2012 Reliability Needs Assessment

New York Independent System Operator

DRAFT REPORT

May 25, 2012

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Executive Summary

To be added…...

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1. Introduction

The Reliability Needs Assessment (RNA) is developed by the NYISO in conjunction with Market Participants and all interested parties as its first step in the Comprehensive System Planning Process (CSPP). It is the foundation study used in the development of the NYISO's Comprehensive Reliability Plan (CRP). The RNA is performed to evaluate electric system reliability, for both transmission security and resource adequacy, over a ten year study period. If the RNA identifies any violation of Reliability Criteria for Bulk Power Transmission Facilities (BPTF) the NYISO will report a Reliability Need, quantified by an amount of compensatory megawatts and/or megavars, and designate one or more Responsible Transmission Owners to develop a regulated backstop solution to address each identified need. In addition, after approval of the RNA, the NYISO will request market-based and alternative regulated proposals from interested parties to address the identified Reliability Needs. This document reports the 2012 RNA findings for the Study Period 2013-2022.

Continued reliability of the bulk power system during the Study Period depends on a combination of additional resources provided by independent developers, in response to market forces, and by the electric utility companies which are obligated to provide reliable and adequate service to their customers. To maintain the system's long-term reliability, those resources must be readily available or in development to meet future needs. Just as important as the electric system plan is the process of planning itself. Electric system planning is an ongoing process of evaluating, monitoring and updating as conditions warrant. Along with addressing reliability, the CSPP is also designed to provide information that is both informative and of value to the New York wholesale electricity marketplace.

Proposed solutions that are submitted in response to an indentified Reliability Need are evaluated in the CRP report and must satisfy Reliability Criteria, including resource adequacy. However, the solutions submitted to the NYISO for evaluation in the CRP do not have to be in the same amounts of compensatory MW/MVar or the locations reported in the RNA. There are various combinations of resources and transmission upgrades that could meet the needs identified in the RNA. The reconfiguration of transmission facilities and/or modifications to operating protocols identified in the solution phase could result in changes and/or modifications of the needs identified in the RNA.

This report begins with an overview of the CSPP. The 2010 Comprehensive Reliability Plan (CRP) and prior reliability plans are then summarized. The report continues with a summary of the 2012 RNA Base Case assumptions and methodology and reports the RNA findings for 2013 - 2022. Detailed analyses, data and results underlying the modeling assumptions are contained in the Appendices.

In addition to assessing the Base Case conditions, the RNA analyzes certain scenarios to test the robustness of the system and the conditions under which needs would arise.

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Attention is given to risks that may give rise to Reliability Needs, including unusually high peak loads and plant retirement notifications.[1]

The NYISO will prepare and issue its 2012 CRP based upon this 2012 RNA report. The NYISO will continue to monitor the progress of the market-based solutions submitted in earlier CRPs and projects that have met the NYISO's Base Case inclusion rules for this RNA. In addition, the NYISO will continue to monitor the various assumptions that are reflected or impact the RNA Base Case to assess whether these projects are progressing as expected and whether any delays or changes in system conditions are likely to adversely impact system reliability. These base case assumptions include, but are not limited to, the measured progress towards achieving the State energy efficiency program standards, the impact(s) of ongoing developments in State and Federal environmental regulatory programs on existing power plants, the status of plant re-licensing efforts, and the development of transmission owner projects identified in the Local Transmission Plans (LTPs).

For informational purposes, this RNA report also provides the marketplace with the latest historical information available for the past five years of congestion via a link to the NYISO's website. The 2012 CRP will be the foundation for the 2013 Congestion Assessment and Resource Integration Study (CARIS). A more detailed evaluation of system congestion is presented in the CARIS. The NYISO completed its second CARIS economic planning assessment of future congestion in March 2012.

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[1] Any generating units that, pursuant to the PSC Orders in Case 05-E-0889, have provided a notice of Retirement, Mothball, protective layup, etc., by the study lock-down date, will be assumed to not be available for the period of the RNA study beginning once the applicable PSC notice period runs.

2. Summary of Prior CRPs

This is the sixth RNA since the NYISO's planning process was approved by FERC in December 2004. The first three RNA reports identified Reliability Needs and the first three CRPs (2005-2007) evaluated the market-based and regulated backstop solutions submitted in response to those identified needs. The 2005 CRP was approved by the NYISO Board of Directors in August 2006, and identified 3,105 MW of resource additions needed through the 10-year Study Period ending in 2015. Market solutions totaled 1200 MW, with the balance provided by updated Transmission Owners' (TOs) plans. The second CRP was approved by the NYISO Board of Directors in September 2007 and identified 1800 MW of resource additions needed over the 10-year Study Period ending in 2016. Proposed market solutions totaled 3007 MW, in addition to updated Transmission Owners' (TOs) plans. The third CRP was approved by the NYISO Board of Directors in July 2008, and identified 2350 MW of resource additions needed through the 10-year Study period ending in 2017. Market solutions totaling 3,380 MW were submitted to meet these needs. The NYISO did not trigger any regulated backstop solutions to meet previously identified Reliability Needs.

The 2009 CRP, approved by the NYISO Board of Directors in January 2009, and the 2010 CRP, approved by the NYISO Board of Directors in January 2011, indicated that the system was reliable and no solutions were necessary in response to their respective 2009 and 2010 RNAs. Therefore, market solutions were not requested. The primary reasons that no needs were identified in the 2009 and 2010 RNAs, as compared to the 2008 RNA, were 1) an increase in generation and transmission facilities, 2) a decrease in the energy forecast due to the Energy Efficiency Portfolio Standard Order (EEPS), and 3) an increase in Special Case Resources (SCRs).[2] Although the 2009 and 2010 CRPs did not identify any needs, as a risk mitigation measure, the NYISO has continued to monitor the market-based solutions submitted for the 2008 CRP.

Table 2-1 presents the market solutions and TOs' plans that were submitted in response to previous requests for solutions and were included in the 2008 CRP. The table also indicates that 1815 MW of solutions are either in-service or are still being reported to the NYISO as moving forward with the development of their projects.

It should be noted that there are a number of other projects in the NYISO interconnection study queue which are also moving forward through the interconnection process, but have not been offered as market solutions in this process. Some of these additional resources have either accepted their cost allocation as part of a Class Year Facilities Study process or are currently included in the 2011 or 2012 Class Year Facilities Studies. These projects are listed in Table 2-2 and 2-3. Both Tables 2-1 and 2-2 note the projects that meet the RNA Base Case inclusion rules.

[2] Footnote to be added addressing similar trends in these or other drivers' impacts on the results in this 2012 RNA report.

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Table 2-1: Current Status of Tracked Market-Based Solutions & TOs' Plans in the 2008 CRP*

Project Type	NYISO Queue #	Submitted	MW	Zone	Original In-Service Date	Current Status	Included in 2012 RNA Base Case
			Resource Proposals				
Gas Turbine NRG Astoria Re-powering	**201 and 224**	CRP 2005, CRP 2007, CRP 2008	520	J	Jun - 2010	New Target June 2014	No
Empire Generation Project	**69**	CRP 2008	635	F	Q1 2010	Placed in Service September 2010	Yes
			Transmission Proposals				
Back-to-Back HVDC, AC Line HTP	**206**	CRP 2007, CRP 2008 and was an alternative regulated proposal in CRP 2005	660 (500 MW specific capacity identified)	PJM - J	Q2 2011 PJM Queue O66	New Target Q2 2013 Article VII approved	Yes
			TOs' Plans				
ConEd M29 Project	**153**	CRP 2005	N/A	J	May - 2011	Placed in Service February 2011	Yes

*2009 and 2010 CRPs did not generate any tracked projects

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Table 2-2: Proposed Resources per 2012 Gold Book

QUEUE POS.	OWNER / OPERATOR	STATION UNIT	ZONE	DATE	NAME-PLATE RATING (MW)	CRIS (MW)	SUMME	UNIT TYPE	CLASS YEAR	Included in RNA Case
Completed Class Year Facilities Study										
232	Bayonne Energy Center, LLC	Bayonne Energy Center	J	2012/05	500.0	512.0	500.0	Dual Fuel	2009	Yes
147	NY Windpower, LLC	West Hill Windfarm	C	2012/09	31.5	31.5	31.5	Wind Turbines	2006	No
161	Marble River, LLC	Marble River Wind Farm	D	2012/10	83.0	83.0	83.0	Wind Turbines	2006	Yes
171	Marble River, LLC	Marble River II Wind Farm	D	2012/10	132.2	132.2	132.2	Wind Turbines	2006	Yes
197	PPM Roaring Brook, LLC / PPM	Roaring Brook Wind	E	2012/12	78.0	0.0	78.0	Wind Turbines	2008	No
263	Stony Creek Wind Farm, LLC	Stony Creek Wind Farm	C	2012/12	94.4	88.5	94.4	Wind Turbines	2010	No
237	Allegany Wind, LLC	Allegany Wind	A	2013/08	72.5	0.0	72.5	Wind Turbines	2010	No
166	Cape Vincent Wind, LLC	St. Lawrence Wind Farm	E	2013/09	79.5	79.5	79.5	Wind Turbines	2007	No
207	BP Alternative Energy NA, Inc.	Cape Vincent	E	2013/09	210.0	0.0	210.0	Wind Turbines	2008	No
119	ECOGEN, LLC	Prattsburgh Wind Farm	C	2013/12	78.2	78.2	78.2	Wind Turbines	2003-05	No
222	Noble Ball Hill Windpark, LLC	Ball Hill Windpark	A	2014/Q1	90.0	90.0	90.0	Wind Turbines	2009	No

Table 2-3: Class Year 2011 and 2012 Projects

QUEUE POS.	OWNER / OPERATOR	STATION UNIT	ZONE	DATE	NAME-PLATE RATING (MW)	CRIS (MW)	SUMMER	UNIT TYPE	Included in 2012 RNA Base Case
Class 2011 Projects									
349	Taylor Biomass Energy, LLC	Taylor Biomass	G	2012/Q4	22.5	TBD	19.0	Solid Waste	No
198	New Grange Wind Farm, LLC	Arkwright Summit Wind Farm	A	2013/09	79.8	TBD	79.8	Wind Turbines	No
169	Alabama Ledge Wind Farm, LLC	Alabama Ledge Wind Farm	B	2013/10	79.8	TBD	79.8	Wind Turbines	No
201	NRG Energy	Berrians GT	J	2014/06	200.0	TBD	200.0	Combined Cycle	No
224	NRG Energy, Inc.	Berrians GT II	J	2014/06	90.0	TBD	50.0	Combined Cycle	No
310	Cricket Valley Energy Center, LLC	Cricket Valley Energy Center	G	2015/09	1136.0	TBD	1019.9	Combined Cycle	No
251	CPV Valley, LLC	CPV Valley Energy Center	G	2016/05	690.6	TBD	677.6	Combined Cycle	No
Class 2012 Candidates									
189	PPM Energy, Inc.	Clayton Wind	E	2013/10	126.0	TBD	126.0	Wind Turbines	No
322	Rolling Upland Wind Farm, LLC	Rolling Upland Wind	E	2014/12	59.4	TBD	59.4	Wind Turbines	No
266	NRG Energy, Inc.	Berrians GT III	J	2016/06	290.0	TBD	250.0	Combined Cycle	No
Other Non Class Year Generators									
284	Broome Energy Resources, LLC	Nanticoke Landfill	C	2012/12	1.6	0.0	1.6	Methane	No
264	RG&E	Seth Green	B	2013/Q1	2.8	0.0	2.8	Hydro	No
338	RG&E	Brown's Race II	B	2013/Q1	8.3	0.0	8.3	Hydro	No
204A	Duer's Patent Project, LLC	Beekmantown Windfarm	D	2013/06	19.5	19.5	19.5	Wind Turbines	No
180A	Green Power	Cody Road	C	2013/Q4	10.0	10.0	10.0	Wind Turbines	No

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3. RNA Base Case Assumptions, Drivers and Methodology

The NYISO has established procedures and a schedule for the collection and submission of data and for the preparation of the models used in the RNA. The NYISO's CSPP procedures are designed to allow its planning activities to be performed in an open and transparent manner and to be aligned and coordinated with the related activities of the NERC, NPCC, and NYSRC. The assumptions underlying the RNA were reviewed at the Transmission Planning Advisory Subcommittee (TPAS) and the Electric System Planning Working Group (ESPWG). The Study Period analyzed in the 2012 RNA is the 10-year period from 2013 through 2022 for both the Base Case and Scenarios.

The RNA Base Case consists of the first Five Year Base Case and the system representations for the second five years of the Study Period as required by Attachment Y of the tariff. All studies and analyses in the RNA Base Case reference a common energy forecast, which is the Baseline Forecast from the NYISO 2012 Load and Capacity Data Report, also known as the "Gold Book". The Baseline Forecast is an econometric forecast with an adjustment for statewide energy efficiency programs. This forecast is the 2012 RNA Base Case forecast.

The Five Year Base Case was developed in accordance with ISO Procedures using projections for the installation and retirement of generation resources and transmission facilities that were developed in conjunction with Market Participants and Transmission Owners. These are included in the Base Case beginning with the FERC 715 filing and consistent with base case inclusion screening process provided in the CRPP Manual. Further, resources that choose to participate in markets outside of New York are modeled as contracts thus removing their available capacity for meeting resource adequacy requirements in New York.

The NYISO developed the system representation for the second five years of the Study Period by starting with the first Five Year Base Case plus:

- The most recent data from the 2012 Gold Book
- The most recent versions of NYISO reliability analyses and assessments provided for or published by NERC, NPCC, NYSRC, and neighboring control areas
- Information reported by neighboring control areas such as power flow data, forecasted energy, significant new or modified generation and transmission facilities, and anticipated system conditions that the NYISO determines may impact the bulk power transmission facilities (BPTF)
- Market Participant input, and
- Changes in the MW and MVAr components of the load model made to maintain a constant power factor.

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The 2012 RNA 2013 – 2022 Base Case model of the New York bulk power system includes the following new and proposed facilities and forecasts in the Gold Book:

- TO projects on non-bulk power facilities included in the FERC 715 Cases
- LTPs identified in the 2012 Gold Book as firm plans and meeting Base Case inclusion rules
- Facilities that have accepted their Attachment S cost allocations and are in service or under construction as of April 1, 2012
- Facilities that have obtained a NYS PSC Certificate (or other regulatory approvals and SEQRA review) and an approved System Reliability Impact Study ("SRIS") and an executed contract with a credit-worthy entity
- Transmission upgrades related to any projects and facilities that are included in the RNA Base Case, as defined above
- Facility reratings and uprates
- Noticed retirements
- The forecasted level of Special Case Resources for Summer 2012 (SCR)

Tables 3-3 and 3-4 show those new projects which meet the screening requirements for inclusion.

The NYISO develops reliability scenarios for the first five years and second five years of the Study Period pursuant to Section 31.2.2.5 of Attachment Y of the OATT. The NYISO also conducts sensitivity analyses pursuant to Section 31.2.2.6 of Attachment Y to determine whether Reliability Needs previously identified can be mitigated through alternate system configurations or operational modes.

3.1. Annual Energy and Summer Peak Demand Forecasts

There are three primary forecasts modeled in the 2012 RNA. The first forecast is an econometric forecast of annual energy and peak demand. The second forecast, which is used for the 2012 RNA Base Case, includes a reduction to the econometric forecast for a portion of the entire goal of the statewide energy efficiency initiative, including the programs authorized by the Energy Efficiency Portfolio Standard (EEPS). The third forecast was prepared for the low load scenario as reflected by a 15 percent energy efficiency achievement by 2015, which represents full achievement of the statewide energy goal by 2015. Additional information on the Base Case load forecast and underlying economic data is contained in Appendix C.

The NYISO has been a party to the NYSPSC EEPS proceeding from its inception and is a member of the Evaluation Advisory Group which is responsible for advising the NYDPS on the methods to be used to track program participation and measure the

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program costs, benefits, and impacts on electric energy usage. In conjunction with the input from market participants at the ESPWG, the NYISO developed energy forecasts for the potential impact of the EEPS over the 10-year planning period. The following factors were considered in developing the 2012 RNA Base Case forecast:

- NYS PSC-approved spending levels for the programs under its jurisdiction, including the Systems Benefit Charge and utility-specific programs
- Expectation of the fulfillment of the investor-owned EEPS program goals by 2018, and continued spending for NYSERDA programs through 2022
- Expected realization rates, participation rates and timing of planned energy efficiency programs
- Degree to which energy efficiency is already included in the NYISO's econometric energy forecast
- Impacts of new appliance efficiency standards, and building codes and standards
- Specific energy efficiency plans proposed by LIPA, NYPA and Consolidated Edison Company of New York, Inc. (Con Edison)
- The actual rates of implementation of EEPS, based on data received from Department of Public Service staff.

Table 3-1(a) below summarizes the 2012 RNA econometric forecast, the 2012 RNA Base Case forecast and the 2012 RNA 15 x 15 scenario forecast. Table 3-1(b) shows a comparison of the Base Case forecasts and energy efficiency program impacts contained in the 2010 RNA and the 2012 RNA. The 2012 RNA 15x15 scenario forecast is based on achievement of the full EEPS goal of 26,880 GWh by 2015, as deducted from the 2015 forecast prepared in 2008, after allowances for certain energy efficiency programs already in place by state utilities. The NYISO has set this 2015 forecast level at 157,380 GWh in prior RNAs.

The 2012 projection of these energy efficiency program impacts was discussed with all market participants during multiple meetings of the Electric System Planning Working Group during the first quarter of 2012. The ESPWG accepted the projection of impacts used in the 2012 RNA Base Case forecast in accordance with procedures established for the RNA.

Figures 3-1(a) and 3-1(b) present actual and weather-normalized historical data and forecasts of annual energy and summer peak demand for the 2012 RNA.

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Table 3-1(a): 2012 RNA Forecast and Scenarios

Annual GWh	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012 High Load Scenario	165,578	168,089	170,480	172,675	174,818	176,146	178,087	180,079	182,406	184,269	185,813
2012 RNA Base Case	163,659	164,627	165,340	166,030	166,915	166,997	168,021	169,409	171,176	172,514	173,569
2012 15x15 Scenario	161,332	160,004	158,687	157,380	158,219	158,297	159,267	160,583	162,258	163,526	164,526

Energy Impacts of EE Programs

Cumulative GWh	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012 RNA Base Case	1,919	3,462	5,140	6,645	7,903	9,149	10,066	10,670	11,230	11,755	12,244
2012 15x15 Scenario	4,246	8,085	11,793	15,295	16,599	17,849	18,820	19,496	20,148	20,743	21,287

Annual MW	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012 High Load Scenario	33,638	34,320	34,846	35,361	35,791	36,224	36,729	37,187	37,627	38,130	38,554
2012 RNA Base Case	33,295	33,696	33,914	34,151	34,345	34,550	34,868	35,204	35,526	35,913	36,230
2012 15x15 Scenario	32,822	32,750	32,549	32,372	32,556	32,750	33,051	33,370	33,675	34,042	34,342

Summer Peak Demand Impacts of EE Programs

Cumulative MW	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2012 RNA Base Case	343	624	932	1,210	1,446	1,674	1,861	1,983	2,101	2,217	2,324
2012 15x15 Scenario	816	1,570	2,297	2,989	3,235	3,474	3,678	3,817	3,952	4,088	4,212

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Table 3-1(b): Comparison of 2010 & 2012 RNA Base Case Forecasts

Comparison of Base Case Energy Forecasts - 2010 & 2012 RNA (GWh)

Annual GWh	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2010 RNA Base Case	160,358	160,446	161,618	163,594	164,556	165,372	166,472	167,517	169,132	171,161	173,332		
2012 RNA Base Case			163,659	164,627	165,340	166,030	166,915	166,997	168,021	169,409	171,176	172,514	173,569
Change from 2010 RNA			2,041	1,033	784	658	443	-520	-1,111	-1,752	-2,156	NA	NA

Comparison of Base Case Peak Forecasts - 2010 & 2012 RNA (MW)

Annual MW	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2010 RNA Base Case	33,025	33,160	33,367	33,737	33,897	34,021	34,193	34,414	34,672	34,986	35,334		
2012 RNA Base Case			33,295	33,696	33,914	34,151	34,345	34,550	34,868	35,204	35,526	35,913	36,230
Change from 2010 RNA			-72	-41	17	130	152	136	196	218	192	NA	NA

Comparison of Energy Impacts from Statewide Energy Efficiency Programs - 2010 RNA & 2012 RNA (GWh)

Cumulative GWh	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2010 RNA Base Case	976	2,860	4,997	6,765	8,413	9,914	11,355	12,327	13,040	13,379	13,684		
2012 RNA Base Case	976	2,860	4,779	6,322	8,000	9,505	10,763	12,009	12,926	13,530	14,090	14,615	15,104
Change from 2010 RNA			-219	-444	-413	-409	-592	-318	-114	151	406	NA	NA

Comparison of Peak Impacts from Statewide Energy Efficiency - 2010 RNA & 2012 RNA (MW)

Cumulative MW	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
2010 RNA Base Case	174	491	825	1,107	1,388	1,675	1,954	2,151	2,311	2,415	2,510		
2012 RNA Base Case	174	491	834	1,115	1,423	1,701	1,937	2,165	2,352	2,474	2,592	2,708	2,815
Change from 2010 RNA			9	8	35	25	-17	14	41	59	82	NA	NA

Figure 3-1(a): 2012 Base Case Forecast and Scenarios – Annual Energy

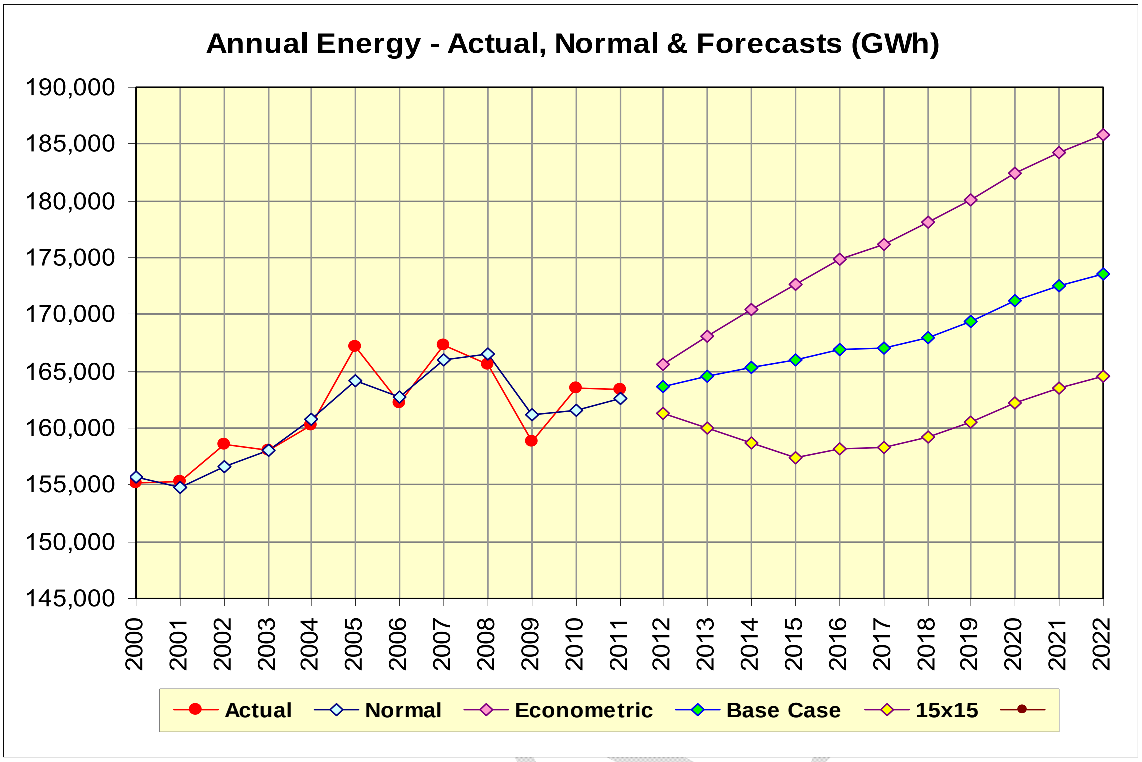
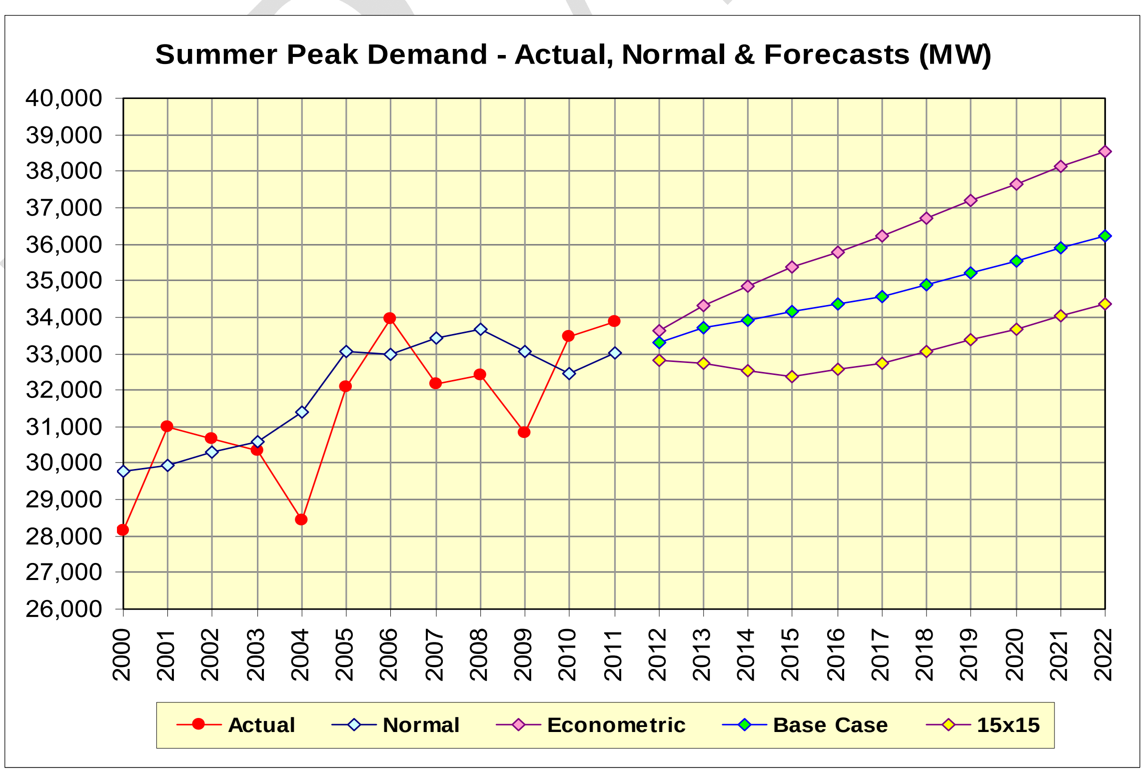


Figure 3-1(b): 2012 Base Case Forecast and Scenarios – Summer Peak Demand



3.2. Forecast of Special Case Resources

To be added….

3.3. Resource Additions

Table 3-3 presents the unit additions and uprates represented in the RNA Base Case.

Table 3-3: Unit Additions

	Queue #	Unit Name	2012	2013	2014	Total MW
New Thermal Units	232	Bayonne Energy (May 2012)	500			500
		New Thermal Units Sub-Total	**500**	**0**	**0**	**500**
New Wind	161	Marble River Wind I (Oct 2012)		83		83
	171	Marble River Wind II (Oct 2012)		132		132
		New Wind Sub-Total	**0**	**215**	**0**	**215**
Unit Uprates	216	Nine Mile Point II (June 2012)	96			96
	127A	Munnsville Wind Power (Dec 2013)			6	6
		Unit Uprates Sub-Total	**96**	**0**	**6**	**102**
		Grand Total	**596**	**215**	**6**	**818**

Note: MW values represent the lesser of Capacity Resource Integration Service (CRIS) and Dependable Maximum Net Capability (DMNC) values.

3.4. Local Transmission Plans

As part of the LTPP, Transmission Owners presented their Local Transmission Plans (LTPs) to the NYISO and Stakeholders in the Fall of 2011.[3] The NYISO reviewed the LTPs and included them in the 2012 Gold Book. Table 3-4 presents the list of 2012 Gold Book firm transmission plans that were included in the in the RNA Base Case.

[3] Consolidated Edison presented an update to their LTP in February 2012 to accommodate the announced mothballing of Astoria Units 2 & 4.
LTPs can be found at http://www.nyiso.com/public/markets_operations/services/planning/process/ltpp/index.jsp

Table 3-4: Firm Transmission Plans included in 2012 RNA Base Case (from 2012 Gold Book)

Queue Pos.	Transmission Owner	Terminals		Line Length miles (1)	Expected Service Date/Yr Prior to (2)	Expected Service Date/Yr Year	Nominal Voltage in kV Operating	Nominal Voltage in kV Design	# of ckts	Thermal Ratings * Summer	Thermal Ratings * Winter	Project Description / Conductor Size	Class Year / Type of Construction
	Merchant Projects												
206	Hudson Transmission Partners	Bergen 230 kV (New Jersey)	West 49th Street 345kV			2013	345	345		660 MW	660 MW	back- to- back AC/DC/AC converter, 345 kV AC cable	2008
351	Linden VFT, LLC (12)	PSE&G 230kV	Goethals 345kV via Linden Cogen 345kV			TBD	345	345		15 MW	15 MW	Variable Frequency Transformer (Uprate)	2011
	TO Firm Plans (included in 2012 RNA)												
	CHGE	E. Fishkill	E. Fishkill	xfmr #2	S	2012	345/115	345/115	1	439 MVA	558 MVA	Transformer #2 (Standby)	
	ConEd	Astoria Annex	Astoria East	xfmr/Phase shifter	S	2012	345/138	345/138	1	241 MVA	288 MVA	xfmr/Phase shifter	-
	NYSEG	Meyer	Meyer	Cap Bank	S	2012	115	115	1	15 MVAR	15 MVAR	Capacitor Bank Installation	-
	NYSEG (6)	Wood Street	Carmel	1.34	S	2012	115	115	1	775	945	477 ACSR	OH
	NYSEG (6)	Wood Street	Katonah	11.70	S	2012	115	115	1	775	945	477 ACSR	OH
	NGRID	Greenbush	Hudson	-26.43	S	2012	115	115	1	648	800	605 ACSR, 350 CU	OH
	NGRID (5)	Greenbush	Klinekill Tap	20.30	S	2012	115	115	1	648	800	605 ACSR, 350 CU	OH
	NGRID (5)	Klinekill Tap	Hudson	6.13	S	2012	115	115	1	648	800	605 ACSR, 350 CU	OH
	O & R	Harriman	-	-	S	2012	69	69	1	16 MVAR	16 MVAR	Capacitor Bank (DOE)	-
	O & R	Snake Hill	-	-	S	2012	138	138	1	32 MVAR	32 MVAR	Capacitor Bank (DOE)	-
	O & R	Bowline	Bowline	-	S	2012	345	345	1	-	-	By-pass switch	OH
	RGE	Station 180	Station 180	Cap Bank	S	2012	115	115	1	10 MVAR	10 MVAR	Capacitor Bank Installation	-
	RGE	Station 128	Station 128	Cap Bank	S	2012	115	115	1	20 MVAR	20 MVAR	Capacitor Bank Installation	-
	NYPA	Willis	Duley	-24.38	W	2012	230	230	1	996	1200	1-795 ACSR	OH
	NYPA (5)	Willis	Patnode	9.11	W	2012	230	230	1	996	1200	1-795 ACSR	OH
	NYPA (5)	Patnode	Duley	15.27	W	2012	230	230	1	996	1200	1-795 ACSR	OH
	O & R	Ramapo	Sugarloaf	16.00	W	2012	138	345	1	1089	1298	2-1590 ACSR	OH
	RGE	Station 42	Station 124	Phase Shifter	W	2012	115	115	1	230 MVA	230 MVA	Phase Shifter	
	RGE	Station 67	Station 418	3.50	W	2012	115	115	1	245 MVA	299 MVA	New 115kV Line	OH
	ConEd (3)	Vernon	Vernon	Phase Shifter	S	2013	138	138	1	300 MVA	300 MVA	Phase Shifter	-
	LIPA	Shore Road	Lake Success	8.72	S	2013	138	138	2	1045	1203	3500 AL	UG
	LIPA (5)	Shoreham	Brookhaven	-7.30	S	2013	138	138	1	1851	2373	2300AL	OH
	LIPA (5)	Shoreham	Wildwood	1.00	S	2013	138	138	1	1851	2373	2300AL	OH
	LIPA (5)	Wildwood	Brookhaven	6.30	S	2013	138	138	1	1851	2373	2300AL	OH
	LIPA (5)	Holbrook	Holtsville GT	-0.32	S	2013	138	138	1	3124	3996	2-1750 AL	OH
	LIPA (5)	Holbrook	West Bus	0.20	S	2013	138	138	1	3124	3996	2-1750 AL	OH
	LIPA (5)	West Bus	Holtsville GT	0.12	S	2013	138	138	1	3124	3996	2-1750 AL	OH
	LIPA (5)	Sill Rd	Holtsville GT	-9.47	S	2013	138	138	1	3124	3996	2-1750 AL	OH
	LIPA (5)	Sill Rd	West Bus	9.35	S	2013	138	138	1	3124	3996	2-1750 AL	OH
	LIPA (5)	West Bus	Holtsville GT	0.12	S	2013	138	138	1	3124	3996	2-1750 AL	OH
	LIPA (5)	Pilgrim	Holtsville GT	-11.86	S	2013	138	138	1	2087	2565	2493 ACAR	OH
	LIPA (5)	Pilgrim	West Bus	11.74	S	2013	138	138	1	2087	2565	2493 ACAR	OH
	NYSEG	Watercure Road	Watercure Road	xfmr	S	2013	345/230	345/230	1	426 MVA	494 MVA	Transformer	
	O & R	New Hempstead	-	-	S	2013	138	138	1	32 MVAR	32 MVAR	Capacitor bank	-
	RGE	Station 124	Station 124	Phase Shifter	S	2013	115	115	2	230 MVA	230 MVA	Phase Shifter	
	RGE	Station 124	Station 124	SVC	S	2013	115	115	1	200 MVAR	200 MVAR	SVC	

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Queue Pos.	Transmission Owner	Terminals		Line Length miles (1)	Expected Service Date/Yr		Nominal Voltage in kV		# of ckts	Thermal Ratings *		Project Description / Conductor Size	Class Year / Type of Construction
					Prior to (2)	Year	Operating	Design		Summer	Winter		
	NYPA (8)	Moses	Willis	-37.11	W	2013	230	230	2	876	1121	795 ACSR	OH
	NYPA (8)	Moses	Willis	37.11	W	2013	230	230	1	876	1121	795 ACSR	OH
	NYPA (8)	Moses	Willis	37.11	W	2013	230	230	1	876	1121	795 ACSR	OH
	LIPA (7)	Riverhead	Wildwood	10.63	S	2014	138	138	1	1399	1709	1192ACSR	OH
	NYSEG	Klinekill Tap	Klinekill	<10	S	2014	115	115	1	>=124 MVA	>+150 MVA	477 ACSR	OH
	NGRID	Lockport	Mortimer	56.18	S	2014	115	115	1	TBD	TBD	115 kV line Replacement	-
	O & R	Little Tor	-	-	S	2014	138	138	1	32 MVARS	32 MVARS	Capacitor bank	-
	O & R	O&R's Line 26	Sterling Forest	xfmr	S	2014	138/69	138/69	1	175 MVA	175 MVA	Transformer	
	O & R	Burns	Nanuet	2.6	S	2014	69	69	1	1604	1723	795 ACSS	OH
	O & R	Burns	Corporate Drive	4	S	2014	138	138	1	1604	1723	795 ACSS	OH
	NYSEG	Coopers Corners 345 kV Sub	Coopers Corners 345 kV Sub	Shunt Reactor	W	2014	345	345	1	150 MVAR	150 MVAR	Shunt Reactor Installation	-
	O & R	Hartley	-	-	W	2014	69	69	1	32 MVAR	32 MVAR	Capacitor bank	-
	O & R	Summit (PJM)	-	-	W	2014	69	69	1	32 MVARS	32 MVARS	Capacitor bank	-
	LIPA	Riverhead	Canal	16.40	S	2015	138	138	1	846	973	2368 KCMIL (1200 mm²) Copper XLPE	UG
	NGRID	Spier	Rotterdam	32.70	S	2015	115	115	1	TBD	TBD	New/Separate Circuit w/Twin-795 ACSR south end	OH
	O & R	Tappan	-	-	S	2015	69	69	1	32 MVAR	32 MVAR	Capacitor bank	-
	CHGE (4)	Pleasant Valley	Todd Hill	5.60	W	2015	115	115	1	1280	1563	Rebuild line with 1033 ACSR	OH
	CHGE (4)	Todd Hill	Fishkill Plains	5.23	W	2015	115	115	1	1280	1563	Rebuild line with 1033 ACSR	OH
	NYSEG	Elbridge	State Street	14.50	W	2016	115	115	1	250 MVA	305 MVA	1033 ACSR	OH
	CHGE	Hurley Ave	Saugerties	11.11	S	2018	115	115	1	1114	1359	1-795 ACSR	OH
	CHGE	Saugerties	North Catskill	12.25	S	2018	115	115	1	1114	1359	1-795 ACSR	OH
	O & R	Sugarloaf	Shoemaker	7.00	W	2018	69	138	2	1062	1141	397 ACSS	OH
	CHGE (9)	St. Pool	High Falls	5.63	S	2020	115	115	1	1114	1359	1-795 ACSR	OH
	CHGE (9)	High Falls	Kerhonkson	10.03	S	2020	115	115	1	1114	1359	1-795 ACSR	OH
	CHGE (9)	Kerhonkson	Honk Falls	4.97	S	2020	115	115	2	1114	1359	1-795 ACSR	OH
	CHGE (9)	Modena	Galeville	4.62	S	2020	115	115	1	1114	1359	1-795 ACSR	OH
	CHGE (9)	Galeville	Kerhonkson	8.96	S	2020	115	115	1	1114	1359	1-795 ACSR	OH

(1) Line Length Miles - negative values indicate removal of Existing Circuit being tappe
(2) S = Summer Pe W = Winter Peak Period
(3) The Facility is partially in Service pending total
(4) Reconductoring of Existing Line
(5) Segmentation of Existing Circuit
(6) 115 kv operation as opposed to previous 46 kV operation
(7) Upgrade of existing 69 kV to 138 kV operation
(8) Project involves tower separation which results in the elimination of the double circuit tower contingency
(9) Upgrade of existing 69 kV to 115 kV operation
(10) The Large Generating Facility will not deliver in excess of 500 MW to the Point of Interconnection at any time.
(11) This reconfiguration is associated with the Linden VFT project that was Queue Position 125 and is the responsibility of the Developer, Linden VFT, LLC and not Con Edison.
* Thermal Ratings in Amperes, except where labeled otherwise.

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3.5. Resource Retirements

Table 3-5 below presents the existing and proposed unit retirements which were represented in the 2012 RNA Base Case. The MW values represent the lesser of CRIS and DMNC values.

Table 3-5: Retired and Proposed Units Retirements

	2012		
Unit	**Retired Units**	**Proposed Retirements**	
Barret 07	0		
Beebee GT	15		
Binghamton Cogen	41		
Ravenswood GT 3-4	32		
Astoria 2*	177		
Astoria 4*		376	
Gowanus 1*		134	
Gowanus 4*		134	
Far Rockaway ST 04*		107	
Glenwood ST 04*		115	
Glenwood ST 05*		109	
Astoria GT 10*		18	
Astoria GT 11*		16	
Dunkirk 1*		75	
Dunkirk 2*		75	
Dunkirk 3*		185	
Dunkirk 4*		185	
Total MW	**265**	**1527**	**1792**

* Units have provided notice of mothballing.

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3.6. Base Case Peak Load and Resource Margins

The announced unit retirements as of April 15, 2012 along with the new resource additions that met the base case inclusion rules, when combined with the existing generation in the 2012 Gold Book, resulted in the 2012 RNA Base Case Peak Load and Resource Margins found in Table 3-6 below.

Table 3-6: NYCA Peak Load and Resource Margins 2013 through 2022

	Year	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
Peak Load (MW)											
	NYCA*	33,696	33,914	34,151	34,345	34,550	34,868	35,204	35,526	35,913	36,230
	Zone J*	11,680	11,830	11,985	12,095	12,200	12,400	12,570	12,725	12,920	13,050
	Zone K*	5,643	5,667	5,710	5,723	5,756	5,797	5,843	5,900	5,965	6,038
Resources (MW)											
NYCA	Capacity**	40,240	40,196	40,196	40,196	40,196	40,196	40,196	40,196	40,196	40,196
	SCR	2,165	2,165	2,165	2,165	2,165	2,165	2,165	2,165	2,165	2,165
	Total	**42,405**	**42,361**	**42,361**	**42,361**	**42,361**	**42,361**	**42,361**	**42,361**	**42,361**	**42,361**
	Res./Load Ratio	125.8%	124.9%	124.0%	123.3%	122.6%	121.5%	120.3%	119.2%	118.0%	116.9%
Zone J	Capacity**	9,269	9,269	9,269	9,269	9,269	9,269	9,269	9,269	9,269	9,269
	SCR	540	540	540	540	540	540	540	540	540	540
	Total	**9,809**	**9,809**	**9,809**	**9,809**	**9,809**	**9,809**	**9,809**	**9,809**	**9,809**	**9,809**
	Res./Load Ratio	84.0%	82.9%	81.8%	81.1%	80.4%	79.1%	78.0%	77.1%	75.9%	75.2%
Zone K	Capacity**	5,208	5,208	5,208	5,208	5,208	5,208	5,208	5,208	5,208	5,208
	SCR	158	158	158	158	158	158	158	158	158	158
	Total	**5,366**	**5,366**	**5,366**	**5,366**	**5,366**	**5,366**	**5,366**	**5,366**	**5,366**	**5,366**
	Res./Load Ratio	95.1%	94.7%	94.0%	93.8%	93.2%	92.6%	91.8%	91.0%	90.0%	88.9%

* NYCA load values represent Baseline Coincident Summer Peak Demand. Zones J & K load values represent Summer Non-Coincident Peak Demand.

** NYCA Capacity values include resources electrically internal to NY, Additions, Reratings, Retirements, and Net Purchases and Sales. Zones J and K Capacity values do not include Net Purchases and Sales. Capacity values include the lesser of CRIS and DMNC values

Table 3-7 below presents the comparison between the 2010 RNA and 2012 RNA in NYCA Peak Load forecast, SCRs, capacity and retirements. For Year 2020, the 2012 RNA Peak Load forecast increased by 192 MW, while the overall NYCA capacity and SCRs decreased by 1,043 MW and 86 MW respectively.

Table 3-7: 2010 RNA to 2012 RNA Load and Capacity Comparison

	2010 RNA Horizon Year 2020	2012 RNA Year 2020	Year 2020 Delta MW	2012 RNA Horizon Year 2022
Load	35,334	35,526	192	36,230
SCR	2,251	2,165	-86	2,165
Capacity without SCRs	41,239	40,196	-1,043	40,196

3.7. Methodology for the Determination of Needs

Reliability Needs are defined by the OATT in terms of total deficiencies relative to Reliability Criteria determined from the assessments of the BPTFs performed for this RNA. There are two different steps to analyzing the reliability of the BPTFs. The first is to evaluate the security of the transmission system; the second is to evaluate the adequacy of the system, subject to the security constraints. The NYISO's planning procedures include both security and adequacy assessments. The transmission adequacy and the resource adequacy assessments are performed together.

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. Compliance with security criteria is assessed deterministically. Security is a deterministic concept, with potential disturbances being treated with equal likelihood in the assessment. These disturbances (single contingency and multiple contingencies) are explicitly defined in the reliability rules as design criteria contingencies. The impacts when applying these design criteria contingencies are assessed to ensure no thermal loading, voltage or stability violations would arise. These design criteria contingencies are sometimes referred to as N-1 or N-1-1. In addition, the NYISO performs a short circuit analysis to determine that the system can clear faulted facilities reliably under short circuit conditions. The NYISO "Guideline for Fault Current Assessment" is used in this study.

Resource adequacy is the ability of the electric systems to supply and deliver the total quantity of electricity demanded at any given time taking into account scheduled and unscheduled outages of system elements. Resource adequacy considers the transmission systems, generation resources, and other capacity resources, such as demand response. Resource adequacy assessments are performed on a probabilistic basis to capture the randomness of system element outages. A system is adequate if the probability of having sufficient transmission and generation to meet expected demand is equal to or less than the system's standard, which is expressed as a Loss of Load Expectation (LOLE). The New York State bulk power system is planned to meet a LOLE that, at any given point in time, is less than or equal to an involuntary load disconnection that is not more frequent than once in every 10 years, or 0.1 events per year[4]. This requirement forms the basis of New York's ICAP requirement.

If Reliability Needs are identified, the amount of compensatory MW required for the New York Control Area (NYCA), in appropriate locations to resolve the need (by load zone), are reported. Compensatory MW amounts are determined by adding generic 250 MW generating units to zones to address the zone-specific needs. The compensatory MW amounts and locations are based on a review of binding transmission constraints and zonal LOLE in an iterative process to determine when Reliability Criteria are satisfied. These additions are used to estimate the amount of resources generally needed to satisfy Reliability Needs. The compensatory MW additions are not intended to represent specific proposed

[4] RNA Study results are rounded to two decimal places. A result of exactly 0.01, for example, would correspond to one event in one hundred years.

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solutions. Resource needs could potentially be met by other combinations of resources in other areas including generation, transmission and demand response measures. Due to the differing natures of supply and demand-side resources and transmission constraints, the amounts and locations of resources necessary to match the level of compensatory MW needs identified will vary. Resource needs could be met in part by transmission system reconfigurations that increase transfer limits, or by changes in operating protocols. Operating protocols could include such actions as using dynamic ratings for certain facilities, operating exceptions, or special protection systems.

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4. Reliability Needs Assessment

4.1. Overview

Reliability is defined and measured through the use of the concepts of security and adequacy. Security is assessed through a power flow analysis that checks for Transmission Security criteria violations. Transmission Adequacy and Resource Adequacy are assessed with the use of General Electric's Multi Area Reliability Simulation (MARS) software package. This is done through the application of interface transfer limits and a probabilistic simulation of the outages of capacity and transmission resources.

4.2. Reliability Needs for Base Case

Below are the principal findings of the 2012 RNA for the 2013-2022 Study Period including: transmission security assessment; short circuit assessment; resource and transmission adequacy; system stability assessments; and scenario analyses.

4.2.1. Transmission Security Assessment

(this section of the report will appear in the next draft)

4.2.2. Short Circuit Assessment

Performance of a transmission security assessment includes the calculation of short circuit current to ascertain whether the circuit breakers in the system would be subject to fault levels in excess of their rated interrupting capability. The analysis was performed for the year 2017 reflecting the study conditions outlined in Sections 3.4, 3.5 and 3.6. The calculated fault levels would be constant over the second five years because no new generation or transmission is modeled in the RNA for second five years, and the methodology for fault duty calculation is not sensitive to load growth. The detailed results are presented in Appendix D of this report.

Based on the study results, there are three stations owned by National Grid which could experience over-duty breakers. Table 4-1 summarizes over-duty breakers at each station. National Grid reports that plans to make the necessary facility upgrades are in place. For Scriba 345 kV, breaker replacements will be completed by the end of 2012. For Porter 115 kV, breaker replacements will be completed in 2015. For Porter 230 kV, the breaker replacements will be completed in 2016.

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Table 4-1: 2012 RNA Over-duty Breaker Summary Table

Station	kV	Number of Over-duty Breaker(s)	Breaker ID
Scriba	345	8	R90,R100,R200,R210,R250,R915,R935,R945
Porter	230	9	R110,R120,R15,R170,R25,R320,R825,R835,R845
Porter	115	10	R10,R130,R20,R30,R40,R50,R60,R70,R80, R90

4.2.3 Transmission and Resource Adequacy Assessment

(this section of the report will appear in future draft)

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4.4.4 System Stability Assessment

The 2010 NYISO Comprehensive Area Transmission Review (CATR), which was completed in June 2011, is the most recent CATR. An Interim Review was performed in 2011 and will be performed in 2012. The 2010 CATR was performed for the study year 2015 and included the required RNA stability assessments. The CATR found that the planned New York State BPTFs are in conformance with the applicable North American Electric Reliability Corporation (NERC) Reliability Standards, NPCC Transmission Design Criteria and NYSRC Reliability Rules.

The stability analyses were conducted to evaluate the stability performance of the New York State BPTF as required in the NPCC and the NYSRC reliability criteria and rules. The BPTF, as defined in this review, includes all of the facilities designated by the NYISO to be part of the bulk power system as defined by the NPCC; additional non-BPS facilities are also included in the BPTF The stability simulations show no stability issues for summer peak load or light load conditions.

4.2.3. Reliability Needs Summary

(this section of the report will appear in future draft)

4.3. Scenarios

Scenarios are variations on the RNA Base Case to assess the impact of possible changes in key study assumptions which, if they occurred, could change whether there could be Reliability Criteria violations on the NYCA system during the study period. The following scenarios were evaluated as part of the RNA:

(this section of the report will appear in future draft)

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5. Impacts of Environmental Program Initiatives

5.1. Environmental Regulations

(these sections to appear in future draft of report)

6. Observations and Recommendations

7. Historic Congestion

Appendix A of Attachment Y of the NYISO OATT states: "As part of its Comprehensive System Planning Process, the NYISO will prepare summaries and detailed analysis of historic congestion across the New York Transmission System. This will include analysis to identify the significant causes of historic congestion in an effort to help Market Participants and other stakeholders distinguish persistent and addressable congestion from congestion that results from onetime events or transient adjustments in operating procedures that may or may not recur. This information will assist Market Participants and other stakeholders to make appropriately informed decisions." The detailed analysis of historic congestion can be found on the NYISO Web site.[5]

Appendices A-E

[5] http://www.nyiso.com/public/markets_operations/services/planning/documents/index.jspdocs=nyiso-historic-congestion-costs/congested-elements-reports

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Appendix A - Reliability Needs Assessment Glossary

Term	Definition
10-year Study Period:	10-year period starting with the year after the study is dated and projecting forward 10 years. For example, the 2012 RNA covers the 10-year Study Period of 2013 through 2022.
Adequacy:	Encompassing both generation and transmission, adequacy refers to the ability of the bulk power system to supply the aggregate requirements of consumers at all times, accounting for scheduled and unscheduled outages of system components.
Alternative Regulated Responses:	Regulated solutions submitted by a TO or other developer in response to a solicitation by the NYISO, if the NYISO determines that it has not received adequate market-based solutions to satisfy the Reliability Need.
Annual Transmission Reliability Assessment (ATRA):	An assessment, conducted by the NYISO staff in cooperation with Market Participants, to determine the System Upgrade Facilities required for each generation and merchant transmission project included in the Assessment to interconnect to the New York State Transmission System in compliance with Applicable Reliability Requirements and the NYISO Minimum Interconnection Standard.
Annual Transmission Review (ATR):	The NYISO, in its role as Planning Coordinator, is responsible for providing an annual report to the NPCC Compliance Committee in regard to its Area Transmission Review in accordance with the NPCC Reliability Compliance and Enforcement Program and in conformance with the NPCC Design and Operation of the Bulk Power System (Directory #1).
Best Available Retrofit Technology (BART):	NYS DEC regulation, required for compliance with the federal Clean Air Act, applying to fossil fueled electric generating units built between August 7, 1962 and August 7, 1977. Emissions control of SO_2, NOx and PM may be necessary for compliance. Compliance deadline is January 2014.
Best Technology Available (BTA):	Proposed NYS DEC policy establishing performance goals for new and existing electricity generating plants for Cooling Water Intake Structures. The policy would apply to plants with design intake capacity greater than 20 million gallons/day and prescribes reductions in fish mortality. The performance goals call for the use of wet, closed-cycle cooling systems at existing generating plants.

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Term	Definition
Bulk Power Transmission Facility (BPTF):	Transmission facilities that are system elements of the bulk power system which is the interconnected electrical system within northeastern North America comprised of system elements on which faults or disturbances can have a significant adverse impact outside of the local area.
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.
Capacity:	The capability to generate or transmit electrical power, or the ability to reduce demand at the direction of the NYISO.
Capacity Resource Integration Service (CRIS):	CRIS is the service provided by NYISO to interconnect the Developer's Large Generating Facility or Merchant Transmission Facility to the New York State Transmission System in accordance with the NYISO Deliverability Interconnection Standard, to enable the New York State Transmission System to deliver electric capacity from the Large Generating Facility or Merchant Transmission Facility, pursuant to the terms of the NYISO OATT.
Class Year:	The group of generation and merchant transmission projects included in any particular Annual Transmission Reliability Assessment [ATRA], in accordance with the criteria specified for including such projects in the assessment.
Clean Air Interstate Rule (CAIR):	Rule proposed by the U.S. EPA to reduce Interstate Transport of Fine Particulate Matter (PM) and Ozone. CAIR provides a federal framework to limit the emission of SO_2 and CO_2.
Comprehensive Reliability Planning Process (CRPP):	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 CRPP consists of two studies: the RNA, which identifies potential problems, and the CRP, which evaluates specific solutions to those problems.
Comprehensive Reliability Plan (CRP):	An annual 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 (RNA). The CRP 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 (CRPP).

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Term	Definition
Comprehensive System Planning Process (CSPP):	A transmission system planning process that is comprised of three components: 1) Local transmission planning; 2) Compilation of local plans into the Comprehensive Reliability Planning Process (CRPP), which includes developing a Comprehensive Reliability Plan (CRP); 3) Channeling the CRP data into the Congestion Assessment and Resource Integration Study (CARIS)
Congestion Assessment and Resource Integration Study (CARIS):	The third component of the Comprehensive System Planning Process (CSPP). The CARIS is based on the Comprehensive Reliability Plan (CRP).
Congestion:	Congestion on the transmission system results from physical limits on how much power transmission equipment can carry without exceeding thermal, voltage and/or stability limits determined to maintain system reliability. If a lower cost generator cannot transmit its available power to a customer because of a physical transmission constraint, the cost of dispatching a more expensive generator is the congestion cost.
Contingencies:	Contingencies are electrical system events (including disturbances and equipment failures) that are likely to happen.
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% of energy transactions occur in the DAM.
Dependable Maximum Net Capability (DMNC):	The sustained maximum net output of a generator, as demonstrated by the performance of a test or through actual operation, averaged over a continuous time period as defined in the ISO Procedures. The DMNC test determines the amount of Installed Capacity used to calculate the Unforced Capacity that the Resource is permitted to supply to the NYCA.
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 TOs in North America. In July 2006, the FERC certified the North American Electric Reliability Corporation (NERC) as America’s ERO.

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Term	Definition
Electric System Planning Work Group (ESPWG):	A NYISO governance working group for Market Participants designated to fulfill the planning functions assigned to it. The ESPWG is a working group that provides a forum for stakeholders and Market Participants to provide input into the NYISO's Comprehensive System Planning Process (CSPP), the NYISO's response to FERC reliability-related Orders and other directives, other system planning activities, policies regarding cost allocation and recovery for regulated reliability and/or economic projects, and related matters.
Energy Efficiency Portfolio Standard (EEPS):	A statewide program ordered by the NYSPSC in response to the Governor's call to reduce New Yorkers' electricity usage by 15% of 2007 forecast levels by the year 2015, with comparable results in natural gas conservation.
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.
FERC 715:	Annual report that is required by transmitting utilities operating grid facilities that are rated at or above 100 kilovolts. The report consists of transmission systems maps, a detailed description of transmission planning Reliability Criteria, detailed descriptions of transmission planning assessment practices, and detailed evaluation of anticipated system performance as measured against Reliability Criteria.
Five Year Base Case:	The model representing the New York State power system over the first five years of the Study Period.
Forced Outage:	An unanticipated loss of capacity, due to the breakdown of a power plant or transmission line. It can also mean the intentional shutdown of a generating unit or transmission line for emergency reasons.
Gap Solution:	A solution to a Reliability Need that is designed to be temporary and to strive to be compatible with permanent market-based proposals. A permanent regulated solution, if appropriate, may proceed in parallel with a Gap Solution.
Gold Book:	Annual NYISO publication of its Load and Capacity Data Report.
Market Monitoring Unit:	A consulting or other professional services firm, or other similar entity,retained by the NYISO Board pursuant to Market Service Tariff Section 30.4, Attachment O - Market Monitoring Plan.

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Term	Definition
Installed Capacity (ICAP):	A generator or load facility that complies with the requirements in the Reliability Rules and is capable of supplying and/or reducing the demand for energy in the NYCA for the purpose of ensuring that sufficient energy and capacity are available to meet the Reliability Rules.
Installed Reserve Margin (IRM):	The amount of installed electric generation capacity above 100% of the forecasted peak electric consumption that is required to meet New York State Reliability Council (NYSRC) resource adequacy criteria. Most studies in recent years have indicated a need for a 15-20% reserve margin for adequate reliability in New York.
Interconnection Queue:	A queue of transmission and generation projects (greater than 20 MW) 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 Pocket:	Areas that have a limited ability to import generation resources from outside their areas in order to meet reliability requirements.
Local Transmission Plan (LTP):	The Local Transmission Owner Plan resulting from the LTPP.
Local Transmission Owner Planning Process (LTPP):	The first step in the Comprehensive System Planning Process (CSPP), under which transmission owners in New York's electricity markets participate in local transmission planning for its own Transmission District.
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 (lower portion), H and I. Greene, Ulster, Orange, Dutchess, Putnam, Rockland and Westchester counties are located in those Load Zones.

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Term	Definition
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 RNA. Those solutions can include generation, transmission and Demand Response Programs.
Market Participant:	An entity, excluding the NYISO, that produces, transmits sells, and/or purchases for resale capacity, energy and ancillary services in the wholesale market. Market Participants include: customers under the NYISO's tariffs, power exchanges, TOs, primary holders, load serving entities, generating companies and other suppliers, and entities buying or selling transmission congestion contracts.
Mercury and Air Toxics Standards (MATS):	In December, 2011 USEPA announced the final rule (previously known as the MACT rule). The rule applies to oil and coal fired generators and establish limits for HAPs, acid gases, Mercury (Hg), and Particulate Matter (PM). Compliance is required on March 2015.
National Ambient Air Quality Standards (NAAQS):	Limits, set by the EPA, on pollutants considered harmful to public health and the environment.
New York Control Area (NYCA):	The area under the electrical control of the NYISO. It includes the entire state of New York, and is divided into 11 zones.
New York State Department of Environmental Conservation (NYSDEC):	The agency that implements New York State environmental conservation law, with some programs also governed by federal law.
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 11,016-mile network of high voltage lines that carry electricity throughout the state. The NYISO also oversees the state's wholesale electricity markets. 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 State Department of Public Service (DPS):	The New York State Department of Public Service, as defined in the New York Public Service Law, which serves as the staff for the New York State Public Service Commission.
New York State Public Service Commission (NYSPSC):	The New York State Public Service Commission, as defined in the New York Public Service Law.

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Term	Definition
New York State Energy Research and Development Authority (NYSERDA):	A corporation created under the New York State Public Authorities law and funded by the System Benefits Charge (SBC). Among other responsibilities, NYSERDA is charged with conducting a multifaceted energy and environmental research and development program to meet New York State's diverse economic needs.
New York State Reliability Council (NYSRC)	A not-for-profit entity that develops, maintains, and, from time-to-time, updates the Reliability Rules which shall be complied with by the New York Independent System Operator ("NYISO") and all entities engaging in electric transmission, ancillary services, energy and power transactions on the New York State Power System.
North American Electric Reliability Corporation (NERC):	A not-for-profit organization that develops and enforces reliability standards; assesses reliability annually via 10-year and seasonal forecasts; monitors the bulk power system; and educates, trains, and certifies industry personnel. NERC is subject to oversight by the FERC and governmental authorities in Canada.
Northeast Power Coordinating Council (NPCC):	A not-for-profit corporation responsible for promoting and improving the reliability of the international, interconnected bulk power system in Northeastern North America.
Open Access Transmission Tariff (OATT):	Document of Rates, Terms and Conditions, regulated by the FERC, under which the NYISO provides transmission service. The OATT is a dynamic document to which revisions are made on a collaborative basis by the NYISO, New York's Electricity Market Stakeholders, and the FERC.
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 more effective 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 – to 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.

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Term	Definition
Reasonably Available Control Technology for Oxides of Nitrogen (NOx RACT):	Revised regulations recently promulgated by NYSDEC for the control of emissions of nitrogen oxides (NOx) from fossil fueled power plants. The regulations establish presumptive emission limits for each type of fossil fueled generator and fuel used as an electric generator in NY. The NOx RACT limits are part of the State Implementation Plan for achieving compliance with the National Ambient Air Quality Standard (NAAQS) for ozone.
Reactive Power Resources:	Facilities such as generators, high voltage transmission lines, synchronous condensers, capacitor banks, and static VAr compensators that provide reactive power. Reactive power is the portion of electric power that establishes and sustains the electric and magnetic fields of alternating-current equipment. Reactive power is usually expressed as kilovolt-amperes reactive (kVAr) or megavolt-ampere reactive (MVAr).
Regional Greenhouse Gas Initiative (RGGI):	A cooperative effort by nine Northeast and Mid-Atlantic states (not including New Jersey) to limit greenhouse gas emissions using a market-based cap-and-trade approach.
Regulated Backstop Solutions:	Proposals required of certain TOs to meet Reliability Needs as outlined in the RNA. 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 Criteria:	The electric power system planning and operating policies, standards, criteria, guidelines, procedures, and rules promulgated by the North American Electric Reliability Corporation (NERC), Northeast Power Coordinating Council (NPCC), and the New York State Reliability Council (NYSRC), as they may be amended from time to time.
Reliability Need:	A condition identified by the NYISO in the RNA as a violation or potential violation of Reliability Criteria.
Reliability Needs Assessment (RNA):	A bi-annual 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 CSPP.
Renewable Portfolio Standard (RPS):	Proceeding commenced by order of the NYSPSC in 2004 which established goal to increase renewable energy used in New York State to 25% (or approximately 3,700 MW) by 2013.

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Term	Definition
Responsible Transmission Owner (Responsible TO):	The Transmission Owner(s) or TOs designated by the NYISO, pursuant to the NYISO CSPP, to prepare a proposal for a regulated solution to a Reliability Need or to proceed with a regulated solution to a Reliability Need. The Responsible TO will normally be the Transmission Owner in whose Transmission District the NYISO identifies a Reliability Need.
Security:	The ability of the power system to withstand the loss of one or more elements without involuntarily disconnecting firm load.
Southeastern New York (SENY):	The portion of the NYCA comprised of the transmission districts of Con Edison and LIPA (Zones H, I, J and K).
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 ICAP market. Companies that sign up as SCRs are paid in advance for agreeing to cut power upon NYISO request.
State Environmental Quality Review Act (SEQRA)	NYS law requiring the sponsoring or approving governmental body to identify and mitigate the significant environmental impacts of the activity/project it is proposing or permitting.
State Implementation Plan (SIP):	A plan, submitted by each State to the EPA, for meeting specific requirements of the Clean Air Act, including the requirement to attain and maintain the National Ambient Air Quality Standards (NAAQS).
Study Period:	The 10-year time period evaluated in the RNA.
System Reliability Impact Study ("SRIS")	A study, conducted in by the NYISO in accordance with Applicable Reliability Standards, to evaluate the impact of the proposed interconnection on the reliability of the New York State Transmission System.
System Benefits Charge (SBC):	An amount of money, charged to ratepayers on their electric bills, which is administered and allocated by NYSERDA towards energy-efficiency programs, research and development initiatives, low-income energy programs, and environmental disclosure activities.
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.
Transmission Owner (TO):	A public utility or authority that owns transmission facilities and provides Transmission Service under the Tariff

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Term	Definition
Transmission Planning Advisory Subcommittee (TPAS):	An identified group of Market Participants that advises the NYISO Operating Committee and provides support to the NYISO Staff in regard to transmission planning matters including transmission system reliability, expansion, and interconnection.
Unforced Capacity Delivery Rights (UDR):	Unforced capacity delivery rights are rights that may be granted to controllable lines to deliver generating capacity from locations outside the NYCA to localities within NYCA.
Upstate New York (UPNY):	The NYCA north of Con Edison's transmission district.
Weather Normalized:	Adjustments made to neutralize the impact of weather when making energy and peak demand forecasts. Using historical weather data, energy analysts can account for the influence of extreme weather conditions and adjust actual energy use and peak demand to estimate what would have happened if the hottest day or the coldest day had been the typical, or "normal," weather conditions. Normal is usually calculated by taking the average of the previous 30 years of weather data.
Zone:	One of the eleven regions in the NYCA connected to each other by identified transmission interfaces. Designated as Load Zones A-K.

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Appendix B - The Reliability Planning Process

This section presents an overview of the NYISO's reliability planning process followed by a summary of the 2005, 2007, 2008, 2009 and 2010 CRPs and their current status[6]. A detailed discussion of the reliability planning process, including applicable Reliability Criteria, is contained in NYISO Manual 26 entitled: "Comprehensive Reliability Planning Process Manual,"[7] which is posted on the NYISO's website.

The NYISO's reliability planning process, also known as Comprehensive Reliability Planning Process (CRPP) is an integral part of the NYISO's overall Comprehensive System Planning Process (CSPP). The CSPP planning process is comprised of Local Transmission Planning Process (LTPP), Comprehensive Reliability Planning Process (CRPP), and Congestion Assessment and Resource Integration Study (CARIS). Each CSPP cycle begins with the LTPP. As part of the LTPP, local Transmission Owners perform transmission studies for their BPTFs in their transmission are according to all applicable criteria. Links to the Transmission Owner's LTPs can be found on the NYISO's website [8]. The LTPP provides inputs for the NYISO's reliability planning process. During the CRPP process, the NYISO conducts the Reliability Needs Assessment (RNA) and Comprehensive Reliability Plan (CRP). The RNA evaluates the adequacy and security of the bulk power system over a 10-year Study Period. In identifying resource adequacy needs, the NYISO identifies the amount of resources in megawatts (known as "compensatory megawatts") and the locations in which they are needed to meet those needs. After the RNA is complete, the NYISO requests and evaluates first market-based solutions, then regulated backstop solutions and alternative regulated responses that address the identified Reliability Needs. This step results in the development of the NYISO's Comprehensive Reliability Plan (CRP) for the 10-year Study Period. The CRPP provides inputs for the NYISO's economic planning process known as CARIS. CARIS Phase 1 examines congestion on the New York bulk power system and the costs and benefits of alternatives to alleviate that congestion. During CARIS Phase 2, the NYISO will evaluate specific transmission project proposals for regulated cost recovery.

The NYISO's reliability planning process is a long-range assessment of both resource adequacy and transmission reliability of the New York bulk power system conducted

6 The first CRP was entitled the "2005 Comprehensive Reliability Plan," while the second CRP, released the following year, was entitled the "2007 Comprehensive Reliability Plan." A year was skipped in the naming convention because the title of the first CRP, which covered the Study Period 2006-2015, designated the year the study assumptions were derived, or 2005, but for the second CRP a different year designation convention was adopted, which identified the first year of the Study Period. The latter naming convention continues to be applied to the 2008, 2009 and 2010 CRP documents. However, the original naming convention is used for the 2012 CRP and subsequent CRP documents.

7 http://www.nyiso.com/public/webdocs/documents/manuals/planning/CRPPManual120707.pdf.

8 http://www.nyiso.com/public/markets_operations/services/planning/process/ltpp/index.jsp

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over five-year and 10-year planning horizons. There are two different aspects to analyzing the bulk power system's reliability in the RNA: adequacy and security. Adequacy is a planning and probabilistic concept. A system is adequate if the probability of having sufficient transmission and generation to meet expected demand is equal to or less than the system's standard, which is expressed as a loss of load expectation (LOLE). The New York State bulk power system is planned to meet an LOLE that, at any given point in time, is less than or equal to an involuntary load disconnection that is not more frequent than once in every 10 years, or 0.1 days per year. This requirement forms the basis of New York's installed capacity (ICAP), or resource adequacy requirement.

Security is an operating and deterministic concept. This means that possible events are identified as having significant adverse reliability consequences, and the system is planned and operated so that the system can continue to serve load even if these events occur. Security requirements are sometimes referred to as N-1 or N-1-1. N is the number of system components; an N-1 requirement means that the system can withstand single disturbance events (e.g., generator, bus section, transmission circuit, breaker failure, double-circuit tower) without violating thermal, voltage and stability limits or before affecting service to consumers. An N-1-1 requirement means that the Reliability Criteria apply after any critical element such as a generator, a transmission circuit, a transformer, series or shunt compensating device, or a high voltage direct current (HVDC) pole has already been lost. Generation and power flows can be adjusted by the use of 10-minute operating reserve, phase angle regulator control and HVDC control and a second single disturbance is analyzed.

The CRPP is anchored in the market-based philosophy of the NYISO and its Market Participants, which posits that market solutions should be the preferred choice to meet the identified Reliability Needs reported in the RNA. In the CRP, the reliability of the bulk power system is assessed and solutions to Reliability Needs evaluated in accordance with existing Reliability Criteria of the North American Electric Reliability Corporation (NERC), the Northeast Power Coordinating Council, Inc. (NPCC), and the New York State Reliability Council (NYSRC) as they may change from time to time. These criteria and a description of the nature of long-term bulk power system planning are described in detail in the applicable planning manual, and are briefly summarized below. In the event that market-based solutions do not materialize to meet a Reliability Need in a timely manner, the NYISO designates the Responsible TO or Responsible TOs to proceed with a regulated backstop solution in order to maintain system reliability. Market Participants can offer and promote alternative regulated responses which, if determined by NYISO to help satisfy the identified Reliability Needs and by regulators to be more desirable, may displace some or all of the Responsible TOs regulated backstop solutions[9]. Under the CRPP, the NYISO also has an affirmative obligation to report historic congestion across the transmission system. In addition, the draft RNA is provided to the Market Monitoring Unit for review and consideration of whether market rules changes are necessary to address an identified failure, if any, in one of the NYISO's competitive markets. If

[9] The procedures for reviewing alternative regulated solutions for a reliability need are currently being discussed in NYPSC Case 07-E-1507.

market failure is identified as the reason for the lack of market-based solutions, the NYISO will explore appropriate changes in its market rules with its stakeholders and Independent Market Advisor. The CRPP does not substitute for the planning that each TO conducts to maintain the reliability of its own bulk and non-bulk power systems.

The NYISO does not have the authority to license or construct projects to respond to identified Reliability Needs reported in the RNA. The ultimate approval of those projects lies with regulatory agencies such as the FERC, the NYS PSC, environmental permitting agencies, and local governments. The NYISO monitors the progress and continued viability of proposed market and regulated projects to meet identified needs, and reports its findings in annual plans. Figure B-1 below summarizes the CRPP and Figure B-2 summarizes the CARIS which collectively comprise the CSPP process.

The 2012 CRP will form the basis for the next cycle of the NYISO's economic planning process. That process will examine congestion on the New York bulk power system and the costs and benefits of alternatives to alleviate that congestion.

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NYISO Reliability Planning Process

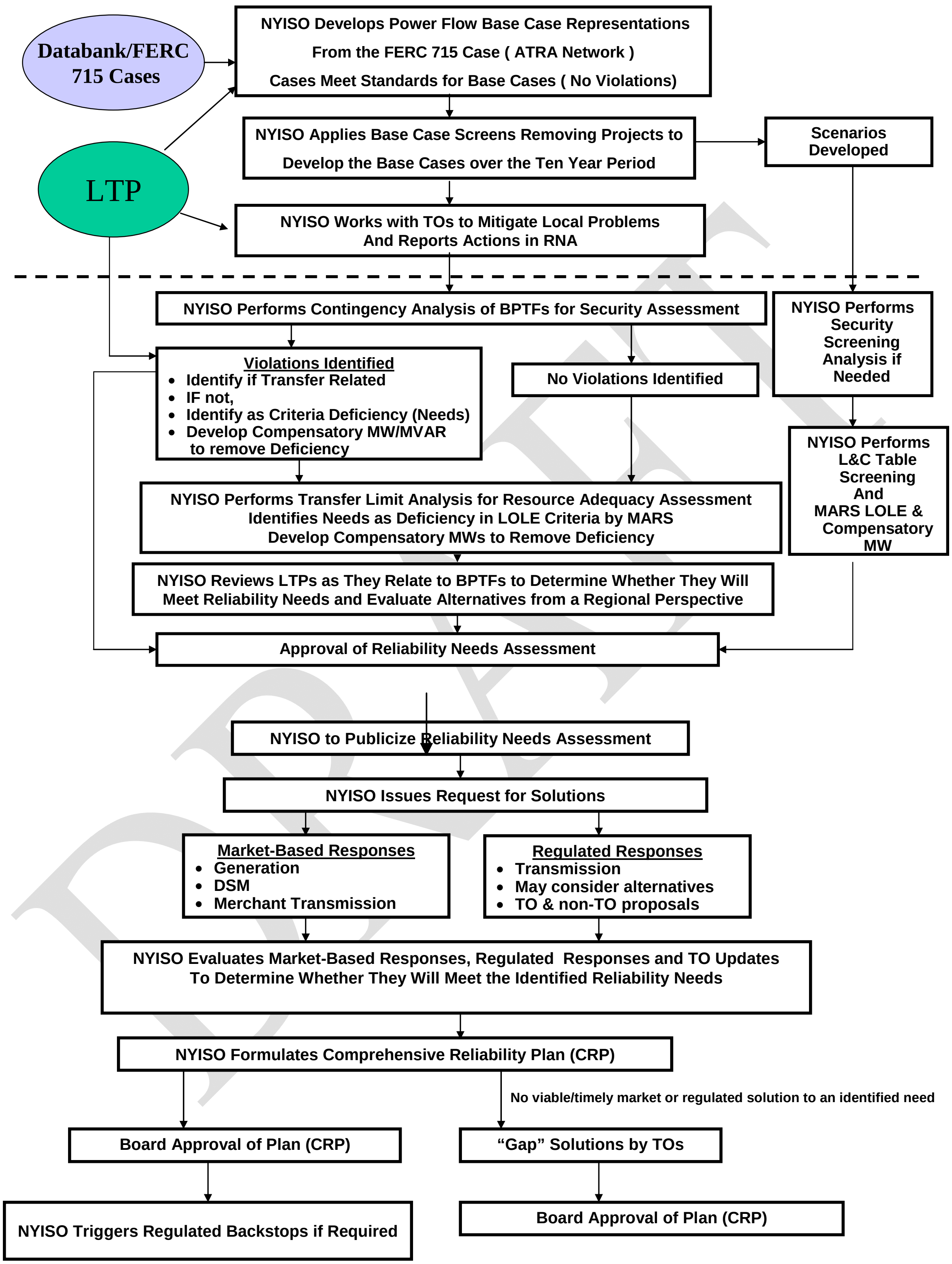

Figure B-1: NYISO Reliability Planning Process

NYISO Comprehensive System Planning Process (CSPP) Economic Planning Process (CARIS)

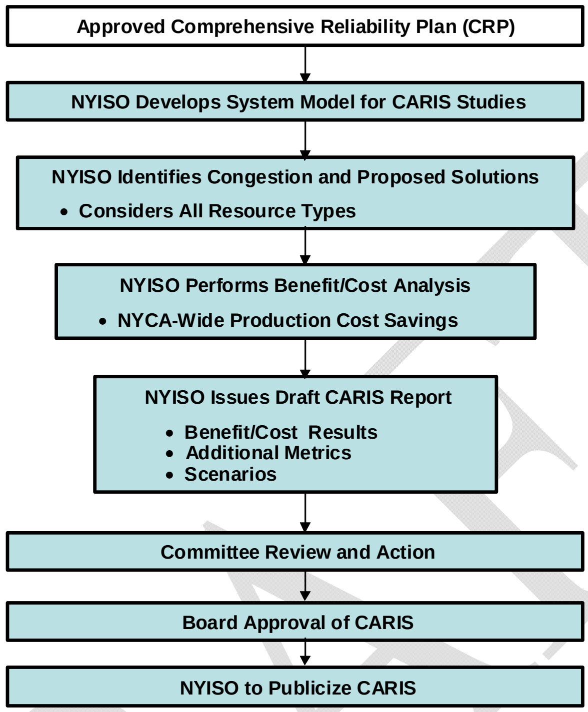

Figure B-2: Economic Planning Process

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Appendix C - Load and Energy Forecast 2013-2022

C-1. Summary

In order to perform the 2012 RNA, a forecast of summer and winter peak demands and annual energy requirements was produced for the years 2013 - 2022. The electricity forecast is based on projections of New York's economy performed by Moody's Analytics in January 2012. The forecast includes detailed projections of employment, output, income and other factors for twenty three regions in New York State. This appendix provides a summary of the electric energy and peak demand forecasts and the key economic input variables used to produce the forecasts. Table C-1 provides a summary of key economic and electric system growth rates from 2001 to 2022.

In June 2008, the Public Service Commission of New York issued its Order regarding the Energy Efficiency Portfolio Standard. This proceeding set forth a statewide goal of a cumulative energy reduction of about 26,900 GWh. The NYISO estimates the peak demand impacts to be about 5500 MW. This goal is expected to be achieved by contributions from a number of state agencies, power authorities and utilities, as well as from federal codes and building standards. The NYISO included fifty-six percent of the goal by the year 2022 in the 2012 RNA Base Case, including achievements obtained during the years 2009 through 2011.

Table C-1: Summary of Econometric & Electric System Growth Rates – Actual & Forecast

	Average Annual Growth			
Economic Indicators	2001-2006	2006-2011	2012-2017	2017-2022
Total Employment	0.44%	0.04%	1.82%	0.58%
Gross State Product	2.83%	0.85%	2.73%	2.25%
Population	0.18%	0.21%	0.30%	0.27%
Total Real Income	3.19%	0.10%	2.75%	1.91%
Weather Normalized Summer Peak	2.06%	0.02%	0.74%	0.95%
Weather Normalized Annual Energy	1.00%	0.00%	0.40%	0.77%

	Shares of Total Employment			
Employment Trends	2006	2011	2017	2022
Business, Services & Retail	53.6%	53.3%	53.3%	53.0%
Health, Education, Government	35.5%	37.4%	37.8%	38.3%
Manufacturing, Agriculture & Construction	10.9%	9.2%	9.0%	8.7%

C-2. Historic Overview

The New York Control Area (NYCA) is a summer peaking system and its summer peak has grown faster than annual energy and winter peak over this period. Both summer and winter peaks show considerable year-to-year variability due to the influence of peak-producing weather conditions for the seasonal peaks. Annual energy is influenced by weather conditions over an entire year, which is much less variable than peak-producing conditions.

Table C-2 shows the New York Control Area's (NYCA) historic seasonal peaks and annual energy growth since 2001. The table provides both actual results and weather-normalized results, together with annual average growth rates for each table entry. The growth rates are averaged over the period 2001 to 2011.

Table C-2: Historic Energy and Seasonal Peak Demand - Actual and Weather-Normalized

	Annual Energy - GWh		Summer Peak - MW		Winter Peak - MW		
Year	Actual	Weather Normalized	Actual	Weather Normalized	Years	Actual	Weather Normalized
2001	155,241	154,780	30,982	30,000	2001-02	22,798	NA
2002	158,508	156,613	30,664	30,302	2002-03	24,454	24,294
2003	158,012	158,030	30,333	30,576	2003-04	25,262	24,849
2004	160,211	160,772	28,433	31,401	2004-05	25,541	25,006
2005	167,208	164,139	32,075	33,068	2005-06	24,947	24,770
2006	162,238	162,703	33,939	32,992	2006-07	25,057	25,030
2007	167,341	166,047	32,169	33,444	2007-08	25,021	25,490
2008	165,612	166,471	32,432	33,670	2008-09	24,673	25,016
2009	158,780	161,234	30,844	33,063	2009-10	24,074	24,537
2010	163,505	161,570	33,452	32,458	2010-11	24,652	24,452
2011	163,330	162,672	33,865	33,019	2011-12	23,901	24,630
	0.51%	0.50%	0.89%	0.96%		0.47%	0.15%

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C-3. Forecast Overview

Table C-3 shows historic and forecast growth rates of annual energy for the different regions in New York. The Upstate region includes Zones A – I. The NYCA's two locality zones, Zones J (New York City) and K (Long Island), are shown individually.

Table C-3: Annual Energy and Summer Peak Demand - Actual & Forecast

	Annual Energy - GWh				Summer Coincident Peak - MW			
Year	Upstate Region	New York City	Long Island	NYCA	Upstate Region	New York City	Long Island	NYCA
2001	84,241	50,277	20,723	155,241	15,146	10,602	4,900	30,648
2002	85,608	51,356	21,544	158,508	15,271	10,321	5,072	30,664
2003	85,223	50,829	21,960	158,012	15,100	10,240	4,993	30,333
2004	85,935	52,073	22,203	160,211	14,271	9,742	4,420	28,433
2005	90,253	54,007	22,948	167,208	16,029	10,810	5,236	32,075
2006	86,957	53,096	22,185	162,238	17,054	11,300	5,585	33,939
2007	89,843	54,750	22,748	167,341	15,824	10,970	5,375	32,169
2008	88,316	54,835	22,461	165,612	16,222	10,979	5,231	32,432
2009	83,788	53,100	21,892	158,780	15,415	10,366	5,063	30,844
2010	85,469	55,114	22,922	163,505	16,407	11,213	5,832	33,452
2011	86,566	54,060	22,704	163,330	16,557	11,373	5,935	33,865
2012	86,991	53,663	23,005	163,659	16,355	11,500	5,440	33,295
2013	87,194	54,094	23,339	164,627	16,461	11,680	5,555	33,696
2014	87,167	54,753	23,420	165,340	16,505	11,830	5,579	33,914
2015	87,174	55,234	23,622	166,030	16,544	11,985	5,622	34,151
2016	87,385	55,756	23,774	166,915	16,616	12,095	5,634	34,345
2017	87,439	55,725	23,833	166,997	16,684	12,200	5,666	34,550
2018	87,676	56,306	24,039	168,021	16,762	12,400	5,706	34,868
2019	88,053	57,096	24,260	169,409	16,882	12,570	5,752	35,204
2020	88,483	58,086	24,607	171,176	16,993	12,725	5,808	35,526
2021	88,887	58,772	24,855	172,514	17,121	12,920	5,872	35,913
2022	89,234	59,118	25,217	173,569	17,236	13,050	5,944	36,230
2001-11	0.3%	0.7%	0.9%	0.5%	0.9%	0.7%	1.9%	1.0%
2012-22	0.3%	1.0%	0.9%	0.6%	0.5%	1.3%	0.9%	0.8%
2001-06	0.6%	1.1%	1.4%	0.9%	2.4%	1.3%	2.7%	2.1%
2006-11	-0.1%	0.4%	0.5%	0.1%	-0.6%	0.1%	1.2%	0.0%
2012-17	0.1%	0.8%	0.7%	0.4%	0.4%	1.2%	0.8%	0.7%
2017-22	0.4%	1.2%	1.1%	0.8%	0.7%	1.4%	1.0%	1.0%

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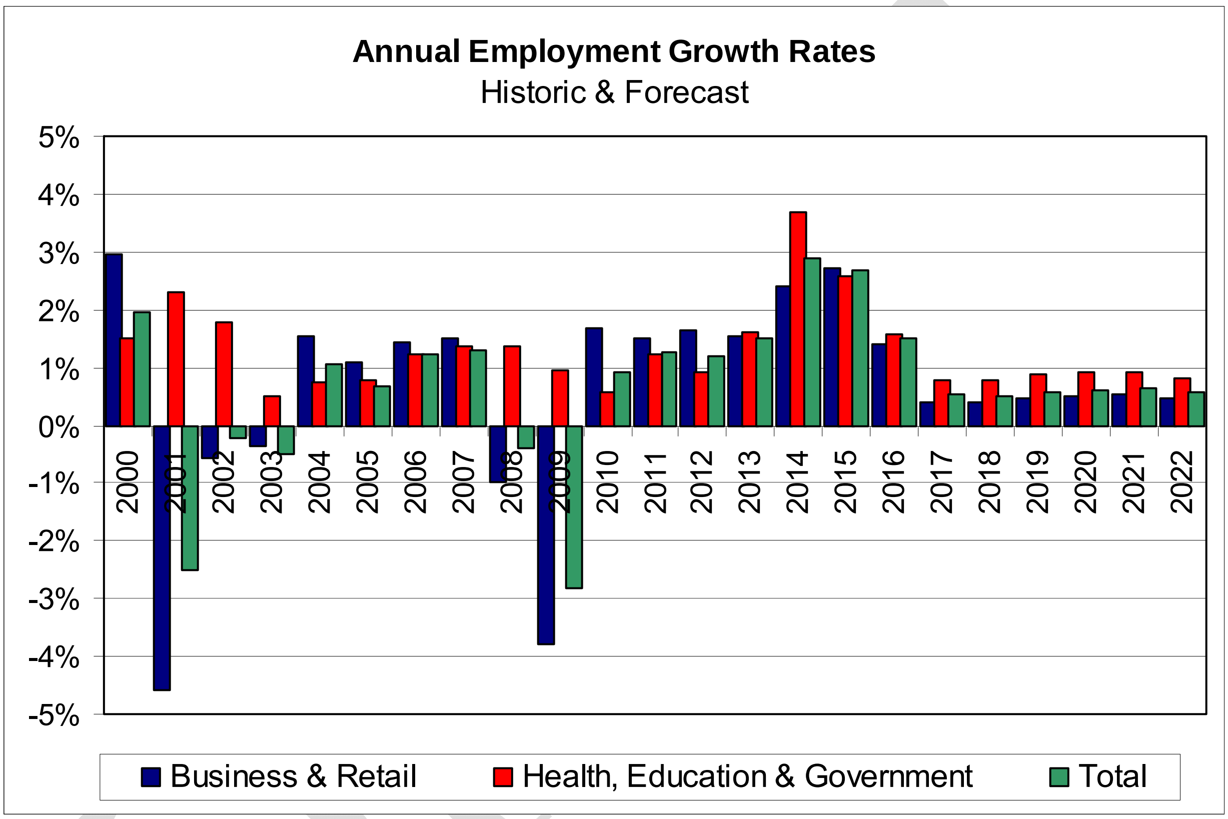
C-4. Trends Affecting Electricity in New York

C-4.1. *2012 Employment Forecast*

The 2012 employment forecast projects modest growth through 2013, higher growth through 2016, then reduced growth rates through 2022.

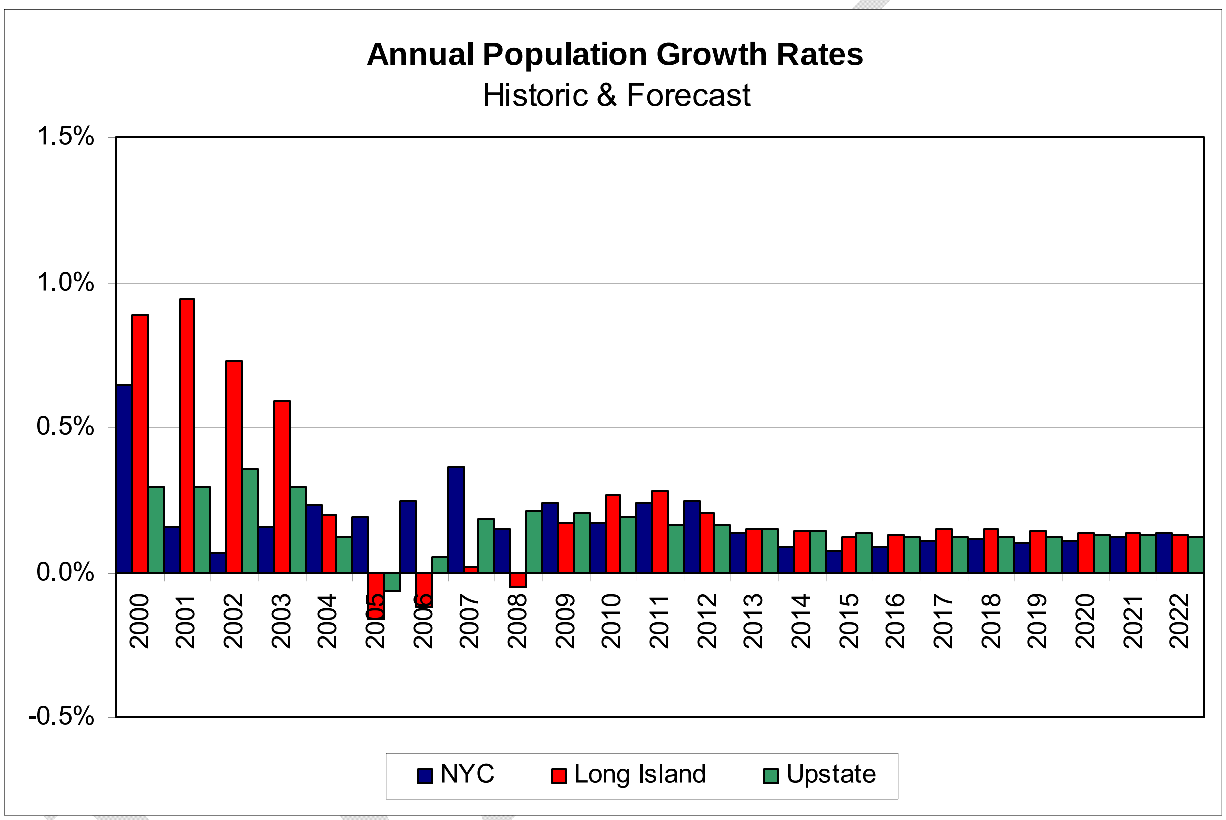
Figure C-1: Annual Employment Growth Rates



C-4.2. *2012 Population Forecast*

The 2012 population forecast projects slower population growth in every region of the state than during the period from 2000 to 2010. While all growth rates remain positive throughout the forecast horizon, population growth from 2013 onward is slower than in the period from 2009 to 2012.

Figure C-2: Annual Change in Population by Region

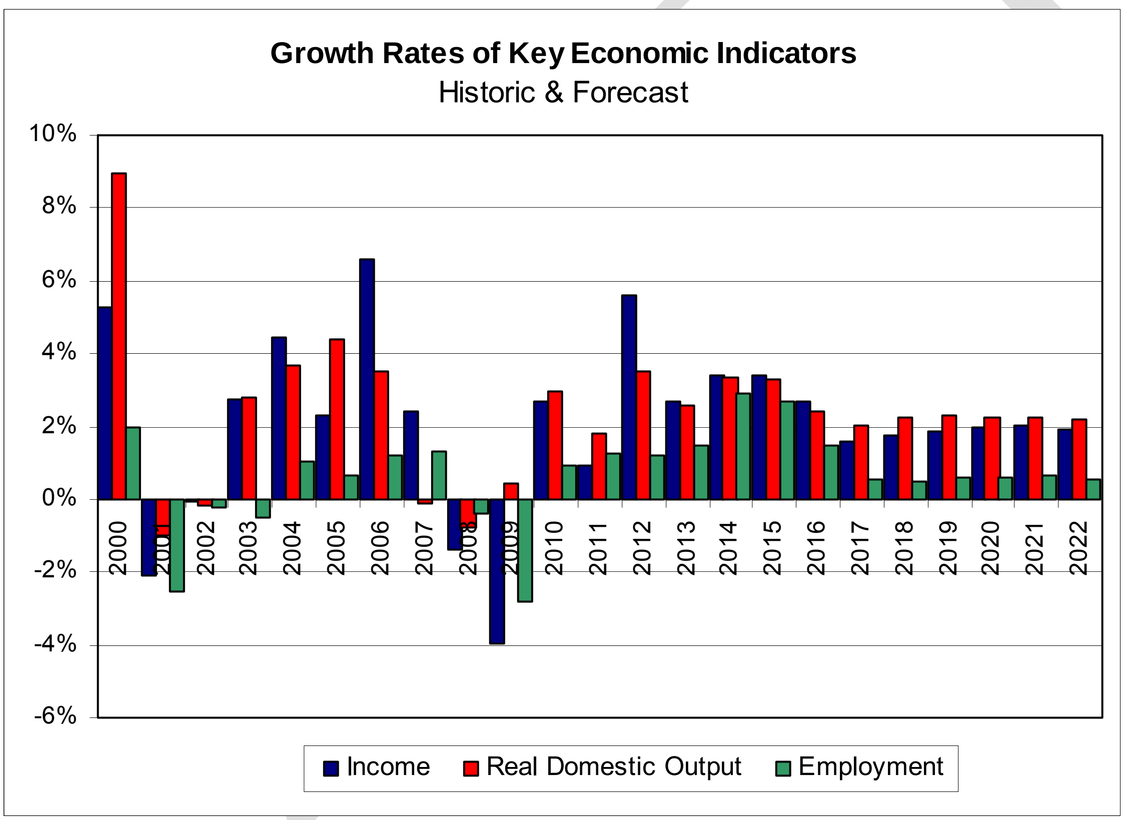


C-4.3. *2012 Forecasts of Real Output, Real Income, Employment*

Three key economic trends in the state are measured by real gross domestic output, total income, and employment. Real gross domestic output measures the prosperity of business, while real income and employment are indicative of the prosperity of households and wage-earners. The period from 2004 to 2007 showed significant growth in all these metrics. The recession caused them to decline substantially through 2009 and only begin to recover in 2010.

The 2012 forecast projects real economic output growth in the range of 2% through 2022. Real income growth has a similar pattern to output. Employment turns positive but is only growing at a rate of about 0.3%. All indices are characterized by faster growth in the near term followed by slower growth in the long term.

Figure C-3: Annual Growth Rates of Income, Real Domestic Output and Employment



C-4.4. Regional Economic Trends

Table C-4 provides a summary of historic and forecast growth rates of economic and demographic data for the state and for the Upstate and Downstate regions. Economic drivers for Long Island and New York City are somewhat higher than for the Upstate region, typical of forecast trends in prior Reliability Needs Assessments.

Table C-4: Regional Economic Growth Rates of Key Economic Indicators

New York State

	Average Annual Growth	
Economic Indicators	2001-2011	2012-2022
Total Employment	0.2%	1.2%
Gross Product	1.8%	2.5%
Population	0.2%	0.3%
Real Income	1.6%	2.3%

New York City

	Average Annual Growth	
Economic Indicators	2001-2011	2012-2022
Total Employment	0.3%	1.3%
Gross Product	1.8%	2.9%
Population	0.2%	0.3%
Real Income	1.8%	3.1%

Upstate Regions

	Average Annual Growth	
Economic Indicators	2001-2011	2012-2022
Total Employment	0.3%	1.1%
Gross Product	1.8%	1.8%
Population	0.2%	0.3%
Real Income	1.5%	1.2%

Long Island

	Average Annual Growth	
Economic Indicators	2001-2011	2012-2022
Total Employment	0.0%	1.1%
Gross Product	2.2%	2.5%
Population	0.2%	0.3%
Real Income	1.4%	2.8%

C-5. Forecast Methodology

The NYISO methodology for producing the long term forecasts for the Reliability Needs Assessment consists of the following steps.

Econometric forecasts were developed for zonal energy using monthly data from 2000 through 2011. For each zone, the NYISO estimated an ensemble of econometric models using population, households, economic output, employment, cooling degree days and heating degree days. Each member of the ensemble was evaluated and compared to historic data. The zonal model chosen for the forecast was the one which best represented recent history and the regional growth for that zone. The NYISO also received and evaluated forecasts from Con Edison and LIPA, which were used in combination with the forecasts we developed for Zones H, I, J and K.

The summer & winter non-coincident and coincident peak forecasts for Zones H, I, J and K were derived from the forecasts submitted to the NYISO by Con Edison and LIPA. For the remaining zones, the NYISO derived the summer and winter coincident peak demands from the zonal energy forecasts by using average zonal weather-normalized load factors from 2000 through 2011. The 2012 summer peak forecast was matched to coincide with the 2012 ICAP forecast.

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C-5.1. Energy Conservation

The Energy Efficiency Portfolio Standard (EEPS) is an initiative of the Governor of New York and implemented by the state's Public Service Commission. The goal of the initiative is to reduce electric energy usage by 15 percent from forecasted energy usage levels in the year 2015 (the 15x15 initiative), which translates into a goal of 26,880 GWh by 2015.

The NYS PSC directed a series of working groups composed of all interested parties to the proceeding to obtain information needed to further elaborate the goal. The NYS PSC issued an Order in June 2008, directing NYSERDA and the state's investor owned utilities to develop conservation plans in accordance with the EEPS goal. The NYS PSC also identified goals that it expected would be implemented by LIPA and NYPA.

The NYISO has been a party to the EEPS proceeding from its inception. As part of the development of the 2012 RNA forecast, the NYISO developed an adjustment to the 2012 econometric model that incorporated a portion of the EEPS goal. This was based upon discussion with market participants in the Electric System Planning Working Group. The NYISO considered the following factors in developing the 2012 RNA Base Case:

- NYS PSC-approved spending levels for the programs under its jurisdiction, including the Systems Benefit Charge and utility-specific programs
- Expectation of the fulfillment of the investor-owned EEPS program goals by 2018, and continued spending for NYSERDA programs through 2022
- Expected realization rates, participation rates and timing of planned energy efficiency programs
- Degree to which energy efficiency is already included in the NYISO’s econometric energy forecast
- Impacts of new appliance efficiency standards, and building codes and standards
- Specific energy efficiency plans proposed by LIPA, NYPA and Consolidated Edison Company of New York, Inc. (Con Edison)
- The actual rates of implementation of EEPS based on data received from Department of Public Service staff

The resulting adjusted econometric forecast included approximately 56% of the entire EEPS goal by the year 2022. Once the statewide energy and demand impacts were developed, zonal level forecasts were produced for the econometric forecast and for the Base Case.

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Figure C-4: Zonal Energy Forecast Growth Rates - 2012 to 2022

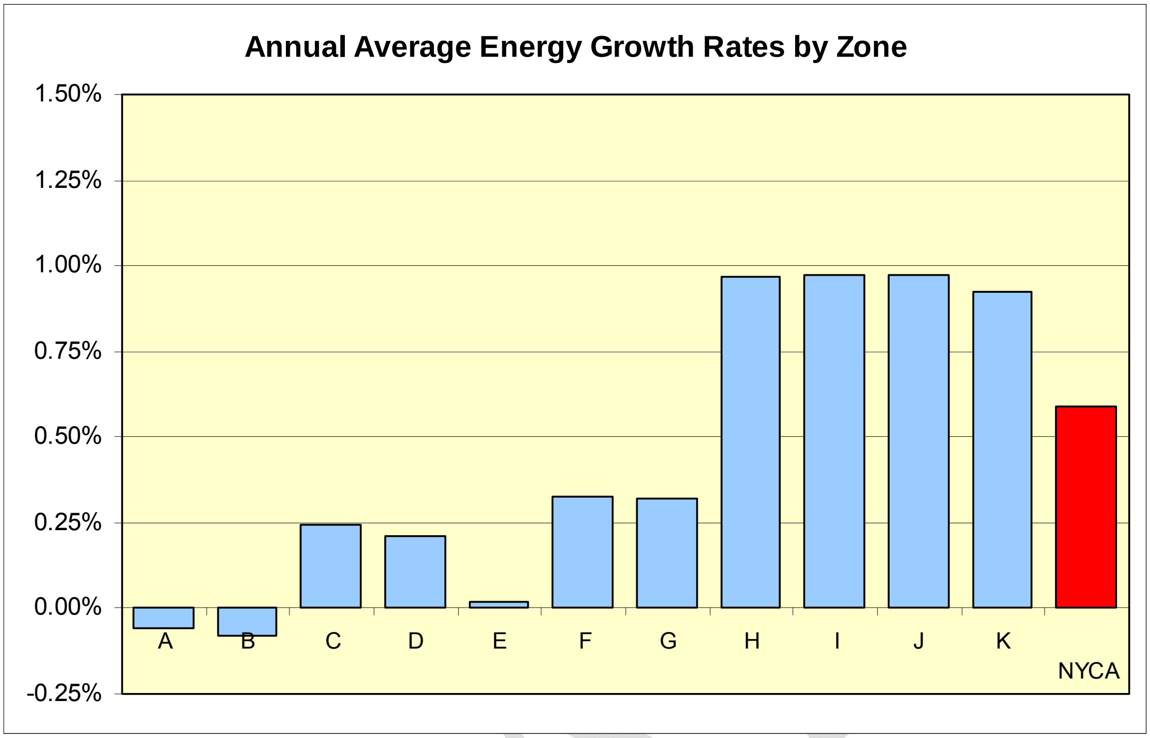

Figure C-5: Zonal Summer Peak Demand Forecast Growth Rates - 2012 to 2022

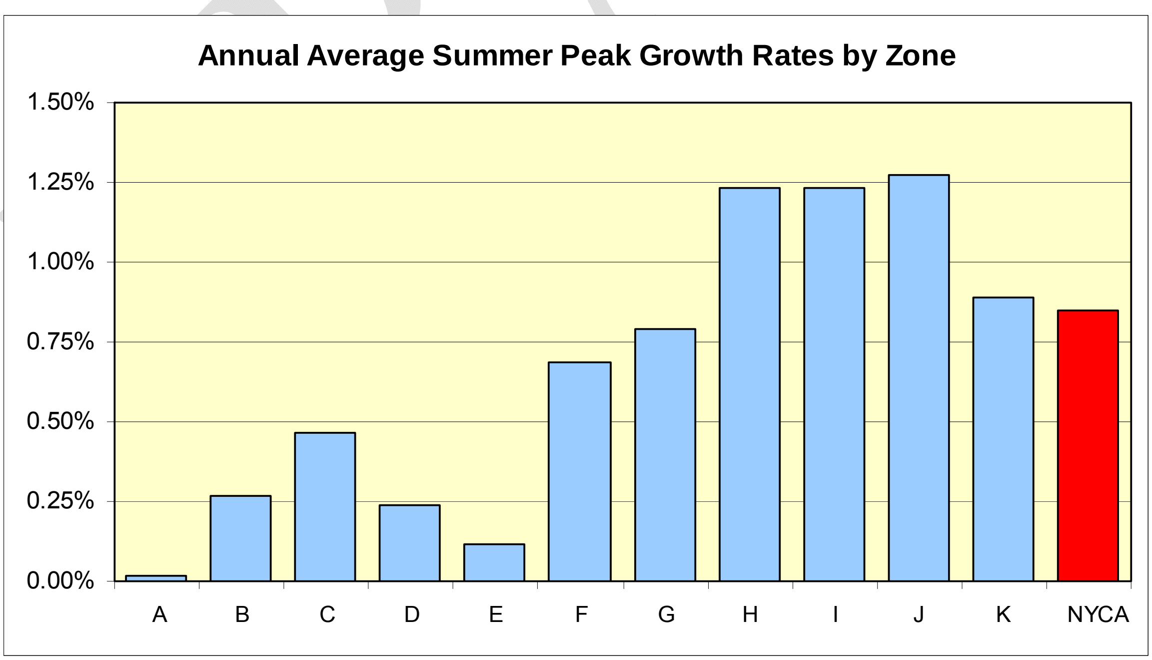

Table C-5: Annual Energy by Zone – Actual & Forecast (GWh)

Year	A	B	C	D	E	F	G	H	I	J	K	NYCA
2002	16,355	9,935	16,356	6,450	7,116	11,302	9,970	2,162	5,962	51,356	21,544	158,508
2003	15,942	9,719	16,794	5,912	6,950	11,115	10,451	2,219	6,121	50,829	21,960	158,012
2004	16,102	9,888	16,825	5,758	7,101	11,161	10,696	2,188	6,216	52,073	22,203	160,211
2005	16,498	10,227	17,568	6,593	7,594	11,789	10,924	2,625	6,435	54,007	22,948	167,208
2006	15,998	10,003	16,839	6,289	7,339	11,337	10,417	2,461	6,274	53,096	22,185	162,238
2007	16,258	10,207	17,028	6,641	7,837	11,917	10,909	2,702	6,344	54,750	22,748	167,341
2008	15,835	10,089	16,721	6,734	7,856	11,595	10,607	2,935	5,944	54,835	22,461	165,612
2009	15,149	9,860	15,949	5,140	7,893	10,991	10,189	2,917	5,700	53,100	21,892	158,780
2010	15,903	10,128	16,209	4,312	7,906	11,394	10,384	2,969	6,264	55,114	22,922	163,505
2011	16,017	10,040	16,167	5,903	7,752	11,435	10,066	2,978	6,208	54,060	22,704	163,330
2012	15,902	10,032	16,146	6,561	7,796	11,458	10,105	2,917	6,074	53,663	23,005	163,659
2013	15,892	10,037	16,126	6,612	7,816	11,466	10,181	2,941	6,123	54,094	23,339	164,627
2014	15,859	9,995	16,116	6,631	7,799	11,453	10,142	2,975	6,197	54,753	23,420	165,340
2015	15,815	9,949	16,114	6,667	7,779	11,456	10,143	2,998	6,253	55,234	23,622	166,030
2016	15,794	9,935	16,165	6,691	7,785	11,487	10,186	3,031	6,311	55,756	23,774	166,915
2017	15,770	9,922	16,194	6,736	7,792	11,498	10,192	3,027	6,308	55,725	23,833	166,997
2018	15,765	9,919	16,235	6,766	7,806	11,534	10,218	3,060	6,373	56,306	24,039	168,021
2019	15,780	9,918	16,307	6,815	7,805	11,597	10,265	3,102	6,464	57,096	24,260	169,409
2020	15,790	9,923	16,387	6,866	7,805	11,665	10,317	3,154	6,576	58,086	24,607	171,176
2021	15,802	9,936	16,471	6,901	7,808	11,746	10,376	3,193	6,654	58,772	24,855	172,514
2022	15,809	9,954	16,548	6,936	7,812	11,834	10,436	3,212	6,693	59,118	25,217	173,569

Table C-6: Summer Coincident Peak Demand by Zone – Actual & Forecast (MW)

Year	A	B	C	D	E	F	G	H	I	J	K	NYCA
2002	2,631	1,842	2,787	777	1,252	2,073	2,076	498	1,335	10,321	5,072	30,664
2003	2,510	1,782	2,727	671	1,208	2,163	2,146	498	1,395	10,240	4,993	30,333
2004	2,493	1,743	2,585	644	1,057	1,953	2,041	475	1,280	9,742	4,420	28,433
2005	2,726	1,923	2,897	768	1,314	2,164	2,236	592	1,409	10,810	5,236	32,075
2006	2,735	2,110	3,128	767	1,435	2,380	2,436	596	1,467	11,300	5,585	33,939
2007	2,592	1,860	2,786	795	1,257	2,185	2,316	595	1,438	10,970	5,375	32,169
2008	2,611	2,001	2,939	801	1,268	2,270	2,277	657	1,399	10,979	5,231	32,432
2009	2,595	1,939	2,780	536	1,351	2,181	2,159	596	1,279	10,366	5,063	30,844
2010	2,663	1,985	2,846	552	1,437	2,339	2,399	700	1,487	11,213	5,832	33,452
2011	2,556	2,019	2,872	776	1,446	2,233	2,415	730	1,510	11,373	5,935	33,865
2012	2,691	2,003	2,853	780	1,365	2,295	2,268	682	1,418	11,500	5,440	33,295
2013	2,694	2,016	2,859	788	1,371	2,308	2,301	689	1,435	11,680	5,555	33,696
2014	2,689	2,017	2,864	791	1,369	2,314	2,306	700	1,455	11,830	5,579	33,914
2015	2,680	2,015	2,868	794	1,366	2,323	2,319	707	1,472	11,985	5,622	34,151
2016	2,677	2,018	2,883	797	1,367	2,337	2,340	713	1,484	12,095	5,634	34,345
2017	2,674	2,022	2,894	803	1,370	2,348	2,352	720	1,501	12,200	5,666	34,550
2018	2,674	2,027	2,906	807	1,373	2,362	2,366	722	1,525	12,400	5,706	34,868
2019	2,680	2,032	2,925	813	1,375	2,383	2,386	742	1,546	12,570	5,752	35,204
2020	2,685	2,039	2,946	819	1,377	2,406	2,408	751	1,562	12,725	5,808	35,526
2021	2,691	2,048	2,968	824	1,379	2,431	2,431	762	1,587	12,920	5,872	35,913
2022	2,696	2,057	2,988	828	1,381	2,458	2,454	771	1,603	13,050	5,944	36,230

Table C-7: Winter Coincident Peak Demand by Zone – Actual & Forecast (MW)

Year	A	B	C	D	E	F	G	H	I	J	K	NYCA
2002-03	2,418	1,507	2,679	925	1,223	1,903	1,590	437	927	7,373	3,472	24,454
2003-04	2,433	1,576	2,755	857	1,344	1,944	1,720	478	981	7,527	3,647	25,262
2004-05	2,446	1,609	2,747	918	1,281	1,937	1,766	474	939	7,695	3,729	25,541
2005-06	2,450	1,544	2,700	890	1,266	1,886	1,663	515	955	7,497	3,581	24,947
2006-07	2,382	1,566	2,755	921	1,274	1,888	1,638	504	944	7,680	3,505	25,057
2007-08	2,336	1,536	2,621	936	1,312	1,886	1,727	524	904	7,643	3,596	25,021
2008-09	2,274	1,567	2,533	930	1,289	1,771	1,634	529	884	7,692	3,570	24,673
2009-10	2,330	1,555	2,558	648	1,289	1,788	1,527	561	813	7,562	3,443	24,074
2010-11	2,413	1,606	2,657	645	1,296	1,825	1,586	526	927	7,661	3,512	24,652
2011-12	2,220	1,535	2,532	904	1,243	1,765	1,618	490	893	7,323	3,378	23,901
2012-13	2,369	1,556	2,568	913	1,276	1,826	1,603	545	929	7,613	3,634	24,832
2013-14	2,364	1,556	2,564	919	1,275	1,823	1,616	551	941	7,691	3,629	24,929
2014-15	2,356	1,548	2,562	920	1,267	1,817	1,610	558	955	7,798	3,608	24,999
2015-16	2,347	1,541	2,561	925	1,261	1,814	1,611	564	966	7,881	3,582	25,053
2016-17	2,341	1,538	2,569	927	1,257	1,816	1,618	570	978	7,968	3,567	25,149
2017-18	2,335	1,536	2,572	933	1,254	1,815	1,618	571	981	7,981	3,557	25,153
2018-19	2,332	1,535	2,578	936	1,253	1,817	1,623	577	993	8,069	3,552	25,265
2019-20	2,332	1,534	2,589	942	1,249	1,824	1,631	585	1,007	8,174	3,555	25,422
2020-21	2,332	1,534	2,601	949	1,246	1,833	1,639	594	1,024	8,307	3,568	25,627
2021-22	2,332	1,536	2,613	953	1,244	1,843	1,648	601	1,035	8,399	3,590	25,794
2022-23	2,331	1,538	2,625	957	1,242	1,854	1,658	604	1,041	8,442	3,616	25,908

Appendix D - Transmission System Assessment

(to be provided)

D-1 Development of RNA Base Case System Cases

(to be provided)

D-2 Emergency Thermal Transfer Limit Analysis

(to be provided)

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D-3 Development of the MARS Topology

Transmission System Representation changes for 2013 IRM Study/2012 RNA - Summer Emergency Ratings (MW)

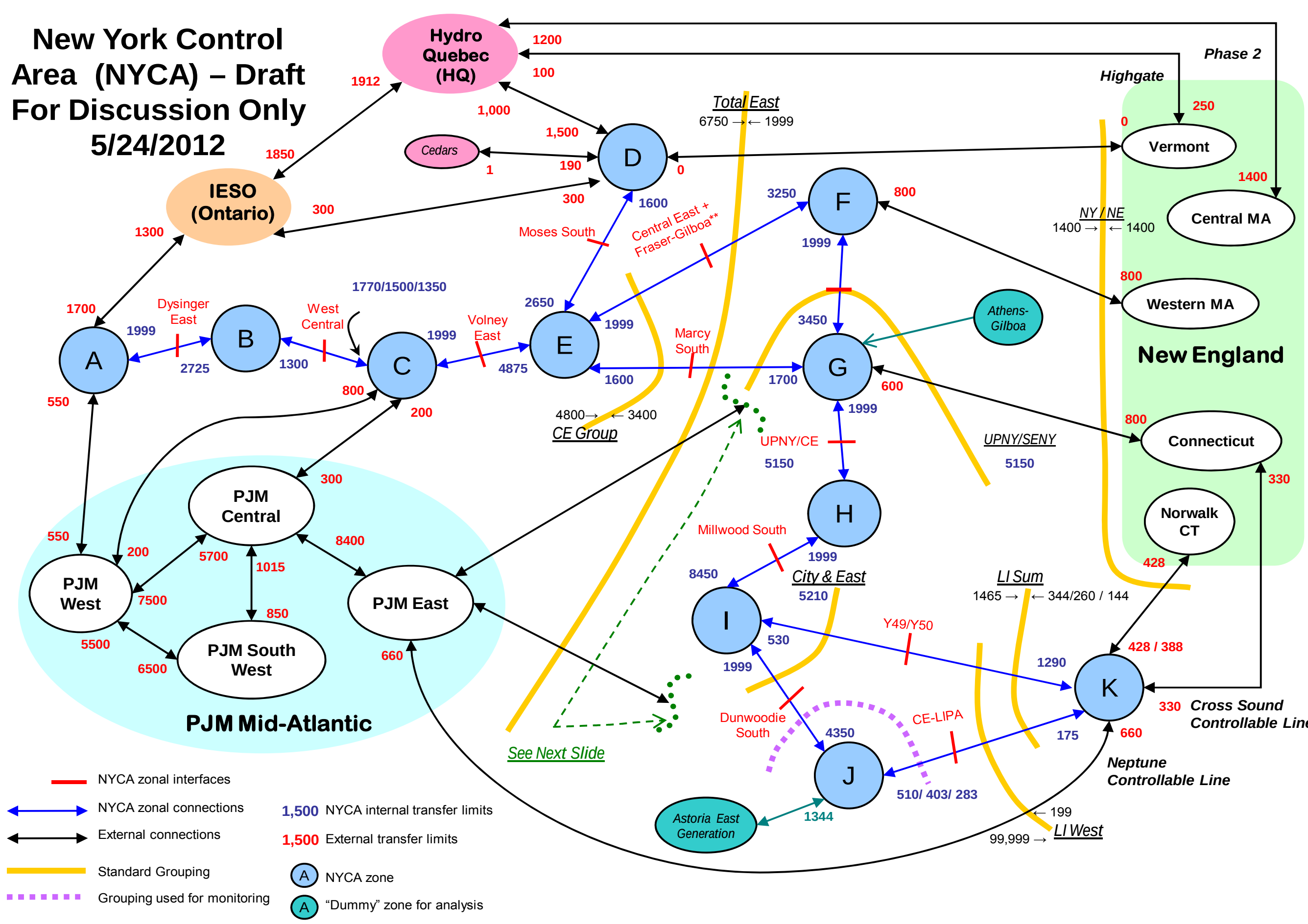
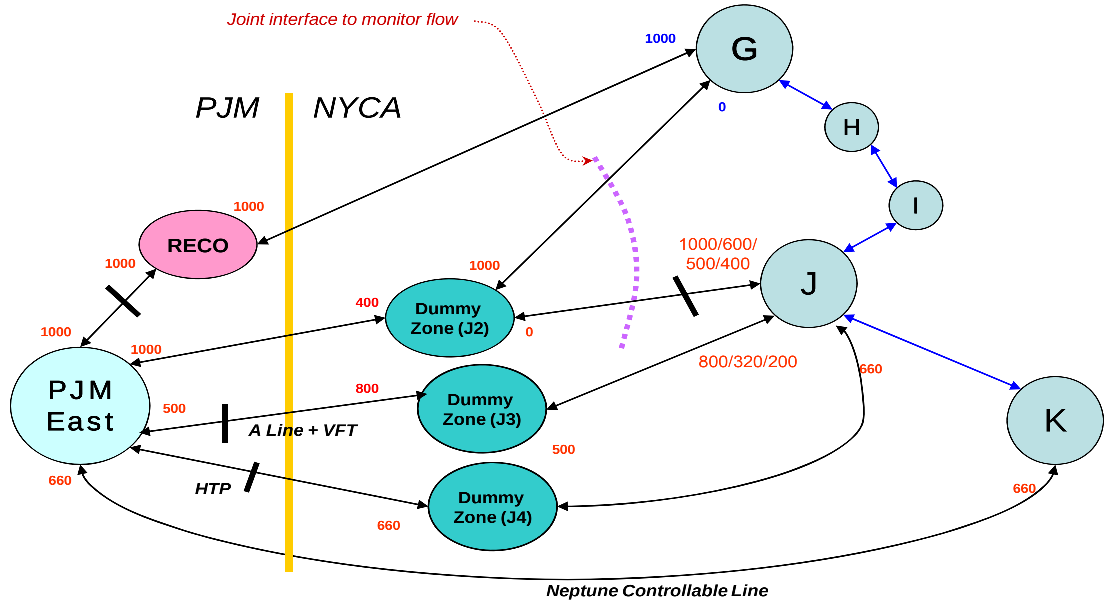


Figure D-1: Development of the 2012 MARS Topology

Transmission System Representation changes for 2013 IRM Study/2012 RNA - Summer Emergency Ratings (MW)

2012 PJM-SENY MARS Model

Draft for discussion only – 5/18/2012



(PJM East to RECO) + (J2 to J) + (PJM East to J3) + (PJM East to J4) = 2000 MW

With the retirement of Hudson 1 and other changes in 2011 PJM RTEP, it was determined that this total interface can be supported to a flow of 2000 MW. This interface grouping contains those interfaces with the Bold hash mark. MARS will distribute this flow accordingly. This will change when additional transmission and generation comes into service in 2014 and 2015 up to 2340.

Figure D-2: 2012 PJM-SENY MARS Model

D-4 Short Circuit Assessment

Table D-3 provides the results of NYISO's short circuit screening test. Individual Breaker Assessment (IBA) is required for any breakers whose rating is exceeded by the maximum fault current. Results of the IBA performed by the NYISO or the Transmission Owner are shown in Table D-4.

Table D-3: 2012 RNA Fault Current Analysis Summary Table

Substation	Nominal	**Lowest Rated**	**Maximum**	**IBA**
Name	kV	**Circuit Breaker**	**Phase Current**	**Required**
		(kA)	**(kA)**	**(Y/N)**
Marcy	765	**63**	**9.7**	**N**
Massena	765	**63**	**7.8**	**N**
Academy	345	**63**	**32.4**	**N**
AES Somerset	345	**32**	**17.9**	**N**
Alps	345	**40**	**17.5**	**N**
AstoriaAnnex	345	**63**	**45.1**	**N**
Athens	345	**48.8**	**34.1**	**N**
Bowline 1	345	**40**	**26.9**	**N**
Bowline 2	345	**40**	**26.7**	**N**
Buchanan N.	345	**63**	**28.8**	**N**
Buchanan S.	345	**40**	**38.5**	**N**
Clay	345	**49**	**32.9**	**N**
Coopers Corners	345	**32**	**15.6**	**N**
Dewitt	345	**40**	**18.9**	**N**
Dunwoodie	345	**63**	**50.4**	**N**
East Fishkill	345	**63**	**39.4**	**N**
East Garden City	345	**63**	**25.3**	**N**
Edic	345	**40**	**32.2**	**N**
Elbridge	345	**40**	**16.1**	**N**
Farragut	345	**63**	**57.7**	**N**
Fitzpatrick	345	**37**	**41.4**	**Y**
Fraser	345	**29.6**	**17.3**	**N**
Fresh Kills	345	**63**	**26.6**	**N**
Gilboa	345	**40**	**25.3**	**N**
Goethals N.	345	**63**	**26.4**	**N**
Goethals S.	345	**63**	**27.3**	**N**
Gowanus N.	345	**63**	**27.7**	**N**
Gowanus S.	345	**63**	**27.7**	**N**
Hurley Avenue	345	**40**	**17.2**	**N**
Independence	345	**41.9**	**38.5**	**N**
Ladentown	345	**63**	**38.9**	**N**
Lafayette	345	**40**	**17.9**	**N**
Leeds	345	**36.6**	**34.7**	**N**

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Marcy	345	**63**	**31.4**	**N**
Middletown Tap	345	**63**	**17.1**	**N**
Millwood	345	**63**	**44.6**	**N**
Mott Haven	345	**63**	**48.5**	**N**
New Scotland	345	**32.4**	**31.4**	**N**
Niagara	345	**63**	**34**	**N**
Nine Mile Point 1	345	**50**	**43.5**	**N**
Oakdale	345	**29.6**	**12.2**	**N**
Oswego	345	**40.6**	**32.5**	**N**
Pleasant Valley	345	**63**	**41.2**	**N**
Pleasantville	345	**63**	**21.9**	**N**
Rainey	345	**63**	**54.7**	**N**
Ramapo	345	**63**	**42.2**	**N**
Reynolds Road	345	**40**	**14.8**	**N**
Rock Tavern	345	**50**	**26.4**	**N**
Roseton	345	**63**	**34.7**	**N**
Scriba	345	**38.4**	**46.9**	**Y**
Shore Road	345	**63**	**27.7**	**N**
South Mahwah- B	345	**40**	**33.5**	**N**
South Mahwah-A	345	**40**	**33.1**	**N**
Sprain Brook	345	**63**	**51.7**	**N**
Station 122	345	**32**	**16.8**	**N**
Station 80	345	**32**	**16.9**	**N**
Stolle Road	345	**32**	**3.9**	**N**
Volney	345	**44.8**	**36.6**	**N**
Watercure	345	**29.6**	**8.2**	**N**
West 49th Street	345	**63**	**49.8**	**N**
West Haverstraw	345	**none**	**28.2**	**n/a**
Adirondack	230	**25**	**9.6**	**N**
Chases Lake	230	**40**	**9.1**	**N**
Dunkirk	230	**28**	**15.2**	**N**
Gardenville	230	**31.8**	**22.7**	**N**
Hillside	230	**28.6**	**12.2**	**N**
Huntley	230	**30.6**	**27.1**	**N**
Meyer	230	**28.6**	**6.6**	**N**
Niagara	230	**63**	**57.3**	**N**
Oakdale	230	**none**	**6.2**	**n/a**
Packard	230	**47.1**	**43.9**	**N**
Porter	230	**18**	**19.5**	**Y**
Robinson Road	230	**34.4**	**14.5**	**N**
Rotterdam	230	**23.5**	**12.7**	**N**
South Ripley	230	**39.9**	**9.1**	**N**
St. Lawrence	230	**37**	**33.2**	**N**
Stolle Road	230	**28.6**	**13.9**	**N**
Watercure	230	**26.4**	**12.2**	**N**
Willis	230	**37**	**12.2**	**N**
Astoria East	138	**63**	**48.4**	**N**
Astoria West	138	**45**	**45.3**	**Y**

Barrett	138	**59.2**	**48.3**	**N**
Brookhaven	138	**35.4**	**26.5**	**N**
Buchanan	138	**40**	**15.8**	**N**
Corona	138	**63**	**48.1**	**N**
Dunwoodie No.	138	**40**	**34.2**	**N**
Dunwoodie So.	138	**40**	**30.5**	**N**
East 13th	138	**63**	**47**	**N**
East 75t ST	138	**63**	**10.9**	**N**
East 179th	138	**63**	**48.3**	**N**
East Garden City	138	**80**	**70.9**	**N**
Eastview	138	**63**	**36.7**	**N**
Fox Hills	138	**40**	**31.7**	**N**
Freeport	138	**63**	**34.4**	**N**
Fresh Kills	138	**40**	**35.7**	**N**
Greenwood	138	**63**	**44.2**	**N**
HG	138	**63**	**41.7**	**N**
Holbrook	138	**52.2**	**48.2**	**N**
Hudson E	138	**63**	**38.1**	**N**
Jamaica	138	**63**	**46.7**	**N**
Lake Success	138	**57.8**	**38.4**	**N**
Millwood W	138	**20**	**19.3**	**N**
Motthaven	138	**50**	**13.3**	**N**
Newbridge Road	138	**80**	**72**	**N**
Northport	138	**56.2**	**59.9**	**Y**
Pilgrim	138	**63**	**59.3**	**N**
Port Jefferson	138	**63**	**32.2**	**N**
Queensbridge	138	**63**	**43.5**	**N**
Riverhead	138	**63**	**17.8**	**N**
Ruland	138	**63**	**45.2**	**N**
SB TR N7	138	**63**	**26.8**	**N**
SB TR S6	138	**63**	**28.9**	**N**
Sherman Creek	138	**63**	**45.3**	**N**
Shore Road	138	**57.8**	**47.8**	**N**
Shoreham	138	**52.2**	**25.4**	**N**
Tremont	138	**63**	**42.5**	**N**
Valley Stream	138	**57.8**	**52.1**	**N**
Vernon East	138	**63**	**42.7**	**N**
Vernon West	138	**63**	**34.5**	**N**
Clay	115	**44.8**	**36.4**	**N**
Porter	115	**37.9**	**41.2**	**Y**
E River	69	**50**	**49.7**	**N**

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Tables D-4 provides the results of NYISO's IBA for Farragut 345kV, Fitzpatrick 345kV, Astoria West 138kV, Northport 138 kV, and National Grid's IBA for Porter 115kV, Porter 230 kV, Scriba 345kV.

.

Table D-4: IBA for 2012 RNA Study

ASTORIA WEST 138 KV

Breaker ID	Rating (kA)	1LG (kA)	2LG (kA)	3LG (kA)	Overduty
G1N	45	42.81	41.11	37.84	N
G2N	45	42.81	41.11	37.84	N

FITZPATRICK 345 kV

Breaker ID	Rating (kA)	1LG (kA)	2LG (kA)	3LG (kA)	Overduty
10042	37	34.06	34.39	32.52	N

NORTHPORT 138 kV

Breaker ID	Rating (kA)	1LG (kA)	2LG (kA)	3LG (kA)	Overduty
1310	56.2	50.074	50.309	51.515	N
1320	56.2	50.051	50.314	51.53	N
1450	56.2	50.98	50.002	48.552	N
1460	56.2	30.745	29.545	26.863	N
1470	56.2	32.377	32.142.	31.681	N

PORTER 115 kV

Breaker ID	Rating (kA)	Phase Current (kA)	Overduty
R10 LN1	43.0	44.7	Y
R100 TB3	43.0	37.2	N
R115 TB1	63.0	44.8	N
R125 TB2	63.0	44.8	N
R130 LN13	43.0	45.0	Y
R20 LN2	43.0	44.7	Y
R200 TB4	43.0	35.9	N
R30 LN3	43.0	44.5	Y
R40 LN4	43.0	44.4	Y
R50 LN5	43.0	44.4	Y
R60 LN6	43.0	45.0	Y
R70 LN7	43.0	44.2	Y
R80 LN8	43.0	44.6	Y
R8105 BUSTIE	47.7	42.6	N
R90 LN9	43.0	45.0	Y

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PORTER 230 kV

Breaker ID	Rating (kA)	Phase Current (kA)	Overduty
R110 B-11	23.9	26.4	Y
R120 B-12	23.9	26.4	Y
R15 B-TB1	23.9	26.4	Y
R170 B-17	23.9	26.4	Y
R25 B-TB2	23.9	26.4	Y
R300 B-30	40.0	22.0	N
R310 B-31	40.0	22.0	N
R320 B-30	23.9	26.4	Y
R825 31-TB2	23.9	25.2	Y
R835 12-TB1	23.9	25.4	Y
R845 11-17	23.9	25.2	Y

SCRIBA 345 kV

Breaker ID	Rating (kA)	Phase Current (kA)	Overduty
R100 B-10	50.0	56.0	Y
R200 B-20	50.0	56.0	Y
R210 B-21	50.0	56.0	Y
R230 B-23	63.0	56.0	N
R250 B-25	50.0	56.0	Y
R90 B-9	50.0	56.0	Y
R915 9-20	50.0	54.7	Y
R925 B-23	63.0	56.0	N
R935 10-21	50.0	53.9	Y
R945 B-25	50.0	56.0	Y

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Appendix E – Environmental Scenarios

E-1 Background

E-2 Selection of Major Environmental Program Initiatives

E-3 Reliability Impact Assessment Methodology

(to be inserted)

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