New York ISO
Independent System Operator

NYCA Renewables 2025

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ICAPWG/MIWG

April 8, 2026

Agenda

- Wind Performance
- BTM and FTM Solar Performance
- Real-Time Market Curtailments
- Coincident Wind and Solar
- Load Ramps
- Questions

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Background on Metrics

- Wind and FTM solar data accounts for all units installed in the NYCA. Due to confidentiality concerns, offshore wind is not reported within zonal metrics.
- Unless otherwise stated, Wind and Solar Capacity Factors are inclusive of ALL hours in 2025 and do not adjust for periods of resource outages or derates.
- Behind-the-meter (BTM) Solar production and capacity factors are based on estimates from NYISO's Solar/PV monitoring vendor. They are influenced by the pitch and tilt of the sampled installations being used to scale up production estimates. They are not a direct measurement of total solar production.
- Capacity Factors are calculated as follows:

$$\text{Wind and FTM Solar Capacity Factor} = \frac{\text{Total Generated AC MW Energy}}{(\text{AC MW Nameplate Capacity})(\text{Total Hours})}$$

$$\text{BTM Solar Capacity Factor} = \frac{\text{Total Generated AC MW Energy}}{(\text{DC MW Nameplate Capacity})(\text{Total Hours})}$$

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Past Presentations and Datasets

Annual Renewable Presentations and hourly data sets from prior years can be found at the locations below.

https://www.nyiso.com/reports-information

- **Under 'Links'**
  - BTM Solar Information
- **Under 'Reports'**
  - Annual Wind and Solar Information

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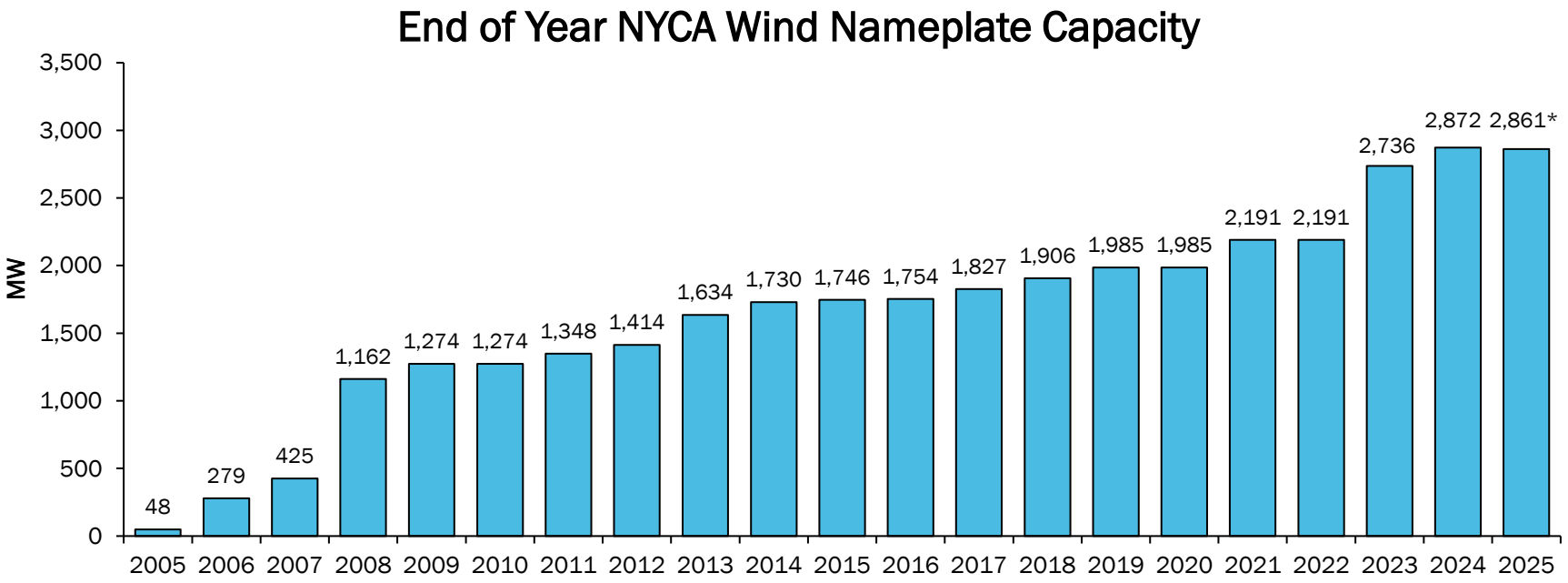
NYCA Wind Performance

Wind Overview



*Madison Wind (11.6 MW, Zone E) was officially retired in September 2025.
Information on Generator Status Updates can be found at www.nyiso.com/ny-power-system-information-outlook

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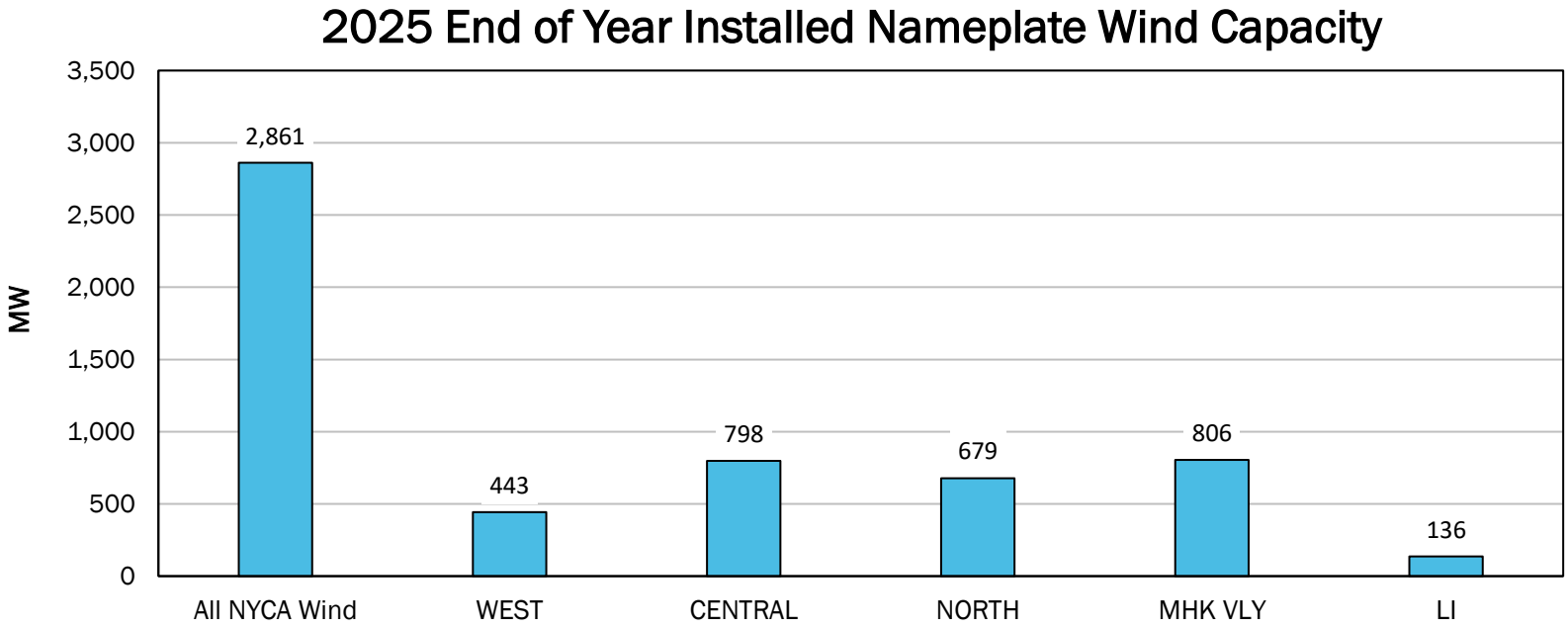
Zonal Wind Capacity



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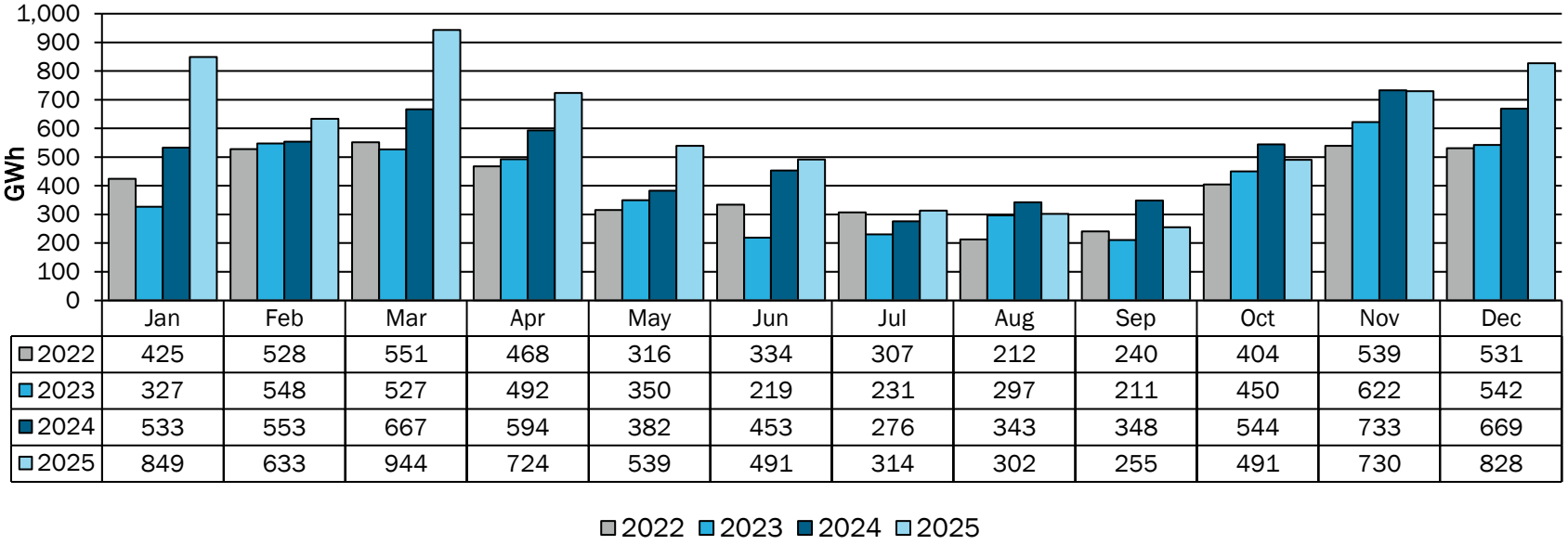
NY Wind Generation

Total Annual Wind Production (GWh)			
2022	2023	2024	2025
4,856	4,815	6,096	7,099

NYCA Wind Plants - Monthly Production



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2022	425	528	551	468	316	334	307	212	240	404	539	531
2023	327	548	527	492	350	219	231	297	211	450	622	542
2024	533	553	667	594	382	453	276	343	348	544	733	669
2025	849	633	944	724	539	491	314	302	255	491	730	828

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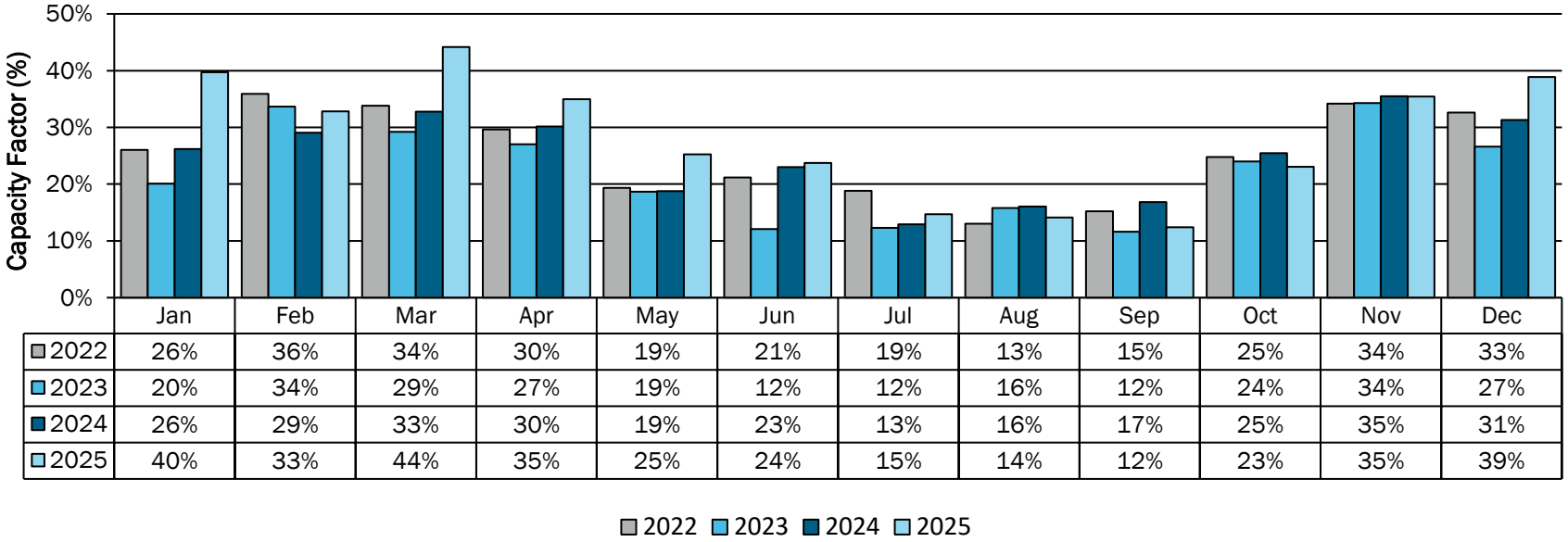
NY Wind Capacity Factors

Annual Wind Capacity Factor			
2022	2023	2024	2025
25%	22%	25%	28%

NYCA Wind Generation – Monthly Capacity Factor



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2022	26%	36%	34%	30%	19%	21%	19%	13%	15%	25%	34%	33%
2023	20%	34%	29%	27%	19%	12%	12%	16%	12%	24%	34%	27%
2024	26%	29%	33%	30%	19%	23%	13%	16%	17%	25%	35%	31%
2025	40%	33%	44%	35%	25%	24%	15%	14%	12%	23%	35%	39%

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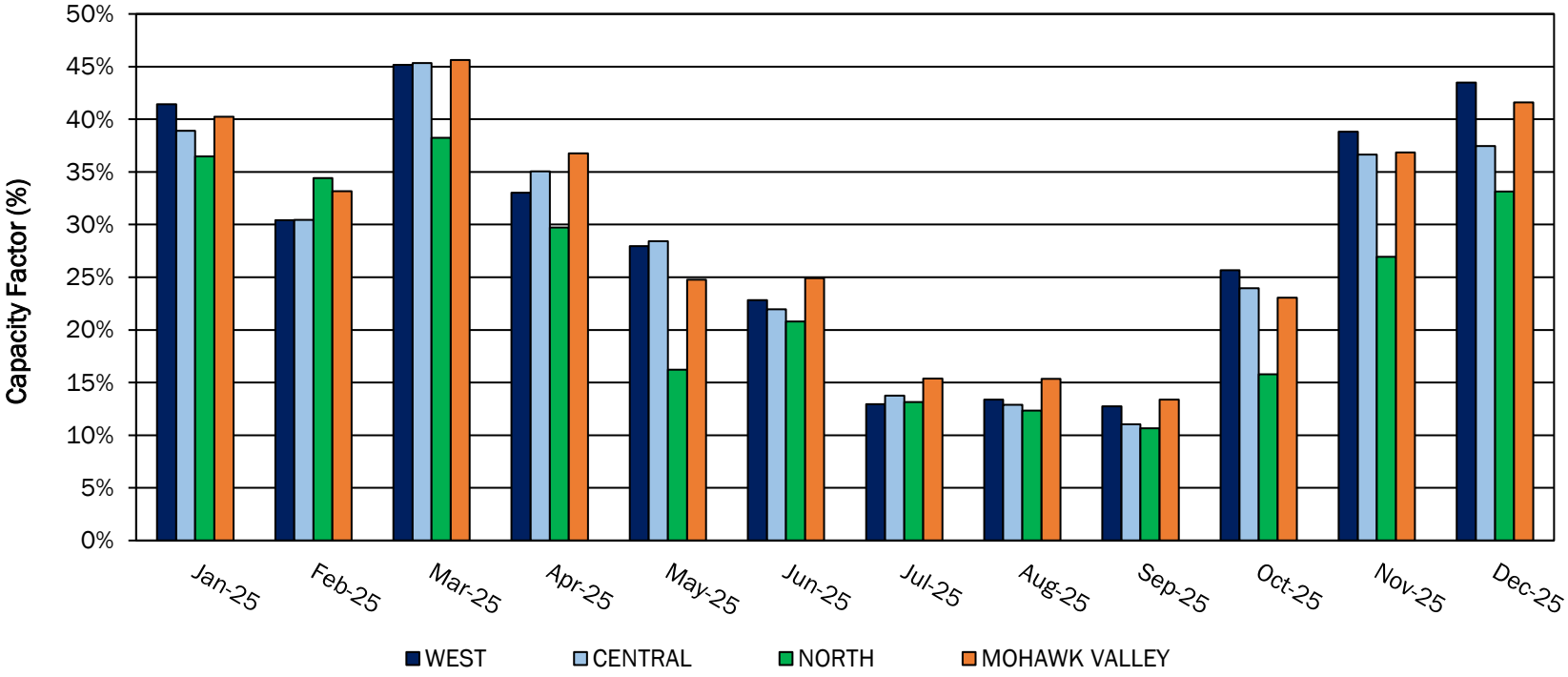
Monthly Wind Capacity Factors by Zone



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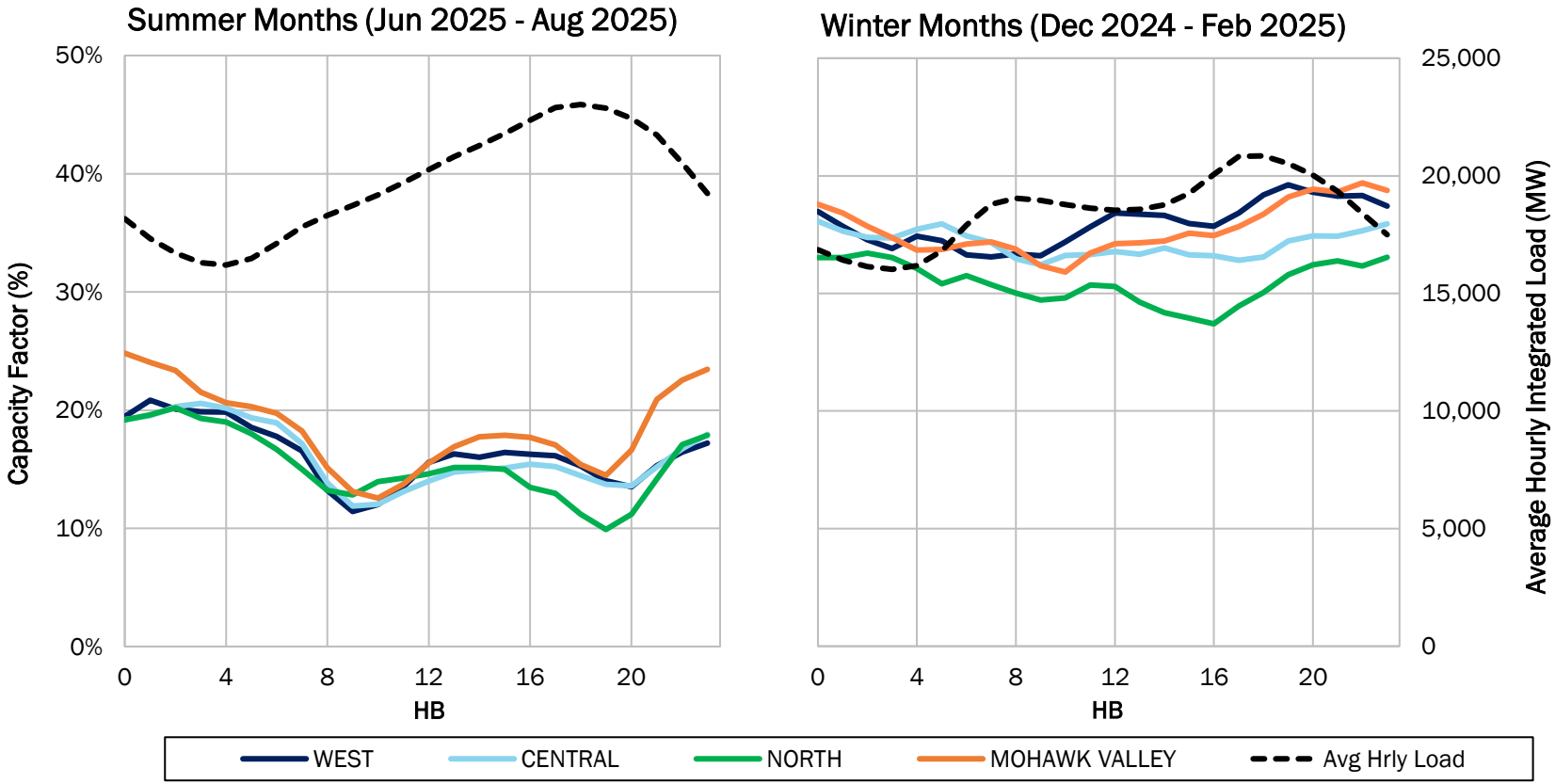
2025 Seasonal Average Hourly Wind Capacity Factors by Zone



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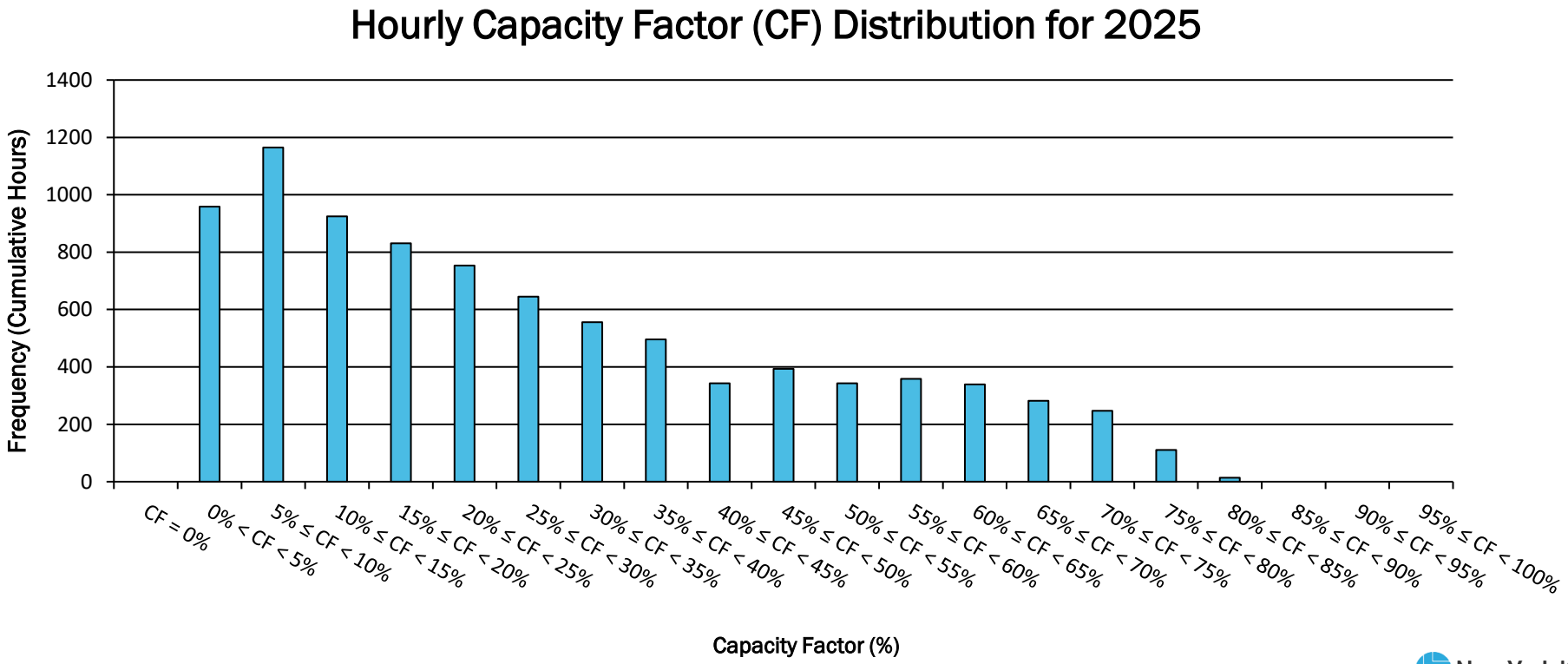
2025 NY Wind Capacity Factor Distribution



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NYCA Solar Performance

Behind-the-Meter (BTM) & Front-of-the-Meter (FTM)

BTM Solar Data Monitoring

- The NYISO's Solar/PV monitoring vendor automatically tracks the real-time power output of a sampling of solar production sites across NY
- The sampled sites are geographically distributed substantially the same as the total BTM facilities in the state
- BTM solar production, at the zonal level, is calculated by scaling up the vendor's readings to the estimated BTM solar installed capacity
- NYISO closely tracks BTM solar PV installed capacity in the NY SUN (MW DC) and NY DPS Standard Interconnection Request (SIR) databases (MW AC) to develop an accurate estimate of BTM solar installed capacity in MW DC
- Inverter and module information are available from the NYSERDA NY Sun database and California Energy Commission datasets. The latter two datasets are used to estimate the total DC installed capacity in the NYCA.
- At the end of 2025, BTM Solar Capacity was estimated to be 6,880 MW (DC)

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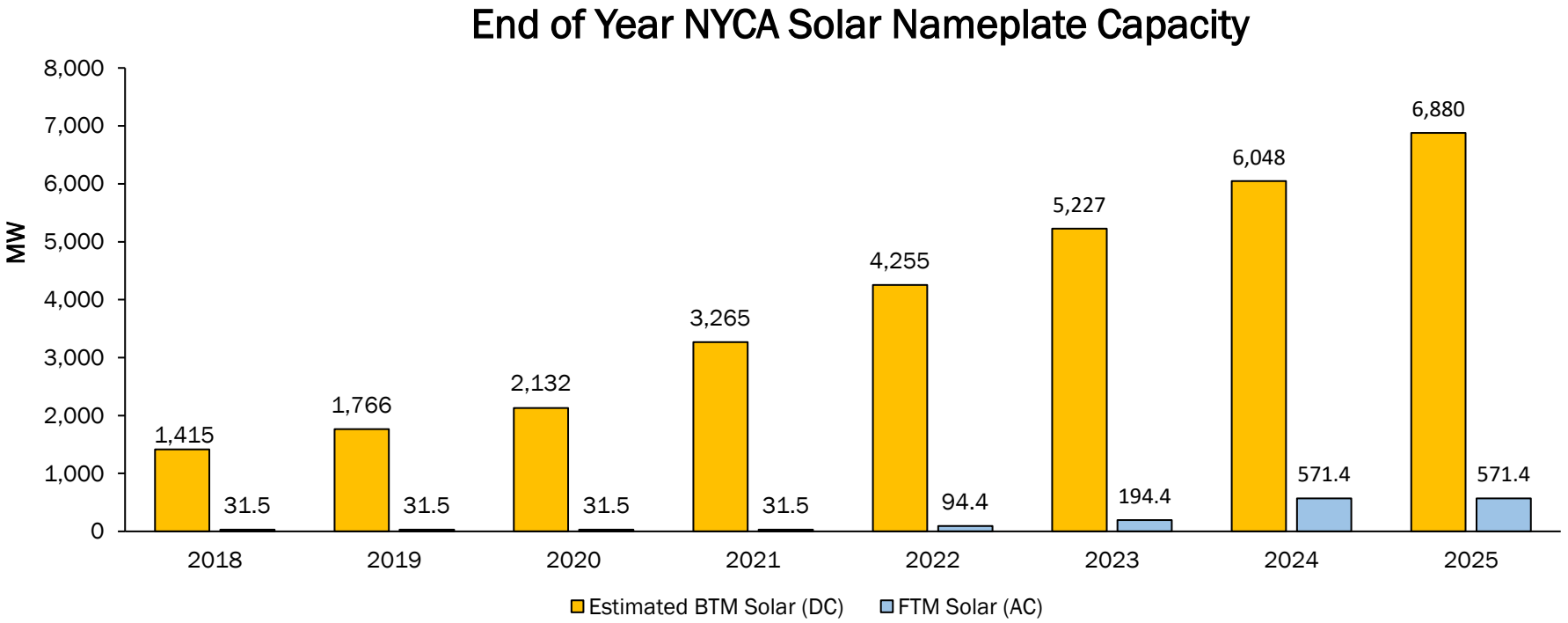
Solar Overview



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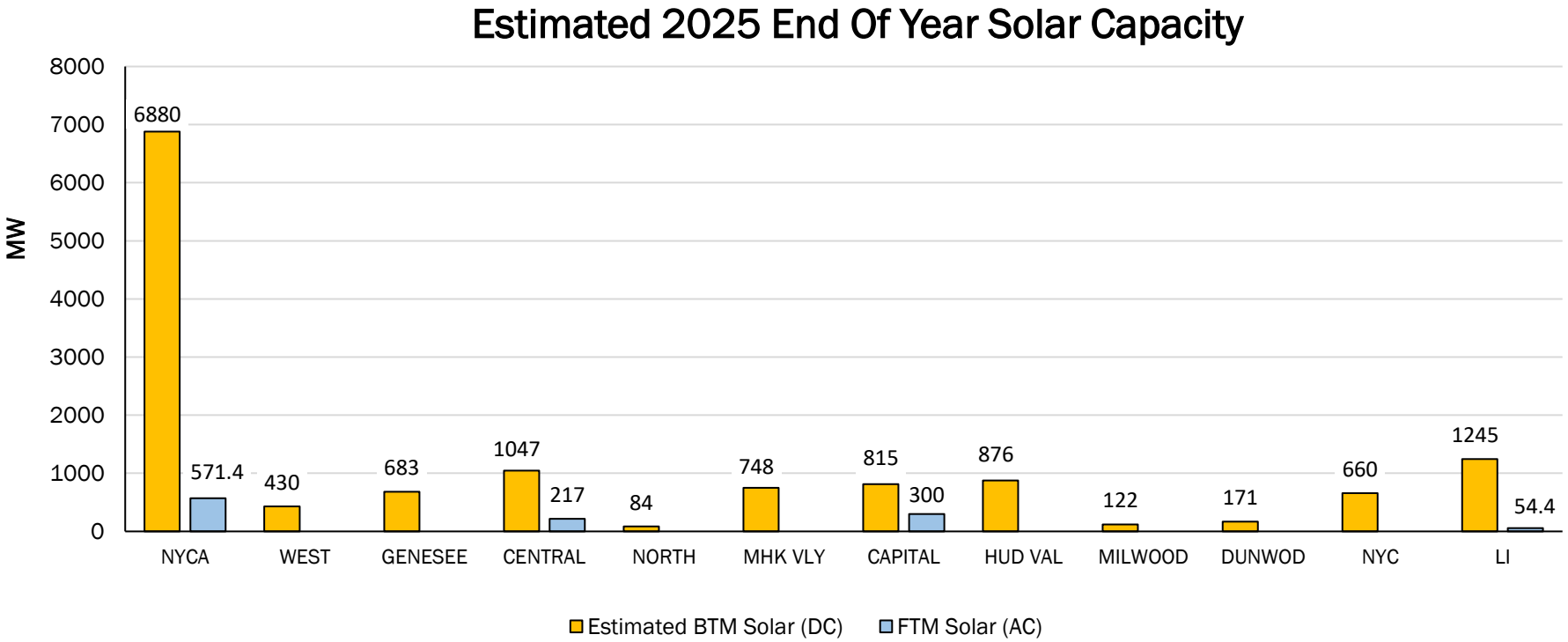
Zonal Solar Capacity



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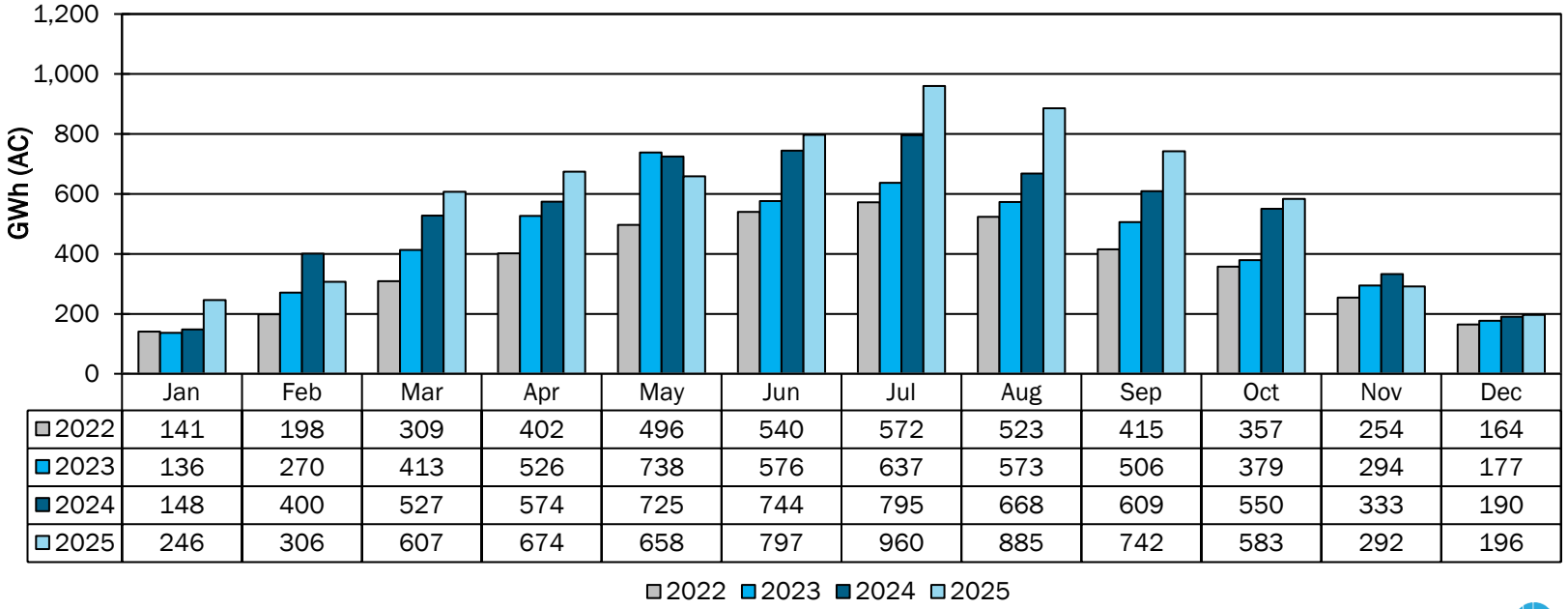
NY BTM Solar Generation

Total Annual BTM Solar Production (GWh)			
2022	2023	2024	2025
4,372	5,228	6,263	6,947

NYCA BTM Solar - Estimated Monthly Production



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2022	141	198	309	402	496	540	572	523	415	357	254	164
2023	136	270	413	526	738	576	637	573	506	379	294	177
2024	148	400	527	574	725	744	795	668	609	550	333	190
2025	246	306	607	674	658	797	960	885	742	583	292	196

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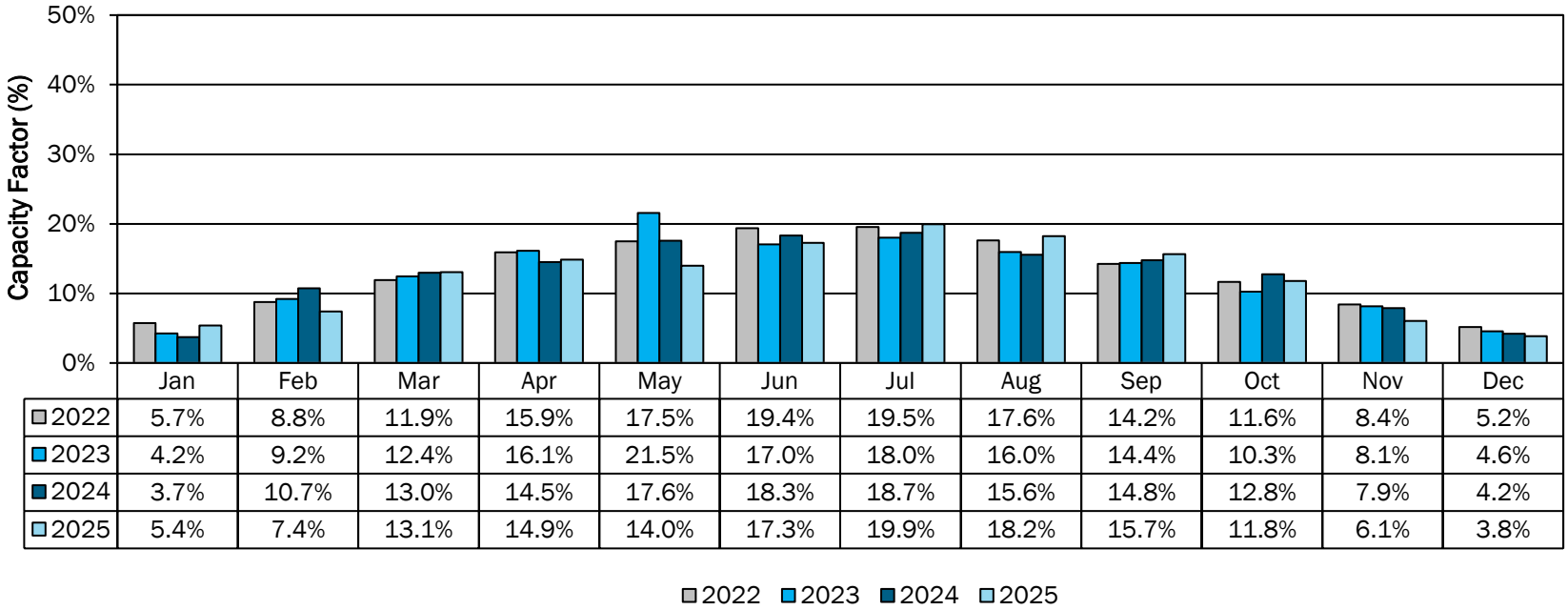
NY BTM Solar Capacity Factors

Annual BTM Solar Capacity Factor			
2022	2023	2024	2025
13.0%	12.7%	12.6%	12.3%

NYCA BTM Solar Generation - Estimated Capacity Factor



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2022	5.7%	8.8%	11.9%	15.9%	17.5%	19.4%	19.5%	17.6%	14.2%	11.6%	8.4%	5.2%
2023	4.2%	9.2%	12.4%	16.1%	21.5%	17.0%	18.0%	16.0%	14.4%	10.3%	8.1%	4.6%
2024	3.7%	10.7%	13.0%	14.5%	17.6%	18.3%	18.7%	15.6%	14.8%	12.8%	7.9%	4.2%
2025	5.4%	7.4%	13.1%	14.9%	14.0%	17.3%	19.9%	18.2%	15.7%	11.8%	6.1%	3.8%

2022 2023 2024 2025

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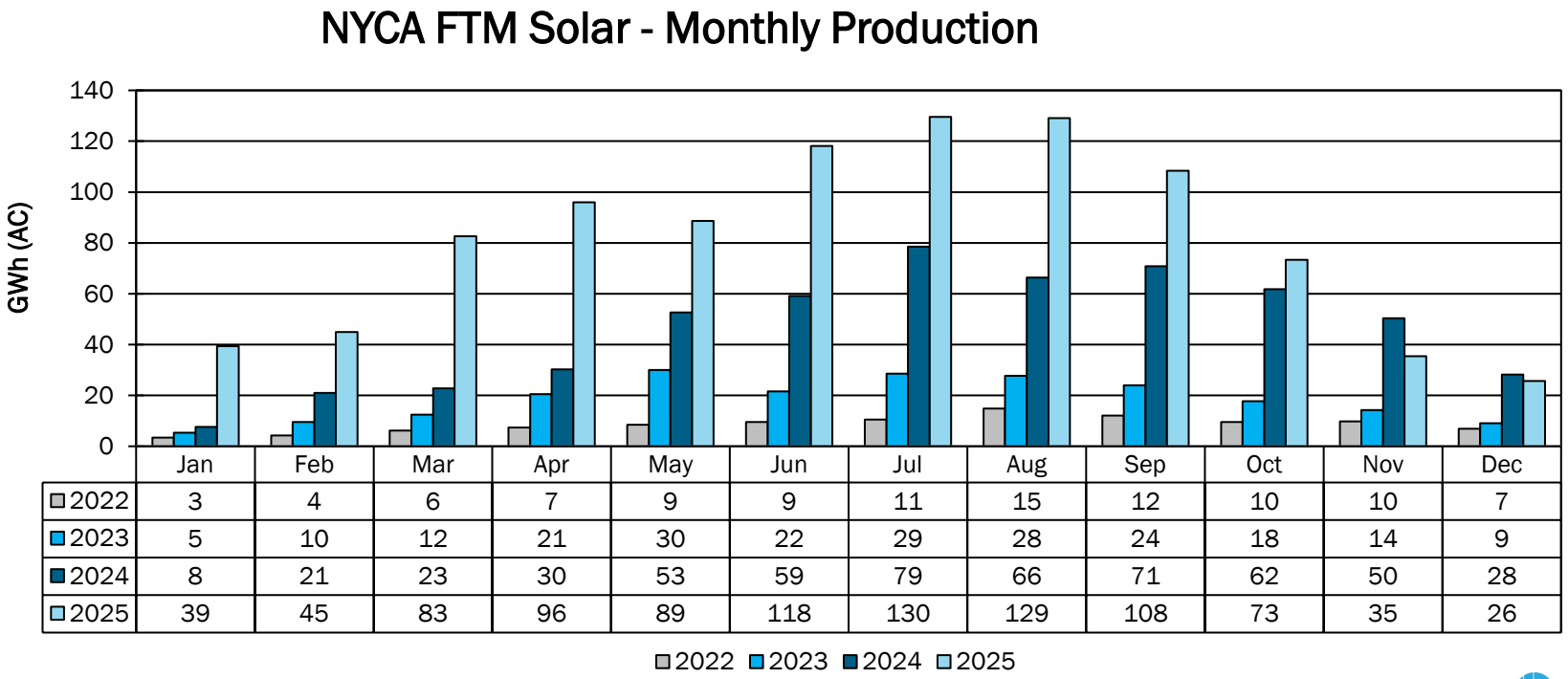
NY FTM Solar Generation

Total Annual FTM Solar Production (GWh)			
2022	2023	2024	2025
103	221	550	971



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2022	3	4	6	7	9	9	11	15	12	10	10	7
2023	5	10	12	21	30	22	29	28	24	18	14	9
2024	8	21	23	30	53	59	79	66	71	62	50	28
2025	39	45	83	96	89	118	130	129	108	73	35	26

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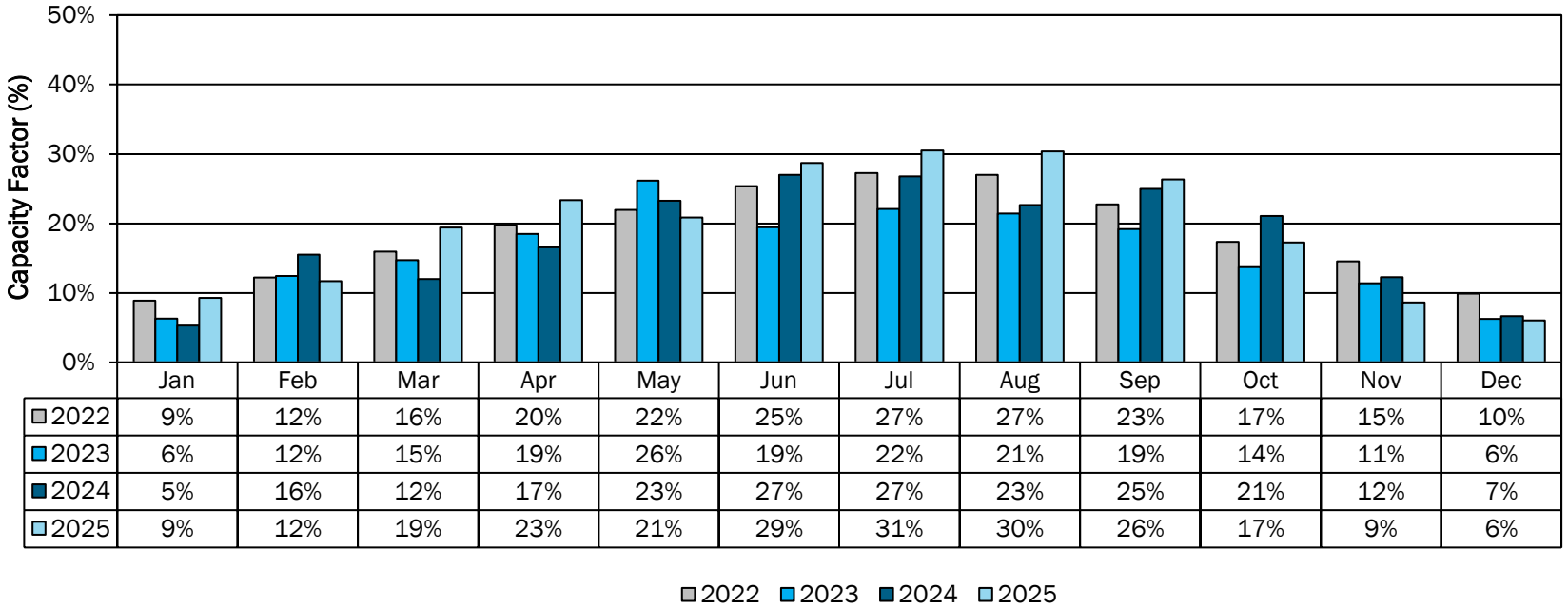
NY FTM Solar Capacity Factors

Annual FTM Solar Capacity Factor			
2022	2023	2024	2025
19%	16%	18%	19%

NYCA FTM Solar Generation - Capacity Factor



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2022	9%	12%	16%	20%	22%	25%	27%	27%	23%	17%	15%	10%
2023	6%	12%	15%	19%	26%	19%	22%	21%	19%	14%	11%	6%
2024	5%	16%	12%	17%	23%	27%	27%	23%	25%	21%	12%	7%
2025	9%	12%	19%	23%	21%	29%	31%	30%	26%	17%	9%	6%

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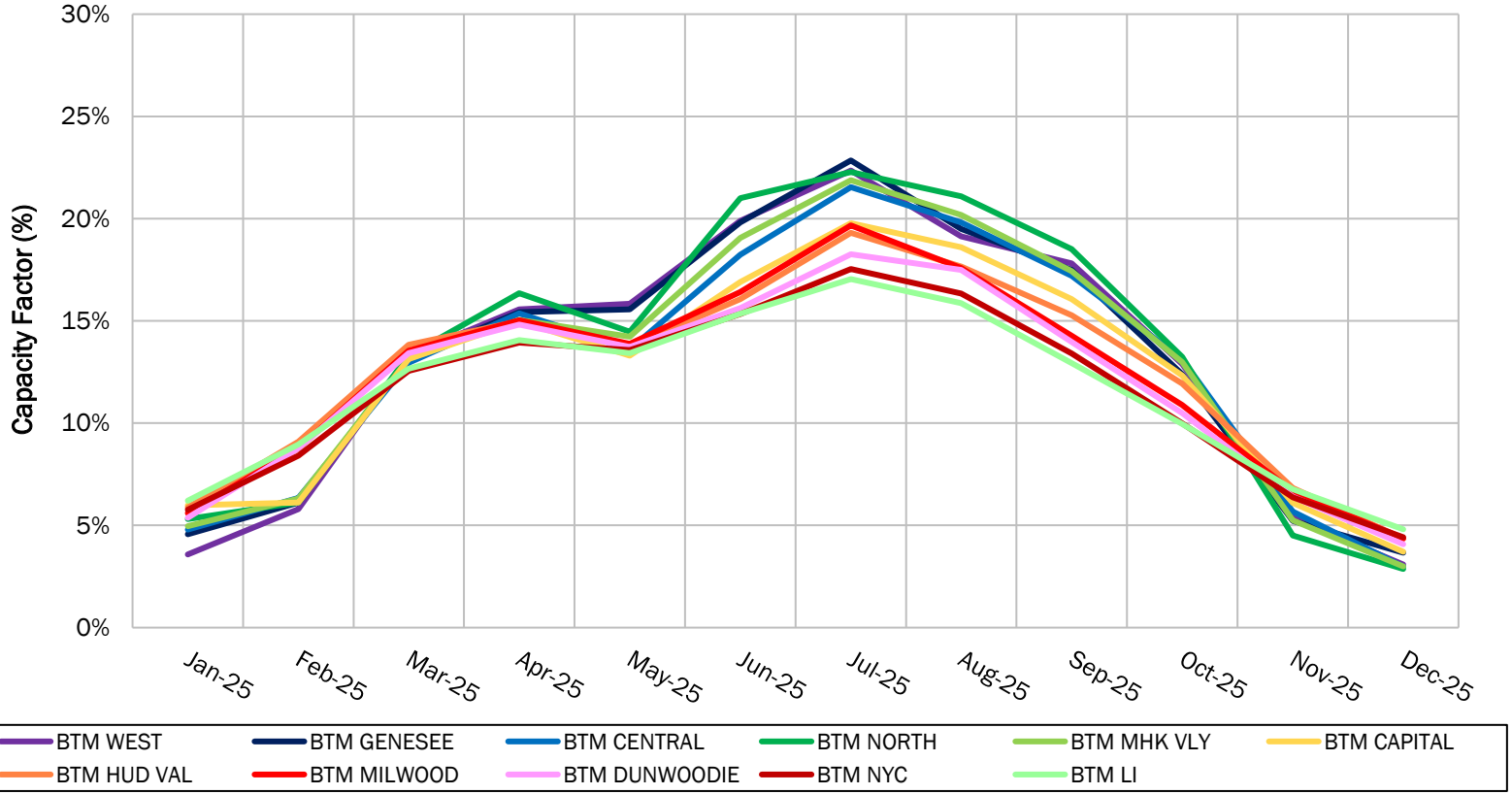
Monthly BTM Solar Capacity Factors by Zone



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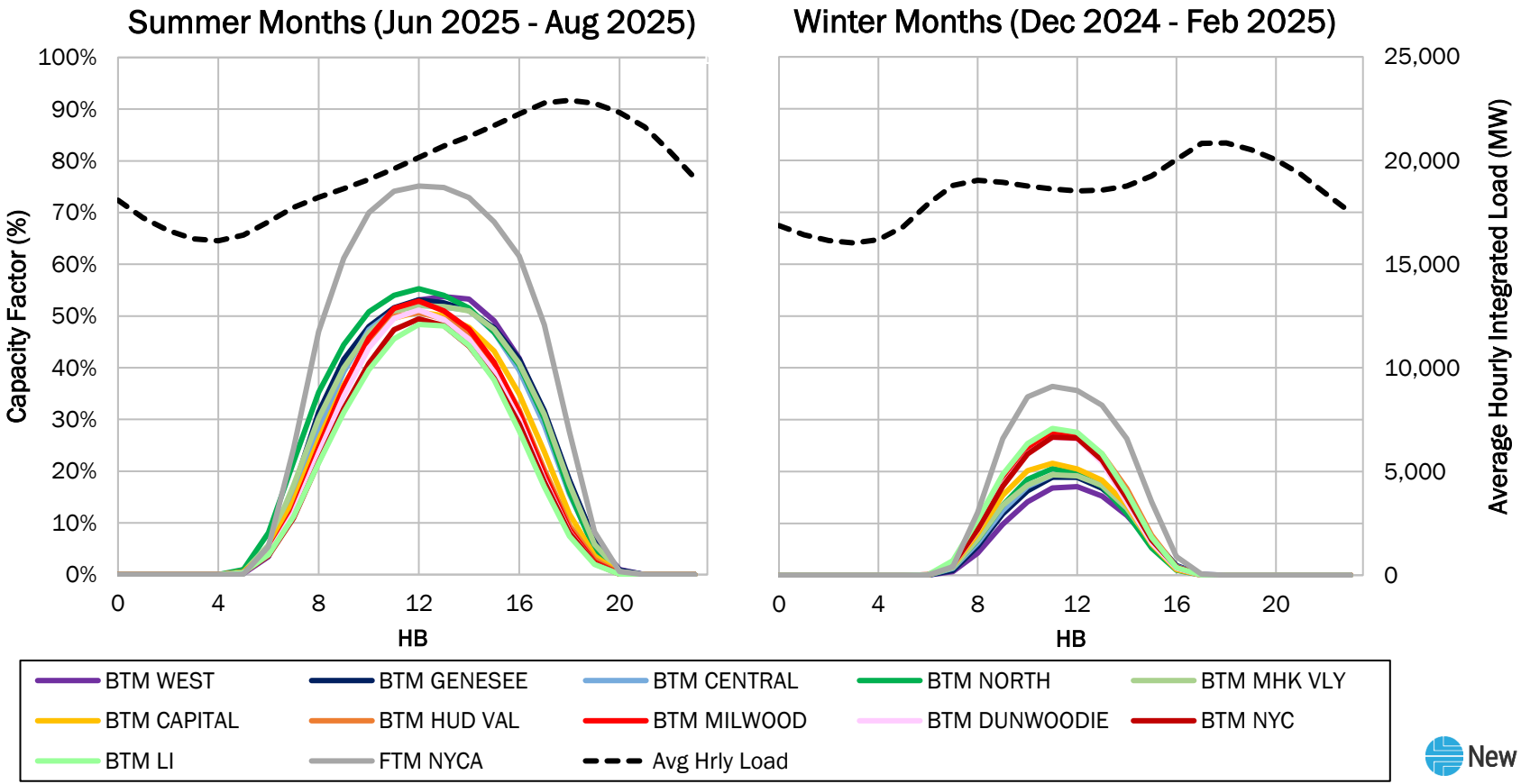
2025 Seasonal Average Hourly Solar Capacity Factors by Zone



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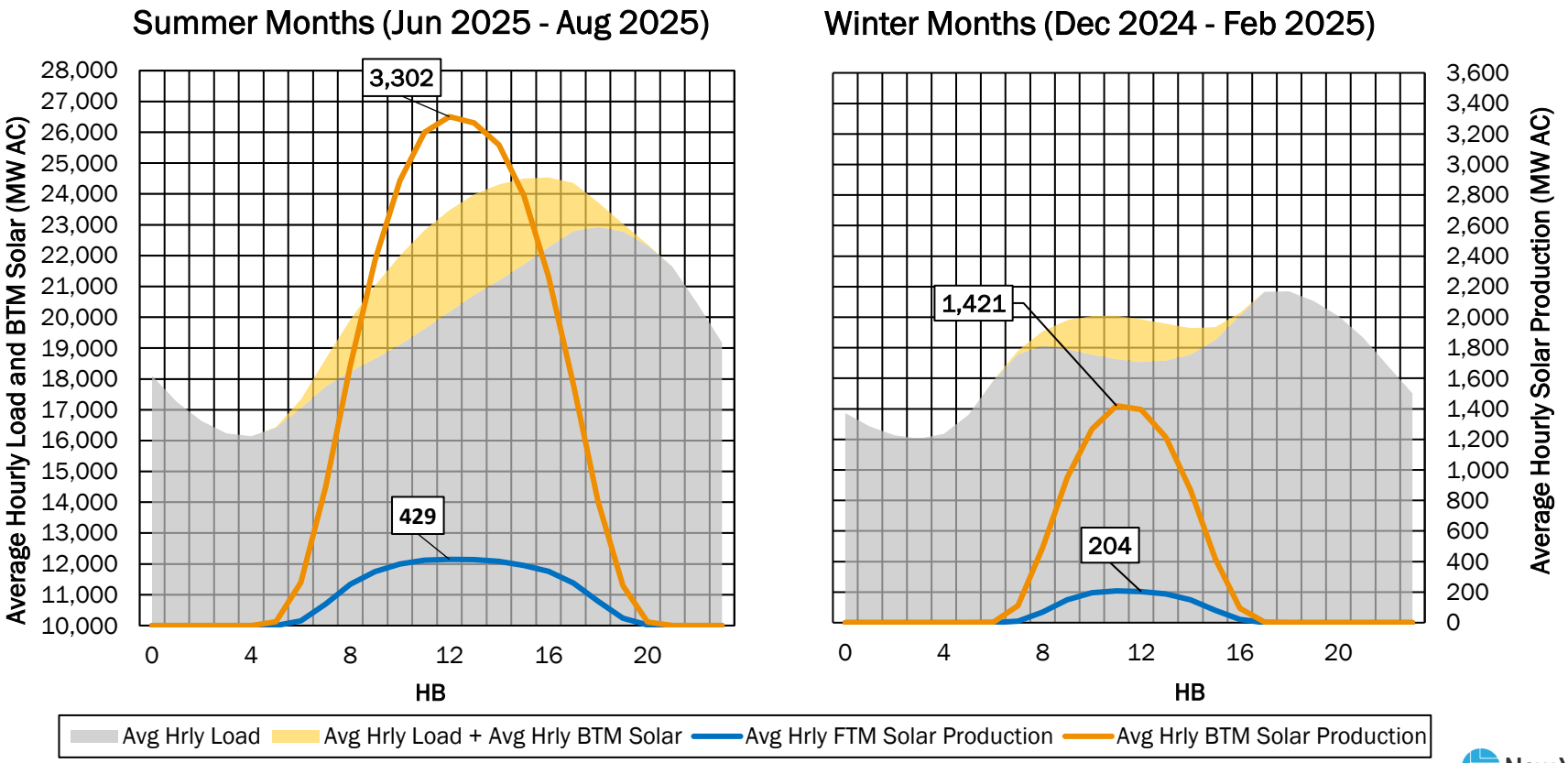
2025 Seasonal Average Hourly Load with Solar Production



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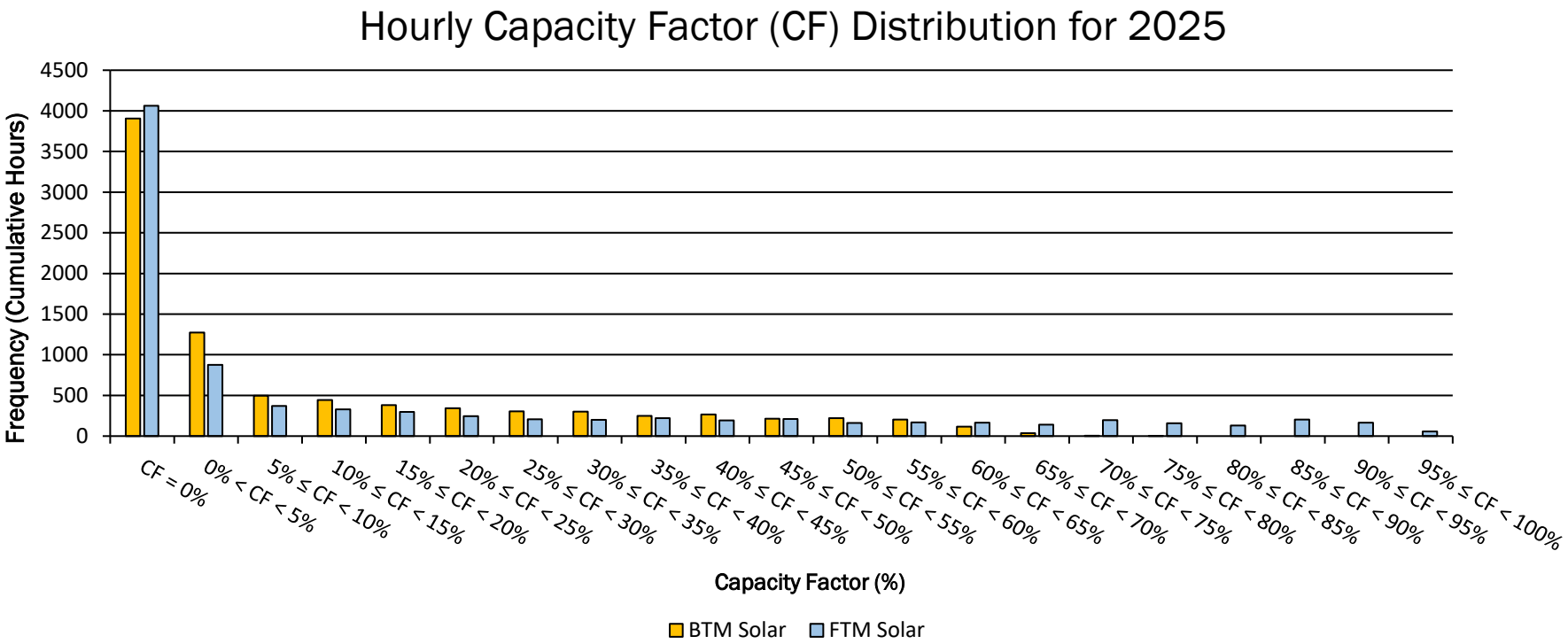
Solar Capacity Factor Distribution



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Real Time Market Curtailments 2025

Background on Curtailment Metrics

- The NYISO's real-time market economically evaluates bids submitted by wind and FTM solar resources
- When forecasted generation is uneconomic, wind and FTM solar resources are instructed to limit their output to economic levels
- The following metrics use these output limits to estimate quantities of curtailed energy
- Real-time market curtailments are associated with:
  1. Transmission constraints driven by
     a. Short term transmission outages for maintenance or repair
     b. Long term transmission outages for system upgrades
     c. Transmission limitations that may be addressed as part of future system upgrades
  2. Uneconomic bid costs
  3. Generation-to-load balancing constraints

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Notable Transmission Upgrade Efforts

- **PPTN Segment A and B completion**
  - Placed in-service across 2021 – 2023
  - Dover PAR additions in 2025
- **Smart Path Connect and Northern NY Priority Transmission Project**
  - Various transmission outages 2023 – 2025
  - Transmission outages continuing into 2026
  - Expected in-service date of 2026
- **Meyer Station Upgrades (NYSEG Local Transmission Plan)**
  - Expected in-service date of 2029

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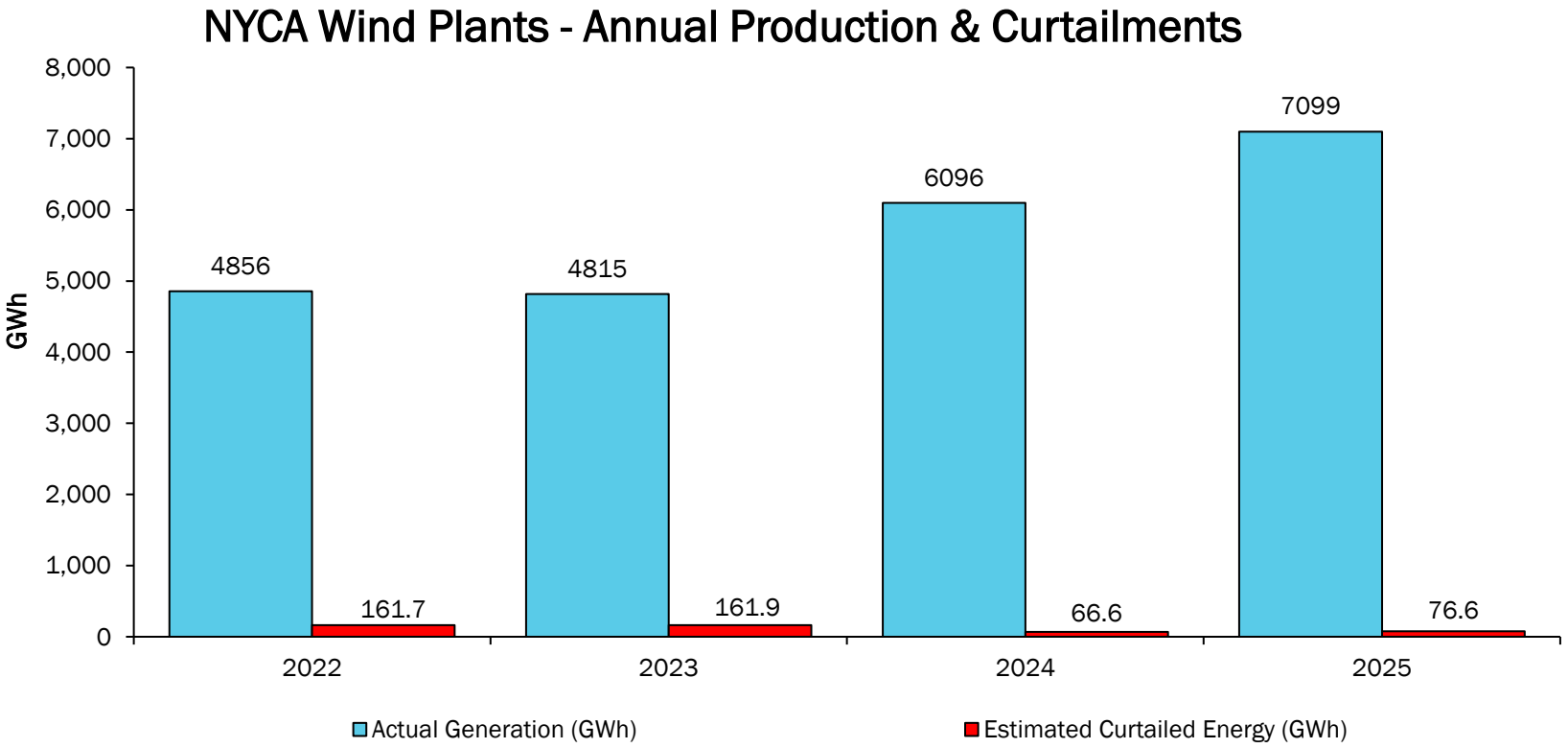
RT Market Curtailments: Wind



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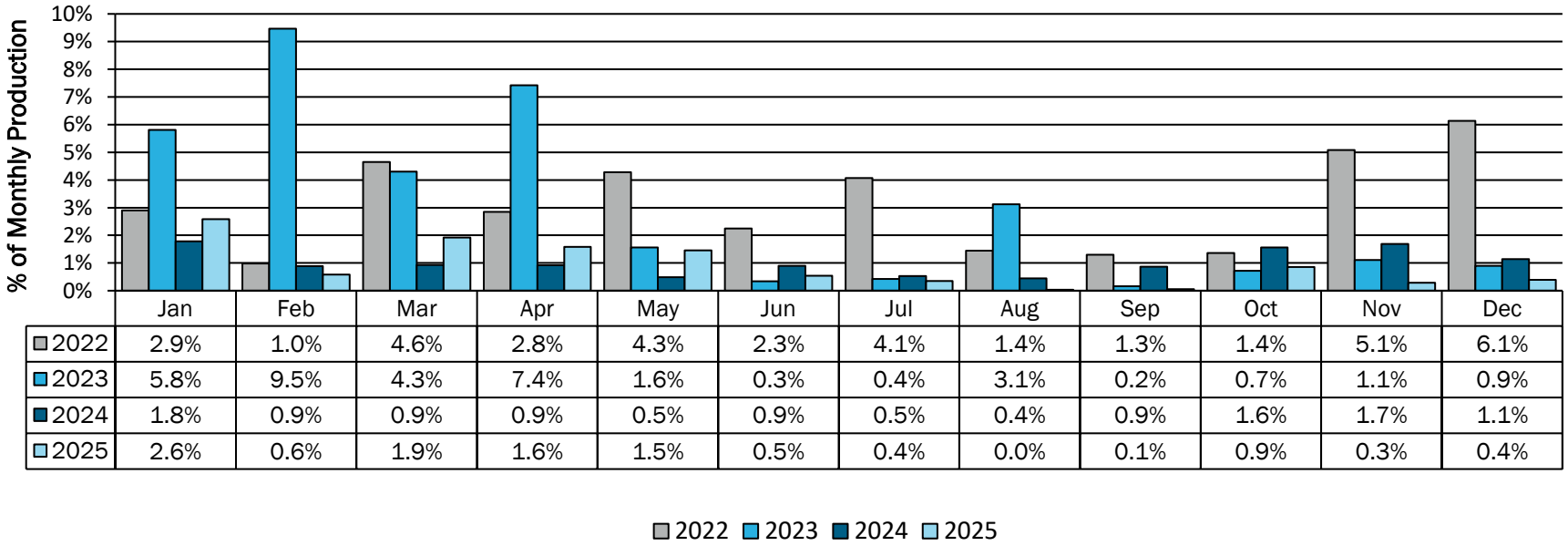
RT Market Curtailments: Wind

Total Estimated Curtailed Energy %			
2022	2023	2024	2025
3.3%	3.4%	1.1%	1.1%

NYCA Wind - Monthly Estimated Curtailed Energy %



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2022	2.9%	1.0%	4.6%	2.8%	4.3%	2.3%	4.1%	1.4%	1.3%	1.4%	5.1%	6.1%
2023	5.8%	9.5%	4.3%	7.4%	1.6%	0.3%	0.4%	3.1%	0.2%	0.7%	1.1%	0.9%
2024	1.8%	0.9%	0.9%	0.9%	0.5%	0.9%	0.5%	0.4%	0.9%	1.6%	1.7%	1.1%
2025	2.6%	0.6%	1.9%	1.6%	1.5%	0.5%	0.4%	0.0%	0.1%	0.9%	0.3%	0.4%

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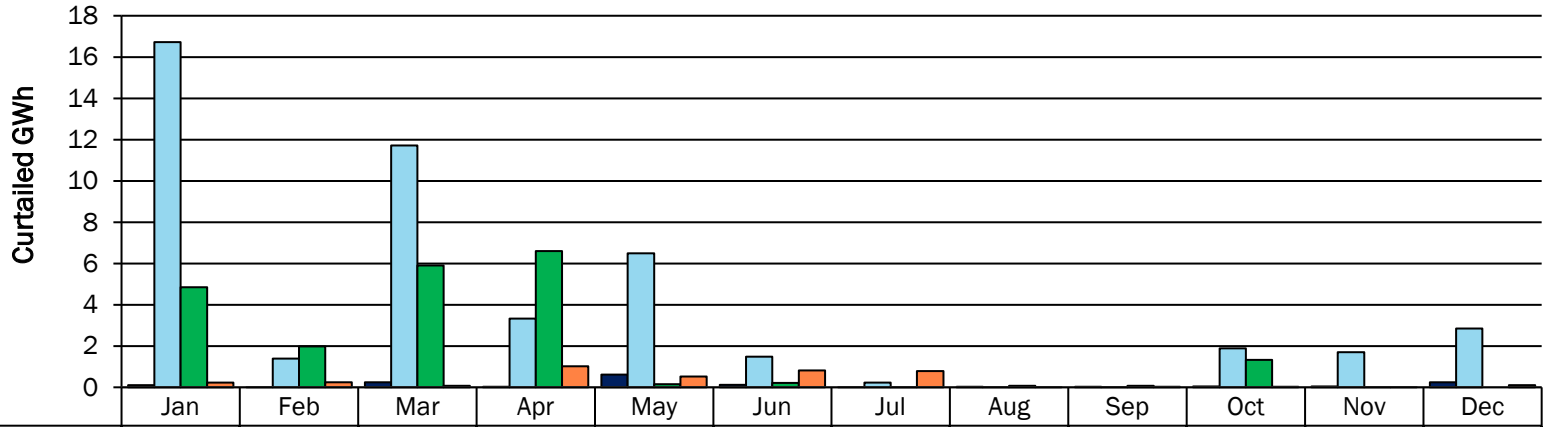
RT Market Curtailments: Wind

Total Annual Estimated Curtailed Energy (GWh)			
West	Central	North	Mohawk Valley
1.53	47.82	21.22	3.85

Zonal Wind - Monthly Estimated Curtailed Energy for 2025



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
WEST	0.11	0.01	0.25	0.02	0.62	0.12	0.00	0.02	0.03	0.05	0.05	0.24
CENTRAL	16.72	1.39	11.72	3.32	6.49	1.49	0.23	0.00	0.01	1.89	1.71	2.85
NORTH	4.85	1.98	5.91	6.60	0.15	0.21	0.02	0.08	0.08	1.33	0.01	0.00
MOHAWK VALLEY	0.22	0.24	0.07	1.02	0.52	0.81	0.79	0.01	0.02	0.03	0.00	0.11

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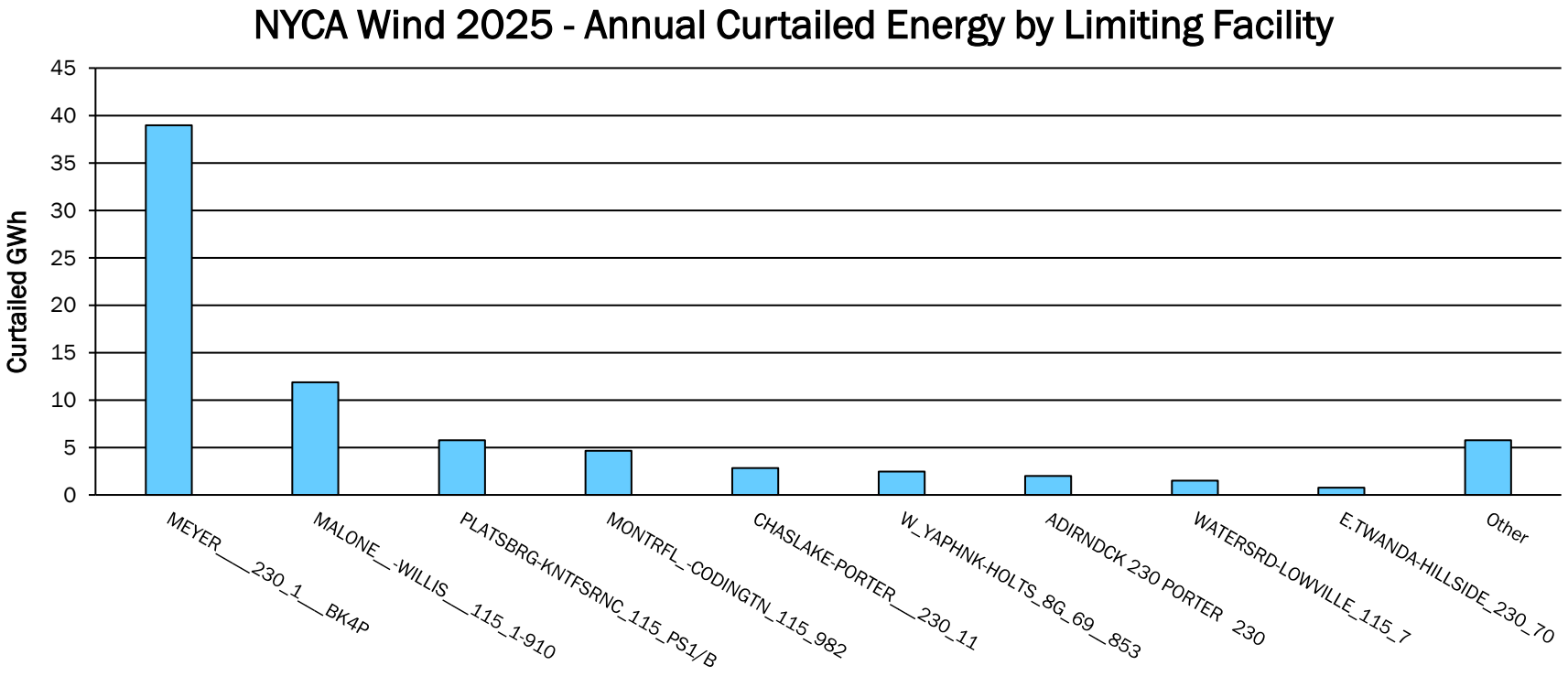
RT Market Curtailments: Wind



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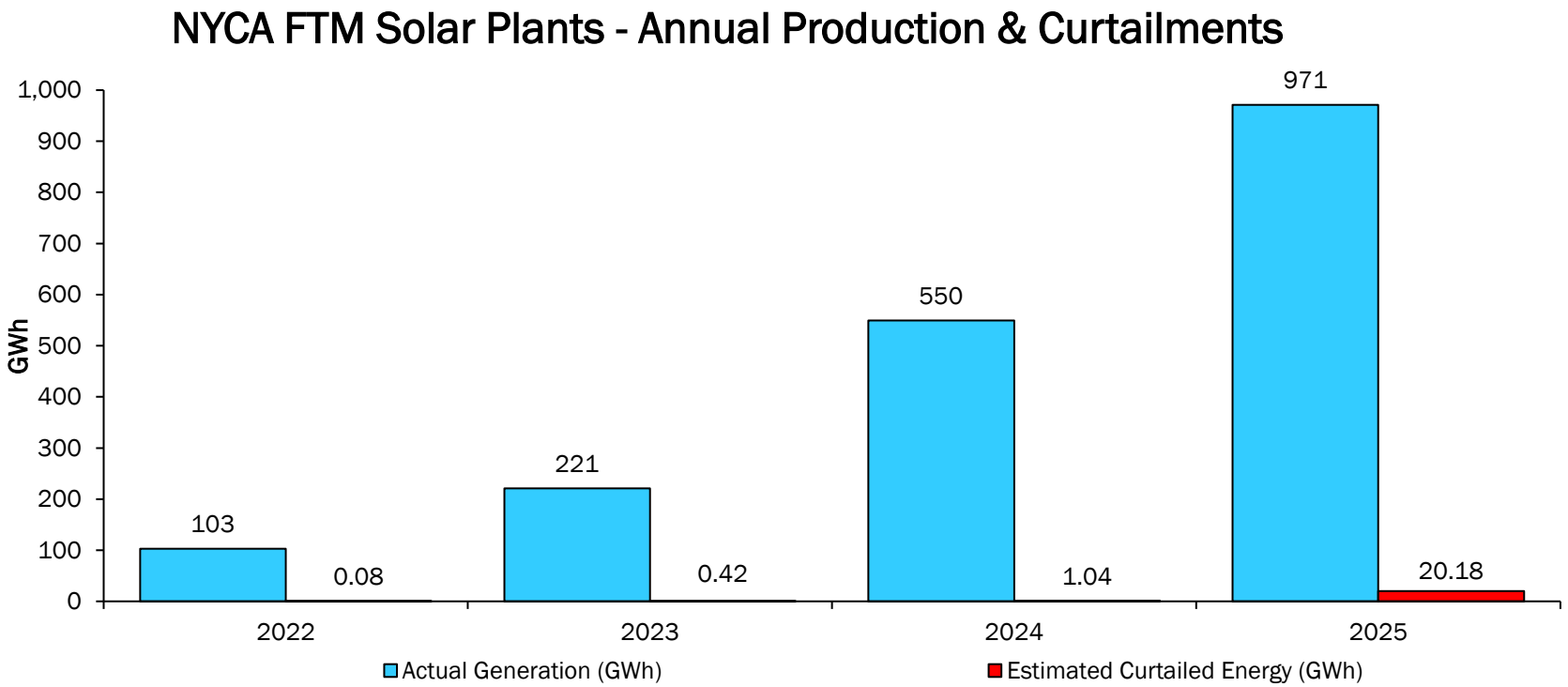
RT Market Curtailments: FTM Solar



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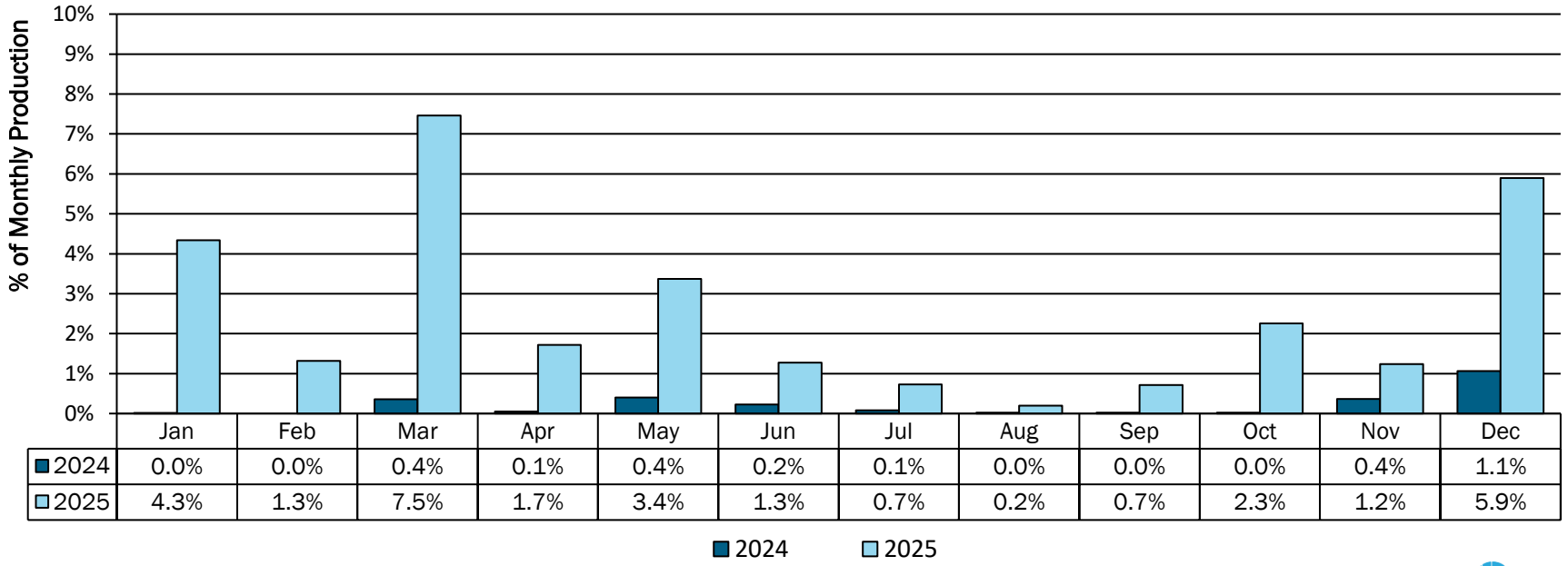
RT Market Curtailments: FTM Solar

Total Estimated Curtailed Energy %	
2024	2025
0.2%	2.1%

NYCA FTM Solar - Monthly Estimated Curtailed Energy %



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2024	0.0%	0.0%	0.4%	0.1%	0.4%	0.2%	0.1%	0.0%	0.0%	0.0%	0.4%	1.1%
2025	4.3%	1.3%	7.5%	1.7%	3.4%	1.3%	0.7%	0.2%	0.7%	2.3%	1.2%	5.9%

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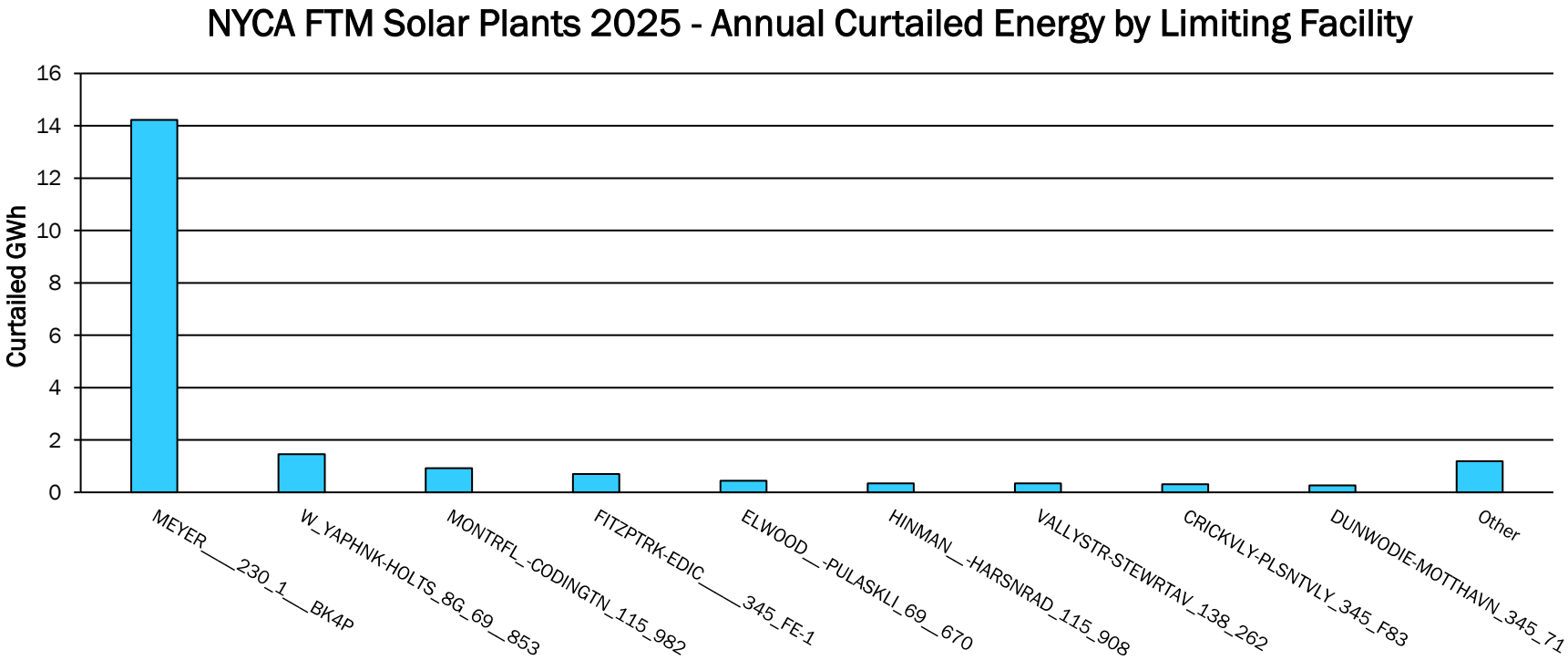
RT Market Curtailments: FTM Solar



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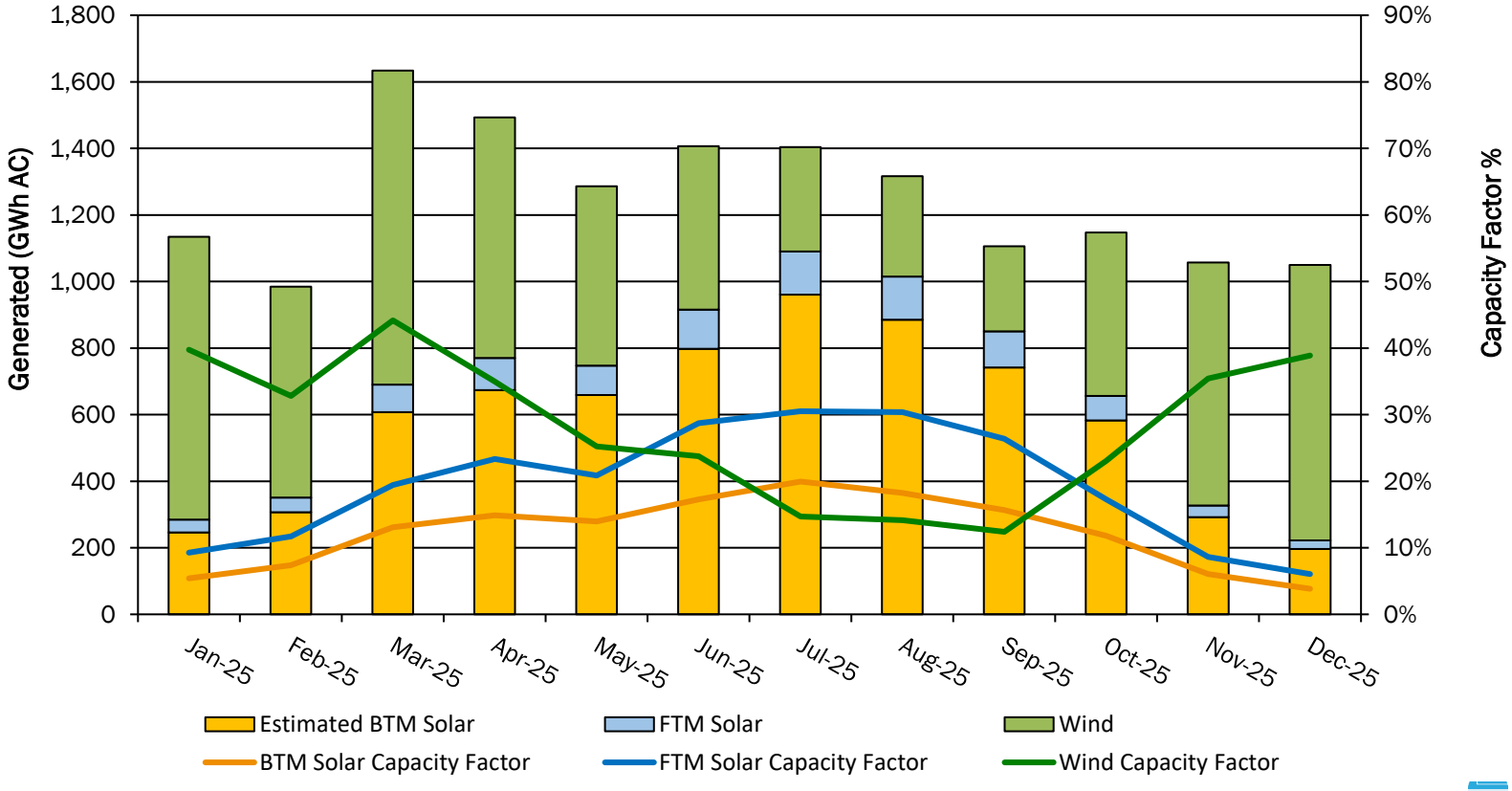
Coincident Wind and Solar

Monthly Wind and Solar Performance (2025)



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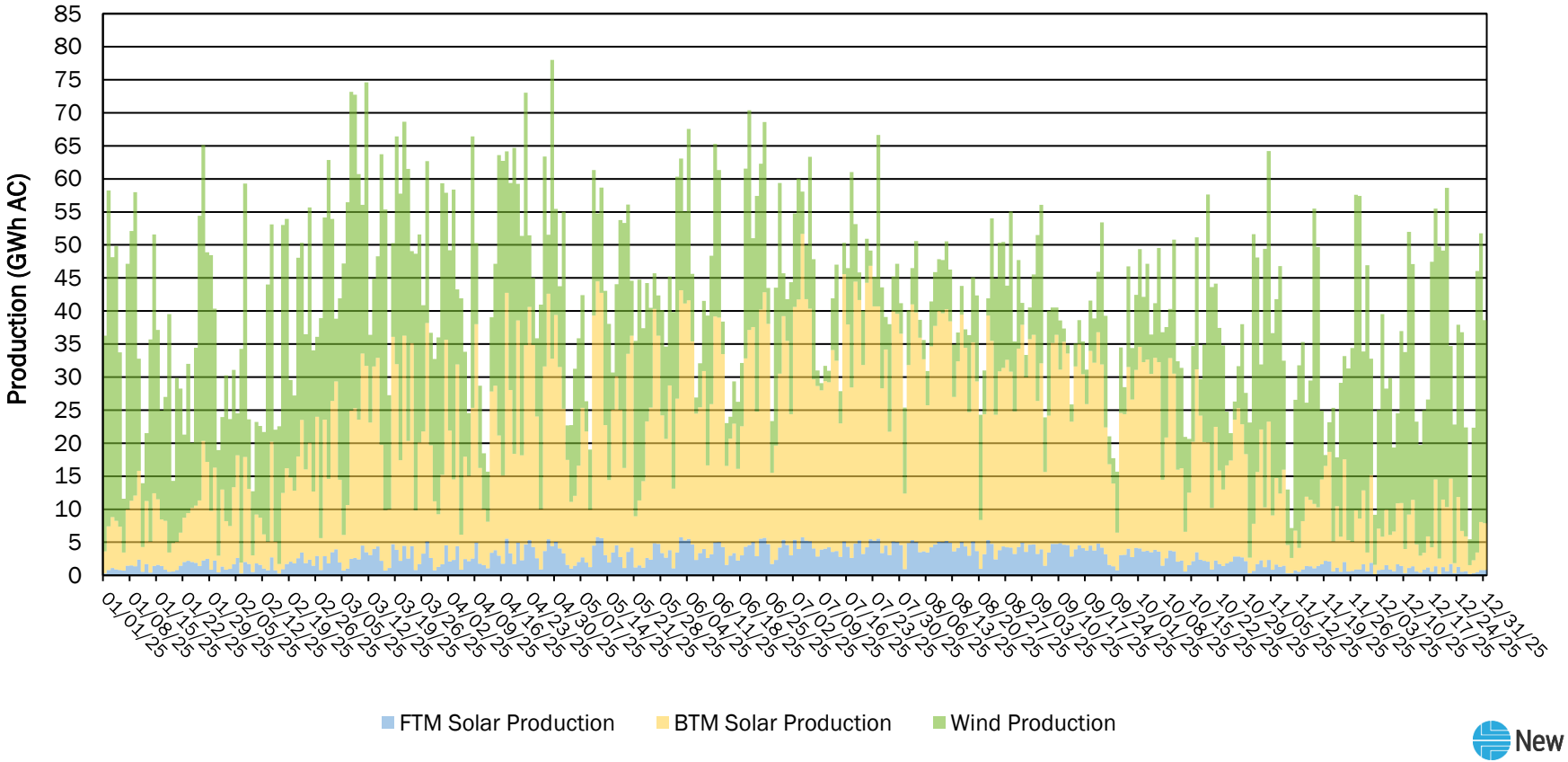
Daily Wind and Solar Performance (2025)



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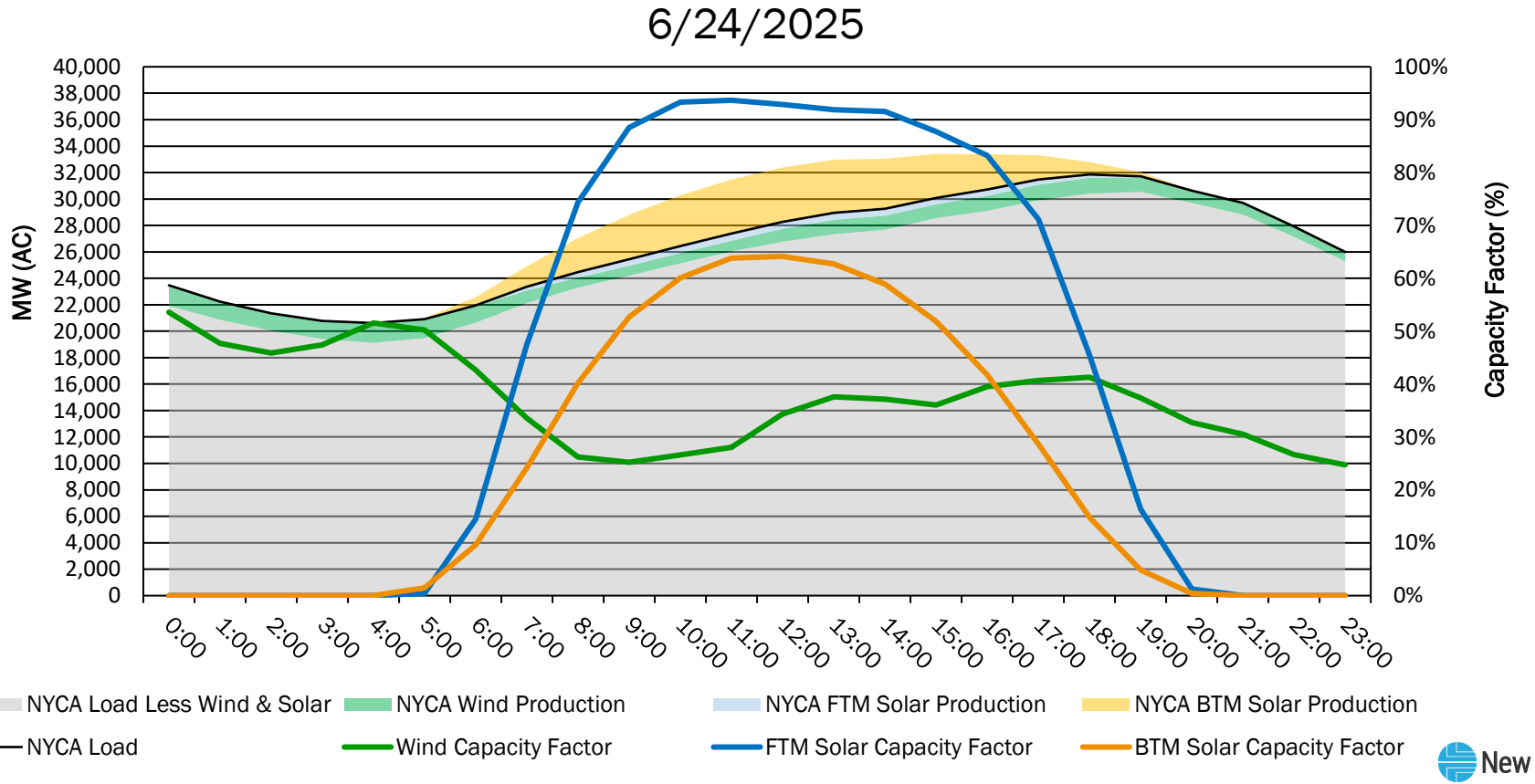
Wind and Solar Performance During Summer Peak Load



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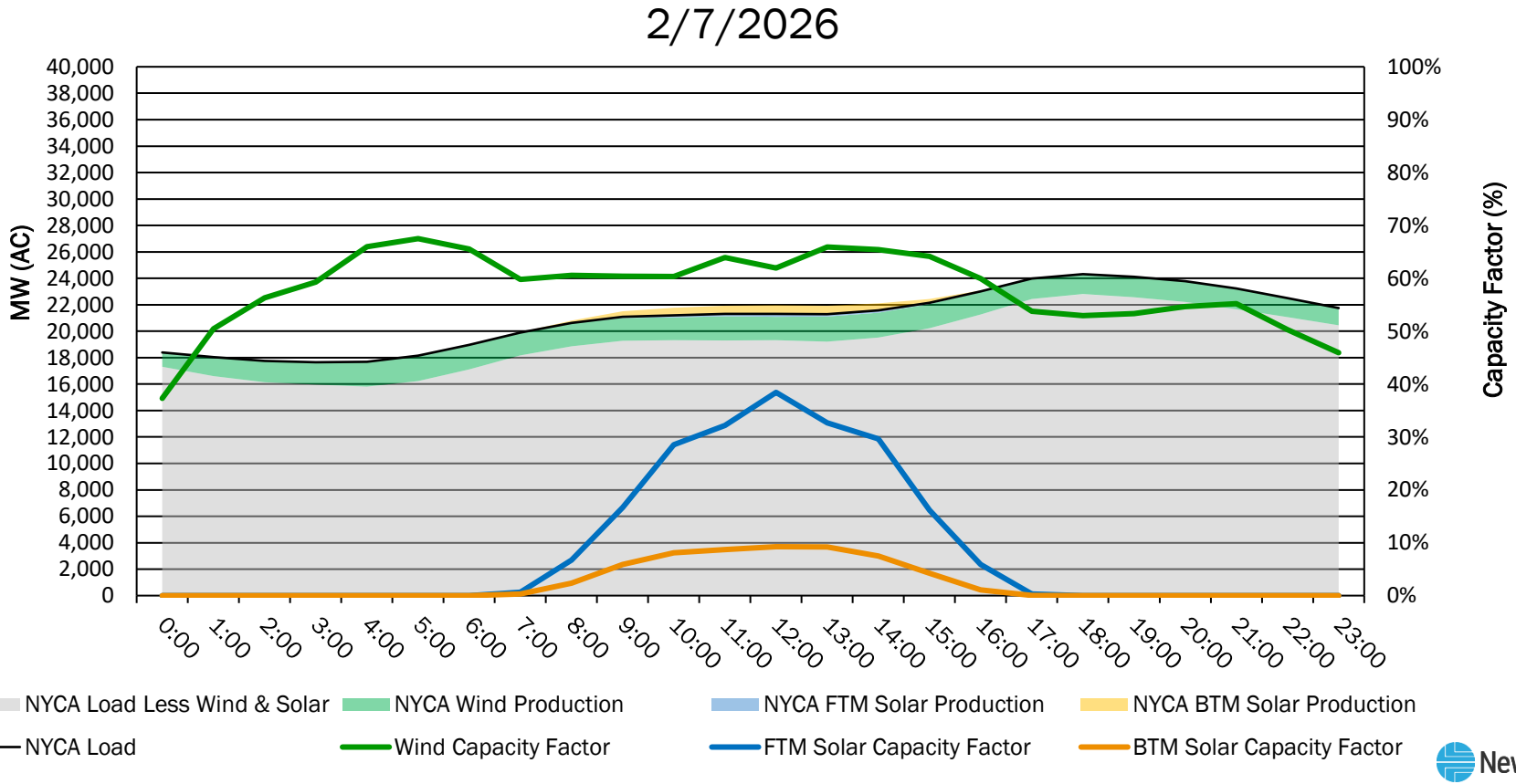
Wind and Solar Performance During Winter Peak Load



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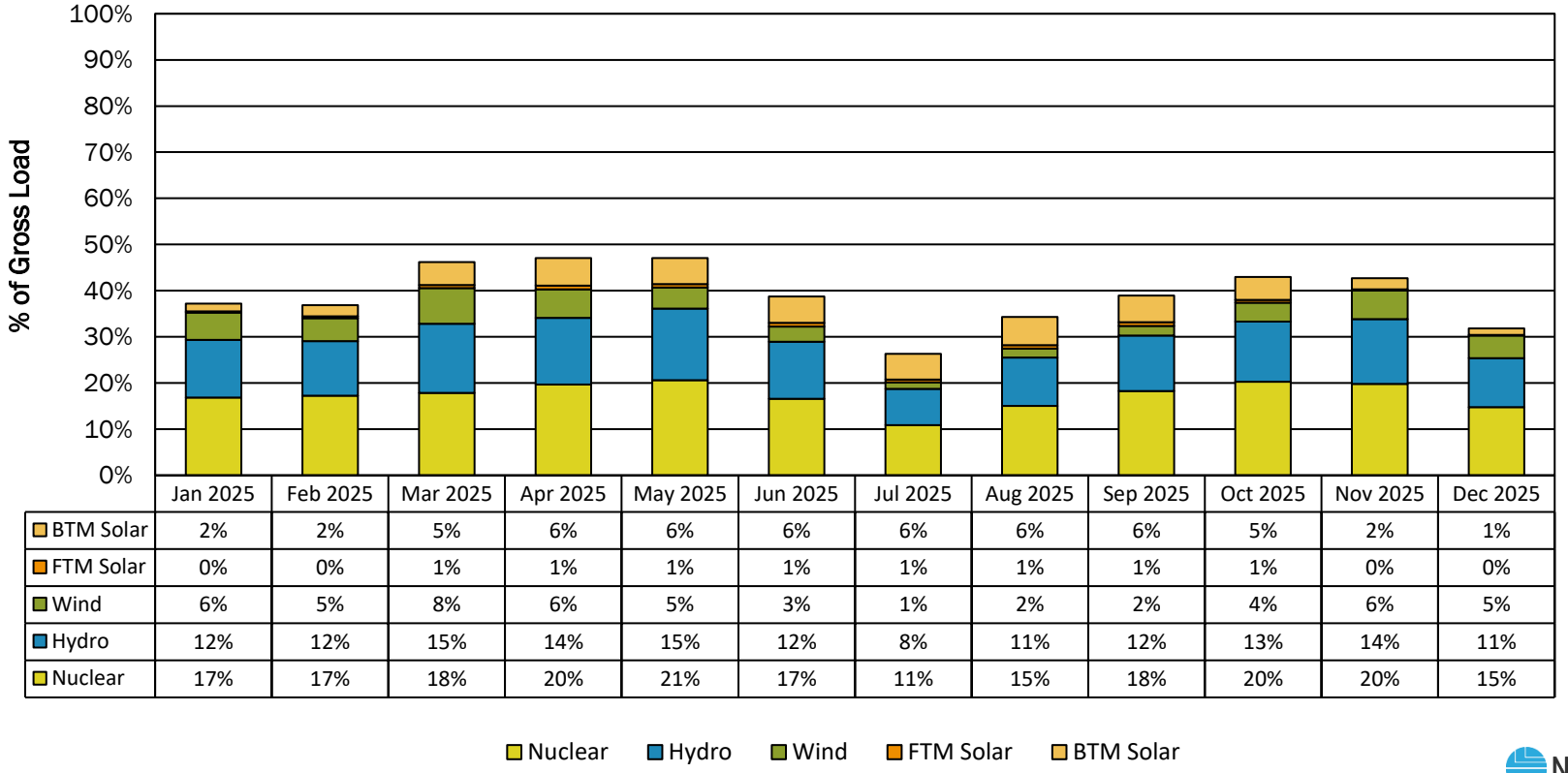
NYCA Emissions-Free Generation

Annual Contribution to Gross Load (38.51%)				
Nuclear	Hydro	Wind	FTM Solar	BTM Solar
17.03%	12.25%	4.30%	0.58%	4.36%



	Jan 2025	Feb 2025	Mar 2025	Apr 2025	May 2025	Jun 2025	Jul 2025	Aug 2025	Sep 2025	Oct 2025	Nov 2025	Dec 2025
BTM Solar	2%	2%	5%	6%	6%	6%	6%	6%	6%	5%	2%	1%
FTM Solar	0%	0%	1%	1%	1%	1%	1%	1%	1%	1%	0%	0%
Wind	6%	5%	8%	6%	5%	3%	1%	2%	2%	4%	6%	5%
Hydro	12%	12%	15%	14%	15%	12%	8%	11%	12%	13%	14%	11%
Nuclear	17%	17%	18%	20%	21%	17%	11%	15%	18%	20%	20%	15%

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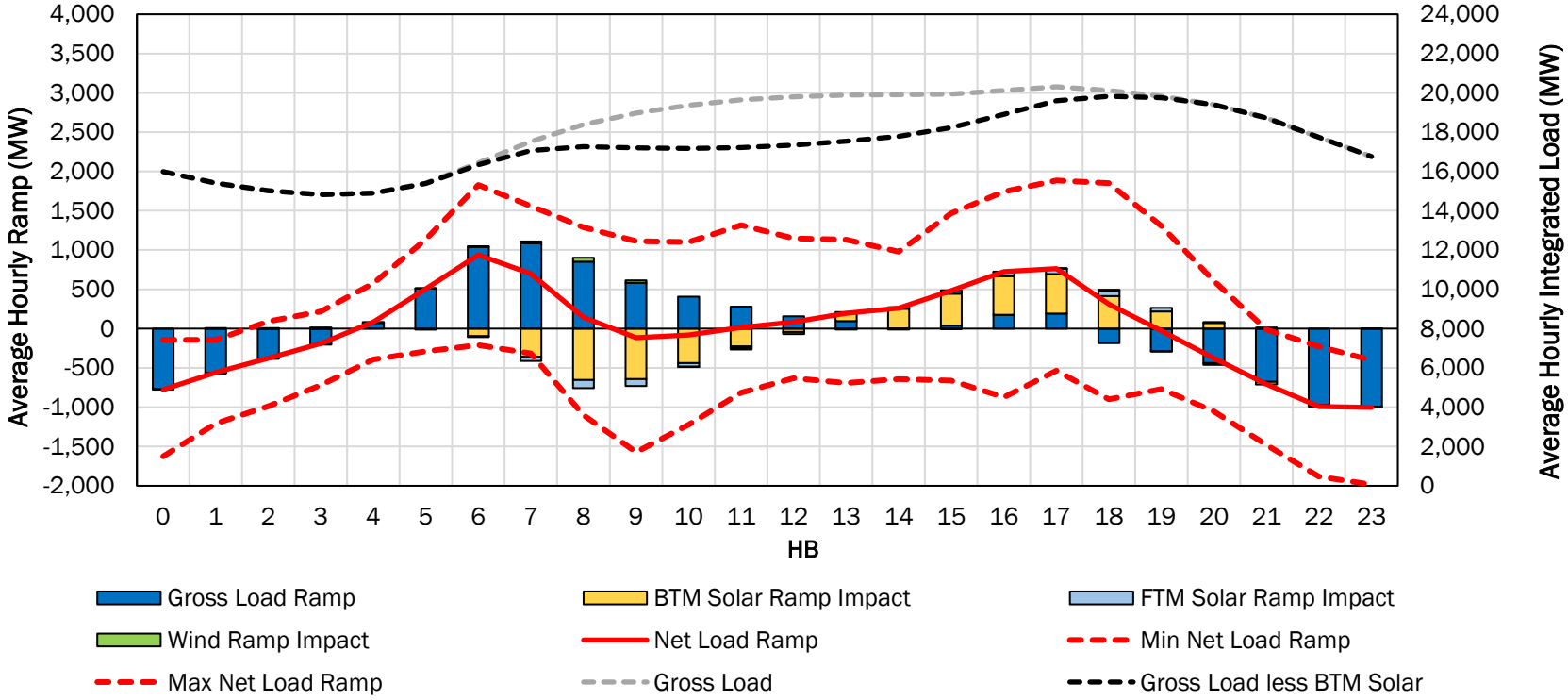
Load Ramps

Average Hourly Net Load Ramps (2025)



Ramps are calculated as the difference between the previous and current hour (HB)
Net Load is defined as Gross Load less Wind and Solar Generation
Wind and Solar ramps are negated to indicate their impact on Net Load Ramp

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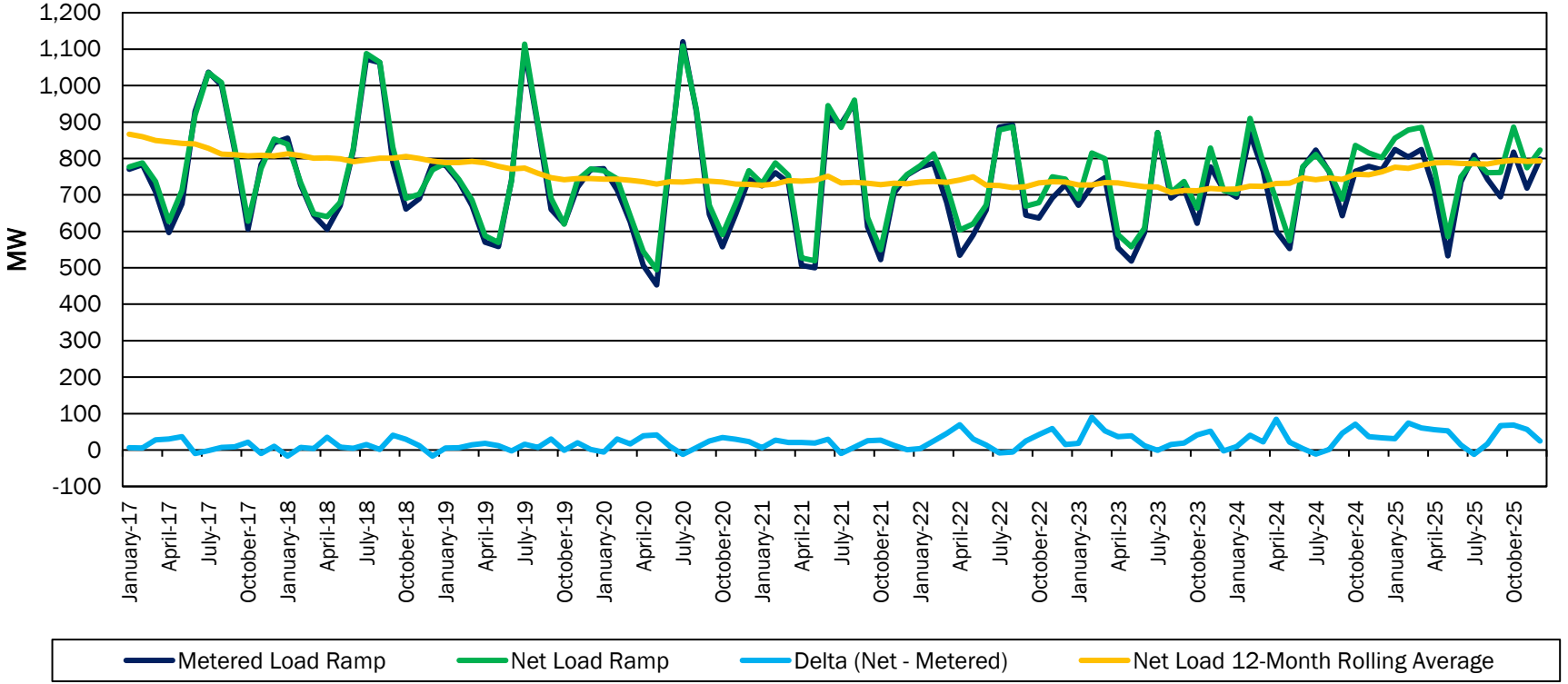
Metered Load vs Net Load Hourly Ramps

(75th Percentile Upward Ramps Only)



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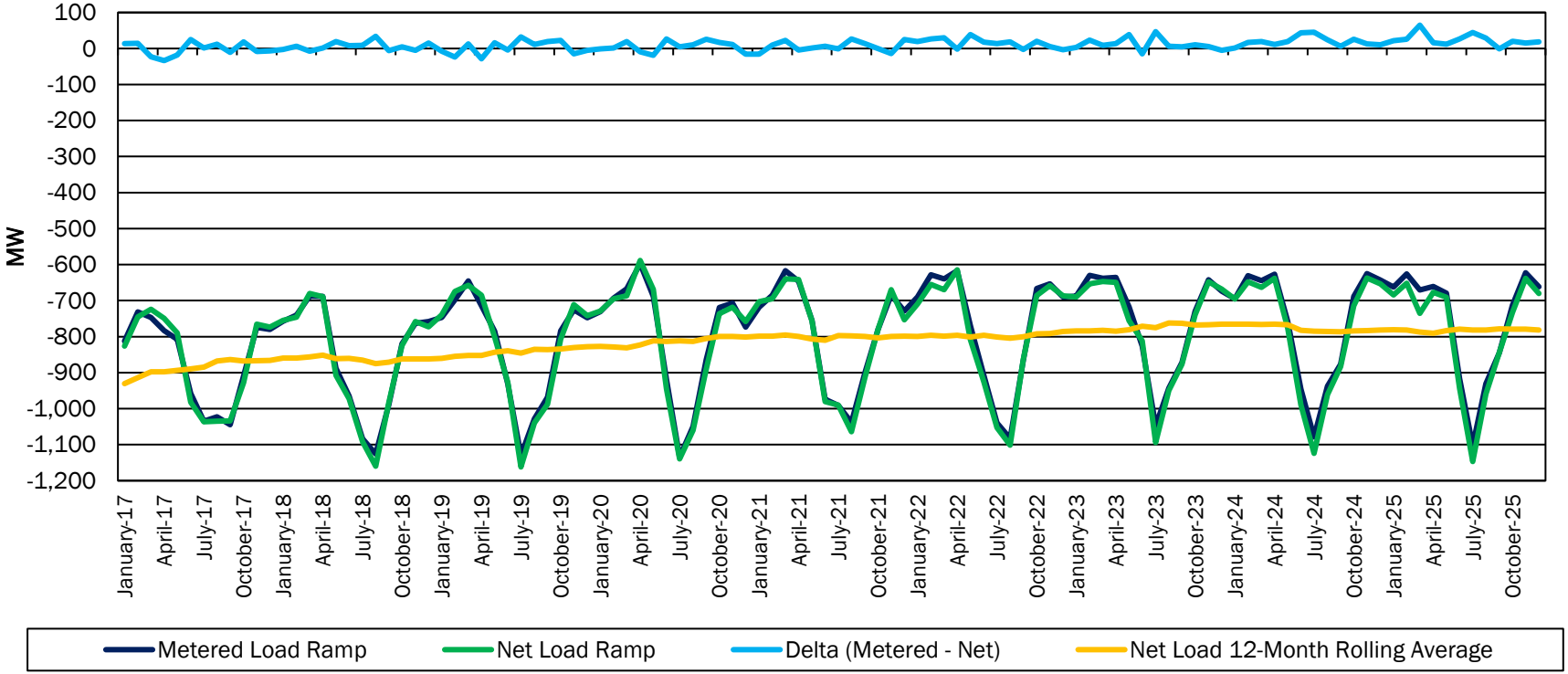
Metered Load vs Net Load Hourly Ramps

(75th Percentile Downward Ramps Only)



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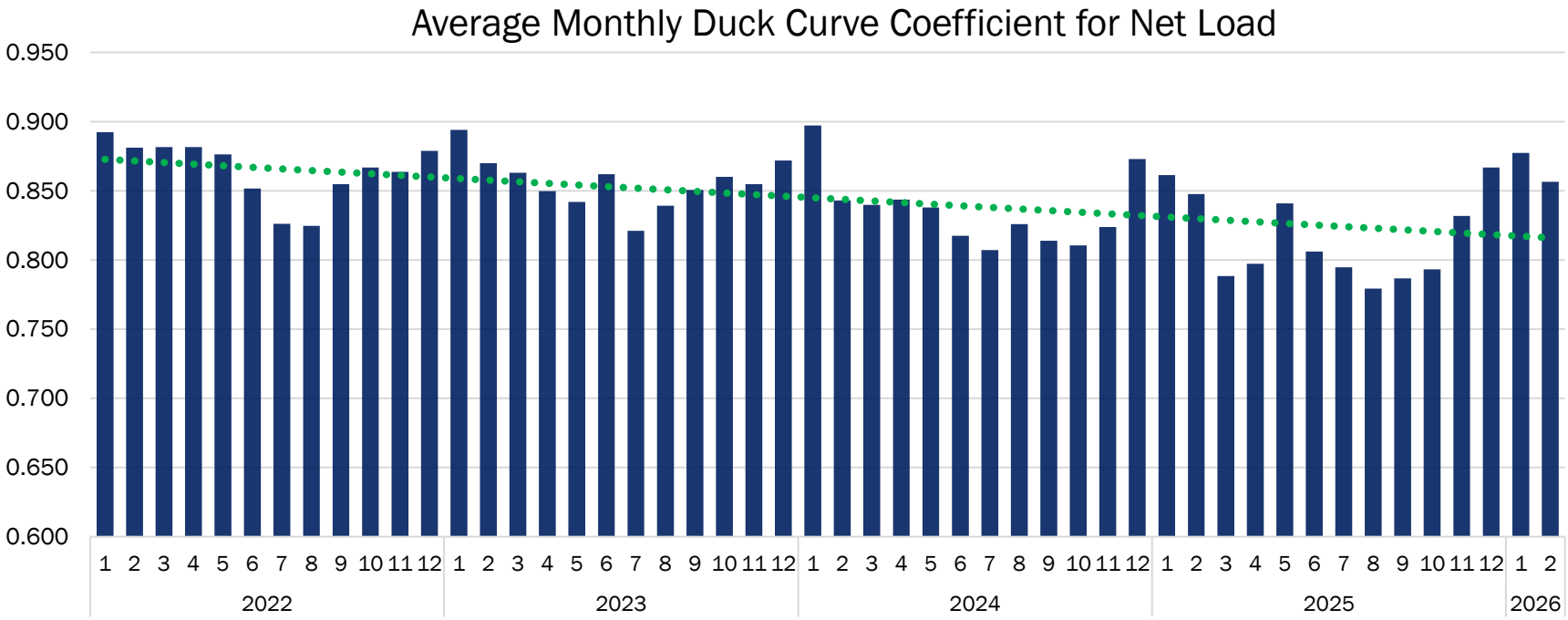
Net Load: Mid-day vs Evening Peak



$$\text{Duck Curve Coefficient} = \frac{\text{Minimum Net Load for Hours 9 to 15}}{\text{Evening Peak Net Load}}$$

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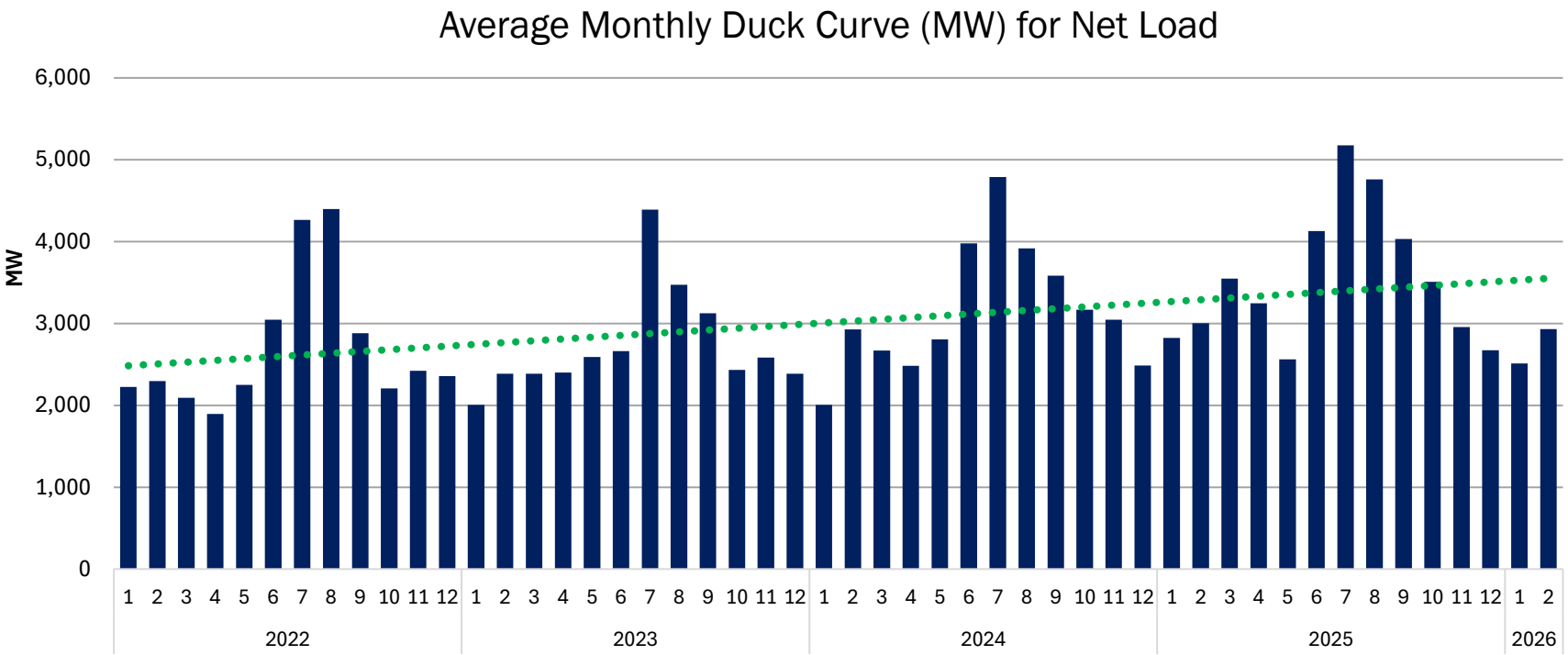
Net Load: Mid-day vs Evening Peak



Duck Curve (MW) = Evening Peak Net Load – Minimum Net Load for Hours 9 to 15

New York ISO

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

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Questions?