NYSRC Fall Forecast Update – Preliminary

2019 IRM Forecast

Arthur Maniaci
Load Forecasting & Analysis

NYSRC – Installed Capacity Subcommittee
October 3, 2018

NEW YORK INDEPENDENT SYSTEM OPERATOR

Overview

1. 2018 Weather Normalized Peaks
2. 2019 IRM Forecast
3. Supporting Details & Calculations

NEW YORK INDEPENDENT SYSTEM OPERATOR

1. 2018 Weather Normalized Peaks

Actual and 20-Year Normal Peak-Producing CTHI Statistics – 1999-2018

Peak Producing CTHI									
Statistic	**CE**	**CH**	**LI**	**N Grid**	**NYPA**	**NYSEG**	**OR**	**RGE**	**NYCA**
Max	91.61	90.18	91.70	86.53	87.86	87.47	90.18	88.33	88.26
20 Yr Avg	86.30	85.51	85.12	82.30	82.19	82.41	85.51	83.56	84.15
Min	81.55	81.83	78.98	77.35	77.26	78.00	81.83	78.50	79.19
StDev	2.86	2.73	3.43	2.55	3.16	2.59	2.73	2.62	2.70
50th	86.30	85.51	85.12	82.30	82.19	82.41	85.51	83.56	84.15
67th	87.54	86.69	86.61	83.40	83.56	83.53	86.69	84.70	85.31
90th	89.97	89.00	89.53	85.57	86.25	85.73	89.00	86.93	87.60
2018	87.23	85.70	85.78	83.17	85.18	82.86	85.70	84.73	85.12
Percentile	63%	53%	58%	63%	83%	57%	53%	67%	64%
z (2018)	0.33	0.07	0.19	0.34	0.94	0.17	0.07	0.44	0.36
CTHI Delta	0.93	0.19	0.66	0.87	2.99	0.45	0.19	1.17	0.97

Peak-producing CTHI is the Cumulative Temperature-Humidity Index that occurs on the day of the NYCA peak each year.

$$Z = \frac{(CTHI - Avg)}{Std\ Dev}$$

Con-Ed and O&R use the 67th percentile for design conditions. All others use the 50th percentile.

NEW YORK INDEPENDENT SYSTEM OPERATOR

Weather Normalization Models and Method

- **Weather-Response Method**
  1. Obtain a regression equation and take its derivative f'(CTHI) (i.e., the slope of the regression line).
  2. Evaluate derivative at design condition. Multiply by difference of (Normal – Actual) CTHI.
  3. Add this change in load to the actual observed MW value.

- **Pooled models (2013, 2016 & 2018) & Single Year Models (2018)**

2018 Coincident Peak Weather Normalization by Transmission District

(1)	(2)	(3a)	(3b)	(4)	(5)	(6) = (3b)+(4)+(5)	(7)	(8) = (7)-(6)	(9) = (8)/(7)	(10)	(11)	(12)
Transmission District	2018 Actual MW, 8/29/2018 HB 16	Demand Response Estimate MW	2018 Actual MW, with DR Estimate	Estimated Muni Self-Gen	Weather Adjustment MW	2018 Weather Normalized MW	2018 ICAP Forecast, Without Loss Adjustment	TO Forecast, Over /Under MW	TO Forecast Error, Percent Over /Under	Loss Reallocation MW	2018 WN MW, Adj for Losses	2018 ICAP Market Forecast MW
Con Edison	12,686	295	12,981	0	119	13,100	13,144	44	0.3%	151	13,251	13,310
Cen Hudson	1,102	7	1,109	0	-5	1,104	1,080	-24	-2.2%	-2	1,102	1,070
LIPA	5,422	15	5,437	10	-115	5,332	5,322	-10	-0.2%	41	5,373	5,368
Nat. Grid	6,680	214	6,894	56	-135	6,815	7,070	255	3.6%	-207	6,608	6,833
NYPA	366	0	366	0	-2	364	324	-40	-12.3%	3	367	328
NYSEG	3,114	35	3,149	0	-34	3,115	3,254	139	4.3%	-13	3,102	3,254
O&R	1,035	19	1,054	0	68	1,122	1,130	8	0.7%	13	1,135	1,146
RG&E	1,531	9	1,540	0	-48	1,492	1,578	86	5.4%	14	1,506	1,594
Grand Total	31,936	594	32,530	66	-152	32,444	32,902	458	1.4%	0	32,444	32,903

Weather normalization based upon TO estimates and NYISO composite model results.

NEW YORK INDEPENDENT SYSTEM OPERATOR

2018 Locality Peak Weather Normalization

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Locality	Date and Time (Hr Beginning)	2018 Actual MW	Demand Response Estimate MW	Estimated Muni Self-Gen	Locality Adjustment MW	2018 Adjusted MW	2018 ICAP Market Forecast MW	Over/Under MW	Percent Over/Under
Zone J - NYC	9/6/2018 HB 16	11,018	100	0	422	11,540	11,539	-1	0.0%
Zone K - LI	8/29/2018 HB 16	5,422	15	10	-67	5,380	5,376	-4	-0.1%
Zone GHIJ	9/6/2018 HB 15	15,062	100	0	648	15,810	15,918	108	0.7%

Locality adjustment based upon coincident peak results and NCP/CP ratios for each Locality.

2. 2019 IRM Study Forecast

2019 IRM Coincident Peak Forecast by Transmission District

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10a)=(8)*(9)	(10b)	(10c)=(10a)+(10b)
Transmission District	**2018 Actual MW**	**Demand Response Estimate MW**	**2018 Estimated Muni Self-Gen**	**Weather Adjustment MW**	**2018 Weather Normalized MW**	**Loss Reallocation MW**	**2018 WN MW, Adj for Losses**	**Regional Load Growth Factors**	**2019 Forecast, Before Adjustments**	**BTM:NG and Other Adjustments to Load**	**2019 IRM Final Forecast**
Con Edison	**12,686**	295	0	119	**13,100**	0	**13,100**	**1.0038**	**13,150**		**13,150.0**
Cen Hudson	**1,102**	7	0	-5	**1,104**	0	**1,104**	**0.9920**	**1,095**		**1,095.0**
LIPA	**5,422**	15	10	-115	**5,332**	0	**5,332**	**0.9859**	**5,257**	**40.6**	**5,297.6**
NGrid	**6,680**	214	56	-135	**6,815**	0	**6,815**	**1.0010**	**6,822**		**6,822.0**
NYPA	**366**	0	0	-2	**364**	0	**364**	**1.1621**	**423**		**423.0**
NYSEG	**3,114**	35	0	-34	**3,115**	0	**3,115**	**0.9982**	**3,109**	**11.6**	**3,120.6**
O&R	**1,035**	19	0	68	**1,122**	0	**1,122**	**0.9822**	**1,102**		**1,102.0**
RG&E	**1,531**	9	0	-48	**1,492**	0	**1,492**	**0.9904**	**1,478**		**1,478.0**
Total	**31,936**	**594**	**66**	**-152**	**32,444**	0	**32,444**	**0.9998**	**32,436**	**52.2**	**32,488.2**
						2019 Forecast from 2018 Gold Book			**32,857**		
						Change from 2018 Gold Book			**-421**		

Note: NYPA RLGF reflects anticipated industrial load growth impact.

NEW YORK INDEPENDENT SYSTEM OPERATOR

2019 IRM Locality Peak Forecast

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11a)	(11b)=(8)+(11a)
Locality	**2018 Actual MW**	**SCR/EDRP Estimate MW**	**2018 Estimated Muni Self-Gen**	**Locality Adjustment MW**	**2018 Weather Normalized MW**	**Regional Load Growth Factors**	**2019 Forecast, Before Adjustments**	**2019 Forecast from 2018 Gold Book**	**Change from Gold Book Forecast**	**BTM:NG and Other Adjustments to Load**	**2019 IRM Final Forecast**
Zone J - NYC	**11,018**	100	0	422	**11,540**	**1.0038**	**11,585**	**11,474**	**111**		**11,585.0**
Zone K - LI	**5,422**	15	10	-67	**5,380**	**0.9859**	**5,305**	**5,323**	**-18**	**40.6**	**5,345.6**
Zone GHIJ	**15,062**	100	0	648	**15,810**	**1.0013**	**15,831**	**15,815**	**16**		**15,831.0**

Locality adjustment based upon coincident peak results and NCP/CP ratios for each Locality.

2019 IRM Coincident Peak Forecast by Transmission District and Zone

	A	B	C	D	E	F	G	H	I	J	K	NYCA
Con Edison								270.9	1,405.1	11,474.0		13,150.0
Cen Hudson					4.0		1,091.0					1,095.0
LIPA											5,297.6	5,297.6
Nat. Grid	1,781.7	440.4	1,299.5	87.0	928.9	2,284.5						6,822.0
NYPA				423.0								423.0
NYSEG	657.9		1,445.0	109.5	384.7	151.1	23.8	348.6				3,120.6
O&R							1,102.0					1,102.0
RG&E		1,478.0										1,478.0
Total	2,439.6	1,918.4	2,744.5	619.5	1,317.6	2,435.6	2,216.8	619.5	1,405.1	11,474.0	5,297.6	32,488.2

2019 IRM Non-Coincident Peak Forecast by Transmission District and Zone

	A	B	C	D	E	F	G	H	I	J	K
Con Edison								274.3	1,420.7	11,585.0	
Cen Hudson					4.2		1,116.6				
LIPA											5,345.6
Nat. Grid	1,875.2	451.3	1,335.4	90.5	975.8	2,347.3					
NYPA				440.0							
NYSEG	692.4		1,484.6	113.9	404.1	155.3	24.4	352.0			
O&R							1,125.0				
RG&E		1,514.7									
Total	2,567.6	1,966.0	2,820.0	644.4	1,384.1	2,502.6	2,266.0	626.3	1,420.7	11,585.0	5,345.6

2019 IRM G-to-J Locality Forecast by Transmission District and Zone

	G	H	I	J	G-J	RLGF
Con Edison		272.9	1,415.5	11,558.1	13,246.5	**1.0038**
Cen Hudson	1,099.1				1,099.1	**0.9920**
LIPA					0.0	
Nat. Grid					0.0	
NYPA					0.0	
NYSEG	24.0	351.2			375.2	**0.9982**
O&R	1,110.2				1,110.2	**0.9822**
RG&E					0.0	
Total	2,233.3	624.1	1,415.5	11,558.1	15,831.0	**1.0013**
NCP/CP Ratio	**1.0074**	**1.0074**	**1.0074**	**1.0074**		

NEW YORK INDEPENDENT SYSTEM OPERATOR

3. Supporting Details & Calculations

2018 Actual Coincident Peak Load

	A	B	C	D	E	F	G	H	I	J	K	Total
Con Edison								261.3	1,355.5	11,069.2		12,686.0
Cen Hudson					4.0		1,098.4					1,102.4
LIPA											5,422.0	5,422.0
Nat. Grid	1,744.6	431.2	1,272.5	85.2	909.6	2,237.0						6,680.1
NYPA				366.1								366.1
NYSEG	659.0		1,435.7	109.7	385.3	151.3	23.8	349.2				3,114.0
O&R							1,035.0					1,035.0
RG&E		1,531.2										1,531.2
Total	2,403.6	1,962.4	2,708.2	561.0	1,298.9	2,388.3	2,157.2	610.5	1,355.5	11,069.2	5,422.0	31,936.8

Zonal Energy Fractions for each TD

	A	B	C	D	E	F	G	H	I	J	K	Total
Con Edison								0.0206	0.1069	0.8726		1.0000
Cen Hudson					0.0036		0.9964					1.0000
LIPA											1.0000	1.0000
Nat. Grid	0.2612	0.0645	0.1905	0.0128	0.1362	0.3349						1.0000
NYPA				1.0000								1.0000
NYSEG	0.2116		0.4610	0.0352	0.1237	0.0486	0.0076	0.1121				1.0000
O&R							1.0000					1.0000
RG&E		1.0000										1.0000

2018 Weather-Adjusted Coincident Peak

	A	B	C	D	E	F	G	H	I	J	K	Total
Con Edison								269.8	1,399.7	11,430.4		13,100.0
Cen Hudson					4.0		1,100.0					1,104.0
LIPA											5,332.0	5,332.0
Nat. Grid	1,779.8	439.9	1,298.2	86.9	928.0	2,282.2						6,815.0
NYPA				364.0								364.0
NYSEG	659.2		1,436.2	109.7	385.4	151.3	23.8	349.3				3,115.0
O&R							1,122.0					1,122.0
RG&E		1,492.0										1,492.0
Total	2,439.0	1,931.9	2,734.4	560.7	1,317.4	2,433.5	2,245.8	619.1	1,399.7	11,430.4	5,332.0	32,444.0

2019 IRM Coincident Peak Forecast by Transmission District and Zone, Before Adjustments

	A	B	C	D	E	F	G	H	I	J	K	NYCA
Con Edison								270.9	1,405.1	11,474.0		13,150.0
Cen Hudson					4.0		1,091.0					1,095.0
LIPA											5,257.0	5,257.0
Nat. Grid	1,781.7	440.4	1,299.5	87.0	928.9	2,284.5						6,822.0
NYPA				423.0								423.0
NYSEG	657.9		1,433.4	109.5	384.7	151.1	23.8	348.6				3,109.0
O&R							1,102.0					1,102.0
RG&E		1,478.0										1,478.0
Total	2,439.6	1,918.4	2,732.9	619.5	1,317.6	2,435.6	2,216.8	619.5	1,405.1	11,474.0	5,257.0	32,436.0

2019 IRM BTM:NG and Other Adjustments to Load

	A	B	C	D	E	F	G	H	I	J	K	NYCA
Con Edison												
Cen Hudson												
LIPA											40.6	40.6
Nat. Grid												
NYPA												
NYSEG			11.6									11.6
O&R												
RG&E												
Total			11.6								40.6	52.2

2019 IRM Final Coincident Peak Forecast by Transmission District and Zone, With Adjustments

	A	B	C	D	E	F	G	H	I	J	K	NYCA
Con Edison								270.9	1,405.1	11,474.0		13,150.0
Cen Hudson					4.0		1,091.0					1,095.0
LIPA											5,297.6	5,297.6
Nat. Grid	1,781.7	440.4	1,299.5	87.0	928.9	2,284.5						6,822.0
NYPA				423.0								423.0
NYSEG	657.9		1,445.0	109.5	384.7	151.1	23.8	348.6				3,120.6
O&R							1,102.0					1,102.0
RG&E		1,478.0										1,478.0
Total	2,439.6	1,918.4	2,744.5	619.5	1,317.6	2,435.6	2,216.8	619.5	1,405.1	11,474.0	5,297.6	32,488.2

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

www.nyiso.com

NEW YORK INDEPENDENT SYSTEM OPERATOR