

NY Renewables – Overview and YTD Operation

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

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MIWG

03/19/2021, Rensselaer, NY

Agenda

- Overview of NY Wind
- Economic Wind Curtailment Statistics
- Overview of NY BTM Solar
- Questions
- **Appendix**

Background on Metrics

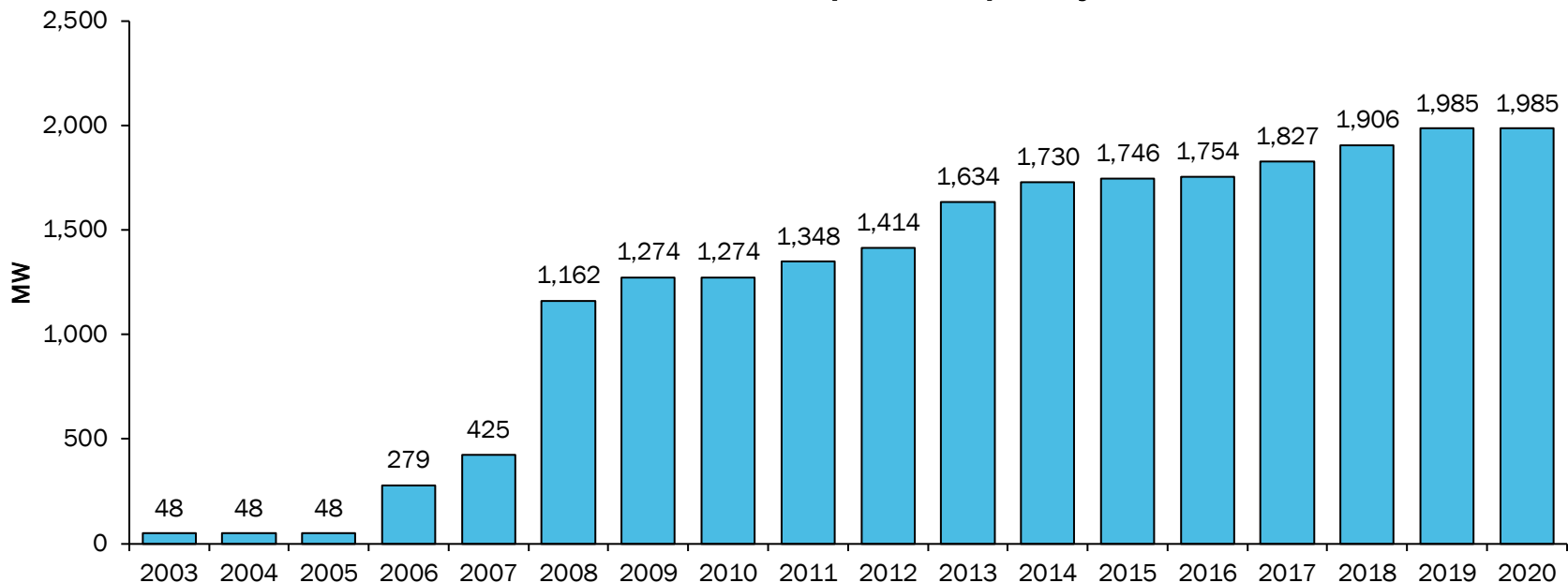
- Unless otherwise stated, Wind data accounts for all wind plants installed in the NYCA.
- Unless otherwise stated, Wind and Solar Capacity Factors are inclusive of ALL hours in 2020 and do not adjust for periods of resource outages or derates.
- Behind-the-meter (BTM) Solar production and capacity factors 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 solar production.
- All BTM solar production is measured in DC (direct current).
- Capacity Factors are calculated as follows:

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

NYCA Wind 2020

Overview

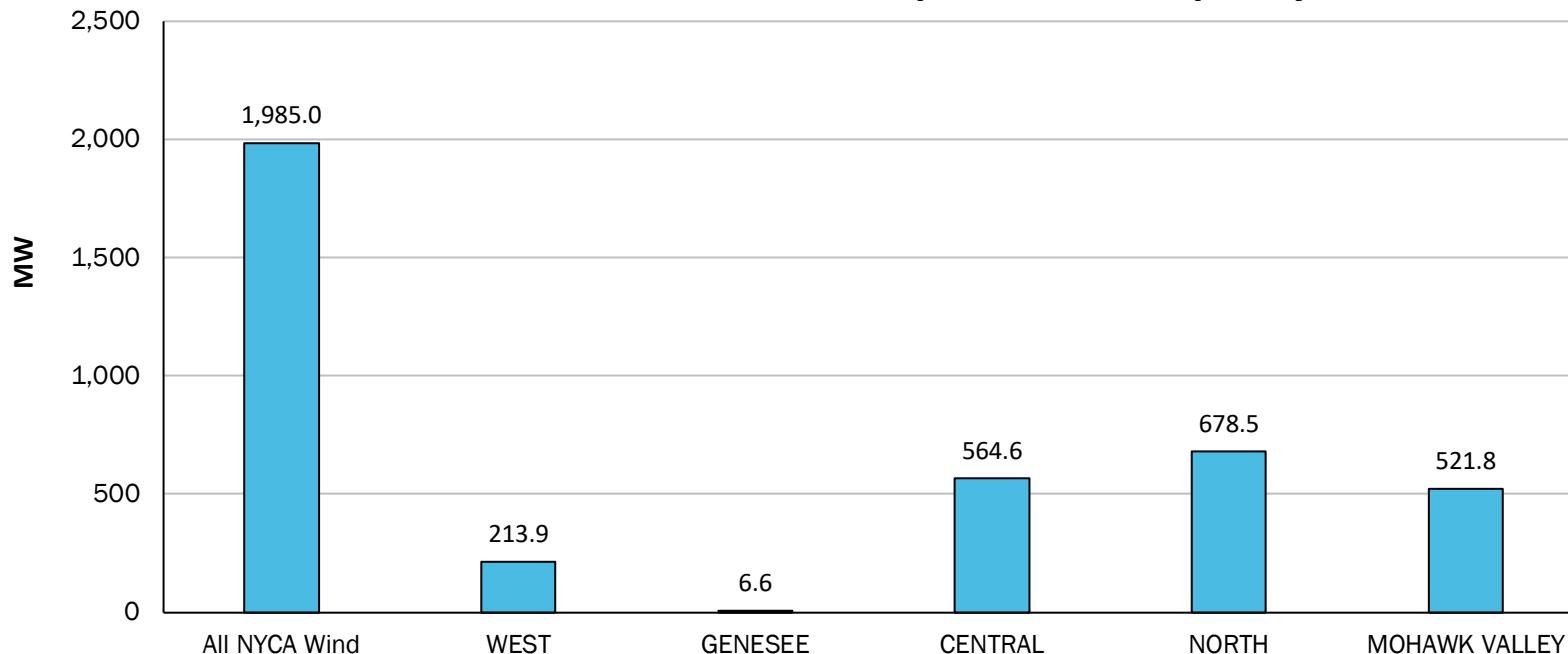
NYCA Wind Nameplate Capacity



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Zonal Wind Capacity

2020 EOY Installed Nameplate Wind Capacity

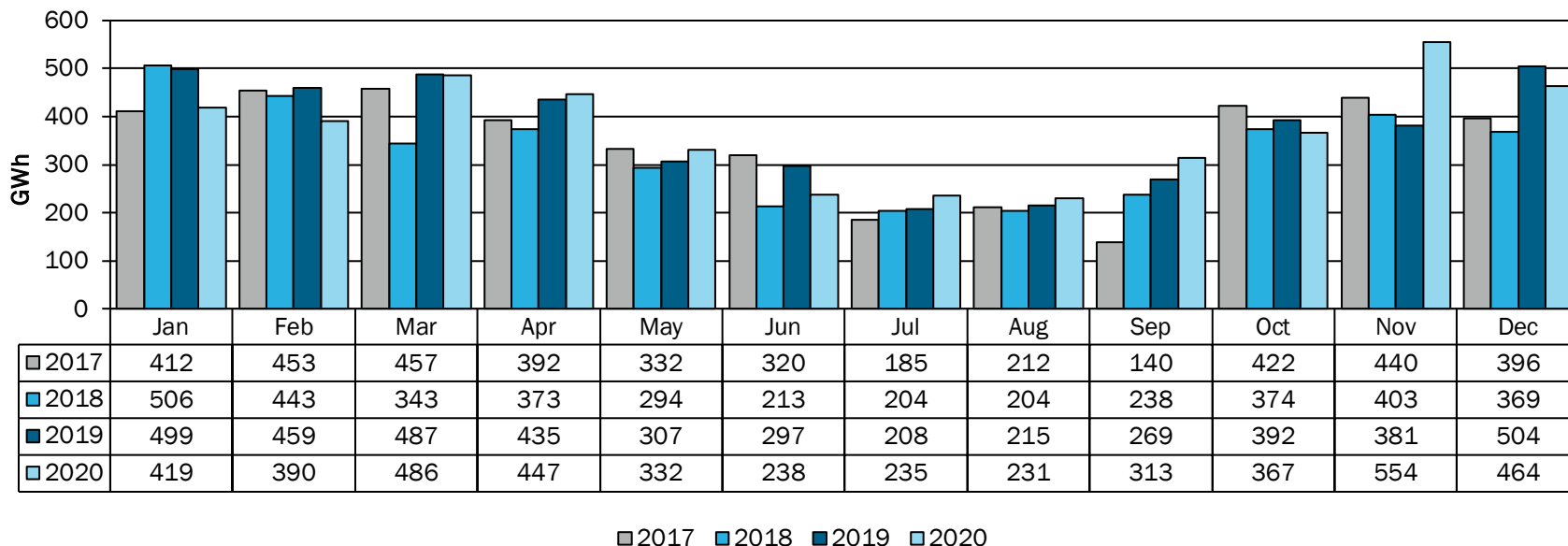


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NY Wind Generation

Total Annual Wind Production (GWh)			
2017	2018	2019	2020
4,162	3,965	4,453	4,476

NYCA Wind Plants - Monthly Production

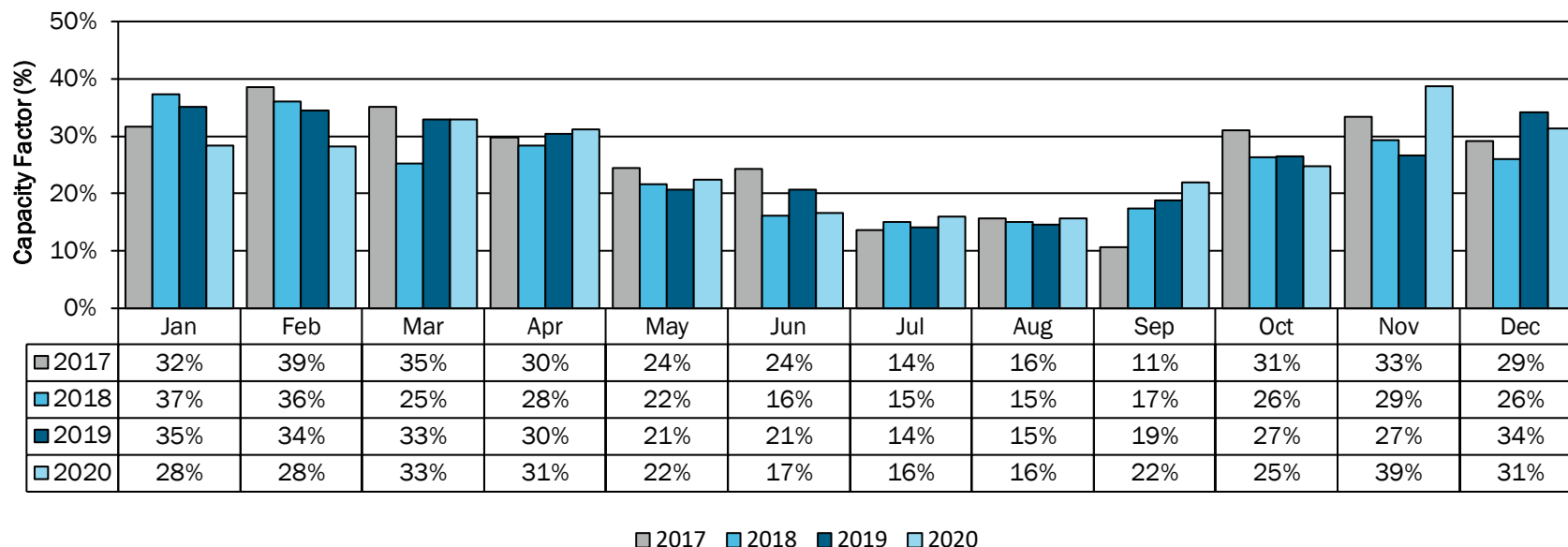


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NY Wind Capacity Factors

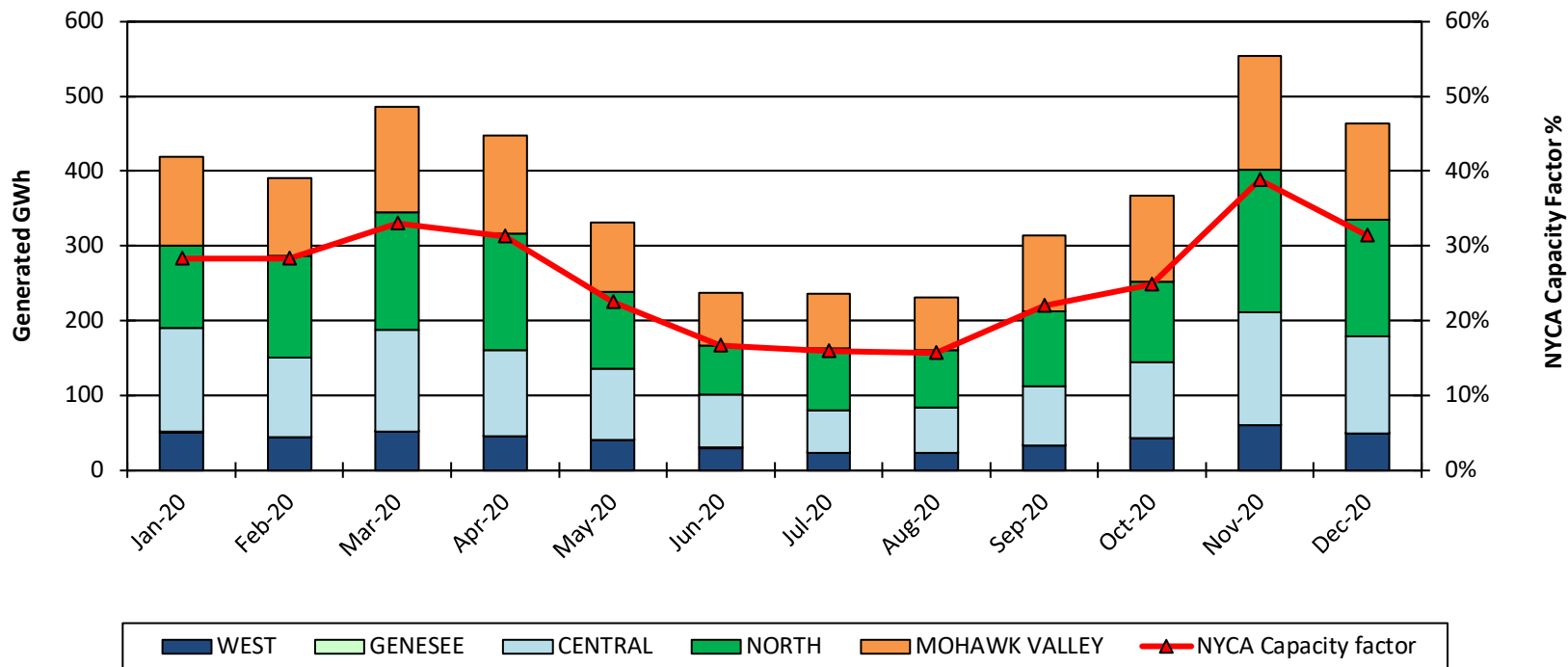
Annual Wind Capacity Factor			
2017	2018	2019	2020
26%	24%	26%	26%

NYCA Wind Generation – Monthly Capacity Factor



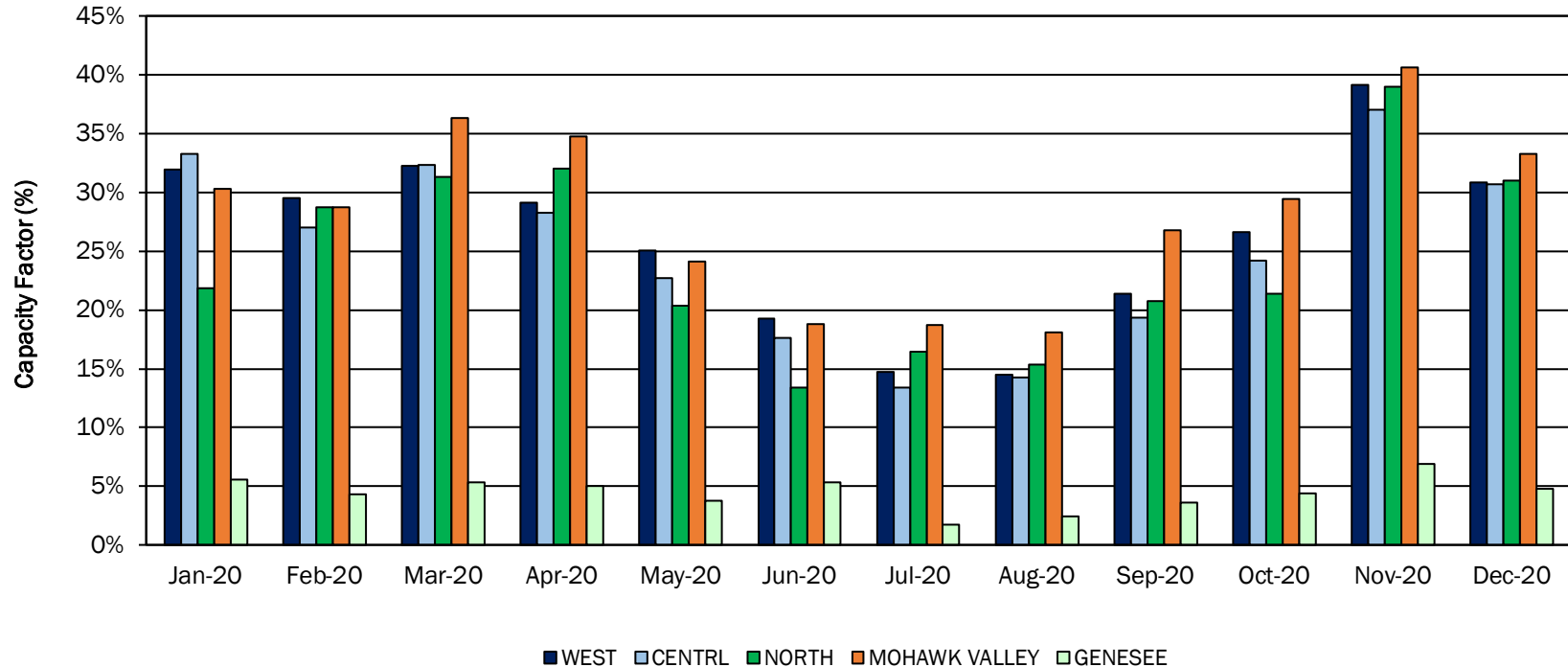
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Monthly Wind Production by Zone



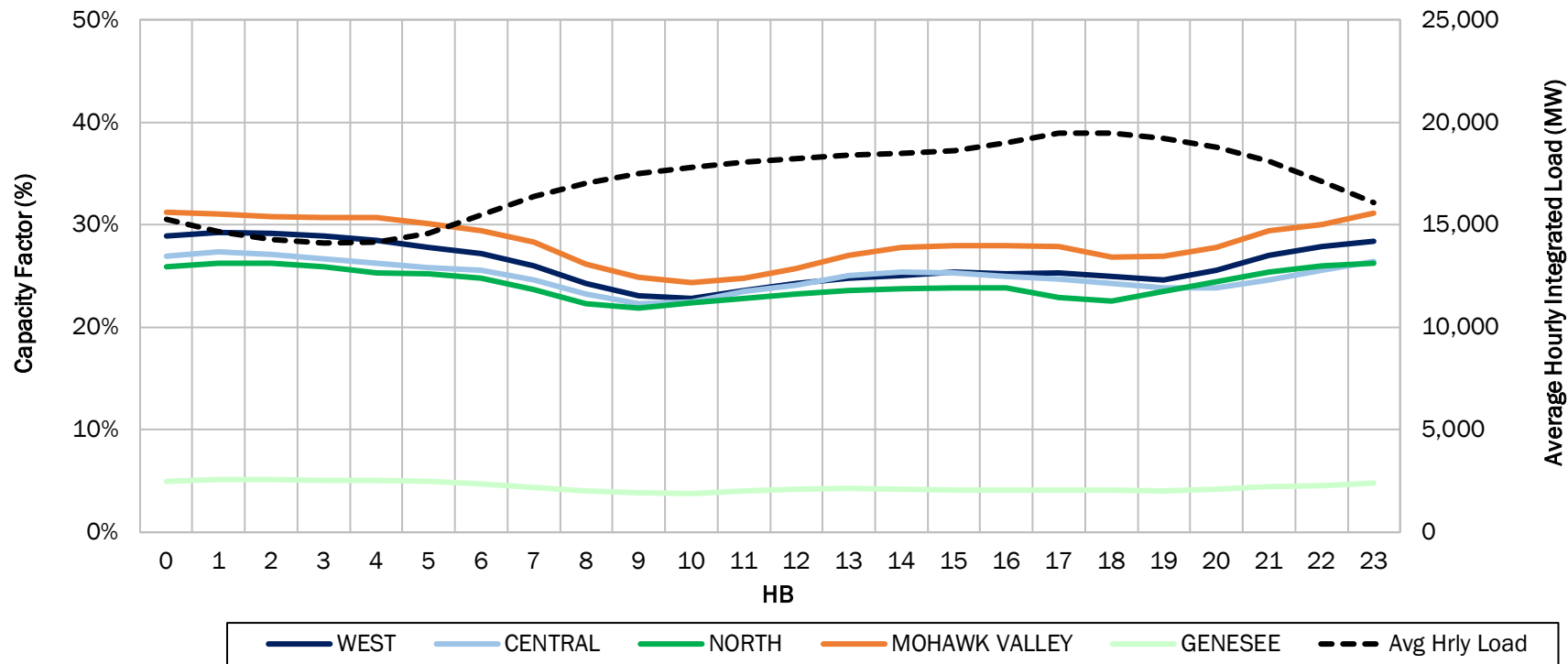
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Monthly Wind Capacity Factors by Zone



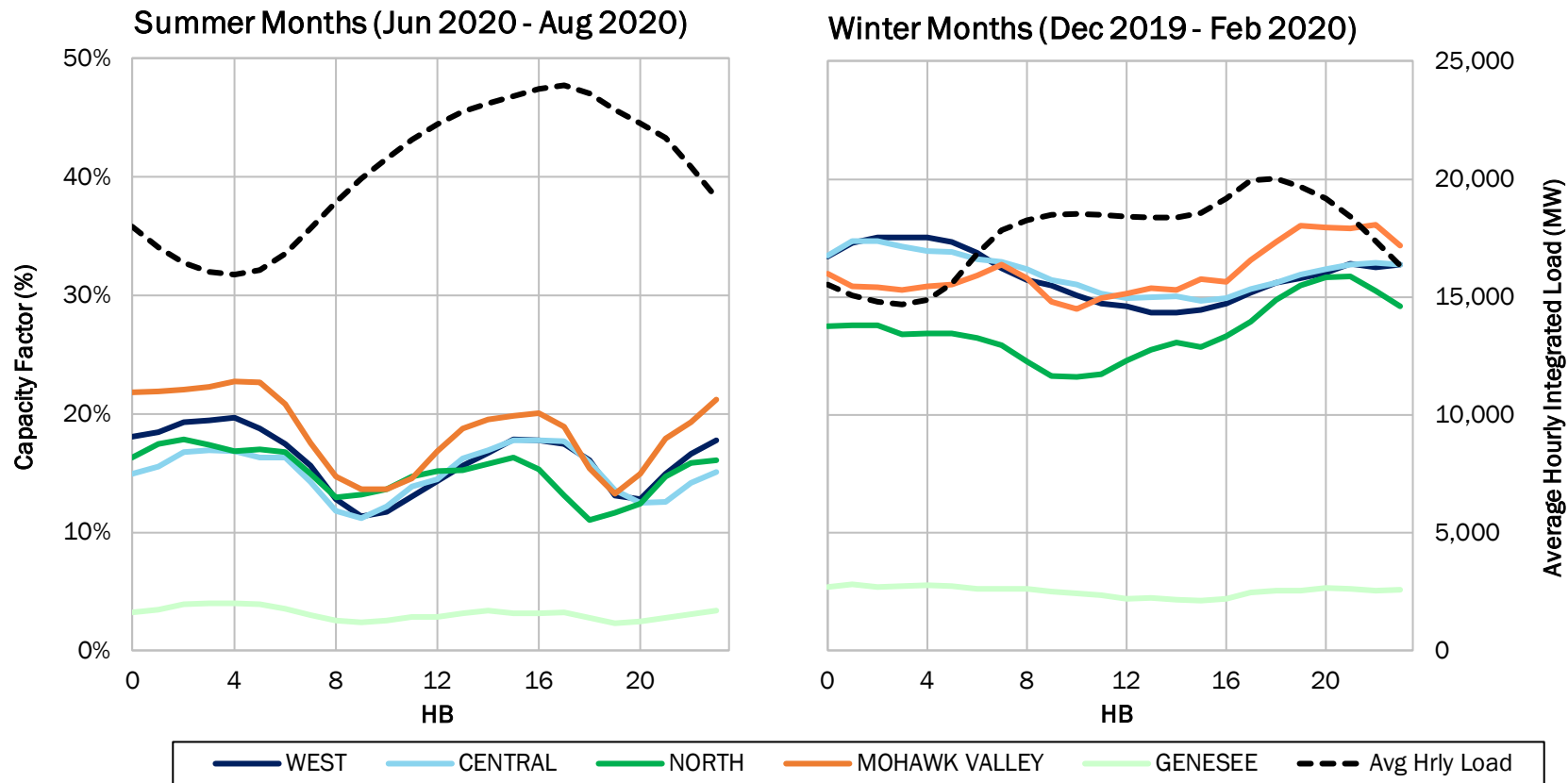
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2020 Average Hourly Wind Capacity Factors by Zone



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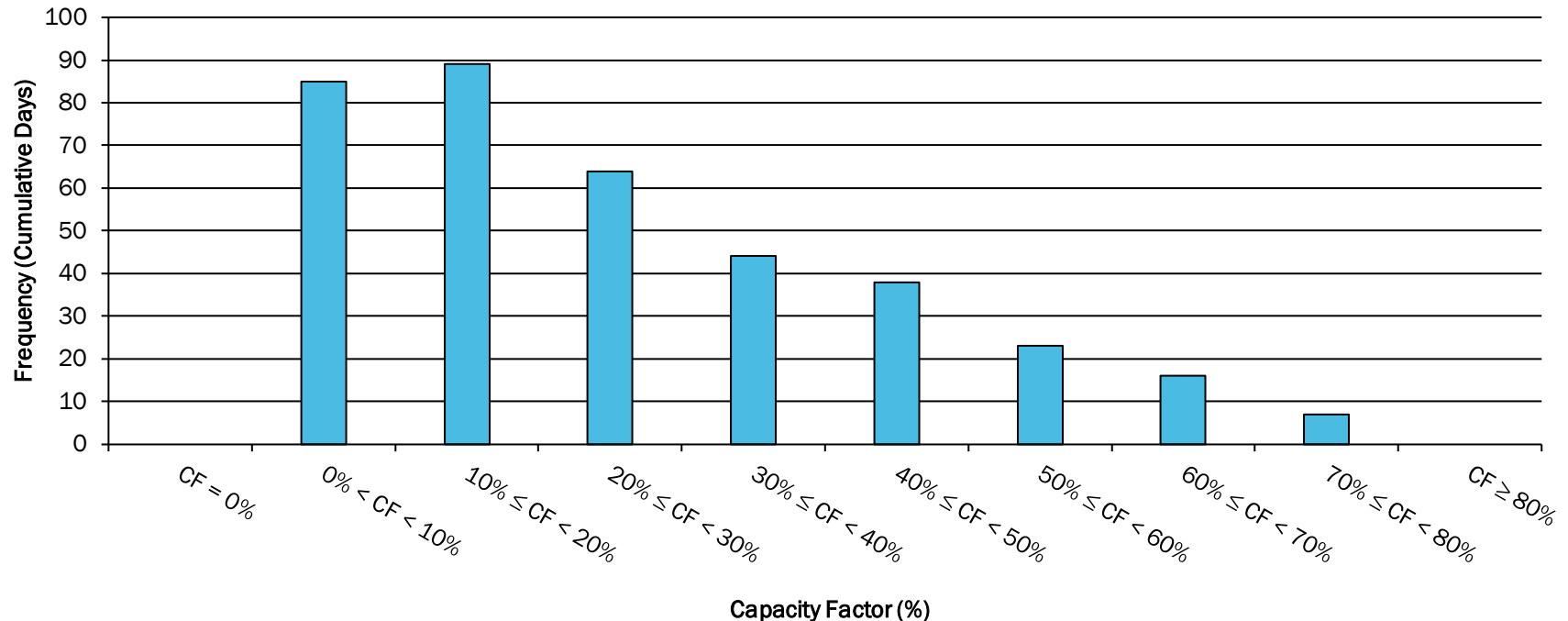
2020 Seasonal Average Hourly Wind Capacity Factors by Zone



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2020 NY Wind Capacity Factor Distribution

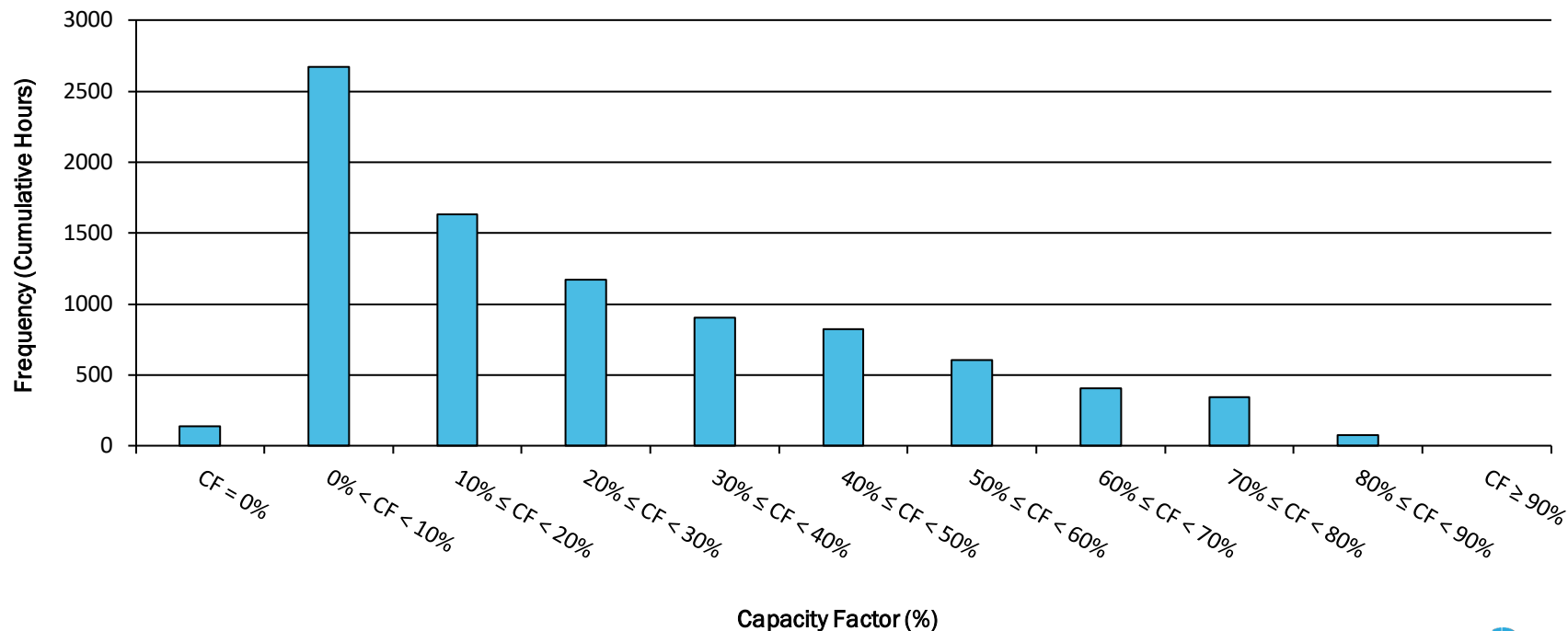
Daily Capacity Factor (CF) Distribution for 2020



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2020 NY Wind Capacity Factor Distribution

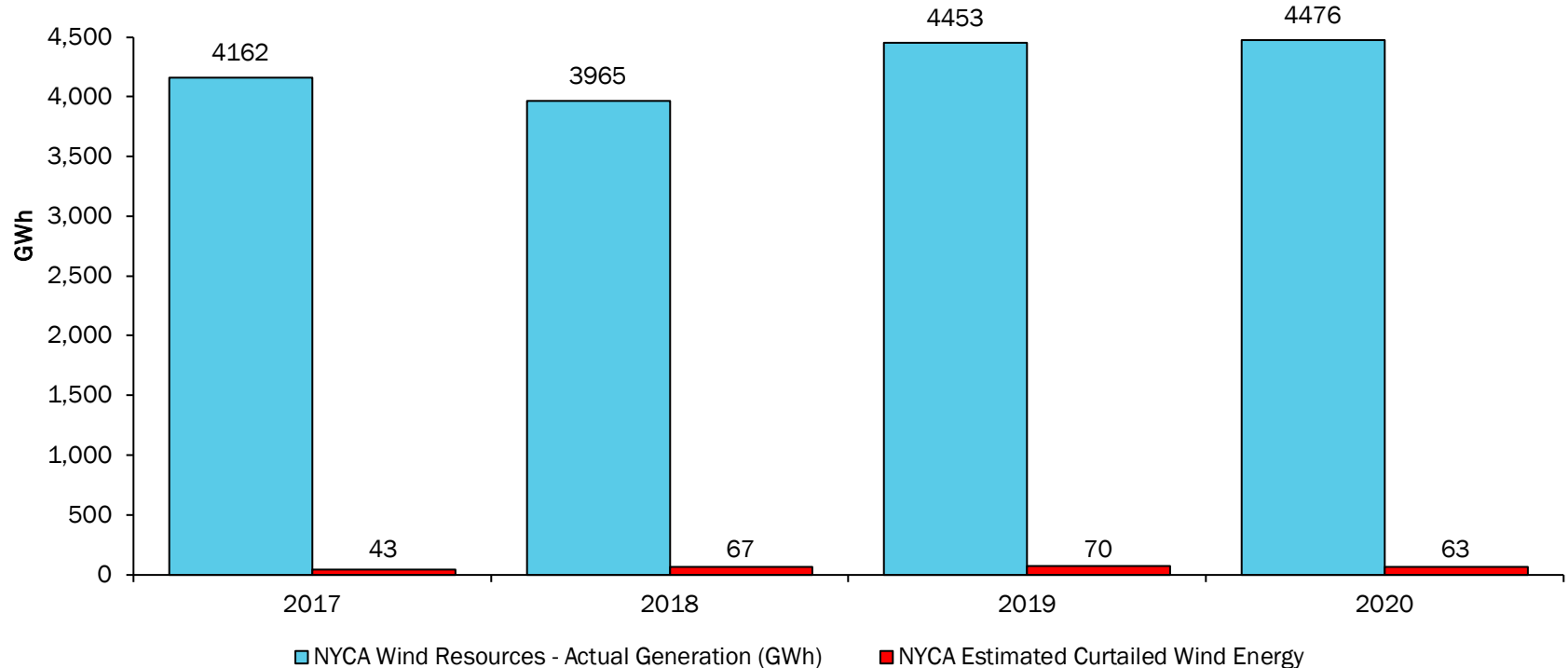
Hourly Capacity Factor (CF) Distribution for 2020



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NY Economic Wind Curtailments

NYCA Wind Plants - Annual Production & Economic Curtailments

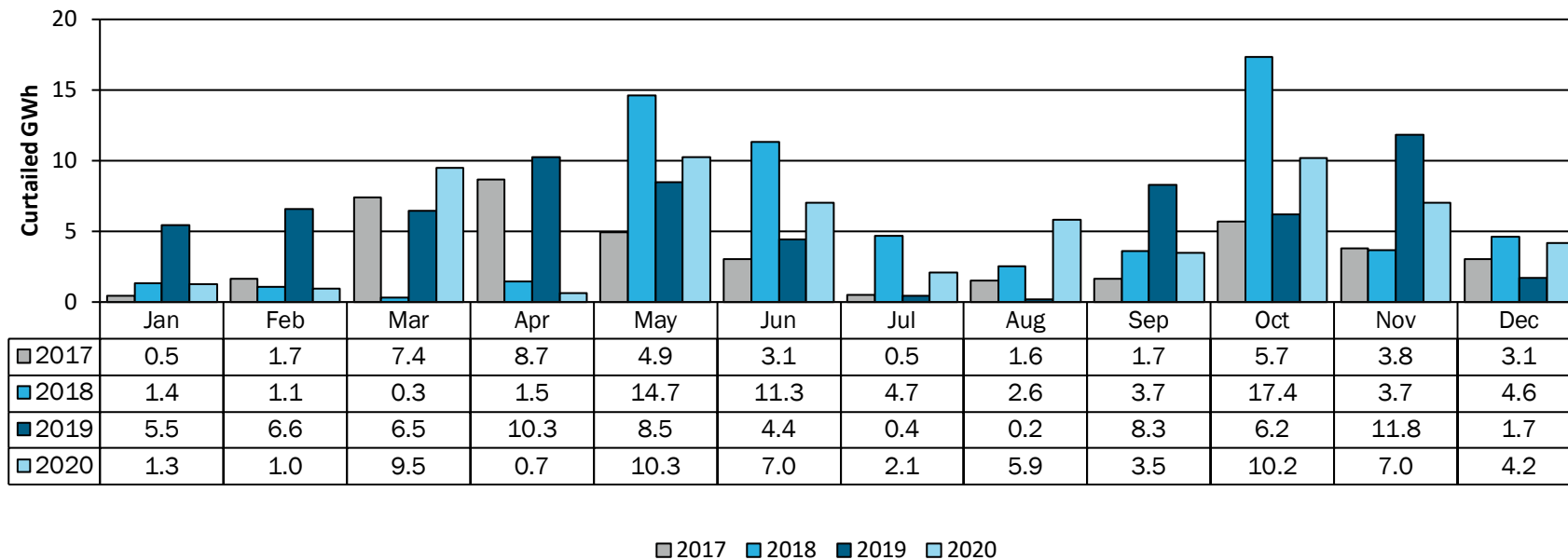


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NY Economic Wind Curtailments

Total Annual Wind Curtailments (GWh)			
2017	2018	2019	2020
42.6	66.9	70.5	62.7

NYCA Wind Plants - Monthly Estimated Curtailed Energy

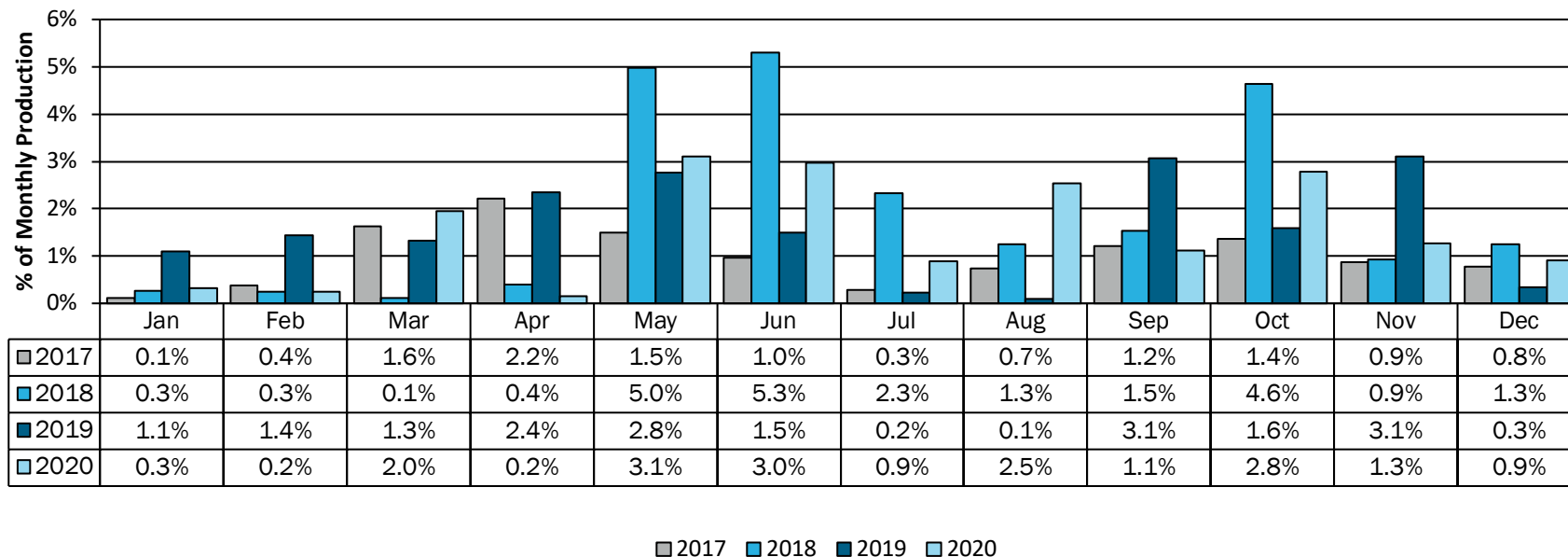


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NY Economic Wind Curtailments

Total Estimated Curtailed Energy %			
2017	2018	2019	2020
1.0%	1.7%	1.6%	1.4%

NYCA Wind Plants - Monthly Estimated Curtailed Energy %



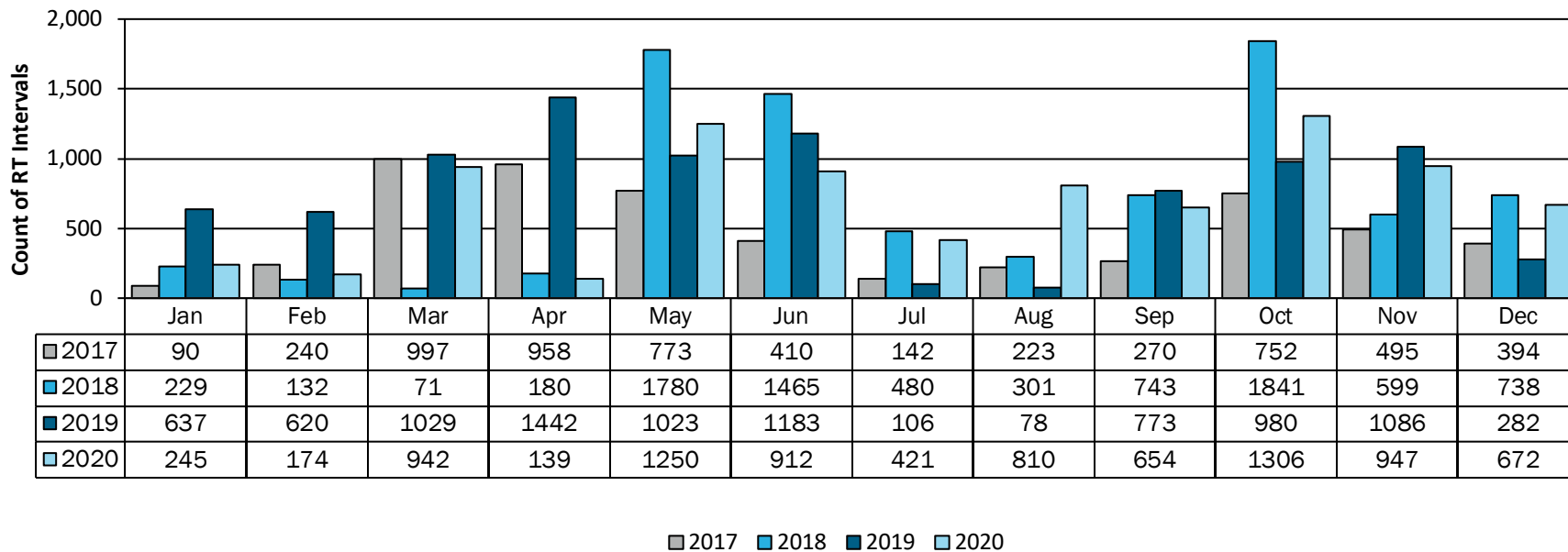
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NY Economic Wind Curtailments

Total Estimated Curtailed Interval Count			
2017	2018	2019	2020
5,744	8,559	9,239	8,472

NYCA Wind Plants - Monthly Estimated Curtailed Interval Count

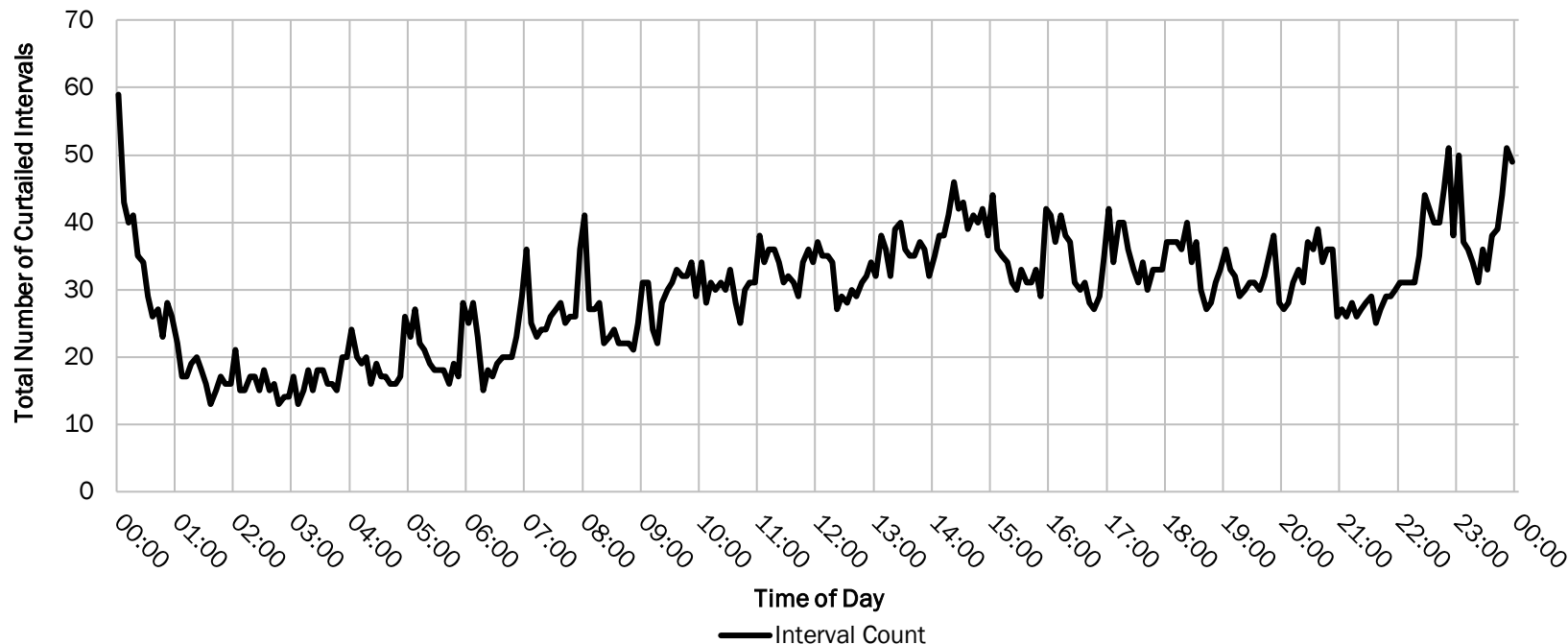
(12 Intervals = 1 Hour)



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NY Economic Wind Curtailments

Interval Count of Curtailments by Time of Day (all of 2020)

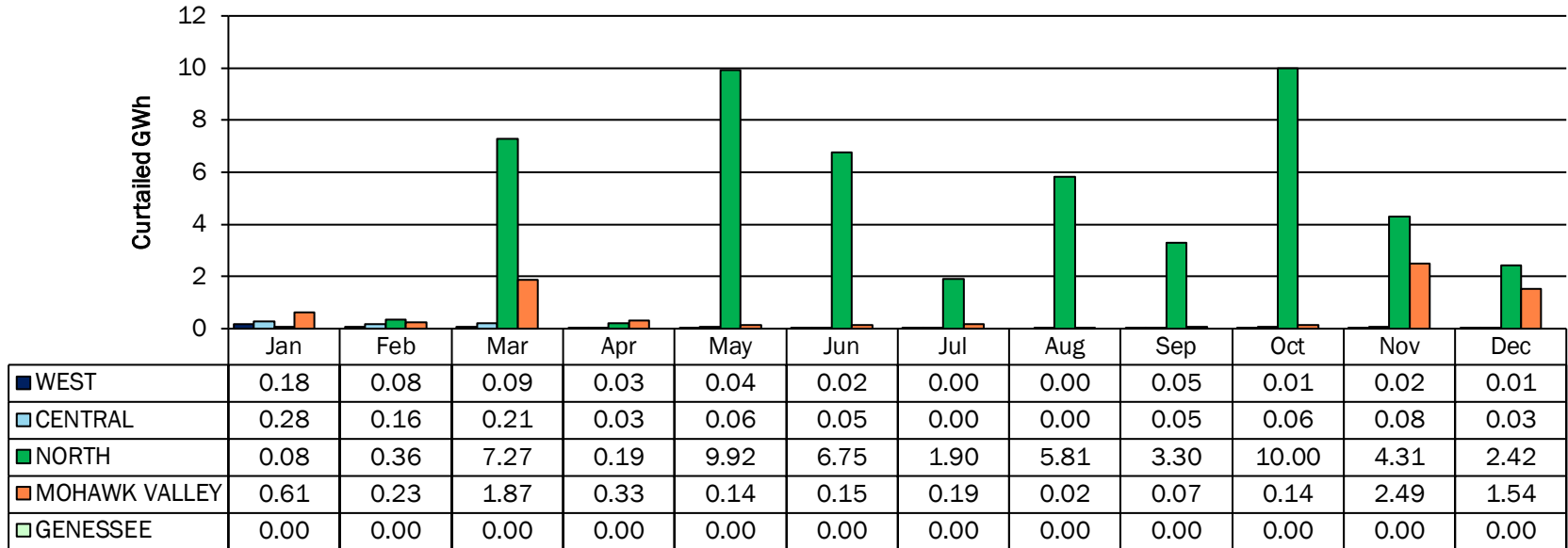


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NY Economic Wind Curtailments

Total Annual Estimated Curtailed Energy (GWh)			
West	Central	North	Mohawk Valley
0.52	1.01	52.31	7.79

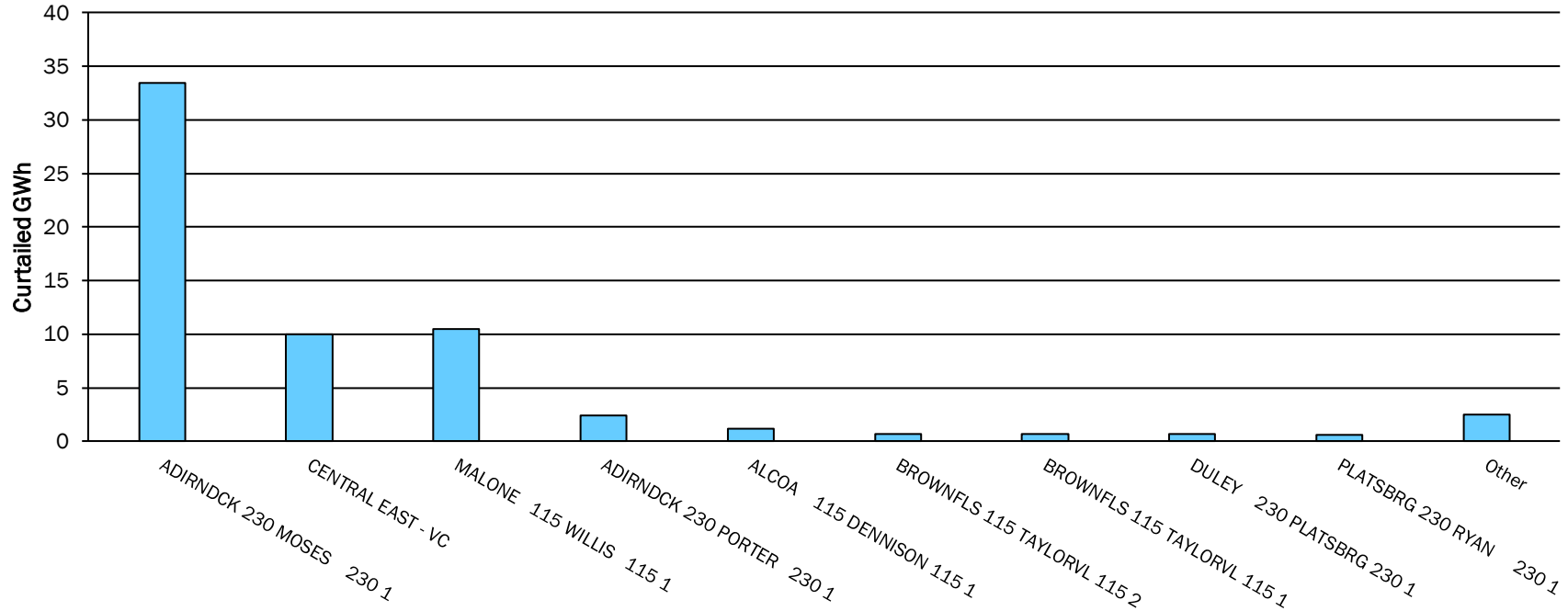
NYCA Zones - Monthly Estimated Curtailed Energy for 2020



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NY Economic Wind Curtailments

NYCA Wind Plants 2020 - Annual Curtailed Energy by Constraint



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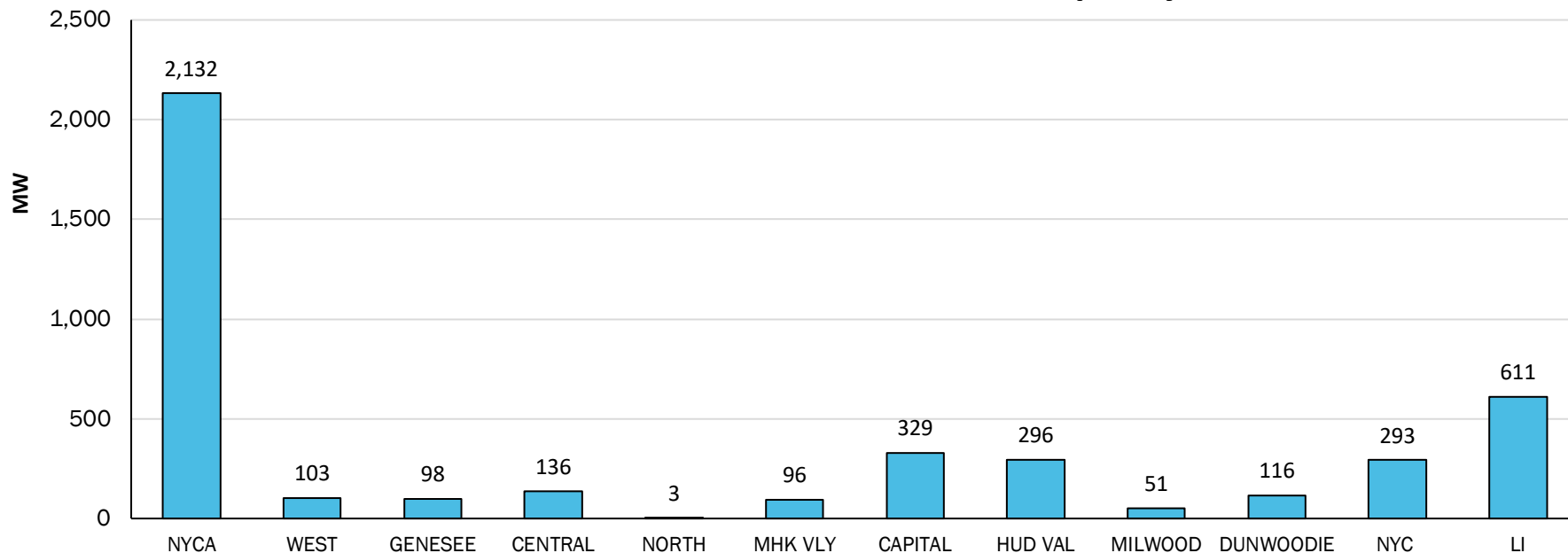
Behind the Meter (BTM) Solar 2020

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
 - There are 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
- At the end of 2020, BTM Solar Capacity was estimated to be 2,132 MWs

Zonal BTM Solar Capacity

Estimated 2020 EOY BTM Solar Capacity

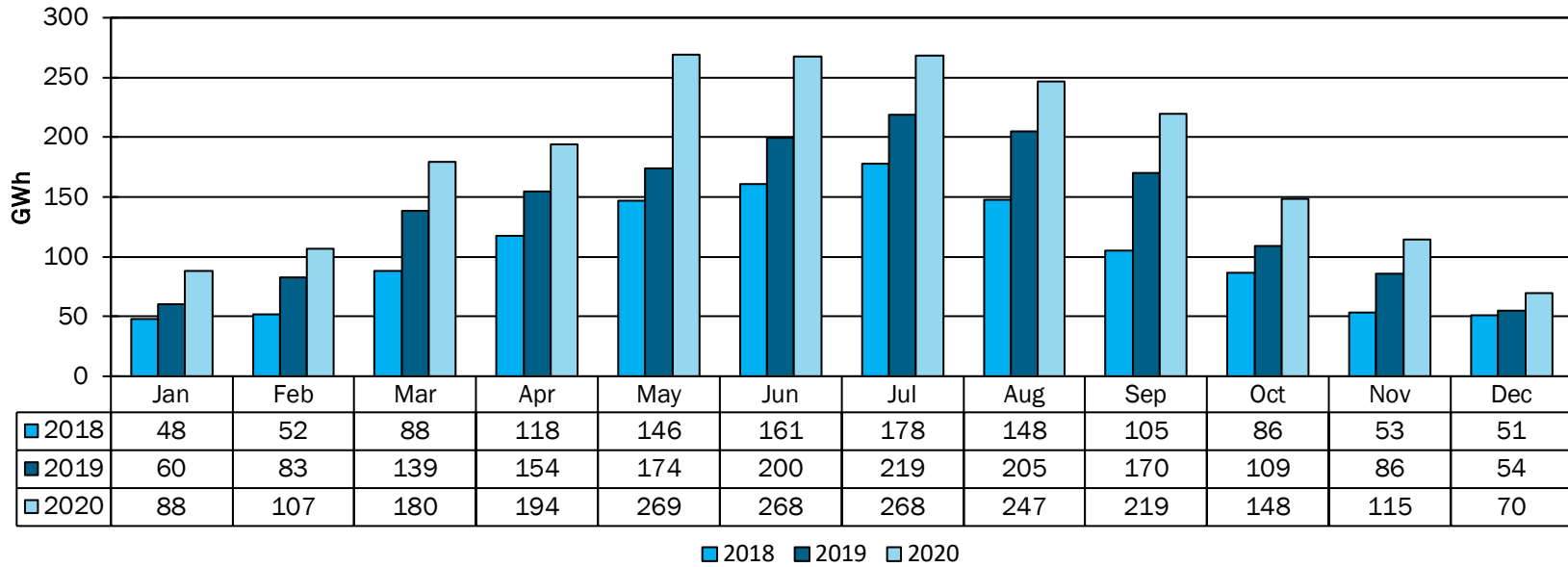


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NY BTM Solar Generation

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

NYCA BTM Solar - Estimated Monthly Production

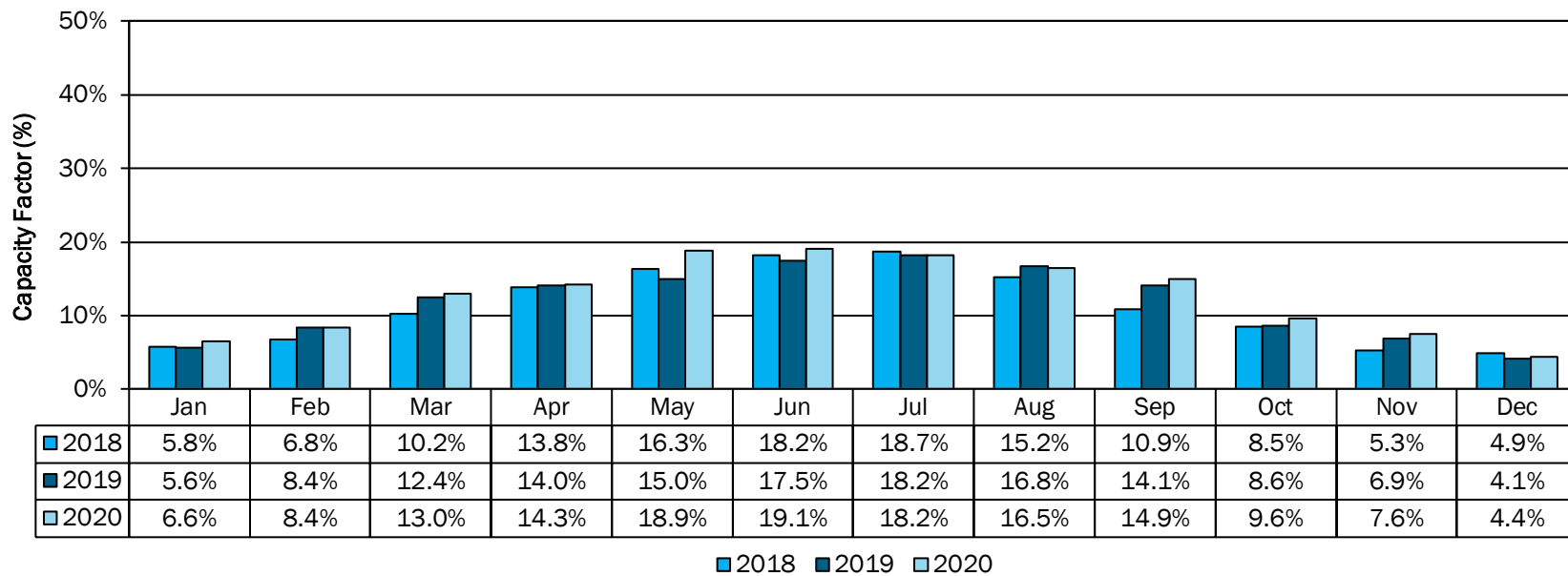


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NY BTM Solar Capacity Factors

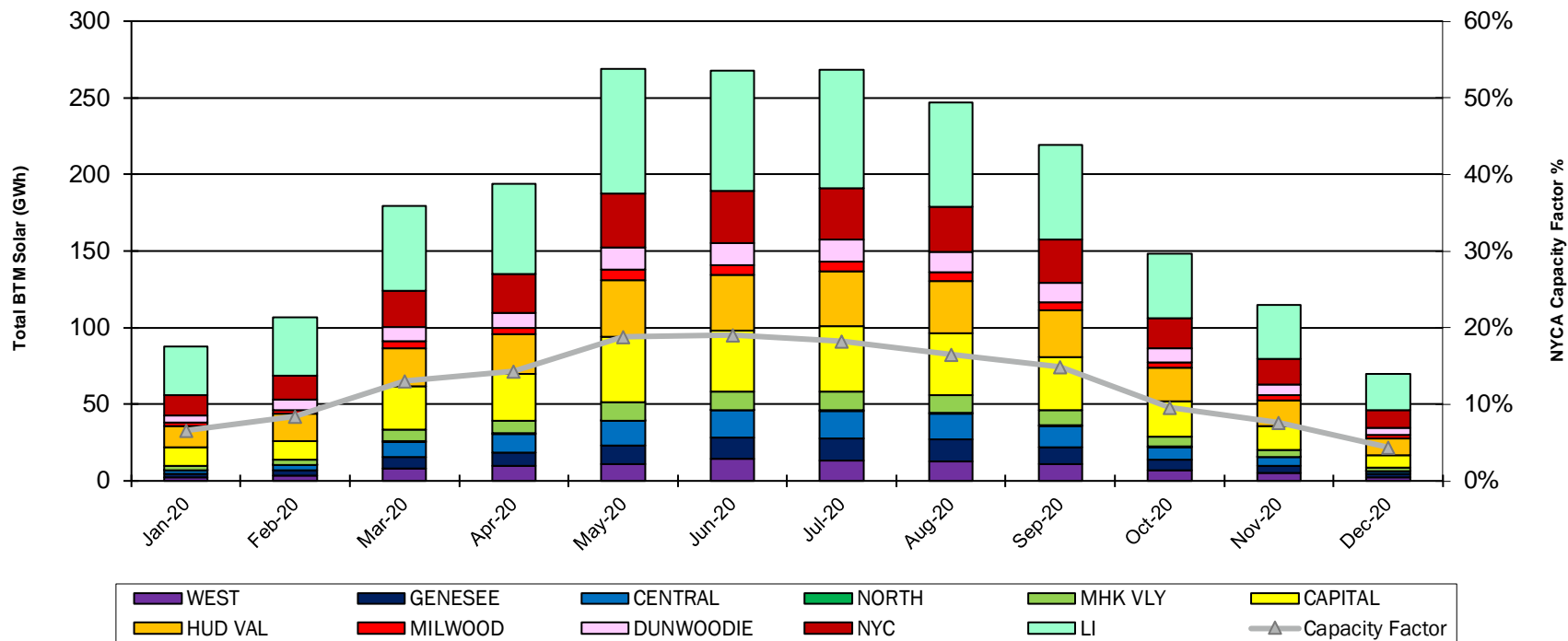
Annual BTM Solar Capacity Factor		
2018	2019	2020
11%	12%	13%

NYCA BTM Solar Generation - Estimated Capacity Factor



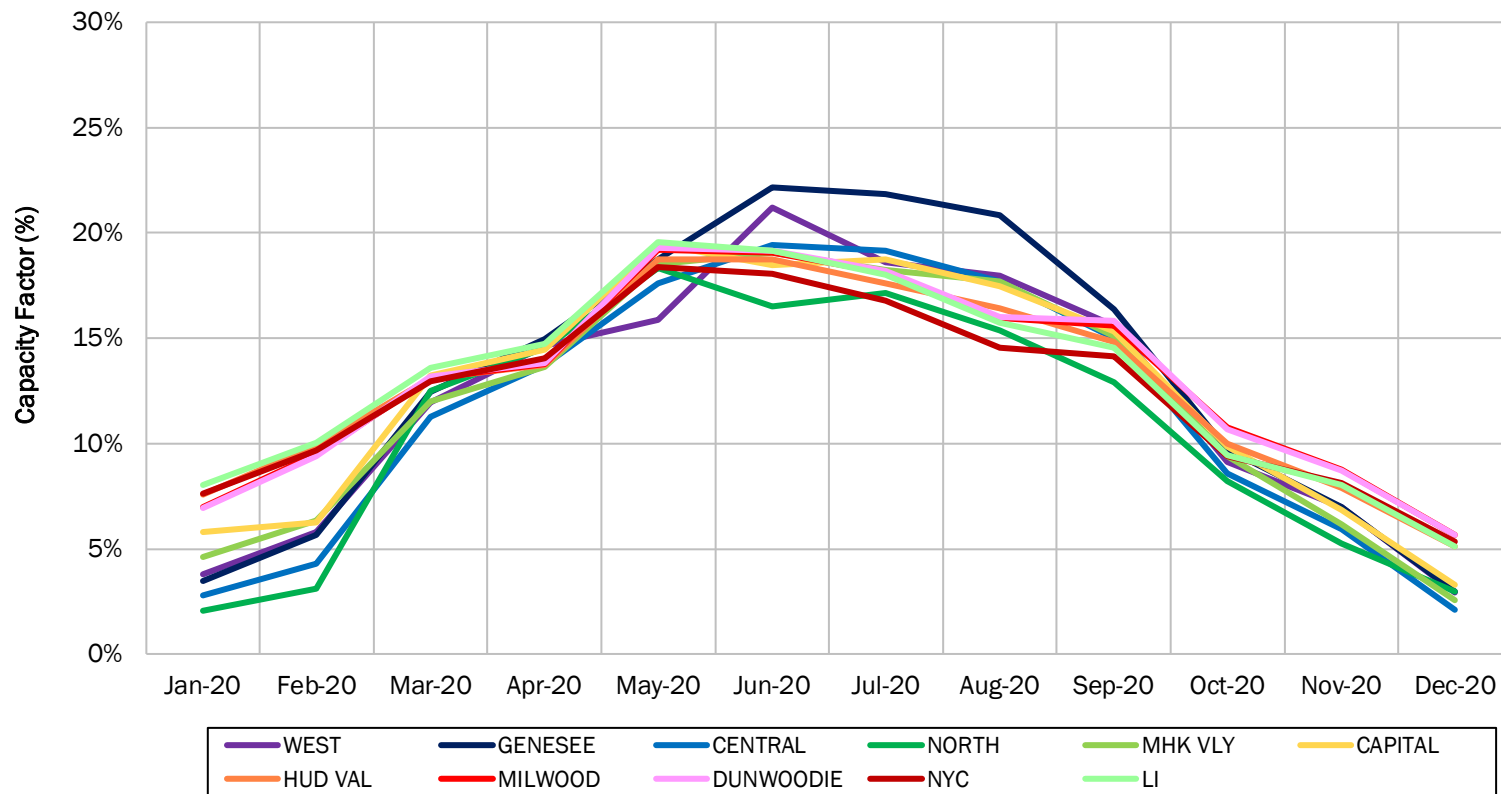
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Monthly BTM Solar Production by Zone



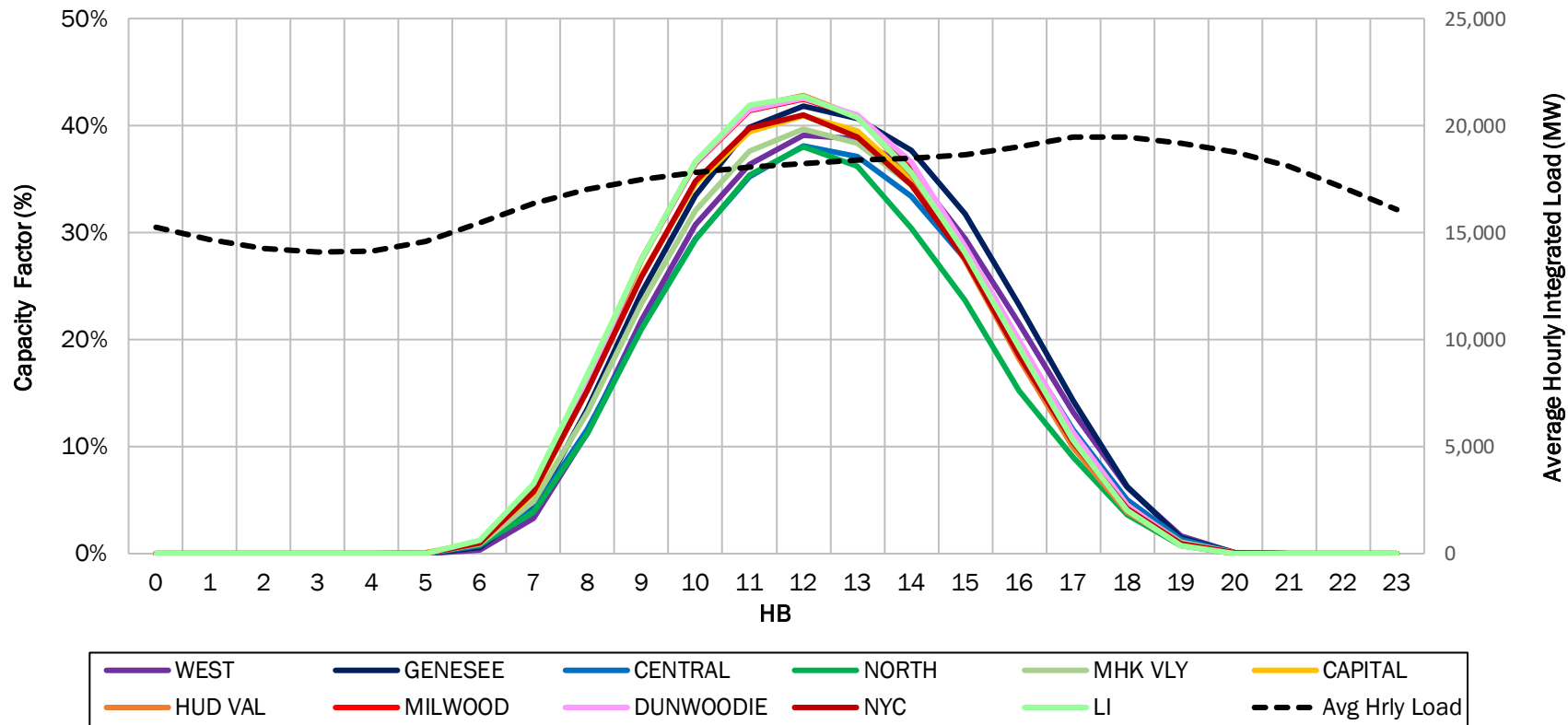
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Monthly BTM Solar Capacity Factors by Zone



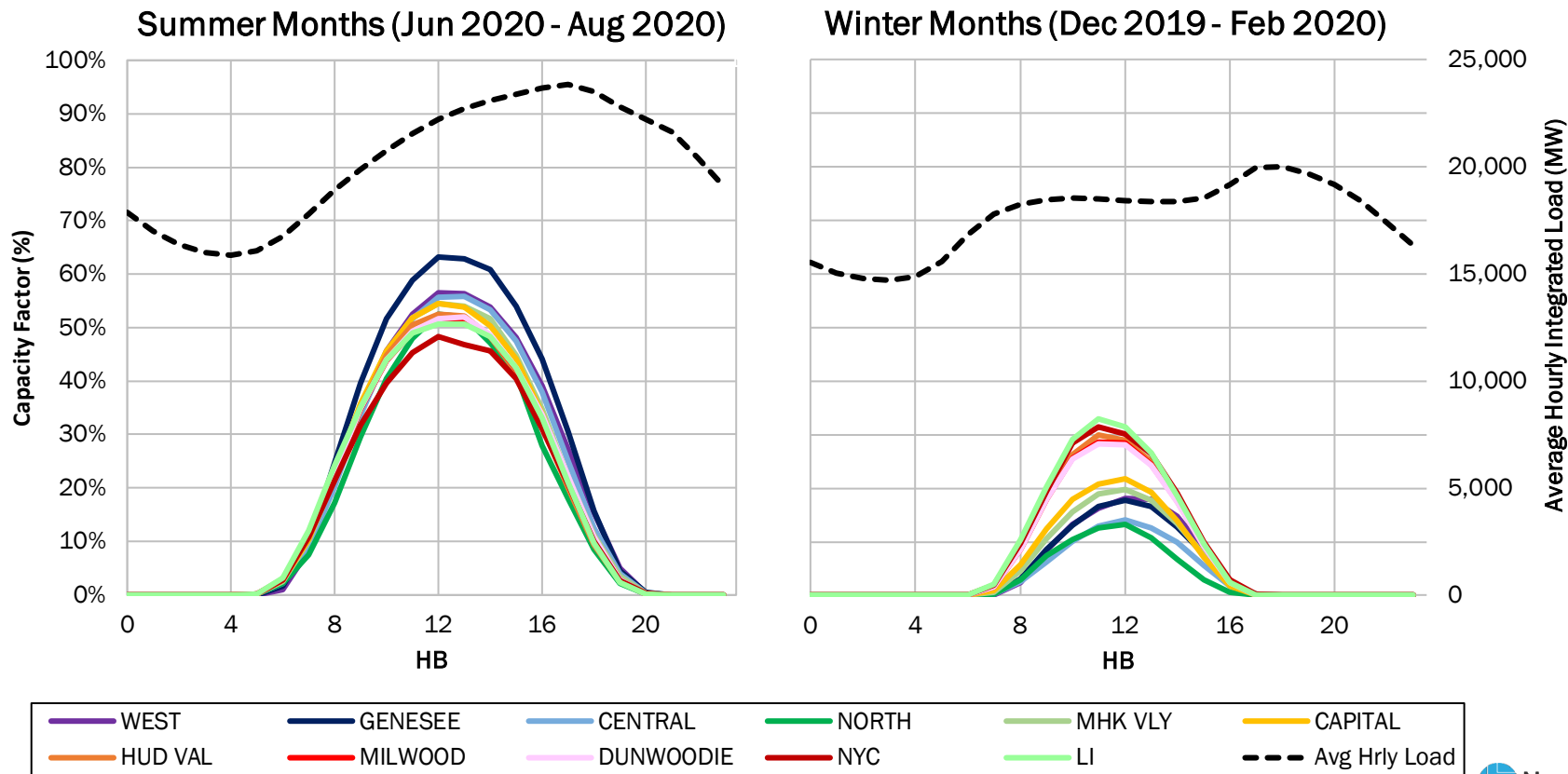
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2020 Average Hourly BTM Solar Capacity Factors by Zone



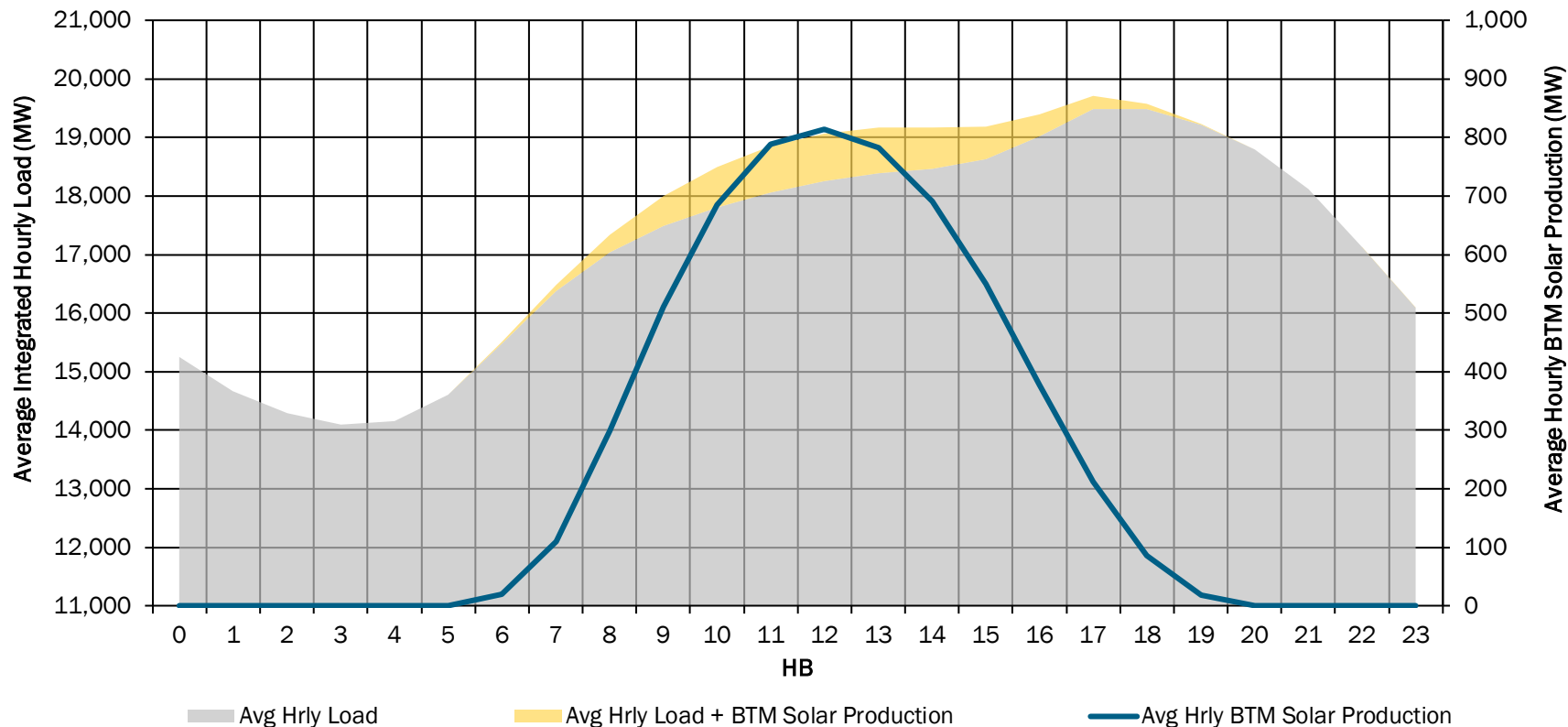
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2020 Seasonal Average Hourly BTM Solar Capacity Factors by Zone



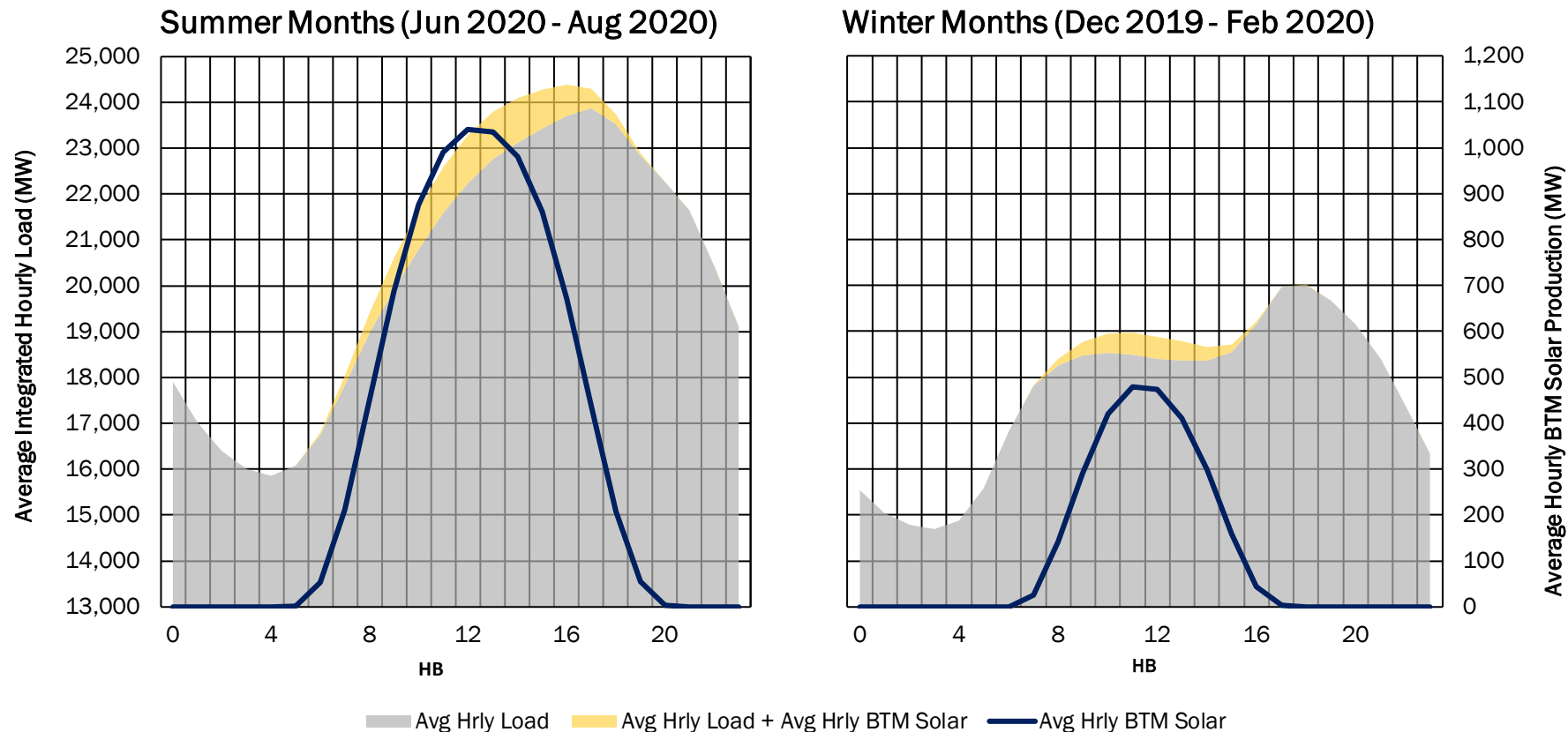
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2020 Average Hourly Load with BTM Solar Production



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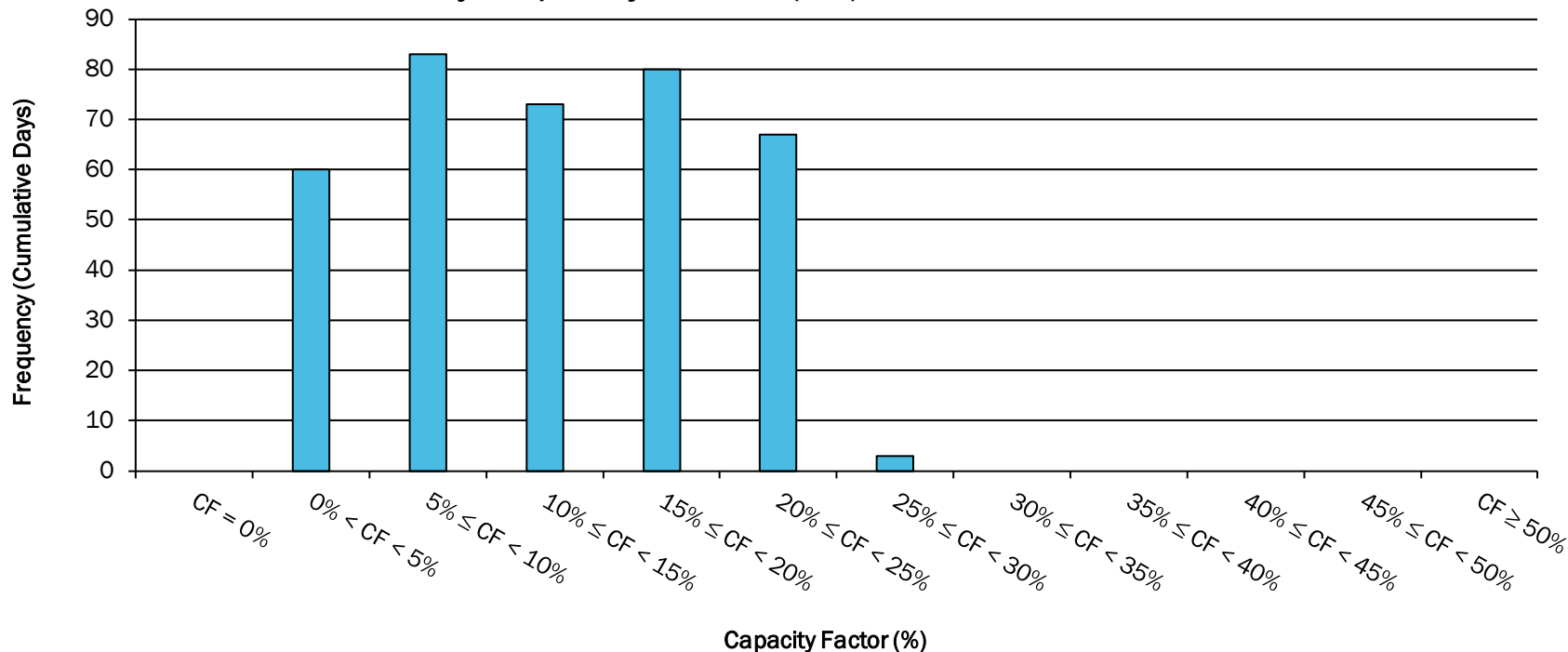
2020 Seasonal Average Hourly Load with BTM Solar Production



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Solar Capacity Factor Distribution

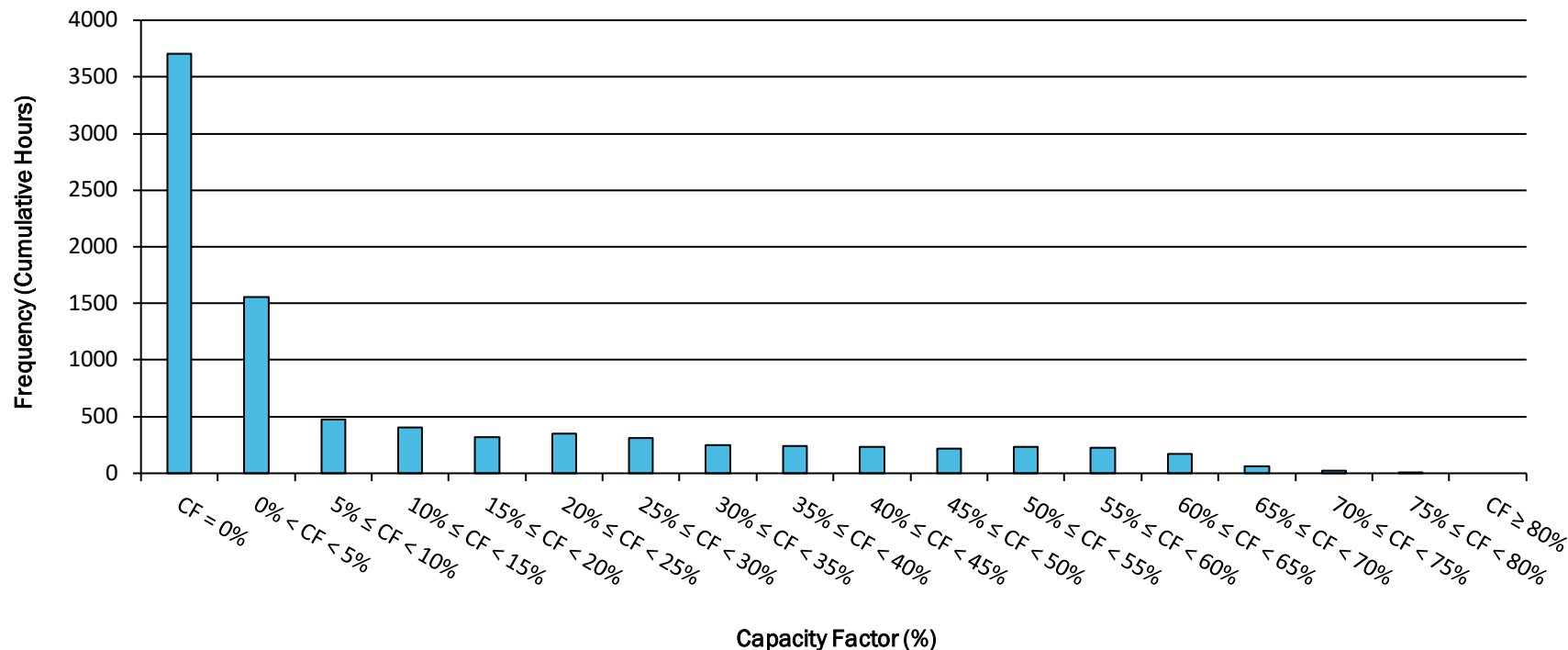
Daily Capacity Factor (CF) Distribution for 2020



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Solar Capacity Factor Distribution

Hourly Capacity Factor (CF) Distribution for 2020

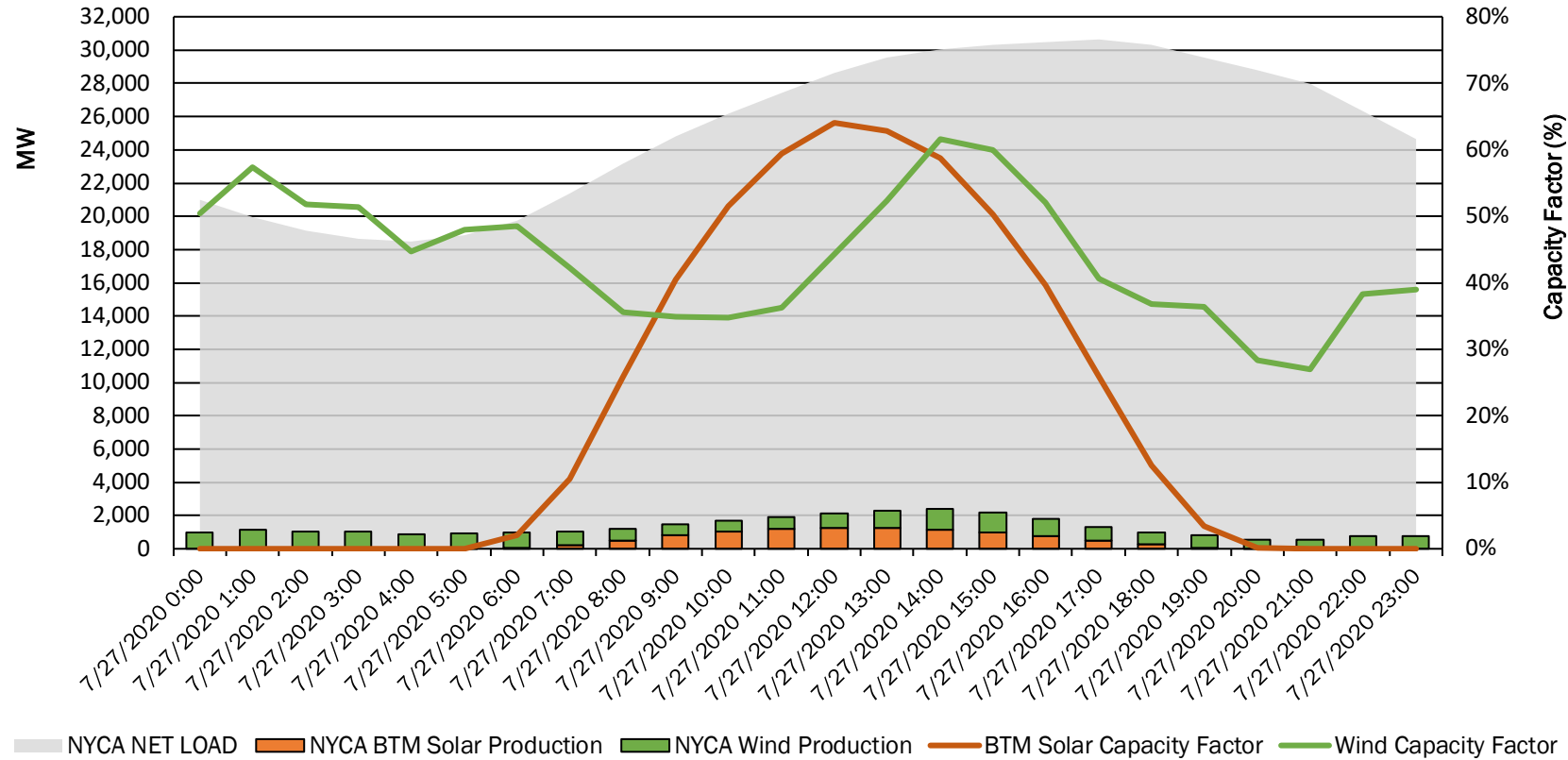


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Questions?

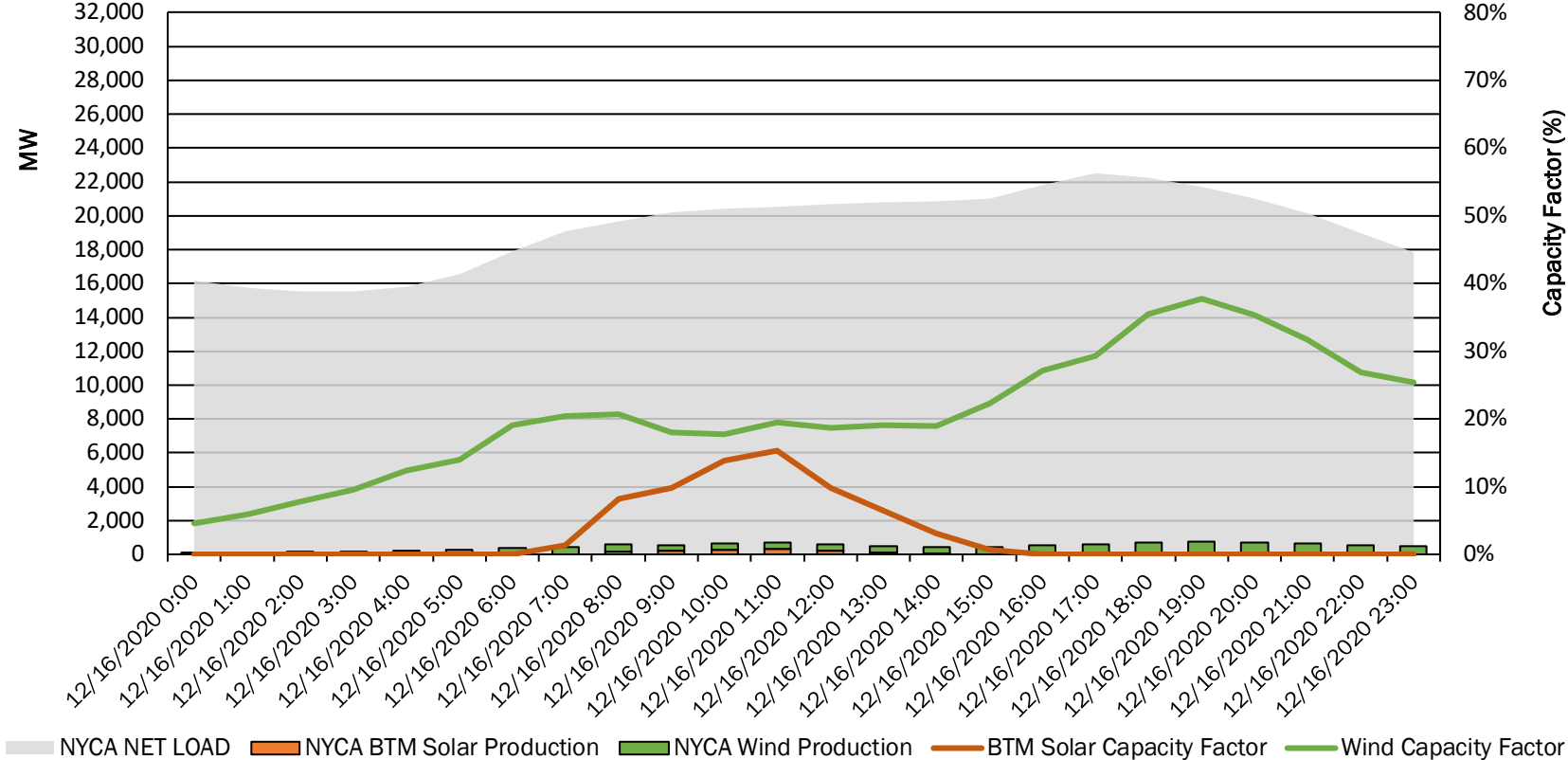
Appendix

Wind and Solar Performance During Summer Peak Load



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Wind and Solar Performance During Winter Peak Load



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Data Tables for Slide 12

Summer Months (June 2020 - August 2020)

	A	B	C	D	E	NYCA
HB	WEST	GENESEE	CENTRL	NORTH	MHK VL	Avg Hrly Load
0	18.1%	3.2%	15.0%	16.3%	21.8%	17,903
1	18.5%	3.4%	15.5%	17.4%	21.9%	17,017
2	19.3%	3.9%	16.8%	17.8%	22.1%	16,393
3	19.5%	4.0%	17.0%	17.4%	22.2%	15,996
4	19.7%	4.0%	16.9%	16.9%	22.8%	15,864
5	18.8%	3.9%	16.3%	17.0%	22.6%	16,078
6	17.5%	3.6%	16.3%	16.8%	20.8%	16,744
7	15.6%	3.1%	14.3%	14.9%	17.6%	17,827
8	12.8%	2.6%	11.8%	13.0%	14.7%	18,952
9	11.3%	2.4%	11.2%	13.2%	13.7%	19,916
10	11.7%	2.5%	12.2%	13.6%	13.6%	20,789
11	13.0%	2.8%	13.9%	14.7%	14.6%	21,575
12	14.3%	2.9%	14.4%	15.1%	16.9%	22,233
13	15.7%	3.1%	16.3%	15.3%	18.8%	22,756
14	16.7%	3.4%	16.9%	15.8%	19.5%	23,108
15	17.8%	3.2%	17.8%	16.4%	19.8%	23,415
16	17.8%	3.1%	17.8%	15.3%	20.0%	23,704
17	17.5%	3.2%	17.7%	13.1%	18.9%	23,859
18	16.1%	2.8%	15.9%	11.1%	15.4%	23,525
19	13.1%	2.4%	13.5%	11.6%	13.3%	22,834
20	12.8%	2.5%	12.5%	12.4%	15.0%	22,255
21	14.9%	2.8%	12.6%	14.7%	17.9%	21,638
22	16.6%	3.1%	14.1%	15.9%	19.3%	20,442
23	17.8%	3.4%	15.1%	16.1%	21.2%	19,111

Winter Months (December 2019 - February 2020)

	A	B	C	D	E	NYCA
HB	WEST	GENESEE	CENTRL	NORTH	MHK VL	Avg Hrly Load
0	33.5%	5.4%	33.5%	27.5%	32.0%	15,536
1	34.6%	5.6%	34.7%	27.6%	30.9%	15,049
2	35.1%	5.4%	34.7%	27.6%	30.9%	14,778
3	35.0%	5.5%	34.3%	26.8%	30.6%	14,691
4	35.1%	5.5%	33.9%	26.9%	30.9%	14,878
5	34.7%	5.4%	33.8%	26.9%	31.0%	15,574
6	33.8%	5.2%	33.2%	26.5%	31.8%	16,838
7	32.4%	5.3%	33.0%	25.9%	32.7%	17,811
8	31.4%	5.2%	32.3%	24.5%	31.6%	18,254
9	31.0%	5.0%	31.4%	23.3%	29.6%	18,478
10	30.2%	4.8%	31.1%	23.2%	29.0%	18,531
11	29.5%	4.7%	30.3%	23.4%	29.9%	18,495
12	29.2%	4.4%	29.9%	24.6%	30.3%	18,406
13	28.7%	4.5%	30.0%	25.5%	30.7%	18,370
14	28.7%	4.3%	30.0%	26.1%	30.6%	18,364
15	28.9%	4.2%	29.6%	25.8%	31.5%	18,549
16	29.5%	4.4%	29.9%	26.7%	31.3%	19,165
17	30.4%	4.9%	30.7%	27.9%	33.1%	19,962
18	31.2%	5.1%	31.2%	29.8%	34.7%	20,015
19	31.6%	5.1%	31.9%	31.0%	36.0%	19,666
20	32.1%	5.3%	32.3%	31.6%	35.9%	19,157
21	32.8%	5.2%	32.8%	31.7%	35.8%	18,403
22	32.5%	5.1%	32.9%	30.5%	36.1%	17,378
23	32.8%	5.2%	32.7%	29.2%	34.3%	16,334

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Data Table for Slide 30

Summer Months (June 2020 - August 2020)

	A	B	C	D	E	F	G	H	I	J	K	NYCA
HB	WEST	GENESEE	CENTRAL	NORTH	MHK VLY	CAPITAL	HUD VAL	MILWOOD	DUNWOODIE	NYC	LI	Avg Hrly Load
0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	17,903
1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	17,017
2	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	16,393
3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	15,996
4	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	15,864
5	0.0%	0.0%	0.1%	0.2%	0.1%	0.2%	0.1%	0.1%	0.1%	0.1%	0.1%	16,078
6	1.0%	1.6%	2.1%	2.1%	2.4%	2.8%	2.9%	2.9%	2.9%	2.7%	3.2%	16,744
7	8.3%	9.7%	8.8%	7.4%	10.1%	10.4%	10.6%	11.0%	11.1%	10.8%	12.1%	17,827
8	21.0%	24.7%	20.3%	17.2%	21.7%	22.9%	22.3%	22.7%	22.8%	21.4%	24.2%	18,952
9	34.8%	39.6%	33.6%	29.6%	34.7%	35.7%	35.0%	34.7%	34.9%	31.7%	35.2%	19,916
10	45.6%	51.6%	44.8%	40.4%	45.3%	45.7%	44.8%	43.8%	44.0%	39.6%	44.0%	20,789
11	52.4%	58.9%	51.7%	48.1%	51.9%	51.8%	50.5%	49.1%	49.4%	45.4%	49.0%	21,575
12	56.5%	63.2%	55.6%	52.5%	54.5%	54.4%	52.6%	51.4%	51.6%	48.3%	50.6%	22,233
13	56.3%	62.8%	55.9%	51.9%	54.0%	53.8%	52.2%	51.7%	52.0%	46.8%	50.6%	22,756
14	53.8%	60.9%	53.3%	47.2%	51.6%	50.4%	48.3%	48.3%	48.6%	45.7%	48.3%	23,108
15	48.1%	54.0%	47.4%	41.3%	44.8%	44.2%	41.6%	42.3%	42.5%	40.4%	42.4%	23,415
16	39.2%	44.1%	37.9%	27.9%	34.8%	33.9%	31.7%	33.6%	33.8%	31.0%	33.1%	23,704
17	27.3%	30.6%	25.0%	18.1%	22.1%	21.6%	20.1%	22.1%	22.2%	20.7%	21.0%	23,859
18	15.4%	15.6%	12.5%	8.4%	11.1%	9.9%	9.4%	10.7%	10.8%	10.0%	9.6%	23,525
19	5.1%	4.4%	4.0%	2.1%	3.4%	2.7%	2.5%	2.8%	2.8%	2.7%	2.2%	22,834
20	0.3%	0.4%	0.3%	0.1%	0.2%	0.2%	0.1%	0.1%	0.1%	0.2%	0.0%	22,255
21	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	21,638
22	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	20,442
23	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	19,111

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Data Table for Slide 30

Winter Months (December 2019 - February 2020)

	A	B	C	D	E	F	G	H	I	J	K	NYCA
HB	WEST	GENESEE	CENTRAL	NORTH	MHK VLY	CAPITAL	HUD VAL	MILWOOD	DUNWOODIE	NYC	LI	Avg Hrly Load
0	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	15,536
1	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	15,049
2	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	14,778
3	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	14,691
4	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	14,878
5	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	15,574
6	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	16,838
7	0.1%	0.3%	0.3%	0.2%	0.6%	0.9%	1.8%	1.5%	1.5%	1.8%	2.1%	17,811
8	2.5%	3.0%	2.5%	2.9%	4.6%	5.7%	9.6%	8.6%	8.5%	9.8%	10.4%	18,254
9	8.5%	8.6%	6.3%	7.4%	10.5%	12.4%	19.2%	18.0%	17.9%	19.5%	20.3%	18,478
10	13.2%	13.1%	10.2%	10.4%	15.6%	17.9%	26.3%	25.5%	25.4%	28.4%	29.2%	18,531
11	16.3%	16.6%	13.0%	12.6%	18.9%	20.7%	30.0%	28.5%	28.4%	31.5%	33.0%	18,495
12	18.1%	17.8%	14.1%	13.2%	19.7%	21.7%	28.9%	28.4%	28.2%	30.1%	31.5%	18,406
13	17.9%	16.7%	12.6%	10.7%	17.8%	19.3%	25.0%	24.4%	24.3%	26.4%	26.6%	18,370
14	14.7%	12.8%	9.9%	6.8%	13.5%	13.9%	18.4%	17.6%	17.4%	19.1%	18.7%	18,364
15	8.5%	7.7%	5.6%	2.9%	7.6%	7.1%	9.6%	9.1%	9.0%	10.0%	9.6%	18,549
16	2.4%	2.3%	1.7%	0.7%	2.2%	1.8%	2.6%	2.5%	2.5%	2.9%	2.5%	19,165
17	0.1%	0.2%	0.1%	0.0%	0.1%	0.1%	0.2%	0.2%	0.2%	0.3%	0.1%	19,962
18	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	20,015
19	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	19,666
20	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	19,157
21	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	18,403
22	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	17,378
23	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	16,334

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Data Tables for Slide 32

Summer Months (June 2020 - August 2020)

HB	Avg Hrly Load	Avg Hrly BTM Solar	Avg Hrly Load + Avg Hrly BTM Solar
0	17,902.79	0.00	17,902.79
1	17,017.28	0.00	17,017.28
2	16,393.26	0.00	16,393.26
3	15,996.11	0.00	15,996.11
4	15,863.59	0.00	15,863.59
5	16,077.73	2.28	16,080.02
6	16,743.71	53.42	16,797.14
7	17,827.08	212.63	18,039.71
8	18,951.71	449.66	19,401.37
9	19,915.60	687.90	20,603.50
10	20,788.65	876.45	21,665.09
11	21,575.24	991.14	22,566.38
12	22,233.02	1,041.16	23,274.19
13	22,756.32	1,034.32	23,790.64
14	23,108.07	981.45	24,089.52
15	23,415.35	861.52	24,276.87
16	23,704.34	671.91	24,376.25
17	23,859.35	436.27	24,295.62
18	23,524.58	208.75	23,733.33
19	22,834.27	55.87	22,890.14
20	22,254.89	3.12	22,258.01
21	21,637.52	0.08	21,637.60
22	20,441.61	0.00	20,441.61
23	19,111.11	0.00	19,111.11

Winter Months (December 2019 - February 2020)

HB	Avg Hrly Load	Avg Hrly BTM Solar	Avg Hrly Load + Avg Hrly BTM Solar
0	15,536.32	0.00	15,536.32
1	15,049.19	0.00	15,049.19
2	14,777.94	0.00	14,777.94
3	14,690.82	0.00	14,690.82
4	14,877.82	0.00	14,877.82
5	15,574.48	0.00	15,574.48
6	16,838.16	0.34	16,838.50
7	17,811.31	25.75	17,837.06
8	18,254.13	141.60	18,395.73
9	18,477.74	291.64	18,769.38
10	18,531.13	419.42	18,950.55
11	18,494.58	479.91	18,974.49
12	18,406.29	472.71	18,879.00
13	18,370.19	411.71	18,781.90
14	18,364.18	299.17	18,663.35
15	18,548.97	157.61	18,706.58
16	19,164.95	43.08	19,208.03
17	19,961.66	2.74	19,964.40
18	20,014.51	0.05	20,014.56
19	19,665.83	0.00	19,665.83
20	19,156.52	0.00	19,156.52
21	18,402.96	0.00	18,402.96
22	17,377.58	0.00	17,377.58
23	16,333.55	0.00	16,333.55

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Our mission, in collaboration with our stakeholders, is to serve the public interest and provide benefit to consumers by:

- Maintaining and enhancing regional reliability
- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policymakers, stakeholders and investors in the power system



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