

# Market Operations Report

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Rana Mukerji

SENIOR VICE PRESIDENT – MARKET STRUCTURES, NYISO

**Business Issues Committee Meeting**

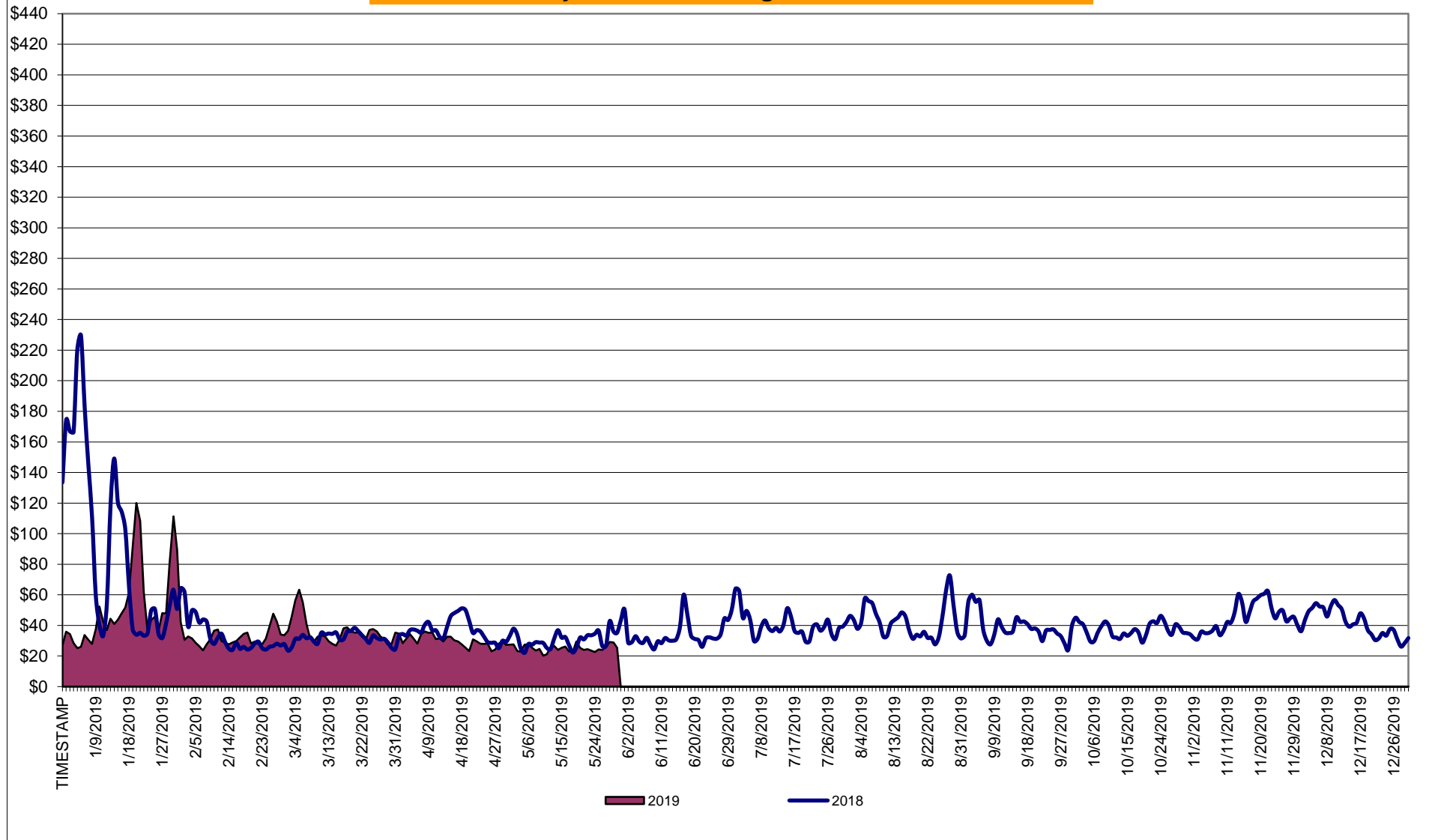
June 20, 2019 Rensselaer, NY

# Market Performance Highlights

## May 2019

- LBMP for May is \$23.10/MWh; lower than \$28.01/MWh in April 2019 and \$28.78/MWh in May 2018.
  - Day Ahead and Real Time Load Weighted LBMPs are lower compared to April.
- May 2019 average year-to-date monthly cost of \$37.57/MWh is a 25% decrease from \$50.20/MWh in May 2018.
- Average daily sendout is 373 GWh/day in May; higher than 371 GWh/day in April 2019 and lower than 397 GWh/day in May 2018.
- Natural gas prices were lower and distillate prices were mixed compared to the previous month.
  - Natural Gas (Transco Z6 NY) was \$2.27/MMBtu, down from \$2.37/MMBtu in April.
  - Natural gas prices are down 11.0% year-over-year.
  - Jet Kerosene Gulf Coast was \$14.64/MMBtu, up from \$14.63/MMBtu in April.
  - Ultra Low Sulfur No.2 Diesel NY Harbor was \$14.54/MMBtu, down from \$14.72/MMBtu in April.
  - Distillate prices are down 8.5% year-over-year.
- Uplift per MWh is higher compared to the previous month.
  - Uplift (not including NYISO cost of operations) is \$0.13/MWh; higher than (\$0.15)/MWh in April.
    - Local Reliability Share is \$0.23/MWh, higher than \$0.20/MWh in April.
    - Statewide Share is (\$0.11)/MWh, higher than (\$0.35)/MWh in April.
  - TSA \$ per NYC MWh is \$0.19/MWh.
  - Total uplift costs (Schedule 1 components including NYISO Cost of Operations) are higher than April.

**Daily NYISO Average Cost/MWh (Energy & Ancillary Services)\***  
**2018 Annual Average \$44.92/MWh**  
**May 2018 YTD Average \$50.20/MWh**  
**May 2019 YTD Average \$37.57/MWh**



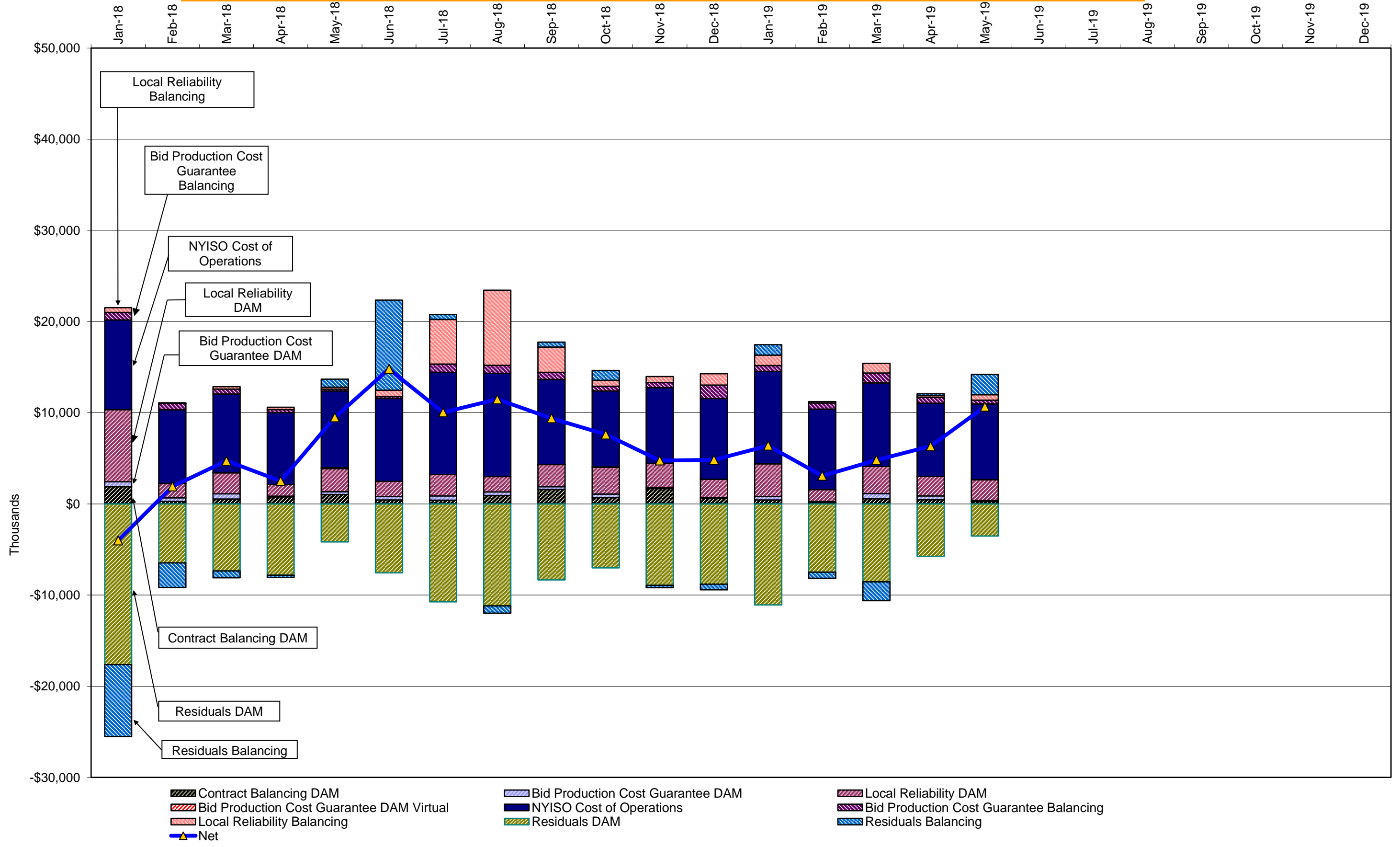
\* Excludes ICAP payments.

**NYISO Average Cost/MWh (Energy and Ancillary Services) \***  
**from the LBMP Customer point of view**

<b>2019</b>	<u>January</u>	<u>February</u>	<u>March</u>	<u>April</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>August</u>	<u>September</u>	<u>October</u>	<u>November</u>	<u>December</u>
LBMP	50.93	33.51	34.91	28.01	23.10							
NTAC	0.51	0.69	0.98	1.16	0.72							
Reserve	0.54	0.51	0.55	0.63	0.63							
Regulation	0.13	0.11	0.10	0.33	0.13							
NYISO Cost of Operations	0.68	0.68	0.69	0.69	0.68							
FERC Fee Recovery	0.08	0.09	0.09	0.10	0.10							
Uplift	(0.25)	(0.44)	(0.33)	(0.15)	0.13							
Uplift: Local Reliability Share	0.32	0.11	0.31	0.20	0.23							
Uplift: Statewide Share	(0.57)	(0.55)	(0.64)	(0.35)	(0.11)							
Voltage Support and Black Start	0.37	0.37	0.38	0.38	0.38							
<b>Avg Monthly Cost</b>	<b>52.99</b>	<b>35.51</b>	<b>37.38</b>	<b>31.16</b>	<b>25.88</b>							
Avg YTD Cost	52.99	44.93	42.54	40.12	37.57							
TSA \$ per NYC MWh	0.00	0.00	0.01	0.01	0.19							
<b>2018</b>	<u>January</u>	<u>February</u>	<u>March</u>	<u>April</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>August</u>	<u>September</u>	<u>October</u>	<u>November</u>	<u>December</u>
LBMP	99.55	33.83	29.91	35.00	28.78	32.53	39.58	42.56	38.70	35.85	43.15	40.31
NTAC	0.71	0.58	0.88	1.09	0.88	1.00	0.93	0.72	0.40	0.36	1.18	0.93
Reserve	0.92	0.65	0.64	0.81	0.68	0.57	0.49	0.51	0.52	0.80	0.66	0.54
Regulation	0.15	0.15	0.16	0.12	0.14	0.16	0.09	0.09	0.09	0.16	0.17	0.17
NYISO Cost of Operations	0.65	0.65	0.66	0.65	0.66	0.67	0.67	0.66	0.66	0.63	0.63	0.63
FERC Fee Recovery	0.08	0.10	0.09	0.10	0.09	0.09	0.06	0.06	0.08	0.09	0.09	0.08
Uplift	(0.92)	(0.50)	(0.31)	(0.45)	0.05	0.30	(0.13)	(0.02)	(0.11)	(0.30)	(0.27)	(0.29)
Uplift: Local Reliability Share	0.59	0.14	0.19	0.12	0.22	0.18	0.44	0.59	0.37	0.27	0.25	0.23
Uplift: Statewide Share	(1.52)	(0.64)	(0.51)	(0.57)	(0.17)	0.12	(0.57)	(0.61)	(0.48)	(0.56)	(0.52)	(0.52)
Voltage Support and Black Start	0.40	0.41	0.42	0.41	0.42	0.42	0.42	0.42	0.42	0.40	0.40	0.40
<b>Avg Monthly Cost</b>	<b>101.54</b>	<b>35.87</b>	<b>32.45</b>	<b>37.74</b>	<b>31.70</b>	<b>35.73</b>	<b>42.12</b>	<b>45.01</b>	<b>40.76</b>	<b>38.00</b>	<b>46.01</b>	<b>42.78</b>
Avg YTD Cost	101.54	72.85	60.06	54.82	50.20	47.70	46.64	46.37	45.75	45.03	45.11	44.92
TSA \$ per NYC MWh	0.00	0.00	0.04	0.00	0.08	0.39	0.21	0.14	0.33	0.75	0.00	0.00

\* Excludes ICAP payments.  
Market Mitigation and Analysis  
Prepared: 6/11/2019 2:35 PM

## NYISO Dollar Flows - Uplift - OATT Schedule 1 components - Data through May 31, 2019



DAM Contract Balancing amounts are for payments made to generating units to make them whole for being dispatched below their Day-Ahead schedule, as a result of out-of-merit dispatches.

DAM Bid Production Cost Guarantees for Virtual Transactions are included in the chart and are shown from the inception of Virtual Transactions. These values are small and cannot be identified on the chart.

DAM residuals consist of both energy and loss revenue collections and payments. By design, there is a net over collection of revenues due to the difference between the marginal losses paid to generation and the average losses charged to loads.

## NYISO Markets Transactions

<b>2019</b>	January	February	March	April	May	June	July	August	September	October	November	December
<b>Day Ahead Market MWh</b>	15,299,458	13,391,383	13,527,834	11,811,029	12,521,583							
DAM LSE Internal LBMP Energy Sales	57%	57%	59%	59%	57%							
DAM External TC LBMP Energy Sales	6%	5%	3%	1%	3%							
DAM Bilateral - Internal Bilaterals	29%	30%	30%	31%	32%							
DAM Bilateral - Import/Non-LBMP Market Bilaterals	5%	5%	5%	5%	6%							
DAM Bilateral - Export/Non-LBMP Market Bilaterals	1%	1%	2%	2%	2%							
DAM Bilateral - Wheel Through Bilaterals	2%	2%	2%	2%	1%							
<b>Balancing Energy Market MWh</b>	-322,442	-323,188	-261,217	-218,482	-392,699							
Balancing Energy LSE Internal LBMP Energy Sales	-120%	-126%	-138%	-178%	-150%							
Balancing Energy External TC LBMP Energy Sales	65%	67%	82%	113%	68%							
Balancing Energy Bilateral - Internal Bilaterals	-4%	-1%	-3%	2%	1%							
Balancing Energy Bilateral - Import/Non-LBMP Market Bilaterals	0%	0%	0%	0%	0%							
Balancing Energy Bilateral - Export/Non-LBMP Market Bilaterals	3%	7%	6%	7%	2%							
Balancing Energy Bilateral - Wheel Through Bilaterals	-45%	-47%	-47%	-44%	-21%							
<b>Transactions Summary</b>												
LBMP	63%	62%	61%	60%	59%							
Internal Bilaterals	29%	30%	30%	31%	33%							
Import Bilaterals	5%	5%	6%	6%	6%							
Export Bilaterals	1%	2%	2%	2%	2%							
Wheels Through	1%	1%	1%	1%	0%							
<b>Market Share of Total Load</b>												
Day Ahead Market	102.2%	102.5%	102.0%	101.9%	103.2%							
Balancing Energy +	-2.2%	-2.5%	-2.0%	-1.9%	-3.2%							
Total MWh	14,977,016	13,068,195	13,266,617	11,592,547	12,128,884							
Average Daily Energy Sendout/Month GWh	449	436	411	371	373							

<b>2018</b>	January	February	March	April	May	June	July	August	September	October	November	December
<b>Day Ahead Market MWh</b>	15,153,751	12,643,854	13,521,386	12,158,686	12,721,073	13,983,384	16,839,994	17,195,447	14,432,632	13,548,828	13,506,134	14,450,460
DAM LSE Internal LBMP Energy Sales	59%	57%	58%	60%	61%	61%	65%	65%	61%	57%	58%	56%
DAM External TC LBMP Energy Sales	4%	3%	2%	2%	2%	1%	1%	2%	3%	6%	6%	6%
DAM Bilateral - Internal Bilaterals	29%	31%	32%	30%	29%	30%	26%	25%	28%	29%	30%	30%
DAM Bilateral - Import/Non-LBMP Market Bilaterals	5%	5%	5%	5%	5%	5%	4%	4%	5%	5%	2%	5%
DAM Bilateral - Export/Non-LBMP Market Bilaterals	2%	2%	2%	2%	2%	1%	1%	1%	1%	2%	2%	2%
DAM Bilateral - Wheel Through Bilaterals	1%	2%	2%	2%	2%	2%	2%	2%	2%	1%	1%	2%
<b>Balancing Energy Market MWh</b>	-149,619	-299,377	-386,811	-72,862	-29,539	-354,112	-80,438	-44,732	-210,436	-314,885	-304,277	-428,748
Balancing Energy LSE Internal LBMP Energy Sales	-147%	-101%	-128%	-208%	-458%	-113%	-123%	-75%	-82%	-105%	-100%	-94%
Balancing Energy External TC LBMP Energy Sales	74%	24%	37%	189%	564%	29%	129%	209%	14%	30%	18%	27%
Balancing Energy Bilateral - Internal Bilaterals	9%	5%	0%	-11%	29%	5%	18%	23%	7%	2%	3%	3%
Balancing Energy Bilateral - Import/Non-LBMP Market Bilaterals	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	10%	0%
Balancing Energy Bilateral - Export/Non-LBMP Market Bilaterals	22%	9%	6%	34%	51%	3%	14%	25%	3%	0%	0%	0%
Balancing Energy Bilateral - Wheel Through Bilaterals	-58%	-36%	-15%	-103%	-287%	-23%	-138%	-281%	-42%	-27%	-31%	-36%
<b>Transactions Summary</b>												
LBMP	63%	59%	59%	62%	63%	61%	66%	68%	64%	63%	64%	61%
Internal Bilaterals	30%	32%	33%	30%	29%	31%	27%	25%	28%	30%	31%	31%
Import Bilaterals	5%	5%	6%	5%	5%	5%	4%	4%	5%	5%	3%	5%
Export Bilaterals	2%	2%	2%	2%	2%	1%	1%	1%	1%	2%	2%	2%
Wheels Through	1%	1%	1%	1%	1%	2%	1%	1%	2%	1%	1%	1%
<b>Market Share of Total Load</b>												
Day Ahead Market	101.0%	102.4%	102.9%	100.6%	100.2%	102.6%	100.5%	100.3%	101.5%	102.4%	102.3%	103.1%
Balancing Energy +	-1.0%	-2.4%	-2.9%	-0.6%	-0.2%	-2.6%	-0.5%	-0.3%	-1.5%	-2.4%	-2.3%	-3.1%
Total MWh	15,004,132	12,344,477	13,134,575	12,085,824	12,691,534	13,629,272	16,759,556	17,150,715	14,222,196	13,233,943	13,201,857	14,021,712
Average Daily Energy Sendout/Month GWh	463	426	413	390	397	445	529	537	458	399	411	425

+ Balancing Energy: Load(MW) purchased at Real Time LBMP.

\* The signs for the detail section intuitively reflect the direction of power flow eliminating the use of double negatives when Balancing Energy is negative.

Notes: Percent totals may not equal 100% due to rounding.

Virtual Transactions are not reflected in this chart.

### NYISO Markets 2019 Energy Statistics

	<u>January</u>	<u>February</u>	<u>March</u>	<u>April</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>August</u>	<u>September</u>	<u>October</u>	<u>November</u>	<u>December</u>
<b><u>DAY AHEAD LBMP</u></b>												
Price *	\$45.01	\$30.66	\$32.34	\$25.97	\$21.16							
Standard Deviation	\$25.67	\$12.86	\$9.30	\$6.32	\$5.89							
Load Weighted Price **	\$46.88	\$31.53	\$33.14	\$26.57	\$21.89							
<b><u>RTC LBMP</u></b>												
Price *	\$40.86	\$29.74	\$31.04	\$25.07	\$21.88							
Standard Deviation	\$23.02	\$10.79	\$8.48	\$7.53	\$8.01							
Load Weighted Price **	\$42.39	\$30.32	\$31.62	\$25.54	\$22.44							
<b><u>REAL TIME LBMP</u></b>												
Price *	\$39.54	\$30.13	\$31.46	\$24.47	\$20.56							
Standard Deviation	\$26.03	\$13.77	\$12.54	\$17.27	\$10.35							
Load Weighted Price **	\$41.24	\$30.80	\$32.06	\$25.06	\$21.28							
Average Daily Energy Sendout/Month GWh	449	436	411	371	373							

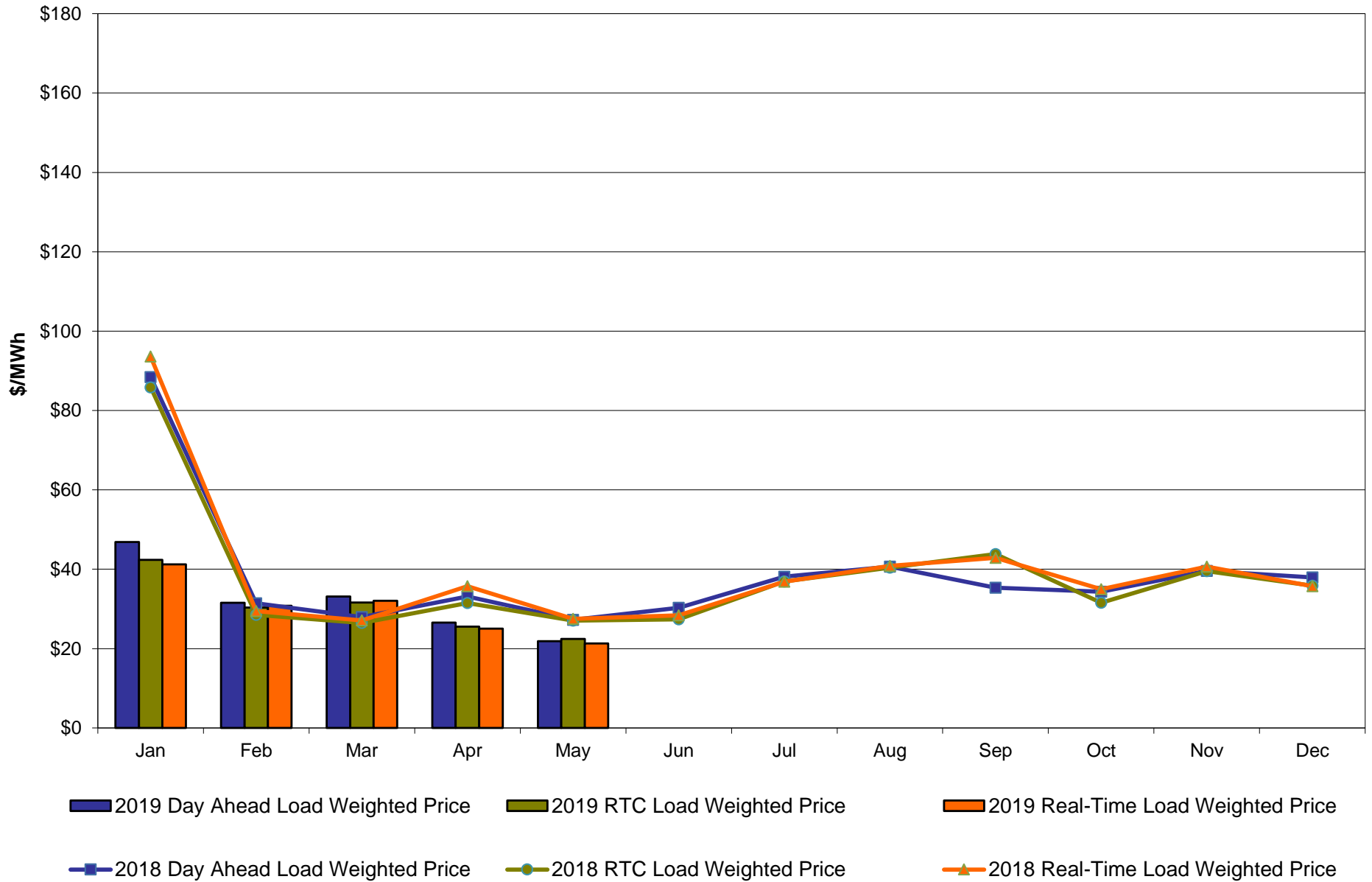
### NYISO Markets 2018 Energy Statistics

	<u>January</u>	<u>February</u>	<u>March</u>	<u>April</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>August</u>	<u>September</u>	<u>October</u>	<u>November</u>	<u>December</u>
<b><u>DAY AHEAD LBMP</u></b>												
Price *	\$83.53	\$30.37	\$27.37	\$32.40	\$25.97	\$28.41	\$35.73	\$38.00	\$33.28	\$33.27	\$38.36	\$36.88
Standard Deviation	\$58.94	\$12.38	\$6.34	\$9.06	\$9.22	\$11.42	\$15.25	\$16.51	\$12.01	\$9.24	\$11.36	\$11.61
Load Weighted Price **	\$88.42	\$31.44	\$27.95	\$33.14	\$27.26	\$30.27	\$38.14	\$40.64	\$35.33	\$34.33	\$39.55	\$37.96
<b><u>RTC LBMP</u></b>												
Price *	\$81.65	\$27.73	\$25.99	\$30.80	\$25.40	\$26.06	\$34.65	\$38.13	\$39.52	\$30.92	\$38.37	\$35.01
Standard Deviation	\$60.83	\$11.96	\$8.99	\$14.30	\$20.37	\$12.78	\$17.44	\$20.05	\$61.50	\$13.43	\$17.24	\$12.27
Load Weighted Price **	\$85.85	\$28.54	\$26.46	\$31.47	\$27.08	\$27.35	\$36.93	\$40.40	\$43.83	\$31.55	\$39.53	\$35.84
<b><u>REAL TIME LBMP</u></b>												
Price *	\$87.94	\$28.50	\$26.49	\$34.53	\$25.57	\$26.31	\$34.34	\$38.07	\$38.15	\$33.88	\$39.18	\$34.74
Standard Deviation	\$87.41	\$17.36	\$12.25	\$26.57	\$23.49	\$24.34	\$18.44	\$27.21	\$46.81	\$37.42	\$26.15	\$17.44
Load Weighted Price **	\$93.59	\$29.49	\$27.09	\$35.72	\$27.47	\$28.38	\$36.84	\$40.87	\$42.87	\$34.94	\$40.63	\$35.70
Average Daily Energy Sendout/Month GWh	463	426	413	390	397	445	529	537	458	399	411	425

\* Average zonal load weighted prices.

\*\* Average zonal load weighted prices, load weighted in each hour.

## NYISO Monthly Average Internal LBMPs 2018- 2019



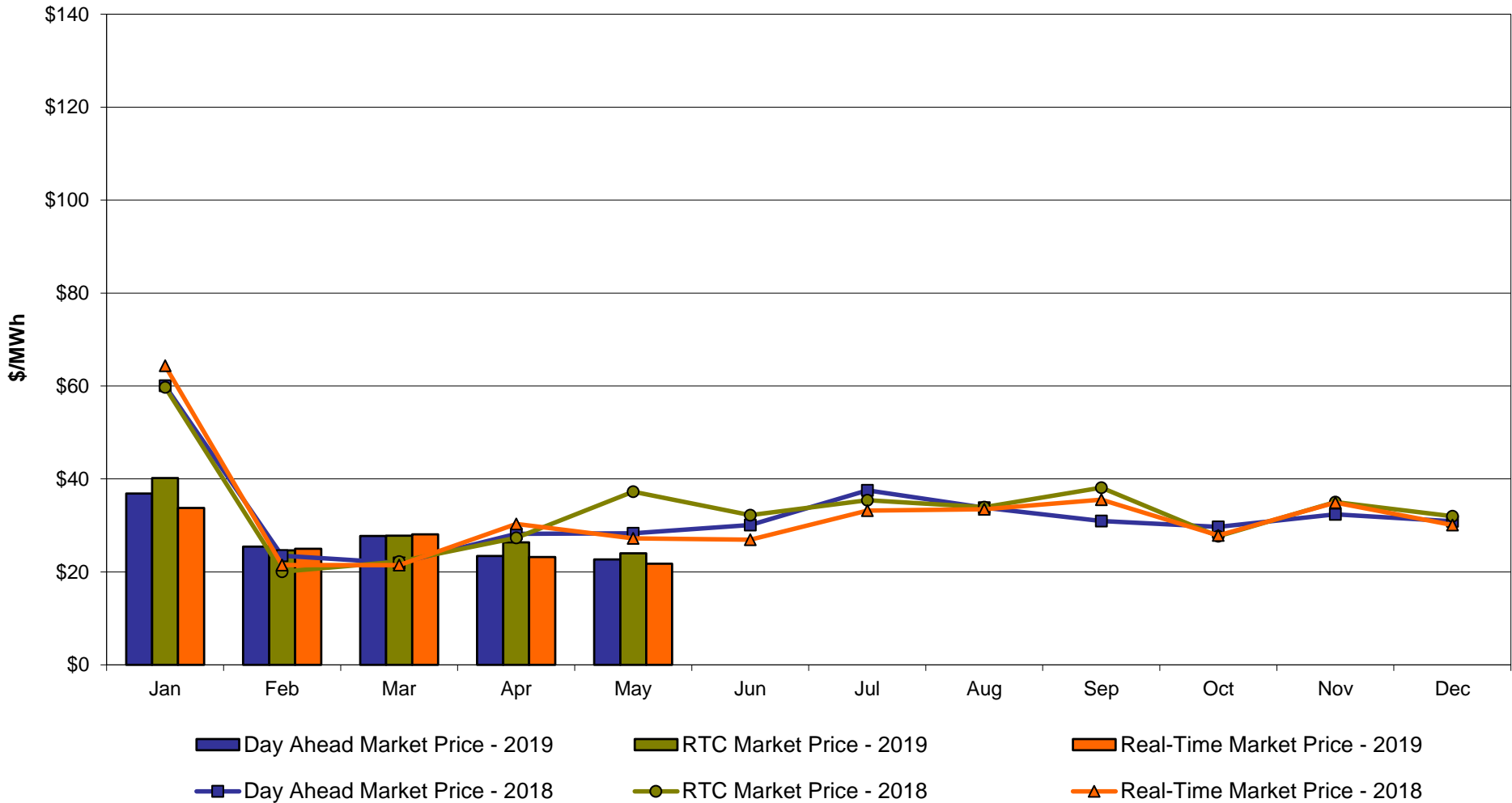


**May 2019 Zonal LBMP Statistics for NYISO (\$/MWh)**

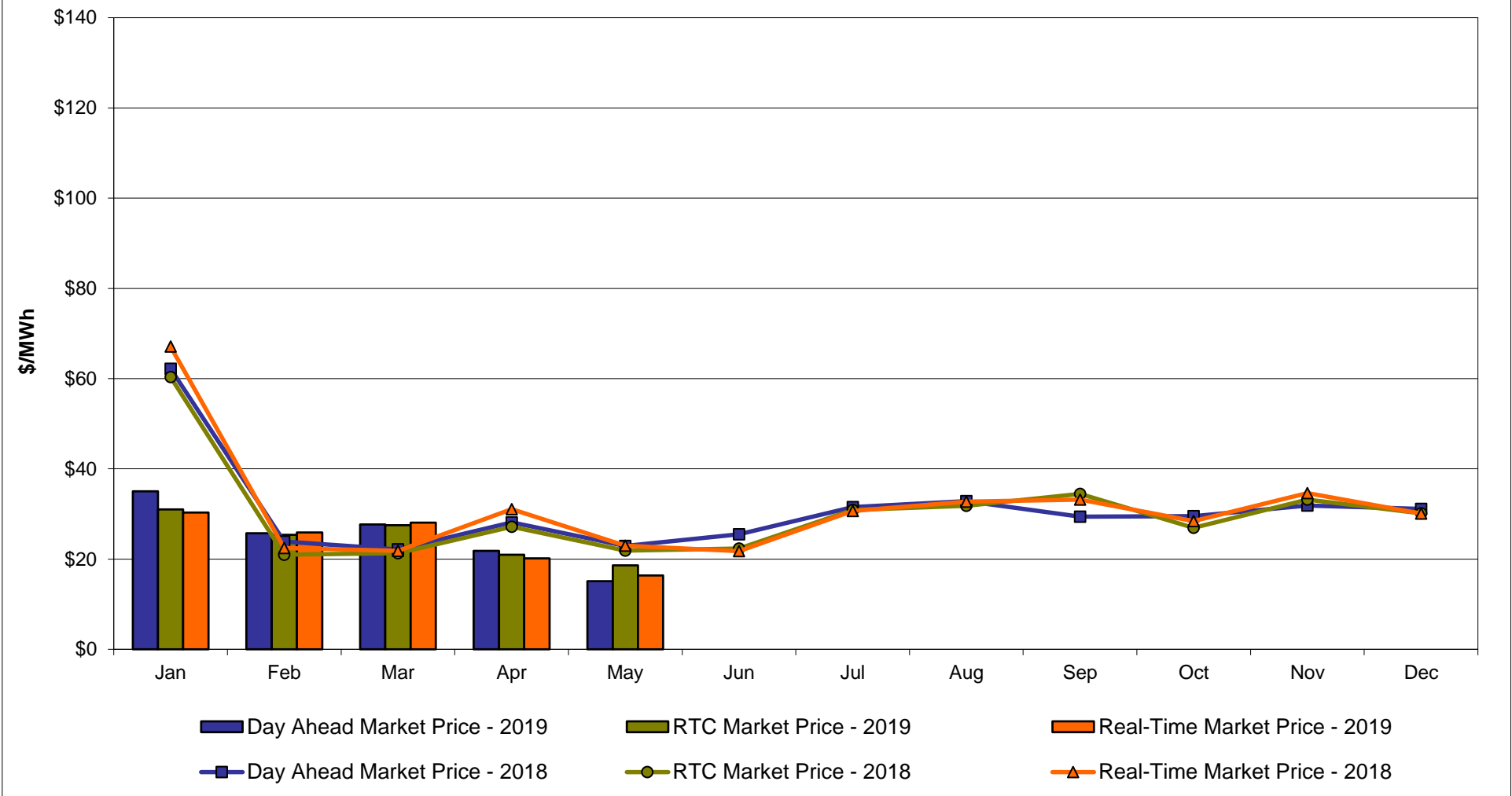
	<u>WEST Zone A</u>	<u>GENESEE Zone B</u>	<u>NORTH Zone D</u>	<u>CENTRAL Zone C</u>	<u>MOHAWK VALLEY Zone E</u>	<u>CAPITAL Zone F</u>	<u>HUDSON VALLEY Zone G</u>	<u>MILLWOOD Zone H</u>	<u>DUNWOODIE Zone I</u>	<u>NEW YORK CITY Zone J</u>	<u>LONG ISLAND Zone K</u>
<b>DAY AHEAD LBMP</b>											
Unweighted Price *	22.70	13.04	12.31	15.11	14.90	22.17	20.43	20.79	20.94	23.39	26.46
Standard Deviation	13.38	5.02	6.44	5.59	5.51	4.93	4.83	4.95	5.06	6.22	7.39
<b>RTC LBMP</b>											
Unweighted Price *	24.00	13.79	15.61	18.60	17.82	21.36	20.89	21.15	21.44	23.41	26.07
Standard Deviation	22.52	10.17	8.89	8.86	7.65	7.35	7.29	7.36	7.45	9.35	17.22
<b>REAL TIME LBMP</b>											
Unweighted Price *	21.79	12.57	13.71	16.34	15.74	20.16	19.31	19.62	20.03	23.23	23.88
Standard Deviation	25.88	12.35	13.36	12.37	11.96	11.52	9.79	9.93	10.31	13.35	12.83
	<u>ONTARIO IESO Zone O</u>	<u>HYDRO QUEBEC (Wheel) Zone M</u>	<u>HYDRO QUEBEC (Import/Export) Zone M</u>	<u>PJM Zone P</u>	<u>NEW ENGLAND Zone N</u>	<u>CROSS SOUND CABLE Controllable Line</u>	<u>NORTHPORT- NORWALK Controllable Line</u>	<u>NEPTUNE Controllable Line</u>	<u>LINDEN VFT Controllable Line</u>	<u>HUDSON Controllable Line</u>	<u>Dennison Controllable Line</u>
<b>DAY AHEAD LBMP</b>											
Unweighted Price *	12.43	12.95	12.95	18.75	22.25	26.07	24.84	24.70	23.05	22.58	12.16
Standard Deviation	4.36	6.14	6.13	5.77	4.36	7.08	5.78	6.37	5.93	5.63	6.33
<b>RTC LBMP</b>											
Unweighted Price *	13.09	16.40	16.40	20.70	23.88	25.72	25.42	24.25	23.30	23.00	15.49
Standard Deviation	8.27	8.04	8.04	8.97	7.22	16.85	16.69	13.19	7.55	6.71	8.77
<b>REAL TIME LBMP</b>											
Unweighted Price *	10.95	14.40	14.40	18.80	21.32	23.72	23.07	22.36	22.42	21.95	13.55
Standard Deviation	20.87	12.94	12.94	11.22	10.74	13.55	12.54	11.68	11.11	10.37	13.18

\* Straight LBMP averages

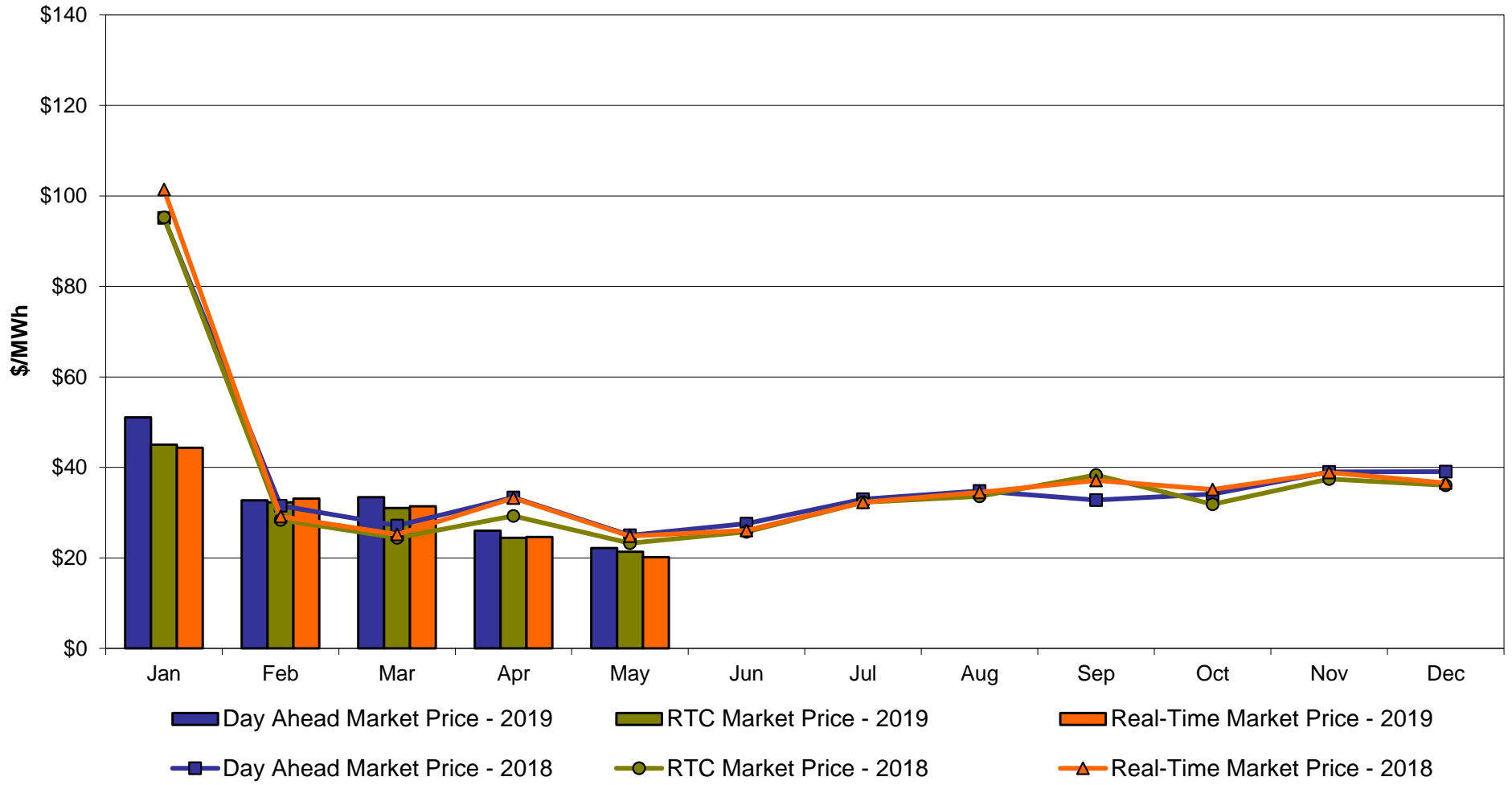
**West Zone A  
Monthly Average LBMP Prices 2018 - 2019**



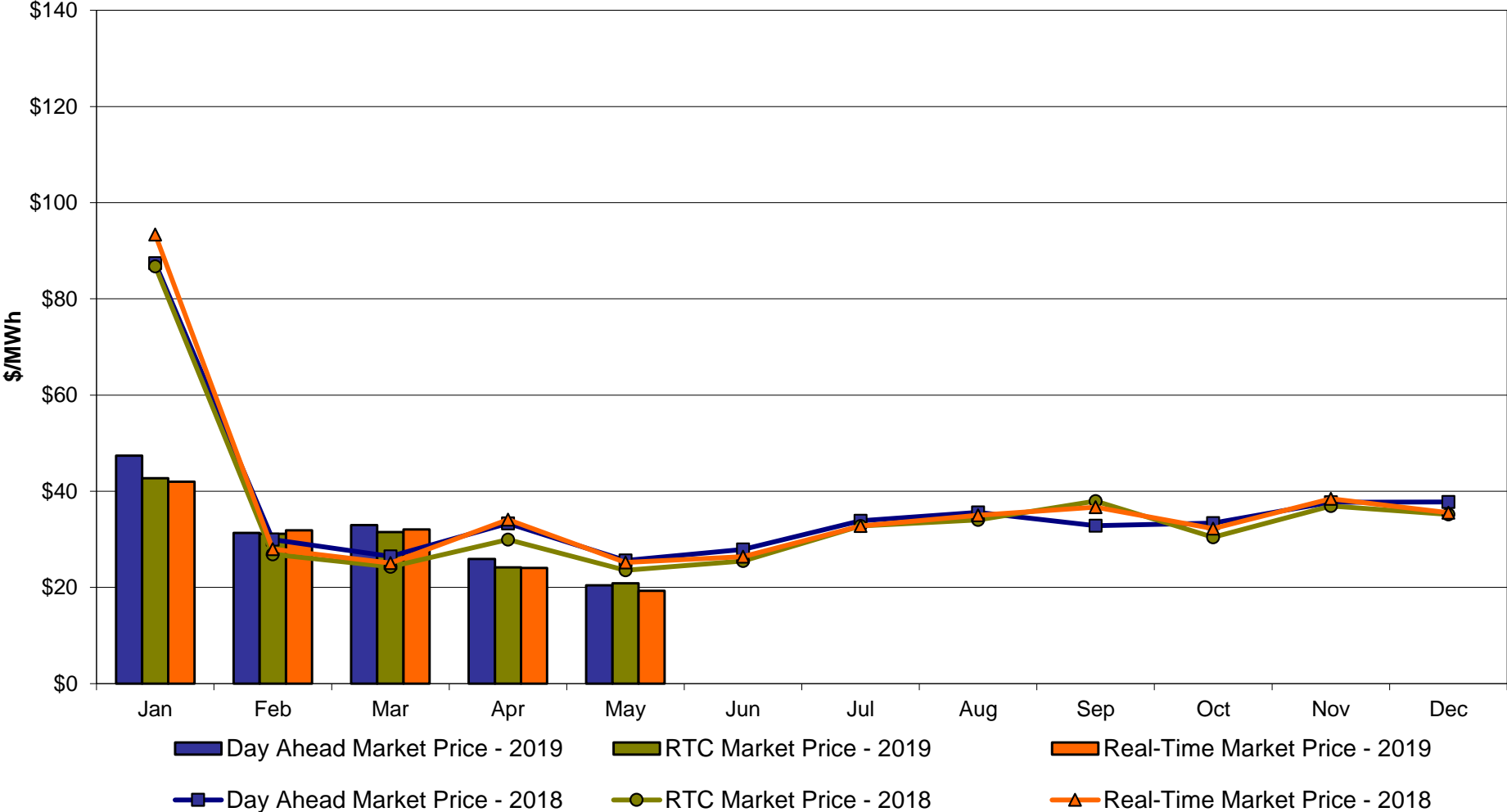
**Central Zone C  
Monthly Average LBMP Prices 2018 - 2019**



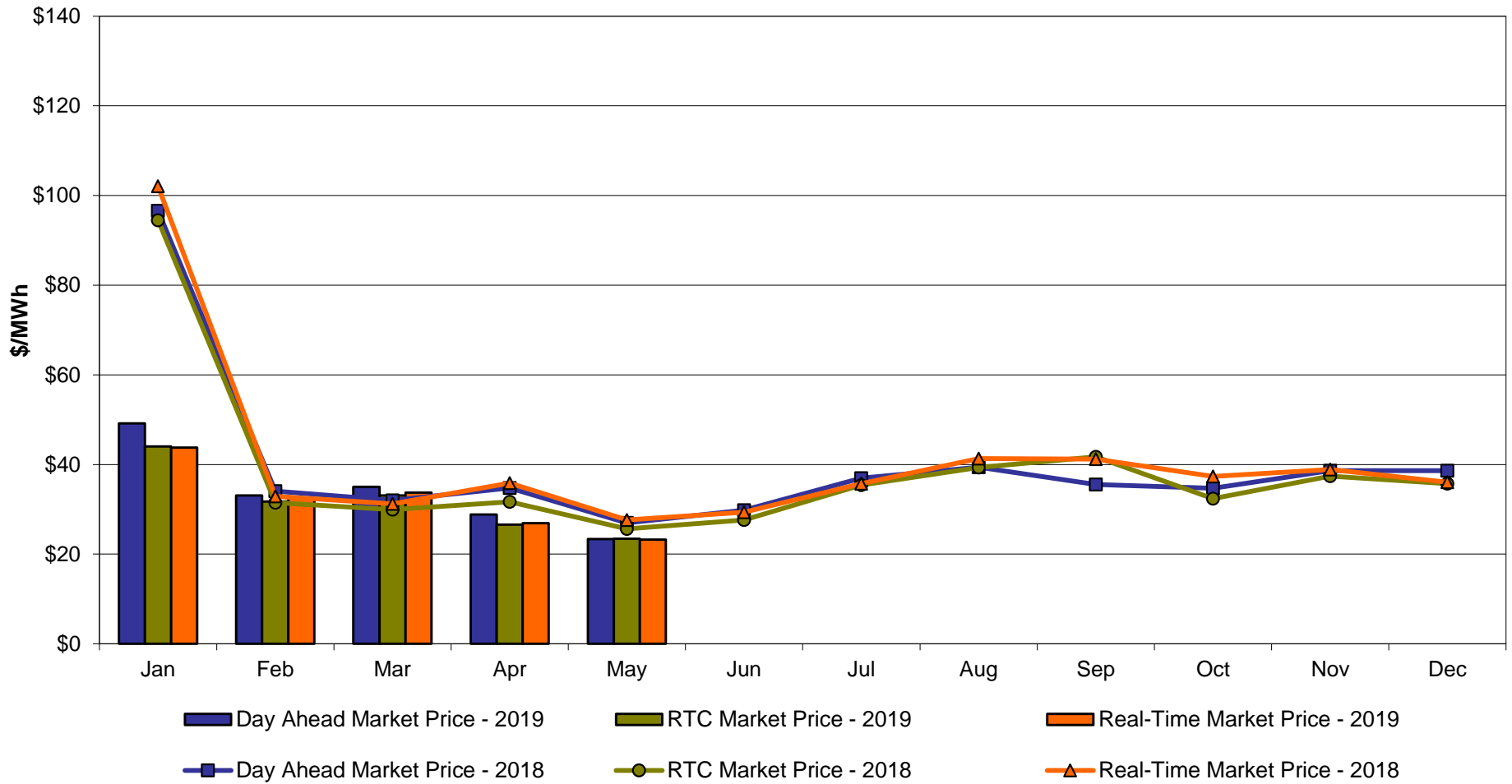
## Capital Zone F Monthly Average LBMP Prices 2018 - 2019



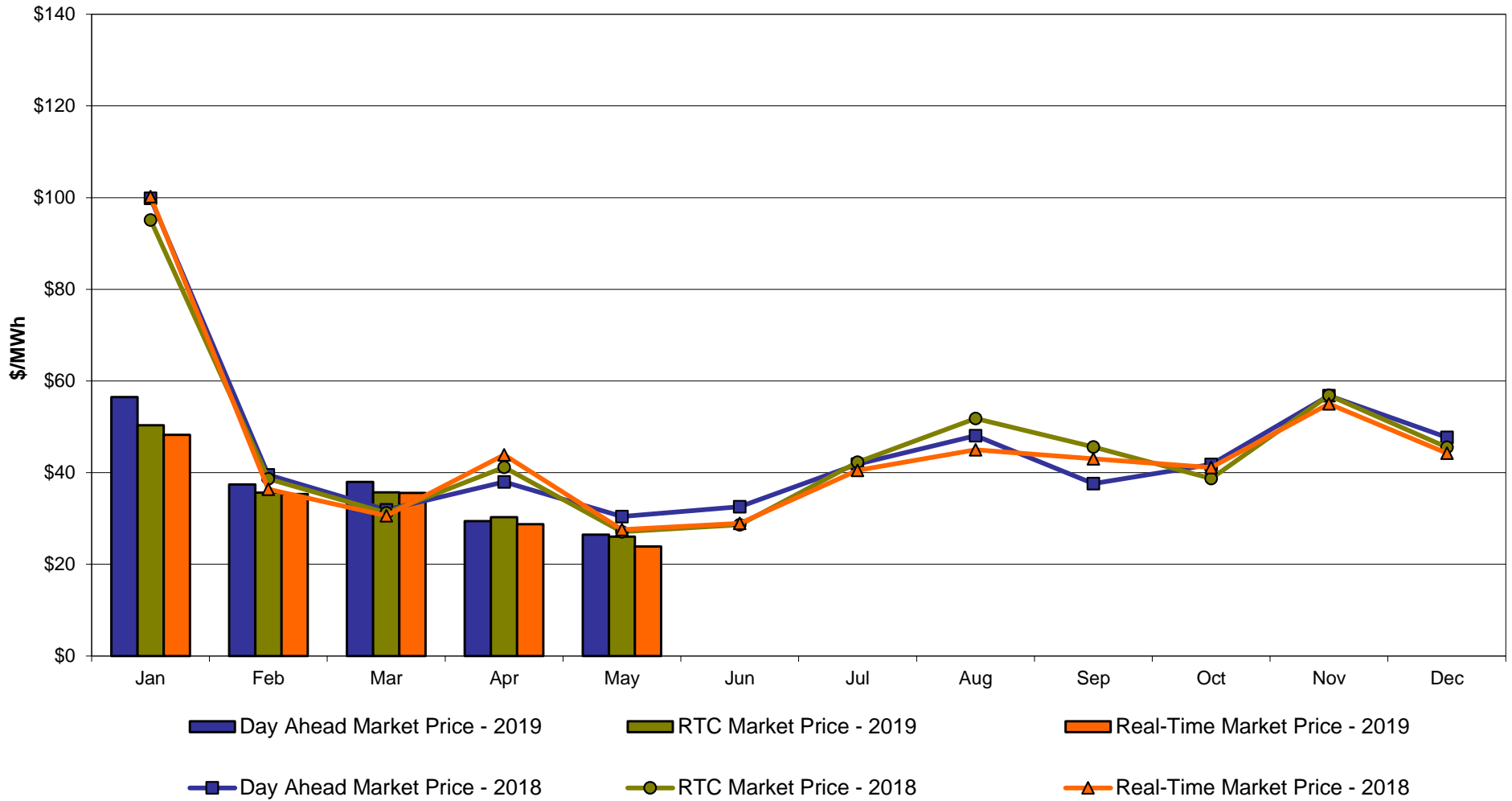
### Hudson Valley Zone G Monthly Average LBMP Prices 2018 - 2019



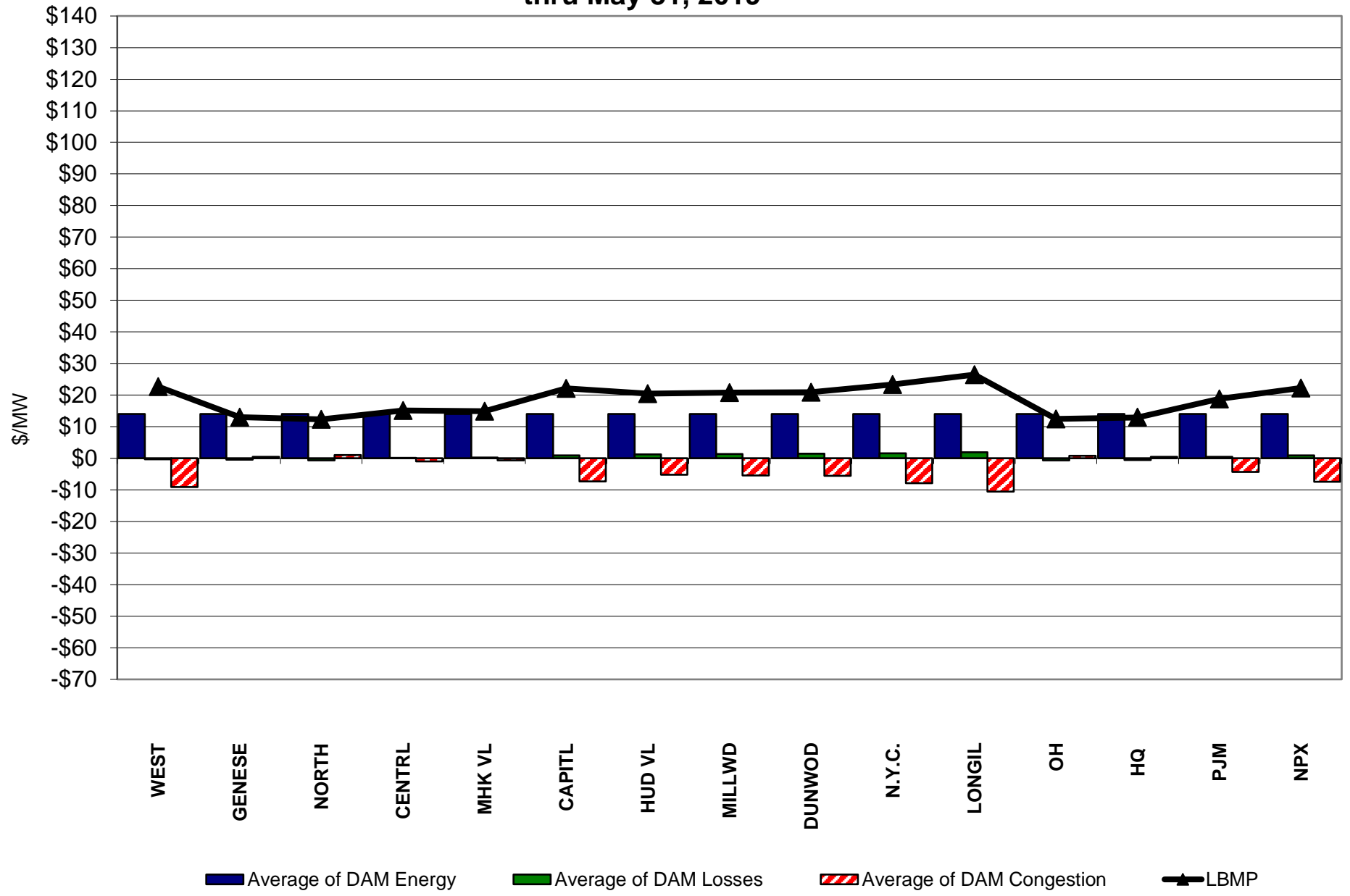
## NYC Zone J Monthly Average LBMP Prices 2018 - 2019



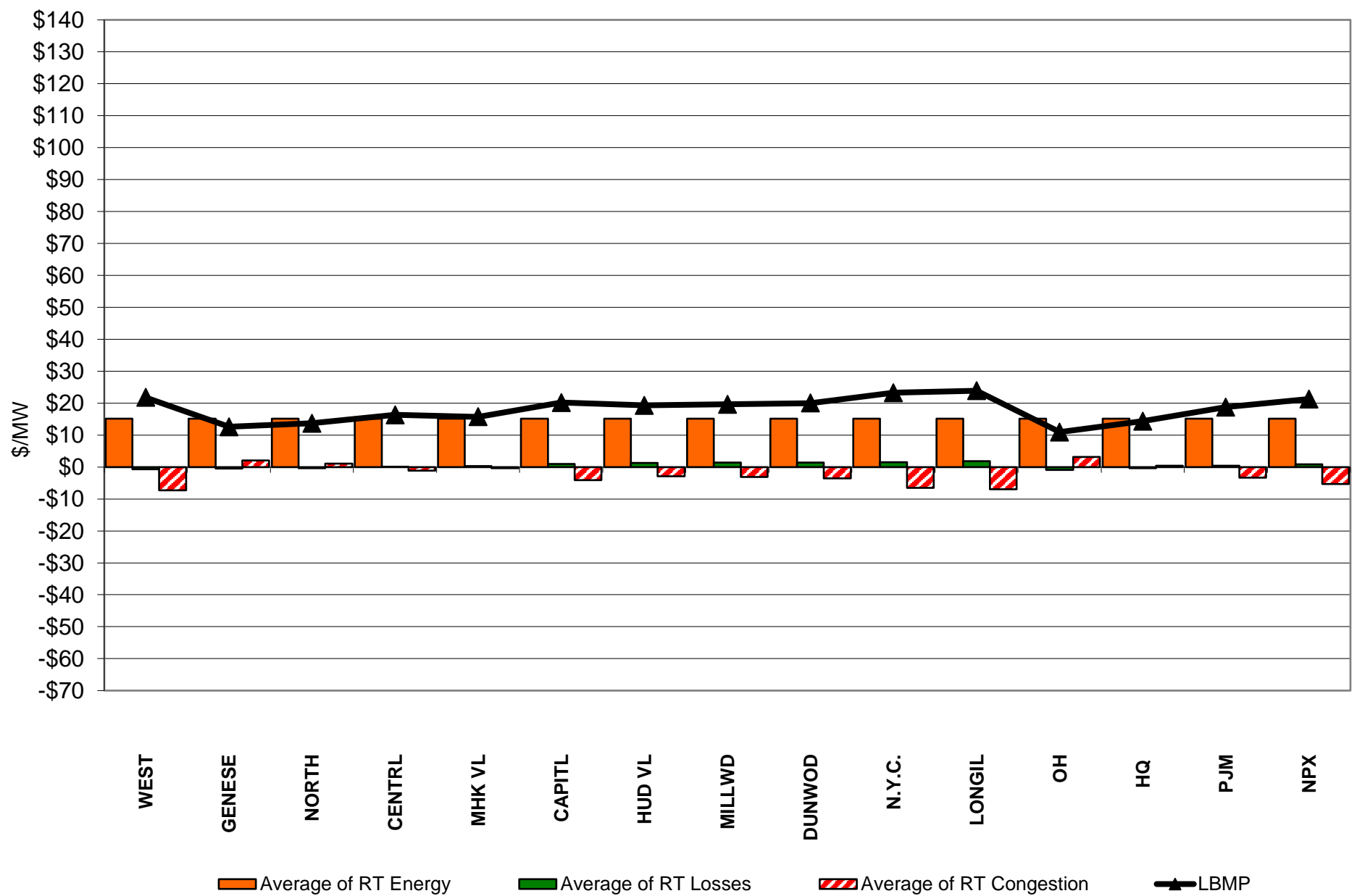
## Long Island Zone K Monthly Average LBMP Prices 2018 - 2019



**DAM Zonal Unweighted Monthly Average LBMP Components  
thru May 31, 2019**

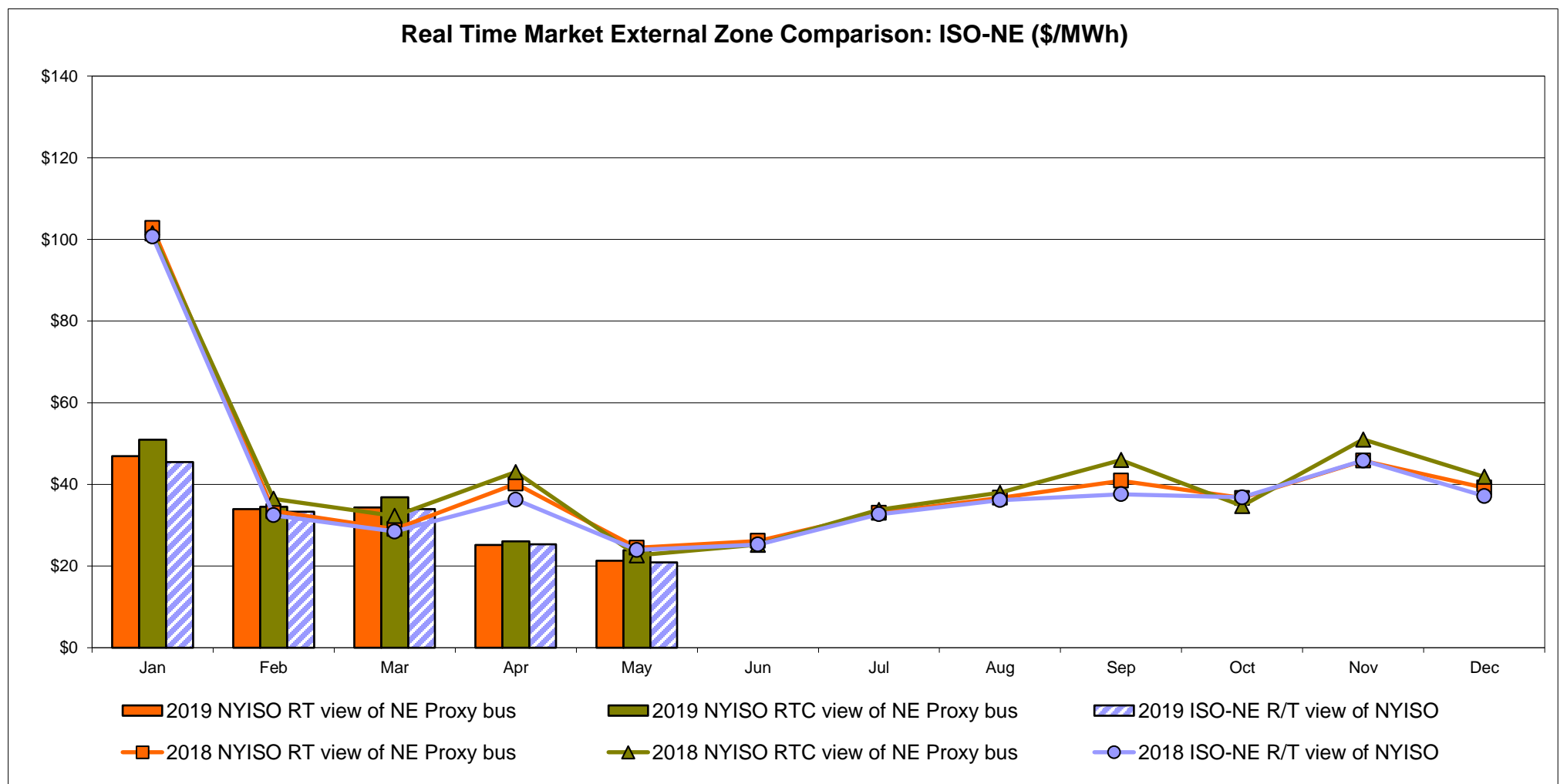
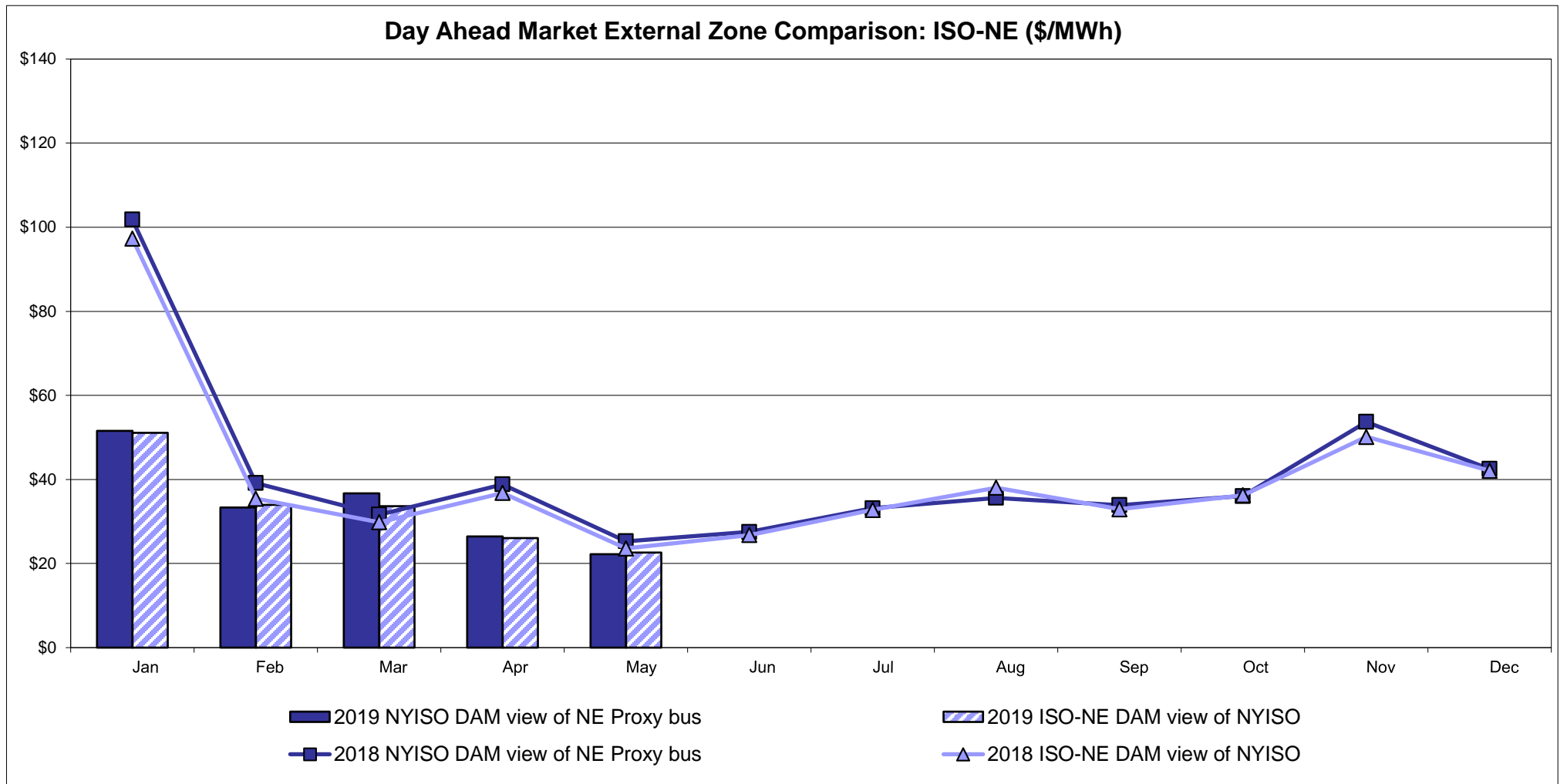


**RT Zonal Unweighted Monthly Average LBMP Components  
thru May 31, 2019**



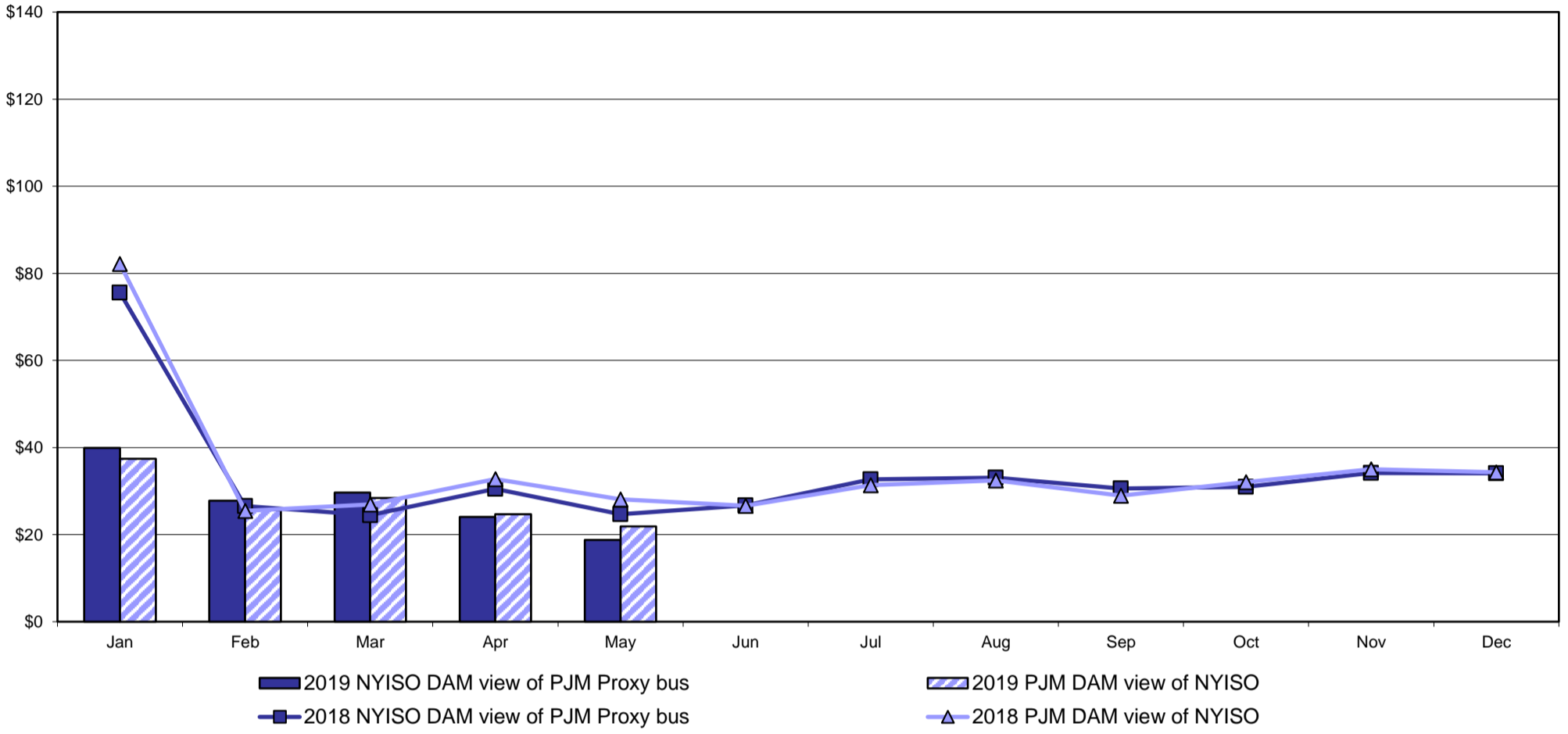


# External Comparison ISO-New England

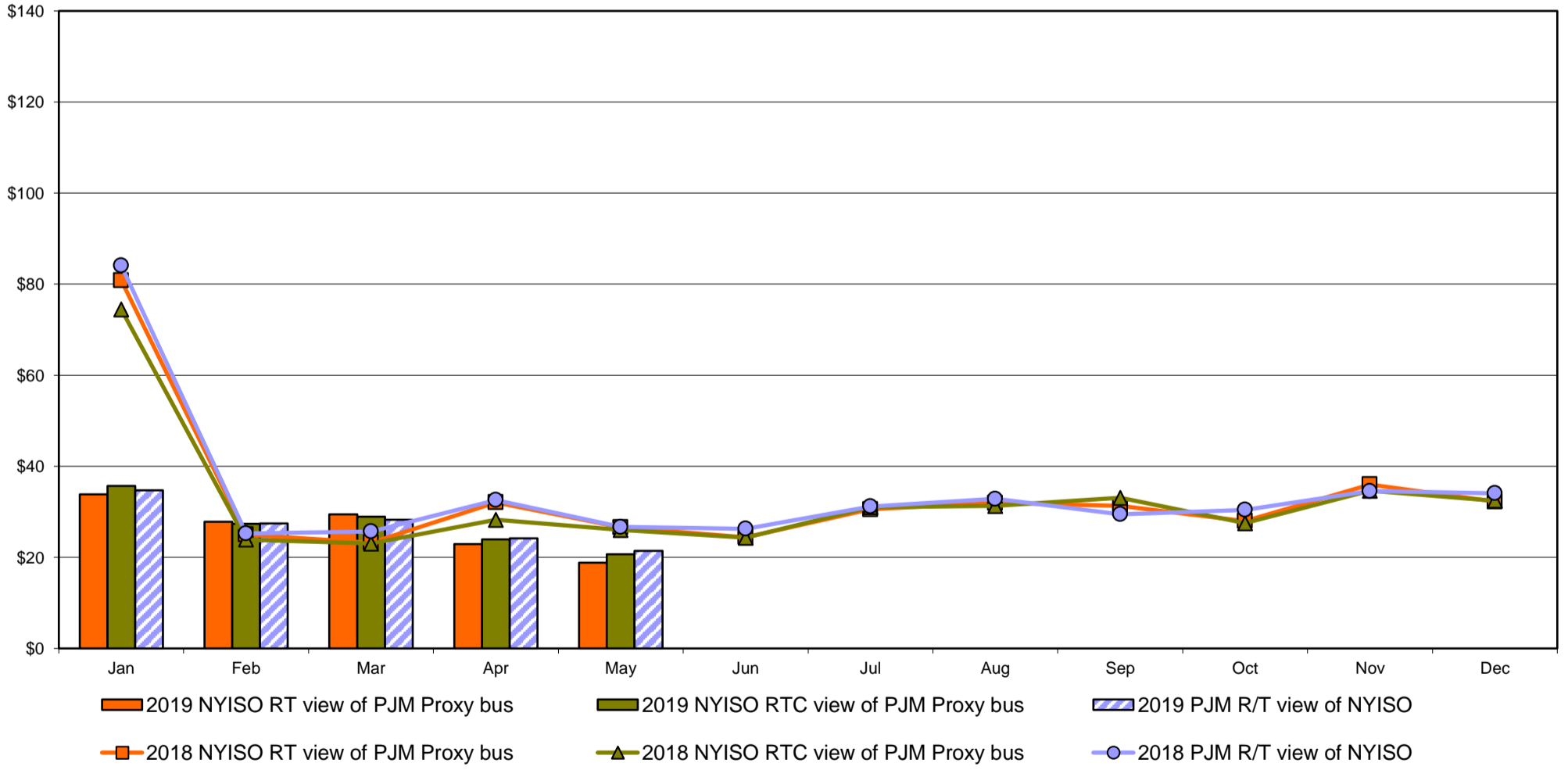


# External Comparison PJM

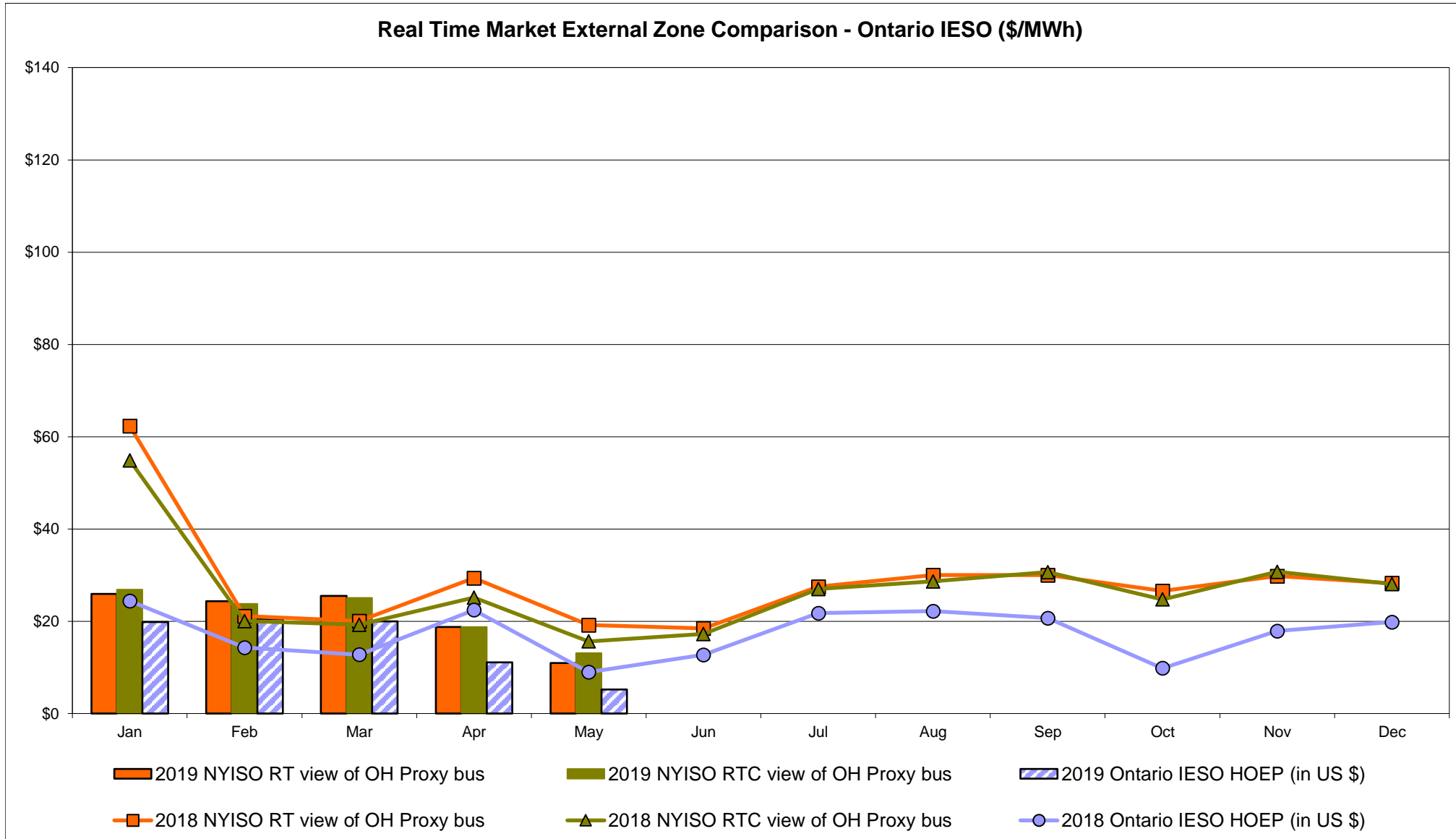
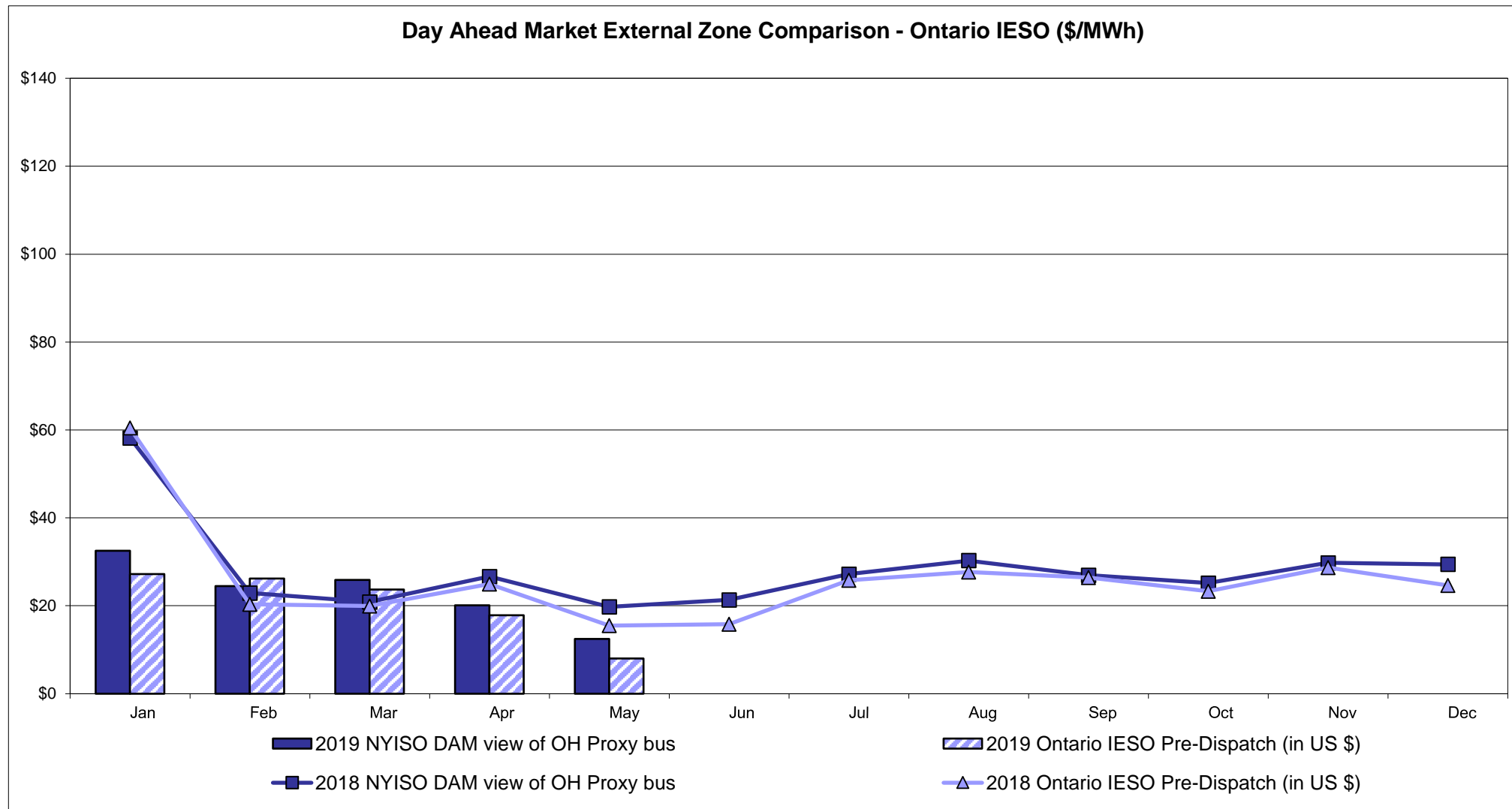
## Day Ahead Market External Zone Comparison - PJM (\$/MWh)



## Real Time Market External Zone Comparison - PJM (\$/MWh)

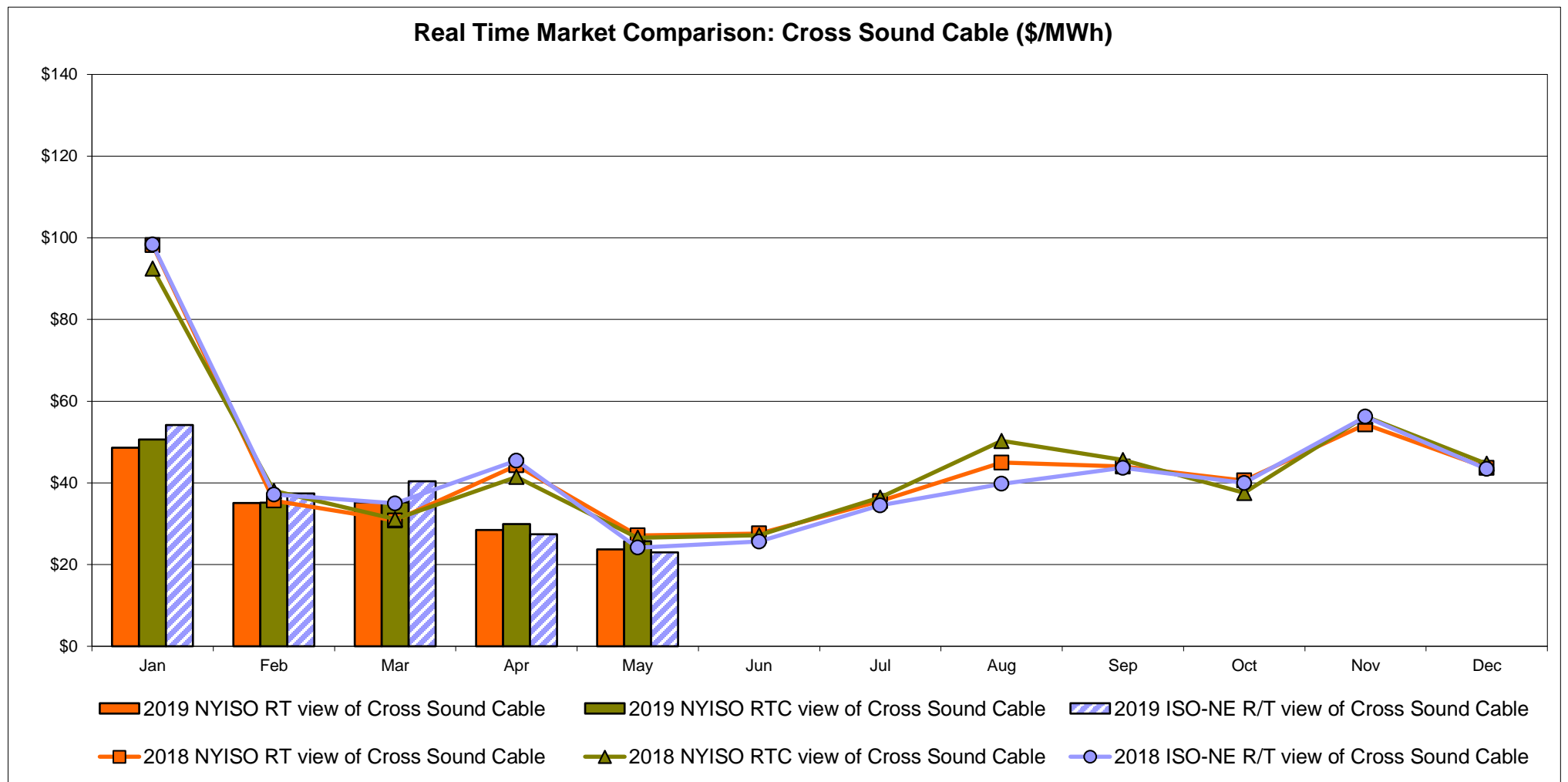
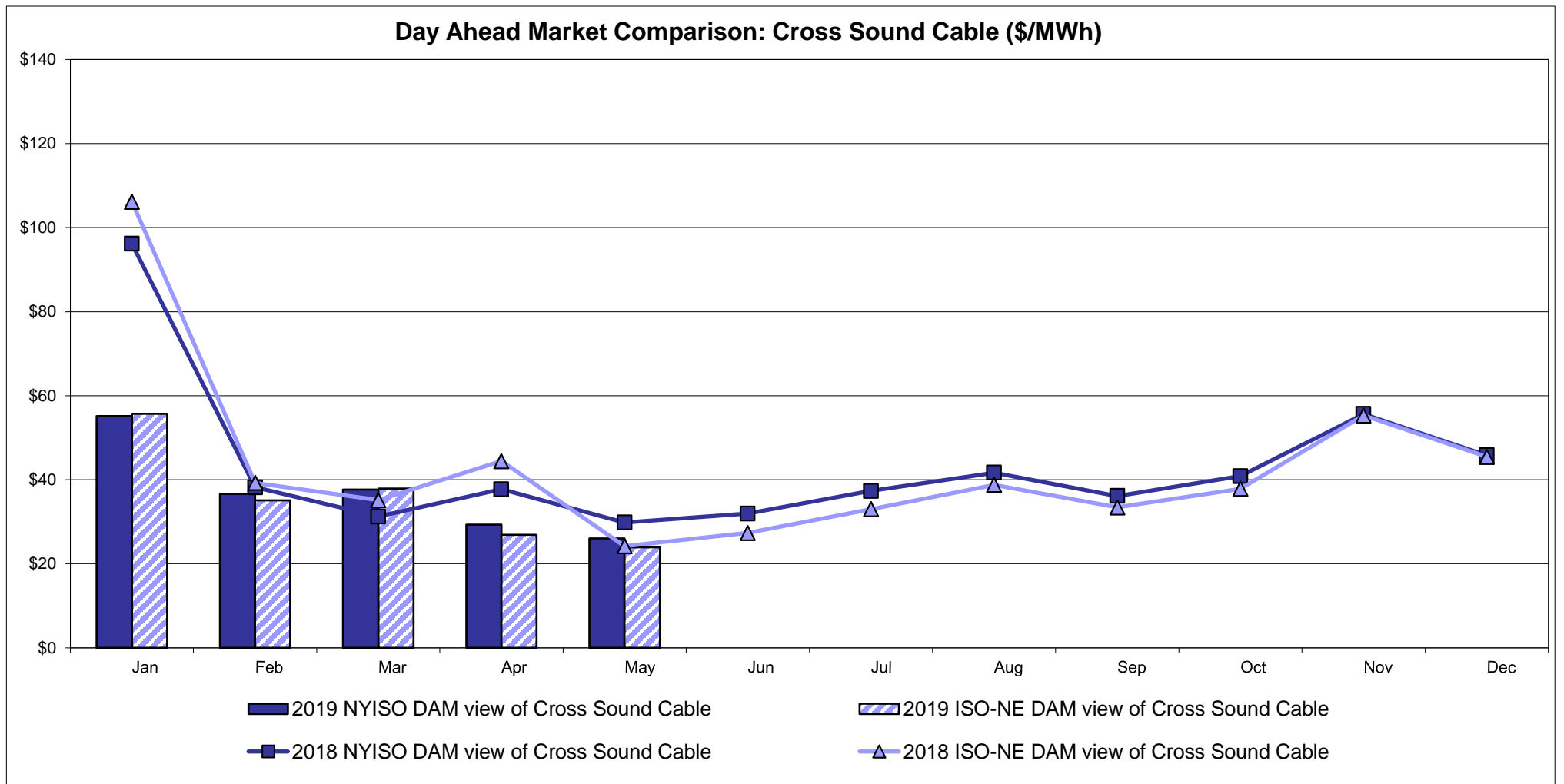


# External Comparison Ontario IESO



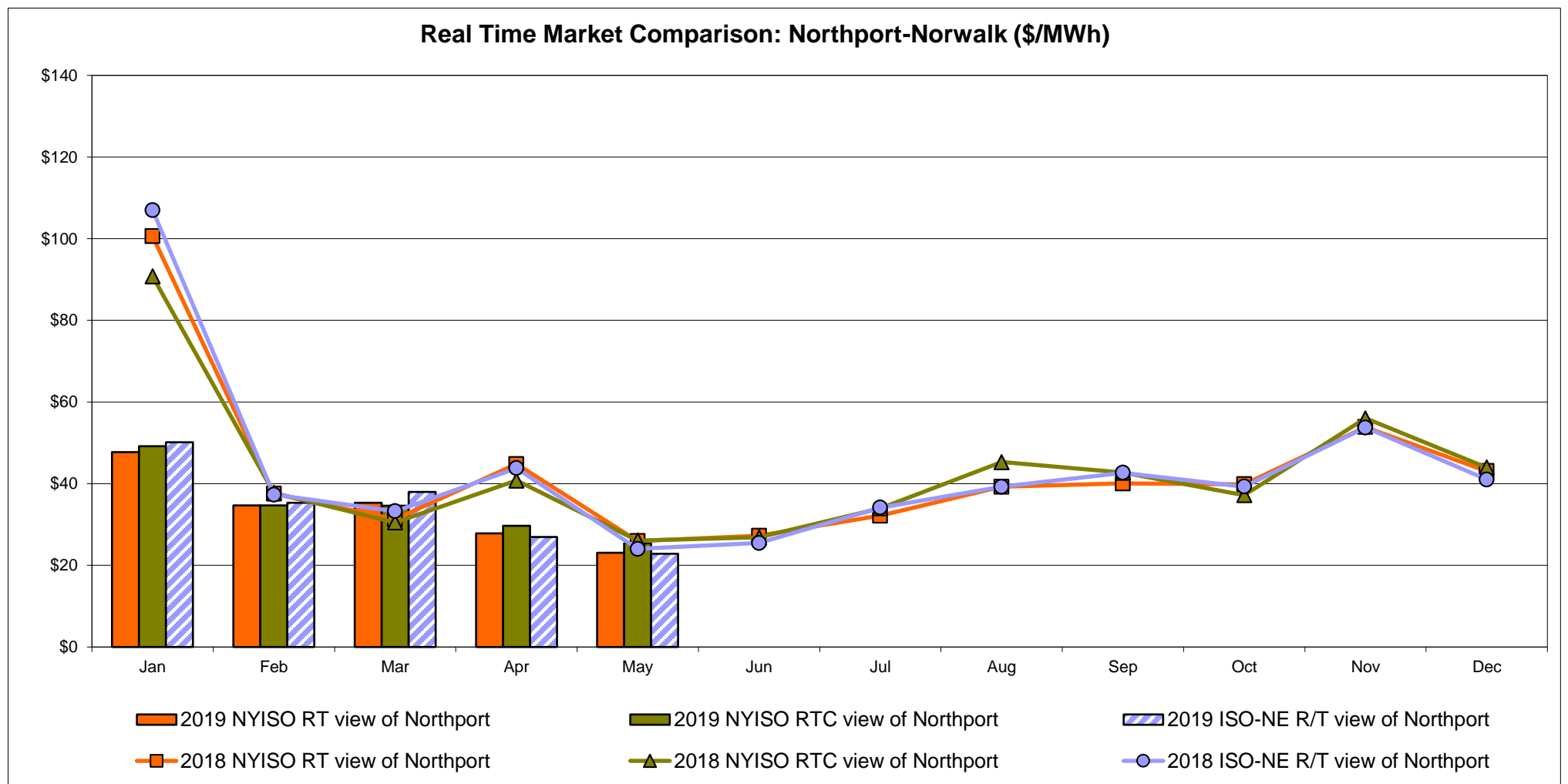
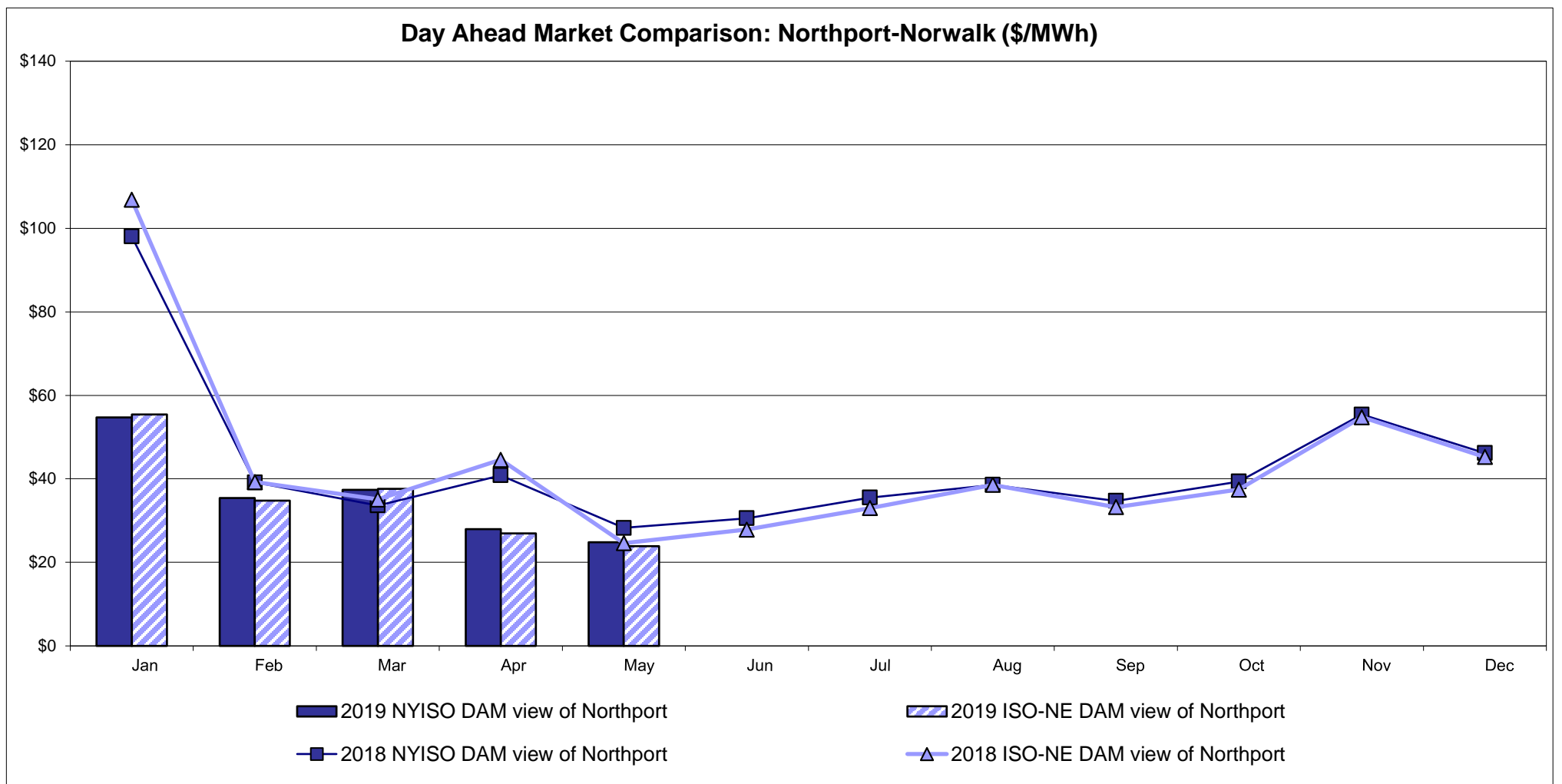
Notes: Exchange factor used for May 2019 was 0.742942050520059 to US  
 HOEP: Hourly Ontario Energy Price  
 Pre-Dispatch: Projected Energy Price

# External Controllable Line: Cross Sound Cable (New England)



Note:  
 ISO-NE Forecast is an advisory posting @ 18:00 day before.  
 The DAM and R/T prices at the Shorham 13899 interface are used for ISO-NE.  
 The DAM and R/T prices at the CSC interface are used for NYISO.

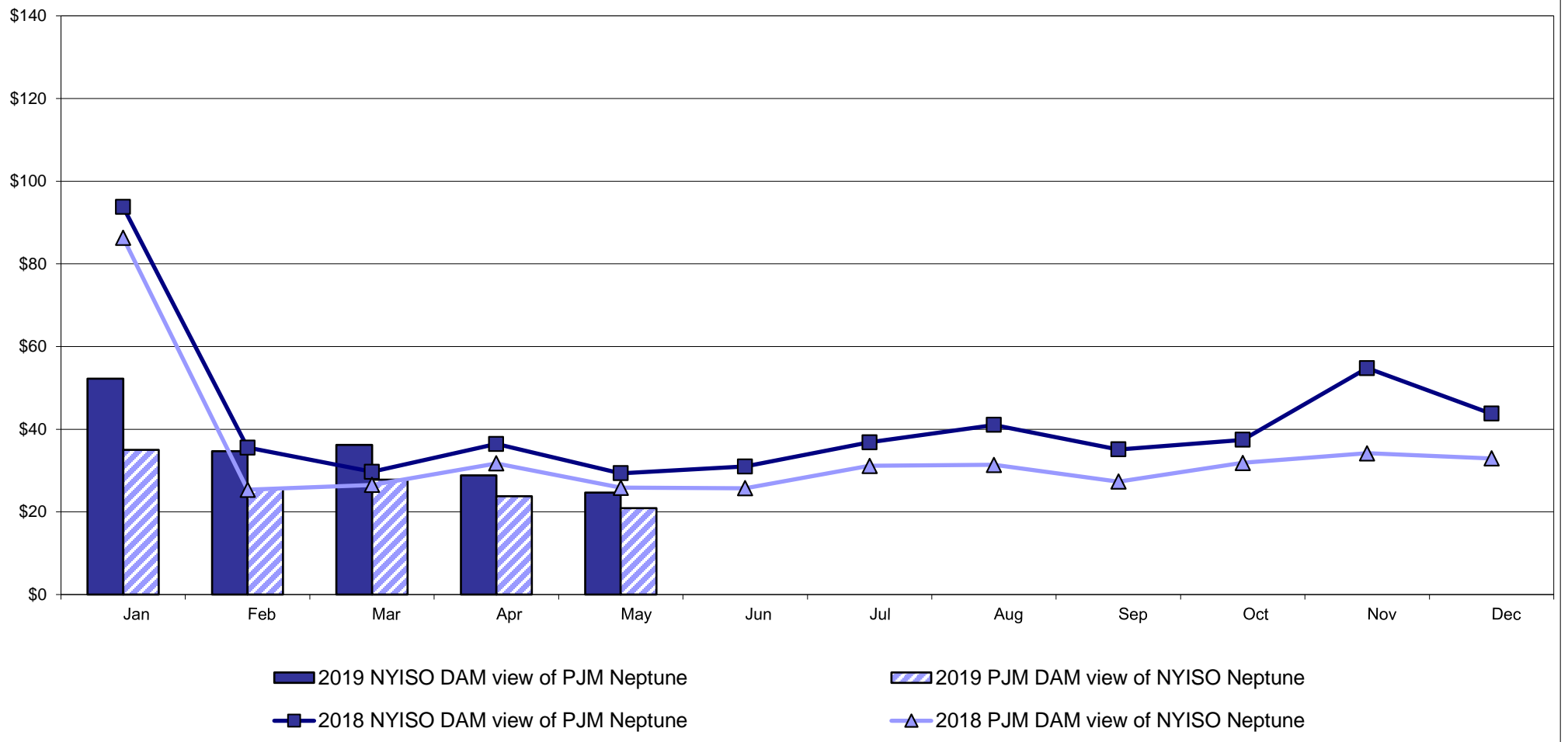
# External Controllable Line: Northport - Norwalk (New England)



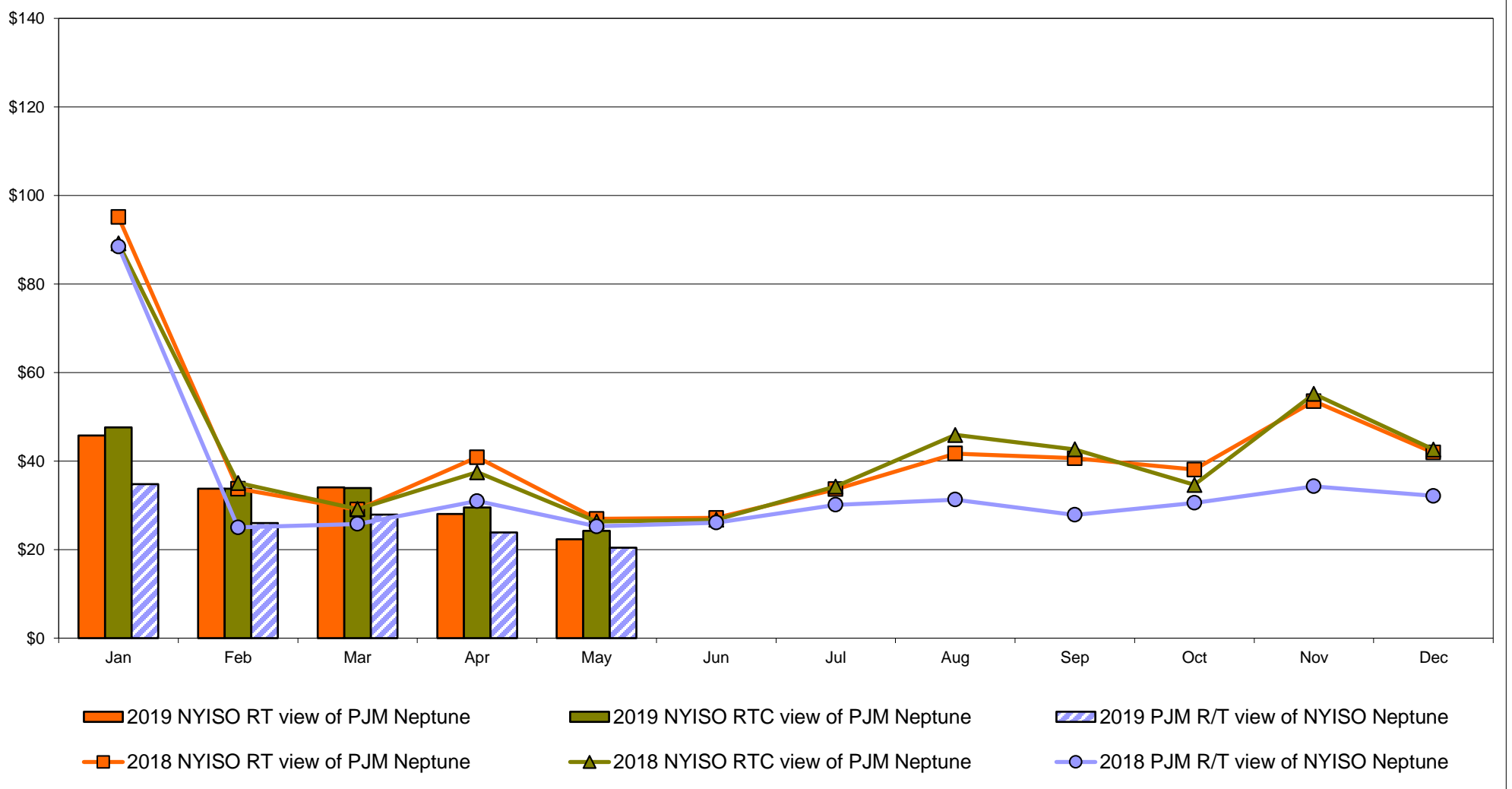
Note:  
 ISO-NE Forecast is an advisory posting @ 18:00 day before.  
 The DAM and R/T prices at the Northport 138 interface are used for ISO-NE.  
 The DAM and R/T prices at the 1385 interface are used for NYISO.

# External Controllable Line: Neptune (PJM)

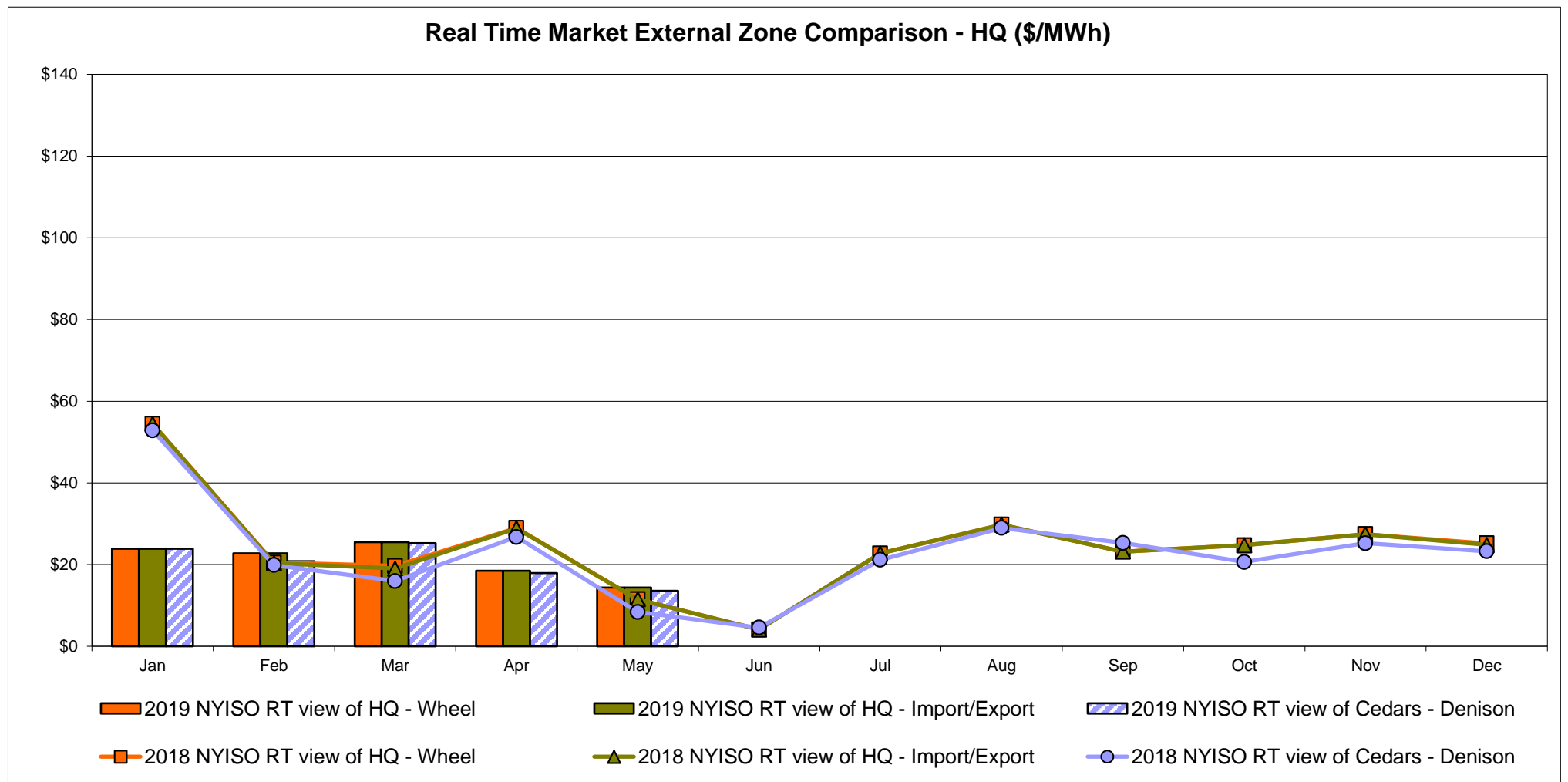
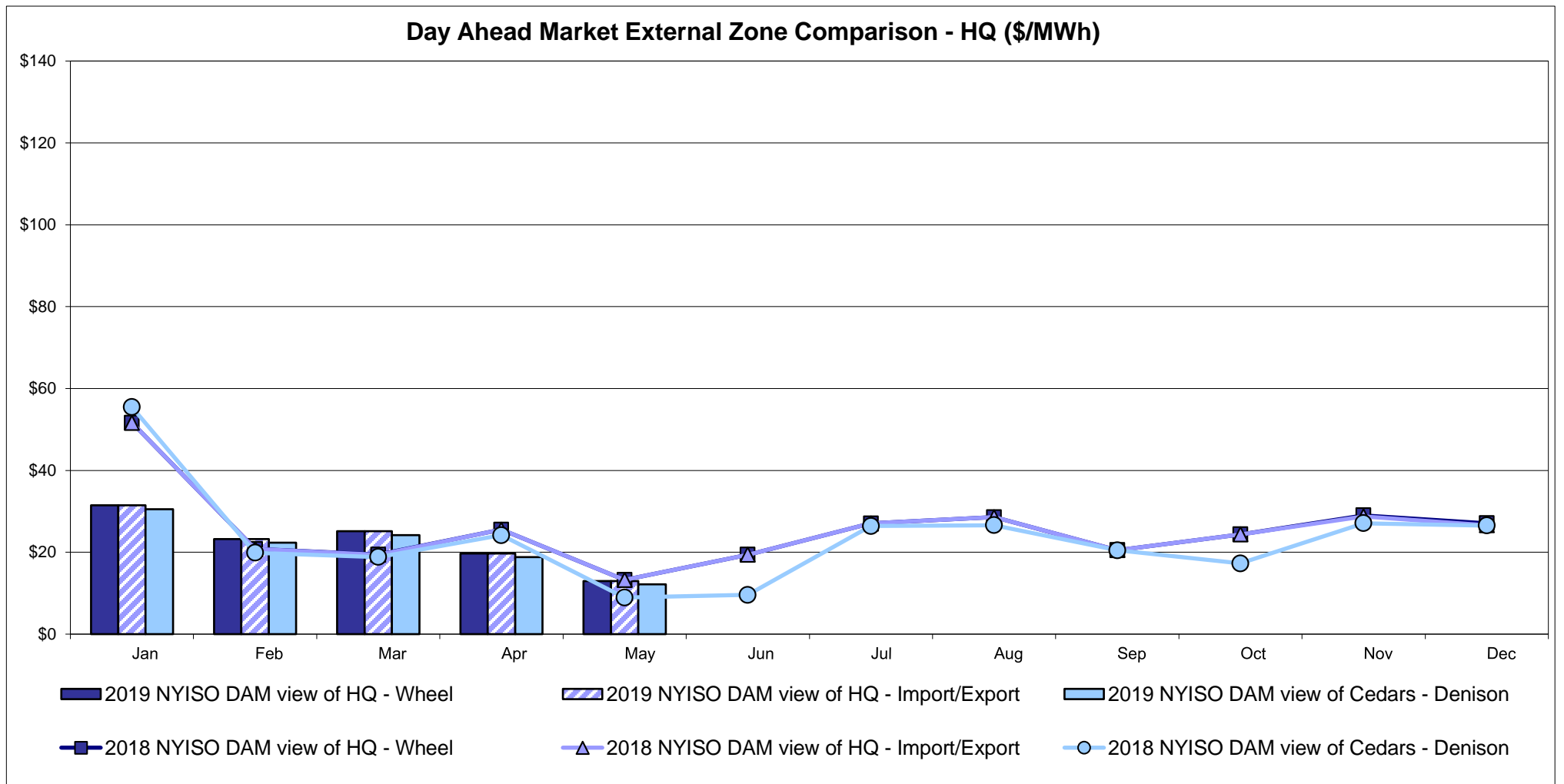
## Day Ahead Market Comparison: Neptune (\$/MWh)



## Real Time Market Comparison: Neptune (\$/MWh)

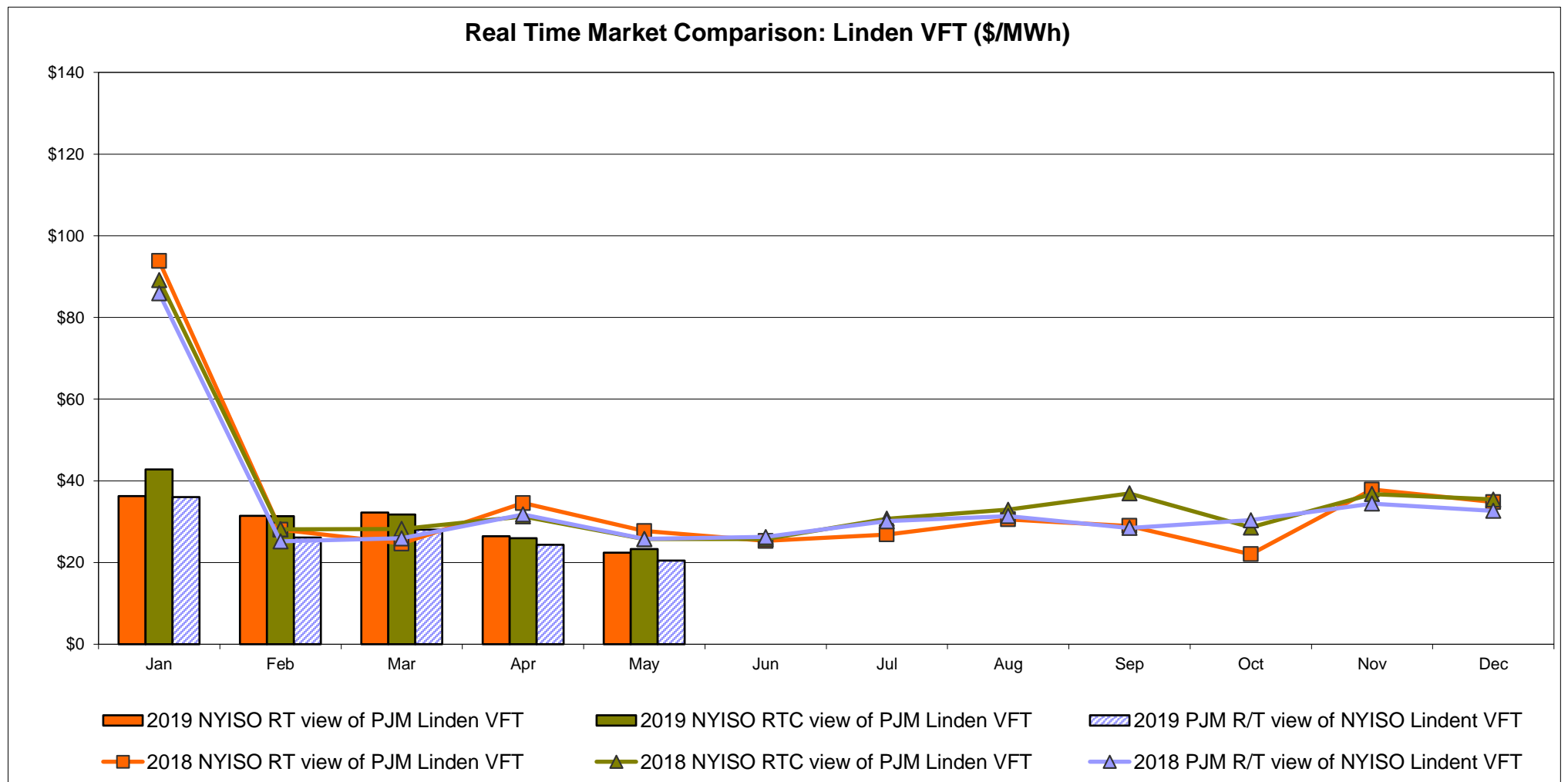
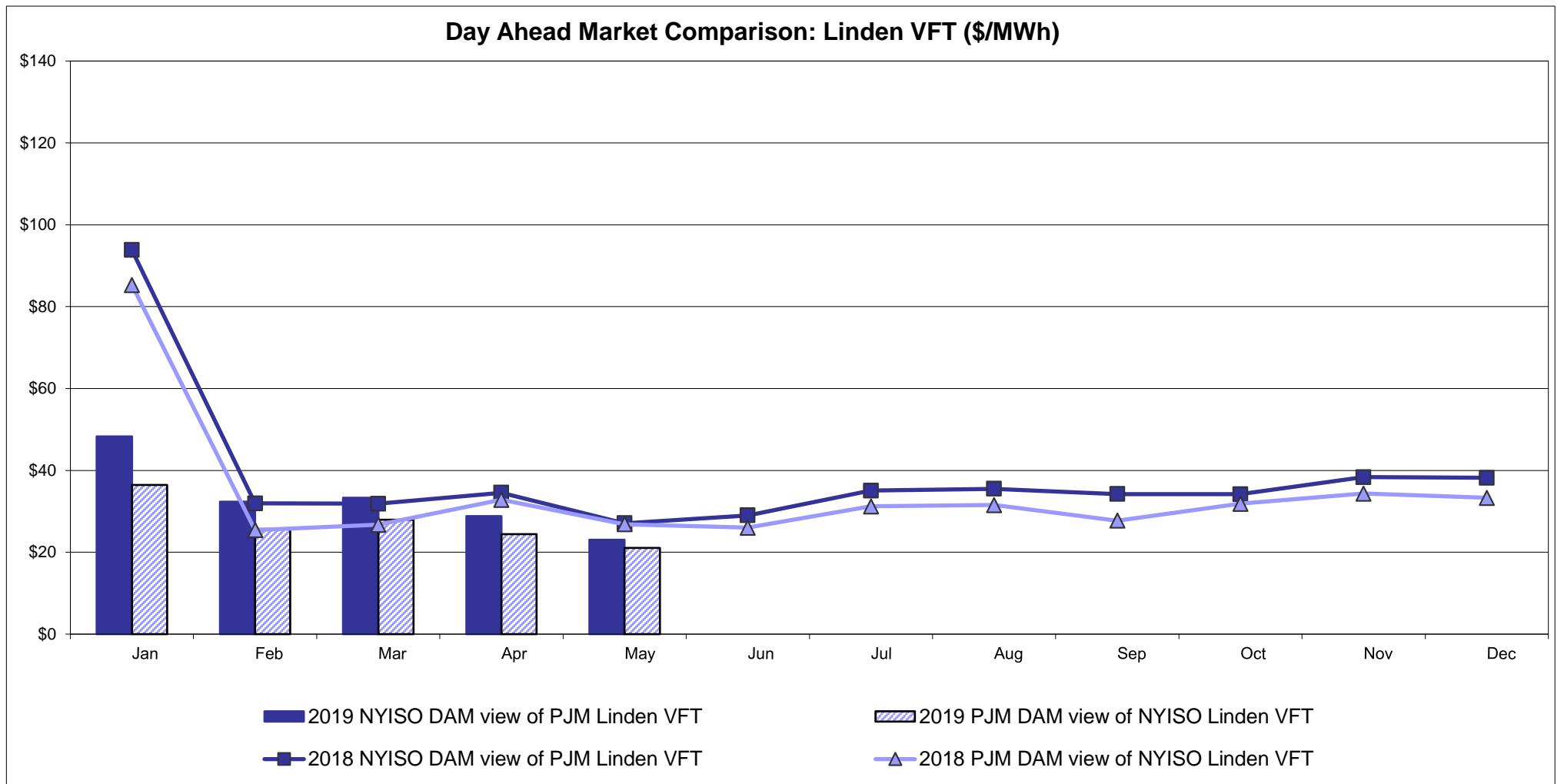


# External Comparison Hydro-Quebec



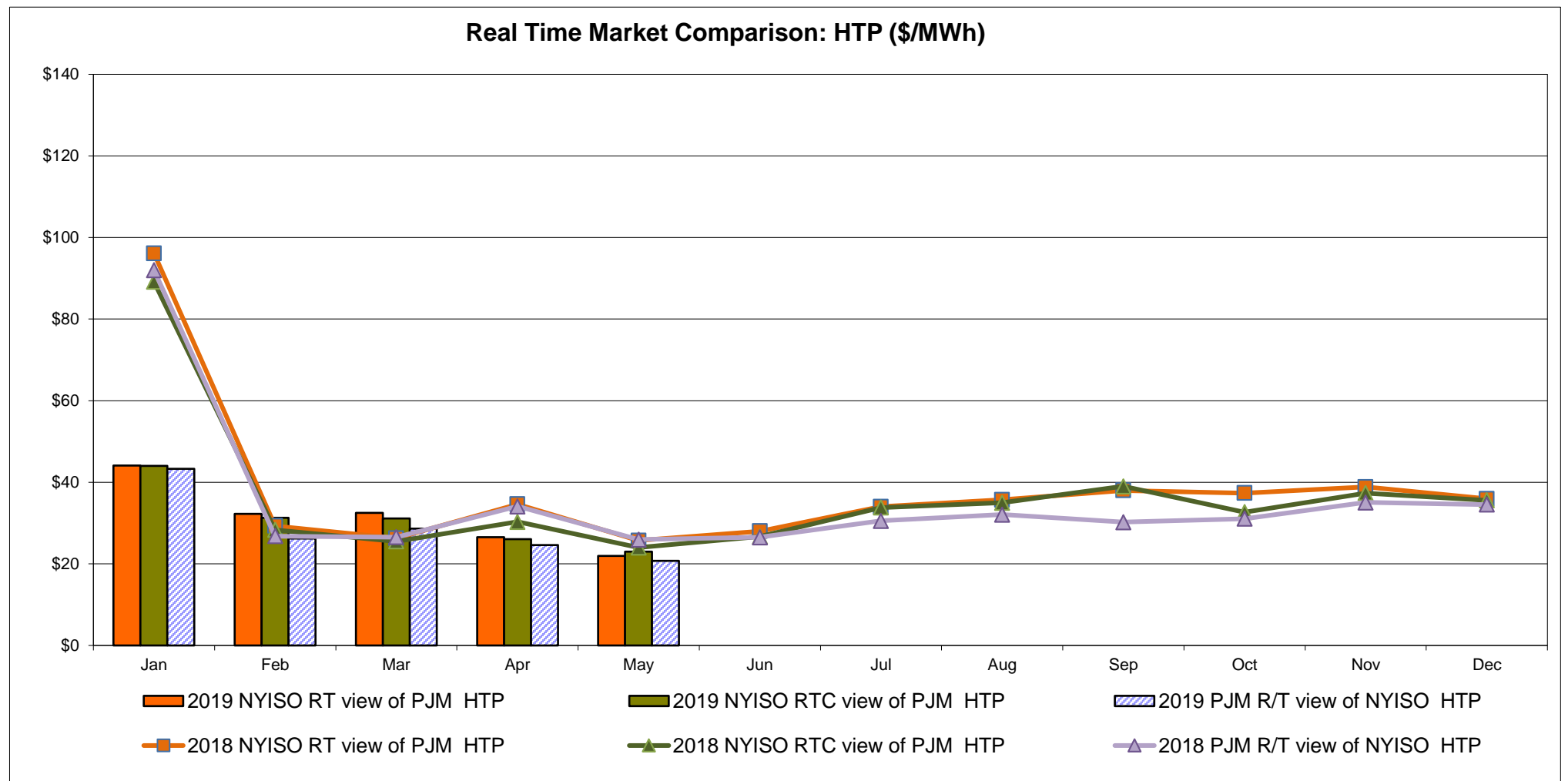
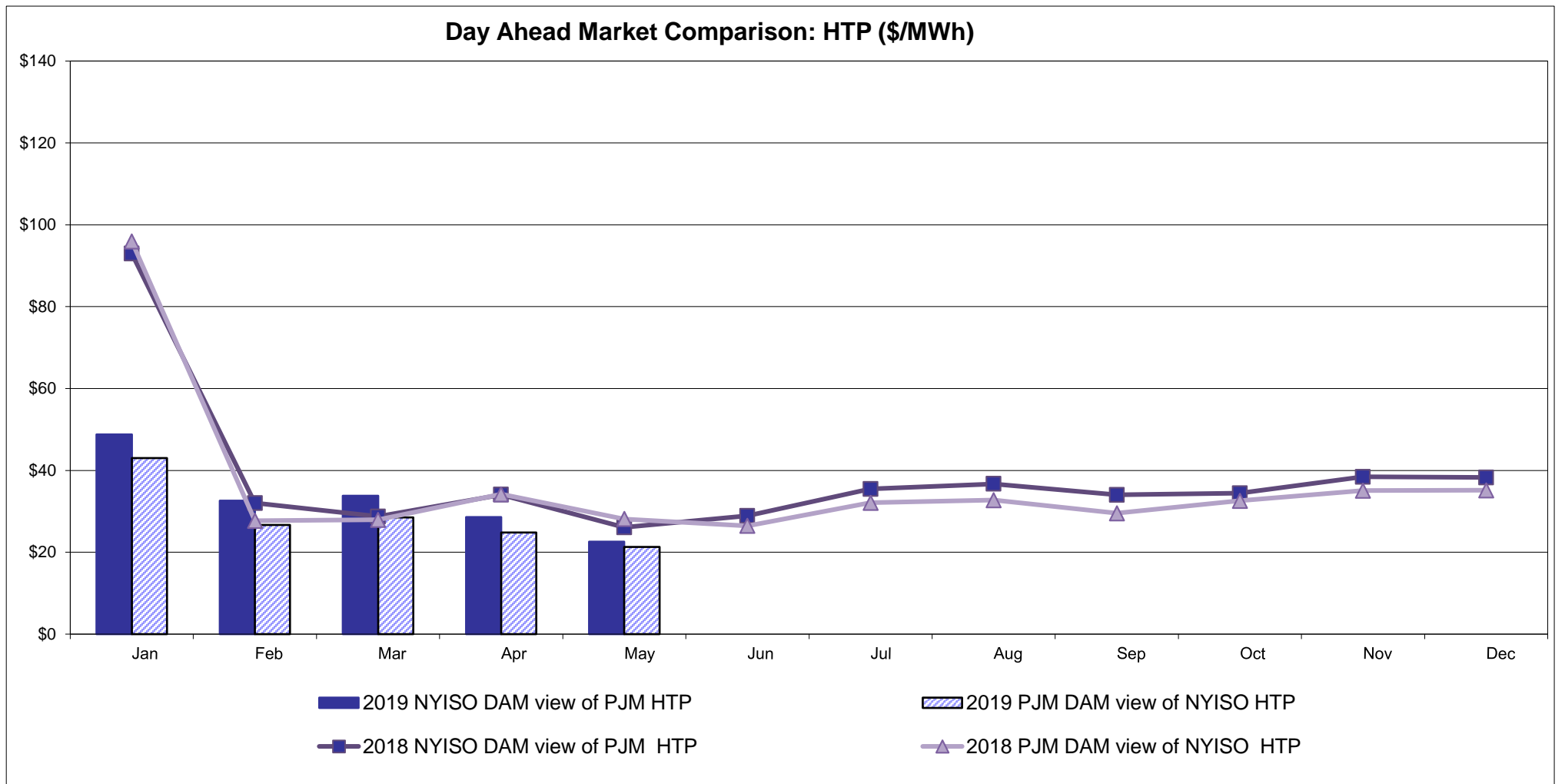
Note:  
Hydro-Quebec Prices are unavailable.

# External Controllable Line: Linden VFT (PJM)





## External Controllable Line: Hudson (PJM)

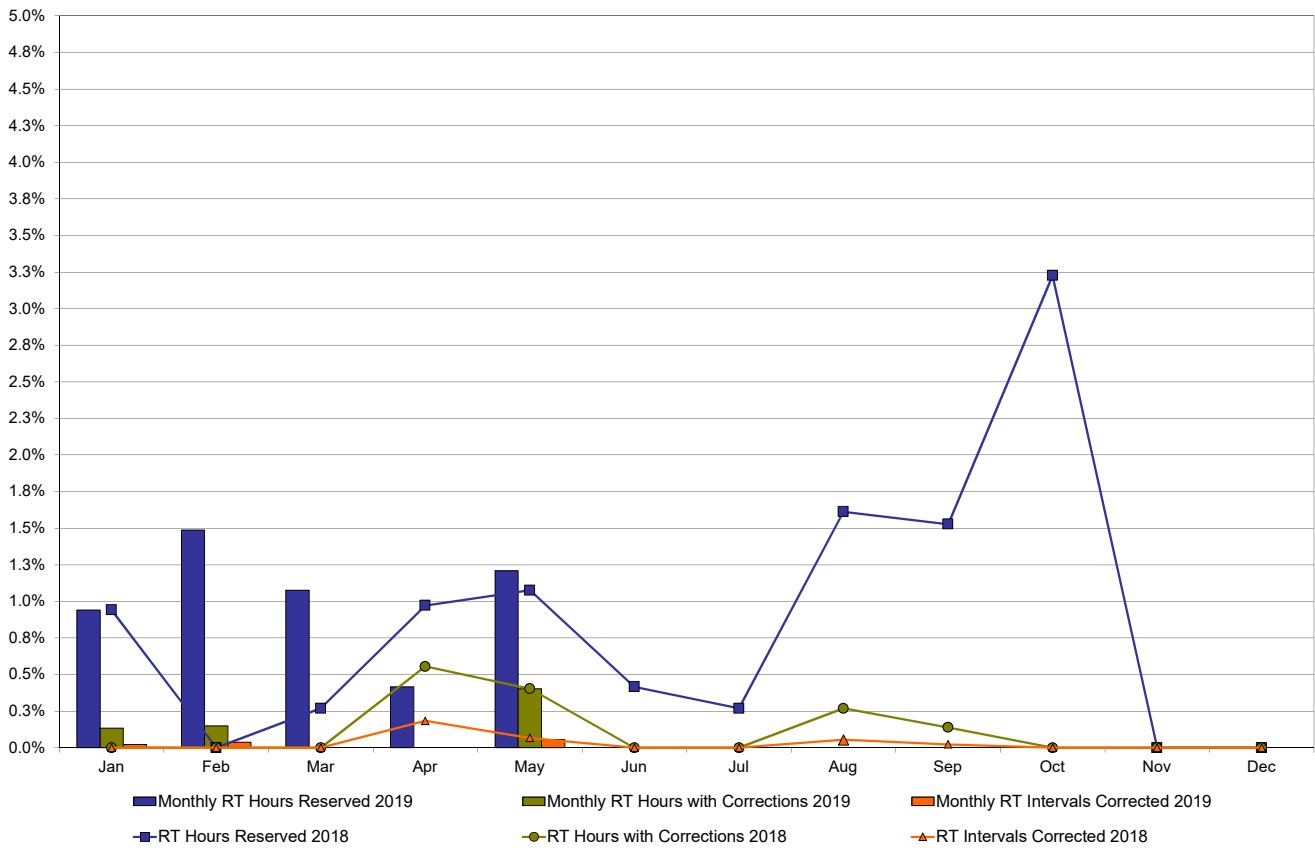


**NYISO Real Time Price Correction Statistics**

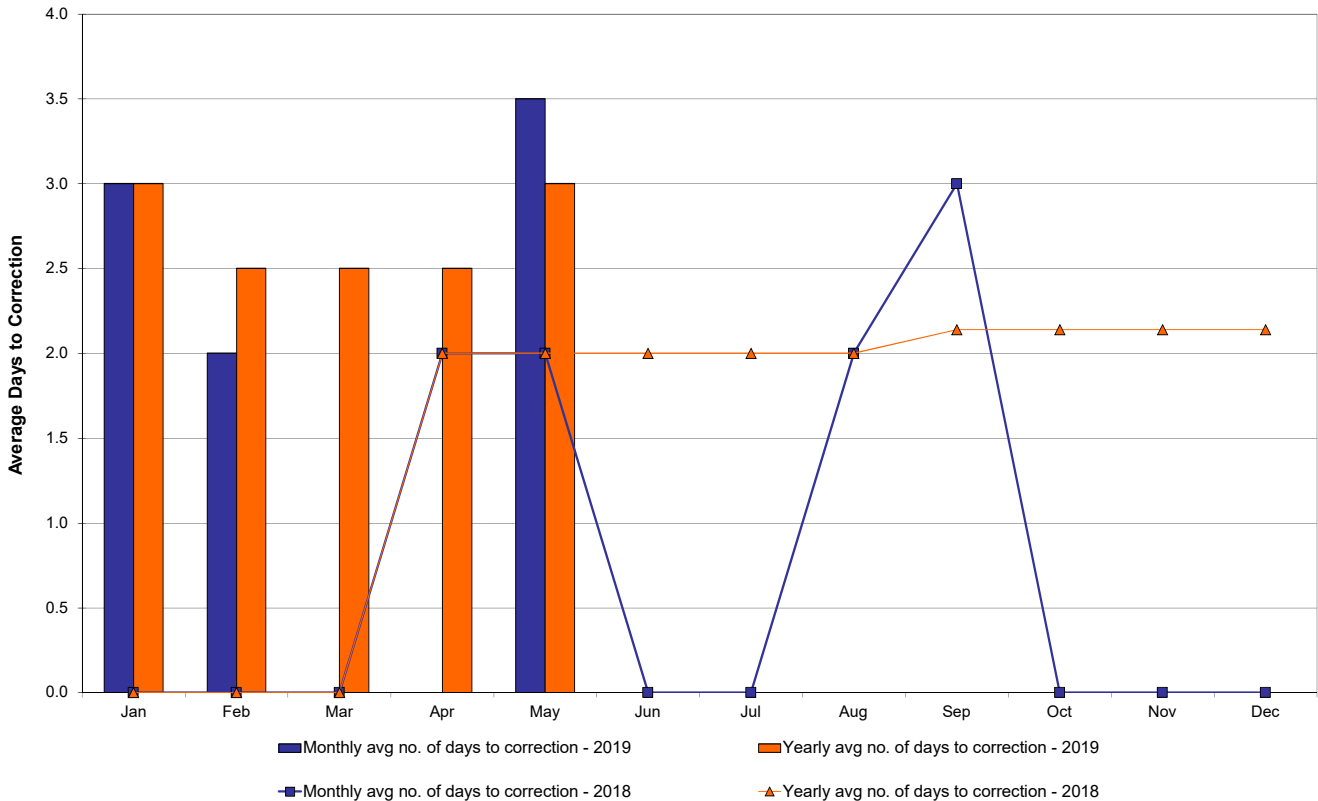
<b>2019</b>		<u>January</u>	<u>February</u>	<u>March</u>	<u>April</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>August</u>	<u>September</u>	<u>October</u>	<u>November</u>	<u>December</u>
<b>Hour Corrections</b>													
Number of hours with corrections	in the month	1	1	0	0	3							
Number of hours	in the month	744	672	743	720	744							
% of hours with corrections	in the month	0.13%	0.15%	0.00%	0.00%	0.40%							
% of hours with corrections	year-to-date	0.13%	0.14%	0.09%	0.07%	0.14%							
<b>Interval Corrections</b>													
Number of intervals corrected	in the month	2	3	0	0	5							
Number of intervals	in the month	9,071	8,131	9,008	8,750	9,033							
% of intervals corrected	in the month	0.02%	0.04%	0.00%	0.00%	0.06%							
% of intervals corrected	year-to-date	0.02%	0.03%	0.02%	0.01%	0.02%							
<b>Hours Reserved</b>													
Number of hours reserved	in the month	7	10	8	3	9							
Number of hours	in the month	744	672	743	720	744							
% of hours reserved	in the month	0.94%	1.49%	1.08%	0.42%	1.21%							
% of hours reserved	year-to-date	0.94%	1.20%	1.16%	0.97%	1.02%							
<b>Days to Correction *</b>													
Avg. number of days to correction	in the month	3.00	2.00	0.00	0.00	3.50							
Avg. number of days to correction	year-to-date	3.00	2.50	2.50	2.50	3.00							
<b>Days Without Corrections</b>													
Days without corrections	in the month	30	27	31	30	29							
Days without corrections	year-to-date	30	57	88	118	147							
<b>2018</b>		<u>January</u>	<u>February</u>	<u>March</u>	<u>April</u>	<u>May</u>	<u>June</u>	<u>July</u>	<u>August</u>	<u>September</u>	<u>October</u>	<u>November</u>	<u>December</u>
<b>Hour Corrections</b>													
Number of hours with corrections	in the month	0	0	0	4	3	0	0	2	1	0	0	0
Number of hours	in the month	744	672	743	720	744	720	744	744	720	744	721	744
% of hours with corrections	in the month	0.00%	0.00%	0.00%	0.56%	0.40%	0.00%	0.00%	0.27%	0.14%	0.00%	0.00%	0.00%
% of hours with corrections	year-to-date	0.00%	0.00%	0.00%	0.14%	0.19%	0.16%	0.14%	0.15%	0.15%	0.14%	0.12%	0.11%
<b>Interval Corrections</b>													
Number of intervals corrected	in the month	0	0	0	16	6	0	0	5	2	0	0	0
Number of intervals	in the month	9,021	8,112	9,002	8,717	9,033	8,723	9,021	9,071	8,723	8,990	8,763	8,993
% of intervals corrected	in the month	0.00%	0.00%	0.00%	0.18%	0.07%	0.00%	0.00%	0.06%	0.02%	0.00%	0.00%	0.00%
% of intervals corrected	year-to-date	0.00%	0.00%	0.00%	0.05%	0.05%	0.04%	0.04%	0.04%	0.04%	0.03%	0.03%	0.03%
<b>Hours Reserved</b>													
Number of hours reserved	in the month	7	0	2	7	8	3	2	12	11	24	0	0
Number of hours	in the month	744	672	743	720	744	720	744	744	720	744	721	744
% of hours reserved	in the month	0.94%	0.00%	0.27%	0.97%	1.08%	0.42%	0.27%	1.61%	1.53%	3.23%	0.00%	0.00%
% of hours reserved	year-to-date	0.94%	0.49%	0.42%	0.56%	0.66%	0.62%	0.57%	0.70%	0.79%	1.04%	0.95%	0.87%
<b>Days to Correction *</b>													
Avg. number of days to correction	in the month	0.00	0.00	0.00	2.00	2.00	0.00	0.00	2.00	3.00	0.00	0.00	0.00
Avg. number of days to correction	year-to-date	0.00	0.00	0.00	2.00	2.00	2.00	2.00	2.00	2.14	2.14	2.14	2.14
<b>Days Without Corrections</b>													
Days without corrections	in the month	31	28	31	28	28	30	31	30	29	31	30	31
Days without corrections	year-to-date	31	59	90	118	146	176	207	237	266	297	327	358

\*Calendar days from reservation date; for June 2018 forward, business days from market date

### Percentage of Real-Time Corrections

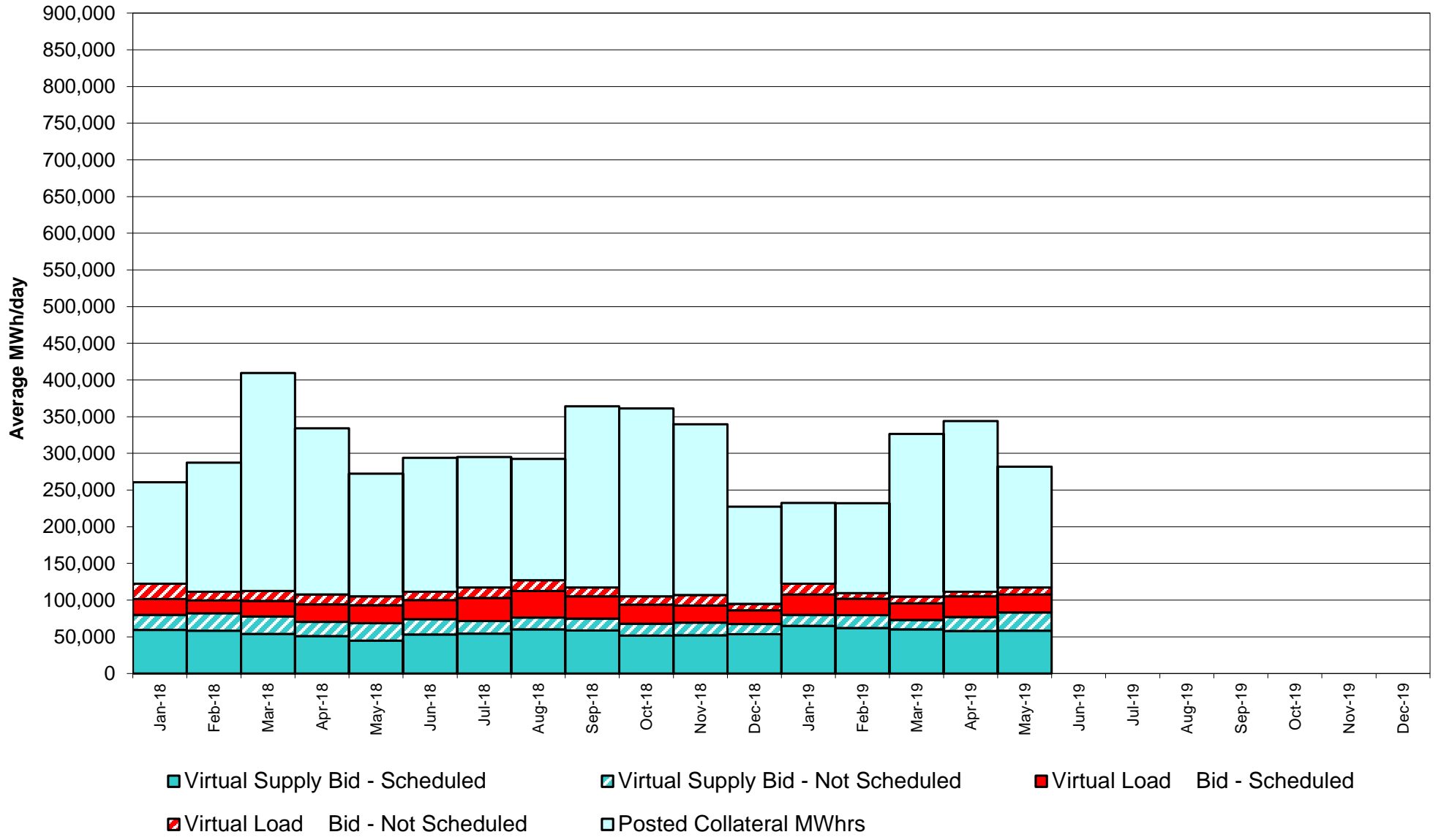


### Annual average time period for making Price Corrections (from reservation date) \*

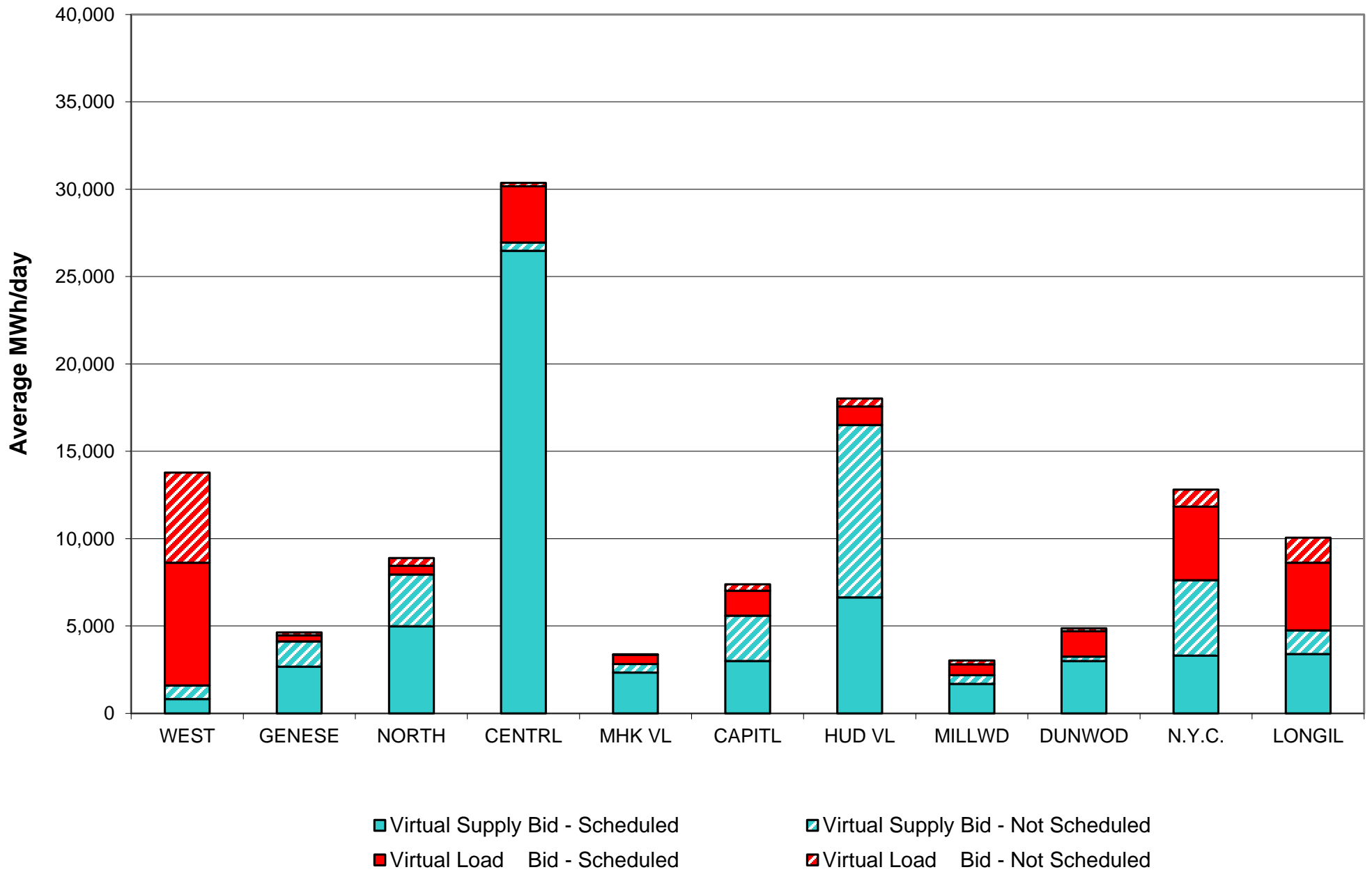


\*Calendar days from reservation date, for June 2018 forward, business days from market date

## NYISO Virtual Trading Average MWh per day



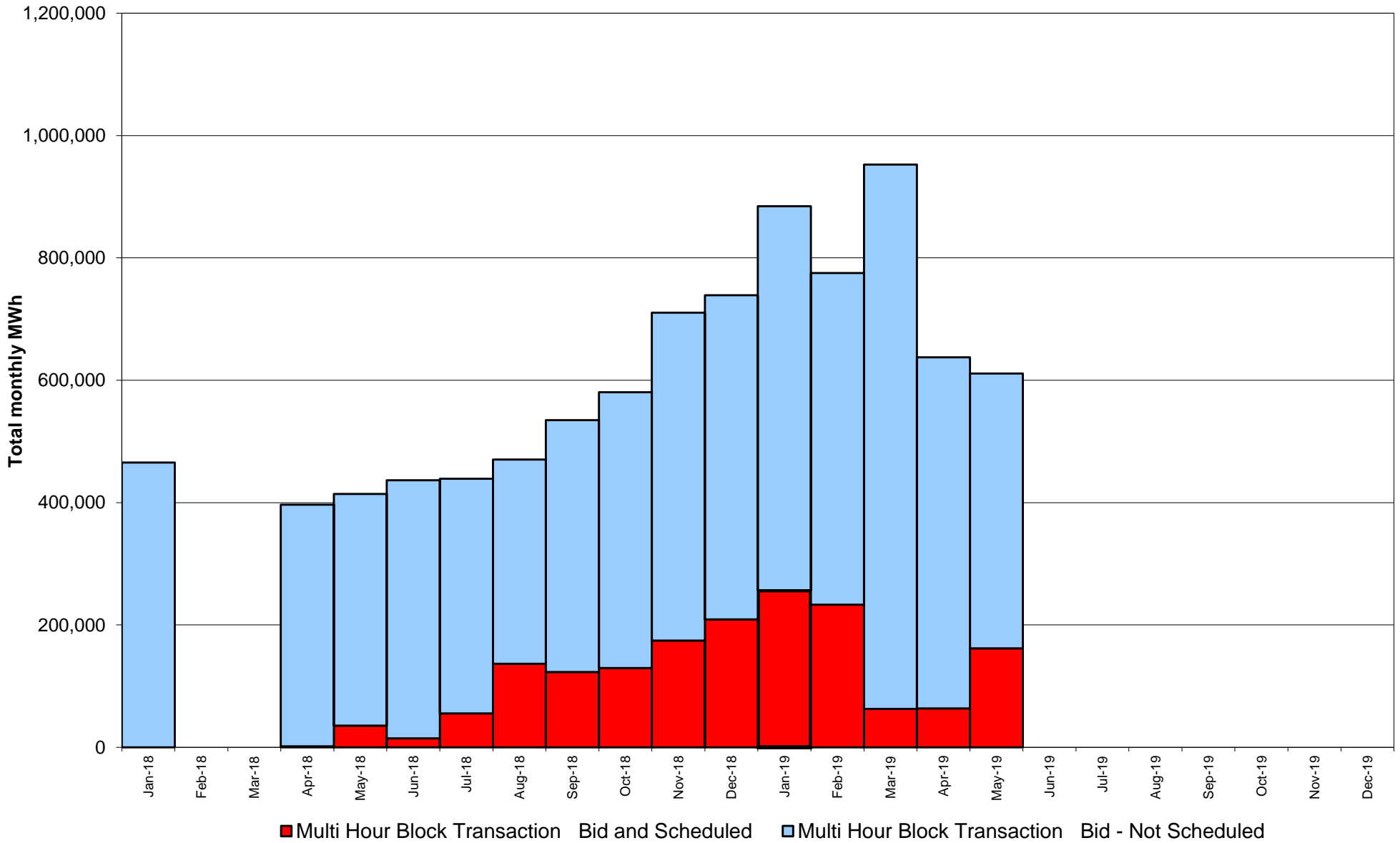
## Virtual Load and Supply Zonal Statistics through May 31, 2019



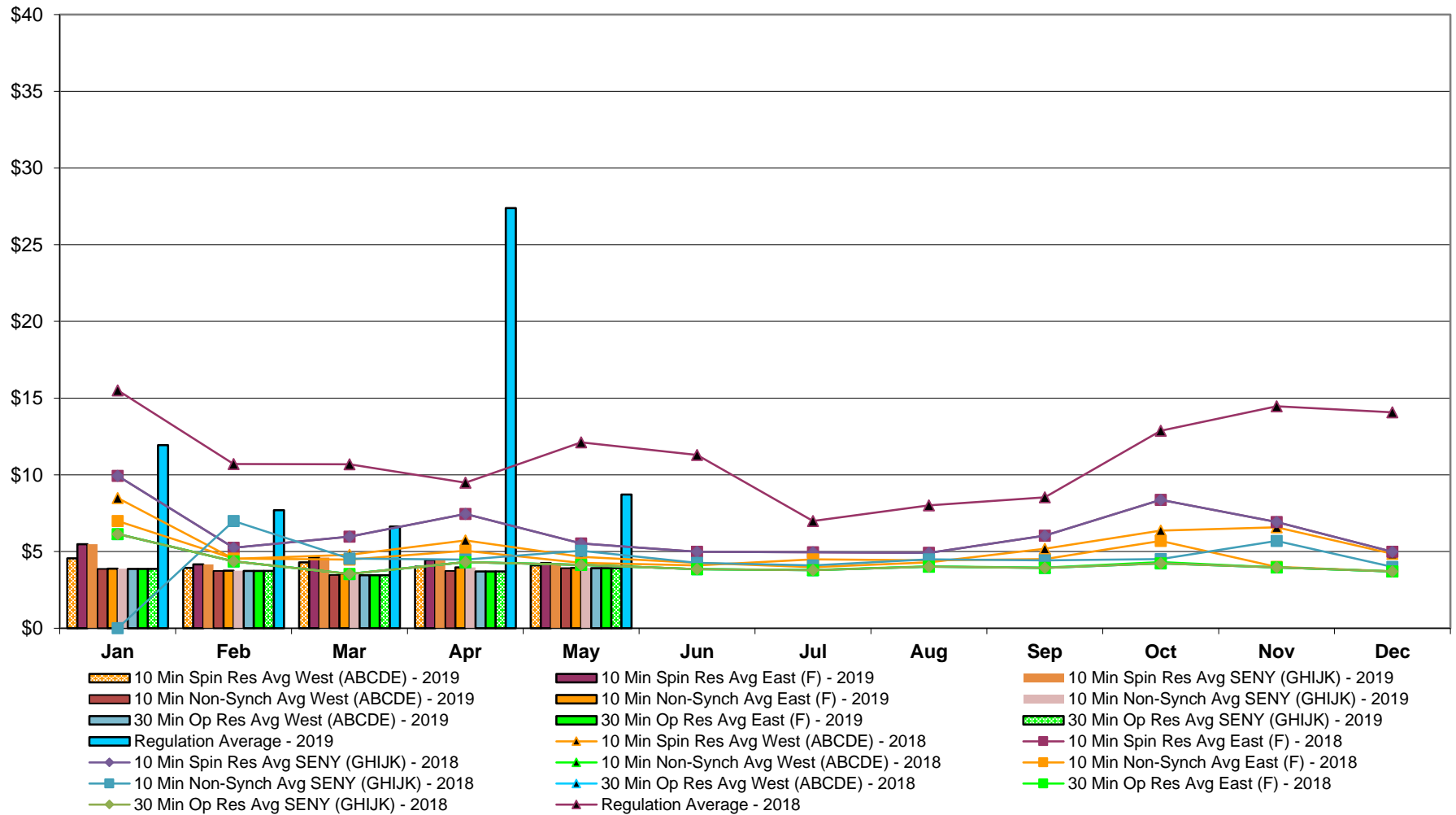
**Virtual Load and Supply Zonal Statistics (Average MWh/day) - 2019**

		Virtual Load Bid		Virtual Supply Bid				Virtual Load Bid		Virtual Supply Bid				Virtual Load Bid		Virtual Supply Bid	
Zone	Date	Scheduled	Not Scheduled	Scheduled	Not Scheduled	Zone	Date	Scheduled	Not Scheduled	Scheduled	Not Scheduled	Zone	Date	Scheduled	Not Scheduled	Scheduled	Not Scheduled
<b>WEST</b>	Jan-19	9,007	5,211	1,609	797	<b>MHK VL</b>	Jan-19	1,171	117	1,965	471	<b>DUNWOD</b>	Jan-19	1,370	798	2,651	203
	Feb-19	6,628	2,000	1,397	921		Feb-19	872	75	1,709	596		Feb-19	1,064	494	3,273	259
	Mar-19	5,264	2,548	1,107	569		Mar-19	1,275	113	2,208	386		Mar-19	1,159	471	3,571	199
	Apr-19	9,744	2,589	721	461		Apr-19	843	43	1,904	331		Apr-19	1,446	125	3,278	228
	May-19	7,022	5,165	818	783		May-19	527	32	2,337	489		May-19	1,459	153	2,999	255
	Jun-19						Jun-19						Jun-19				
	Jul-19						Jul-19						Jul-19				
	Aug-19						Aug-19						Aug-19				
	Sep-19						Sep-19						Sep-19				
	Oct-19						Oct-19						Oct-19				
	Nov-19						Nov-19						Nov-19				
	Dec-19						Dec-19						Dec-19				
<b>GENESE</b>	Jan-19	527	153	3,560	529	<b>CAPITL</b>	Jan-19	3,042	962	1,550	1,424	<b>N.Y.C.</b>	Jan-19	3,665	3,061	2,599	1,366
	Feb-19	896	66	3,776	520		Feb-19	2,591	485	1,851	1,756		Feb-19	2,545	2,025	2,248	1,648
	Mar-19	987	241	3,224	432		Mar-19	2,012	383	2,004	1,666		Mar-19	3,746	1,774	2,432	968
	Apr-19	808	83	4,479	475		Apr-19	1,585	232	2,102	1,111		Apr-19	3,431	656	2,869	4,012
	May-19	343	171	2,680	1,446		May-19	1,438	362	3,006	2,580		May-19	4,207	977	3,304	4,320
	Jun-19						Jun-19						Jun-19				
	Jul-19						Jul-19						Jul-19				
	Aug-19						Aug-19						Aug-19				
	Sep-19						Sep-19						Sep-19				
	Oct-19						Oct-19						Oct-19				
	Nov-19						Nov-19						Nov-19				
	Dec-19						Dec-19						Dec-19				
<b>NORTH</b>	Jan-19	484	540	6,406	1,553	<b>HUD VL</b>	Jan-19	856	980	9,176	7,130	<b>LONGIL</b>	Jan-19	3,362	2,135	3,091	1,056
	Feb-19	431	359	6,559	1,743		Feb-19	977	843	7,408	7,858		Feb-19	2,514	1,297	3,446	1,425
	Mar-19	349	419	6,855	1,845		Mar-19	1,460	1,425	8,787	4,948		Mar-19	2,752	1,198	3,372	1,025
	Apr-19	284	186	7,243	1,823		Apr-19	1,011	487	7,962	8,845		Apr-19	4,934	1,386	3,096	697
	May-19	498	446	4,995	2,954		May-19	1,064	457	6,634	9,871		May-19	3,869	1,430	3,396	1,359
	Jun-19						Jun-19						Jun-19				
	Jul-19						Jul-19						Jul-19				
	Aug-19						Aug-19						Aug-19				
	Sep-19						Sep-19						Sep-19				
	Oct-19						Oct-19						Oct-19				
	Nov-19						Nov-19						Nov-19				
	Dec-19						Dec-19						Dec-19				
<b>CENTRL</b>	Jan-19	3,795	374	30,145	507	<b>MILLWD</b>	Jan-19	405	386	2,051	169	<b>NYISO</b>	Jan-19	27,683	14,720	64,802	15,203
	Feb-19	3,059	123	29,111	609		Feb-19	540	138	1,311	247		Feb-19	22,118	7,905	62,089	17,582
	Mar-19	3,411	332	25,195	542		Mar-19	505	89	1,404	155		Mar-19	22,918	8,993	60,159	12,736
	Apr-19	3,475	150	22,748	453		Apr-19	686	215	1,636	371		Apr-19	28,247	6,153	58,038	18,807
	May-19	3,220	195	26,474	474		May-19	613	226	1,687	505		May-19	24,261	9,615	58,331	25,035
	Jun-19						Jun-19						Jun-19				
	Jul-19						Jul-19						Jul-19				
	Aug-19						Aug-19						Aug-19				
	Sep-19						Sep-19						Sep-19				
	Oct-19						Oct-19						Oct-19				
	Nov-19						Nov-19						Nov-19				
	Dec-19						Dec-19						Dec-19				

## NYISO Multi Hour Block Transactions Monthly Total MWh

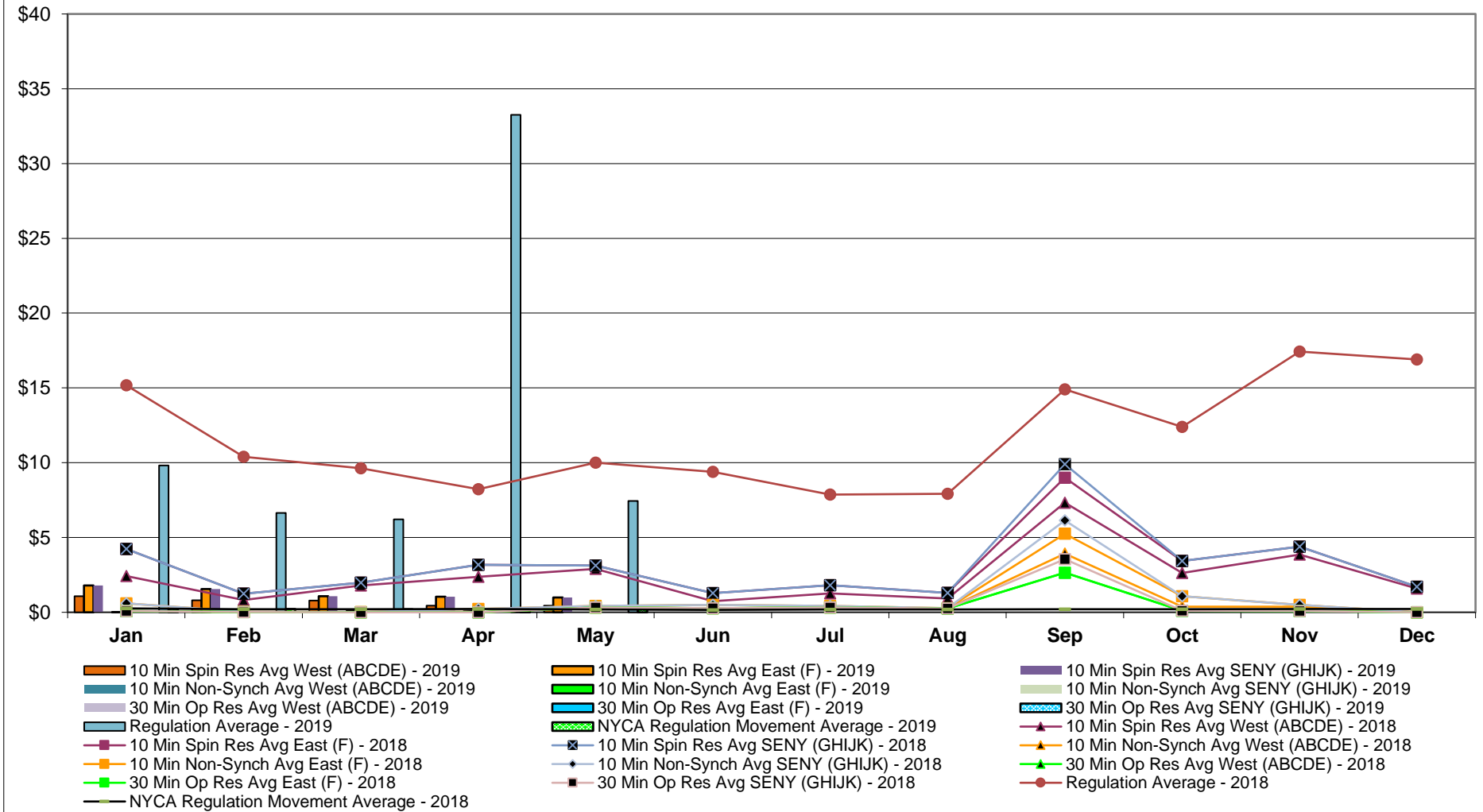


### NYISO Monthly Average Ancillary Service Prices Day Ahead Market 2018 - 2019

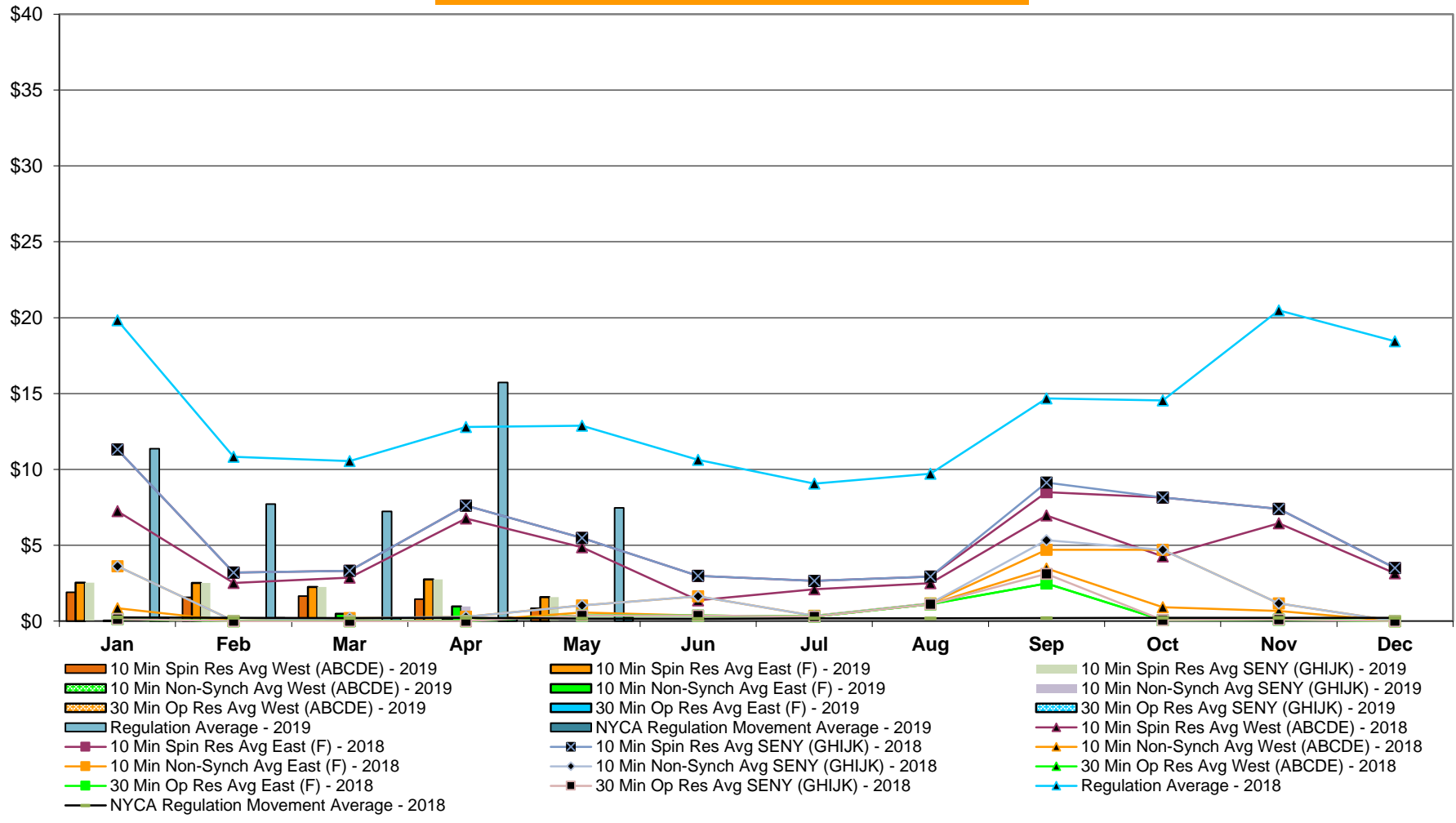




## NYISO Monthly Average Ancillary Service Prices RTC Market 2018 - 2019



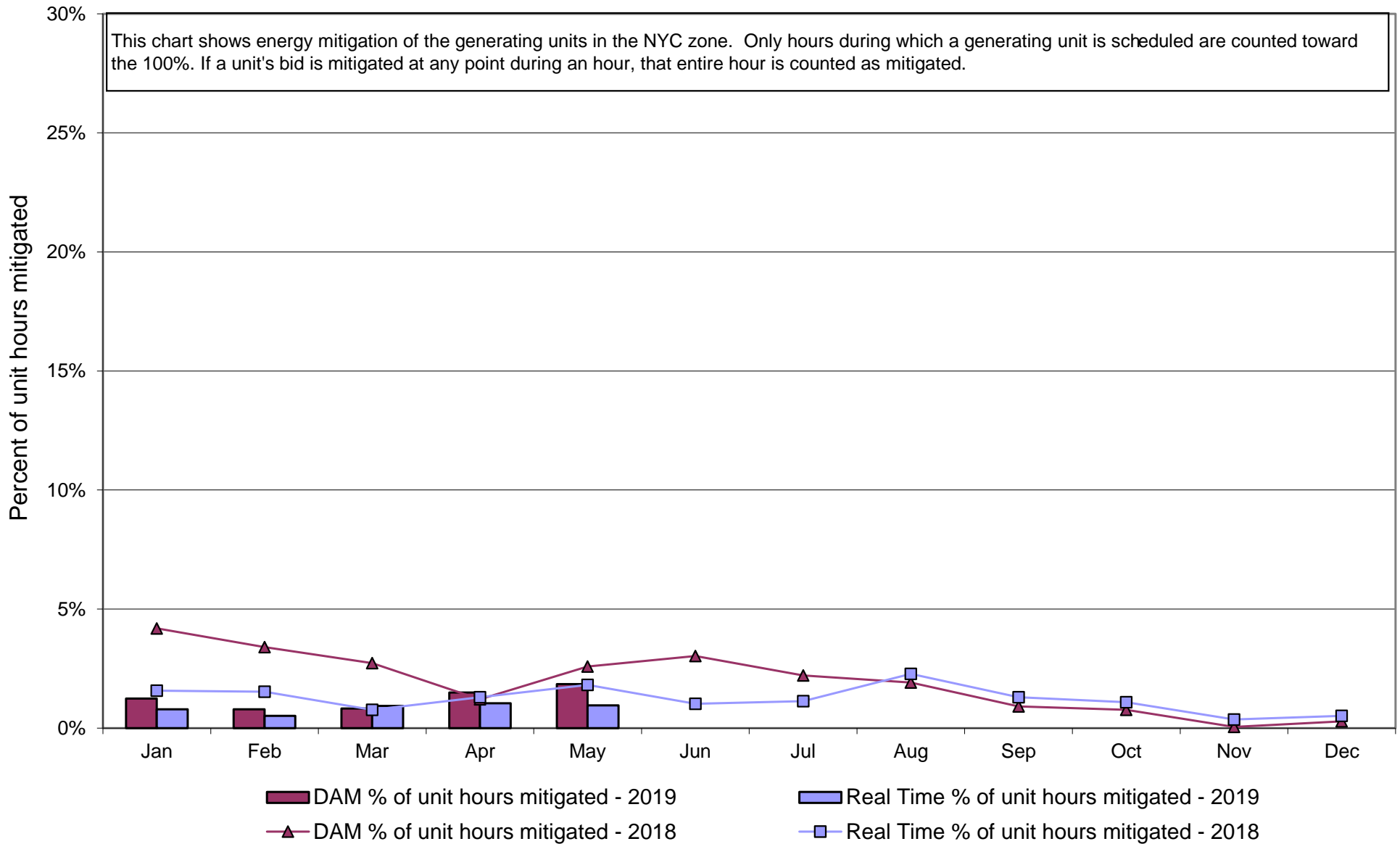
### NYISO Monthly Average Ancillary Service Prices Real Time Market 2018 - 2019



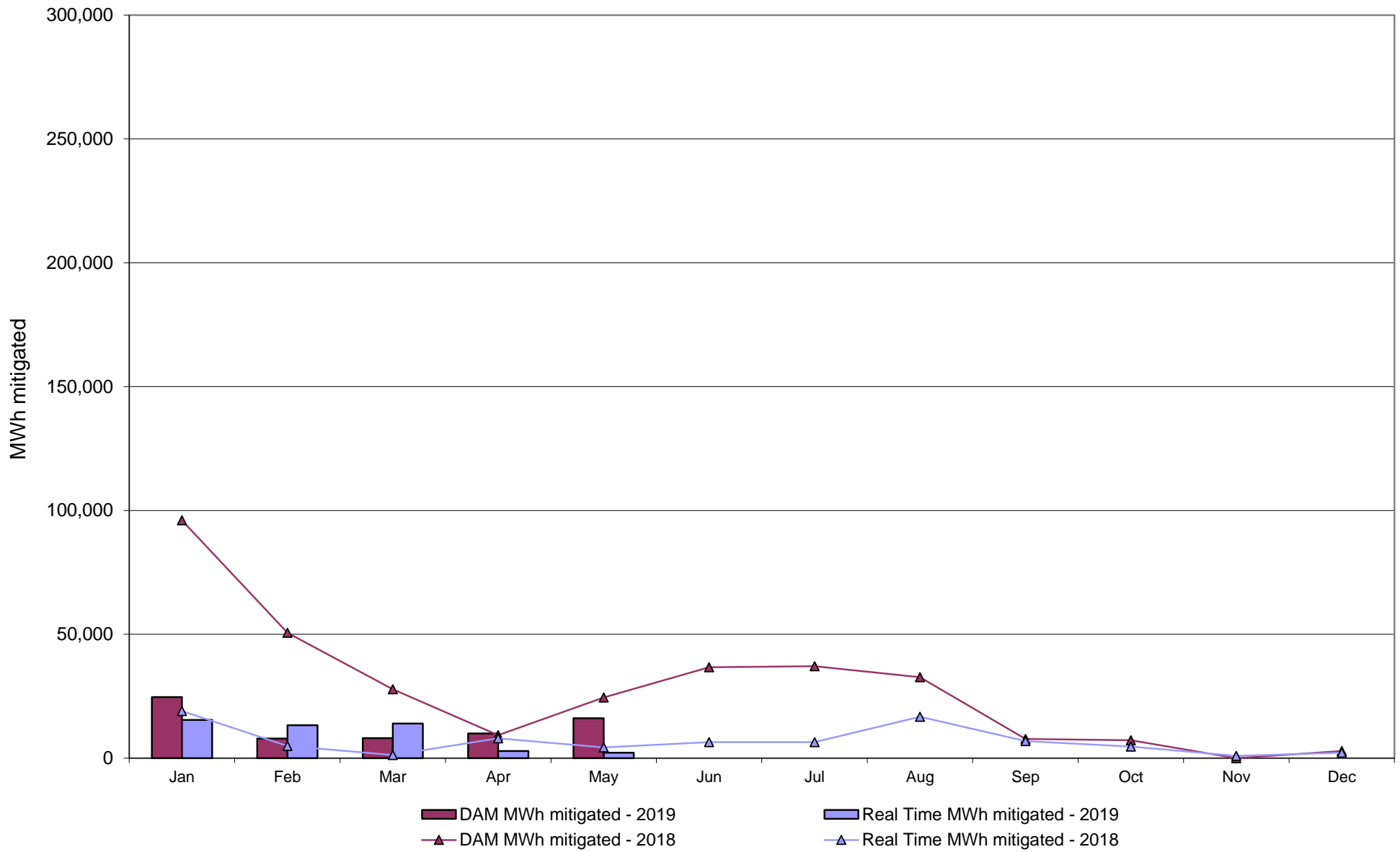
## NYISO Markets Ancillary Services Statistics - Unweighted Price (\$/MWH)

2019	January	February	March	April	May	June	July	August	September	October	November	December
<b>Day Ahead Market</b>												
10 Min Spin SENEY (GHIJK)	5.47	4.17	4.61	4.46	4.25							
10 Min Spin East (F)	5.47	4.17	4.61	4.46	4.25							
10 Min Spin West (ABCDE)	4.56	3.94	4.30	4.01	4.09							
10 Min Non Synch SENEY (GHIJK)	3.88	3.75	3.57	3.96	3.94							
10 Min Non Synch East (F)	3.88	3.75	3.57	3.96	3.94							
10 Min Non Synch West (ABCDE)	3.86	3.74	3.47	3.73	3.91							
30 Min SENEY (GHIJK)	3.86	3.74	3.46	3.71	3.91							
30 Min East (F)	3.86	3.74	3.46	3.71	3.91							
30 Min West (ABCDE)	3.86	3.74	3.46	3.71	3.91							
Regulation	11.94	7.69	6.62	27.38	8.71							
<b>RTC Market</b>												
10 Min Spin SENEY (GHIJK)	1.80	1.55	1.08	1.04	0.99							
10 Min Spin East (F)	1.80	1.55	1.08	1.04	0.99							
10 Min Spin West (ABCDE)	1.08	0.80	0.79	0.44	0.44							
10 Min Non Synch SENEY (GHIJK)	0.01	0.08	0.11	0.13	0.00							
10 Min Non Synch East (F)	0.01	0.08	0.11	0.13	0.00							
10 Min Non Synch West (ABCDE)	0.00	0.01	0.01	0.00	0.00							
30 Min SENEY (GHIJK)	0.00	0.01	0.01	0.00	0.00							
30 Min East (F)	0.00	0.01	0.01	0.00	0.00							
30 Min West (ABCDE)	0.00	0.01	0.01	0.00	0.00							
Regulation	9.81	6.64	6.21	33.26	7.45							
NYCA Regulation Movement	0.23	0.22	0.21	0.25	0.24							
<b>Real Time Market</b>												
10 Min Spin SENEY (GHIJK)	2.53	2.51	2.24	2.75	1.58							
10 Min Spin East (F)	2.53	2.51	2.24	2.75	1.58							
10 Min Spin West (ABCDE)	1.89	1.57	1.64	1.45	0.85							
10 Min Non Synch SENEY (GHIJK)	0.03	0.18	0.48	0.96	0.00							
10 Min Non Synch East (F)	0.03	0.18	0.48	0.96	0.00							
10 Min Non Synch West (ABCDE)	0.00	0.01	0.09	0.17	0.00							
30 Min SENEY (GHIJK)	0.00	0.01	0.03	0.00	0.00							
30 Min East (F)	0.00	0.01	0.03	0.00	0.00							
30 Min West (ABCDE)	0.00	0.01	0.03	0.00	0.00							
Regulation	11.36	7.72	7.23	15.73	7.47							
NYCA Regulation Movement	0.22	0.22	0.20	0.25	0.23							
<b>2018</b>												
	January	February	March	April	May	June	July	August	September	October	November	December
<b>Day Ahead Market</b>												
10 Min Spin SENEY (GHIJK)	9.93	5.24	5.97	7.45	5.52	4.98	4.95	4.91	6.04	8.37	6.93	4.99
10 Min Spin East (F)	9.93	5.24	5.97	7.45	5.52	4.98	4.95	4.91	6.04	8.37	6.93	4.99
10 Min Spin West (ABCDE)	8.49	4.53	4.78	5.73	4.65	4.26	3.98	4.30	5.18	6.36	6.57	4.86
10 Min Non Synch SENEY (GHIJK)	6.99	4.54	4.48	5.05	4.26	4.09	4.49	4.43	4.51	5.69	4.00	3.71
10 Min Non Synch East (F)	6.99	4.54	4.48	5.05	4.26	4.09	4.49	4.43	4.51	5.69	4.00	3.71
10 Min Non Synch West (ABCDE)	6.15	4.36	3.54	4.31	4.13	3.85	3.80	4.03	3.95	4.31	3.97	3.70
30 Min SENEY (GHIJK)	6.14	4.36	3.54	4.31	4.13	3.85	3.79	4.02	3.94	4.22	3.97	3.70
30 Min East (F)	6.14	4.36	3.54	4.31	4.13	3.85	3.79	4.02	3.94	4.22	3.97	3.70
30 Min West (ABCDE)	6.14	4.36	3.54	4.31	4.13	3.85	3.79	4.02	3.94	4.22	3.97	3.70
Regulation	15.51	10.70	10.68	9.49	12.11	11.30	6.99	8.00	8.54	12.88	14.47	14.07
<b>RTC Market</b>												
10 Min Spin SENEY (GHIJK)	4.23	1.24	1.98	3.17	3.13	1.28	1.81	1.29	9.90	3.43	4.39	1.71
10 Min Spin East (F)	4.23	1.24	1.98	3.17	3.13	1.28	1.81	1.29	9.90	3.43	4.39	1.71
10 Min Spin West (ABCDE)	2.43	0.82	1.79	2.38	2.91	0.74	1.27	0.93	7.33	2.63	3.85	1.58
10 Min Non Synch SENEY (GHIJK)	0.59	0.03	0.01	0.22	0.42	0.49	0.42	0.27	6.14	1.07	0.50	0.00
10 Min Non Synch East (F)	0.59	0.03	0.01	0.22	0.42	0.49	0.42	0.27	5.25	1.07	0.50	0.00
10 Min Non Synch West (ABCDE)	0.08	0.02	0.00	0.00	0.33	0.27	0.33	0.25	3.92	0.38	0.38	0.00
30 Min SENEY (GHIJK)	0.08	0.02	0.00	0.00	0.32	0.27	0.33	0.25	3.55	0.11	0.09	0.00
30 Min East (F)	0.08	0.02	0.00	0.00	0.32	0.27	0.33	0.25	2.65	0.11	0.09	0.00
30 Min West (ABCDE)	0.08	0.02	0.00	0.00	0.32	0.27	0.33	0.25	2.65	0.11	0.09	0.00
Regulation	15.17	10.40	9.63	8.22	10.01	9.39	7.87	7.92	14.90	12.40	17.43	16.90
NYCA Regulation Movement	0.26	0.21	0.20	0.22	0.19	0.16	0.19	0.19	0.20	0.21	0.22	0.22
<b>Real Time Market</b>												
10 Min Spin SENEY (GHIJK)	11.31	3.19	3.31	7.62	5.48	2.98	2.65	2.93	9.13	8.14	7.39	3.49
10 Min Spin East (F)	11.31	3.19	3.31	7.62	5.48	2.98	2.65	2.93	8.50	8.14	7.39	3.49
10 Min Spin West (ABCDE)	7.24	2.52	2.86	6.77	4.86	1.37	2.10	2.50	6.96	4.26	6.45	3.15
10 Min Non Synch SENEY (GHIJK)	3.61	0.01	0.19	0.28	1.03	1.63	0.35	1.16	5.33	4.70	1.16	0.00
10 Min Non Synch East (F)	3.61	0.01	0.19	0.28	1.03	1.63	0.35	1.16	4.70	4.70	1.16	0.00
10 Min Non Synch West (ABCDE)	0.85	0.00	0.00	0.00	0.57	0.37	0.29	1.12	3.47	0.92	0.67	0.00
30 Min SENEY (GHIJK)	0.13	0.00	0.00	0.00	0.37	0.37	0.29	1.12	3.11	0.06	0.10	0.00
30 Min East (F)	0.13	0.00	0.00	0.00	0.37	0.37	0.29	1.12	2.48	0.06	0.10	0.00
30 Min West (ABCDE)	0.13	0.00	0.00	0.00	0.37	0.37	0.29	1.12	2.48	0.06	0.10	0.00
Regulation	19.82	10.82	10.54	12.80	12.88	10.62	9.06	9.71	14.67	14.54	20.48	18.44
NYCA Regulation Movement	0.24	0.21	0.20	0.21	0.17	0.15	0.18	0.18	0.20	0.21	0.22	0.21

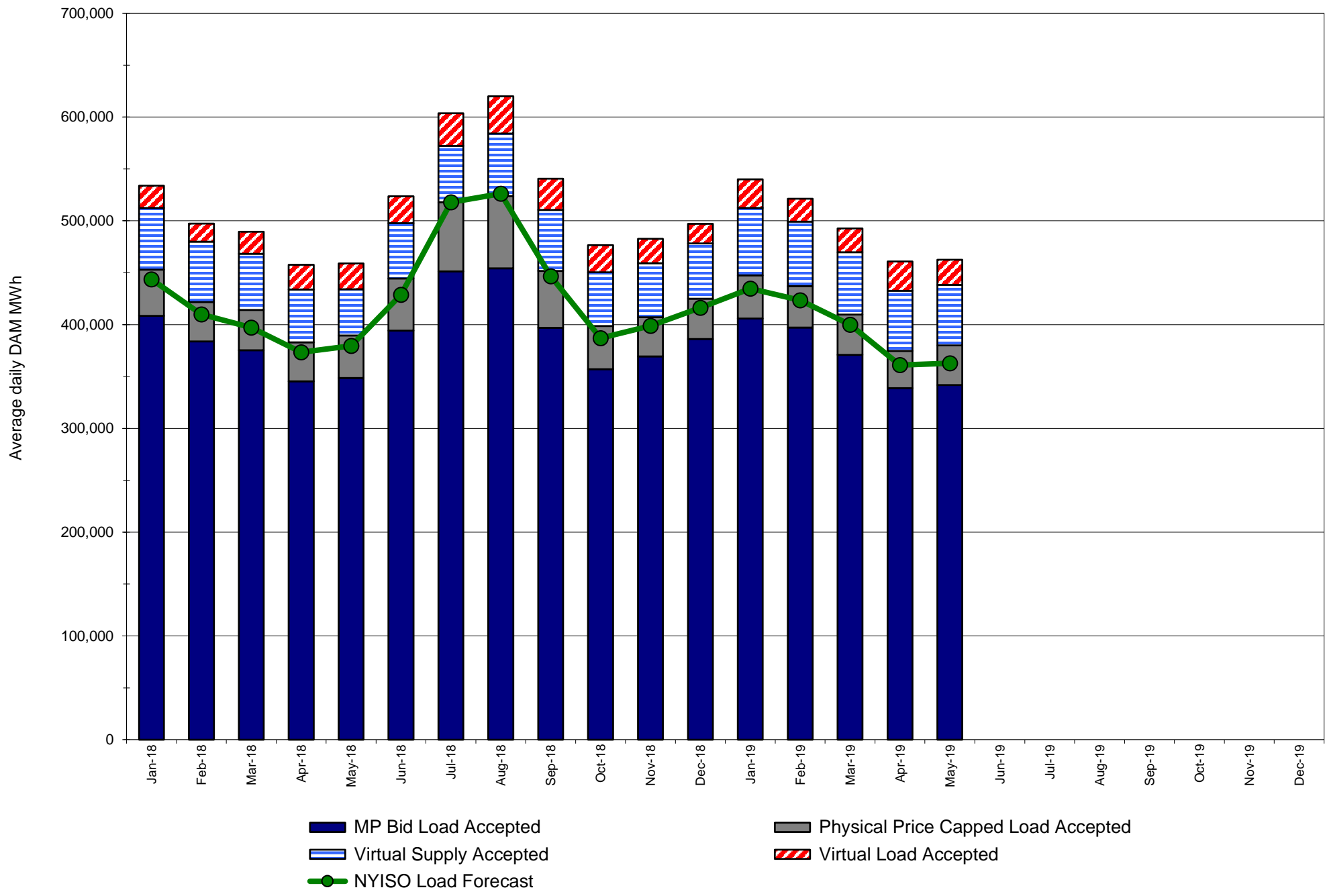
## NYISO In City Energy Mitigation - AMP (NYC Zone) 2018 - 2019 Percentage of committed unit-hours mitigated



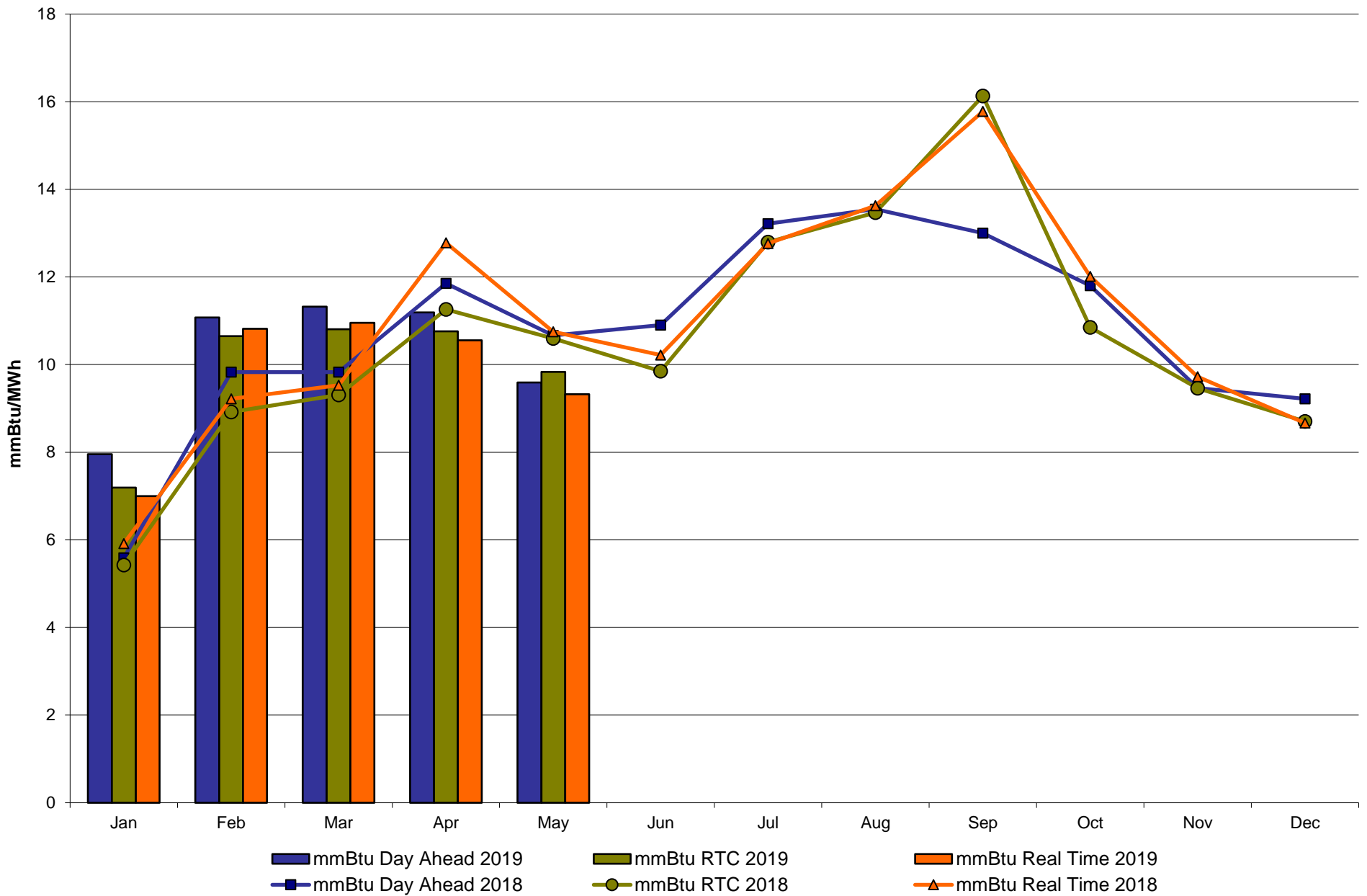
**NYISO In City Energy Mitigation (NYC Zone) 2018 - 2019**  
**Monthly megawatt hours mitigated**



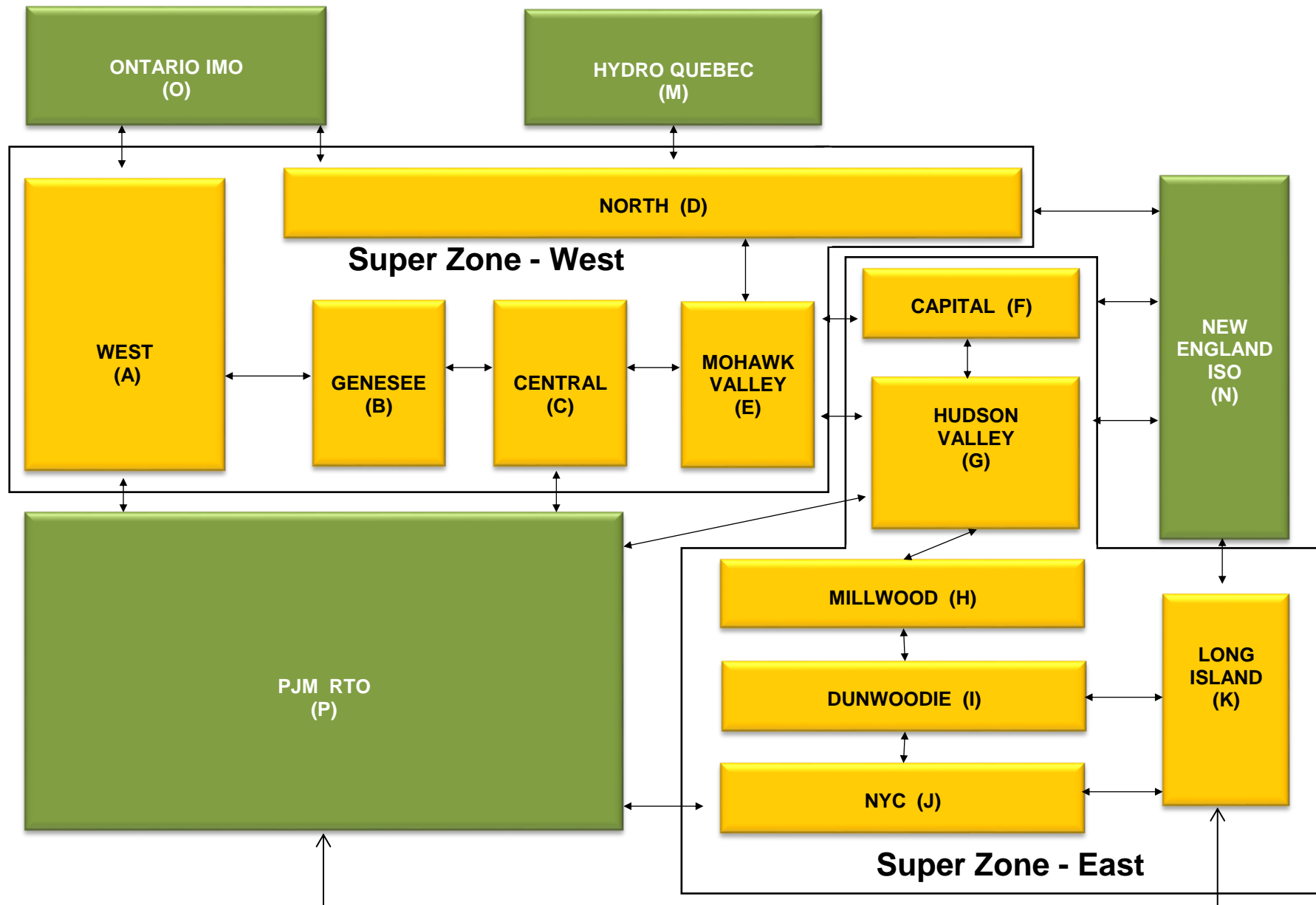
# NYISO Average Daily DAM Load Bid Summary



## Monthly Implied Heat Rate 2018-2019



# NYISO LBMP ZONES





**Billing Codes for Chart C**

<b>Chart - C Category Name</b>	<b>Billing Code</b>	<b>Billing Category Name</b>
Bid Production Cost Guarantee Balancing	81203	Balancing NYISO Bid Production Cost Guarantee - Internal Units
Bid Production Cost Guarantee Balancing	81204	Balancing NYISO Bid Production Cost Guarantee - External Units
Bid Production Cost Guarantee Balancing	81205	Balancing NYISO Bid Production Cost Guarantee Expenditure due to Curtailed Imports
Bid Production Cost Guarantee Balancing	81208	Balancing NYISO Bid Production Cost Guarantee - Internal Units
Bid Production Cost Guarantee Balancing	81209	Balancing NYISO Bid Production Cost Guarantee - External Units
Bid Production Cost Guarantee Balancing	81213	Balancing NYISO Bid Production Cost Guarantee Expenditure due to Curtailed Imports
Bid Production Cost Guarantee DAM	81201	DAM NYISO Bid Production Cost Guarantee - Internal Units
Bid Production Cost Guarantee DAM	84001	EDRP/SCR Demand Response - Local
Bid Production Cost Guarantee DAM	84101	EDRP/SCR Demand Response - NYISO Wide
Bid Production Cost Guarantee DAM	81401	DAM Price Responsive Load Program
Bid Production Cost Guarantee DAM	81202	DAM NYISO Bid Production Cost Guarantee - External Units
Bid Production Cost Guarantee DAM	81206	DAM NYISO Bid Production Cost Guarantee - Internal Units
Bid Production Cost Guarantee DAM	81207	DAM NYISO Bid Production Cost Guarantee - External Units
Bid Production Cost Guarantee DAM Virtual	81501	DAM Virtual Bid Production Cost Guarantee
DAM Contract Balancing	81315	DAM Contract Balancing
DAM Contract Balancing	81317	DAM Contract Balancing
Local Reliability Balancing	81002	Balancing Local Reliability Bid Production Cost Guarantee
Local Reliability Balancing	83901	Margin Restoration (MOB) Revenue
Local Reliability DAM	81001	DAM Local Reliability Bid Production Cost Guarantee
NYISO Cost of Operations	80901	NYISO Cost Of Operations
NYISO Cost of Operations	80902	NYISO Cost Of Operations
NYISO Cost of Operations	83501	NYISO Cost Of Operations
NYISO Cost of Operations	83502	NYISO Cost Of Operations
Residuals Balancing	81302	Balancing Market Energy Residual
Residuals Balancing	81304	Balancing Market Loss Residual
Residuals Balancing	81305	Balancing Market Congestion Balancing
Residuals Balancing	81306	Emergency Energy Purchases
Residuals Balancing	81307	Emergency Energy Sales
Residuals Balancing	81309	Balancing Market Energy Residual
Residuals Balancing	81311	Balancing Market Loss Residual
Residuals Balancing	81312	Balancing Market Congestion Balancing
Residuals Balancing	81313	Emergency Energy Purchases
Residuals Balancing	81314	Emergency Energy Sales
Residuals DAM	81301	Day Ahead Market Energy Residual
Residuals DAM	81303	Day Ahead Market Loss Residual
Residuals DAM	81308	Day Ahead Market Energy Residual
Residuals DAM	81310	Day Ahead Market Loss Residual

# The Mission of the New York Independent System Operator is to:

- Serve the public interest and
- Provide benefit to stakeholders by
  - Maintaining and enhancing regional reliability
  - Operating open, fair and competitive wholesale electricity markets
  - Planning the power system for the future
  - Providing factual information to policy makers, stakeholders and investors in the power system



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