

2020-2021 NYCA IRM Requirement Study

Preliminary Base Case (PBC) Model Assumptions

Assumption Matrix

Draft V 0.1

January 29, 2019

Load Parameters

| # | Parameter | 2019 Model Assumptions | 2020 Model Assumptions | Basis for Recommendation | Model Change | Est. IRM Impact* |
|----------|--|---|--|---|--------------|------------------|
| 1 | Peak Load Forecast (Preliminary Base Case – Parametric & Sensitivities) | 2018 Gold Book NYCA: 32,857MW NYC: 11,474 MW LI: 5,323 MW G-J: 15,815 MW | 2019 Gold Book NYCA: xxxxxMW NYC: yyyyy MW LI: zzzz MW G-J: rrrrr MW | Most recent Gold Book Forecast is used for Preliminary Base Case parametric study and sensitivity cases | | |
| 2 | Peak Load Forecast (Final Base Case) | October 2018 Fcst. NYCA: 32,488 MW NYC: 11,585 MW LI: 5,346 MW G-J: 15,831 MW | October 2019 Fcst. NYCA: xxxxxMW NYC: yyyyy MW LI: zzzz MW G-J: rrrrr MW | Forecast based on examination of 2019 weather normalized peaks. Top three external Area peak days aligned with NYCA | | |
| 3 | Load Shape (Multiple Load Shape) | Bin 1: 2006 Bin 2: 2002 Bins 3-7: 2007 | Bin 1: aaaa Bin 2: bbbb Bins 3-7: cccc | ICS Recommendation | | |
| 4 | Load Forecast Uncertainty (LFU)- Summer | 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 and analyses. | | |
| <u>5</u> | <u>LFU Winter</u> | <u>No update</u> | <u>Updated</u> | <u>Winter LFU no longer representative.</u> | | |

*(-) 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%.

Generation Parameters

| # | Parameter | 2019 Model Assumptions | 2020 Model Assumptions | Basis for Recommendation | Model Change | Est. IRM Impact* |
|---|--|--|--|--|--------------|------------------|
| 1 | Existing Generating Unit Capacities | 2018 Gold Book values. Use min (DMNC vs. CRIS) capacity value | 2019 Gold Book values. Use min (DMNC vs. CRIS) capacity value | Latest Gold Book publication | | |
| 2 | Proposed New Units (Non-Renewable) and re-ratings | MW 11.1 MW of new non- wind resources, plus 209.3 MW of project related re-ratings. (Attachment B1) | MW ddd MW of new non- wind resources, plus eee MW of project related re-ratings. (Attachment B1) | Latest Gold Book publication, NYISO interconnection queue, and generator notifications | | |
| 3 | Retirements, Mothballed units, and ICAP ineligible units | 0 MW of retirements, 399.2 MW of unit deactivations, and 389.4 MW of IIFO and IR (Attachment B2) | fff MW of retirements, ggg MW of unit deactivations, and hhh MW of IIFO and IR ¹ (Attachment B2) | Latest Gold Book publication and generator notifications | | |
| 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. (Attachment C) | Five-year (2014-2018) 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 | | |
| 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 | | |

¹ ICAP Ineligible Forced Outage (IIFO) and inactive Reserve (IR)

| # | Parameter | 2019 Model Assumptions | 2020 Model Assumptions | Basis for Recommendation | Model Change | Est. IRM Impact* |
|----|--------------------------------------|---|---|---|--------------|------------------|
| 6 | Summer Maintenance | Nominal 50 MWs – divided equally between zones J and K | Nominal iii MWs – divided equally between zones J and K | Review of most recent data | | |
| 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 curves | | |
| 8 | Existing and Proposed New Wind Units | 158.3 MW of Wind Capacity additions totaling 1891.7 MW of qualifying wind (Attachment B3) | jjj MW of Wind Capacity additions totaling kkkk MW of qualifying wind (Attachment B3) | ICAP units based on RPS agreements, interconnection queue, and ICS input. | | |
| 9 | Wind Shape | Actual hourly plant output over the period 2013-2017. New units will use zonal hourly averages or nearby units. | Actual hourly plant output over the period 2014-2018. 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. | | |
| 10 | Solar Resources (Grid connected) | Total of 31.5 MW of qualifying Solar Capacity. (Attachment B3) | Total of ll MW of qualifying Solar Capacity. (Attachment B3) | ICAP Resources connected to Bulk Electric System | | |
| 11 | Solar Shape | Actual hourly plant output over the period 2013-2017. New units will use zonal hourly averages or nearby units. | Actual hourly plant output over the period 2014-2018. 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. | | |

| # | Parameter | 2019 Model Assumptions | 2020 Model Assumptions | Basis for Recommendation | Model Change | Est. IRM Impact* |
|----|-----------------------|--|--|--|--------------|------------------|
| 12 | BTM- NG Program | Addition of Greenidge 4 to BTM NG program. 104.3 MW unit. Forecast load adjustment of 11.6 MW (Attachment B4) | Addition of ----- to BTM NG program. ---- MW unit. Forecast load adjustment of --- MW (Attachment B4) | Both the generation of the participating resources and the full host loads are modeled. | | |
| 13 | Small Hydro Resources | Actual hourly plant output over the period 2013-2017. | Actual hourly plant output over the period 2014-2018. | Program randomly selects a Hydro shape of hourly production from the most recent five-year period for each model iteration. | | |
| 14 | Large Hydro | Probabilistic Model based on 5 years of GADS data (2013-2017) | Probabilistic Model based on 5 years of GADS data (2014-2018) | Transition Rates representing the Equivalent Forced Outage Rates (EFORd) during demand periods over the most recent five-year period | | |
| 15 | Land Fill Gas | Actual hourly plant output over the period 2013-2017. | Actual hourly plant output over the period 2014-2018. | Program randomly selects a LFG shape of hourly production from the most recent five-year period for each model iteration. | | |

Transactions – Imports and Exports

| | # | Parameter | 2019 Model Assumptions | 2020 Model Assumptions | Basis for Recommendation | Model Change | Est. IRM Impact* |
|--|----------|--|--|--|--|--------------|------------------|
| | 1 | Capacity Purchases | Existing Rights: PJM – 1080 MW HQ – 1110 MW All contracts model as equivalent contracts | Existing Rights: PJM – 1080 MW HQ – 1110 MW All contracts model as equivalent contracts | Grandfathered Rights, ETCNL, and other awarded long-term rights. | | |
| | 2 | Capacity Sales | Long Term firm sales Summer 279.3 MW | Long Term firm sales Summer 279.3 MW | These are long term federal contracts. | | |
| | 3 | FCM Sales from a Locality ² | No Sales modeled within study period | No Sales modeled within study period | White Paper, NYISO recommendation, and ICS discussions | | |
| | <u>4</u> | <u>Wheels through NYCA</u> | <u>None Modeled</u> | <u>300 MW HQ to NE through NYCA</u> | | | |
| | 4 | New UDRs | No new UDR projects | No new UDR projects | Existing UDR elections are made by August 1 st and will be incorporated into the model. | | |
| | 5 | New EDRs?? | | | | | |

² 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 | 2019 Model Assumptions | 2020 Model Assumptions | Basis for Recommendation | Model Change | Est. IRM Impact* |
|---|------------------------------|--|--|---|--------------|------------------|
| 1 | Interface Limits | Update provided to TPAS with updated VFT return path. B and C lines out of service for base case. Par 33 from Ontario out of service. (Attachment E) | (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. | | |
| 2 | New Transmission | None Identified | | Based on TO provided models and NYISO's review. | | |
| 3 | AC Cable Forced Outage Rates | All existing Cable EFORs will be updated for NYC and LI to reflect most recent five-year history (2013-2017) | All existing Cable EFORs will be updated for NYC and LI to reflect most recent five-year history (2014-2018) | TO provided transition rates with NYISO review. | | |
| 4 | UDR Line Unavailability | Five year history of forced outages (2013-2017) | Five year history of forced outages (2014-2018) | NYISO/TO review. | | |

Emergency Operating Procedures

| # | Parameter | 2019 Model Assumptions | 2020 Model Assumptions | Basis for Recommendation | Model Change | Est. IRM Impact* |
|---|------------------------|--|--|--|--------------|------------------|
| 1 | Special Case Resources | July 2018 –1309 MW based on registrations and modeled as 903 MW of effective capacity. Monthly variation based on historical experience* | July 2018 –kkkk MW based on registrations and modeled as lll MW of effective capacity. Monthly variation based on historical experience* | SCRs sold for the program discounted to historic availability. Summer values calculated from July 2019 registrations. Performance calculation updated per ICS presentations on SCR performance. (Attachment F) | | |
| 2 | EDRP Resources | July 2018 5.5 MW registered modeled as 1.0 MW in July and proportional to monthly peak load in other months. Limit to five calls per month | July mmmm MW registered modeled as n MW in July and proportional to monthly peak load in other months. Limit to five calls per month | Those sold for the program discounted to historic availability. Summer values calculated from July registrations and forecast growth. | | |
| 3 | Other EOPs | 713.4 MW of non-SCR/non-EDRP resources (Attachment D) | 713.4 MW of non-SCR/non-EDRP resources (Attachment D) | Based on TO information, measured data, and NYISO forecasts. | | |
| 4 | EOP Structure | 10 EOP Steps Modeled | 12 EOP Steps Modeled | Add one to separate EA from 10 min reserve. Add 2 nd as placeholder for Policy 5, Appendix C | | |

* The number of SCR calls is limited to 5/month when calculating LOLE based on all 8,760 hours.

External Control Areas

| # | Parameter | 2019 Model Assumptions | 2020 Model Assumptions | Basis for Recommendation | Model Change | Est. IRM Impact* |
|---|----------------------|--|--|---|--------------|------------------|
| 1 | PJM | Load and Capacity data provided by PJM/NPCC CP-8 Data may be adjusted per NYSRC Policy 5 (Attachment E) | Load and Capacity data provided by PJM/NPCC CP-8 Data may be adjusted per NYSRC Policy 5 (Attachment E) | 2018 External Representations retained due to uncertainty surrounding new data and its treatment. | | |
| 2 | ISONE, Quebec, IESO | Load and Capacity data provided by ISONE/NPCC CP-8 Data may be adjusted per NYSRC Policy 5 (Attachment E) | Load and Capacity data provided by ISONE/NPCC CP-8 Data may be adjusted per NYSRC Policy 5 (Attachment E) | 2018 External Representations retained due to uncertainty surrounding new data and its treatment | | |
| 5 | 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. | | |
| 6 | 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 Modelling of Emergency Assistance for NYCA in IRM studies | | |

Miscellaneous

| # | Parameter | 2019 Model Assumptions | 2019 Model Assumptions | Basis for Recommendation | Model Change | Est. IRM Impact* |
|---|---------------------------|--|------------------------|---|--------------|------------------|
| 1 | MARS Model Version | Version 3.22.6 | Version pp.p | Per benchmark testing and ICS recommendation. | | |
| 2 | Environmental Initiatives | No estimated impacts based on review of existing rules and retirement trends | | Review of existing regulations and rules. | | |

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Attachment A

NYCA Load Forecast Uncertainty Model

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Attachment B1

New Non-Wind Units and Unit Re-ratings³

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³ Unit re-ratings are for generation facilities that have undergone uprate projects.

Attachment B2

Retiring and Ineligible Generating Units

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Attachment B3

New Wind and Bulk Solar⁴ Resources

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⁴ Bulk Power System connected solar resources. Distributed solar resource impacts are accounted for in the load forecast.

Attachment B4

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

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

1. Based on adjusted DMGC value
2. Based on ACHL

Attachment C

NYCA Five Year Derating Factors

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Attachment D

Emergency Operating Procedures

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Attachment E

IRM Topology

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Attachment F
SCR/~~EDRP~~ Determinations

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Assumption Matrix History

| Date | Ver | Preliminary Base Case | Date | Ver | Final Base Case |
|---------|------|---|------|-----|-----------------|
| 1/29/19 | V0.0 | Preliminary assumptions without attachments. | | | |
| | | Adds winter LFU update, removes EDRP in model | | | |
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