NYCA IRM Requirement Study 2022-2023 Preliminary Base Case (PBC) Model Assumptions Matrix

Draft V 3.0

NYSRC

Installed Capacity Subcommittee Meeting #245

March 30, 2021

Load Forecast Uncertainty

#	Parameter	2021 Model Assumptions	2022 Model Assumptions	Basis for Recommendation	Model Change	Expected Date	Est. IRM Impact*
1	Peak Load Forecast (Preliminary Base Case – Parametric & Sensitivities)	2020 Gold Book NYCA: 32,129MW[1] NYC: 11,460 MW LI: 5,139 MW G-J: 15,660 MW				May 2021	
2	Peak Load Forecast (Final Base Case)	October 2020 Fcst. NYCA: 32,243 MW[2] NYC: 11,232 MW LI: 5,282.0 MW G-J: 15,385 MW				November 2021	
3	Load Shape (Multiple Load Shape)	Bin 1: 2006 Bin 2: 2002 Bins 3-7: 2007				N/A	
4	Load Forecast Uncertainty (LFU)-	Zonal Model to reflect current data with input from Con Ed and LIPA. (Attachment A1)				May 2021	
5	LFU Winter	Attachment A2				May 2021	

*(-) indicates a reduction in IRM while (+) indicates an increase. Range: Low < 0.5%, Medium 0.5% - 1%, High > 1%, Minimal indicates there may be some movement but within 0 to +/- 0.1%.
New Capacity resources will continue to be tracked by the NYISO. The Final Base Case resource list is subject to change based on project status' by October 2020.
1 The loads associated with the BTM-NG program need to be added to these values.
2 BTM-NG loads have been incorporated into these numbers.

[3] Hudson Ave GT 3 is returning from IIFO. This unit was not removed from the Preliminary Base Case while in IIFO and will continue to be modeled in the Final Base Case.

*Units that did not participate in the Capacity Market have been removed from this year's study

Generation Parameters

#	Parameter	2021 Model Assumptions	2022 Model Assumptions	Basis for Recommendation	Model Change	Expected Date	Est. IRM Impact*
6	Existing Generating Unit Capacities	2020 Gold Book Values. Use min. (DMNC vs. CRIS) capacity value				May 2021	
7	Proposed New Units (Thermal) and re-ratings	0 MW of new Thermal resources[3], plus 56.6 MW of project related re-ratings. (Attachment B1)				May 2021	
8	Deactivations and Removals*	1,104 MW of unit deactivations and 192.7 MW of unit removals (Attachment B2)				May 2021	
9	Forced and Partial Outage Rates	Five-year (2015-2019) GADS data for each unit represented. Those units with less than five years – use representative data. (Attachment C)				April 2021	
10	Planned Outages	Based on schedules received by the NYISO and adjusted for history				April 2021	

Generation Parameters

#	Parameter	2021 Model Assumptions	2022 Model Assumptions	Basis for Recommendation	Model Change	Expected Date	Est. IRM Impact*
11	Summer Maintenance	Nominal 50 MWs – divided equally between Zones J and K				August 2021	
12	Combustion Turbine Derates	Derate based on temperature correction curves provided				April 2021	
13	Existing and Proposed New Wind Units[4]	126.5 MW of Wind Capacity additions totaling 1865.7 MW of qualifying wind (Attachment B3)				May 2021 & July 2021	
14	Wind Shape	Actual hourly plant output over the period 2015-2019. New units will use zonal hourly averages or nearby units.				April 2021	
15	Existing and Proposed New Solar Resources[4]	0 MW of Solar Capacity additions totaling 31.5MW of qualifying Solar Capacity. (Attachment B3)				May 2021 & July 2021	
16	Solar Shape	Actual hourly plant output over the period 2015-2019. New units will use zonal hourly averages or nearby units.				April 2021	

[4]Units that did not participate in the Capacity Market have been removed from this year's study

Generation Parameters

#	Parameter	2021 Model Assumptions	2022 Model Assumptions	Basis for Recommendation	Model Change	Expected Date	Est. IRM Impact*
17	BTM- NG Program	Two new BTM NG resource (Attachment B5)				May 2021	
18	Small Hydro Resources	Actual hourly plant output over the period 2015-2019.				April 2021	
19	Large Hydro	Probabilistic Model based on five years of GADS data (2015-2019)				April 2021	
20	Landfill Gas	Actual hourly plant output over the period 2015-2019.				April 2021	
21	New ESR (Energy Storage Resources)[4]	0 MW of new battery storage scheduled. 0MW of total battery storage modeled (see attachment B4)				May 2021	
22	Energy Limited Resources (ELR)	Based upon elections made by August 1st 2020				August 2021	

[4]Units that did not participate in the Capacity Market have been removed from this year's study

Transactions- Imports and Exports

#	Parameter	2021 Model Assumptions	2022 Model Assumptions	Basis for Recommendation	Model Change	Expected Date	Est. IRM Impact*
23	Capacity Purchases	Existing Rights: PJM – 1,080 MW HQ – 1,110 MW All contracts modeled as equivalent contracts				April 2021	
24	Capacity Sales	Long Term firm sales Summer 265.9 MW				June 2021	
25	FCM Sales from a Locality[5]	No sales modeled within study period				April 2021	
26	Wheels through NYCA	300 MW HQ to NE equivalent contract				April 2021	
27	New UDRs (Unforced capacity Deliverability Rights)	Projects with expired CRIS will be modeled as Emergency Assistance Only: HTP				April 2021 & August 2021	
28	New EDRs (External Deliverability Rights)	0 MWs for 2021 Study				July 2021	

[5] Final FCM sales that will materialize are unknowable at the time of the IRM study. To reflect the impact these sales have on reliability, the NYISO applies a Locality Exchange Factor in the market.

Topology

#	Parameter	2021 Model Assumptions	2022 Model Assumptions	Basis for Recommendation	Model Change	Expected Date	Est. IRM Impact*
29	Interface Limits	Removal of PJM-SENY Group Interface, PSEG-LI updates to increase Zone K Imports/Exports: Jamaica ties no longer dependent on Barrett Availability (Attachment E-E4)				May 2021	
30	New Transmission	None Identified				April 2021	
31	AC Cable Forced Outage Rates	All existing Cable EFORds for NYC and LI to reflect most recent five-year history (2015-2019)				April 2021	
32	UDR Line Unavailability	Five year history of forced outages (2015-2019)				April 2021	

Emergency Operating Procedures

#	Parameter	2021 Model Assumptions	2022 Model Assumptions	Basis for Recommendation	Model Change	Expected Date	Est. IRM Impact*
33	Special Case Resources	July 2020 –1195 MW based on registrations and modeled as 822 MW of effective capacity. Monthly variation based on historical experience.				August 2021	
34	Other EOPs	844.4 MW of non- SCR/non-EDRP resources [6](Attachment D)				August 2021	
35	EOP Structure	10 EOP steps modeled				April 2021	

[6]NYISO proposes to model "General Public Appeals" MW using the same value as the 2020 IRM study unless a Transmission Owner presents analysis supporting an alternate MW value.

External Control Areas

#	Parameter	2021 Model Assumptions	2022 Model Assumptions	Basis for Recommendation	Model Change	Expected Date	Est. IRM Impact*
36	PJM	Load and Capacity data will be provided by ISONE/NPCC CP-8 Data may be adjusted per NYSRC Policy 5 (Attachment E)				May 2021	
37	ISONE, Quebec, IESO	Load and Capacity data will be provided by ISONE/NPCC CP-8 Data adjusted per NYSRC Policy 5 (Attachment E)				May 2021	
38	External Adjustments per Policy 5	If needed, add load to externals proportional to existing excess capacity					
39	Reserve Sharing	All NPCC Control Areas indicate that they will initially share reserves equally among all members and then among non-members				April 2021	
40	Emergency Assistance	Statewide Limit of 3,500 MW of emergency assistance allowed from neighbors.				April 2021	

Miscellaneous

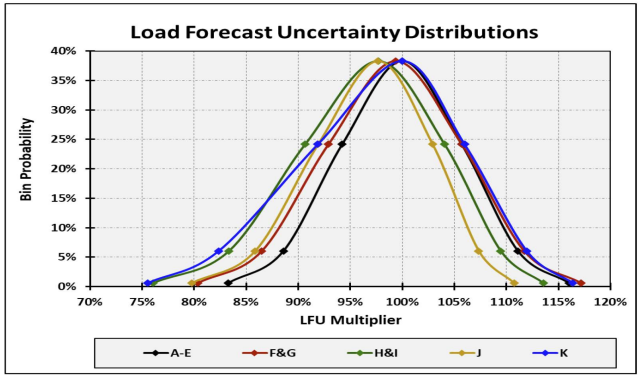
#	Parameter	2021 Model Assumptions	2022 Model Assumptions	Basis for Recommendation	Model Change	Expected Date	Est. IRM Impact*
41	MARS Model Version	3.31.1546				April 2021	
42	Environmental Initiatives	No new rules for 2021 Capability Year				July 2021	

Attachment A1

NYCA Summer Load Forecast Uncertainty Model: 2021 and 2022

Load Forecast 2022

Load Forecast 2021



Bin	Probability	A-E	F&G	H&I	J	K
B1	0.62%	116.02%	117.17%	113.56%	110.73%	116.38%
B2	6.06%	111.11%	111.70%	109.46%	107.33%	111.97%
B3	24.17%	105.70%	105.70%	104.06%	102.89%	105.98%
B4	38.30%	100.00%	99.36%	97.68%	97.67%	100.00%
B5	24.17%	94.22%	92.89%	90.66%	91.91%	91.88%
B6	6.06%	88.58%	86.48%	83.35%	85.86%	82.34%
B7	0.62%	83.28%	80.33%	76.06%	79.79%	75.52%

Delta	A-E	F&G	H&I	J	K
B1 - B4	16.02%	17.80%	15.88%	13.06%	16.38%
B4 - B7	16.72%	19.04%	21.62%	17.88%	24.48%
Total Range	32.74%	36.84%	37.50%	30.94%	40.87%

Attachment A2

NYCA Winter Load Forecast Uncertainty Model: 2021 and 2022

Attachment B1

New Thermal Units and Unit Re-Ratings[7]

Proposed New Thermal Units and Unit Re-ratings (summer ratings)					
Project or Generator Name	Zone	2021 MARS Model (MW)	2021 Gold Book (MW)	New or Incremental (MW)	2022 MARS Model (MW)
New Units					
Total New Units					

[7] Unit re-ratings are for generation facilities that have undergone uprate projects.

Attachment B2

Deactivations and Removals

Announced Unit Deactivations since 2021 IRM Study		
Generator Name	Zone	CRIS (MW)
Total Deactivations		

Attachment B2

Deactivations and Removals[4]

Unit Removal since 2021 IRM Study			
Generator Name	Type	Zone	CRIS (MW)
Total Removals			

[4]Units that did not participate in the Capacity Market have been removed from this year's study
[8]Albany LFGE unit removed from 2021 IRM Model Assumptions due to IIFO status

Attachment B3

New Intermittent Resources

Wind				
Resource	Zone	CRIS (MW)	Summer Capability (MW)	Lesser of Summer Capability VS Cris
New Wind Units				
Total				

Attachment B3

New Intermittent Resources

Solar				
Resource	Zone	CRIS (MW)	Summer Capability (MW)	Lesser of Summer Capability VS Cris
New Solar Units				
TotalNewSolar	N/A	N/A	N/A	N/A
Total New Intermittent				

Attachment B4

New Energy Storage Resources

Energy Storage				
Resource	Zone	CRIS (MW)	Summer Capability (MW)	Lesser of Summer Capability VS CRIS
New Battery Units				
Total New Energy Storage	N/A	N/A	N/A	N/A

Attachment B5

Resources in the Behind the Meter Net Generation Program (BTM-NG)

Attachment B4 -Units in the Behind the Meter Net Generation Program*			
Generator Name	**Zone**	**Resource Value (MW)[9]**	**Peak Load Adjustment (MW)[10]**
Existing:			
Stony Brook	K	36.2	42.0
Greenidge 4	C	103.4	32.0
New:			
Lyons Falls Hydro	E	8.0	2.7
(CONFIDENTIAL)***	J		21.3
Total BTM-NG			98.0

*The IRM study independently models the generation and load components of BTM:NG Resources

[9]Based on adjusted Dependable Maximum Gross Capability (DMGC) value

[10]Based on Average Coincident Host Load (ACHL)

*** One existing resource in Zone J is expected to begin participating in the BTM:NG program prior to 6/1/2021

Attachment C

NYCA Five Year Derating Factors

Attachment D

Emergency Operating Procedures

Step	Procedure	2021 MW Value	2022 MW Value
1	Special Case Resources –Load, Gen	1,195 MW Enrolled/ 822 MW modeled	
2	5% manual voltage Reduction	59.64 MW	
3	Thirty-minute reserve to zero	655 MW	
4	5% remote voltage reduction	445.42 MW	
5	Voluntary industrial curtailment	259.36 MW	
6	General Public Appeals	80 MW	
7	Emergency Purchases	Varies	
8	Ten-minute reserves to zero	1,310 MW	
9	Customer disconnections	As needed	
10	Adjustment used if IRM is lower than technical study margin	As needed	

Attachment E

IRM Topology

Attachment E1

ISO-NE 14 Bubble Model

Attachment E2

Group Limits

NYCA Group Interfaces				
	2021 IRM		2020 IRM	
	Forward	Reverse	Forward	Reverse
UPNYSENY	5250	99999	5600	99999
UPNYSNY2	N/A	N/A	6950	99999
CE_GRP	N/A	N/A	5000	3400
CPV&E_G	N/A	N/A	2275	99999
LI_SUM	1593	104	1593	104
LI_WEST	99999	134	99999	18
DSY49Y50	5643	1999	5600	1999
A_EAST	1850	99999	1850	99999

Attachment E3

Interface Limits

NYCA Interface Limits				
	2021 IRM		2020 IRM	
	Forward	Reverse	Forward	Reverse
DYSINGER EAST	1700	1999	1700	1999
WEST CENTRAL	1300	1600	1300	1600
VOLNEY EAST	5650	1999	5650	1999
MOSES_SOUTH	2650	1600	2650	1600
CENTRAL EAST	3100	1999	3100	1999
MARCY SOUTH	2250	1600	2275	1600
CAPITAL HUDSON VALLEY	3475	1999	3475	1999
UPNY - CONED	7000	1999	6000	1999
MILLWOOD SOUTH	8450	1999	8450	1999
DUNWOODIE SOUTH	4350	1999	4400	1999
CONED LILCO	320	505	320	505
AREA I TO AREA K	1293	515	1293	342

Attachment E4

Dynamic Limits

Central East Voltage Limits, Oswego Complex Units								
	IRM2021				IRM2020			
Dependency	9MILP1, 9MILP2, FPNUC1, STHIND, OS05, OS06				9MILP1, 9MILP2, FPNUC1, STHIND, OS05, OS06			
Units Available	E_TO_F		E_TO_FG		E_TO_F		E_TO_FG	
	Forward	Reverse	Forward	Reverse	Forward	Reverse	Forward	Reverse
6	3100	1999	5000	3400	3100	1999	5000	3400
5	3050	1999	4925	3400	3050	1999	4925	3400
4	2990	1999	4840	3400	2990	1999	4840	3400
3	2885	1999	4685	3400	2885	1999	4685	3400
2	2770	1999	4510	3400	2770	1999	4510	3400
All Other Conditions	2645	1999	4310	3400	2645	1999	4310	3400

LI_NE: Northport Units 1-4				
Units Available	IRM2021		IRM2020	
	Norwalk to K	K to Norwalk	Norwalk to K	K to Norwalk
4	260	414	260	414
All Other Conditions	404	414	404	414

Dynamic Limits Continued

ConEd-LIPA: Barrett Units 1 & 2				
Units Available	IRM2021		IRM2020	
	IJ to K	K to IJ	IJ to K	K to IJ
2	1613	220	1593	104
1	1613	200	1593	74
0	1613	130	1593	0

Staten Island Import Limits, AK and Linden CoGen Units							
				IRM2021		IRM2020	
Unit Availability				J_TO_J3		J_TO_J3	
AK02	AK03	LINCOG1	LINCOG2	Forward	Reverse	Forward	Reverse
A	A	A	A	315	200	315	200
U	A	A	A	315	500	315	500
A	U	A	A	315	700	315	700
A	A	U	A	315	500	315	500
A	A	A	U	315	500	315	500
All Other Conditions				315	815	315	815

Dynamic Limits Continued

UPNYSENY					
Units Available					
CPV	Cricket	Athens	IRM2021	IRM2021 (2020 Topology)	IRM2020
2	3	3	5250	5260	6950
2	3	2	5100	5060	6750
1	3	3	5350	5345	6700
2	2	3	5200	5200	6550
2	1	3	5150	5140	6150
1	1	3	5250	5275	5950
2	0	3	5100	5130	5800
All Other Conditions			5350		6600

E to G		
Units Available		
CPV	IRM2021	IRM2020
2	1750	N/A
1	2000	N/A
0	2250	N/A

Attachment F

SCR Determinations 2021 and 2020 IRM Studies

SCR Performance for 2022 IRM Study						
Super Zones	Enrollments (July 2020)	Forecast (2021)[1]	Performance Factor[2]	UCAP (2021)	Adjustment Factor[3]	Model Value
A-F						
G-I						
J						
K						
Totals						

SCR Performance for 2021 IRM Study						
Super Zones	Enrollments (July 2020)	Forecast (2021)[1]	Performance Factor[2]	UCAP (2021)	Adjustment Factor[3]	Model Value
A-F	622.8	622.8	0.862	537.2	0.949	509.5
G-I	102.0	102.0	0.747	76.2	0.851	64.9
J	427.3	427.3	0.693	296.2	0.752	222.7
K	43.0	43.0	0.706	30.3	0.821	24.9
Totals	1195.1	1195.1		**940.0**		**822.1**
					Overall Performance = 68.8%	

1. These values represent no growth from July 2020 ICAP based enrollments.
2. Performance Factor based on ACL methodology
3. The SCR Adjustment factor captures two different performance derates; 1) Calculated Translation Factor (TF) between ACL and CBL values, and the Fatigue Factor (FF=1.00)

Attachment G

Wind Units Modeled

Wind				
Resource	Zone	CRIS (MW)	Summer Capability (MW)	Lesser of Summer Capability VS CRIS
Bliss Wind Power [WT]	A	100.5	100.5	100.5
Canandaigua Wind Power [WT]	C	125.0	125.0	125.0
High Sheldon Wind Farm [WT]	C	112.5	118.1	112.5
Howard Wind [WT]	C	57.4	55.4	55.4
Orangeville Wind Farm [WT]	C	94.4	93.9	93.9
Wethersfield Wind Power [WT]	C	126.0	126.0	126.0
Altona Wind Power [WT]	D	97.5	97.5	97.5
Chateaugay Wind Power [WT]	D	106.5	106.5	106.5
Clinton Wind Power [WT]	D	100.5	100.5	100.5
Ellenburg Wind Power [WT]	D	81.0	81.0	81.0
Jericho Rise Wind Farm [WT]	D	77.7	77.7	77.7
Marble River Wind [WT]	D	215.2	215.2	215.2
Hardscrabble Wind [WT]	E	74.0	74.0	74.0
Madison Wind Power [WT]	E	11.5	11.6	11.5
Maple Ridge Wind [WT01]	E	231.0	231.0	231.0
Maple Ridge Wind [WT02]	E	90.7	90.8	90.7
Munnsville Wind Power [WT]	E	34.5	34.5	34.5
Cassadaga Wind [WT]	A	126.0	126.5	126.0
Total		**1,861.9**	**1,865.7**	**1,859.4**

Attachment G1

Wind Units Not Modeled

Wind				
Resource	Zone	CRIS (MW)	Summer Capability (MW)	Lesser of Summer Capability VS CRIS
Erie Wind [WT]	A	0.0	0.0	0.0
Steel Wind [WT]	A	0.0	0.0	0.0
Arkwright Summit Wind Farm [WT]	A	78.4	0.0	0.0
Western NY Wind Power [WT]	B	0.0	0.0	0.0
Fenner Wind Power [WT]	C	0.0	0.0	0.0
Marsh Hill Wind Farm [WT]	C	0.0	0.0	0.0
Copenhagen Wind [WT]	E	79.9	0.0	0.0
Total		**158.3**	**0.0**	**0.0**

Attachment G2

Solar Units Modeled

Solar				
Resource	Zone	CRIS (MW)	Summer Capability (MW)	Lesser of Summer Capability VS CRIS
Long Island Solar Farm [PV]	K	31.5	31.5	31.5
Total		**31.5**	**31.5**	**31.5**

Attachment G3

Solar Units Not Modeled

Solar				
Resource	Zone	CRIS (MW)	Summer Capability (MW)	Lesser of Summer Capability VS CRIS
Shoreham Solar [PV]	K	24.9	0.0	0.0
Total		**24.9**	**0.0**	**0.0**

Attachment G4

LFG Units Modeled

LFG				
Resource	Zone	CRIS (MW)	Summer Capability (MW)	Lesser of Summer Capability VS CRIS
CHAFEE [IC]	A	6.4	6.4	6.4
Model City Energy LFGE [IC]	A	5.6	5.6	5.6
Modern LFGE [IC]	A	6.4	6.4	6.4
Hyland LFGE [IC]	B	4.8	4.8	4.8
Mill Seat [IC]	B	6.4	6.4	6.4
Broome 2 [IC]	C	2.0	2.0	2.0
Broome LFGE [IC]	C	2.1	2.1	2.1
High Acres Group [IC] (23767)	C	9.6	9.6	9.6
Ontario LFGE [IC]	C	7.6	11.2	7.6
Seneca Energy Group [IC] (23797)	C	17.6	17.6	17.6
Clinton LFGE [IC]	D	6.4	6.4	6.4
DANC LFGE [IC]	E	6.4	6.4	6.4
Madison County LFGE [IC]	E	1.6	1.6	1.6
Oneida-Herkimer LFGE [IC]	E	3.2	3.2	3.2
Colonie LFGTE [IC]	F	6.4	6.4	6.4
Totals		**92.5**	**96.1**	**92.5**

Attachment G5

LFG Units Not Modeled

LFG				
Resource	**Zone**	**CRIS (MW)**	**Summer Capability (MW)**	**Lesser of Summer Capability VS CRIS**
Monroe Livingston [IC]	B	2.4	0.0	0.0
Steuben County LFGE [IC]	C	3.2	0.0	0.0
Albany LFGE [IC]	F	4.5	5.6	4.5
Total		**10.1**	**5.6**	**4.5**

Assumption Matrix History

Date	Ver	Preliminary Base Case	Date	Ver	Final Base Case
1/28/20	V0.0	Preliminary assumptions without attachments.			
2/3/20	V1.0	Preliminary assumptions without attachments.			
3/3/20	V2.0	Preliminary assumptions without attachments.			
3/30/20	V3.0	Preliminary assumptions without attachments.			