

Operations Performance Metrics Monthly Report



March 2022 Report

Operations & Reliability Department New York Independent System Operator

Prepared by NYISO Operations Analysis and Services, based on settlements initial invoice data collected on or before April 8, 2022.

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March 2022 Operations Performance Highlights

- Peak load of 20,450 MW occurred on 3/28/2022 HB 19
- All-time winter capability period peak load of 25,738 MW occurred on 01/07/2014 HB 18
- 2 hours of Thunderstorm Alerts were declared
- 7 hours of NERC TLR level 3 curtailment
- To reduce risks from COVID-19, the NYISO continues to take several actions to maintain critical business operations and protect the health and well-being of our employees and stakeholders.

The following table identifies the estimated production cost savings associated with the Broader Regional Market initiatives.

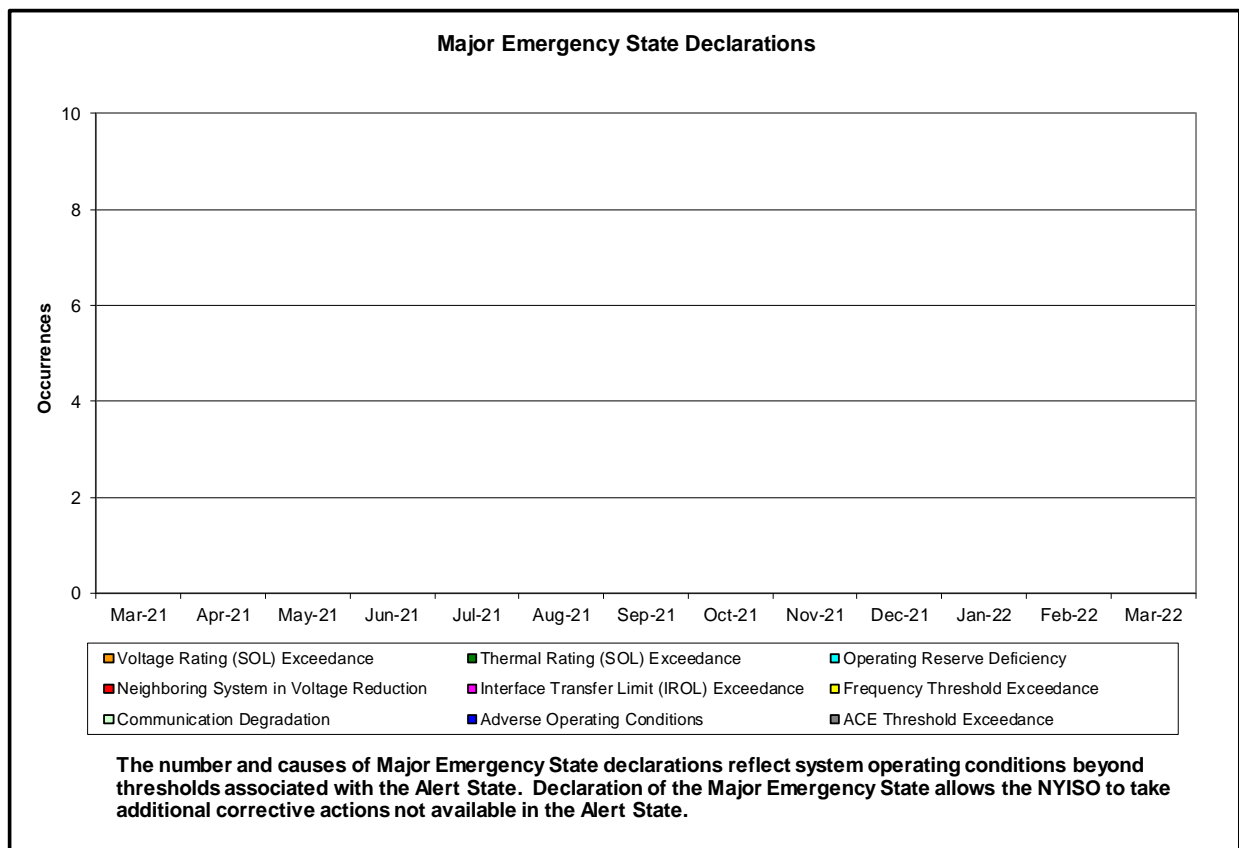
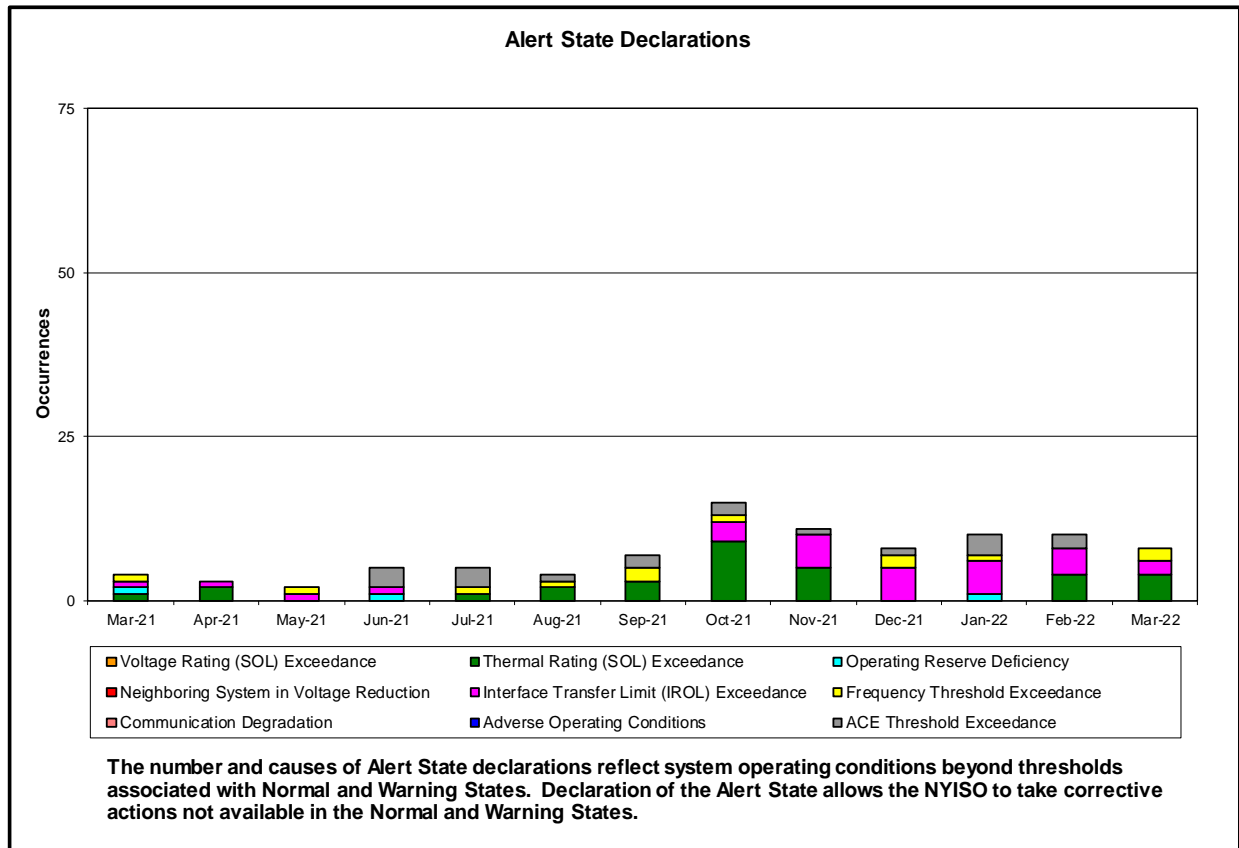
	Current Month Value (\$M)	Year-to-Date Value (\$M)
NY Savings from PJM-NY Congestion Coordination	\$5.47	\$6.47
NY Savings from PJM-NY Coordinated Transaction Scheduling	(\$0.44)	(\$0.53)
NY Savings from NE-NY Coordinated Transaction Scheduling	(\$0.54)	\$2.14
Total NY Savings	\$4.49	\$8.08
Regional Savings from PJM-NY Coordinated Transaction Scheduling	\$0.53	\$1.85
Regional Savings from NE-NY Coordinated Transaction Scheduling	\$0.12	\$1.70
Total Regional Savings	\$0.65	\$3.55

- Statewide uplift cost monthly average was (\$0.36)/MWh.
- The following table identifies the Monthly ICAP spot market prices and the price delta.

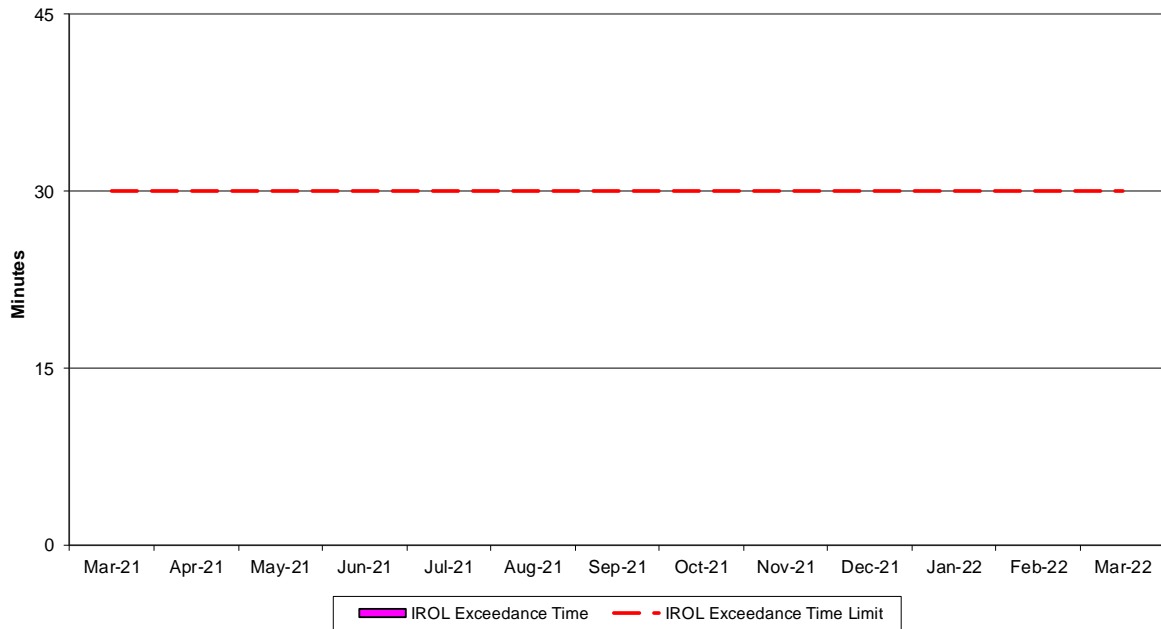
Spot Auction Price Results	NYCA	Lower Hudson Valley Zones	New York City Zone	Long Island Zone
April 2022 Spot Price	\$0.76	\$0.76	\$0.76	\$1.81
March 2022 Spot Price	\$0.89	\$0.89	\$0.89	\$1.80
Delta	(\$0.13)	(\$0.13)	(\$0.13)	\$0.01

- NYCA experienced \$0.76 clearing price. Decline in clearing price was due to an increase in net Imports. The clearing price for Lower Hudson Valley, New York City were set by NYCA.

Reliability Performance Metrics

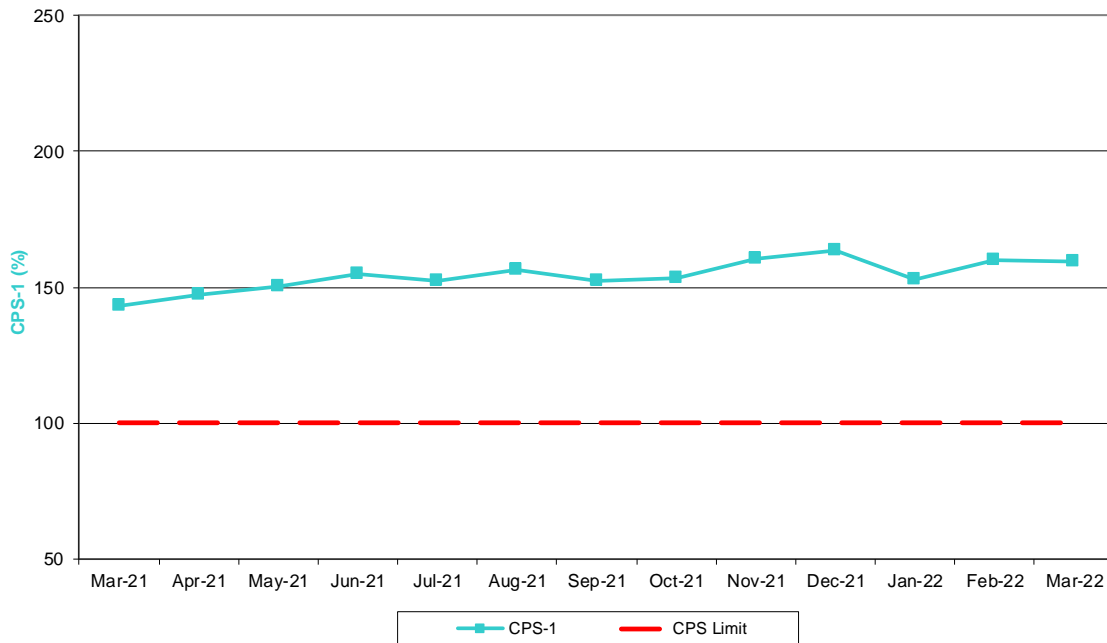


NERC IROL Time Over Limit



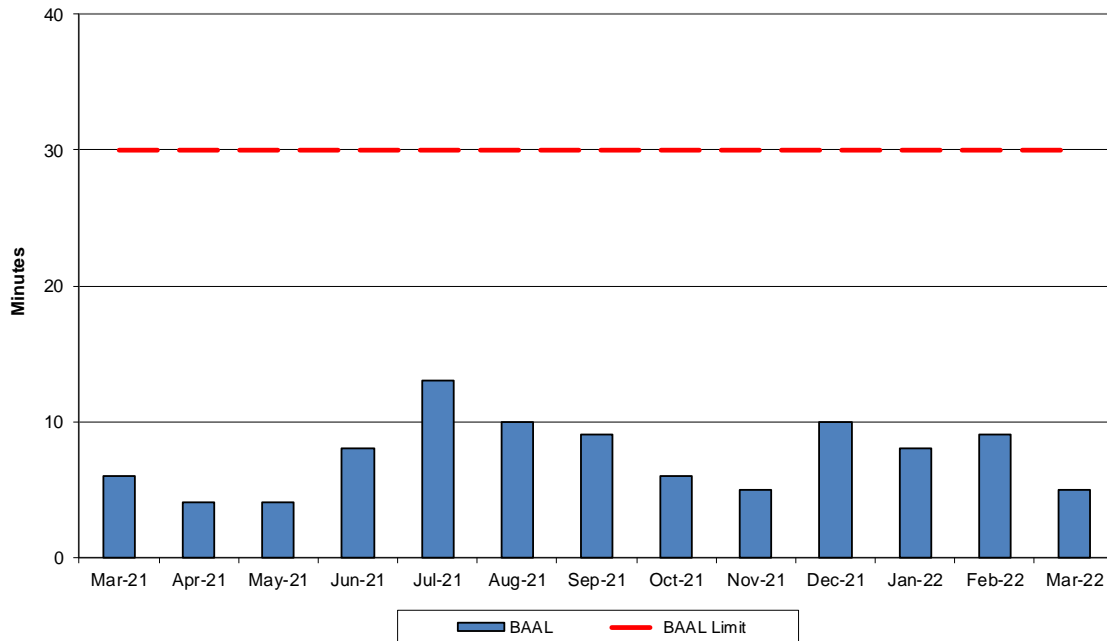
For IROL exceedances leading to Major Emergency State declarations, the maximum IROL exceedance time is identified. IROL exceedances of less than thirty minutes are considered NERC compliant.

NERC Control Performance Standards



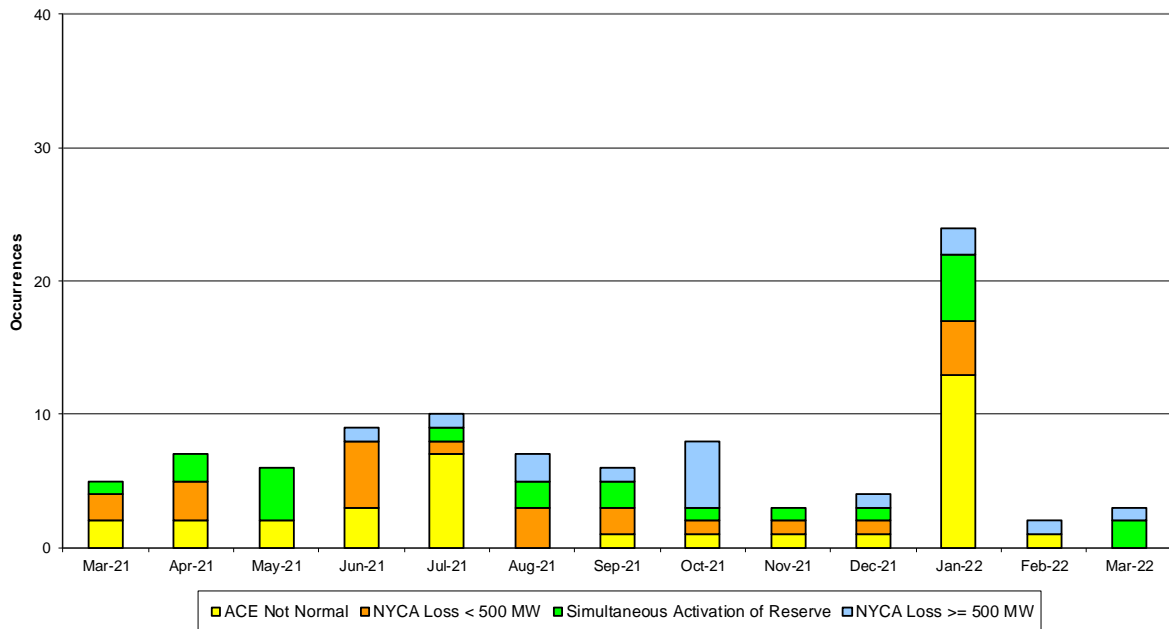
The value of NERC Control Performance Standards (CPS-1) is an indicator of the NYISO Area resource and demand balancing. Values exceeding the identified threshold are NERC compliant.

NERC Balancing Authority ACE Limit Standard



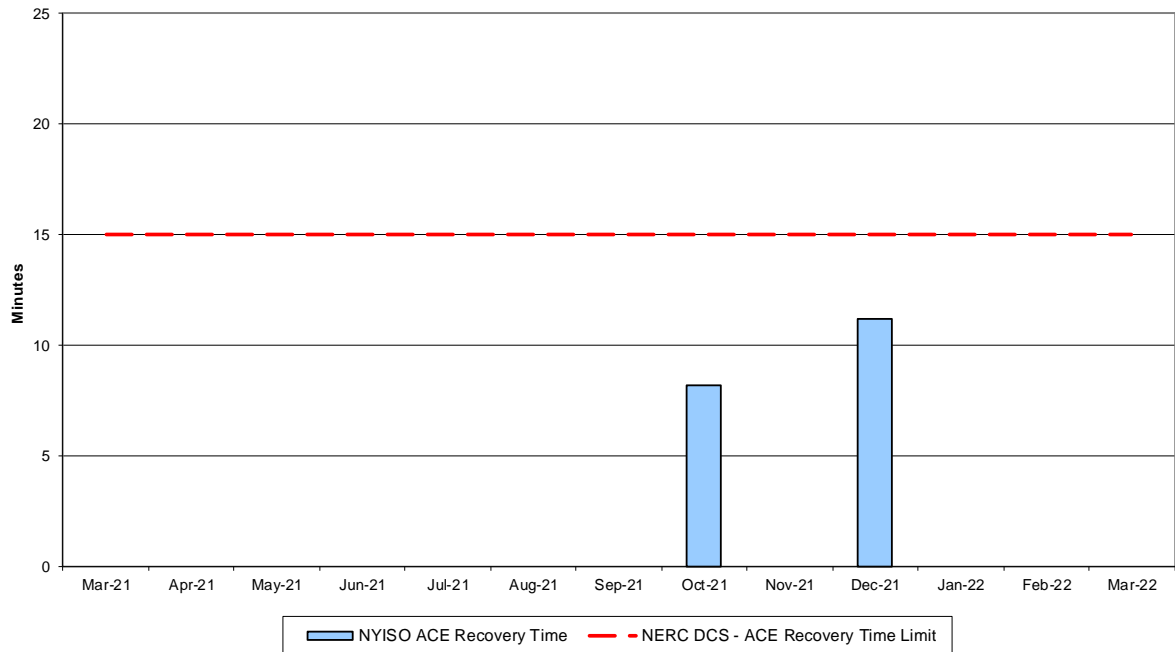
The amount of time the clock-minute average ACE exceeds the clock-minute Balancing Authority ACE Limit (BAAL) is an indicator of the NYISO Area resource and demand balancing. The maximum BAAL exceedance time is identified. BAAL exceedances of less than 30 consecutive clock-minutes are NERC compliant.

Reserve Activations



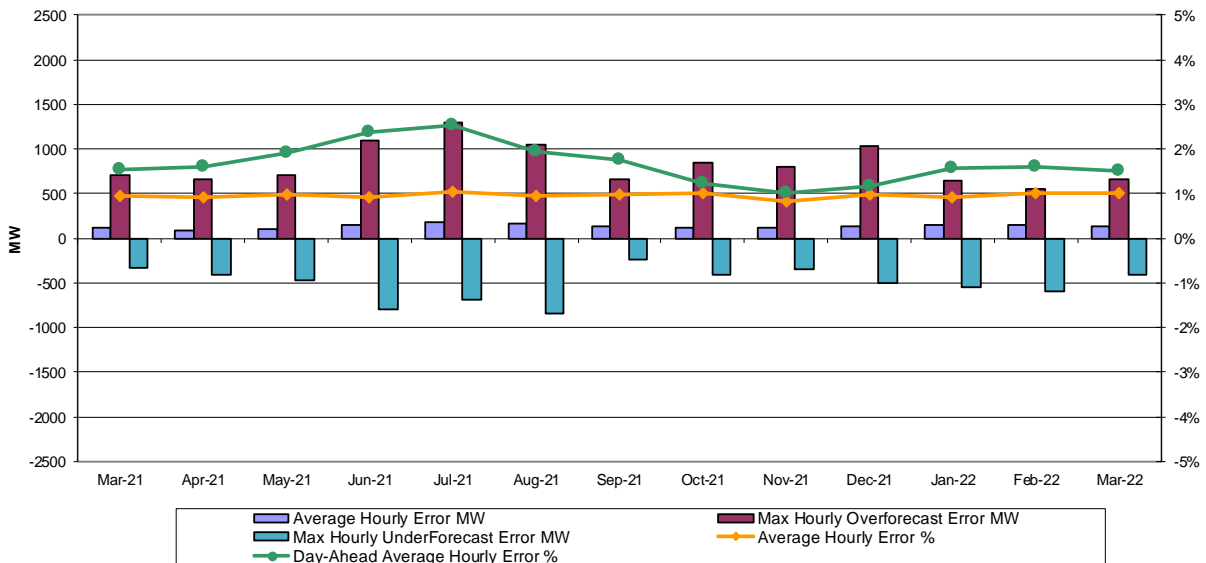
NYISO Reserve Activations are indicators of the need to respond to unexpected operational conditions within the NYISO Area or to assist a neighboring Area (Simultaneous Activation of Reserves) by activating an immediate resource and demand balancing operation.

DCS Event Time to ACE Recovery



For NYISO initiated NERC Reportable Disturbances, the maximum ACE recovery time is identified. Recovery times of less than 15 minutes are considered NERC compliant.

Load Forecast Performance

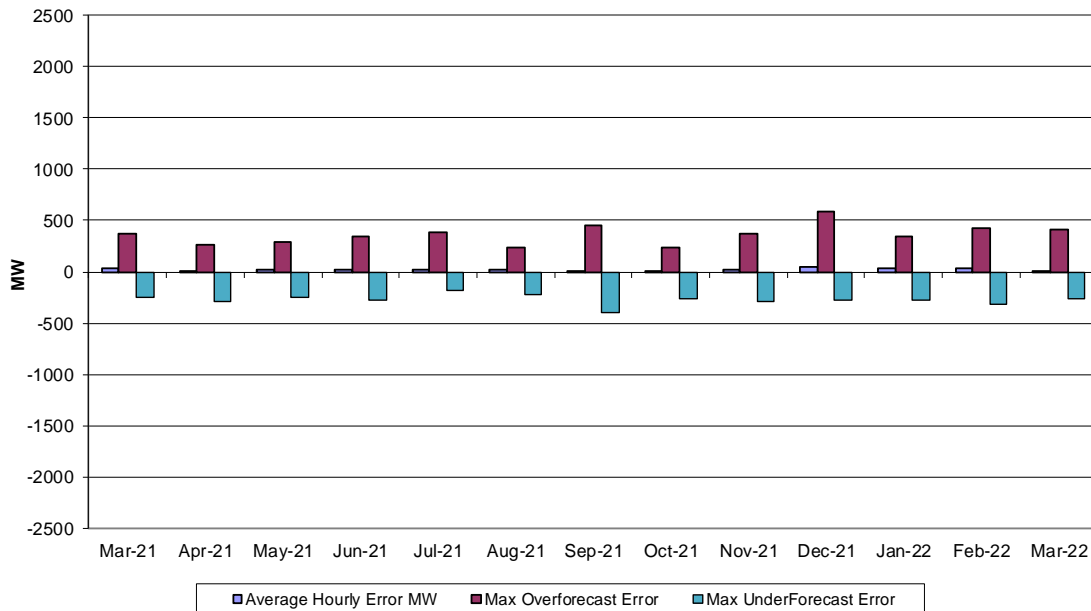


Hourly Error MW - Value of the difference between the hourly average actual load demand and the average hour ahead forecast load demand.

Average Hourly Error % - Average value of the ratio of hourly average error magnitude to hourly average actual load demand.

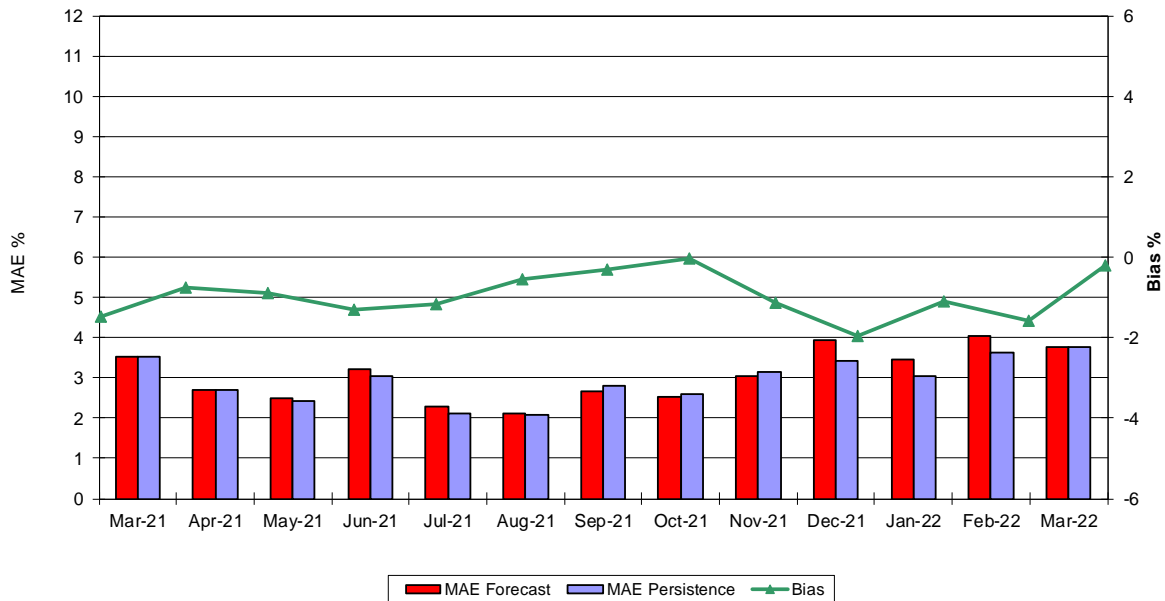
Day-Ahead Average Hourly Error % - Average across all hours of the month of the absolute value of the difference between actual load demand and the Day-Ahead forecast load demand, divided by the actual load demand.

Wind Forecast Performance Hour Ahead MW Error

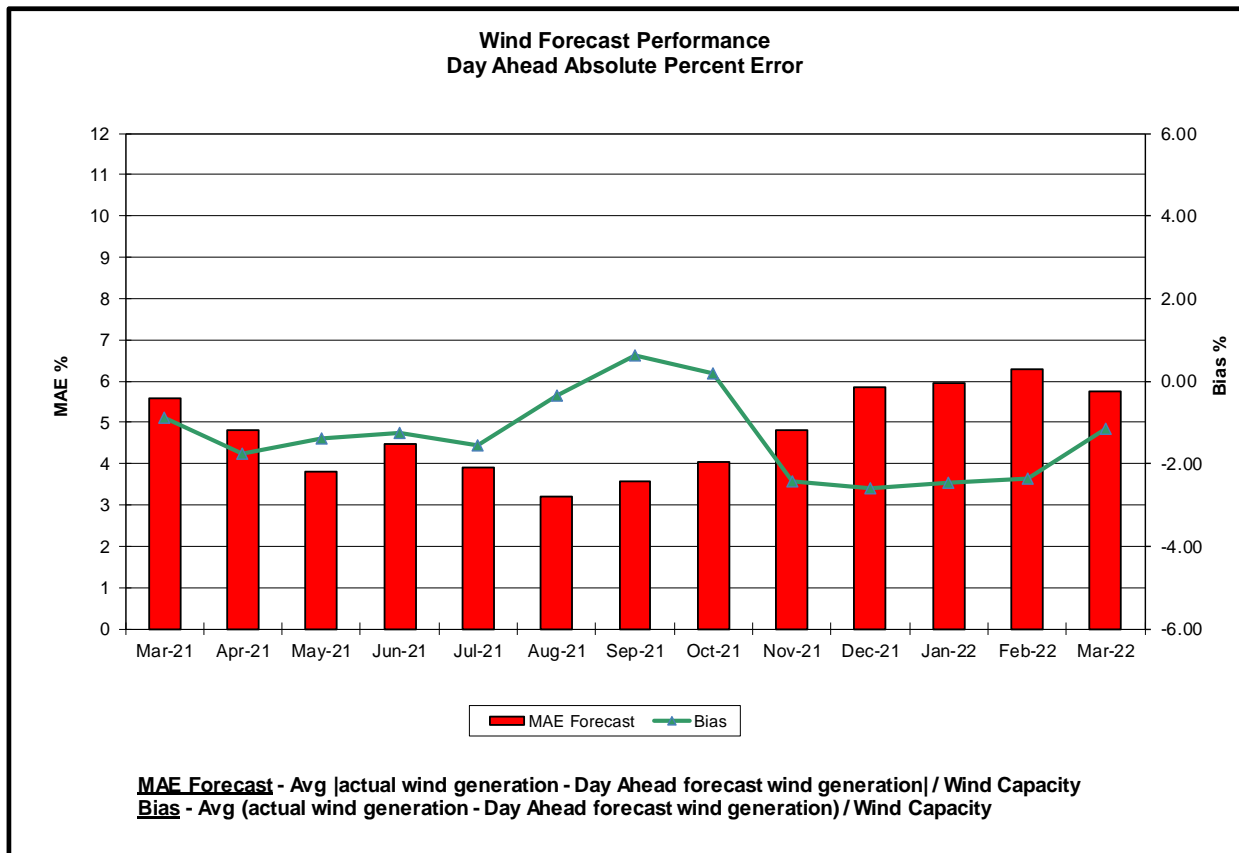
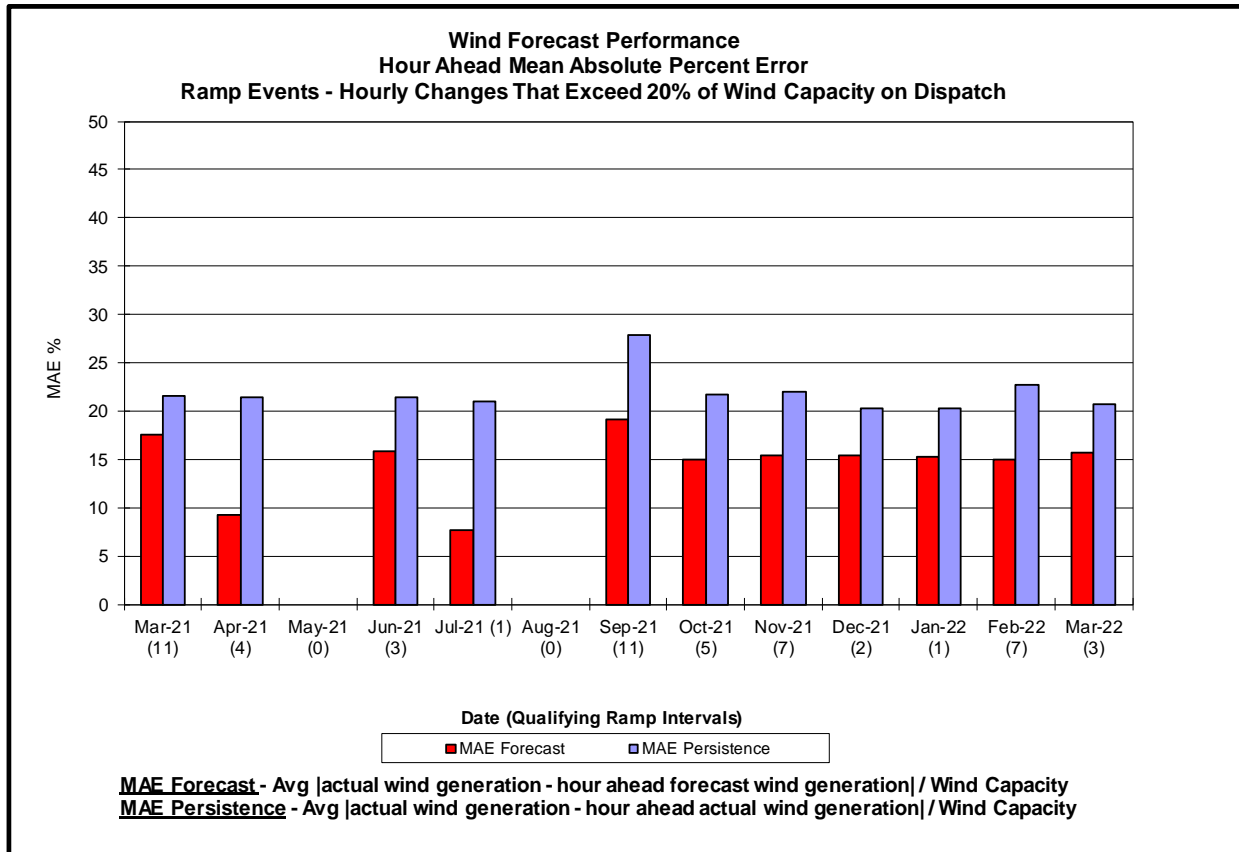


Hourly Error MW - Value of the difference between the hourly average actual wind generation and the average hour ahead forecast wind generation.

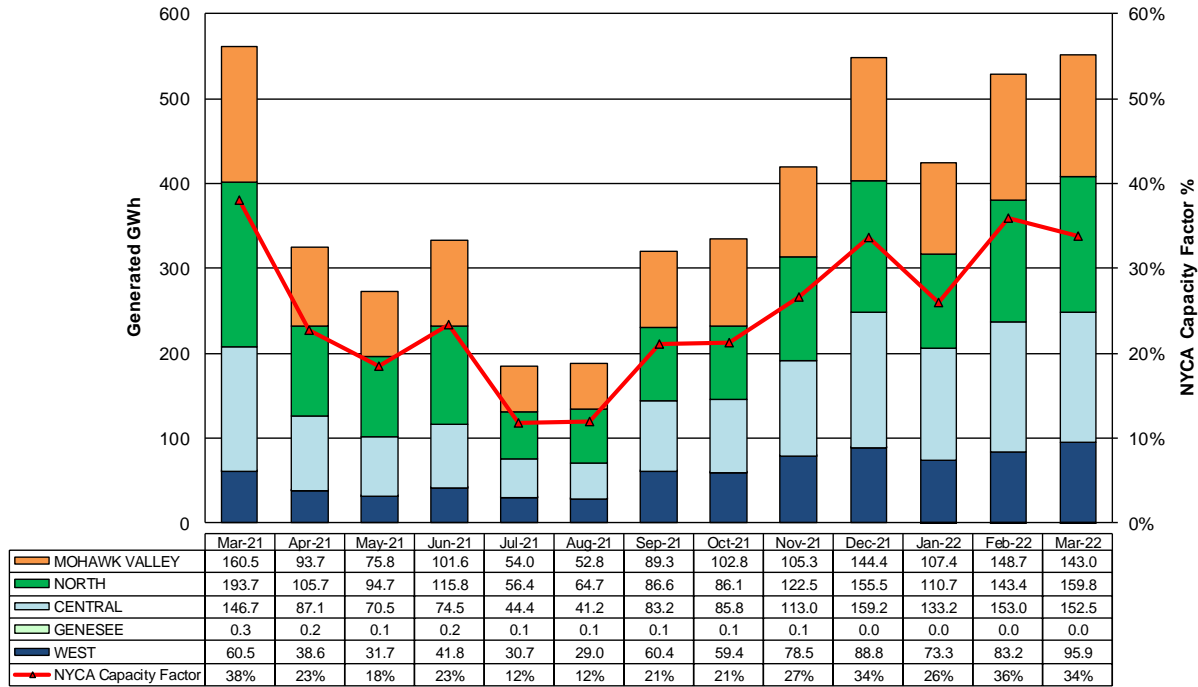
Wind Forecast Performance Hour Ahead Percent Error



MAE Forecast - Avg |actual wind generation - hour ahead forecast wind generation| / Wind Capacity
MAE Persistence - Avg |actual wind generation - hour ahead actual wind generation| / Wind Capacity
Bias - Avg (actual wind generation - hour ahead forecast wind generation) / Wind Capacity

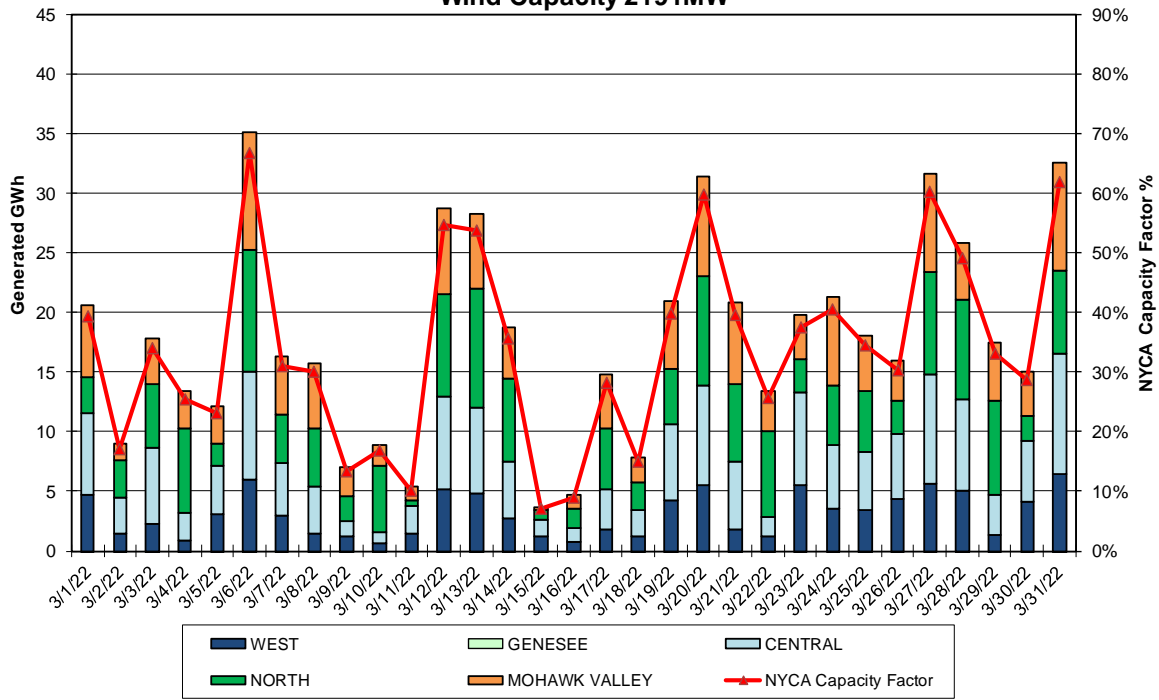


Wind Performance Monthly Production and Capacity Factor Wind Capacity 2191MW

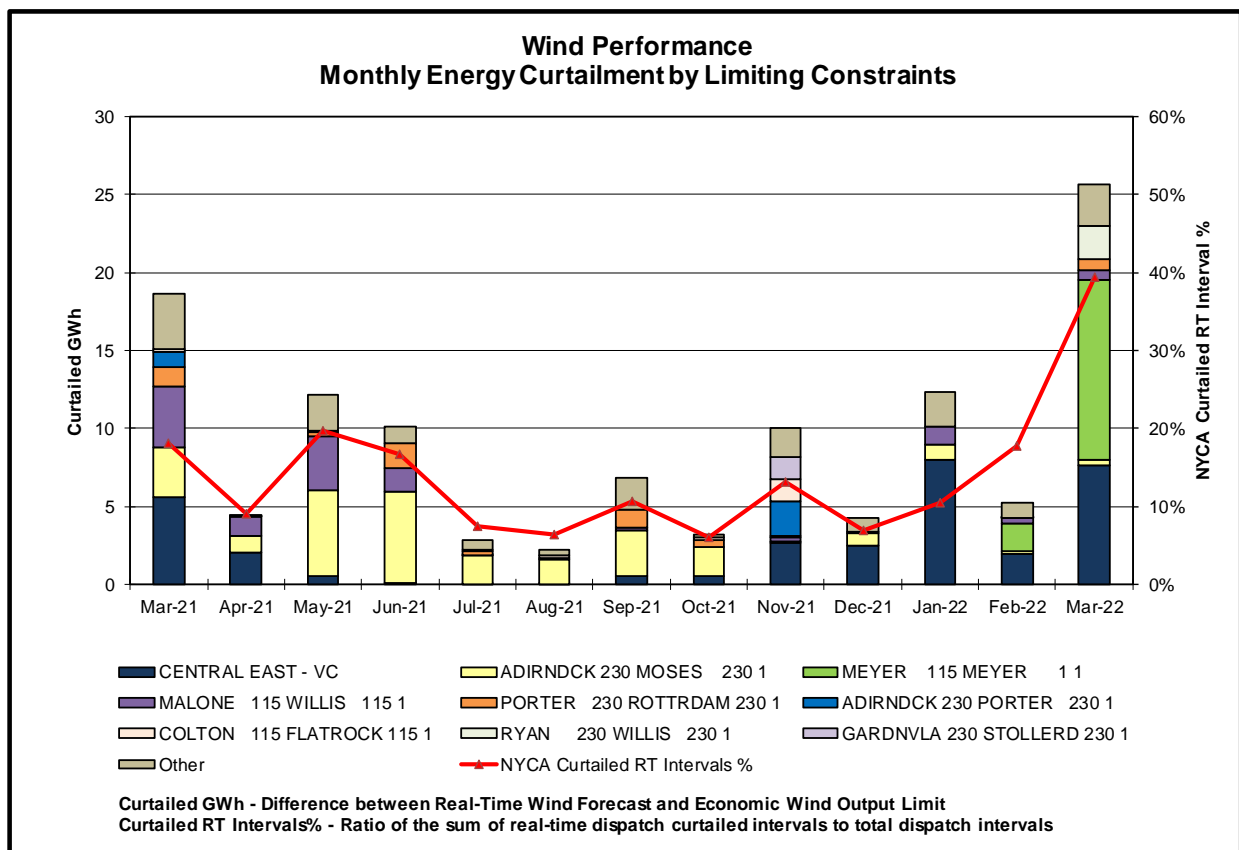
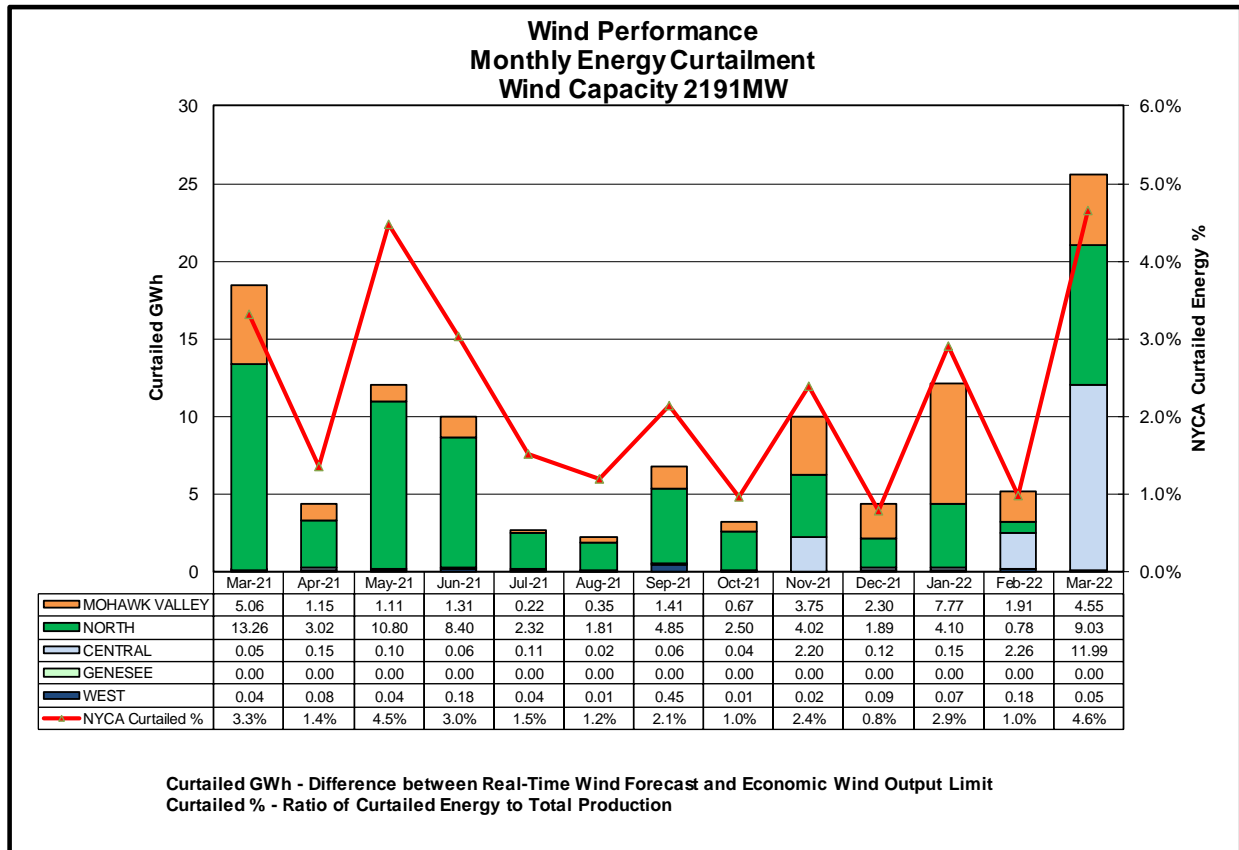


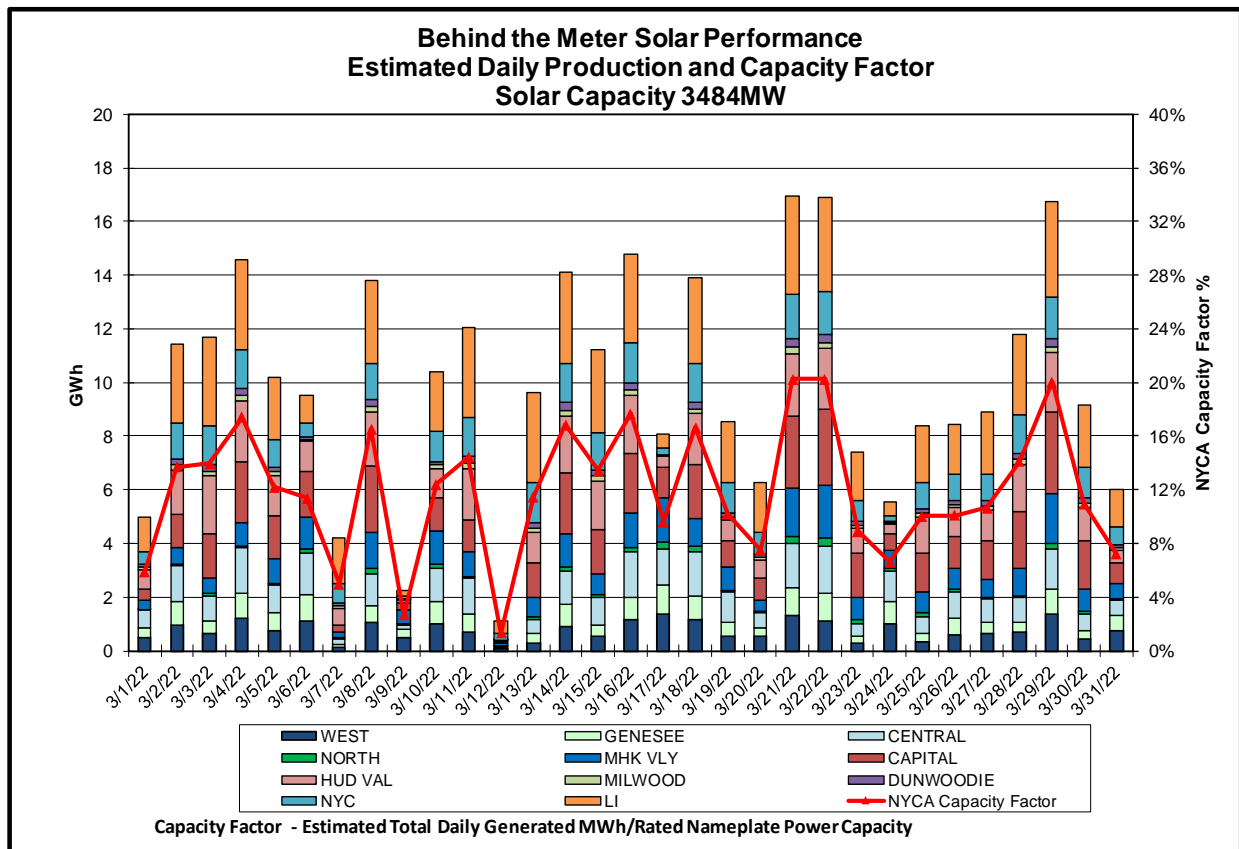
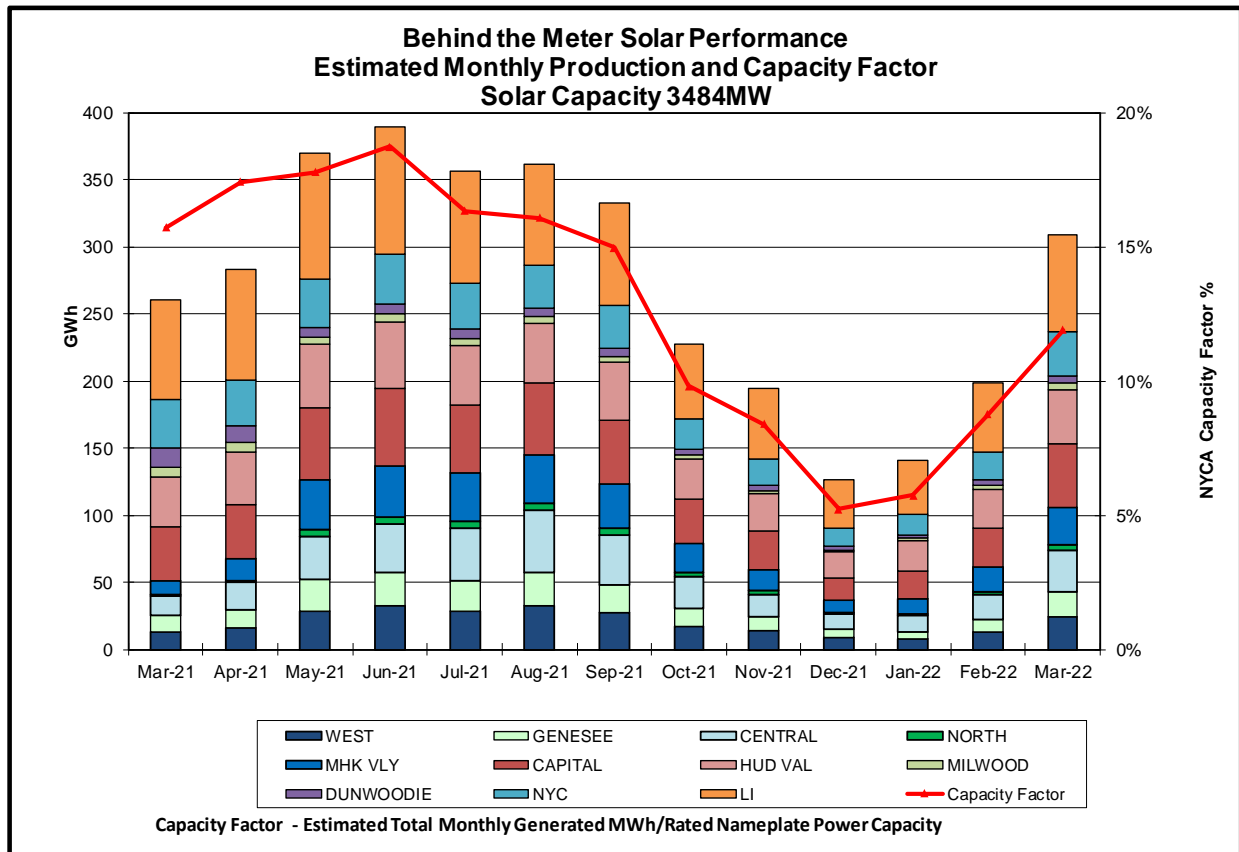
Capacity Factor - Total Monthly Generated MWh/Rated Nameplate Power Capacity

Wind Performance Daily Production and Capacity Factor Wind Capacity 2191MW

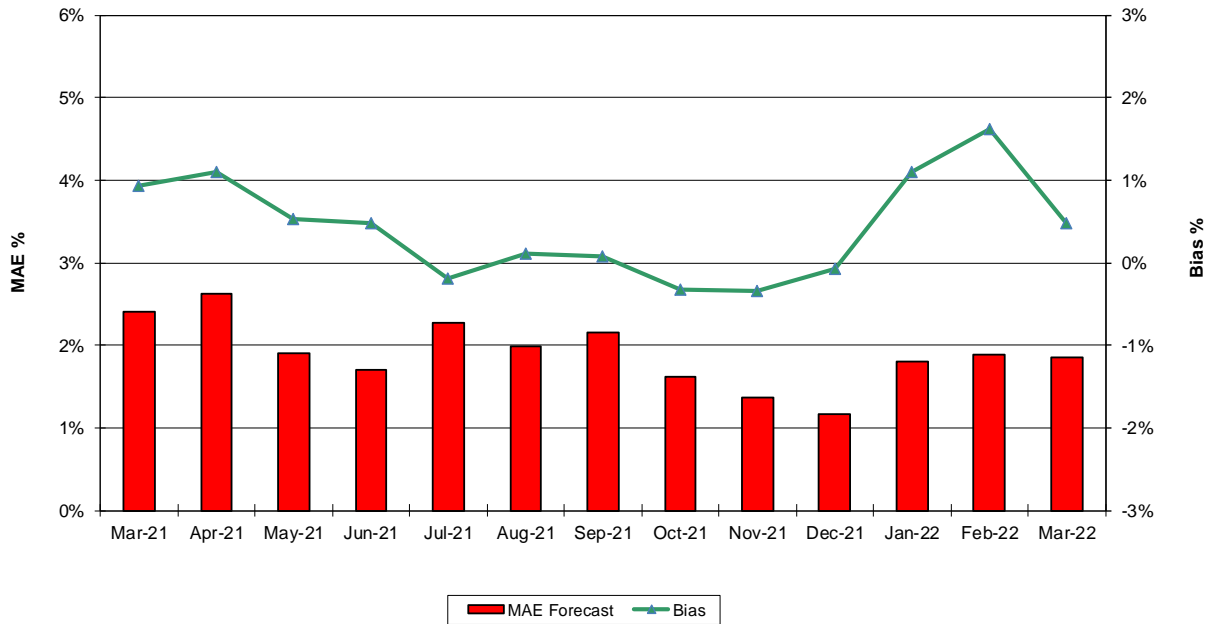


Capacity Factor - Total Daily Generated MWh/Rated Nameplate Power Capacity



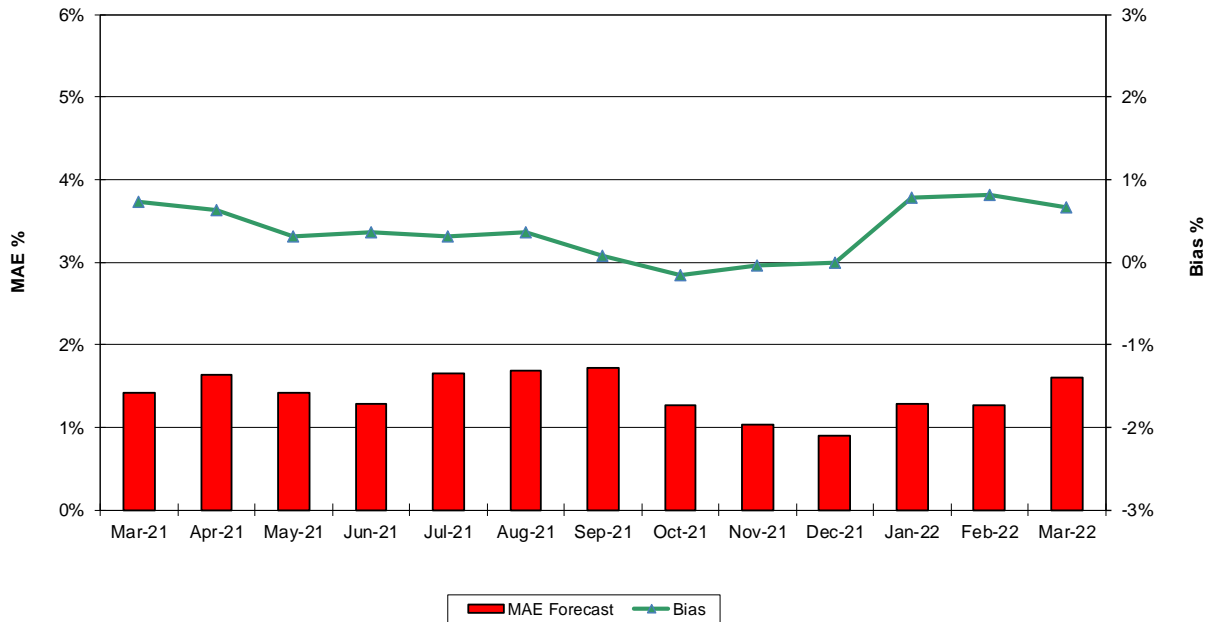


Behind the Meter Solar Forecast Performance Day Ahead Percent Error

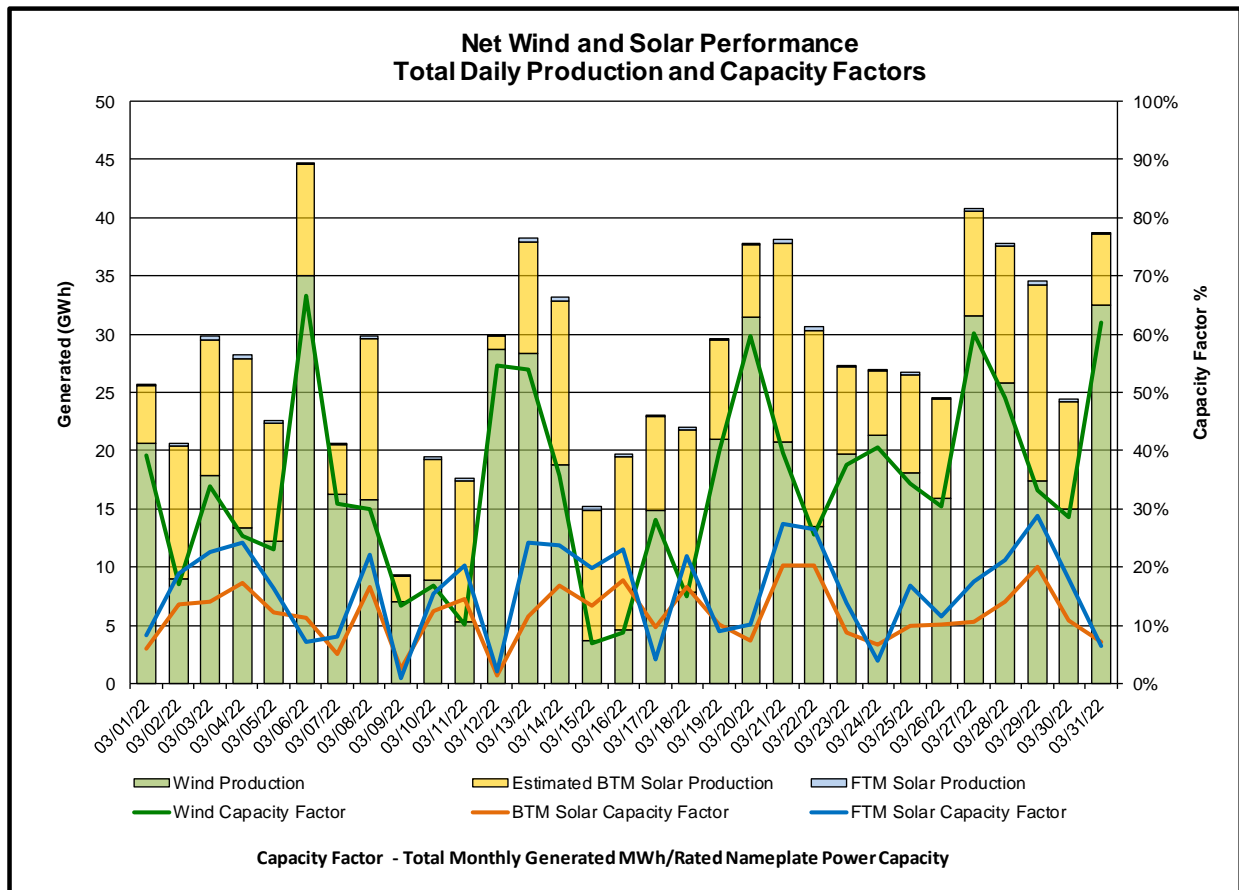
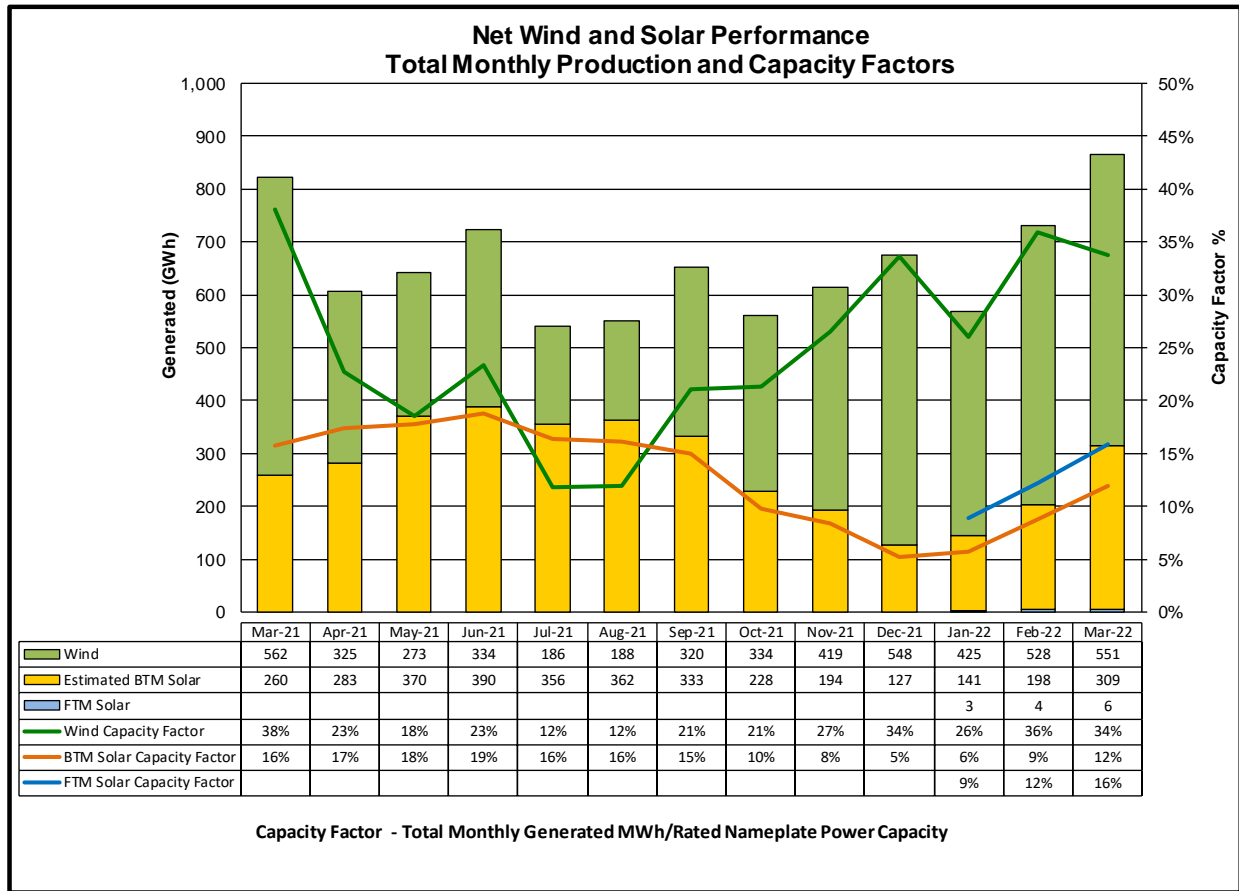


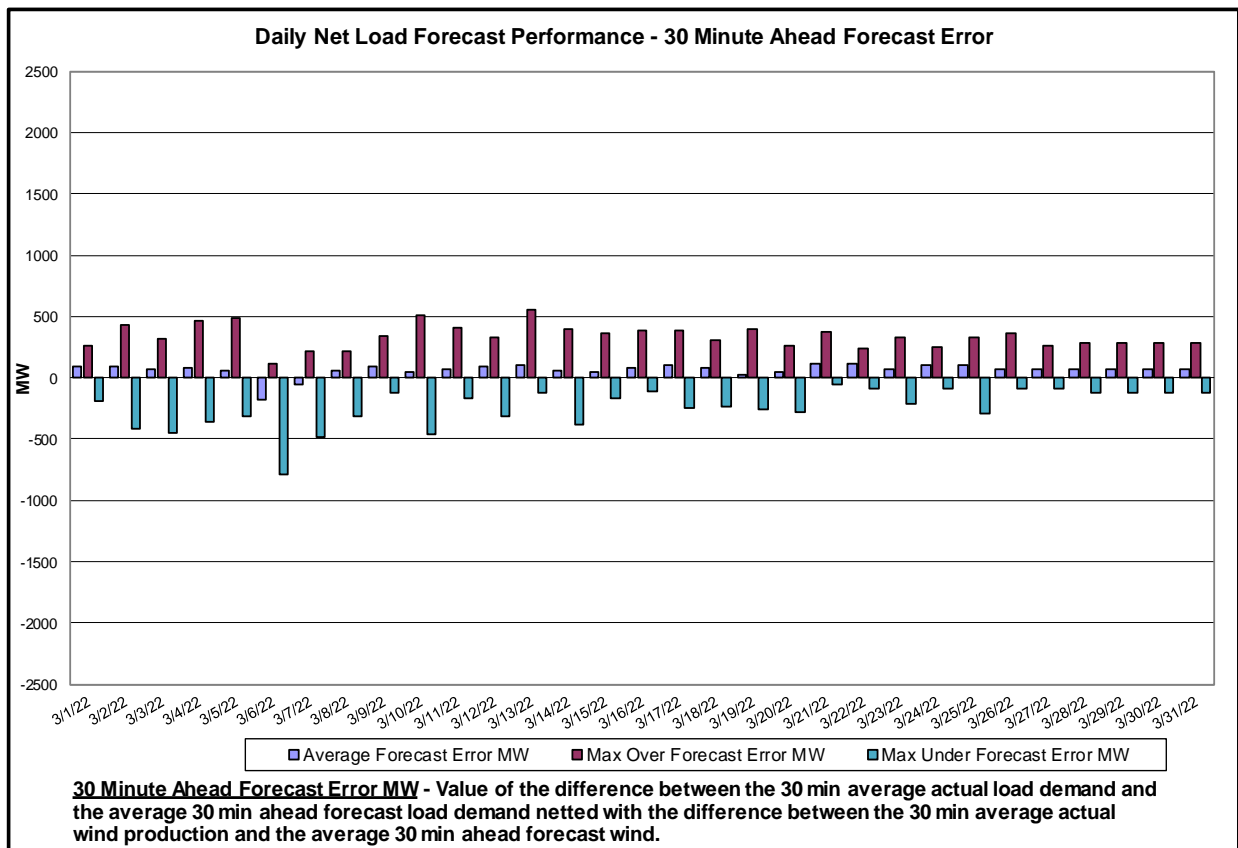
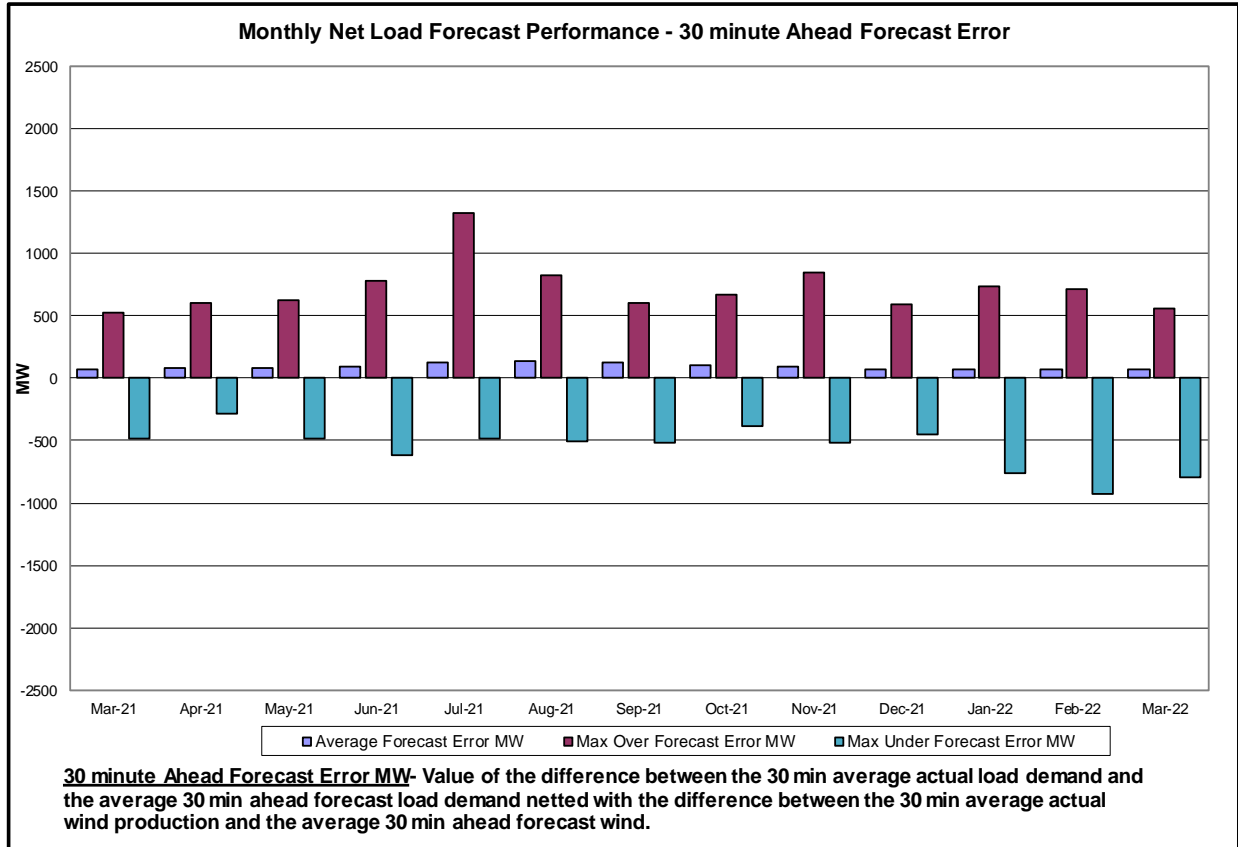
MAE Forecast - Avg |est. actual solar generation - Day Ahead forecast solar generation| / Solar Capacity
Bias - Avg (est. actual solar generation - Day Ahead forecast solar generation) / Solar Capacity

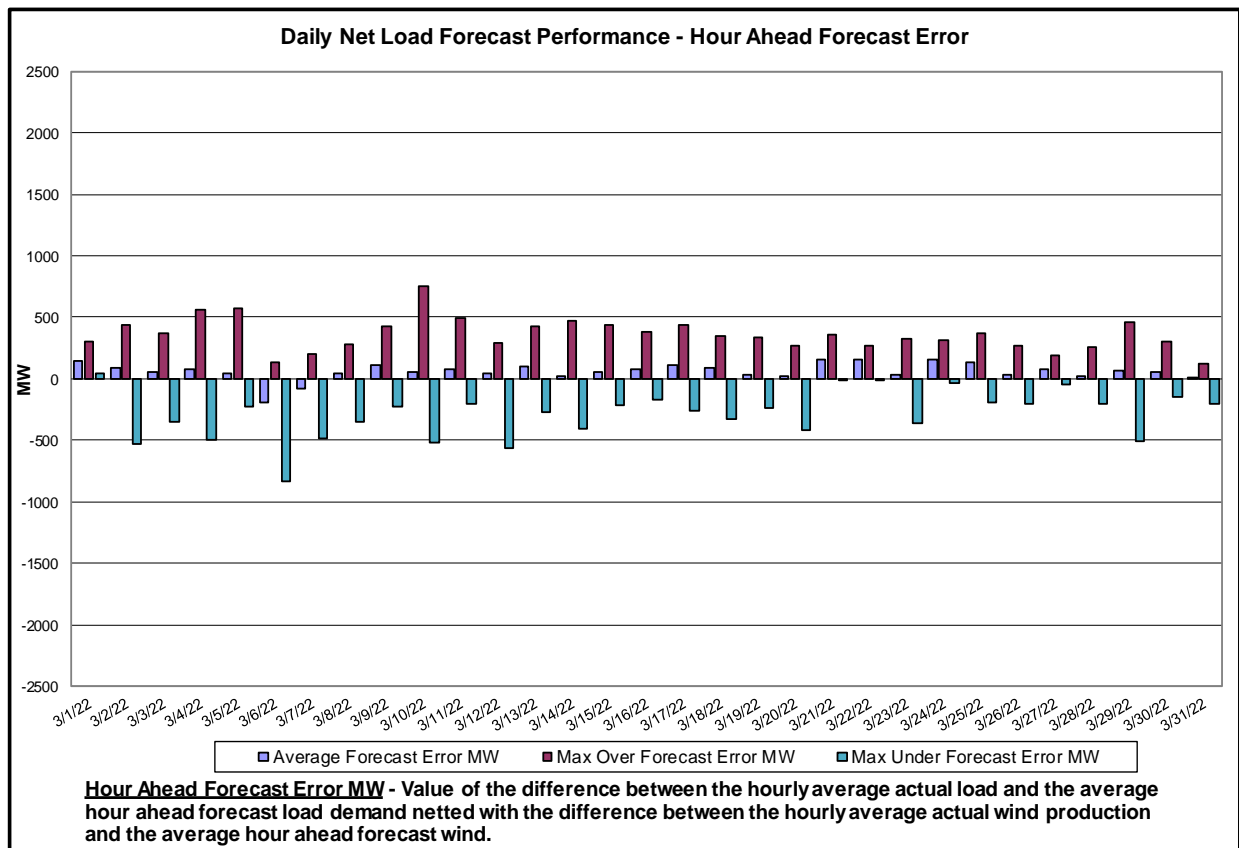
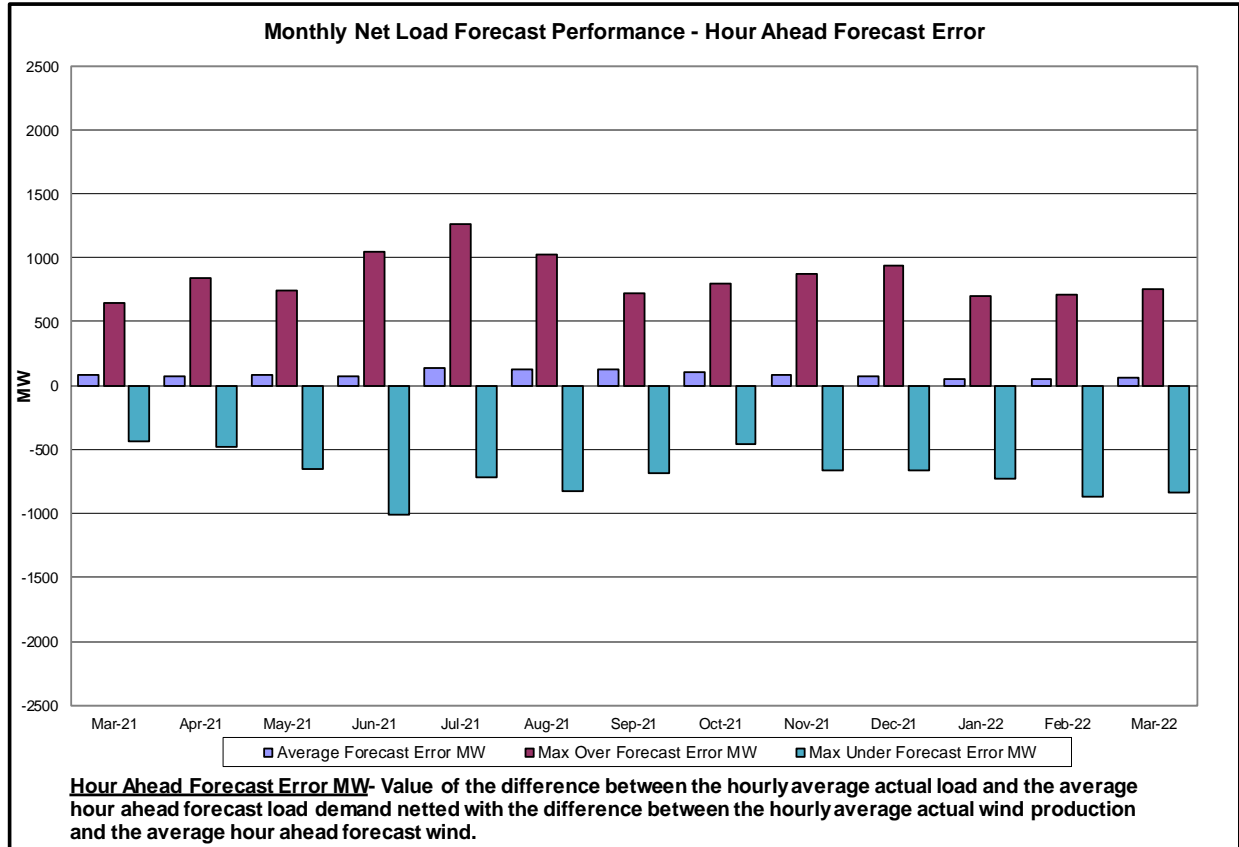
Behind the Meter Solar Forecast Performance Hour Ahead Percent Error

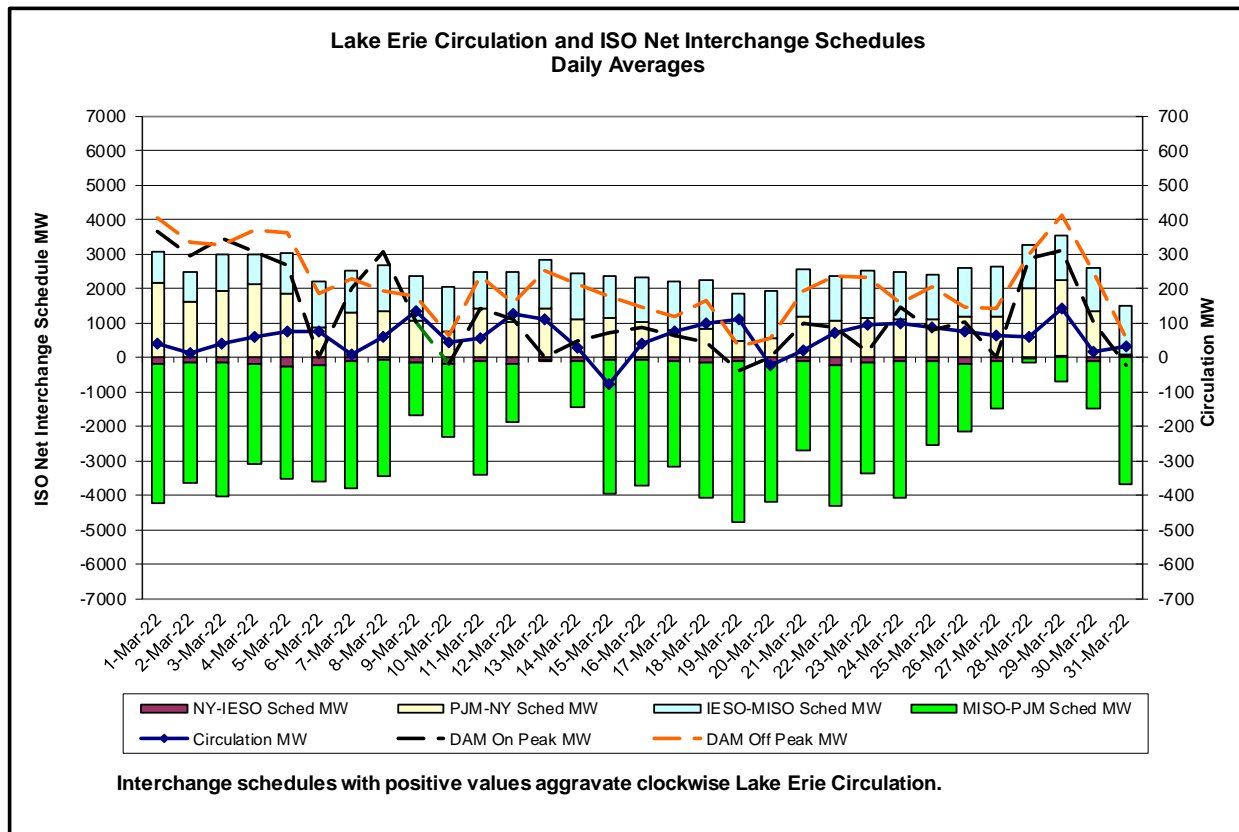
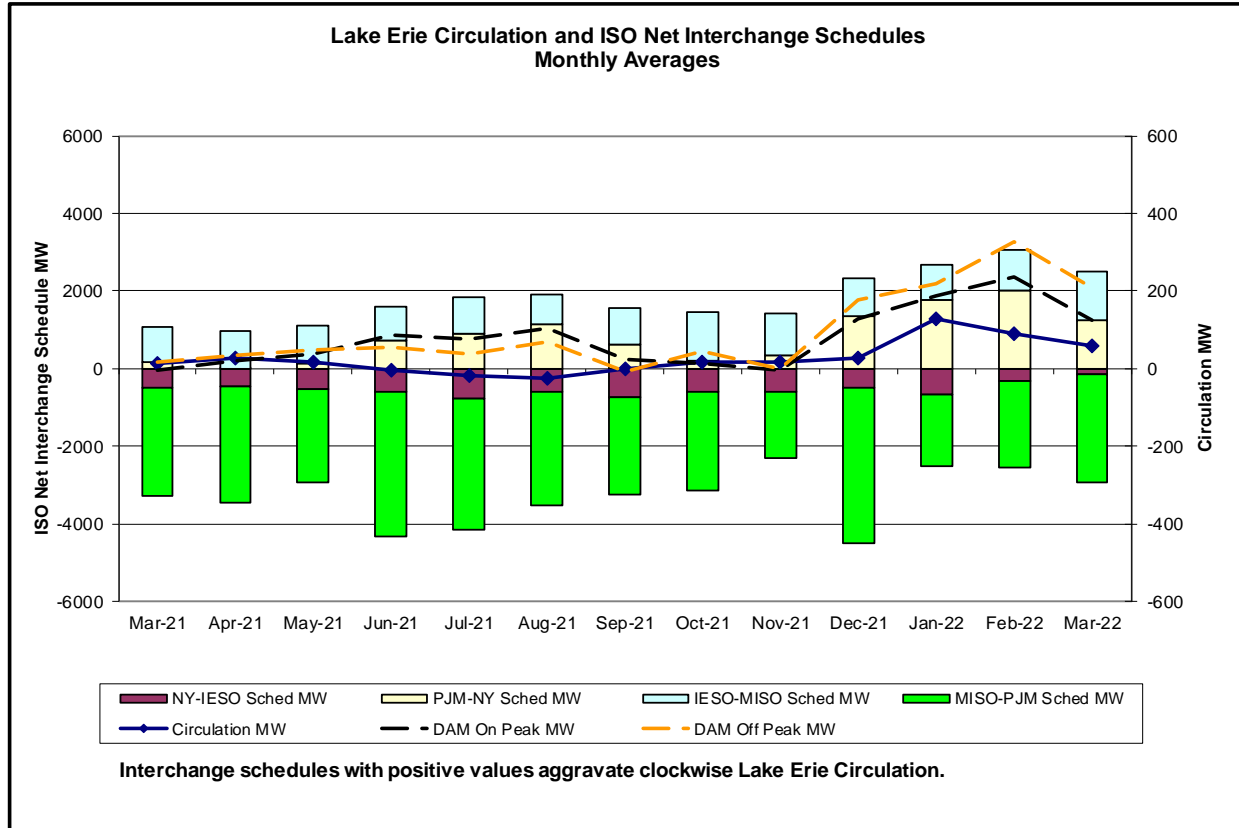


MAE Forecast - Avg |est. actual solar generation - Hour Ahead forecast solar generation| / Solar Capacity
Bias - Avg (est. actual solar generation - Hour Ahead forecast solar generation) / Solar Capacity

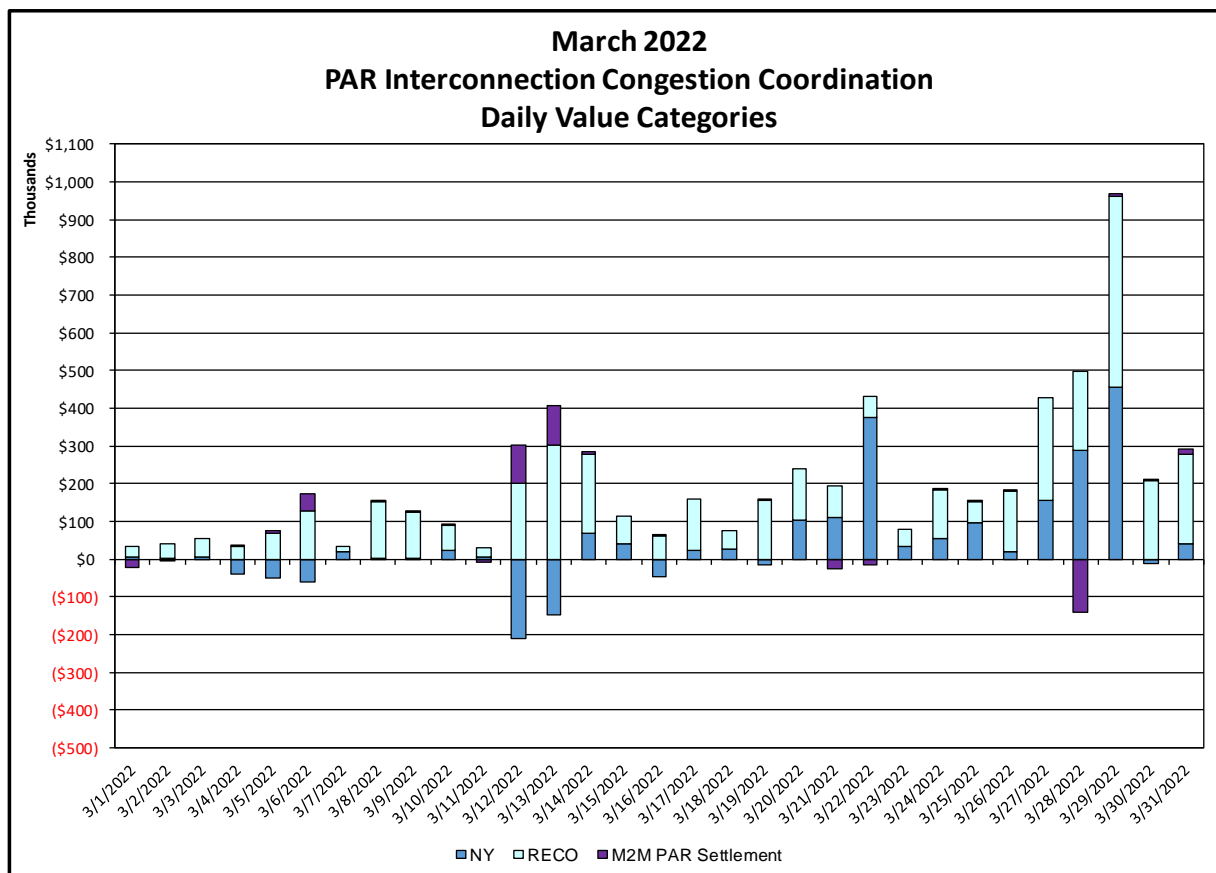
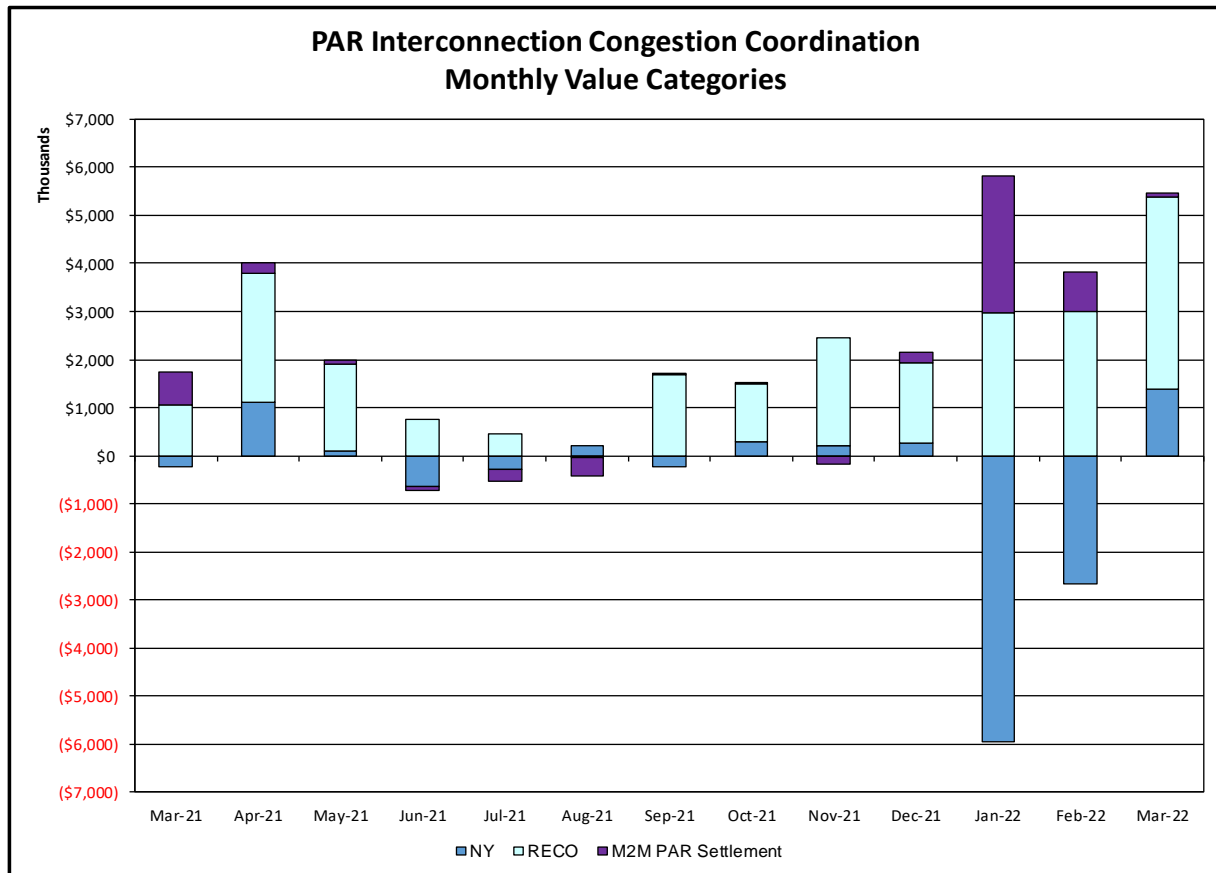




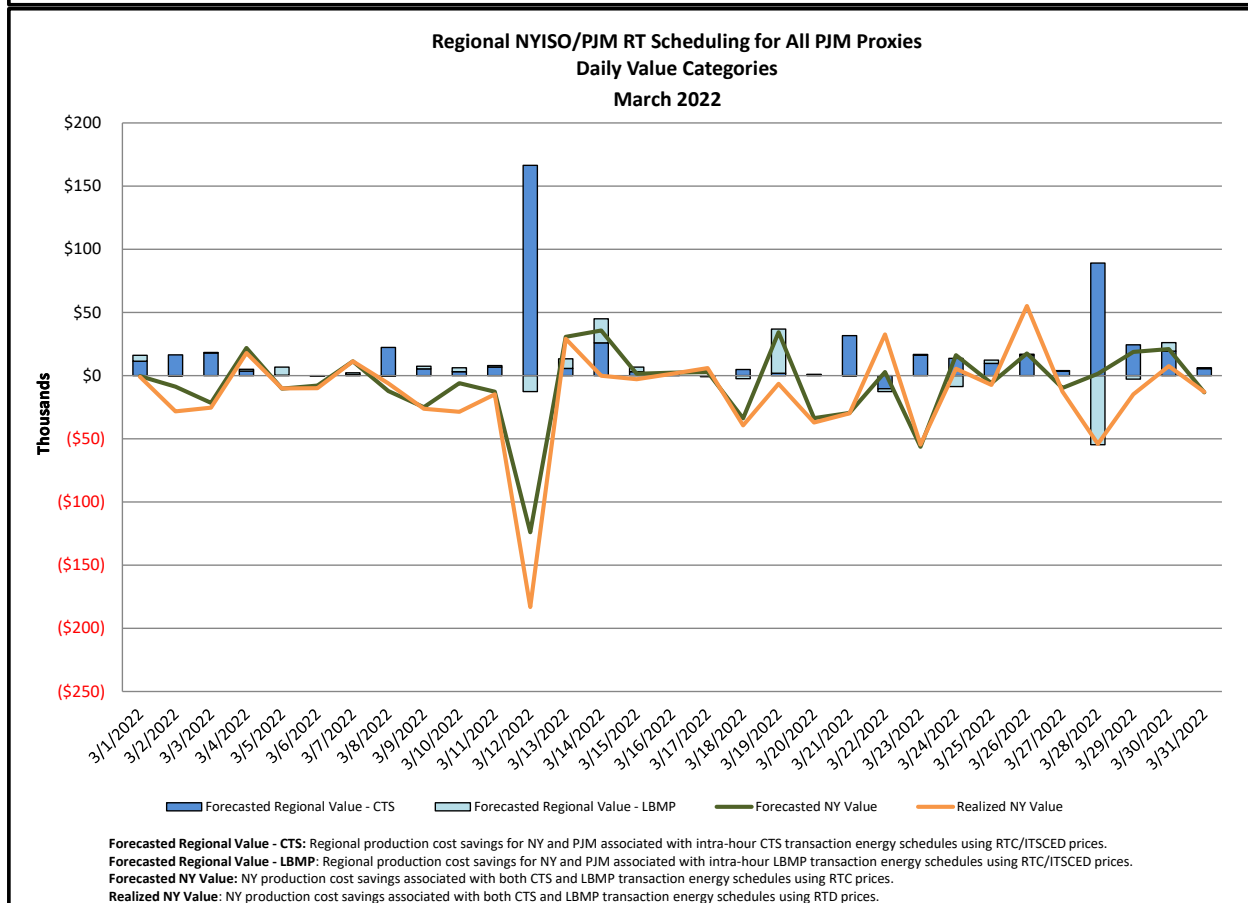
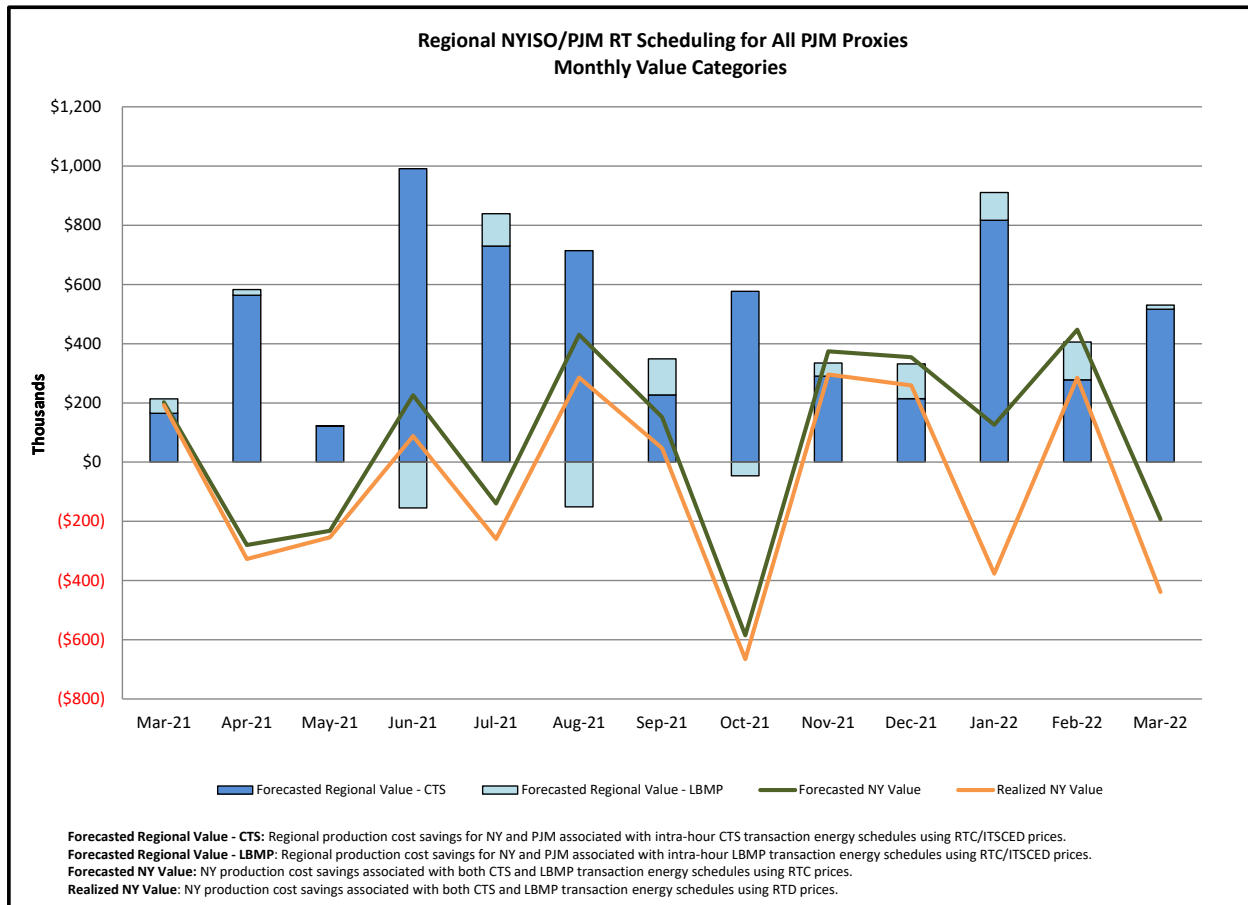




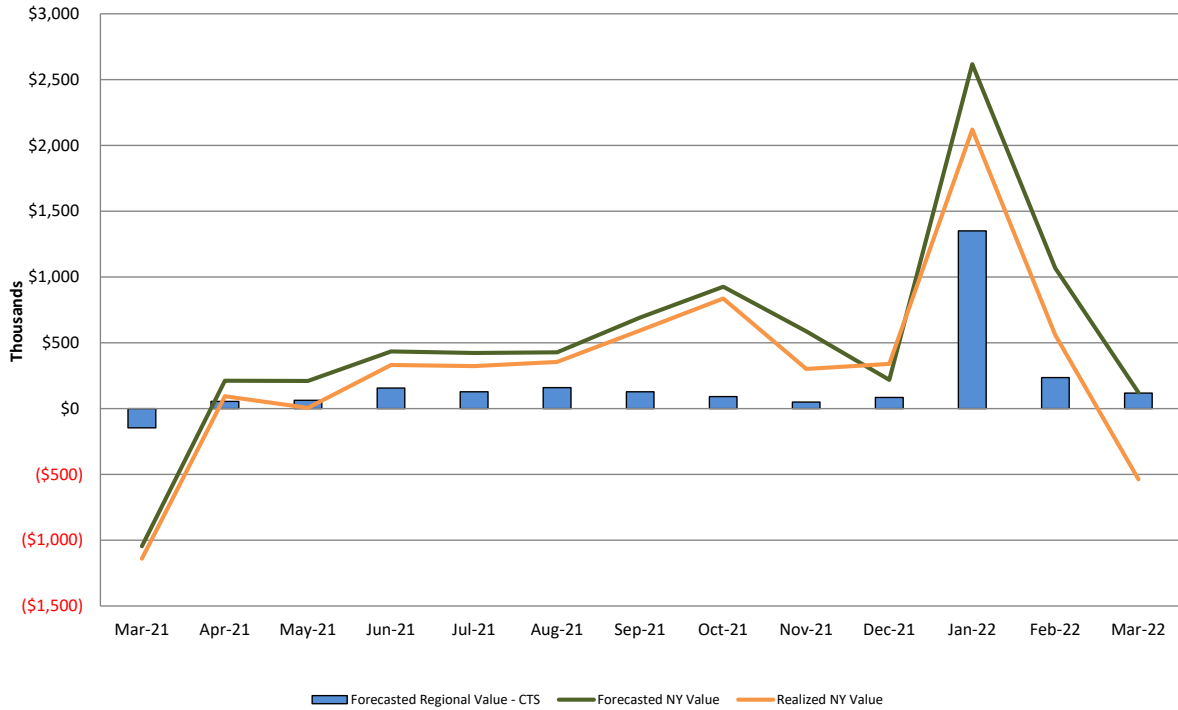
Broader Regional Market Performance Metrics



<u>PAR Interconnection Congestion Coordination</u>	
<u>Category</u>	<u>Description</u>
NY	Represents the value NY realizes from Market-to-Market PAR Coordination when experiencing congestion. This is the estimated savings to NY for additional deliveries into NY
RECO	Represents the value of PJM's obligation to deliver 80% of service to RECO load over Ramapo 5018. This is the estimated reduction in NYCA congestion due to the PJM delivery of RECO over Ramapo 5018.
M2M PAR Settlement	Market-to-Market PAR Coordination settlement on coordinated flowgates. Through April 2017 this value was included in the NY and RECO categories. The positive sign convention indicates settlement to NY while the negative indicates settlement to PJM.

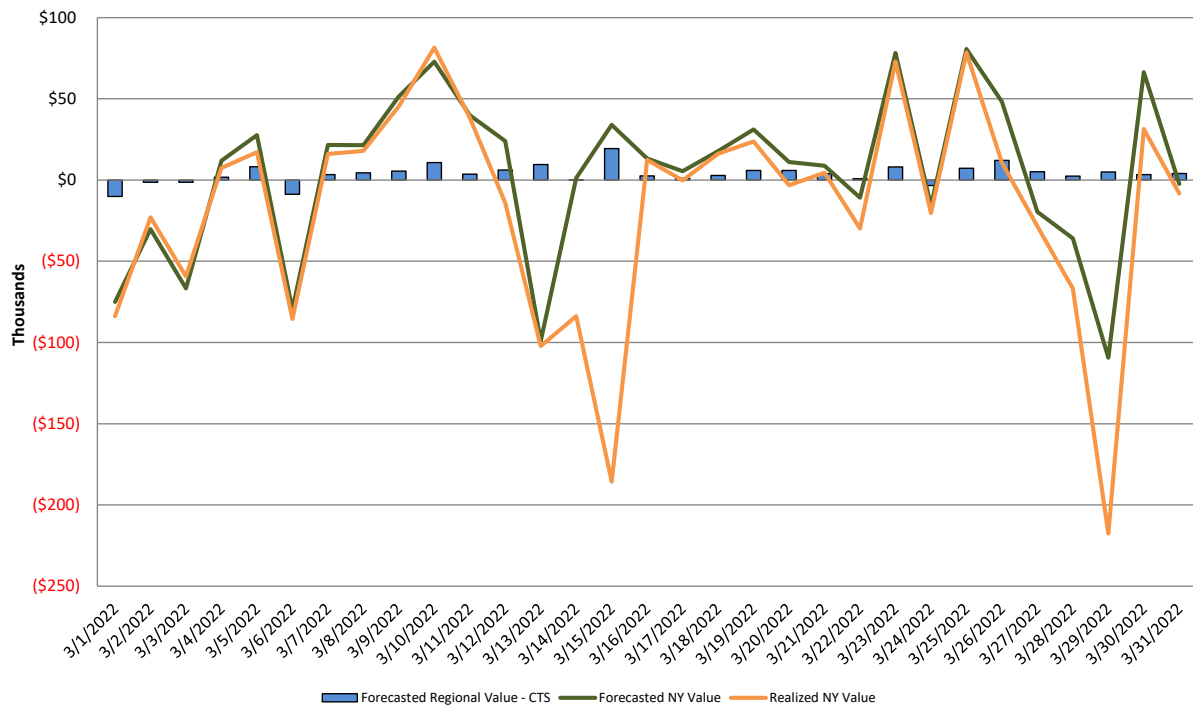


Regional NYISO/NE RT Scheduling for ISO-NE AC Monthly Value Categories



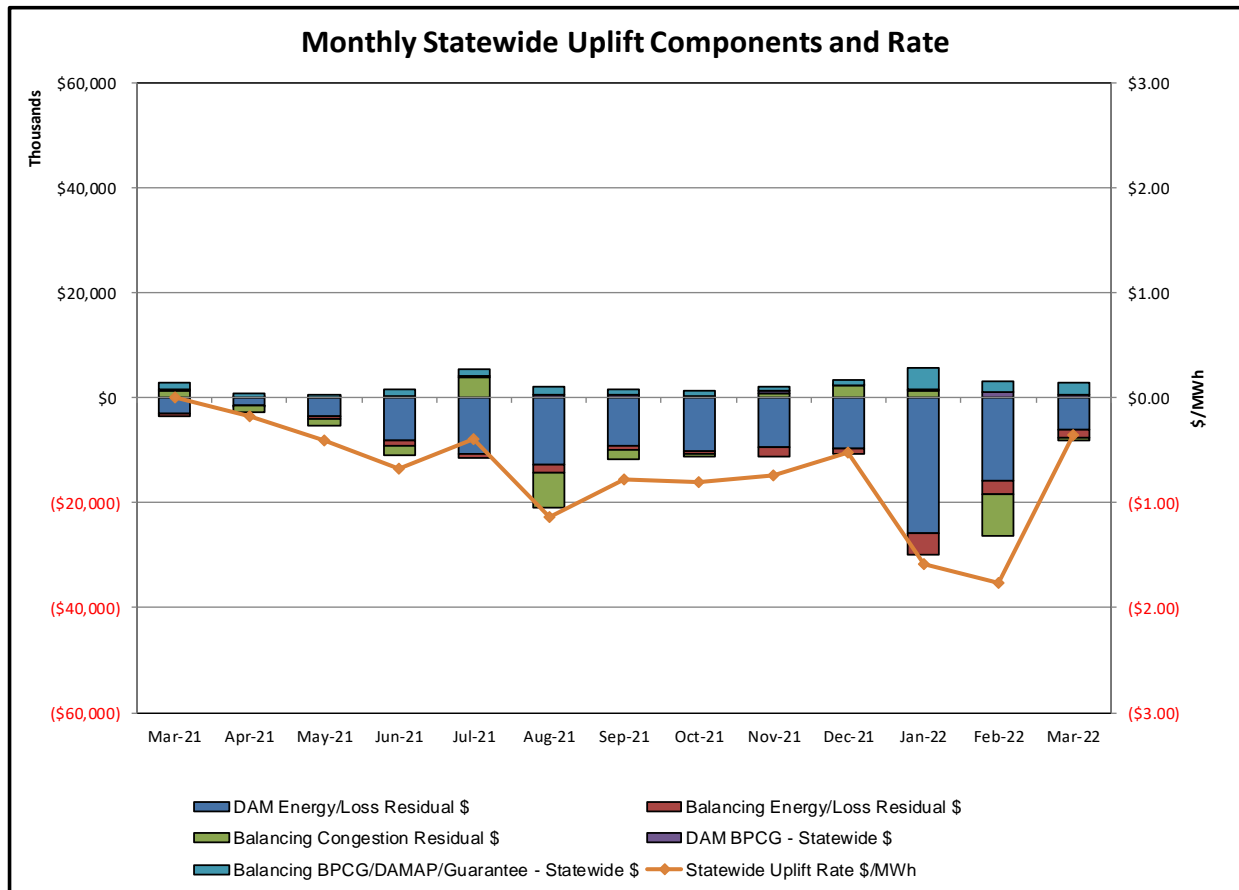
Forecasted Regional Value - CTS: Regional production cost savings for NY and NE associated with intra-hour CTS transaction energy schedules using RTC prices and NE forecasted prices.
Forecasted NY Value: NY production cost savings associated with CTS transaction energy schedules using RTC prices.
Realized NY Value: NY production cost savings associated with CTS transaction energy schedules using RTD prices.

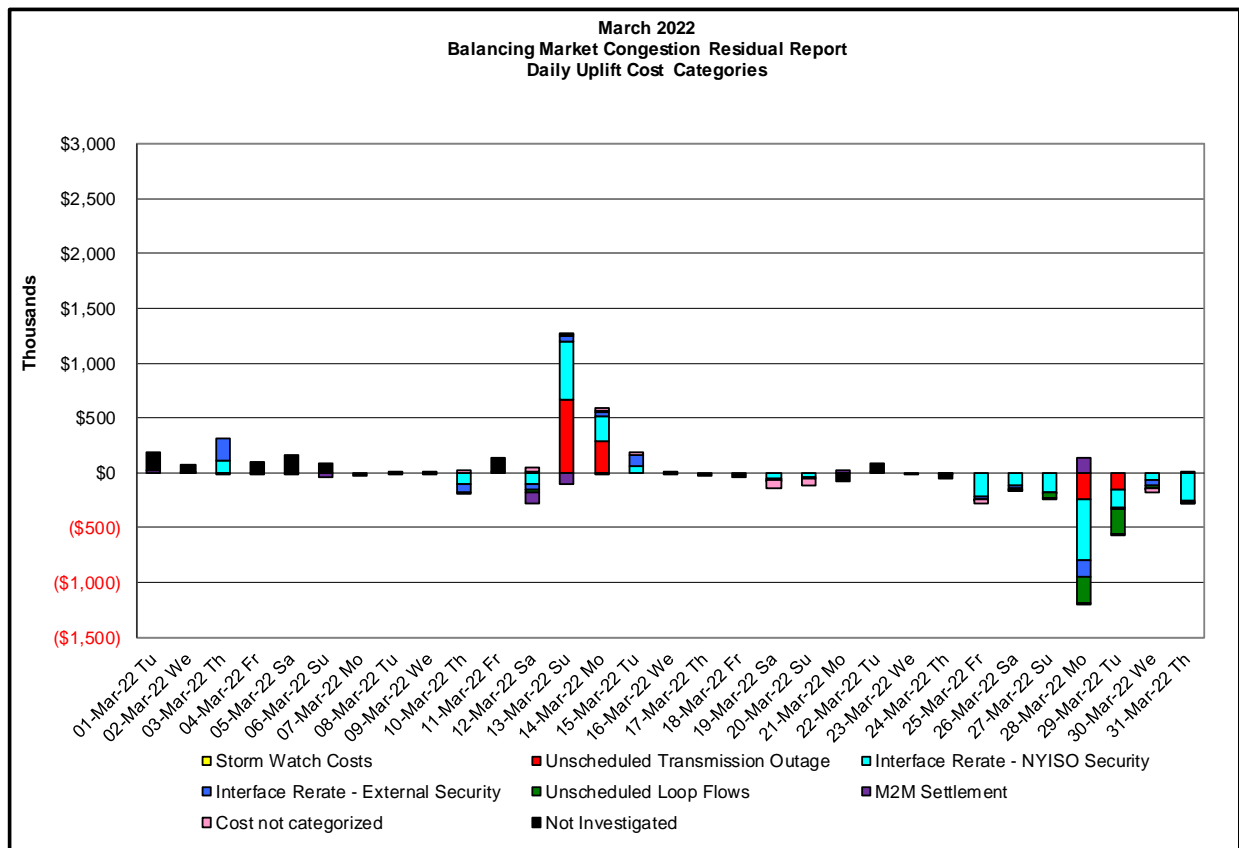
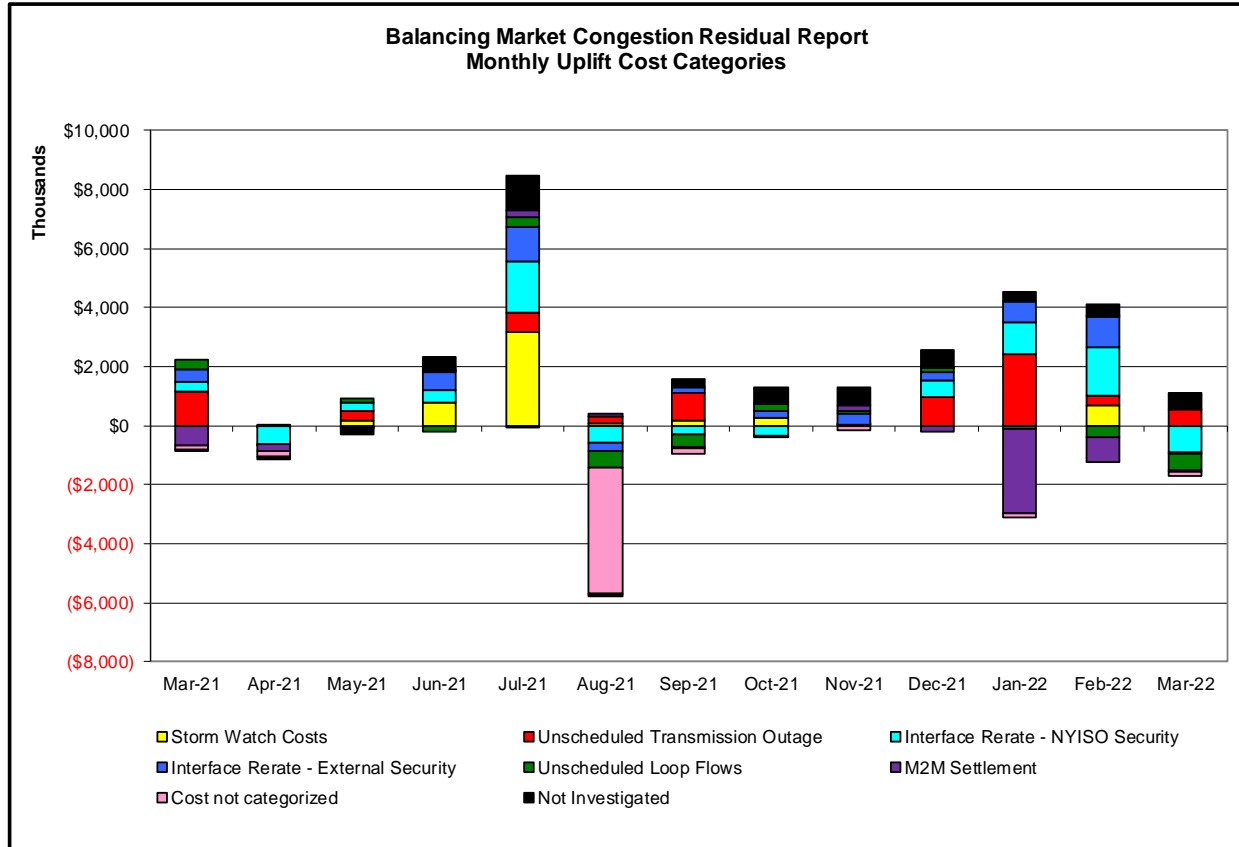
Regional NYISO/NE RT Scheduling for ISO-NE AC Daily Value Categories March 2022



Forecasted Regional Value - CTS: Regional production cost savings for NY and NE associated with intra-hour CTS transaction energy schedules using RTC prices and NE forecasted prices.
Forecasted NY Value: NY production cost savings associated with CTS transaction energy schedules using RTC prices.
Realized NY Value: NY production cost savings associated with CTS transaction energy schedules using RTD prices.

Market Performance Metrics





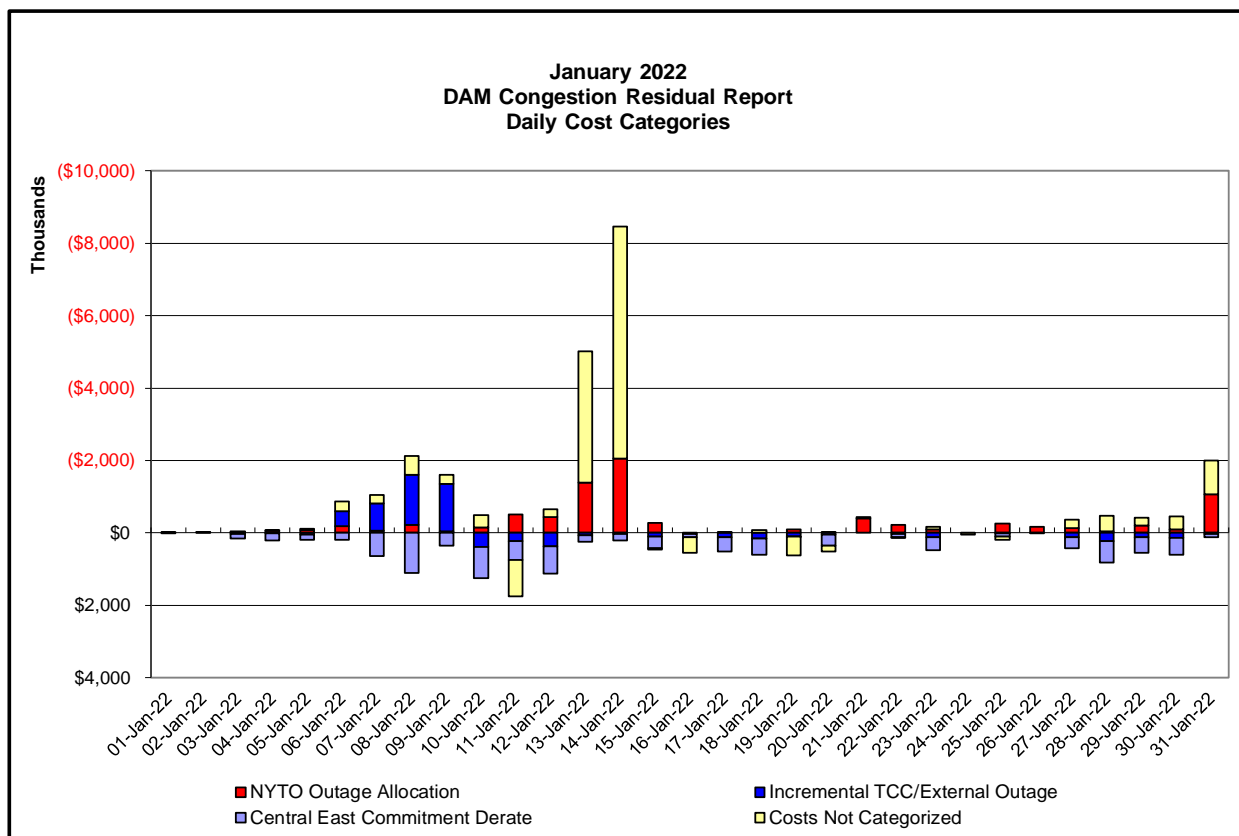
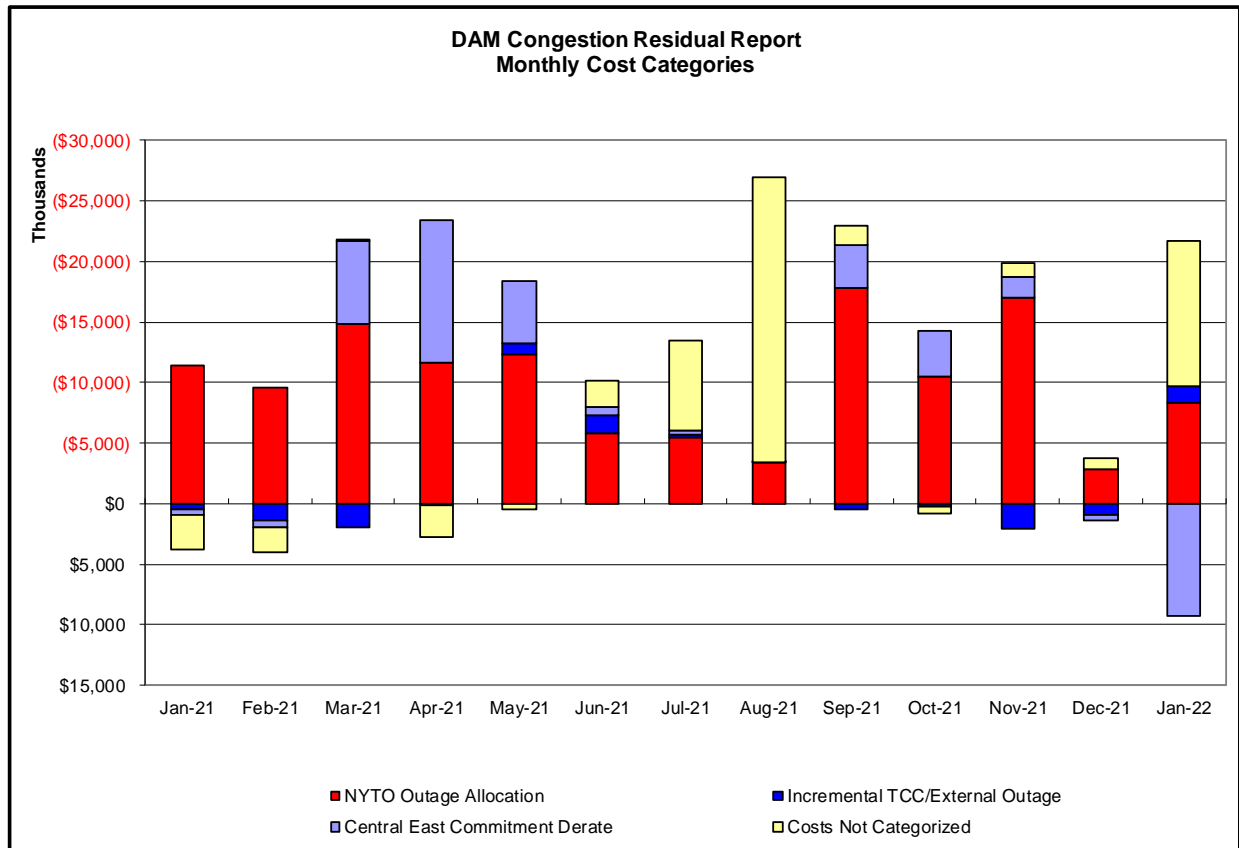
Day's investigated in March:3,10,12,13,14,15,19,20,25,26,27,28,29,30,31		
Event	Description	March Dates
	Early return to service Vernon-Greenwood 138kV (#31231)	28,29
	Extended Outage Porter-Rotterdam 230kV (#30)	12
	Forced Outage Gilboa-Leeds 345kV (#GL3)	29
	Forced Outage Sprainbrook-EastGardenCity 345kV (#Y49)	13,14
	Derate AstoriaAnnex-AstoriaEast 138kV (#34091)	14
	Derate Central East	13,14,19,26
	Derate Dunwoodie-Shore Rd 345kV (#Y50)	3,15,28
	Derate Dunwoodie-Shore Rd 345kV (#Y50) I/o SCB:SPBK(RNS2):Y49&M29&Y49_ST	3
	Derate Dunwoodie-Shore Rd 345kV (#Y50) I/o Sprainbrook-EastGardenCity 345kV (#Y49)	3
	Derate East 13th Street- West 49th Street 345kV (#M54)	14
	Derate Farragut-Gowanus 345kV (#41)	3
	Derate Foxhills-Greenwood 138kV (#29231) I/o Foxhills-Willowbrook 138kV (#29212&BK2)	13,28
	Derate Foxhills-Greenwood 138kV (#29231) I/o SCB:GOETH(9):G23L&26&R26	28
	Derate Foxhills-Greenwood 138kV (#29232) I/o Foxhills-Willowbrook 138kV (#29211&BK1)	30
	Derate Foxhills-Greenwood 138kV (#29232) I/o SCB:GOETH(9):G23L&26&R26	19,29
	Derate Goethals-Gowanus 345kV (#25) I/o SCB:GOETH(8):G23M&26&R26	13
	Derate Goethals-Gowanus 345kV (#26)	28,30
	Derate Goethals-Gowanus 345kV (#26) I/o SCB:GOETH(3):25&22&R25	13
	Derate Goethals-Gowanus 345kV (#26) I/o SCB:GOETH(6):21&G23M	28
	Derate Greenwood-Vernon 138kV (#31231) I/o Farragut-Gowanus 345kV (#41)	3
	Derate Malone-Willis 115kV (#1-910) I/o TWR:MOSES MW2 & MAL4	14
	Derate Rocktavern-Roseton 345kV (#311) I/o TWR: Y88 & Y94 & TA5	3
	NYCA DNI Ramp Limit	3,12,14,25,27-31
	Uprate Central East	10,12,13,25,27-31
	Uprate E179th St-Hellgate 138kV (#15055)	31
	Uprate Foxhills-Greenwood 138kV (#29232) I/o SCB:GOETH(9):G23L&26&R26	19,20,25-31
	Uprate Porter-Rotterdam 230kV (#30) I/o BUS:N.SCTLD #99&18&1&94&BK1&C2	10
	HQ Cedars-NY Scheduling Limit	15
	HQ Chat-NY Scheduling Limit	29
	NE_AC Active DNI Ramp Limit	3,12-15,25-31
	NE_AC-NY Scheduling Limit	3,10,19
	NE_NNC1385-NY Scheduling Limit	3,10,13,14,28-30
	PJM_AC ACTIVE DNI Ramp Limit	14,15,19,26,30
	PJM_AC-NY Scheduling Limit	3,28,29
	Lake Erie Circulation, DAM-RTM exceeds +/-125MW; Central East	12-14,20,25-31
	Lake Erie Circulation, DAM-RTM exceeds +/-125MW; West	12-14,20,26-31

Real-Time Balancing Market Congestion Residual (Uplift Cost) Categories

<u>Category</u>	<u>Cost Assignment</u>	<u>Events Types</u>	<u>Event Examples</u>
Storm Watch	Zone J	Thunderstorm Alert (TSA)	TSA Activations
Transmission Outage Mismatch	Market-wide	Changes in DAM to RTM transfers related to transmission outage mismatch	Forced Line Outage, Unit AVR Outages, Early Line Return from Outage
Interface/Facility Rerate - NYISO Security	Market-wide	Changes in DAM to RTM transfers not related to transmission outage	Interface/Facility Rerates due to RTM voltages
Interface Rerate - External Security	Market-wide	Changes in DAM to RTM transfers related to External Control Area Security Events	TLR Events, External Transaction Curtailments
Unscheduled Loop Flows	Market-wide	Changes in DAM to RTM unscheduled loop flows impacting NYISO Interface transmission constraints	DAM to RTM Lake Erie Loop Flows exceeding +/- 125 MW
M2M Settlement	Market-wide	Settlement result inclusive of coordinated redispatch and Ramapo flowgates	

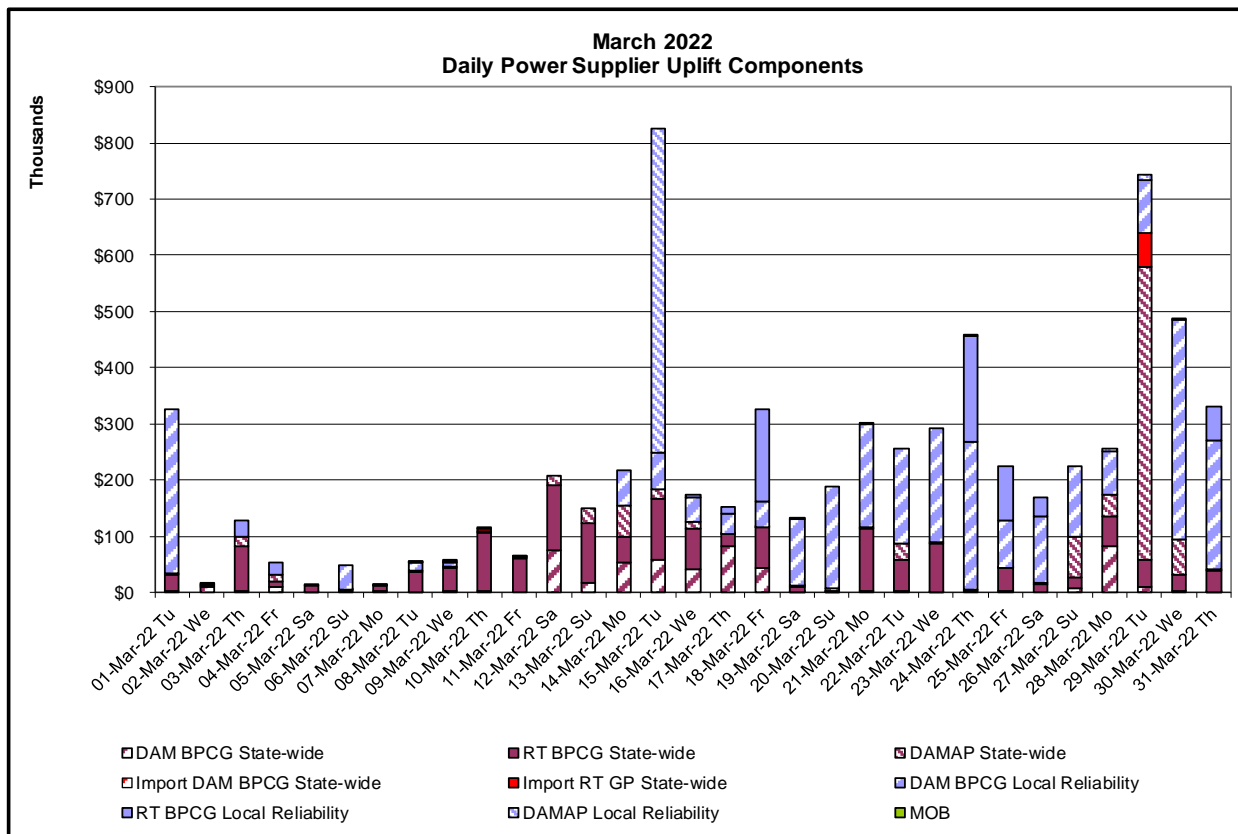
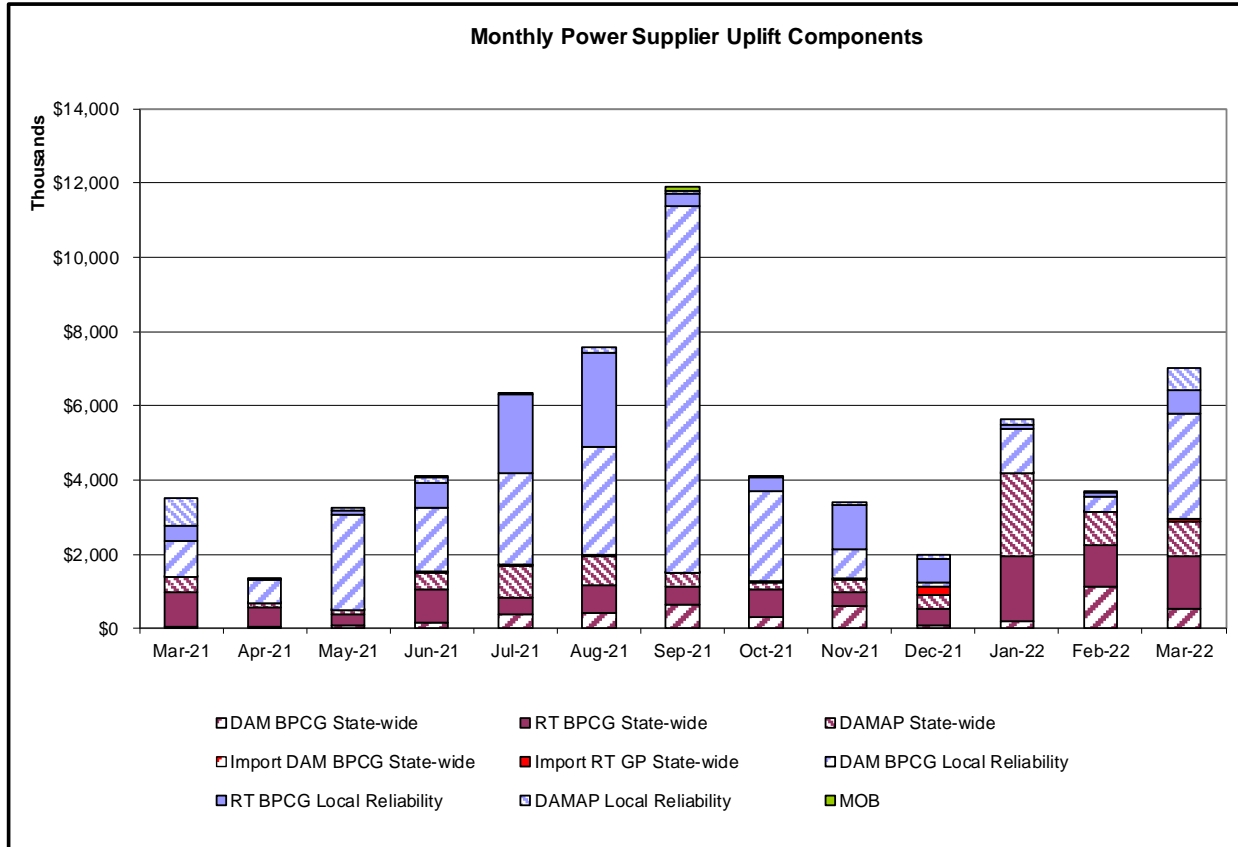
Monthly Balancing Market Congestion Report Assumptions/Notes

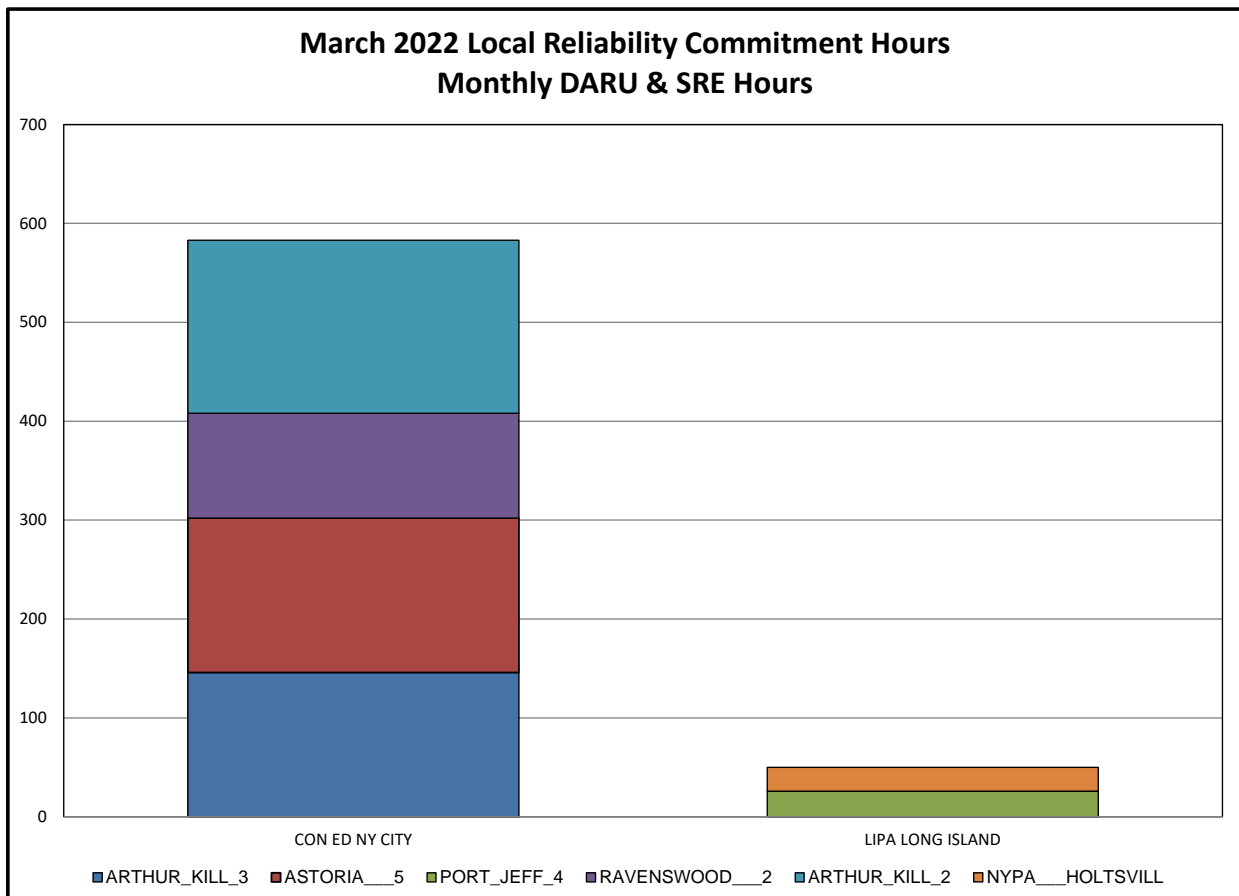
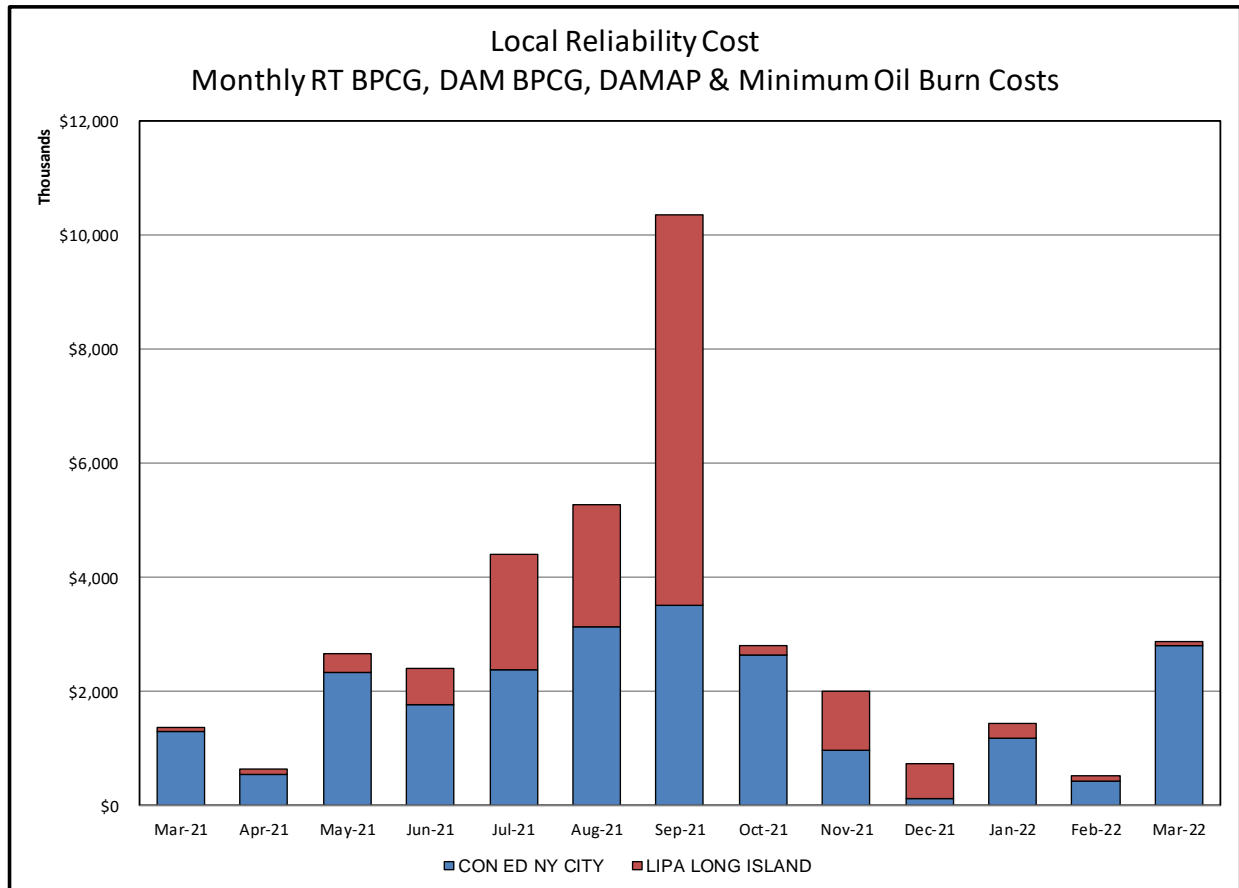
- 1) Storm Watch Costs are identified as daily total uplift costs
- 2) Days with a value of BMCR less M2M Settlement of \$100K/HR, shortfall of \$200K/Day or more, or surplus of \$100K/Day or more are investigated.
- 3) Uplift costs associated with multiple event types are apportioned equally by hour

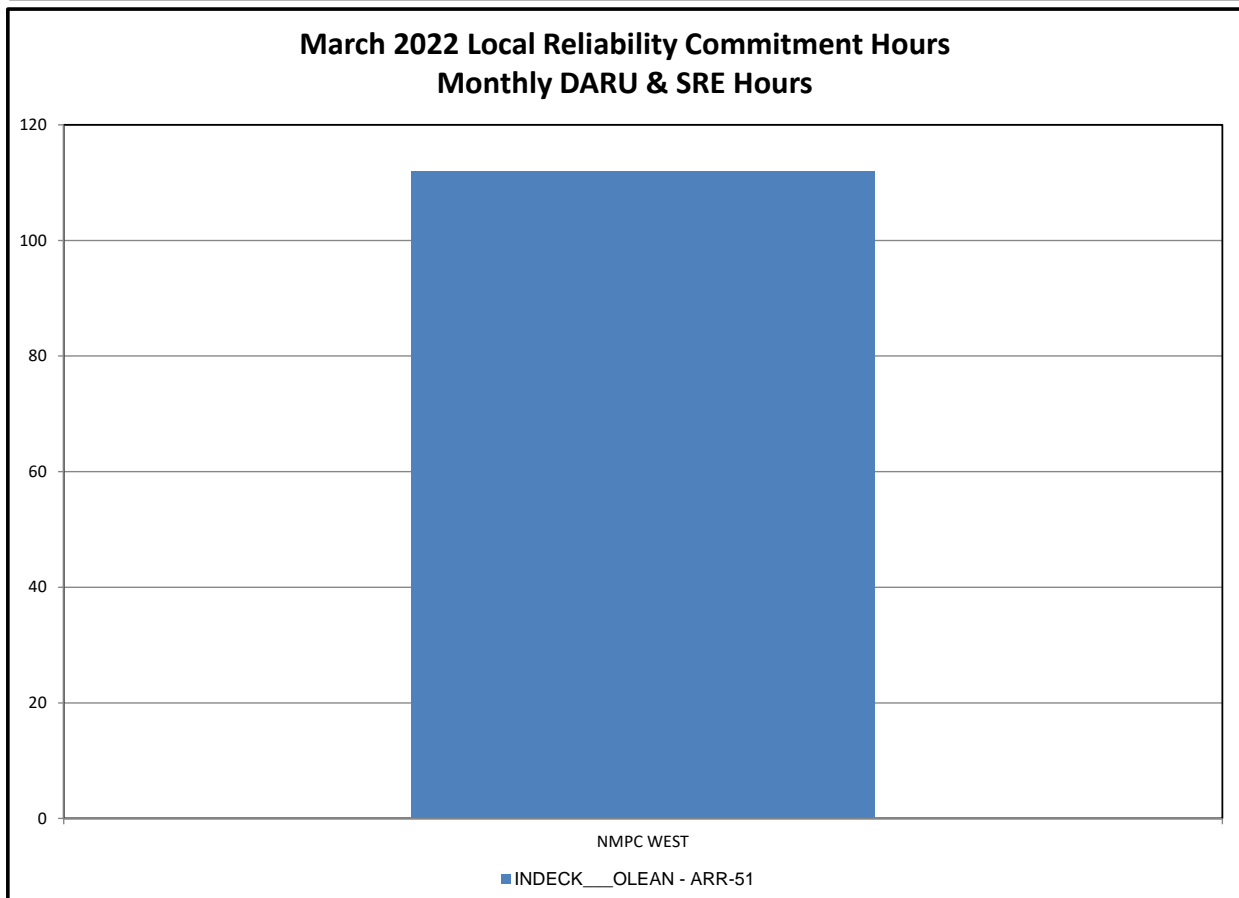
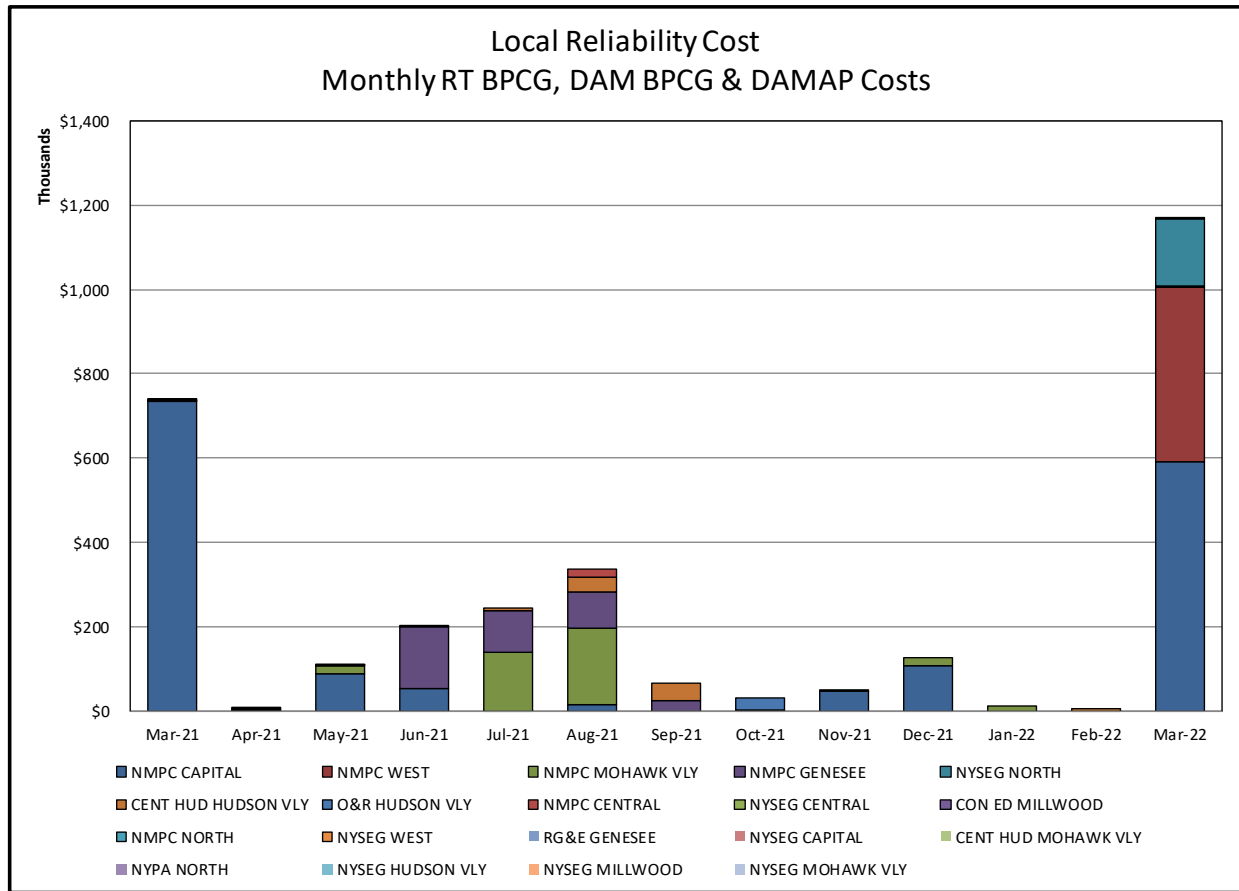


Day-Ahead Market Congestion Residual Categories

<u>Category</u>	<u>Cost Assignment</u>	<u>Events Types</u>	<u>Event Examples</u>
NYTO Outage Allocation	Responsible TO	Direct allocation to NYTO's responsible for transmission equipment status change.	DAM scheduled outage for equipment modeled in-service for the TCC Auction.
Incremental TCC/External Outage Impacts	All TO by Monthly Allocation Factor	Allocation associated with transmission equipment status change caused by change in status of external equipment or change in status of equipment associated with Incremental TCC.	Tie line required out-of-service by TO of neighboring control area.
Central East Commitment Derate	All TO by Monthly Allocation Factor	Reductions in the DAM Central East_VC limit as compared to the TCC Auction limit, which are not associated with transmission line outages.	

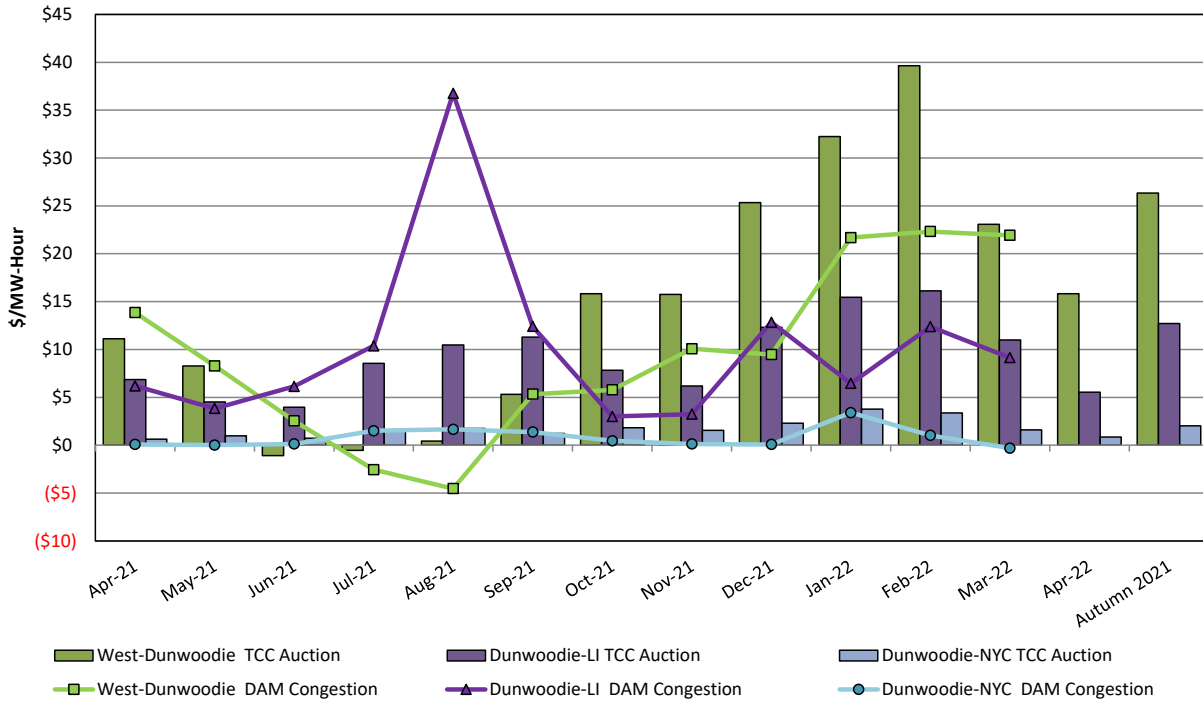






TCC & Day Ahead Market Selected Internal Path Congestion

TCC Monthly Reconfiguration Auction vs. Monthly DAM Average
with Autumn 2021 Centralized TCC Auction Six-Month Average



TCC & Day Ahead Market West to Dunwoodie Path Congestion

TCC Monthly Reconfiguration Auction vs. Monthly DAM Average
with Autumn 2021 Centralized TCC Auction Six-Month Average

