



**2006
TRIENNIAL REVIEW
OF
RESOURCE ADEQUACY**

**COVERING THE
NORTHEAST POWER COORDINATING COUNCIL'S**

NEW YORK CONTROL AREA

For the years 2007 – 2011

October 1, 2006

Approved by the RCC

November 28, 2006

1.0 EXECUTIVE SUMMARY

1.1 Major Findings

The New York Control Area (NYCA) Triennial Review of Resource Adequacy, conducted by the New York Independent System Operator (NYISO), supplants the 2005 Review that was approved by Northeast Power Coordinating Council's (NPCC) Joint Coordinating Committees in March, 2006.

Weather-adjusted, the NYCA peak load has grown from approximately 27,500 MW in 1995 to 33,068 MW in 2005, which totals growth of 5,568 MW. This represents a ten-year compound growth rate of approximately 1.86%.

The 2006 Triennial Review demonstrates that the number of firm load disconnections range from 0.005 to 0.085 days/year for the base load forecast and 0.009 to 0.152 for the high load forecasts. For the period 2007 through 2011, the New York Control Area (NYCA) is in compliance and has sufficient existing resource capacity and planned resource capacity additions to meet the NPCC resource adequacy criterion. It is anticipated that from April 1, 2006 to 2011, 2939 MW of new capacity, including 95 MW of re-rated capacity, will be added to the NYCA system. 1721 MW of existing generating facilities will be retired.

In 2005, the NYISO initiated a Comprehensive Reliability Planning Process (CRPP) to determine whether the electric system resources provided by a combination of market forces and regulated entities is providing sufficient resources to maintain the reliability of the New York State bulk power system. The recently completed Comprehensive Reliability Plan resulted in the following measures being identified:

- Delay the retirement of Poletti 1 (888 MW) in New York City from 2008 to 2009
- Implement Transmission Owner plans which will add 466 MW of generating capacity, 900 MW of firm capacity imports across new transmission facilities from neighboring control areas, and 449 MW of demand-side resources
- Development of 950 MW of merchant generation in New York City and 250 MW on Long Island

The NYISO Board of Director approved the CRP in August, 2006.

1.2 Major Assumptions and Results

Table I shows study results and where in the report to locate the major assumptions. The basis for the assumptions in this study is the NYISO's 2006 Load and Capacity Data report, supplemented by resources included in the approved CRP.

TABLE I
MAJOR ASSUMPTIONS AND RESULTS

<u>ASSUMPTION</u>	<u>DESCRIPTION</u>	<u>REF. PAGE</u>
Criterion	NPCC Criterion of 0.1 day per year disconnection	6
Reliability Study		
Program	GE MARS Program	23
Load Model	8760 Hours	16
Load Uncertainty	Historical Basis	16
Unit Availability		
Definition	NERC-GADS (EFORD)	17
Basis	5 Year History	18
Maintenance Schedule	Planned, modified to reflect 5 Year History	18
Emergency Operating Procedures	Modeled	7
Operating Reserve	Modeled	7
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Adequacy of System	Through 2011 with base load forecast and 2010 with the high load forecast	10
	Base Case	High Forecast Case
	Expected Number of Firm Load Disconnections	Expected Number of Firm Load Disconnections
<u>Year</u>	<u>Days/year</u>	<u>Days/year</u>
2007	0.015	0.023
2008	0.005	0.009
2009	0.028	0.051
2010	0.053	0.091
2011	0.085	0.152

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3.0 INTRODUCTION

This report was prepared to satisfy the Triennial Review requirements of the Northeast Power Coordinating Council (NPCC) “Guidelines of Area Review of Resource Adequacy (Revised: November 29, 2005).”

The report demonstrates that NYISO is expected to meet the NYSRC and NPCC resource adequacy design criterion (i.e., the frequency of disconnecting non-interruptible customers due to resource deficiencies, on average, will be no more than once in ten years) for the period 2007 through 2011 under the base case and 2007 through 2010 under the high load forecast scenarios.

The NYISO has completed its initial CRPP to determine whether the electric system resources provided by a combination of market forces and regulated entities is providing sufficient resources to maintain the reliability of the New York State Bulk Power System. The first CRP has been approved by the NYISO Board of Directors. The resource solutions it identifies ensure the reliability of the NYCA through 2011. The resources include:

- Delay the retirement of Poletti 1 (888 MW) in New York City from 2008 to 2009
- Implement Transmission Owner plans which will add 466 MW of generating capacity, 900 MW of firm capacity imports across new transmission facilities from neighboring control areas, and 449 MW of demand-side resources
- Development of 950 MW of merchant generation in New York City and 250 MW on Long Island.

3.1 Previous Triennial Review

The NPCC Reliability Coordinating Committee approved the previous NYCA Triennial Review in March 2005. That review concluded that NYPP had adequate capacity planned or available to meet its load forecast for the five-year planning period.

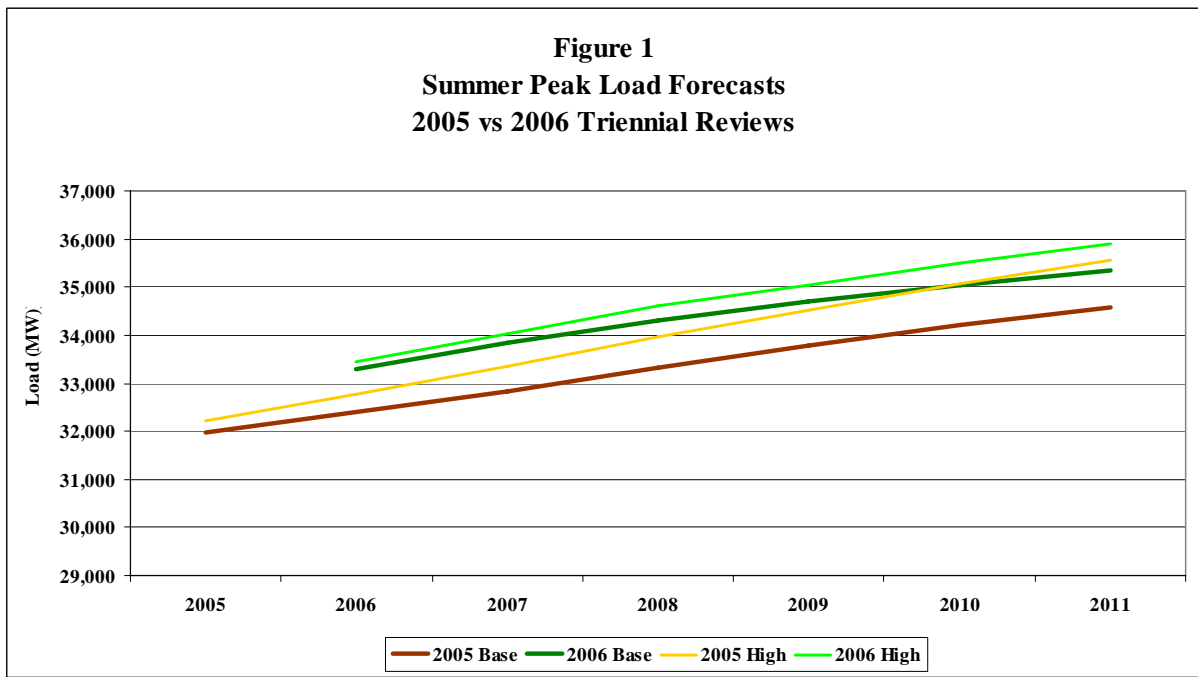
3.2 Comparison of Current and Previous Resource Plans

3.2.1 Load

The comparison of 2005 and 2006 load forecasts is shown in Figure 1. Both forecasts are before reductions for of Demand Side Management (DSM). NYSIO sponsored demand management programs include the Emergency Demand Response Program (ERDP) and Special Case Resource (SCR). EDRP is expected to provide approximately 250 MW of peak demand reduction. SCRs are considered capacity resources. They are expected to add approximately 1,000 MW of capacity. Appendix A, Section 1.1.4 for a discussion of SCRs.

Weather-adjusted, the NYCA peak load has grown from approximately 27,500 MW in 1995 to 33,068 MW in 2005, which totals growth of 5,568 MW. This represents a ten-year compound growth rate of approximately 1.86%.

The annual peak loads used in the 2006 Triennial Review are higher than the corresponding values used in the 2005 Triennial Review. The difference is mainly due to a higher starting point resulting from a sharp upwards weather-normalization of the 2004 peak load. Predicted economic trends employed in the 2006 forecast are not significantly different from those assumed in the 2005 forecast.



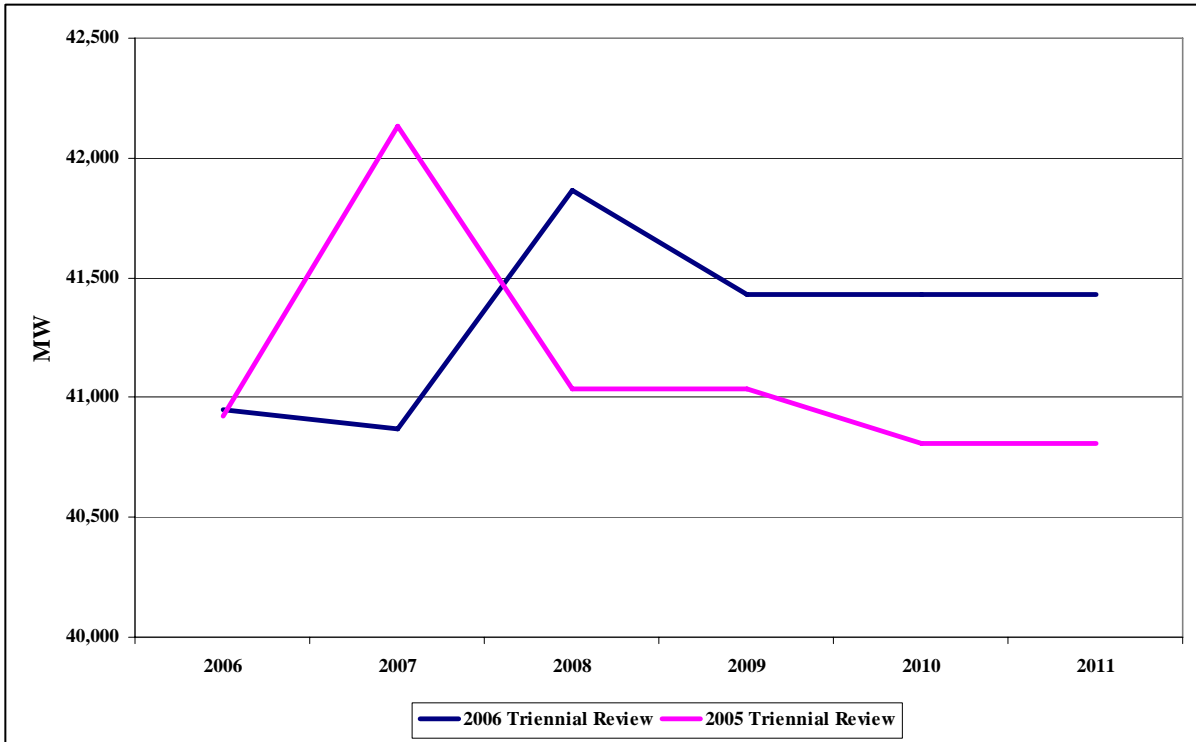
3.2.2 Resources

The 2005 Triennial Review assumed NYCA capacity resources would total 40,922 MW for summer, 2006. As of April 1, 2006, the NYCA installed capability was 40,948 MW. The difference of 26 MW is accounted for by higher projected SCRs (1,016 MW vs. 975 MW) and changes in generating unit Dependable Maximum Net Capacity (DMNC) estimates.

To be consistent with studies conducted for the New York State Reliability Council (NYSRC), firm purchases are not included as a resource for this assessment. In the summer of 2005, for example, there were over 2,000 MW of external Installed Capacity (ICAP) purchases accepted into the NYCA market. But these are not assumed as resources in forward looking studies such as the Triennial Review. For the summer of 2006 to 2007, the firm purchases are anticipated to be only 410 MW and 330 MW between 2008 and 2011. For the summer of 2007 to 2009, the firm sales are anticipated to be 305 MW and 298 MW for 2010 and 2011. Purchases are discussed further in Section 5.1.

Figure 2 shows the capacity projections made in 2005 and 2006.

**Figure 2 Projected Summer Capacity
2005 vs. 2006 Triennial Review**



The 2005 and 2006 capacity projections include Special Case Resources and wind generation at their fully stated capacity. See Appendix A for a description of how these resources are treated in reliability calculations.

4.0 RESOURCE ADEQUACY CRITERION

4.1 Statement of NPCC and NYSRC Resource Adequacy Criteria

The NYISO adheres to the NPCC resource adequacy criterion, which reads:

“Each Area’s probability (or risk) of disconnecting any firm load due to resource deficiencies shall be, on average, not more than once in ten years. Compliance with this criteria shall be evaluated probabilistically, such that the loss of load expectation (LOLE) of disconnecting firm load due to resource deficiencies shall be, on average, no more than 0.1 day per year. This evaluation shall make due allowance for scheduled outages and deratings, forced outages and deratings, assistance over interconnections with neighboring Areas and Regions, transmission transfer capabilities, and capacity and/or load relief from available operating procedures.”

The NYISO also adheres to the NYSRC resource adequacy criterion (A-R1), which reads:

“The NYSRC shall establish the Installed Reserve Margin(IRM) requirement for the NYCA such that the probability (or risk) of disconnecting any firm load due to resource deficiencies shall be, on average, not more than once in ten years. Compliance with this criteria shall be evaluated probabilistically, such that the loss of load expectation (LOLE) of disconnecting firm load due to resource deficiencies shall be, on average, no more than 0.1 day per year. This evaluation shall make due allowance for scheduled outages and deratings, forced outages and deratings, assistance over interconnections with neighboring control areas, NYS Transmission System transfer capability, and capacity and/or load relief from available operating procedures.”

The NYSRC criterion is consistent with the NPCC criteria. In addition, NYSRC imposes Installed Capacity Requirements on NYCA Load Serving Entities (LSE) (A-R2), as follows:

"LSEs shall be required to procure sufficient resource capacity for the entire NYISO defined obligation procurement period so as to meet the statewide IRM requirement determined from A-R1. Further, this LSE capacity obligation shall be distributed so as to meet locational ICAP requirements, considering the availability and capability of the NYS Transmission System to maintain the A-R1 reliability requirements."

This means that NYS Transmission System capability limitations shall not prevent NYISO from meeting the NYSRC resource adequacy criterion.

NYSRC uses these criteria to establish the appropriate NYISO installed reserve requirements. According to these criteria, expected disconnections are limited to once in ten years. However, before a load disconnection will occur, a series of emergency operating procedures (EOP’s) will be invoked. These are aimed at either reducing load or increasing capacity. The procedures are described in section 4.2.

4.2 Statement of NYISO Emergency Operating Procedures (EOPs)

Table II lists the selection of load control and generator resource supplements that may be available on an emergency basis to reduce the possibility of customer disconnections. These EOPs are initiated when required by the senior NYISO dispatcher. In general, the priority order shown in Table II is followed. These EOP's are also modeled in NYISO and NYSRC reliability studies.

TABLE II
EMERGENCY OPERATING PROCEDURES

Step	Procedure	Effect	Percentage	MW Value
1	Special Case Resources	Load relief	----	1016 MW*
2	Emergency Demand Response Prog	Load relief	N/A**	269 MW
3	5% manual voltage Reduction	Load relief	0.26	85 MW
4	Thirty-minute reserve to zero	Allow operating reserve to decrease to largest unit capacity (10-minute reserve)	N/A	600 MW
5	5% remote voltage reduction	Load relief	1.53	505 MW**
6	Curtail Company use	Load relief	N/A	11 MW
7	Voluntary industrial curtailment	Load relief	N/A	128 MW**
8	General public appeals	Load relief	N/A	13 MW
9	Ten-minute reserve to zero	Allow 10-minute reserve to decrease to zero	N/A	1200 MW
10	Customer disconnections	Load relief	N/A	As needed
<p>* The SCR's are modeled as 1016 MW, however they are discounted to 934 MW in July and August and further discounted in other months based on past performance.</p> <p>** These EOPs are modeled in the program as a percentage. The associated MW value is based on a forecast 2006 peak load of 33,295 MW.</p>				

4.3 Statement of Required Installed Reserve

For resource planning, NYSRC requires an 18% installed reserve margin over the NYSIO annual peak load. A recent reliability study (see Section 4.5) demonstrated that this reserve level meets the NPCC resource reliability criterion.

Interconnections to neighboring Areas are considered as a part of NYISO analysis of installed reserve adequacy. The 2005 NYSRC IRM study showed that interconnection support allows the installed reserve margin to be reduced from roughly 25% to 18% for approximately a 2,300 MW benefit. This interconnection benefit is an aggregate number. Interconnection benefits with individual neighboring systems have not been calculated.

4.4 Comparison of NYSRC and NPCC Resource Reliability Criteria

The NYSRC resource adequacy criterion is consistent with (see section 4.1) the criterion established by NPCC. The NYSRC maintains the criterion is met by imposing an IRM requirement on the NYCA.

4.5 Reliability Study Results

Studies¹ conducted since the last Triennial Review resulted in annual IRM requirements of 18%. These studies showed that for a NYCA installed reserve margin of 18%, the expected frequency of disconnecting non-interruptible customers due to resource deficiencies would be less than one day in ten years. The General Electric MARS (Multi-Area Reliability Simulation) model was used for these studies. This model has also been used in other periodic studies such as “Review of Interconnection Assistance Reliability Benefits” and “Summer Multi-Area Probabilistic Reliability Assessment” performed by Working Groups under the direction of NPCC’s Task Force on Coordination of Planning.

These IRM studies also determined that internal NYCA transmission constraints would not cause its resource adequacy design criterion to be violated when an 18% installed reserve margin is maintained. The IRM study demonstrates that when the locational installed capacity requirements are met, internal NYCA constraints do not affect statewide reserve margin requirements. These locational installed capacity requirements are set through an NYISO study².

The above assessments demonstrate that an 18% reserve level is sufficient for NYISO to meet the NPCC resource adequacy design criterion.

¹ NYSRC Report titled, “New York Control Area Installed Capacity Requirements for the Period May 2006 Through April 2007”.

²“Locational Installed Requirements Study, Covering the New York Control Area, For the 2005-2006 Capability Year”, New York Independent System Operator

5.0 RESOURCE ADEQUACY ASSESSMENT

5.1 Planned vs. Required Reserve for Base Case Load Forecast

Figure 3 shows the projected NYISO installed reserve levels for the base load forecast made in 2005 vs. the NYISO 2006 forecast along with the 18% required reserve margin for maintaining the NPCC criterion. The 18% requirement for the 2006-2007 capability year is extended, in the figure, for reference purposes. The NYSRC has not set reserves for the years beyond the 2006-2007 capability year. The base load forecast is based on a 2006 economic forecast that was provided by Economy.com (formerly RFA associates) and is the expected scenario, having 50% probabilities of being exceeded or of not being met.

Figure 3 – Percent Installed Reserve
2005 vs. 2006 Triennial Review

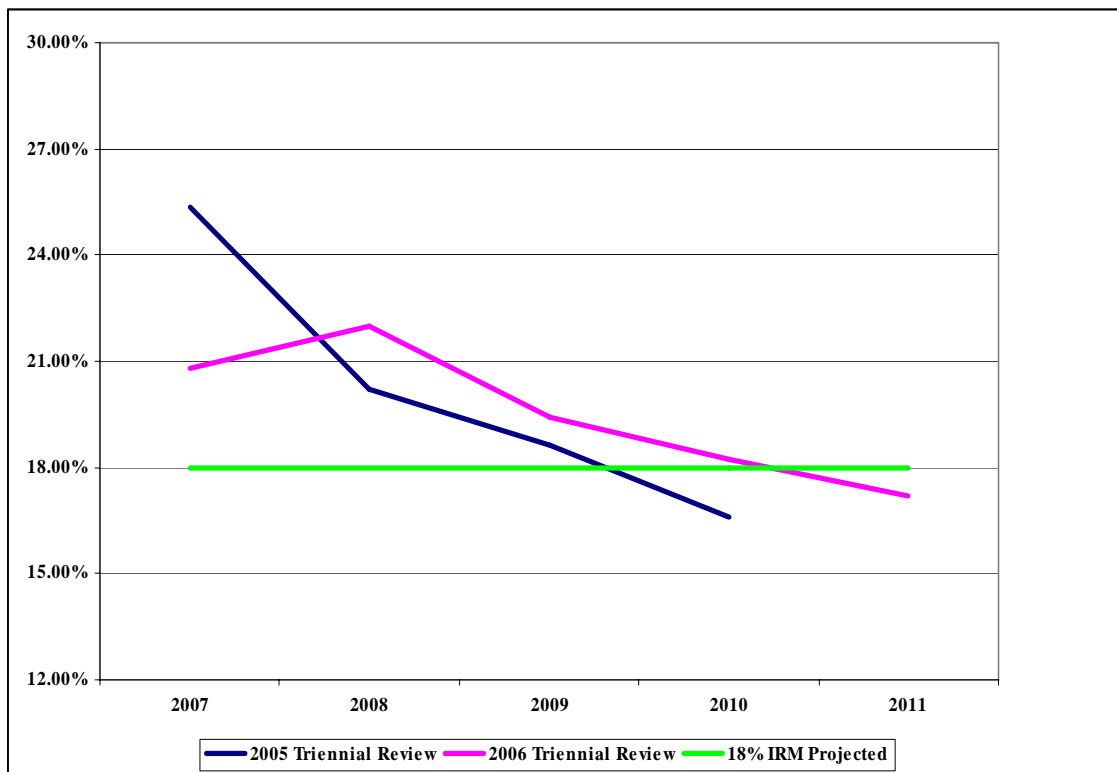


Table III							
Comparison of Planned & Required Reserves Base Load Forecast							
Year	July Installed Capacity (MW)	System Peak Forecast (MW)	Planned Reserve		Reserves Needed For 18% Reserve Margin		LOLE
			MW	%	MW	%	
2007	40,868	33,831	7,037	20.8%	6,089	18.0%	0.023
2008	41,866	34,314	7,552	22.0%	6,176	18.0%	0.005
2009	41,431	34,688	6,743	19.4%	6,243	18.0%	0.028
2010	41,431	35,042	6,389	18.2%	6,307	18.0%	0.053
2011	41,431	35,348	6,083	17.2%	6,362	18.0%	0.085

Table III shows the planned vs. required reserves over the study period and compares them against the NYISO base load forecast. The NYISO 2006 Load and Capacity Report as of April 1, 2006, lists 2,843 MW of capacity of additional resources under construction and proposed and 95 MW of ratings. This is partially offset by 1721 MW of planned retirements. It should be noted that the majority of these new resources are located in the zones within the NYCA that exhibit the highest LOLE in the MARS model output. The selection of these units was based on the ability of developers to recently site and build projects. Of the measures approved in the RNA, only the delay in the retirement of Poletti 1 is included in Table III.

Even when the Planned Reserve dips below 18% in 2011, the NYCA LOLE is less than 0.10 days per year.

The Long Island Cross Sound Controllable Line (CSCL) is included in the 2006 Triennial Review. The CSCL affords access to firm installed capacity resources in New England which are required by NYISO Procedures to be counted as capacity resource in the New York Control Area.

5.2 Planned vs. Required Reserve for High Load Forecast

The 2006 high load forecast reflects a more robust economy than the base case. According to Economy.com, the vendor for the economic forecasts used by NYISO in this study, this level of economic growth is estimated to have approximately a 20% probability of occurring.

Table IV

**Comparison of Planned & Required Reserves
High Load Forecast**

Year	July Installed Capacity (MW)	System Peak Forecast (MW)	Planned Reserve		Reserves Needed For 18% Reserve Margin		LOLE
			MW	%	MW	%	
			2007	40,868	34,035	6,833	
2008	41,866	34,595	7,271	21.0%	6,227	18.0%	0.009
2009	41,431	35,049	6,382	18.2%	6,309	18.0%	0.051
2010	41,431	35,496	5,935	16.7%	6,389	18.0%	0.091
2011	41,431	35,904	5,527	15.4%	6,463	18.0%	0.152

Table IV shows the planned vs. required reserves over the study period and compares them against the NYISO high load forecast. Additional capacity will be required for 2011 to meet the reserve requirement.

5.3 Contingency Plans

NYISO has in place a Comprehensive Reliability Planning Process to investigate and address reliability needs. The CRPP is evaluated annually so that reliability needs will be identified in time for solutions to be developed.

6.0 PLANNED RESOURCE CAPACITY MIX

6.1 Planned Resource Capacity Mix

Figure 4 depicts NYCA's resource capacity mix by fuel type for the year 2006 on an installed capacity basis.

Figure 4

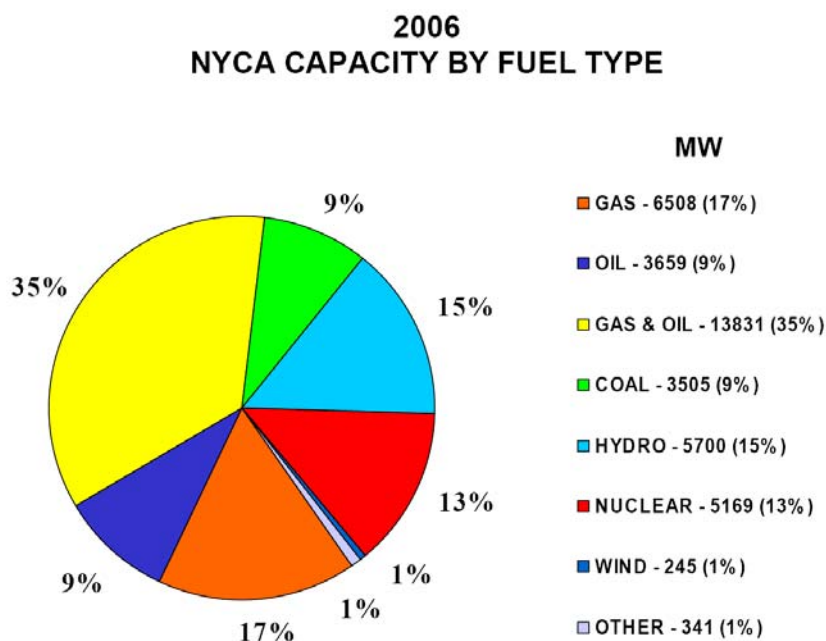


TABLE V								
Planned Resource Capacity Mix By Year								
Month Of July	Coal %	Gas & Oil %	Gas Only %	Hydro %	Nuclear %	Oil Only %	Wind %	Other %
2007	8.9%	36.2%	16.4%	14.4%	13.1%	9.2%	0.9%	0.9%
2008	8.5%	36.3%	16.5%	14.4%	13.3%	9.3%	0.9%	0.9%
2009	8.1%	35.0%	17.0%	14.9%	13.7%	9.5%	0.9%	0.9%
2010	8.1%	35.0%	17.0%	14.9%	13.7%	9.5%	0.9%	0.9%
2011	8.1%	35.0%	17.0%	14.9%	13.7%	9.5%	0.9%	0.9%

Table V shows the projected installed capacity resource mix from 2007 through 2011. The “other” category includes wind power, resource recovery, wood burning, and other fuels.

6.2 Reliability Impact of Resource Diversification Strategy

The deregulation of the electric infrastructure and the opening of the wholesale electric markets have caused a lapse in the movement to develop diversely fueled resources. Although this is beginning to be addressed in the U.S. on a federal level through a national

energy plan, the short-term implication is that new capacity additions will be driven only by current economic considerations.

For the duration of this study period in New York, resources fueled by natural gas will meet all of the growth in projected energy consumption. Except for wind energy, no new resources employing other fuels are expected to be added in the planning period.

There is a potential for a natural gas shortage in New York State. This could cause natural gas fired units to burn other fuels or curtail operations. If unit operation curtailment due to fuel unavailability occurs in load pockets, generation from other areas would need to help meet demand, causing heavier loading on the existing transmission system. Many of the dual fired units are the larger older steam units located in load pockets and would impact reliability needs in a multiple ways if retired. The real challenge on a going forward basis will be to maintain the benefits that fuel diversity, in particular dual fired fuel capability, provides today. This will be especially critical in New York City and Long Island which are entirely dependent on oil and gas fired units many at which have interruptible gas transportation contracts. This issue will be considered in developing CRPP Plans.

In terms of operational strategy, the NYSRC has adopted the following local reliability rule:

I-R3. Loss of Generator Gas Supply (New York City & Long Island)³

The NYS Bulk Power System shall be operated so that the loss of a single gas facility (i.e., pipeline or storage facility) does not result in the loss of electric load within the New York City and Long Island zones.

6.2.1 Fuel Risk Analysis

NYSIO categorizes generation capacity fuel types into three supply risks: Low, Moderate and High

Low Fuel Supply Risk: Low fuel risk is defined as the low probability of a generating unit running out of fuel, particularly during the winter heating season. Most of the fuels characterized as low fuel risk are not competing with fuels required to meet heating load or generators have effectively been able to manage the fuel supply risks. For this analysis, generating units with low fuel risk include:

1. Nuclear: nuclear units run for long periods of time without disruption from fuel supplies. The greatest fuel supply risk are extended outages when changing fuel rods or other protracted maintenance outages.
2. Hydro: Hydro units in New York have relatively stable supplies of fuel. While some hydro units are limited due to “run-of-river” limitations or are pump storage units, for the most part hydro units are not restricted by fuel supplies.
3. Coal: While there are no mine-mouth coal units operating in New York, coal generators effectively mitigate potential fuel interruptions with both on-site

³ “NYSRC RELIABILITY RULES For Planning And Operating the New York State Power System”, Revision 2, Version 14, October 14, 2005

storage up to 30 days as well as firm transportation of coal to their facility, including purchasing their own railroad cars. Furthermore, many coal units source coal from multiple geographic locations, thereby minimizing disruption from any single coal source.

4. Dual Fuel w/Firm Natural Gas: A dual fuel unit with firm natural gas supply is considered to be a low fuel risk as it has reduced the risk for fuel interruption by having both firm gas contracts and alternative fuel availability.

Moderate Fuel Risk: Moderate fuel risk is characterized by units using fuels which could possibly face shortages during the winter months but have mitigated that risk with the availability of a secondary fuel or have firm contracts for the transportation of fuel.

5. Dual Fuel units with Residual Fuel Oil: As residual fuel oil is not used to meet heating load, generators capable of firing residual fuel oil face fewer supply risks than the other fossil fuels. The greatest risk to this group is delivery of residual fuel oil, particularly for the older steam boiler units. Fortunately in New York, most of these units are sited near a navigable water way and have firm barge transport for their fuel deliveries.
6. Dual Fuel units with Fuel Oil #2: Fuel oil #2 or heating oil faces greater supply risks during the winter months as this fuel is also used for heating homes. This is particularly true in the northeastern United States including portions of up-state New York. The increased demand for heating oil decreases available supplies as well as increases the delays in transportation.
7. Dual Fuel units with Kerosene or Jet-Kero: Kerosene or Jet-Kero is a very thinly produced market segment of the distillate fuels and as such is more prone to supply disruptions than the other fuels. The higher cost of this fuel relative to the other fuel oils limits its use in the economic dispatch in New York.
8. Natural Gas with Firm Contracts Only: Gas only units with firm contracts pose a higher risk than the other dual fuel units, particularly those generators with offsetting peaking options on their firm gas contracts.

High Risk: High fuel supply risk is characterized by units with a single source of fuel supply or intermittent resources such as wind generators. These units have no alternative or back-up fuel and therefore are exposed to shortages in their single source of fuel. The ranking within the high risk fuels also reflects the likelihood of shortages in that particular fuel. Note that gas fired generators without firm contracts are rated as one of the highest fuel risks in this analysis. Generators with high risk include:

9. Residual Fuel only: Typically, generators capable of firing with residual fuel also have gas fired capability. In New York there are no residual fuel only generators.
10. Distillate Fuel Oil only: This group typically includes GTs without access to natural gas and therefore use either fuel oil #2 or kerosene for their operations. Both of these fuels either compete with the heating load during the winter or are a very thinly produced segment of the fuel oil market and therefore prone to potential disruptions.
11. Gas Only Non-Firm: This characterizes the group of generators which have no firm natural gas supplies and no source of back-up fuel. There are a few older steam plants which fall into this category.

12. Other: The highest fuel risk characterizes those units with little or no control over the fuel supply. This includes intermittent resources including wind power as well as the smaller refuse or bio-fueled generators.

TABLE VI
Fuel Risk Profile

Rank	Risk	Fuel Type	Capacity in MW	Cumulative in MW
1	Low	Nuclear	5,113	5,113
2		Hydro	5,844	10,957
3		Coal	3,663	14,620
4		Dual Fuel w/ Firm Natural Gas	4,629	19,249
5	Moderate	Dual Fuel w/ Residual Oil	5,834	25,083
6		Dual Fuel w/ Fuel Oil #2	3,470	28,553
7		Dual Fuel w/ Kerosene	1,541	30,094
8		Firm Natural Gas only	2,091	32,185
9	High	Residual Fuel Oil only	-	32,185
10		Distillate Fuel Oil only	2,470	34,655
11		Gas Only non-firm	4,411	39,066
12		Other	371	39,437

The greatest risk to fuel supply interruption occurs during the winter months when both natural gas and heating fuel oils are competing to serve electrical and heating loads. Fortunately in New York, peak electrical loads occur during the summer months when demand is nearly 7,000 MWs greater than the winter peak. As such, New York can meet the winter peak of roughly 25,000 MW with sufficient generation without exposure to significant fuel risks. Even with a forced outage rate of 10%, there is sufficient generation in the low to moderate fuel risk categories to meet the winter electrical peak of 25,500 MW. This would leave a margin of nearly 4,000 MW or 14% of the total capacity characterized by low to moderate fuel risk.

APPENDIX A

A. DESCRIPTION OF RESOURCE RELIABILITY MODEL⁴

A 1.1 LOAD MODEL

A 1.1.1 Description of Load Model

MARS employs an 8760-hour chronological zonal load model. The load model currently used relies on an actual year of historical loads that has been demonstrated to give conservative results. The year chosen was 2002. This model is then scaled up to the summer peak for the future year being analyzed.

A 1.1.2 Load Forecast Uncertainty

For this study, new load forecast uncertainty models were provided for Consolidated Edison and LIPA for Zones J and K, respectively. The models are presented below:

Table A1 – Load Forecast Uncertainty Models

<u>Multiplier</u>	<u>NYCA Tot</u>	<u>Con Ed (J)</u>	<u>LIPA (K)</u>	<u>NYCA Net</u>
0.0062	1.0584	1.0481	1.1552	1.0413
0.0606	1.0499	1.0325	1.0970	1.0309
0.2417	1.0250	1.0000	1.0485	1.0206
0.3830	1.0000	0.9642	1.0000	1.0000
0.2417	0.9770	0.9319	0.9515	0.9852
0.0606	0.9460	0.9066	0.9030	0.9561
0.0062	0.9070	0.8972	0.8448	0.8987

Load uncertainty for the State is not used in the simulations.

A 1.1.3 Loads of Other Areas

These are based on each Area's load model used in the summer 2004 CP8 study⁵. The load models are scaled so the projected peaks for 2007 are obtained. Those control areas, external to NYCA, whose isolated LOLE's were below that of the NYCA were further adjusted to match the NYCA isolated LOLE.

⁴ More detailed descriptions of the model can be found in the NYSRC Report titled, "New York Control Area Installed Capacity Requirements for the Period May 2006 Through April 2007"

⁵ NPCC CP-8 Working Group report titled, "Review of Interconnection Assistance Reliability Benefits" dated June 29, 2004

A 1.1.4 Demand Side Management

The NYISO Demand Side Management program consists of the Special Case Resources (SCR) program and the Emergency Demand Response Program (EDRP). These programs consist of loads that are capable of being interrupted and distributed generators that are activated on demand, and which are not metered directly by the NYISO. SCR's receive payment as ICAP providers for their capacity contribution. SCR and EDRP programs are available as resources to operators in order to mitigate operating reserve deficiencies.

SCRs are used to supplement other NYCA ICAP resources for meeting peak loads during July and August. This study assumed 1016 MW of SCRs and 269 MW of EDRP will be available during the summer periods.

In the MARS model, SCRs and EDRP are modeled as Emergency Operating Procedures, as shown on Table II in Section 4.2.

A 1.2 RESOURCE UNIT REPRESENTATION

A 1.2.1 Unit Ratings

A 1.2.1.1 Definitions

The unit ratings in reliability calculations, referred to as Dependable Maximum Net Capability (DMNC), are based on seasonal certification that establishes each unit's sustained maximum net output. Combustion turbines are tested for a one-hour period and all other units, for a four-hour period.

A 1.2.1.2 Procedure for Verifying Ratings

The document that describes the procedure for verifying unit ratings through DMNC testing is in section 4.2 of the "NYISO Installed Capacity Manual".

A 1.2.2 Unit Unavailability Factors

A 1.2.2.1 Unavailability Factors Represented

NYISO represents forced outage rates, planned outages, maintenance outages, and partial outage rates.

A 1.2.2.2 Source of Outage Factors

Unit outage data is based on actual history. Unit forced and partial outage rates are calculated from NERC-GADS (North American Electric Reliability Council Generation Availability Data System) event data for the years 2000 – 2004.

Units that do not have a complete 5-year history for unscheduled outages are augmented with class average ratings from the NERC Generating Unit Statistical Brochure for the years 2000-2004.

Approved schedules for planned outages are compared to historical duration averages and may be adjusted before being input. Units that do not supply schedules are automatically scheduled by the program for durations based on historical averages from 5-year NERC-GADS data.

Historical hydro generation from the small units has been found to vary significantly by season. An analysis of the on-line data at the NYISO control center resulted in a monthly adjustment to the model.

A 1.2.2.3 Maturity Considerations

No separate immature/mature unavailability factors are used in NYISO reliability studies.

A 1.2.2.4 Tabulation of Unavailability Factors

Table A-1 presents the average availability factors used in the NYISO reliability study compared to NERC averages.

Table A2
Average Availability Factors

Unit Type	MW Nameplate	EAF%		FOR%		EFORd%	
		NERC	NYISO	NERC	NYISO	NERC	NYISO
Coal - Primary	All Sizes	84.90	85.74	4.56	4.94	6.21	7.50
Gas - Primary	All Sizes	85.97	81.81	6.38	9.51	5.86	7.59
Oil - Primary	All Sizes	83.77	80.75	5.64	3.65	6.73	5.82
Nuclear - All Types	All Sizes	86.86	87.28	3.83	4.94	4.77	5.66
Jet Engine	All Sizes	88.70	88.75	25.38	9.37	8.44	4.21
Gas Turbine	All Sizes	89.83	87.09	32.83	15.62	9.93	3.94
Combined Cycle	All Sizes	84.65	90.93	4.00	1.47	5.57	2.70
Hydro	All Sizes	89.04	83.08	3.70	0.82	3.49	0.86

EAF- Equivalent Availability Factor

FOR - Forced Outage Rate

EFORd - Equivalent Force Outage Rate during Demand

A 1.2.3 Purchase and Sale Representation

The following purchases of ICAP from other control areas and sales of ICAP to other control areas were modeled for the study years.

TABLE A3
ANNUAL EXTERNAL ICAP PURCHASES AND SALES – 2007-2011

Purchases/Sales	Installed Capacity (MW)				
	2007	2008	2009	2010	2011
PJM Purchases	80	80	0	0	0
Long Island CSCL	330	330	330	330	330
Total Purchases	410	410	330	330	330
ISO-New England Sales	127	127	127	127	127
PJM-RTO Sales	176	176	176	169	169
Ontario Sales	2	2	2	2	2
Total Sales	305	305	305	298	298

A 1.2.4 Retirements

The following retirements were considered in the study.

TABLE A4
Plant Retirements – 2006-2010

Station	Zone	Date	Capability (MW)		Reason for Retirement
			Summer	Winter	
Poletti 1	J	2/1/2009	885	886	Station Replacement
Huntley 65,66	A	11/1/2007	167	170	Environmental Restrictions
Russell Station	B	12/1/2007	238	245	Environmental Restrictions
Lovett 5	G	6/1/2007	188	190	Environmental Restrictions
Lovett 3 & 4	G	6/1/2008	243	246	Environmental Restrictions
Total:			1721	1735	

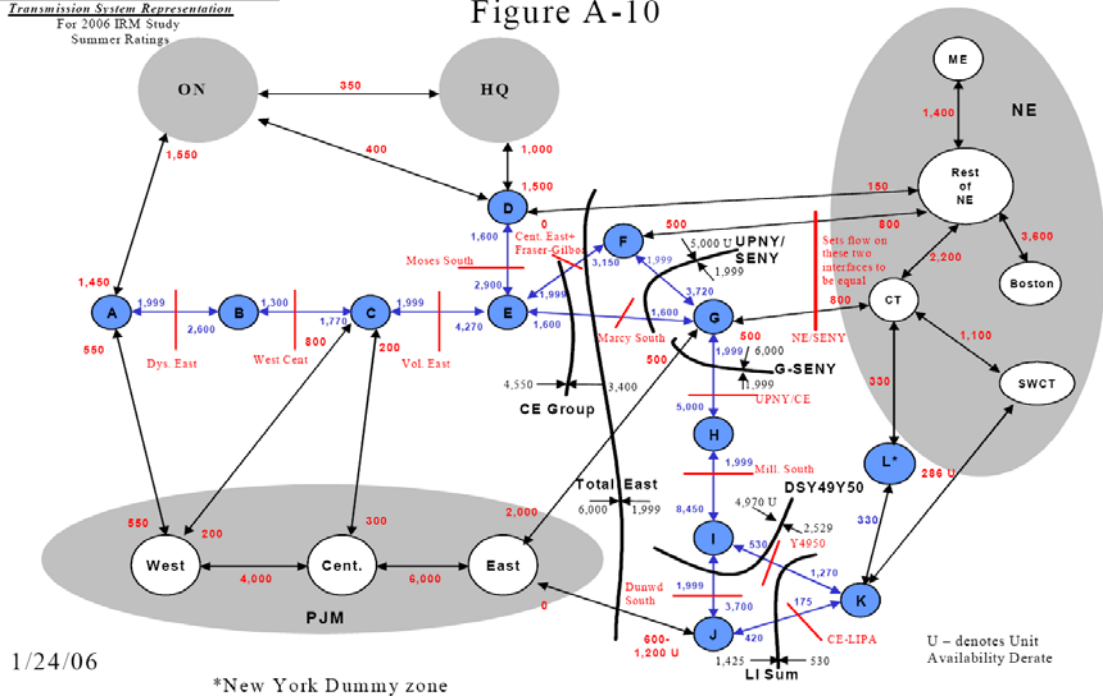
A 1.3 INTERCONNECTED SYSTEMS

The Independent Electricity System Operator (IESO), ISO-New England, Hydro-Quebec, and PJM's interconnections were modeled as shown in Figure A1 below. The installed reserve margin was fixed at 15% for the 2007-2011 period for these Areas by increasing their load.

Figure A1
New York Control Area Transmission System Representation

New York Control Area
Transmission System Representation
For 2006 IRM Study
Summer Ratings

Figure A-10



A 1.4 MODELING OF LIMITED ENERGY RESOURCES

The Gilboa pumped storage facility is considered available for all hours in which the unit is not on forced or scheduled outage.

Seasonal variation in small hydro units is accounted for and is described in Section A 1.2.2.2 above.

The Robert Moses – Niagara hydroelectric project is modeled with a probability capacity model that is based on historical data.

A 1.5 MODELING OF DEMAND SIDE MANAGEMENT (DSM)

A description of the DSM program is given in section A1.1.4. 1016 MW of Special Case Resources are modeled in the study. This amount is less than the total registered for the program and reflects actual operating history of these resources.

A 1.6 MODELING OF RESOURCES

Modeling of resources is described in the above sections. Greater detail can be found in the IRM study⁶

A 1.7 OTHER ASSUMPTIONS

Internal ties were modeled at emergency limits and can be seen on the previous figure A-1. Maintenance over-runs and environmental constraints were not modeled in this study. The study assumes units needed for reliability will not be prevented from operating because of environmental constraints.

Derates on Gas Turbines were introduced due to lower output at higher than tested temperatures. These derates equate to 640 MW at a temperature of 100 Degrees F, or 80 MW per degree over the design test temperature of 92° F. There were no significant changes to the transmission limits for the 2006 to 2010 period.

Wind resources were modeled by using the local 2002 wind speed profiles for these facilities to calculate hour-by-hour MW outputs. These were derated to achieve a 20% availability factor to reflect aggregate historical performance.

A 1.8 RELIABILITY IMPACTS OF MARKET RULES

The Regional Greenhouse Gas Initiative (RGGI) is a plan developed by the northeastern states to address carbon dioxide emissions from power sources located in that section of the country.

⁶ NYSRC Report titled, “New York Control Area Installed Capacity Requirements for the Period May 2006 Through April 2007”

The plan is anticipated to start in 2009 and covers all units that are 25 MW or larger in size. Seven states have signed the Memorandum of Understanding (MOU). The impacts of this initiative are being considered in the CRPP.

APPENDIX B

B. DESCRIPTION OF RELIABILITY PROGRAM

NYISO uses the GE MARS model to perform its reliability studies. MARS can model multi-pool power systems and each pool can be modeled as several zones. MARS uses sequential Monte Carlo simulation to model the availability of generating units over the time period of the study. The study period is one year, with each day modeled sequentially. For each unit, the model generates a random availability profile based on its forced and partial outage rates. Units can be fully available, forced out, or in one of several partial availability states. The availability profiles for each unit change from replication to replication. Scheduled maintenance is developed externally based on history.

Total resource capacities are developed from these profiles for each area. These are compared to the daily peak loads. If an area's resource capacity is not enough to meet its load, emergency purchases are made to the extent excess capacity is available elsewhere and transmission constraints allow the excess capacity to be transmitted to the deficient area. If emergency purchases are not sufficient for the area to meet its load, then additional emergency operating procedures are initiated. If more than one area is deficient, excess reserves from other areas are shared between the deficient ones proportionately.

If an area is still deficient after all these steps, the program records that it has experienced a loss of load for that day at that load level. These resources are compared to various load levels that simulate load forecast uncertainty. The resultant loss of loads, when weighted by the probability of being at each load level, produces an expected value for that replication. These expected values are accumulated over the number of replications and the LOLE, and other measures of reliability, are calculated and reported.