

Aggregate Market Power in the PJM Energy Market

MMUAC

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Monitoring Analytics

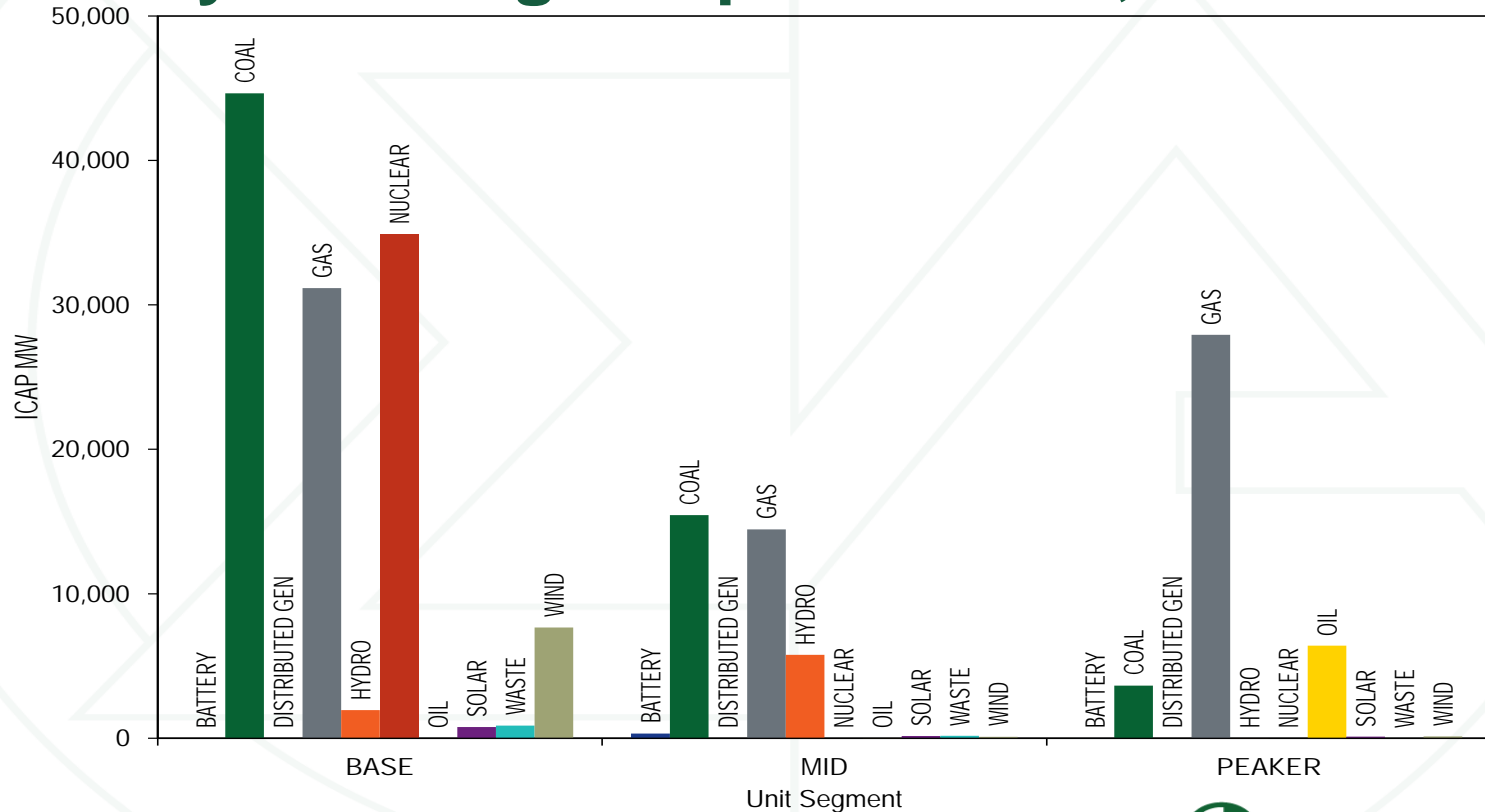
PJM hourly energy market HHI: January 1 through September 30, 2016 and 2017

	Hourly Market HHI (Jan - Sep, 2016)	Hourly Market HHI (Jan - Sep, 2017)
Average	1023	929
Minimum	786	696
Maximum	1356	1208
Highest market share (One hour)	28%	27%
Average of the highest hourly market share	20%	18%
# Hours	6,575	6,551
# Hours HHI > 1800	0	0
% Hours HHI > 1800	0%	0%

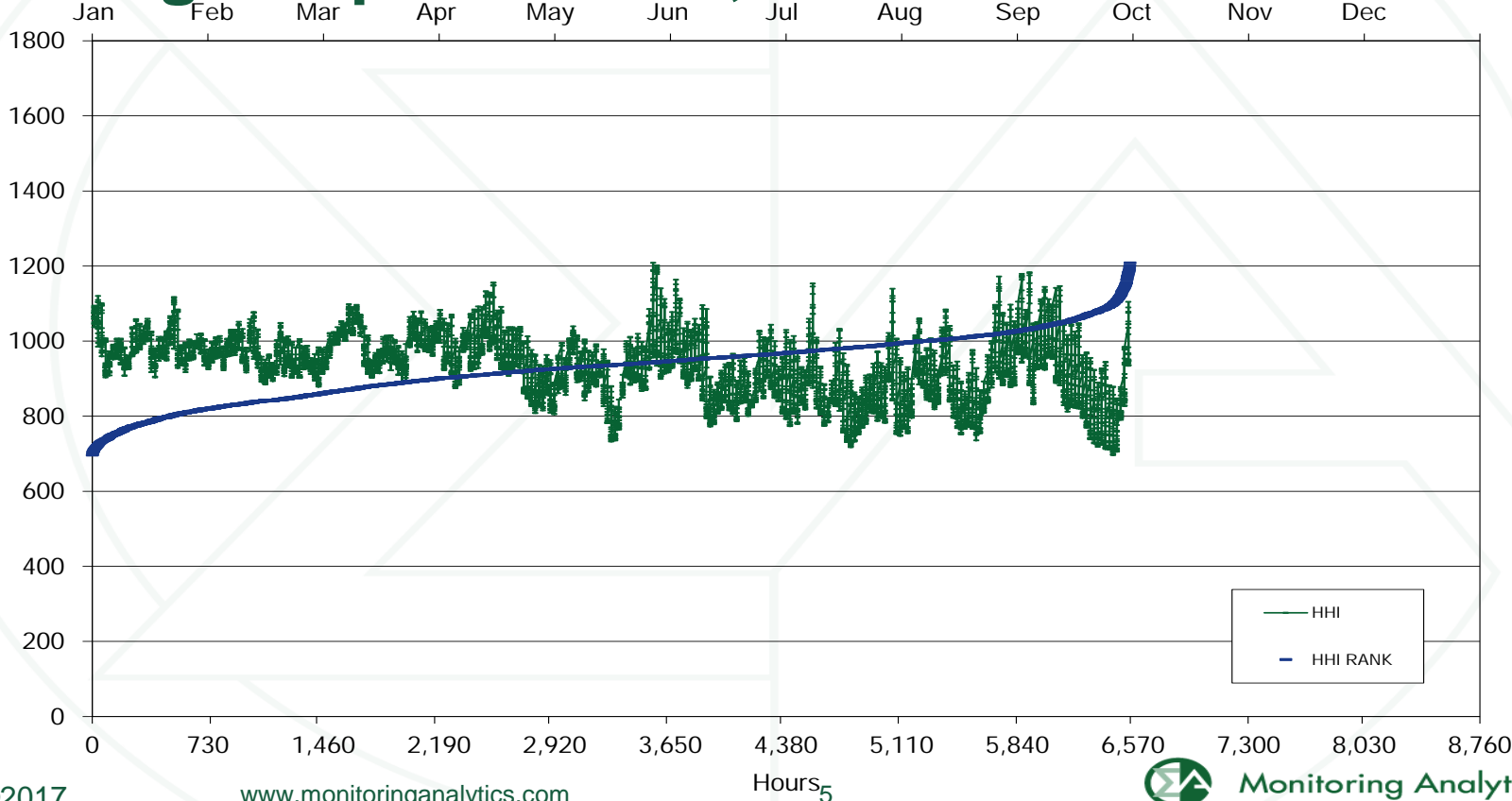
PJM hourly energy market HHI (By supply segment): January 1 through September 30, 2016 and 2017

	Jan - Sep, 2016			Jan - Sep, 2017		
	Minimum	Average	Maximum	Minimum	Average	Maximum
Base	974	1117	1443	831	982	1254
Intermediate	533	1700	8102	779	1740	9894
Peak	647	6052	10000	705	5967	10000

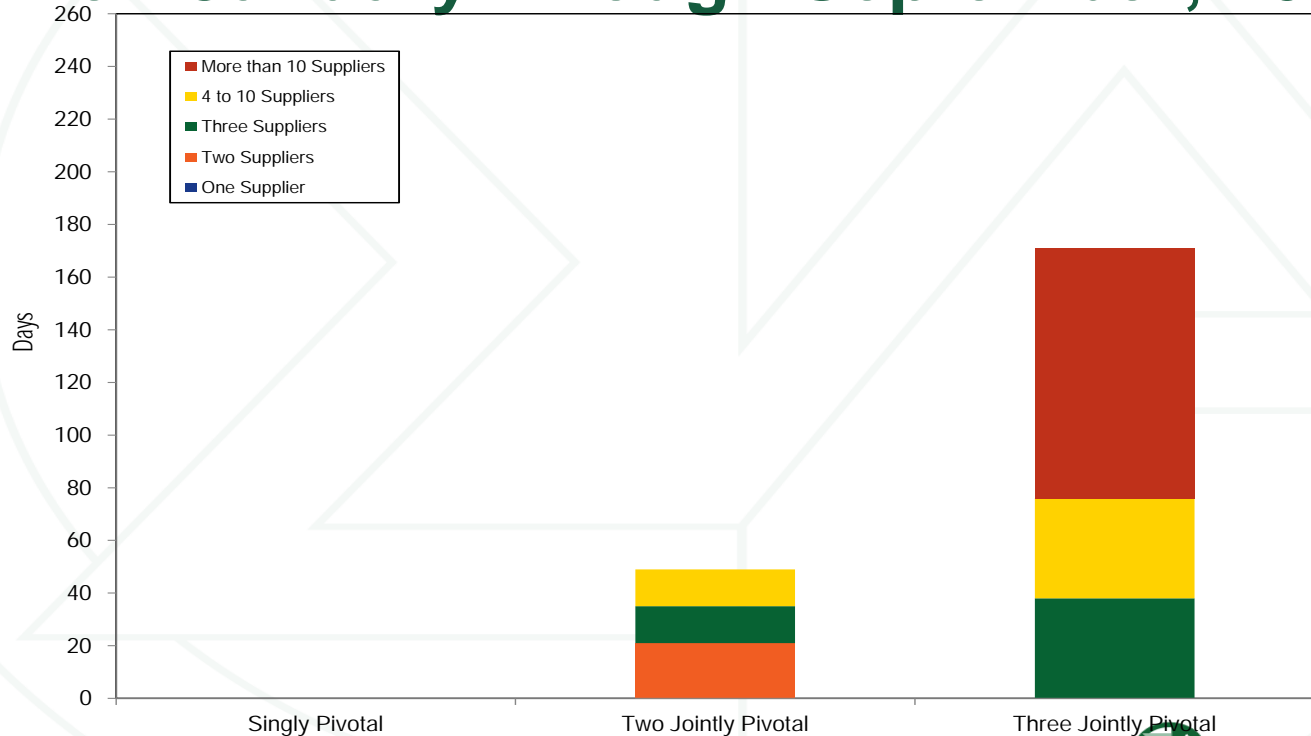
Fuel source distribution in unit segments: January 1 through September 30, 2017



PJM hourly energy market HHI: January 1 through September 30, 2017



Days with pivotal suppliers and numbers of pivotal suppliers in the PJM DA Energy Market: January through September, 2017



Frequency of days as a pivotal supplier for the 10 largest suppliers: January 1 through September 30, 2017

Pivotal Supplier Rank	Days Singly Pivotal	Percent of Days	Days Jointly Pivotal with One Other Supplier	Percent of Days	Days Jointly Pivotal with Two Other Suppliers	Percent of Days
1	0	0%	52	19%	199	73%
2	0	0%	51	19%	198	73%
3	0	0%	29	11%	185	68%
4	0	0%	17	6%	161	59%
5	0	0%	10	4%	147	54%
6	0	0%	5	2%	112	41%
7	0	0%	2	1%	127	47%
8	0	0%	2	1%	114	42%
9	0	0%	1	0%	103	38%
10	0	0%	1	0%	87	32%

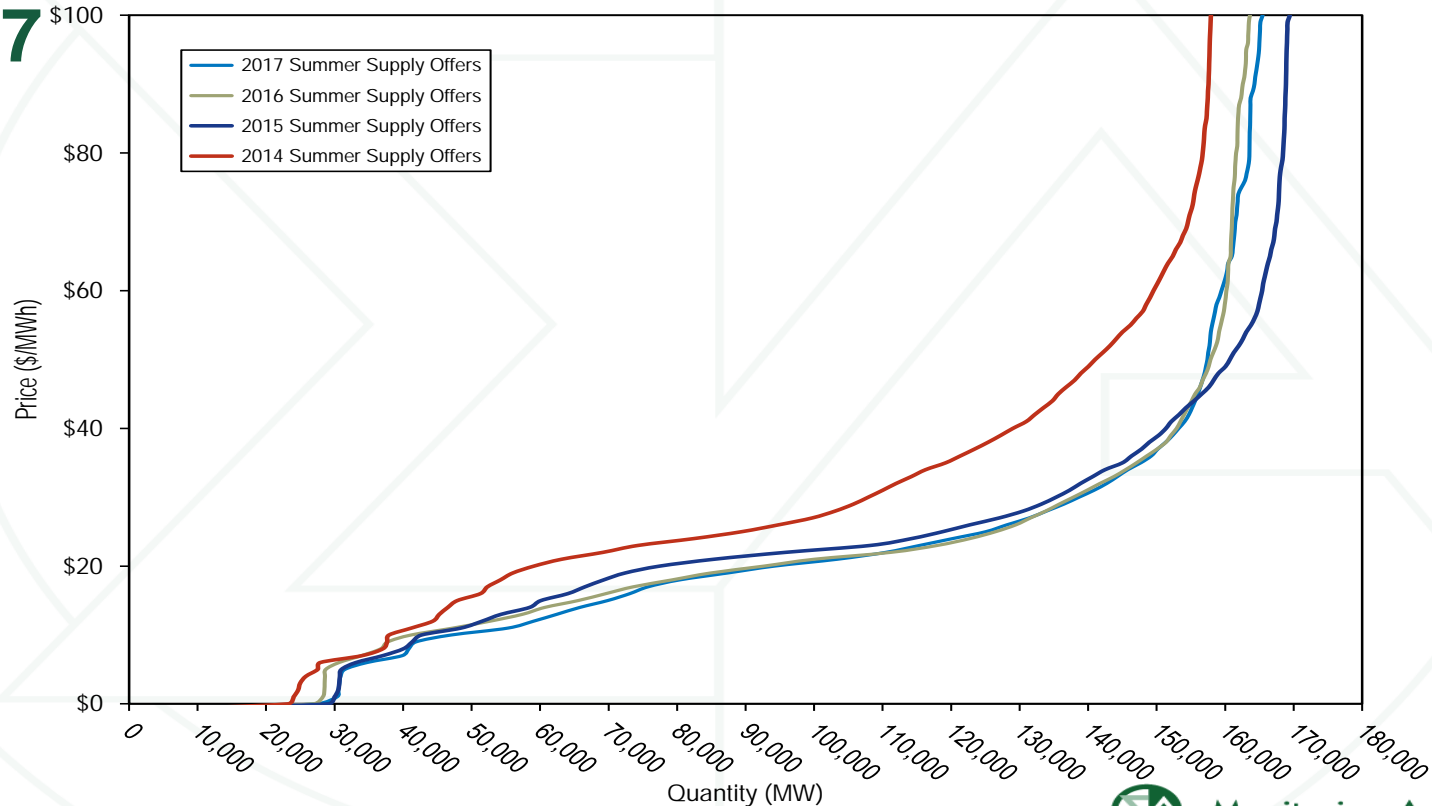
Marginal unit contribution to PJM real-time, load-weighted LMP (By parent company): January 1 through September 30, 2016 and 2017

Company	2016 (Jan-Sep)					2017 (Jan - Sep)					
	All Hours		Peak Hours			All Hours		Peak Hours			
	Percent of Price	Cumulative Percent	Company	Percent of Price	Cumulative Percent	Company	Percent of Price	Cumulative Percent	Company	Percent of Price	Cumulative Percent
1	24.2%	24.2%	1	24.4%	24.4%	1	13.8%	13.8%	1	13.2%	13.2%
2	14.8%	39.0%	2	15.4%	39.8%	2	13.6%	27.4%	2	12.6%	25.7%
3	12.9%	51.9%	3	10.9%	50.7%	3	12.1%	39.5%	3	10.9%	36.6%
4	9.3%	61.2%	4	9.5%	60.2%	4	10.5%	50.0%	4	10.0%	46.7%
5	8.1%	69.3%	5	7.0%	67.2%	5	9.8%	59.8%	5	9.1%	55.8%
6	5.4%	74.8%	6	4.9%	72.1%	6	4.4%	64.2%	6	5.8%	61.6%
7	2.2%	77.0%	7	3.0%	75.1%	7	3.8%	68.0%	7	5.1%	66.7%
8	2.1%	79.1%	8	2.5%	77.6%	8	3.5%	71.5%	8	3.5%	70.3%
9	2.0%	81.1%	9	2.5%	80.1%	9	3.5%	75.0%	9	3.3%	73.6%
Other (68 companies)	18.9%	100.0%	Other (60 companies)	19.9%	100.0%	Other (73 companies)	25.0%	100.0%	Other (67 companies)	26.4%	100.0%

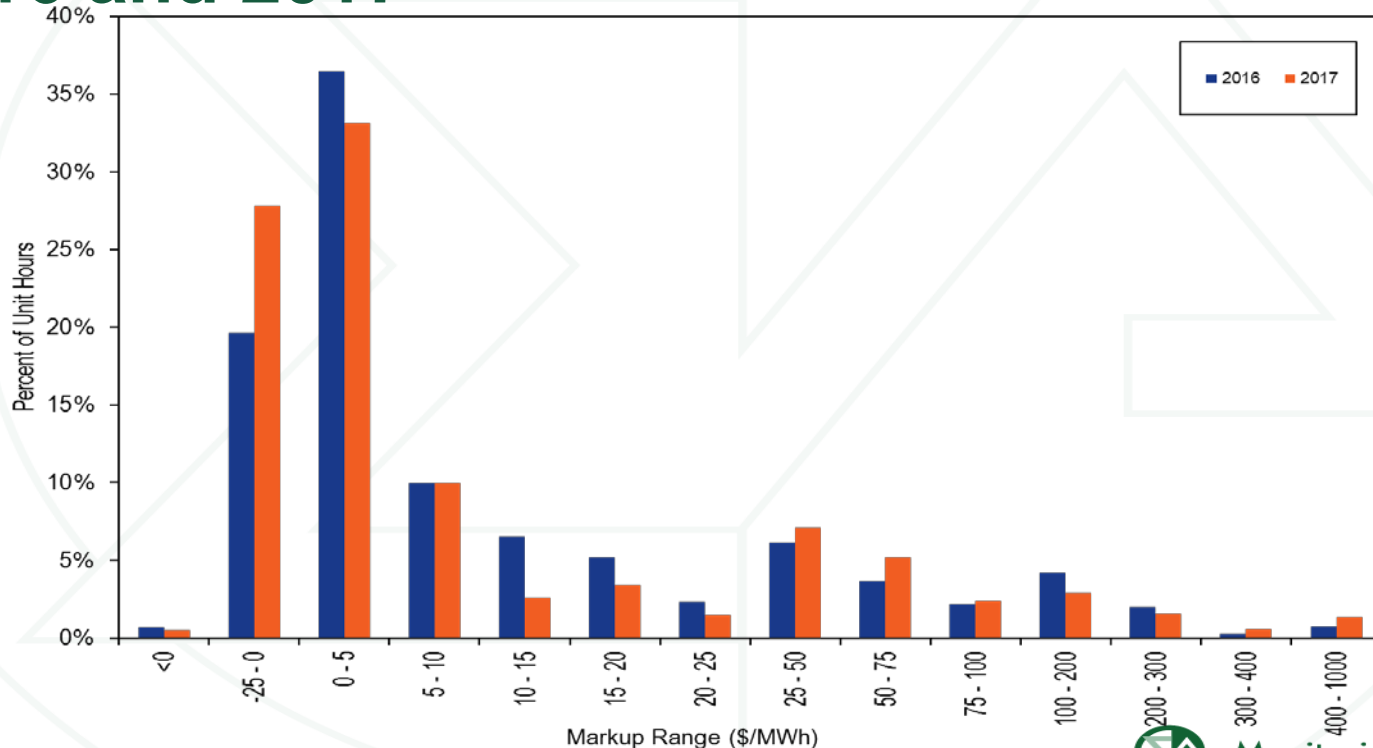
Marginal resource contribution to PJM day-ahead, load-weighted LMP (By parent company): January 1 through September 30, 2016 and 2017

Company	2016 (Jan - Sep)					2017 (Jan - Sep)					
	All Hours Percent of Price	Cumulative Percent Company	Rank	Peak Hours Percent of Price	Cumulative Percent Company	All Hours Percent of Price	Cumulative Percent Company	Rank	Peak Hours Percent of Price	Cumulative Percent Company	
1	14.4%	14.4%	1	12.8%	12.8%	1	9.6%	9.6%	1	12.0%	12.0%
2	9.2%	23.6%	2	12.0%	12.0%	2	8.1%	17.7%	2	6.9%	18.9%
3	7.4%	31.0%	3	9.1%	9.1%	3	6.7%	24.4%	3	5.3%	24.1%
4	7.0%	38.0%	4	8.9%	8.9%	4	6.0%	30.4%	4	5.1%	29.3%
5	6.8%	44.8%	5	6.5%	6.5%	5	5.5%	35.9%	5	4.9%	34.2%
6	5.5%	50.3%	6	6.5%	6.5%	6	5.3%	41.2%	6	4.7%	38.9%
7	4.5%	54.8%	7	5.2%	5.2%	7	4.9%	46.1%	7	4.6%	43.5%
8	4.3%	59.2%	8	3.5%	3.5%	8	4.4%	50.5%	8	4.5%	48.1%
9	3.2%	62.4%	9	3.2%	3.2%	9	3.8%	54.4%	9	4.3%	52.4%
Other (164 companies)	37.6%	100.0%	Other (157 companies)	32.2%	32.2%	Other (152 companies)	45.6%	100.0%	Other (147 companies)	47.6%	100.0%

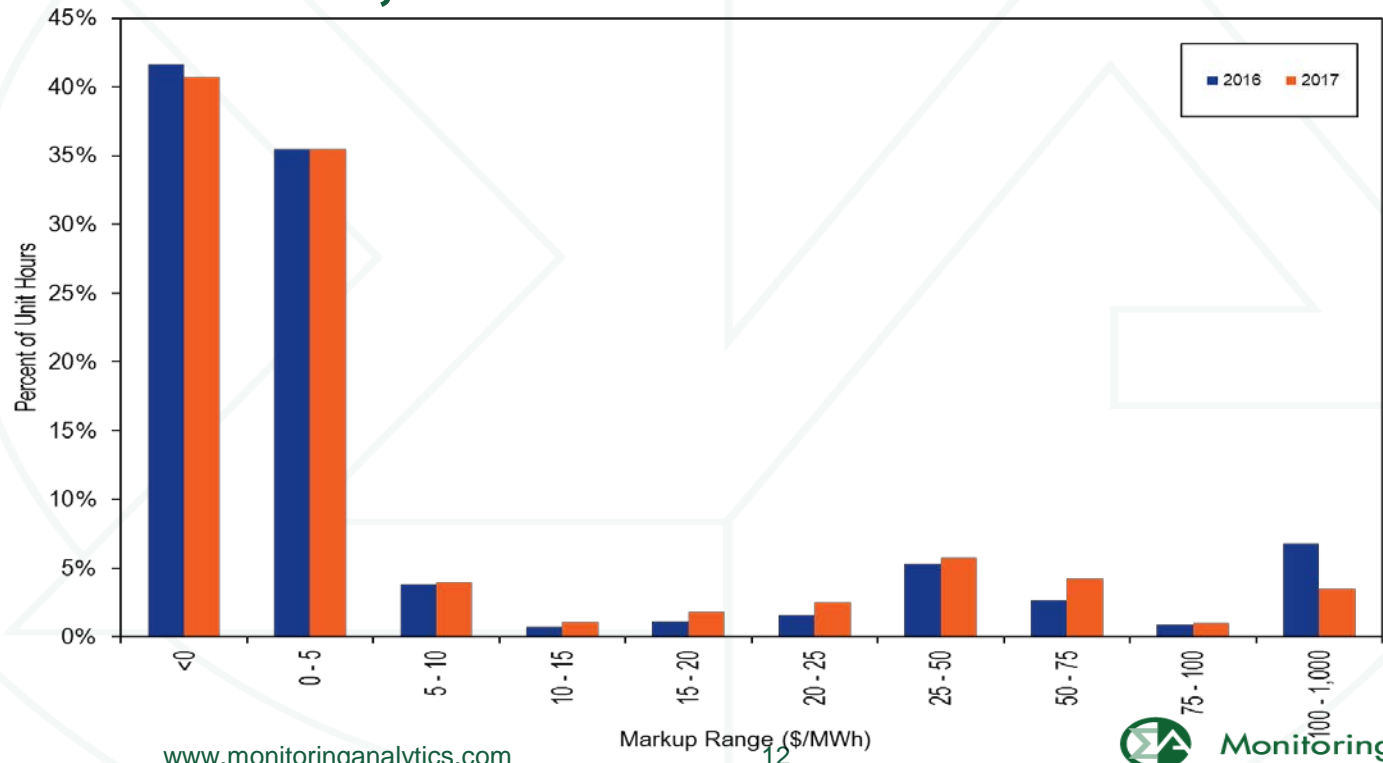
Average PJM aggregate RT generation supply curves by offer price: summer of 2014 through 2017



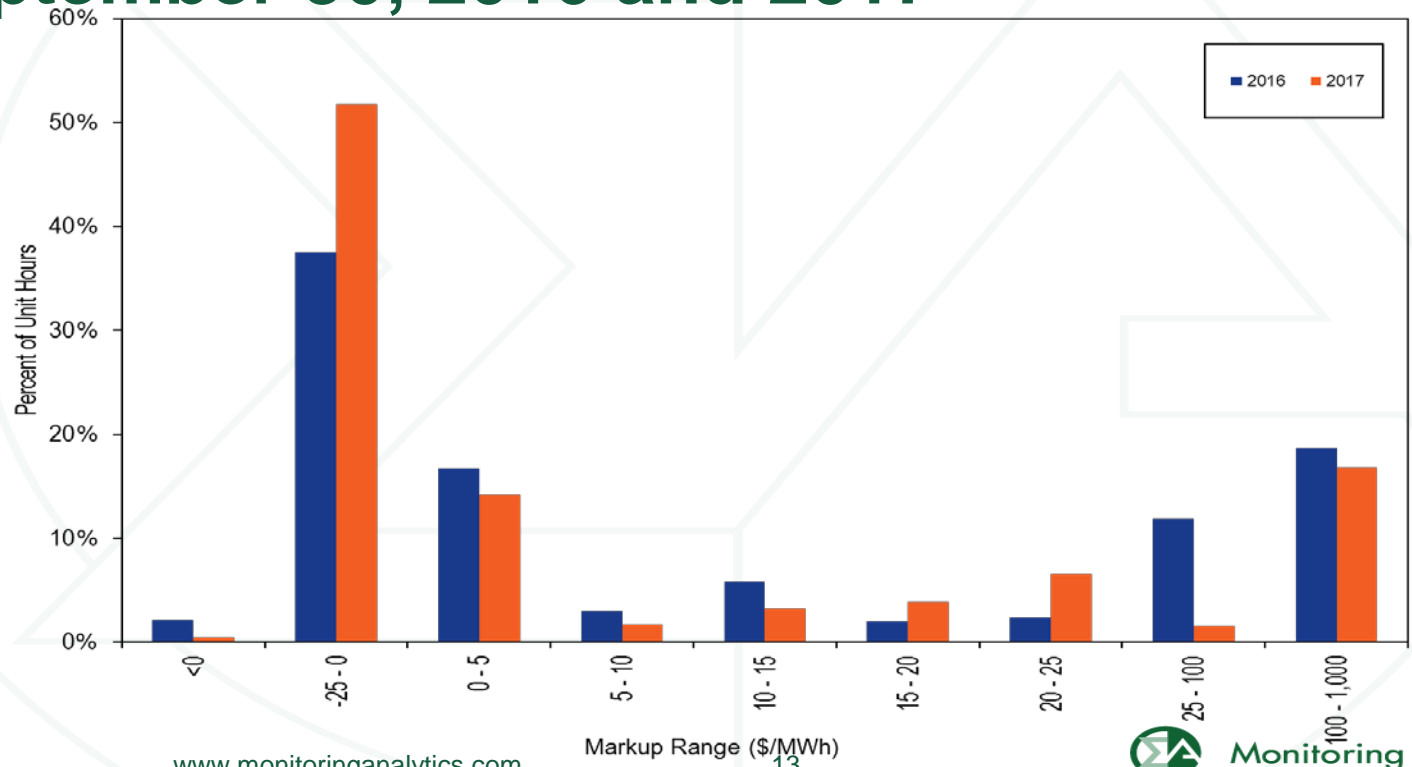
Frequency distribution of highest markup of gas units offered: January 1 through September 30, 2016 and 2017



Frequency distribution of highest markup of coal units offered: January 1 through September 30, 2016 and 2017



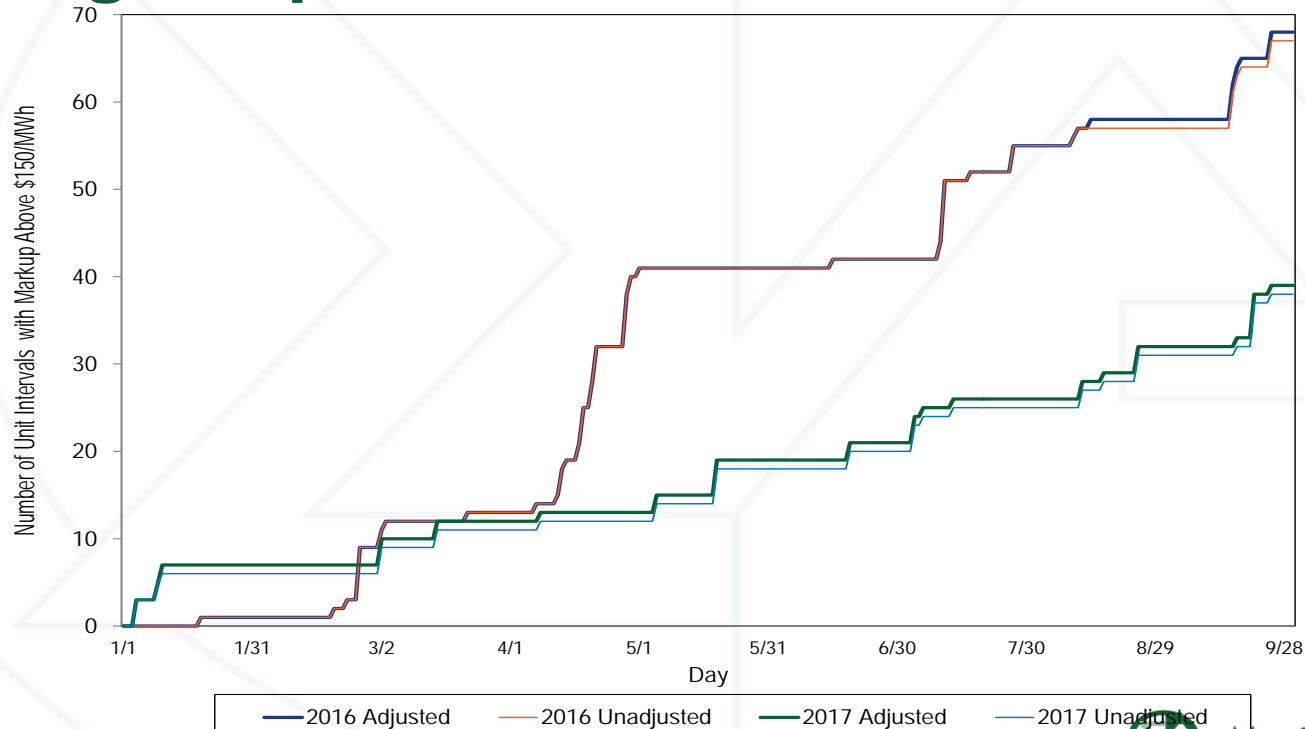
Frequency distribution of highest markup of oil units offered: January 1 through September 30, 2016 and 2017



Average, real-time marginal unit markup index (By offer price category unadjusted): January 1 through September 30, 2016 and 2017

Offer Price Category	2016 (Jan-Sep)			2017 (Jan-Sep)		
	Average Markup Index	Average Dollar Markup	Frequency	Average Markup Index	Average Dollar Markup	Frequency
< \$25	0.01	(\$0.92)	62.6%	0.17	\$0.21	65.2%
\$25 to \$50	(0.03)	(\$2.08)	25.7%	0.06	\$1.67	27.8%
\$50 to \$75	0.18	\$10.11	1.6%	0.38	\$22.33	1.8%
\$75 to \$100	0.31	\$26.46	0.5%	0.28	\$24.21	0.7%
\$100 to \$125	0.05	\$5.04	2.4%	0.37	\$40.82	0.2%
\$125 to \$150	0.01	\$1.43	5.2%	0.25	\$32.45	0.3%
>= \$150	0.04	\$7.31	2.0%	0.01	\$1.40	4.0%

Cumulative number of marginal unit intervals with markups above \$150 per MWh: January 1 through September 30, 2016 and 2017



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