NYCA IRM Requirement Study

2021-2022 Preliminary Base Case (PBC)

Model Assumptions Assumption Matrix

Draft V 3.0 - April 28, 2020

Load Forecast Uncertainty

#	Parameter	2020 Model Assumptions	2021 Model Assumptions	Basis for Recommendation	Model Change	Est. IRM Impact*
1	Peak Load Forecast (Preliminary Base Case – Parametric & Sensitivities)	2020 Gold Book NYCA: 32,202MW[1] NYC: 11,651 MW LI: 5,134 MW G-J: 15,911 MW	2020 Gold Book NYCA: 32,129MW[1] NYC: 11,460 MW LI: 5,139 MW G-J: 15,758 MW	Most recent Gold Book Forecast is used for Preliminary Base Case parametric study and sensitivity cases		Low (+/-)
2	Peak Load Forecast (Final Base Case)	October 2020 Fcst. NYCA: 32,393 MW[2] NYC: 11,503 MW LI: 5,384MW G-J: 15,795 MW	October 2020 Fcst. NYCA: xxxxx MW[2] NYC: yyyyy MW LI: zzzzz MW G-J: wwwww MW	Forecast based on examination of 2020 weather normalized peaks		TBD
3	Load Shape (Multiple Load Shape)	Bin 1: 2006 Bin 2: 2002 Bins 3-7: 2007	Bin 1: 2006 Bin 2: 2002 Bins 3-7: 2007	ICS Recommendation		None
4	Load Forecast Uncertainty (LFU)-	Zonal Model to reflect current data with input from Con Ed and LIPA. (Attachment A)	Zonal Model to reflect current data with input from Con Ed and LIPA. (Attachment A)	Based on TO and NYISO data analyses		Medium (+)
5	LFU Winter	Updated see attachment A1	Attachment A1	Based on TO and NYISO data analyses		None

*(-) 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%.

Note that the draft 2020 Gold Book has been issued for stakeholder comments and the numbers presented may be amended before the 2020 Gold Book is finalized by the end of April 2020.

New Capacity resources are from the draft Gold Book and current NYISO Interconnection Queue; not all of these resources will necessarily meet the IRM inclusion rules. The Final decision to include/exclude new resources will be made close to the PBC lock down (e.g., late June)

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[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.

Generation Parameters

#	Parameter	2020 Model Assumptions	2021 Model Assumptions	Basis for Recommendation	Model Change	Est. IRM Impact*
1	Existing Generating Unit Capacities	2019 Gold Book values. Use min. (DMNC vs. CRIS) capacity value	2020 Gold Book Values. Use min. (DMNC vs. CRIS) capacity value	Latest Gold Book publication		Low
2	Proposed New Units (Non-Renewable) and re-ratings	MW 1,020 MW of new non-wind resources, plus 0 MW of project related re-ratings. (Attachment B1)	MW 0 MW of new non-wind resources, plus 0 MW of project related re-ratings. (Attachment B1)	Latest Gold Book publication, NYISO interconnection queue and generation notifications		TBD
3	Retirements, Mothballed units, and ICAP ineligible units	1,205.9 MW of unit deactivations (Attachment B2)	0 MW of retirements, 1,104 MW of unit deactivations, 0 MW of ICAP Ineligible (Attachment B2)	Latest Gold Book publications and generator notifications		TBD
4	Forced and Partial Outage Rates	Five-year (2014-2018) GADS data for each unit represented. Those units with less than five years – use representative data. (Attachment C)	Five-year (2015-2019) GADS data for each unit represented. Those units with less than five years – use representative data. (Attachment C)	Transition Rates representing the Equivalent Forced Outage Rates (EFORd) during demand periods over the most recent 5 year period		TBD
5	Planned Outages	Based on schedules received by the NYISO and adjusted for history	Based on schedules received by the NYISO and adjusted for history	Updated schedules		TBD

#	Parameter	2020 Model Assumptions	2021 Model Assumptions	Basis for Recommendation	Model Change	Est. IRM Impact*
6	Summer Maintenance	Nominal 50[4] MWs – divided equally between Zones J and K	Nominal xx MWs – divided equally between Zones J and K	Review of most recent data		TBD
7	Combustion Turbine Derates	Derate based on temperature correction curves provided	Derate based on temperature correction curves provided	Operational history indicates the derates are in-line with manufacturer's		None
8	Existing and Proposed New Wind Units	0 MW of Wind Capacity additions totaling 1,891.7 MW of qualifying wind (Attachment B3)	864.4 MW of Wind Capacity additions totaling Xx MW of qualifying wind (Attachment B3)	ICAP units based on RPS agreements, interconnection queue and ICS input.		TBD
9	Wind Shape	Actual hourly plant output over the period 2014-2018. New units will use zonal hourly averages or nearby units.	Actual hourly plant output over the period 2015-2019. New units will use zonal hourly averages or nearby units.	Program randomly selects a wind shape of hourly production from the most recent 5 year period for each model iteration.		TBD
10	Existing and Proposed New Solar Resources	Total of 51.5 MW of qualifying Solar Capacity. (Attachment B3)	290.5MW of Solar Capacity additions totaling xx MW of qualifying Solar Capacity. (Attachment B3)	ICAP Resources connected to Bulk Electric System		TBD
11	Solar Shape	Actual hourly plant output over the period 2014-2018. New units will use zonal hourly averages or nearby units.	Actual hourly plant output over the period 2015-2019. New units will use zonal hourly averages or nearby units.	Program randomly selects a solar shape of hourly production from the most recent 5 year period for each model iteration.		TBD

#	Parameter	2020 Model Assumptions	2021 Model Assumptions	Basis for Recommendation	Model Change	Est. IRM Impact*
12	BTM- NG Program	No new BTM NG resources (Attachment B4)	One new BTM NG resources (Attachment B4)	Both the generation of the participating resources and the full host loads are modeled.		TBD
13	Small Hydro Resources	Actual hourly plant output over the period 2014-2018.	Actual hourly plant output over the period 2015-2019.	Program randomly selects a Hydro shape of hourly production from the most recent five-year period for each model iteration.		TBD
14	Large Hydro	Probabilistic Model based on 5 years of GADS data (2014-2018)	Probabilistic Model based on 5 years of GADS data (2015-2019)	Transition Rates representing the Equivalent Forced Outage Rates (EFORd) during demand periods over the most recent five-year period.		TBD
15	Landfill Gas	Actual hourly plant output over the period 2014-2018.	Actual hourly plant output over the period 2015-2019.	Program randomly selects a LFG shape of hourly production from the most recent five-year period for each model iteration.		TBD
16	New ESR (Energy Storage Resources)	0 MW of new battery storage resource scheduled (see attachment B3)	220 MW of battery storage scheduled (see attachment B3)	Sensitivities on simplified model and GE software enhancement		Minimal

Transactions – Imports and Exports

#	Parameter	2020 Model Assumptions	2021 Model Assumptions	Basis for Recommendation	Model Change	Est. IRM Impact*
1	Capacity Purchases	Existing Rights: PJM – 1,080 MW HQ – 1,110 MW All contracts model as equivalent contracts	Existing Rights: PJM – 1,080 MW HQ – 1,110 MW All contracts model as equivalent contracts	Grandfathered Rights, ETCNL, and other awarded long-term rights.		None
2	Capacity Sales	Long Term firm sales Summer 281.1 MW	Long Term firm sales Summer xxx MW	These are long term federal contracts.		Minimal
3	FCM Sales from a Locality[5]	No Sales modeled within study period	No Sales modeled within study period	White Paper, NYISO recommendation		None
4	Wheels through NYCA	300 MW HQ to NE equivalent contract	300 MW HQ to NE equivalent contract			None
5	New UDRs (Unforced capacity Deliverability Rights)	No new UDR projects	No new UDR projects	Existing UDR elections are made by August 1st and will be incorporated into the model.		None
6	New EDRs (External Deliverability Rights)	0 MWs for 2020 Study	xx MWs for 2021 Study			TBD

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[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	2020 Model Assumptions	2021 Model Assumptions	Basis for Recommendation	Model Change	Est. IRM Impact*
1	Interface Limits	Updated UPNY-SENY interface group, Jamaica ties (from J to K), and UPNY-ConEd interface. The Cedars bubble merged into the HQ bubble (Attachment E)	Removal of PJM-SENY Group Interface, PSEG-LI updates to increase Zone K Imports/Exports (Attachment E)	Based on the most recent NYISO studies and processes, such as Operating Study, Operations Engineering Voltage Studies, Comprehensive System Planning Process, and additional analysis including interregional planning initiatives.		TBD
2	New Transmission	None Identified	None Identified	Based on TO provided models and NYISO's review		None
3	AC Cable Forced Outage Rates	All existing Cable EFORs for NYC and LI to reflect most recent five-year history (2014-2018)	All existing Cable EFORs for NYC and LI to reflect most recent five-year history (2015-2019)	TO provided transition rates with NYISO review.		TBD
4	UDR Line Unavailability	Five year history of forced outages (2014-2018)	Five year history of forced outages (2015-2019)	NYISO/TO Review		TBD

Emergency Operating Procedures

#	Parameter	2020 Model Assumptions	2021 Model Assumptions	Basis for Recommendation	Model Change	Est. IRM Impact*
1	Special Case Resources	July 2019 –1,282 MW based on registrations and modeled as 873 MW of effective capacity. Monthly variation based on historical experience*	July 2020 –xxxx MW based on registrations and modeled as YYY MW of effective capacity. Monthly variation based on historical experience*	SCRs sold for the program discounted to historic availability. Summer values calculated from July 2020 registrations. Performance calculation updated per ICS presentations on SCR performance. (Attachment F)		TBD
2	Other EOPs	692 MW of non-SCR/non-EDRP resources (Attachment D)	xxx MW of non-SCR/non-EDRP resources (Attachment D)	Based on TO information, measured data, and NYISO forecasts.		TBD
3	EOP Structure	12 EOP Steps Modeled	9 EOP steps modeled	Based on agreement with ICS, step 1 and 2 separated step 3 removed and step 7 and 8 combined	Y	Minimal

External Control Areas

| #	Parameter	2020 Model Assumptions	2021 Model Assumptions	Basis for Recommendation	Model Change	Est. IRM Impact*
1	PJM	Load and Capacity data provided by ISONE/NPCC CP-8 Data may be adjusted per NYSRC Policy 5 (Attachment E)	Load and Capacity data will be provided by ISONE/NPCC CP-8 Data may be adjusted per NYSRC Policy 5	Initial Review performed by the NPCC CP-8 WG prior to Policy 5 changes		TBD
2	ISONE, Quebec, IESO	Load and Capacity data provided by ISONE/NPCC CP-8 Data adjusted per NYSRC Policy 5 (Attachment E)	Load and Capacity data will be provided by ISONE/NPCC CP-8 Data adjusted per NYSRC Policy 5	Initial Review performed by the NPCC CP-8 WG prior to Policy 5 changes		TBD
3	External Adjustments per Policy 5	If needed, add load to externals proportional to existing excess capacity				TBD
4	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	Per NPCC CP-8 WG		None
5	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.	White Paper on Modeling of Emergency Assistance for NYCA in IRM studies		None

Miscellaneous

#	Parameter	2020 Model Assumptions	2021 Model Assumptions	Basis for Recommendation	Model Change	Est. IRM Impact*
1	MARS Model Version	Version 3.22.6	3.27.1376	Per testing and ICS recommendation		None
2	Environmental Initiatives	Proposed rules would not take effect until after the summer of 2020	TBD	Review of existing regulations and rules		TBD

Attachment A
## NYCA Summer Load Forecast Uncertainty Model
2021 Summer LFU Models

Load Forecast Uncertainty Distributions
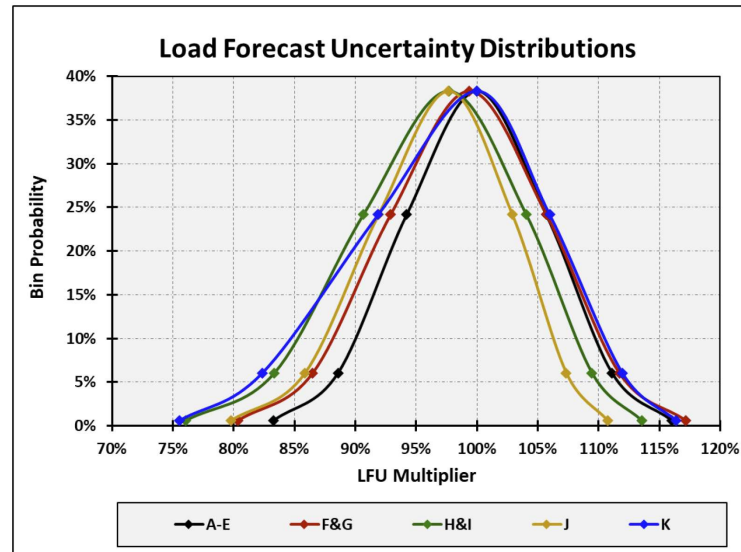
Bin	Probability	A-E	F&G	H&I	J	K
B1	0.62%	116.02%	117.17%	113.56%	110.73%	116.38%
B2	6.06%	111.11%	111.70%	109.46%	107.33%	111.97%
B3	24.17%	105.70%	105.70%	104.06%	102.89%	105.98%
B4	38.30%	100.00%	99.36%	97.68%	97.67%	100.00%
B5	24.17%	94.22%	92.89%	90.66%	91.91%	91.88%
B6	6.06%	88.58%	86.48%	83.35%	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 A1
NYCA Winter Load Forecast Uncertainty Model
2021 Winter LFU Models
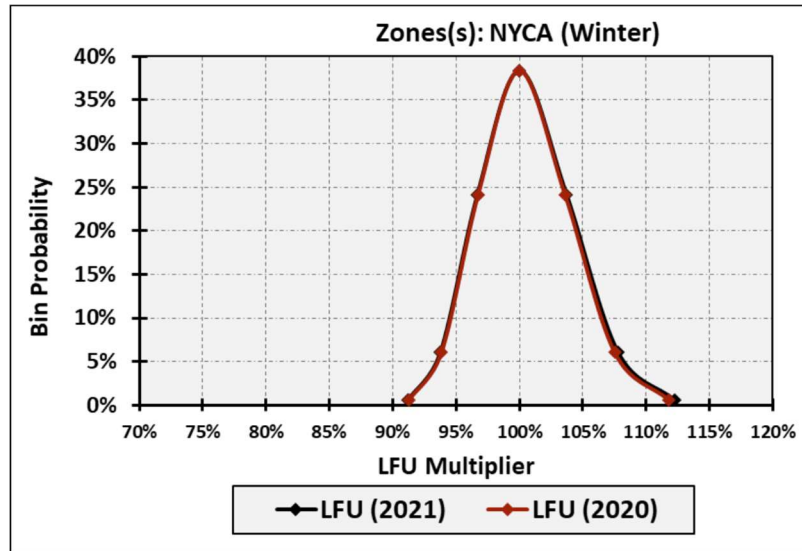
Zones(s): NYCA (Winter)					
Bin	**Probability**	**Wthr**	**MW**	**LFU (2021)**	**LFU (2020)**
B1	0.62%	53.75	25,593	112.22%	111.80%
B2	6.06%	47.98	24,577	107.77%	107.52%
B3	24.17%	42.20	23,648	103.69%	103.59%
B4	38.30%	36.43	22,806	100.00%	100.00%
B5	24.17%	30.66	22,051	96.69%	96.75%
B6	6.06%	24.89	21,383	93.76%	93.85%
B7	0.62%	19.12	20,802	91.22%	91.28%
Design		36.43	22,806		

Attachment B1
New Thermal Units and Unit Re-ratings[6]

B1 - Proposed Thermal Units and Unit Re-ratings (summer ratings)					
Project or Generator Name	**Zone**	**2020 MARS Model (MW)**	**2021 Gold Book (MW)**	**New or Incremental (MW)**	**2021 MARS Model (MW)**
New Units					
Total New Units					

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

Attachment B2

Attachment B2 -Announced Unit Deactivations since 2020 IRM Study		
Generator Name	Zone	CRIS (MW)
Retirements:		
Deactivations:		
West Babylon 4	K	49.0
Indian Point 3	H	1,040.4
Glenwood	K	14.6
ICAP Ineligible:		
Total Removals		1,104

Attachment B3

B3 - New Intermittent Resources*				
Resource	Zone	CRIS (MW)	Summer Capability	Lesser of Summer Capability VS Cris
New Wind Units				
Cassadaga Wind, LLC	A	126.0	126.5	126.0
Anbaric Development Parners, LLC	K	500.00	500.00	500.00
Baron Winds, LLC	C	300.00	238.4	238.4
Total New Wind		**926**	**864.9**	**864.4**
Other Intermittent				
KCE NY 2, LLC (Energy Storage)	G	TBD	200	TBD
KCE NY8 LLC (Energy Storage)	G	TBD	20	TBD
Total New Other			**220**	**TBD**

B3 - New Intermittent Resources				
Resource	**Zone**	**CRIS (MW)**	**Summer Capability**	**Lesser of Summer Capability VS Cris**
New Solar Units				
Mohawk Solar LLC	F	TBD	90.5	TBD
Rock District Solar, LLC	F	TBD	20	TBD
Tayandenega Solar, LLC	F	TBD	20	TBD
Hecate Energy Albany 1 LLC	F	TBD	20	TBD
Hecate Energy Albany 2 LLC	F	TBD	20	TBD
Grissom Solar, LLC	F	TBD	20	TBD
Darby Solar, LLC	F	TBD	20	TBD
Branscomb Solar, LLC	F	TBD	20	TBD
ELP Ticonderoga Solar LLC	F	TBD	20	TBD
Regan Solar, LLC	F	TBD	20	TBD
Puckett Solar, LLC	E	TBD	20	TBD
Total New Solar		**TBD**	**290.5**	**TBD**
Total New Intermittent		**TBD**	**1,375.4**	**TBD**

*The NYISO will track the status of these projects

Attachment B4
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)[1]	Peak Load Adjustment (MW)[2,3]
Existing:			
Stony Brook	K	47.0	TBD
Greenidge 4	C	112.5	TBD
New:			
Lyons Falls Hydro	E	8.0	TBD
Total BTM-NG			

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

1. Based on adjusted Dependable Maximum Gross Capability (DMGC) value
2. Based on Average Coincident Host Load (ACHL)
3. The load adjustment values need to be added to the load forecast

Attachment C
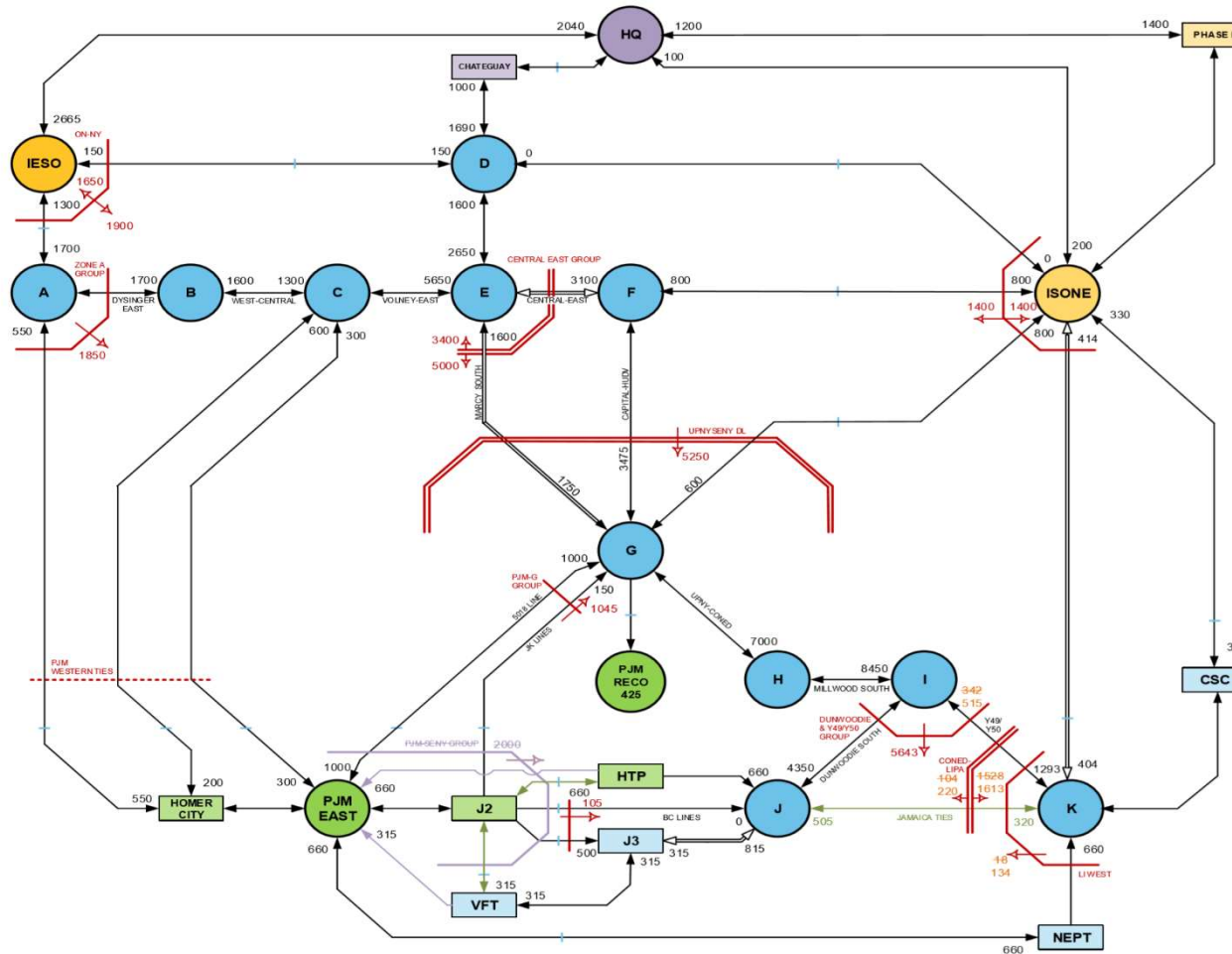
NYCA Five Year Derating Factors

Attachment D
Emergency Operating Procedures

Step	Procedure	2020 MW Value	2021 MW Value
1	Special Case Resources –Load, Gen	1,282 MW Enrolled/ 873 MW	
2	5% manual voltage Reduction	57 MW	
3	Thirty-minute reserve to zero	655 MW	
4	5% remote voltage reduction	347 MW	
5	Voluntary industrial curtailment, General Public Appeals	287 MW	
6	Emergency Purchases	Varies	
7	Ten-minute reserves to zero	1,310 MW	
8	Customer disconnections	As needed	
9	Adjustment used if IRM is lower than technical study margin	As needed	

2021 IRM Topology (Summer Limits)

Draft Topology for 2020 RNA: Study Year 2021

Attachment F
SCR Determinations

	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						
G - I						
J						
K						
Totals						

Assumption Matrix History

Date	Ver	Preliminary Base Case	Date	Ver	Final Base Case
1/17/19	V0.0	Preliminary assumptions without attachments.			
2/21/20	V1.0	Preliminary assumptions without attachments.			
3/19/20	V2.0	Preliminary assumptions without attachments.			
4/15/20	V3.0	Added in LFU Models, Data from Draft of Gold Book A-B4 and E			