

Operations Performance Metrics Monthly Report



July 2020 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 August 10, 2020.

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July 2020 Operations Performance Highlights

- Peak load of 30,660 MW occurred on 07/27/2020 HB 17
- All-time summer capability period peak load of 33,956 MW occurred on 7/19/2013 HB 16
- 29.93 hours of Thunder Storm Alerts were declared
- 0 hours of NERC TLR level 3 curtailment
- Warmer than normal temperatures offset the COVID-19 load impacts in July
- 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.

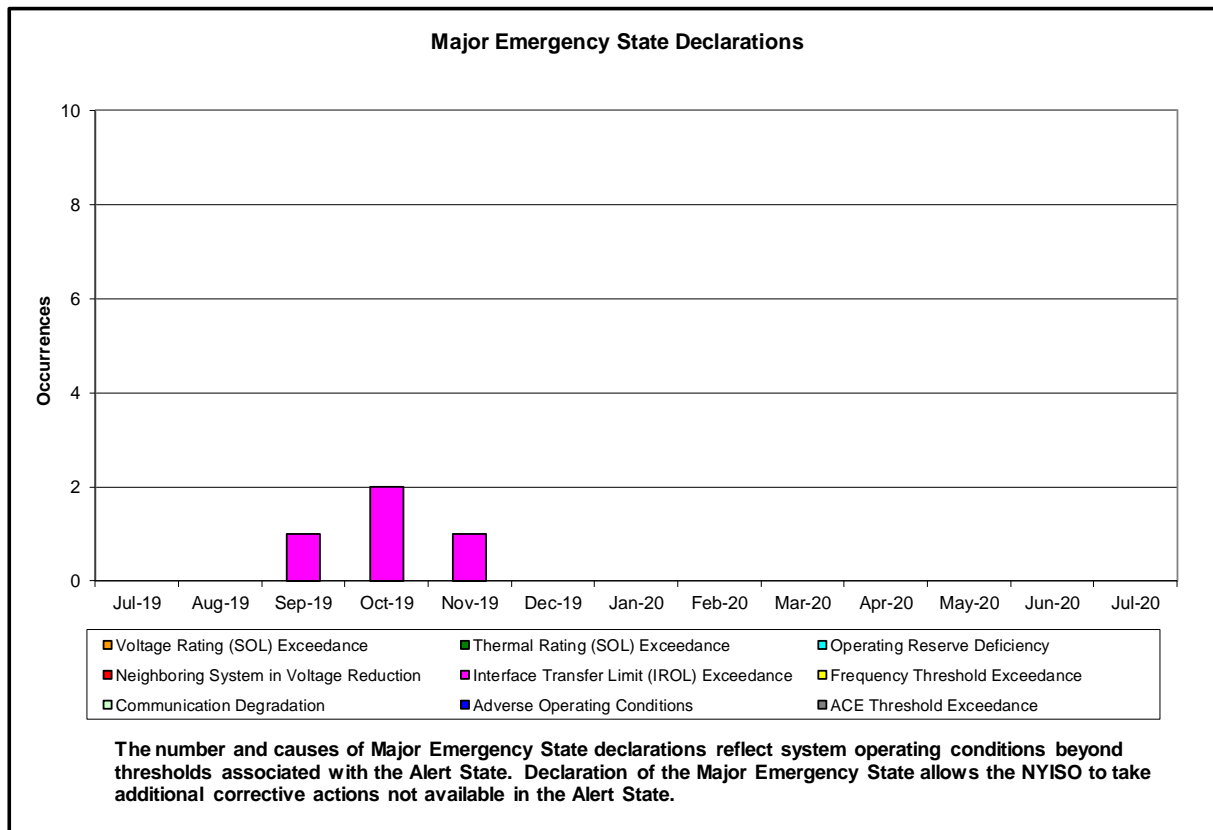
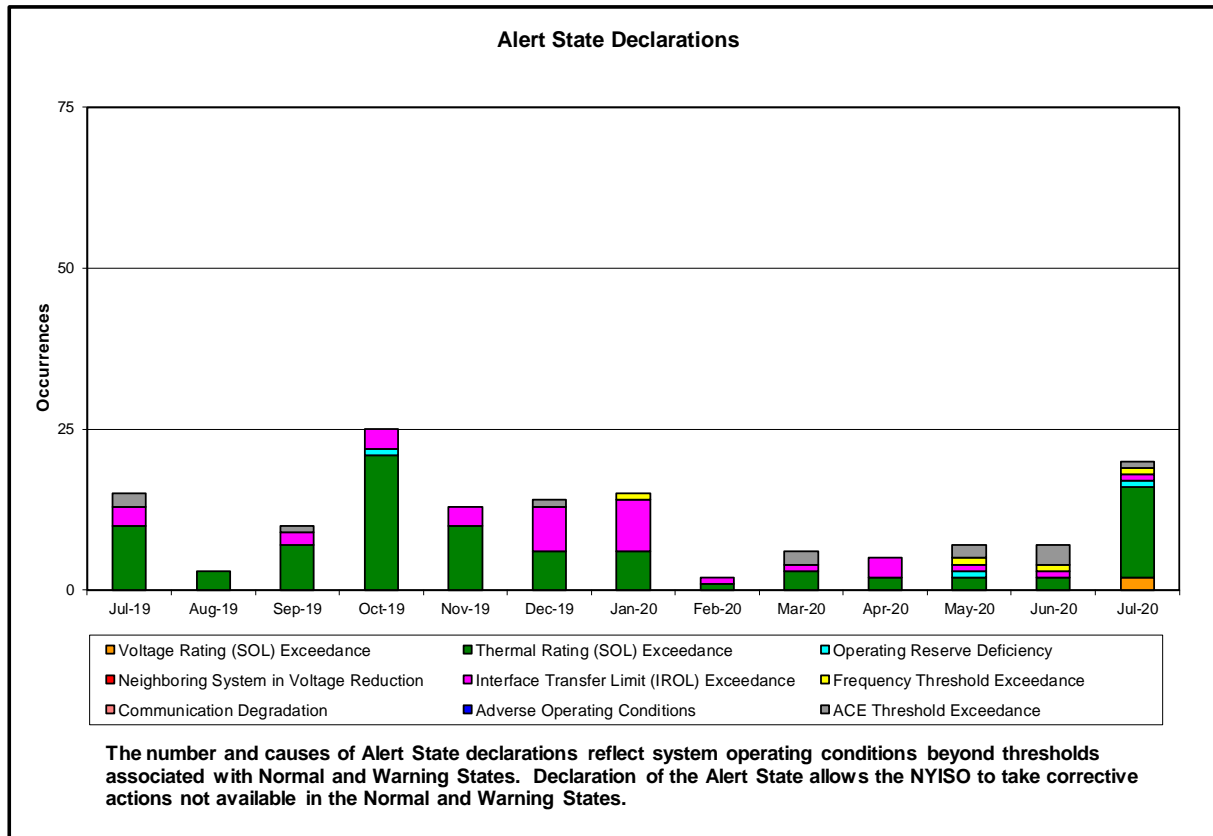
| | Current Month Value (\$M) | Year-to-Date Value (\$M) |
|--|---------------------------|--------------------------|
| NY Savings from PJM-NY Congestion Coordination | \$0.42 | \$2.95 |
| NY Savings from PJM-NY Coordinated Transaction Scheduling | (\$0.30) | (\$0.41) |
| NY Savings from NE-NY Coordinated Transaction Scheduling | \$0.49 | \$1.04 |
| Total NY Savings | \$0.61 | \$3.58 |
| Regional Savings from PJM-NY Coordinated Transaction Scheduling | \$0.40 | \$1.17 |
| Regional Savings from NE-NY Coordinated Transaction Scheduling | \$0.16 | \$0.18 |
| Total Regional Savings | \$0.56 | \$1.35 |

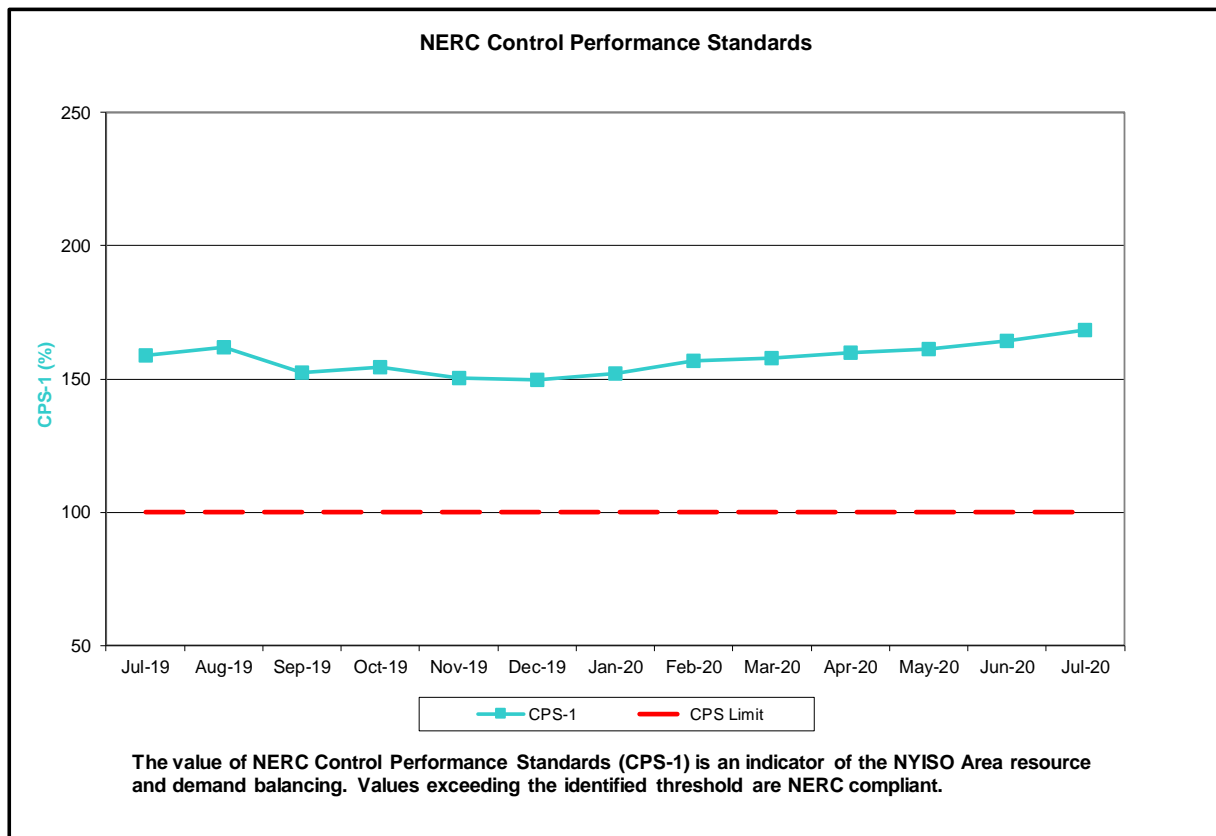
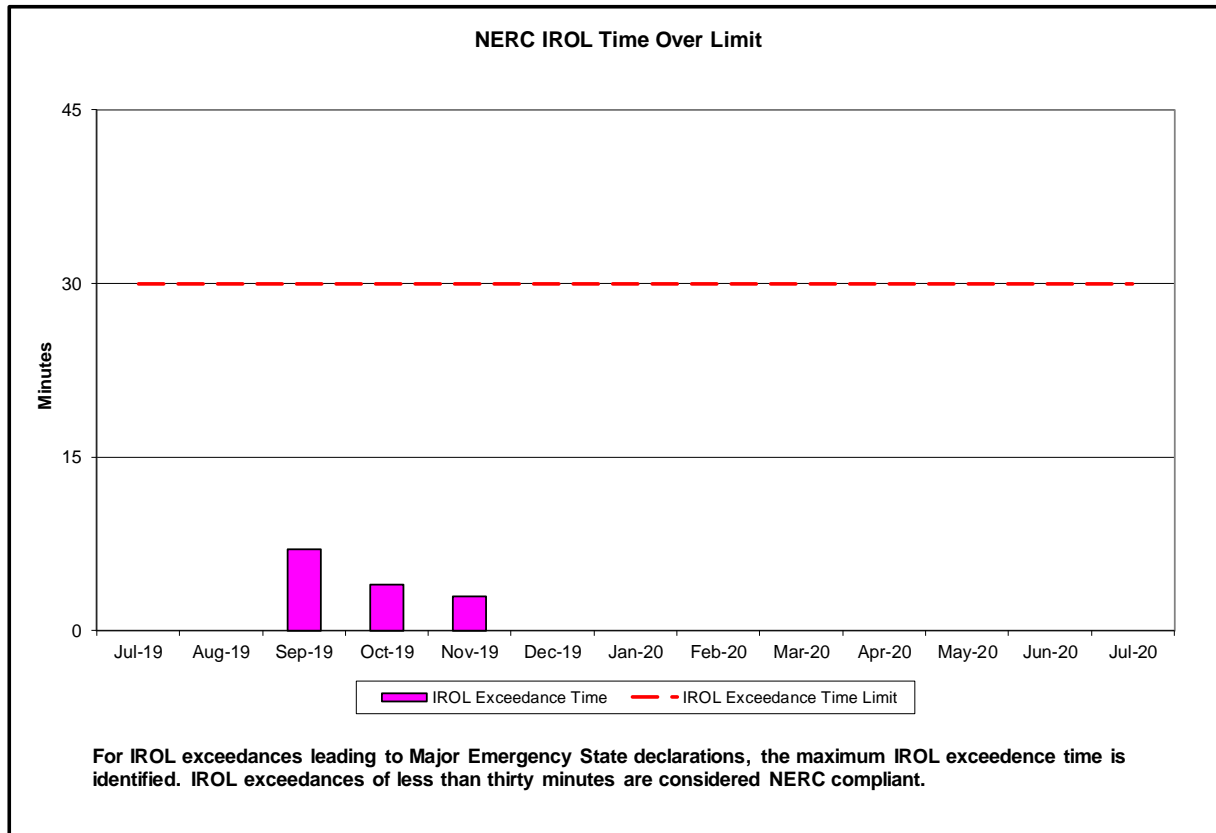
- Statewide uplift cost monthly average was (\$0.31)/MWh
- The following table identifies the Monthly ICAP spot market prices and the price delta.

| Spot Auction Price Results | NYCA | Lower Hudson Valley Zones | New York City Zone | Long Island Zone |
|----------------------------|----------|---------------------------|--------------------|------------------|
| August 2020 Spot Price | \$2.37 | \$2.37 | \$18.72 | \$5.17 |
| July 2020 Spot Price | \$2.69 | \$2.69 | \$19.03 | \$5.32 |
| Delta | (\$0.32) | (\$0.32) | (\$0.31) | (\$0.15) |

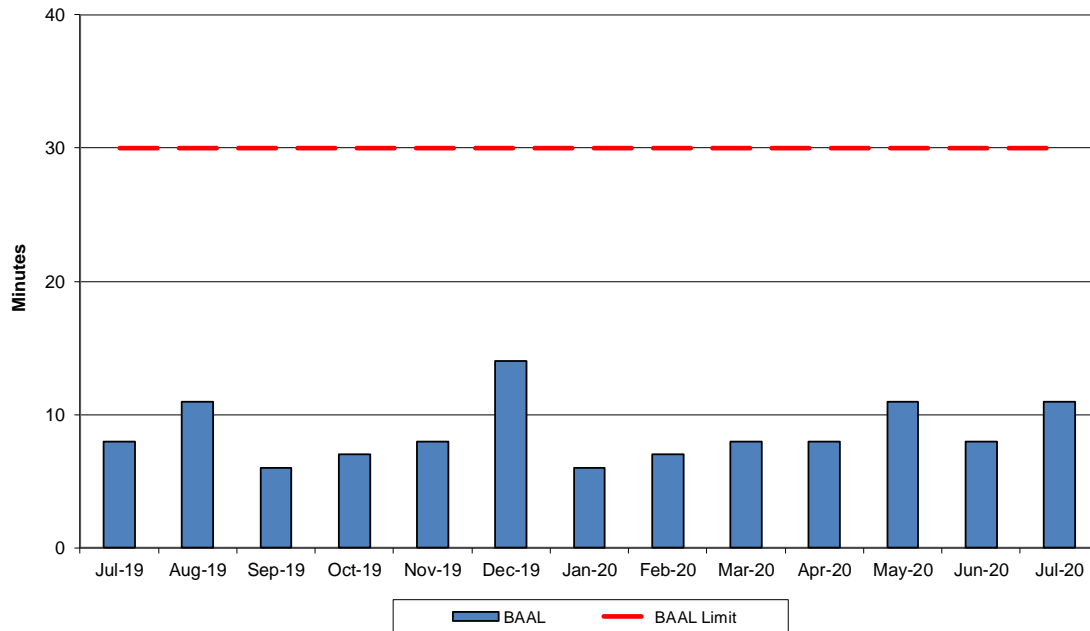
- Long Island - Increase in Gen UCAP, increase in SCR availability, decrease in unoffered
- NYC - Increase in Gen UCAP, increase in SCR availability, decrease in unoffered
- Lower Hudson Valley - Increase in Gen UCAP, increase in SCR availability, increase in unoffered
- NYCA - Increase in Gen UCAP, increase in SCR availability, increase in unoffered, increase in net imports

Reliability Performance Metrics



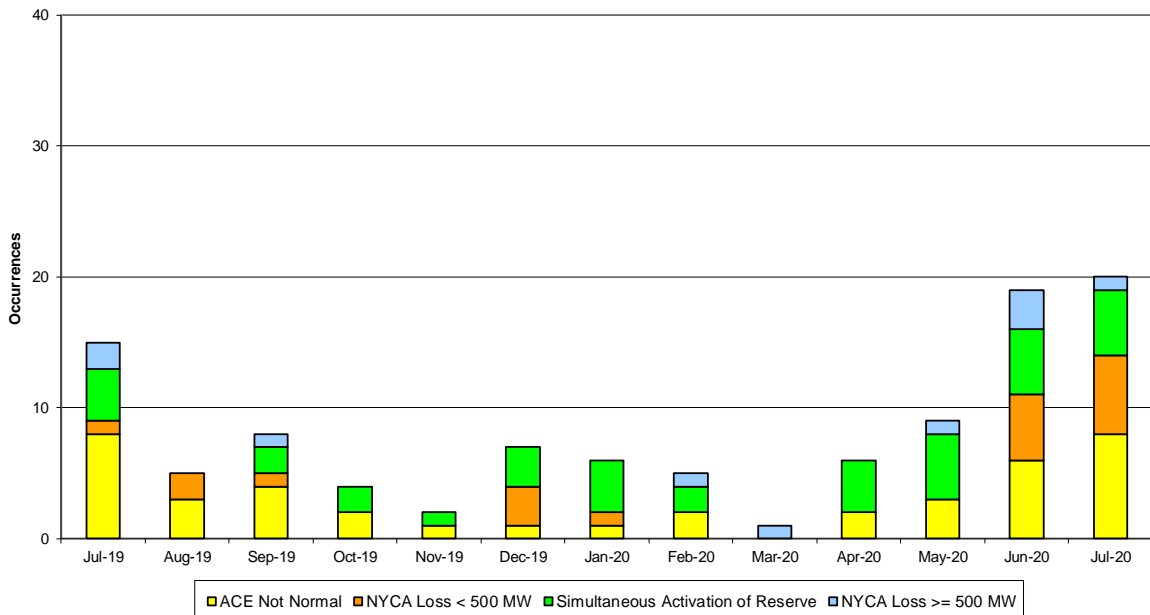


NERC Balancing Authority ACE Limit Standard



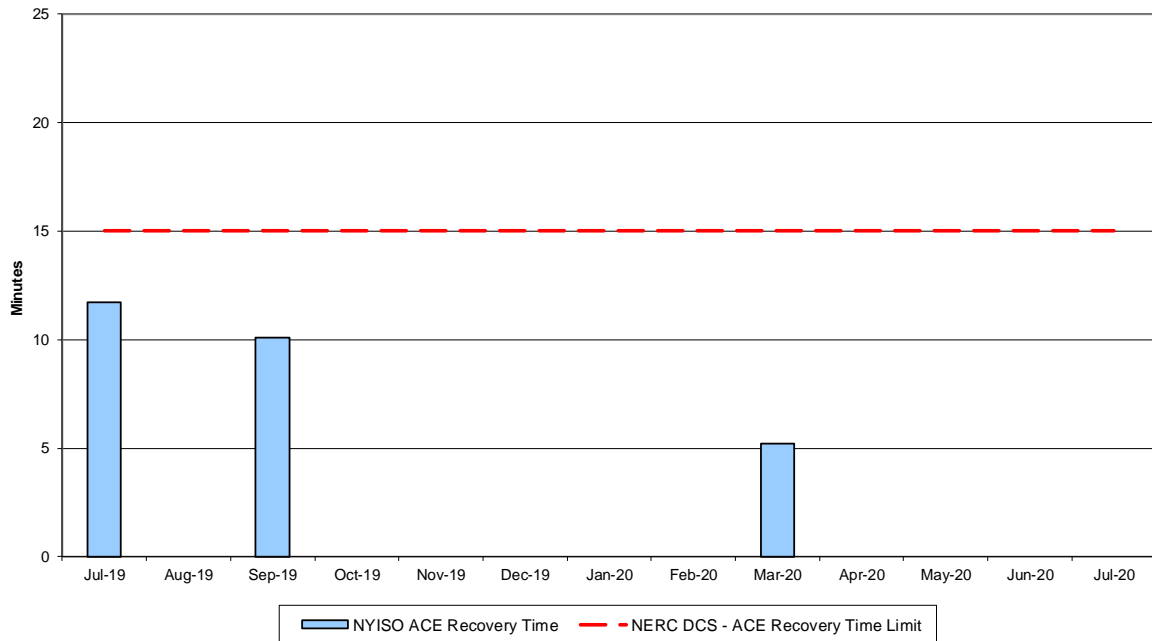
The amount of time the clock-minute average ACE exceeds the clock-minute Balancing Authority ACE Limit (BAAL) is an indicator of the NYISO Area resource and demand balancing. The maximum BAAL exceedance time is identified. BAAL exceedances of less than 30 consecutive clock-minutes are NERC compliant.

Reserve Activations



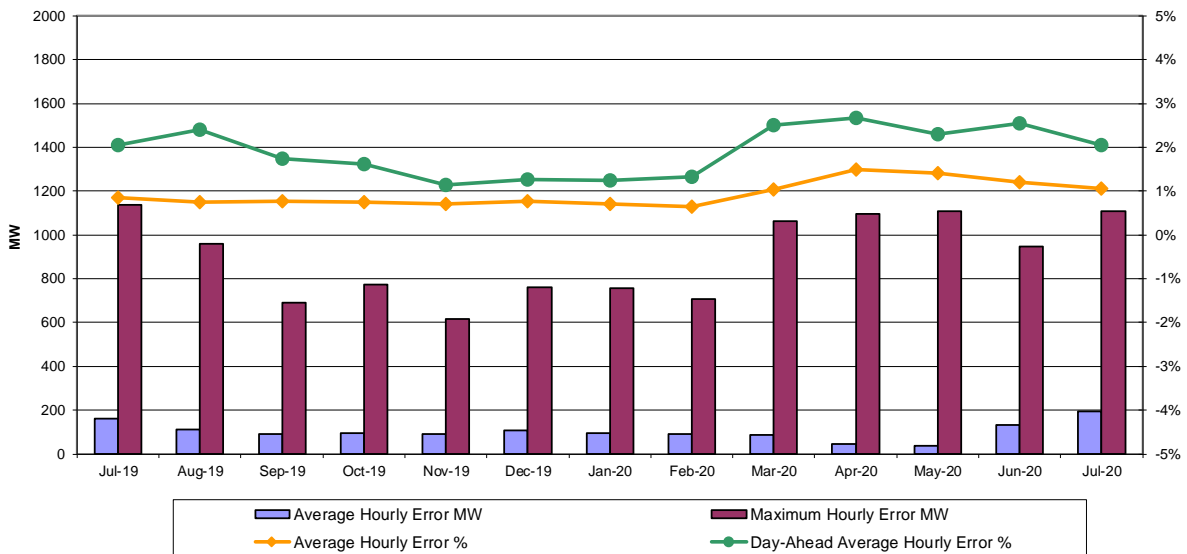
NYISO Reserve Activations are indicators of the need to respond to unexpected operational conditions within the NYISO Area or to assist a neighboring Area (Simultaneous Activation of Reserves) by activating an immediate resource and demand balancing operation.

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

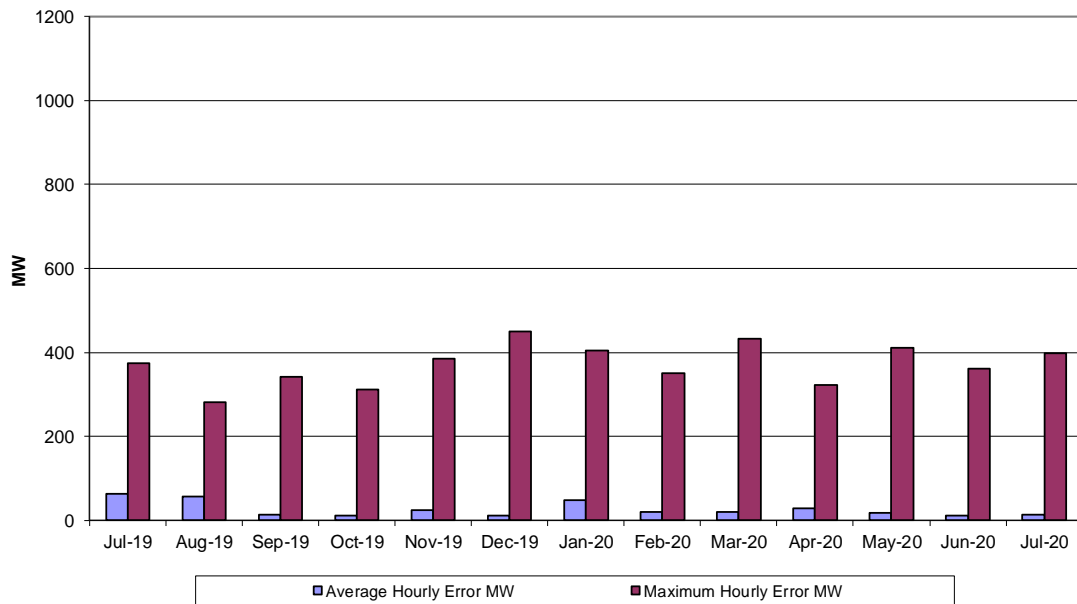


Hourly Error MW - Absolute value of the difference between the hourly average actual load demand and the average hour ahead forecast load demand.

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

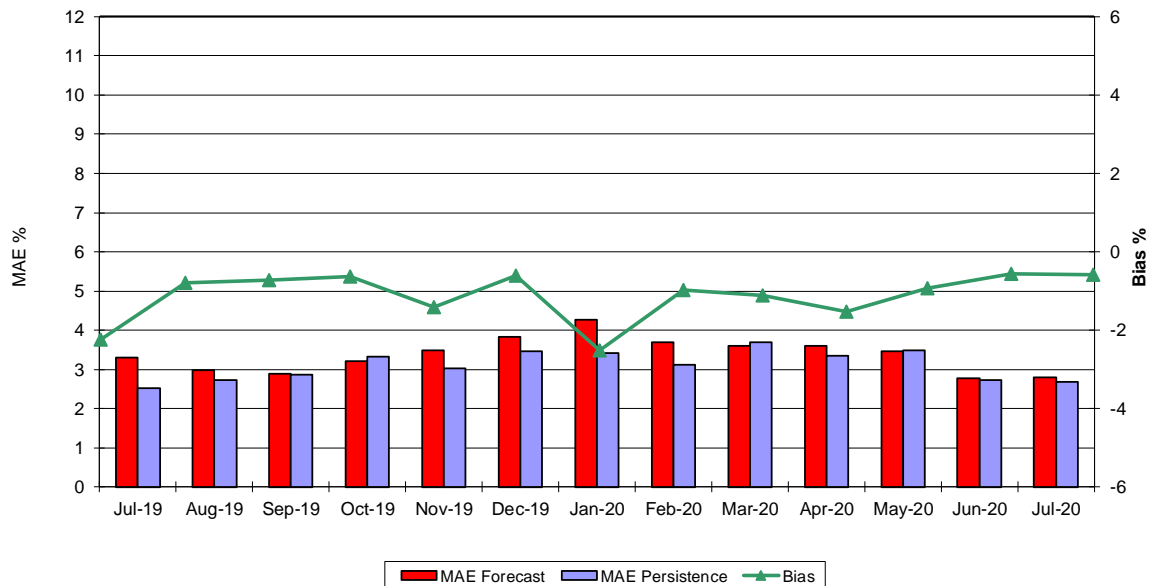
Day-Ahead Average Hourly Error % - Average across all hours of the month of the absolute value of the difference between actual load demand and the Day-Ahead forecast load demand, divided by the actual load demand.

Wind Forecast Performance Hour Ahead MW Error

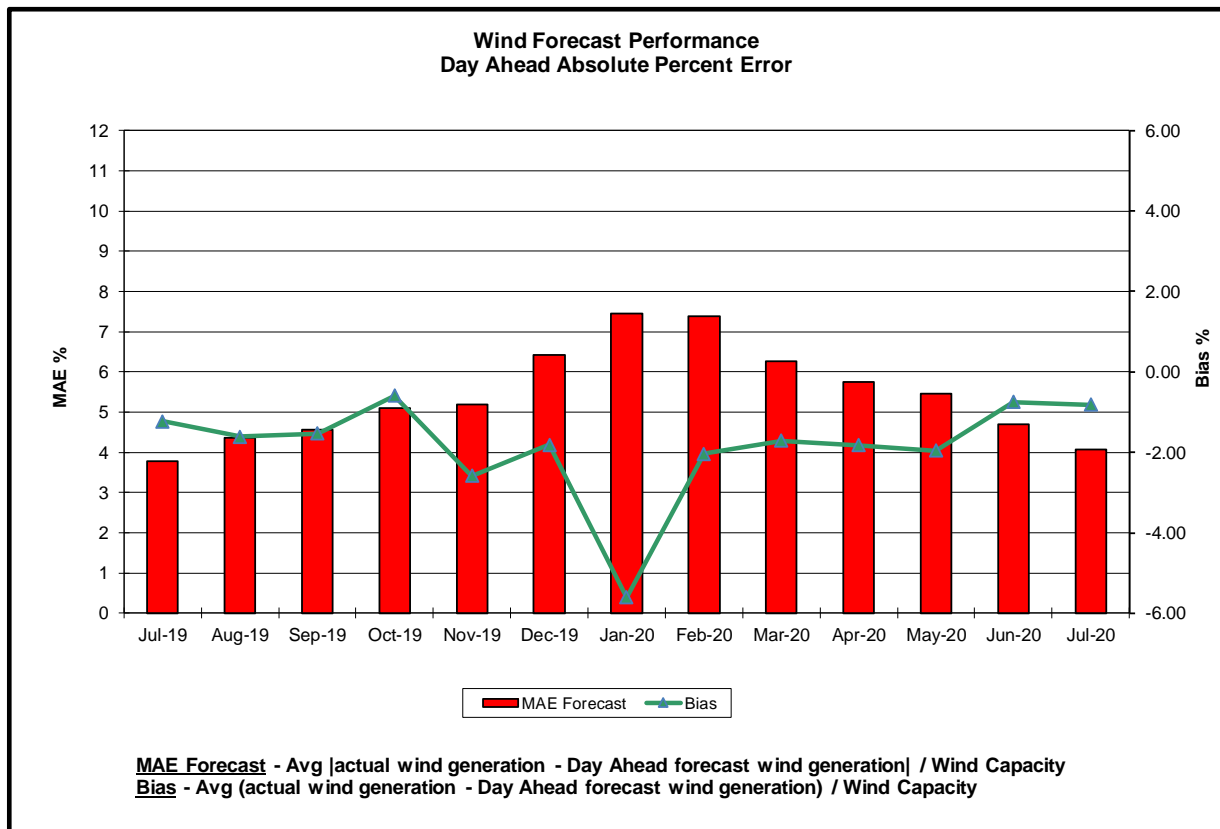
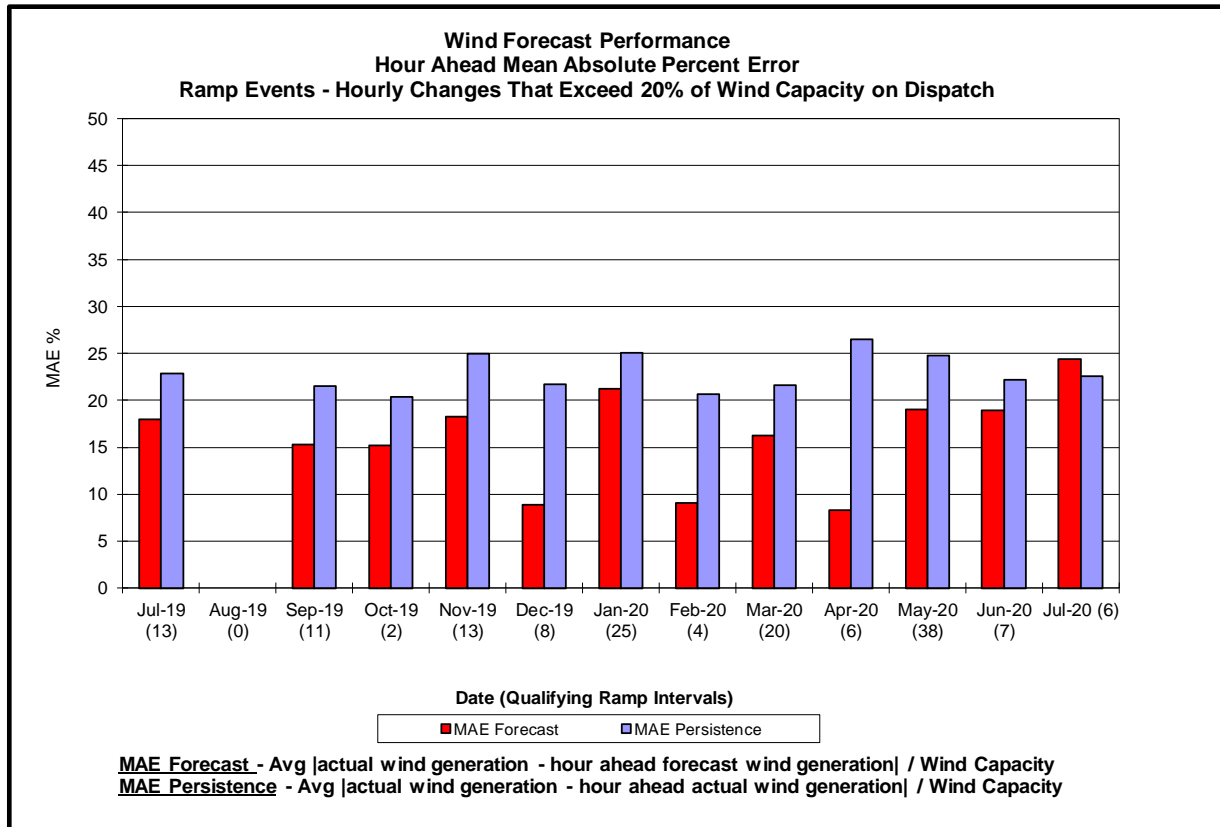


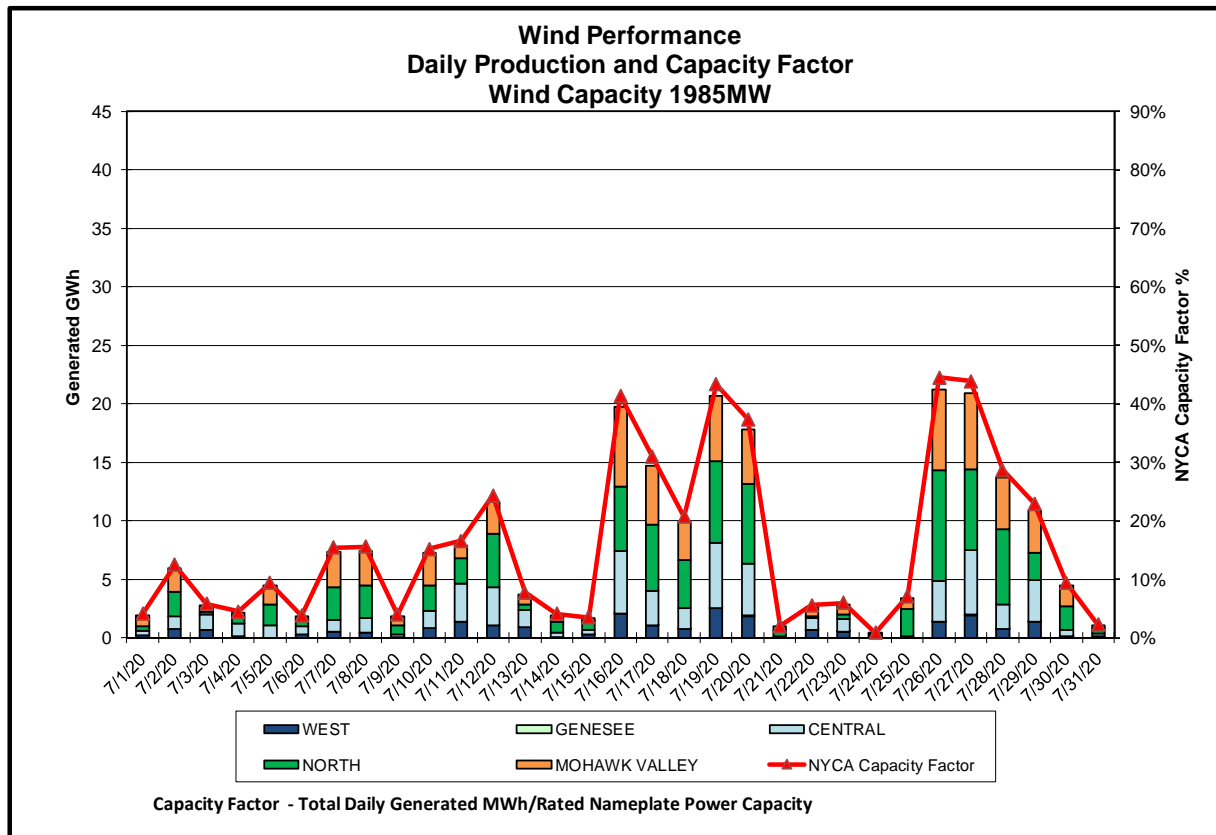
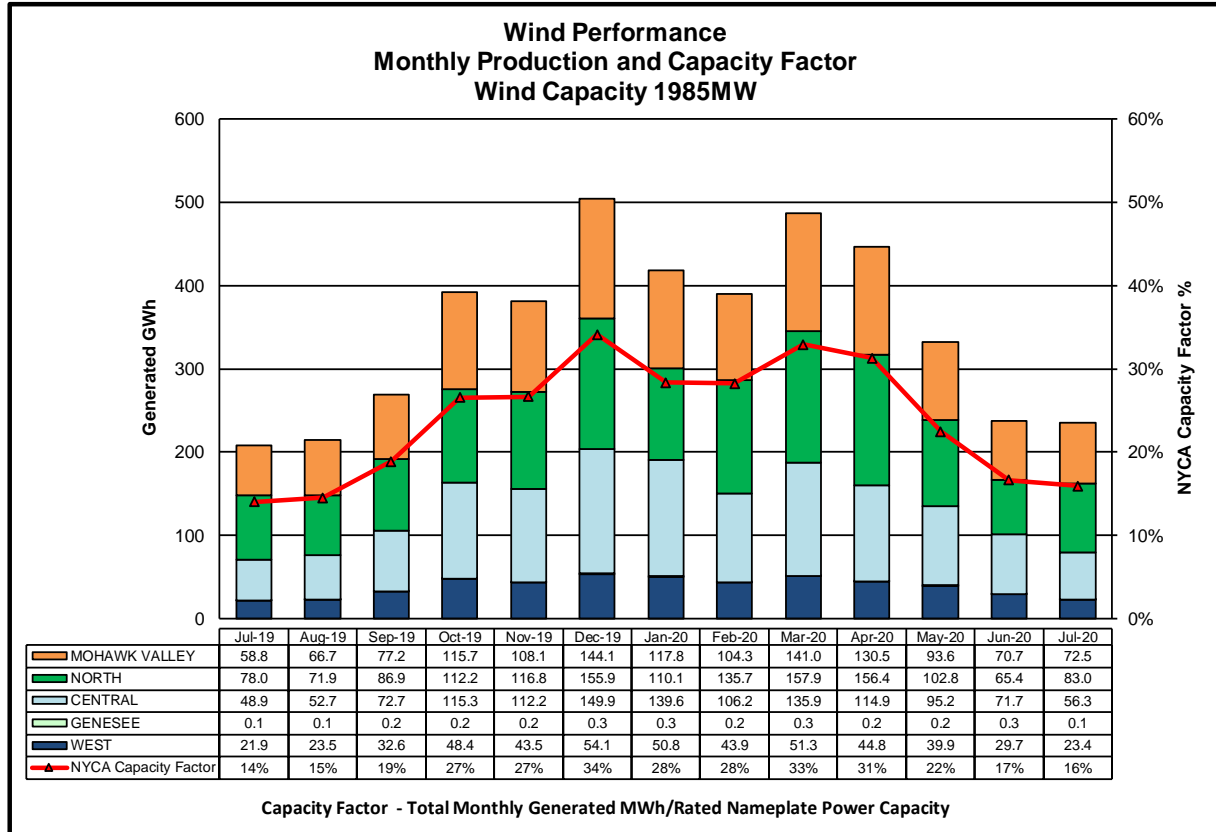
Hourly Error MW - Absolute value of the difference between the hourly average actual wind generation and the average hour ahead forecast wind generation.

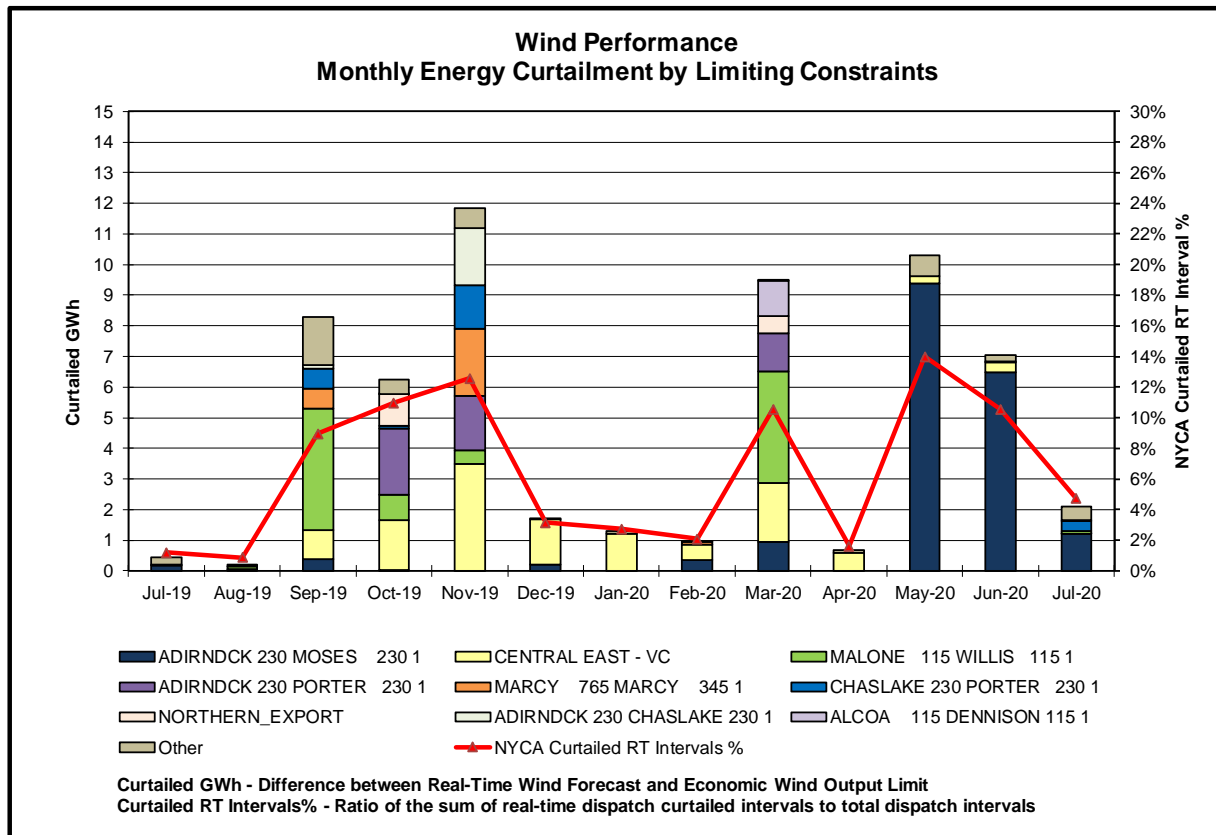
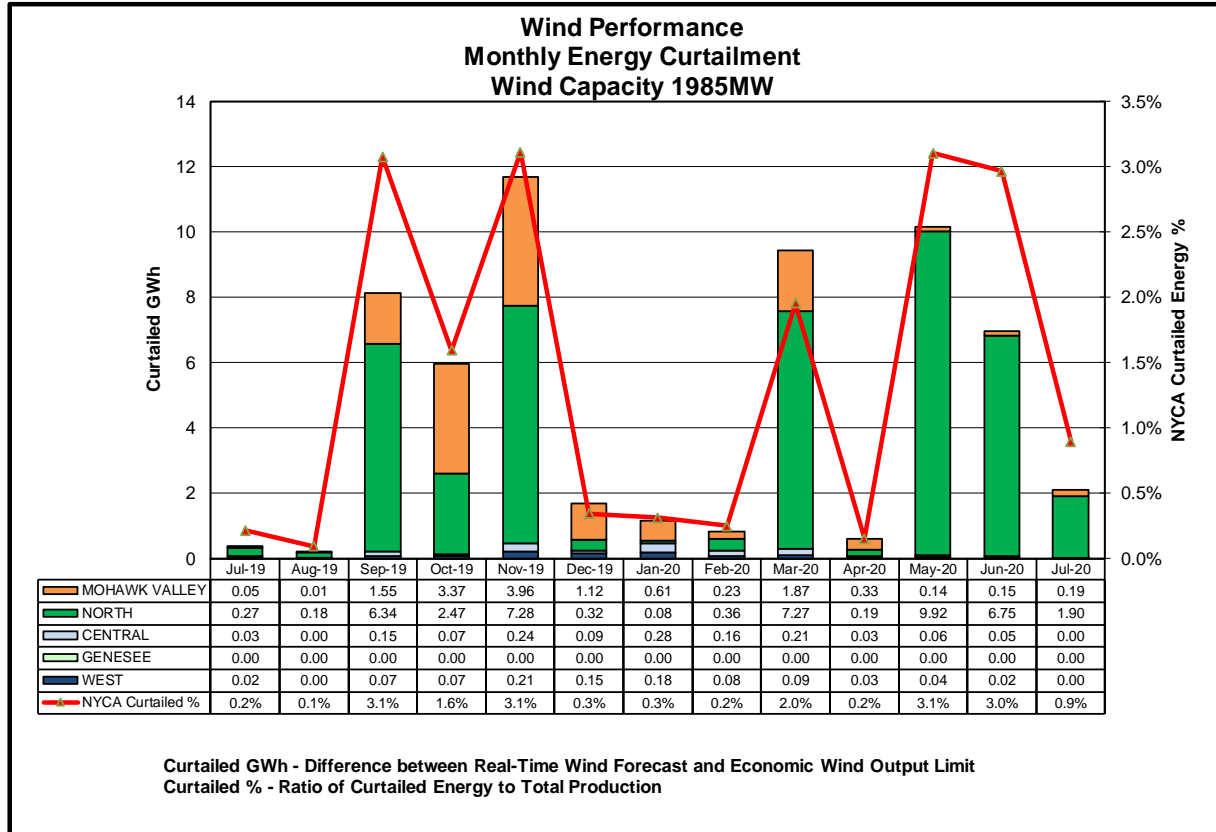
Wind Forecast Performance Hour Ahead Percent Error

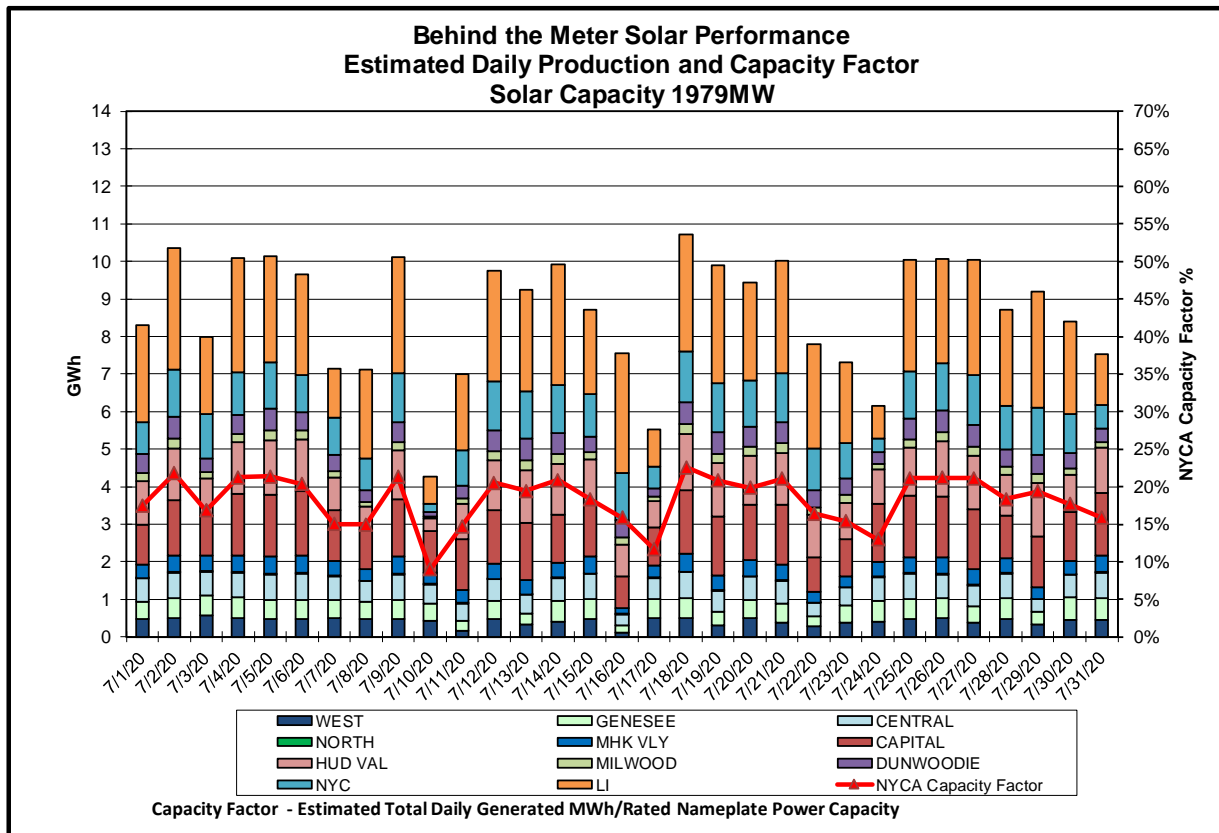
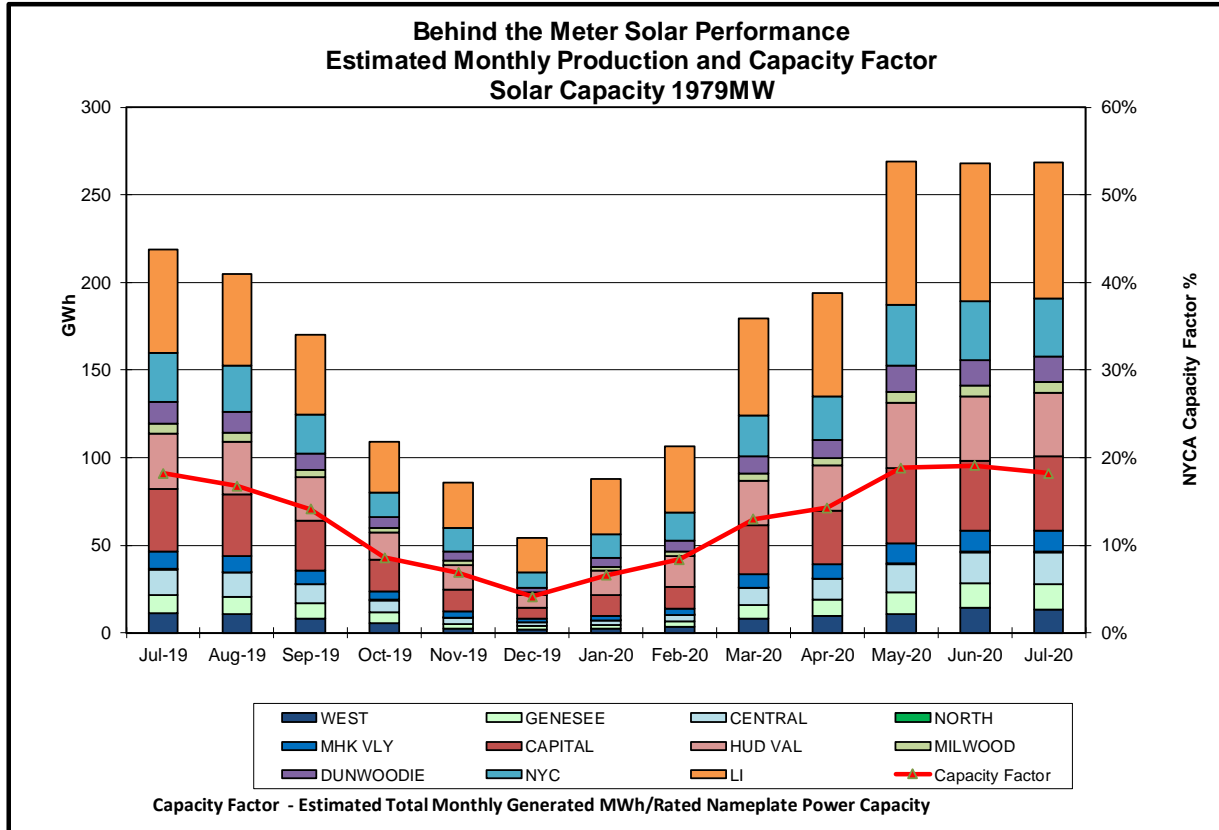


MAE Forecast - Avg [actual wind generation - hour ahead forecast wind generation] / Wind Capacity
MAE Persistence - Avg [actual wind generation - hour ahead actual wind generation] / Wind Capacity
Bias - Avg (actual wind generation - hour ahead forecast wind generation) / Wind Capacity

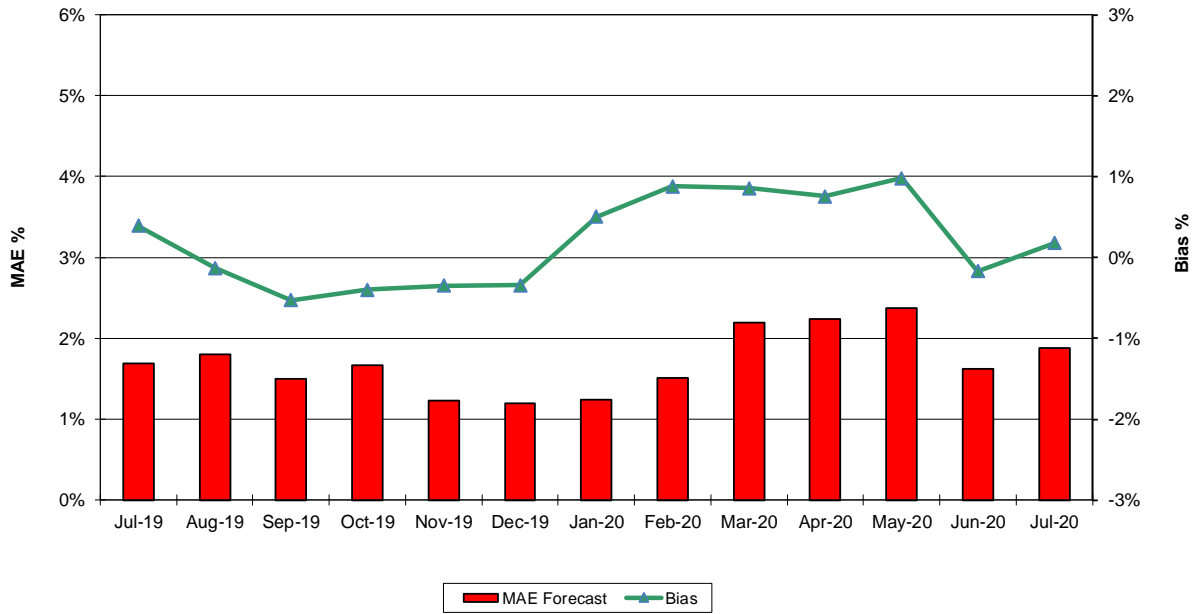






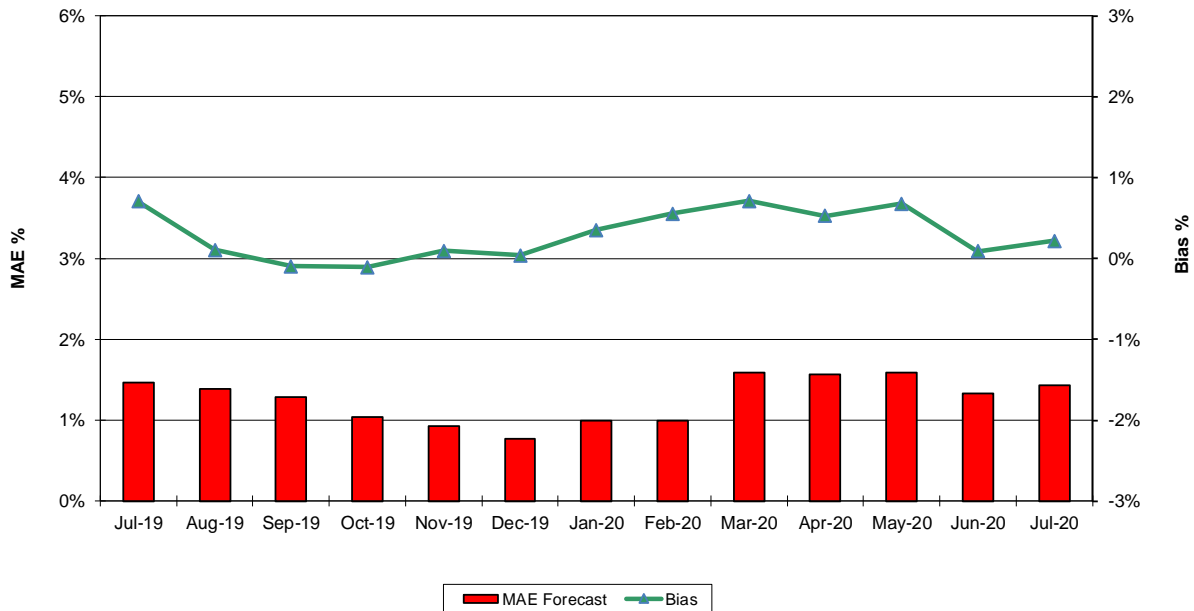


Behind the Meter Solar Forecast Performance Day Ahead Percent Error

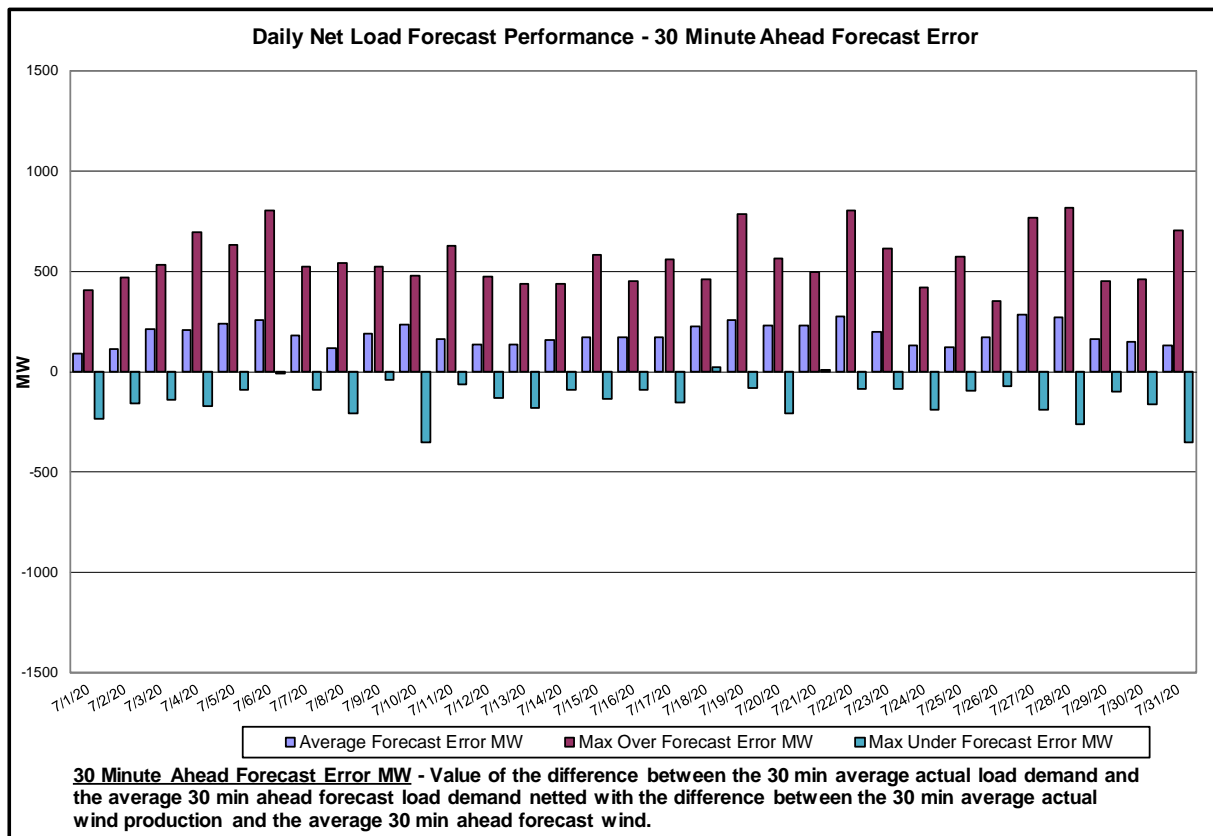
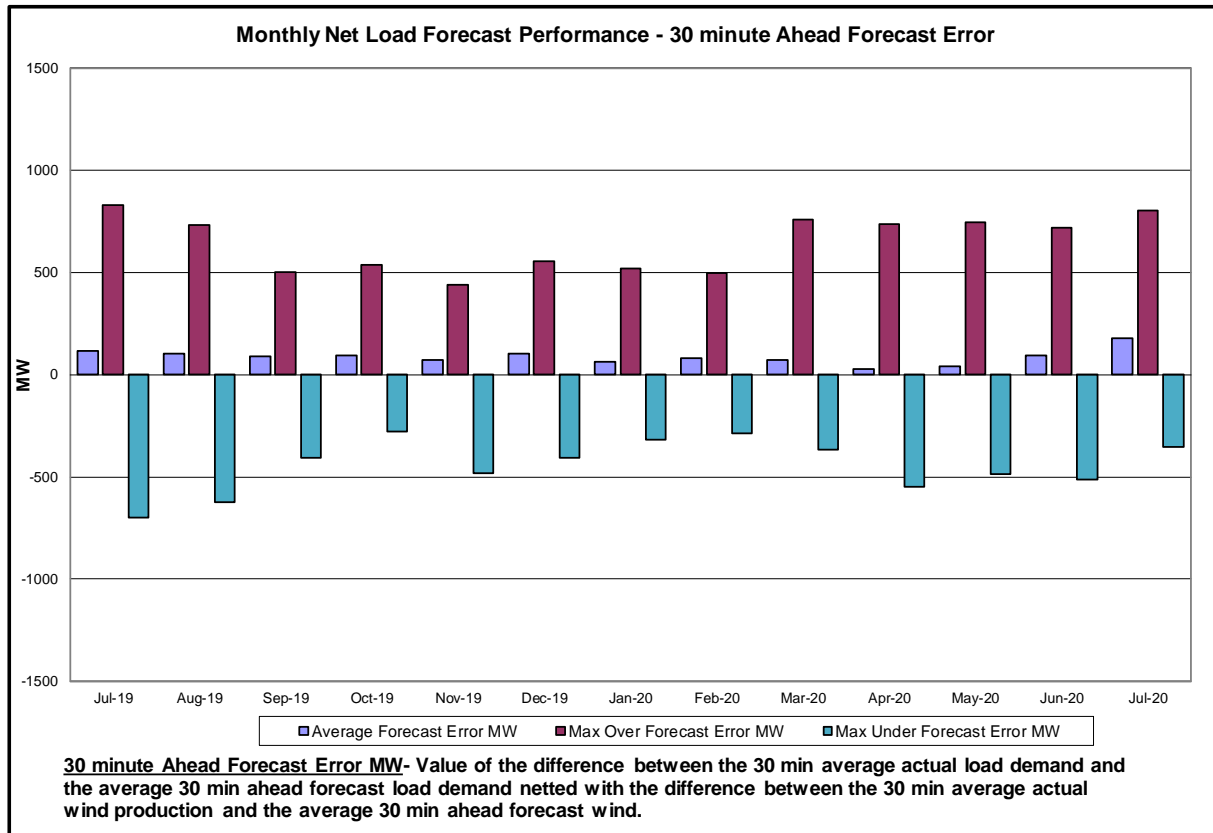


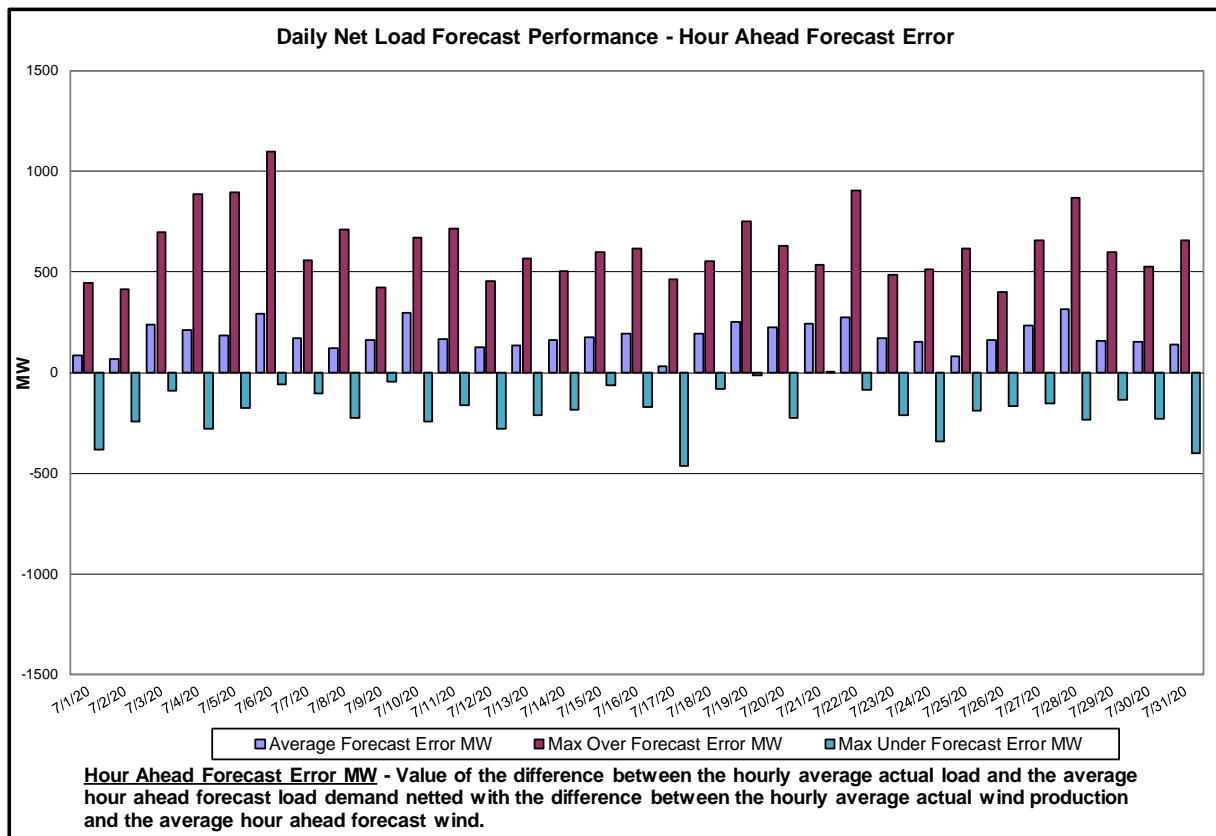
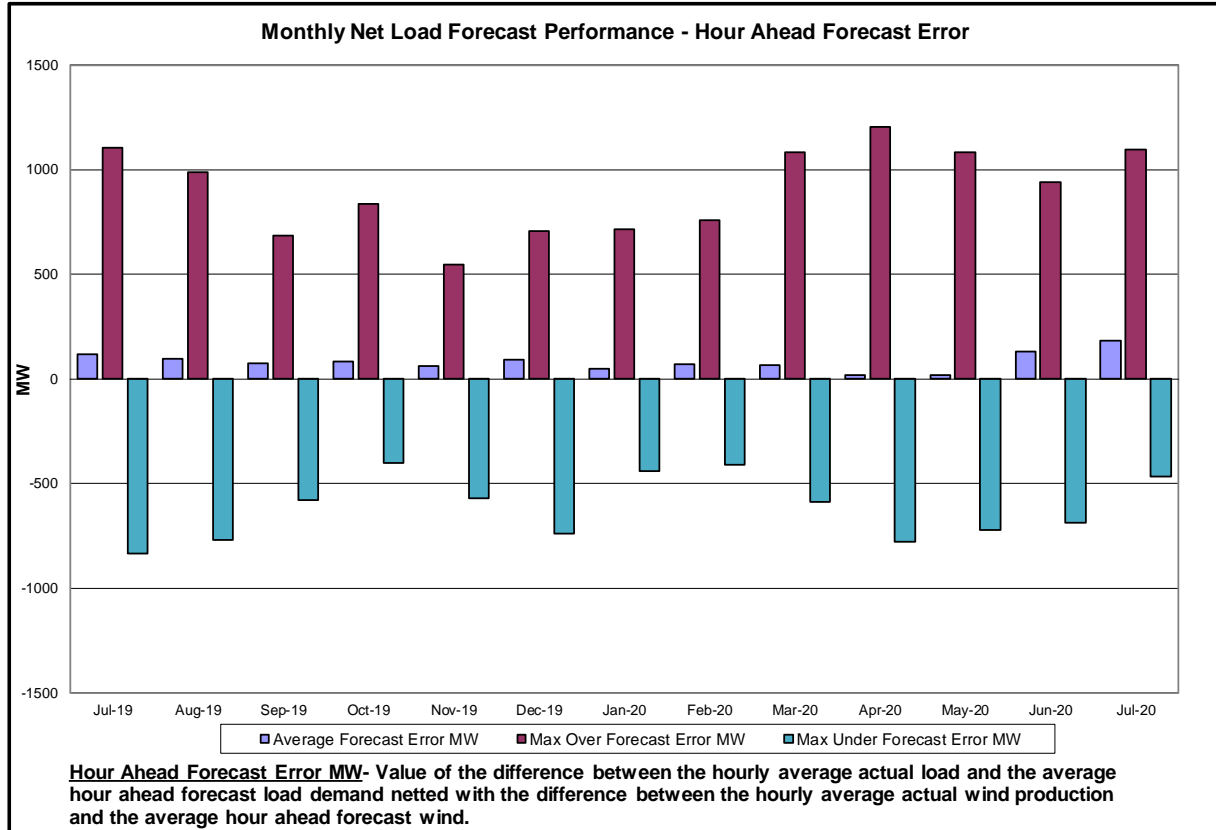
MAE Forecast - Avg |est. actual solar generation - Day Ahead forecast solar generation| / Solar Capacity
Bias - Avg (est. actual solar generation - Day Ahead forecast solar generation) / Solar Capacity

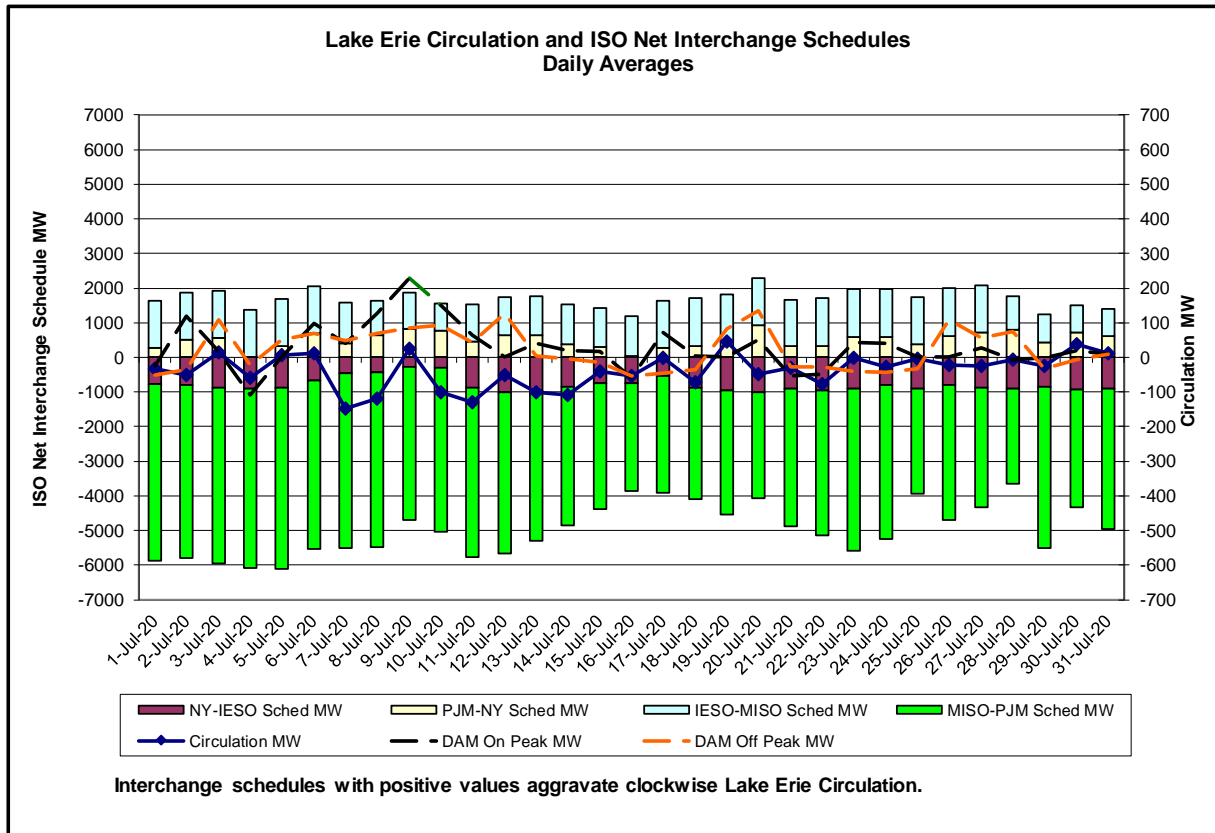
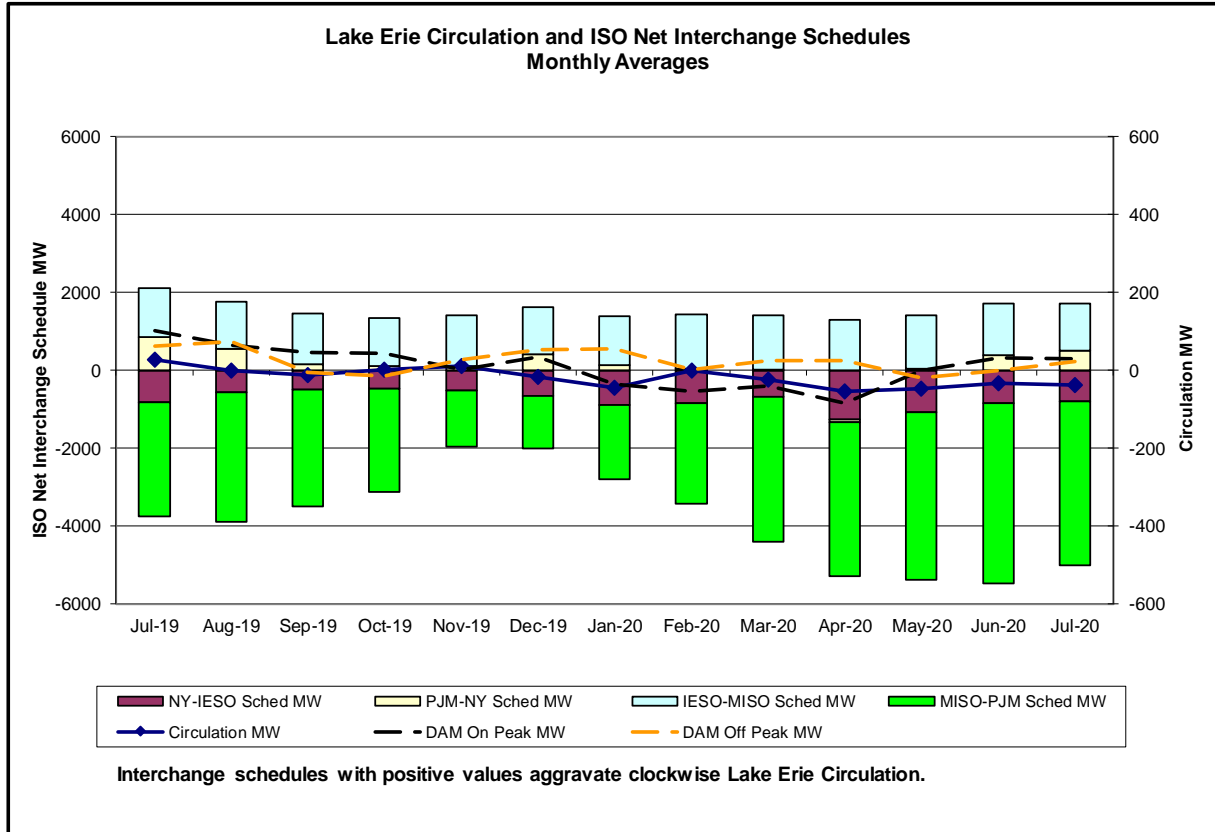
Behind the Meter Solar Forecast Performance Hour Ahead Percent Error



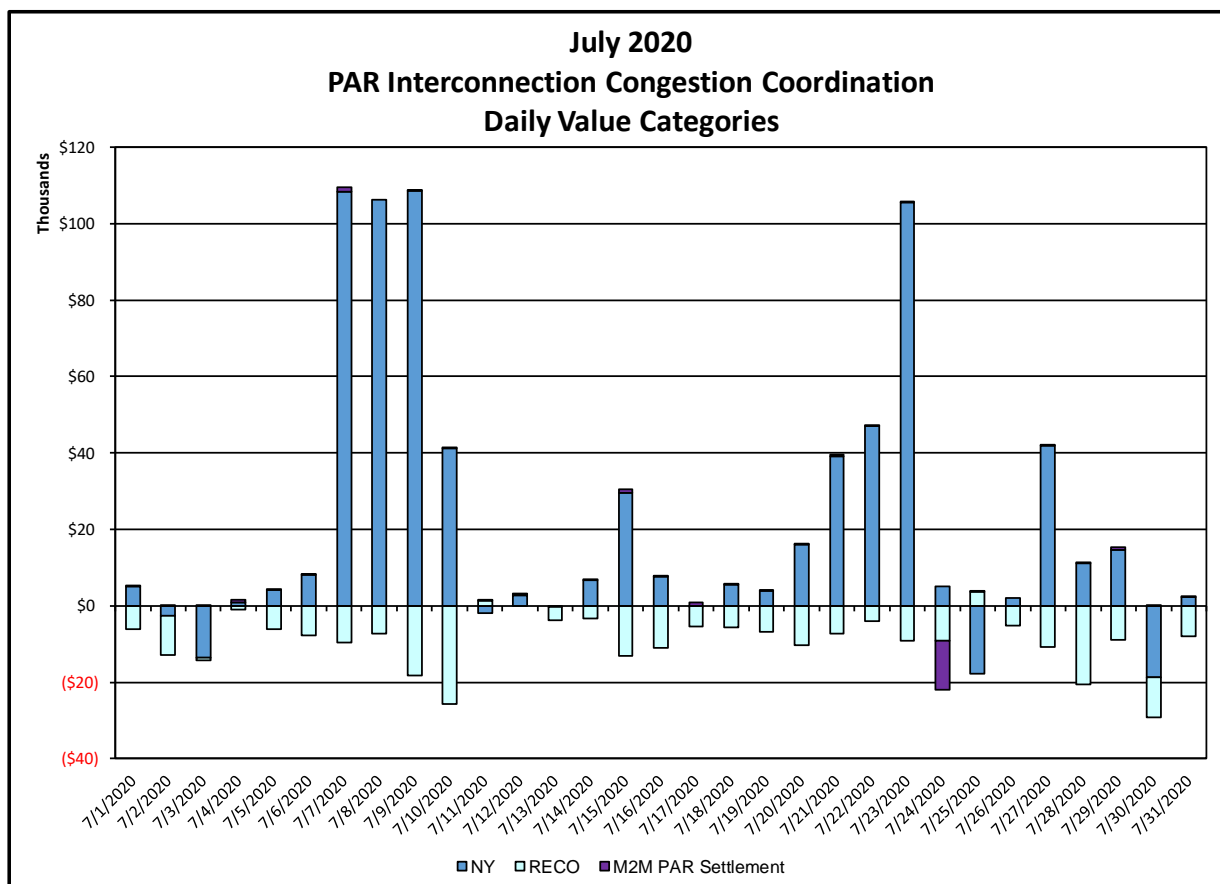
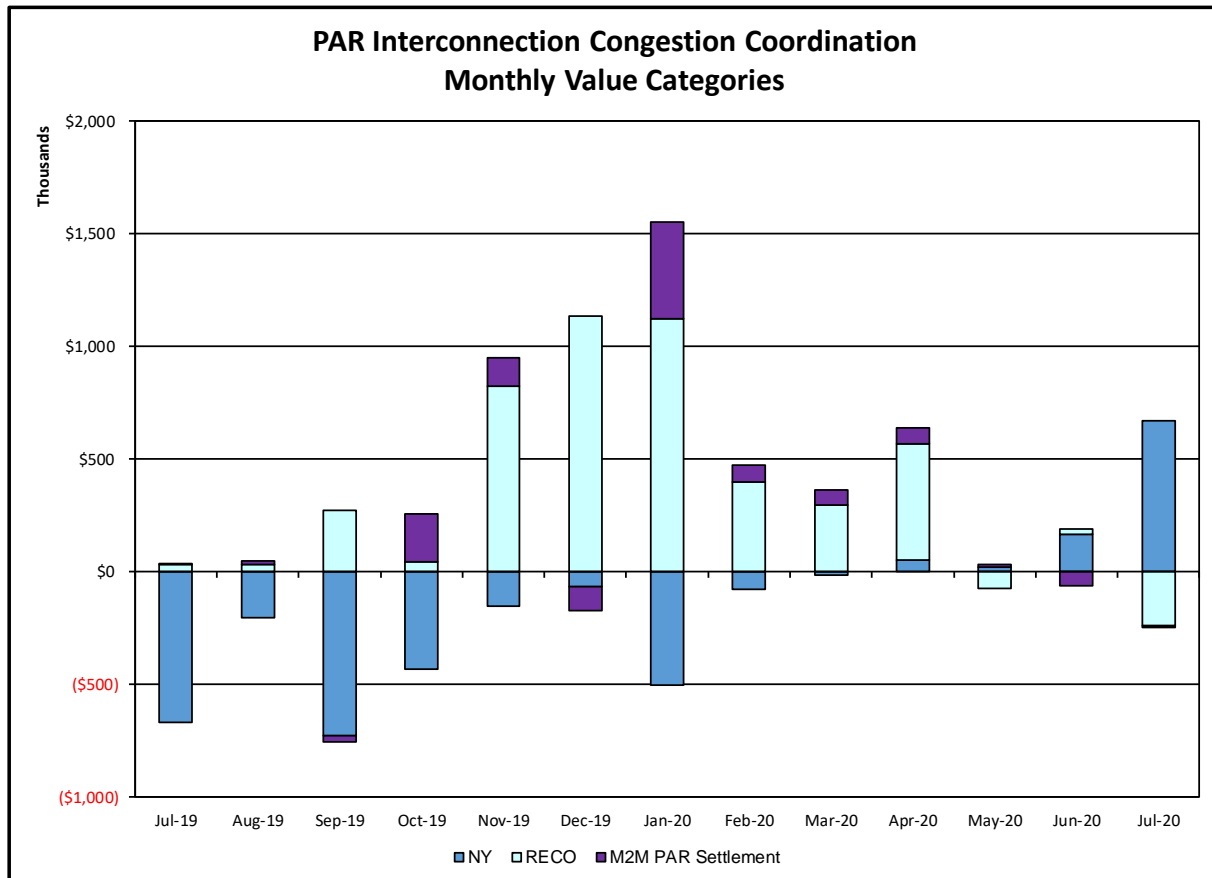
MAE Forecast - Avg |est. actual solar generation - Day Ahead forecast solar generation| / Solar Capacity
Bias - Avg (est. actual solar generation - Day Ahead forecast solar generation) / Solar Capacity





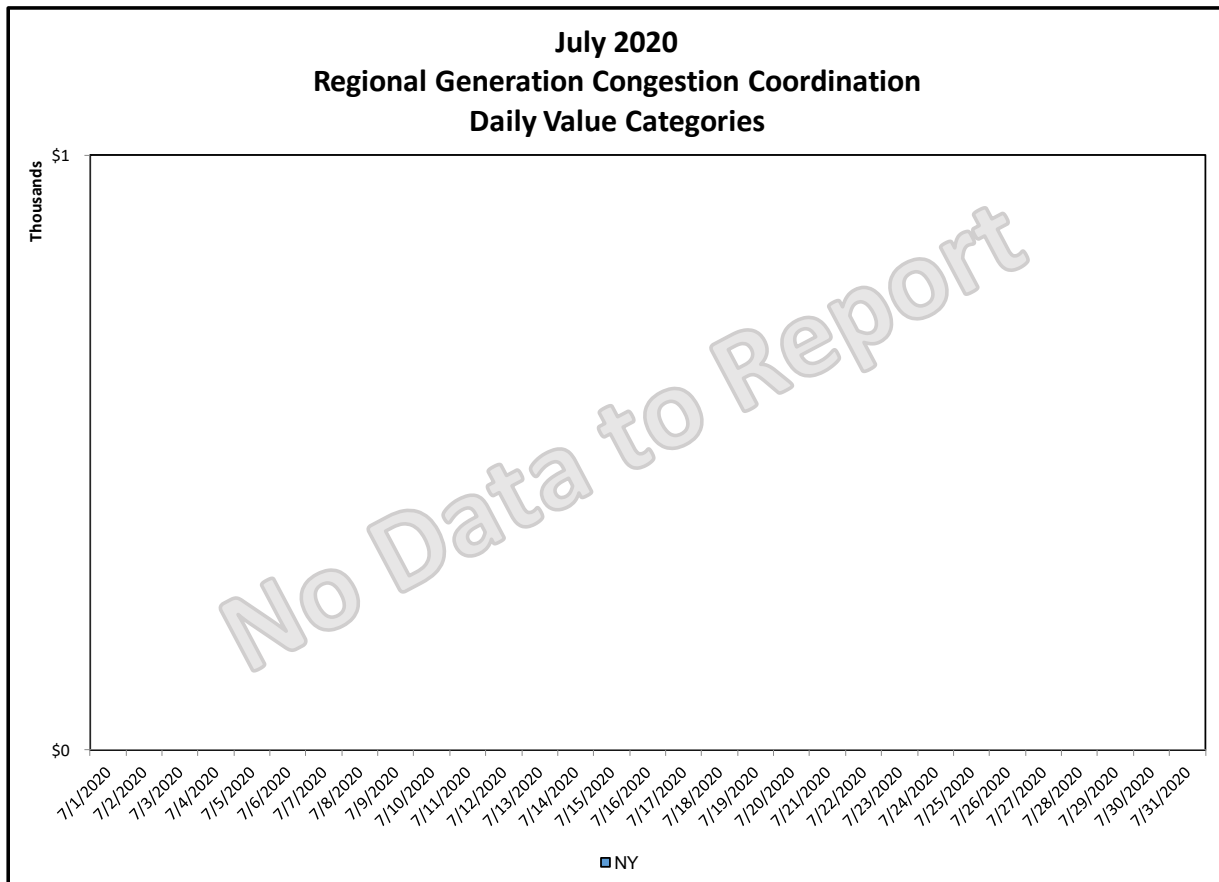
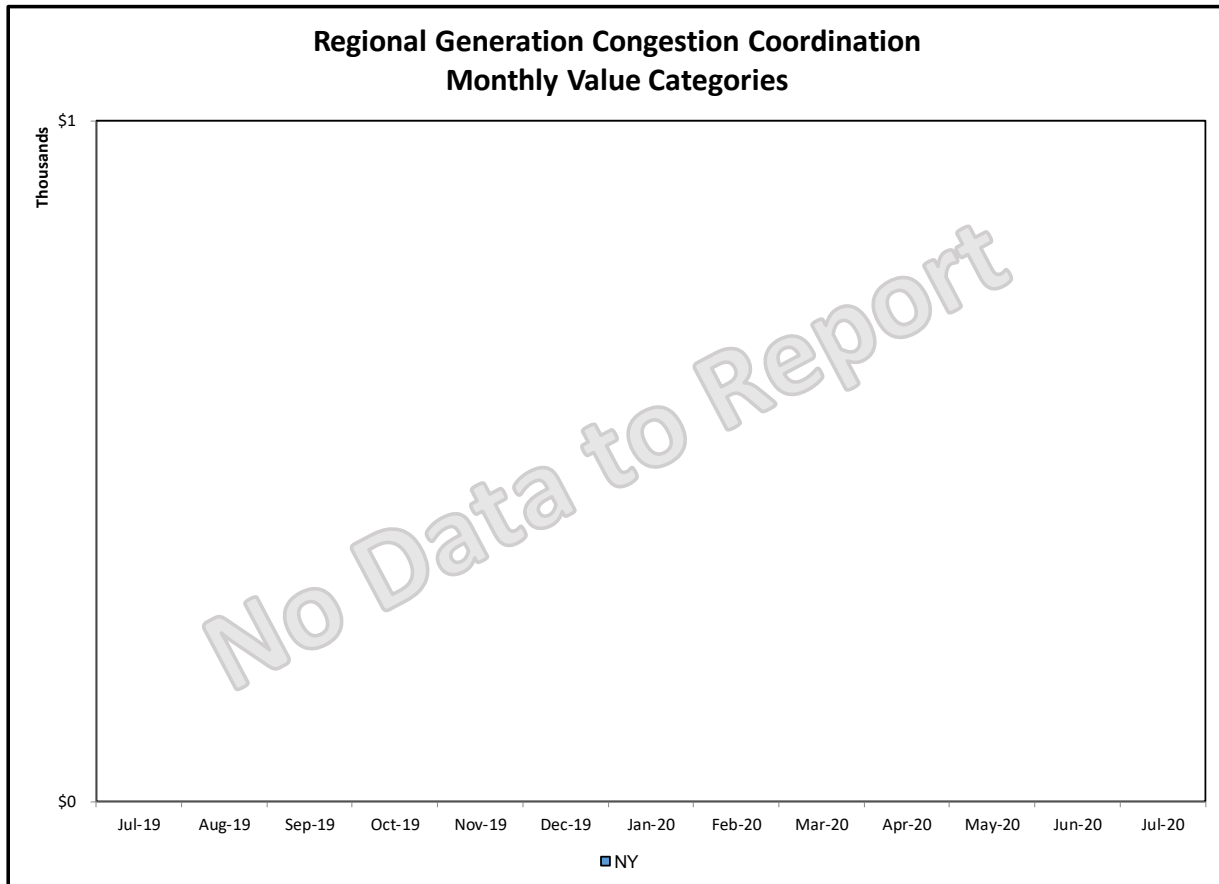


Broader Regional Market Performance Metrics



PAR Interconnection Congestion Coordination

| <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. |



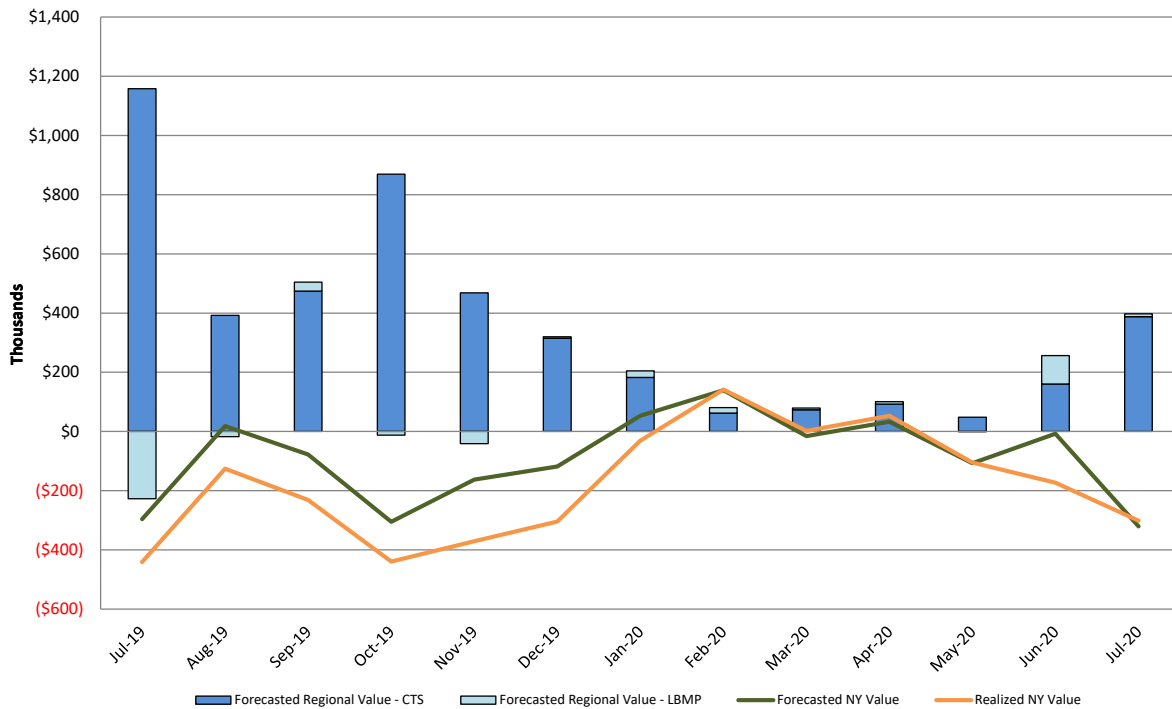
Regional Generation Congestion Coordination

Category
NY

Description

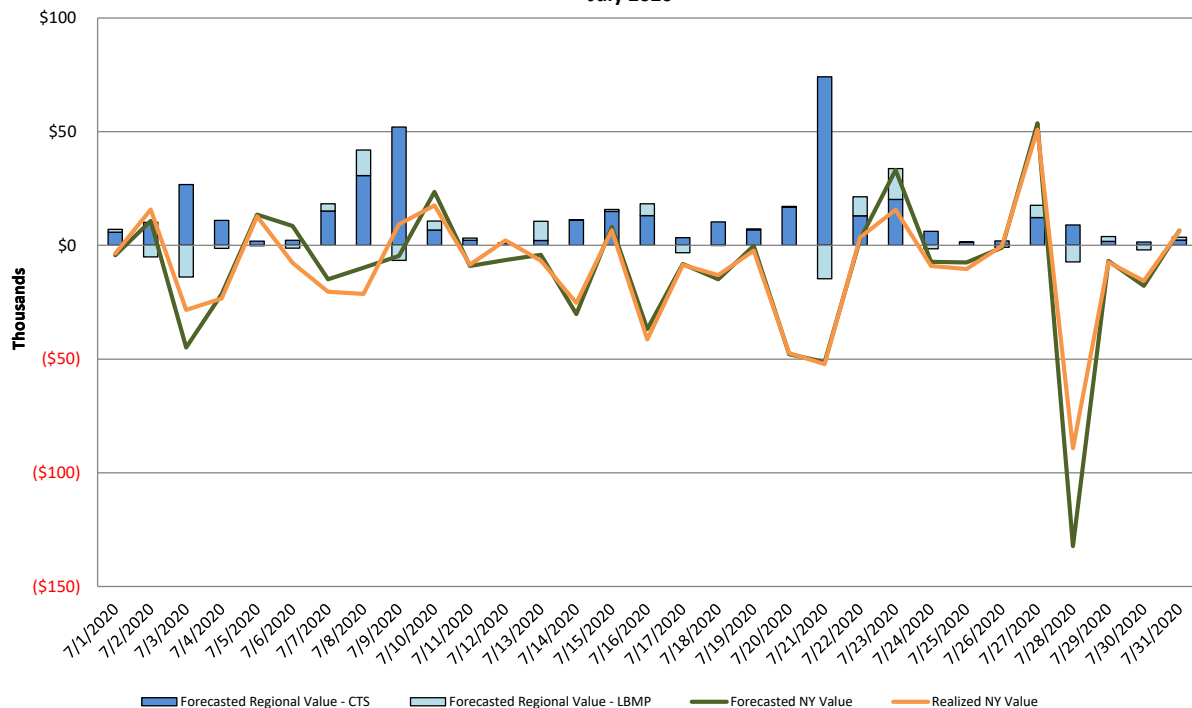
NYISO savings that result from PJM payments to NYISO when PJM's transmission use (PJM's market flow) is greater than PJM's entitlement of the NY transmission system and NYISO is incurring Western or Central NY congestion. Additionally, NYISO savings may result from the more efficient regional utilization of PJM's generation resources to directly address Western or Central NY transmission congestion.

Regional NYISO/PJM RT Scheduling for All PJM Proxies Monthly Value Categories



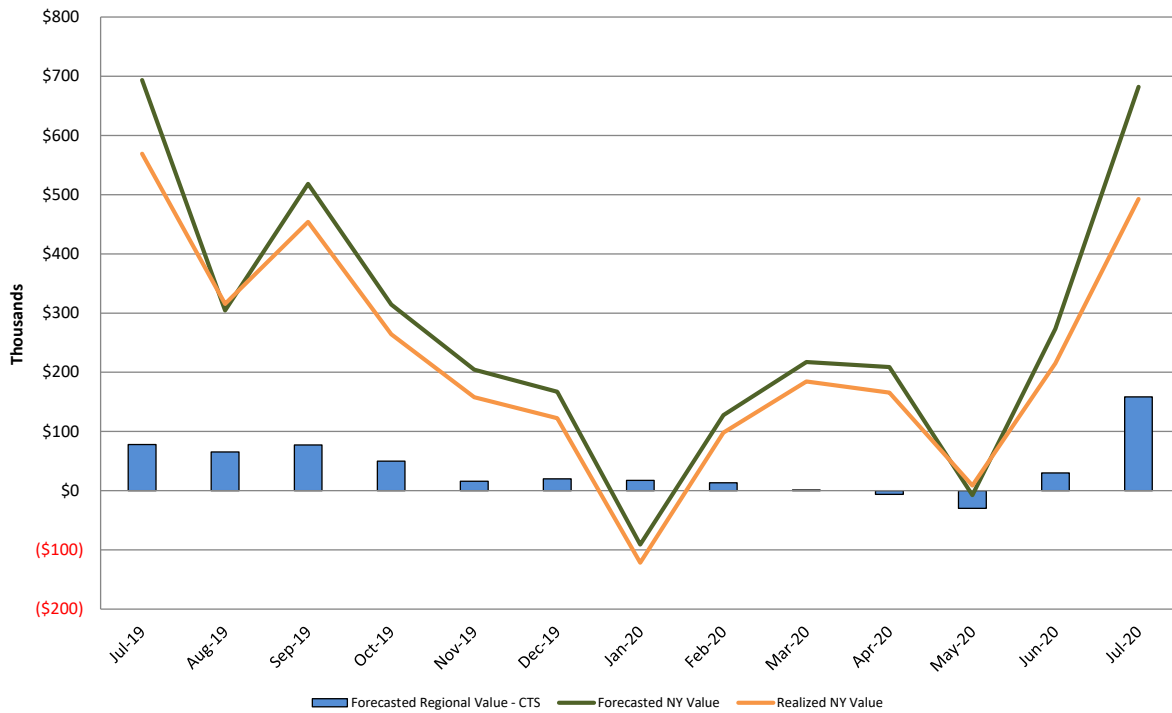
Forecasted Regional Value - CTS: Regional production cost savings for NY and PJM associated with intra-hour CTS transaction energy schedules using RTC/ITSCEd prices.
Forecasted Regional Value - LBMP: Regional production cost savings for NY and PJM associated with intra-hour LBMP transaction energy schedules using RTC/ITSCEd prices.
Forecasted NY Value: NY production cost savings associated with both CTS and LBMP transaction energy schedules using RTC prices.
Realized NY Value: NY production cost savings associated with both CTS and LBMP transaction energy schedules using RTD prices.

Regional NYISO/PJM RT Scheduling for All PJM Proxies Daily Value Categories July 2020



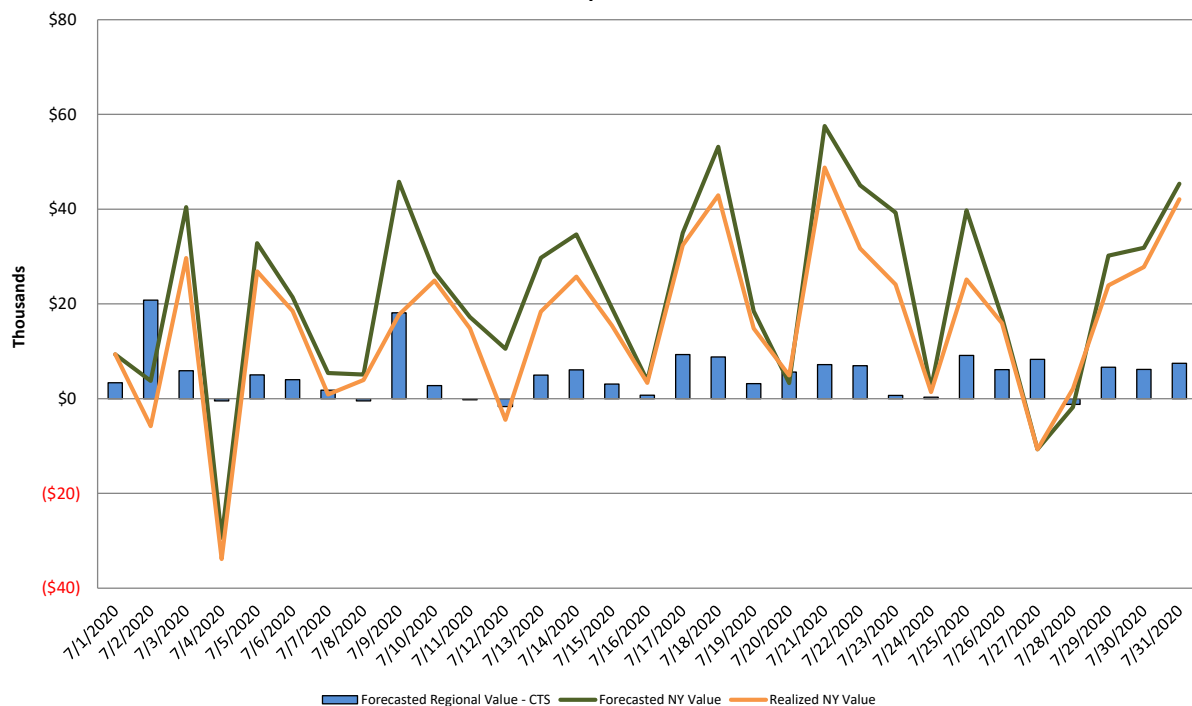
Forecasted Regional Value - CTS: Regional production cost savings for NY and PJM associated with intra-hour CTS transaction energy schedules using RTC/ITSCEd prices.
Forecasted Regional Value - LBMP: Regional production cost savings for NY and PJM associated with intra-hour LBMP transaction energy schedules using RTC/ITSCEd prices.
Forecasted NY Value: NY production cost savings associated with both CTS and LBMP transaction energy schedules using RTC prices.
Realized NY Value: NY production cost savings associated with both CTS and LBMP transaction energy schedules using RTD prices.

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



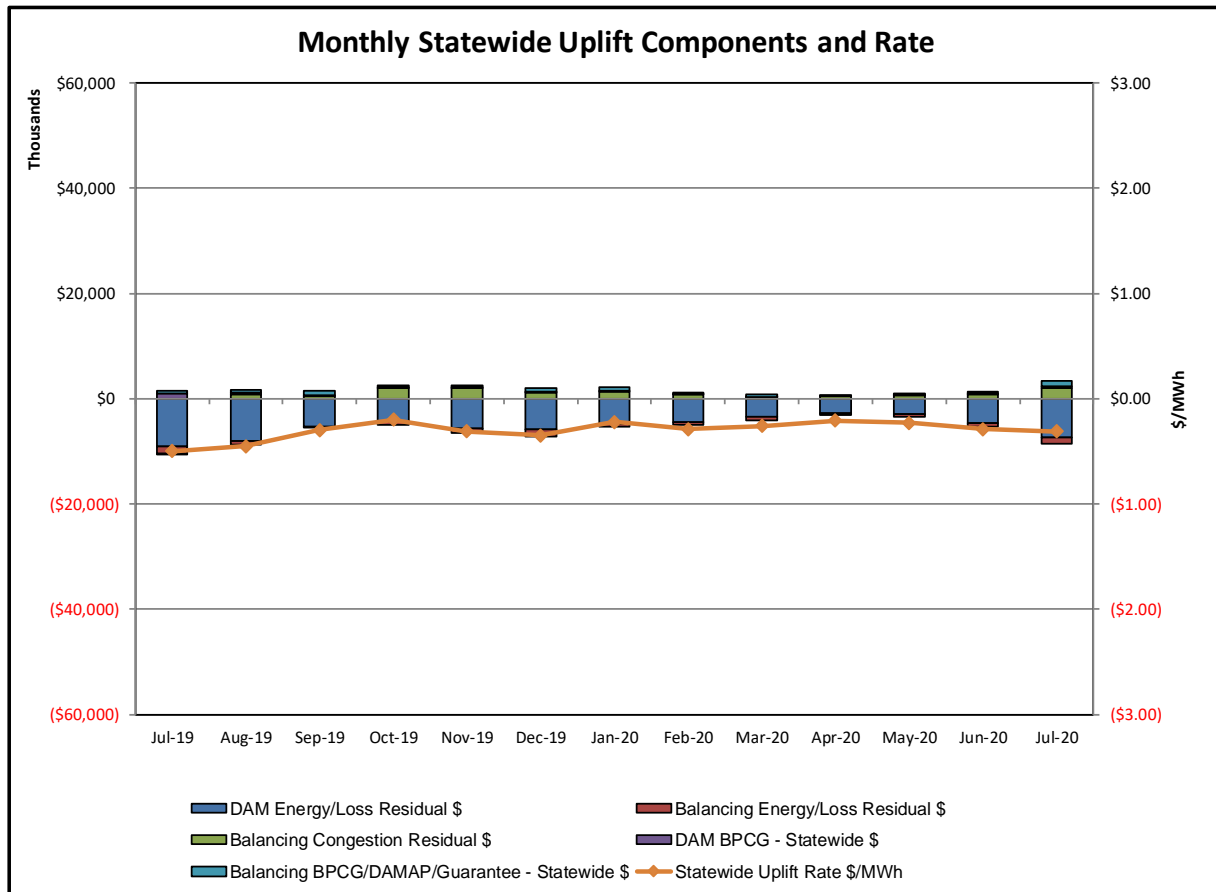
Forecasted Regional Value - CTS: Regional production cost savings for NY and NE associated with intra-hour CTS transaction energy schedules using RTC prices and NE forecasted prices.
Forecasted NY Value: NY production cost savings associated with CTS transaction energy schedules using RTC prices.
Realized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

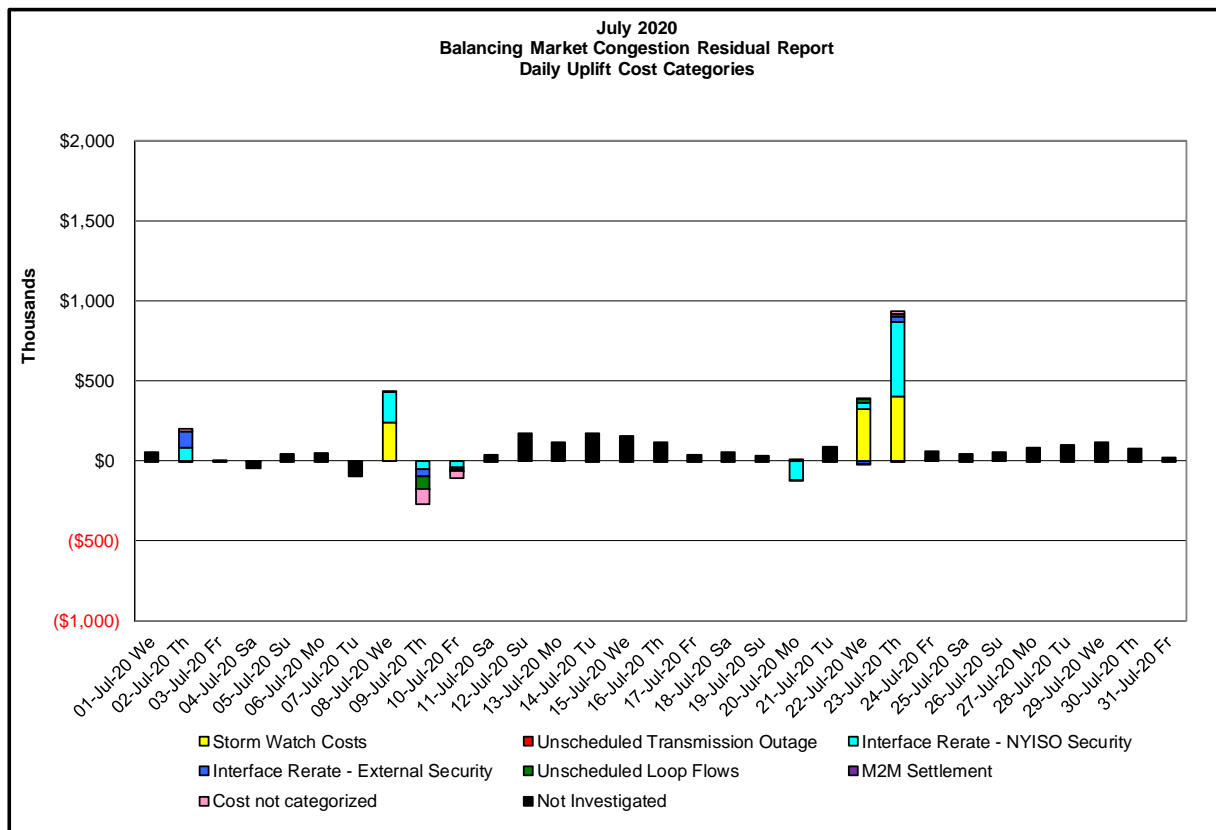
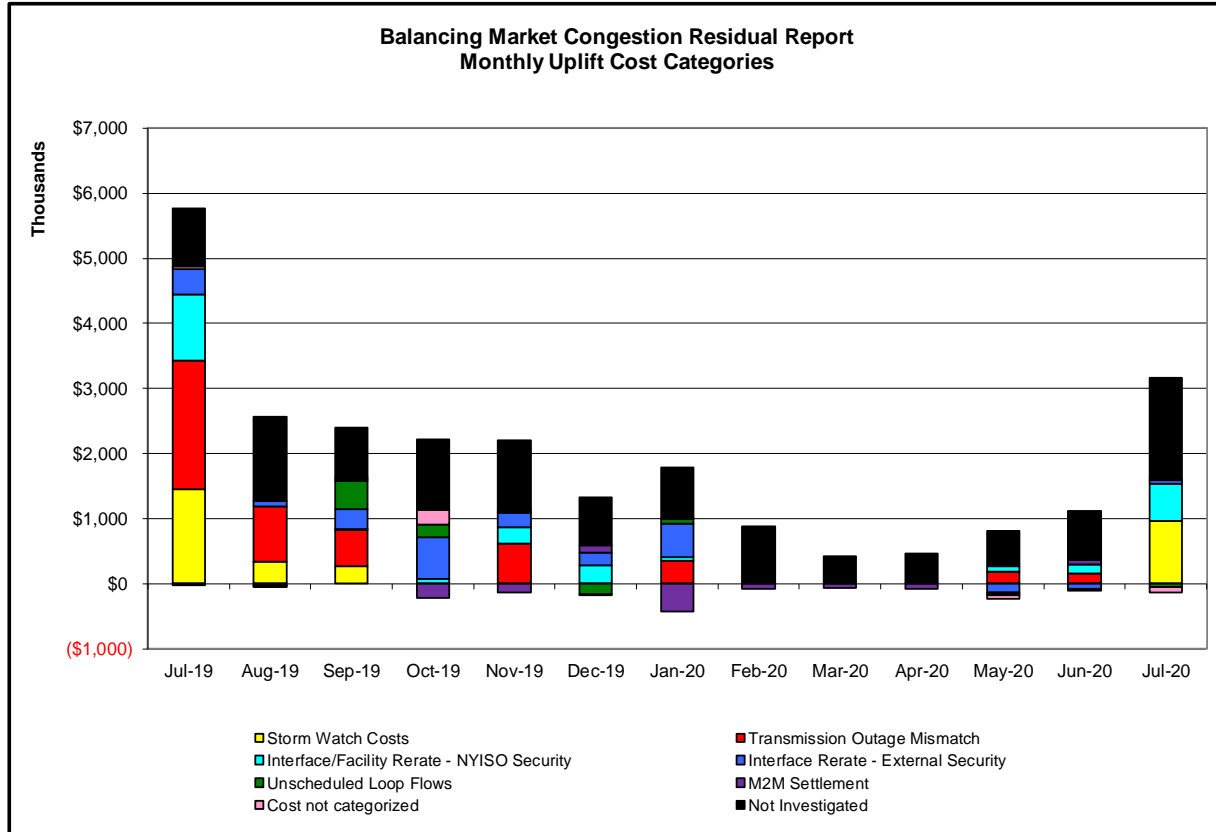
Regional NYISO/NE RT Scheduling for ISO-NE AC Daily Value Categories July 2020



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





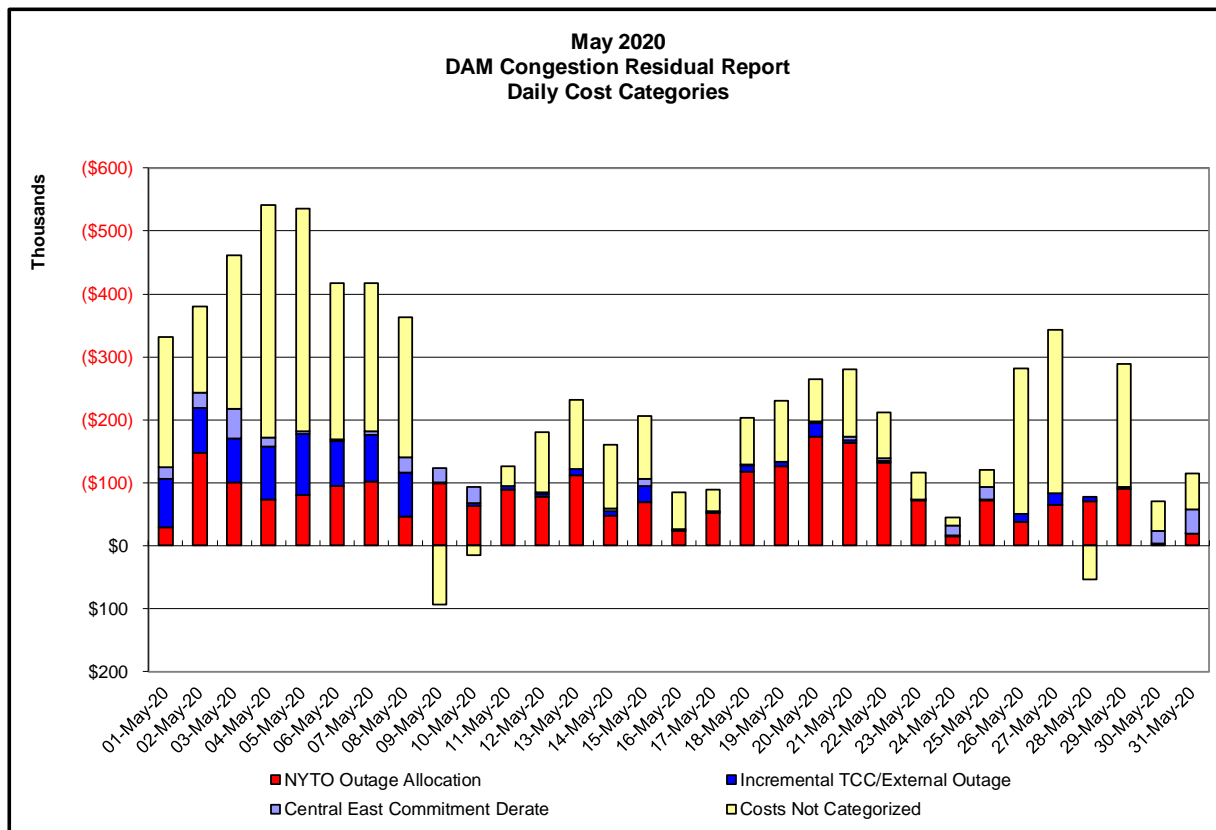
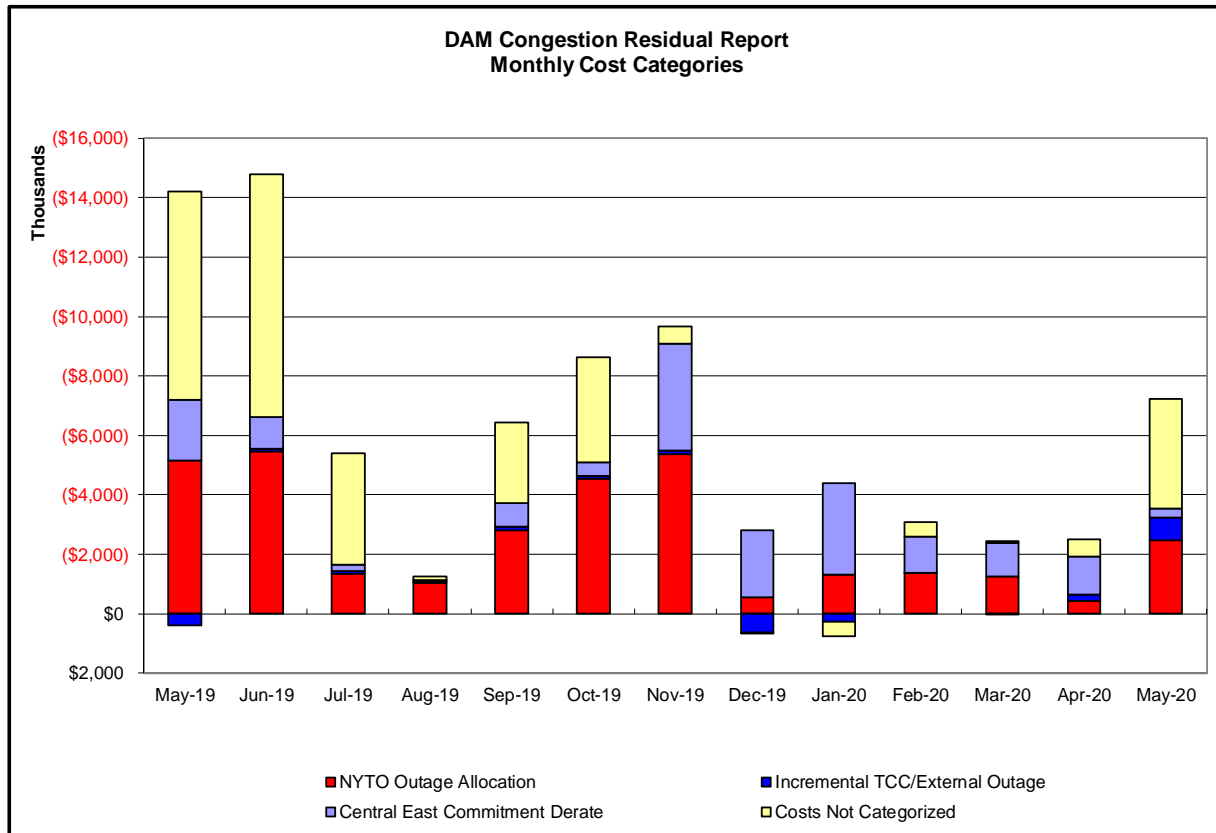
| Day's investigated in July: 2, 8, 9, 10, 20, 22, 23 | | | |
|---|-----------------|---------------------|---|
| Event | Date (yyyymmdd) | Hours | Description |
| | 7/2/2020 | 16,17 | Derate C.Islip-Happauge 138kV (#889) for I/o TWR:HOLTSVILLE 881& 882& 880 |
| | 7/2/2020 | 13,14 | Derate of Cricket Valley-Pleasant Valley 345 kV (#F83) for I/o Cricket Valley-Pleasant Valley 345 kV (#F84) |
| | 7/2/2020 | 17-20 | Derate Dunwoodie-Shore Road 345kV (#Y50) for I/o SCB:SPBK(RNS2):Y49&M29&Y49_ST |
| | 7/2/2020 | 14 | Derate Moses South |
| | 7/2/2020 | 13-20 | Derate Scriba-Volney 345kV (#20) for I/o Scriba-Volney 345kV (#21) |
| | 7/2/2020 | 20 | NYCA DNI Ramp Limit |
| | 7/2/2020 | 13-22 | PJM_AC-NY Scheduling Limit |
| | 7/2/2020 | 15 | NE_NNC1385-NY Scheduling Limit |
| | 7/8/2020 | 12-15,17 | Thunder Storm Alert, Buchanan 345/138kV (#TA5) |
| | 7/8/2020 | 12 | NYCA DNI ramp limit |
| | 7/8/2020 | 12-14 | Derate of Cricket Valley-Pleasant Valley 345 kV (#F83) for I/o Cricket Valley-Pleasant Valley 345 kV (#F84) |
| | 7/9/2020 | 15-17,20 | Uprate of Niagara-Packard 230kV (#62) for I/o TWR:NIAGARA 61 & 64 |
| | 7/9/2020 | 14 | NE_AC ACTIVE DNI ramp limit |
| | 7/9/2020 | 20 | PJM_AC ACTIVE DNI ramp limit |
| | 7/9/2020 | 13,15-17 | Lake Erie Circulation, DAM-RTM exceeds +/-125MW; West |
| | 7/10/2020 | 13 | Uprate of Niagara-Packard 230kV (#62) for I/o TWR:NIAGARA 61 & 64 |
| | 7/10/2020 | 13 | Uprate Niagara Blvd-Packard 115kV (#) |
| | 7/10/2020 | 17 | IESO_AC DNI Ramp Limit |
| | 7/10/2020 | 22 | HQ_CEDARS - NY Scheduling Limit |
| | 7/10/2020 | 17 | Lake Erie Circulation, DAM-RTM exceeds +/-125MW; West |
| | 7/20/2020 | 23 | NYCA DNI Ramp Limit |
| | 7/20/2020 | 17,19 | Uprate Buffalo78-Huntley 115kV (#130) for SIN:PACKARD-WALCK_RD_129 |
| | 7/20/2020 | 11,16,18 | Derate East Garden City-Valley Stream 138kV (#262) for BUS:BARRETT 292&459&G2&IC9-12 |
| | 7/20/2020 | 10,19,22 | Uprate Gowanus-Greenwood 138kV (#42231) |
| | 7/20/2020 | 10,19,22 | Uprate Gowanus-Greenwood 138kV (#42232) |
| | 7/20/2020 | 19,22 | Uprate Gowanus-Greenwood 138kV (#42232) for TWR:GOETHALS 22 & 21 |
| | 7/20/2020 | 7,8,14,16,18 | Derate Greenwood-Vernon 138kV (#31231) for TWR:GOETHALS 22 & 21 |
| | 7/20/2020 | 7,8,11 | Derate Mott Haven-Dunwoodie 345kV (#71) |
| | 7/20/2020 | 18 | Lake Erie Circulation, DAM-RTM exceeds +/-125MW; West |
| | 7/22/2020 | 16-20 | Thunder Storm Alert, Buchanan 345/138kV (#TA5) |
| | 7/22/2020 | 17,18 | Thunder Storm Alert, Chester-Shoemaker 138kV (#27) |
| | 7/22/2020 | 11-16,20 | Derate Niagara - Packard 230 kV (#61) for I/o TWR:PACKARD 62 & BP76 |
| | 7/22/2020 | 12,20 | Derate Scriba - Volney 345 kV (#20) for I/o Scriba - Volney 345kV (#21) |
| | 7/22/2020 | 9,10 | Uprate Buffalo78-Huntley 115kV (#130) for SIN:PACKARD-WALCK_RD_129 |
| | 7/22/2020 | 9,19 | Uprate East 179th Street-Hellgate 138kV (#15055) |
| | 7/22/2020 | 10 | NE_AC DNI ramp limit |
| | 7/22/2020 | 9 | PJM_AC DNI ramp limit |
| | 7/22/2020 | 12-14 | Lake Erie Circulation, DAM-RTM exceeds +/-125MW; West |
| | 7/23/2020 | 14-21 | Thunder Storm Alert, Buchanan 345/138kV (#TA5) |
| | 7/23/2020 | 16,18 | NYCA DNI Ramp Limit |
| | 7/23/2020 | 11,12,16-18,22,23 | Derate C.Islip-Happauge 138kV (#889) for I/o TWR:HOLTSVILLE 881& 882& 880 |
| | 7/23/2020 | 10,11 | Derate Cricket Valley-Pleasant Valley 345kV (#F83) for I/o Cricket Valley-Pleasant Valley 345kV (#F84) |
| | 7/23/2020 | 8-12,14-18,20-23 | Derate Packard-Sawyer 230kV (#77) for I/o BUS:PACKARD BK3 & 61 & 78 |
| | 7/23/2020 | 9,11,12,14-16,21-23 | Derate Scriba-Volney 345 kV (#20) for I/o Scriba - Volney 345kV (#21) |
| | 7/23/2020 | 19 | PJM_AC DNI ramp limit |
| | 7/23/2020 | 9,14 | Lake Erie Circulation, DAM-RTM exceeds +/-125MW; West |

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 | |

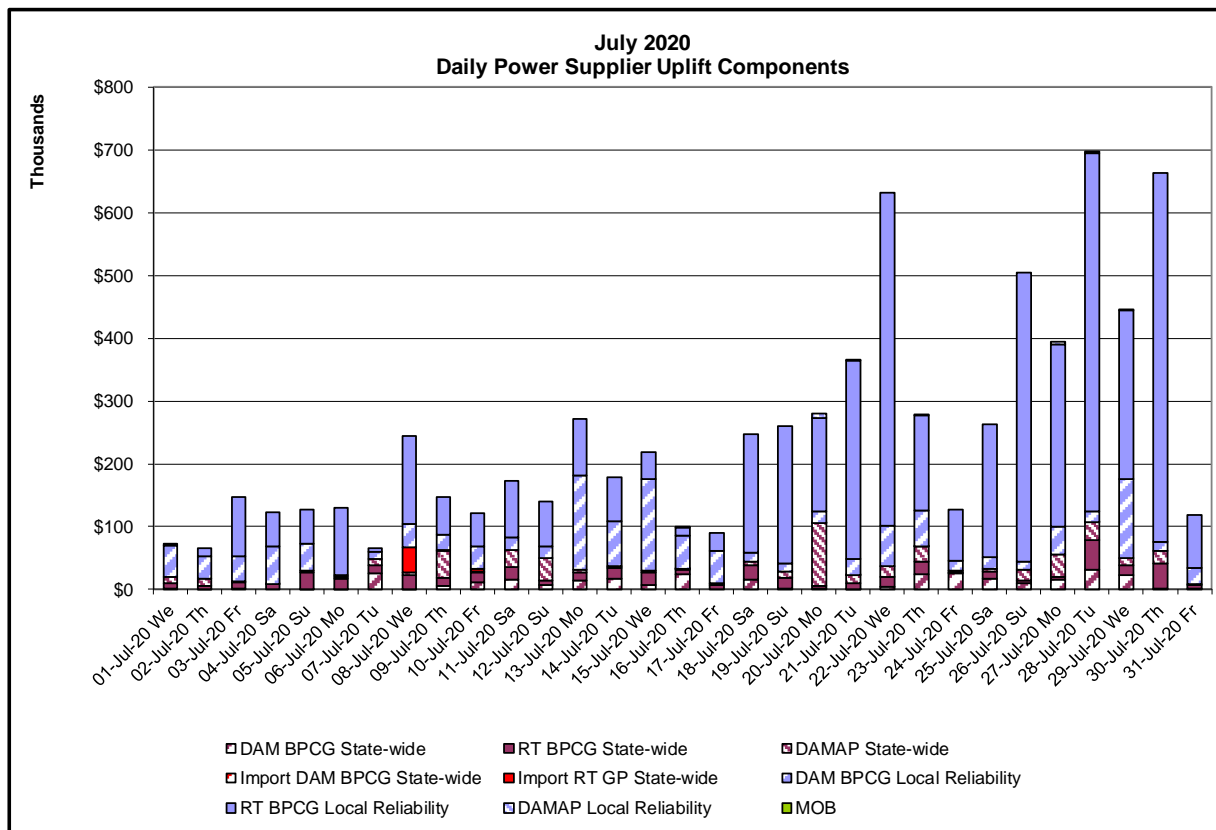
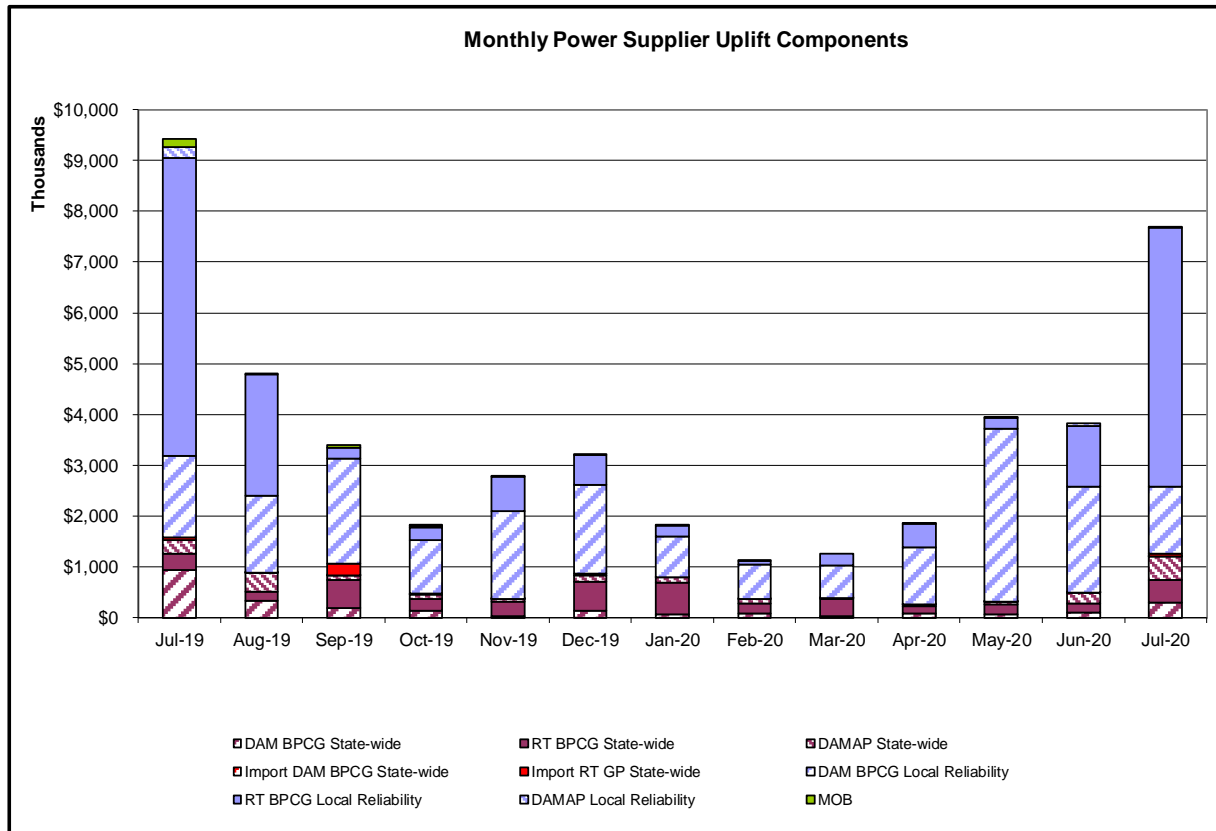
Monthly Balancing Market Congestion Report Assumptions/Notes

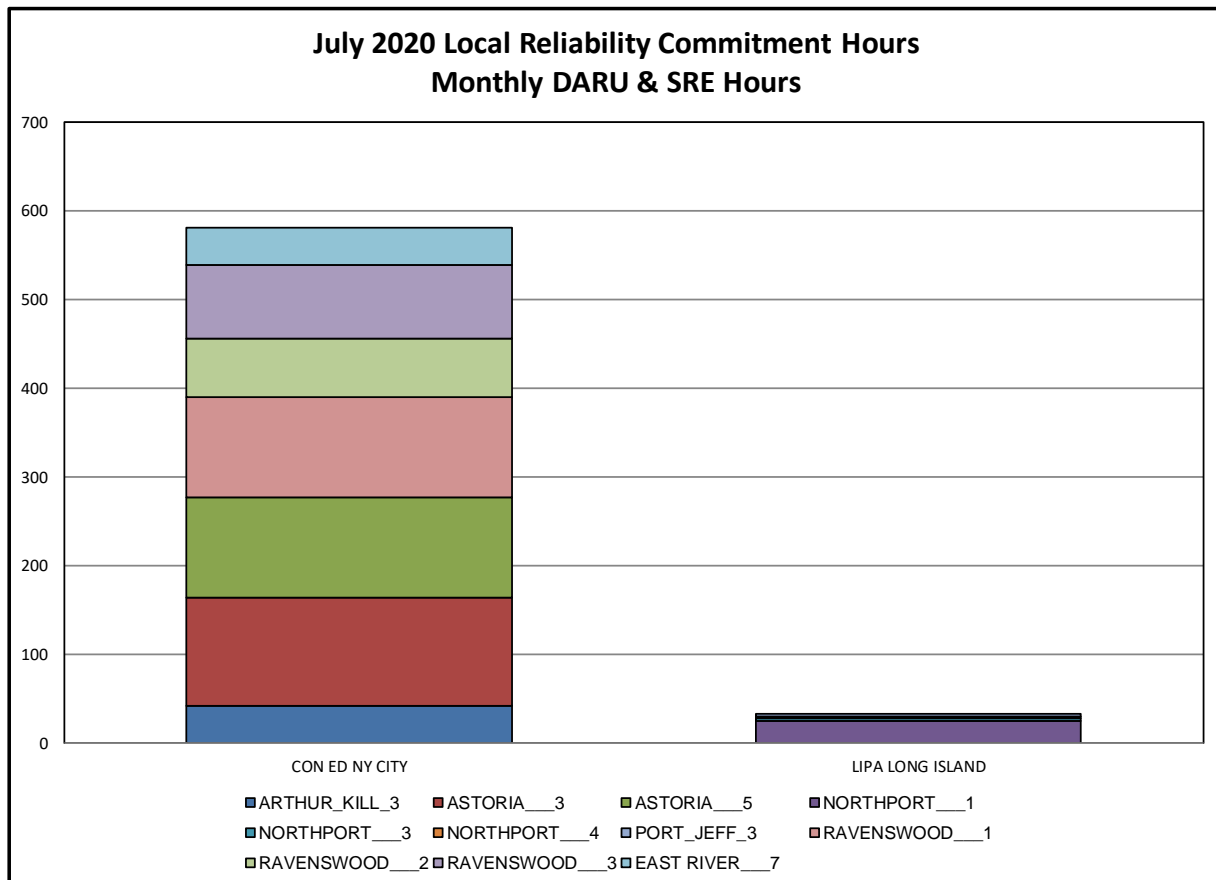
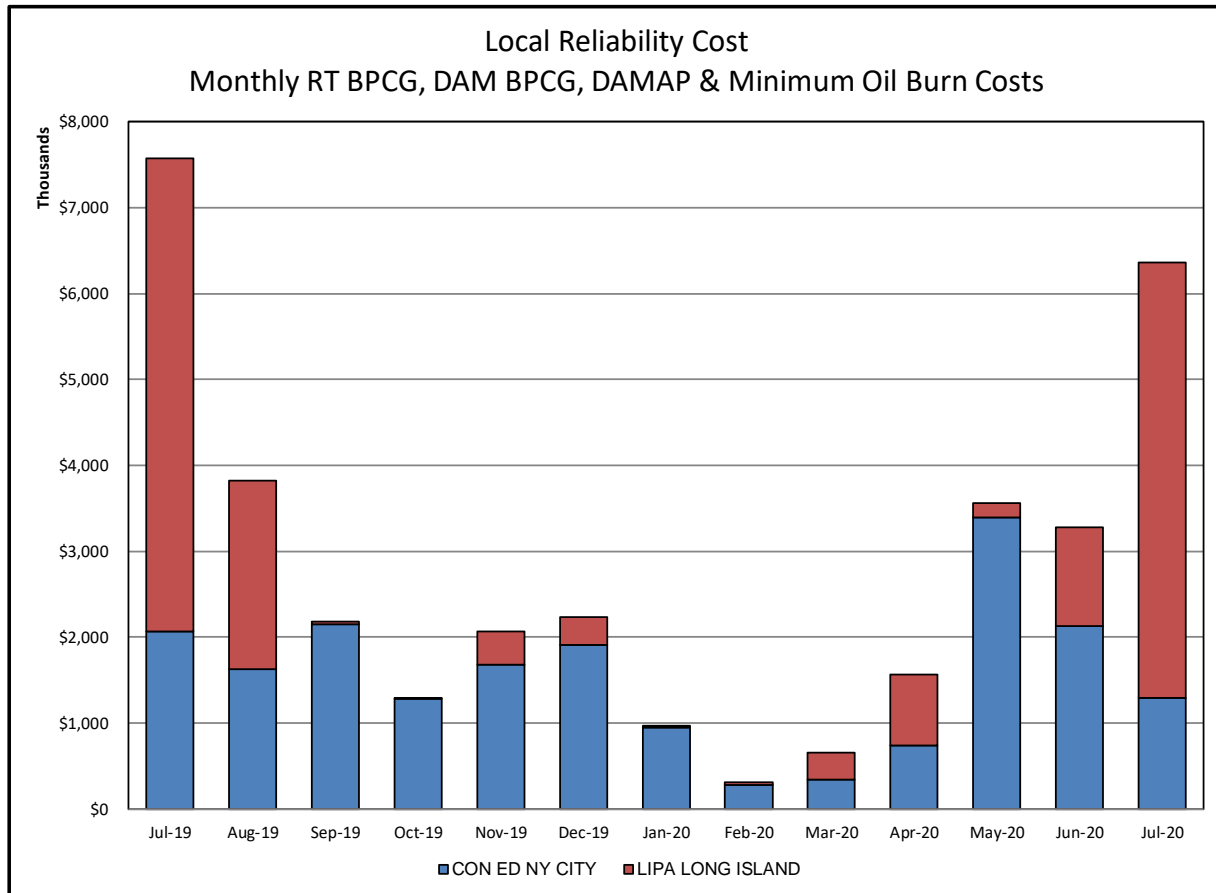
- 1) Storm Watch Costs are identified as daily total uplift costs
- 2) Days with a value of BMCR less M2M Settlement of \$100K/HR, shortfall of \$200K/Day or more, or surplus of \$100K/Day or more are investigated.
- 3) Uplift costs associated with multiple event types are apportioned equally by hour

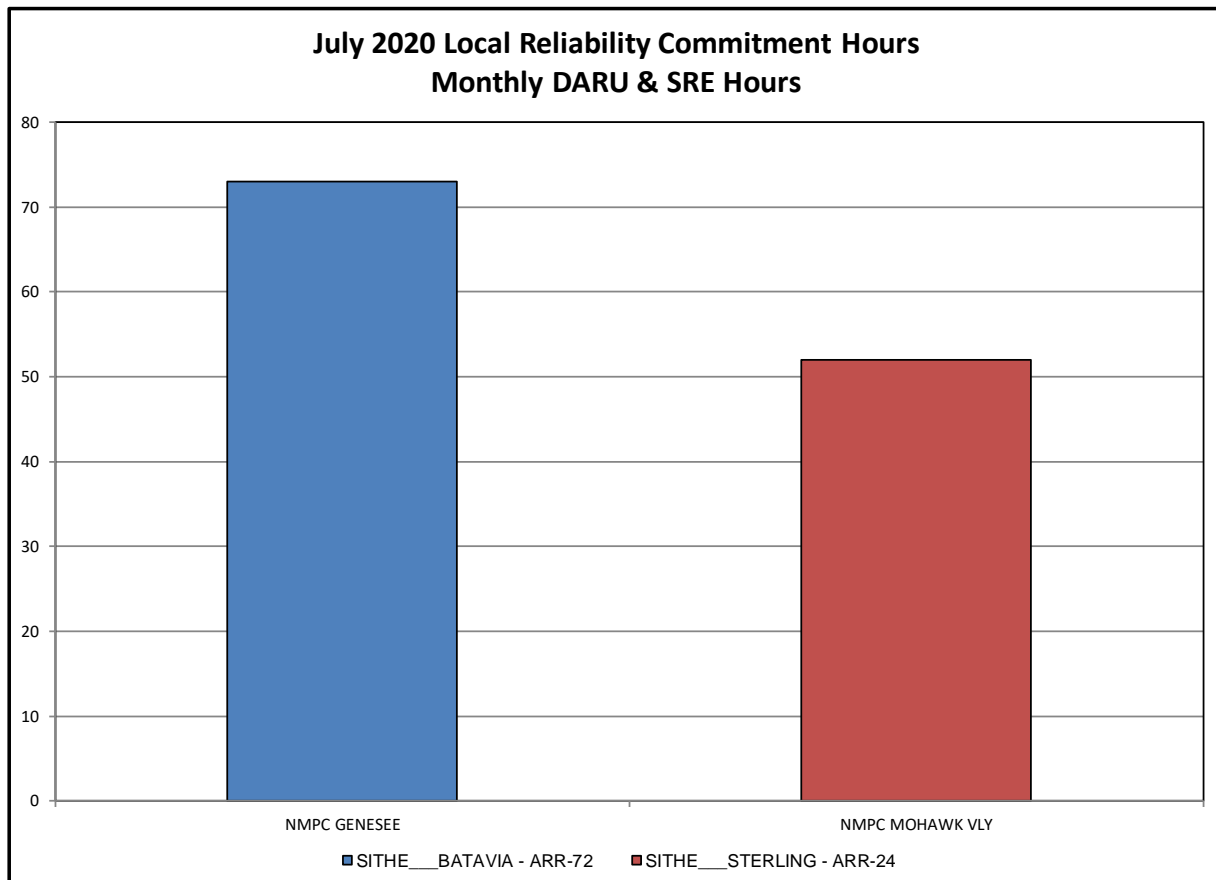
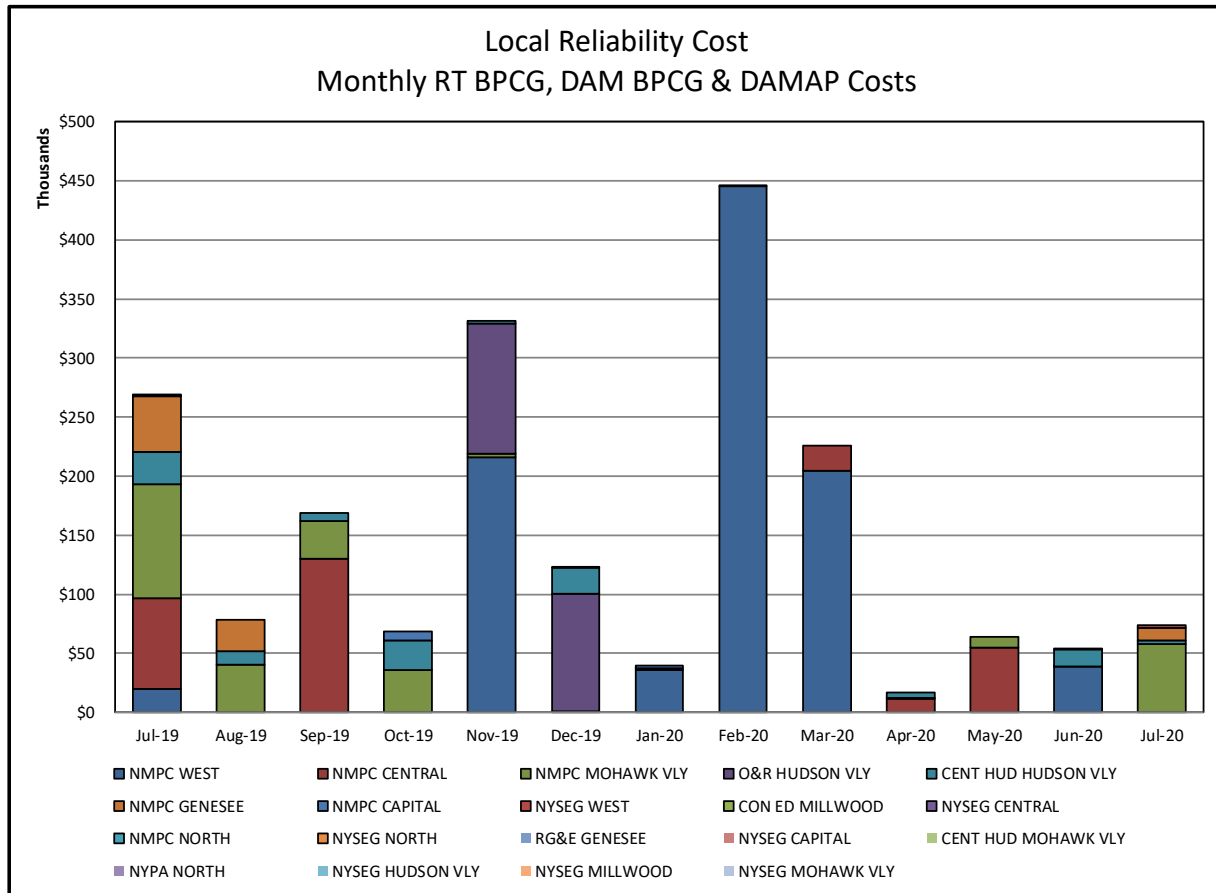


Day-Ahead Market Congestion Residual Categories

| <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. | |

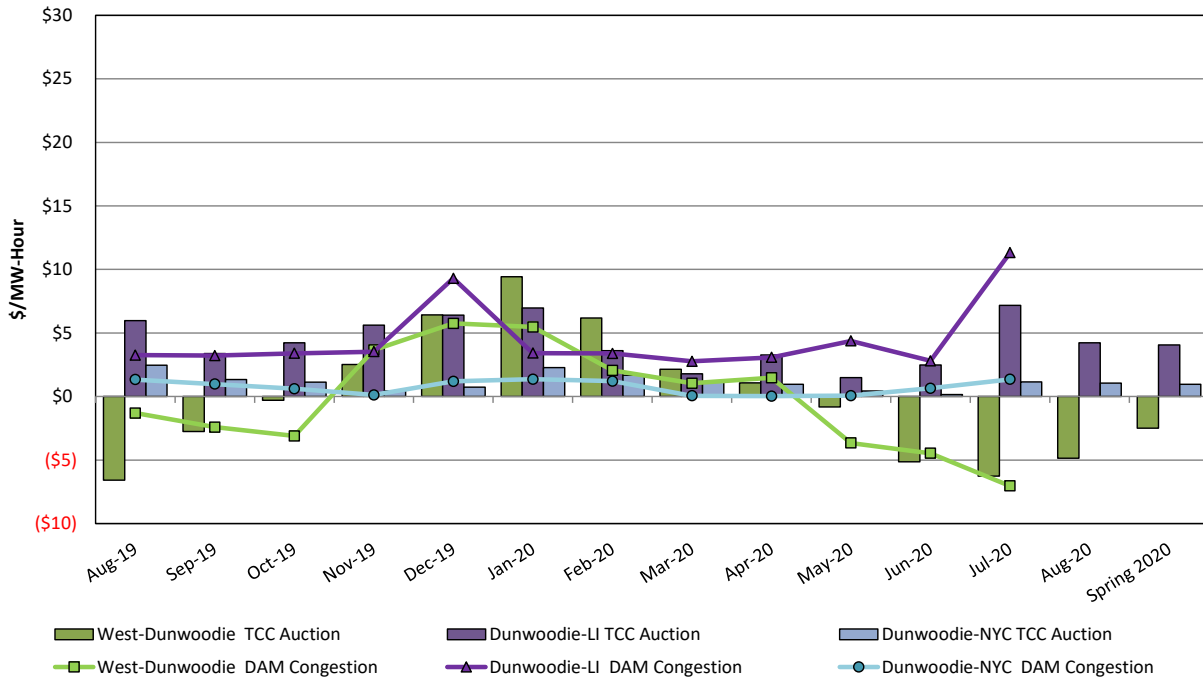






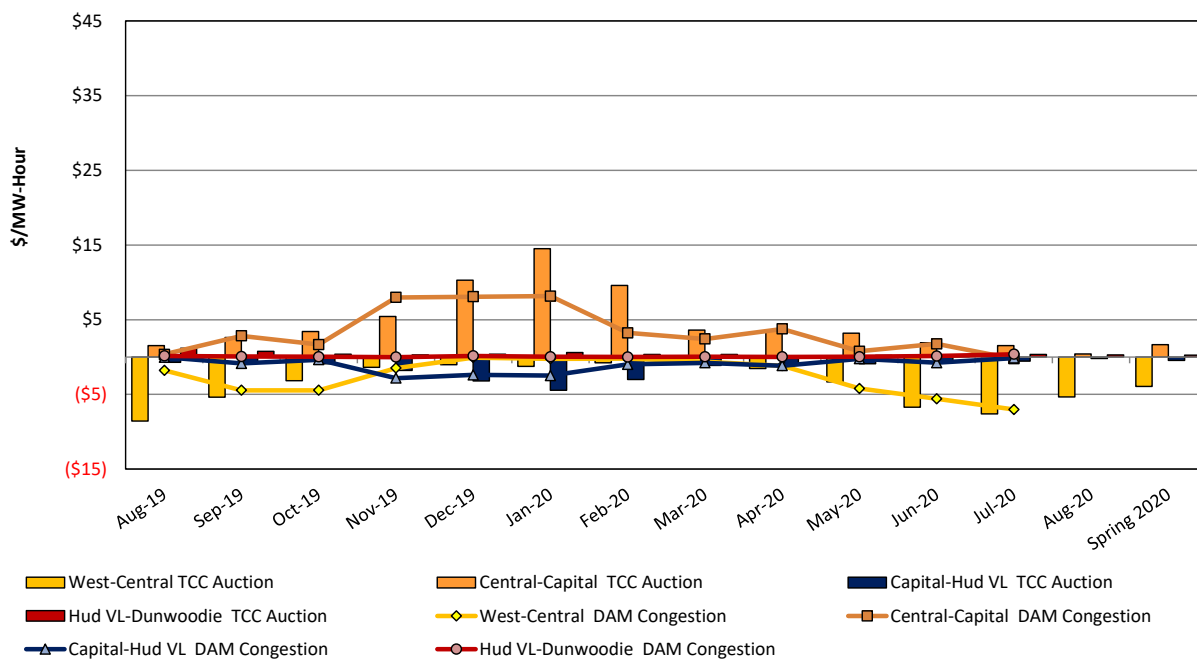
TCC & Day Ahead Market Selected Internal Path Congestion

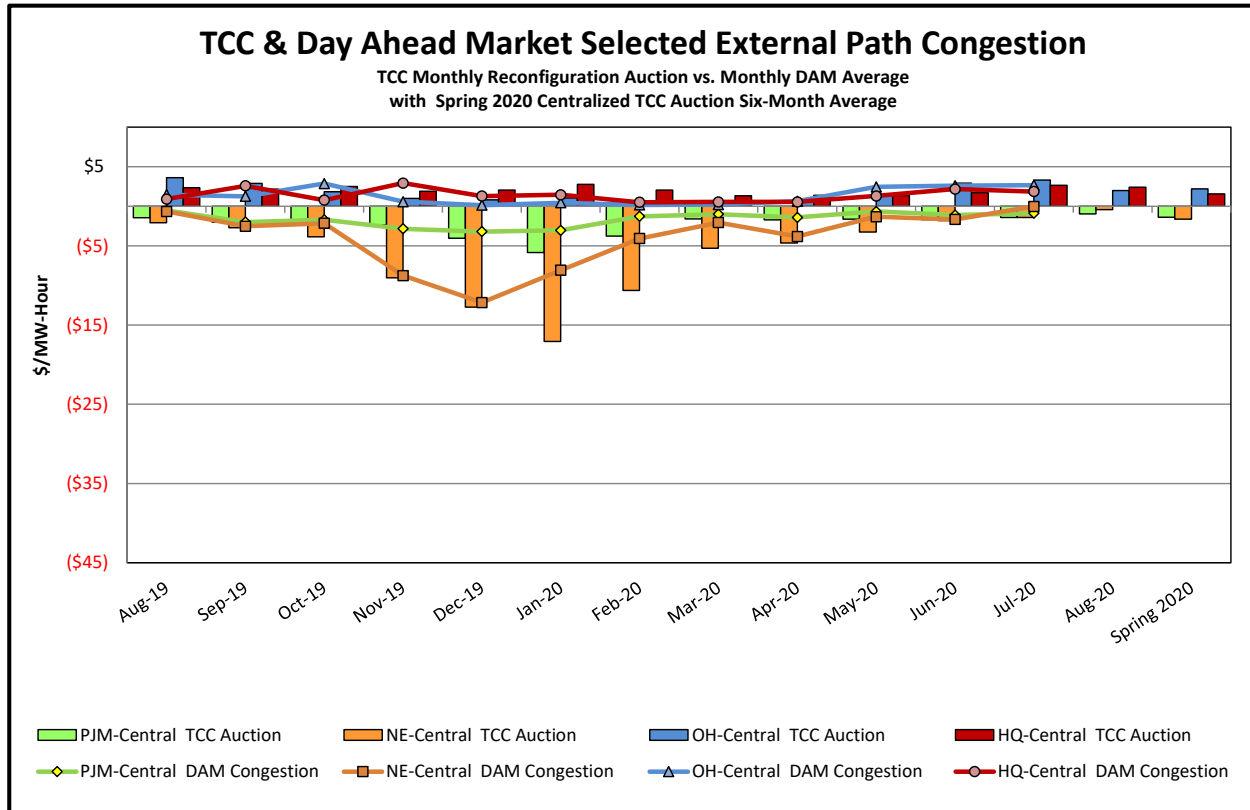
TCC Monthly Reconfiguration Auction vs. Monthly DAM Average
with Spring 2020 Centralized TCC Auction Six-Month Average



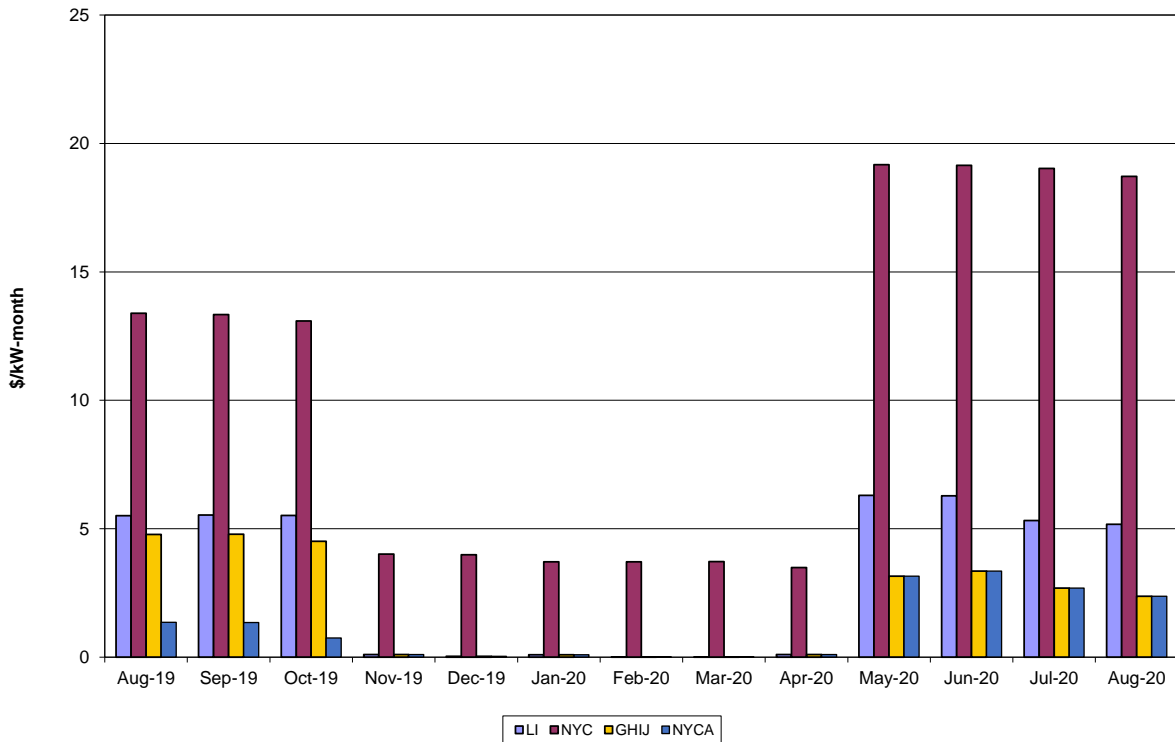
TCC & Day Ahead Market West to Dunwoodie Path Congestion

TCC Monthly Reconfiguration Auction vs. Monthly DAM Average
with Spring 2020 Centralized TCC Auction Six-Month Average





ICAP Spot Market Clearing Price



UCAP Sales

