Highlights from the Quarterly Report on the New York ISO Electricity Markets First Quarter of 2016

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Highlights and Market Summary: Energy Market

- A copy of the full report on the first quarter of 2016 may be found at: www.nyiso.com/public/markets_operations/documents/studies_reports/index.jsp
- The energy markets performed competitively and variations in wholesale prices were driven primarily by changes in fuel prices, demand, and supply availability.
- Average all-in prices ranged from $20/MWh in the North Zone to $47/MWh in NYC, down 49 to 60 percent from the first quarter of 2015. (see slide 9)
  - ✓ In addition to the LBMP reductions mentioned below, capacity costs fell 13 percent (Lower Hudson Valley) to 47 percent (Long Island) from 2015-Q1.
- RT LBMPs averaged from $18/MWh in the North Zone to $33/MWh in Long Island, down 57 to 65 percent from 2015-Q1, primarily because:
  - ✓ Average load fell 8 percent and peak load fell 5 percent. (see slides 10-11)
  - ✓ Gas prices fell 18 percent in West NY and nearly 70 percent in East NY because of the combined effects of milder weather conditions, increased LNG deliveries to the region, falling oil prices, and higher production from the Marcellus and Utica shales. (see slide 12)
  - ✓ Average nuclear and hydro generation rose a combined 600 MW (see slide 15), which, however, was partly offset by lower net imports from neighboring areas (see slide 42).

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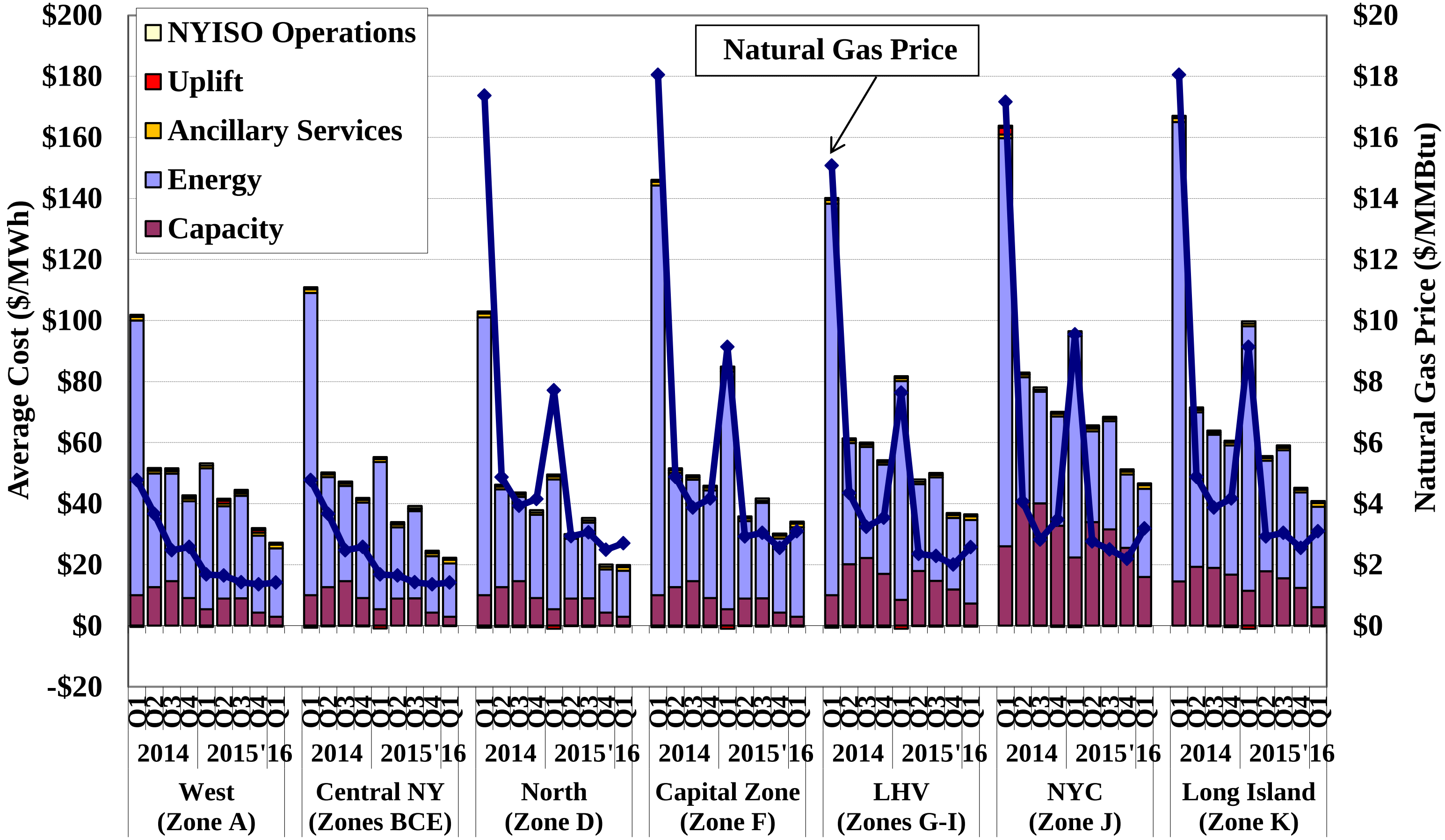
All-In Energy Price by Region



Note: Natural Gas Price is based on the following gas indices (plus a transportation charge of $0.20/MMbtu): the Dominion North index for West Zone and Central NY, the Iroquois Waddington index for North Zone, the Iroquois Zone 2 index for Capital Zone and LI, the average of Texas Eastern M3 and Iroquois Zone 2 for LHV, the Transco Zone 6 (NY) index for NYC. A 6.9 percent tax rate is also included NYC.

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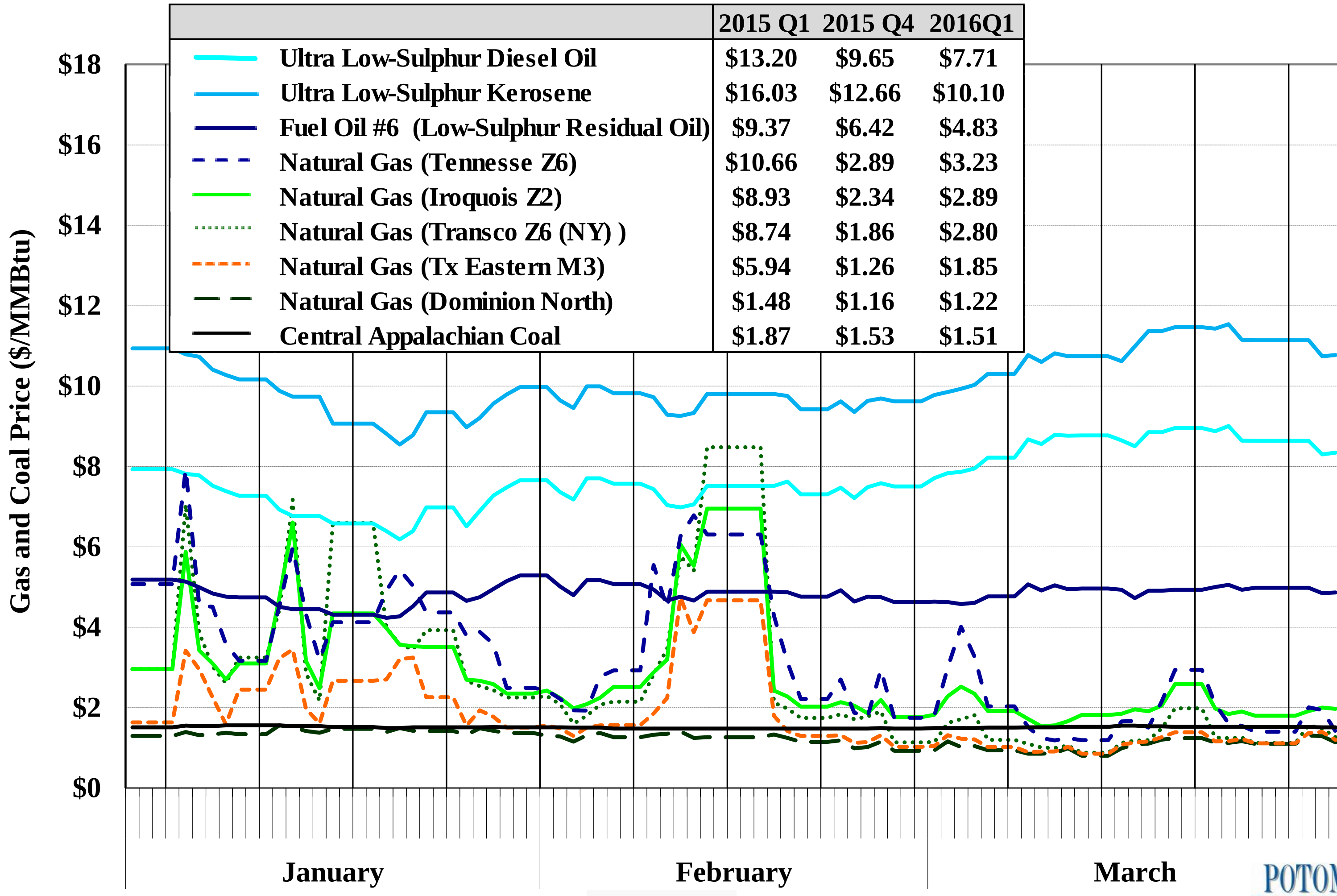
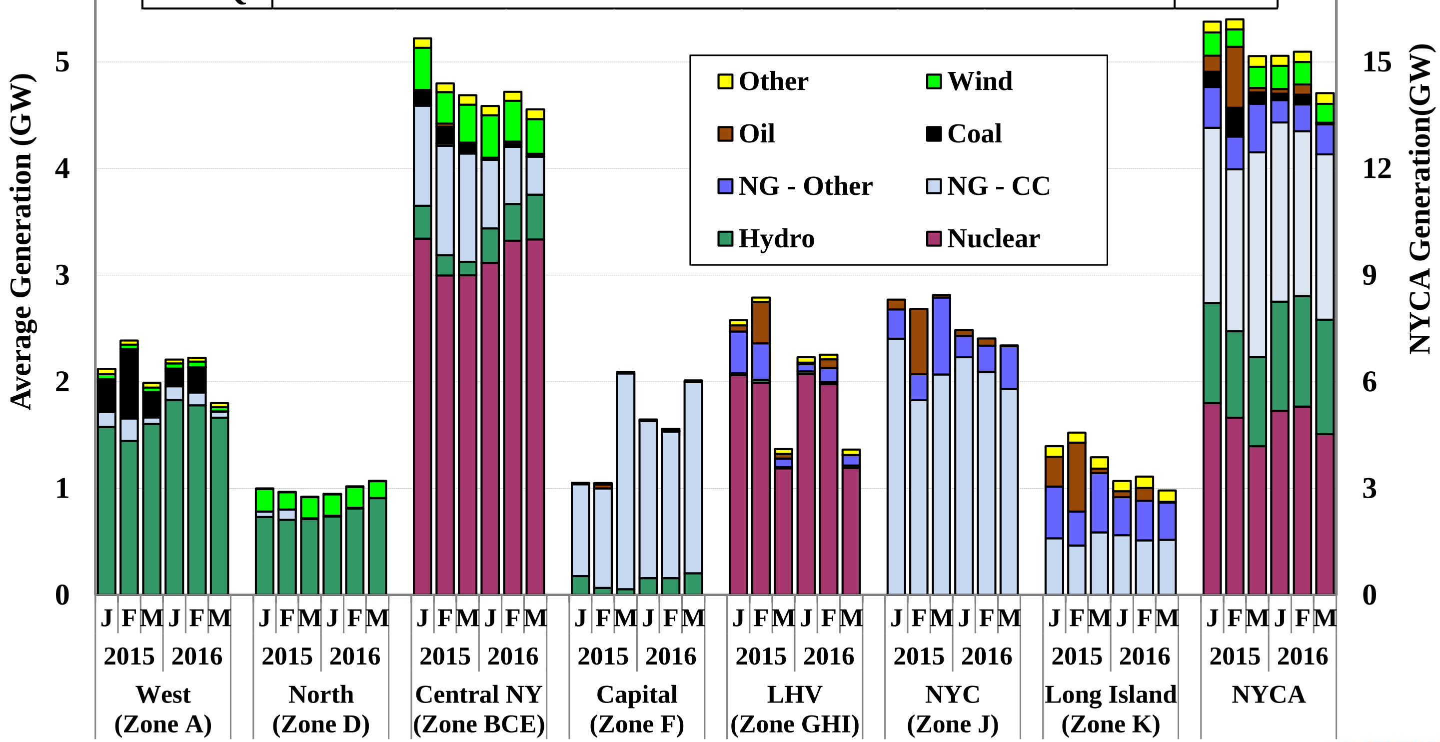
Coal, Natural Gas, and Fuel Oil Prices



	2015 Q1	2015 Q4	2016Q1
Ultra Low-Sulphur Diesel Oil	$13.20	$9.65	$7.71
Ultra Low-Sulphur Kerosene	$16.03	$12.66	$10.10
Fuel Oil #6 (Low-Sulphur Residual Oil)	$9.37	$6.42	$4.83
Natural Gas (Tennesse Z6)	$10.66	$2.89	$3.23
Natural Gas (Iroquois Z2)	$8.93	$2.34	$2.89
Natural Gas (Transco Z6 (NY))	$8.74	$1.86	$2.80
Natural Gas (Tx Eastern M3)	$5.94	$1.26	$1.85
Natural Gas (Dominion North)	$1.48	$1.16	$1.22
Central Appalachian Coal	$1.87	$1.53	$1.51

Real-Time Generation Output by Fuel Type

Quarter	Average Internal Generation by Fuel Type in NYCA (GW)								
	Nuclear	Hydro	Coal	NG-CC	NG-Other	Oil	Wind	Other	Total
2016 Q1	5.00	3.13	0.16	4.79	0.74	0.14	0.60	0.29	14.85
2015 Q4	5.19	2.91	0.10	4.62	1.26	0.01	0.55	0.31	14.96
2015 Q1	4.91	2.62	0.52	5.15	1.16	0.75	0.59	0.30	16.00



Notes: Pumped-storage resources in pumping mode are treated as negative generation. “Other” includes Methane, Refuse, Solar & Wood.

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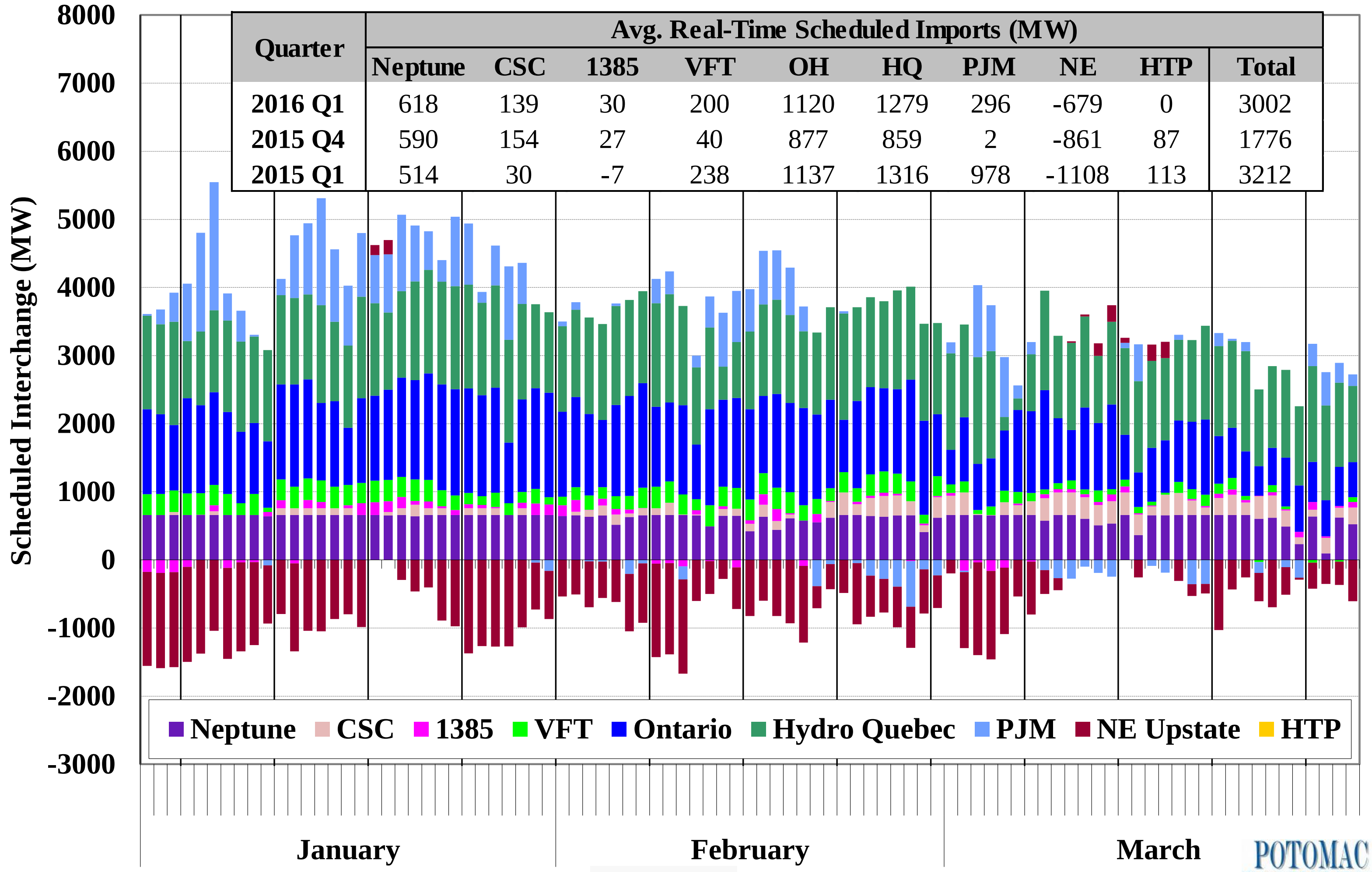
Net Imports Scheduled Across External Interfaces

Daily Peak Hours (1-9pm)



Quarter	Avg. Real-Time Scheduled Imports (MW)									
	Neptune	CSC	1385	VFT	OH	HQ	PJM	NE	HTP	Total
2016 Q1	618	139	30	200	1120	1279	296	-679	0	3002
2015 Q4	590	154	27	40	877	859	2	-861	87	1776
2015 Q1	514	30	-7	238	1137	1316	978	-1108	113	3212

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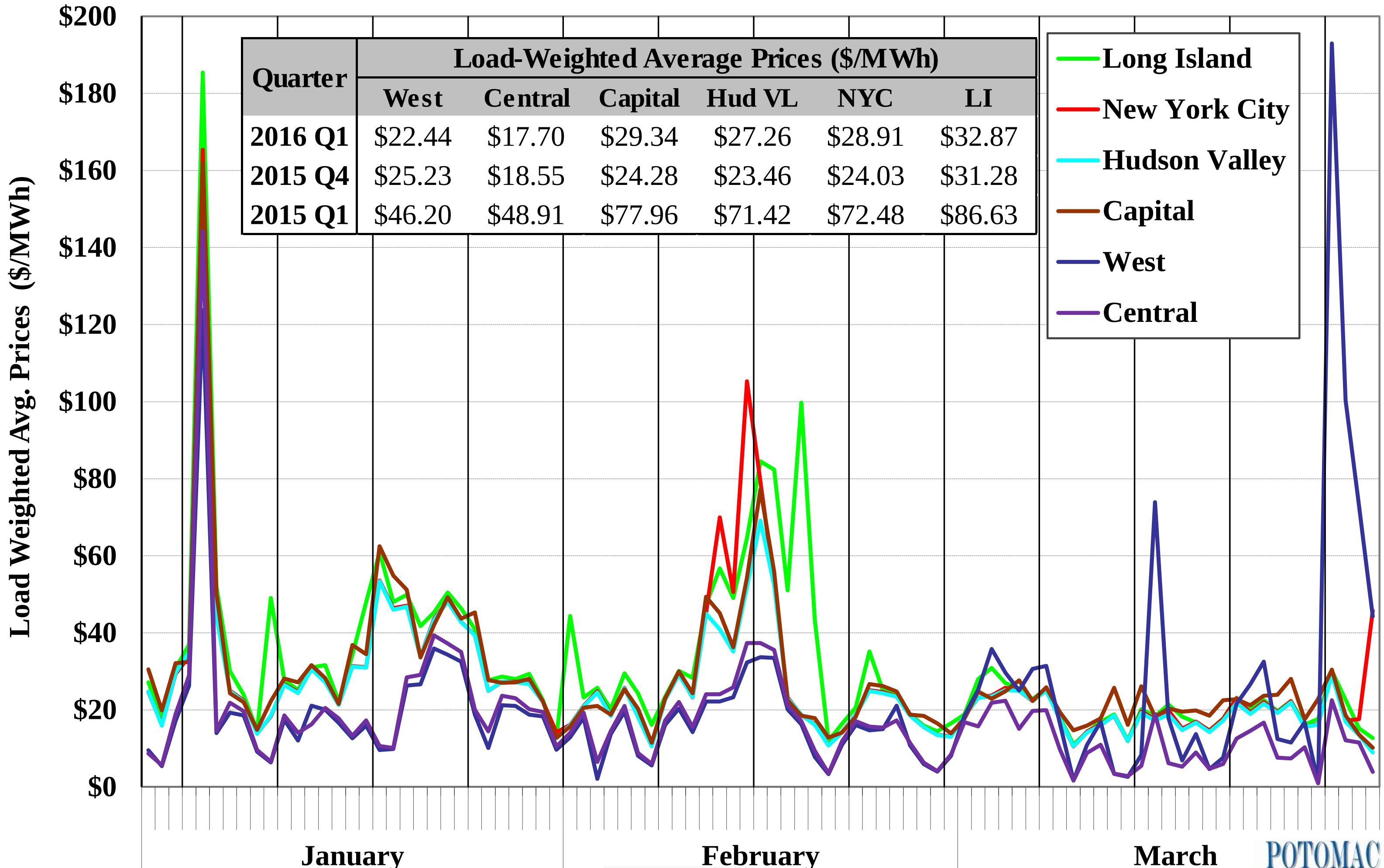
Real-Time Electricity Prices by Zone



Quarter	Load-Weighted Average Prices ($/MWh)					
	West	Central	Capital	Hud VL	NYC	LI
2016 Q1	$22.44	$17.70	$29.34	$27.26	$28.91	$32.87
2015 Q4	$25.23	$18.55	$24.28	$23.46	$24.03	$31.28
2015 Q1	$46.20	$48.91	$77.96	$71.42	$72.48	$86.63

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Real-Time Electricity Prices
January 5th Real-Time Event

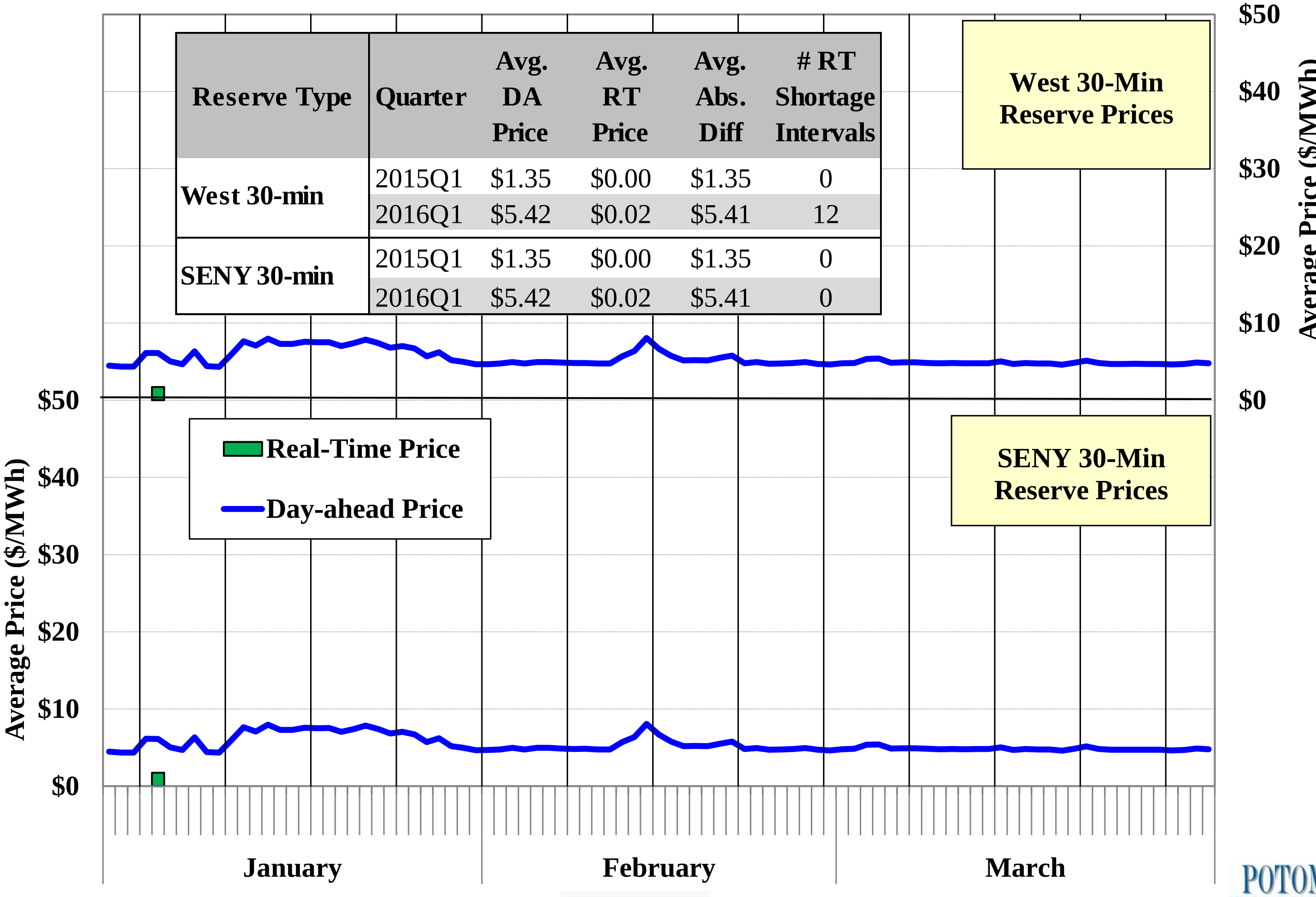
- On January 5, energy and reserve price spikes occurred from 8:35 to 10:40:
  - ✓ A TLR3b was issued by PJM at 8:07 am, resulting in the net loss of 1.3 GW of imports starting at 8:30.
    - – When a TLR is issued, NYISO operators do not have a way to reflect transaction cuts in RTC until the TLR process identifies specific transactions to be cut. Thus, no cuts were included until ~700 MW were included in the RTC that initialized at 9:00, which schedules CTS transactions for 9:35 and 30-minute GTs for 9:45.
    - – Consequently, RTC prices were below \$150 while RTD prices generally exceeded \$1,000, reflecting that RTC did not perceive the value of importing CTS transactions from ISO-NE and starting 30-min GTs.
  - ✓ A large generator (600 MW) tripped off at 8:33.
  - ✓ 1.4 GW of offline 10-minute units were started in reserve pick-ups.
    - – This quantity was increased by poor generator performance. Approximately 450 MW failed to start, including 260 MW offering without apparent gas supply.
      - NYISO is working with generators to clarify their obligations in such cases.
    - – This led to Eastern 10-minute reserve shortages from 8:45 to 10:40.
  - ✓ RTC shut down 1 GW of 10-minute units at 9:45 (at the end of their minimum run times), leading to statewide 10-minute reserve shortages (since GTs cannot provide reserves immediately after being shut down).

Highlights and Market Summary:
Operating Reserve Market and CTS Performance

- The average DA clearing price for 30-min operating reserves was $5.42/MWh, up 301 percent from the same quarter of 2015 despite milder weather. (see slide 30)
  - ✓ The resulted primarily from rule changes (under the Comprehensive Shortage Pricing Project in November 2015). (see slides 27 & 31-33)
    - The NYCA 30-minute reserve requirement increased 655 MW to 2,620 MW;
    - Reserve scheduling from Long Island generators was limited to an average of 423 MW, down 310 MW from the first quarter of 2015.
    - These factors increased the need for reserves outside Long Island by 970 MW.
  - ✓ The rise in offer prices in West NY was a less important factor. (see slide 33)
- In our review of the operation of CTS (see slides 43-51), we find that:
  - ✓ High transaction fees greatly reduce participation and liquidity at the PJM border;
  - ✓ Performance is diminished by errors in short-term forecasting of RT conditions;
  - ✓ Price forecasting by PJM and ISO-NE was generally more accurate than forecasting by the NYISO, consistent with the overall pattern of higher RT price volatility in New York; and
  - ✓ Forecasting by PJM improved considerably from the previous year and is slightly more accurate than forecasting at the ISO-NE interface.

Day-Ahead and Real-Time Ancillary Services Prices
Western and SENY 30-Minute Reserves

Reserve Type	Quarter	Avg. DA Price	Avg. RT Price	Avg. Abs. Diff	# RT Shortage Intervals
West 30-min	2015Q1	$1.35	$0.00	$1.35	0
	2016Q1	$5.42	$0.02	$5.41	12
SENY 30-min	2015Q1	$1.35	$0.00	$1.35	0
	2016Q1	$5.42	$0.02	$5.41	0



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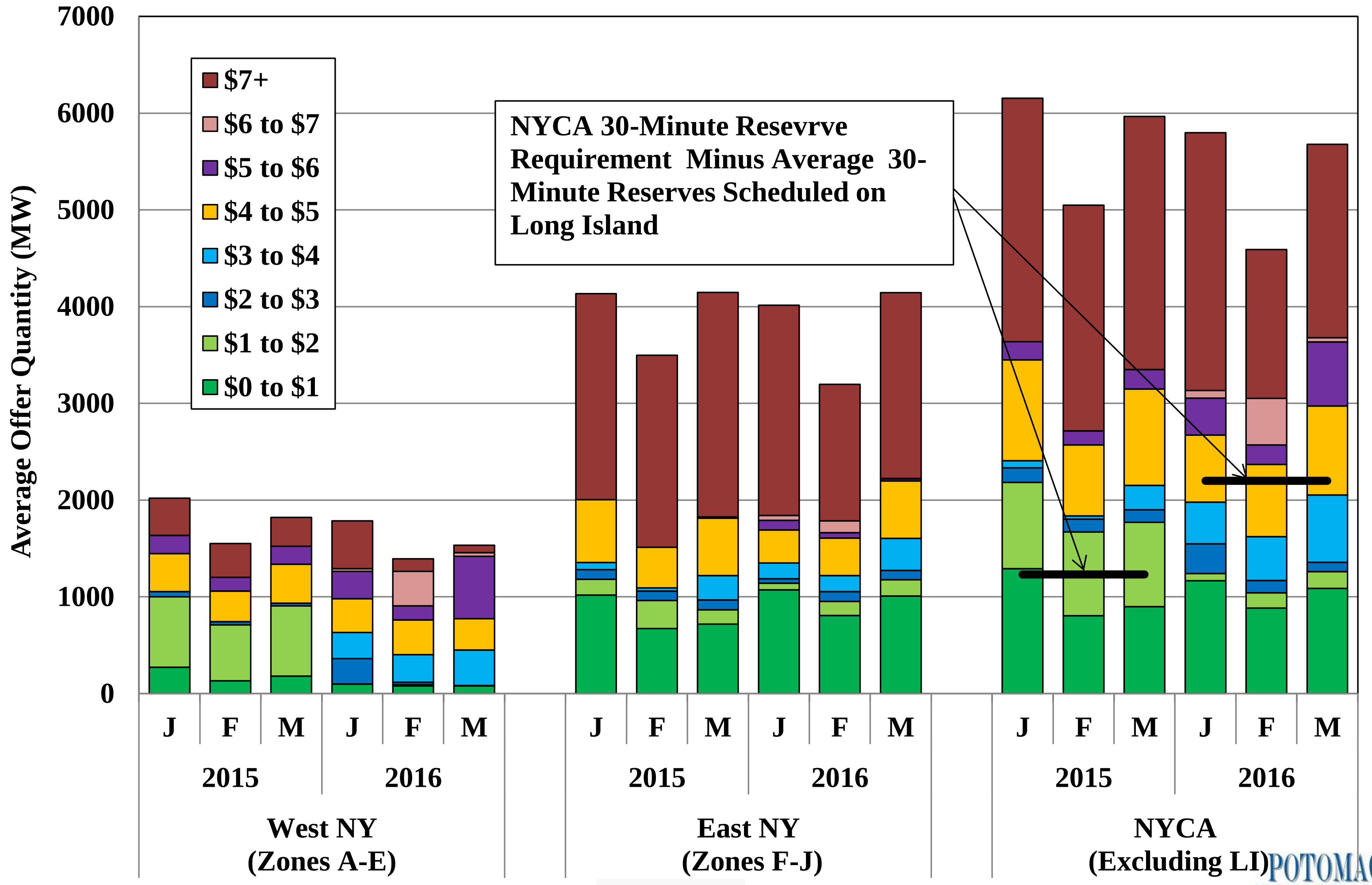
Day-Ahead NYCA 30-Minute Operating Reserve Offers
From Committed and Available Offline Quick-Start Resources



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Efficiency of Intra-Hour Scheduling Under CTS
Primary PJM and NE Interfaces

			Average/Total During Intervals w/ Adjustment					
			CTS - NY/NE			CTS - NY/PJM		
			Both Forecast Errors <= $20	Any Forecast Error > $20	Total	Both Forecast Errors <= $20	Any Forecast Error > $20	Total
% of All Intervals w/ Adjustment			76%	14%	**91%**	62%	8%	**70%**
Average Flow Adjustment (MW)			-16 (Net) / 81 (Gross)	-18 (Net) / 104 (Gross)	**-17 (Net) / 85 (Gross)**	20 (Net) / 64 (Gross)	6 (Net) / 104 (Gross)	**18 (Net) / 69 (Gross)**
Production Cost Savings ($ Million)	Projected at Scheduling Time		$0.9	$0.7	**$1.6**	$0.4	$0.9	**$1.3**
	Net Over-Projection by:	NY Market	-$0.02	-$0.2	**-$0.2**	-$0.1	-$0.6	**-$0.7**
		Neighbor Market	-$0.01	-$0.3	**-$0.3**	$0.001	-$0.3	**-$0.3**
	Unrealized Savings Due to:	Ramping	-$0.05	-$0.1	**-$0.1**	-$0.02	-$0.02	**-$0.04**
		Curtailment	-$0.01	-$0.01	**-$0.02**	-$0.002	-$0.5	**-$0.5**
		Price Curve	-$0.1	-$0.3	**-$0.4**	N/A	N/A	**N/A**
	Actual Savings		$0.7	-$0.1	**$0.6**	$0.3	-$0.6	**-$0.3**
Interface Prices ($/MWh)	NY Market	Actual	$21.64	$49.94	**$26.09**	$18.25	$54.06	**$22.41**
		Forecast	$22.40	$35.49	**$24.46**	$18.45	$35.63	**$20.45**
	Neighbor Market	Actual	$22.60	$34.63	**$24.49**	$20.84	$35.64	**$22.56**
		Forecast	$23.05	$29.47	**$24.06**	$21.21	$36.56	**$23.00**
Price Forecast Errors ($/MWh)	NY Market	Fcst. - Act.	$0.76	-$14.45	**-$1.63**	$0.20	-$18.43	**-$1.97**
		Abs. Val.	$4.67	$43.72	**$10.81**	$3.80	$48.59	**$9.01**
	Neighbor Market	Fcst. - Act.	$0.46	-$5.16	**-$0.43**	$0.38	$0.92	**$0.44**
		Abs. Val.	$4.26	$35.90	**$9.23**	$2.88	$38.94	**$7.07**

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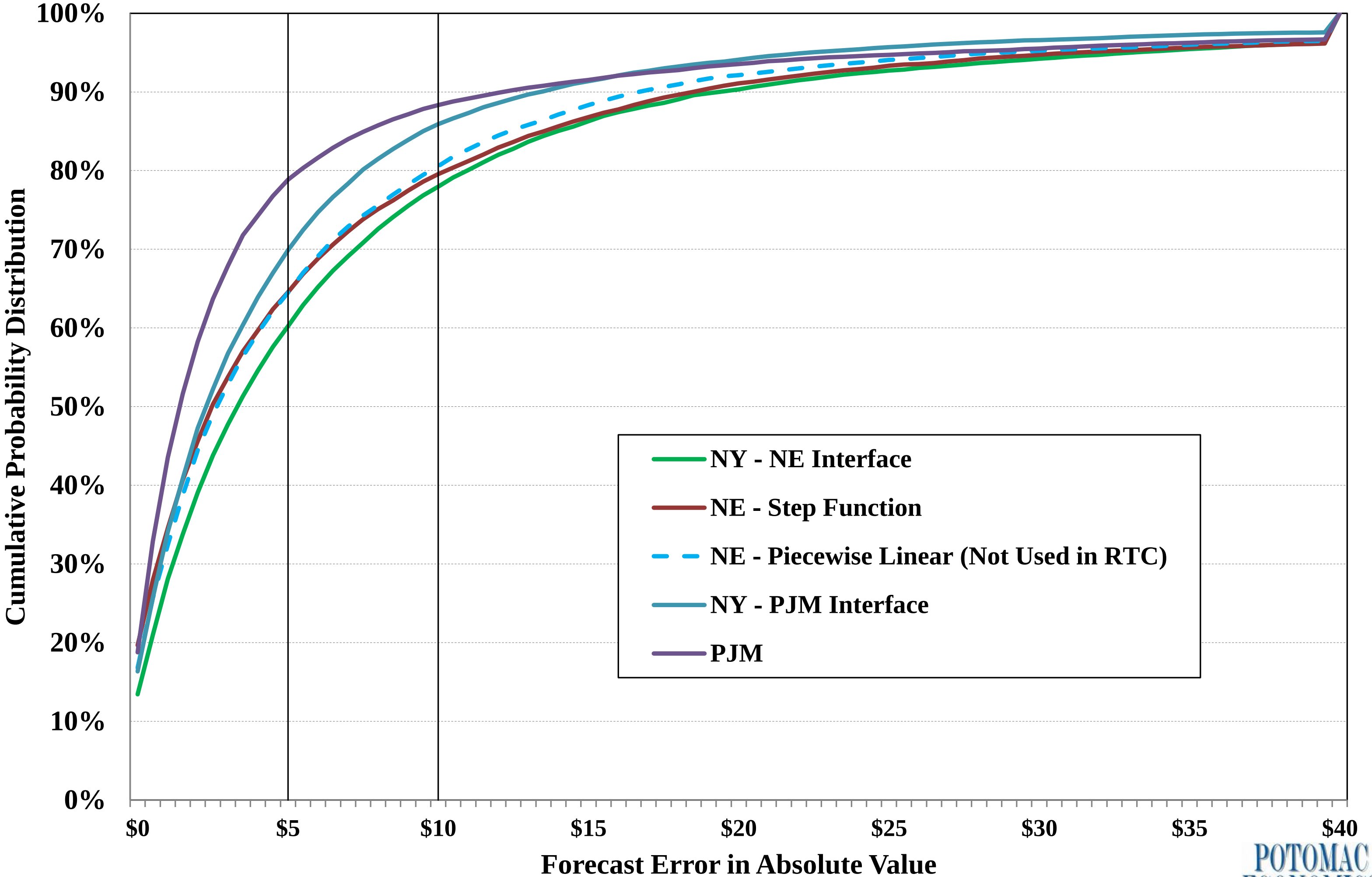
Distribution of Price Forecast Errors Under CTS
Primary PJM and NE Interfaces



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Highlights and Market Summary: Congestion Patterns

- DAM congestion revenues totaled $125 million (see slides 55-56, 59-60), down 55 percent from 2015-Q1 primarily because of lower load levels and gas prices.
  - ✓ The Central-East interface accounted for the largest share (over 50 percent).
    - – Consistent natural gas price spreads between West NY and East NY lead to frequent congestion across the Central-East Interface.
    - – Although DAM congestion revenue decreased 60 percent from the first quarter of 2015, the frequency of congestion increased because Central-East transfer capability was reduced more by transmission outages (to support the TOTS projects).
  - ✓ West Zone lines accounted for the next largest share (~20 percent) of congestion.
    - – Unlike other areas, congestion in the West Zone actually rose from the first quarter of 2015.
    - – Over 90 percent of this congestion occurred in March because of significant transmission outages after the Huntley units retired at the end of February. The outages were necessary to install new transmission facilities that will help relieve congestion on the 230 kV lines, but this work was not completed until May.
    - – Severe West Zone congestion is often associated with high clockwise loop flows and sudden clockwise changes from the prior interval. (See slide 68)

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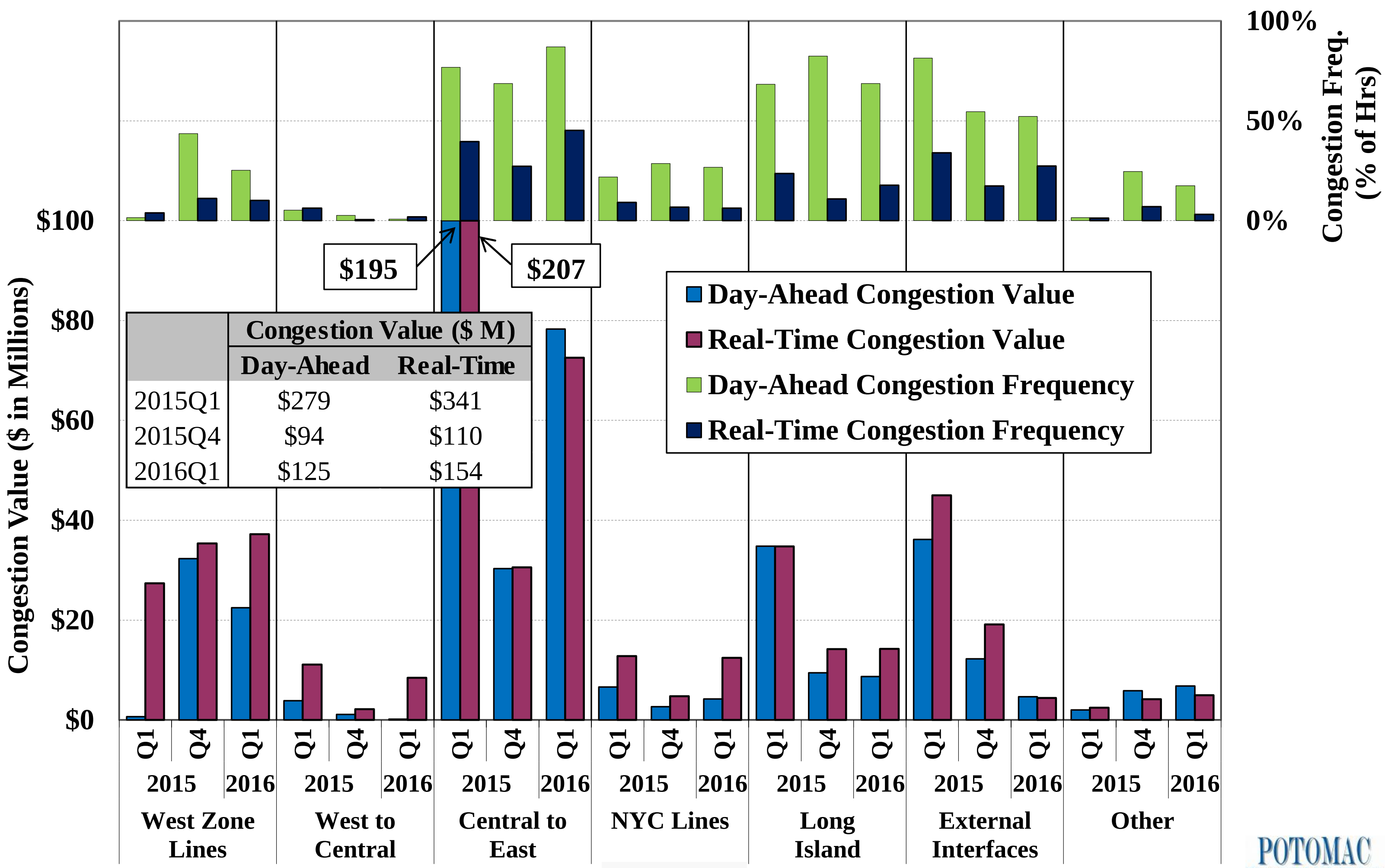
DA and RT Congestion Value and Frequency by Transmission Path



	Congestion Value ($ M)	
	Day-Ahead	Real-Time
2015Q1	$279	$341
2015Q4	$94	$110
2016Q1	$125	$154

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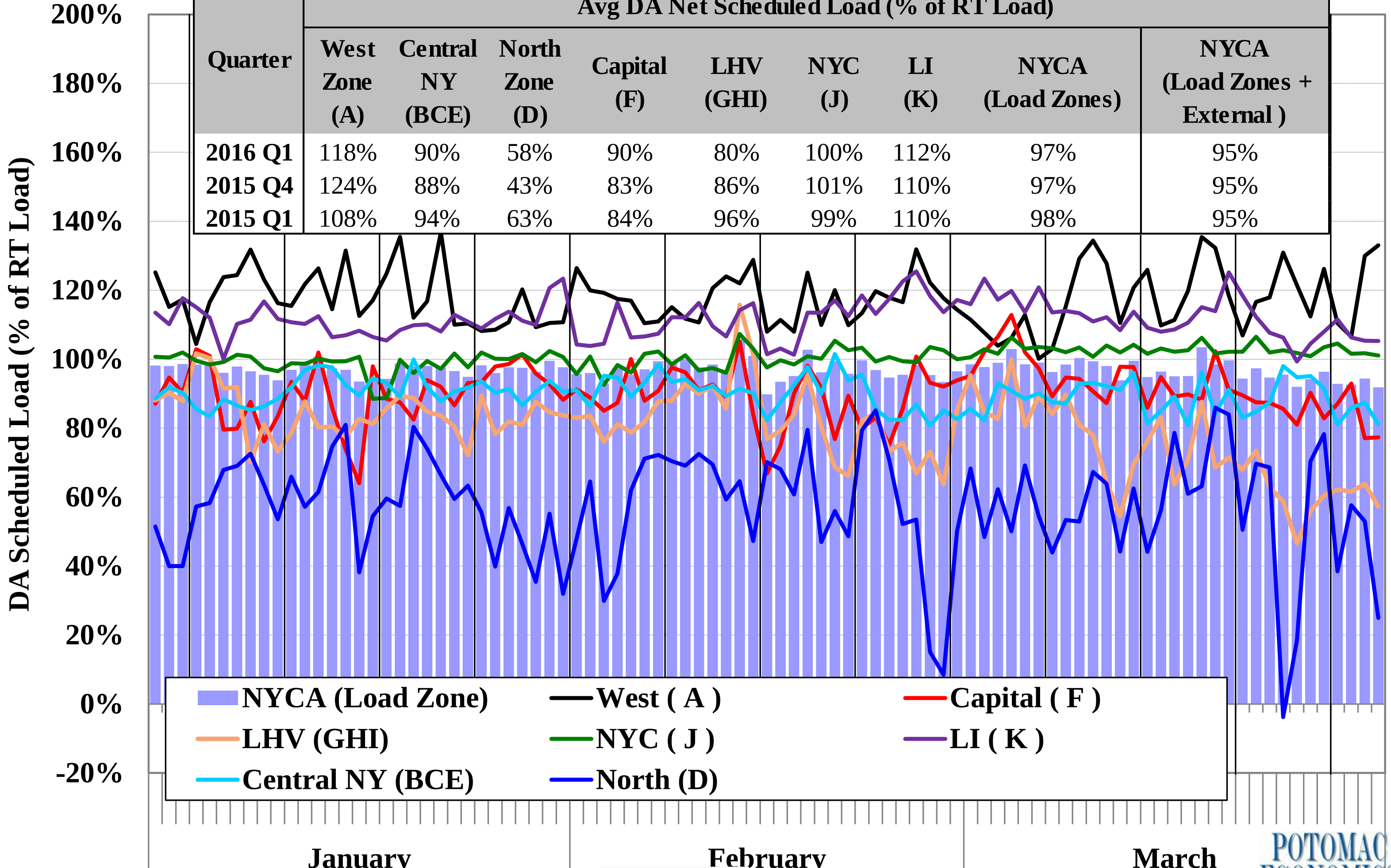
Day-ahead Scheduled Load and Actual Load

Daily Peak Load Hour

Quarter	Avg DA Net Scheduled Load (% of RT Load)								
	West Zone (A)	Central NY (BCE)	North Zone (D)	Capital (F)	LHV (GHI)	NYC (J)	LI (K)	NYCA (Load Zones)	NYCA (Load Zones + External)
2016 Q1	118%	90%	58%	90%	80%	100%	112%	97%	95%
2015 Q4	124%	88%	43%	83%	86%	101%	110%	97%	95%
2015 Q1	108%	94%	63%	84%	96%	99%	110%	98%	95%



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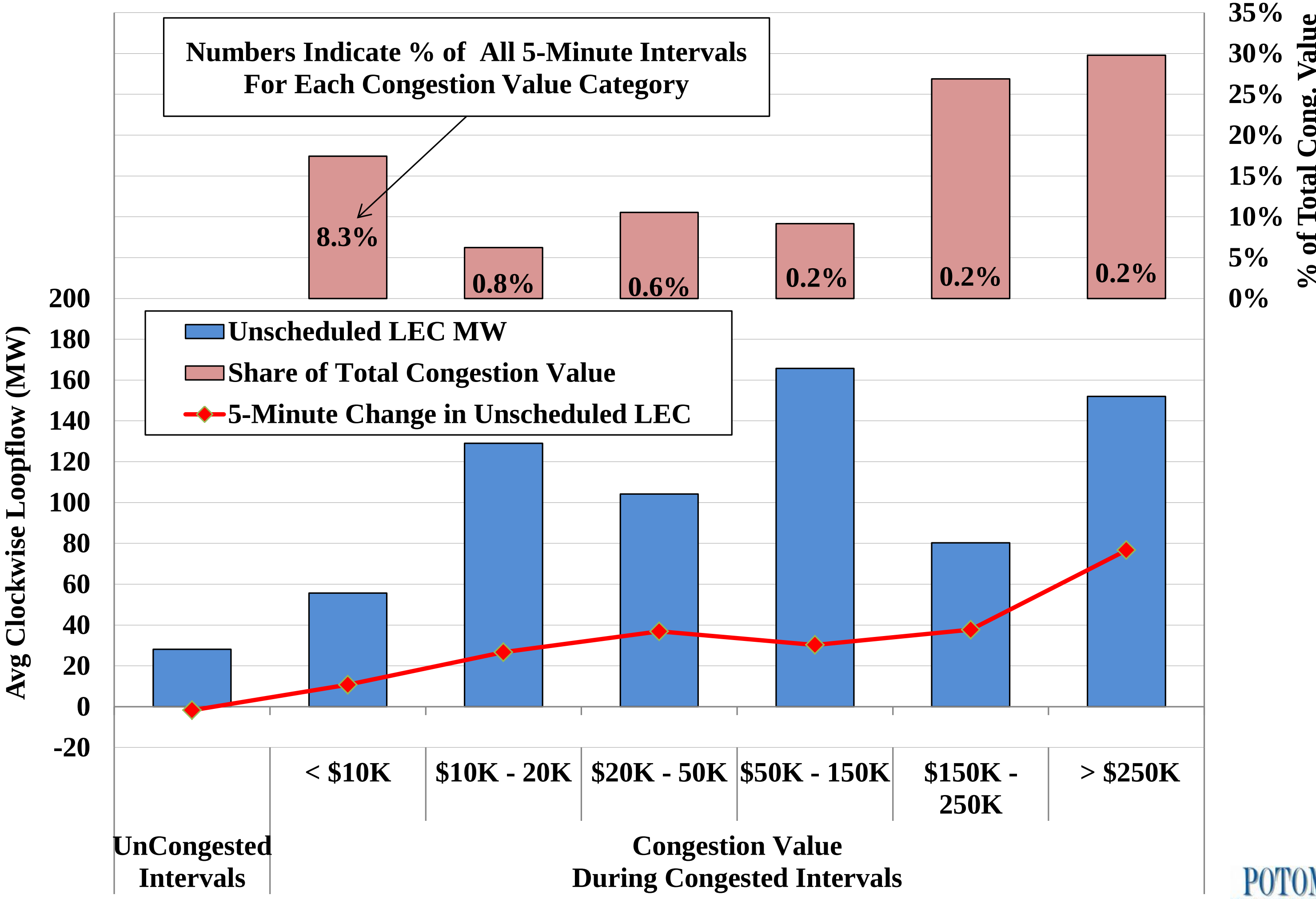
West Zone Congestion and Clockwise Loop Flows



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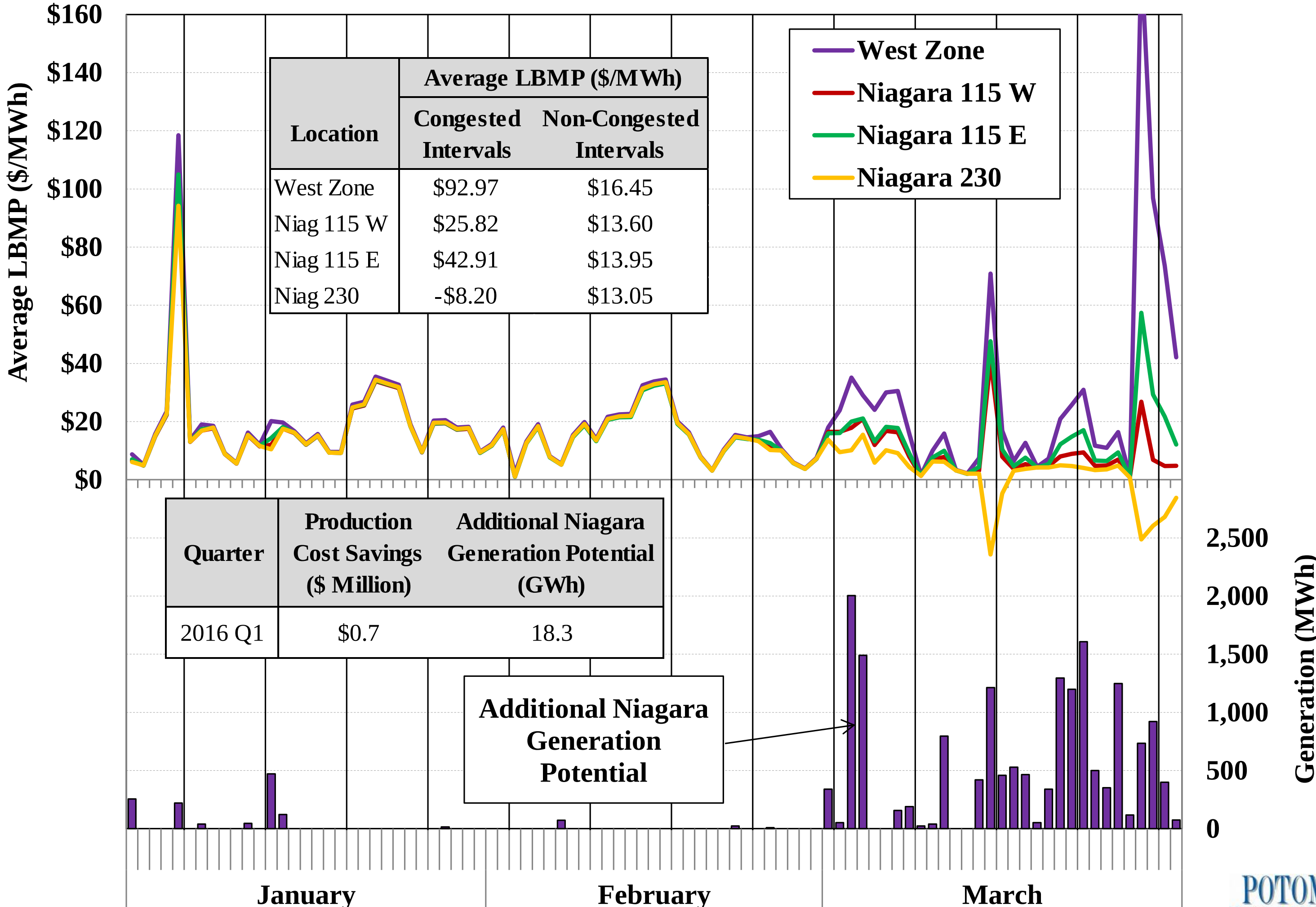
West Zone Congestion and Niagara Generation
First Quarter of 2016



Location	Average LBMP ($/MWh)	
	Congested Intervals	Non-Congested Intervals
West Zone	$92.97	$16.45
Niag 115 W	$25.82	$13.60
Niag 115 E	$42.91	$13.95
Niag 230	-$8.20	$13.05

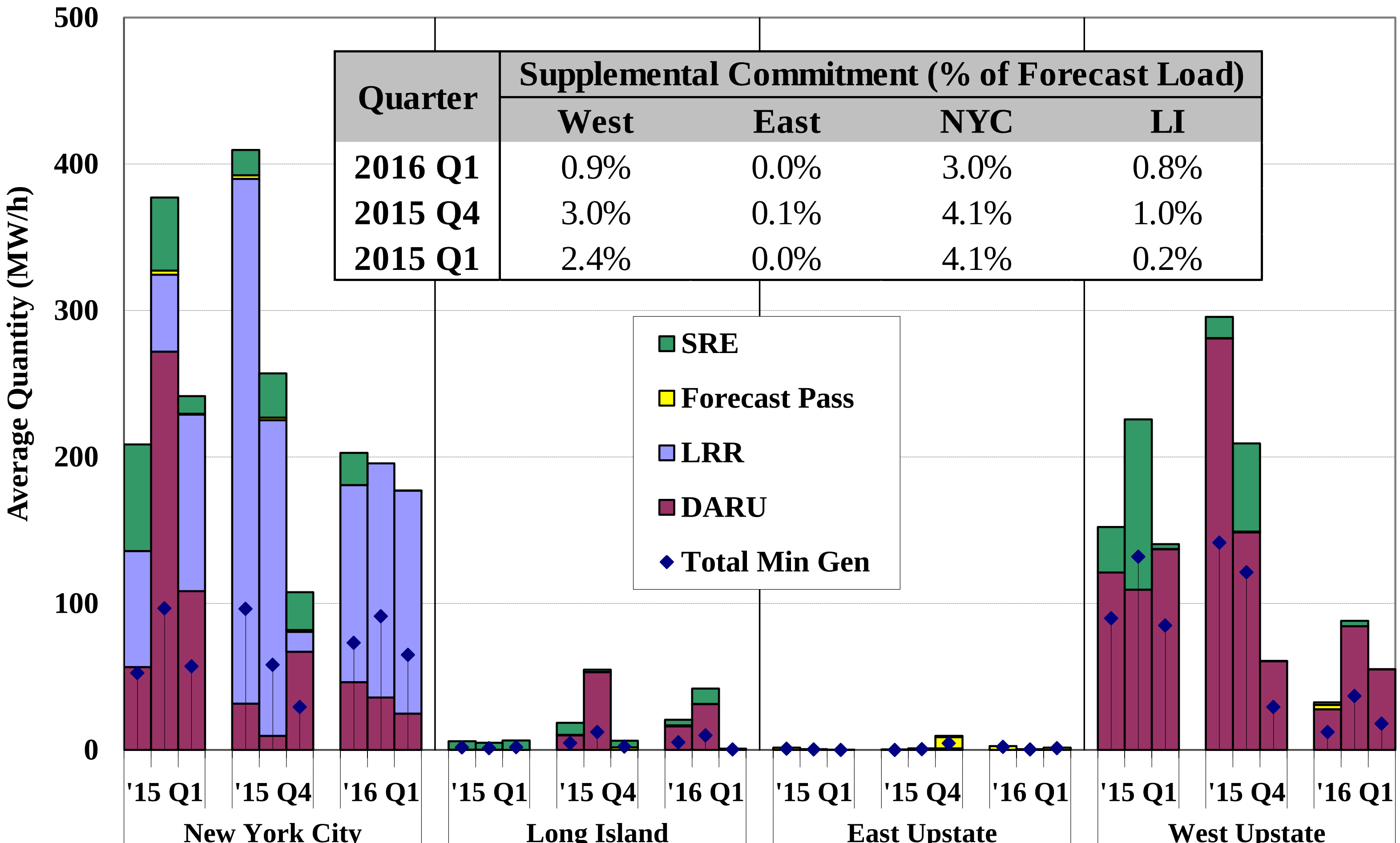
Quarter	Production Cost Savings ($ Million)	Additional Niagara Generation Potential (GWh)
2016 Q1	$0.7	18.3

Highlights and Market Summary: Uplift and Revenue Shortfalls

- Guarantee payments were $7M, down 68 percent from 2015-Q1. (see slides 83-84)
  - ✓ Lower natural gas prices decreased the commitment costs of gas-fired units; and
  - ✓ Lower load levels and transmission upgrades in Western NY (required by the retirement of Dunkirk 2) reduced supplemental commitment and OOM dispatch.
- DAM congestion shortfalls were $24M. (see slides 57, 61)
  - ✓ Transmission outages were the primary driver of shortfalls, contributing to: (a) $11M on the Central-East interface; (b) $5M on the West Zone constraints; and (c) $2.6M in NYC.
  - ✓ The remaining shortfalls accrued primarily on the West Zone constraints, resulting from assumptions related to loop flows and Niagara generator modeling.
- Balancing congestion shortfalls were low overall ($2M), although large shortfalls were offset by substantial surplus contributions. (see slides 58, 62)
  - ✓ The primary shortfalls were from differences between DA assumptions and RT flows for the ConEd-LIPA wheel ($2M), the ConEd-PSEG wheel ($3M), and loop flow around Lake Erie ($2.5M).
  - ✓ Significant surpluses resulted from differences between DA assumptions and RT outcomes in the operation of the Ramapo line ($5M) and the distribution of generation between 115 and 230 kV units at the Niagara plant ($3M).

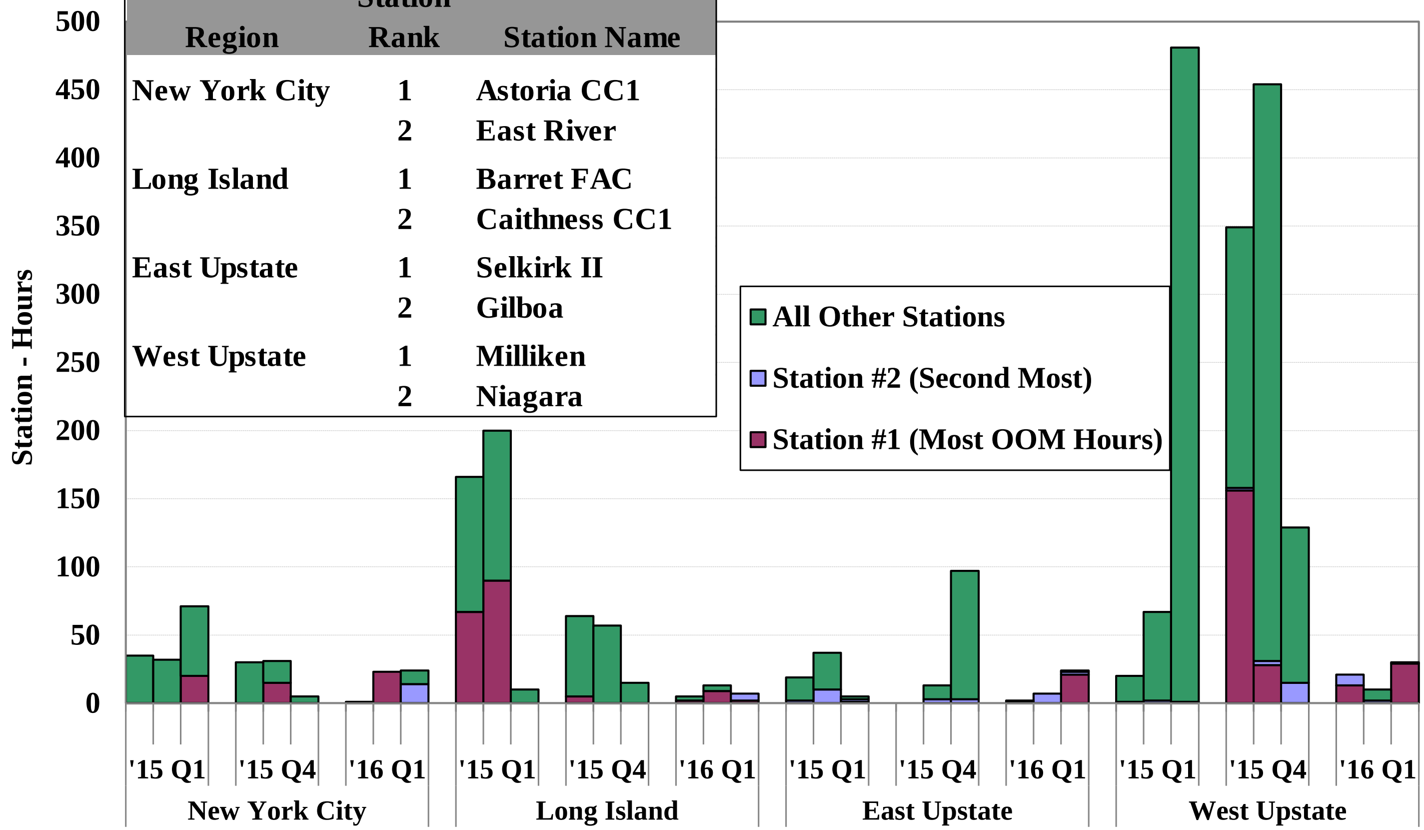
Supplemental Commitment for Reliability
by Category and Region

Quarter	Supplemental Commitment (% of Forecast Load)			
	West	East	NYC	LI
2016 Q1	0.9%	0.0%	3.0%	0.8%
2015 Q4	3.0%	0.1%	4.1%	1.0%
2015 Q1	2.4%	0.0%	4.1%	0.2%



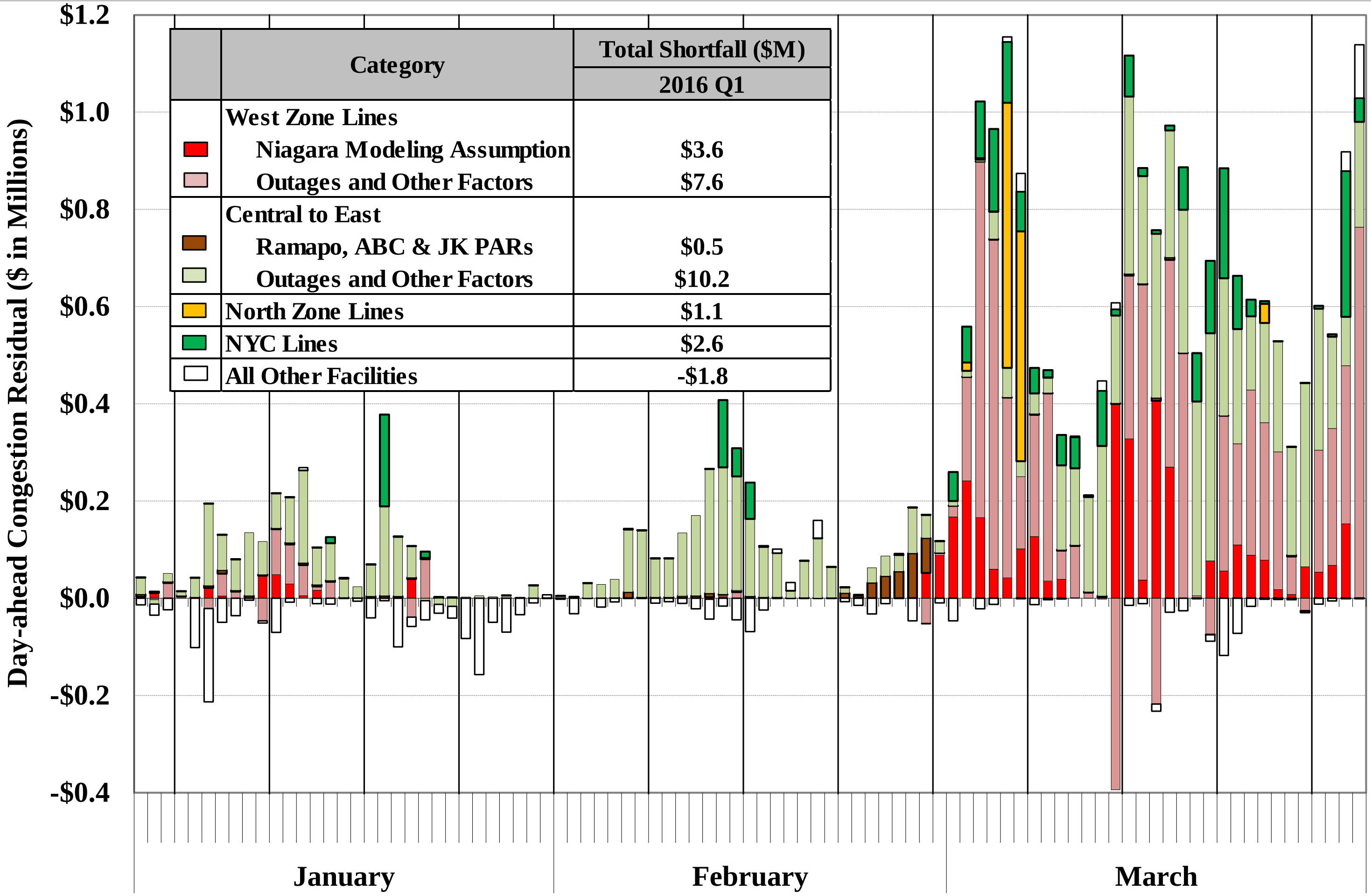
Frequency of Out-of-Merit Dispatch by Region by Month

Region	Station Rank	Station Name
New York City	1	Astoria CC1
	2	East River
Long Island	1	Barret FAC
	2	Caithness CC1
East Upstate	1	Selkirk II
	2	Gilboa
West Upstate	1	Milliken
	2	Niagara



Note: The NYISO also instructed Niagara to shift output among the generators at the station in order to secure certain 115kV and/or 230kV transmission facilities in 383 hours in 2015-Q1, 840 hours in 2015-Q4, and 337 hours in 2016-Q1. However, these were not classified as Out-of-Merit in hours when the NYISO did not adjust the UOL or LOL of the Resource.

Day-Ahead Congestion Revenue Shortfalls by Transmission Facility



Note: "Niagara Modeling Assumption" estimates the shortfalls resulted from differences in assumed generation at the Niagara 115 kV Buses between TCC and DAM (for DAMCR) and between DAM and RT actual (for BMCR).

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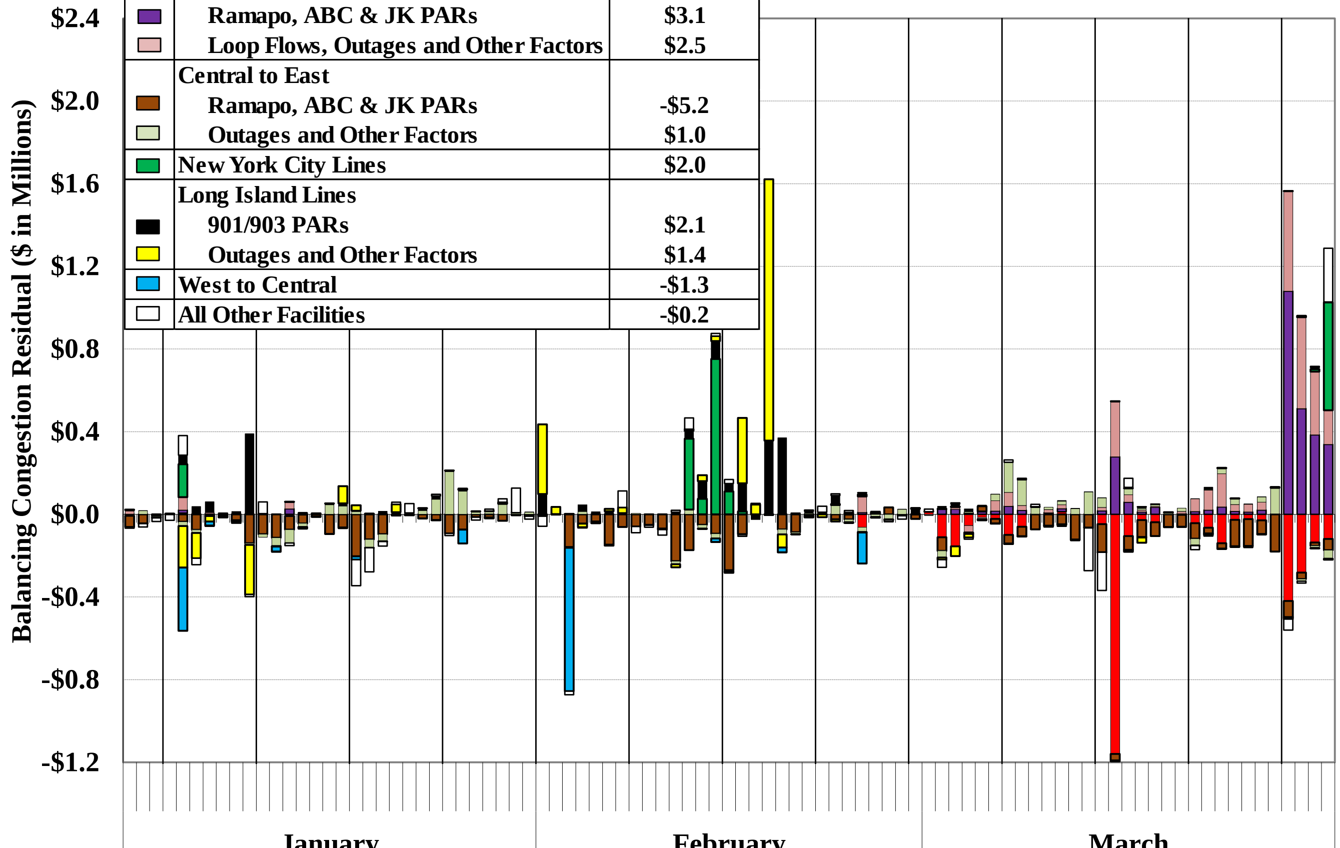
Balancing Congestion Shortfalls by Transmission Facility



	Category	Total Shortfall ($M)
	West Zone Lines	
	Niagara Modeling Assumption	-$3.2
	Ramapo, ABC & JK PARs	$3.1
	Loop Flows, Outages and Other Factors	$2.5
	Central to East	
	Ramapo, ABC & JK PARs	-$5.2
	Outages and Other Factors	$1.0
	New York City Lines	$2.0
	Long Island Lines	
	901/903 PARs	$2.1
	Outages and Other Factors	$1.4
	West to Central	-$1.3
	All Other Facilities	-$0.2

Note: The BMCR estimated above may differ from actual BMCR because the figure is partly based on real-time schedules rather than metered values.

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Highlights and Market Summary: Capacity Market

- UCAP spot prices fell notably from the first quarter of 2015. UCAP prices:
  - ✓ In New York City fell 30 percent to an average of $5.83/kW-month;
  - ✓ In the G-J Locality fell 13 percent to an average of $3.15/kW-month;
  - ✓ On Long Island fell 51 percent to an average of $1.53/kW-month;
  - ✓ In Rest of State fell 48 percent to an average of $1.12/kW-month.
- Capacity spot prices fell across the system primarily because: (see slides 93-95)
  - ✓ Internal ICAP supply rose by 135 MW in NYC, 527 MW in the G-J Locality, and 50 MW in NYCA because of the net effects of:
    - (a) the retirement of Dunkirk 2 and Huntley 67 & 68 (in West NY); (b) the return-to-service of Bowline 2 at full capability (in LHV) and Astoria 2 (in NYC); (c) the ICAP Ineligible Forced Outages of Astoria GT 5, 7, 12 & 13 (in NYC); and (d) increases in DMNC test results across the fleet.
  - ✓ The ICAP requirement fell 54 MW (0.5 percent) in NYC, 148 MW (3 percent) in Long Island, and 115 MW (0.3 percent) in NYCA.
    - However, the ICAP requirement rose 451 MW (3 percent) in the G-J Locality, partly offsetting the decrease of UCAP prices in the G-J Locality.
    - The LCR reductions in NYC and Long Island and the increased LCR in the G-J Locality resulted primarily from recent capacity additions in LHV.

Key Drivers of Capacity Market Results

	NYCA	NYC	LI	G-J Locality
Avg. Spot Price				
2016 Q1 ($/kW-Month)	1.12	5.83	1.53	3.15
% Change from 2015 Q1	-48%	-30%	-51%	-13%
Change in Demand				
Load Forecast (MW)	-98	147	43	49
IRM/LCR	0%	-1.5%	-3.5%	2.5%
2016 Q1	*117%*	*83.5%*	*103.5%*	*90.5%*
2015 Q1	*117%*	*85.0%*	*107.0%*	*88.0%*
ICAP Requirement (MW)	**-115**	**-54**	**-148**	**451**
Change in ICAP Supply (MW)				
Reductions Due to: Retirement (R), ICAP Inegilible FO (FO)				
R - Huntley 67 & 68 (Mar-16)	-375			
FO - Astoria GT 05,07,12,13 (Jan-16)	-74	-74		-74
R - Dunkirk 2 (Jan-16)	-75			
Additions Due to: Return to Service				
Astoria Unit 2 (Mar-15)	167	167		167
Bowline Unit 2 (Jul-15)	374			374
Changes Due to: DMNC Test	33	42	11	60
Net Changes (MW)	**50**	**135**	**11**	**527**