

2018 RNA Final Results

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Management Committee

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Goals

- **This presentation describes:**
 - The Reliability Planning Process
 - 2018 RNA Major Assumptions
 - 2018 RNA Base Case and Scenario Results
- **Seeking Management Committee recommendation for Board of Directors approval**

Stakeholders Process

- February-June ESPWG/TPAS: presentations of the major assumptions
- June 22 ESPWG/TPAS: Presented preliminary (“1st pass”) RNA results and assumptions
- June 28 ESPWG and/or July 2 TPAS: PSEG-LIPA’ presentation of LTP updates, as related to the preliminary Reliability Needs identified in the June 22 ESPWG/TPAS presentation
- July 6, 2018: lock down assumptions for final (“2nd pass”) RNA
- July 19, Aug 8, and Aug 22 ESPWG: review draft RNA reports
- September 12 OC: OC’s recommendation for MC and Board of Directors approval
- **September 26 MC: Market Monitoring Unit review and MC’s recommendation for Board of Directors approval**
- **October: Board of Directors approval**

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Reliability Planning Process (RPP)

2018 RPP Background

- This 2018-2019 Reliability Planning Process (RPP) starts with the 2018 Reliability Needs Assessment (2018 RNA) followed by the Comprehensive Reliability Plan (CRP)
 - 2018 RNA Study Period: year 1 = 2019 through year 10 = 2028
- The RPP is part of the Comprehensive System Planning Process and is performed pursuant to the Attachment Y of the NYISO OATT; see Section 31.2.
 - Additional implementation details, including recently updated RNA Base Case inclusion rules, are captured in the RPP Manual #26
- 2018 RNA is based on the information from the Gold Book 2018, the 2018 FERC 715 filing (power flow cases and auxiliary files), historical data, and market participant data

2018 RNA Base Case Development Background

- Based on the RNA Base Case, the NYISO identifies Reliability Needs of the New York State Bulk Power Transmission Facilities (BPTFs) in accordance with applicable Reliability Criteria (*i.e.*, NERC, NPCC, and NYSRC)
- Reliability evaluations consist of resource adequacy and transmission security evaluations of the New York Bulk Power Transmission Facilities over a ten-year Study Period
- **2018 RNA Base Case:**
 - For the transmission security evaluations, the NYISO uses the 2018 FERC Form 715 filing and the information from the 2018 Gold Book as a starting point for developing the base case system models with the application of the inclusion rules.
 - For the resource adequacy evaluation, the models are developed starting with prior resource adequacy models, and are updated with information from the 2018 Gold Book and historical data, with the application of the inclusion rules. Information on modeling of neighboring systems is based on the input received from the NPCC CP-8 working group.
- In January 2018, an updated Manual 26 was approved and posted with the only change being in Section 3; mainly related to the RNA Base Case development and its inclusion rules
- The inclusion rules are used as guidelines to determine what proposed projects will be included in the RNA Base Case, and also how to treat generator deactivations

RNA Major Assumptions

2018 RNA Summer Peak Load Forecast Assumptions

Topline (formerly Econometric), Baseline and Adjusted Summer Peak Forecast

Annual MW	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
2018 Topline* Forecast	33,763	34,099	34,367	34,554	34,727	34,946	35,132	35,442	35,750	35,982	36,154
2018 Gold Book Baseline**	32,904	32,857	32,629	32,451	32,339	32,284	32,276	32,299	32,343	32,403	32,469
+ 2018 Solar PV	440	566	689	774	843	889	928	963	989	1,017	1,038
2018 RNA RA Base Case***	33,344	33,423	33,318	33,225	33,182	33,173	33,204	33,262	33,332	33,420	33,507

Comparison of Base Case Peak Forecasts - 2016 & 2018 RNA (MW)

Annual MW	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
2016 RNA RA Base Case***	33,618	33,726	33,825	33,948	34,019	34,120	34,256	34,393	34,515	34,646	34,803		
2018 RNA RA Base Case***			33,344	33,423	33,318	33,225	33,182	33,173	33,204	33,262	33,332	33,420	33,507
Change from 2016 RNA			-481	-525	-701	-895	-1,074	-1,220	-1,311	-1,384	-1,471	NA	NA

Notes:

* The topline forecast will be used for the resource adequacy high load scenario

** The transmission security power flow RNA base cases use this Gold Book baseline forecast

***For the resource adequacy (RA) study RNA Base Case, the 2018 Gold Book baseline load forecast was modified by removing the behind-the-meter solar PV impacts in order to model the solar PV explicitly as a generation resource to account for the intermittent nature of its availability

The Gold Book 2018 contains additional details on the load forecast:

http://www.nyiso.com/public/webdocs/markets_operations/services/planning/Documents_and_Resources/Planning_Data_and_Reference_Docs/Data_and_Reference_Docs/2018-Load-Capacity-Data-Report-Gold-Book.pdf

Queue #	Project Name	Zone	CRIS Request	SP MW	Interconnection Status	Included in RNA Base Case From Beginning of
Proposed Transmission Additions, other than Local Transmission Owner Plans (LTPs)						
530	Western NY PPTPP Empire State Line	Regulated Transmission Solutions	n/a/	n/a	TIP Facility Study	Study Year 4
SDU	Leeds-Hurley SDU	System Deliverability Upgrades (SDU)	n/a	n/a	SDU triggered for construction in CY11	Study Year 2
Proposed Generation Additions						
251	CPV Valley Energy Center ¹	G	680.0	677.6	CY11	Study Year 1
349	Taylor Biomass	G	19.0	19.0	CY11	Study Year 3
395	Copenhagen Wind	E	79.9	79.9	CY15	Study Year 1
403	Bethlehem Energy Center Uprate	F	78.1	72.0	CY15	Study Year 1
387	Cassadaga Wind	A	126.0	126.0	CY17	Study Year 2
421	Arkwright Summit	A	78.4	78.0	CY17	Study Year 1
444	Cricket Valley Energy Center II	G	1020.0	1020.0	CY17	Study Year 2
461	East River 1 Uprate	J	n/a	2.0	CY17	Study Year 1
462	East River 2 Uprate	J	n/a	2.0	CY17	Study Year 1
467	Shoreham Solar	K	24.9	25.0	CY17	Study Year 1
510	Bayonne Energy Center II	J	120.4	120.4	CY17	Study Year 1
511	Ogdensburg	E	79.0	79.0	CY17	Study Year 1
N/A	Nine Mile Point 2	C	63.4	63.4	CY17 (CRIS only)	Study Year 1
N/A	East River 6	J	8.0	N/A	CY17 (CRIS only)	Study Year 1
MW additions from 2016 RNA			1,598	1,588		
Total MW gen. additions			2,377	2,364		

Also included in the 2016 RNA

Proposed Generation Projects Included in the 2018 RNA Base Case

Notes:

1. On August 1, 2018, the New York State Department of Environmental Conservation (DEC) denied the January 2018 application of Competitive Power Ventures Valley Energy Center (CPV Valley) to renew its Air State Facility (ASF) permit for the reasons set forth in the DEC's letter. Subsequently, Supreme Court, Albany County, issued a Temporary Restraining Order regarding the DEC's determination. The NYISO will continue to monitor the status of the CPV Valley facility.



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Proposed Transmission Projects Included in the 2018 RNA Base Case

- All firm LTPs from the Gold Book 2018 were included in the 2018 RNA Base Case
- The Q545A Western NY - Empire State Line is also included

Assumed Generation Deactivations

Owner/Operator	Plant Name	Zone	CRIS	2018 RNA Base Case	2016 RNA Base Case
Helix Ravenswood LLC	Ravenswood 04	J	15.2	out	out
	Ravenswood 05	J	15.7	out	out
	Ravenswood 06	J	16.7	out	out
International Paper Company	Ticonderoga	F	7.6	part of the SCR program	in
Niagara Generation LLC	Niagara Bio-Gen	A	50.5	out	out
NRG Power Marketing LLC	Dunkirk 2	A	97.2	out	out
	Huntley 67	A	196.5	out	out
	Huntley 68	A	198.0	out	out
	Astoria GT 05	J	16.0	out	out
	Astoria GT 07	J	15.5	out	out
	Astoria GT 08	J	15.3	out	out
	Astoria GT 10	J	24.9	out	out
	Astoria GT 11	J	23.6	out	out
	Astoria GT 12	J	22.7	out	out
	Astoria GT 13	J	24.0	out	out
ReEnergy Black River LLC	Chateaugay Power	D	18.6	out	out
Binghamton BOP, LLC	Binghamton	C	43.8	out	in
Helix Ravenswood, LLC	Ravenswood 09	J	21.7	out	in
Entergy Nuclear Power Marketing, LLC	Indian Point 2	H	1027.0	out	in
	Indian Point 3	H	1040.0	out	in
Selkirk Cogen Partners, LP	Selkirk 1	F	82.1	out	in
	Selkirk 2	F	291.3	out	in
J- Power USA Generation, LP Edgewood Energy, LLC	PPL Pilgrim ST GT1	K	45.6	out	in
	PPL Pilgrim ST GT2	K	46.2		
Helix Ravenswood, LLC	Ravenswood 2-1	J	40.4	out	in
	Ravenswood 2-2	J	37.6		
	Ravenswood 2-3	J	39.2		
	Ravenswood 2-4	J	39.8		
	Ravenswood 3-1	J	40.5		
	Ravenswood 3-2	J	38.1		
	Ravenswood 3-4	J	35.8		
Lyonsdale Biomass, LLC	Lyonsdale (Burrows)	E	20.2	out	in
R.E. Ginna Nuclear Power Plant, LLC	Ginna	B	582.0	in	out
Cayuga Operating Company, LLC	Cayuga 1	C	154.1	in	out
	Cayuga 2	C	154.7	in	out
Entergy Nuclear Power Marketing LLC	Fitzpatrick 1	C	858.9	in	out
change in status	Changes in deactivations since 2016 RPP		1,147		
	Total 2018 RNA MW assumed as deactivated		3,647		

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2018 RNA Load and Capacity Summary

Year		2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
		Peak Load (MW) -Gold Book 2018 NYCA Baseline									
	NYCA*	32,857	32,629	32,451	32,339	32,284	32,276	32,299	32,343	32,403	32,469
	Zone J*	11,474	11,410	11,363	11,336	11,328	11,335	11,350	11,372	11,399	11,429
	Zone K*	5,323	5,278	5,246	5,231	5,229	5,237	5,251	5,268	5,287	5,306
	Zone G-J*	15,815	15,715	15,639	15,594	15,574	15,576	15,591	15,616	15,648	15,685
		Resources (MW)									
NYCA	Capacity**	39,230	39,358	38,339	38,339	38,339	38,339	38,339	38,339	38,339	38,339
	Net Purchases & Sales	1,279	1,785	1,800	1,942	1,942	1,942	1,942	1,942	1,942	1,942
	SCR	1,219	1,219	1,219	1,219	1,219	1,219	1,219	1,219	1,219	1,219
	Total Resources	41,728	42,362	41,358	41,500	41,500	41,500	41,500	41,500	41,500	41,500
	Capacity/Load Ratio	119.4%	120.6%	118.1%	118.6%	118.8%	118.8%	118.7%	118.5%	118.3%	118.1%
	Cap+NetPurch/Load Ratio	123.3%	126.1%	123.7%	124.6%	124.8%	124.8%	124.7%	124.5%	124.3%	124.1%
	Cap+NetPurch+SCR/Load Ratio	127.0%	129.8%	127.4%	128.3%	128.5%	128.6%	128.5%	128.3%	128.1%	127.8%
Zone J	Capacity**	9,562	9,562	9,562	9,562	9,562	9,562	9,562	9,562	9,562	9,562
	Cap+UDR+SCR/Load Ratio	95.2%	95.8%	96.2%	96.4%	96.5%	96.4%	96.3%	96.1%	95.9%	95.6%
Zone K	Capacity**	5,220	5,220	5,220	5,220	5,220	5,220	5,220	5,220	5,220	5,220
	Cap+UDR+SCR/Load Ratio	117.6%	118.6%	119.3%	119.6%	119.7%	119.5%	119.2%	118.8%	118.4%	117.9%
Zone G-J	Capacity**	15,371	15,373	14,354	14,354	14,354	14,354	14,354	14,354	14,354	14,354
	Cap+UDR+SCR/Load Ratio	106.4%	107.1%	101.1%	101.3%	101.5%	101.5%	101.4%	101.2%	101.0%	100.8%

Notes:

*NYCA load values represent baseline coincident summer peak demand (which includes reductions due to energy efficiency programs, building codes, BtM solar, and non-solar distributed energy generation). Zones J and K load values represent non-coincident summer peak demand. Aggregate Zones G-J values represent G-J coincident peak, which is non-coincident with NYCA.

**NYCA Capacity values include resources electrically internal to NYCA, additions, re-ratings, and retirements (including proposed retirements and mothballs). Capacity values reflect the lesser of CRIS and DMNC values. NYCA resources include the net purchases and sales as per the Gold Book. Zonal totals reflect the awarded UDRs for those capacity zones



2018 RNA: Load and Resources Comparison for Study Year 5 (2023)

Year 2023	2018 RNA	2016 RNA	Delta
Baseline* Load	32,284	33,748	-1,464
Total Resources**	41,500	41,147	353
Net Margin: Change in (net capacity - net load)			1,817

Notes:

*includes the reductions due to projected energy efficiency programs, building codes and standards, distribution energy resources and behind-the-meter solar photovoltaic power; it also reflects expected impacts (increases) from projected electric vehicle usage.

**includes the total Special Case Resources (SCR), and net capacity purchases and sales from the Gold Book 2018

Resource Adequacy Results

2018 RNA LOLE Results

RNA Base Case LOLE final

results:

Year	NYCA LOLE <i>days/year</i>
2019	0.01
2020	0.00
2021	0.01
2022	0.01
2023	0.01
2024	0.01
2025	0.01
2026	0.01
2027	0.01
2028	0.01

**Resource Adequacy
conclusion:**

**No resource adequacy
Reliability Needs are identified
as result of this assessment**

Criterion: LOLE < 0.1 days/year

Transmission Security Results

Transmission Security Findings

Preliminary findings:

- Evaluated Year 1 (2019), Year 5 (2023), Year 10 (2028) summer peak baseline power flow cases
- No Reliability Needs identified for Year 1 and Year 5
- There was one preliminary Reliability Need identified in Eastern Long Island: year 10 showed a 3 MW deficiency in Eastern Long Island
 - A 1% overload on Brookhaven to Edwards Ave. 138 kV (Line 864)
 - Contingency is the loss of Wildwood to Riverhead 138 kV (Line 890) and returning the system to Normal Criteria (N-1-0 criteria violation)
- PSEG – LIPA presented an updated firm LTP at the June 28 ESPWG/TPAS which addressed the preliminary Reliability Need:
 - Terminal Upgrades at the Brookhaven 138 kV Substation, I/S June 2019

**Transmission Security
conclusion:**

**No Reliability Needs are
identified as result of this
assessment**

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2018 RNA Conclusion

This 2018 Reliability Needs Assessment finds that the Reliability Criteria are met throughout the 10-year Study Period.

Therefore, there are no Reliability Needs identified on the New York State Bulk Power Transmission Facilities.

2018 RNA: Scenarios

	Scenario	Type of Assessments
1	Topline (formerly Econometric) Load Forecast:	Resource Adequacy
	<i>Baseline load forecast without the Energy Efficiency Savings and Behind the Meter Generation</i>	
2	Zonal Capacity at Risk:	Resource Adequacy
	<i>Identification of the maximum level of zonal MW “perfect” capacity¹ that can be removed without causing NYCA LOLE violations, or exceeding the zonal capacity</i>	
3	AC Transmission Goal	Transmission Security and Resource Adequacy
	<i>contingent upon finding needs in the RNA Preliminary (1st pass”) Base Case: no pertinent needs identified</i>	

1. “Perfect” capacity is capacity that is not derated (e.g., due to ambient temperature or unit unavailability) and not tested for transmission security or interface impacts

High Load Scenario Results

Year	Topline Load	Baseline Load	Delta Topline - RNA Base Case
2019	34,099	32,857	1,242
2020	34,367	32,629	1,738
2021	34,554	32,451	2,103
2022	34,727	32,339	2,388
2023	34,946	32,284	2,662
2024	35,132	32,276	2,856
2025	35,442	32,299	3,143
2026	35,750	32,343	3,407
2027	35,982	32,403	3,579
2028	36,154	32,469	3,685

High Load Scenario Finding:

Using the Gold Book Topline forecast, LOLE criterion violations would occur starting in 2025 and continue through the remainder of the Study Period.

Note: The scenario results in RNA are for information only.

Scenario	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Base Case	0.01	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
High Load Forecast	0.03	0.02	0.06	0.07	0.09	0.09	0.11	0.13	0.17	0.18

Zonal Capacity at Risk Results

Load Zones	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Zone A	1,450	1,500	1,400	1,400	1,400	1,400	1,400	1,400	1,400	1,350
Zone B ¹	EZR	EZR	EZR	EZR	EZR	EZR	EZR	EZR	EZR	EZR
Zone C	2,700	3,200	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,300
Zone D	1,900	1,900	1,900	1,850	1,850	1,850	1,850	1,850	1,850	1,800
Zone E ¹	EZR	EZR	EZR	EZR	EZR	EZR	EZR	EZR	EZR	EZR
Zone F	2,700	3,200	2,450	2,450	2,450	2,450	2,450	2,450	2,450	2,300
Zone G	2,400	2,900	2,100	2,100	2,100	2,100	2,100	2,100	2,100	1,950
Zone H ¹	EZR	EZR	EZR	EZR	EZR	EZR	EZR	EZR	EZR	EZR
Zone I ¹	EZR	EZR	EZR	EZR	EZR	EZR	EZR	EZR	EZR	EZR
Zone J	1,400	1,500	1,200	1,200	1,200	1,200	1,200	1,200	1,200	1,100
Zone K	850	950	900	900	900	900	900	850	850	800

¹ EZR = Exceeds Zonal Resources

Zonal Groups	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Zones A-F	2,700	3,200	2,450	2,450	2,450	2,450	2,450	2,450	2,450	2,300
Zones G-I	2,400	2,950	2,100	2,100	2,100	2,100	2,100	2,100	2,100	1,950

Notes:

- i. “Zonal capacity at risk” refers to the amount of MW of zonal “perfect capacity” which, if lost, can lead to NYCA LOLE violations
- ii. “Perfect capacity” in this context is capacity that is not derated (e.g., due to ambient temperature or unit unavailability) and not tested for transmission security or interface impacts

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Next Steps

September 26 MC: Market Monitoring Unit review and MC's recommendation for Board of Directors approval

October: Board of Directors approval

Questions?

We are here to help. Let us know if we can add anything.

The Mission of the New York Independent System Operator, in collaboration with its stakeholders, is to serve the public interest and provide benefits to consumers by:

- Maintaining and enhancing regional reliability
- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policy makers, stakeholders and investors in the power system



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