

NYCA IRM Requirement Study 2023- 2024 Preliminary Base Case (PBC) Model Assumptions Matrix

NYSRC

Draft v 2.0

[Installed Capacity Subcommittee Meeting #262](#)

June 29, 2022

Load Forecast

| # | Parameter | 2022 Model Assumptions | 2023 Model Assumptions | Basis for Recommendation | Model Change | Est. IRM Impact |
|---|---|---|---|---|--------------|-----------------|
| 1 | Peak Load Forecast (Preliminary Base Case – Parametric & Sensitivities) | 2021 Gold Book NYCA: 32,308 MW ² NYC: 11,286 MW LI: 5,192 MW G-J: 15,453 MW (Attachment A1) | 2022 Gold Book NYCA: 32,018 MW ¹ NYC: 11,001 MW LI: 5,031 MW G-J: 15,223 MW (Attachment A1) | Most recent Gold Book Forecast is used for Preliminary Base Case parametric study and sensitivity cases | N | TBD |
| 2 | Peak Load Forecast (Final Base Case) | October 2021 Fcst. NYCA: 32,139 MW ² NYC: 10,944 MW LI: 5,159 MW G-J: 15,171 MW | <i>(Data is expected October 2022)</i> | Updated Load Forecast in October will be used for Final Base Case | TBD | 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 | N | None |
| 4 | Load Forecast Uncertainty (LFU)- | Zonal Model to reflect current data with input from Con Ed and LIPA. (Attachment A2) | Zonal Model to reflect current data with input from Con Ed and LIPA. (Attachment A2) | Based on TO and NYISO data analyses | N | Medium(-) |
| 5 | LFU Winter | Attachment A3 | Attachment A3 | Based on TO and NYISO data analyses | N | 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%. 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 2022.

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 | 2022 Model Assumptions | 2023 Model Assumptions | Basis for Recommendation | Model Change | Est. IRM Impact |
|----|---|--|--|--|--------------|-----------------|
| 6 | Existing Generating Unit Capacities | 2021 Gold Book Values. Use min. (DMNC vs. CRIS) capacity value | 2022 Gold Book Values. Use min. (DMNC vs. CRIS) capacity value | Latest Gold Book publication | N | TBD |
| 7 | Proposed New Units (Thermal) and re-ratings | 111.2 MW of new Thermal resources | 0 MW of new Thermal resources, (Attachment B1) | NYISO recommendation based on documented process that includes the latest Gold Book publication, NYISO interconnection queue, and generation notifications | N | None |
| 8 | Deactivations and Removals ³ | 19.1 MW of unit deactivations | 1,266.5 MW unit deactivations (Attachment B2) | Latest Gold Book publications and generator notifications | N | TBD |
| 9 | Forced and Partial Outage Rates | Five-year (2016-2020) GADS data for each unit represented. Those units with less than five years – use representative data. (Attachment C) | Five-year (2017-2021) 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 five-year period | N | Low(-) |
| 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 | Updated schedules | N | TBD |

Generation Parameters

| # | Parameter | 2022 Model Assumptions | 2023 Model Assumptions | Basis for Recommendation | Model Change | Est. IRM Impact |
|----|--|---|---|---|--------------|-----------------|
| 11 | Summer Maintenance | Nominal 50 MWs – divided equally between Zones J and K | <i>(Data is expected August 2022)</i> | Review of most recent data | TBD | TBD |
| 12 | 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 provided curves | N | TBD |
| 13 | Existing and Proposed New Wind Units ⁴ | 158.1 MW of Wind Capacity additions totaling 2017.5 MW of qualifying wind | 417.5 MW of Wind Capacity additions totaling 2435.0 MW of qualifying wind (Attachment B3) | ICAP units based on RPS agreements, interconnection queue and ICS input. | N | TBD |
| 14 | Wind Shape | Actual hourly plant output over the period 2016-2020. New units will use zonal hourly averages or nearby units. | Actual hourly plant output over the period 2017-2021. New units will use zonal hourly averages or nearby units | Program randomly selects a wind shape of hourly production from the most recent five-year period for each model iteration. | N | TBD |
| 15 | Existing and Proposed New Solar Resources ⁴ | 182.9 MW of Solar Capacity additions totaling 214.4 MW of qualifying Solar Capacity. | 0 MW of Solar Capacity additions totaling 214.4 MW of qualifying Solar Capacity. (Attachment B3) | ICAP Resources connected to Bulk Electric System | N | None |
| 16 | Solar Shape | Actual hourly plant output over the period 2016-2020. New units will use zonal hourly averages or nearby units. | Actual hourly plant output over the period 2017-2021. New units will use zonal hourly averages or nearby units. | Program randomly selects a solar shape of hourly production from the most recent five-year period for each model iteration. | N | TBD |

Generation Parameters

| # | Parameter | 2022 Model Assumptions | 2023 Model Assumptions | Basis for Recommendation | Model Change | Est. IRM Impact |
|----|---|---|---|--|--------------|-----------------|
| 17 | BTM- NG Program | One new BTM NG resource (Attachment B5) | No new BTM NG resources, for 161.6 MW (Attachment B5) | Both the generation of the participating resources and the full host loads are modeled. | N | TBD |
| 18 | Small Hydro Resources | Actual hourly plant output over the period 2016-2020. | Actual hourly plant output over the period 2017-2021. | Program randomly selects a hydro shape of hourly production from the most recent five-year period for each model iteration. | N | TBD |
| 19 | Large Hydro | Probabilistic Model based on five years of GADS data (2016-2020) | Probabilistic Model based on five years of GADS data (2017-2021) | Transition Rates representing the Equivalent Forced Outage Rates (EFORd) during demand periods over the most recent five-year period. | N | TBD |
| 20 | Landfill Gas | Actual hourly plant output over the period 2016-2020. | Actual hourly plant output over the period 2017-2021. | Program randomly selects a LFG shape of hourly production from the most recent five-year period for each model iteration. | N | TBD |
| 21 | New ESR (Energy Storage Resources) ⁴ | 0 MW of new battery storage scheduled. 0 MW of total battery storage modeled | 0 MW of new battery storage scheduled. 0 MW of total battery storage modeled (see attachment B4) | Sensitivities on simplified model and GE software enhancement | N | N/A |
| 22 | Energy Limited Resources (ELR) | Based upon elections made by August 1 st 2021 | Based upon elections made by August 1 st 2021 | Existing elections are made by August 1st and will be incorporated into the model. Elected ELR units will be modeled using the GE MARS ELR functionalities | Y | Medium(-) |

Transactions- Imports and Exports

| # | Parameter | 2022 Model Assumptions | 2023 Model Assumptions | Basis for Recommendation | Model Change | Est. IRM Impact |
|----|--|--|--|---|--------------|-----------------|
| 23 | Capacity Purchases | Existing Rights: PJM - 1,080 MW HQ - 1,190 MW All contracts modeled as equivalent contracts. | Existing Rights: PJM - 1,080 MW HQ - 1,190 MW All contracts modeled as equivalent contracts. | Grandfathered Rights, ETCNL, and other awarded long-term rights. | N | None |
| 24 | Capacity Sales | Long Term firm sales Summer 265.9 MW | Long Term firm sales Summer 265.4 MW | These are long term FERC approved contracts. | N | TBD |
| 25 | FCM Sales from a Locality ³ | No sales modeled within study period | No sales modeled within study period | NYISO recommendation | N | None |
| 26 | Wheels through NYCA | 300 MW HQ to NE equivalent contract | 300 MW HQ to NE equivalent contract | HQ Wheel has an ISO-NE capacity supply obligation (CSO) for 2023-24 | N | None |
| 27 | New UDRs (Unforced capacity Deliverability Rights) | Projects with expired CRIS will be modeled as Emergency Assistance Only: HTP | No new UDRs Identified | Existing UDR elections are made by August 1st and will be incorporated into the model | N | None |
| 28 | New EDRs (External Deliverability Rights) | 80 MWs for 2022 Model | No new EDRs Identified | Existing EDRs are incorporated in the model as an increase in the transfer limits | N | None |

³ 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 | 2022 Model Assumptions | 2023 Model Assumptions | Basis for Recommendation | Model Change | Est. IRM Impact |
|----|------------------------------|--|---|---|--------------|-----------------|
| 29 | Interface Limits | Revisions due to Western NY Public Policy impacts, Central East derate, Cedars upgrade, ConEd-LIPA dynamic limit, Neptune derate (Attachment E-E3) | Central East forward and Group limit updates due to AC Transmission Segment A, Neptune no longer derated unless further delay in return to full service, UPNY-ConED series reactors in service, West Central Reverse uprate External transfer limits update , Zone K export Transfer Limit update | 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. | Y | TBD |
| 30 | New Transmission | Cedars External to Rest of State Capacity Deliverability Rights from HQ | None Identified | Based on TO provided models and NYISO's review | N | N/A |
| 31 | AC Cable Forced Outage Rates | All existing Cable EFORDs for NYC and LI to reflect most recent five-year history (2016-2020) (Attachment E4) | All existing Cable EFORDs for NYC and LI to reflect most recent five-year history (2017-2021) (Attachment E4) | TO provided transition rates with NYISO review. | N | TBD |
| 32 | UDR Line Unavailability | Five year history of forced outages (2016-2020) | Five year history of forced outages (2017-2021) | NYISO/TO Review | N | TBD |

Emergency Operating Procedures

| # | Parameter | 2022 Model Assumptions | 2023 Model Assumptions | Basis for Recommendation | Model Change | Est. IRM Impact |
|----|------------------------|--|---|---|--------------|-----------------|
| 33 | Special Case Resources | July 2021 –1164 MW based on registrations and modeled as 812 MW of effective capacity. Monthly variation based on historical experience. | <i>(Data is expected July 2022)</i> July 2022 – ___ MW based on registrations and modeled as ___ MW of effective capacity. Monthly variation based on historical experience. | SCRs sold for the program discounted to historic availability. Summer values calculated from July 2022 registrations. Performance calculation updated per ICS presentations on SCR performance. | TBD | TBD |
| 34 | Other EOPs | 863.6 MW of non-SCR/non-EDRP resources (Attachment D) | 350 MW of 10-min Operating Reserve maintained at Load Shedding <i>(Data is expected July 2022)</i> ___ MW of non-SCR/non-EDRP resources | Based on white paper recommendation approved by EC Based on TO information, measured data, and NYISO forecasts | Y | High(+) |
| 35 | EOP Structure | 10 EOP steps modeled | 10 EOP steps modeled | Based on agreement with ICS | N | N/A |

External Control Areas

| # | Parameter | 2022 Model Assumptions | 2023 Model Assumptions | Basis for Recommendation | Model Change | 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) | Load and Capacity data will be provided by ISONE/NPCC CP-8 Data may be adjusted per NYSRC Policy 5 (Attachment E) | Initial Review performed by the NPCC CP-8 WG prior to Policy 5 changes | N | TBD |
| 37 | ISONE, Quebec, IESO | Load and Capacity data will be 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 (Attachment E) | Initial Review performed by the NPCC CP-8 WG prior to Policy 5 changes | N | TBD |
| 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 | White paper on external Control Area adjustments | N | TBD |
| 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 | Per NPCC CP-8 WG | N | TBD |
| 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. | White Paper on Modeling of Emergency Assistance for NYCA in IRM studies | N | None |

Miscellaneous

| # | Parameter | 2022 Model Assumptions | 2023 Model Assumptions | Basis for Recommendation | Model Change | Est. IRM Impact |
|----|---------------------------|---------------------------------------|-------------------------------------|--|--------------|-----------------|
| 41 | MARS Model Version | 4.2.1765 | 4.10.2035 | Per testing and ICS recommendation | Y | None |
| 42 | Environmental Initiatives | No new rules for 2022 Capability Year | <i>(Data is expected July 2022)</i> | Review of existing regulations and rules | TBD | TBD |

Attachment A1

NYCA Summer Load Forecast Coincident and Non-Coincident Peak: 2022 PBC and FBC

| 2022 FBC | | | | | | | | | | | | | |
|---------------------|--------|--------|--------|-------|--------|--------|--------|-------|--------|---------|--------|---------|---------|
| Area | A | B | C | D | E | F | G | H | I | J | K | NYCA | G_J |
| NCP - Forecast | 2918 | 2112.1 | 2881.2 | 668.1 | 1425.1 | 2419.8 | 2256.2 | 634.4 | 1408.9 | 10943.7 | 5158.5 | | |
| CP - Forecast | 2764.2 | 2047.2 | 2814.8 | 655.7 | 1366.1 | 2381.7 | 2219.3 | 625.9 | 1390 | 10796.9 | 5076.8 | 32138.6 | |
| G-J Peak - Forecast | | | | | | | 2243.1 | 632.6 | 1404.9 | 10890.5 | | | 15171.1 |

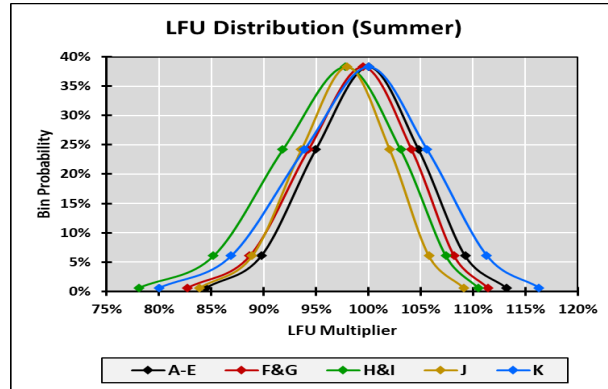
| 2023 PBC | | | | | | | | | | | | | |
|---------------------|------|--------|--------|-----|------|------|------|-----|------|---------|--------|---------|-------|
| Area | A | B | C | D | E | F | G | H | I | J | K | NYCA | G_J |
| NCP - Forecast | 2886 | 2245.4 | 2883.5 | 703 | 1361 | 2428 | 2236 | 639 | 1398 | 11024.6 | 5072.1 | | |
| CP - Forecast | 2726 | 2178.4 | 2816.5 | 687 | 1305 | 2390 | 2199 | 630 | 1379 | 10876.6 | 4992.1 | 32179.6 | |
| G-J Peak - Forecast | | | | | | | 2223 | 637 | 1394 | 10969 | | | 15223 |

| Delta | | | | | | | | | | | | | |
|---------------------|-------|-------|-----|------|-------|-----|-------|-----|-------|------|-------|------|------|
| Area | A | B | C | D | E | F | G | H | I | J | K | NYCA | G_J |
| NCP - Forecast | -32 | 133.3 | 2.3 | 34.9 | -64.1 | 8.2 | -20.2 | 4.6 | -10.9 | 80.9 | -86.4 | | |
| CP - Forecast | -38.2 | 131.2 | 1.7 | 31.3 | -61.1 | 8.3 | -20.3 | 4.1 | -11 | 79.7 | -84.7 | 41 | |
| G-J Peak - Forecast | | | | | | | -20.1 | 4.4 | -10.9 | 78.5 | | | 51.9 |

Attachment A2

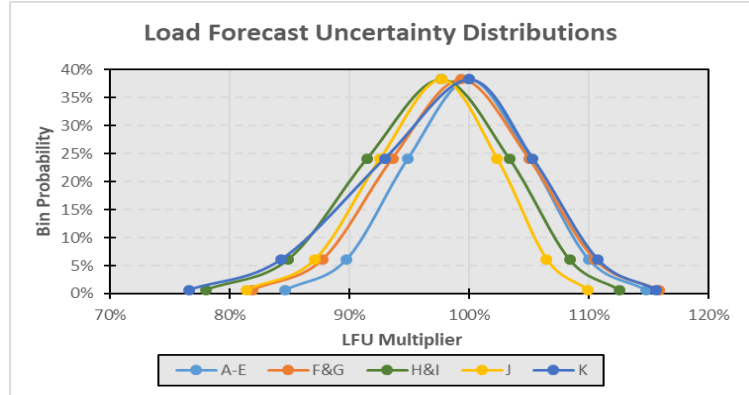
NYCA Summer Load Forecast Uncertainty Model: 2023 and 2022

Load Forecast 2023



| Bin | Bin z | Bin Probability | A-E | F&G | H&I | J | K |
|-------|-------|-----------------|---------|---------|---------|---------|---------|
| Bin 1 | 2.74 | 0.62% | 113.18% | 111.42% | 110.50% | 109.10% | 116.30% |
| Bin 2 | 1.79 | 6.06% | 109.25% | 108.20% | 107.41% | 105.78% | 111.32% |
| Bin 3 | 0.89 | 24.17% | 104.80% | 104.14% | 103.08% | 102.05% | 105.60% |
| Bin 4 | 0.00 | 38.29% | 100.00% | 99.46% | 97.82% | 97.98% | 100.00% |
| Bin 5 | -0.89 | 24.17% | 94.96% | 94.28% | 91.83% | 93.60% | 93.87% |
| Bin 6 | -1.79 | 6.06% | 89.75% | 88.67% | 85.21% | 88.90% | 86.89% |
| Bin 7 | -2.74 | 0.62% | 84.49% | 82.72% | 78.09% | 83.89% | 80.04% |

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% |
| Delta | | A-E | F&G | H&I | J | K |
| B1 -B4 | 14.78% | 16.49% | 14.87% | 12.28% | 15.63% | |
| B4 - B7 | 15.37% | 17.48% | 19.70% | 16.29% | 23.40% | |
| Total Range | 30.15% | 33.97% | 34.57% | 28.57% | 39.03% | |

Attachment A3

NYCA Winter Load Forecast Uncertainty Model: 2023

| Bin | Bin z | Bin Probability | NYCA |
|-------|-------|-----------------|---------|
| Bin 1 | 2.74 | 0.62% | 110.29% |
| Bin 2 | 1.79 | 6.06% | 106.26% |
| Bin 3 | 0.89 | 24.17% | 102.65% |
| Bin 4 | 0.00 | 38.29% | 99.37% |
| Bin 5 | -0.89 | 24.17% | 96.32% |
| Bin 6 | -1.79 | 6.06% | 93.46% |
| Bin 7 | -2.74 | 0.62% | 90.74% |

Attachment B1

New Thermal Units and Unit Re-Ratings

| New Thermal Units and Unit Re-ratings (summer ratings) | | | | | |
|--|------|-----------------------------|-----------------------------|-------------------------|----------------------|
| Project or Generator Name | Zone | 2022 Gold Book (MW) CRIS | 2022 Gold Book (MW) DMNC | New or Incremental (MW) | 2023 MARS Model (MW) |
| New Units | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| | | | | | |
| Total New Units and Upgrades (MW) | | | | | |

Attachment B2

Deactivations and Removals

| Unit Removal since 2022-2023 IRM Study | | | |
|--|------|------|------------------|
| Generator Name | Type | Zone | SUMMER CRIS (MW) |
| Ravenswood 01 | GT | J | 8.8 |
| Ravenswood 11 | GT | J | 20.2 |
| Allegheny Cogen | CC | B | 62.9 |
| Nassua Energy Corp. | CC | K | 51.6 |
| Sithe Sterling | CC | B | 57.4 |
| Gowanus 1-1 | GT | J | 19.1 |
| Gowanus 1-2 | GT | J | 17.1 |
| Gowanus 1-3 | GT | J | 17.2 |
| Gowanus 1-4 | GT | J | 17.1 |
| Gowanus 1-5 | GT | J | 16.5 |
| Gowanus 1-6 | GT | J | 18 |
| Gowanus 1-7 | GT | J | 17.6 |
| Gowanus 4-1 | GT | J | 16.8 |
| Gowanus 4-2 | GT | J | 17.3 |
| Gowanus 4-3 | GT | J | 17.6 |
| Gowanus 4-4 | GT | J | 17.1 |
| Gowanus 4-5 | GT | J | 17.1 |
| Gowanus 4-6 | GT | J | 18.6 |
| Gowanus 4-7 | GT | J | 16.6 |
| Gowanus 4-8 | GT | J | 19 |

Continued on next slide

Attachment B2 continued

| | | | |
|-----------------------|----|---|----------------|
| Astoria GT 2-1 | GT | J | 41.2 |
| Astoria GT 2-2 | GT | J | 42.4 |
| Astoria GT 2-3 | GT | J | 41.2 |
| Astoria GT 2-4 | GT | J | 41 |
| Astoria GT 3-1 | GT | J | 41.2 |
| Astoria GT 3-2 | GT | J | 43.5 |
| Astoria GT 3-3 | GT | J | 43 |
| Astoria GT 3-4 | GT | J | 43 |
| Astoria GT 4-1 | GT | J | 42.6 |
| Astoria GT 4-2 | GT | J | 41.4 |
| Astoria GT 4-3 | GT | J | 41.1 |
| Astoria GT 4-4 | GT | J | 42.8 |
| Coxsackie GT | GT | G | 21.6 |
| South Cairo | GT | G | 19.8 |
| 74 St. GT 1 & 2 | GT | J | 39.1 |
| Astoria GT 01 | GT | J | 15.7 |
| Hudson Ave 3 | GT | J | 16 |
| Hudson Ave 5 | GT | J | 15.1 |
| Ravenswood 01 | GT | J | 21.2 |
| NorthPort GT | GT | K | 13.8 |
| Port Jefferson GT 01 | GT | K | 14.1 |
| Shoreham 1 | GT | K | 48.9 |
| Shoreham 2 | GT | K | 18.5 |
| Glenwood GT 03 | GT | K | 54.7 |
| Total Removals | | | 1,266.5 |

Attachment B3

New Intermittent Resources

| New Intermittent Units | | | | |
|--------------------------------|------|-----------|---------------------------|-----------------------|
| Resource | Zone | CRIS (MW) | Summer Capability (MW) | MARS Modeled Capacity |
| Wind | | | | |
| Eight Point Wind Energy Center | C | 101.8 | 101.8 | 101.8 |
| Number 3 Wind Energy Center | E | 103.9 | 103.9 | 103.9 |
| Bluestone Wind | E | 111.8 | 111.8 | 111.8 |
| Ball Hill | A | 100.0 | 100.0 | 100.0 |
| Total Wind | | | | 417.5 |
| Solar | | | | |
| | | | | |
| Total Solar | | | | |

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 | | | | |

Attachment B5

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

| Attachment B5 -Units in the Behind the Meter Net Generation Program* | | | |
|--|------|----------------------------------|--|
| Generator Name | Zone | Resource Value (MW) ⁴ | Peak Load Adjustment (MW) ⁵ |
| Existing: | | | |
| Stony Brook | K | 42.3 | 41.1 |
| Greenidge 4 | C | 101.8 | 41.5 |
| Lyons Falls Hydro | E | 0.0 | 2.0 |
| (CONFIDENTIAL)*** | J | | 23.6 |
| Red Rochester | B | 78.6 | 53.4 |
| Total BTM-NG | | | 161.6 |

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

⁴ Based on adjusted Dependable Maximum Gross Capability (DMGC) value.

⁵ Based on Average Coincident Host Load (ACHL).

*** One existing resource in Zone J is expected to begin participating in the BTM:NG program in Summer 2022

Attachment C

NYCA Five Year Derating Factors

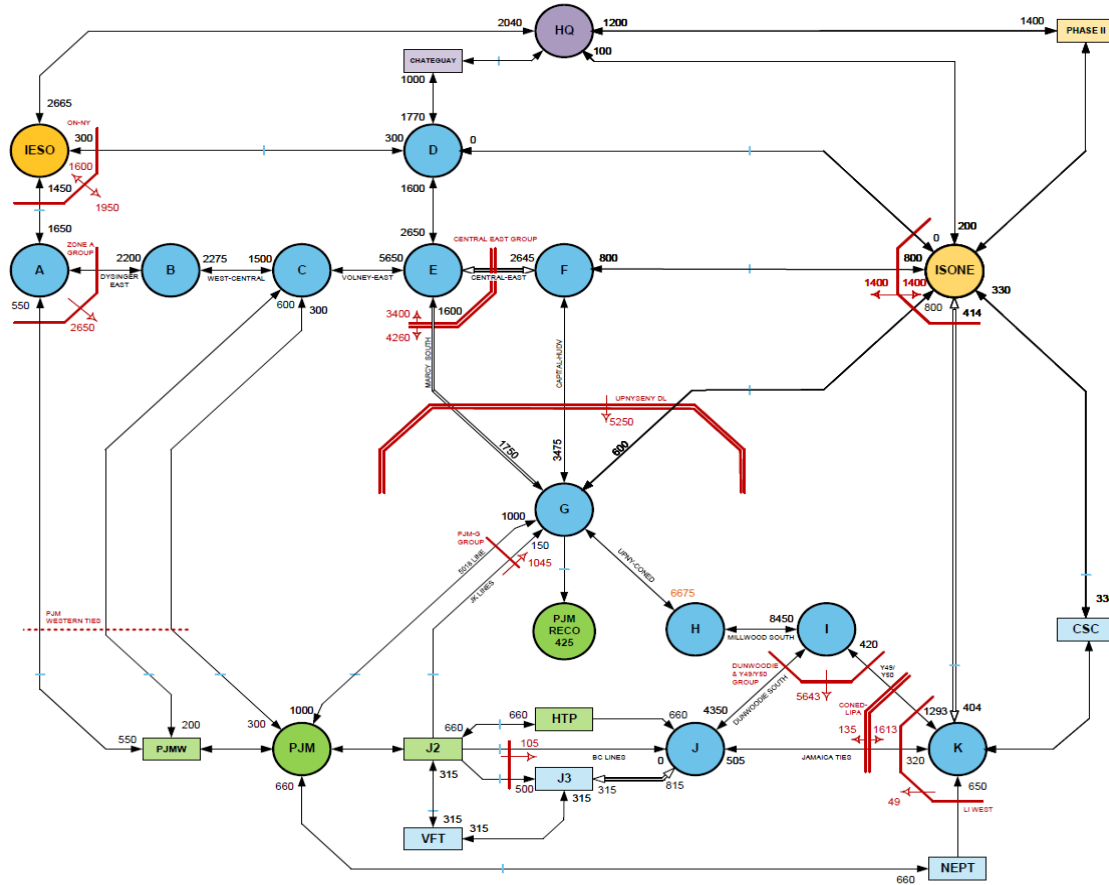
Attachment D

Emergency Operating Procedures

| Step | Procedure | 2022 IRM MW Value | 2023 IRM MW Value |
|------|--|--|---|
| 1 | Special Case Resources –Load, Gen | 1,164 MW Enrolled/ 812 MW modeled | |
| 2 | 5% manual voltage Reduction | 60.43 MW | |
| 3 | Thirty-minute reserve to zero | 655 MW | |
| 4 | 5% remote voltage reduction | 483.09 MW | |
| 5 | Voluntary industrial curtailment | 240.05 MW | |
| 6 | General Public Appeals | 80 MW | |
| 7 | Emergency Purchases | Varies | |
| 8 | Ten-minute reserves to zero | 1,310 MW | 960 MW (350 MW maintained at load shedding) |
| 9 | Customer disconnections | As needed | |
| 10 | Adjustment used if IRM is lower than technical study margin | As needed | |

Attachment E1

IRM Topology



Notes

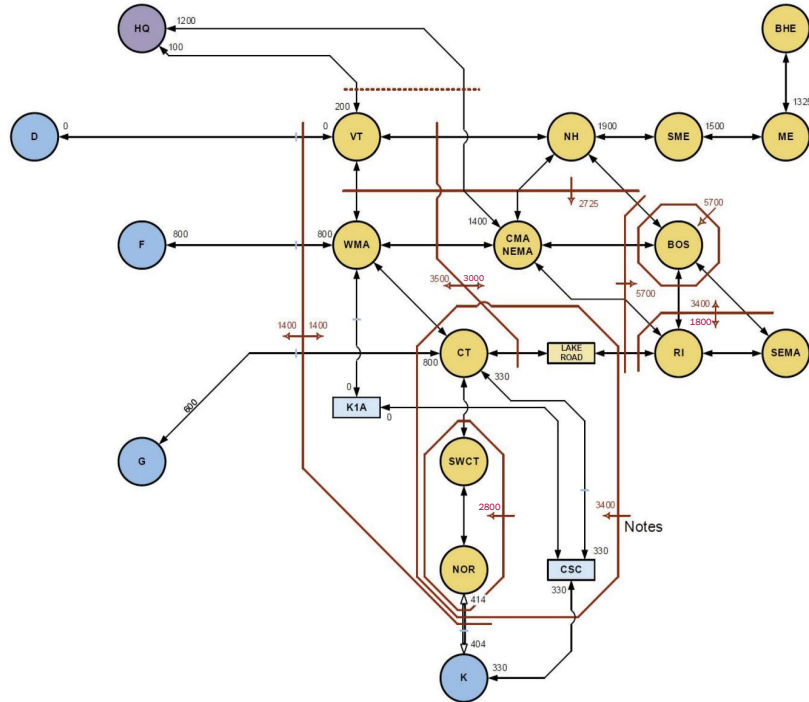
1. PJM to NY emergency assistance (EA) assumption for calculating the PJM-NY Western ties, PJM-G Group, and ABC Line Group flow distribution limit: 1500MW
2. NYCA EA simultaneous import limit: 3,500 MW
3. External areas representation based upon information received from the NPCC CP-S WG

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

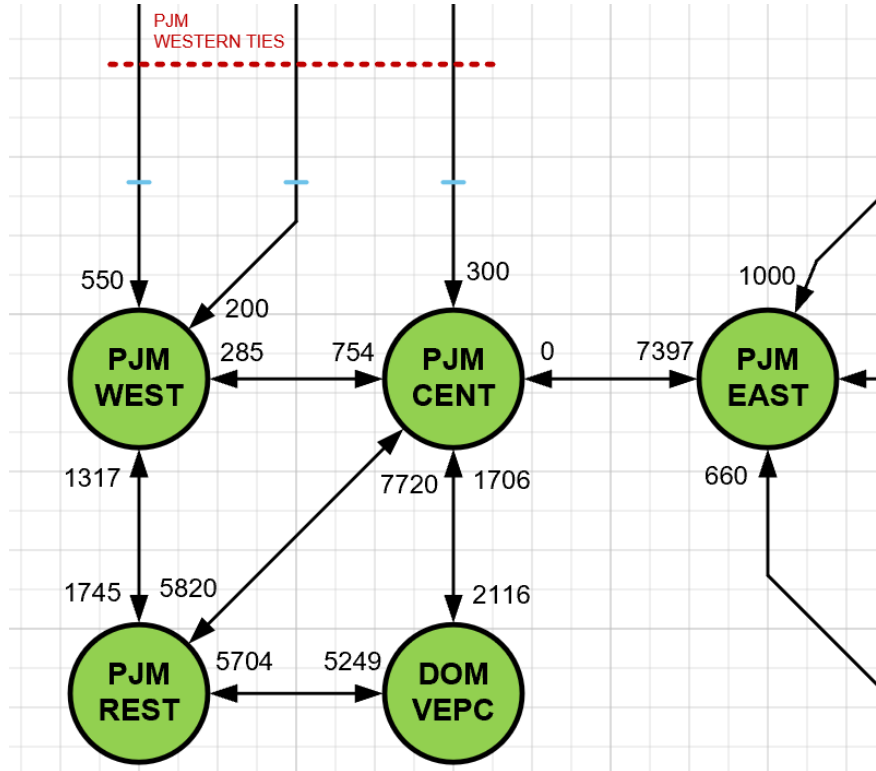
Attachment E2

ISO-NE 14 Bubble Model



Attachment E3

PJM Bubble Model



Attachment E4

| 5 Year Average Cable Outage Rate | |
|----------------------------------|---------|
| 2017-21 | 2016-20 |
| | 6.42% |

The facilities included in these averages are VFT, HTP, Dunwoodie-South, Y49/Y50, CSC, Neptune, Norwalk-Northport and A-Line.

Attachment E5

Dynamic Limits

| ConEd-LIPA: Barrett1 and 2 | | | | |
|----------------------------|---------|---------|---------|---------|
| Units Available | SY2023 | | SY2022 | |
| | IJ to K | K to IJ | IJ to K | K to IJ |
| 2 | 1613 | 135 | 1613 | 220 |
| 1 | 1613 | 135 | 1613 | 220 |
| 0 | 1613 | 0 | 1613 | 130 |

| Central East Voltage Limits, Oswego Complex Units | | | | | | | | |
|---|--|---------|---------|---------|--|---------|---------|---------|
| Dependency | SY2023 | | | | SY2022 | | | |
| | 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 | 2645 | 1999 | 4260 | 1999 | 2800 | 3400 | 4515 | 3400 |
| 5 | 2640 | 1999 | 4260 | 1999 | 2740 | 3400 | 4425 | 3400 |
| 4 | 2585 | 1999 | 4185 | 1999 | 2650 | 3400 | 4290 | 3400 |
| 3 | 2530 | 1999 | 4100 | 1999 | 2605 | 3400 | 4230 | 3400 |
| 2 | 2440 | 1999 | 3970 | 1999 | 2490 | 3400 | 4055 | 3400 |
| All Other Conditions | 2356 | 1999 | 3845 | 1999 | 2415 | 3400 | 3935 | 3400 |

Attachment F

SCR Determinations 2022 and 2023 IRM Studies

| SCR Performance for 2022 IRM Study | | | | | | |
|------------------------------------|-------------------------|------------------------------|---------------------------------|--------------|--------------------------------|--------------|
| Super Zones | Enrollments (July 2021) | Forecast (2022) ⁶ | Performance Factor ⁷ | UCAP (2022) | Adjustment Factor ⁸ | Model Value |
| A-F | 636.0 | 636.0 | 0.866 | 550.9 | 0.949 | 522.4 |
| G-I | 84.9 | 84.9 | 0.772 | 65.5 | 0.846 | 55.5 |
| J | 406.5 | 406.5 | 0.701 | 284.9 | 0.746 | 212.4 |
| K | 36.8 | 36.8 | 0.735 | 27.0 | 0.822 | 22.2 |
| Totals | 1164.2 | 1164.2 | | 928.4 | | 812.5 |
| | | | | | Overall Performance = 69.8% | |

6. These values represent no growth from July 2020 ICAP based enrollments.

7. Performance Factor based on ACL methodology.

8. 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

| Resource | Wind | | | |
|-------------------------------------|------|---------------|------------------------|---------------------------|
| | Zone | CRIS (MW) | Summer Capability (MW) | MARS Modeled Capability** |
| 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 |
| Arkwright Summit Wind Farm [WT] | A | 78.4 | 78.4 | 78.4 |
| Roaring Brook [WT] | E | 79.7 | 79.7 | 79.7 |
| Eight Point Wind Energy Center [WT] | C | 101.8 | 101.8 | 101.8 |
| Bluestone Wind [WT] | E | 111.8 | 111.8 | 111.8 |
| Number 3 Wind Energy [WT] | E | 103.9 | 103.9 | 103.9 |
| Ball Hill Wind [WT] | A | 100.0 | 100.0 | 100.0 |
| Total | | 2337.0 | 2441.3 | 2435.0 |

Attachment G1

Wind Units Not Currently Participating in ICAP Market

| Wind | | | | | |
|----------------------------|------|----------------|-------------|------------------------|-----------------------|
| Resource | Zone | Nameplate (MW) | CRIS (MW) | Summer Capability (MW) | MARS Modeled Capacity |
| Erie Wind [WT] | A | 15.0 | 0.0 | 0.0 | 0.0 |
| Steel Wind [WT] | A | 20.0 | 0.0 | 0.0 | 0.0 |
| Western NY Wind Power [WT] | B | 6.6 | 0.0 | 0.0 | 0.0 |
| Marsh Hill Wind Farm [WT] | C | 16.2 | 0.0 | 0.0 | 0.0 |
| Copenhagen Wind [WT] | E | 79.9 | 79.9 | 0.0 | 0.0 |
| Fenner Wind [WT] | C | 30.0 | 0.0 | 0.0 | 0.0 |
| Total | | 167.7 | 79.9 | 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 |
| Calverton Solar Energy Center [PV] | K | 22.9 | 22.9 | 22.9 |
| Total | | 54.4 | 54.4 | 54.4 |

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 |

*Unit provides power at the distribution rather than at the transmission level.

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 | 11.2 | 11.2 | 11.2 |
| 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 |
| Fulton County Landfill [IC] | F | 3.2 | 3.2 | 3.2 |
| Totals | | 99.3 | 99.3 | 99.3 |

Attachment G5

LFG Units Not Modeled

| LFG | | | | |
|--------------|------|------------|------------------------|-------------------------------------|
| Resource | Zone | CRIS (MW) | Summer Capability (MW) | Lesser of Summer Capability VS CRIS |
| Albany LFGE | F | 4.5 | 5.6 | 4.5 |
| Total | | 4.5 | 5.6 | 4.5 |

2023 - 2024 IRM Proposed MARS Topology Additional Changes

Ying Guo

NYISO

ICS Meeting # 262

June 29, 2022

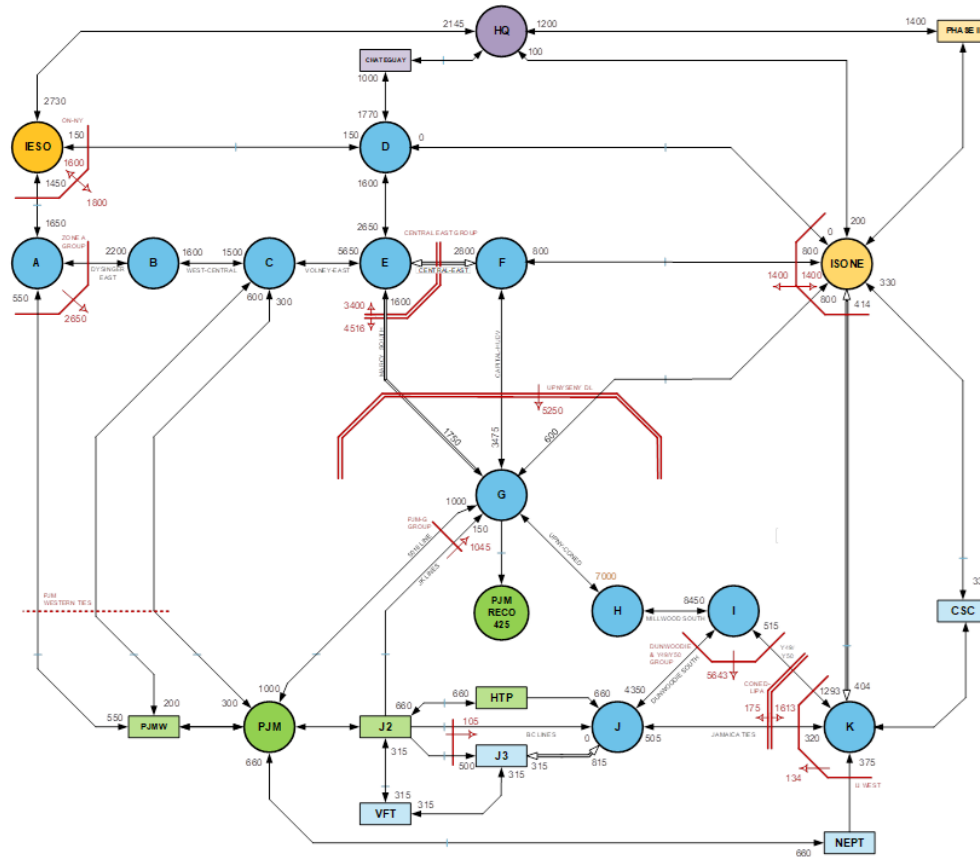
Zone K Export Limits and Ontario Import Limit

- Based on information from PSEG LI, Zone K Export Transfer Limits are updated due to the anticipated retirement of Trigen and the derate on 138-291

| Forward Limits (MW) | Y49/Y50 | CONED-LIPA | LI-WEST |
|-----------------------------------|---------|------------|---------|
| 2022-2023 IRM | 515 | 220 | 134 |
| Proposed Change for 2023-2024 IRM | 420 | 135 | 49 |
| <i>Delta</i> | -95 | -85 | -85 |

- Limits from Ontario are updated based on confirmation from IESO

2022-2023 IRM Topology For New York Control Area



- Notes**
1. PJM to NY emergency assistance (EA) assumption for calculating the PJM-NY Western ties, PJM-G Group, and ABC Line Group flow distribution limit: 1500MW
 2. NYCA EA simultaneous import limit: 3,500 MW
 3. External areas representation based upon information received from the NPCC CP-8 WG

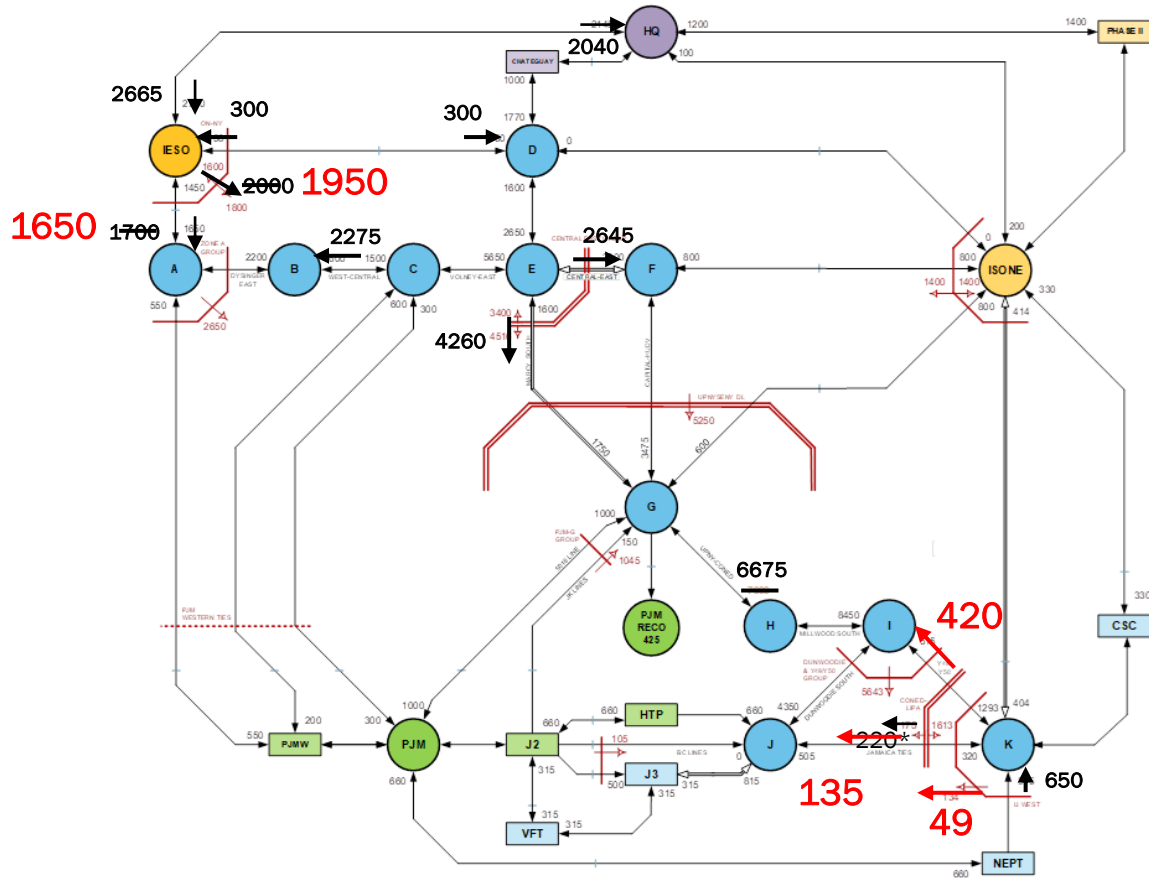
Legend

- ↔ 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



Proposed internal topology changes



Notes

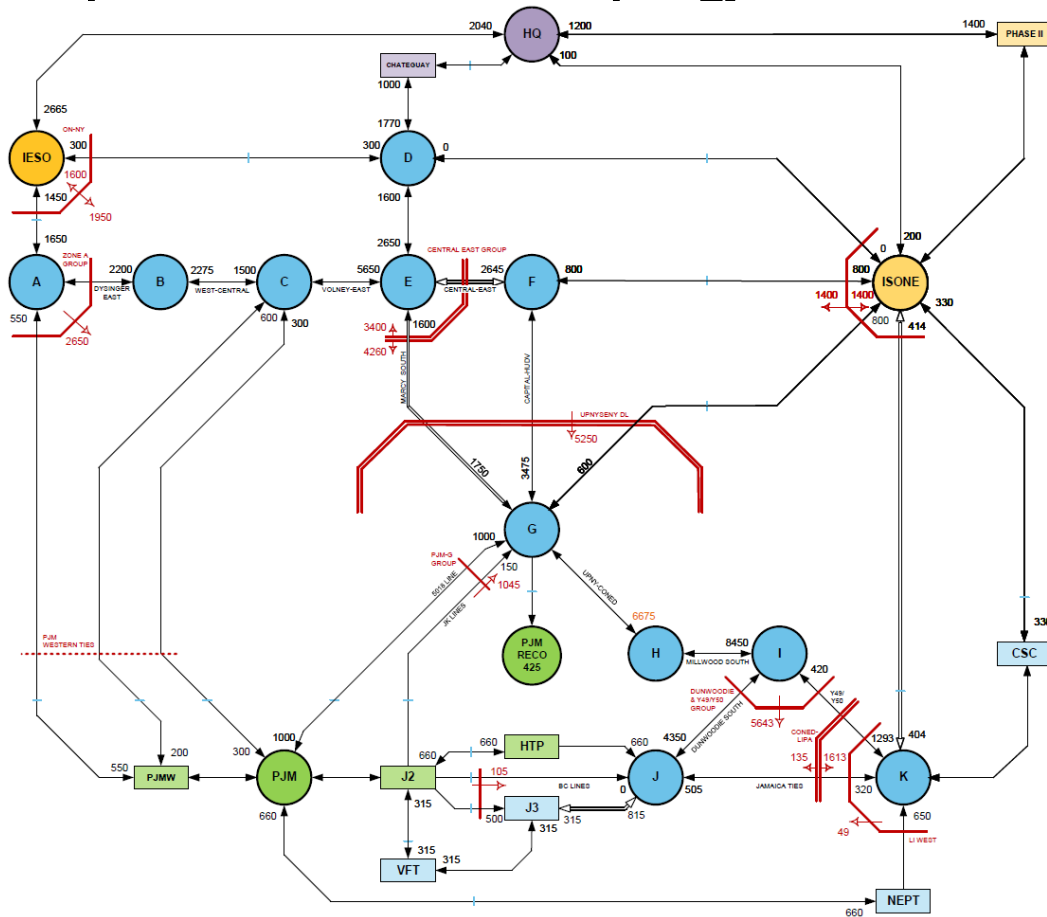
1. PJM to NY emergency assistance (EA) assumption for calculating the PJM-NY Western ties, PJM-G Group, and ABC Line Group flow distribution limit: 1500MW
2. NYCA EA simultaneous import limit: 3,500 MW
3. External areas representation based upon information received from the NPCC CP-8 WG

Legend

- ↔ Interface
 - Undirectional 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

* Error identified in the diagram. Update to reflect correct limit in the model

Proposed 2023-2024 IRM Topology For New York Control Area



Notes

1. PJM to NY emergency assistance (EA) assumption for calculating the PJM-NY Western ties, PJM-G Group, and ABC Line Group flow distribution limit: 1500MW
2. NYCA EA simultaneous import limit: 3,500 MW
3. External areas representation based upon information received from the NPCC CP-8 WG

Legend

- Interface
 - Unidirectional Interface
 - Interface w/ Dynamic Ratings
 - Interface Group w/ Dynamic Ratings
 - 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

Questions?

Our Mission & Vision



Mission

Ensure power system reliability and competitive markets for New York in a clean energy future



Vision

Working together with stakeholders to build the cleanest, most reliable electric system in the nation