

BTM Solar Modeling – LFU Impact Assessment

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Agenda

- Background
- Supplemental Impact Assessment
- Next Steps
- Appendix



Background



Background

- With the expectation of increasing behind-the-meter (BTM) solar penetration over time, it is important to monitor its impact on the system
 - Therefore, the ICS expressed interest to explore ways to model BTM solar explicitly in the installed reserve margin (IRM) study
- During the ICS meeting on 1/30/2024, the NYISO presented potential methodologies and preliminary impact assessments of modeling BTM solar explicitly in the IRM database (see Appendix for additional information)
 - On the load side, BTM solar is modeled with the 2013, 2017, and 2018 gross load shapes adjusted to the gross peak load forecast (IRM peak load forecast + BTM solar peak load delta by zone)
 - Two different resource side approaches were explored for modeling BTM solar units
 - **Option 1:** Modeling BTM solar units using the past 5 years of hourly profiles and letting GE MARS randomly select the profile during the simulation (~3.2% IRM increase based on the preliminary assessment results)
 - **Option 2:** Modeling BTM solar units using the hourly profiles that are aligned with the load shapes for each Load Forecast Uncertainty (LFU) bin (~1.8% IRM increase based on the preliminary assessment results)
- The ICS expressed interest in assessing the potential impacts of different ways to apply LFU multipliers on the BTM solar modeling options
 - Assessment 1: Isolated impact assessment of the two BTM solar modeling options with no LFU multipliers
 applied
 - Assessment 2: Updated impact assessment of modeling option 2 with and without LFU multipliers applied to the BTM solar modeled as a resource



Supplemental Impact Assessment



BTM Solar Modeling Impact Assessment 1 – No LFU Sensitivity

	IRM	11.05			
	11 / 191	J LCR	K LCR	G-J LCR	
2024-2025 FBC	23.10%	72.73%	103.21%	84.58%	
tion 1: Random Selection	26.32% (13.22)	73.82% (1.09)	106.15% (▲2.94)	85.38% (10.80)	
Option 2: Aligning Solar	24.93% (1.83)	73.25% (▲0.52)	104.96% (1.75)	84.96% (▲0.38)	
2024-2025 FBC	13.97%	71.14%	98.24%	83.41%	
tion 1: Random Selection	16.47% (12.50)	71.89% (▲0.75)	100.96% (2.72)	83.97% (▲0.56)	
Option 2: Aligning Solar	15.93% (1.96)	71.26% (▲0.12)	99.43% (1.19)	83.50% (▲0.09)	
D	ption 2: Aligning Solar	ption 2: Aligning Solar 15.93% (1.96)	ption 2: Aligning Solar 15.93% (🔺 1.96) 71.26% (🔺 0.12)	ption 2: Aligning Solar 15.93% (🔺 1.96) 71.26% (🔺 0.12) 99.43% (🔺 1.19)	

- With modeling option 1, removing the application of LFU multipliers reduces the previously observed impact on IRM by ~0.7%
 - The difference is attributed to the current set of LFU multipliers, which were developed for the net load shapes (<u>i.e.</u>, load shapes that reflect the embedded impact of BTM solar)
 - With modeling option 1, the LFU multipliers are not applied to the resource side modeling of BTM solar
- With modeling option 2 removing the application of LFU multipliers has a limited impact on previously observed impact on the IRM (change of ~0.1% to the previously observed impact)
 - This is because the LFU multiplies are applied to the solar production shapes (i.e., resource side modeling of BTM solar) under modeling option 2
 - Implies that, for modeling option 2, the LFU multipliers do not appear to be a primary driver of the observed impact on the IRM

BTM Solar Modeling Impact Assessment 2 – No LFU in BTM Solar Generation

- For modeling option 2, the preliminary impact assessment presented at the 1/30/2024 ICS meeting included the application of LFU multipliers to the resource side modeling of BTM solar
 - A supplemental impact assessment was conducted removing the application of LFU multipliers from the resource side modeling of BTM solar under modeling option 2

		IRM	J LCR	K LCR	G-J LCR
2024-2025 FBC		23.10%	72.73%	103.21%	84.58%
Option 2: Aligning Solar	Solar Production with LFU	24.93% (1.83)	73.25% (▲0.52)	104.96% (▲1.75)	84.96% (1.38)
	Solar Production without LFU	25.42% (2.32)	73.29% (▲0.56)	105.08% (1.87)	84.99% (.41)
	Delta with vs. without LFU	▲0.49	▲ 0.04	▲0.12	▲0.03

- With modeling option 2, removing the application of LFU multipliers from the resource side modeling of BTM solar further increases the previously observed impact on the IRM by ~0.5%
 - Without LFU multipliers applied to the resource side modeling, BTM solar production is underrepresented compared to the underlying gross load shapes that includes the application of LFU multipliers

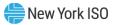


Next Steps



Observations

- The supplemental analysis indicates that the application of the current LFU multipliers is not likely
 a primary driver of the previously observed impacts on the IRM
- Changes to the current load modeling procedures are needed to proceed with an explicit modeling of BTM solar as a resource to mitigate the potential for unintended impacts on the IRM
 - Improvement of the current load shape adjustment procedures is already identified as a priority for 2025 in the Resource Adequacy Modeling Improvement Strategic Plan
 - Development of potential interim solutions could be considered to facilitate proceeding with efforts to explicitly model BTM solar for the 2025-2026 IRM study
 - For example, the NYISO Reliability Needs Assessment (RNA) utilizes a load shape adjustment process that could be further evaluated for potential use in the IRM model on an interim basis
 - The procedures employed in conducting the RNA account for seasonal peaks, as well as annual energy requirements distributed at monthly and zonal levels
 - Manually adding BTM solar production shapes on top of the IRM load shapes could also be considered as a potential interim solution
 - A manual adjustment could potentially be used in conjunction with the RNA's load adjustment method



Next Steps

- The NYISO will continue to explore the BTM solar modeling methodology and discuss the options and potential impacts with ICS
- The NYISO will continue working with ICS towards a recommendation for the BTM solar modeling methodology to be used in the 2025-2026 IRM study over the next few months
 - The recommendation should also include proper adjustment on the load side



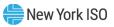
Appendix

(Slides Presented at the 1/30/2024 ICS Meeting)



Overview of Alternative Methodologies

- To model BTM solar explicitly adjustments need to be made on both resource side and load side to properly account for the BTM solar impact in MARS simulations
 - On the load side, gross load shapes and gross peak load forecast were developed with BTM solar impact backed out from the current inputs
 - For 2024-2025 study, 1,720 MW of BTM solar peak impact is estimated
 - On the resource side, NYISO explored the two approaches to explicitly model BTM solar
- With BTM solar being modeled explicitly in the MARS model, the calculation for the IRM should remain unchanged
 - Net demand forecast should continue to be used as the denominator of the IRM calculation
 - The MW of BTM solar would not be counted in the total ICAP in the numerator of the IRM calculation
 - The derating factor of BTM solar would not be included in the IRM zonal derating factors as a part of the shifting methodology



Treatment on Load Side

- On the load side, BTM solar would be modeled with the following characteristics:
 - 2013, 2017 and 2018 gross load shapes (with the estimated BTM solar impact added back)
 - LFU Bin 1 & 2: 2013
 - LFU Bin 3 & 4: 2018
 - LFU Bin 5 7: 2017
 - Gross peak load forecast would be developed to be used in load shape adjustment
 - Gross peak load forecast = IRM Coincident, Non-Coincident, and G-J peak

+ BTM solar peak load delta by zone

✤ BTM Solar peak load deltas represent estimated peak load impact of BTM solar penetration

BTM Solar Peak Load Delta (MW)												
Year	А	В	С	D	Е	F	G	Н	I	J	K	NYCA
2024	139	169	280	20	188	235	205	31	35	140	278	1,720

• Subject to existing LFU multipliers



Treatment on Resource Side

- On the resource side, BTM solar would be modeled with the following generic characteristics:
 - Modeled as Demand Side Management (DSM) units with hourly profiles ("BTM solar units")
 - MW will be aggregated to one BTM solar unit per zone
 - The NYISO's BTM solar data would be utilized to develop the hourly profiles for BTM solar units. Inputs include:
 - BTM solar PV Annual Energy Reduction (Gold Book Baseline Forecast Table I-9b)
 - Representative hourly values of BTM solar by zone (energy normalized)
 - To be multiplied by the Gold Book Table I-9b for hourly production in MW for the projected year
- The NYISO explored two different approaches for modeling the BTM solar units
 - Modeling the BTM solar units using the past 5 years of hourly profiles and let MARS randomly select the profile during the simulation
 - Modeling the BTM solar units using the hourly profiles that are aligned with the load shapes for each LFU bins



Modeling Option 1: Random Selection of Solar Production Shapes

- BTM solar units would be modeled using the most recent 5 years of historical hourly production shapes
 - 2018 2022 shapes used for the impact assessment presented herein For 2025-2026 IRM study, 2019 – 2023 shapes would be used
 - One of the historical shapes is chosen randomly for each replication during the MARS simulations
 - The selection will be consistent with the selection of the other DSM resources
- Pros
 - Probabilistic study approach
 - Aligns with NYISO Reliability Needs
 Assessment (RNA) study modeling method
 - Provides a representation for the variability of solar production
 - Consistent with existing renewable resources' modeling in the IRM study

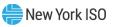
- Cons
 - May result in a less accurate representation of load
 and weather correlation
 - High load days during summer should correlate to higher solar production
 - May overstate the variability of solar production
 - Selected solar shapes are applied to all LFU bins
 - Consistent with all DSM shape selection

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Modeling Option 2: Aligning BTM Solar Shapes to Load Shapes

- BTM solar units are modeled using 2013, 2017, and 2018 historical production shapes
 - Solar shapes are aligned with the load shapes without random selection
 - <u>e.g.</u>, the 2013 BTM solar shapes will be applied only the LFU Bin 1 and 2, where the 2013 load shape is applied
- Solar production shapes are subject to LFU multipliers
- Pros
 - Consistent with the current IRM study modeling construct
 - The current IRM study uses BTM solar embedded in load shapes
 - May provide more accurate representation of load and weather correlation

- Cons
 - May be less representative of the variability of solar production
 - Removing the randomness in the Monte-Carlo simulation



Questions?



Our Mission & Vision

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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

