Draft 2020 RNA Models Assumptions Matrix

1. Resource Adequacy (GE MARS)

#	Parameter	2018 RNA/CRP (2018 GB) Study Period: 2019 -2028	2020 RNA (2020 GB) Study Period: 2024(y4) -2030 (y10)	2020 RNA 70x30 Scenario Case Study Period: 2030
Load Parameters				
1	**Peak** Load Forecast	Adjusted 2018 Gold Book NYCA baseline peak load forecast. The GB 2018 baseline peak load forecast includes the impact (reduction) of behind-the-meter (BtM) solar at the time of NYCA peak. For the Resource Adequacy load model, the deducted BtM solar MW were added back to the NYCA zonal loads, which then allows for a discrete modeling of the BtM solar resources.	Similar method	2 variations, same as the two CARIS 70x30 Scenarios: 1. RNA 70x30 similar to the 2019 CARIS's Case labeled 'Base Load' 2. RNA 70x30 similar to the 2019 CARIS's Case labeled "Scenario Load"
2	Load **Shapes** (Multiple Load Shapes)	Used Multiple Load Shape MARS Feature 8,760 hours historical load shapes were used as base shapes for LFU bins: Bin 1: 2006 Bin 2: 2002 Bins 3-7: 2007 Peak adjustments on a seasonal basis. For the BtM Solar adjustment, the BtM shape is added back to account for the impact of the BtM generation on both on-peak and off-peak hours.	Similar method	Single year load shape that includes BtM taken directly from CARIS 70x30 Case original load (losses not included).
3	Load Forecast Uncertainty (**LFU**)	Used updated summer LFU values for the 11 NYCA zones.	Updated via Load Forecast Task Force (LFTF) process **Reference**: April 13 2020 LFTF presentation: https://www.nyiso.com/documents/20142/11883362/LFU_Summary.pdf	Same as 2020 RNA Base Case

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Generation Parameters				
1	**Existing** Generating Unit Capacities	2018 Gold Book values. Use summer min. of (DMNC vs. CRIS) MW capabilities. Use winter min. of (DMNC vs. CRIS) MW capabilities. Adjusted for RNA inclusion rules.	Similar method	Same as 2020 RNA Base Case
2	**Proposed New Units Inclusion** Determination	GB2018 with Inclusion Rules Applied	Similar method	Off-shore wind, land-based wind and utility scale PV added to align with CARIS 70x30 Case Renewable Resources mix.
3	Retirement, Mothballed Units, IIFO	GB2018 with Inclusion Rules Applied	Similar method	Units that are retired in 2020 RNA Base Case. Additionally, all unit impacted by DEC's Peaker Rule were removed to align with CARIS 70x30 Case assumptions.
4	Forced and Partial Outage Rates	Five-year (2013-2017) GADS data for each unit represented. Those units with less than five years – use representative data. Transition Rates representing the Equivalent Forced Outage Rates (EFORd) during demand periods over the most recent five-year period. For new units or units that are in service for less than three years, NERC five-year class average EFORd data are used.	Similar method	Same as 2020 RNA Base Case
5	Planned Outages	Based on schedules received by the NYISO and adjusted for history.	Similar method	Same as 2020 RNA Base Case
6	Summer Maintenance	Nominal 50 MW (25 MW in J and 25 MW in K)	None	Same as 2020 RNA Base Case

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7	Combustion Turbine Derates	Derate based on temperature correction curves . For new units: use data for a unit of same type in same zone or neighboring zone.	Similar method	Same as 2020 RNA Base Case
8	Existing Landfill Gas Plants	**New method:** Actual hourly plant output over the period 2013-2017. Program randomly selects a LFG shape of hourly production over the 2013-2017 for each model replication. Probabilistic model is incorporated based on five years of input shapes, with one shape per replication randomly selected in the Monte Carlo process.	Similar method	Same as 2020 RNA Base Case
9	Existing **Wind** Units (>5 years of data)	Actual hourly plant output over the period 2013-2017. Probabilistic model is incorporated based on five years of input shapes with one shape per replication being randomly selected in Monte Carlo process.	Similar method	8,760 hourly shapes based on output profile from CARIS 70x30 case. Notes: 1. CARIS 70x30 case output profile captures curtailments observed in the CARIS MAPS simulations. 2. CARIS 70x30 case wind shape input based on 2009 NREL data.
10	Existing **Wind** Units (<5 years of data)	For existing data, use the actual hourly plant output over the period 2013-2017. For missing data, scale the nameplate normalized average of units in the same load zone by the unit's nameplate rating.	Similar method	8,760 hourly shapes based on output profile from CARIS 70x30 case. Notes: 1. CARIS 70x30 case output profile captures curtailments observed in the CARIS MAPS simulations. 2. CARIS 70x30 case wind shape input based on 2009 NREL data.

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11a	Proposed **Land-based Wind** Units	Inclusion Rules Applied to determine the generator status. The nameplate normalized average of units in the same load zone is scaled by the unit's nameplate rating.	Similar method	8,760 hourly shapes based on output profile from CARIS 70x30 case. Notes: 1. CARIS 70x30 case output profile captures curtailments observed in the CARIS MAPS simulations. 2. CARIS 70x30 case wind shape input based on 2009 NREL data.
11b	Proposed **Offshore Wind** Units	N/A	N/A	8,760 hourly shapes based on output profile from CARIS 70x30 case. Notes: 1. CARIS 70x30 case output profile captures curtailments observed in the CARIS MAPS simulations. 2. CARIS 70x30 case wind shape input based on 2009 NREL data.
12a	Existing **Utility-scale Solar Resources**	The 31.5 MW Upton metered solar capacity: probabilistic model chooses from five years of production data output shapes covering the period 2013-2017 (one shape per replication is randomly selected in Monte Carlo process.)	Similar method	8,760 hourly shapes based on output profile from CARIS 70x30 case. Notes: 1. CARIS 70x30 case output profile captures curtailments. 2. CARIS 70x30 case existing utility scale PV shape input based on Y2017 historical data.
12b	Proposed **Utility-scale Solar Resources**	Inclusion rules applied to determine the generator status. The nameplate normalized average of units in the same load zone is scaled by the unit's nameplate rating.	Similar method	8,760 hourly shapes based on output profile from CARIS 70x30 case. Notes: 1. CARIS 70x30 case output profile captures curtailments. 2. CARIS 70x30 case future utility scale PV shape

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				input based on 2006 NREL data.
13	Projected **BtM Solar Resources**	The large projection of increasing retail (BtM) solar installations over the 10-year period require a discrete model with detailed hourly performance. **New method:** A 8,760 hourly shape was created by using NREL's PV Watt[1] tool. MARS will randomly select a daily shape from the current month for each day of each month of each replication.	**New Method:** Will use five years of inverter production data. Probabilistic model is incorporated based on five years of input shapes with one shape per replication being randomly selected in Monte Carlo process. **Reference**: April 6, 2020 TPAS/ESPWG meeting materials	8,760 hourly shape from CARIS 70x30 output. Note: CARIS BtM solar profile based on hourly shape created using NREL's PV Watt tool.
14	Existing **BTM-NG Program**	**New category:** These are former load modifiers selling capacity into the ICAP market. Modeled as cogen type 2 unit in MARS. Unit capacity set to CRIS value, load modeled with weekly pattern that can change monthly.	Similar method	Same as 2020 RNA Base Case
15	Existing **Small Hydro** Resources	**New method:** Actual hourly plant output over the period 2013-2017. Program randomly selects a hydro shape of hourly production over the five-year window for each model replication. The randomly selected shape is multiplied by their current nameplate rating.	Similar method	Same as 2020 RNA Base Case

[1] NREL's PVWatts Calculator, credit of the U.S. Department of Energy (DOE)/NREL/Alliance (Alliance for Sustainable Energy, LLC).

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16	Existing **Large Hydro**	Probabilistic Model based on five years of GADS data. Transition rates representing the Equivalent Forced Outage Rates (EFORd) during demand periods over the most recent five-year period (2013-2017). Methodology consistent with thermal unit transition rates.	Similar method	Same as 2020 RNA Base Case
17	Proposed **Energy Storage**	N/A	N/A	Utilize MARS energy storage model, which allows for charging and discharging, and also includes temporal constraints (*e.g.,* hours/days or hours/month).
Transaction - Imports / Exports				
1	Capacity Purchases	Grandfathered Rights and other awarded long-term rights. Modeled using MARS explicit contracts feature.	Similar method	Same as 2020 RNA Base Case except for imports from HQ, (see HQ section for additional information). Add 1,310 MW HVDC connection between HQ and Zone J
2	Capacity Sales	These are long-term contracts filed with FERC. Modeled using MARS explicit contracts feature. Contracts sold from ROS (Zones: A-F). ROS ties to external pool are derated by sales MW amount.	Similar method	Same as 2020 RNA Base Case
3	FCM Sales	Model sales for known years Modeled using MARS explicit contracts feature. Contracts sold from ROS (Zones: A-F). ROS ties to external pool are derated by sales MW amount.	Similar method	Same as 2020 RNA Base Case

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4	UDRs	Updated with most recent elections/awards information (VFT, HTP, Neptune, CSC).	Similar method	Same as 2020 RNA Base Case
5	EDRs	N/A	**New category:** Cedars Uprate 80 MW. Increased the HQ to D by 80 MW. Note: the Cedar bubble has been removed and its corresponding MW was reflected in HQ to D limit. **References**: 1. March 16, 2020 ESPWG/TPAS 2. April 6, 2020 TPAS/ESPWG	Not modeled (see HQ section for additional information).
6	Wheel-Through Contract	n/a	**New category:** 300 MW HQ through NYISO to ISO-NE. Modeled as firm contract. Reduced the transfer limit from HQ to NYISO by 300 MW and increased the transfer limit from NYISO to ISO-NE by 300 MW.	Not modeled (see HQ section for additional information)
MARS Topology: a simplified bubble-and-pipe representation of the transmission system				
0			**Summary of major topology changes** (as compared with the 2018-2019 RPP): Link1)-7); Link8)-9); Link10) 1) Marion-Farragut 345kV cables (B and C) assumed out of service 2) 71, 72, M51, M52 series reactors assumed by-passed after deactivation of Indian Point 3) Moses – St. Lawrence (L33P) tie line assumed out of service	Same as 2020 RNA Base Case + LIPA topology updates for the 70x30 scenario additional (to the Base Case) peakers removal

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			4) Rainey – Corona transmission project in service impacting J to K limits 5) UPNY-SENY simplification 2021-2023 before the addition of AC PPTPP projects 6) AC PPTPs Segment A and B Projects Added starting 2024 7) Removal of Cedars bubble/tie to Zone D model; adding the MW from the bubble to the tie HQ to D tie limit 8) Removal of PJM-SENY Group Interface 9) Updates to Zone K Imports/Exports 10) Somerset retirement impacts 11) The external areas model for PJM and ISO-NE were simplified by consolidating the 5 PJM areas (bubbles) into one, and the 8 ISO-NE areas into one.	
1	Interface Limits	Developed by review of previous studies and specific analysis during the RNA study process.	Similar method	Same as 2020 RNA Base Case
2	New Transmission	Based on TO- provided firm plans (via Gold Book 2018 process) and proposed merchant transmission; inclusion rules applied.	Similar method	Same as 2020 RNA Base Case
3	AC Cable Forced Outage Rates	All existing cable transition rates updated with data received from ConEd and PSEG-LIPA to reflect most recent five-year history.	Similar method	Same as 2020 RNA Base Case
4	UDR Unavailability	Five-year history of forced outages.	Similar method	Same as 2020 RNA Base Case
Emergency Operating Procedures				

#	Parameter	2018 RNA/CRP (2018 GB) Study Period: 2019 -2028	2020 RNA (2020 GB) Study Period: 2024(y4) -2030 (y10)	2020 RNA 70x30 Scenario Case Study Period: 2030
1	Special Case Resources	SCRs sold for the program discounted to historic availability ("effective capacity"). Summer values calculated from the latest available July registrations, held constant for all years of study. Five calls/month	Similar method but with 15 calls/year. Note: also, combined the two SCR steps (generation and load zonal MW).	Same as 2020 RNA Base Case
2	EDRP Resources	2018 Gold Book with effective capacity modeled. Resources sold for the program and discounted to historic availability. Summer values calculated from July 2018 registrations and forecast growth. Values held constant for all years of study.	Not modeled: the values are less than 2 MW.	Same as 2020 RNA Base Case
3	Other EOPs	Based on TO information, measured data, and NYISO forecasts.	Similar method	Same as 2020 RNA Base Case
External Control Areas				
1	PJM	As per RNA Procedure, external model (load, capacity, topology) provided by PJM/NPCC CP-8 WG. PJM is a five-zone model. LOLE of pool adjusted to be between 0.10 and 0.15 days per year by adjusting capacity pro-rata in all areas.	**New model:** Simplified model: The five PJM MARS areas (bubbles) were consolidated into one bubble.	Same as 2020 RNA Base Case
2	ISO-NE	As per RNA Procedure, external model (load, capacity, topology) provided by PJM/NPCC CP-8 WG. LOLE of pool adjusted to be between 0.10 and 0.15 days per year by adjusting capacity pro-rata in all areas.	**New model:** Simplified model: The eight ISO-NE MARS areas (bubbles) were consolidated into one bubble.	Same as 2020 RNA Base Case
3	HQ	As per RNA Procedure, external model (load, capacity, topology) provided by PJM/NPCC CP-8 WG. LOLE of pool adjusted to be between 0.10 and 0.15 days per year by	Similar method	HQ bubble not modeled for consistency with CARIS. Imports from HQ modeled as injections based upon usage profile from MAPS analysis. No flows between HQ and IESO or ISO-NE.

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		adjusting capacity pro-rata in all areas.		
4	IESO	As per RNA Procedure, external model (load, capacity, topology) provided by PJM/NPCC CP-8 WG. LOLE of pool adjusted to be between 0.10 and 0.15 days per year by adjusting capacity pro-rata in all areas.	Similar method	Same as 2020 RNA Base Case
5	Reserve Sharing	All NPCC Control Areas indicate that they will share reserves **equally** among all members before sharing with PJM.	Similar method	Same as 2020 RNA Base Case
6	NYCA Emergency Assistance Limit	Implemented a statewide limit of 3,500 MW.	Similar method	Implemented a statewide (excluding assistance from HQ) limit of 3,500 MW.
Miscellaneous				
1	MARS Model Version	Version 3.22.6	3.29.1499	3.29.1499

2. 2020 RNA: Transmission Security Studies Assumptions

Parameter	2020 RNA Transmission Security Studies Modeling Assumptions	2020 RNA 70x30 Scenario Case Study Period: 2030	Source
Peak Load	NYCA baseline coincident summer peak forecast, which already includes EE and DG (including solar) reductions.	NYCA baseline coincident summer peak forecast for 2030 with adjustments to BTM Solar in accordance with the CARIS 70x30 Base Load.	2020 Gold Book
Load Model	ConEd: voltage varying	No Change	2020 FERC 715 filing
	Rest of NYCA: constant power	No Change	
System Representation	Per updates received through Databank process (Subject to RNA base case inclusion rules).	No Change	NYISO RAD Manual, 2020 FERC 715 filing
Inter-area Interchange Schedules	Consistent with ERAG MMWG interchange schedule.	No Change	2020 FERC 715 filing, MMWG
Inter-area Controllable Tie Schedules	Consistent with applicable tariffs and known firm contracts or rights.	No Change	2020 FERC 715 filing
In-City Series Reactors	Consistent with ConEdison operating protocol. Note: series reactors on 71, 72, M51, and M52 are modeled by-passed with Y49, 41, and 42 series reactors modeled in-service.	No Change	2020 FERC 715 filing, Con Edison protocol
SVCs, FACTS	Set at zero pre-contingency; allowed to adjust post-contingency	No Change	NYISO T&D Manual
Transformer & PAR taps	Taps allowed to adjust pre-contingency; fixed post-contingency.	No Change	2020 FERC 715 filing
Switched Shunts	Allowed to adjust pre-contingency; fixed post-contingency.	No Change	2020 FERC 715 filing
Fault Current analysis settings	Per Fault Current Assessment Guideline.	No Change	NYISO Fault Current Assessment Guideline