

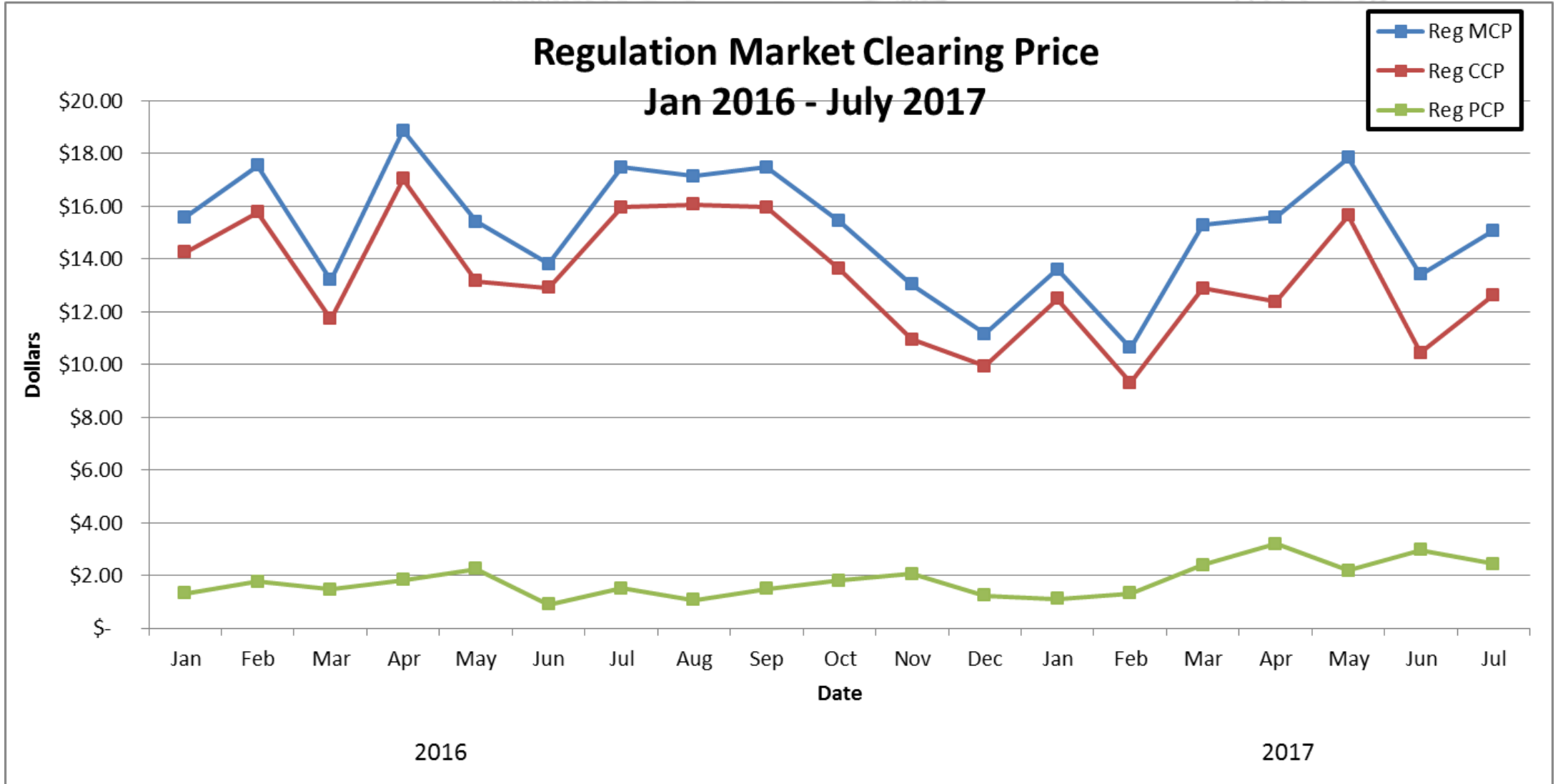


# Regulation Update



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- On Jan 9<sup>th</sup> 2017 PJM put new regulation signals and requirements in operations
  - Regulation Signals implemented 30 minute conditional neutrality
    - Signal tuning has occurred since implementation to enhance signal performance
  - Regulation requirement defined seasonally and as ramp/non-ramp periods
    - 800 MW Ramp Requirement, 525MW Non-Ramp Requirement
- RMISTF remaining design components endorsed at June MRC and July MC
  - See Appendix for design components and PJM/IMM package summary



- Mileage Ratio has increased since the new signal implementation
  - Larger Utilization of Regulation D resources
  - Regulation A signal better aligned with unit ramp

Average Mileage Ratio	
Jan-16	3.80
Feb-16	2.67
Mar-16	2.44
Apr-16	2.74
May-16	2.45
Jun-16	3.61
Jul-16	2.44
Aug-16	2.57
Sep-16	2.93
Oct-16	2.44
Nov-16	2.76
Dec-16	2.42
Jan-17	5.17
Feb-17	5.94
Mar-17	6.38
Apr-17	6.22
May-17	6.12
Jun-17	6.19
Jul-17	6.44

- PJM Moved to Summer Requirements on June 1

Season	Dates	Off-Ramp	On-Ramp	Excursion	Effective MW Requirement
Winter	Dec 1 – Feb 29	HE1 – HE4, HE10 – HE16	HE5 – HE9, HE17 – HE24	HE7 – HE8, HE18 – HE21	Non-Ramp = 525MW Ramp = 800MW
Spring	Mar 1 – May 31	HE1 – HE5 HE9 – HE17	HE6 – HE8 HE18- HE24	HE7 – HE8, HE18 – HE21	Non-Ramp = 525MW Ramp = 800MW
<b>Summer</b>	<b>Jun 1- Aug 31</b>	<b>HE1 – HE5 HE15 – HE18</b>	<b>HE6 – HE14 HE19- HE24</b>	<b>HE7 – HE8, HE18 – HE21</b>	<b>Non-Ramp = 525MW Ramp = 800MW</b>
Fall	Sep 1 – Nov 30	HE1 – HE5 HE9 – HE17	HE6 – HE8 HE18- HE24	HE7 – HE8, HE18 – HE21	Non-Ramp = 525MW Ramp = 800MW

MW	Steam	Hydro	CT	DSR
<b>Regulation A</b>				
Avg. Performance Score (1/1)	75%	86%	84%	85%
Avg. Performance Score (5/1)	76%	87%	85%	86%
Avg. Performance Score (6/1)	76%	87%	85%	86%
Avg. Performance Score (8/1)	76%	87%	89%	85%
<b>Regulation A Qualified MW (8/1)</b>	4134.0	1051.0	1181.6	5.0

MW	Hydro	CT	Energy Storage	DSR
<b>Regulation D</b>				
Avg. Performance Score (1/1)	77%	90%	96%	85%
Avg. Performance Score (5/1)	78%	92%	88%	82%
Avg. Performance Score (6/1)	78%	91%	91%	82%
Avg. Performance Score (8/1)	78%	92%	90%	82%
<b>Regulation D Qualified MW (8/1)</b>	420.0	121.6	286.5	17.0

- Signals are continuing to provide improvement to ACE control
  - Regulation signals are always controlling ACE

Signal Type	Date	Avg. Median Daily ACE	Avg. Daily Stdv
New Signal	Jan 2017(1/9-1/31)	34	244
	Feb 2017	32	236
	Mar 2017	38	269
	Apr 2017	38	254
	May 2017	30	245
	Jun 2017	39	247
	Jul 2017	47	240
Old Signal	Jan 2017(1/1 - 1/8)	68	285
	2016	56	274
	2015	52	284



- For the majority, RegD signal is pegged for only small durations of time, which is to be expected for ACE control
  - Occasional longer pegged due to system conditions
  - Less RegD pegging observed with signal tuning
  - Peg = 99% of TREG

	Jan	Feb	Mar	Apr	May	Jun	Jul
20-30 minute duration	8	11	20	13	12	6	10
>30 minute duration	3	2	4	1	2	0	0

	<b>Ramp, Excursion</b>	<b>Ramp</b>	<b>Non-Ramp</b>
	AVG MW	AVG MW	AVG MW
<b>NEW SIGNAL</b>	197	200	196
<b>OLD SIGNAL</b>	195	245	218

# Appendix

Total Unique Responders	29				
Total Companies	159				
Voting Members	52				
Affiliates	107				
Question	Yes	No	Abstain	#	%
1. Do you support Package E – PJM/IMM? -- Response	114	39	6	159	75%
2. Do you support Package F - Beacon? -- Response	23	118	18	159	16%
3. Do you support Package G - ESA? -- Response	33	108	18	159	23%
4. Do you support Package H – Steel Producers? -- Response	11	106	42	159	9%
5. Do you support Package I – Mosaic & A.F. Mensah? -- Response	33	108	18	159	23%
6. Do you support Package J – NextEra? -- Response	23	117	19	159	16%
7. Do you support Package K – ESA Compromise? -- Response	39	107	13	159	27%
	Make a Change	Retain the Status Quo	Abstain	#	%
8. Do you prefer to make a change to Regulation Market regarding performance score, clearing, and settlements, or retain the status quo? -- Response	126	19	14	159	87%

## Benefit Factor - Application and clearing

- Replace Benefit Factor (BF) with Regulation Rate of Technical Substitution (RRTS)
- Effective MW calculation will be area under the RRTS curve

## Performance Scoring

- Precision only calculation
- Minimum allowable participation threshold to be raised from status quo 40% to 50%

## Settlements

- Replace Mileage Ratio from the Regulation Performance Credit with Marginal Rate of Technical Substitution
- Marginal Rate of Technical Substitution will be added to the Regulation Capability Credit

## Transition Plan

- The 1st 12 months of the 24 month transition period will have a minimum (floor) RRTS value of 0.65. The last 12 months of the 24 month transition period would have a minimum (floor) RRTS value of 0.50.