

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

Draft V 4.0

NYSRC

**Installed Capacity Subcommittee Meeting #245**

May 5, 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 <sup>1</sup> NYC: 11,460 MW LI: 5,139 MW G-J: 15,660 MW	2020 Gold Book** NYCA: 32,178MW <sup>1</sup> NYC: 11,268 MW LI: 5,153 MW G-J: 15,435 MW				Low(-)
2	Peak Load Forecast (Final Base Case)	October 2020 Fcst. NYCA: 32,243 MW <sup>2</sup> 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)	Zonal Model to reflect current data with input from Con Ed and LIPA. (Attachment A1)				High (-)
5	LFU Winter	Attachment A2	Attachment A2				Minimal

\*(-) 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.

\*\*The Gold Book data is currently in draft

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.

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# 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	2021 Gold Book Values. Use min. (DMNC vs. CRIS) capacity value				TBD
7	Proposed New Units (Thermal) and re-ratings	0 MW of new Thermal resources, plus 56.6 MW of project related re-ratings. (Attachment B1)	17.3 MW of new Thermal resources,** (Attachment B1)				TBD
8	Deactivations and Removals*	1,104 MW of unit deactivations and 192.7 MW of unit removals (Attachment B2)	0 MW of unit deactivations and (Attachment B2)				TBD
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)	Five-year (2016-2020) GADS data for each unit represented. Those units with less than five years - use representative data. (Attachment C)				Minimal
10	Planned Outages	Based on schedules received by the NYISO and adjusted for history	Based on schedules received by the NYISO and adjusted for history				Minimal

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

\*\*Draft, generator inclusion is under review

# 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	Derate based on temperature correction curves provided				Minimal
13	Existing and Proposed New Wind Units <sup>4</sup>	126.5 MW of Wind Capacity additions totaling 1865.7 MW of qualifying wind (Attachment B3)	205.7 MW of Wind Capacity additions totaling 2071.4 MW of qualifying wind (Attachment B3)				Minimal
14	Wind Shape	Actual hourly plant output over the period 2015-2019. New units will use zonal hourly averages or nearby units.	Actual hourly plant output over the period 2016-2020. New units will use zonal hourly averages or nearby units.				Minimal
15	Existing and Proposed New Solar Resources <sup>4</sup>	0 MW of Solar Capacity additions totaling 31.5MW of qualifying Solar Capacity. (Attachment B3)	22.9 MW of Solar Capacity additions totaling 54.4 MW of qualifying Solar Capacity. (Attachment B3)				Minimal
16	Solar Shape	Actual hourly plant output over the period 2015-2019. New units will use zonal hourly averages or nearby units.	Actual hourly plant output over the period 2016-2020. New units will use zonal hourly averages or nearby units.				Minimal

<sup>4</sup>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.	Actual hourly plant output over the period 2016-2020.				Minimal
19	Large Hydro	Probabilistic Model based on five years of GADS data (2015-2019)	Probabilistic Model based on five years of GADS data (2016-2020)				Minimal
20	Landfill Gas	Actual hourly plant output over the period 2015-2019.	Actual hourly plant output over the period 2016-2020.				Minimal
21	New ESR (Energy Storage Resources) <sup>4</sup>	0 MW of new battery storage scheduled. 0MW of total battery storage modeled (see attachment B4)	6 MW of new battery storage scheduled. 6MW of total battery storage modeled (see attachment B4)			May 2021	
22	Energy Limited Resources (ELR)	Based upon elections made by August 1 <sup>st</sup> 2020				August 2021	

<sup>4</sup>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 <sup>5</sup>	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	

<sup>5</sup> 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)	Western NY Public Policy impacts, PARs in Zone D in service, Cedars upgrade				TBD
30	New Transmission	None Identified	None Identified				N/A
31	AC Cable Forced Outage Rates	All existing Cable EFORds for NYC and LI to reflect most recent five-year history (2015-2019)	All existing Cable EFORds for NYC and LI to reflect most recent five-year history (2016-2020)				TBD
32	UDR Line Unavailability	Five year history of forced outages (2015-2019)	Five year history of forced outages (2016-2020)				TBD

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# 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 <sup>6</sup> (Attachment D)				August 2021	
35	EOP Structure	10 EOP steps modeled	10 EOP steps modeled			April 2021	

<sup>6</sup>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	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	All NPCC Control Areas indicate that they will initially share reserves equally among all members and then among non-members				Minimal
40	Emergency Assistance	Statewide Limit of 3,500 MW of emergency assistance allowed from neighbors.	Statewide Limit of 3,500 MW of emergency assistance allowed from neighbors.				Minimal

# Miscellaneous

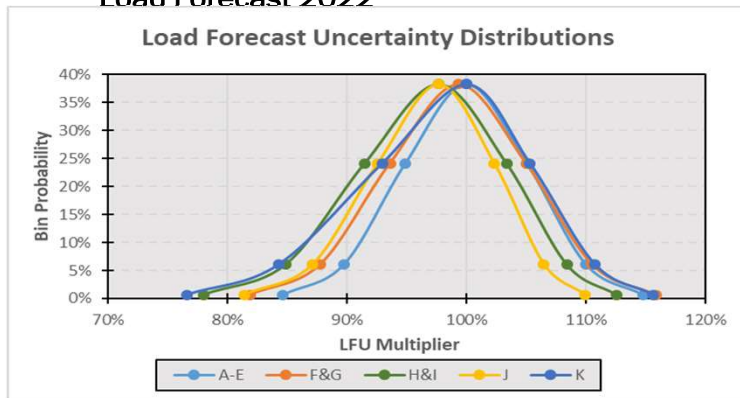
#	Parameter	2021 Model Assumptions	2022 Model Assumptions	Basis for Recommendation	Model Change	Expected Date	Est. IRM Impact*
41	MARS Model Version	3.31.1546	4.1.1749			April 2021	Minimal
42	Environmental Initiatives	No new rules for 2021 Capability Year				July 2021	

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# Attachment A1

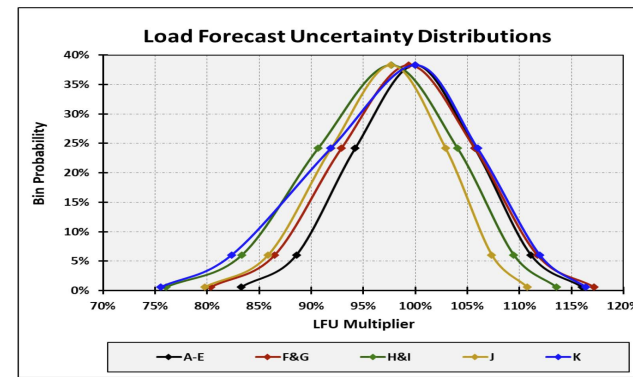
## NYCA Summer Load Forecast Uncertainty Model: 2021 and 2022

Load Forecast 2022



Bin	Probability	A-E	F&G	H&I	J	K
B1	0.62%	114.78%	115.85%	112.55%	109.95%	115.63%
B2	6.06%	110.01%	110.53%	108.40%	106.49%	110.73%
B3	24.17%	105.06%	105.01%	103.36%	102.33%	105.30%
B4	38.30%	100.00%	99.36%	97.68%	97.67%	100.00%
B5	24.17%	94.88%	93.61%	91.50%	92.58%	92.96%
B6	6.06%	89.73%	87.77%	84.89%	87.13%	84.32%
B7	0.62%	84.63%	81.88%	77.98%	81.38%	76.60%
<b>Delta</b>		<b>A-E</b>	<b>F&amp;G</b>	<b>H&amp;I</b>	<b>J</b>	<b>K</b>
B1 - B4	14.78%	14.78%	16.49%	14.87%	12.28%	15.63%
B4 - B7	15.37%	15.37%	17.48%	19.70%	16.29%	23.40%
<b>Total Range</b>		<b>30.15%</b>	<b>33.97%</b>	<b>34.57%</b>	<b>28.57%</b>	<b>39.03%</b>

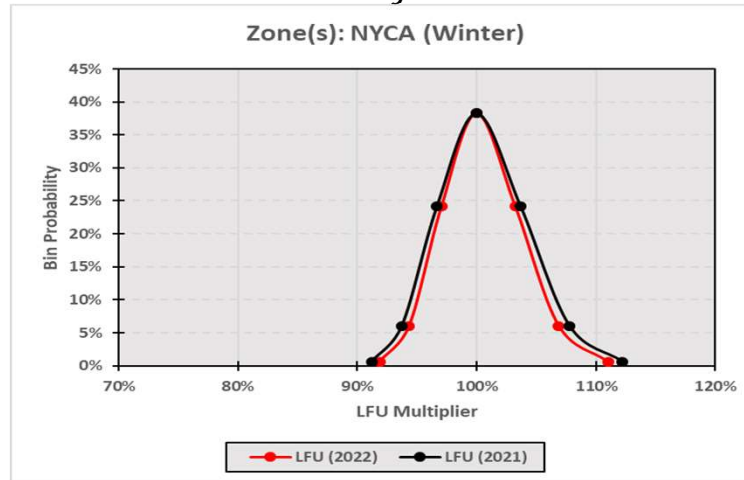
Load Forecast 2021



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

# Attachment A2

NYCA Winter Load Forecast Uncertainty Model: 2021 and 2022



Bin	Probability	LFU (2022)	LFU (2021)
B1	0.62%	111.01%	112.22%
B2	6.06%	106.89%	107.77%
B3	24.17%	103.25%	103.69%
B4	38.30%	100.00%	100.00%
B5	24.17%	97.05%	96.69%
B6	6.06%	94.34%	93.76%
B7	0.62%	91.85%	91.22%

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# Attachment B1

## New Thermal Units and Unit Re-Ratings<sup>7</sup>

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					
<b>Total New Units</b>					

<sup>7</sup> Unit re-ratings are for generation facilities that have undergone uprate projects.

# Attachment B2

## Deactivations and Removals<sup>4</sup>

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

<sup>4</sup>Units that did not participate in the Capacity Market have been removed from this year's study

<sup>8</sup>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				
Cassadaga Wind	A	126	126	126
Atlantic Wind	E	79.7	79.7	79.7
<b>Total</b>				225.7

Solar				
Resource	Zone	CRIS (MW)	Summer Capability (MW)	Lesser of Summer Capability VS Cris
New Solar Units				
LI Solar Generation	K	22.9	22.9	22.9
<b>Total</b>				22.9

\*Draft, generator inclusion is under review

# Attachment B4

## New Energy Storage Resources\*

Energy Storage				
Resource	Zone	CRIS (MW)	Summer Capability (MW)	Lesser of Summer Capability VS CRIS
New Battery Units				
King's Plaza	J	3.6	3.6	3.6
<b>Total New Energy Storage</b>				<b>3.6</b>

\*Draft, generator inclusion is under review



# 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) <sup>9</sup>	Peak Load Adjustment (MW) <sup>10</sup>
<b>Existing:</b>			
Stony Brook	K	36.2	42.0
Greenidge 4	C	103.4	32.0
<b>New:</b>			
Lyons Falls Hydro	E	8.0	2.7
(CONFIDENTIAL)***	J		21.3
<b>Total BTM-NG</b>			98.0

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

<sup>9</sup>Based on adjusted Dependable Maximum Gross Capability (DMGC) value

<sup>10</sup>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

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# Attachment C

NYCA Five Year Derating Factors

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# Attachment D

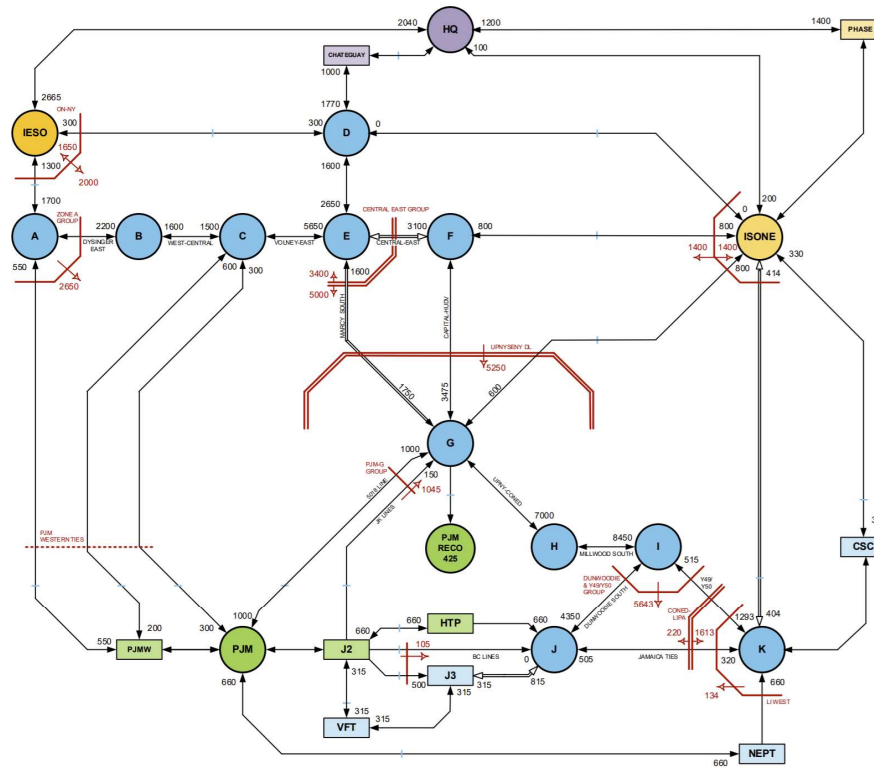
## Emergency Operating Procedures

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	

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# Attachment E

## IRM Topology



**Legend**

- Interface
- Unidirectional Interface
- Interface w/ Dynamic Ratings
- Interface Group
- Interface Group w/ Dynamic Ratings
- Monitoring Interface Group
- NYCA EA Interface Group Marker
- XX "Dummy Bubble" i.e. no load

NOTE: An interface is considered to not have a MW limitation if no number is specified

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# Attachment F

## SCR Determinations 2022 and 2021 IRM Studies

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

SCR Performance for 2021 IRM Study						
Super Zones	Enrollments (July 2020)	Forecast (2021) <sup>1</sup>	Performance Factor <sup>2</sup>	UCAP (2021)	Adjustment Factor <sup>3</sup>	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
<b>Totals</b>	<b>1195.1</b>	<b>1195.1</b>		<b>940.0</b>		<b>822.1</b>
					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)

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# 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
<b>Total</b>		<b>1,861.9</b>	<b>1,865.7</b>	<b>1,859.4</b>

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# 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		<b>158.3</b>	<b>0.0</b>	<b>0.0</b>

Draft

# 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		<b>31.5</b>	<b>31.5</b>	<b>31.5</b>

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# 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
<b>Total</b>		<b>24.9</b>	<b>0.0</b>	<b>0.0</b>

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# 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
<b>Totals</b>		<b>92.5</b>	<b>96.1</b>	<b>92.5</b>

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# 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
<b>Total</b>		<b>10.1</b>	<b>5.6</b>	<b>4.5</b>

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# Assumption Matrix History

Date	Ver	Preliminary Base Case	Date	Ver	Final Base Case
1/28/21	V0.0	Preliminary assumptions without attachments.			
2/3/21	V1.0	Preliminary assumptions without attachments.			
3/3/21	V2.0	Preliminary assumptions without attachments.			
3/30/21	V3.0	Preliminary assumptions without attachments.			
5/5/21	V4.0	Added in LFU Models, Data from Draft of Gold Book A-B4 and E			

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