

Operations Performance Metrics Monthly Report



December 2016 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 January 10, 2016.

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December 2016 Operations Performance Highlights

- Peak load of 24,164 MW occurred on 12/15/2016 HB 17
- All-time winter capability period peak load of 25,738 MW occurred on 1/7/2014 HB 18
- 0 hours of Thunder Storm Alerts were declared
- 0 hours of NERC TLR level 3 curtailment
- In response to a recommendation in the 2015 State of the Market Report (recommendation #21 for Day-Ahead Market Scheduling), a modification was made on 12/7/16 to evaluate the commitment of gas turbines as blocked resources throughout the MIP evaluation.
- The following table identifies the estimated production cost savings associated with the Broader Regional Market initiatives.

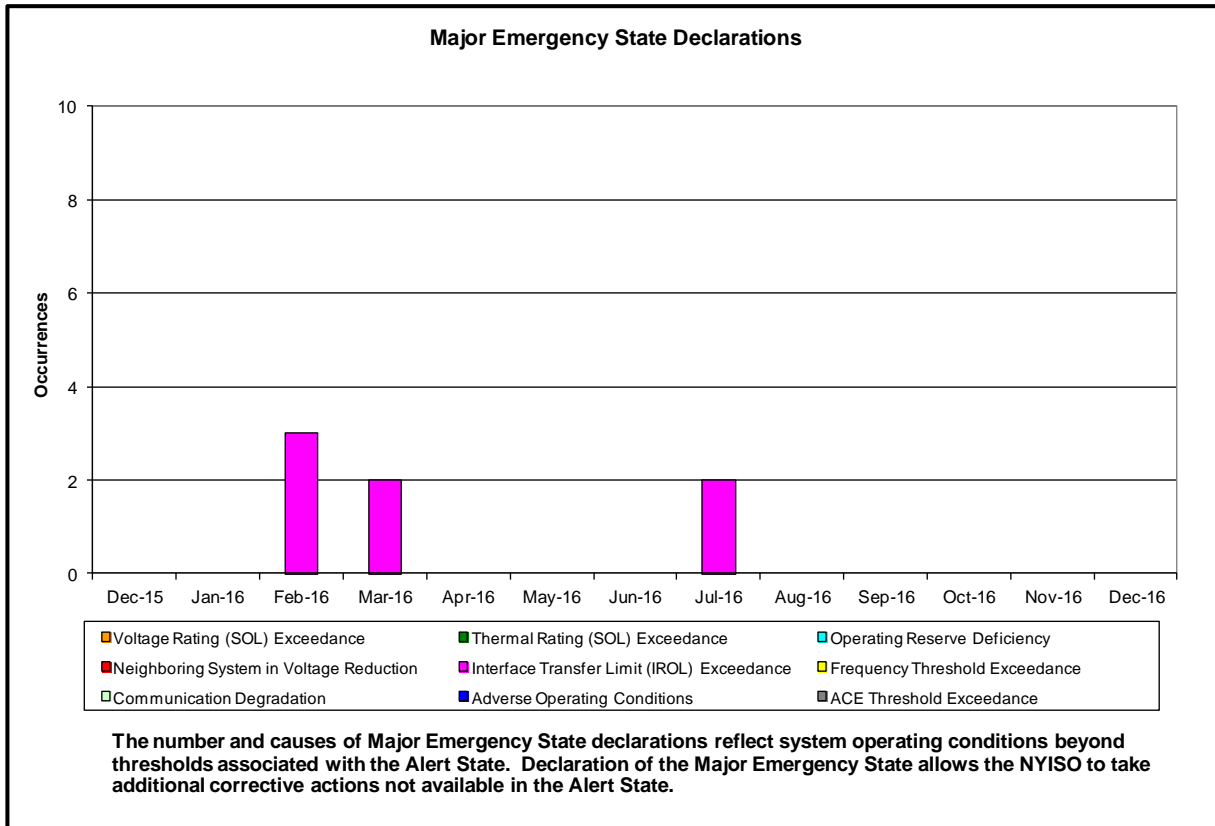
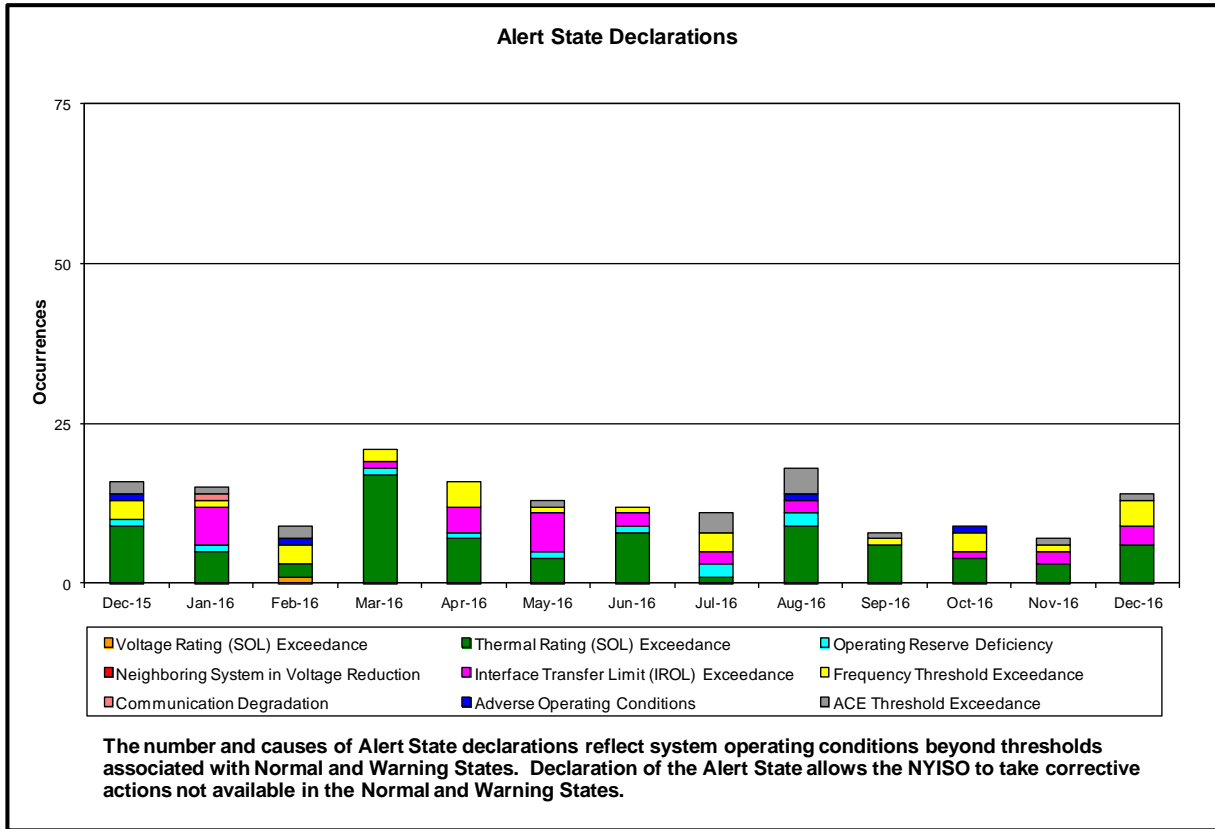
	Current Month Value (\$M)	Year-to-Date Value (\$M)
NY Savings from PJM-NY Congestion Coordination	\$3.70	\$20.69
NY Savings from PJM-NY Coordinated Transaction Scheduling	\$0.04	(\$0.54)
NY Savings from NE-NY Coordinated Transaction Scheduling	(\$0.35)	(\$2.08)
Total NY Savings	\$3.39	\$18.07
Regional Savings from PJM-NY Coordinated Transaction Scheduling	\$0.09	\$2.30
Regional Savings from NE-NY Coordinated Transaction Scheduling	\$0.07	\$1.67
Total Regional Savings	\$0.16	\$3.97

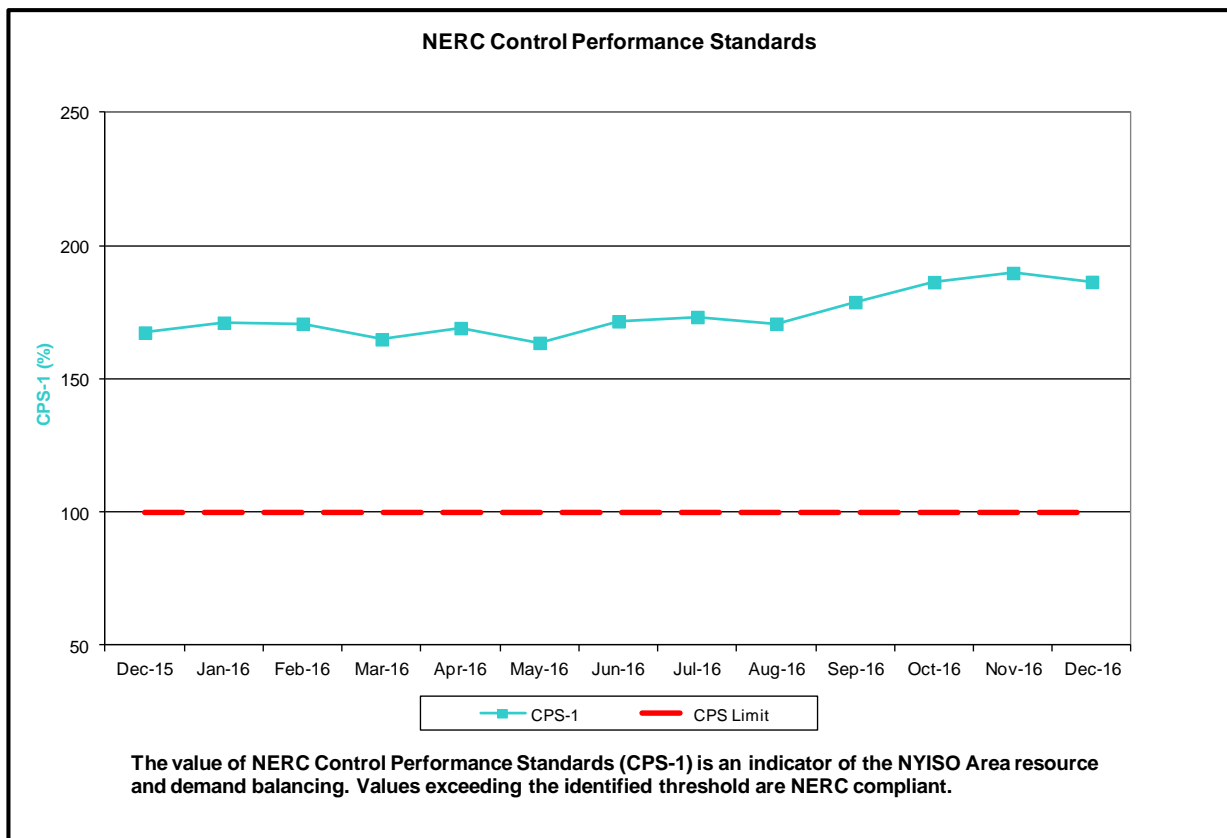
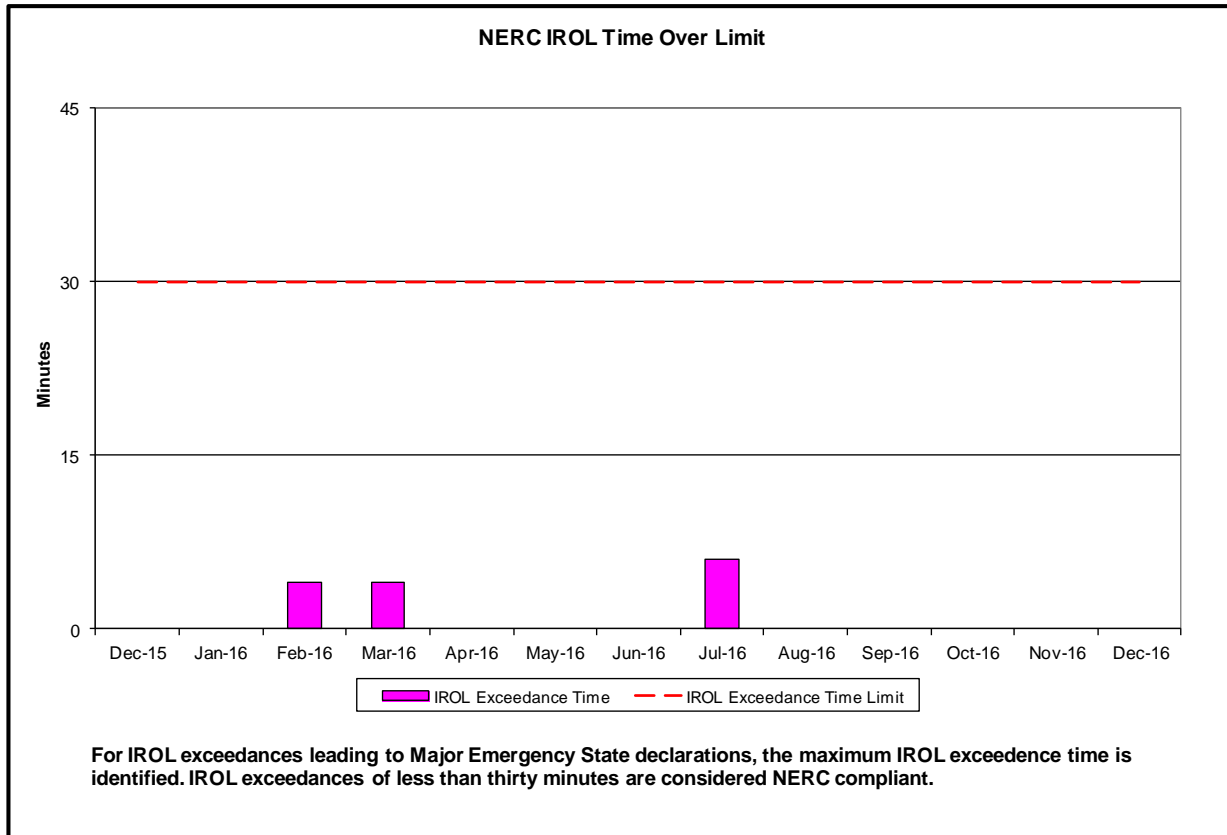
- Statewide uplift cost monthly average was (\$0.43)/MWh
- The following table identifies the Monthly ICAP spot market prices by locality and price delta

Spot Auction Price Results	NYCA	Lower Hudson Valley Zones	New York City Zone	Long Island Zone
January 2017 Spot Price	\$0.32	\$3.53	\$3.53	\$0.32
December 2016 Spot Price	\$0.55	\$3.63	\$3.63	\$0.55
Delta	(\$0.23)	(\$0.10)	(\$0.10)	(\$0.23)

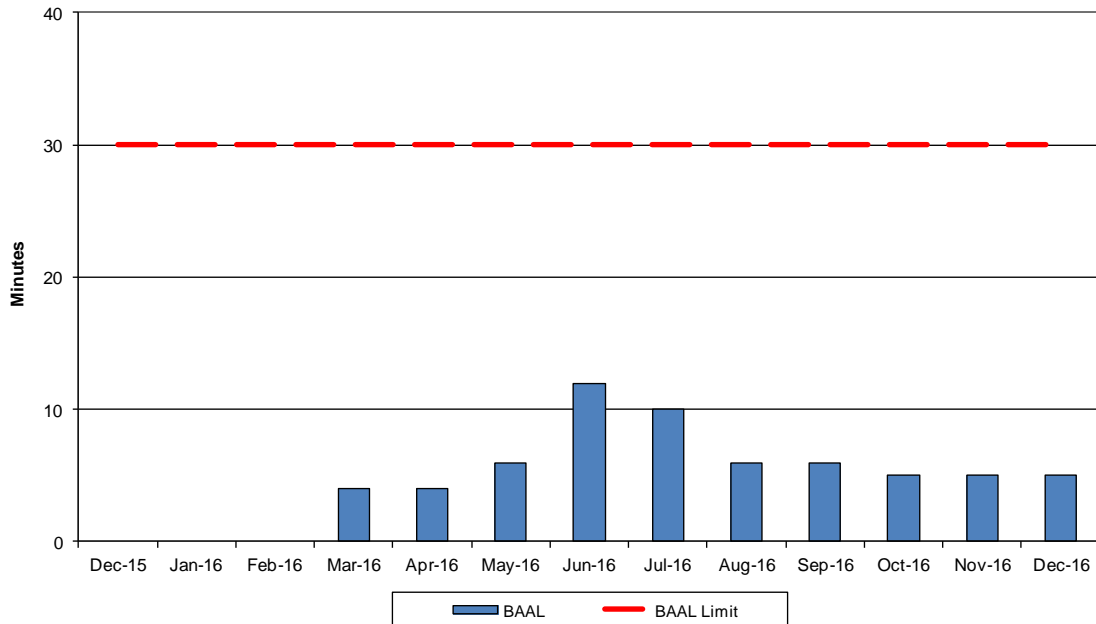
- NYCA - Price decreases by \$0.23 due to increases in Imports and Generator UCAP available, and less Unoffered MW.
- LHV - Price decreases by \$0.10 due to increases in generator UCAP available and decrease in unoffered MW
- NYC - Price decreases by \$0.10 due to LHV price decreasing. LHV set the NYC price for this month.
- LI - Price decreases by \$0.23 due to NYCA price decreasing. NYCA set the LI price for this month.
- NYCA set the LI price and Lower Hudson Valley set the NYC price for this month.

- Reliability Performance Metrics



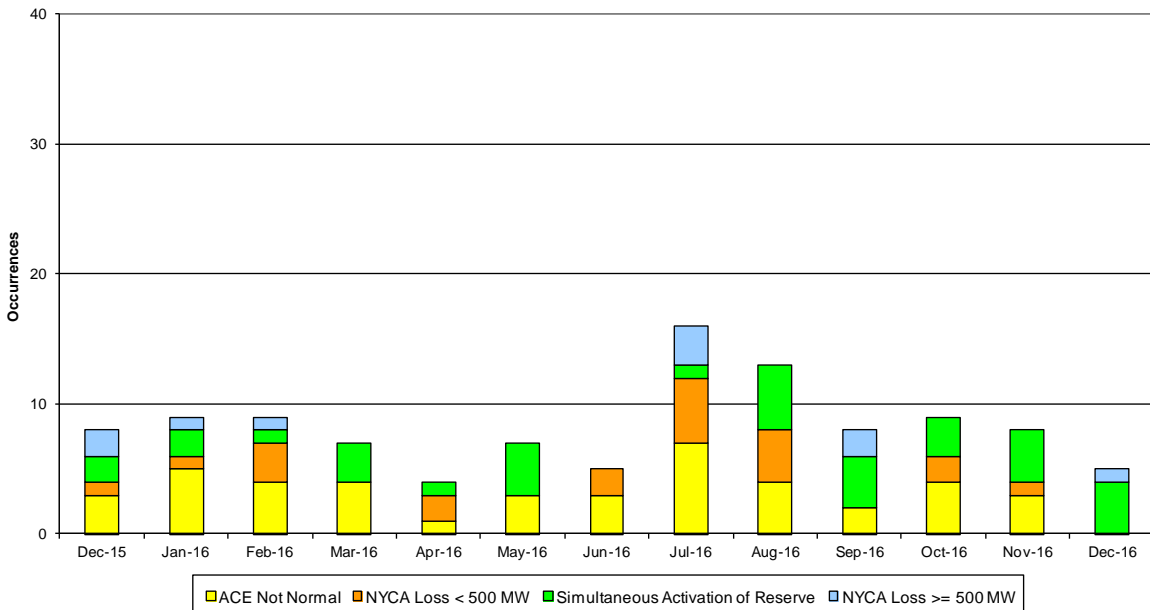


NERC Balancing Authority ACE Limit Standard



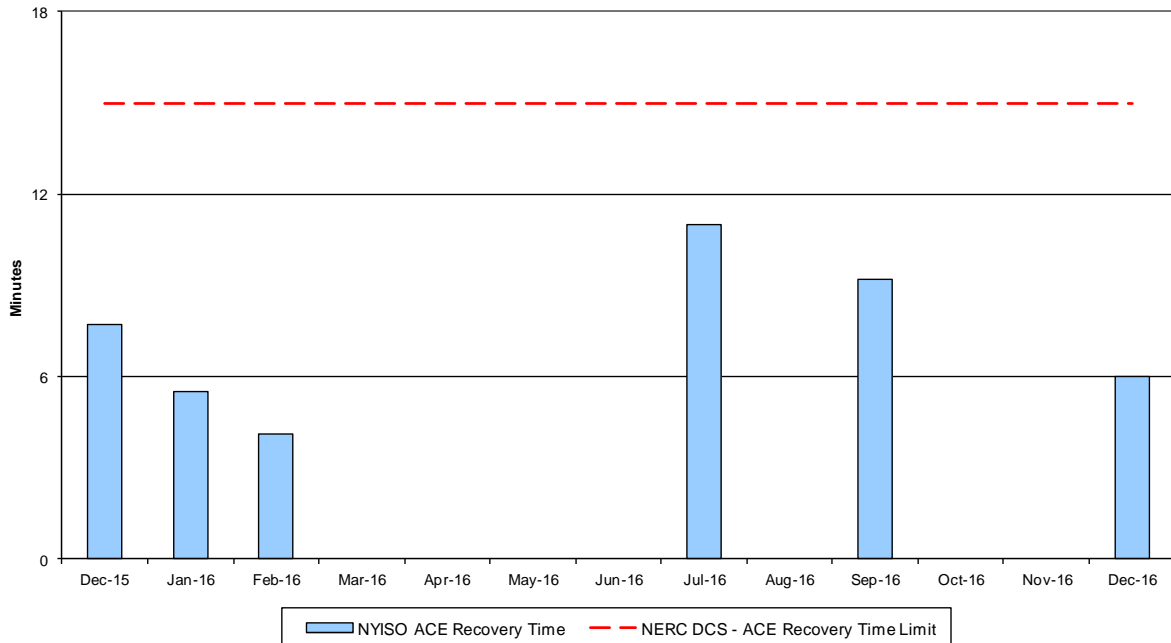
The amount of time the clock-minute average ACE exceeds the clock-minute Balancing Authority ACE Limit (BAAL) is an indicator of the NYISO Area resource and demand balancing. The maximum BAAL exceedance time is identified. BAAL exceedances of less than 30 consecutive clock-minutes are NERC compliant.

Reserve Activations



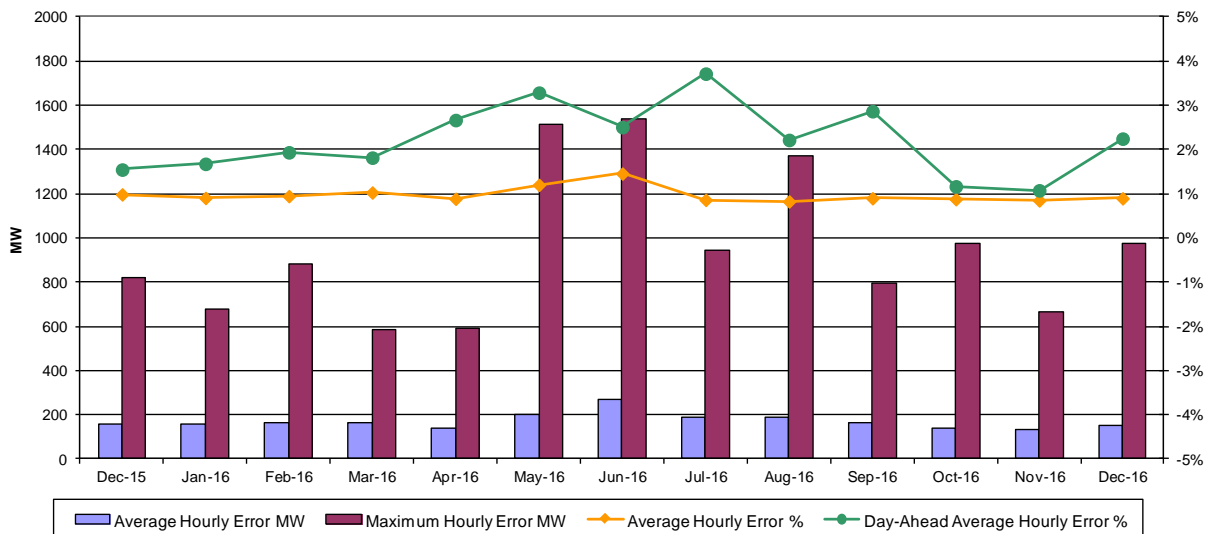
NYISO Reserve Activations are indicators of the need to respond to unexpected operational conditions within the NYISO Area or to assist a neighboring Area (Simultaneous Activation of Reserves) by activating an immediate resource and demand balancing operation.

DCS Event Time to ACE Recovery

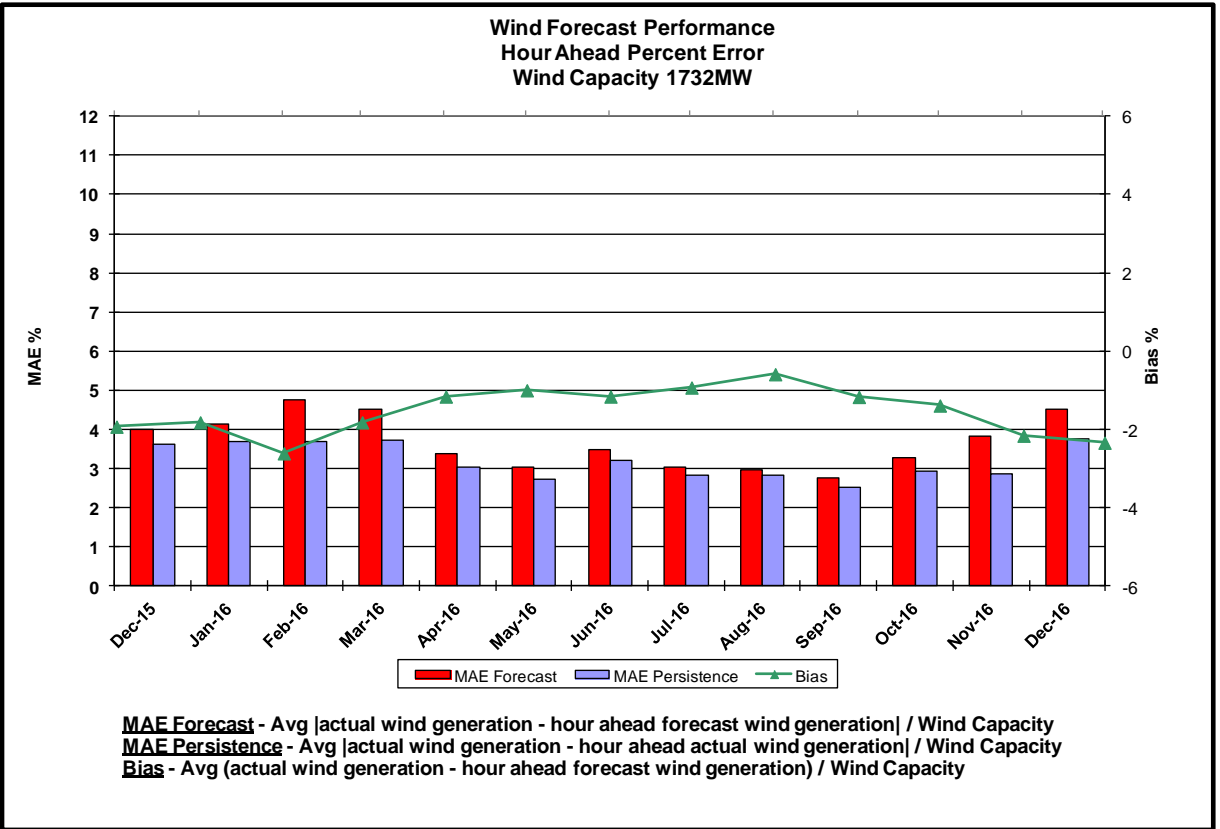
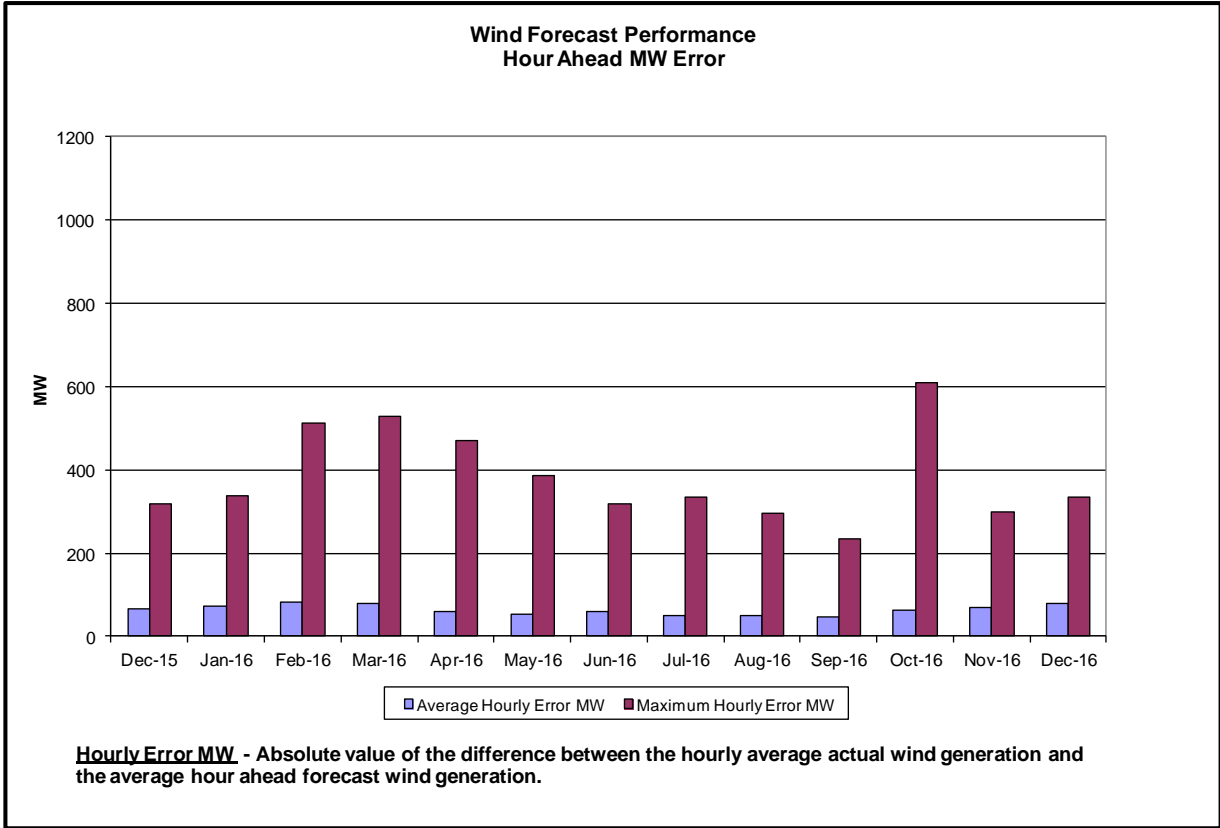


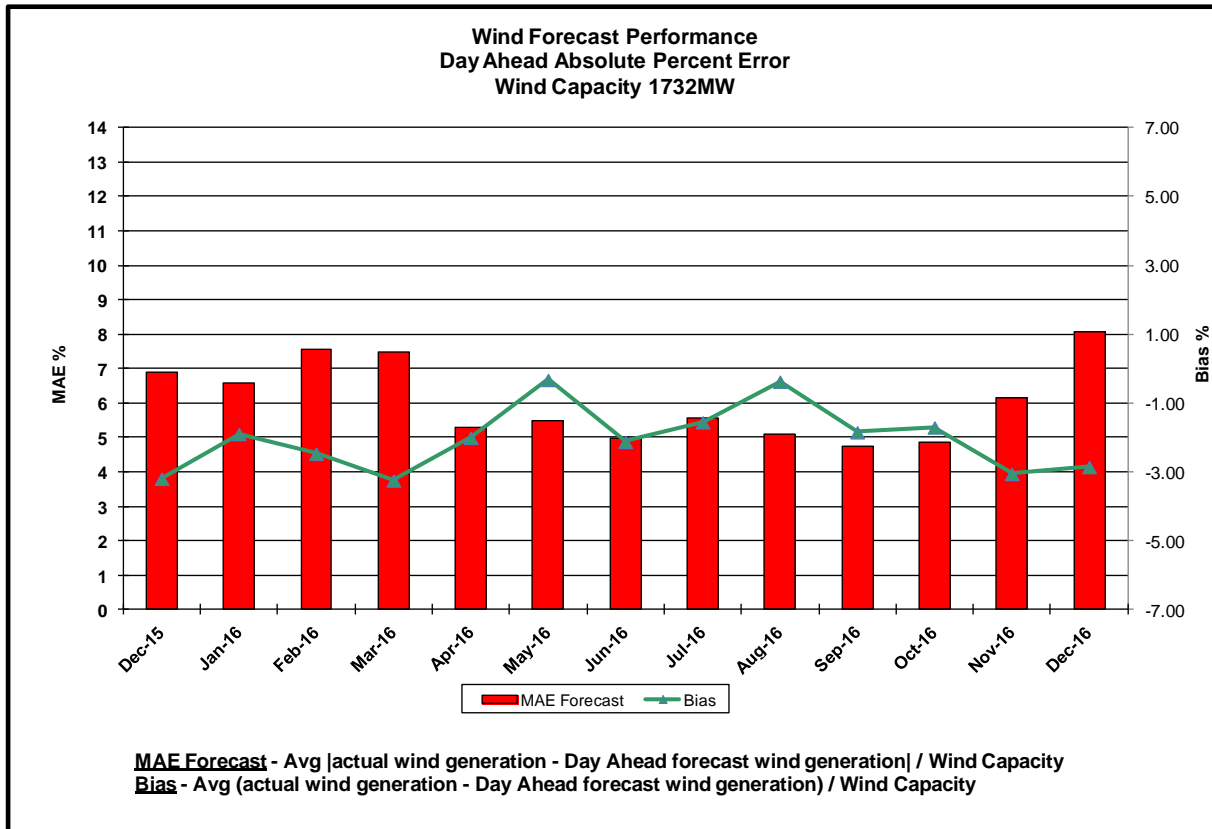
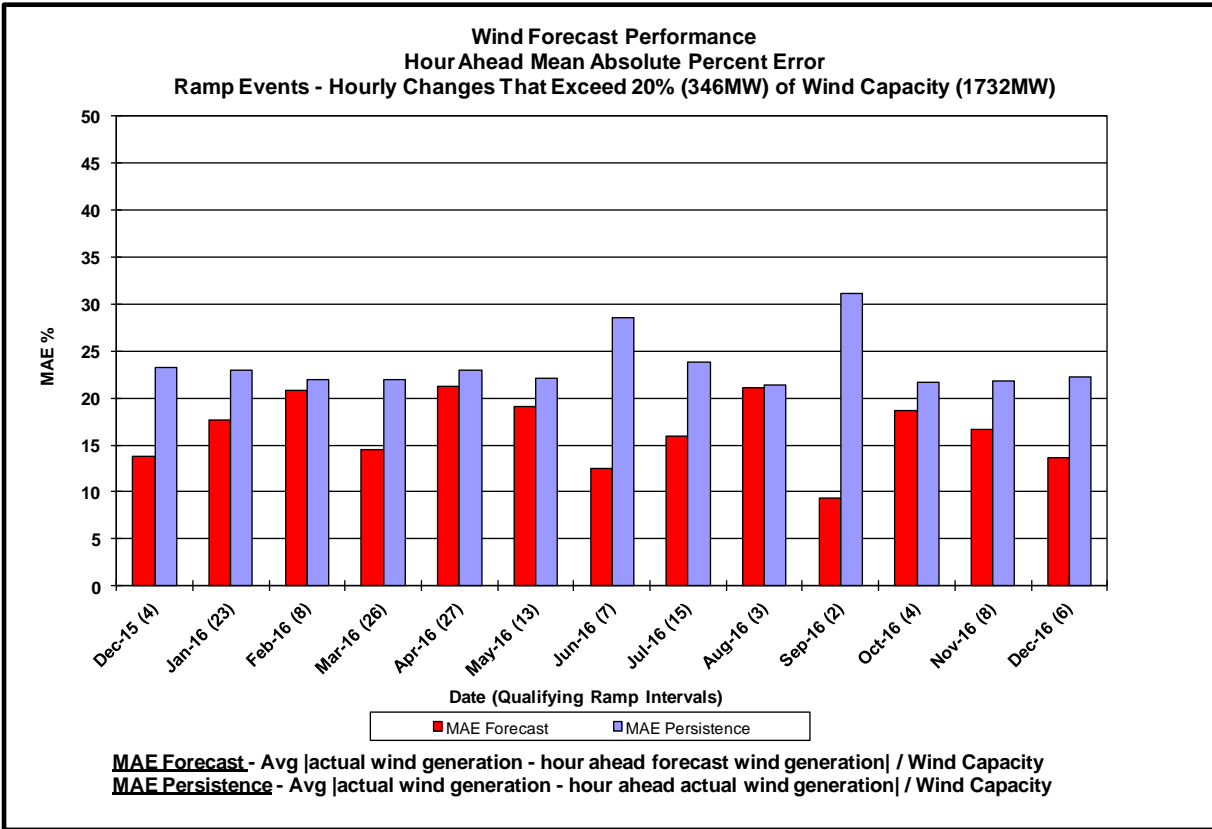
For NYISO initiated Reportable Disturbances, the maximum ACE recovery time is identified. Recovery times of less than 15 minutes are considered NERC compliant.

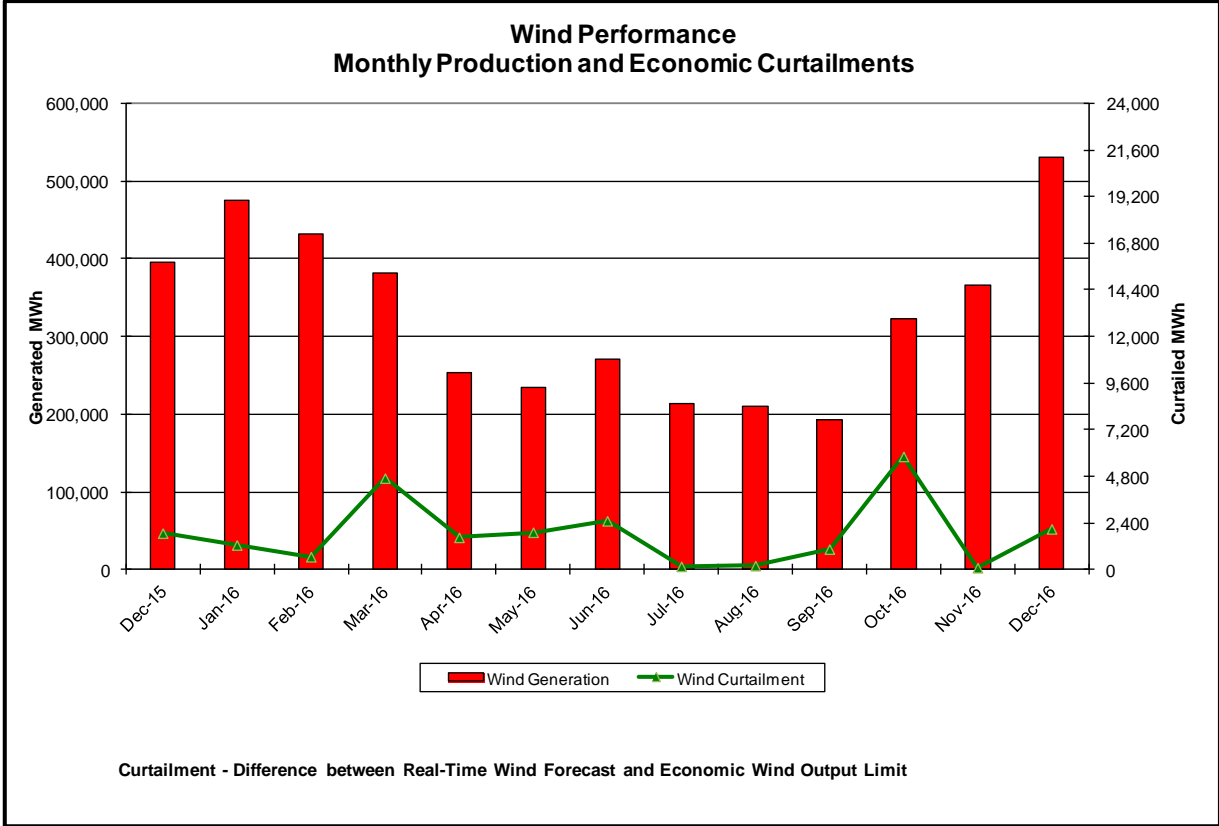
Load Forecast Performance

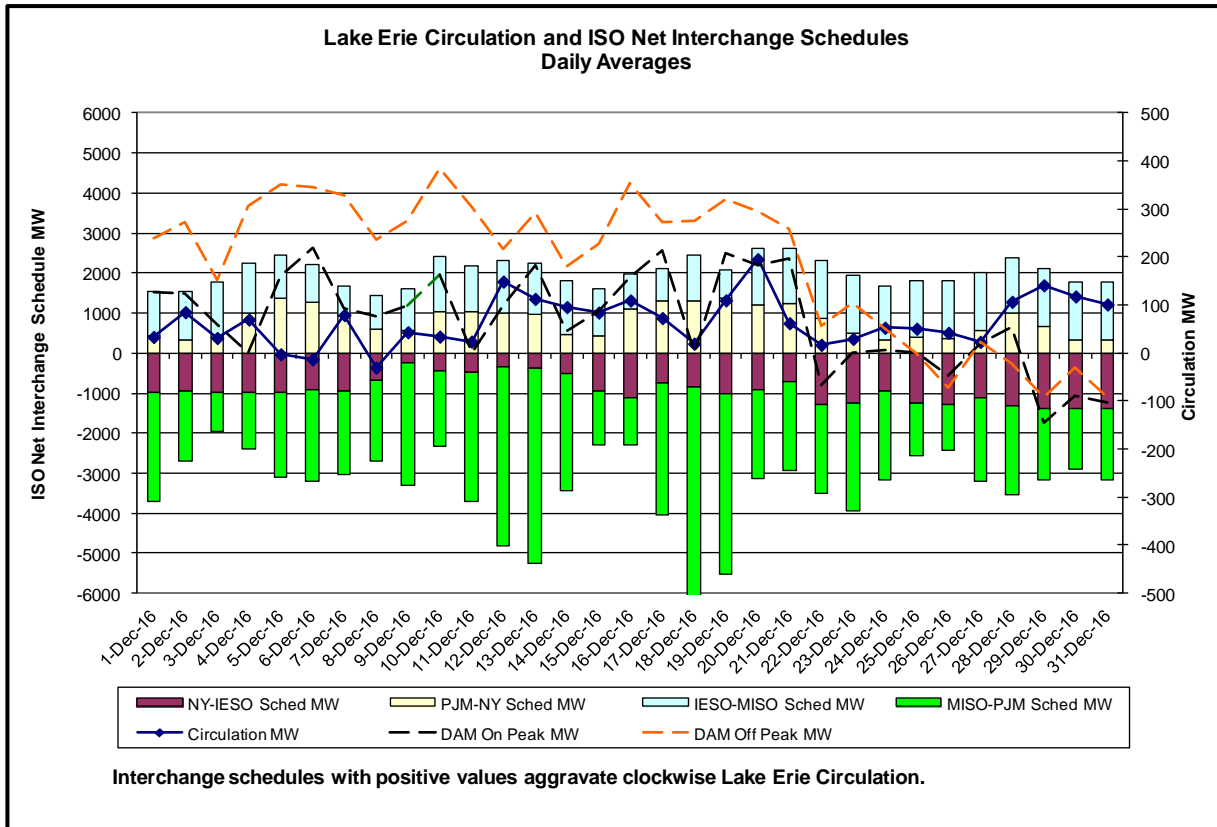
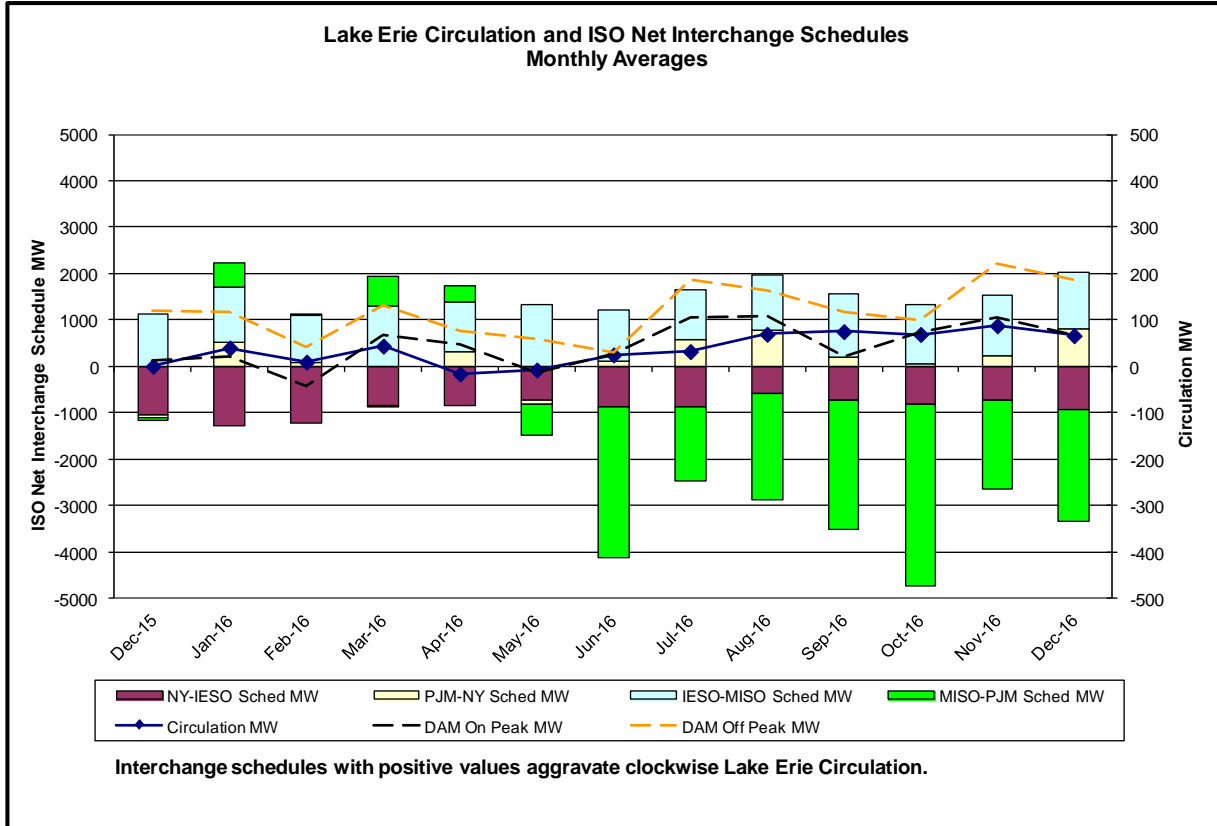


Hourly Error MW - Absolute value of the difference between the hourly average actual load demand and the average hour ahead forecast load demand.
Average Hourly Error % - Average value of the ratio of hourly average error magnitude to hourly average actual load demand.
Day-Ahead Average Hourly Error % - 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.

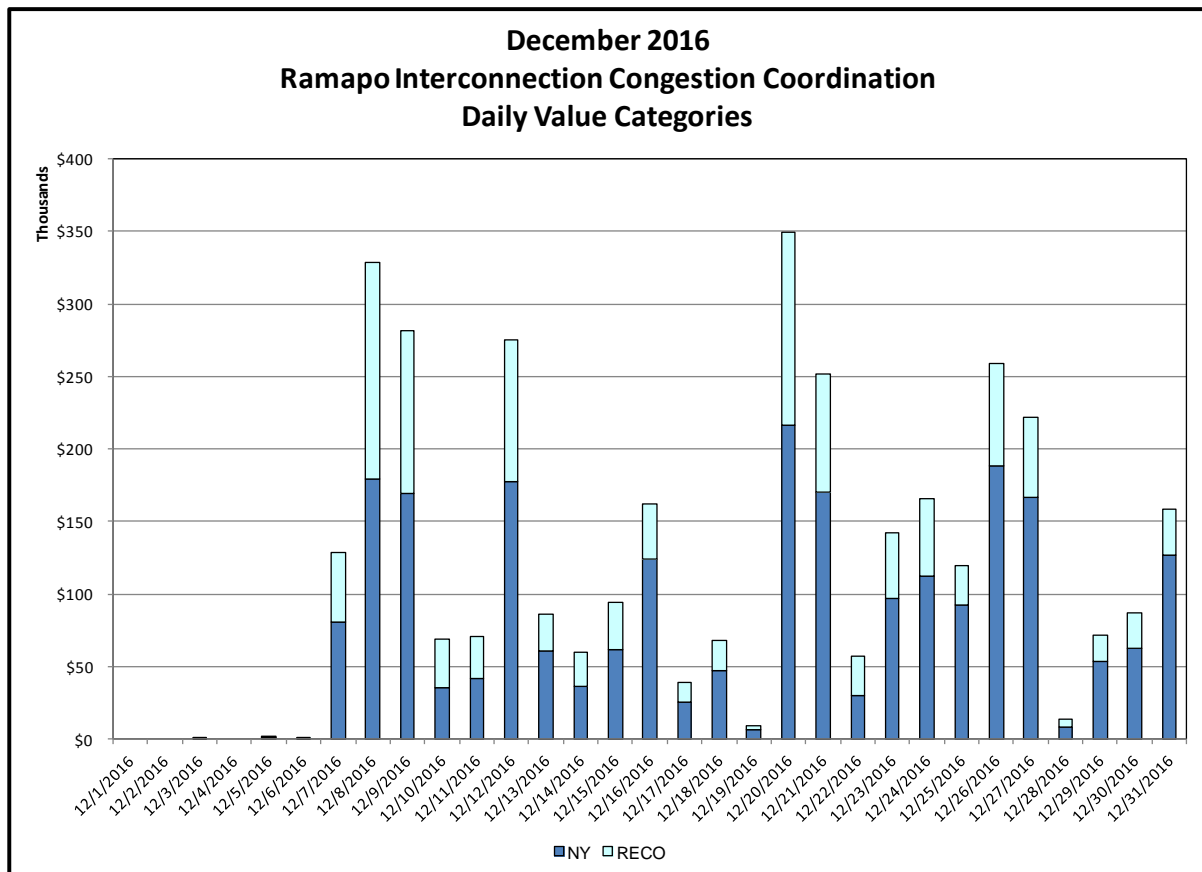
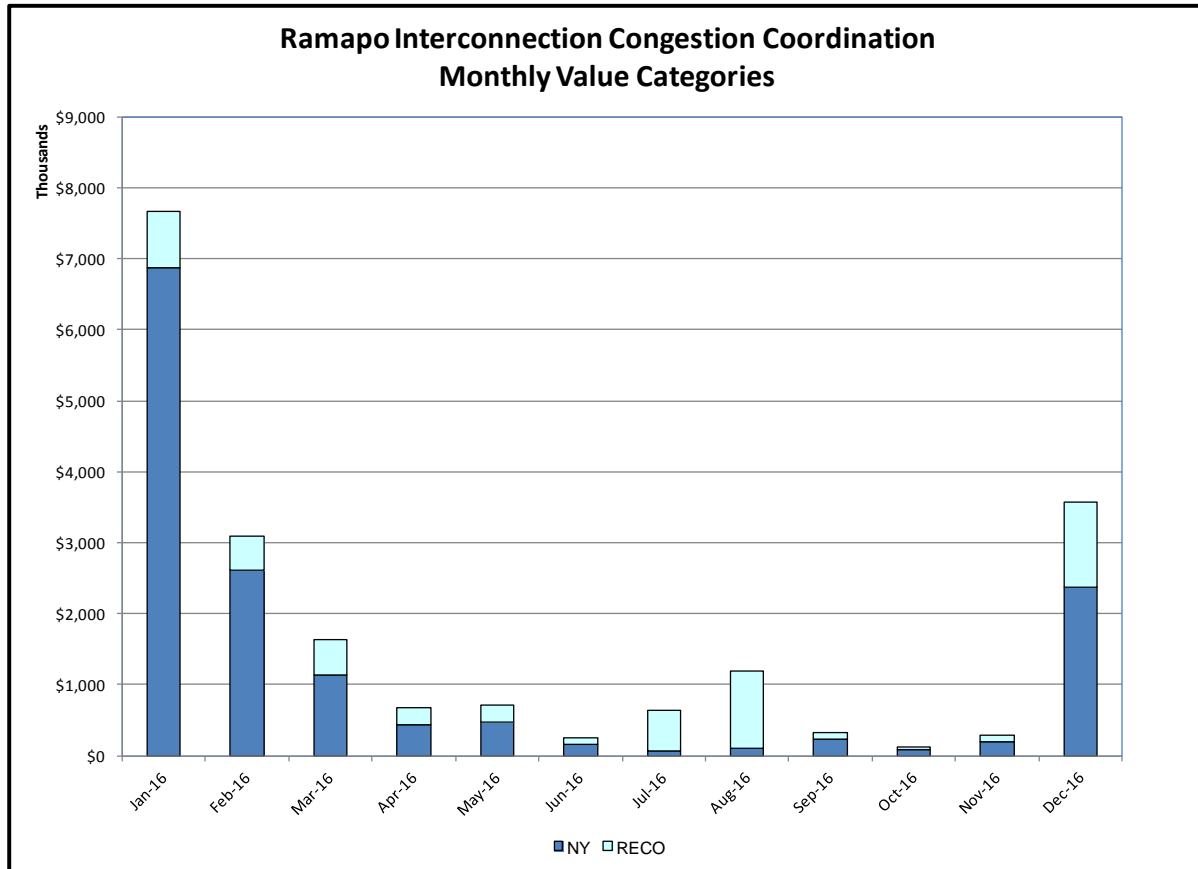






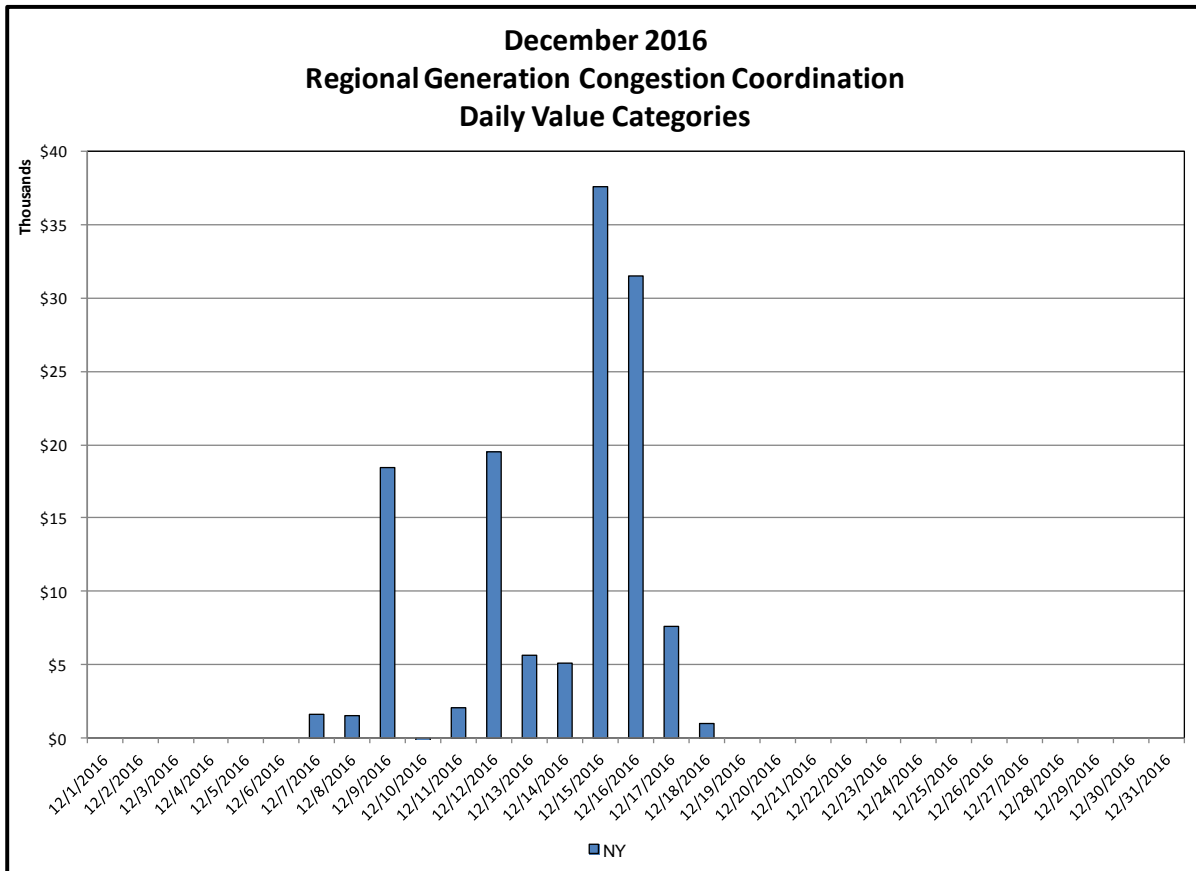
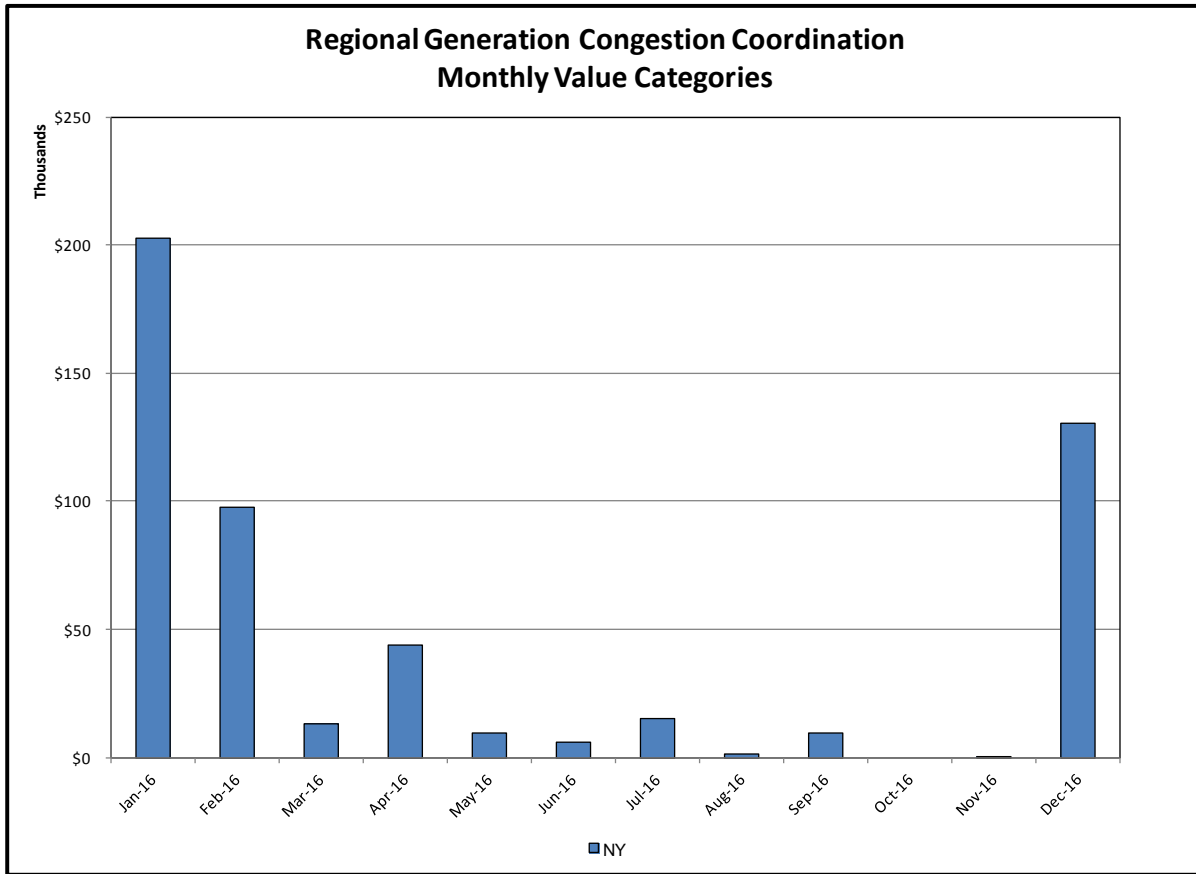


Broader Regional Market Performance Metrics



Ramapo Interconnection Congestion Coordination

<u>Category</u>	<u>Description</u>
NY	Represents the value NY realizes from Market-to-Market Ramapo Coordination. When experiencing congestion, this includes (1) the estimated savings to NY for additional deliveries into NY, plus (2) PJM compensation to NY for additional deliveries into PJM (as compared to the Ramapo Target level, excluding RECO). This is net of any settlements to PJM when they are congested.
RECO	Represents the value of PJM's obligation to deliver 80% of service to RECO load over Ramapo 5018. This includes (1) the estimated reduction in NYCA congestion due to the PJM delivery of RECO over Ramapo 5018, plus (2) PJM compensation to NY for NYCA congestion for the under-delivery or inability to deliver service to RECO load over Ramapo 5018.



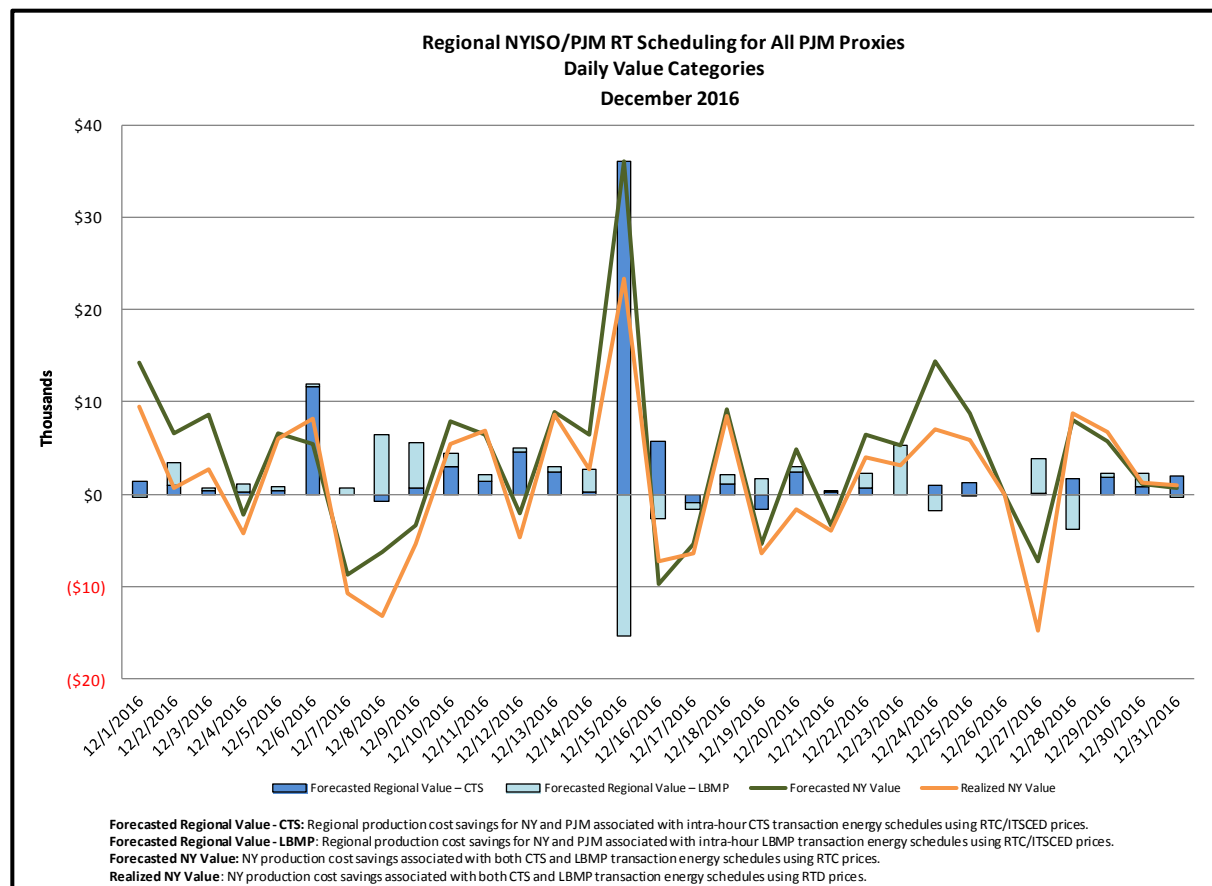
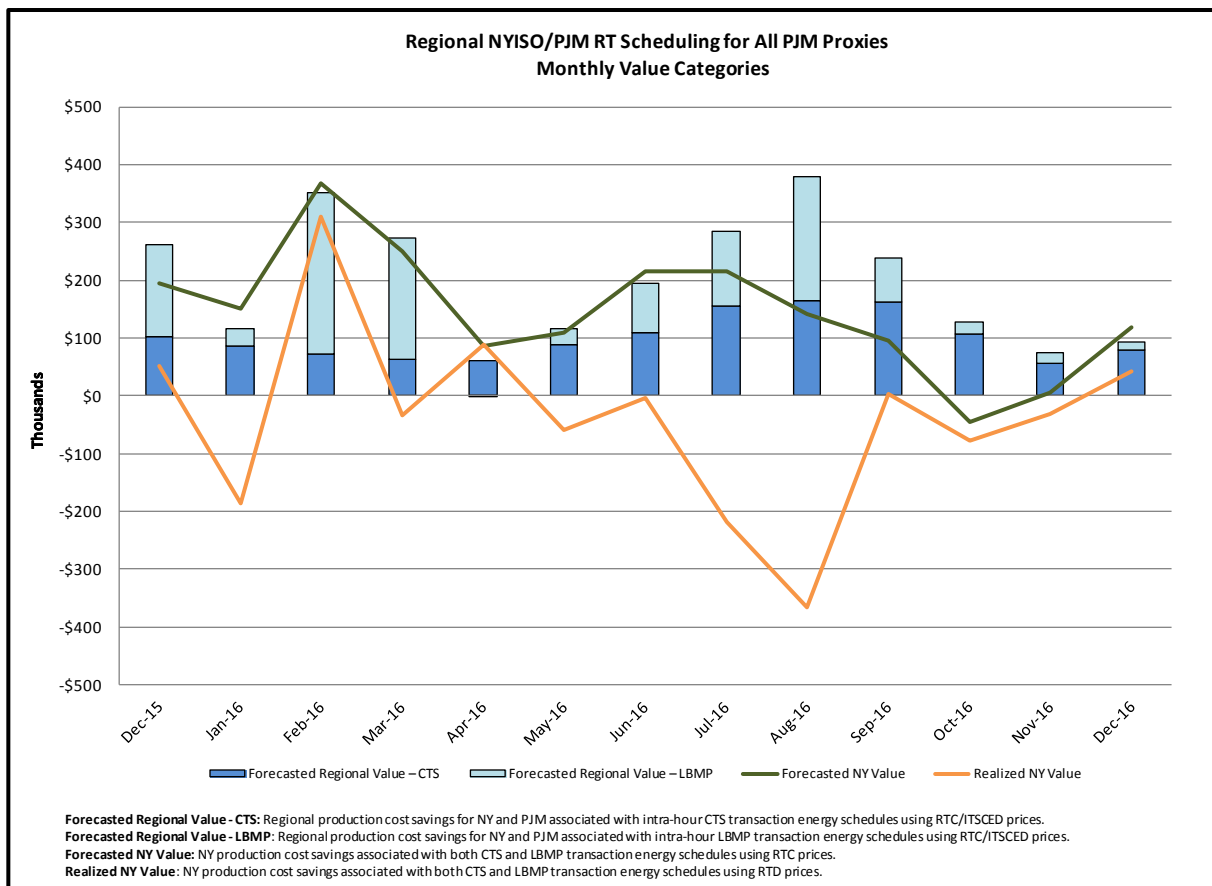
Regional Generation Congestion Coordination

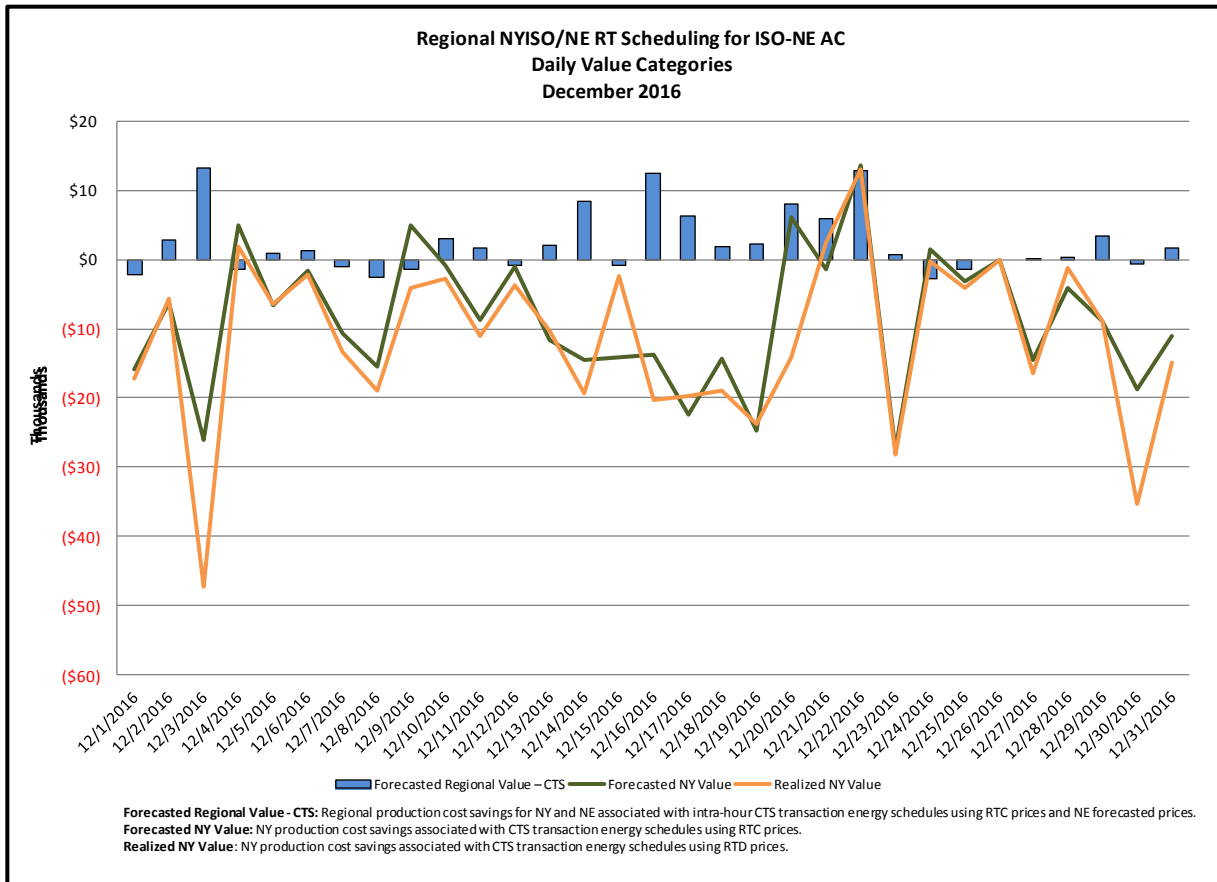
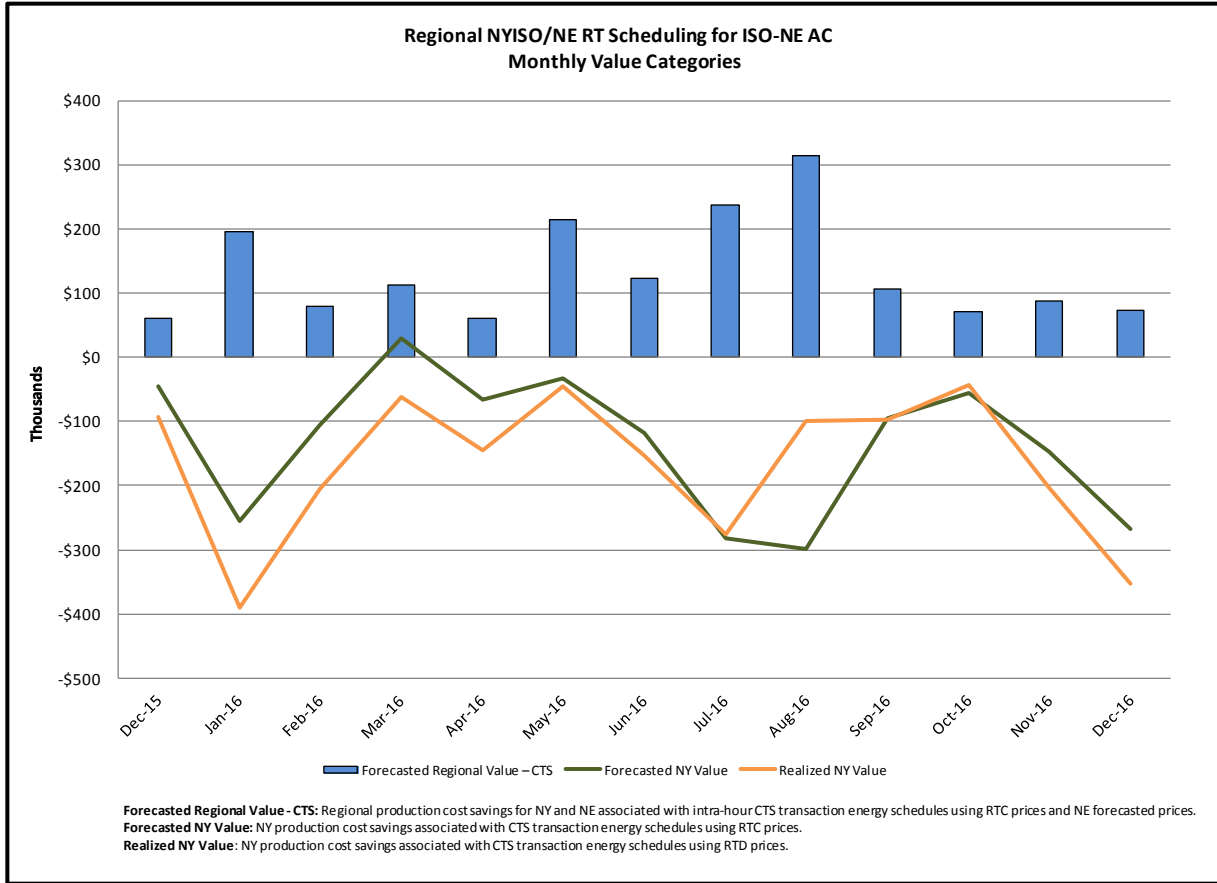
Category

NY

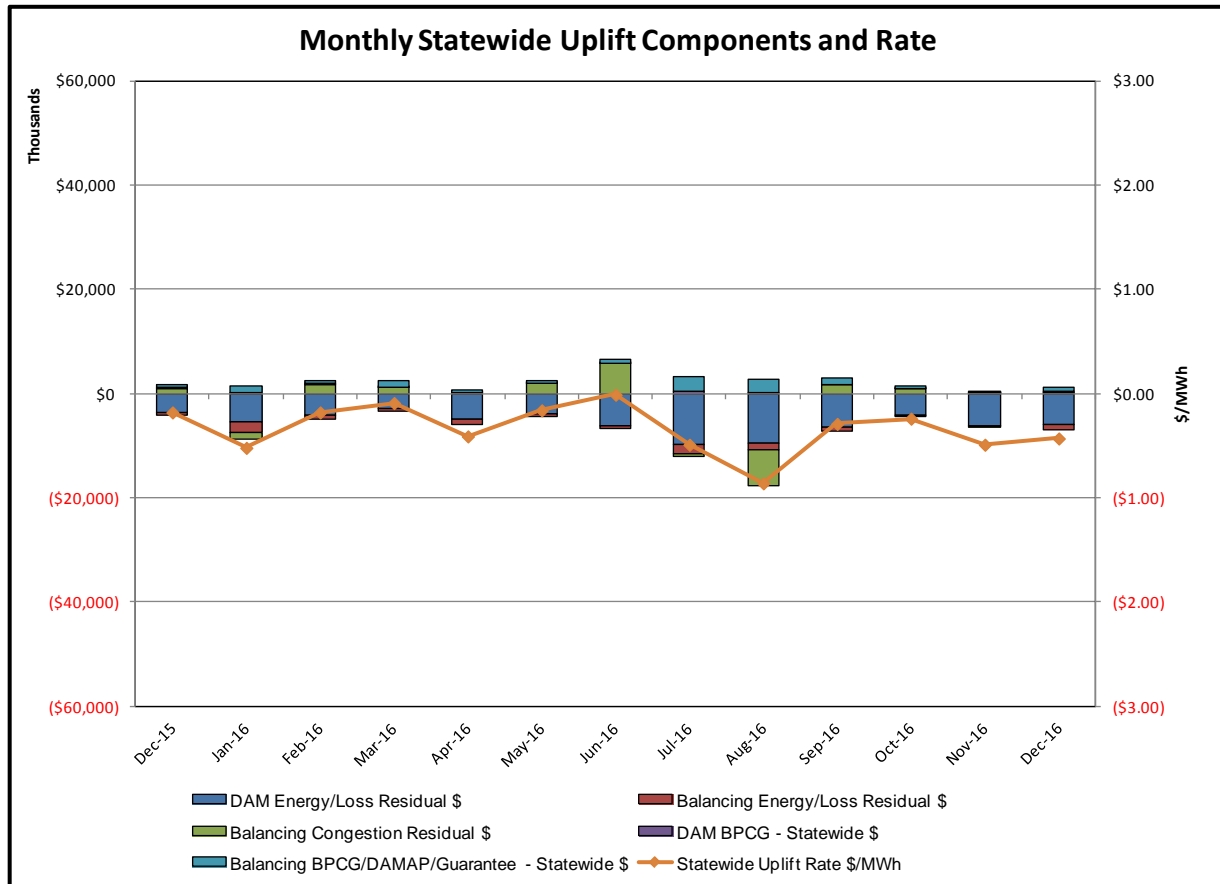
Description

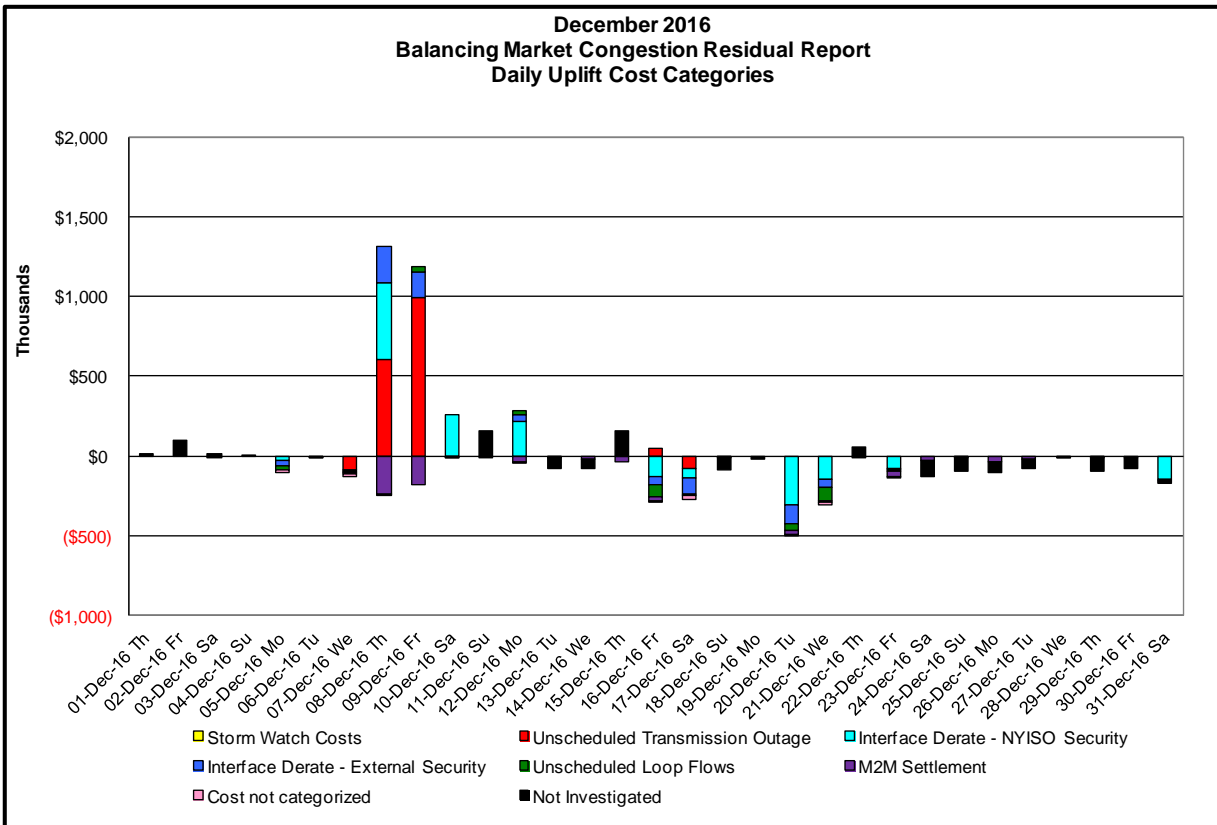
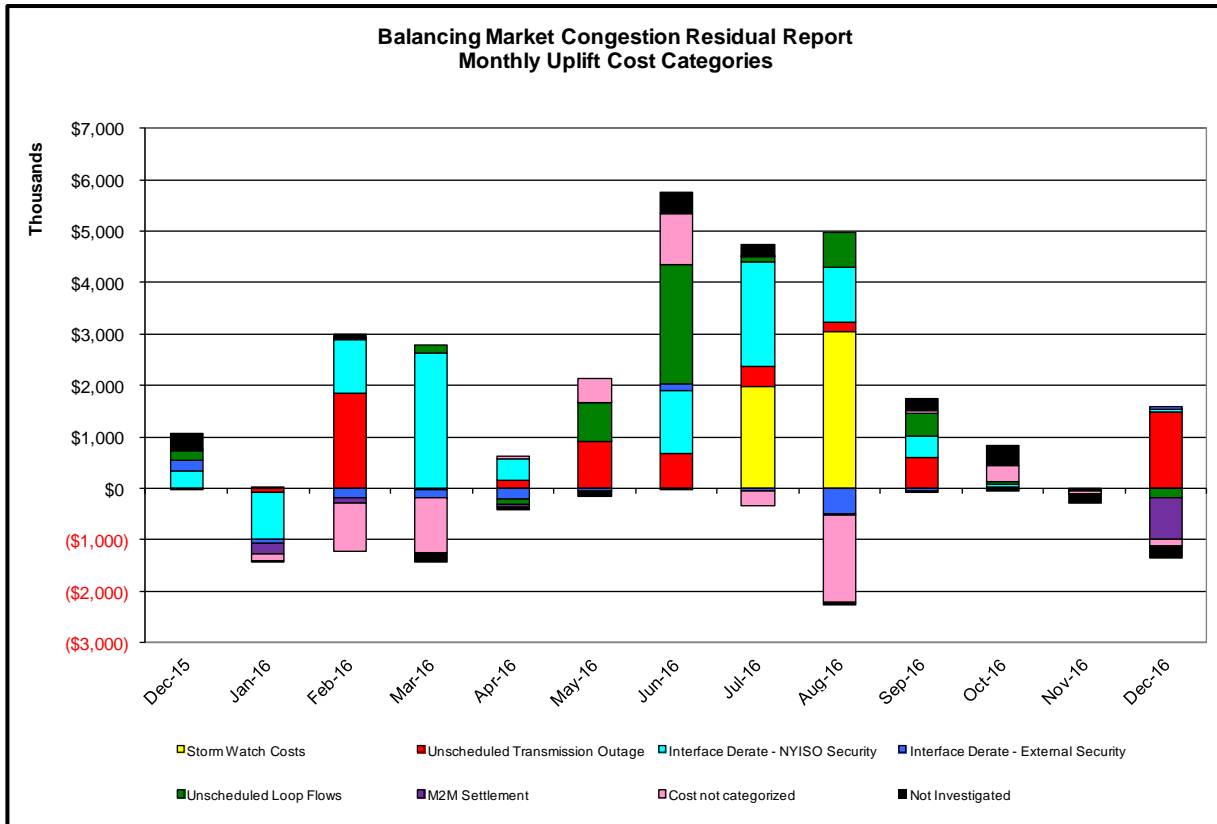
NYISO savings that result from PJM payments to NYISO when PJM's transmission use (PJM's market flow) is greater than PJM's entitlement of the NY transmission system and NYISO is incurring Western or Central NY congestion. Additionally, NYISO savings may result from the more efficient regional utilization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





Market Performance Metrics





Day's investigated in December: 5,7,8,9,10,12,16,17,20,21,23,31

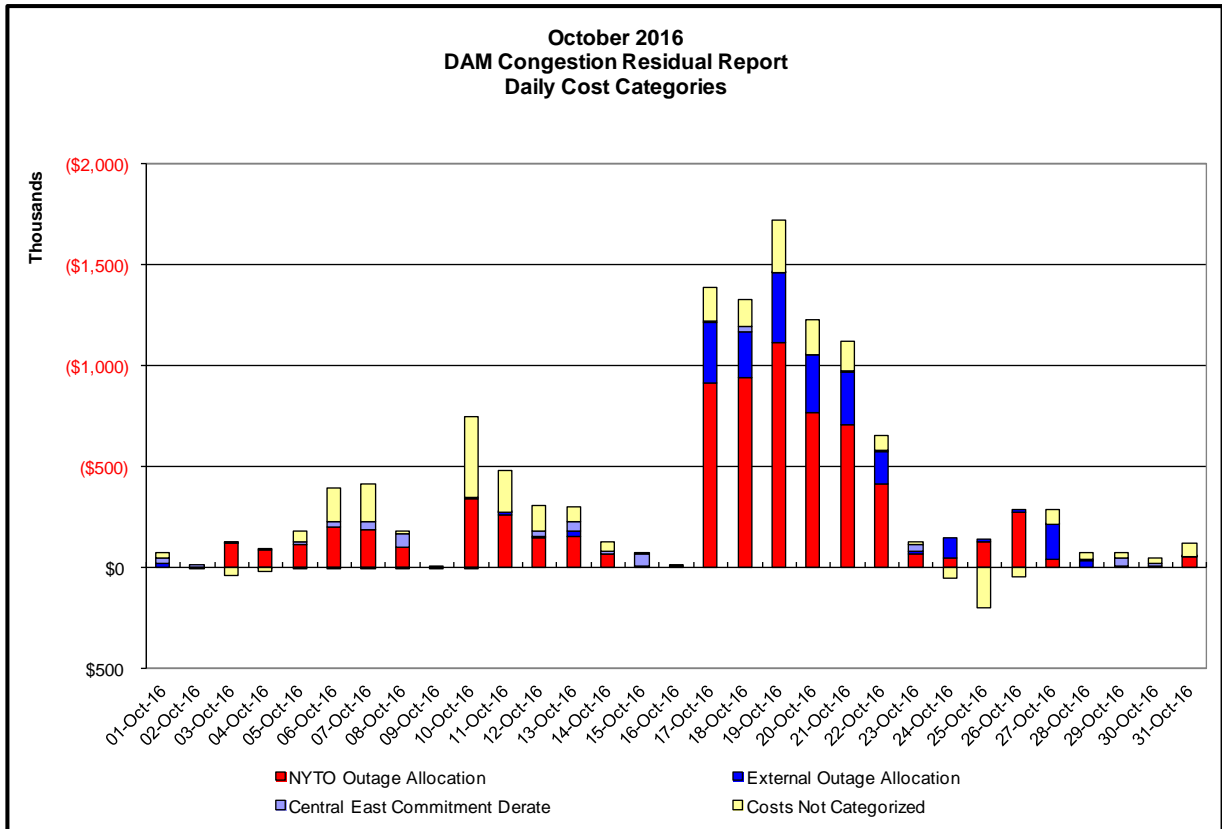
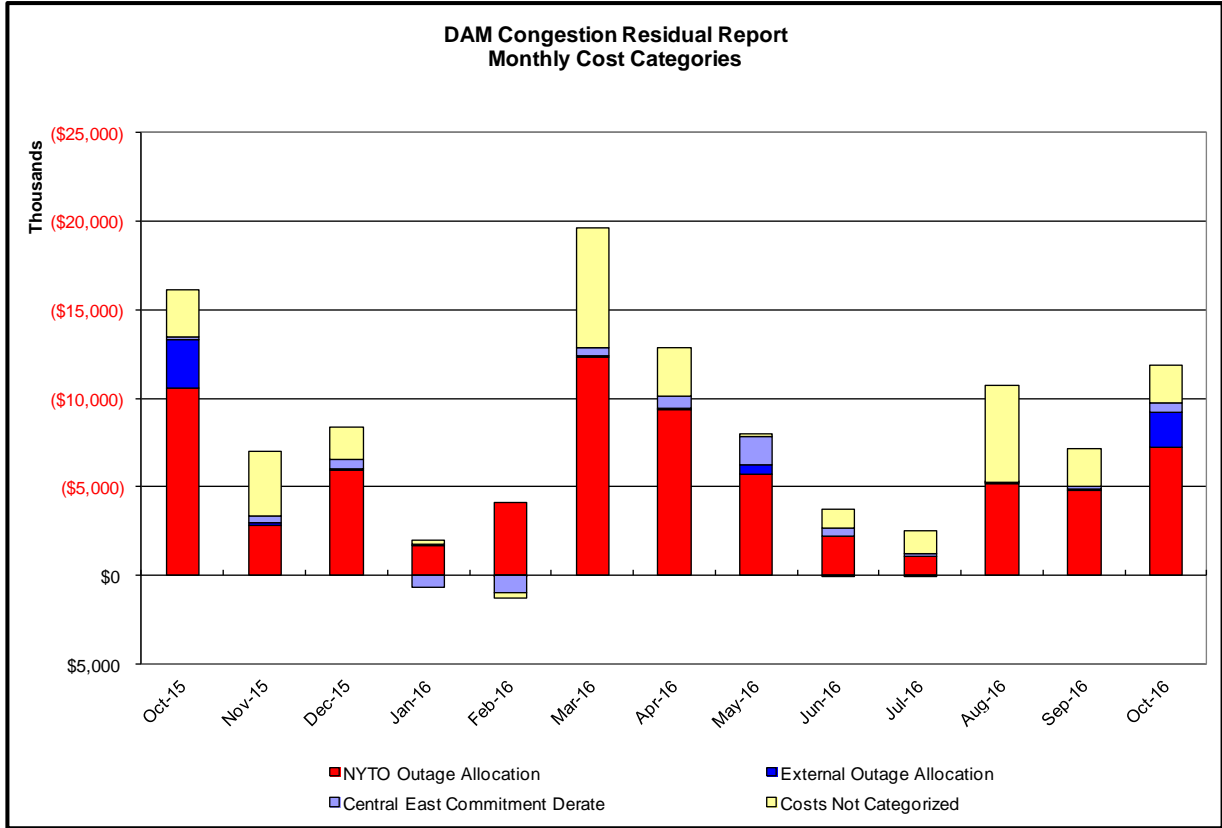
Event	Date (yyyymmdd)	Hours	Description
	12/5/2016	9,10,12-14,20	Uprate Central East
	12/5/2016	8,10,11,13	NE_AC-NY Scheduling Limit
	12/5/2016	9,10,12-14	Lake Erie Circulation, DAM-RTM exceeds +/-125MW; Central East
	12/7/2016	7,9-15,18,21-23	Forced outage of Marcy South Series Compensation
	12/7/2016	7	HQ-CHAT-NY Scheduling Limit
	12/7/2016	7	NE-AC-NY ACTIVE DNI Ramp Limit
	12/7/2016	7	PJM_AC ACTIVE DNI Ramp Limit
	12/7/2016	7,23	Lake Erie Circulation, DAM-RTM exceeds +/-125MW; Central East
	12/8/2016	15-21	Forced outage Shore Road 345/138kV (#Bk1)
	12/8/2016	16-19	Extended outage Farragut-Gowanus 345kV (#41)
	12/8/2016	13-23	Early return of Marcy South Series Compensation
	12/8/2016	5-12	Derate Central East
	12/8/2016	3	Uprate Central East
	12/8/2016	6-15	Derate Greenwood-FoxHills 138kV (#29232) for I/o FoxHills-Willow Brook 138kV (#29211) &BK2
	12/8/2016	5-15	Derate Gowanus-Greenwood 138kV (#42232) for I/o TWR:GOETHALS 22 & 21
	12/8/2016	8	NYCA DNI Ramp Limit
	12/8/2016	5-7,10,19,21-23	NE_AC DNI Ramp Limit
	12/9/2016	0-23	Early return of Marcy South Series Compensation
	12/9/2016	0,4,5,6,8,11-14,16-18,22,23	Forced outage of Farragut-Gowanus 345kV (#41)
	12/9/2016	0,5,15,16,20,22	NE-AC-NY ACTIVE DNI
	12/9/2016	8,22	PJM_AC ACTIVE DNI
	12/9/2016	21,22	Lake Erie Circulation, DAM-RTM exceeds +/-125MW; Central East
	12/10/2016	0-6,8,13-16,21,22	Derate Central East
	12/10/2016	15,16	NYCA DNI Ramp Limit
	12/12/2016	0-4,6,12-23	Derate Central East
	12/12/2016	9	NYCA DNI Ramp Limit
	12/12/2016	3,6,20,22,23	NE_AC DNI Ramp Limit
	12/12/2016	9	NE_NNC1385-NY Scheduling Limit
	12/12/2016	16	PJM_AC-NY Scheduling Limit
	12/12/2016	9,13-17	Lake Erie Circulation, DAM-RTM exceeds +/-125MW; Central East
	12/16/2016	9,10	Forced outage of West 49th Street-East 13th Street 345kV (#M55)
	12/16/2016	0-3,12-15,20-23	Uprate Central East
	12/16/2016	12-15	Uprate East 179th St-Hellgate 138kV (#15055)
	12/16/2016	12-15,21	Uprate Freshkills 345/138kV TA1
	12/16/2016	12,21	NYCA DNI Ramp Limit
	12/16/2016	14,15,20-23	NE_AC DNI Ramp Limit
	12/16/2016	12,13	PJM_AC ACTIVE DNI
	12/16/2016	0-3,12,13,20,21,23	Lake Erie Circulation, DAM-RTM exceeds +/-125MW; Central East
	12/17/2016	8-16,20,21,23	Early return of Gilboa-New Scotland 345kV (#GNS-1), Leeds-New Scotland 345kV (94), Marcy-New Scotland 345kV (#18)
	12/17/2016	1,5,6	Uprate Central East
	12/17/2016	10-12	Uprate East 179th St-Hellgate 138kV (#15055)
	12/17/2016	14,21	NYCA DNI Ramp Limit
	12/17/2016	1	IESO_AC ACTIVE DNI
	12/17/2016	8,12,13,15,16	NE_NNC1385-NY Scheduling Limit
	12/17/2016	1,5,6,9-14,20,21,23	NE-AC-NY Scheduling Limit
	12/17/2016	6,16	NE_AC DNI Ramp Limit
	12/17/2016	6,8,9,12-16	PJM_AC-NY Scheduling Limit
	12/20/2016	0-4,6-21,23	Uprate Central East
	12/20/2016	10,11	Uprate East 179th St-Hellgate 138kV (#15055)
	12/20/2016	9-12	Uprate Freshkills-Willow Brooke 138kV (#29212)
	12/20/2016	7,21	NYCA DNI Ramp Limit
	12/20/2016	0-3,6,16,18	NE_AC-NY Scheduling Limit
	12/20/2016	0-5,18,19	NE_NNC1385-NY Scheduling Limit
	12/20/2016	14	NE_AC DNI Ramp Limit
	12/20/2016	8,9,18,19	Lake Erie Circulation, DAM-RTM exceeds +/-125MW; Central East
	12/21/2016	1-5,7,10-14,16-19,21-23	Uprate Central East
	12/21/2016	17-19,21,22	NE_AC-NY Scheduling Limit
	12/21/2016	1,23	NE_NNC1385-NY Scheduling Limit
	12/21/2016	16	PJM_AC ACTIVE DNI Ramp Limit
	12/21/2016	1-4,9-13,19	Lake Erie Circulation, DAM-RTM exceeds +/-125MW; Central East
	12/23/2016	7,10-13,17-23	Uprate Central East
	12/23/2016	21,22	PJM_AC ACTIVE DNI Ramp Limit
	12/23/2016	12,18,20	Lake Erie Circulation, DAM-RTM exceeds +/-125MW; Central East
	12/31/2016	9-16,18-20,22,23	Uprate Central East
	12/31/2016	14	NE_AC DNI Ramp Limit

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	

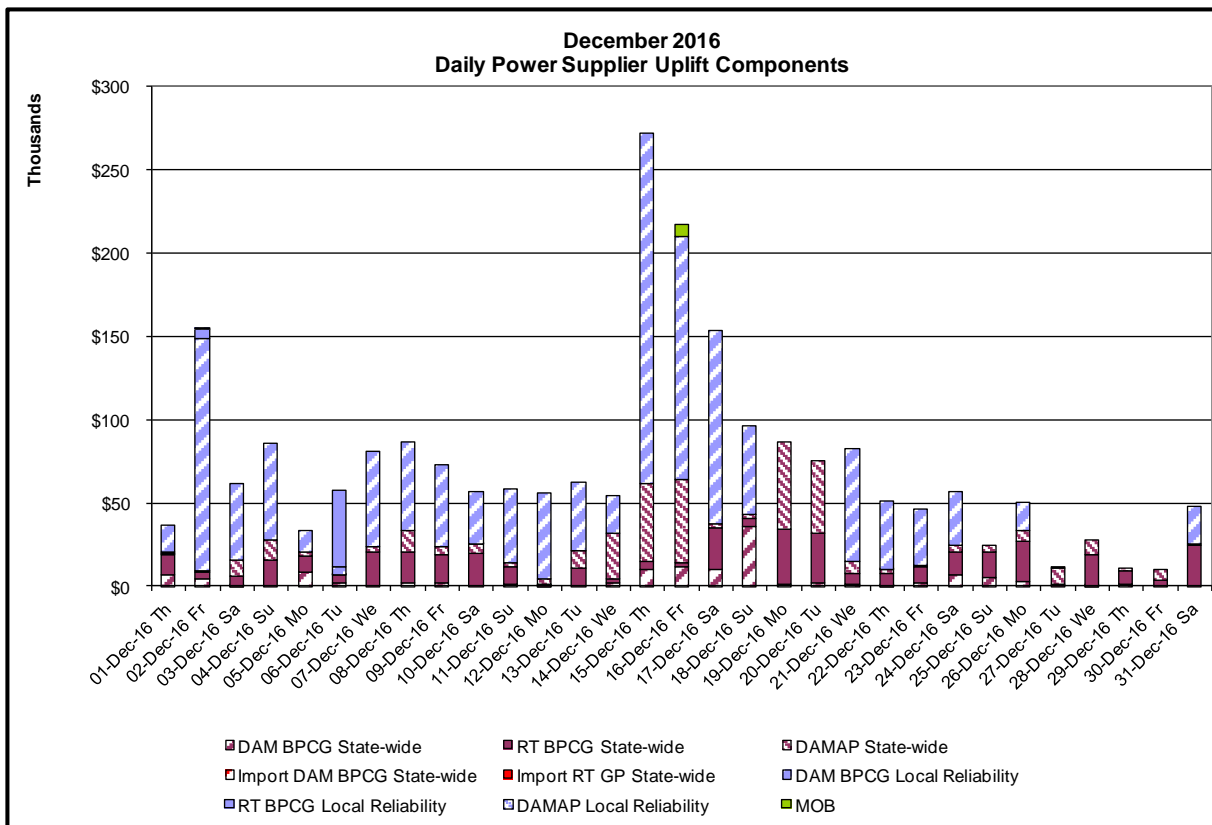
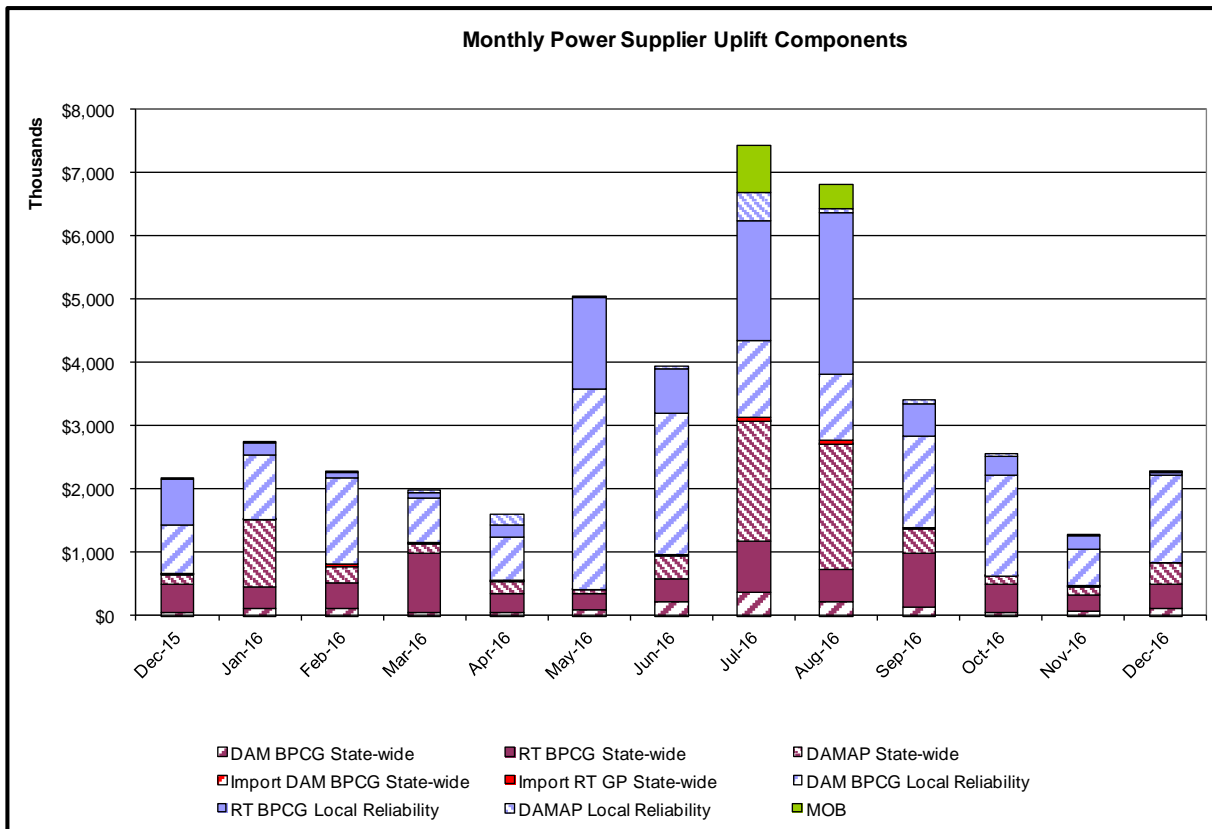
Monthly Balancing Market Congestion Report Assumptions/Notes

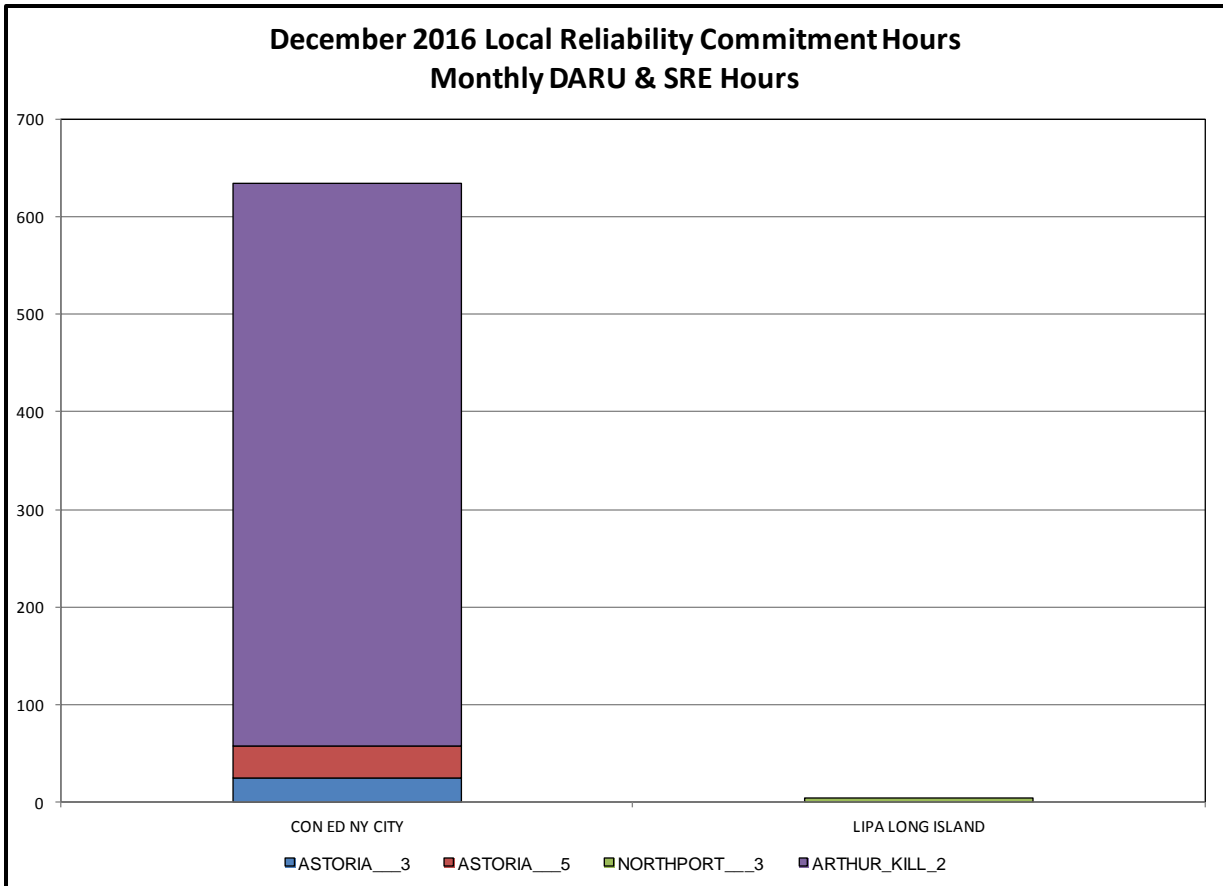
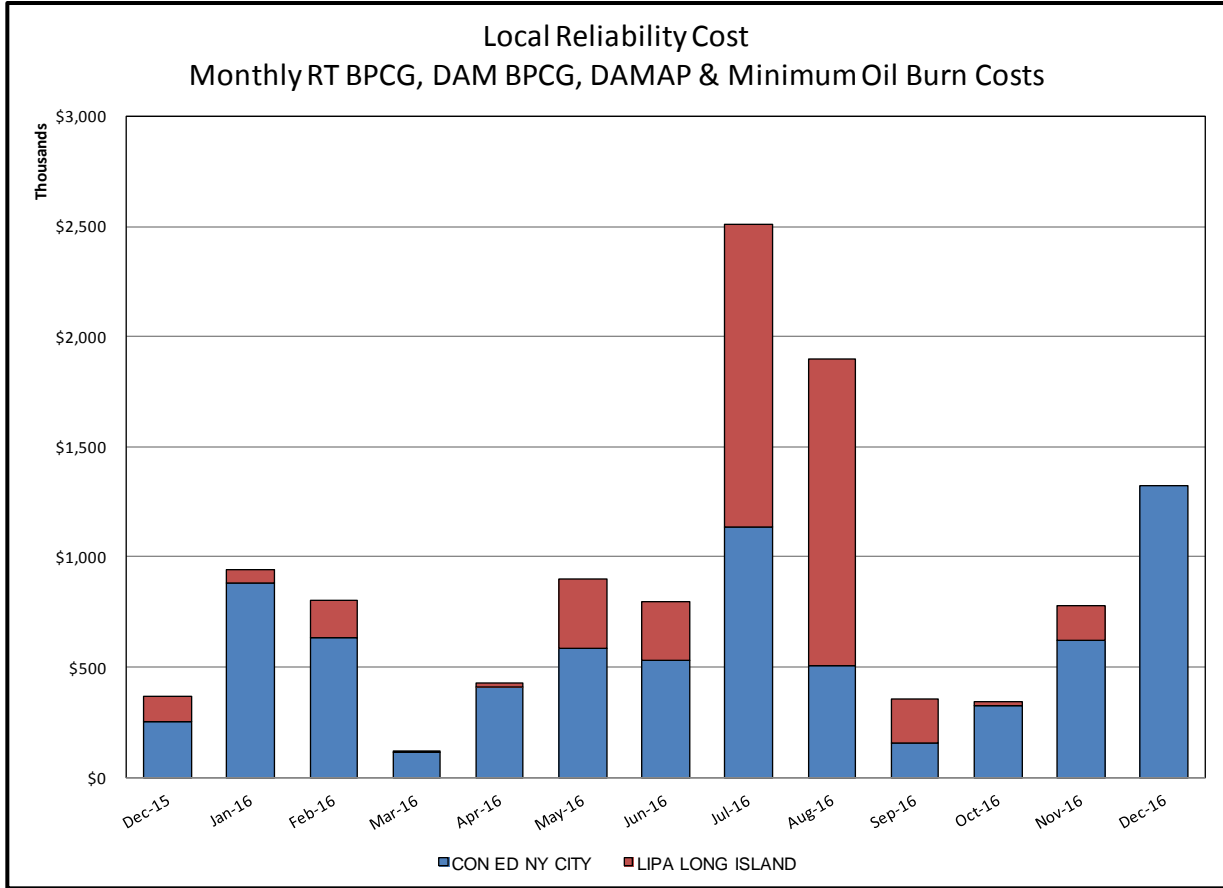
- 1) Storm Watch Costs are identified as daily total uplift costs
- 2) Days with a value of BMCR less M2M Settlement of \$100K/HR, shortfall of \$200K/Day or more, or surplus of \$100K/Day or more are investigated.
- 3) Uplift costs associated with multiple event types are apportioned equally by hour

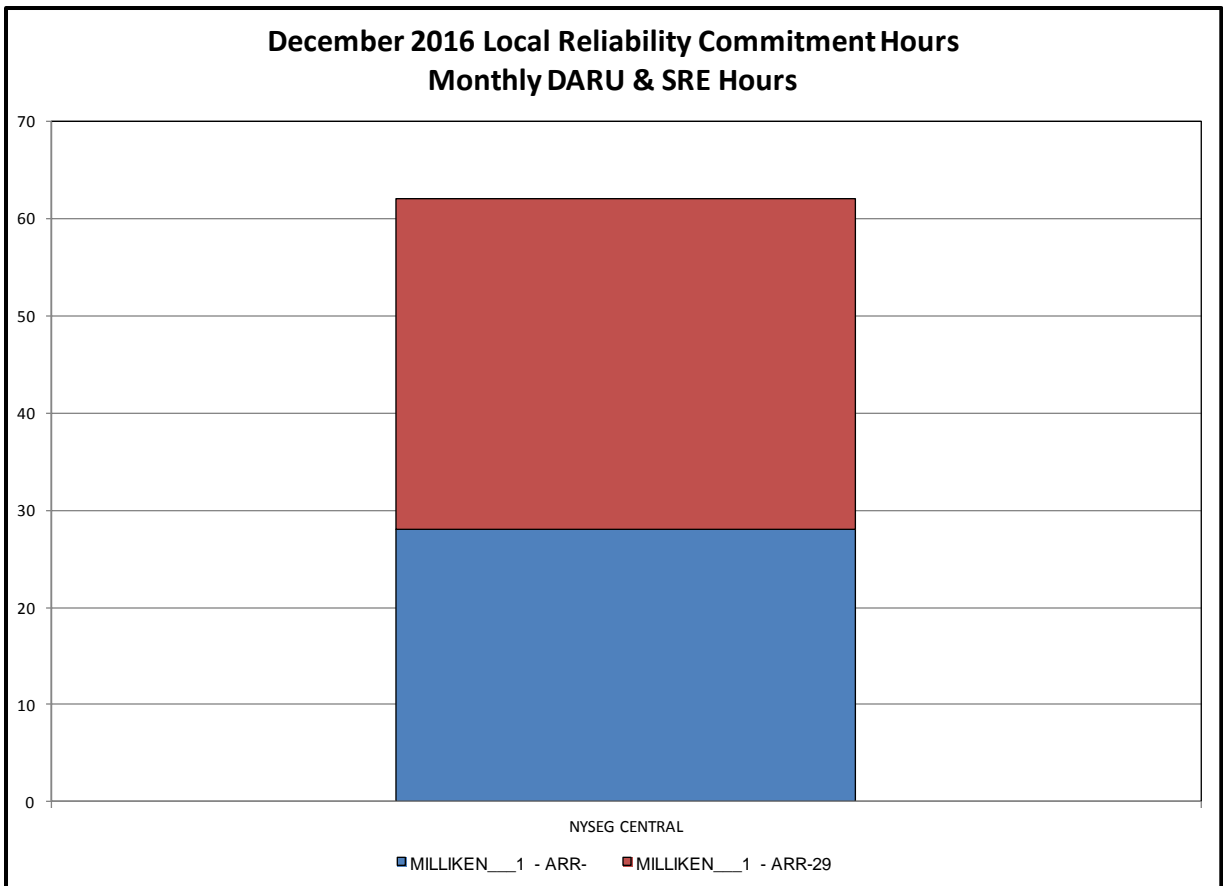
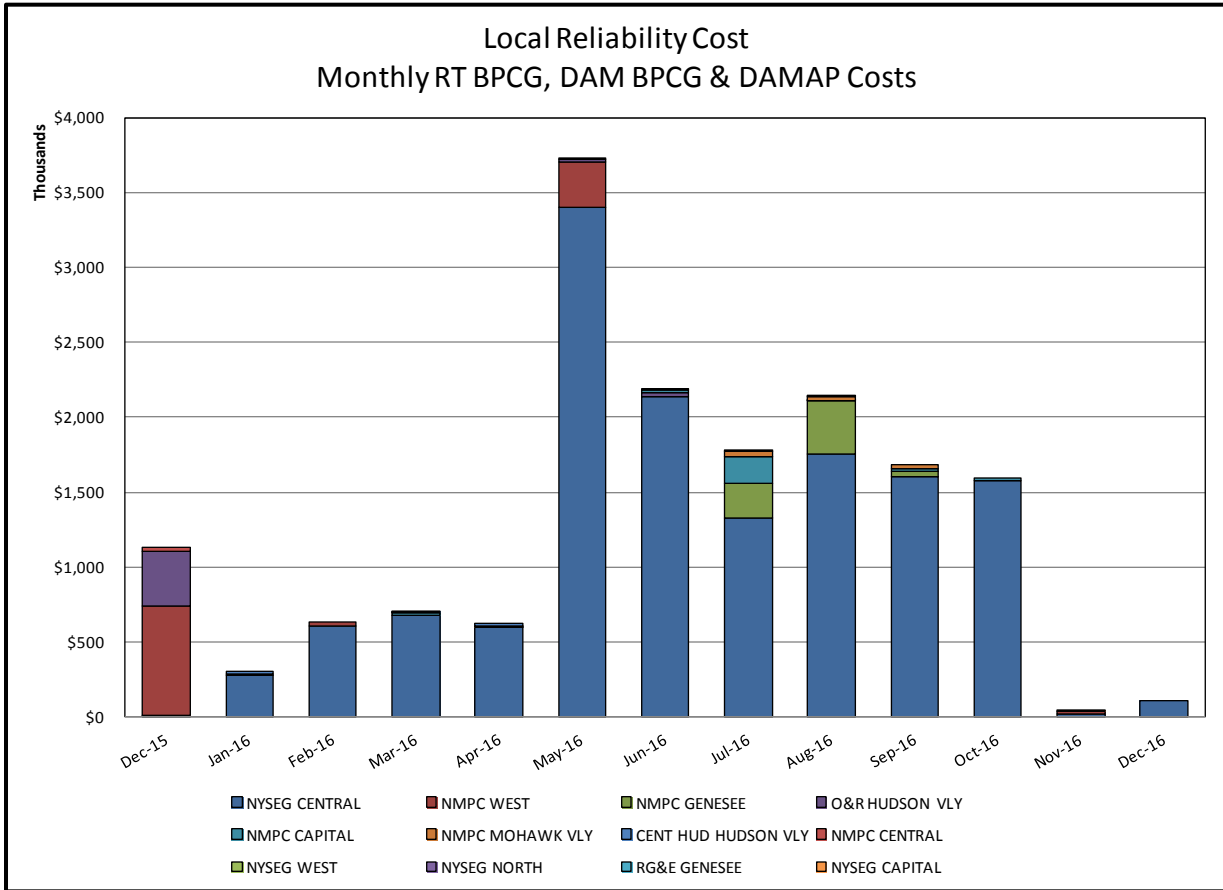


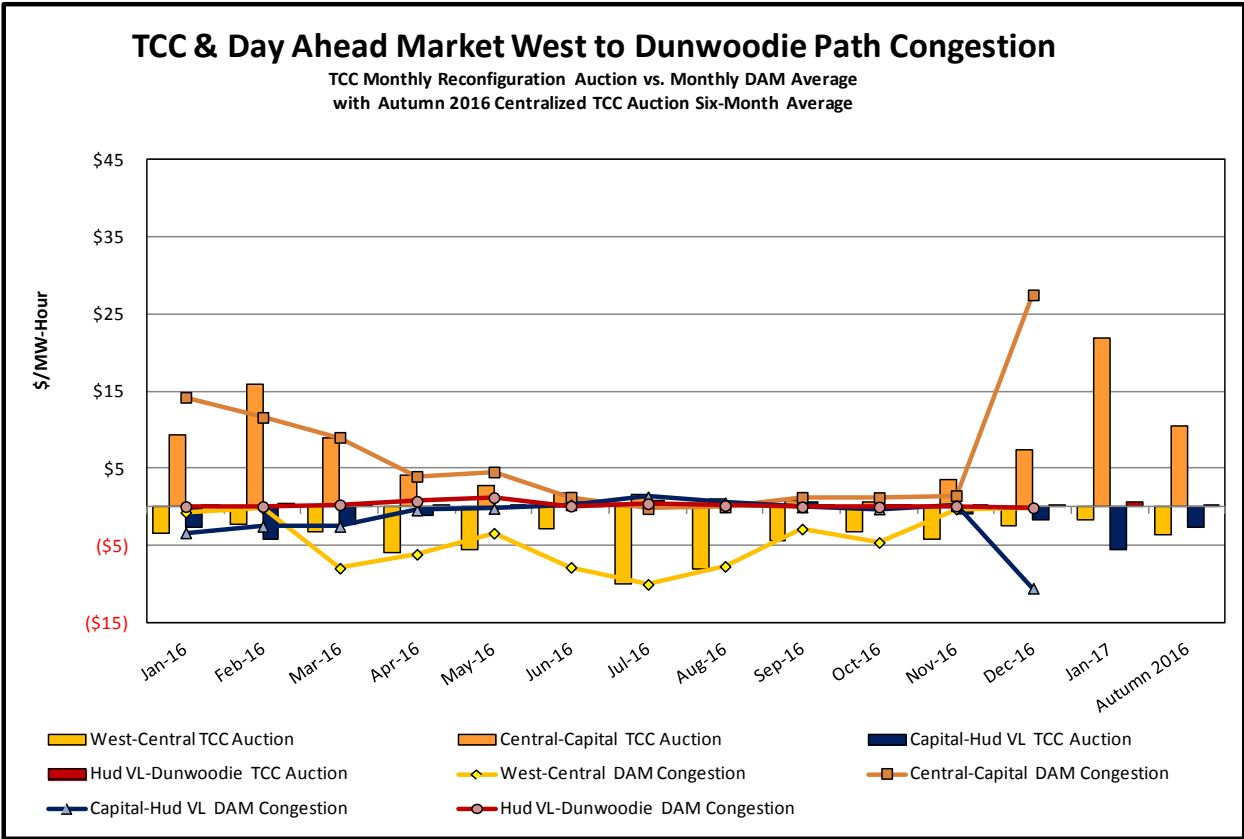
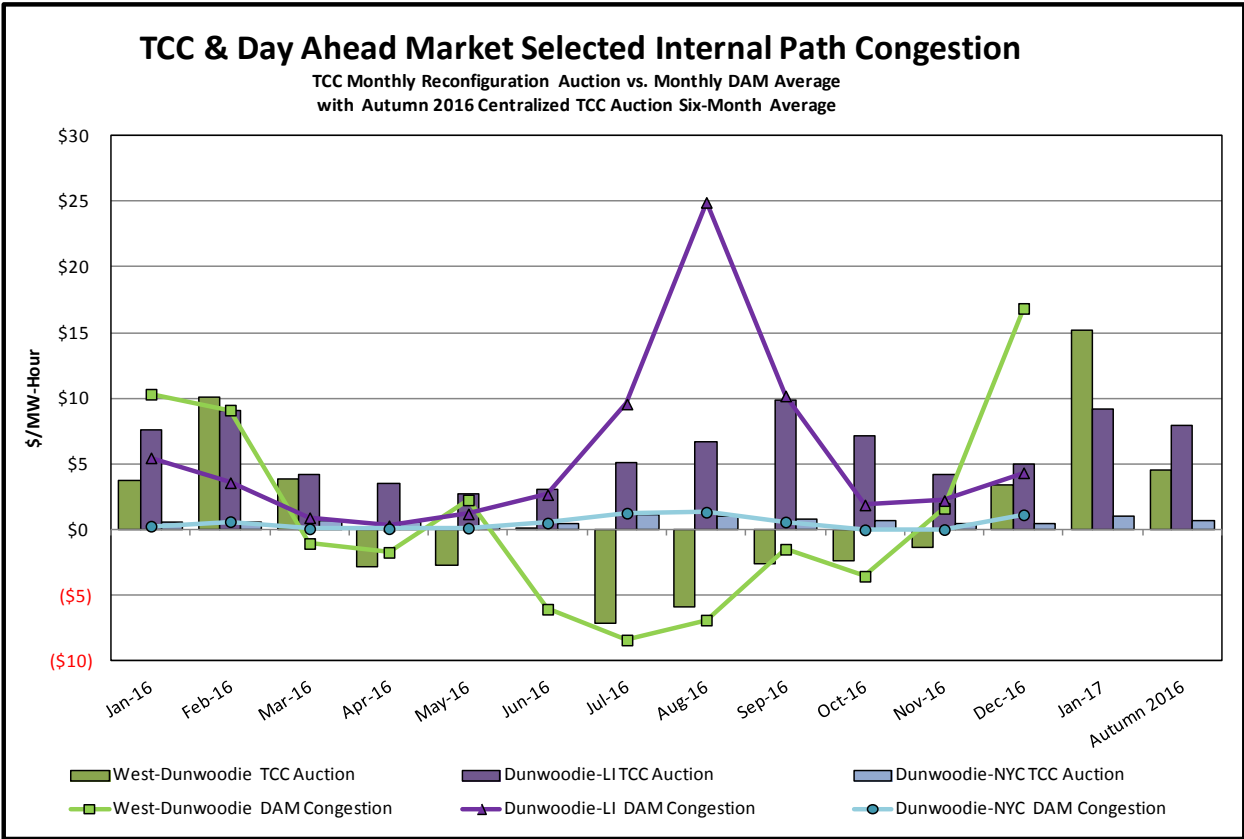
Day-Ahead Market Congestion Residual Categories

<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 Autumn 2016 Centralized TCC Auction Six-Month Average

