2014 RNA: Preliminary Results

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ESPWG/TPAS
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KCC

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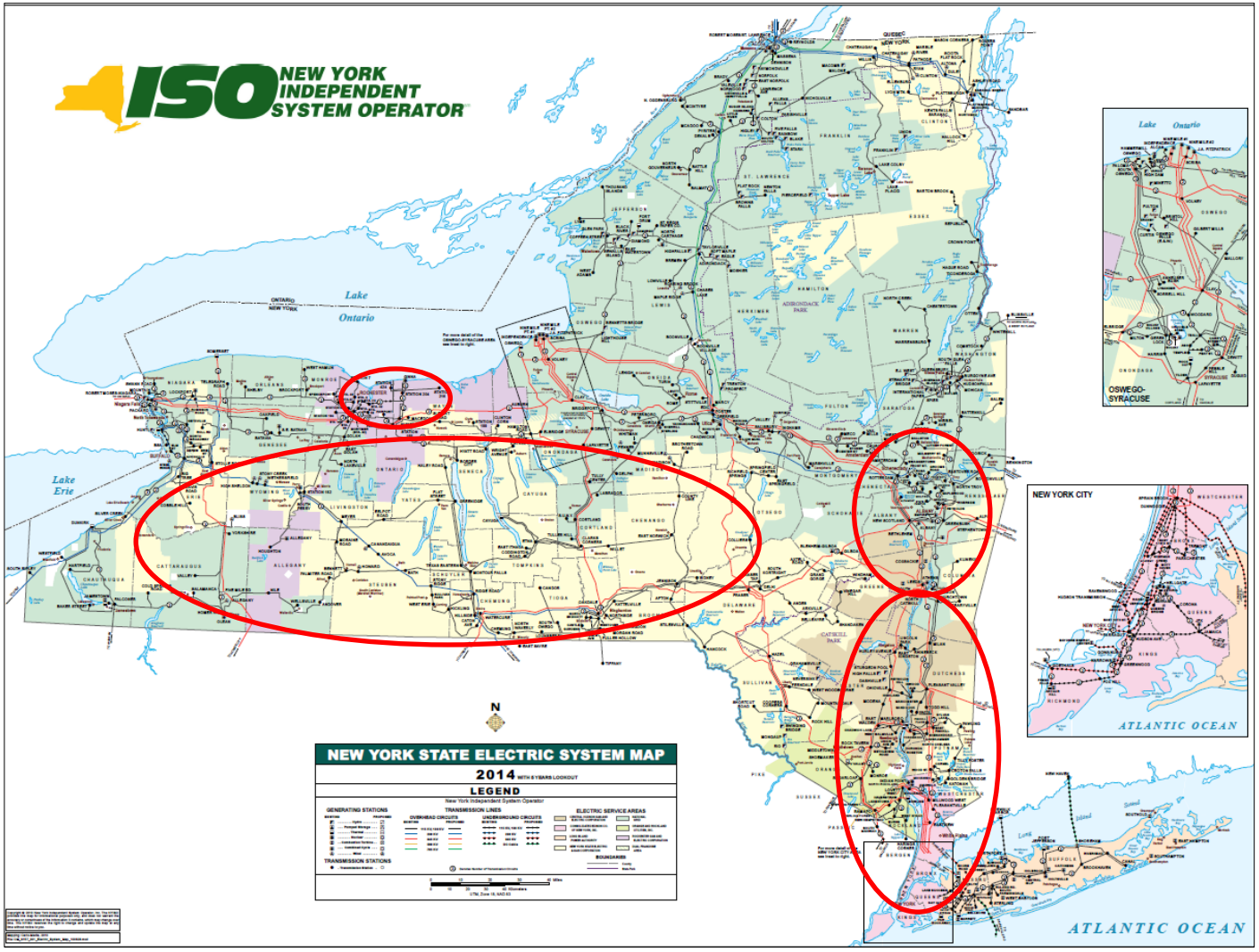
2014 RNA Timeline associated with Dunkirk Refueling Status

- **Timeline:**
  - *April 1, 2014: 2014 RNA assumptions locked down, both with and without Dunkirk Refueling as Base Case*
  - *May 15, 2014: Lack of PSC decision, Base case is locked down and modeled without Dunkirk Refueling*
  - *June 12, 2014: PSC Announces Dunkirk Repowering Approval*
- **Dunkirk Refueling**
  - *Not included in the Base Case: construction of the gas pipeline has not received regulatory approval*
  - *Will be included as a sensitivity*
  - *Will identify Reliability Needs mitigated by Dunkirk Refueling and report back to ESPWG*

Reliability Needs: Base Case

Year of Need	Transmission Security Violations (Transmission District/LBMP Zone/Transmission Owner)	Resource Adequacy (LOLE)
2015	Rochester Area in Genesee (Zone B), owned by RG&E	No violation
	Binghamton Area in Central (Zone C), owned by NYSEG	
	Syracuse Area in Central (Zone C), owned by N. Grid	
	Utica Area in Mohawk Valley (Zone E), owned by N. Grid	
	Albany Area in Capital (Zone F), owned by N. Grid	
2016	No additional violations	
2017	Rochester Area issues mitigated	
	Additional Syracuse Area in Central (Zone C), owned by N. Grid	
	Additional Utica Area violations	
2018	Buffalo Area in West (Zone A), owned by N. Grid	
2019	No additional violations	Violation (LOLE = 0.11)
2020	Additional Binghamton Area in Central (Zone C), owned by NYSEG	Violation (LOLE = 0.13)
2021	Additional Buffalo Area in West (Zone A), owned by N. Grid	Violation (LOLE = 0.15)
2022	Additional Buffalo Area in West (Zone A), owned by N. Grid	Violation (LOLE = 0.18)
	Transmission between Capital (Zone F) and Hudson Valley (Zone G), owned by N. Grid	
2023	No additional violations	Violation (LOLE = 0.22)
2024	No additional violations	Violation (LOLE = 0.26)

Map of Reliability Needs



Resource Addition and Removal

Compare generation status between 2012 RNA and 2014 RNA:

- **455.9 MW addition**
- **1368.8 MW removal**

Station Unit	Zone	CRIS (MW)	2012 RNA Status	2014 RNA Status
Resource Addition				
Stony Creek Wind	C	93.9	N/A	I/S since Nov. 2013
Taylor Biomass	G	19	N/A	I/S starting Dec. 2015
Astoria GT 10	J	24.9	O/S	return to service since July 15, 2013
Astoria GT 11	J	23.6	O/S	return to service since July 15, 2013
Gowanus 1	J	154.4	O/S	I/S (Intent to Retirement withdrawn)
Gowanus 4	J	140.1	O/S	I/S (Intent to Retirement withdrawn)
Total Resource Addition (CRIS MW)		**455.9**		
Resource Removal				
Dunkirk 2	A	97.2	O/S	I/S until May, 31 2015
RG&E Station 9	B	14.3	I/S	O/S
Seneca Oswego Fulton 1	C	0.7	I/S	O/S
Seneca Oswego Fulton 2	C	0.3	I/S	O/S
Syracuse Energy ST1	C	11	I/S	O/S
Syracuse Energy ST2	C	58.9	I/S	O/S
Cayuga 1	C	154.1	I/S	I/S until June 30 2017
Cayuga 2	C	154.1	I/S	I/S until June 30 2017
Chateaugay Power	D	18.2	I/S	O/S
Selkirk-I	F	76.1	I/S	O/S
Selkirk-II	F	271.6	I/S	O/S
Danskammer 1	G	61	I/S	O/S
Danskammer 2	G	59.2	I/S	O/S
Danskammer 3	G	137.2	I/S	O/S
Danskammer 4	G	236.2	I/S	O/S
Danskammer 5	G	0	I/S	O/S
Danskammer 6	G	0	I/S	O/S
Ravenswood 07	J	12.7	I/S	O/S
Montauk 2, 3, 4	K	6	I/S	O/S
Total Resource Removal (CRIS MW)		**1368.8**		

2014 RNA Base Case: Peak Load

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Peak Load (MW)										
NYCA*	34,066	34,412	34,766	35,111	35,454	35,656	35,890	36,127	36,369	36,580
Zone J*	12,050	12,215	12,385	12,570	12,700	12,790	12,900	12,990	13,100	13,185
Zone K*	5,543	5,588	5,629	5,668	5,708	5,748	5,789	5,831	5,879	5,923
Zone G-J*	16,557	16,749	16,935	17,149	17,311	17,421	17,554	17,694	17,828	17,935

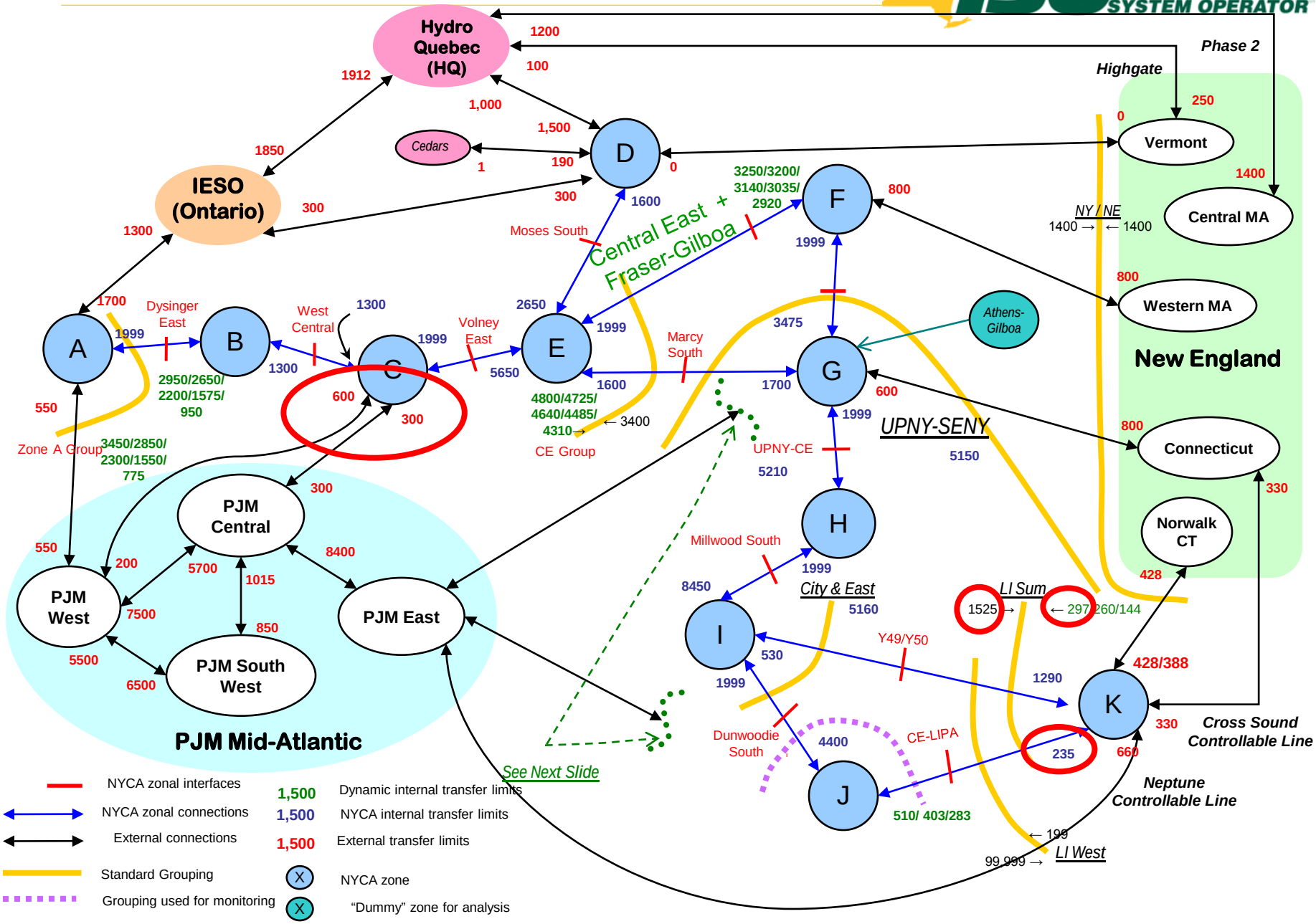
*NYCA load values represent Baseline Coincident Summer Peak Demand. Zones J and K load values represent Summer Non-Coincident Summer Peak Demand. Aggregate Zones G-J values represent G-J coincident peak which is non coincident with NYCA

2014 RNA Base Case: Resources

	Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
	Resources (MW)										
NYCA	Capacity**	37,375	37,394	37,085	37,085	37,085	37,085	37,085	37,085	37,085	37,085
	Net Purchases & Sales	2,237	2,237	2,237	2,237	2,237	2,237	2,237	2,237	2,237	2,237
	SCR	1,189	1,189	1,189	1,189	1,189	1,189	1,189	1,189	1,189	1,189
	Total Resources	**40,801**	**40,820**	**40,511**	**40,511**	**40,511**	**40,511**	**40,511**	**40,511**	**40,511**	**40,511**
	Capacity/Load Ratio	109.7%	108.7%	106.7%	105.6%	104.6%	104.0%	103.3%	102.7%	102.0%	101.4%
	Cap+NetPurch/Load Ratio	116.3%	115.2%	113.1%	112.0%	110.9%	110.3%	109.6%	108.8%	108.1%	107.5%
	Tot.Res./Load Ratio	119.8%	118.6%	116.5%	115.4%	114.3%	113.6%	112.9%	112.1%	111.4%	110.7%
Zone J	Capacity**	9,440	9,440	9,440	9,440	9,440	9,440	9,440	9,440	9,440	9,440
	UDR Awarded	635	635	635	635	635	635	635	635	635	635
	SCR	382	382	382	382	382	382	382	382	382	382
	Total Resources	**10,457**	**10,457**	**10,457**	**10,457**	**10,457**	**10,457**	**10,457**	**10,457**	**10,457**	**10,457**
	Capacity/Load Ratio	78.3%	77.3%	76.2%	75.1%	74.3%	73.8%	73.2%	72.7%	72.1%	71.6%
	Cap+UDR/Load Ratio	83.6%	82.5%	81.3%	80.1%	79.3%	78.8%	78.1%	77.6%	76.9%	76.4%
	Tot.Res./Load Ratio	86.8%	85.6%	84.4%	83.2%	82.3%	81.8%	81.1%	80.5%	79.8%	79.3%
Zone K	Capacity**	5,279	5,279	5,279	5,279	5,279	5,279	5,279	5,279	5,279	5,279
	UDR Awarded	756	756	756	756	756	756	756	756	756	756
	SCR	91	91	91	91	91	91	91	91	91	91
	Total Resources	**6,126**	**6,126**	**6,126**	**6,126**	**6,126**	**6,126**	**6,126**	**6,126**	**6,126**	**6,126**
	Capacity/Load Ratio	95.2%	94.5%	93.8%	93.1%	92.5%	91.8%	91.2%	90.5%	89.8%	89.1%
	Cap+UDR/Load Ratio	108.9%	108.0%	107.2%	106.5%	105.7%	105.0%	104.2%	103.5%	102.7%	101.9%
	Tot.Res./Load Ratio	110.5%	109.6%	108.8%	108.1%	107.3%	106.6%	105.8%	105.1%	104.2%	103.4%
Zone G-J	Capacity**	13,716	13,716	13,716	13,716	13,716	13,716	13,716	13,716	13,716	13,716
	UDR Awarded	635	635	635	635	635	635	635	635	635	635
	SCR	446	446	446	446	446	446	446	446	446	446
	Total Resources	14,797	14,797	14,797	14,797	14,797	14,797	14,797	14,797	14,797	14,797
	Capacity/Load Ratio	82.8%	81.9%	81.0%	80.0%	79.2%	78.7%	78.1%	77.5%	76.9%	76.5%
	Cap+UDR/Load Ratio	86.7%	85.7%	84.7%	83.7%	82.9%	82.4%	81.8%	81.1%	80.5%	80.0%
	Tot.Res./Load Ratio	89.4%	88.3%	87.4%	86.3%	85.5%	84.9%	84.3%	83.6%	83.0%	82.5%

** NYCA Capacity values include resources electrically internal to NY, Additions, Reratings, Retirements (including Proposed 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

Topology Update: Transmission System Representation for Year 2015



Net Change in Capacity Less Load

Year 2019	2012 RNA	2014 RNA	delta
Load	35,204	35,454	250
SCR	2,165	1,189	-976
Total Capacity without SCRs	40,196	39,322	-874
Net Change in capacity less load (MW)			2,100

Transmission Security: Thermal

Zone	Owner	Monitored Element	Normal Rating (MVA)	LTE Rating (MVA)	STE Rating (MVA)	2015 Flow (MVA)	2019 Flow (MVA)	2024 Flow (MVA)	First Contingency	Second Contingency
A	N.Grid	Packard-Huntley (#77) 230 (Packard-Sawyer)	556	644	704			649	Packard-Huntley (#78) 230	SB Robinson Rd 230
A	N.Grid	Packard-Huntley (#78) 230 (Packard-Sawyer)	556	644	746			649	Packard-Huntley (#77) 230	SB Robinson Rd 230
A	N.Grid	Huntley-Gardenville (#79) 230 (Huntley-Sawyer)	566	654	755			664	Huntley-Gardenville (#80) 230	SB Robinson Rd 230
A	N.Grid	Huntley-Gardenville (#80) 230 (Huntley-Sawyer)	566	654	755		661	672	Huntley-Gardenville (#79) 230	SB Robinson Rd 230
								697	Robinson-Stolle Rd (#65) 230	Huntley-Gardenville (#79) 230
B	RGE	Pannell 345/115 1TR	228	282	336	372			L/O Ginna	SB Pannell 345
B	RGE	Pannell 345/115 2TR	228	282	336	372			L/O Ginna	SB Pannell 345
B	RGE	Pannell-Quaker (#914) 115	207.1	246.9	284.8	298			L/O Ginna	Pannell 345/115 3TR
C	NYSEG	Oakdale 345/115 2TR	428	556	600	573			Watercure 345/230 1TR	SB Oakdale 345
							440	444	Oakdale 345/115 3TR	Base Case
							574	586	Fraser 345/115 2TR	SB Oakdale 345
C	NYSEG	Oakdale 345/115 3TR	428	556	600			438	Oakdale 345/115 2TR	Base Case
C	N.Grid	Clay-Lockheed Martin (#14) 115	116	120	145	146	166	168	SB Oswego 345	N/A
							139	142	Elbridge 345/115 1TR	Base Case
						165	204	216	Clay-Woodard (#17) 115	SB Lafayette 345
C	N.Grid	Clay-Teall (#10) 115 (Clay-Bartell Rd-Pine Grove)	116	120	145	131			Clay-Teall (#11) 115	SB Dewitt 345
C	N.Grid	Clay-Dewitt (#3) 115 (Clay-Bartell Rd)	116	120	145	126			Clay-Dewitt (#13) 345	SB Oswego 345
C	N.Grid	Clay 345/115 1TR	478	637	794		710	757	Oswego-Elbridge-Lafayette (#17) 345	SB Clay 345
C	N.Grid	Clay-Woodard (#17) 115 (Euclid-Woodward)	174	174	174			183	SB Lafayette 345	N/A
							207	220	Clay-Lockheed Martin (#14) 115	SB Lafayette 345
C	N.Grid	S. Oswego-Clay (#4) 115 (S. Oswego-Whitaker)	104	104	104		114	117	Clay 345/115 1TR	SB Clay 345
E	N.Grid	Porter-Yahnundasis (#3) 115 (Porter-Kelsey)	116	120	145	128	141	142	Oswego-Elbridge-Lafayette (#17) 345	SB Clay 345
								143	Clay-Dewitt (#13) 345	SB Oswego 345
E	N.Grid	Porter-Oneida (#7) 115 (Porter-W. Utica)	116	120	145		122	125	Oswego-Elbridge-Lafayette (#17) 345	SB Clay 345
								126	Clay-Dewitt (#13) 345	SB Oswego 345
F	N.Grid	Rotterdam 230/115 7TR	300	355	402	438	400	435	Eastover Rd. 230/115	SB Rotterdam 230
F	N.Grid	New Scotland 345/115 1TR	458	570	731	631	659	837	L/O Bethlehem	New Scotland (#77) 345
F	N.Grid	Reynolds 345/115	459	562	755	492	498	584	L/O Bethlehem	Base Case
F-G	N.Grid	Leeds-Pleasant Valley (#92) 345	1331	1538	1724			1587	Athens-Pleasant Valley (#91) 345	Tower 41&33
F-G	N.Grid	Athens-Pleasant Valley (#91) 345	1331	1538	1724			1584	Leeds-Pleasant Valley (#92) 345	Tower 41&33

Transmission Security: Voltage

- Oakdale area has low voltage under N-1-1 conditions starting in 2017 for loss of transformer sources into the local area from the bulk system.
- The Porter 115 kV area has local low voltage issues in all years due to a stuck breaker contingency.

Transmission Security Assessment

- In March 2014 Selkirk Cogen Partners submitted their intent to mothball Selkirk I and Selkirk II
- Pre- and post-contingency overloads on non-bulk facilities in the Capital Region
- N-1-1 overloads were also noted on BPTF
  - *Reynolds 345/115 kV transformer*
  - *New Scotland 345/115 kV transformer*
  - *Rotterdam 230/115 kV transformer*
- National Grid developing corrective action plans as part of their local transmission plan
- The loadings on BPTF facilities will be reevaluated in the CRP with the corrective action plans

Transmission Security Reliability Need Year

Zone	Owner	Monitored Element	Year of Need
B	RGE	Pannell 345/115 1TR	2015
B	RGE	Pannell 345/115 2TR	2015
B	RGE	Pannell-Quaker (#914) 115	2015
C	NYSEG	Oakdale 345/115 2TR	2015
C	N.Grid	Clay-Lockheed Martin (#14) 115	2015
C	N.Grid	Clay-Teall (#10) 115 (Clay-Bartell Rd-Pine Grove)	2015
C	N.Grid	Clay-Dewitt (#3) 115 (Clay-Bartell Rd)	2015
E	N.Grid	Porter-Yahnundasis (#3) 115 (Porter-Kelsey)	2015
F	N.Grid	Rotterdam 230/115 7TR	2015
F	N.Grid	New Scotland 345/115 1TR	2015
F	N.Grid	Reynolds 345/115	2015
C	N.Grid	Clay 345/115 1TR	2017
C	N.Grid	Clay-Woodard (#17) 115 (Euclid-Woodward)	2017
C	N.Grid	S. Oswego-Clay (#4) 115 (S. Oswego-Whitaker)	2017
E	N.Grid	Porter-Oneida (#7) 115 (Porter-W. Utica)	2017
A	N.Grid	Huntley-Gardenville (#80) 230 (Huntley-Sawyer)	2018
C	NYSEG	Oakdale 345/115 3TR	2020
A	N.Grid	Packard-Huntley (#77) 230 (Packard-Sawyer)	2021
A	N.Grid	Packard-Huntley (#78) 230 (Packard-Sawyer)	2021
A	N.Grid	Huntley-Gardenville (#79) 230 (Huntley-Sawyer)	2022
F	N.Grid	Leeds-Pleasant Valley (#92) 345	2022
F	N.Grid	Athens-Pleasant Valley (#91) 345	2022

Base Case LOLE (LOLE criteria = 0.1)

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
Zone A	0	0	0	0	0	0	0	0	0	0
Zone B	0.02	0.02	0.04	0.05	0.06	0.06	0.07	0.08	0.08	0.09
Zone C	0	0	0	0	0	0	0	0	0	0
Zone D	0	0	0	0	0	0	0	0	0	0
Zone E	0.02	0.02	0.04	0.05	0.06	0.06	0.07	0.08	0.08	0.09
Zone F	0	0	0	0	0	0	0	0	0	0
Zone G	0.01	0.01	0.02	0.03	0.04	0.04	0.05	0.06	0.07	0.08
Zone H	0	0	0	0	0	0	0	0	0	0
Zone I	0.04	0.04	0.06	0.08	0.11	0.13	0.15	0.18	0.22	0.25
Zone J	0.04	0.04	0.06	0.08	0.10	0.12	0.15	0.18	0.21	0.25
Zone K	0.01	0.02	0.03	0.04	0.06	0.07	0.09	0.12	0.15	0.19
NYCA	0.04	0.04	0.06	0.08	0.11	0.13	0.15	0.18	0.22	0.26

Compensatory MW

Table below provides an example of possible compensatory MW solutions to mitigate NYCA LOLE violations. The locational dependency is shown using three independent groups of zone(s). Lowest values highlight the most effective location.

Zones Adjusted	Only in G-J	Only in K	Only in ABCEF	Only in J	Only in G-I
MW Distribution	25% each	100%	20% each	100%	33.3% each
2015	-	-	-	-	-
2016	-	-	-	-	-
2017	-	-	-	-	-
2018	-	-	-	-	-
2019	100	100	400	100	100
2020	300	300	3900	300	300
2021	500	500	5600	500	500
2022	700	800	7400	700	700
2023	950	1100	not feasible	950	950
2024	1150	1500	not feasible	1150	1150

Stressed Winter Scenario: Proposed Methodology

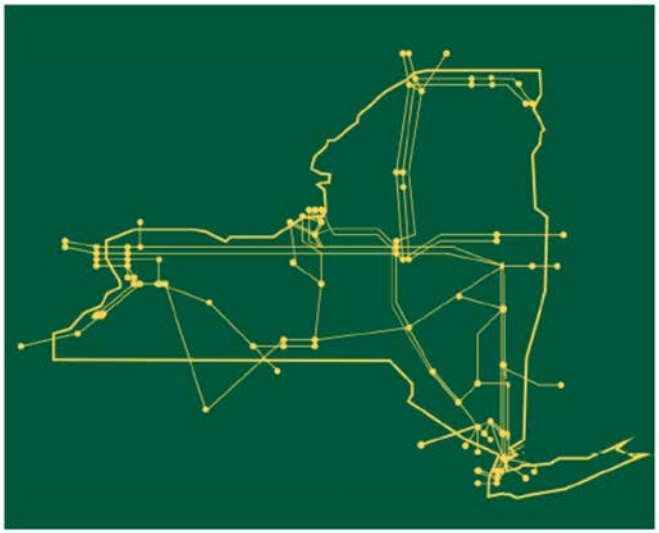
- Goals:
  - *Impose broader regional limitation in NYCA and all externals*
  - *Report on the levels of capacity loss that could occur before LOLE is violated in the RNA*
- Test stressed winter conditions by representing capacity loss:
  - *Apply to all resource types, state-wide based on zonal aggregate*
  - *Apply in January 2015 in the MARS model to evaluate incremental impact to 2015 LOLE*

Assumptions

- MARS topology:
  - *Consistent with 2014 RNA base case model for 2015*

- January 2014 load conditions as basis:
  - *Update load forecast and shape for January 2015*
  - *Modify winter LFU to account for actual January 2014 conditions*
  - *Winter LFU multipliers would be lowered based on amount actual conditions were above 50/50 midpoint*

The New York Independent System Operator (NYISO) is a not-for-profit corporation responsible for operating the state's bulk electricity grid, administering New York's competitive wholesale electricity markets, conducting comprehensive long-term planning for the state's electric power system, and advancing the technological infrastructure of the electric system serving the Empire State.



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