

Operations Performance Metrics Monthly Report



May 2018 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 June 8, 2018.

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May 2018 Operations Performance Highlights

- Peak load of 24,441 MW occurred on 05/29/2018 HB 17
- All-time summer capability period peak load of 33,956 MW occurred on 7/19/2013 HB 16
- 5.6 hours of Thunder Storm Alerts were declared
- 0 hours of NERC TLR level 3 curtailment
- High levels of wind curtailment in the North Country this month were coincident with the scheduled outages of the Moses-Adirondack 230kV (#MA2) transmission line, Browns Falls-Taylorville 115kV (#4), Marcy-Coopers Corners 345kV (UCC2-41), Marcy 765/345kV (#AT2), and the forced outage of the St. Lawrence-Moses 230kV (#L33P).
- The following table identifies the estimated production cost savings associated with the Broader Regional Market initiatives.

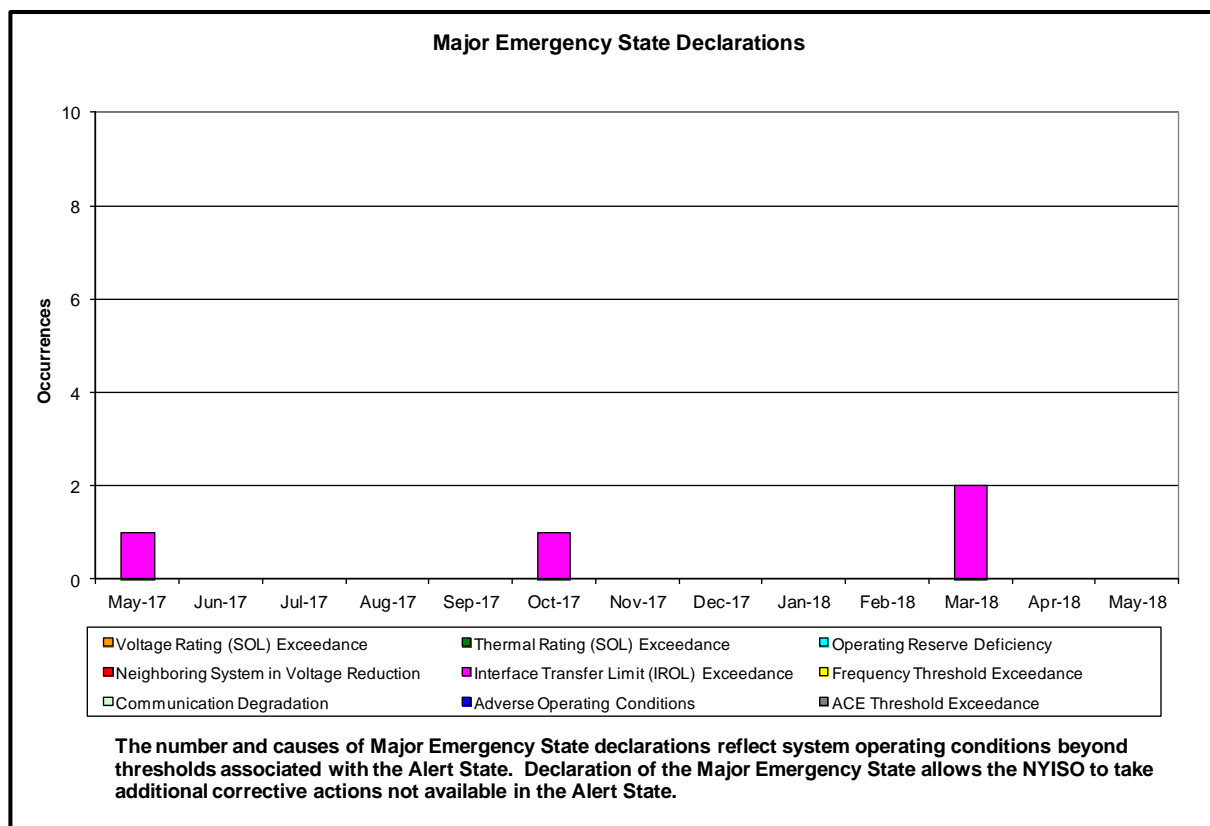
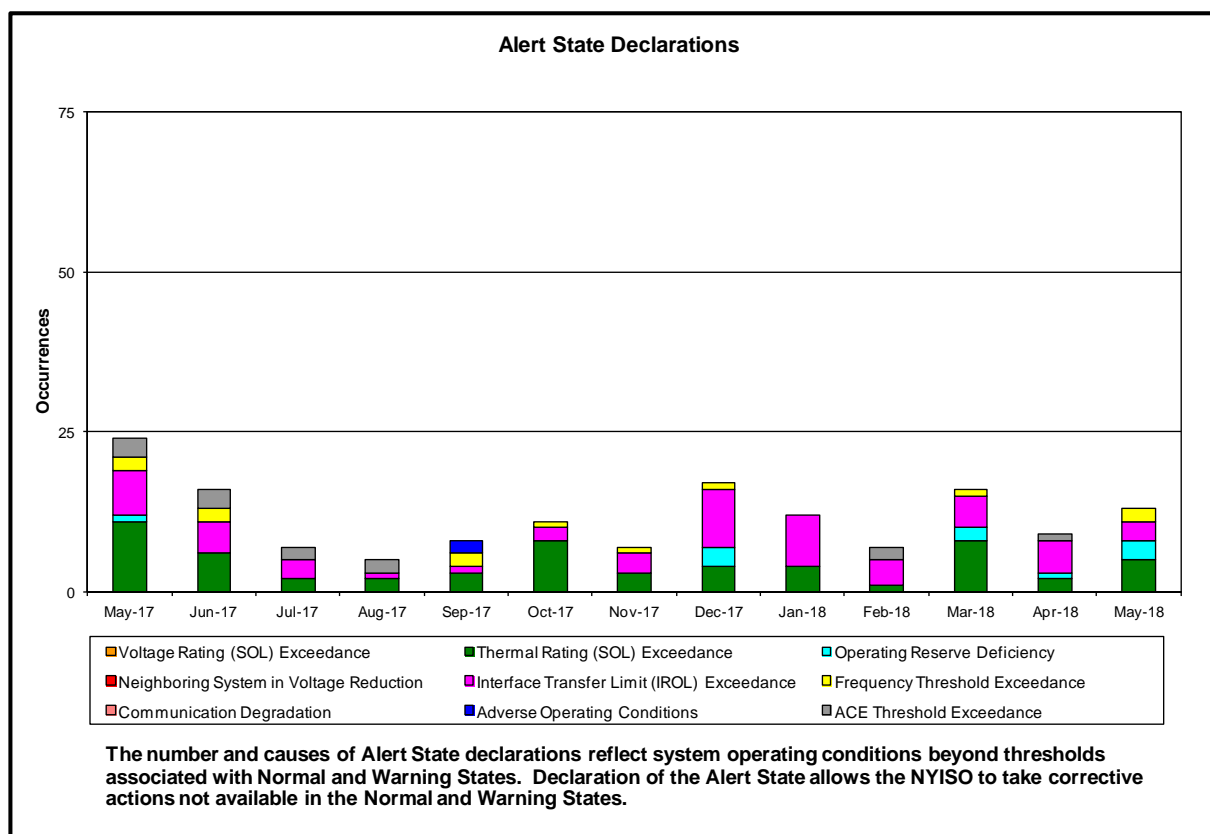
	Current Month Value (\$M)	Year-to-Date Value (\$M)
NY Savings from PJM-NY Congestion Coordination	\$0.43	\$8.79
NY Savings from PJM-NY Coordinated Transaction Scheduling	(\$0.07)	\$0.61
NY Savings from NE-NY Coordinated Transaction Scheduling	(\$0.13)	(\$0.67)
Total NY Savings	\$0.23	\$8.73
Regional Savings from PJM-NY Coordinated Transaction Scheduling	\$0.25	\$1.27
Regional Savings from NE-NY Coordinated Transaction Scheduling	\$0.07	\$0.29
Total Regional Savings	\$0.32	\$1.56

- Statewide uplift cost monthly average was (\$0.17)/MWh
- The following table identifies the Monthly ICAP Spot Market prices and the price delta.

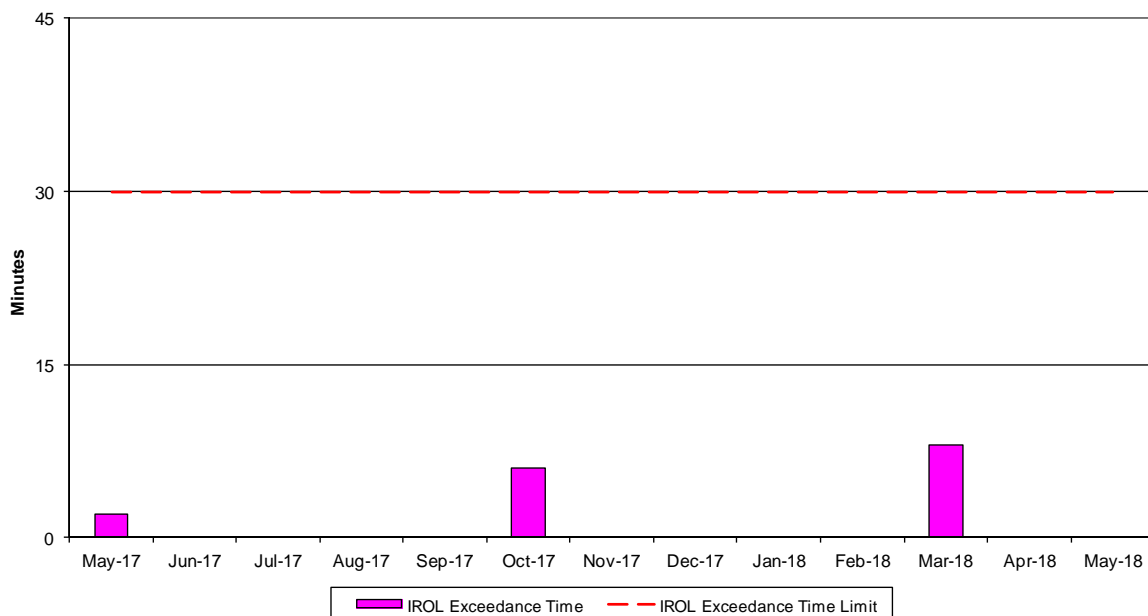
Spot Auction Price Results	NYCA	Lower Hudson Valley Zones	New York City Zone	Long Island Zone
June 2018 Spot Price	\$4.33	\$10.24	\$10.24	\$6.80
May 2018 Spot Price	\$2.70	\$11.86	\$11.86	\$6.81
Delta	\$1.63	(\$1.62)	(\$1.62)	(\$0.01)

- NYC: Price is decreased by \$1.62 due primarily to an increase in Generation UCAP Available
- LHV: Price is decreased by \$1.62 due primarily to an increase in Generation UCAP Available
- NYCA: Price is increased by \$1.63 due primarily to an increase in exports and decrease in imports

Reliability Performance Metrics

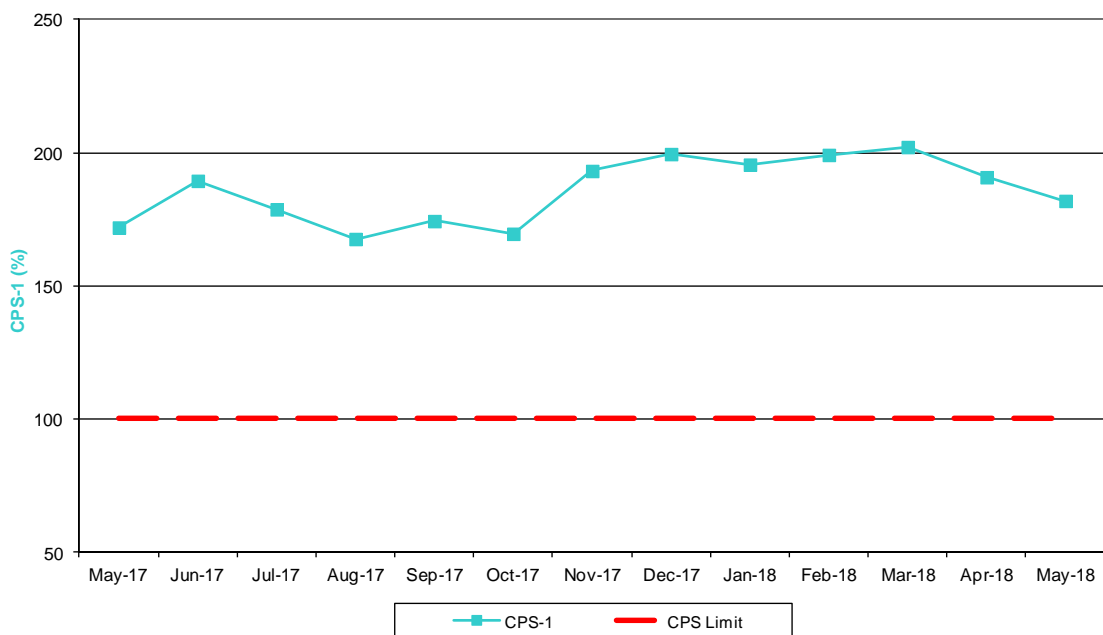


NERC IROL Time Over Limit



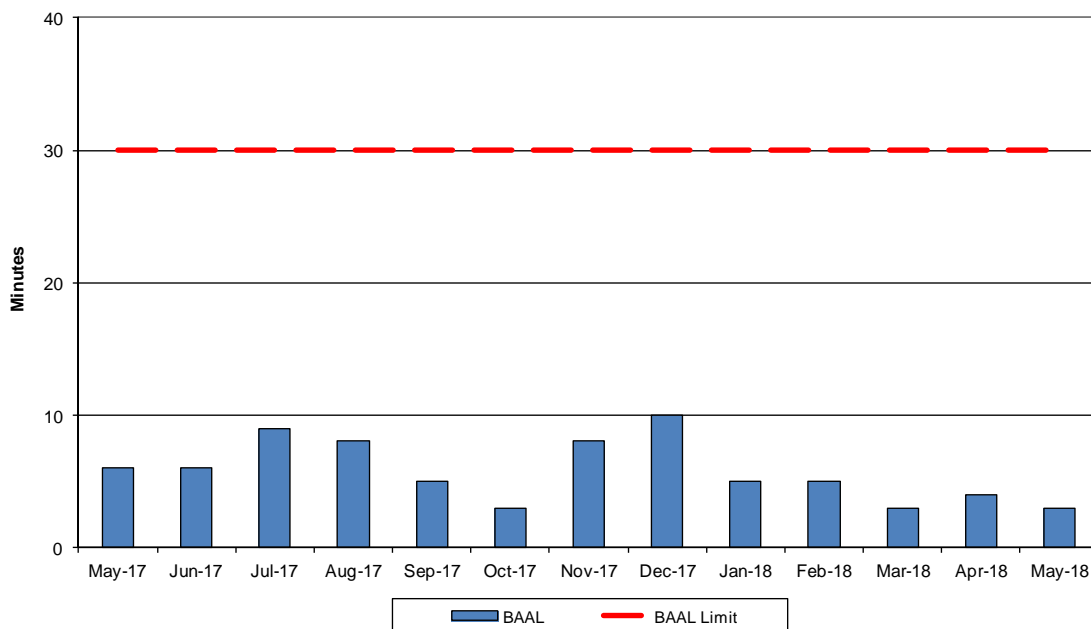
For IROL exceedances leading to Major Emergency State declarations, the maximum IROL exceedance time is identified. IROL exceedances of less than thirty minutes are considered NERC compliant.

NERC Control Performance Standards



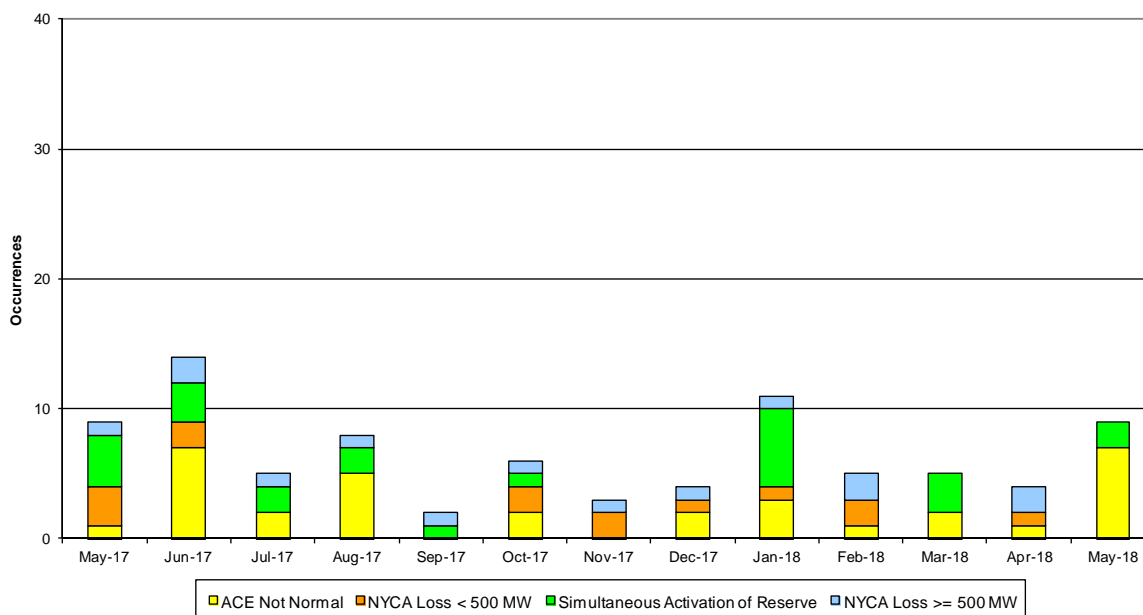
The value of NERC Control Performance Standards (CPS-1) is an indicator of the NYISO Area resource and demand balancing. Values exceeding the identified threshold are NERC compliant.

NERC Balancing Authority ACE Limit Standard



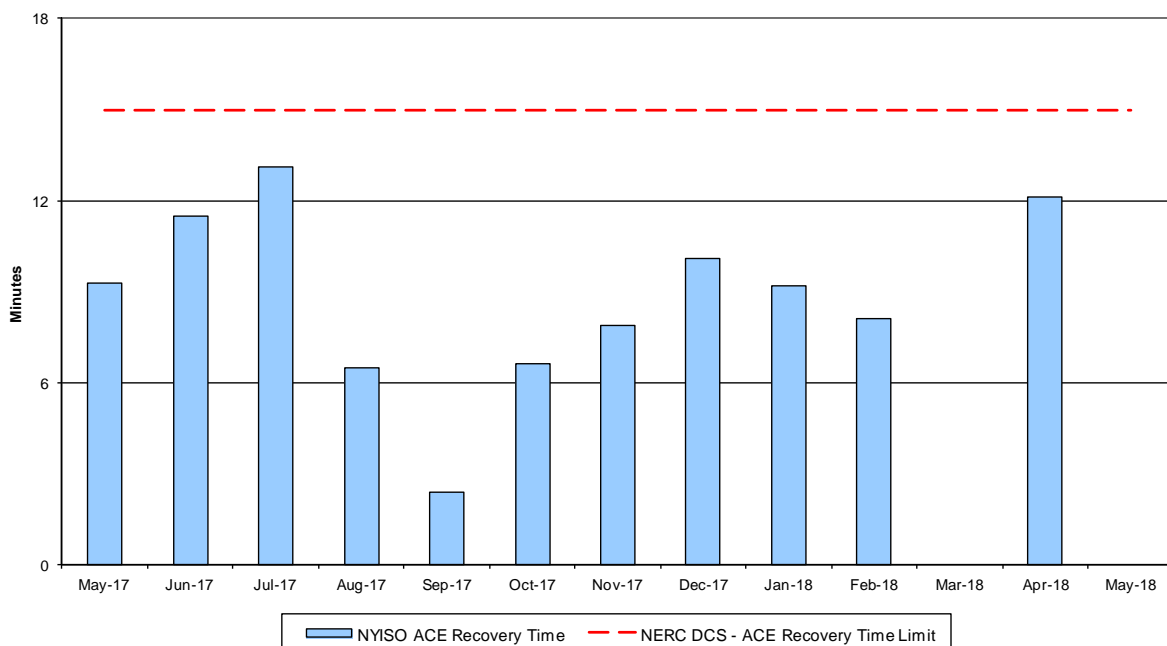
The amount of time the clock-minute average ACE exceeds the clock-minute Balancing Authority ACE Limit (BAAL) is an indicator of the NYISO Area resource and demand balancing. The maximum BAAL exceedance time is identified. BAAL exceedances of less than 30 consecutive clock-minutes are NERC compliant.

Reserve Activations



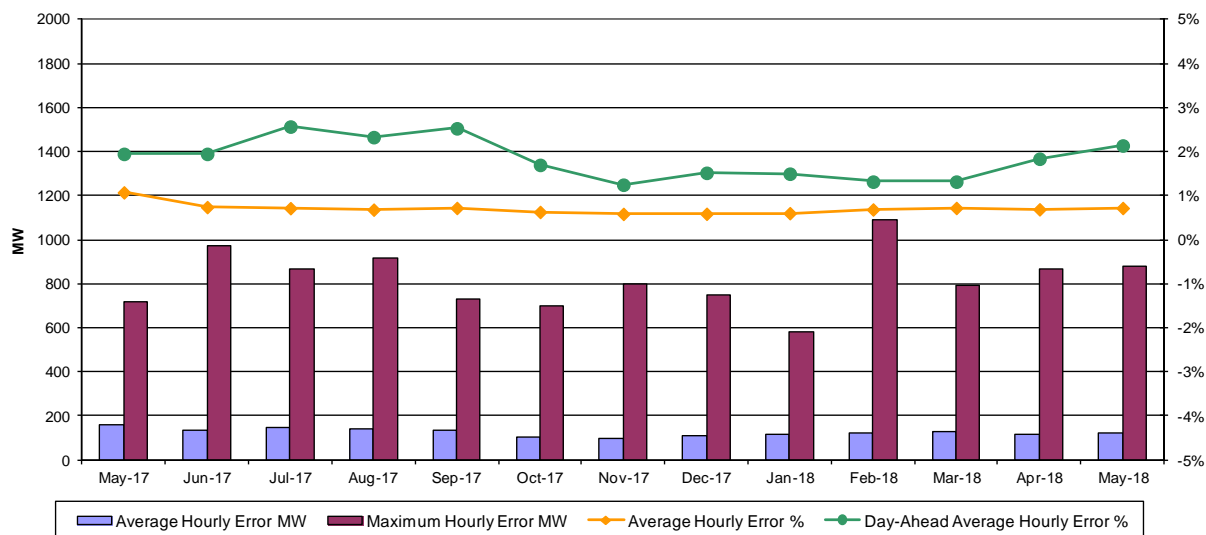
NYISO Reserve Activations are indicators of the need to respond to unexpected operational conditions within the NYISO Area or to assist a neighboring Area (Simultaneous Activation of Reserves) by activating an immediate resource and demand balancing operation.

DCS Event Time to ACE Recovery



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

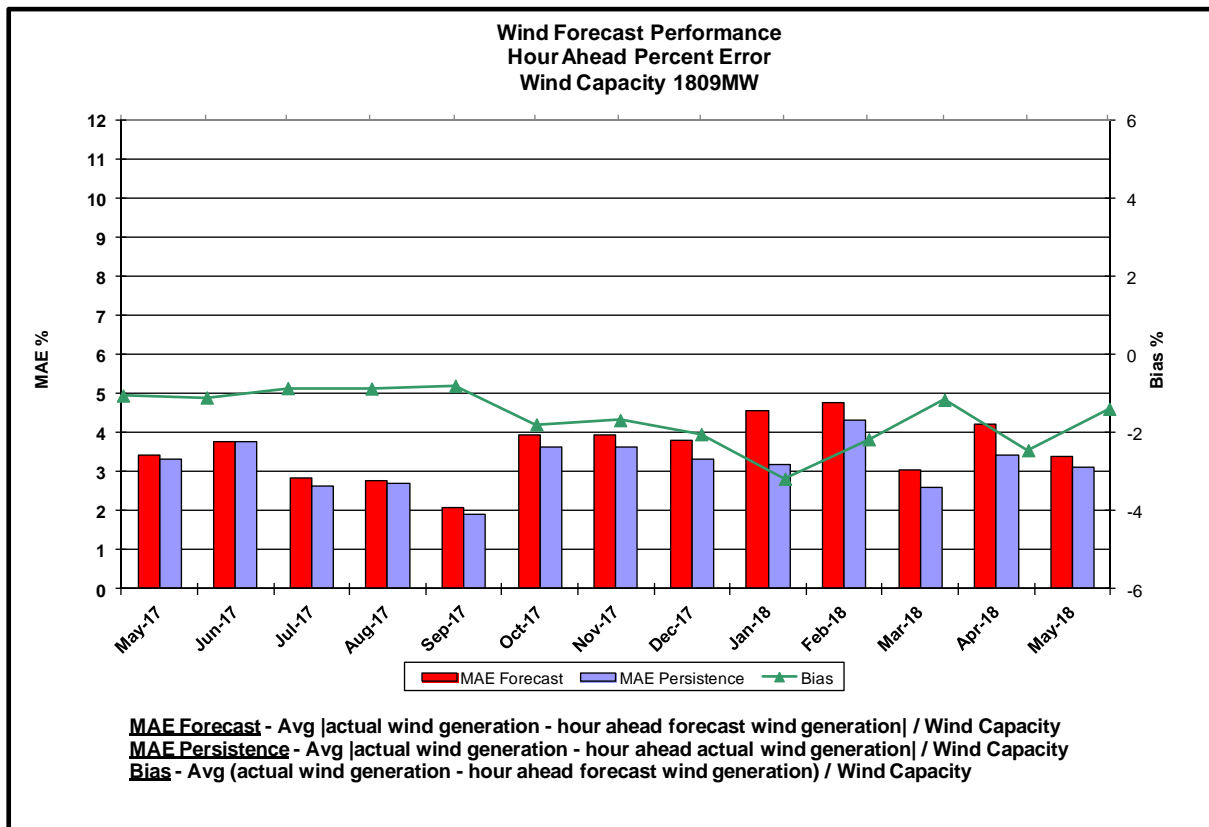
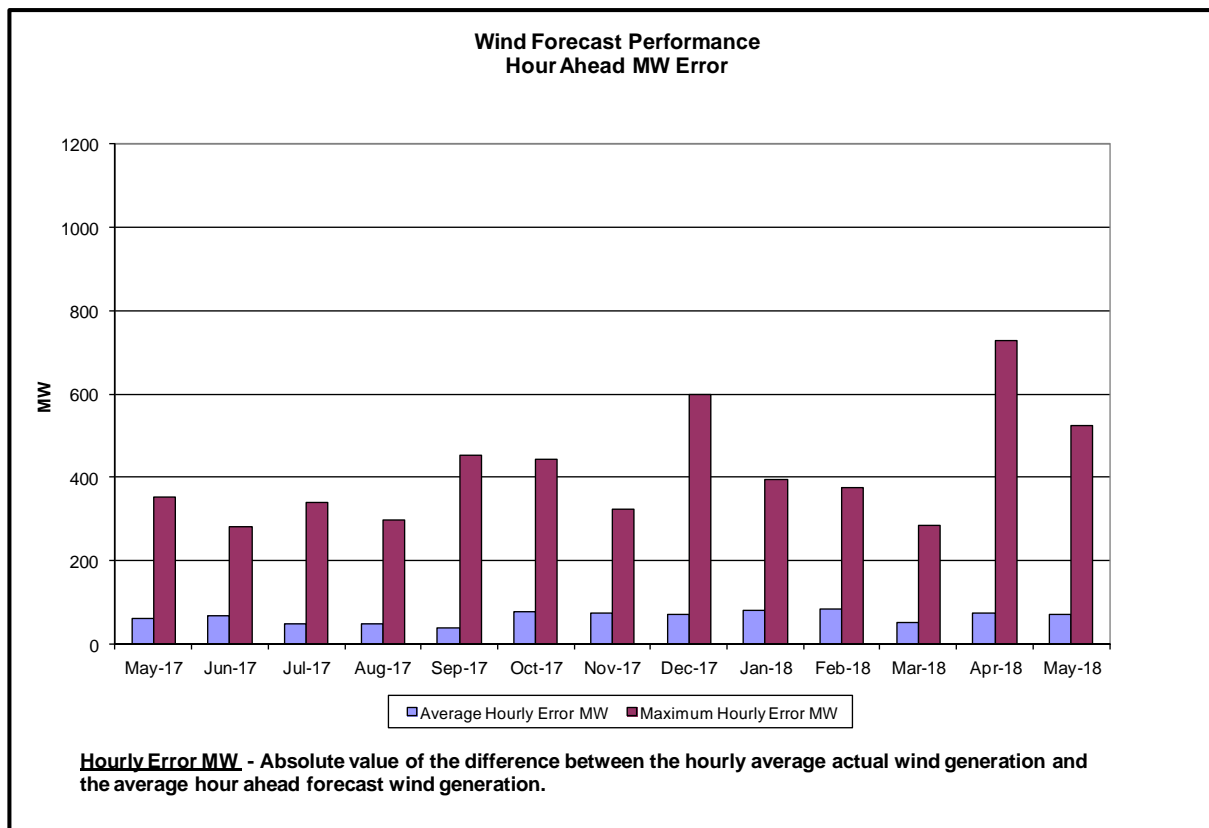
Load Forecast Performance

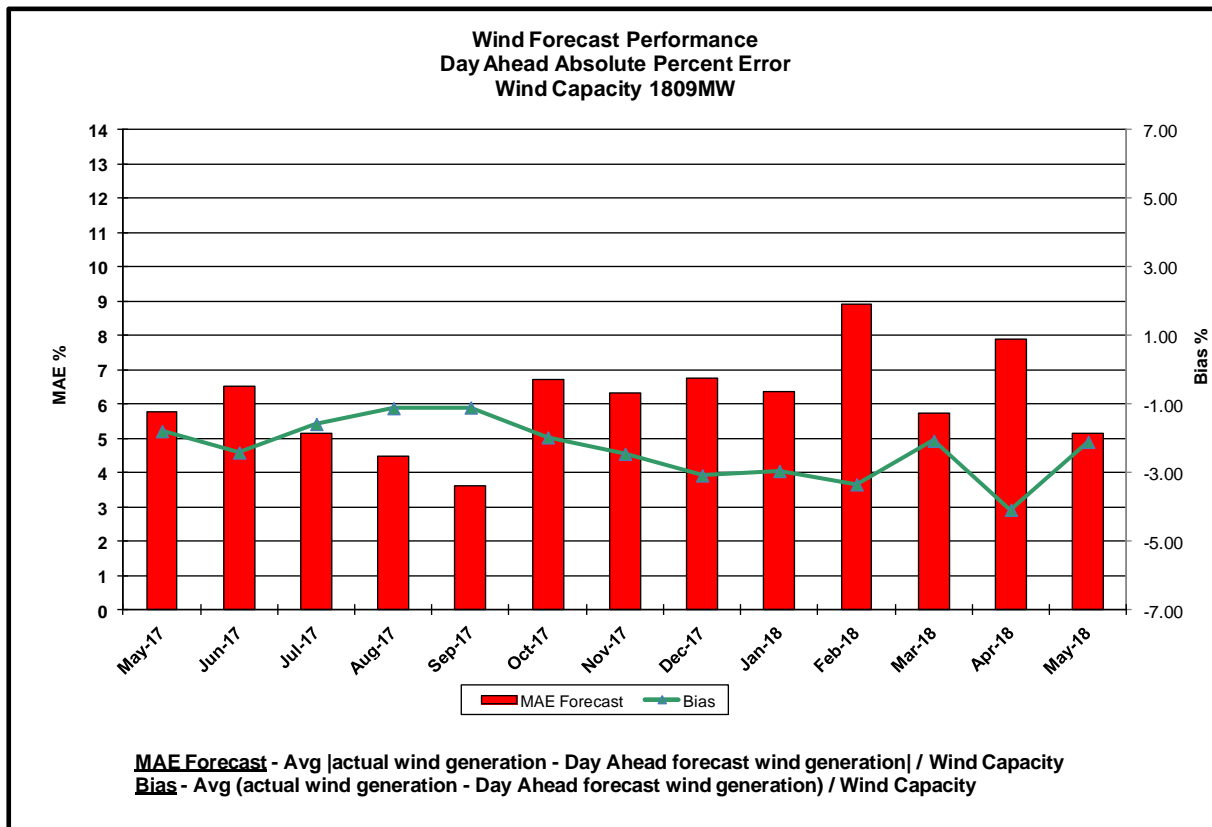
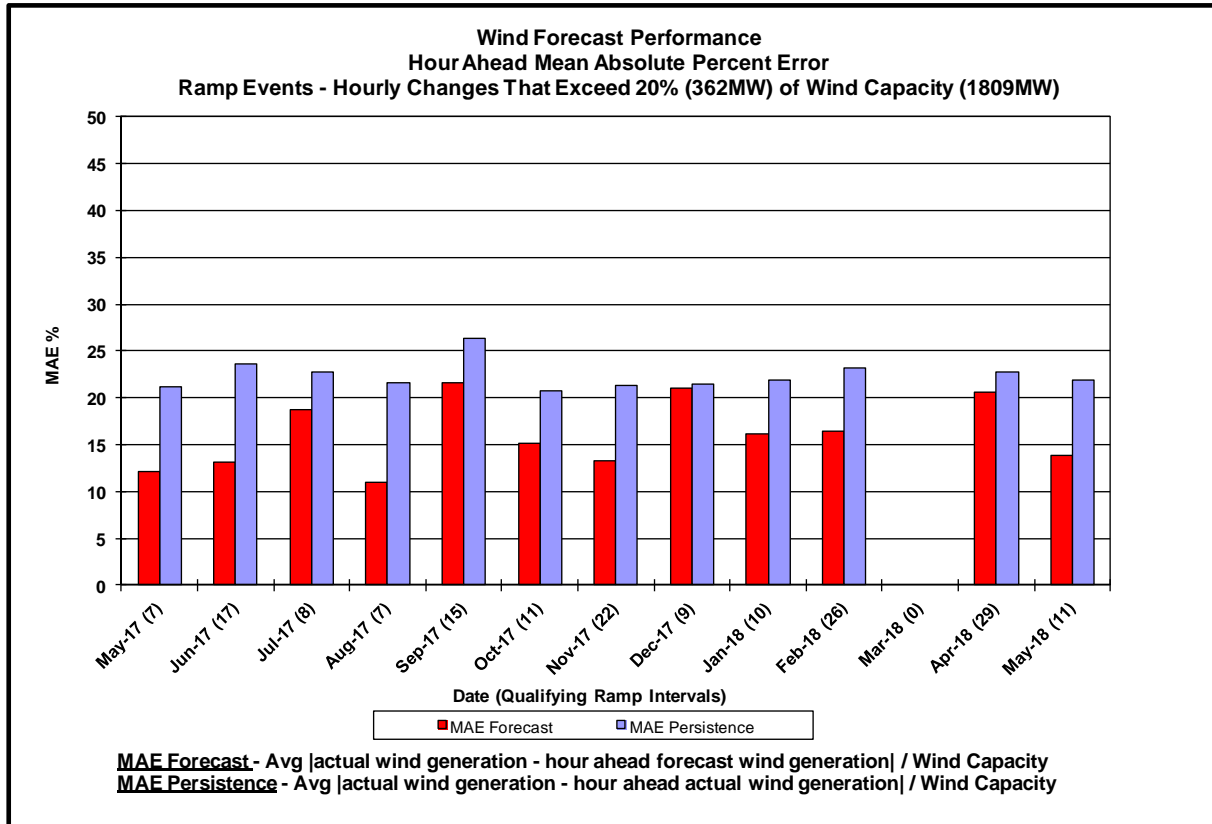


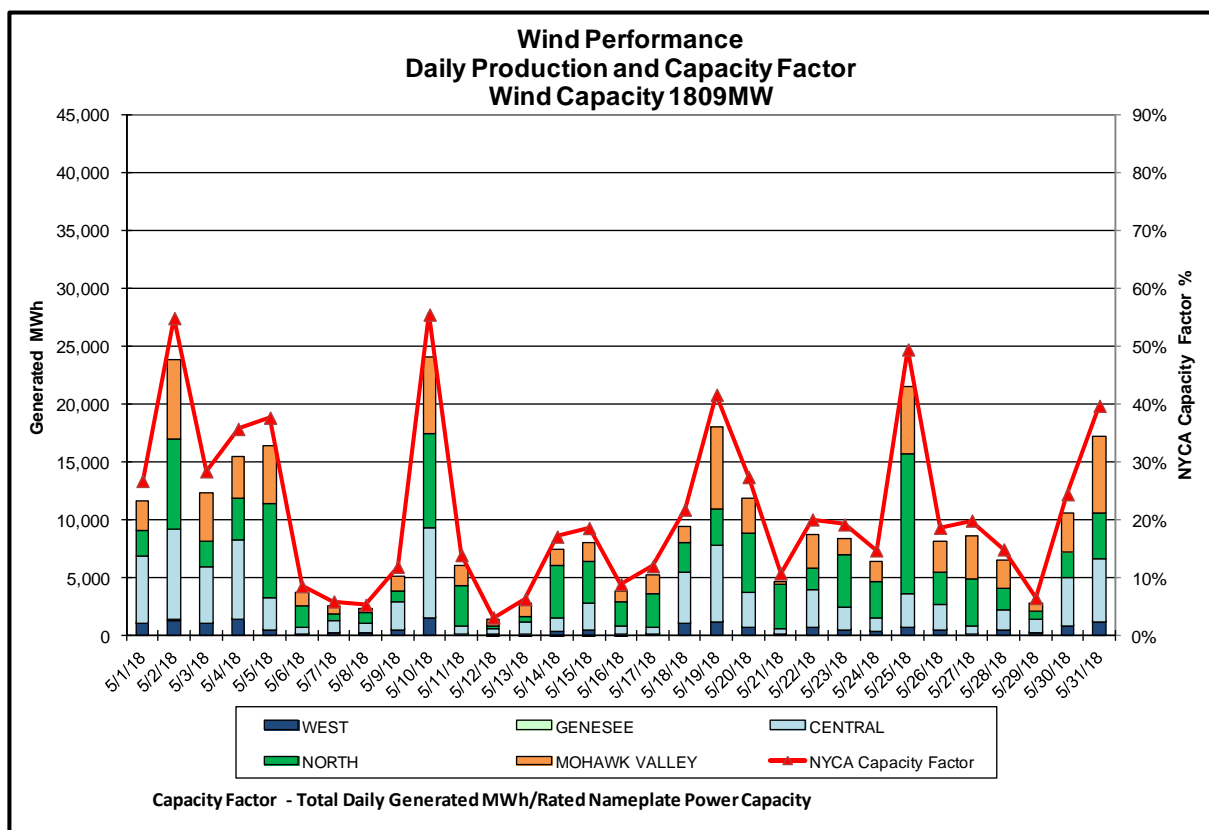
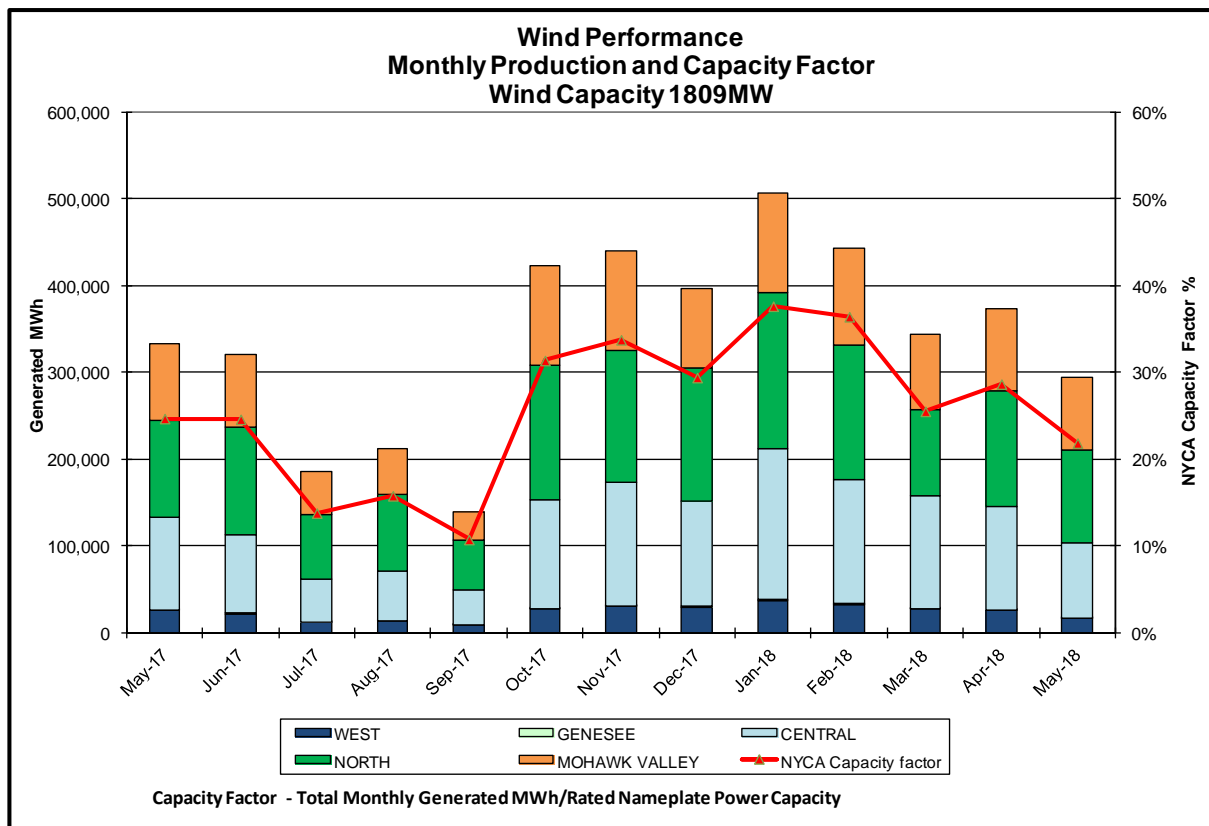
Hourly Error MW - Absolute value of the difference between the hourly average actual load demand and the average hour ahead forecast load demand.

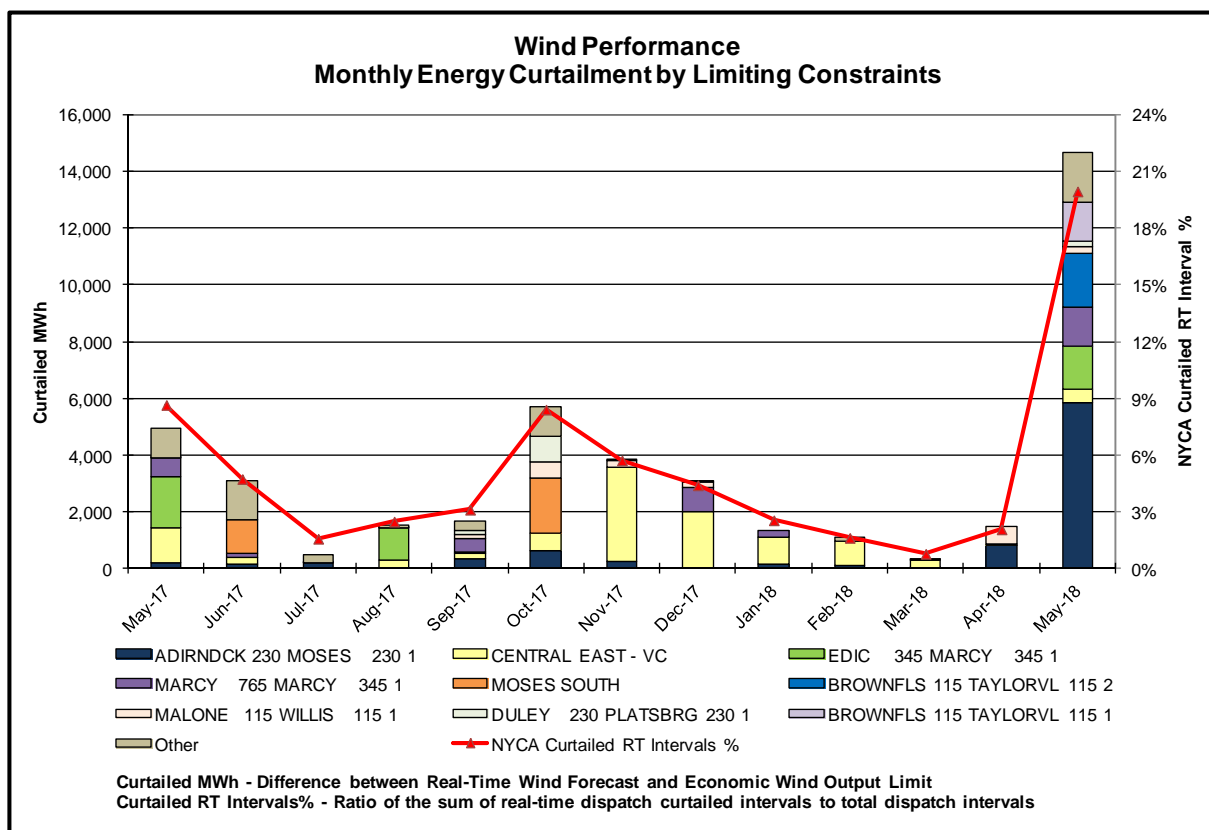
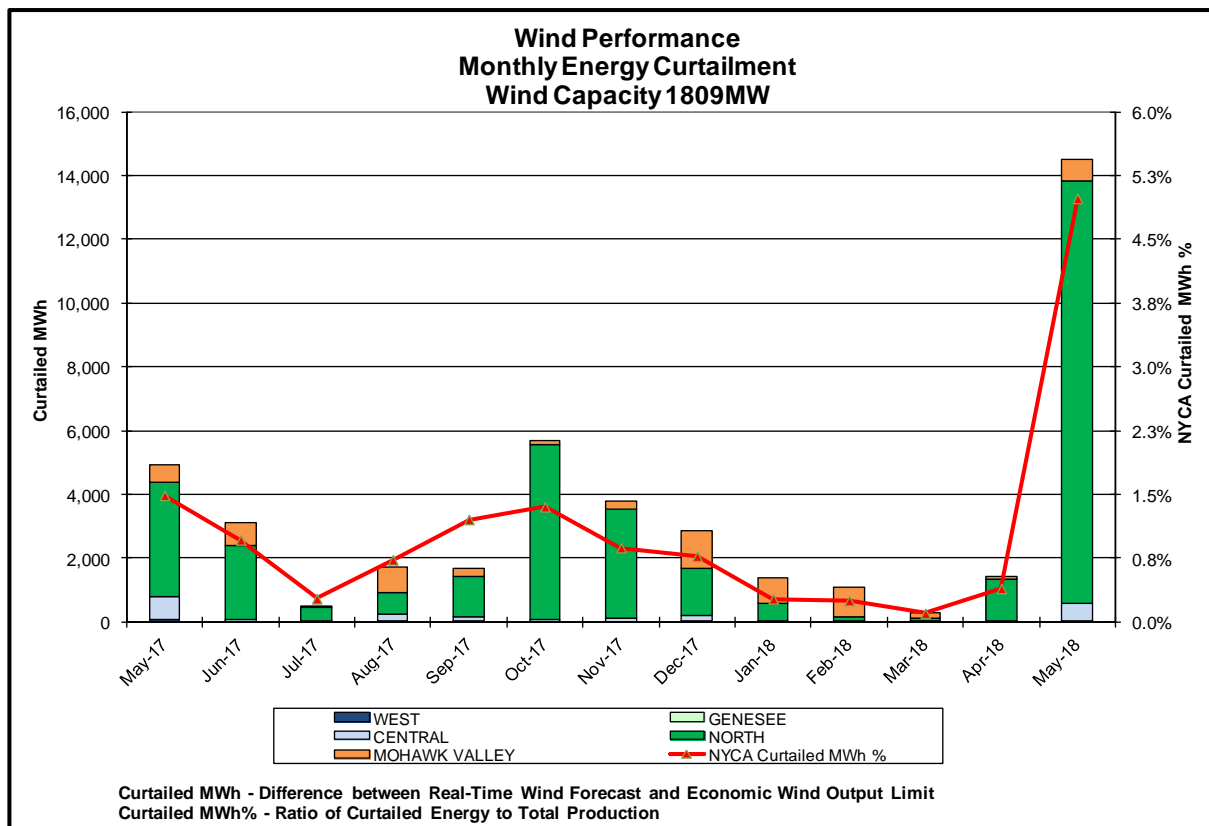
Average Hourly Error % - Average value of the ratio of hourly average error magnitude to hourly average actual load demand.

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.

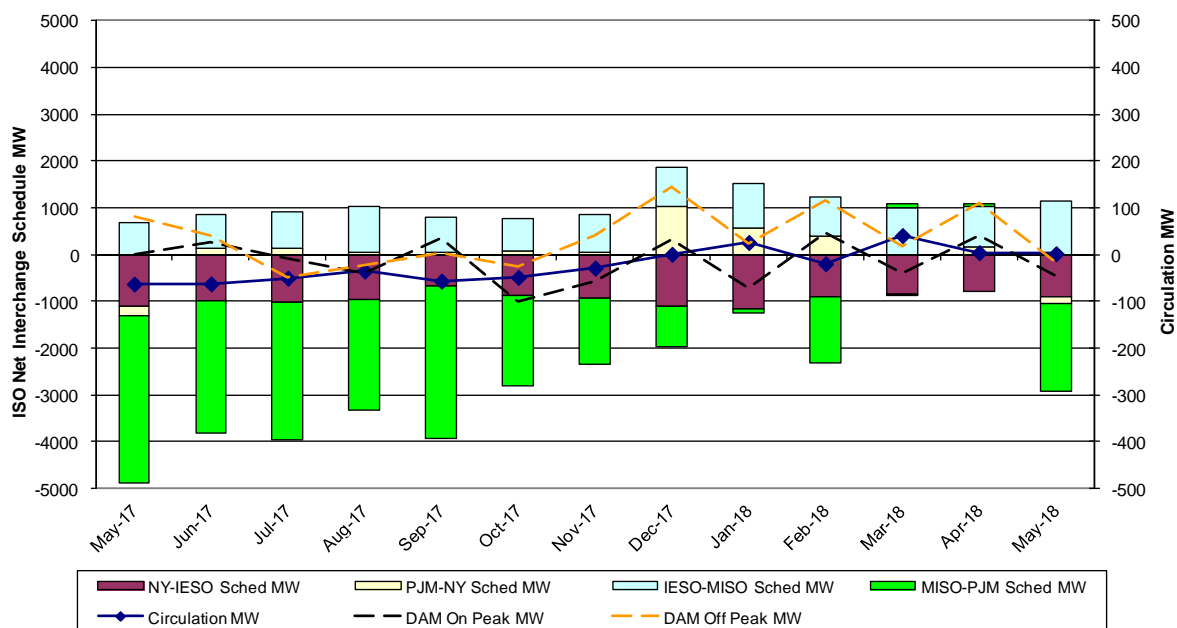






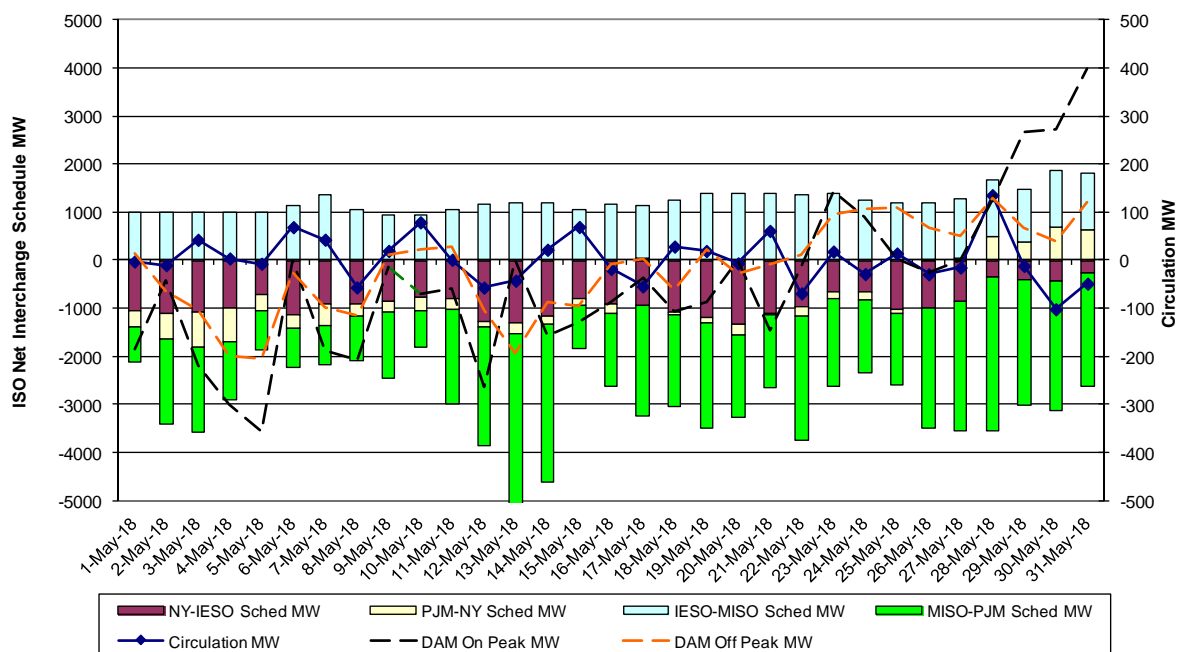


**Lake Erie Circulation and ISO Net Interchange Schedules
Monthly Averages**



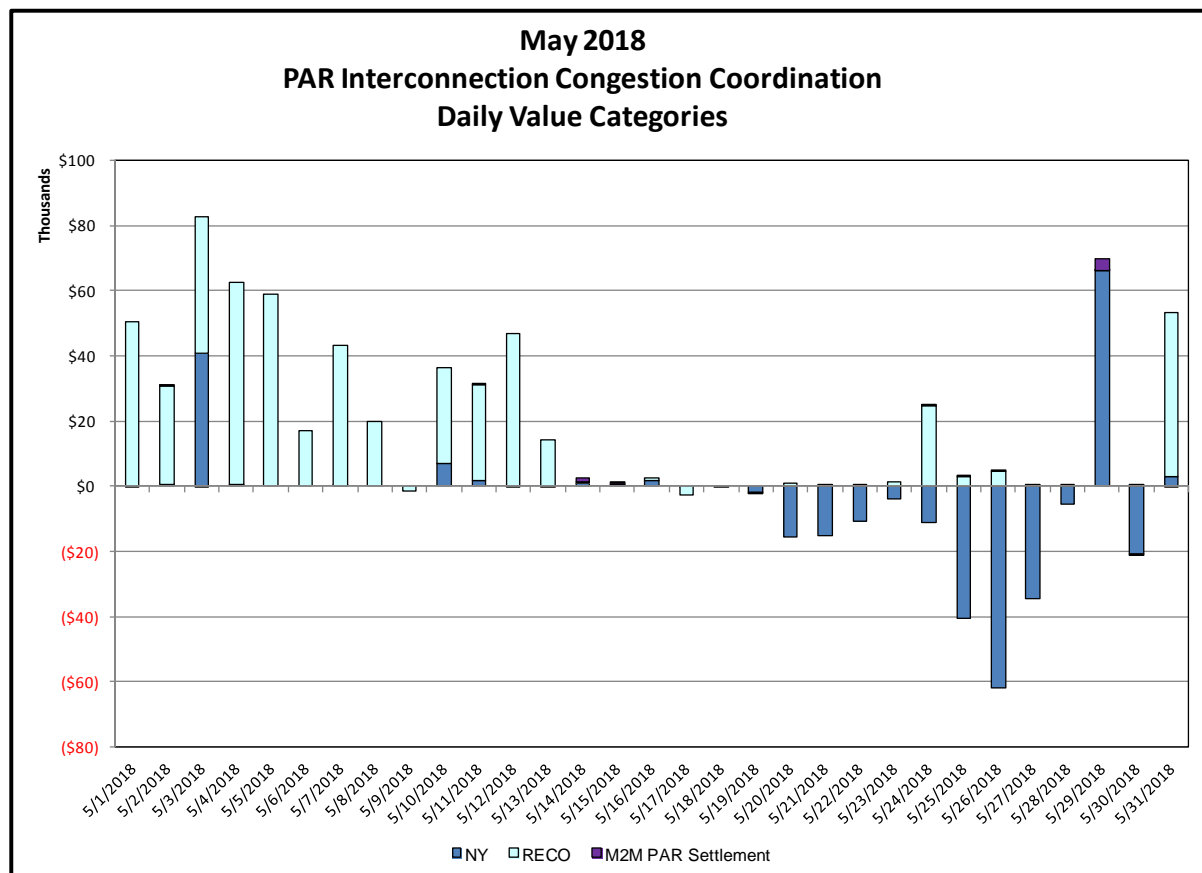
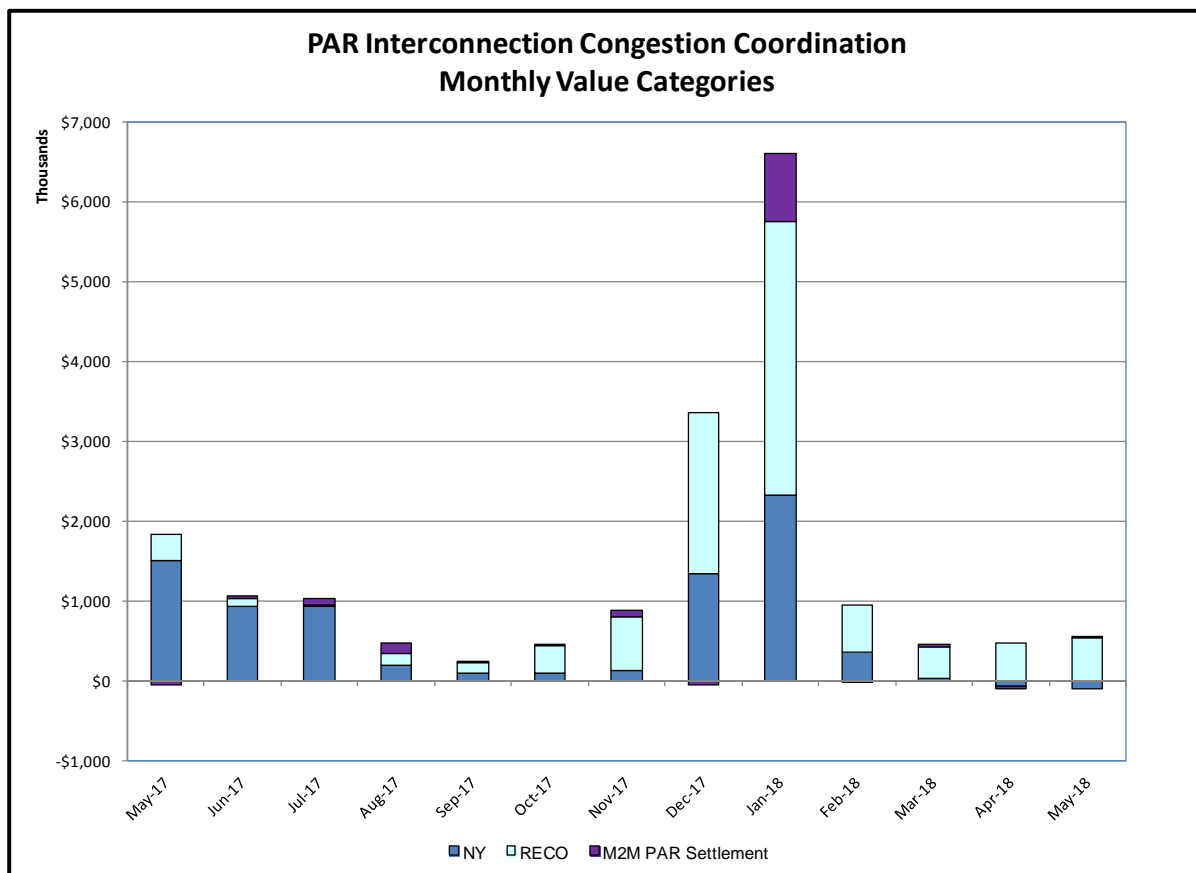
Interchange schedules with positive values aggravate clockwise Lake Erie Circulation.

**Lake Erie Circulation and ISO Net Interchange Schedules
Daily Averages**



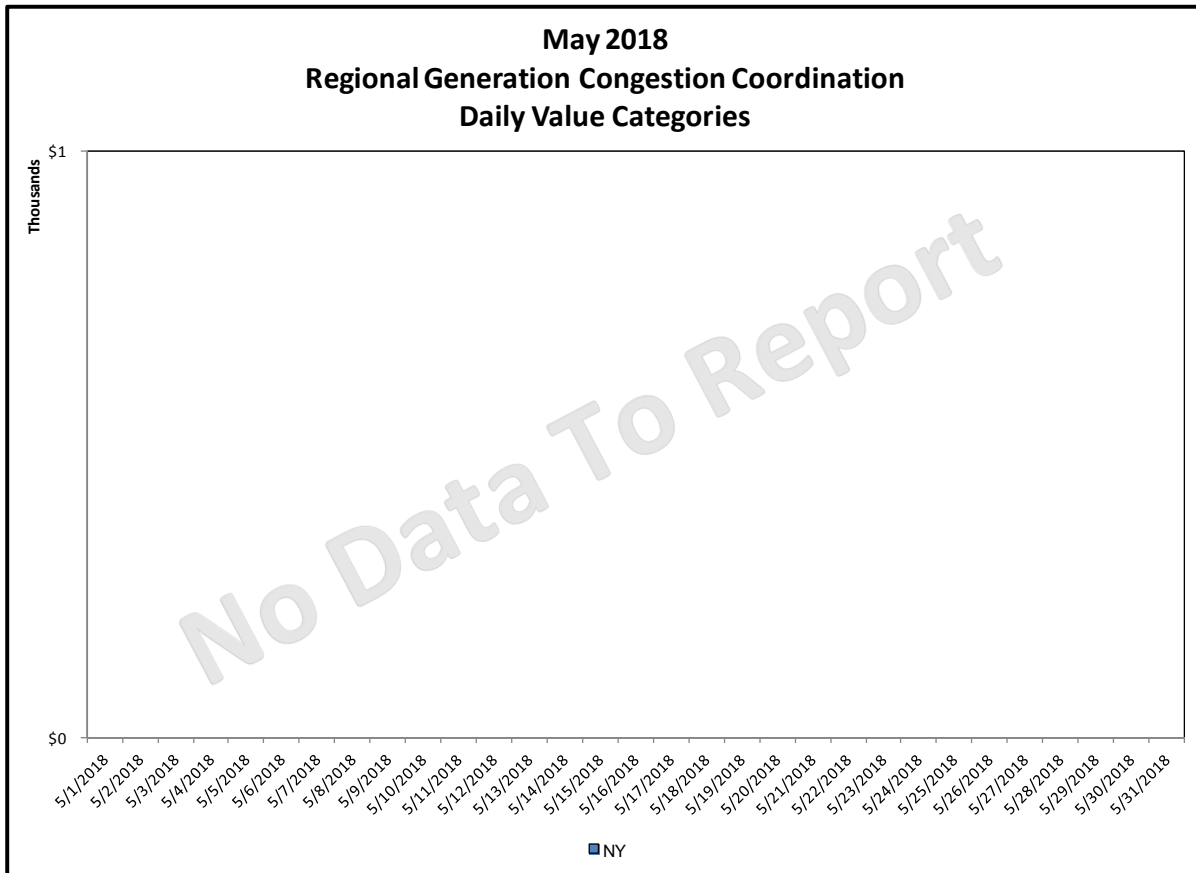
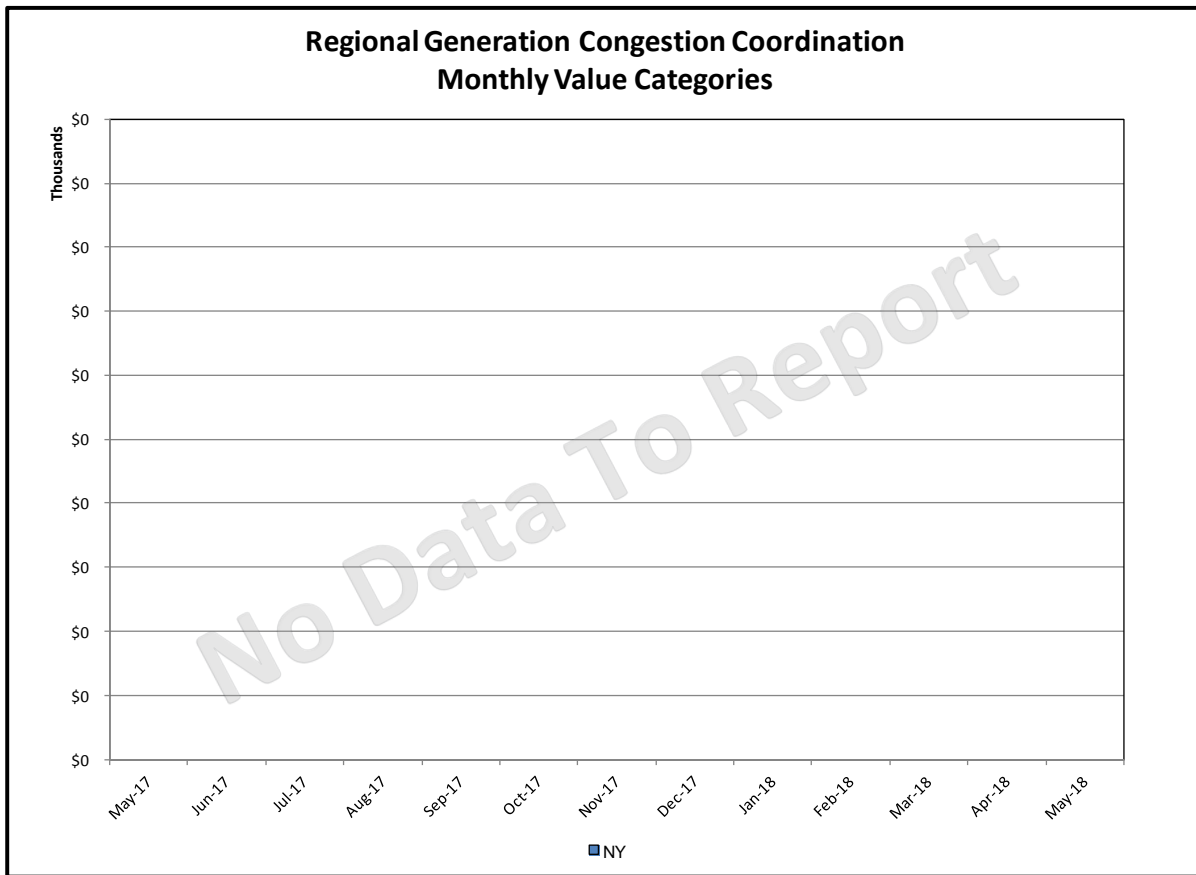
Interchange schedules with positive values aggravate clockwise Lake Erie Circulation.

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.



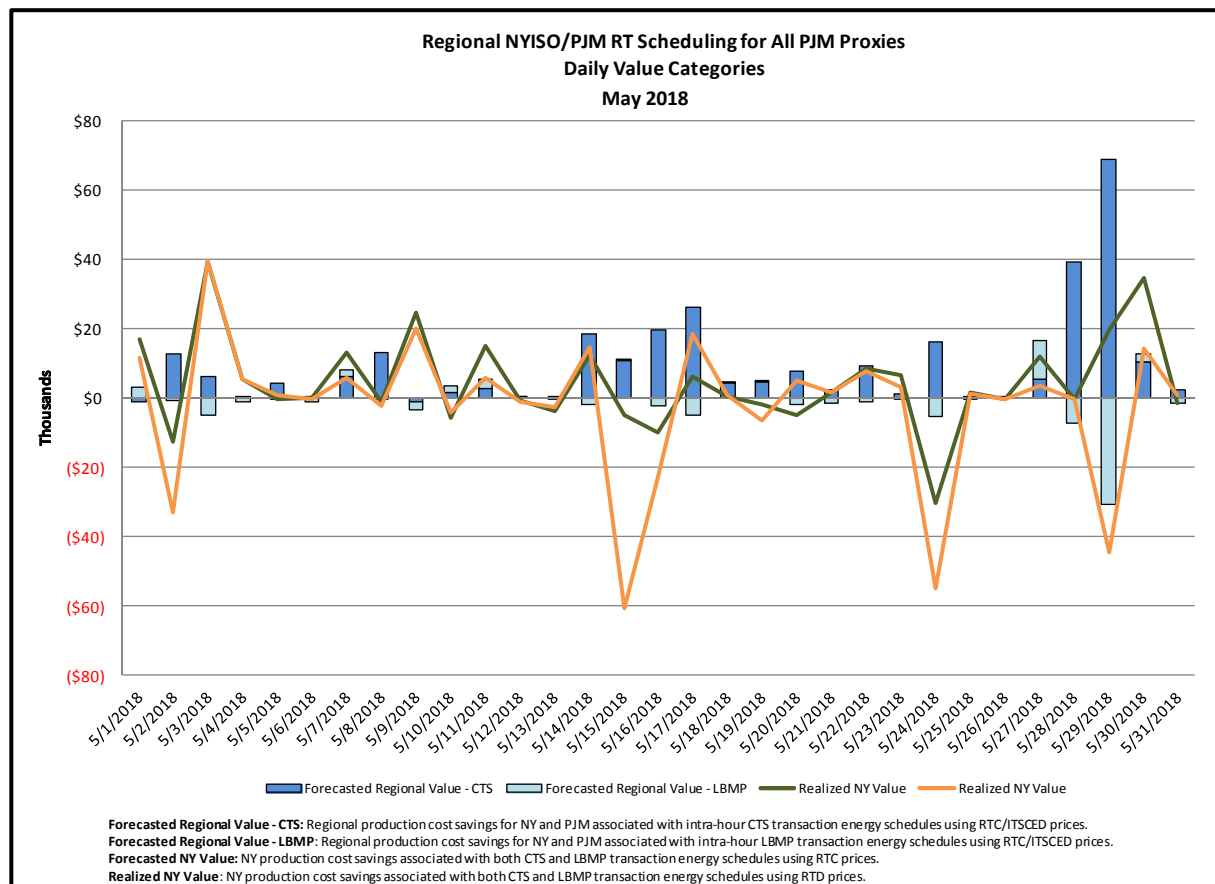
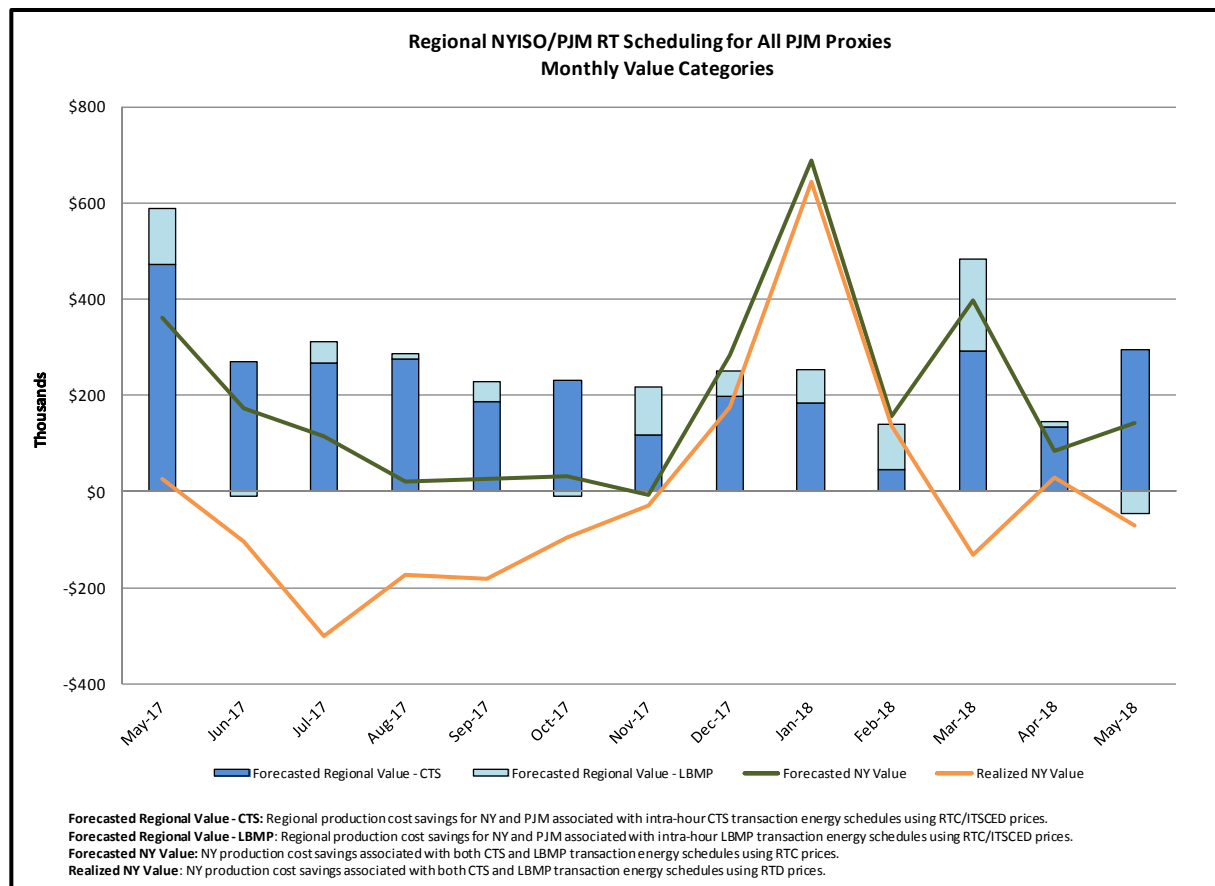
Regional Generation Congestion Coordination

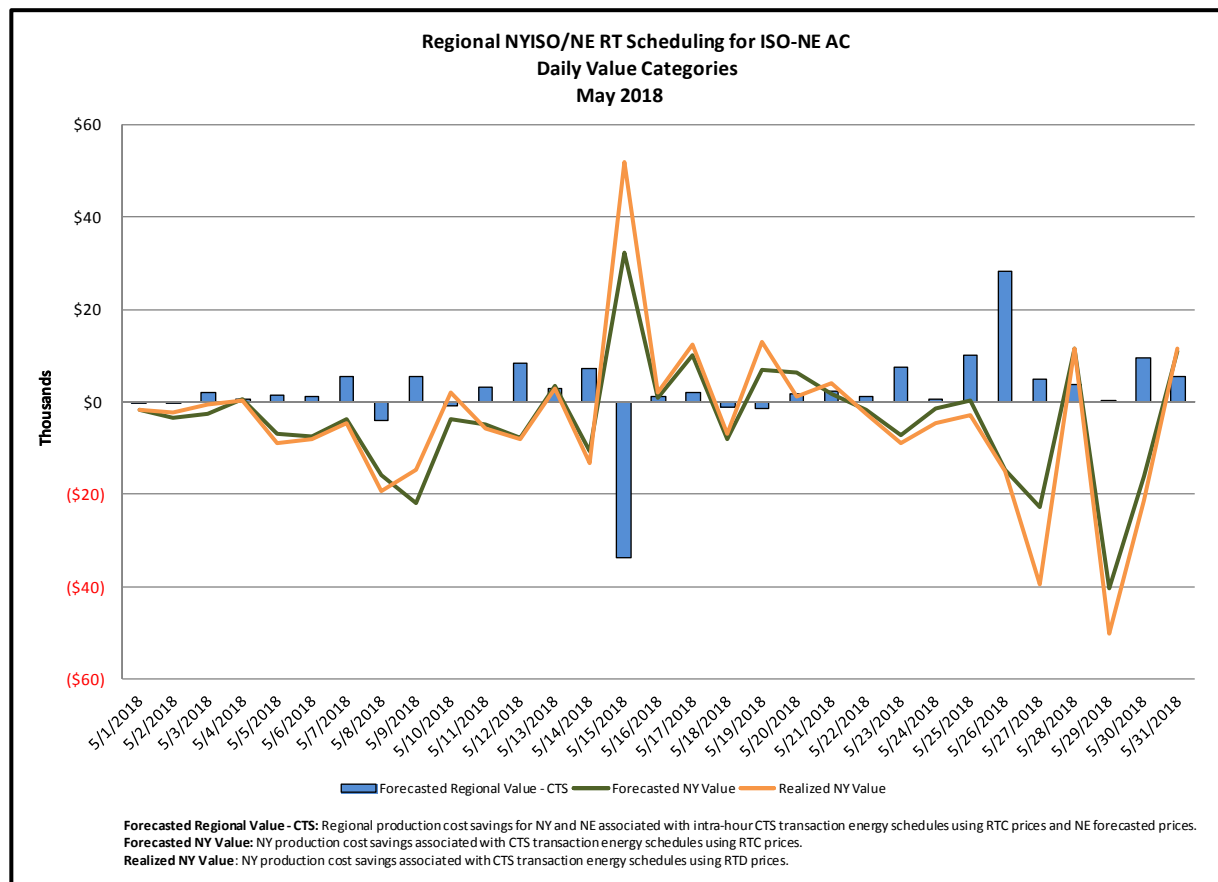
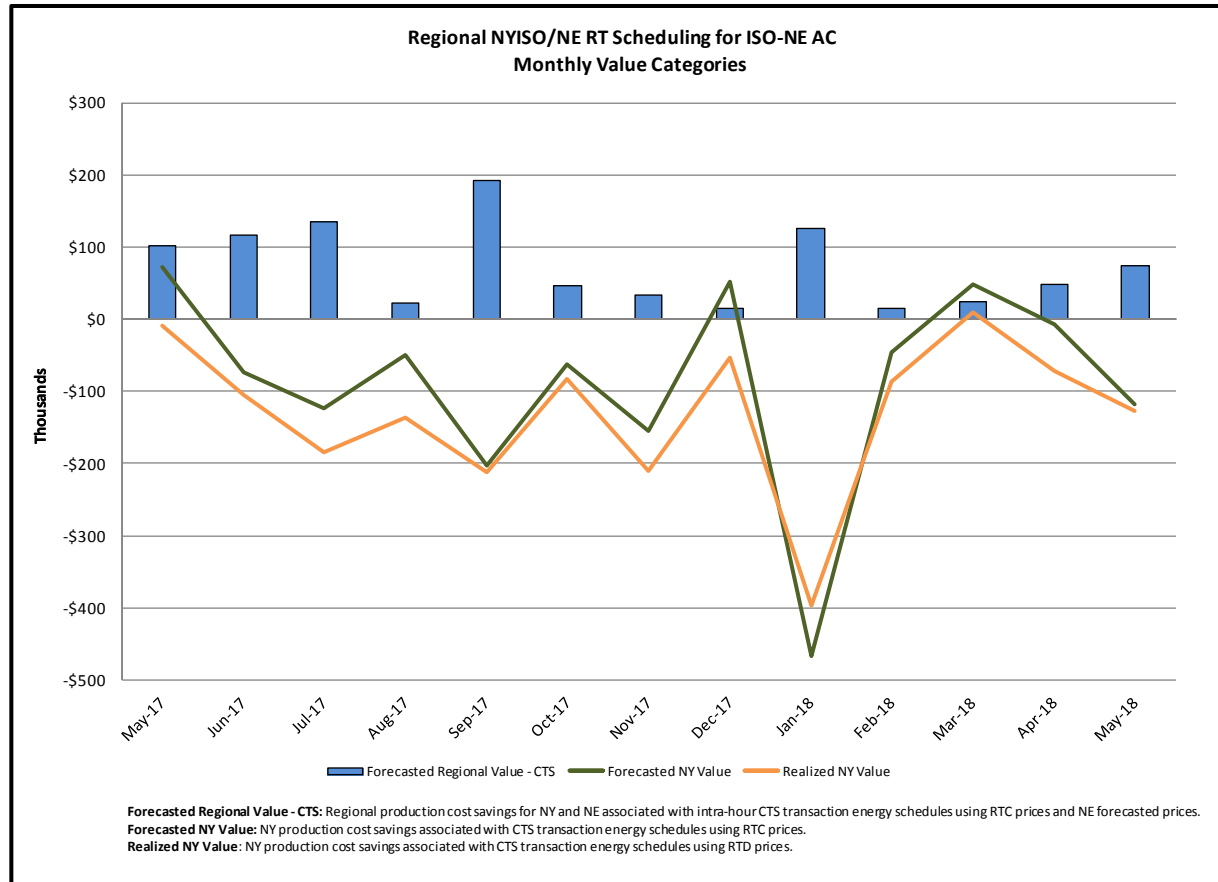
Category

NY

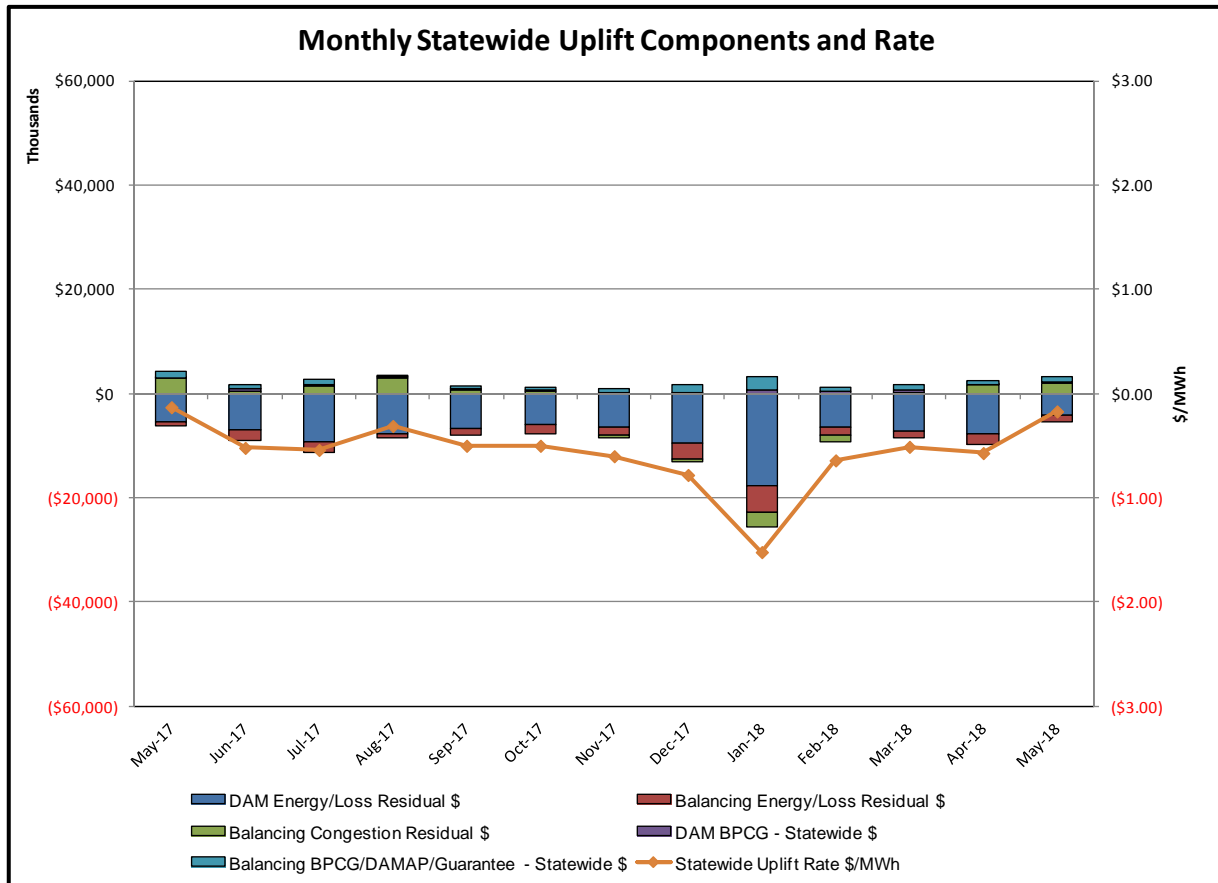
Description

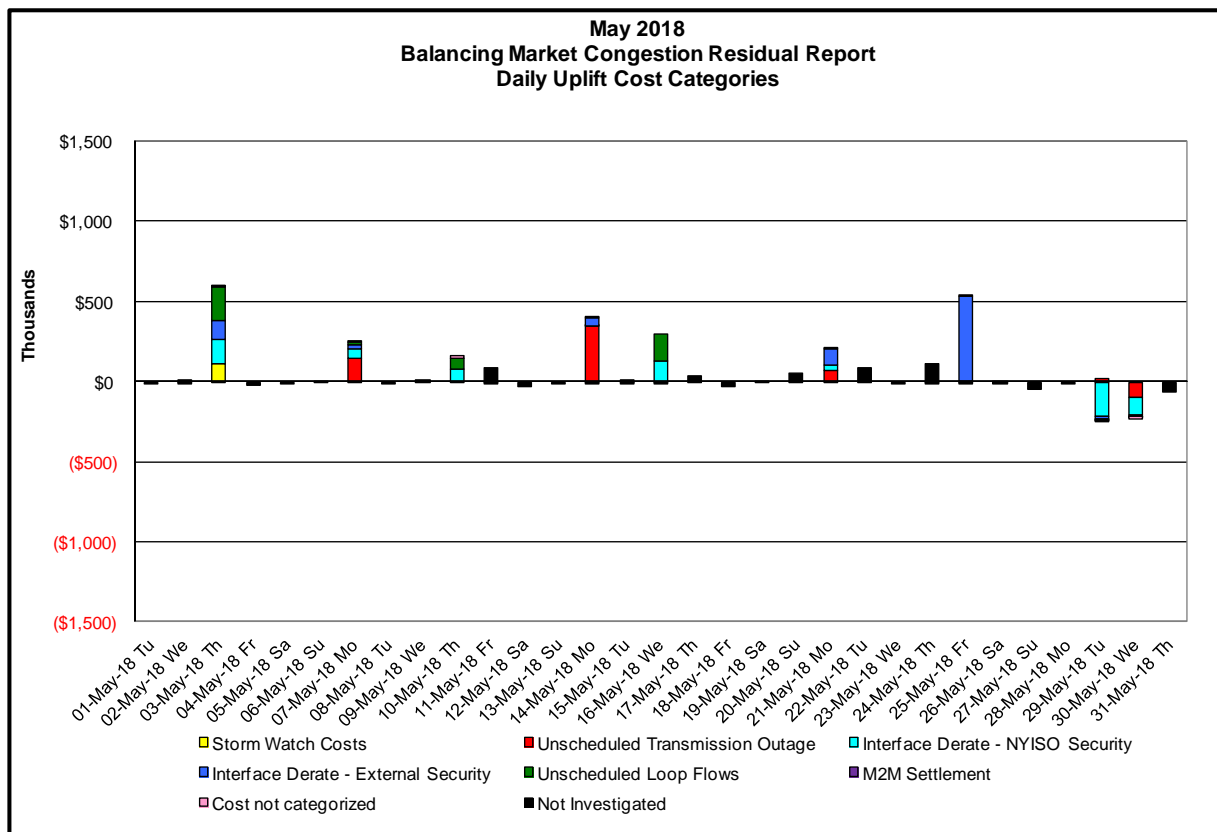
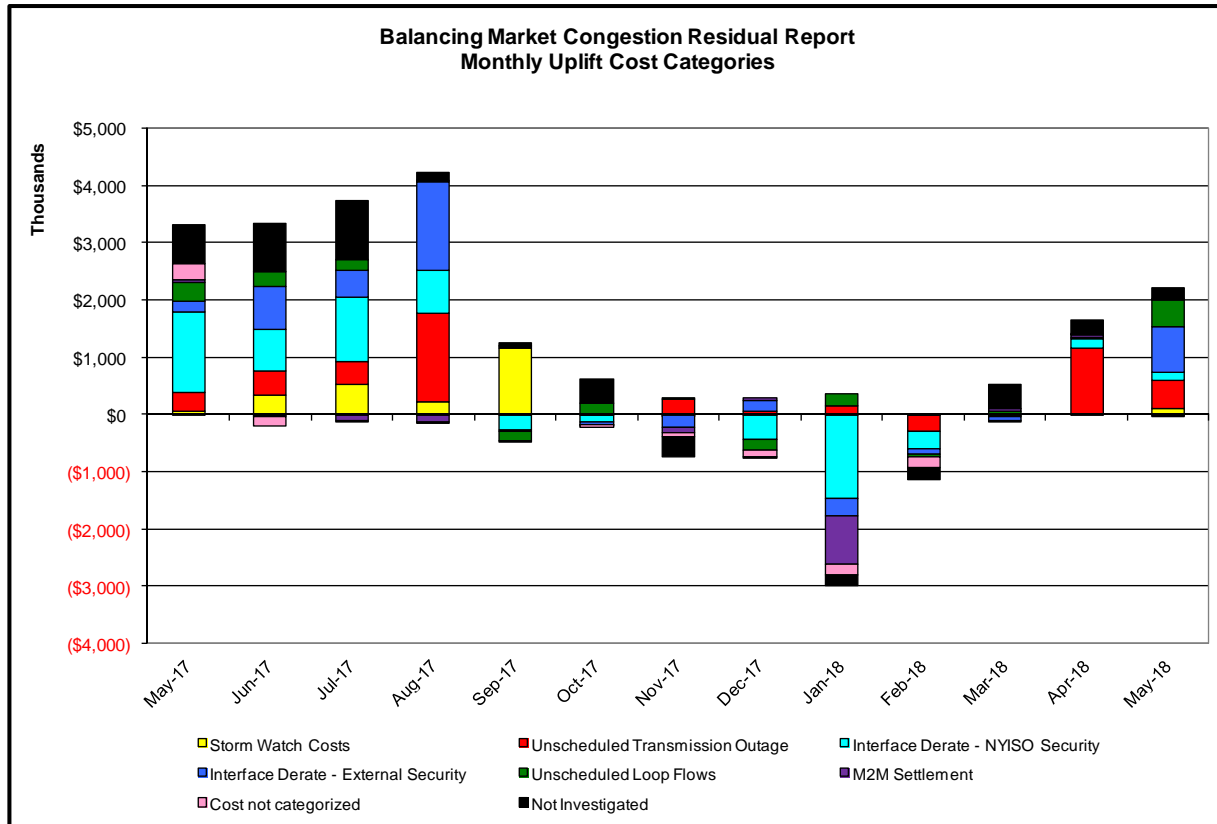
NYISO savings that result from PJM payments to NYISO when PJM's transmission use (PJM's market flow) is greater than PJM's entitlement of the NY transmission system and NYISO is incurring Western or Central NY congestion. Additionally, NYISO savings may result from the more efficient regional utilization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





Market Performance Metrics





Day's investigated in May: 3,7,10,14,16,21,25,29,30

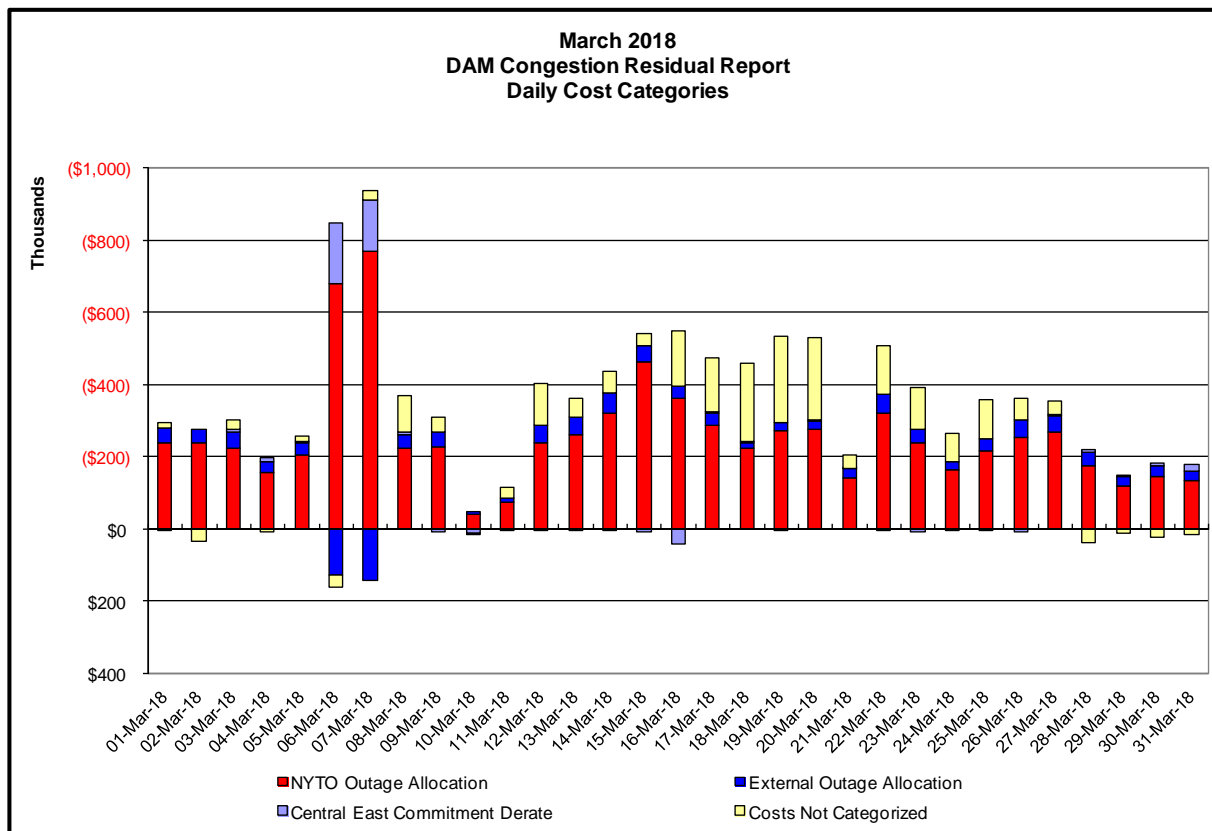
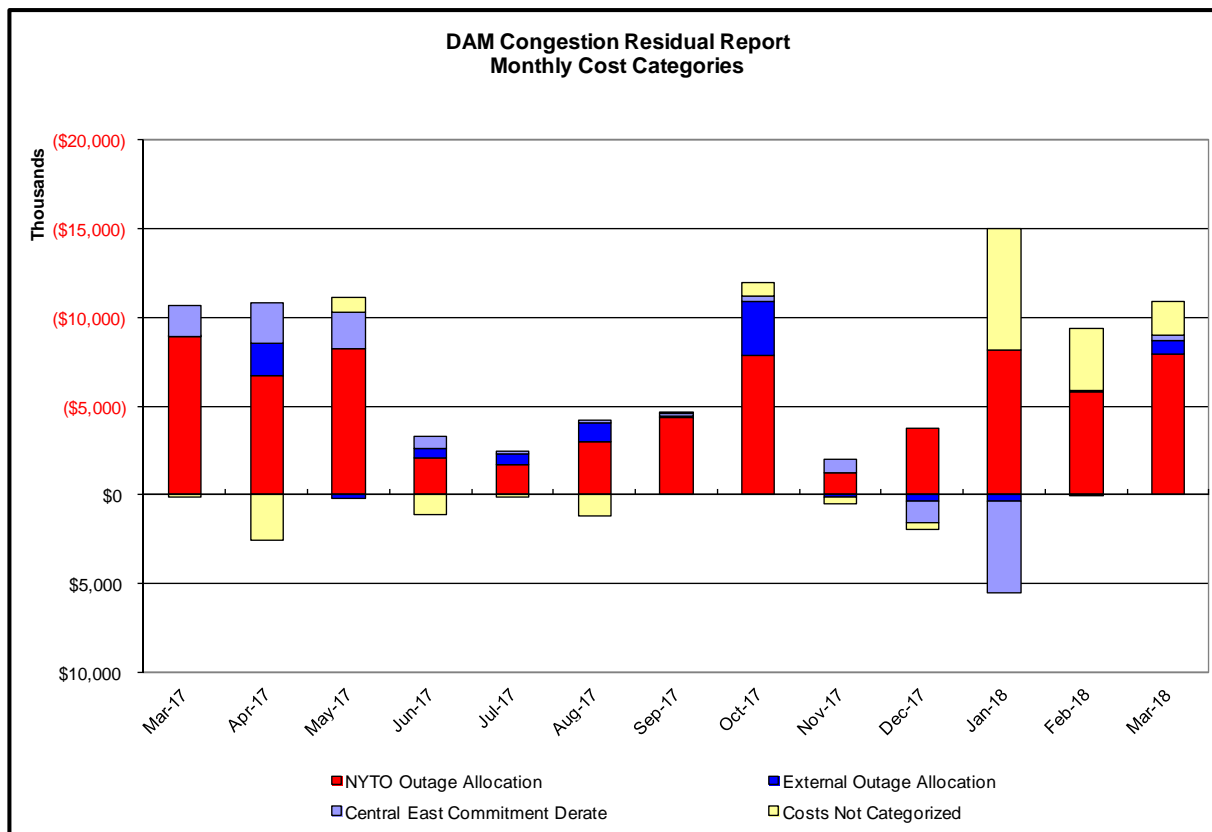
Event	Date (yyyymmdd)	Hours	Description
	5/3/2018	18,19	Thunder Storm Alert
	5/3/2018	10	NYCA DNI Ramp Limit
	5/3/2018	13,14,20,21,23	Derate Adirondack-Moses 230kV (#MA1) I/o SIN:MSU1&7040& HQ GN&LD PROXY
	5/3/2018	12-14,20,23	Derate E13THSTA-W49TH_ST 345kV (#M55) I/o \$SCB DUNW 7 W/ 3 OOS
	5/3/2018	10	Uprate E13THSTA-W49TH_ST 345kV (#M55) I/o \$SCB DUNW 7 W/ 3 OOS
	5/3/2018	10	Uprate Dunwoodie-Shore Rd 345kV (#Y50)
	5/3/2018	10	Uprate E179thSt - Hellgate 138kV (#15055)
	5/3/2018	10	Uprate E179thSt - Hellgate 138kV (#15053)
	5/3/2018	10	Uprate Gowanus-Greenwood 138kV (#42231) I/o \$SCB GOW 6 W/ GOETHALS 6 OOS
	5/3/2018	10	Uprate Greenwood-Vernon 138kV (#31231) I/o \$SCB GOW 6 W/ GOETHALS 6 OOS
	5/3/2018	10	Uprate Hudson Ave-Plymouth St 138kV (#32078)
	5/3/2018	18-20	HQ_CHAT-NY Scheduling Limit
	5/3/2018	10	PJM_AC-NY Scheduling Limit
	5/3/2018	11-14	Lake Erie Circulation, DAM-RTM exceeds +/-125MW; Niagara-Packard 230kV, Niagara-Robinson Road 230kV
	5/3/2018	12	Lake Erie Circulation, DAM-RTM exceeds +/-125MW; Packard-Sawyer 230kV
	5/7/2018	5-23	Extended Outage Sprainbrook-East Garden City 345kV (#Y49)
	5/7/2018	5,9-17	Derate E13THSTA-W49TH_ST 345kV (#M55) I/o \$SCB DUNW 7 W/ 3 OOS
	5/7/2018	6,16	HQ_CHAT-NY Scheduling Limit
	5/7/2018	13	IESO_AC-NY Scheduling Limit
	5/7/2018	11,12,14,15	Lake Erie Circulation, DAM-RTM exceeds +/-125MW; Niagara-Robinson Rd 230kV
	5/7/2018	12	Lake Erie Circulation, DAM-RTM exceeds +/-125MW; Dysinger East
	5/10/2018	16,19,23	Derate Adirondack-Moses 230kV (#MA1) I/o SIN:MSU1&7040& HQ GN&LD PROXY
	5/10/2018	16,19	Lake Erie Circulation, DAM-RTM exceeds +/-125MW; Niagara-Packard 230kV
	5/14/2018	7-10	Extended Outage Massena-Marcy 765kV (MSU1)
	5/14/2018	12	NYCA DNI Ramp Limit
	5/14/2018	10	IESO_AC-NY Scheduling Limit
	5/14/2018	12	HQ_CHAT DNI Ramp Limit
	5/16/2018	15,16	Derate Marcy 765/345kV (#AT1) for I/o TWR:Moses MA1&MA2
	5/16/2018	14-16	Lake Erie Circulation, DAM-RTM exceeds +/-125MW; Niagara-Packard 230kV
	5/21/2018	7,9,10,13-15	Forced Outage Gowanus-Greenwood 138kV (#43232)
	5/21/2018	10,13-18	Derate Adirondack-Moses I/o SIN:MSU1&7040& HQ GN&LD PROXY
	5/21/2018	13,14,16	Derate Edic-Marcy 345kV (#UE1-7) I/o TWR:12& UNS-18
	5/21/2018	9	IESO_AC-NY Scheduling Limit
	5/21/2018	13,14,16	NE_AC-NY Scheduling Limit
	5/21/2018	6,7,18	NE_AC Active DNI Ramp Limit
	5/25/2018	6	Extended outage Foxhills-Willowbrook 138kV (#29211)
	5/25/2018	13-17	PJM_AC-NY Scheduling Limit
	5/29/2018	10	Extended outage Farragut-Hudson Avenue 138kV (#32711)
	5/29/2018	10	Forced outage Linden-Goethals 345kV (#A2253)
	5/29/2018	12,13	Uprate Brownsfalls-Taylorville 115kV (#3)
	5/29/2018	16	Uprate Brownsfalls-Taylorville 115kV (#3) I/o SCB:MARCY(3108): UE1-7& VU-19
	5/29/2018	12,13	Uprate Brownsfalls-Taylorville 115kV (#3) I/o SIN:MSU1&7040& HQ GN&LD PROXY
	5/29/2018	17	NE_AC-NY Scheduling Limit
	5/29/2018	17	NE_AC Active DNI Ramp Limit
	5/29/2018	16	Lake Erie Circulation, DAM-RTM exceeds +/-125MW; Packard-Sawyer 230kV
	5/30/2018	15	Early return to service Niagara-Packard 115kV (#193)
	5/30/2018	15	Uprate Brownsfalls-Taylorville 115kV (#3)
	5/30/2018	15	Uprate Brownsfalls-Taylorville 115kV (#3) I/o SCB:MARCY(3108): UE1-7& VU-19
	5/30/2018	11	Uprate Brownsfalls-Taylorville 115kV (#3) I/o SIN:MSU1&7040& HQ GN&LD PROXY
	5/30/2018	0	NYCA DNI Ramp Limit
	5/30/2018	0	NE_AC Active DNI Ramp Limit
	5/30/2018	11	Lake Erie Circulation, DAM-RTM exceeds +/-125MW; Niagara-Packard 230kV

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
Unscheduled Transmission Outage	Market-wide	Reduction in DAM to RTM transfers related to unscheduled transmission outage	Forced Line Outage, Unit AVR Outages
Interface Derate - NYISO Security	Market-wide	Reduction in DAM to RTM transfers not related to transmission outage	Interface Derates due to RTM voltages
Interface Derate - External Security	Market-wide	Reduction 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	

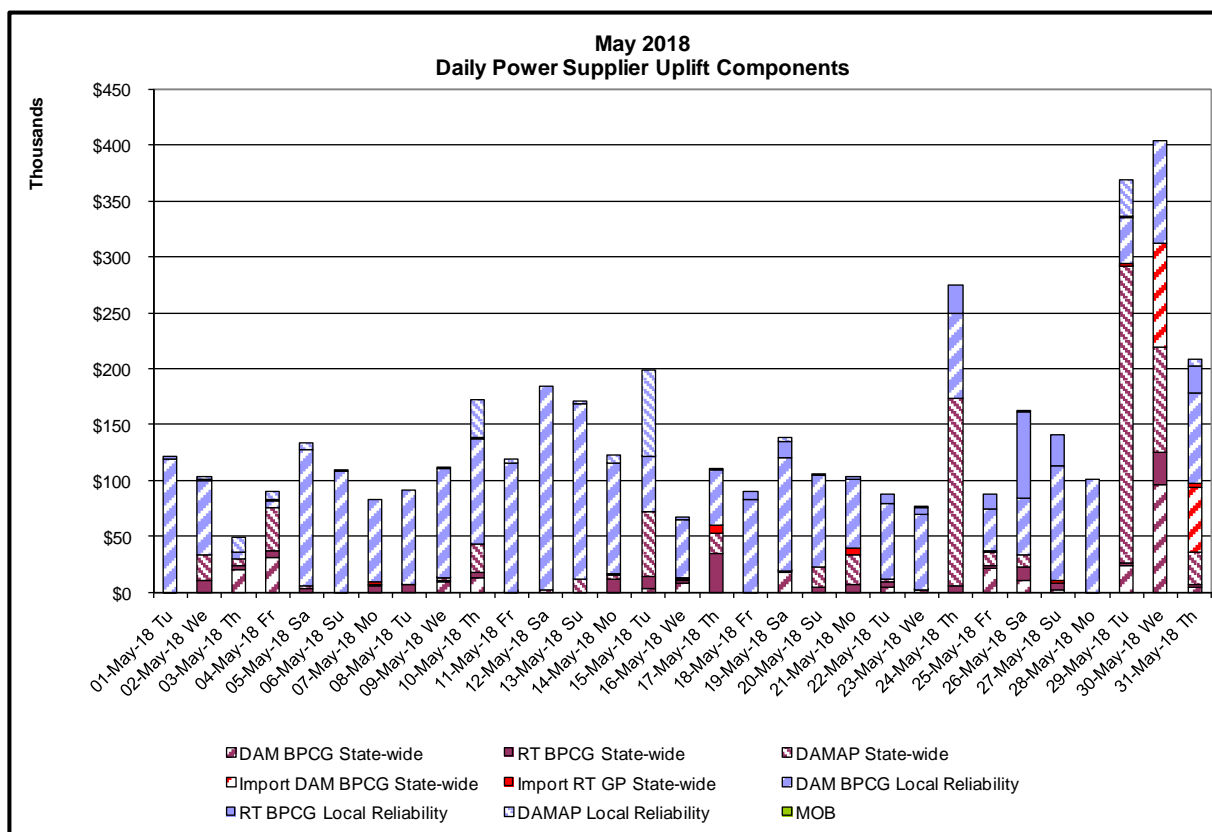
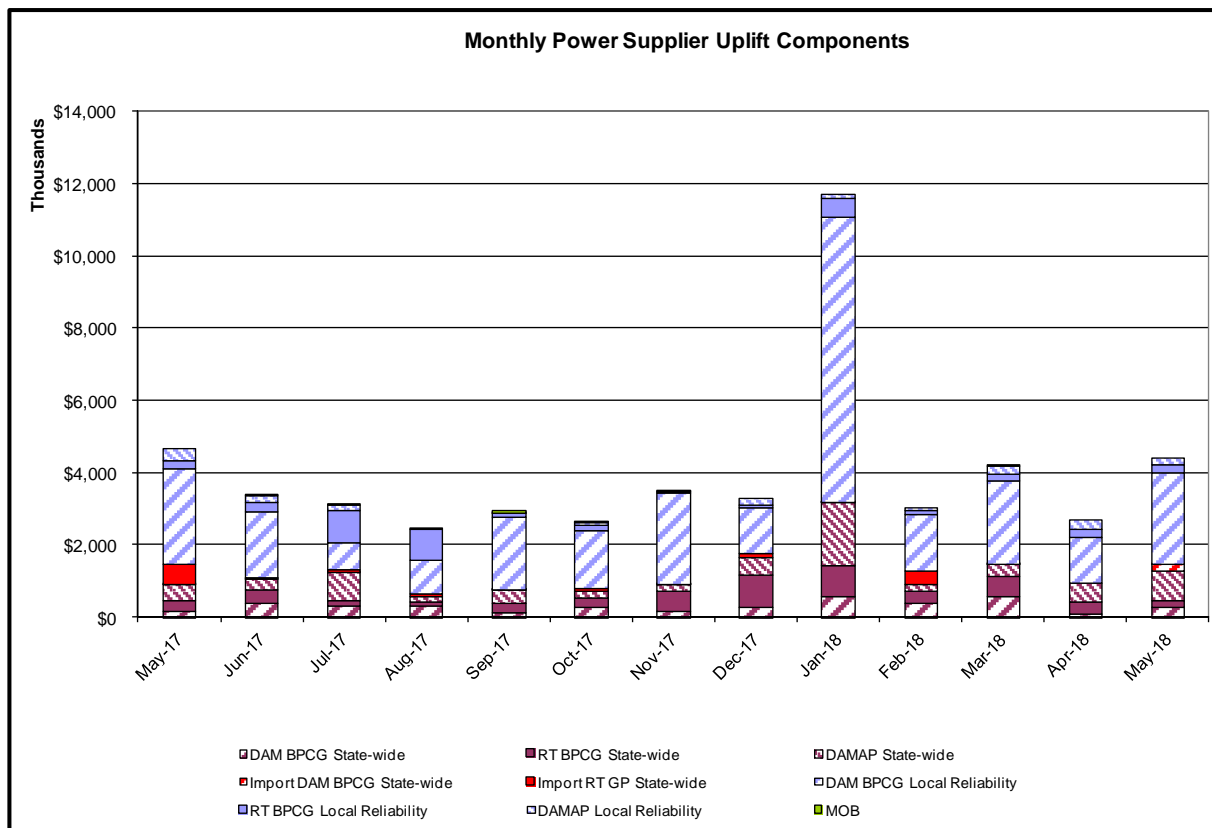
Monthly Balancing Market Congestion Report Assumptions/Notes

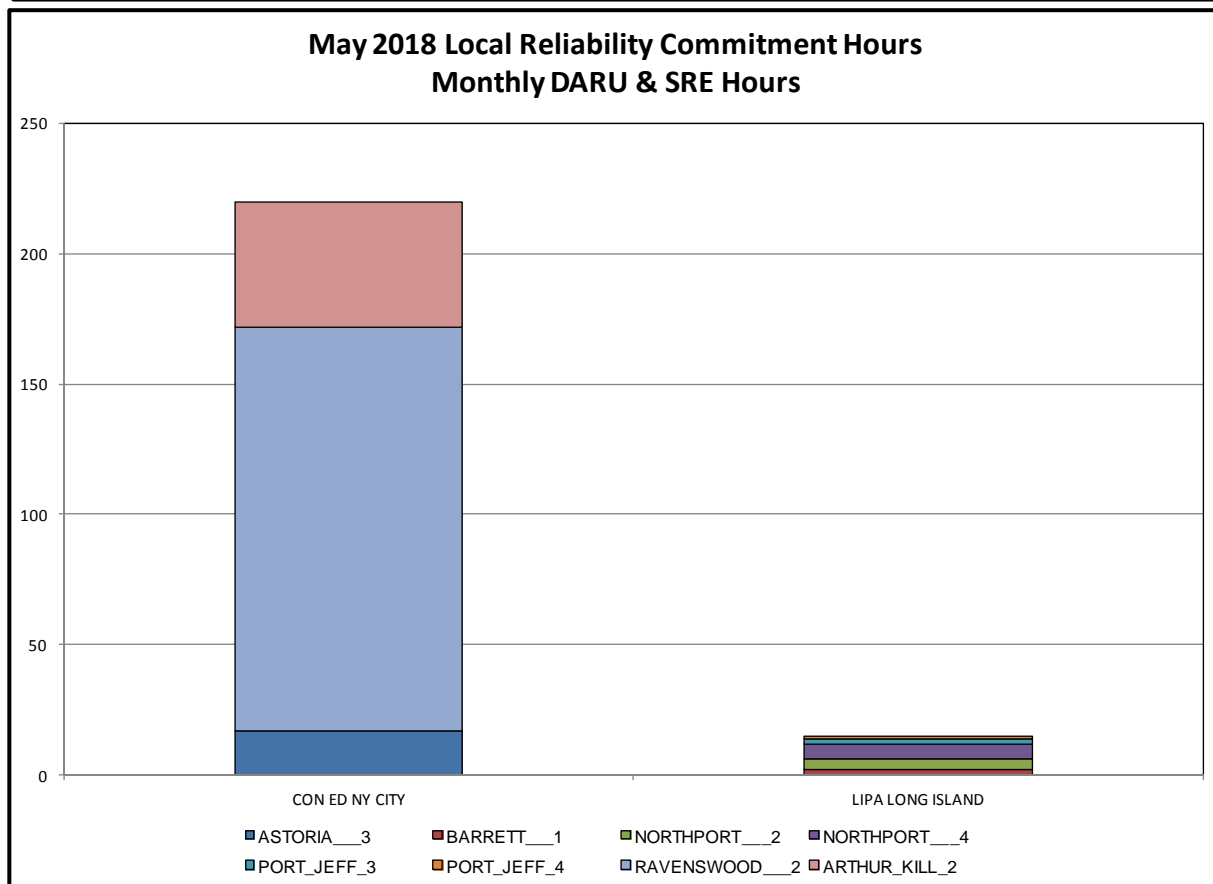
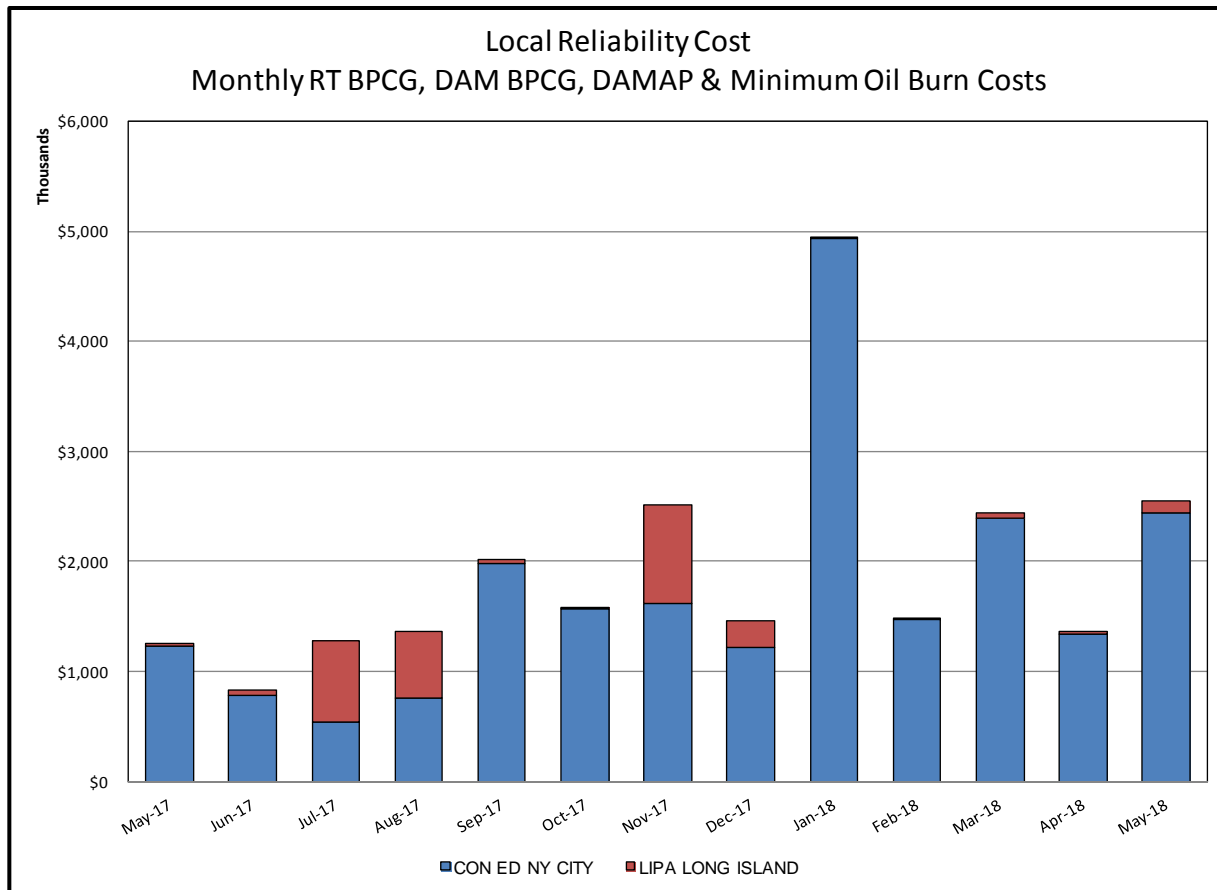
- 1) Storm Watch Costs are identified as daily total uplift costs
- 2) Days with a value of BMCR less M2M Settlement of \$100K/HR, shortfall of \$200K/Day or more, or surplus of \$100K/Day or more are investigated.
- 3) Uplift costs associated with multiple event types are apportioned equally by hour

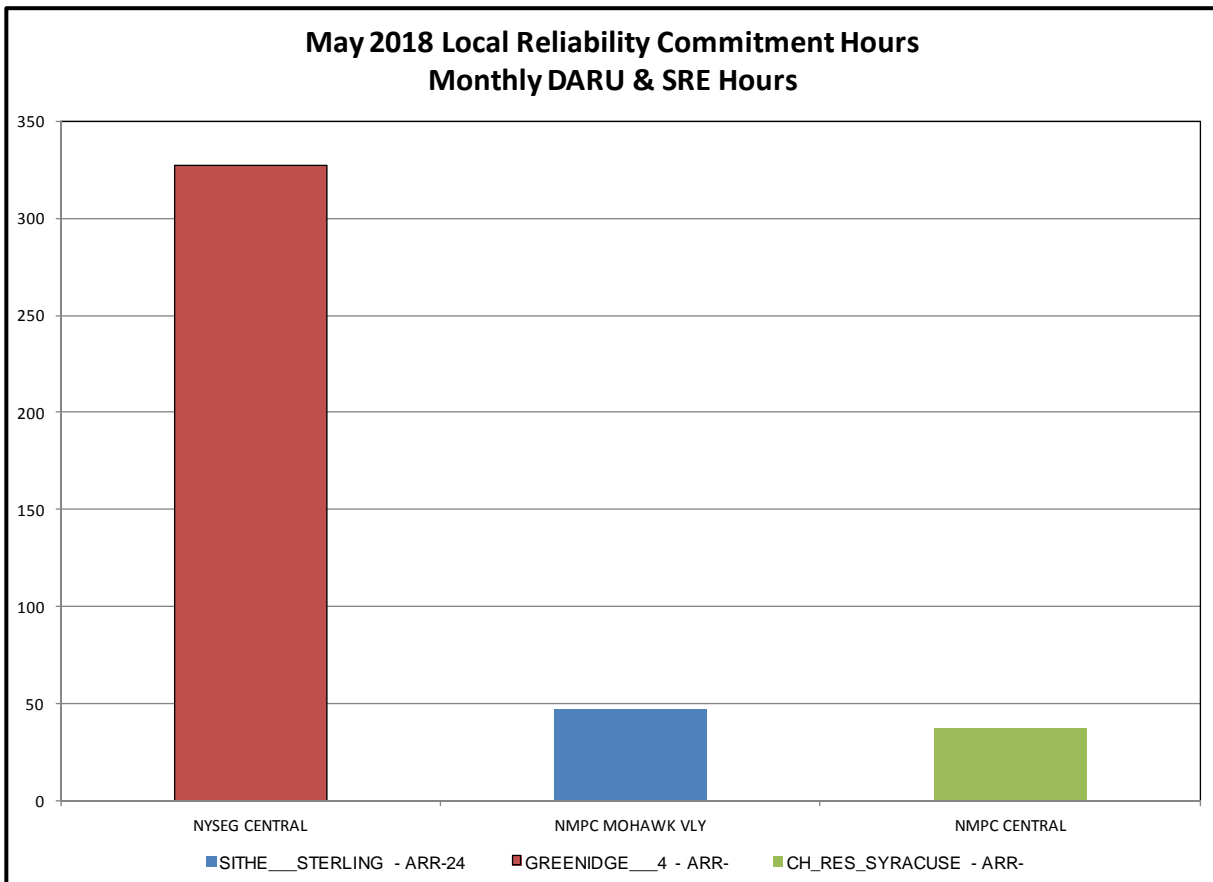
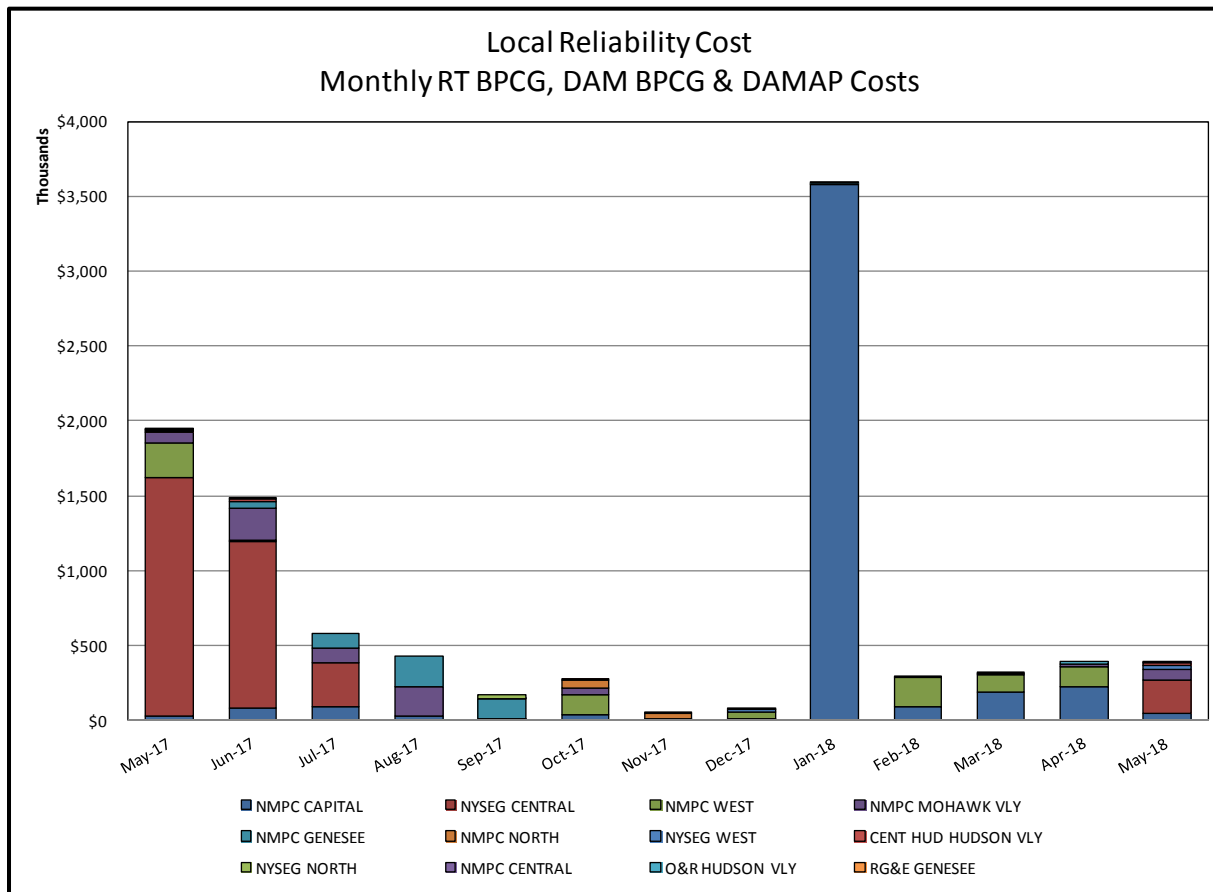


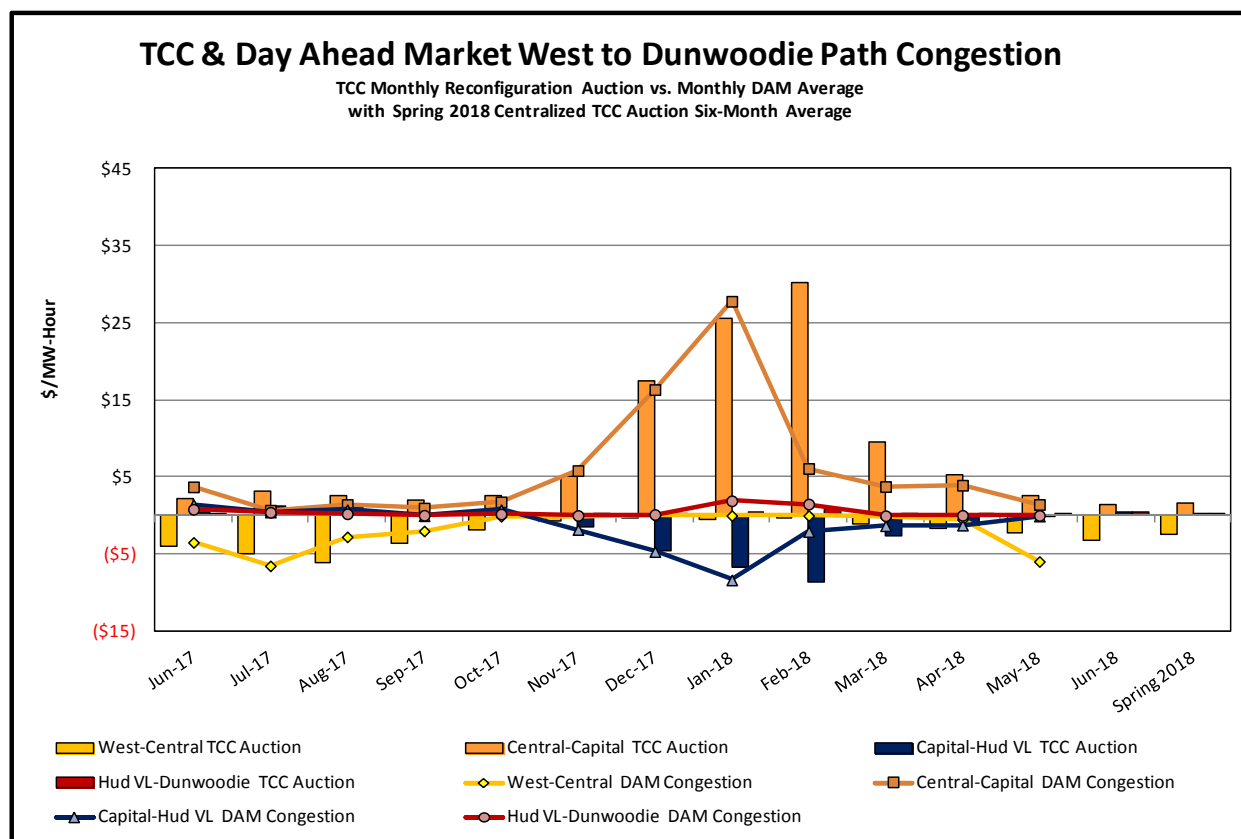
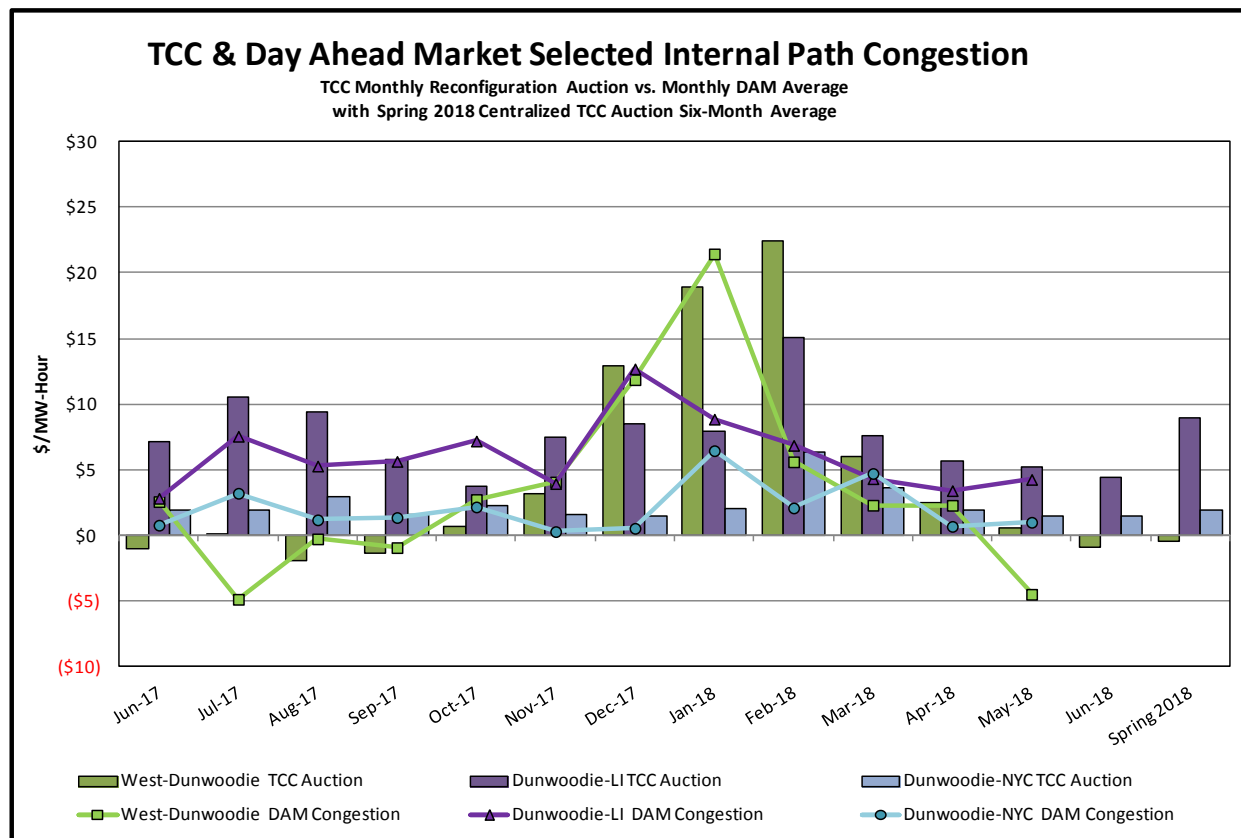
Day-Ahead Market Congestion Residual Categories

<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.
External Outage Allocation	All TO by Monthly Allocation Factor	Direct allocation to transmission equipment status change caused by change in status of external equipment.	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 External Path Congestion

TCC Monthly Reconfiguration Auction vs. Monthly DAM Average
with Spring 2018 Centralized TCC Auction Six-Month Average

