New York ISO
Independent System Operator

NY Renewables Overview and YTD Operation

Reposted in Response to Stakeholder Feedback – Content with Green Text is New or Revised Material

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03/31/2022, Rensselaer, NY

Agenda

- Overview of NY Wind
- Economic Wind Curtailment Statistics
- Overview of NY BTM Solar
- Coincident Wind and BTM Solar
- Questions

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Background on Metrics

- Unless otherwise stated, Wind data accounts for all wind plants installed in the NYCA.
- Unless otherwise stated, Wind and Solar Capacity Factors are inclusive of ALL hours in 2021 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.
- All BTM solar production is measured in DC (direct current).
- Capacity Factors are calculated as follows:

$$\text{Capacity Factor} = \frac{\text{Total Generated Energy}}{(\text{Nameplate Capacity})(\text{Total Hours})}$$

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Past Presentations and Datasets

For those interested, 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

More information on the wind curtailment process can be found within the presentation below.

https://www.nyiso.com/documents/20142/1394222/agenda_06_MC_1272009_v1_WindResourceMgmt.pdf/10de5bc1-cbae-c2c1-ac50-57223ae45956

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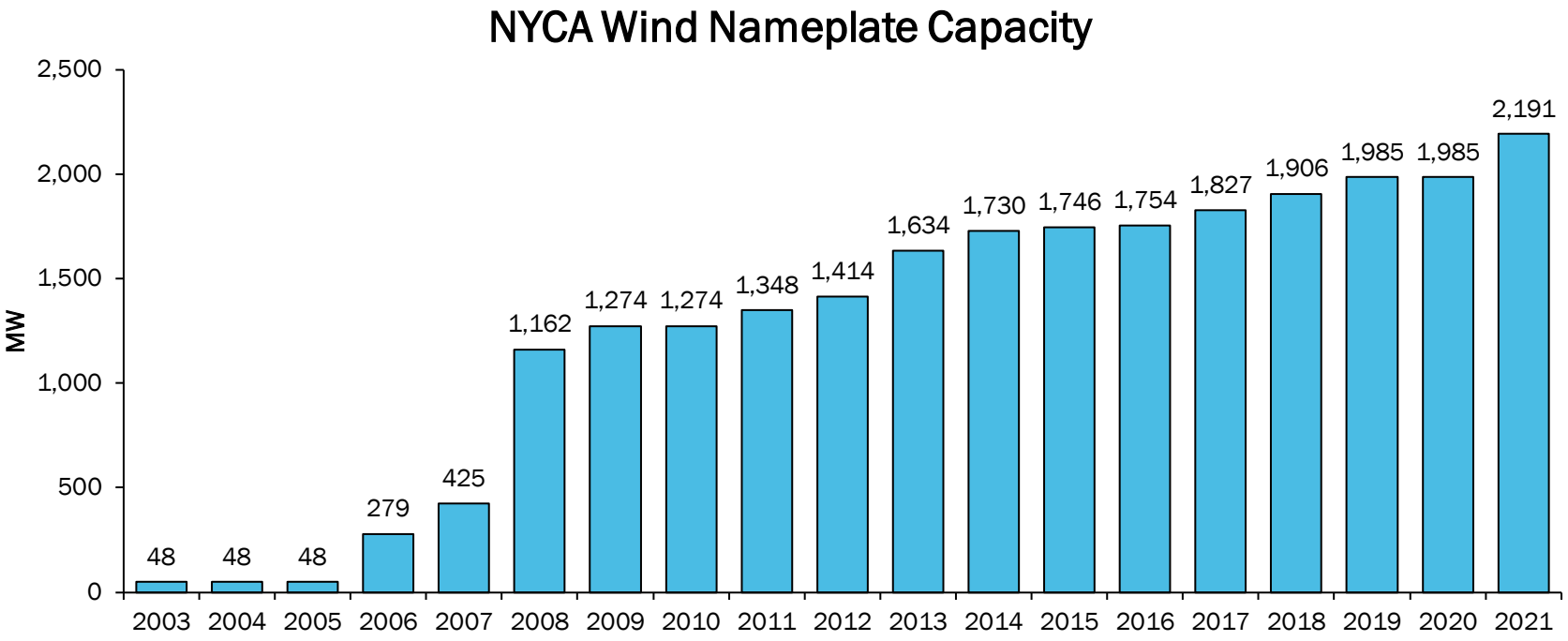
NYCA Wind 2021

Overview



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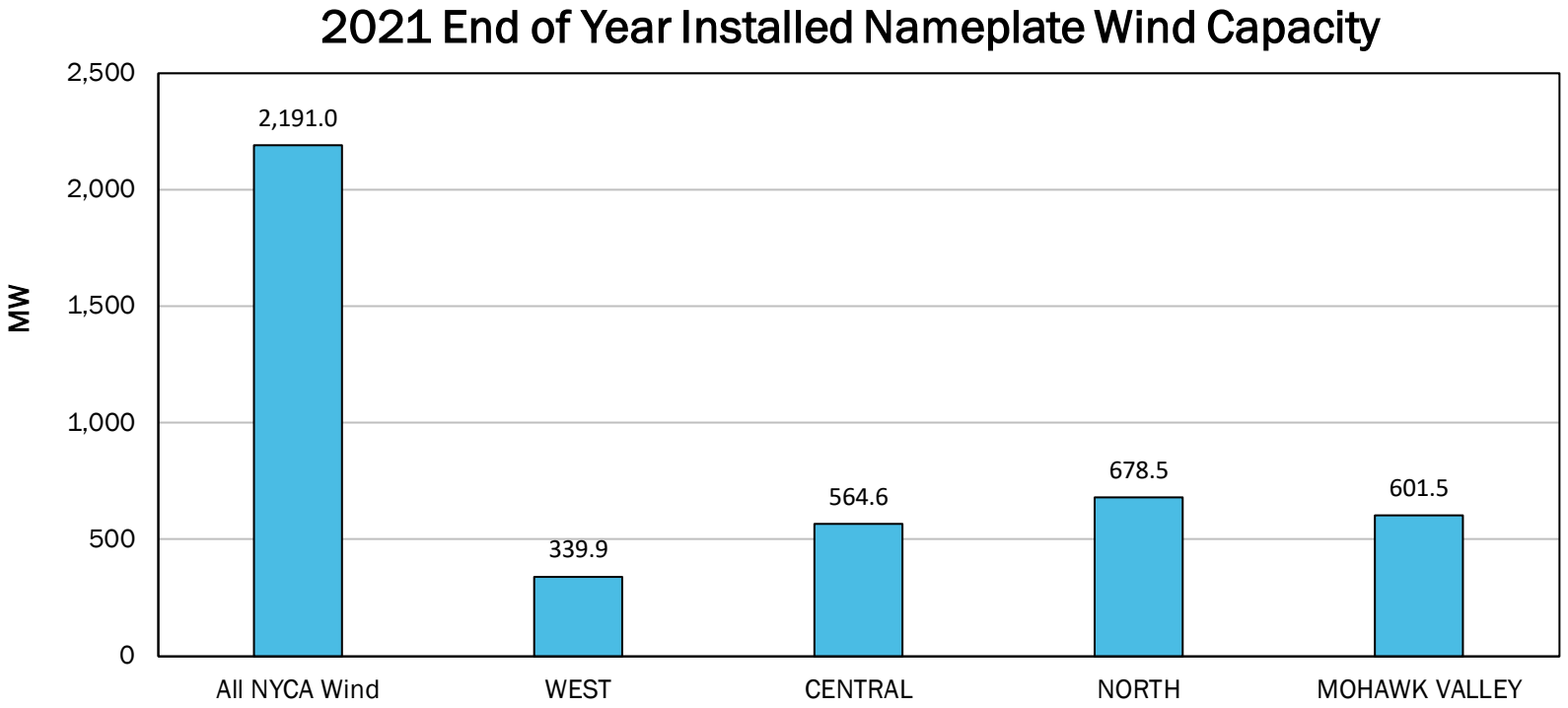
Zonal Wind Capacity



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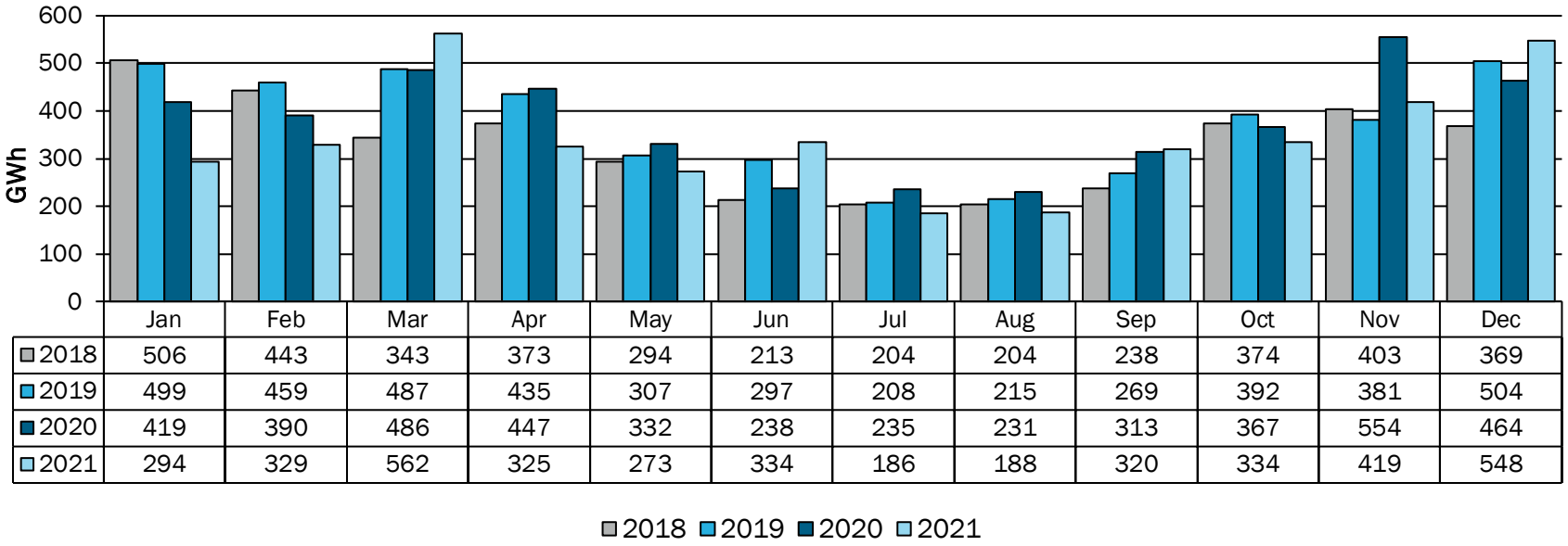
NY Wind Generation

Total Annual Wind Production (GWh)			
2018	2019	2020	2021
3,965	4,453	4,476	4,111

NYCA Wind Plants - Monthly Production



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2018	506	443	343	373	294	213	204	204	238	374	403	369
2019	499	459	487	435	307	297	208	215	269	392	381	504
2020	419	390	486	447	332	238	235	231	313	367	554	464
2021	294	329	562	325	273	334	186	188	320	334	419	548

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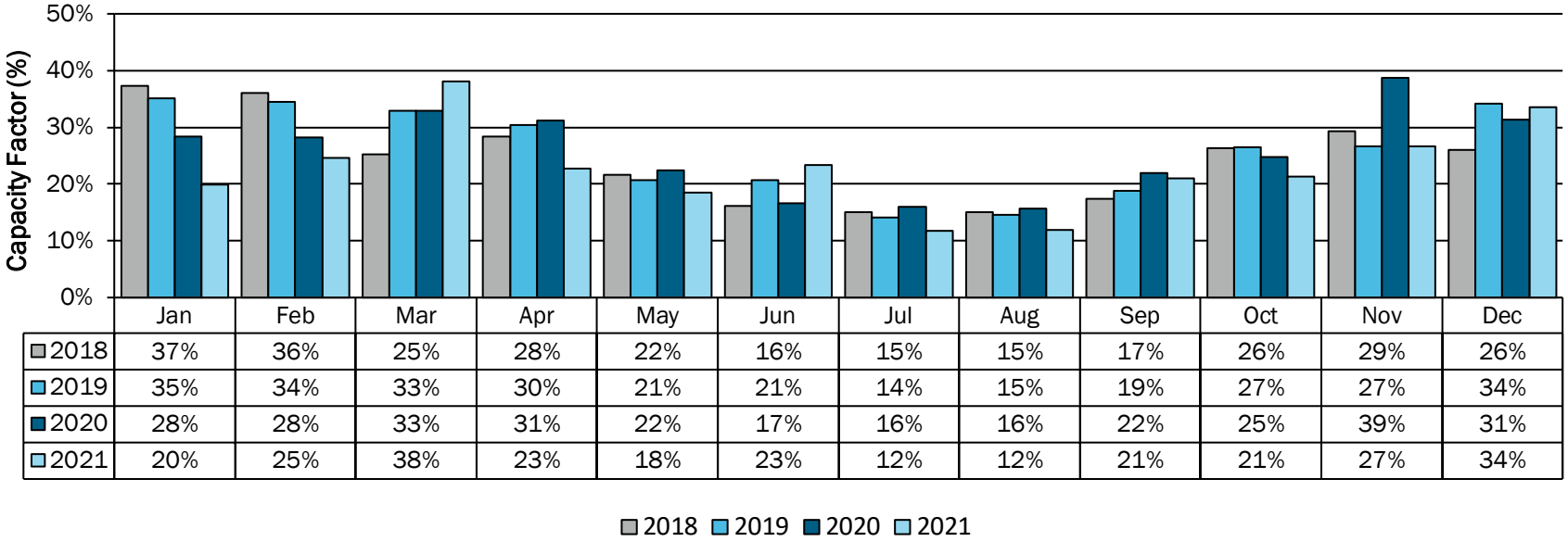
NY Wind Capacity Factors

Annual Wind Capacity Factor			
2018	2019	2020	2021
24%	26%	26%	23%

NYCA Wind Generation – Monthly Capacity Factor



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2018	37%	36%	25%	28%	22%	16%	15%	15%	17%	26%	29%	26%
2019	35%	34%	33%	30%	21%	21%	14%	15%	19%	27%	27%	34%
2020	28%	28%	33%	31%	22%	17%	16%	16%	22%	25%	39%	31%
2021	20%	25%	38%	23%	18%	23%	12%	12%	21%	21%	27%	34%

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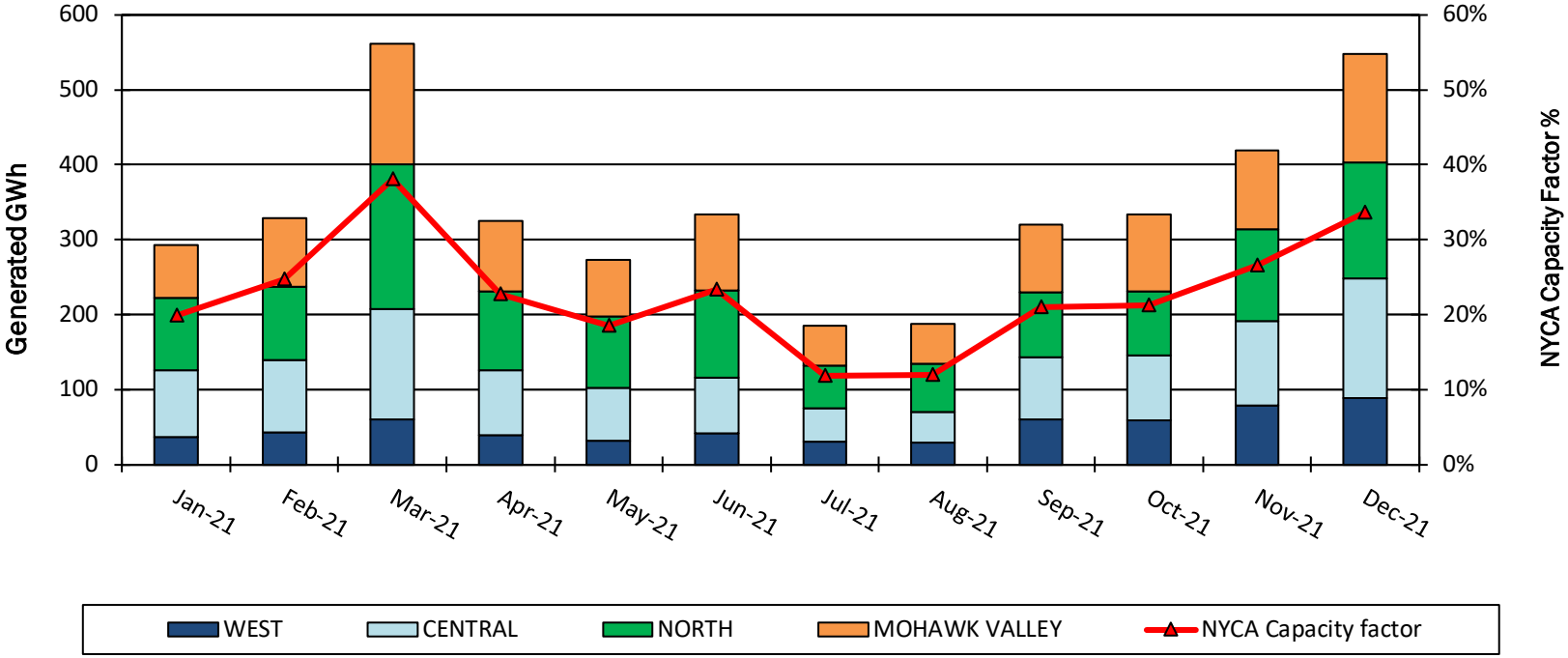
Monthly Wind Production by Zone



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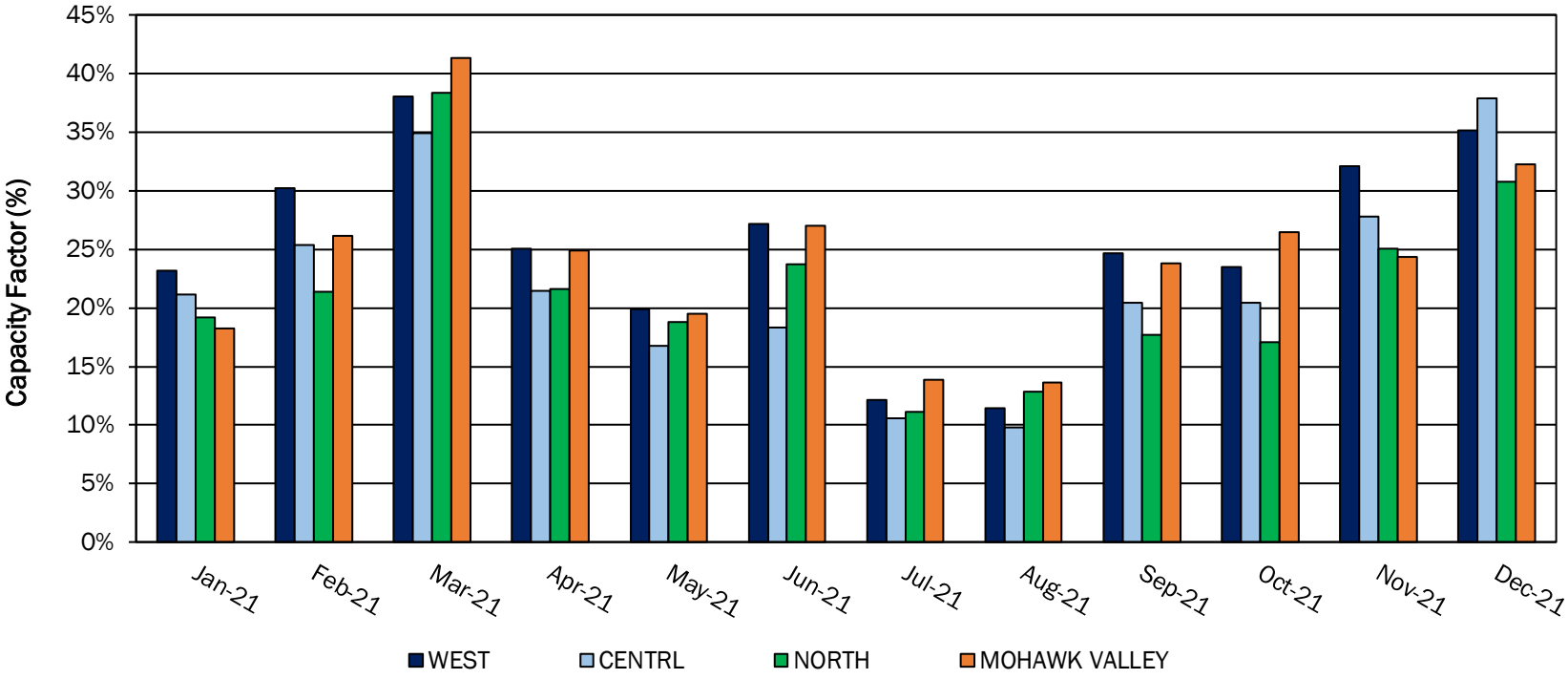
Monthly Wind Capacity Factors by Zone



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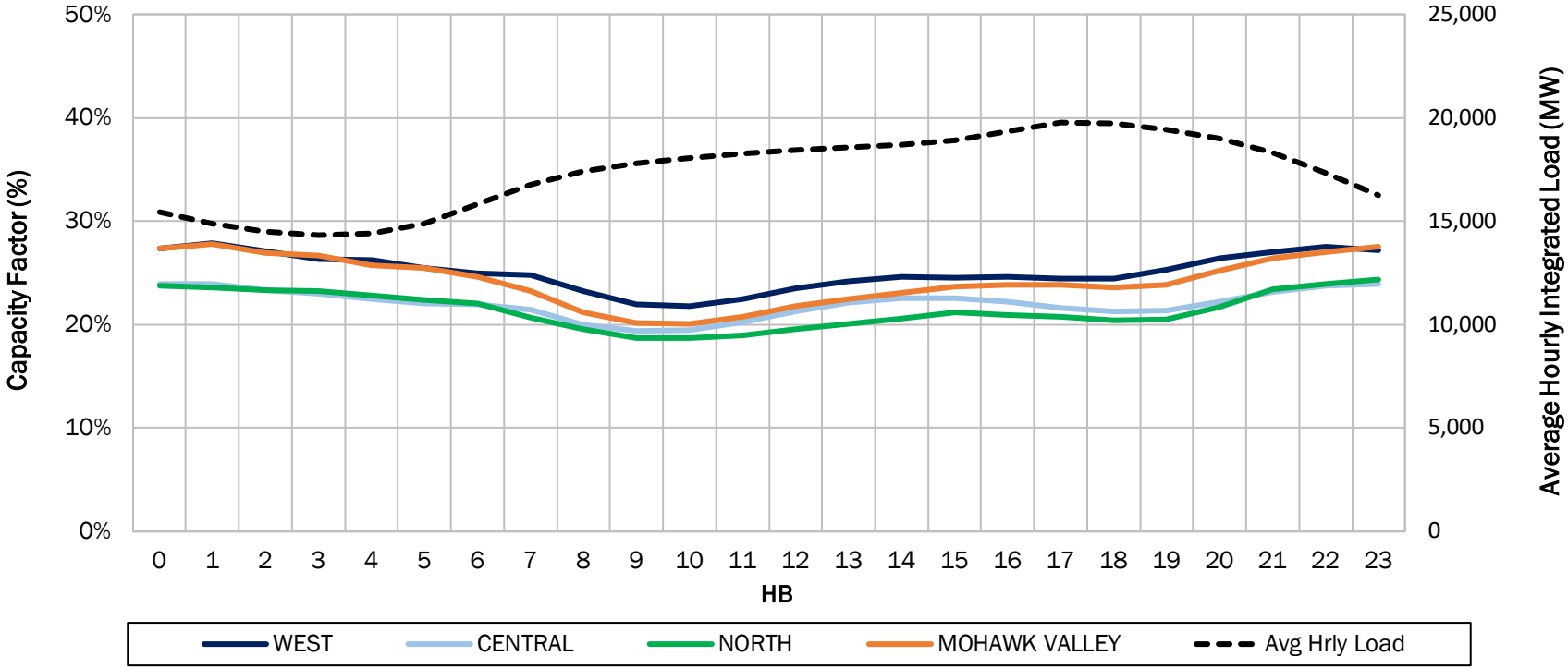
2021 Average Hourly Wind Capacity Factors by Zone



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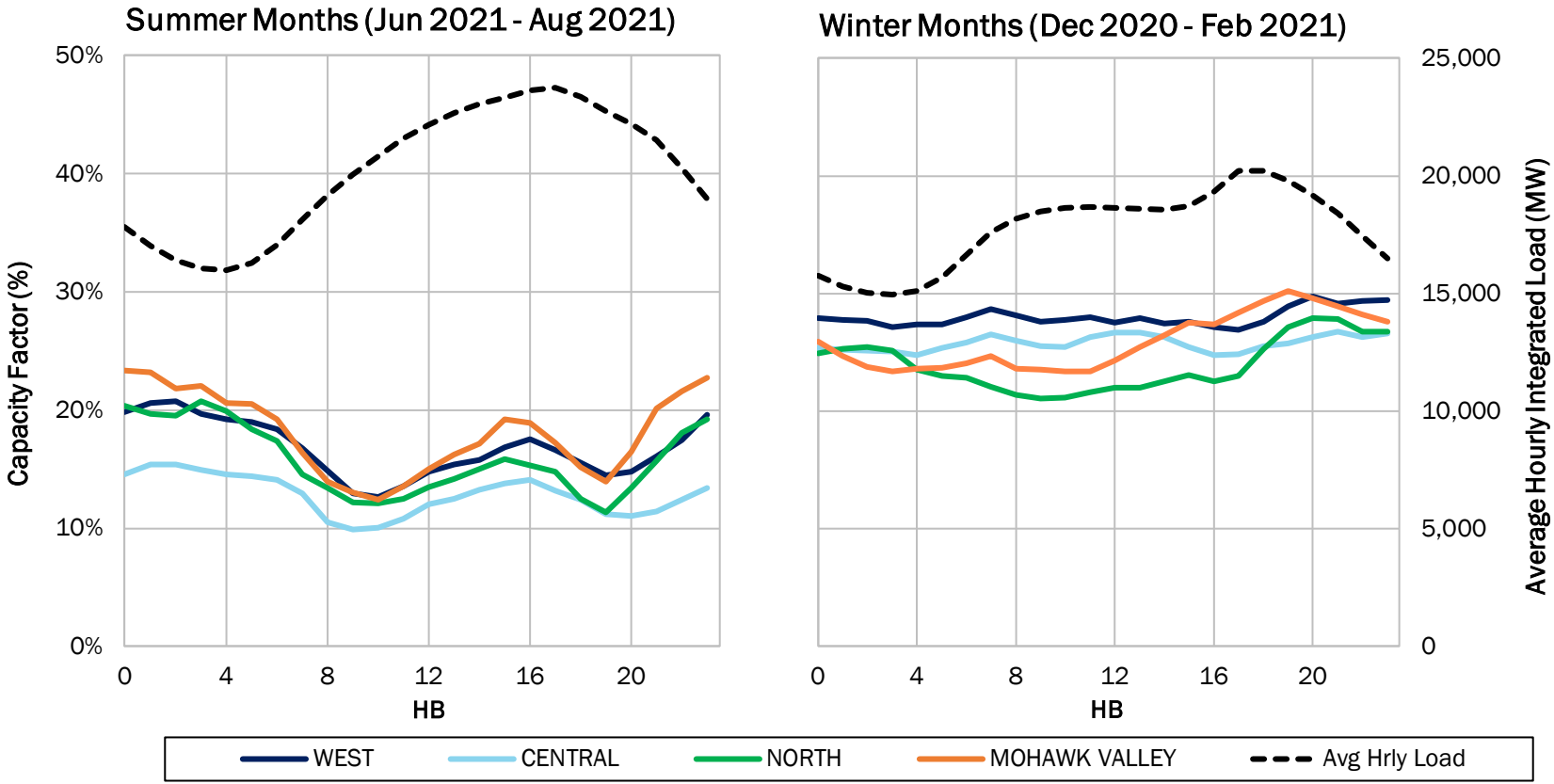
2021 Seasonal Average Hourly Wind Capacity Factors by Zone



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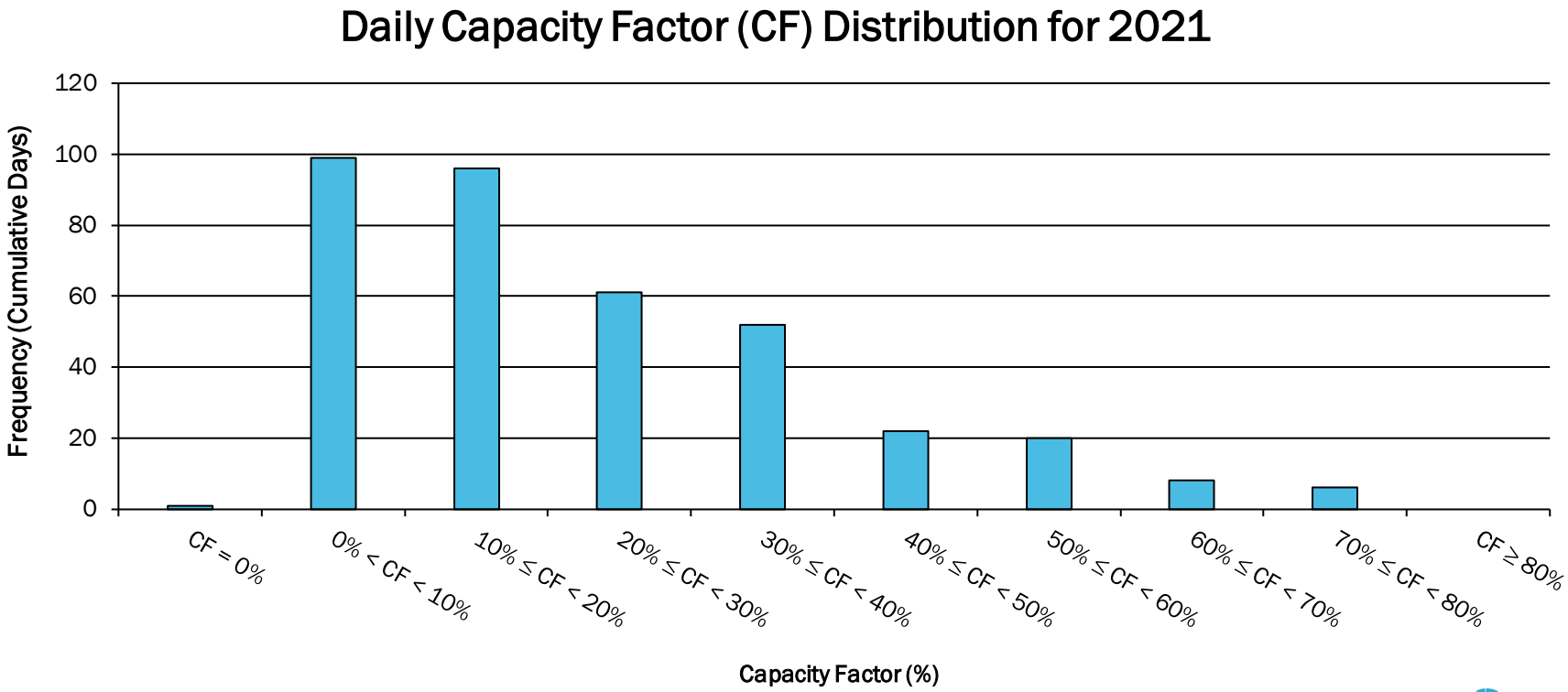
2021 NY Wind Capacity Factor Distribution



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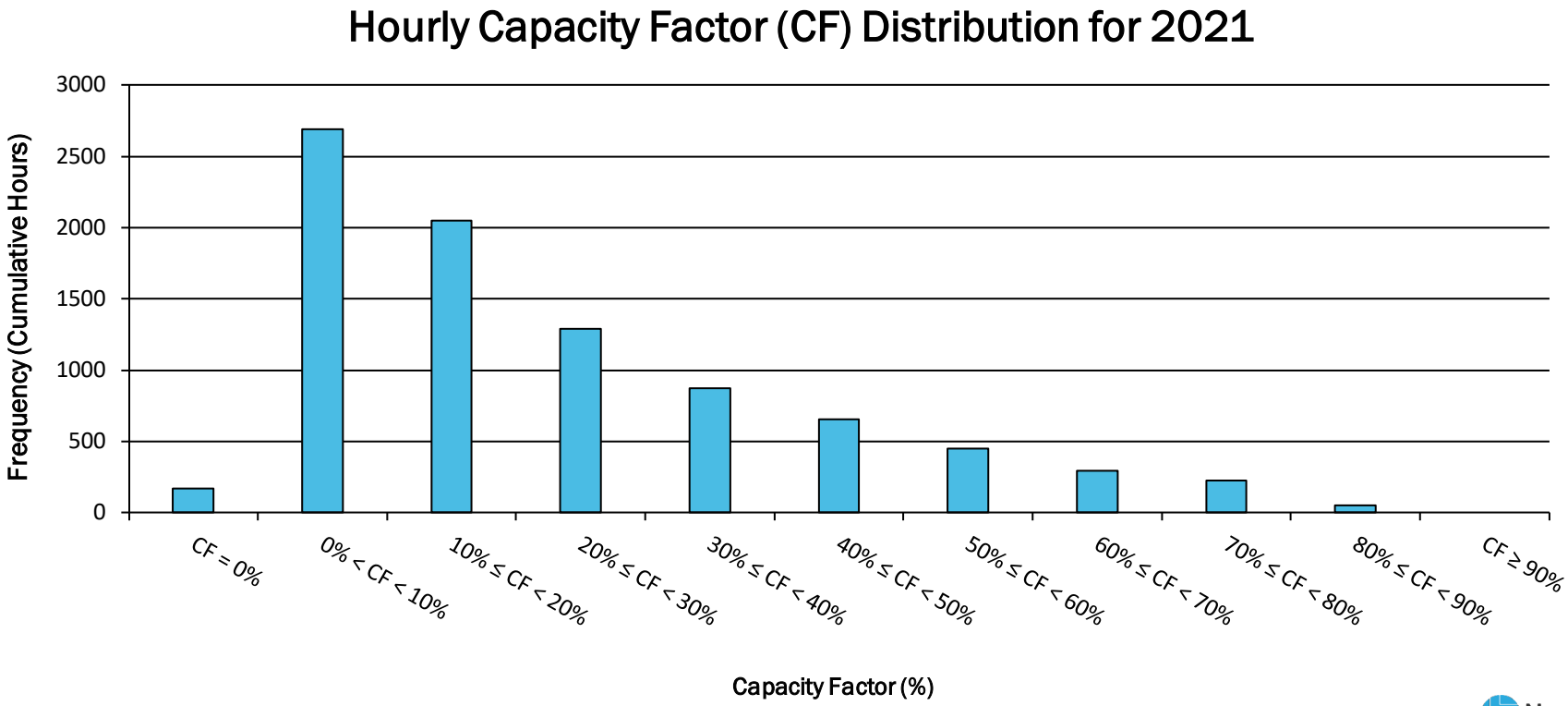
2021 NY Wind Capacity Factor Distribution



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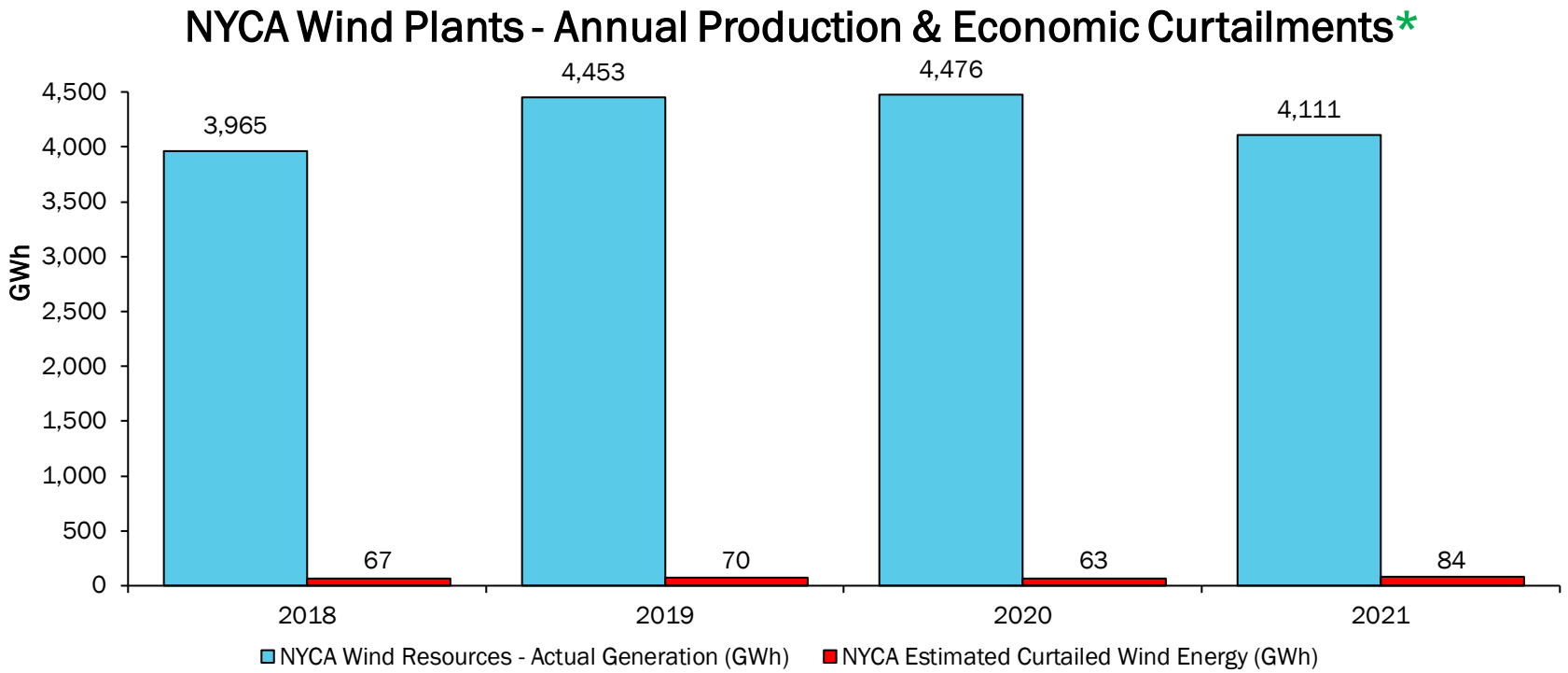
NY Economic Wind Curtailments



*Economic Curtailments are instructions sent to Wind Units to limit their output. The instructions come from NYISO's real-time dispatch market evaluation and are most often associated with transmission constraints or gen-to-load balancing constraints.

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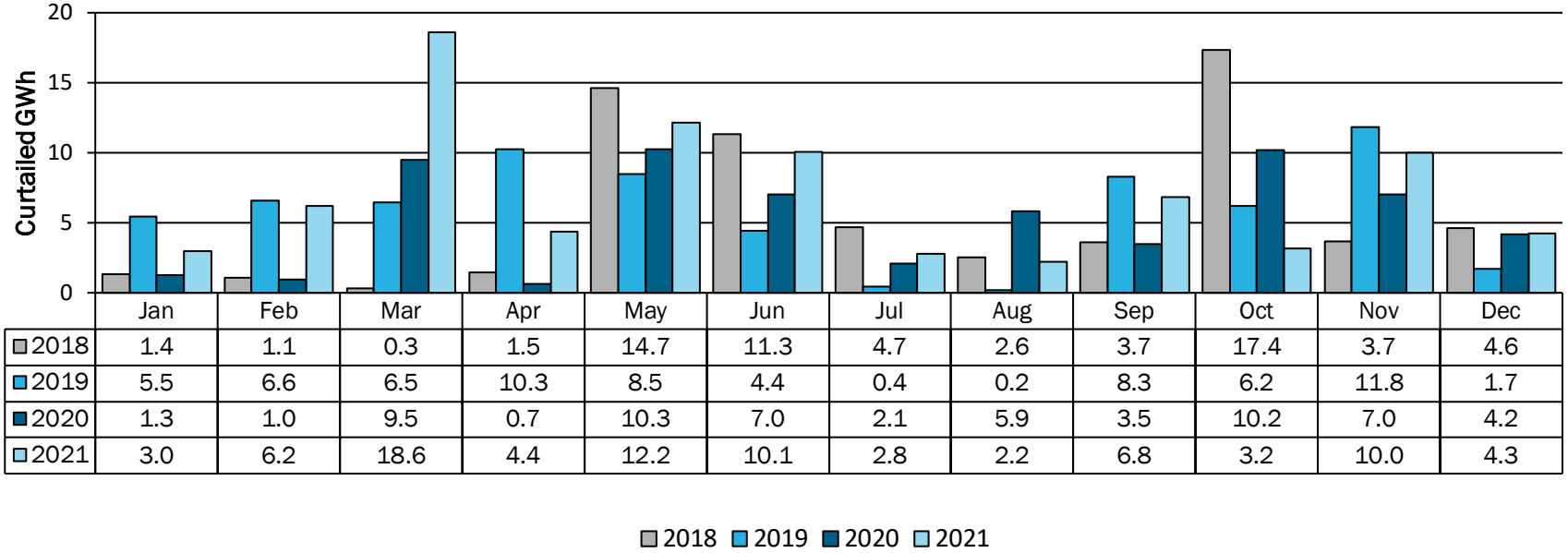
NY Economic Wind Curtailments

Total Annual Wind Curtailments (GWh)			
2018	2019	2020	2021
66.9	70.5	62.7	84.0

NYCA Wind Plants - Monthly Estimated Curtailed Energy



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2018	1.4	1.1	0.3	1.5	14.7	11.3	4.7	2.6	3.7	17.4	3.7	4.6
2019	5.5	6.6	6.5	10.3	8.5	4.4	0.4	0.2	8.3	6.2	11.8	1.7
2020	1.3	1.0	9.5	0.7	10.3	7.0	2.1	5.9	3.5	10.2	7.0	4.2
2021	3.0	6.2	18.6	4.4	12.2	10.1	2.8	2.2	6.8	3.2	10.0	4.3

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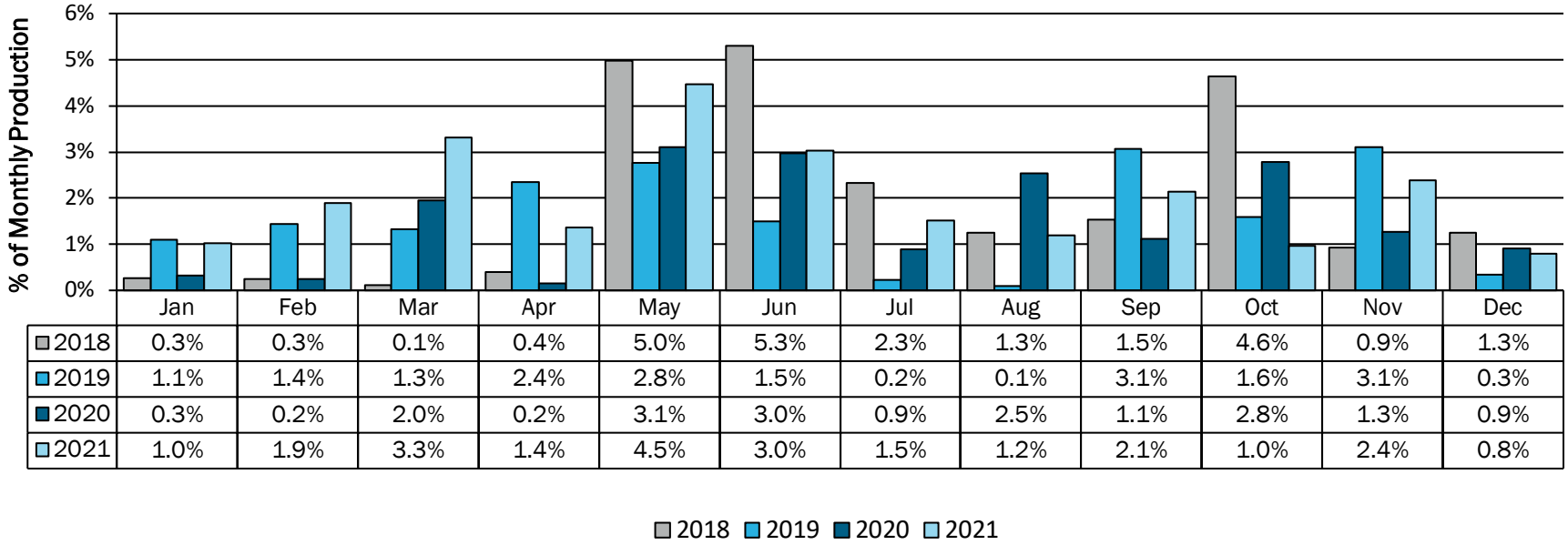
NY Economic Wind Curtailments

Total Estimated Curtailed Energy %			
2018	2019	2020	2021
1.7%	1.6%	1.4%	2.0%

NYCA Wind Plants - Monthly Estimated Curtailed Energy %



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2018	0.3%	0.3%	0.1%	0.4%	5.0%	5.3%	2.3%	1.3%	1.5%	4.6%	0.9%	1.3%
2019	1.1%	1.4%	1.3%	2.4%	2.8%	1.5%	0.2%	0.1%	3.1%	1.6%	3.1%	0.3%
2020	0.3%	0.2%	2.0%	0.2%	3.1%	3.0%	0.9%	2.5%	1.1%	2.8%	1.3%	0.9%
2021	1.0%	1.9%	3.3%	1.4%	4.5%	3.0%	1.5%	1.2%	2.1%	1.0%	2.4%	0.8%

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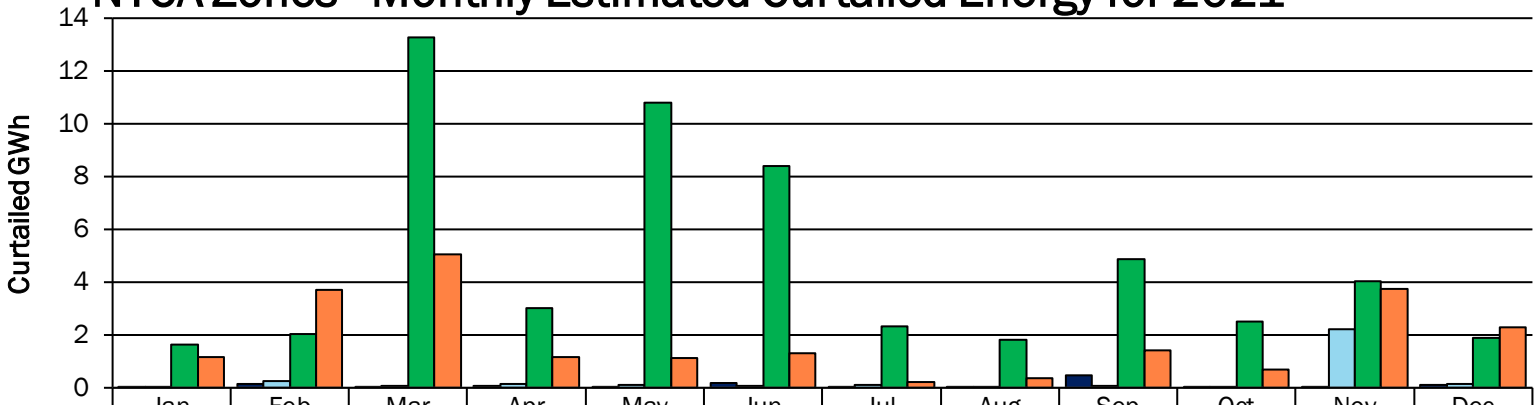
NY Economic Wind Curtailments

Total Annual Estimated Curtailed Energy (GWh)			
West	Central	North	Mohawk Valley
1.12	3.20	56.54	22.18

NYCA Zones - Monthly Estimated Curtailed Energy for 2021*



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
WEST	0.03	0.12	0.04	0.08	0.04	0.18	0.04	0.01	0.45	0.01	0.02	0.09
CENTRAL	0.04	0.24	0.05	0.15	0.10	0.06	0.11	0.02	0.06	0.04	2.20	0.12
NORTH	1.64	2.03	13.26	3.02	10.80	8.40	2.32	1.81	4.85	2.50	4.02	1.89
MOHAWK VALLEY	1.14	3.70	5.06	1.15	1.11	1.31	0.22	0.35	1.41	0.67	3.75	2.30

*North Zone curtailments in 2021 are coincident with several long-term facility outages related to transmission upgrades.

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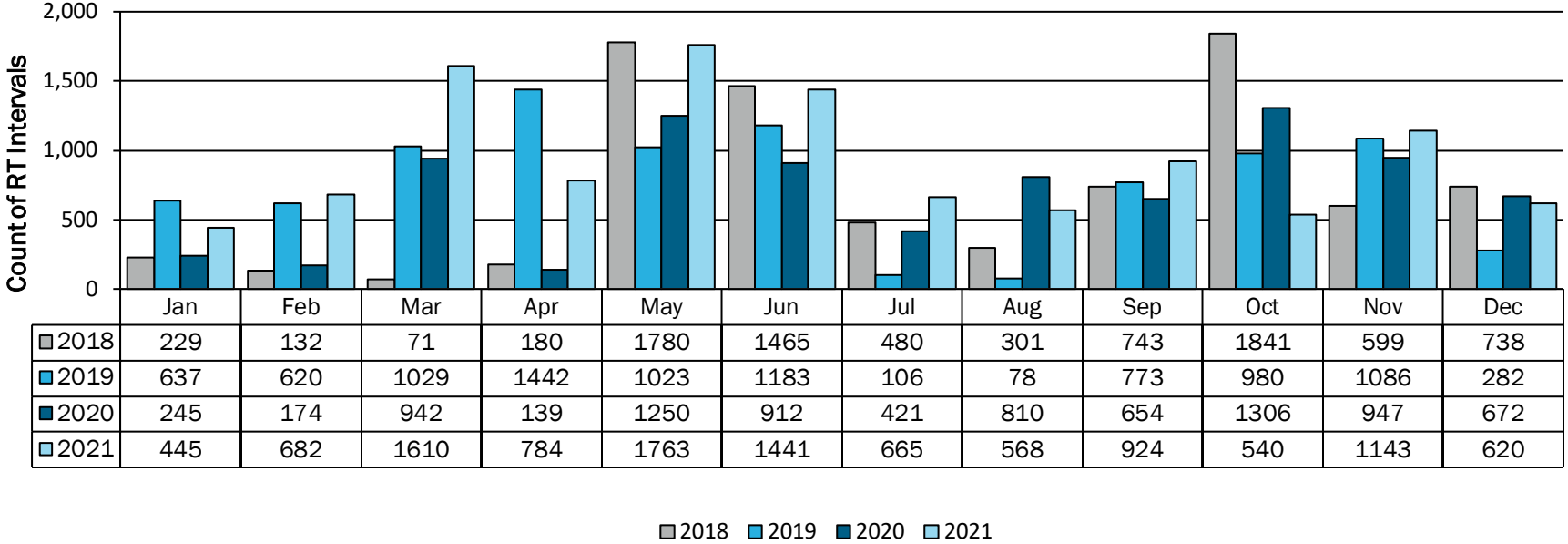
NY Economic Wind Curtailments

Total Estimated Curtailed Interval Count			
2018	2019	2020	2021
8,559	9,239	8,472	11,185

NYCA Wind Plants - Monthly Estimated Curtailed Interval Count

(12 Intervals = 1 Hour)



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2018	229	132	71	180	1780	1465	480	301	743	1841	599	738
2019	637	620	1029	1442	1023	1183	106	78	773	980	1086	282
2020	245	174	942	139	1250	912	421	810	654	1306	947	672
2021	445	682	1610	784	1763	1441	665	568	924	540	1143	620

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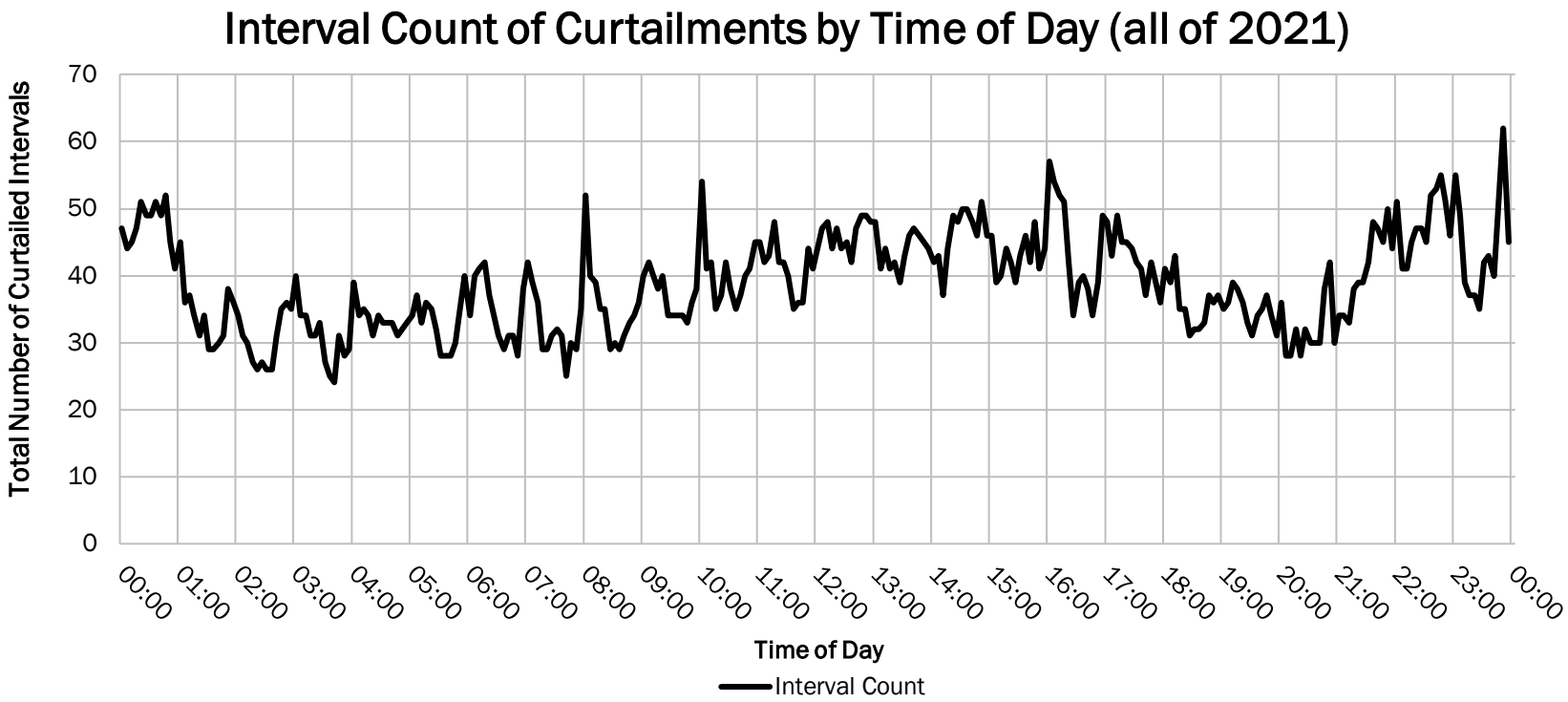
NY Economic Wind Curtailments



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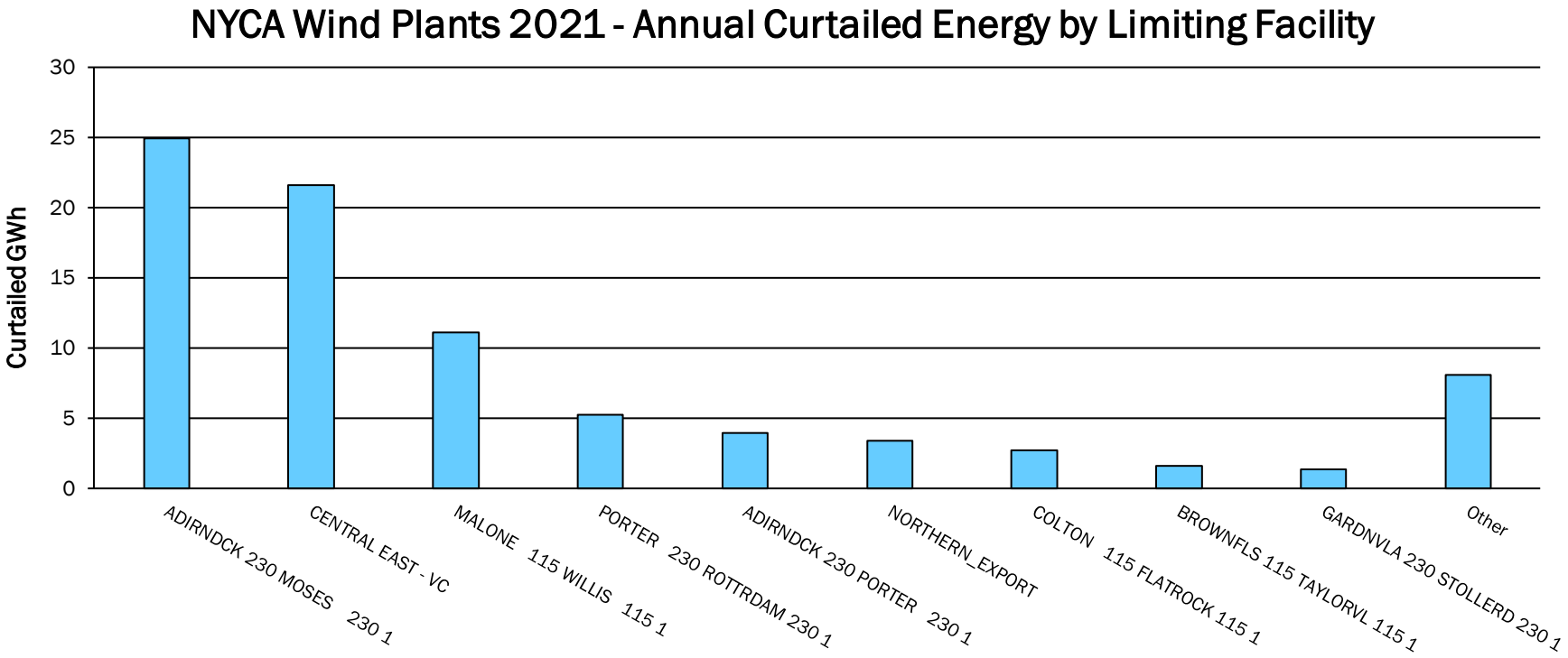
NY Economic Wind Curtailments



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Behind the Meter (BTM) Solar 2021

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
  - Sampling is taken from approximately 9,234 individual solar production sites across NY representing over 100 MWs
- 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 installations in the NY SUN and NY DPS Standard Interconnection Request (SIR) databases to develop an accurate estimate of BTM solar installed capacity
- At the end of 2021, BTM Solar Capacity was estimated to be 3,265 MWs

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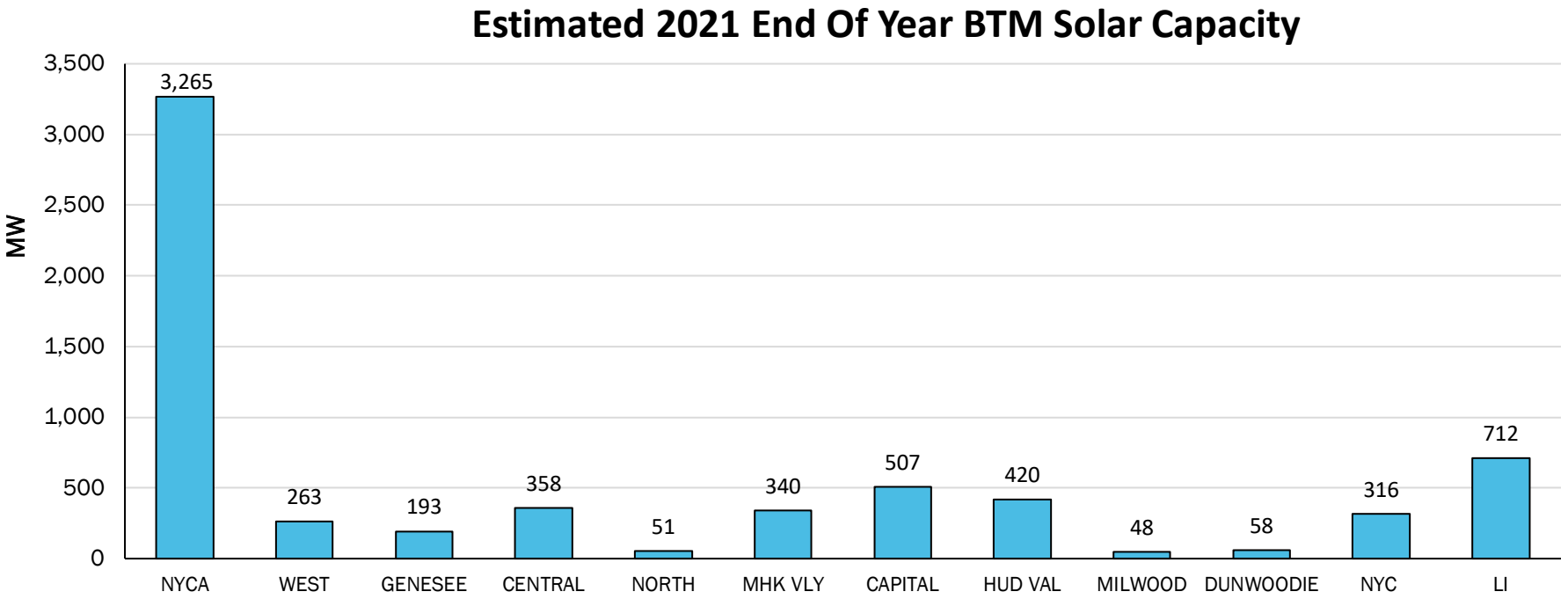
Zonal BTM Solar Capacity



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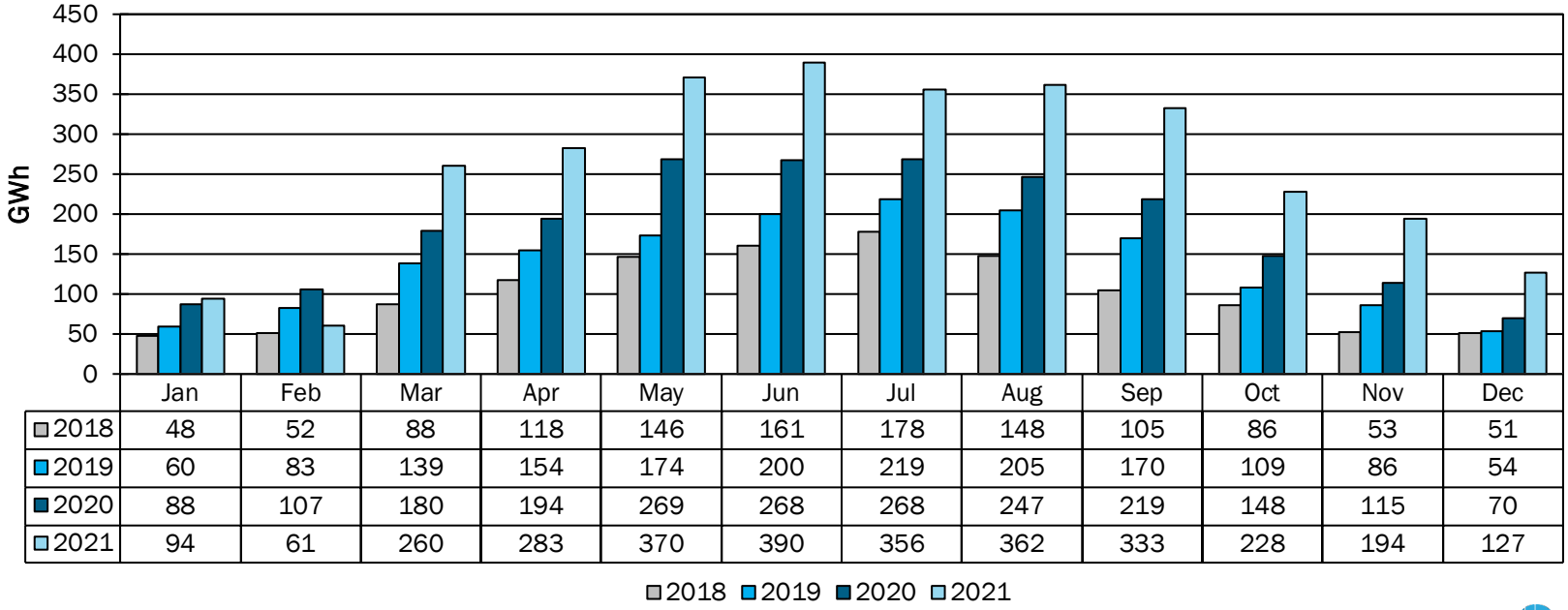
NY BTM Solar Generation

Total Annual BTM Solar Production (GWh)			
2018	2019	2020	2021
1,234	1,652	2,172	3,057

NYCA BTM Solar - Estimated Monthly Production



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2018	48	52	88	118	146	161	178	148	105	86	53	51
2019	60	83	139	154	174	200	219	205	170	109	86	54
2020	88	107	180	194	269	268	268	247	219	148	115	70
2021	94	61	260	283	370	390	356	362	333	228	194	127

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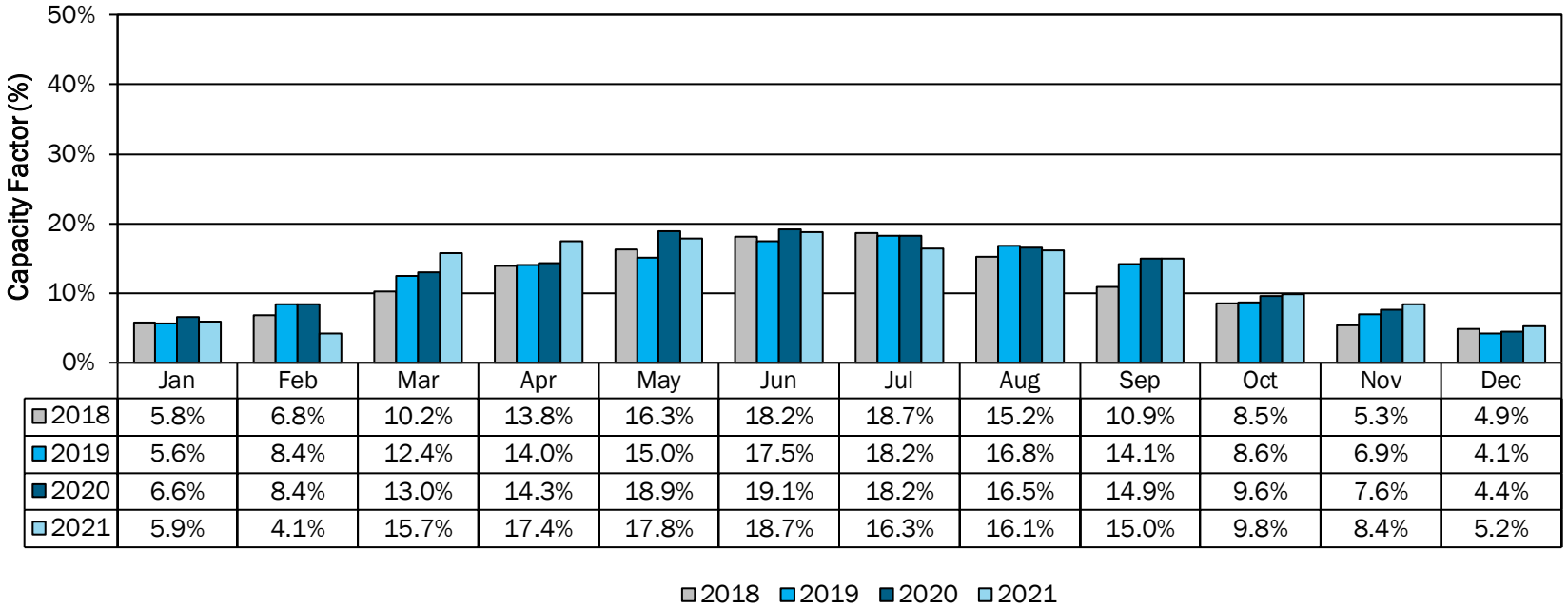
NY BTM Solar Capacity Factors

Annual BTM Solar Capacity Factor			
2018	2019	2020	2021
11%	12%	13%	13%

NYCA BTM Solar Generation - Estimated Capacity Factor



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2018	5.8%	6.8%	10.2%	13.8%	16.3%	18.2%	18.7%	15.2%	10.9%	8.5%	5.3%	4.9%
2019	5.6%	8.4%	12.4%	14.0%	15.0%	17.5%	18.2%	16.8%	14.1%	8.6%	6.9%	4.1%
2020	6.6%	8.4%	13.0%	14.3%	18.9%	19.1%	18.2%	16.5%	14.9%	9.6%	7.6%	4.4%
2021	5.9%	4.1%	15.7%	17.4%	17.8%	18.7%	16.3%	16.1%	15.0%	9.8%	8.4%	5.2%

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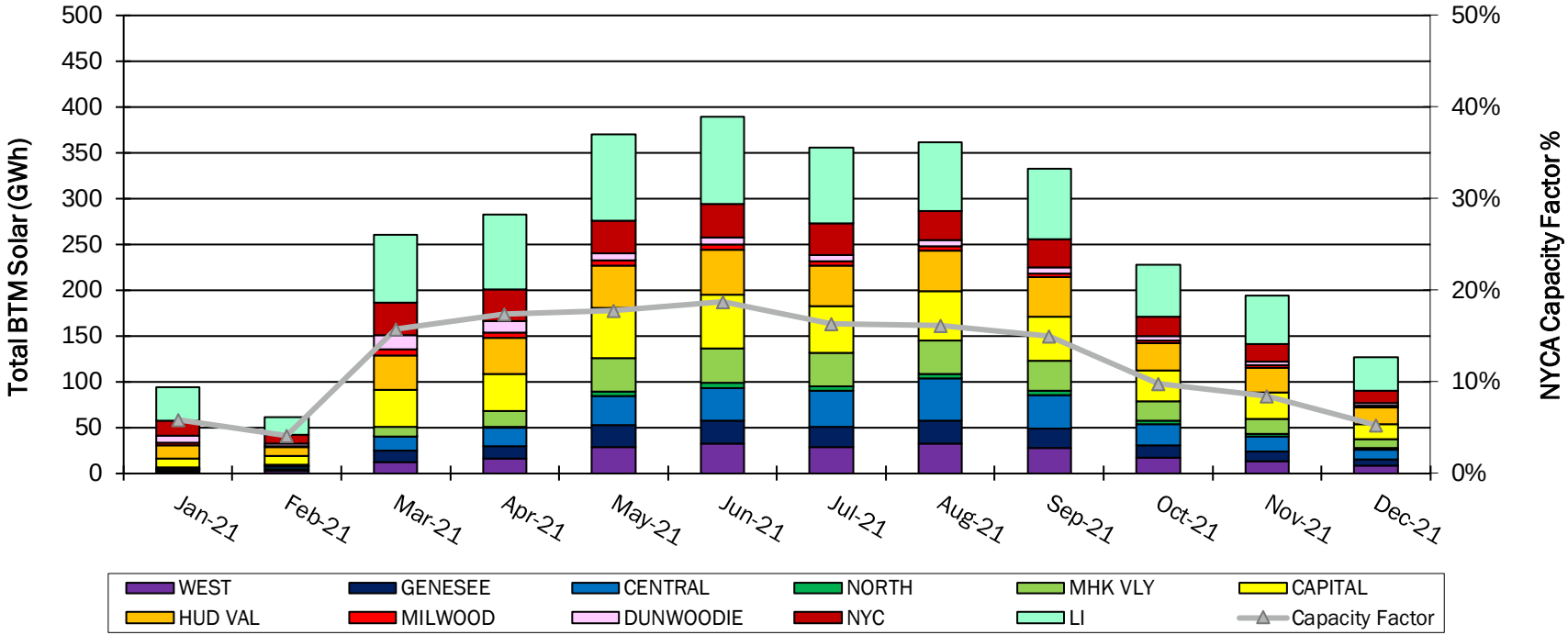
Monthly BTM Solar Production by Zone



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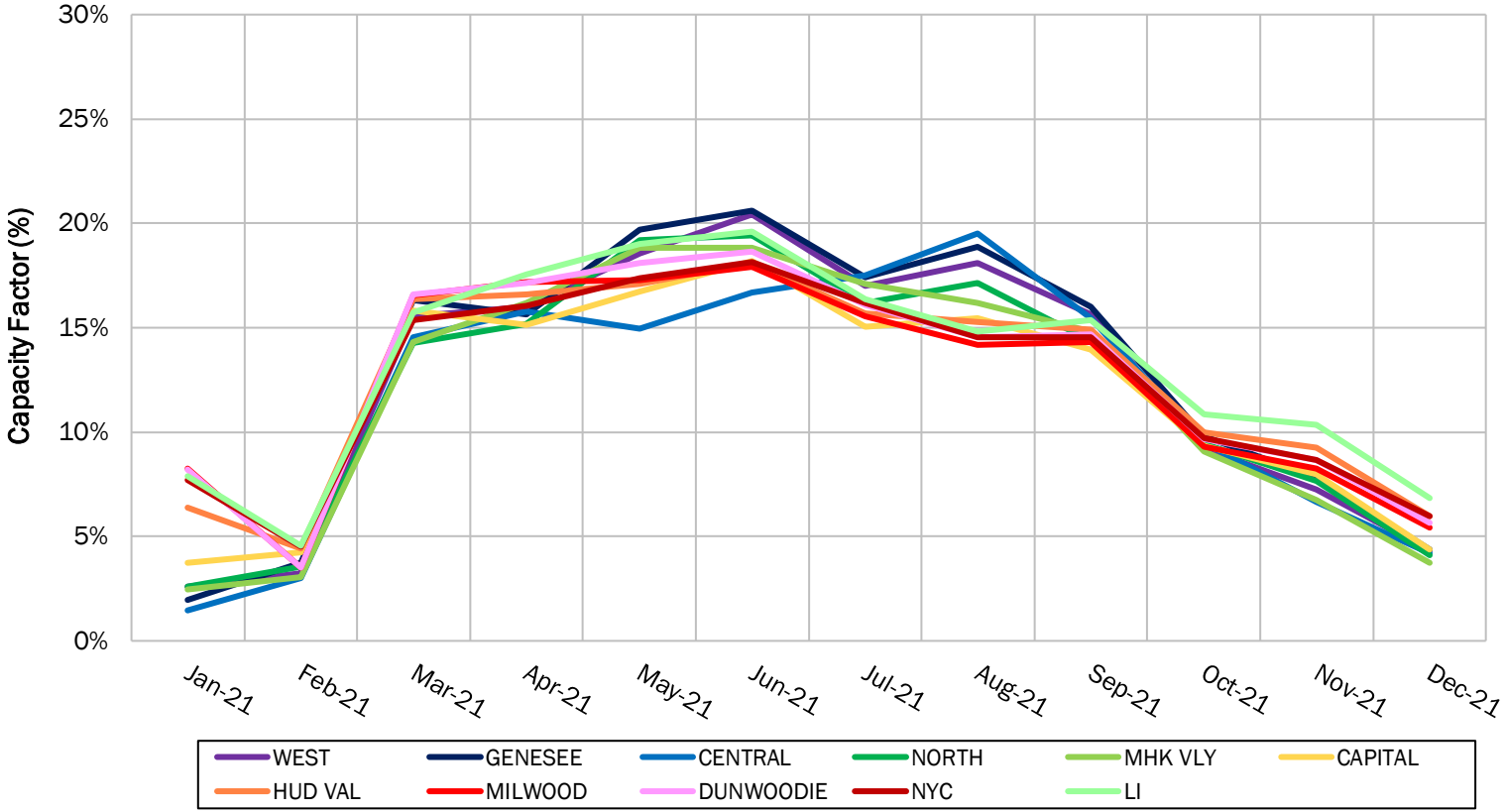
Monthly BTM Solar Capacity Factors by Zone



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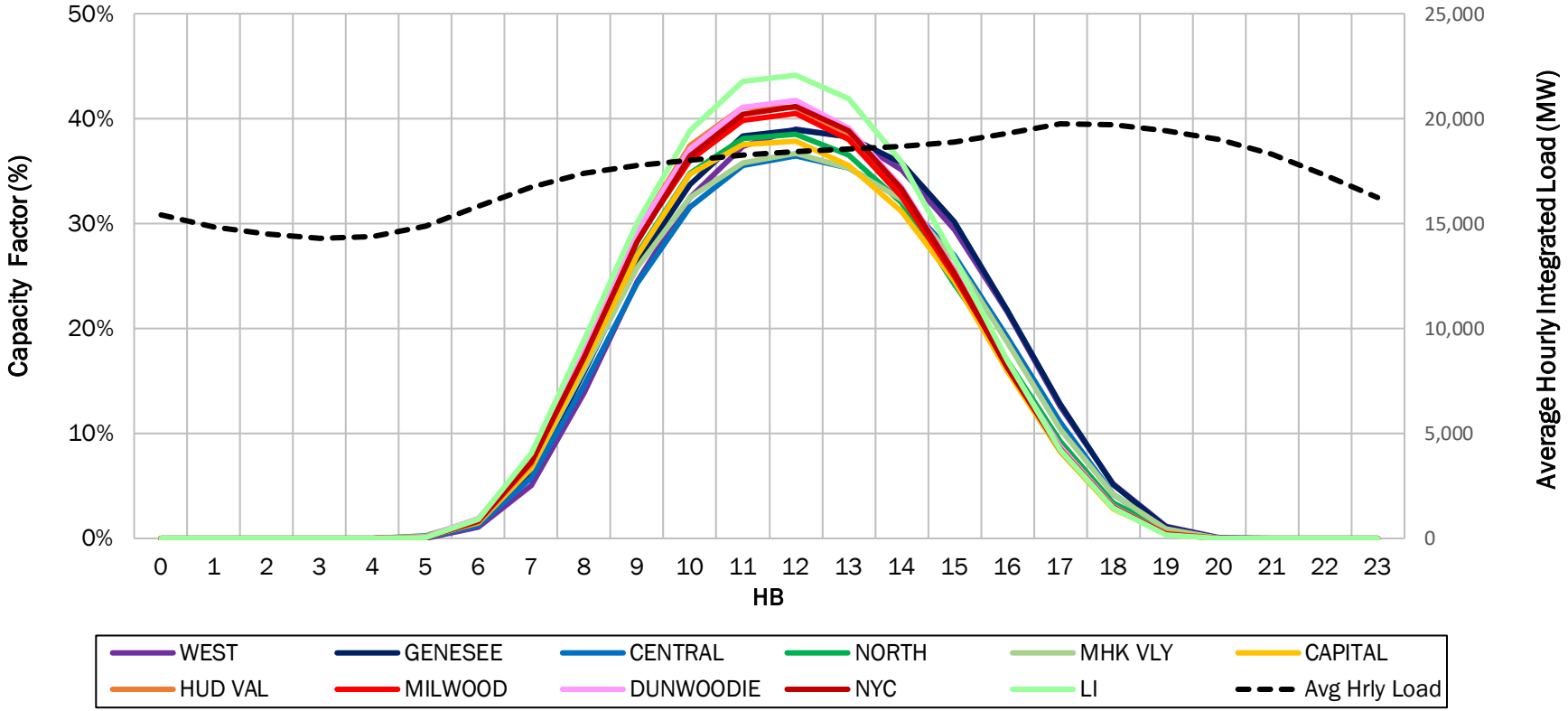
2021 Average Hourly BTM Solar Capacity Factors by Zone



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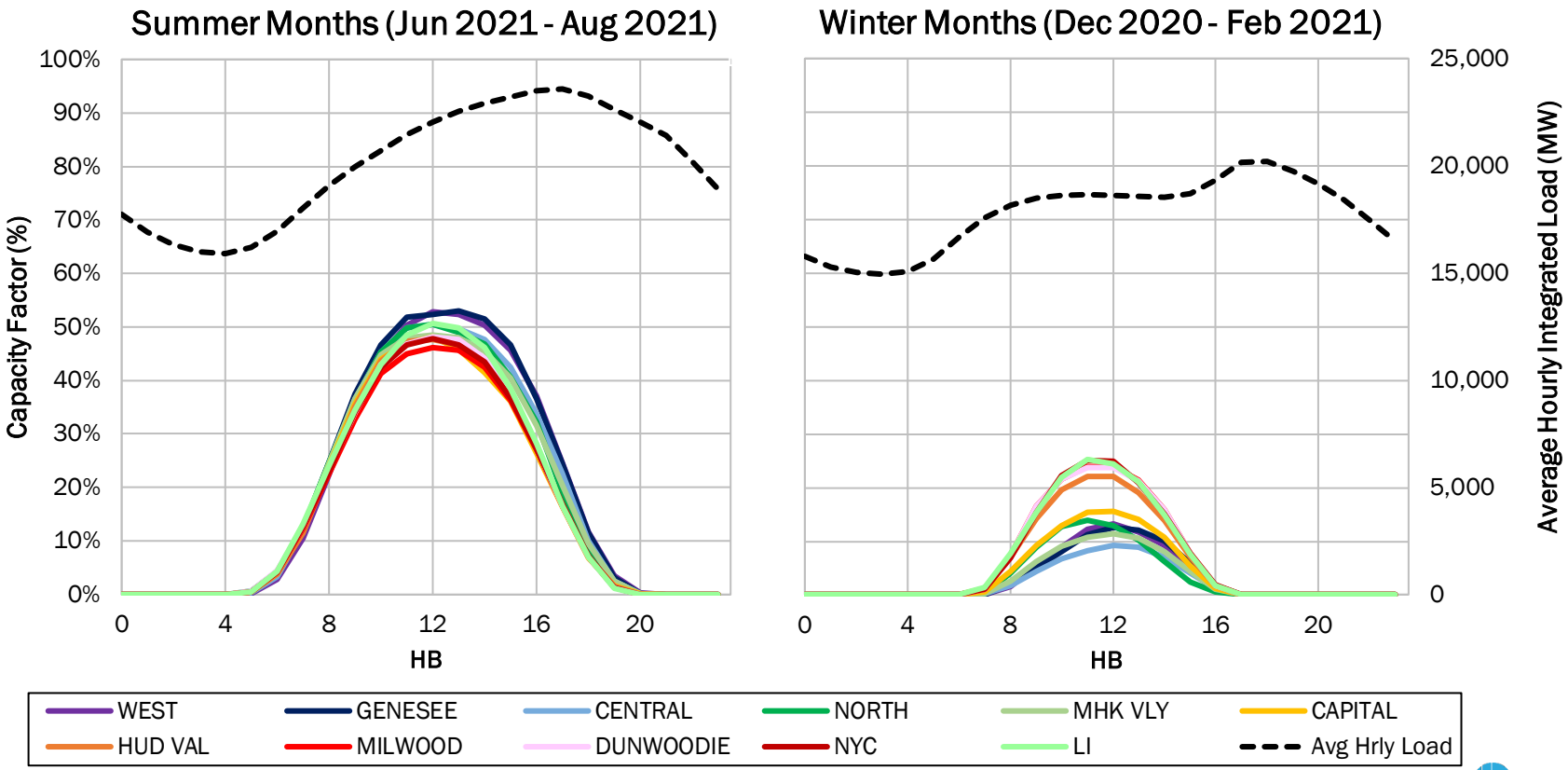
2021 Seasonal Average Hourly BTM Solar Capacity Factors by Zone



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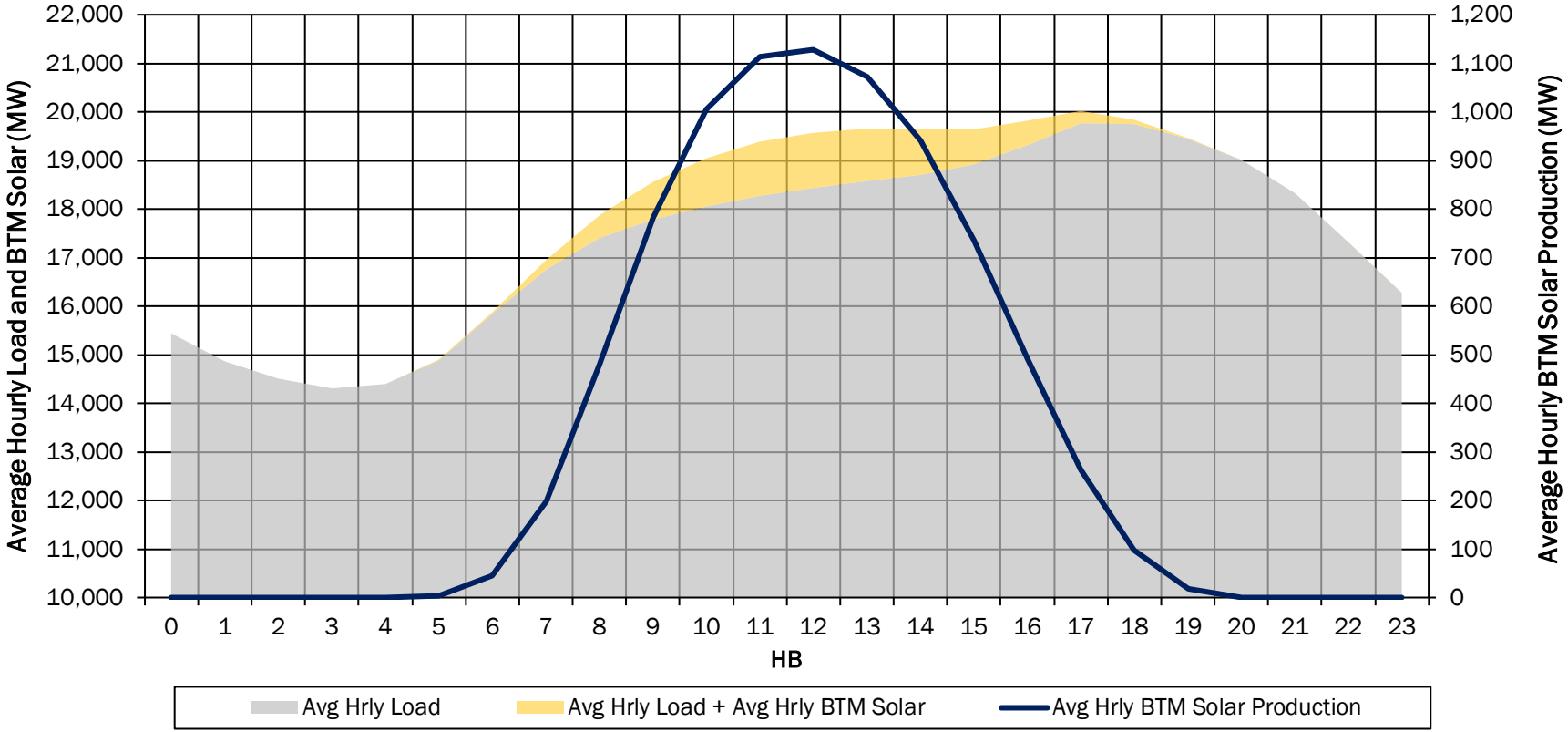
2021 Average Hourly Load with BTM Solar Production



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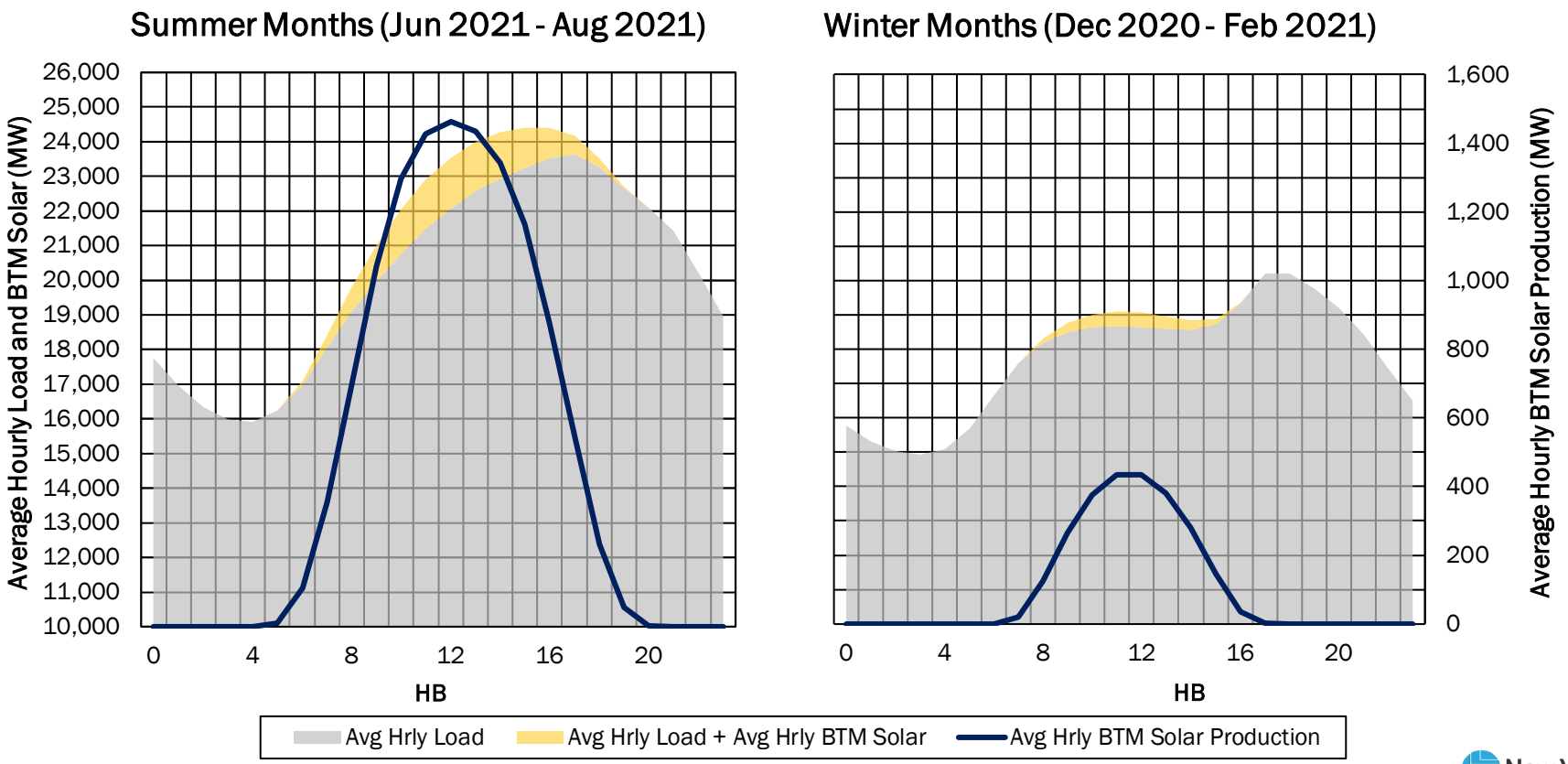
2021 Seasonal Average Hourly Load with BTM Solar Production



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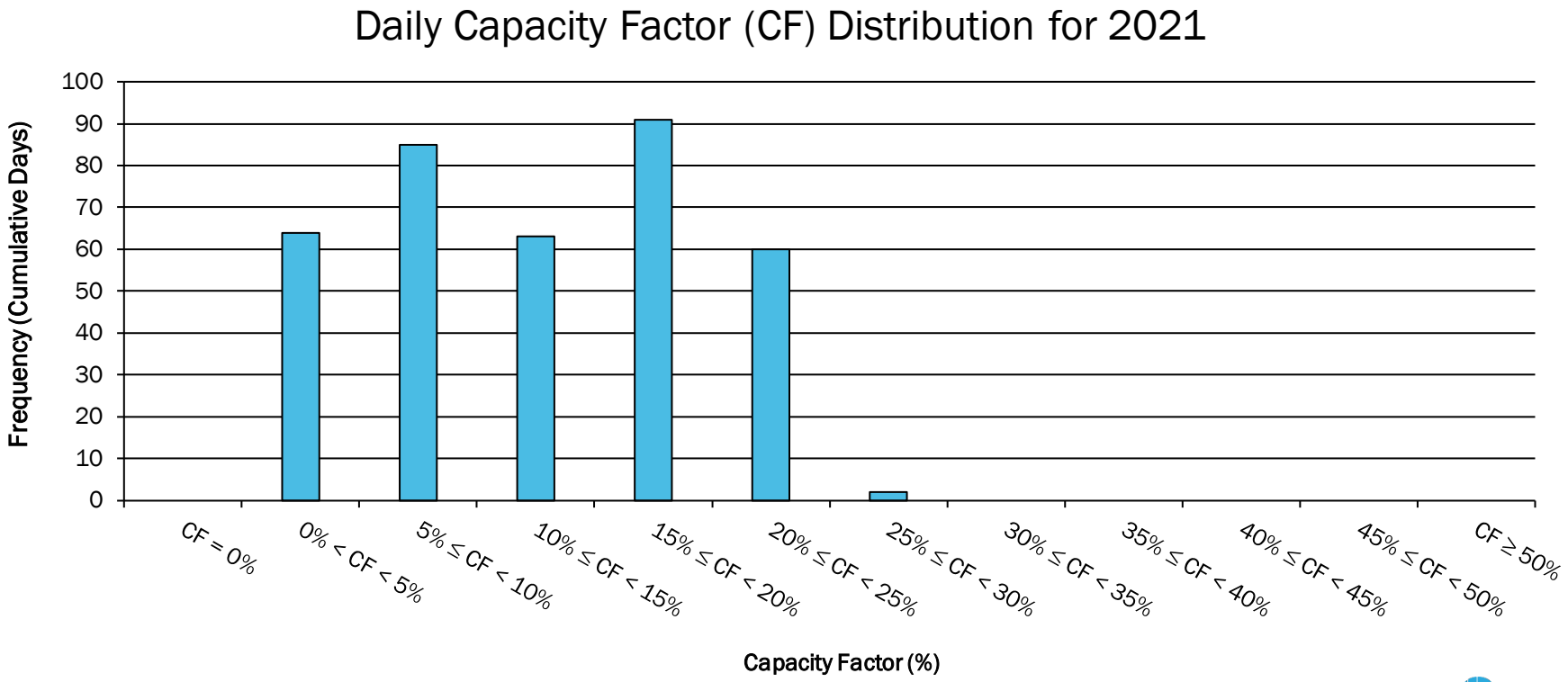
BTM Solar Capacity Factor Distribution



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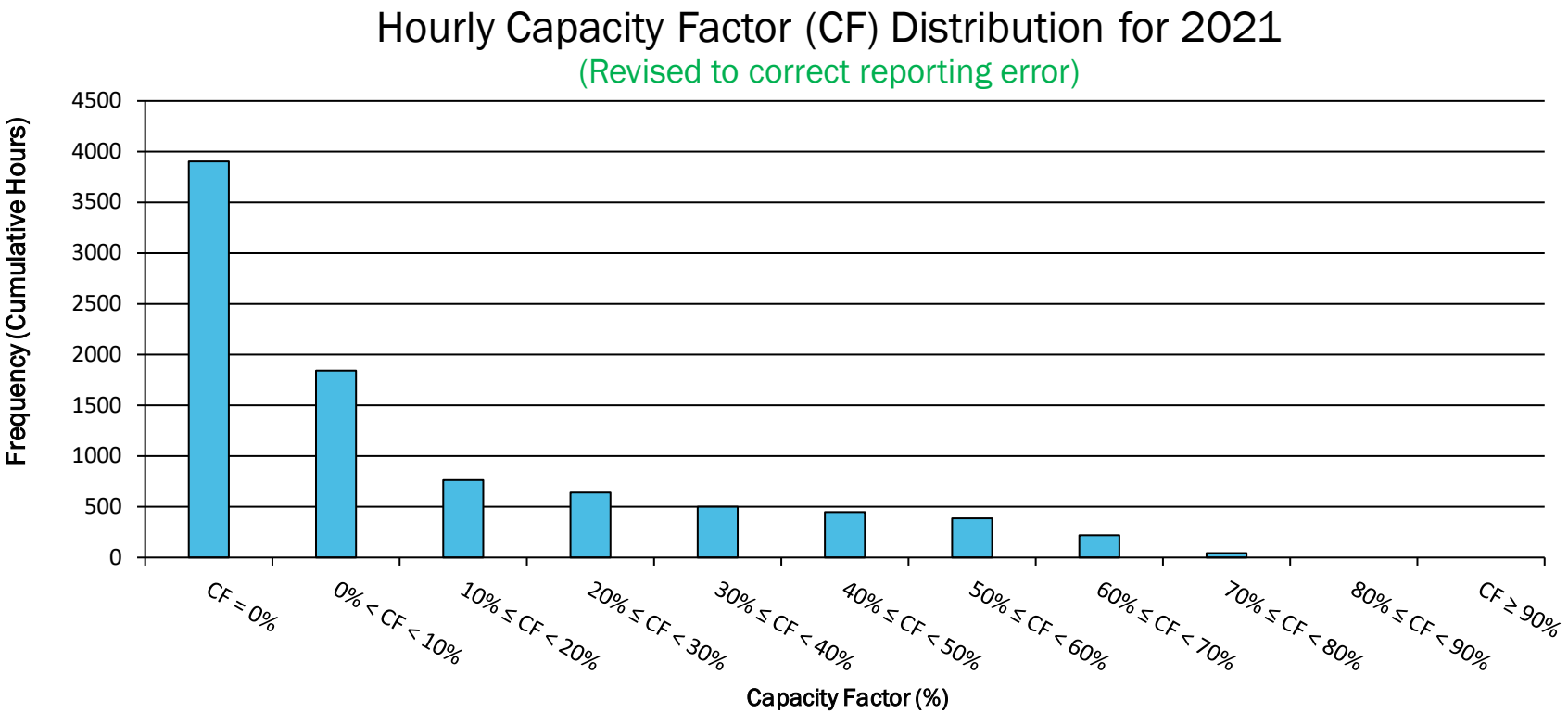
BTM Solar Capacity Factor Distribution



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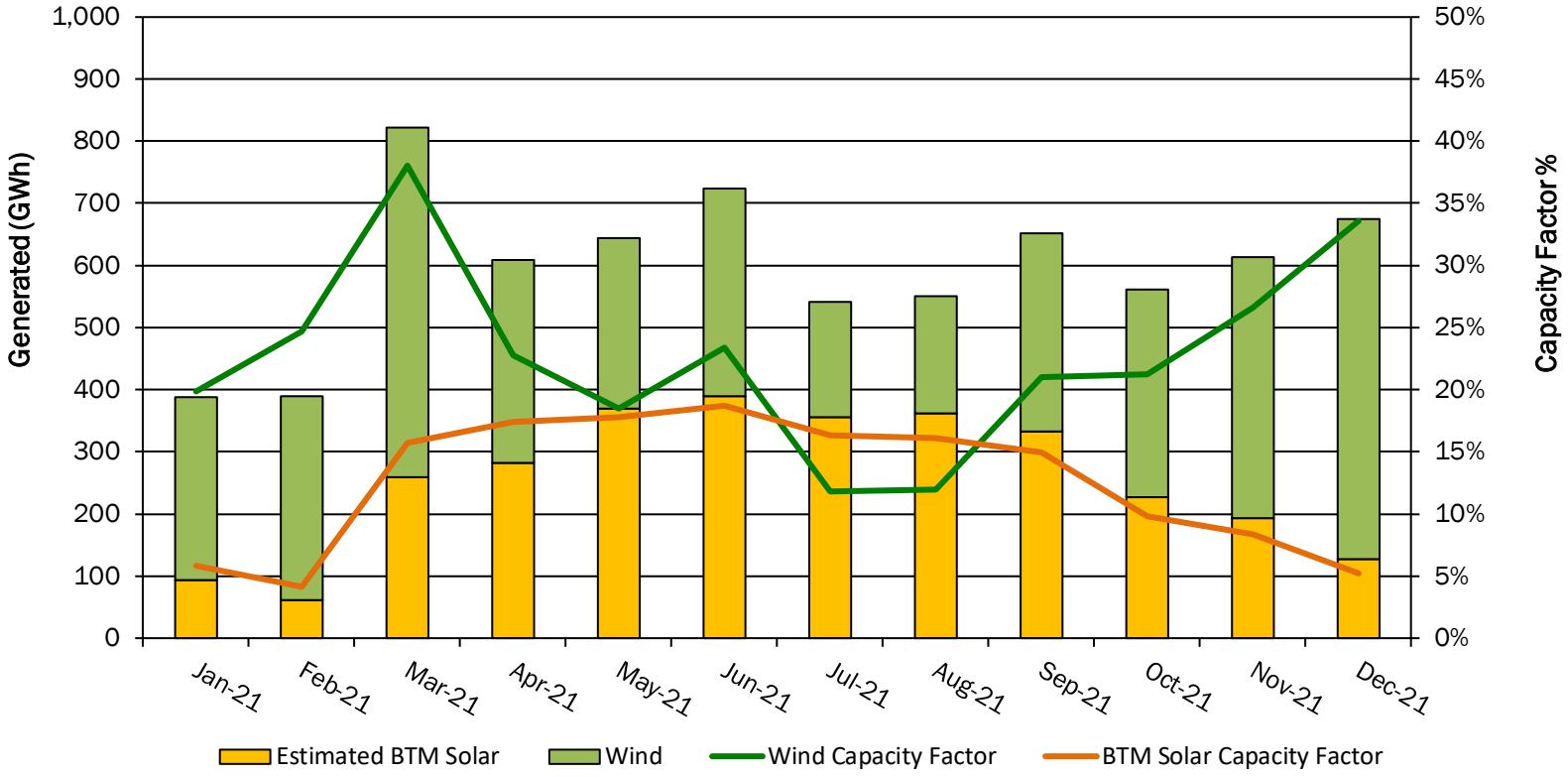
Coincident Wind and BTM Solar

Monthly Wind and BTM Solar Performance (2021)



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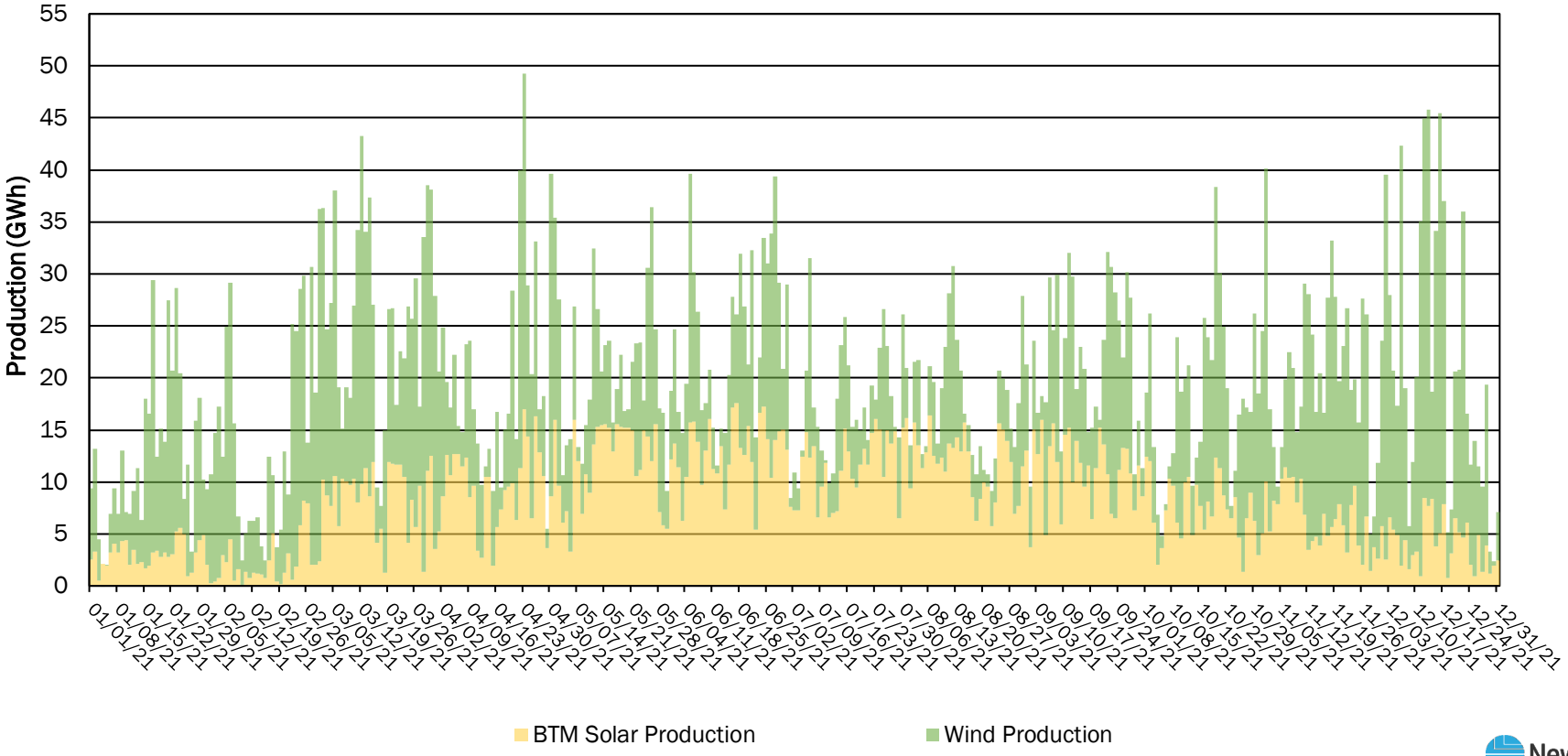
Daily Wind and BTM Solar Performance (2021)



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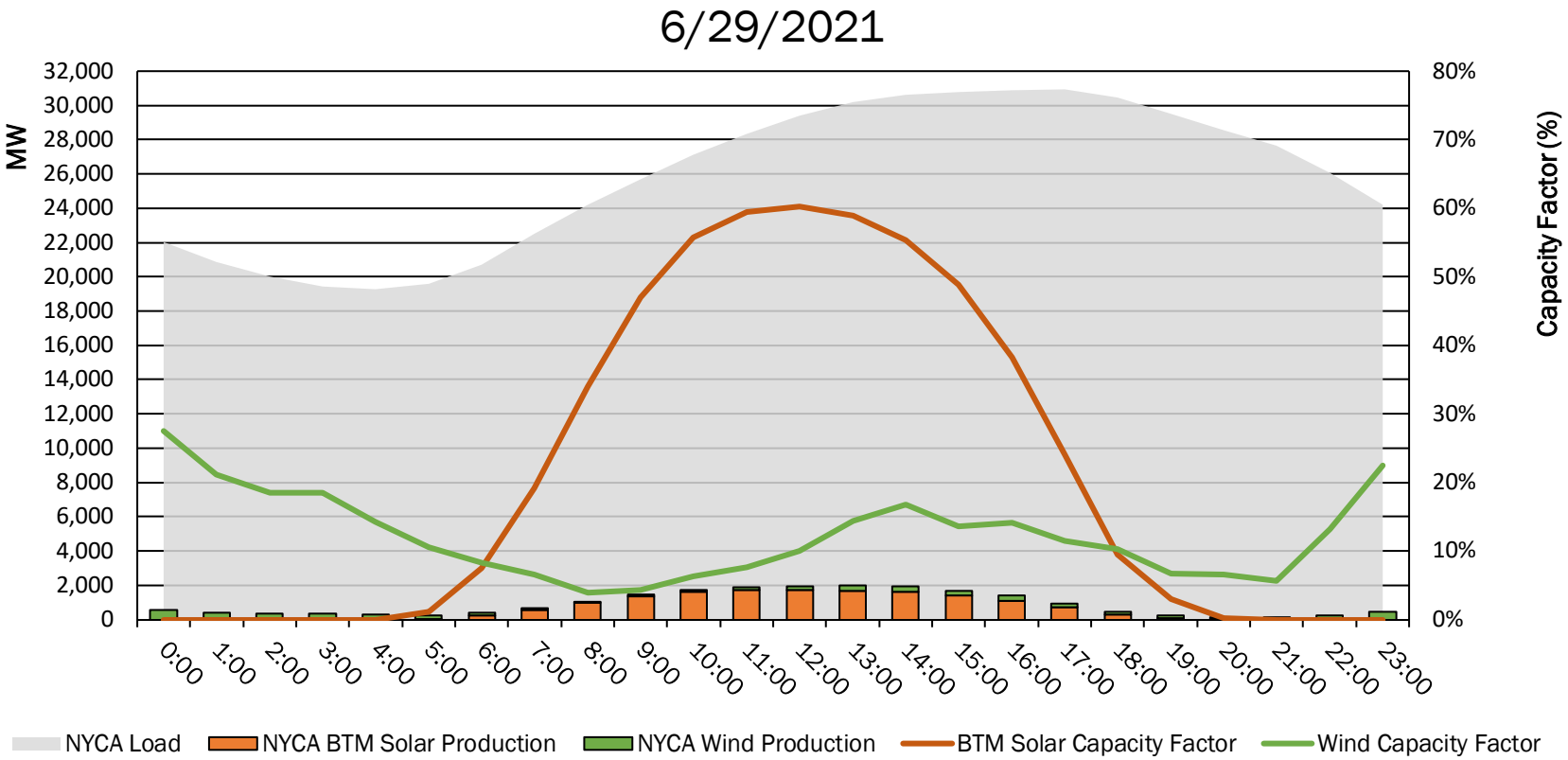
Wind and BTM Solar Performance During Summer Peak Load



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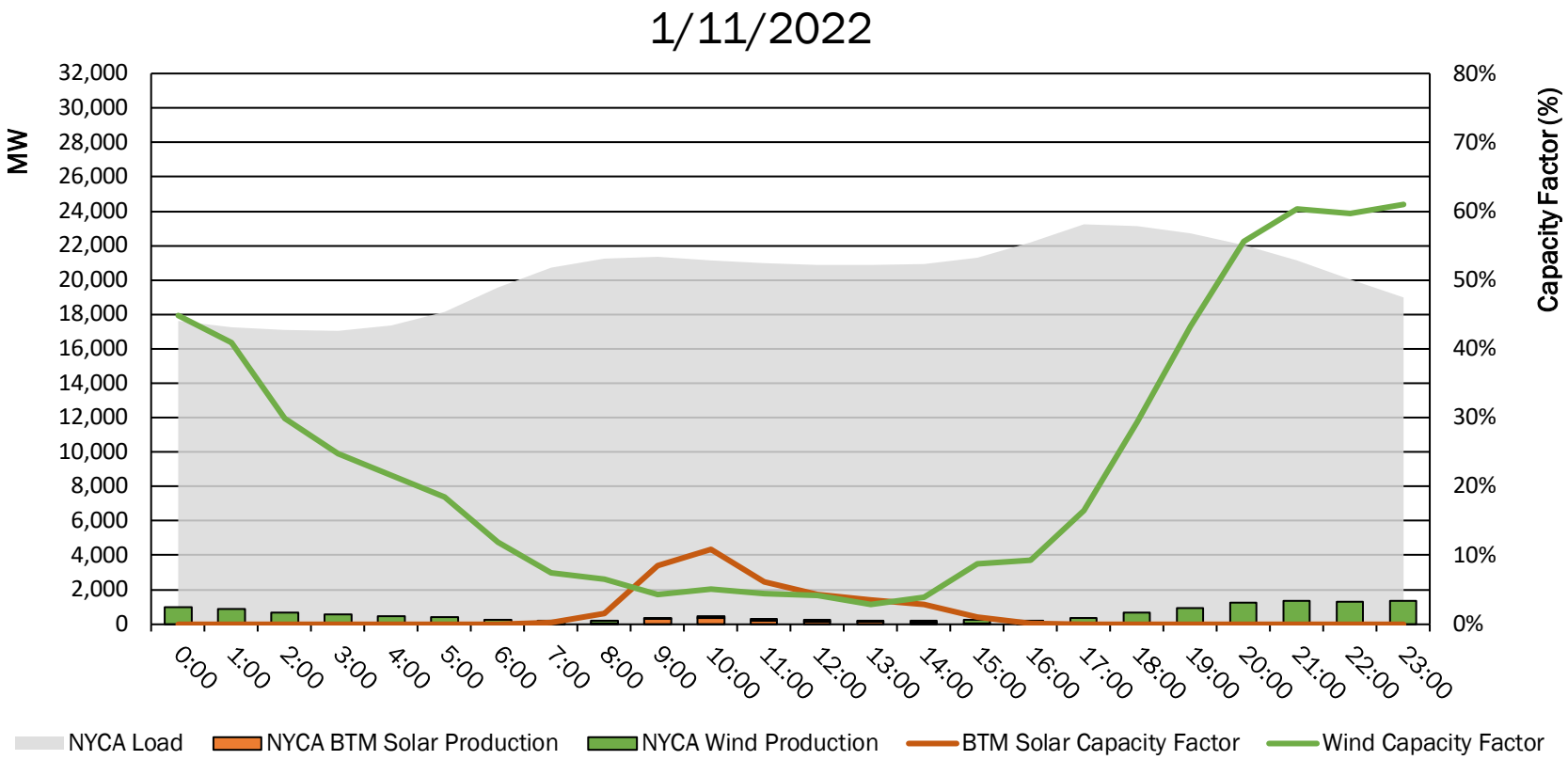
Wind and BTM Solar Performance During Winter Peak Load



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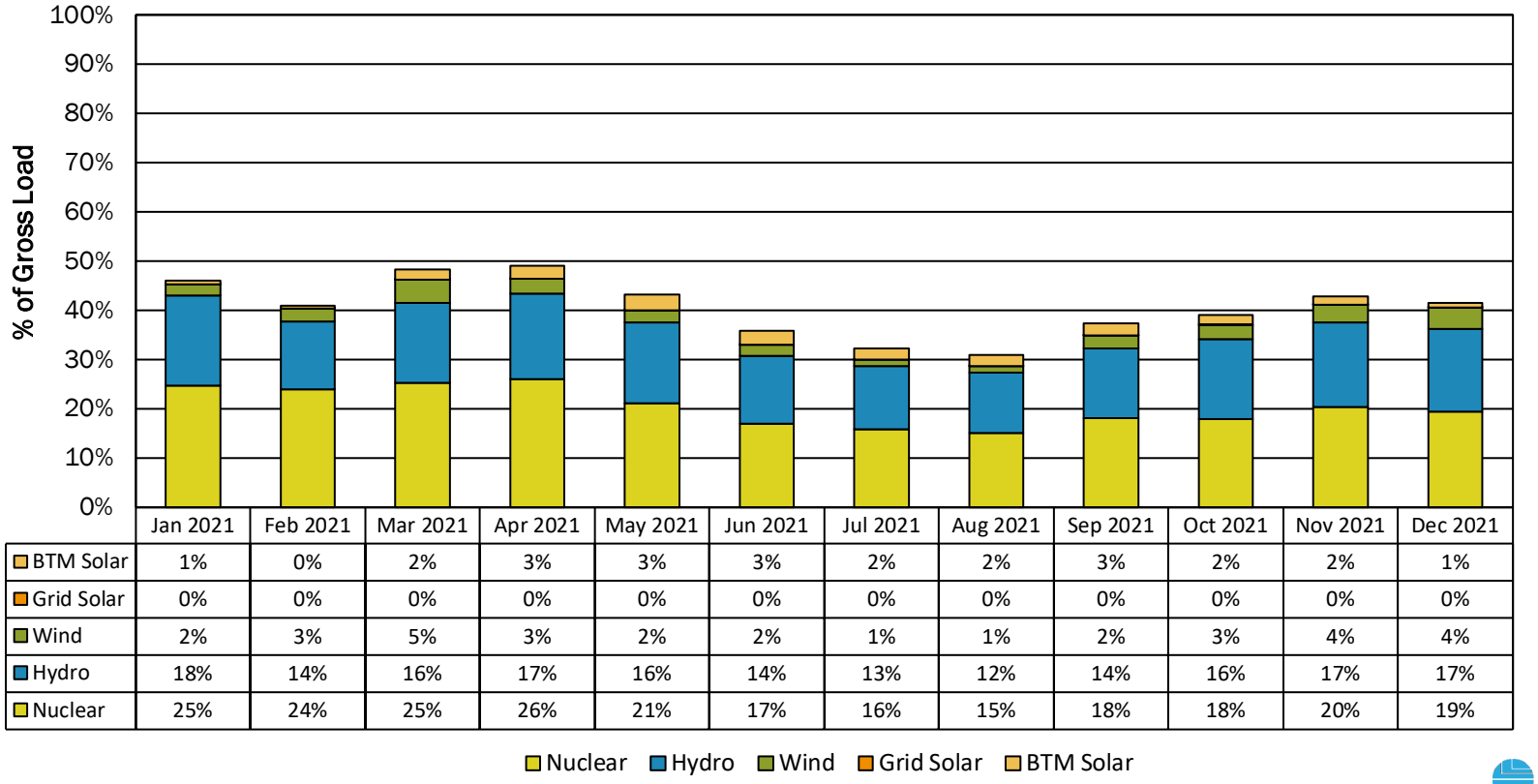
NYCA Emissions-Free Generation

Annual % Gross Load				
Nuclear	Hydro	Wind	Grid Solar	BTM Solar
20.12%	15.32%	2.66%	0.03%	1.95%



	Jan 2021	Feb 2021	Mar 2021	Apr 2021	May 2021	Jun 2021	Jul 2021	Aug 2021	Sep 2021	Oct 2021	Nov 2021	Dec 2021
BTM Solar	1%	0%	2%	3%	3%	3%	2%	2%	3%	2%	2%	1%
Grid Solar	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Wind	2%	3%	5%	3%	2%	2%	1%	1%	2%	3%	4%	4%
Hydro	18%	14%	16%	17%	16%	14%	13%	12%	14%	16%	17%	17%
Nuclear	25%	24%	25%	26%	21%	17%	16%	15%	18%	18%	20%	19%

New York ISO

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

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