

NYISO 2014 Interim Review

of

Resource Adequacy

Covering the New York Balancing Authority

For the period 2015 to 2017

Approved by the RCC

December 2, 2014

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EXECUTIVE SUMMARY

This report provides the results of NYISO's 2014 Interim Review of Resource Adequacy covering the period from 2015 to 2017. It is the New York Independent System Operator's (NYISO) second Annual Interim Assessment of its 2012 Comprehensive Review of Resource Adequacy, which covered the time period of 2013 through 2017. This assessment is conducted to comply with the Reliability Assessment Program established by the Northeast Power Coordinating Council (NPCC). This assessment follows the resource adequacy guidelines outlined in NPCC's Regional Reliability Reference Directory #1, Appendix D.¹

The 2014 Interim Review Report demonstrates that New York will meet the NPCC resource adequacy criterion that the probability of disconnecting load due to resource deficiencies, which is known as the loss of load expectation (LOLE) criterion, shall be, on average, no more than 0.1 days per year for the Base Case.

¹ <http://www.npcc.org/documents/regStandards/Directories.aspx>

1. Introduction

The 2014 Interim Review provides the second update of NYISO's 2012 Comprehensive Review of Resource Adequacy which was approved by NPCC in November 2012. Since the approval of the 2012 Comprehensive Review, the NYISO has conducted additional resource adequacy assessments as part of the Comprehensive System Planning Process (CSPP)² and additional annual studies to determine the Installed Capacity Requirements for the New York Balancing Area (NYBA). The major assumptions of this interim review are consistent with those studies with revisions to incorporate updated data that have met Base Case inclusion rules as defined by the CSPP.

2. Assumption Changes

2.1. Load Shape Model

The NYISO reported in the 2013 Interim Review that the single load shape model had been reviewed in 2011 and 2012 in conjunction with the Installed Capacity Subcommittee (ICS) of the New York State Reliability Council (NYSRC) and replaced with a multiple load shape model using the years 2002, 2006, and 2007. The NYISO and the ICS reviewed this model for the 2014 IRM (Installed Reserve Margin) study and determined that no changes were necessary.

2.2. Load

Table 2-1 compares the peak demand forecasts from the 2012 Comprehensive Review with the 2014 Load and Capacity Data Report³ (Gold Book) peak demand forecasts for this Interim Review. The baseline forecast includes the impact of energy efficiency programs and represents an annual average growth rate of 0.83% over the Gold Book's ten-year horizon. This compares to a growth rate of 0.85% as reported in the 2012 Comprehensive Review.

Table 2-1 Comparison of Peak Demand Forecasts

Year	Baseline Forecast (MW)			High Load Forecast (MW)		
	2012 Comprehensive Review	2014 Interim Review	Delta	2012 Comprehensive Review	2014 Interim Review	Delta
2013	33,696			34,320		
2014	33,914			34,846		
2015	34,151	34,066	-85	35,361	34,557	-804
2016	34,345	34,412	67	35,791	35,160	-631
2017	34,550	34,766	216	36,224	35,691	-533

² http://www.nyiso.com/public/webdocs/documents/tariffs/oatt/oatt_attachments/att_v.pdf

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http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Documents_and_Resources/Planning_Data_and_Reference_Docs/Data_and_Reference_Docs/2014_GoldBook.pdf

2.3. Resources

For this review, resource assumptions are based upon the 2013 summer capability ratings of generation resources in the New York Balancing Authority as reported in the 2014 Gold Book. Capacity values in Table 2-2 include resources electrically internal to the New York Balancing Authority, additions, re-ratings, retirements, purchases, sales, UDRs (UCAP Deliverability Rights) with firm capacity, and SCRs (Special Case Resources).

Compared to the 2012 Comprehensive Review, the resource totals for this review account for 1,178 MW of generation removed from service and 456 of new or returning to service generation. Additionally, registered SCRs were reduced by 976 MW. Since the time the reliability studies were performed for this assessment, several units have either returned to service, rescinded their intent to mothball, or are in the process of returning to service. These units include a) Danskammer Units 1-4 (494 MW), b) Astoria 20 (177 MW), c) Selkirk Units 1-2 (358 MW), d) Binghamton Cogen (41 MW), e) Dunkirk fuel conversion (435 MW), and f) Bowline uprate (378 additional MW).

Table 2-2 Comparison of Resource Assumptions (Summer MW ratings)

Year	2012 Comprehensive Review (MW)	2014 Interim Review ⁴ (MW)	Delta (MW)
2013	42,405		
2014	42,361		
2015	42,361	40,801	-1560
2016	42,361	40,820	-1541
2017	42,361	40,511	-1850

2.4. Transmission

The power flow study base cases were developed in accordance with NYISO procedures using projections for transmission facilities that were developed in conjunction with Market Participants and Transmission Owners. These were included in the base case using the NYISO 2014 FERC 715 filing as a starting point, and consistent with the base case inclusion screening process provided in the NYISO's Reliability Planning Process (RPP) Manual.

The National Grid Five Mile Road project includes tapping the Homer City-Stolle Rd. 345 kV circuit and connecting to a new 115 kV station through one 345/115 kV transformer. The National Grid Eastover Rd. project consists of tapping the Rotterdam-Bear Swamp 230 kV circuit and connecting to a new 115 kV station with two 230/115 kV transformers (one spare). These projects are modeled as in-service by summer of 2015.

The Transmission Owner Transmission Solutions (TOTS) is a group of projects by NYPA, NYSEG, and Con Edison that includes three primary projects. The first is Marcy South Series

⁴ Note: Wind units are listed at their nameplate capability rating.

Compensation, which includes the installation of series capacitance at the Marcy station on the Marcy-Coopers Corners 345 kV circuit, and at Fraser station on the Edic-Fraser 345 kV and the Fraser-Coopers Corners 345 kV circuits. A section of the Fraser-Coopers Corners 345 kV circuit will also be reconductored. The second project is Rock Tavern-Ramapo, which includes building an additional 345 kV circuit between Rock Tavern and Ramapo and a 345/138 kV tap connecting to the existing Sugarloaf 138 kV station. The third project is Staten Island Unbottling, which includes the reconfiguration of Goethals and Linden CoGen substations as well as the installation of additional cooling on the 345 kV cables from Goethals to Gowanus and Gowanus to Farragut. The TOTS projects are scheduled to be completed by summer of 2016.

An additional 345/115 kV transformer is modeled as in-service at the NYSEG Wood Street station by the summer of 2016. An additional 230/115/34.5 kV transformer will also be installed at the NYSEG Gardenville substation by the summer of 2017.

The RGE Station 255 project that taps the existing Somerset-Rochester and Niagara-Rochester 345 kV circuits is in the 2014 RNA base case. An additional 345 kV line will be added from Station 255 to Station 80. Station 255 will have two 345/115 kV transformers connecting to a new 115kV station in the Rochester area. These projects, collectively known as the Rochester Area Reliability Project, are modeled as in-service by 2017. Also, two 345/115 kV transformers (T1 and T3) located at RGE Station 80 have been replaced with transformers which have higher ratings.

Two FirstEnergy projects within Pennsylvania that tap NYSEG transmission lines are also included: the Farmers Valley project, which taps the Homer City-Five Mile Rd. 345 kV tie-line, and the Mainesburg project, which taps the Homer City-Watercure 345 kV tie-line. Both projects are modeled as in-service for summer 2015.

2.5. Unit Availability

Table 2-3 compares the 5-year weighted EFORd (Equivalent Demand Forced Outage Rate) values for generation units in the New York Balancing Authority included in this Interim Review to the EFORd values used in the 2012 Comprehensive Review. The EFORd for thermal units and large hydro units is calculated from NERC GADS data submitted by the generator owners. Run of river hydro units are given a 45% derate. Production wind data from 2012 is used to determine the capacity factor for summer and winter capability seasons. Wind capacity factors are ~17% and ~30% respectively. A performance factor for SCRs is determined based upon their actual load reduction in either required system tests of their capability to reduce load or actual demand response activation calls.

Table 2-3 5-Year Weighted EFORD values (%)

Unit Type	2012 Comprehensive Review	2014 Interim Review
Coal	4.8	4.4
Oil	10.0	8.6
Gas	16.3	19.8
Nuclear	2.2	2.7
Combustion Turbines	19.5	22.8
Jet Engine	14.6	15.0
Combined Cycle	3.5 Block/3.9 Individual	4.4
All Thermal Fossil Units (5-Year EFORD)	8.0	9.3

3. Gas Infrastructure Adequacy Assessment

As the plentiful low cost gas produced in the Marcellus Shale makes its way into New York, the amount of electrical demand supplied and energy produced by this gas have steadily increased. The benefits of this shift in the relative costs of fossil fuels include reduced emissions, improved generation efficiency, and lower electricity prices. These benefits, however, are accompanied by a reduction in overall fuel diversity in NYCA. This reduction in fuel diversity has led to the Eastern Interconnection Planning Collaborative (EIPC) gas and electric infrastructure study and FERC proceedings addressing gas and electric system communications, and market coordination, all of which are intended to improve the knowledge base for electric and gas system planners, operators, and policy makers.

Based on the October 2013 survey results, it was determined that of 18,011 MW (Summer DMNC) dual fuel generators reported in the 2013 Gold Book, 16,983 MW have permits that allow them to operate on oil. In addition, there were 2,505 MW (Summer DMNC) oil-only generators reported in the 2013 Gold Book; based on the October 2013 Survey results, this has increased to 2,579 MW (Summer DMNC). Thus, the summer capability of oil and dual fuel units with oil permits totals 19,562 MW. These oil and dual fuel facilities represent a strong fleet of resources that can respond to delivery disruptions on the gas pipeline system during both summer and winter seasons.

The NYISO has recently completed a study that examined the ability of the regional natural gas infrastructure to meet the reliability needs of New York’s electric system. Specifically the study provided a detailed review of New York gas markets and infrastructure, assessed historic pipeline congestion patterns, provided an infrastructure and supply adequacy forecast, and examined postulated contingency events. Importantly, the study concluded there will be no unserved gas demand for generation on the interstate gas pipeline systems throughout the next five years, even with the retirement of Indian Point and related replacement of that generation with 2,000 MW of new capacity in the Lower Hudson Valley.

4. Environmental Initiatives

There are numerous environmental initiatives that may impact the manner in which the existing generating fleet operates, or that may require retrofitting environmental control technologies in order to comply with the new requirements. Several final rules will require fuel-switching or significant capital investments by New York generators in order to achieve the new standards.

The following programs were reviewed:

- a) *NOx RACT*: Reasonably Available Control Technology (Effective July 2014)
- b) *BART*: Best Available Retrofit Technology for regional haze (Effective January 2014)
- c) *MATS*: Mercury and Air Toxics Standard for hazardous air pollutants (Effective April 2015)
- d) *MRP*: Mercury Reduction Program for Coal-Fired Electric Utility Steam Generating Units – Phase II reduces Mercury emissions from coal fired power plants in New York beginning January 2015
- e) *CSAPR*: Cross State Air Pollution Rule for the reduction of SO₂ and NO_x emissions in 28 Eastern States. The U.S. Supreme Court has upheld the CSAPR as promulgated by USEPA. The Supreme Court remanded the rule to the District Circuit Court of Appeals for further proceedings, and eventual implementation by the USEPA.
- f) *CAIR*: Clean Air Interstate Rule will continue in place until CSAPR is implemented
- g) *RGGI*: Regional Greenhouse Gas Initiative Phase II cap reductions started January 2014
- h) *CO₂ Emission Standards*: NSPS scheduled to become effective June 2014, Existing Source Performance Standards may be effective in 2016
- i) *RICE*: NSPS and NESHAP – New Source Performance Standards and Maximum Achievable Control Technology for Reciprocating Internal Combustion Engines (Effective July 2016).
- j) *BTA*: Best Technology Available for cooling water intake structures (Effective upon Permit Renewal)

Table 2-4 summarizes the impact of these environmental regulations. Approximately 33,800 MW of nameplate capacity may be affected to some extent by these regulations. Compliance plans are in place for NO_x RACT, BART, and RGGI. Reviewing publicly available information from USEPA and USEIA has demonstrated that most generators affected by MATS and MRP have demonstrated operations with emission levels consistent with the new regulations. BTA determinations are the result of extensive studies and negotiations that in most cases have not resulted in decisions requiring conversion of existing generators to closed cycle cooling systems. These determinations are made on a plant specific schedule. The Indian Point Nuclear Plant BTA determination is the

subject of an extensive hearing and Administrative Law Judge determination process that will continue through 2015.

Table 2-4 Summary of Environmental Initiatives

Program	Status	Compliance Deadline	Approximate Nameplate Capacity
RGGI	In effect	In effect	25,800 MW (154 units)
BART	In effect	January 2014	8,400 MW (15 units)
NOx RACT	In effect	July 2014	27,100 MW (221 units)
MRP	In effect	January 2015	1,500 MW (6 units)
MATS	In effect	April 2015/2016/2017	10,300 MW (23 units)
BTA	In effect	Upon permit Renewal	16,400 MW (34 units)
CSAPR	Supreme Court validated USEPA rule	TBD	26,300 MW (160 units)

Using publicly available information from USEPA and USEIA, the NYISO further identified the units that may experience significant operational impacts from the environmental regulations. The summary is provided below and in Table 2-5:

- *NOx RACT program:* It appears that compliance with each of the three NOx bubble limitation is achievable.
- *BART limits:* The Oswego Units #5 and #6 are estimated to be able to start and operate at maximum output for many more days than they have been committed historically. Accordingly, imposing these estimated BART operating limits does not change NYCA LOLE in 2014 RNA.
- *MATS/MRP Program:* Given the current outlook for the continued attractiveness of natural gas compared to heavy oil, it is anticipated that compliance can be achieved by dual fuel units through the use of natural gas to maintain fuel ratios that are specified in the regulation.
- *RGGI:* The impact of RGGI may increase the operating cost of all coal units. Should all coal units retire, loss of nearly 1,500 MW in upstate would cause LOLE to exceed 0.1/day in year 2017 or before, and cause reliability violations.

Table 2-5: Summary of Potentially Significant Operational Impacts due to New Environmental Regulations

Program	Status	Significant Operational Impacts	Future Operations Potentially Impacted	Capacity (MW)
BART	In effect	Emission caps	Oswego 5 & 6: limited number of days for operations at peak	1,600
RGGI	In effect	Cost increases up to \$10/MWH	All Coal units	1,450
NOx RACT	In effect	Three NYC NOx bubbles	Arthur Kill, Astoria Gas Turbines, Astoria, Narrows, Gowanus, Ravenswood	5,300
MATS/MRP	April 2015/2006/2007	Oil use limits	Astoria, Ravenswood, Northport, Barrett, Port Jefferson, Bowline, Roseton, Oswego	8,800
BTA	Permit Renewal	Potential retirements or capacity factor limits	Indian Point, Bowline, and Huntley	
CSAPR	Uncertain	Cost increases	Uncertain	

5. Results

General Electric’s Multi-Area Reliability Simulation (GE-MARS) is the computer software program used for probabilistic analysis by the NYISO. Table 3-1 summarizes the Loss of Load Expectation (LOLE) results produced by the GE-MARS program comparing the 2012 Comprehensive Review results with the 2014 Interim Review for the Base Case and the high load forecast case results.

Table 5-1 LOLE Results

Year	Base Case Forecast		High Load Forecast	
	2012 Comprehensive Review	2014 Interim Review	2012 Comprehensive Review	2014 Interim Review
2013	0.01		0.02	
2014	0.01		0.04	
2015	0.02	0.04	0.06	0.07
2016	0.02	0.04	0.09	0.09
2017	0.03	0.06	0.16	0.14

6. Conclusion

This Interim Review finds that the New York Balancing Authority will comply with the NPCC resource adequacy criterion under the Base Case peak demand forecast. The NYISO will continue to monitor and evaluate progress on pending environmental initiatives and the implications of generator compliance with final initiatives to understand their impact, if any, on capacity availability and retirements. Should the NYISO determine that conditions have significantly changed during or outside of the normal planning cycle, it will determine whether market-based solutions that are currently progressing are sufficient to meet the resource adequacy and system security needs of the New York power grid. If not, the NYISO will address any newly identified Reliability Need in the subsequent RNA or, if necessary, issue a request for an interim, or “Gap” solution to maintain bulk power system reliability.