforce mandatory electric reliability standards that apply to bulk electricity grid operators, generators and transmission owners in North America. In July 2006, the FERC certified the North American Electric Reliability Corporation (NERC) as America's ERO.

Emergency Demand Response Program (EDRP): A NYISO Demand Response program designed to reduce power usage through the voluntary electricity consumption reduction by businesses and large power users. The companies are paid by the NYISO for reducing energy consumption upon NYISO request.

Energy Efficiency Portfolio Standard (EPS): A proceeding initiated on May 16, 2007 by the New York State Public Service Commission (PSC) to establish targets for energy efficiency, similar to the existing Renewable Portfolio Standard, and other programs, intended to reverse the pattern of increasing energy use in New York. The PSC determined that New York possesses sufficient potential energy efficiency resources to reduce electric usage by 15 percent of projected levels by 2015.

Energy Independence and Security Act of 2007: An extensive energy statute approved by President George W. Bush in December 2007. The stated purposes of the act are "to move the United States toward greater energy independence and security, to increase the production of clean renewable fuels, to protect consumers, to increase the efficiency of products, buildings, and vehicles, to promote research on and deploy greenhouse gas capture and storage options, and to improve the energy performance of the Federal Government, and other purposes."

Energy Policy Act of 2005 (EPAAct): An extensive energy statute approved by President George W. Bush in August 2005 that requires the adoption of mandatory electric reliability standards and gave the FERC the authority to site major transmission lines under certain circumstances in National Interest Electric Transmission Corridors (NIETC) identified by the U.S. Department of Energy. The EPAAct also made major changes to federal energy law concerning wholesale electricity markets, fuels, renewable resources, electricity reliability and the energy infrastructure needs of the nation.

Federal Energy Regulatory Commission (FERC): The federal energy regulatory agency within the U.S. Department of Energy that approves the NYISO's tariffs and regulates its operation of the bulk electricity grid, wholesale power markets, and planning and interconnection processes.

High Electric Demand Days (HEDD): Days of high electricity demand, which can dramatically increase ozone-forming air pollution from electric generation, often resulting in nitrogen oxide (NOx) emissions that can be greater than two times their average levels. Days of high electrical use often coincide with days with high ozone levels.

Installed Capacity: A generator or load facility that can supply and/or reduce demand that qualifies as installed capacity in the New York Control Area (NYCA).

Installed Reserve Margin (IRM): The amount of installed electric generation capacity above 100 percent of the forecasted peak electric consumption that is required to meet New York State Reliability Council (NYSRC) resource adequacy criteria.

Interconnection Queue: A queue of merchant transmission and generation projects that have submitted an Interconnection Request to the NYISO to be interconnected to the state's bulk electricity grid. All projects must undergo three studies – a Feasibility Study (unless parties agree to forgo it), a System Reliability Impact Study (SRIS) and a Facilities Study – before interconnecting to the grid.

Load: A consumer of energy (an end-use device or customer) or the amount of energy (megawatt-hour - MWh) or demand (megawatt - MW) consumed.

Load Following: Refers to the type of power plants that adjusts power output as demand for electricity fluctuates throughout the day.

Locational Installed Capacity Requirement: A NYISO determination of that portion of the statewide installed capacity (ICAP) requirement that must be located electrically within a locality to provide that sufficient capacity is available there to meet the reliability standards.

Loss of load expectation (LOLE): LOLE establishes the amount of generation and demand-side resources needed - subject to the level of the availability of those resources, load uncertainty, available transmission system transfer capability and emergency operating procedures - to minimize the probability of an involuntary loss of firm electric load on the bulk electricity grid. The state's bulk electricity grid is designed to meet an LOLE that is not greater than one occurrence of an involuntary load disconnection in 10 years, expressed mathematically as 0.1 days per year.

Lower Hudson Valley: The southeastern section of New York, comprising New York Control Area Load Zones G, H and I. Greene, Ulster, Orange, Dutchess, Putnam, Rockland and Westchester counties are located in those Load Zones.

Market-Based Solutions: Investor-proposed projects that are driven by market needs to meet future reliability requirements of the bulk electricity grid as outlined in the Reliability Needs Assessment (Needs Assessment). Those solutions can include generation, transmission and Demand Response Programs. Market-based solutions are preferred by the NYISO's Comprehensive Reliability Planning Process (Planning Process). The NYISO is responsible for evaluating all solutions to determine if they will meet the identified reliability needs in a timely manner.

Minimum Oil Burn: Requirements that apply to certain dual-fuel generators in New York City and on Long Island as called for in NYSRC's Local Reliability Rule I-R3. The identified generators are required to burn oil when electric consumption in New York City approaches peak demand levels during summer and winter capability periods, based upon limitations in the gas supply infrastructure, to reduce the risk of loss of electric generators during these periods due to loss of gas supply.

Megawatt (MW): A measure of electricity that is the equivalent of 1 million watts.

Megavolt Ampere Reactive (MVAR): A measure of reactive power equivalent to 1 million VARs.

Neptune Regional Transmission System: A 660 MW underwater and underground direct current (DC) transmission line stretching between Sayreville, N.J. and Nassau County, Long Island. Built by Neptune Regional Transmission System, LLC, the line opened in summer 2007. Also known as the Neptune Project.

New York Independent System Operator (NYISO): Formed in 1997 and commencing operations in 1999, the NYISO is a not-for-profit organization that manages New York's bulk electricity grid – a 10,775-mile network of high voltage lines that carry electricity throughout the state. The NYISO administers the state's competitive wholesale electricity markets and provides comprehensive reliability planning for the state's bulk power system. The organization is governed by an independent Board of Directors and a governance structure made up of committees with Market Participants and stakeholders as members.

New York Control Area (NYCA): The area under the electrical control of the NYISO. It includes the entire state of New York, divided into 11 load zones.

National Interest Electric Transmission Corridor (NIETC): Areas of the country designated by the Secretary of Energy as experiencing "electric energy transmission capacity constraints or congestion that adversely affects customers." The designations are based on congestion studies that consider economics, reliability, fuel diversity, national energy policy and national security. The federal Department of Energy is charged with the responsibility of designating NIETCs, through authority granted under the Energy Policy Act of 2005.

New York Power Pool (NYPP): The New York Power Pool, established July 21, 1966 in response to the Northeast Blackout of 1965, was a voluntary collaboration of the state's six investor-owned utilities plus New York's two power authorities created to coordinate the operations of the New York State power grid. The NYISO assumed this responsibility in 1999.

Order 890: Adopted by FERC in February 2007, Order 890 is a change to FERC's 1996 open access regulations (established in Orders 888 and 889). Order 890 is intended to provide for enhanced competition, transparency and planning in wholesale electricity markets and transmission grid operations, as well as to strengthen the Open Access Transmission Tariff (OATT) with regard to non-

discriminatory transmission service. Order 890 requires transmission providers – including the NYISO – have a formal planning process that provides for a coordinated transmission planning process, including reliability and economic planning studies.

Outage: Removal of generating capacity or transmission line from service either forced or scheduled.

Peak Demand: The maximum instantaneous power demand averaged over any designated interval of time, which is measured in megawatt hours (MWh). Peak demand, also known as peak load, is usually measured hourly.

Peaking: Refers to power plants that generally run only when there is the highest consumption of, or peak demand for, electricity (See “Peak Demand.”)

PJM: PJM Interconnection is a regional transmission organization. The PJM acronym originally referred to its Pennsylvania, New Jersey and Maryland jurisdictions, however, PJM currently serves all or part of 13 states and the District of Columbia.

Regulated Backstop Solutions: Proposals required of certain Transmission Owners to meet reliability needs as outlined in the Needs Assessment. Those solutions can include generation, transmission, or demand response. Non-Transmission Owner developers may also submit regulated solutions. The NYISO may call for a Gap solution if neither market-based nor regulated backstop solutions meet reliability needs in a timely manner. To the extent possible, the Gap solution should be temporary and strive to ensure that market-based solutions will not be economically harmed. The NYISO is responsible for evaluating all solutions to determine if they will meet identified reliability needs in a timely manner.

Reliability Needs Assessment (also referred to as the Needs Assessment): A report that evaluates resource adequacy and transmission system security over a 10-year planning horizon, and identifies future needs of the New York electric grid. It is the first step in the NYISO’s Comprehensive Reliability Planning Process (Planning Process).

Renewable Portfolio Standard (RPS): The New York State Public Service Commission, in September 2004, issued its “Order Approving Renewable Portfolio Standard Policy” that calls for an increase in renewable energy used in New York State from the then current level of about 19% to 25% by the year 2013.

Security: The ability of the power system to withstand the loss of one or more elements without involuntarily disconnecting firm load.

Special Case Resources (SCR): A NYISO Demand Response program designed to reduce power usage by businesses and large power users qualified to participate in the NYISO’s installed capacity (ICAP) market. Companies that sign up as SCRs are paid in advance for agreeing to cut power upon NYISO request during periods of system stress.

Transfer Capability: The amount of electricity that can flow on a transmission line at any given instant, respecting facility rating and reliability rules.

Transmission Constraints: Limitations on the ability of a transmission facility to transfer electricity during normal or emergency system conditions.

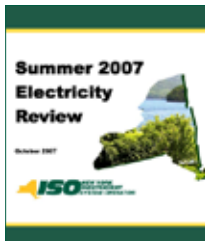
Upstate: The New York Control Area (NYCA) north of the upstate New York and southeast New York Interface, or UPNY – SENY Interface.

Other NYISO Publications



2008 Reliability Needs Assessment

The NYISO Board of Directors approved the *2008 Reliability Needs Assessment* in December 2007, beginning the NYISO's third cycle of comprehensive planning for the state's bulk electricity grid. The Needs Assessment is the first part of the NYISO's Comprehensive Reliability Planning Process, which analyzes, identifies and addresses New York's generation adequacy and transmission reliability needs over a 10-year span.



Summer 2007 Electricity Review

This report issued in October 2007, looks back at electricity supply and reliability in the summer of 2007. New York State reached its summer 2007 peak load of 32,169 megawatts (MW) on August 8, almost 2,000 MW below the record peak load (33,939 MW) set on August 2, 2006.



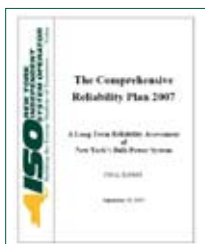
The Future is Now: Energy Efficiency, Demand Response and Advanced Metering

The remarks and presentations of the June 27, 2007 NYISO-sponsored symposium are available in this single volume. More than 200 participants attended the event, which featured remarks from government and private sector leaders in the fields of energy efficiency, demand response, and advanced metering.



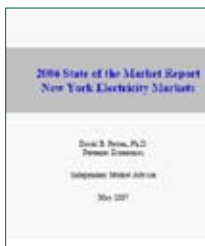
2007 Load & Capacity Data

This report, also known as "the Gold Book," presents New York Control Area (NYCA) system data and NYISO forecasts of peak demand, energy requirements and emergency demand response programs; existing resource capacity and planned changes; and existing and proposed transmission facilities.



Comprehensive Reliability Plan 2007

The NYISO Board of Directors approved the *2007 Comprehensive Reliability Plan* for New York's bulk electricity grid in September 2007. It provides information on planned transmission system upgrades, and market-based solutions proposed to meet reliability needs.



Independent Market Advisor Annual Report for 2006

The *2006 State of the Market Report* is prepared by the NYISO's Independent Market Advisor, Dr. David Patton. It provides a comprehensive look at the performance of New York's wholesale electricity markets in 2006. The report calls the NYISO's operation "the most complete and efficient set of electricity markets in the U.S."



A Cost-Benefit Analysis of the New York Independent System Operator: The Initial Years

The March 2007 report, *A Cost-Benefit Analysis of the New York Independent System Operator: The Initial Years*, was prepared by Susan F. Tierney and Edward F. Kahn of the Analysis Group. The report's primary conclusion is that the quantifiable benefits arising from the NYISO-administered markets have exceeded its costs.

Copies of NYISO Publications are available for download at www.nyiso.com

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