2014 State of the Market Report for the NYISO Markets: Energy Market Highlights & Recommendations

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Schedule for Review of 2014 SOM Report

- On 5/13: Report posted on NYISO website
- Presentation schedule:
  - ✓ 5/20 MIWG: Energy Market Highlights & Recommendations
  - ✓ 5/27 MC: Overview of Report & Recommendations
  - ✓ 5/28 ICAPWG: Capacity Market Highlights & Recommendations
- Comments/questions submitted by 5/26 will be posted on the NYISO website and addressed at the 5/28 ICAPWG.
- Comments/questions received after 5/26 will be addressed case by case.

Highlights and Market Summary: Energy Market

- The energy markets performed competitively and price variations were driven primarily by fundamentals (i.e., demand, fuel prices, supply availability).
- Average "all-in" prices ranged from $63/MWh in Western NY to $98/MWh in NYC and $90/MWh in Long Island in 2014.
- Price spreads between natural gas trading hubs in and around New York continued to increase from previous years.
  - ✓ Average prices ranged from $3.18/MMbtu for Dominion North to $7.54/MMbtu for Iroquois Zone 2.
- Unusual weather patterns led to sizable changes in natural gas prices and electricity prices from 2013 to 2014.
  - ✓ In the first quarter, abnormally cold weather led to record natural gas prices, increasing energy prices 55 to 119 percent from 2013 at different locations.
  - ✓ Over the last three quarters, mild summer weather and very low natural gas prices caused electricity prices to fall 14 to 34 percent from the previous year.

Highlights and Market Summary: Congestion Patterns & Uplift Charges

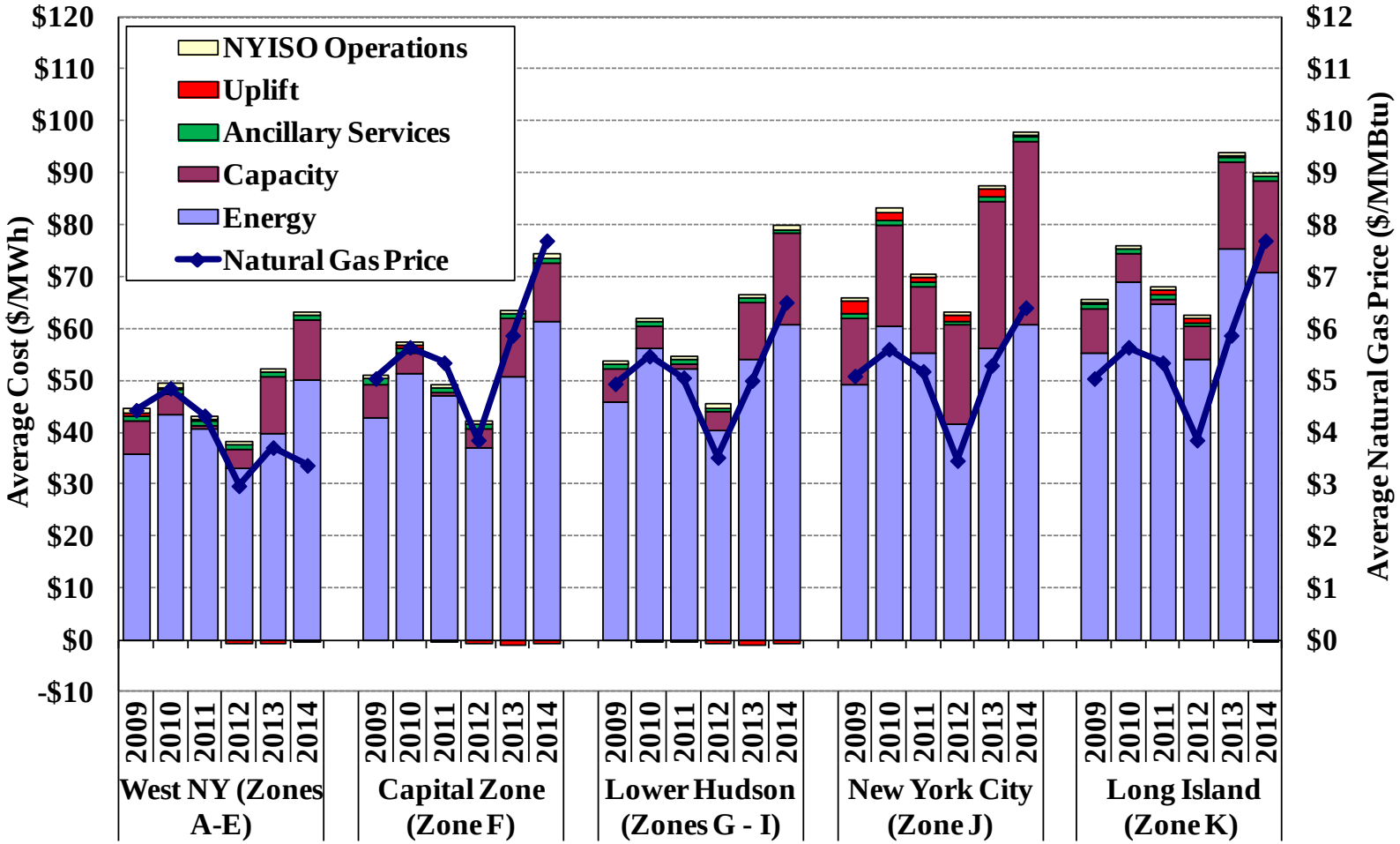
Congestion Patterns:

- Congestion from west-to-east on the natural gas pipeline system led to a similar pattern of prices in the wholesale electric market.
  - ✓ Flows through western New York and across the Central-East Interface accounted for 64 percent of the $573 million in DAM congestion revenue.

Uplift Charges:

- Uplift charges continue to decline from past years -- guarantee payments fell 10 percent to $147 million as transmission upgrades in the North Country and on Long Island required less out-of-merit dispatch and commitment.
- Day-ahead congestion shortfalls totaled $69 million, most of which were caused by transmission outages scheduled during the Polar Vortex.
  - ✓ $71 million was allocated to the responsible transmission owners.
- Balancing congestion shortfalls were very low ($5 million), reflecting good operating performance, fewer TSAs, and the benefits of M2M coordination.

Average All-In Price by Region



See Sections I.A & III.A

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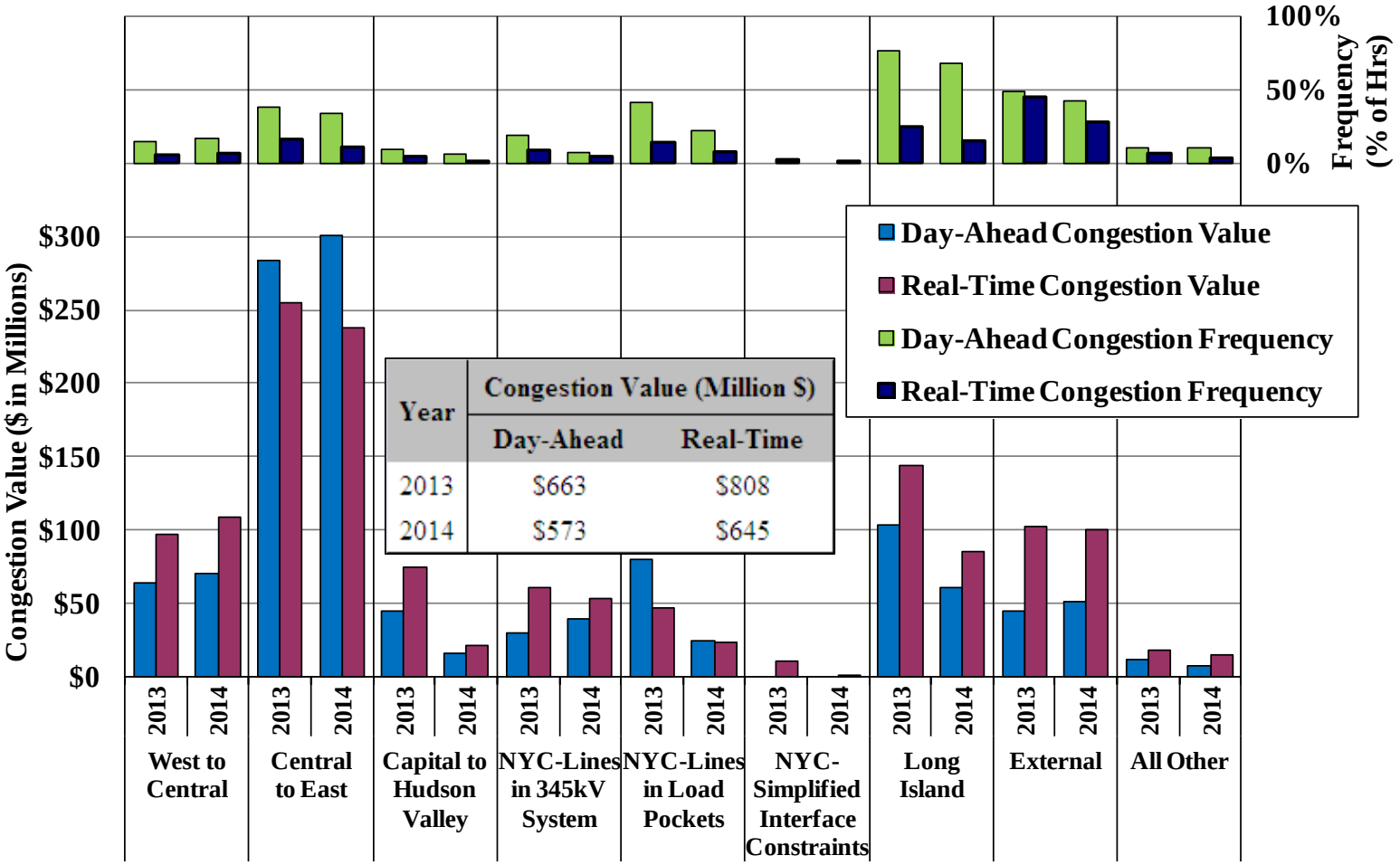
Fuel Prices and Energy Prices by Region

	Annual Average			Q1 Average			Q2 - Q4 Average		
	2013	2014	% Change	2013	2014	% Change	2013	2014	% Change
Fuel Prices ($/MMBtu)									
Ultra Low-Sulfur Diesel Oil	$21.70	$20.21	-7%	$22.53	$22.36	-1%	$21.43	$19.50	-9%
Fuel Oil #6	$16.44	$15.59	-5%	$17.95	$18.43	3%	$15.93	$14.64	-8%
NG - Dominion North	$3.51	$3.18	-9%	$3.49	$4.59	32%	$3.52	$2.71	-23%
NG - Tx Eastern M3	$3.93	$5.13	31%	$4.16	$11.78	183%	$3.85	$2.91	-24%
NG - Transco Z6 (NY)	$5.13	$6.21	21%	$8.30	$15.72	89%	$4.07	$3.05	-25%
NG - Iroquois Z2	$5.69	$7.54	33%	$8.54	$17.85	109%	$4.74	$4.11	-13%
Energy Prices ($/MWh)									
West New York (Dominion)	$39.72	$50.32	27%	$43.74	$95.71	119%	$38.29	$33.06	-14%
Capital Zone (Iroquois)	$50.94	$61.38	20%	$74.03	$134.24	81%	$43.24	$35.21	-19%
Lw. Hudson(TxEastern/Iroq.)	$54.14	$60.83	12%	$68.02	$128.27	89%	$49.75	$37.26	-25%
New York City (Transco)	$56.25	$60.89	8%	$74.12	$133.70	80%	$50.85	$37.57	-26%
Long Island (Iroquois)	$75.42	$70.97	-6%	$97.26	$150.56	55%	$68.78	$45.40	-34%

See Sections I.A & III.B

Congestion in the DA & RT Markets



Year	Congestion Value (Million $)	
	Day-Ahead	Real-Time
2013	$663	$808
2014	$573	$645

See Sections I.A & III.E

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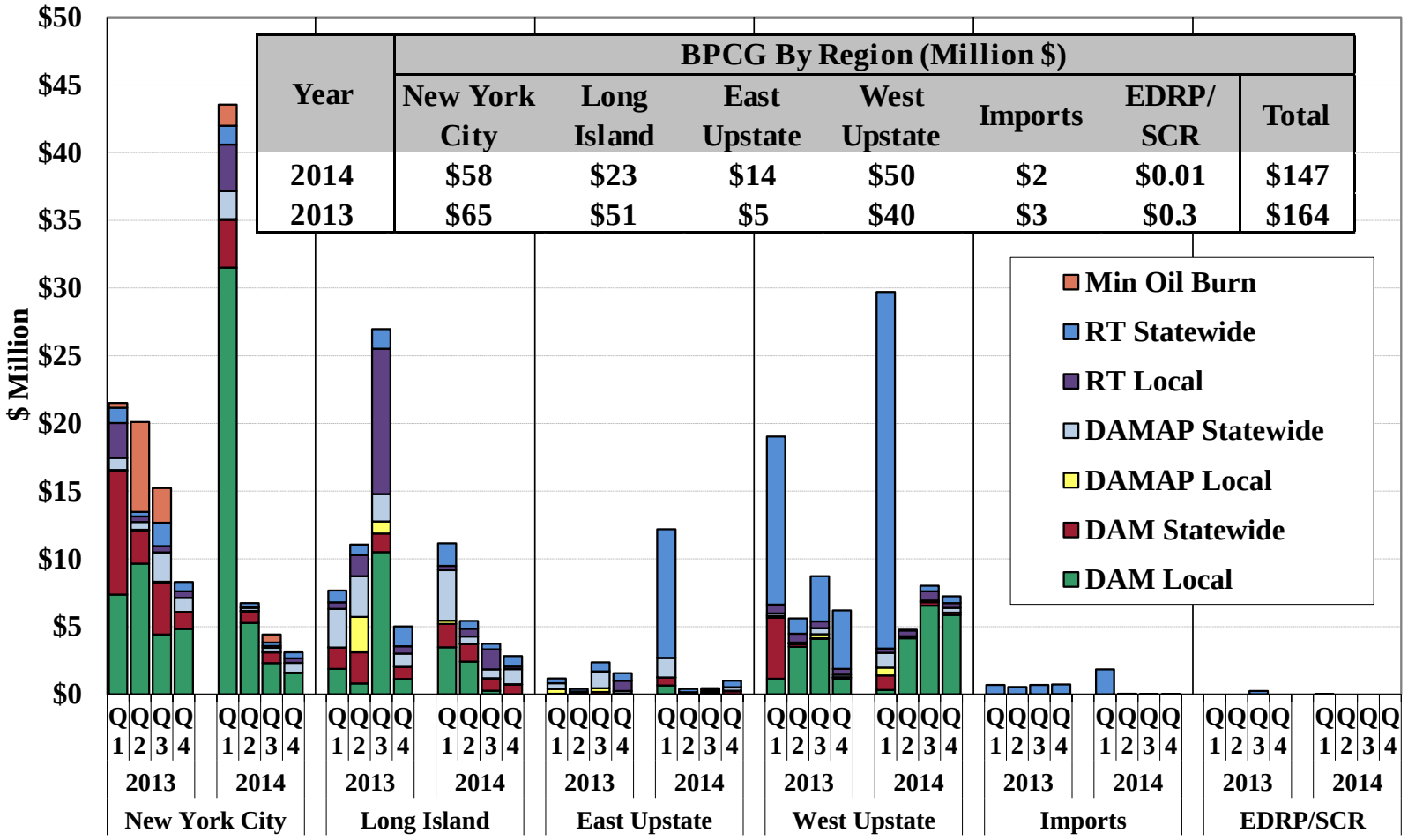
Uplift from Guarantee Payments

Year	BPCG By Region (Million $)						
	New York City	Long Island	East Upstate	West Upstate	Imports	EDRP/ SCR	Total
2014	$58	$23	$14	$50	$2	$0.01	$147
2013	$65	$51	$5	$40	$3	$0.3	$164



See Sections I.E & IX.G

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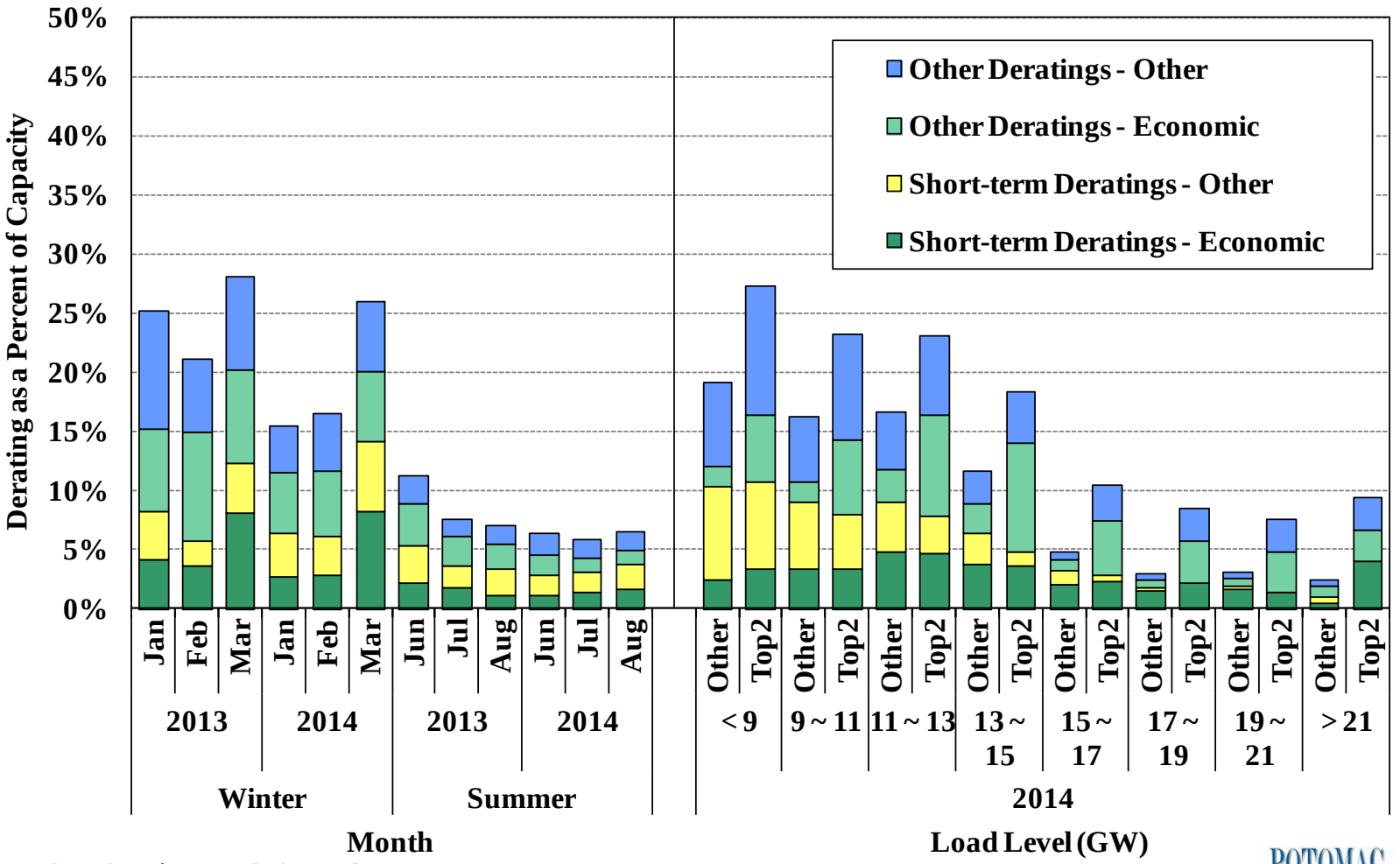
Deratings and Outages in Eastern New York



See Sections I.C & IV.A

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Recommendations to Enhance RT Performance Incentives

10. *Modify criteria for GTs to set price*
11. *Adopt Comprehensive Scarcity Pricing*
12. *Model 100+kV transmission constraints in the day-ahead and real-time markets*
15. *Recognize gas system limits for reserve providers*
    - Principles:
      - ✓ Price = Cost of Maintaining Reliability
      - ✓ Compensate resources based on performance
    - Benefits:
      - ✓ Efficient scheduling of generation and imports
      - ✓ Investment in resources with flexible characteristics
      - ✓ Improve resource performance
      - ✓ Reduce reliance on capacity market

See Sections IX.A-C, IX.F.3, & XI

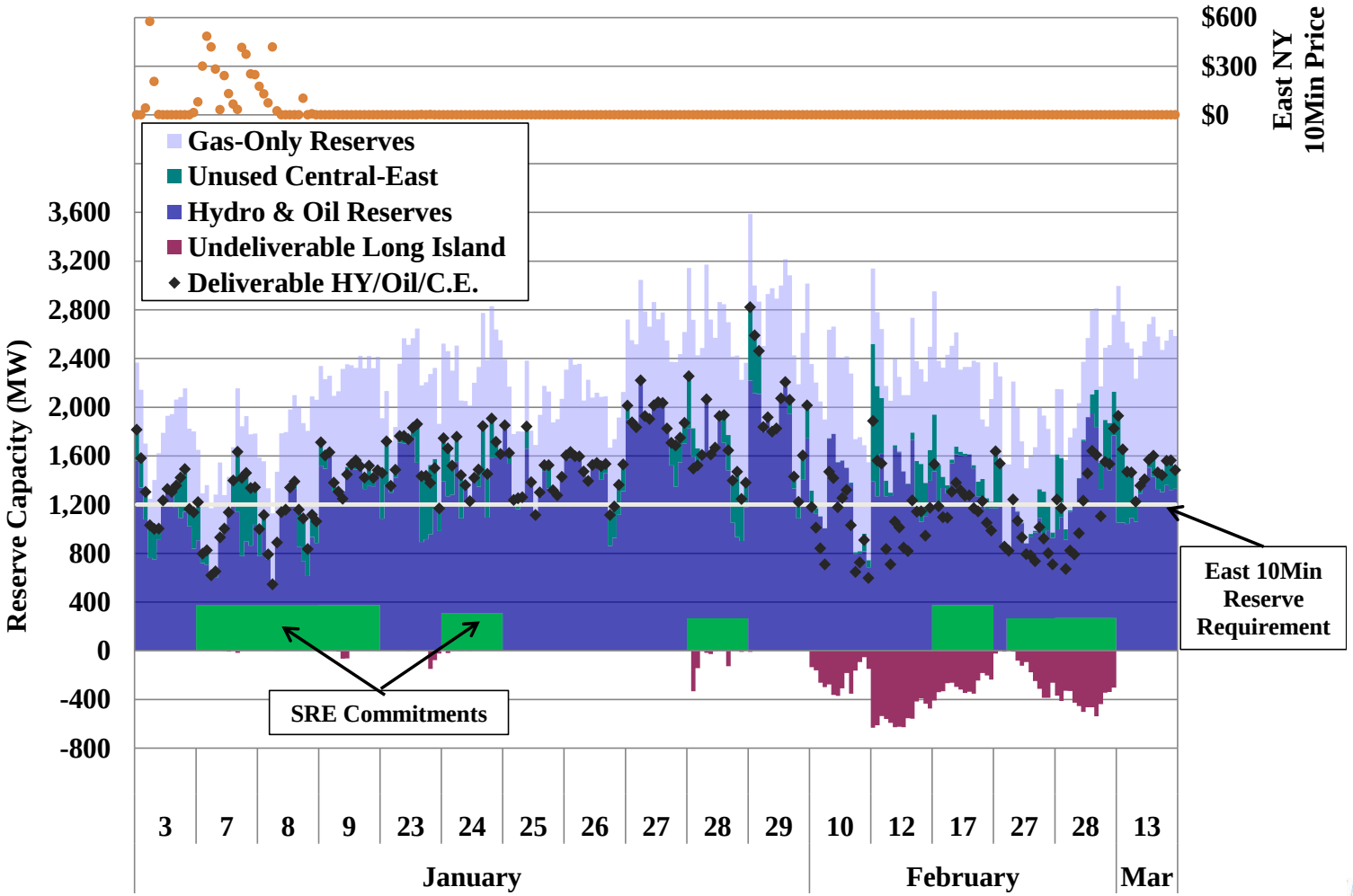
Frequency of Out-of-Merit Dispatch & Recommendation #12

Region	OOM Station-Hours		
	2013	2014	% Change
West Upstate	714	2031	184%
East Upstate	348	189	-46%
New York City	1649	241	-85%
Long Island	2501	701	-72%

Note: This table does not include out-of-market instructions to re-dispatch between 115kV and 230kV units at the Niagara plant to manage congestion in the West Zone.

See Sections IX.F.3 & XI (#12)

10-Minute Reserves in East NY on OFO Days & Recommendation #15



See Sections IX.B & XI (#15)

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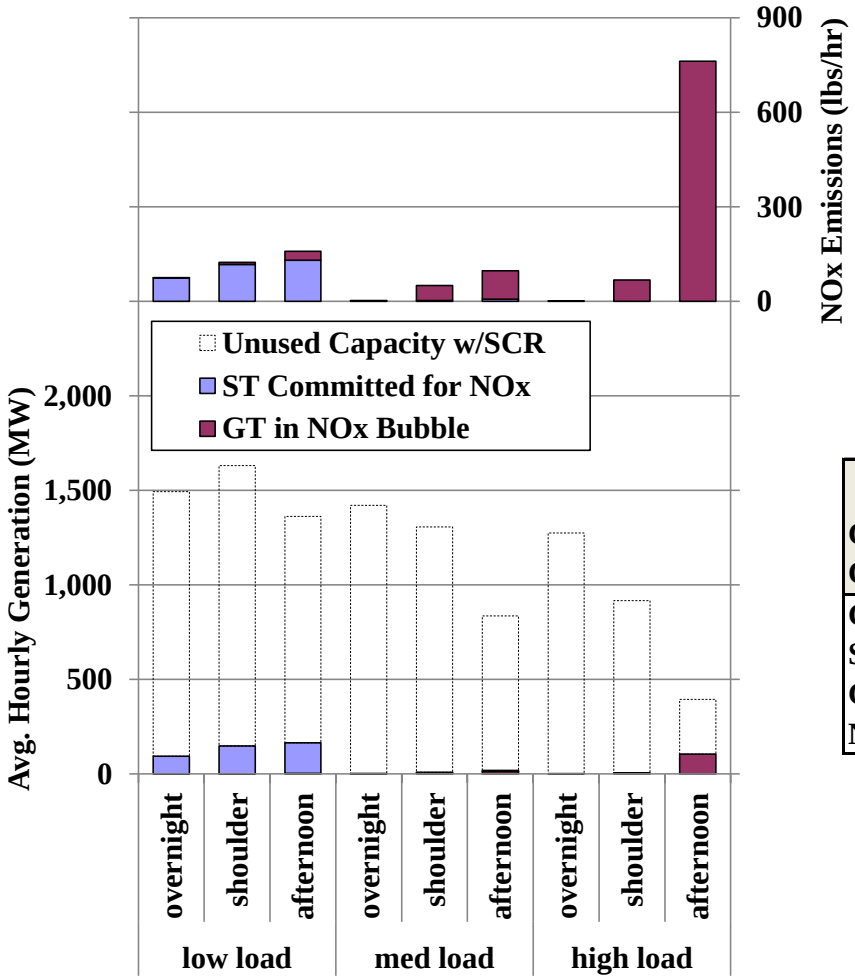
Recommendation to Reduce Excess Commitment Costs & NOx Emissions

13. *Work with work with generators in NOx bubbles to ensure their RACT compliance plans use the most economic compliance option available*

- Principles:
  - ✓ Use lowest cost options to reduce NOx emissions
  - ✓ Reduce out-of-market commitment
- Benefits:
  - ✓ Efficient pricing and scheduling of generation
  - ✓ Reduced NOx pollution

See Sections IX.F.2 & XI (#13)

Scheduling of NOx Bubble Generators & Recommendation #13



Load Category:	Output from GTs in NOx Bubble	Output from STs Committed for Nox
Low	7%	97%
Medium	23%	3%
High	70%	0%
All Days	100%	100%

Generator Category:	Share of Generation	Share of NOx Emissions
GT in NOx Bubble	0.3%	8%
Steam Turbine	29%	80%
Generator w/SCR	71%	12%
NYC Total	100%	100%

See Sections IX.F.2 & XI (#13)

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High Priority Recommendation to Coordinate with Adjacent Control Areas

6. *Work with adjacent ISOs to better utilize the transfer capability between regions by coordinating intra-hour transactions.*

- Principle:
  - ✓ Maximize the economic utilization of external transmission capability to lower production costs.
- Approach:
  - ✓ Facilitate efficient intra-hour changes in external transactions based on current and projected market conditions.
- Market Enhancements:
  - ✓ 2013-Q1: M2M Congestion Management with PJM
  - ✓ 2014-Q4: CTS with PJM
  - ✓ 2015-Q4: CTS with ISO New England

See Sections I.D, VII.C, VII.D, IX.E, & XI (#6)

Intra-hour Scheduling Performance under CTS

			Adjustments in the Export Direction (NY to PJM)	Adustments in the Import Direction (PJM to NY)	Total
% of All Intervals			39%	45%	
Average Flow Adjustment (MW)			-97	99	
Production Cost Savings ($ Million)	Projected at Scheduling Time		$4.2	$2.0	**$6.2**
	Unrealized Savings Due to:	NY Fcst. Err.	-$0.7	-$0.5	**-$1.1**
		PJM Fcst. Err.	-$2.2	-$1.6	**-$3.8**
		Other	-$0.4	-$0.2	**-$0.6**
	Actual		$1.0	-$0.4	**$0.7**
Interface Prices ($/MWh)	NY	Actual	$53.13	$51.90	
		Forecast	$48.84	$52.34	
	PJM	Actual	$57.13	$56.42	
		Forecast	$62.30	$48.18	
Price Forecast Errors ($/MWh)	NY	Fcst. - Act.	-$4.29	$0.44	
		Abs. Val.	$13.46	$14.73	
	PJM	Fcst. - Act.	$5.17	-$8.24	
		Abs. Val.	$25.70	$19.21	

See Sections I.D & VII.D

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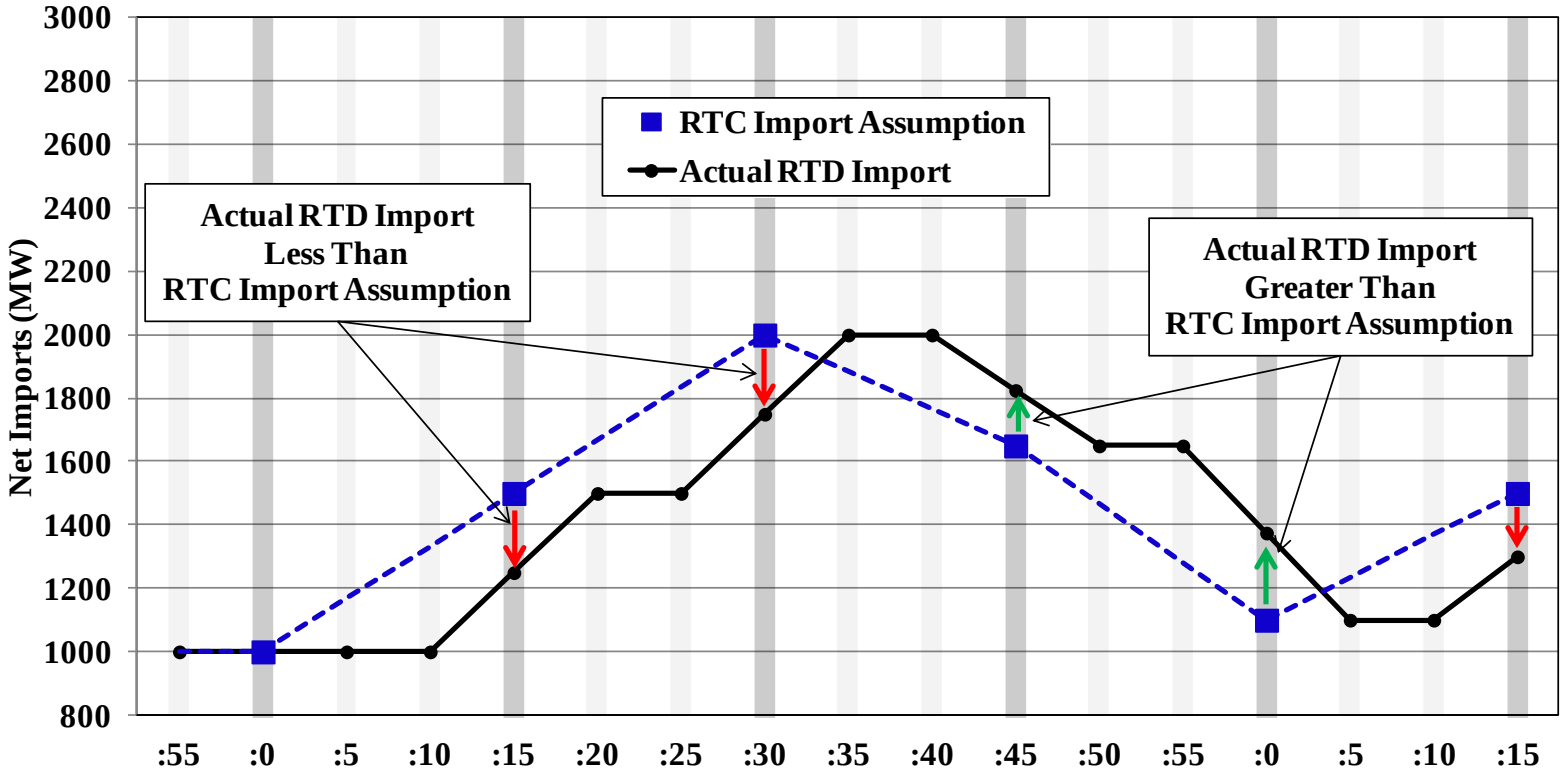
Illustration of External Ramp Profiles in RTC and RTD



See Sections VII.D, IX.E, & Appendix IV.E

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Recommendations to Address Transient Price Volatility

8. *Adjust RTD and RTC look ahead evaluations to be consistent with external transaction ramp and GT commitment.*
9. *Consider enhanced modeling of loop flows and PAR-controlled lines to reflect the effects of expected generation, load, and PAR-controls on line flows more accurately.*
   - Principles:
     - ✓ Price volatility from unpredictable factors is efficient
     - ✓ Price volatility from poor forecasting is inefficient
   - Benefits:
     - ✓ Reduce unnecessary uplift, cycling costs, and market risk
     - ✓ Improve resource performance incentives
     - ✓ Provide incentives to invest in resources with flexible characteristics

See Sections IX.E & XI (#8 & #9)

Top Drivers of Transient RT Price Volatility

Key Contributors to Transient Spikes	% of Total Contributions to the Price Spikes				
	Power Balance	West Zone 230kV Lines	Central East	Dunwoodie-Shore Rd 345 kV	East Garden City - Valley Stream 138 kV
External Interchange	34%	7%	18%	45%	2%
Fixed Schedule PARs	0%	9%	23%	15%	71%
Loop Flows & Other Non-Market	0%	69%	10%	7%	6%
RTC Shutdown Resource	16%	0%	12%	17%	11%
Self Sched Shutdown/Dispatch	15%	0%	12%	2%	4%
All Other	36%	15%	24%	14%	6%

See Sections IX.E & XI (#8 & #9)

High Priority Recommendation to Use Internal Transmission Efficiently

7. *Operate PAR-controlled lines to minimize production costs and create financial rights that compensate affected transmission owners.*

- Principles/Approach:
  - ✓ Use transmission to reduce production costs
  - ✓ Modernize grandfathered wheeling agreements
- Benefits:
  - ✓ Reduce production costs (up to $15M/year) and balancing congestion uplift ($5M/year)
  - ✓ Reduce prices for Long Island customers
  - ✓ Create financial rights that benefit NYC customers

See Sections I.D, VI.A.3, IX.D, XI (#7), & Appendix III.E

List of Recommendations
Broader Regional Markets and Energy Market

RECOMMENDATION	Discussed in	Current Effort	High Priority	Scoping/Future
Broader Regional Markets				
(6) Work with adjacent ISOs on rules to better utilize the transfer capability between regions by coordinating intra-hour transactions.	VII.D	X	X	
Energy Market Enhancements - RT Market Operations				
(7) Operate PAR-controlled lines to minimize production costs and create financial rights that compensate affected transmission owners.	IX.D		X	
(8) Adjust RTD and RTC look ahead evaluations to be consistent with timing of external transaction ramp and gas turbine commitment.	IX.E			X
(9) Consider enhanced modeling of loop flows and PAR-controlled lines to reflect the effects of expected generation, load, and PAR-controls on line flows more accurately.	IX.E			X
Energy Market Enhancements - RT Pricing				
(10) Modify criteria for gas turbines to set prices in the real-time market.	IX.C			
(11) Adopt Comprehensive Scarcity Pricing.	IX.A	X		
(12) Consider modeling 100+ kV transmission constraints in the DA and RT markets using economic commitment and dispatch software.	IX.F.3			X

See Section XI

List of Recommendations
Energy Market and Gas-Electric Coordination

RECOMMENDATION	Discussed in	Current Effort	High Priority	Scoping/Future
Energy Market Enhancements - Reliability Commitment				
(13) Work with generators in NOx bubbles to ensure their RACT compliance plans use the most economic compliance option available.	IX.F.2			
Energy Market Enhancements - Fuel Assurance				
(14) Consider allowing generators to submit offers that reflect certain energy storage and fuel supply constraints in the day-ahead market.	IX.B.2	X		
(15) Enhance recognition of gas system limitations when scheduling resources to provide operating reserves.	IX.B.2			X
Gas-Electric Coordination				
(16) Require Generators to provide timely information on fuel availability (e.g., on-site inventory, scheduled deliveries, & nominations).	IX.B.2	X		

See Section XI