



Item 7: Independent Market Monitor (IMM) Report

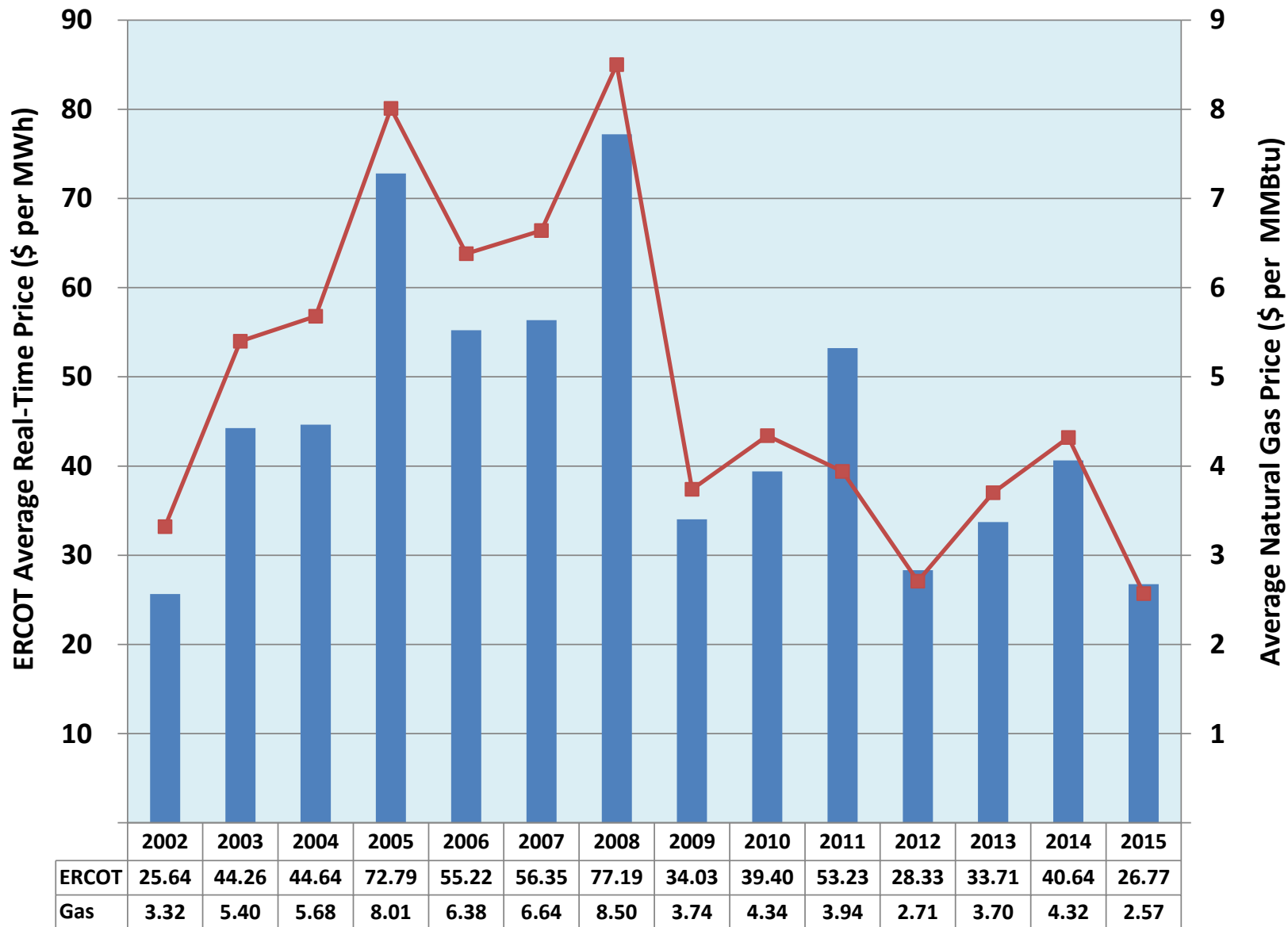
Beth Garza / David Patton

Board of Directors Meeting

ERCOT Public
June 14, 2016

Today

- Any questions about the Monthly report?
- 2015 State of the Market report released
- ORDC outcomes
- IMM recommendations



Annual Averages

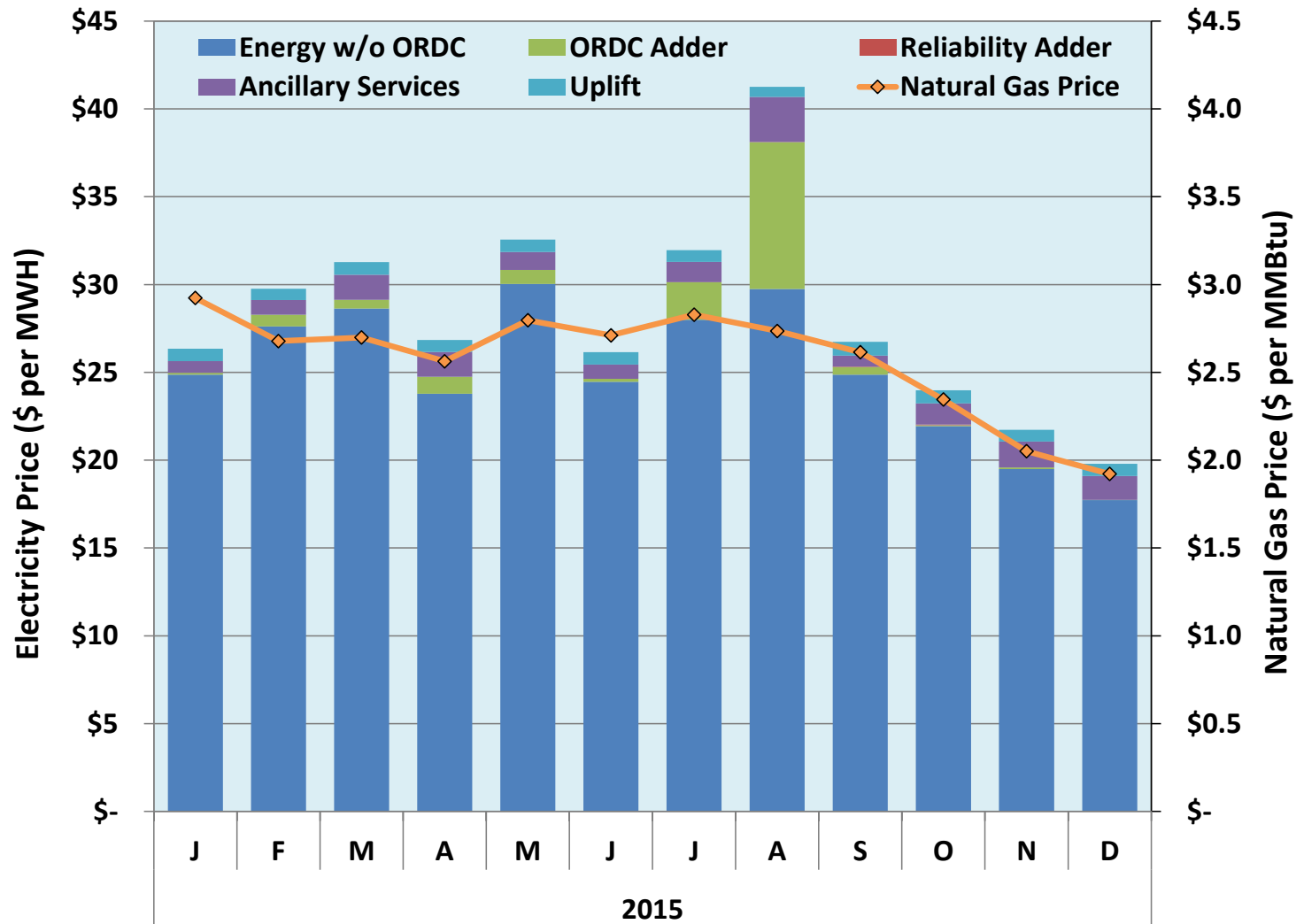
Real Time Energy
\$26.77 per MWh
(w/adders)
\$25.35 per MWh
(no adders)

Reserve Adder
\$1.41 per MWh

Reliability Adder
\$0.01 per MWh

Ancillary Services
\$1.23 per MWh

Uplift
\$0.70 per MWh



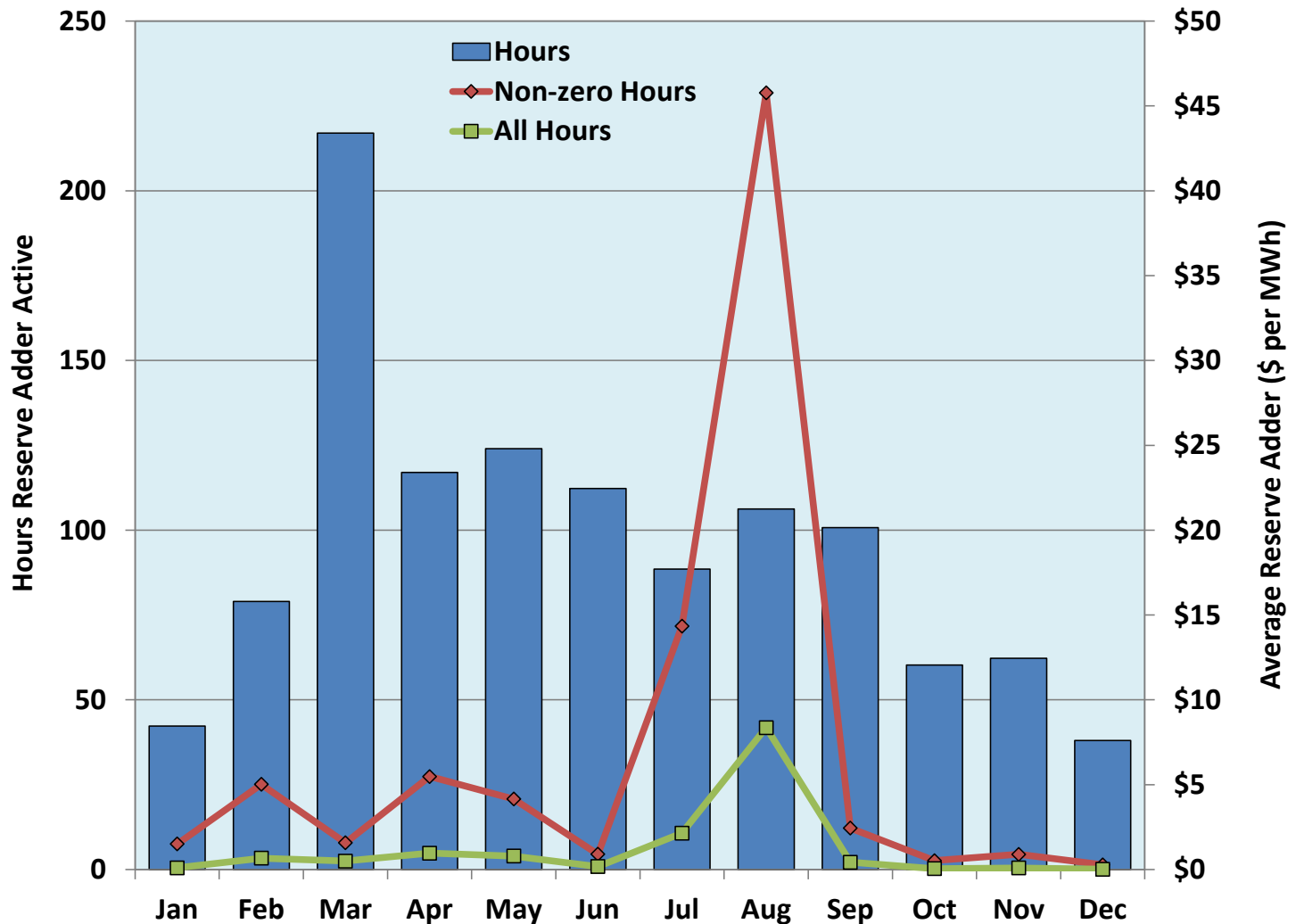
Contribution of Reserve Adder to RT Price

Annual Values

1147 hours
13% of time

Reserve Adder
\$1.41 / MWh

~ 5% of RT price



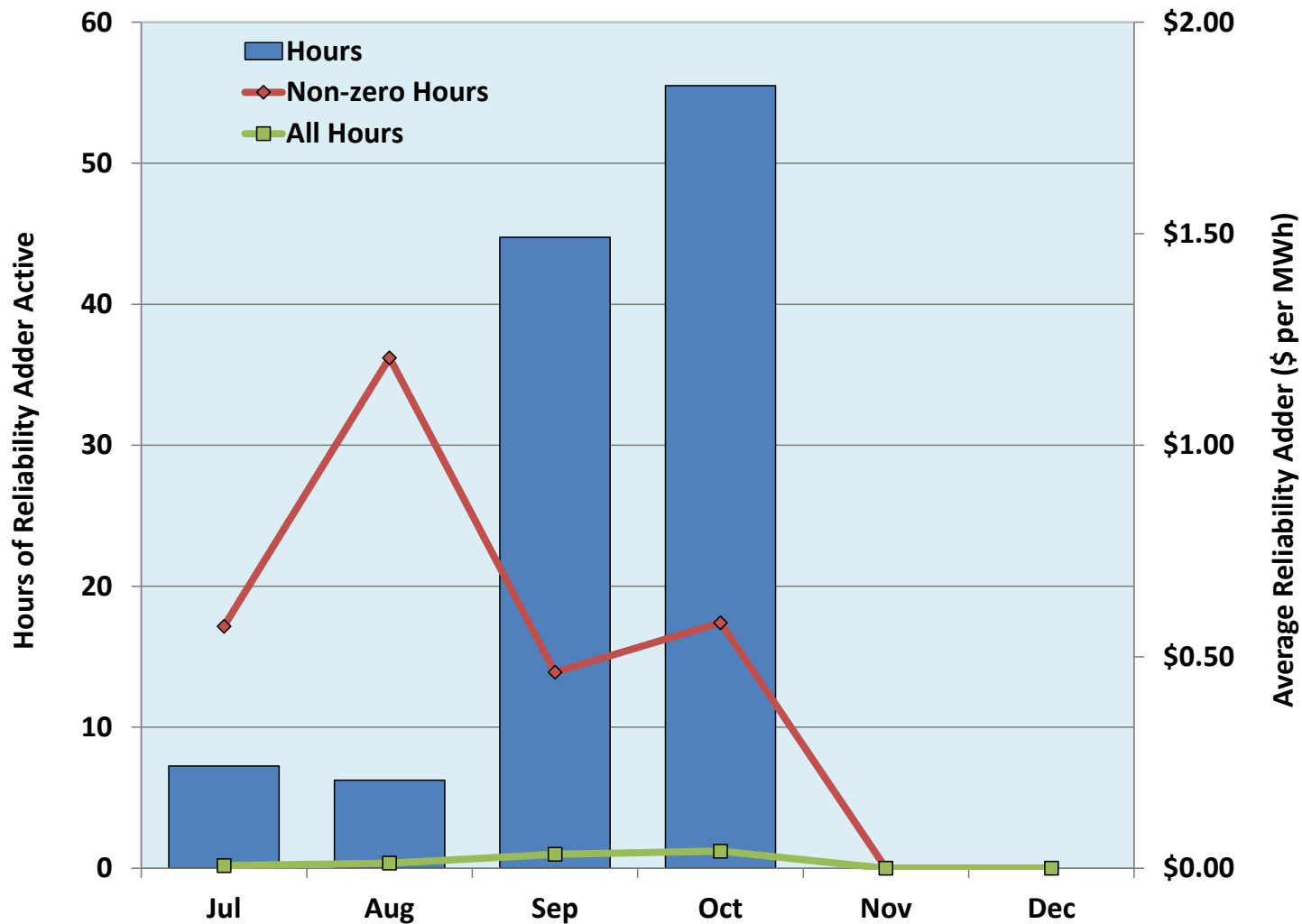
Contribution of Reliability Adder to RT Price

Annual Values

114 hours
3% of time

Reliability Adder
\$0.01 / MWh

Negligible
component of RT
price



ORDC expectations and limitations

- The modest ORDC values to date are expected given surplus planning reserves and resulting sufficient operating reserves.
- ORDC values should be modest in most years as frequent shortages are only expected under unusually high load conditions or low supply availability.
- Regardless of the ORDC parameters selected, current market design does not allow for the graceful conversion of most operating reserves into energy.
- Co-optimization would ensure efficient shortage pricing and improve the utilization of ERCOT's resources.

IMM Recommendations

- Real-time Co-optimization
- Multi-Interval Real-Time Market
- Ancillary Service pricing should reflect constraints imposed as part of procurement
- The PUCT should evaluate:
 - Emergency Response Service (ERS)
 - Transmission Cost allocation

To the Public Utility Commission of Texas

ERCOT Wholesale Electricity Market Monthly Report

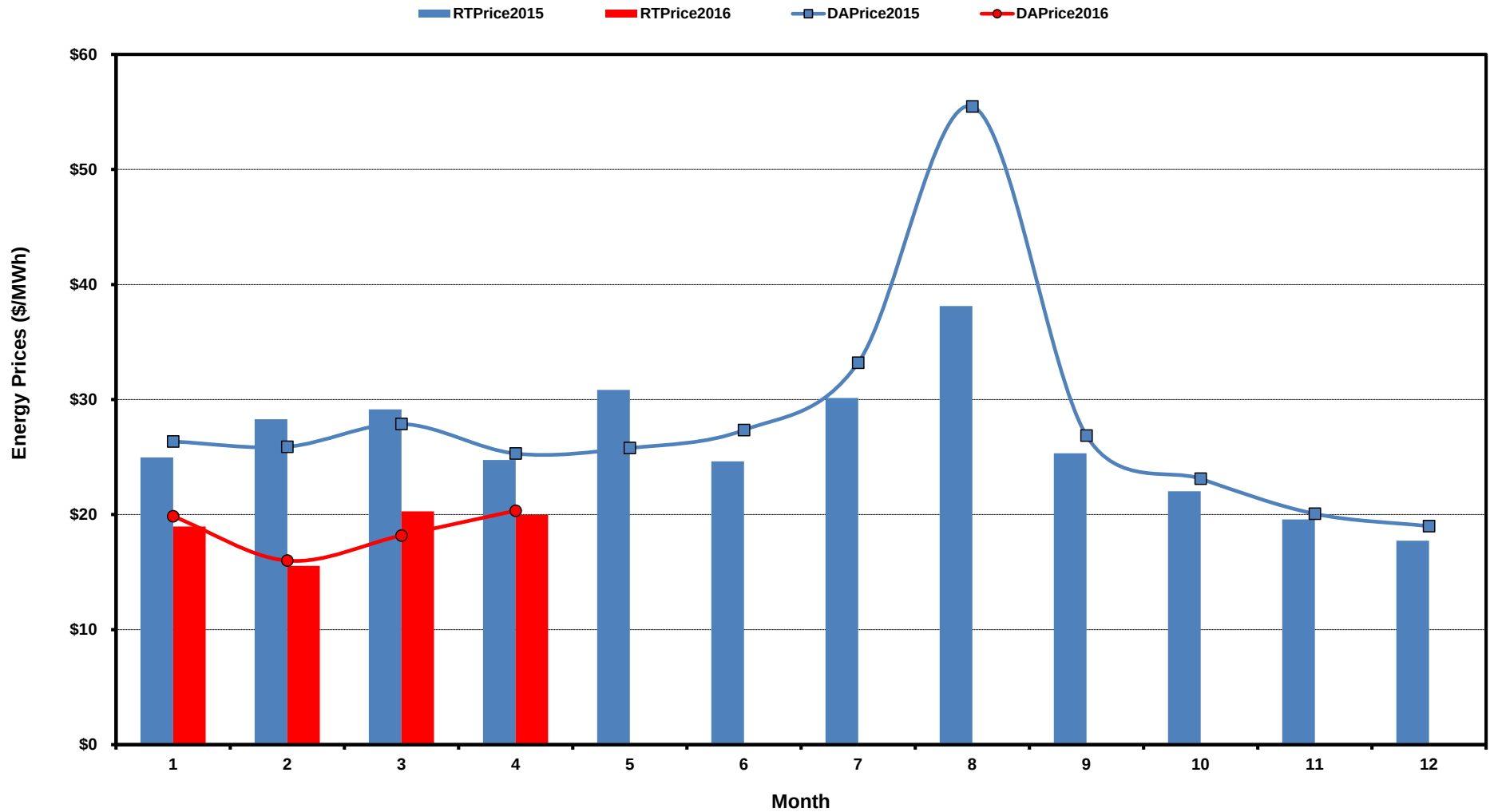
Thursday, May 12, 2016

Potomac Economics, Ltd.
Independent Market Monitor

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ERCOT-wide Average Energy Prices DA vs RT

(avg. DA & RT SPPs weighted by Real Time Settlement Loads)



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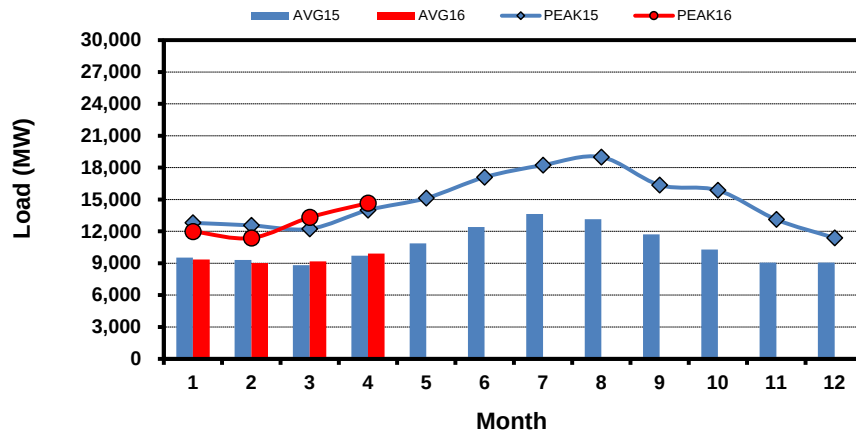
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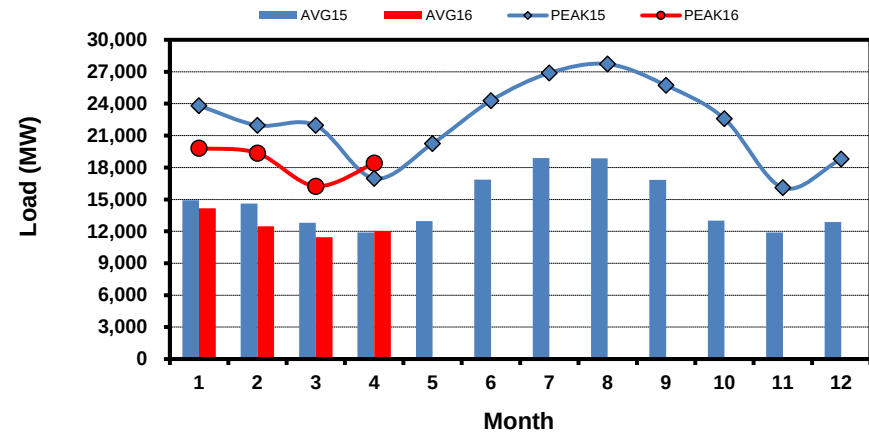
Load Zone Load Statistics

(Nodal load zone made comparable to zonal sytem Load Zone definitions*)

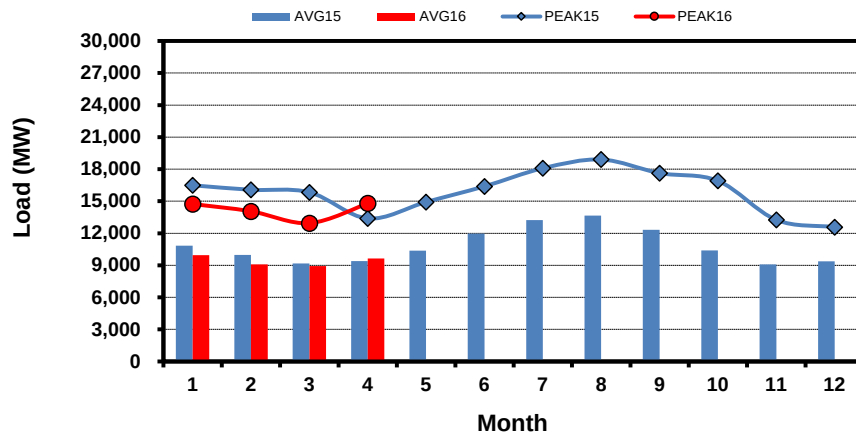
Houston Zone



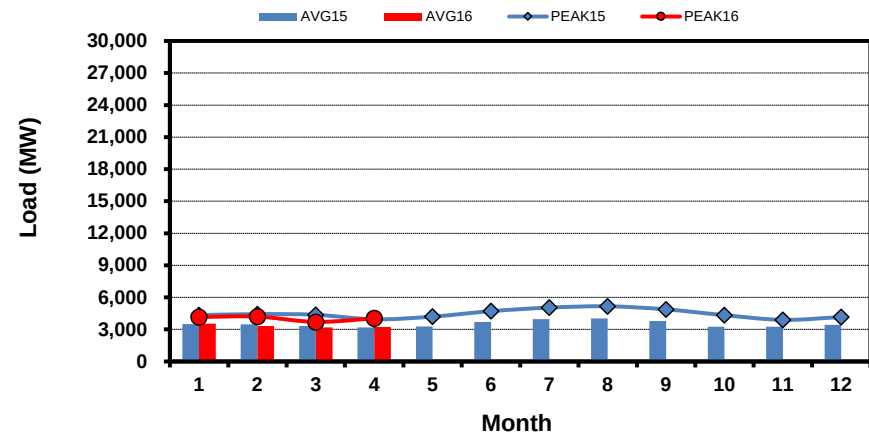
North Zone



South Zone



West Zone



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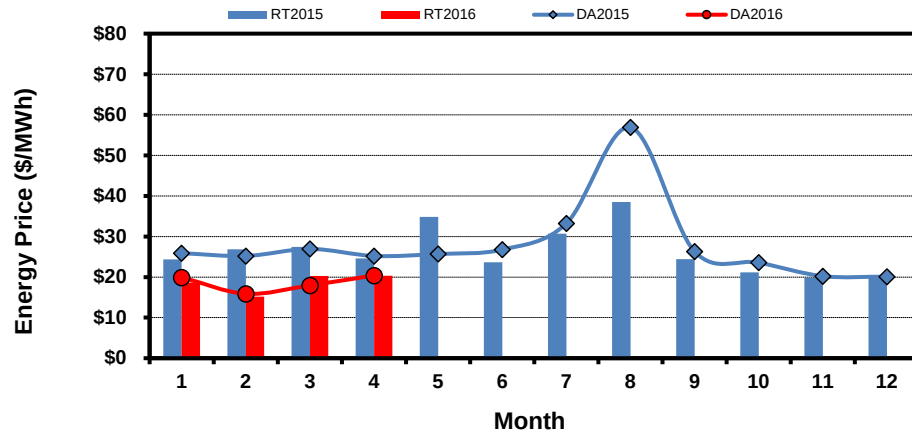
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Note: * Zonal load zone definition vs. Nodal comparable load zone definition: LZ_Houston=LZ_Houston; LZ_West=LZ_West; LZ_North=(LZ_North,LZ_RAYBN); LZ_South=(LZ_South,LZ_CPS,LZ_AEN,LZ_LCRA)

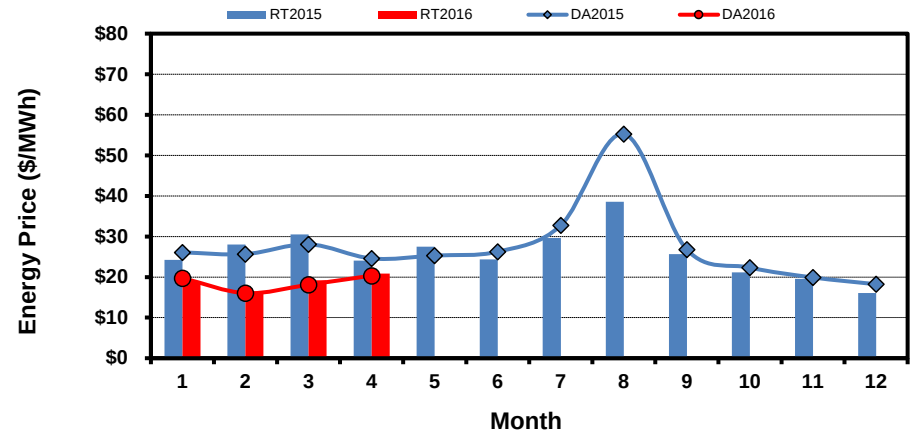
Load Zone Monthly Average Energy Price DA vs RT

(avg. DA & RT SPPs weighted by Real Time Settlement Loads)
(Nodal load zone made comparable to zonal sytem Load Zone definitions*)

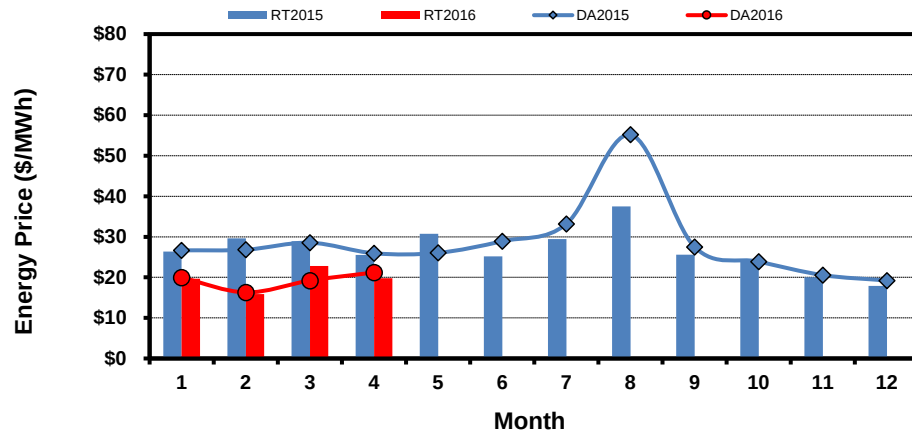
Houston Zone



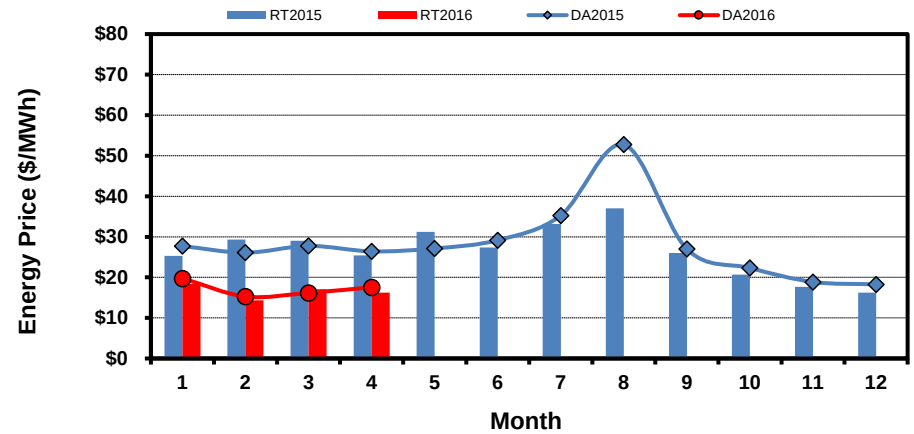
North Zone



South Zone



West Zone



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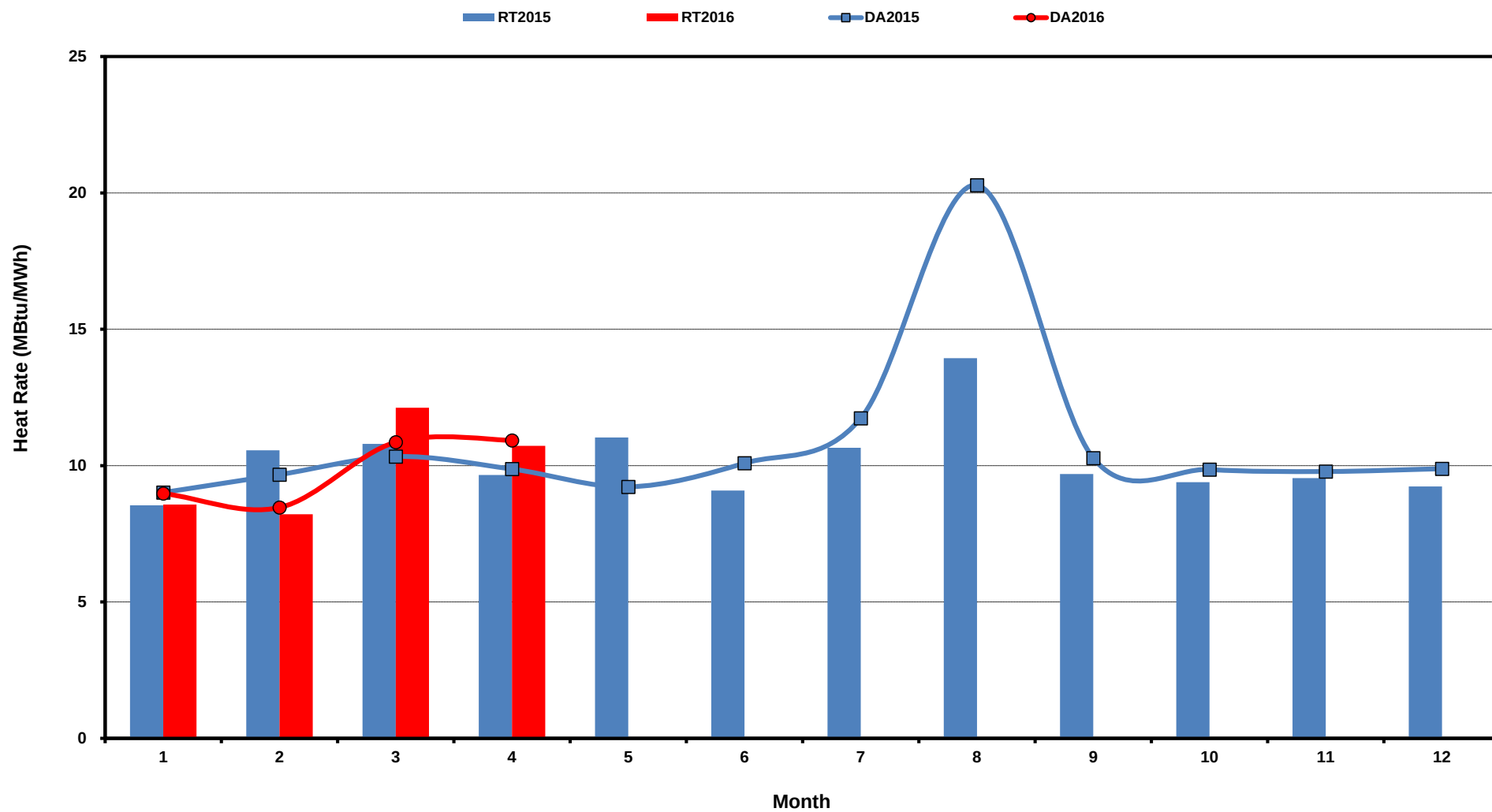
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Note: * Zonal load zone definition vs. Nodal comparable load zone definition: LZ_Houston=LZ_Houston; LZ_West=LZ_West; LZ_North=(LZ_North,LZ_RAYBN); LZ_South=(LZ_South,LZ_CPS,LZ_AEN,LZ_LCRA)

ERCOT-wide Monthly Implied Heat Rate DA vs RT

(avg. heat rates weighted by Real Time Settlement Loads)



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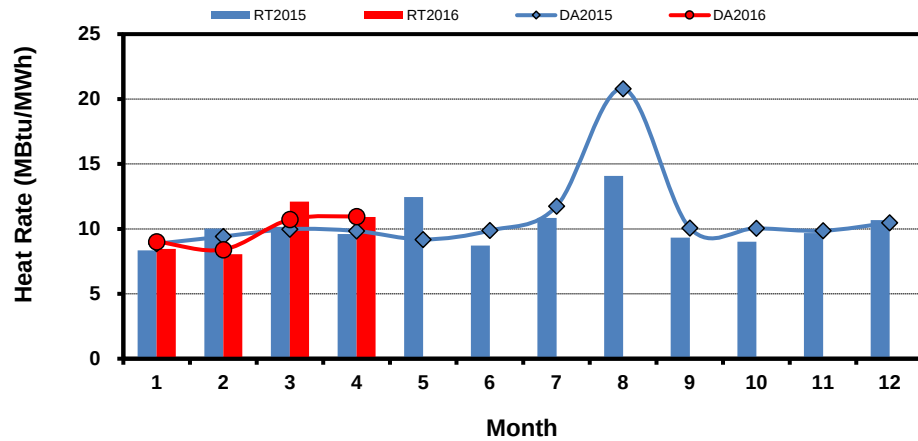
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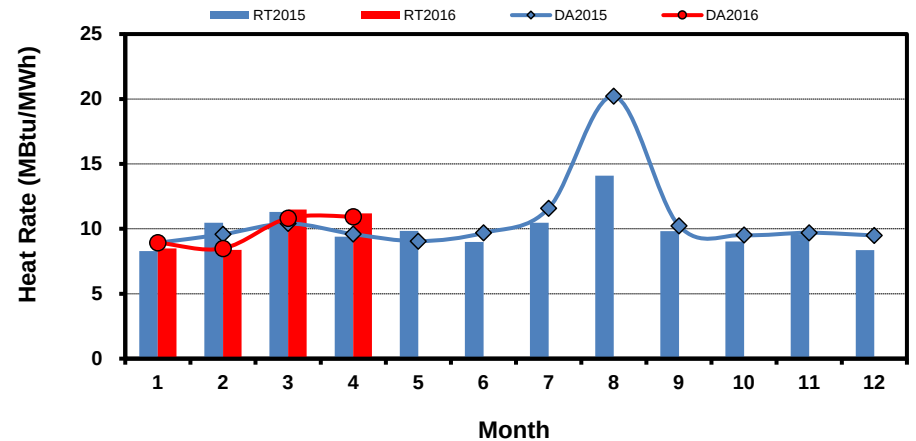
Load Zone Monthly Implied Heat Rate DA vs RT

(avg. heat rates weighted by Real Time Settlement Loads)
(Nodal load zone made comparable to zonal sytem Load Zone definitions*)

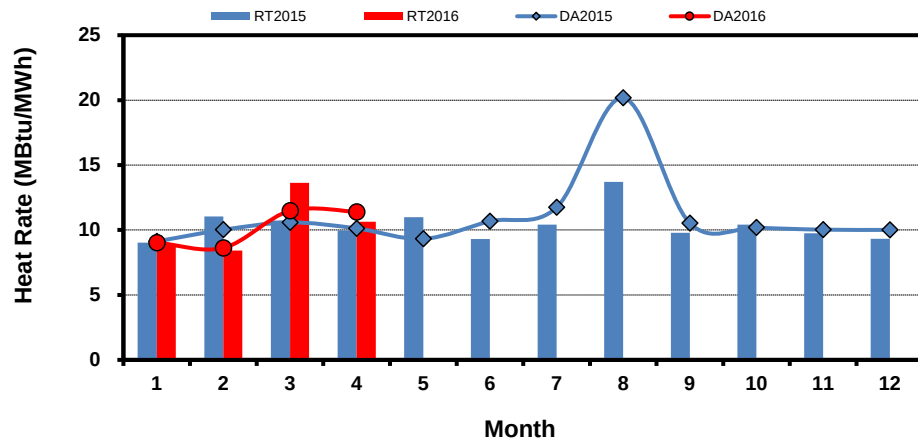
Houston Zone



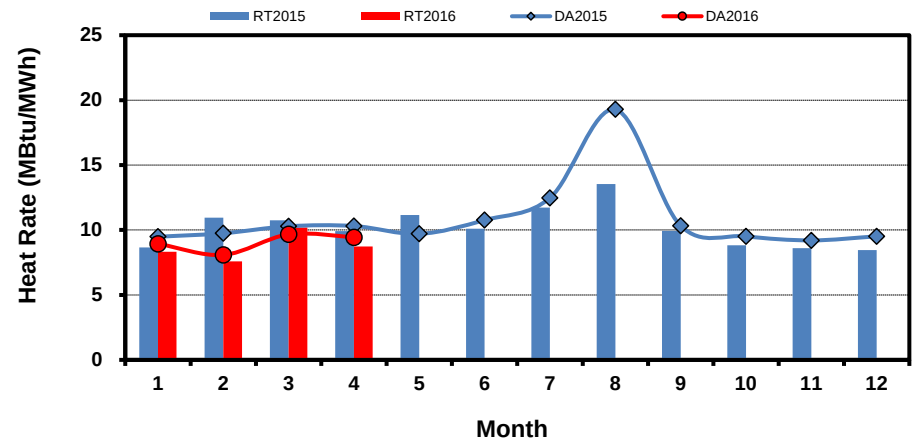
North Zone



South Zone



West Zone



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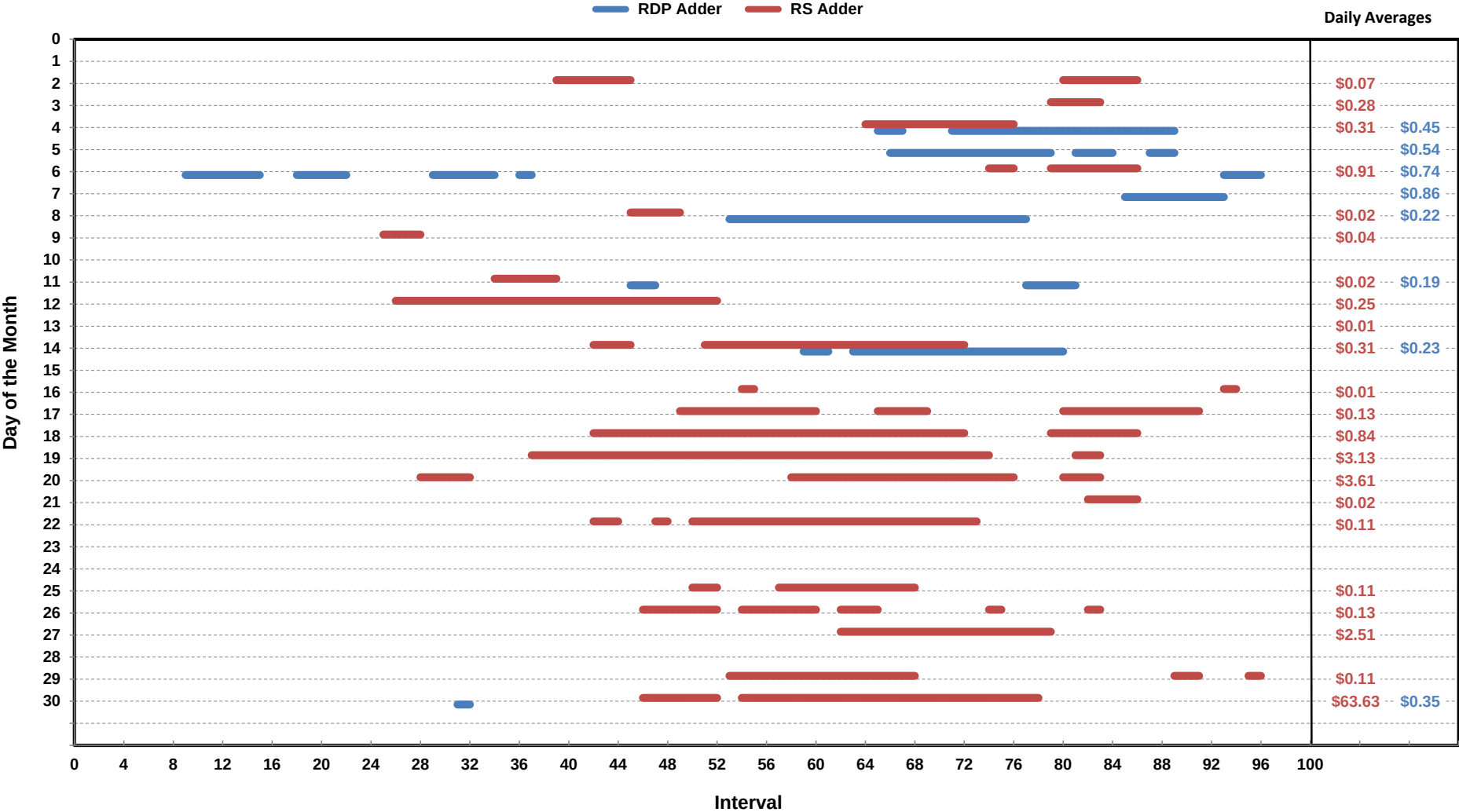
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Note: * Zonal load zone definition vs. Nodal comparable load zone definition: LZ_Houston=LZ_Houston; LZ_West=LZ_West; LZ_North=(LZ_North,LZ_RAYBN); LZ_South=(LZ_South,LZ_CPS,LZ_AEN,LZ_LCRA)

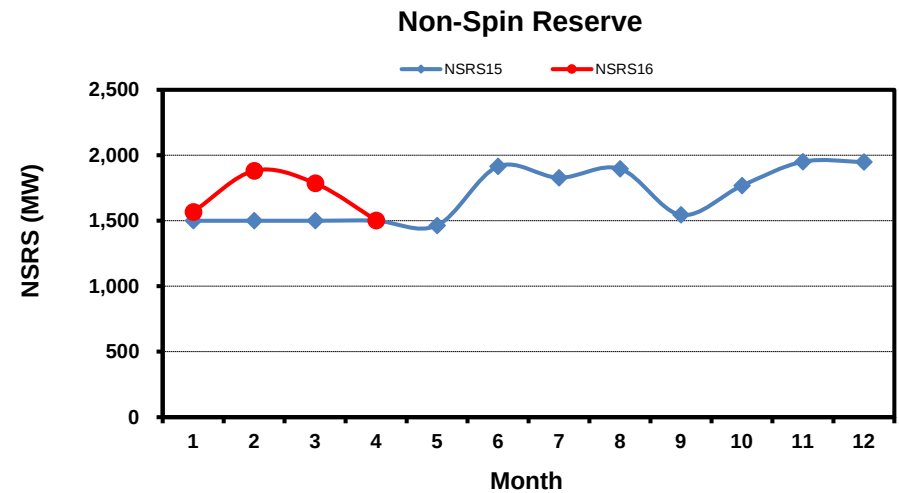
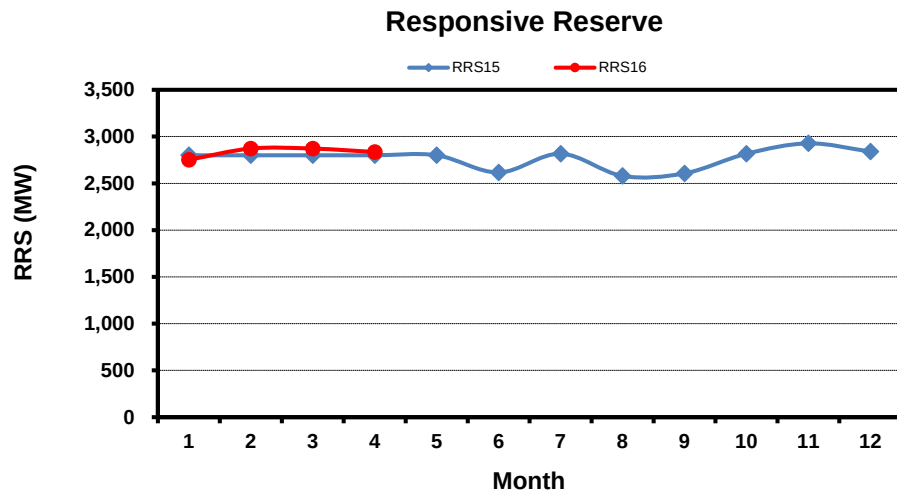
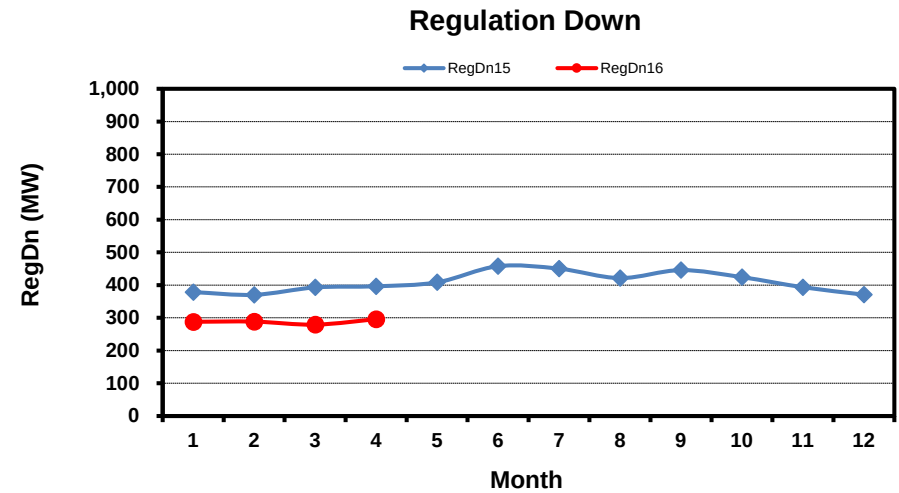
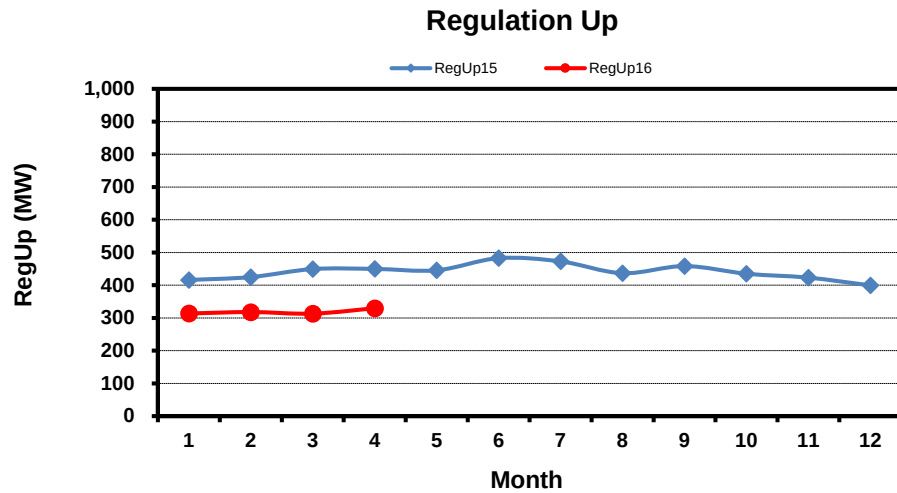
Daily ORDC Adders Average Values and Interval Duration

Apr-2016



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Monthly Average of Ancillary Services Required MW



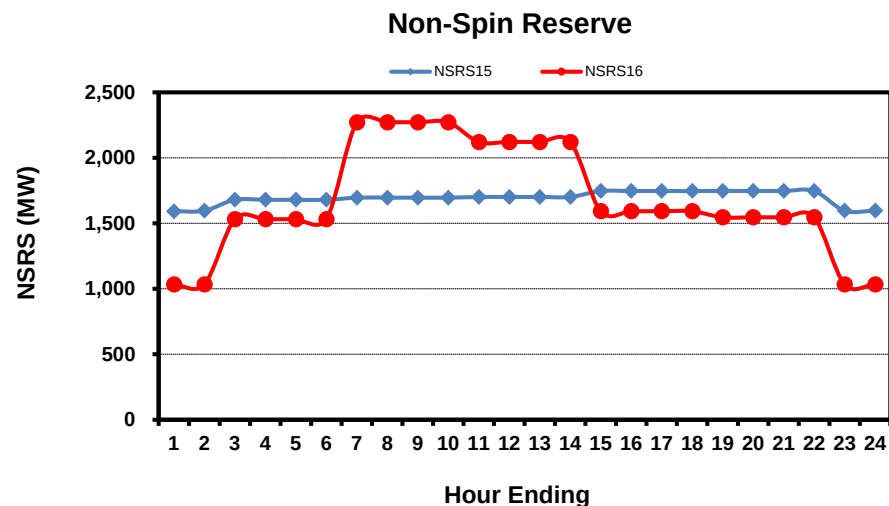
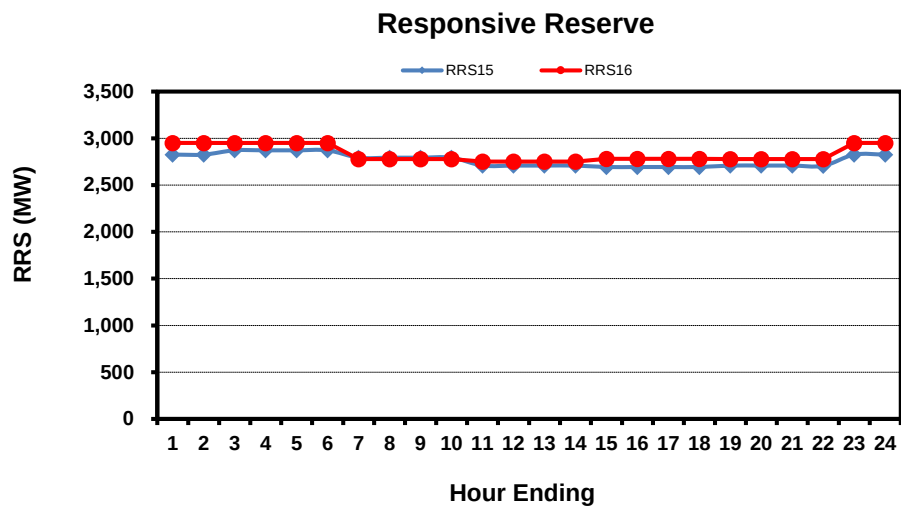
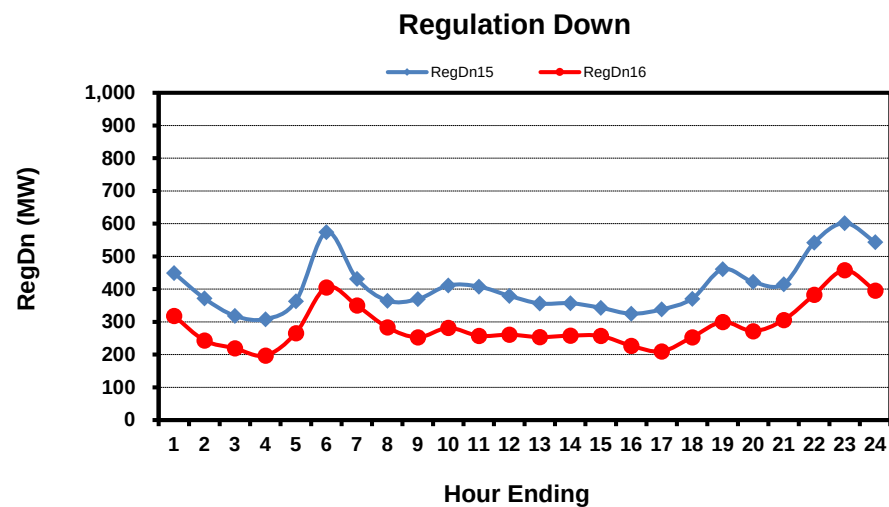
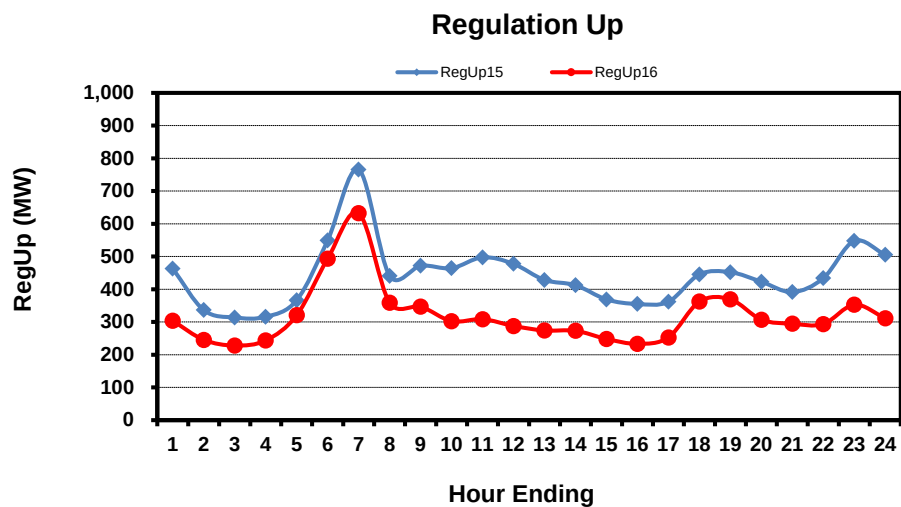
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Hourly Average of Ancillary Services Required MW



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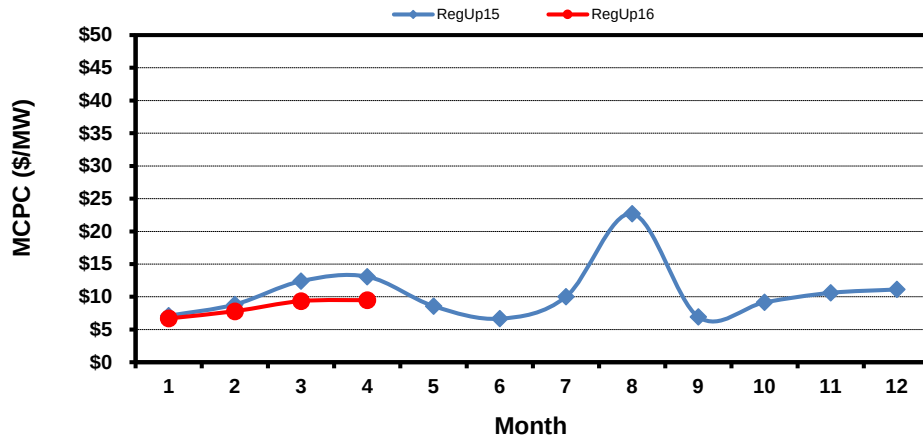
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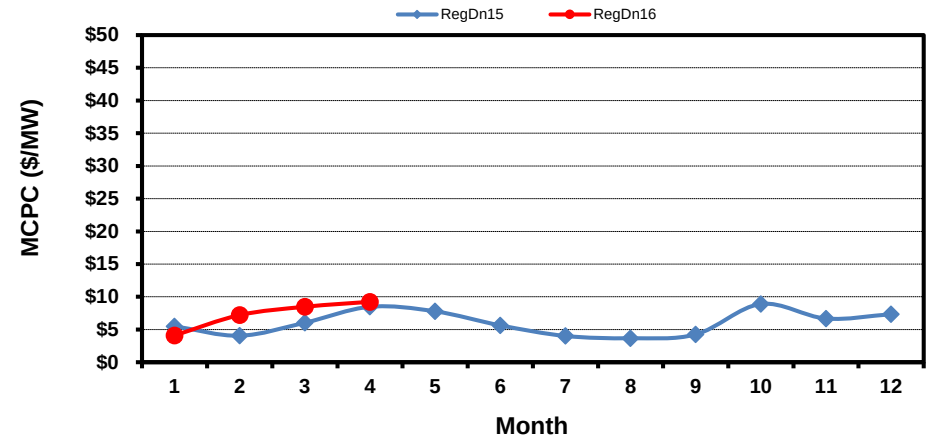
Monthly Average Ancillary Services Price

(weighted by A/S Quantities Required)

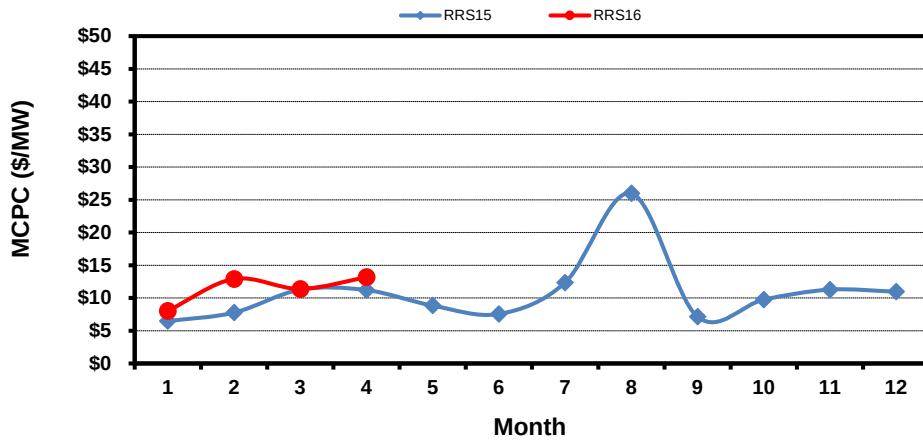
Regulation Up



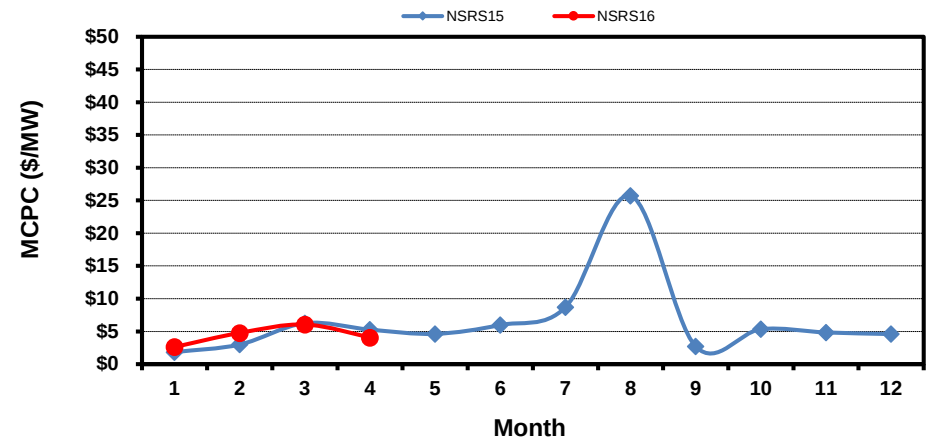
Regulation Down



Responsive Reserve



Non-Spin Reserve



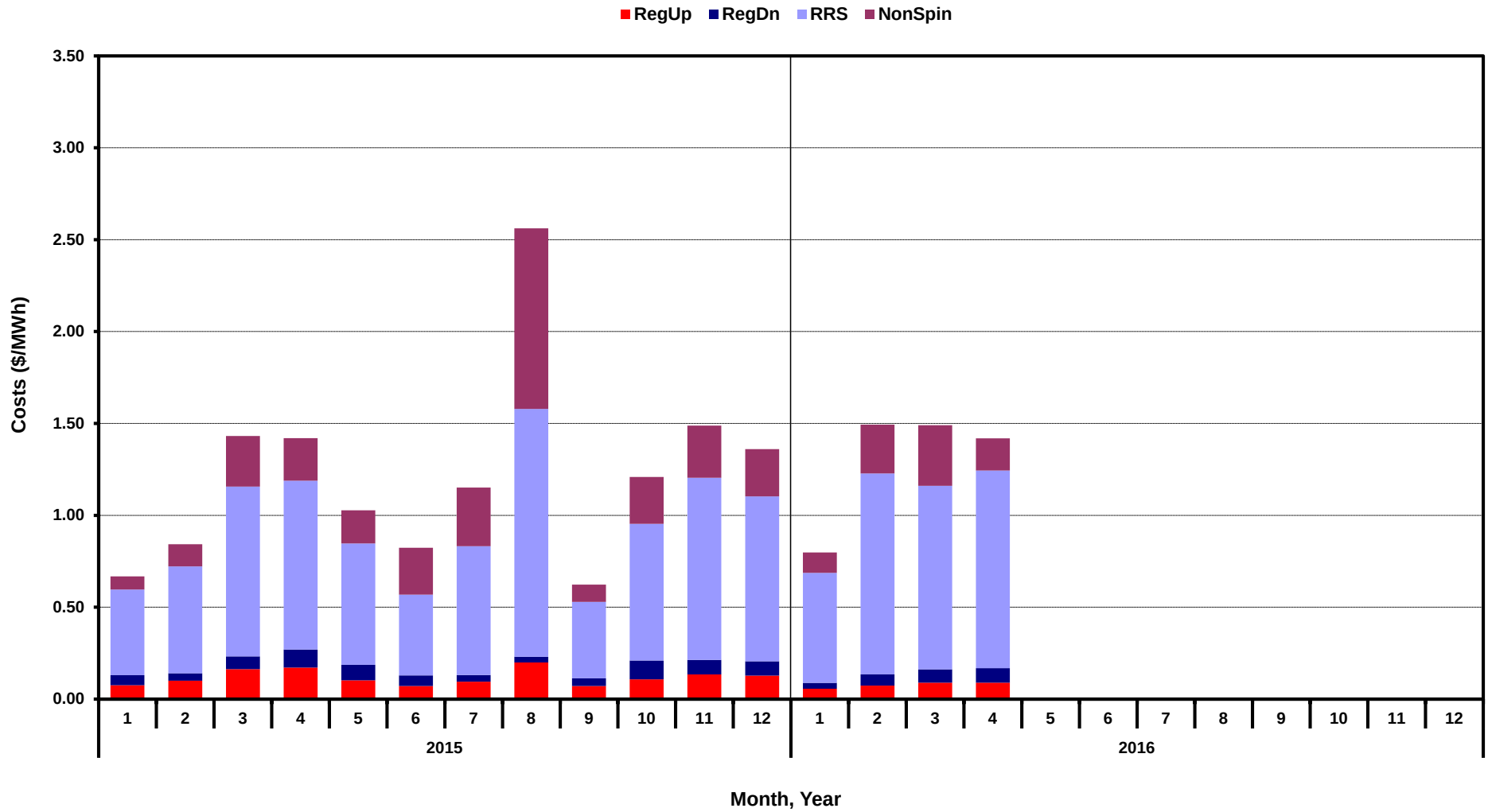
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Monthly Average A/S Cost per MWh Load



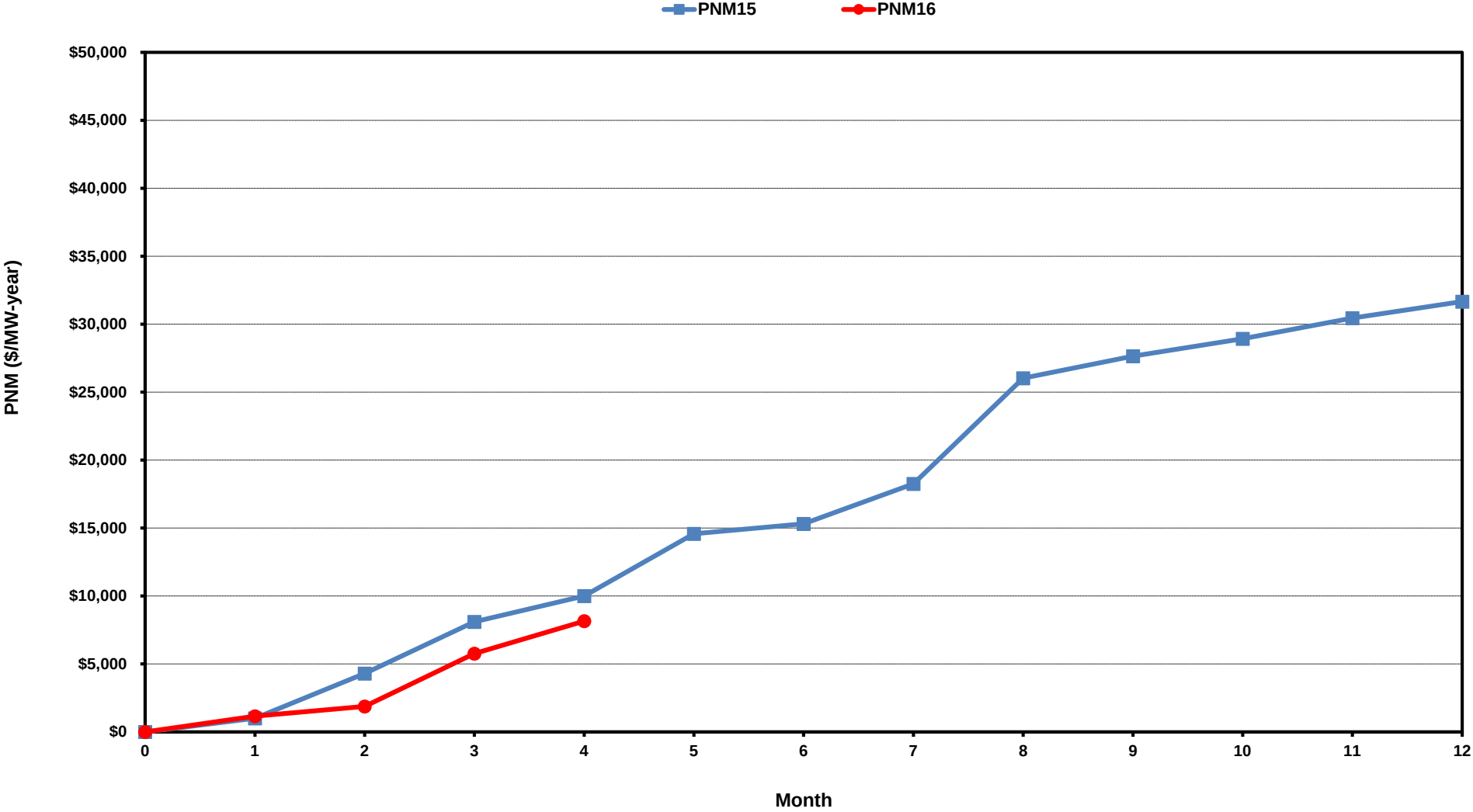
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ERCOT-wide Cumulative Peaker Net Margin



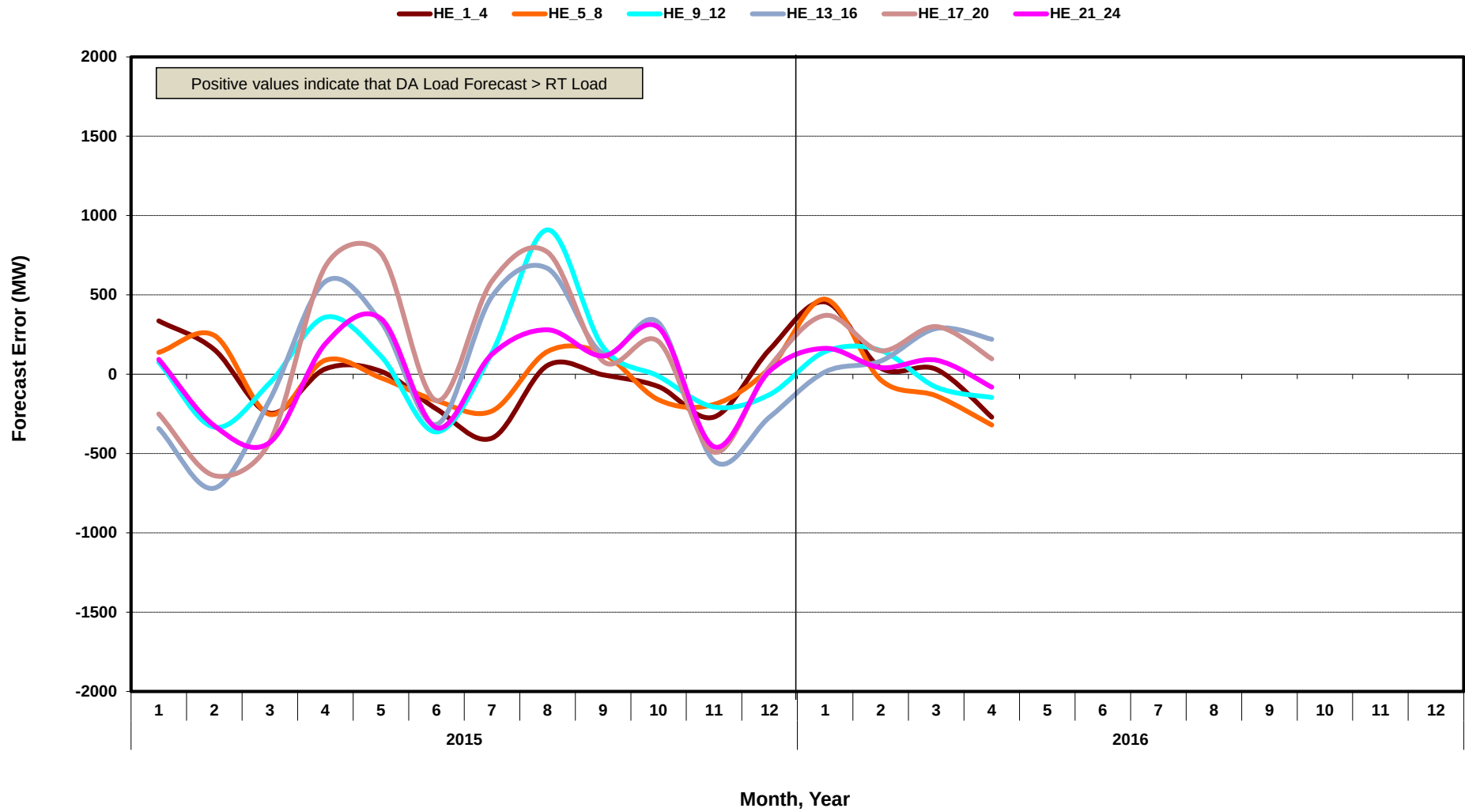
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DA vs. RT Load Forecast Error by Hour Ending



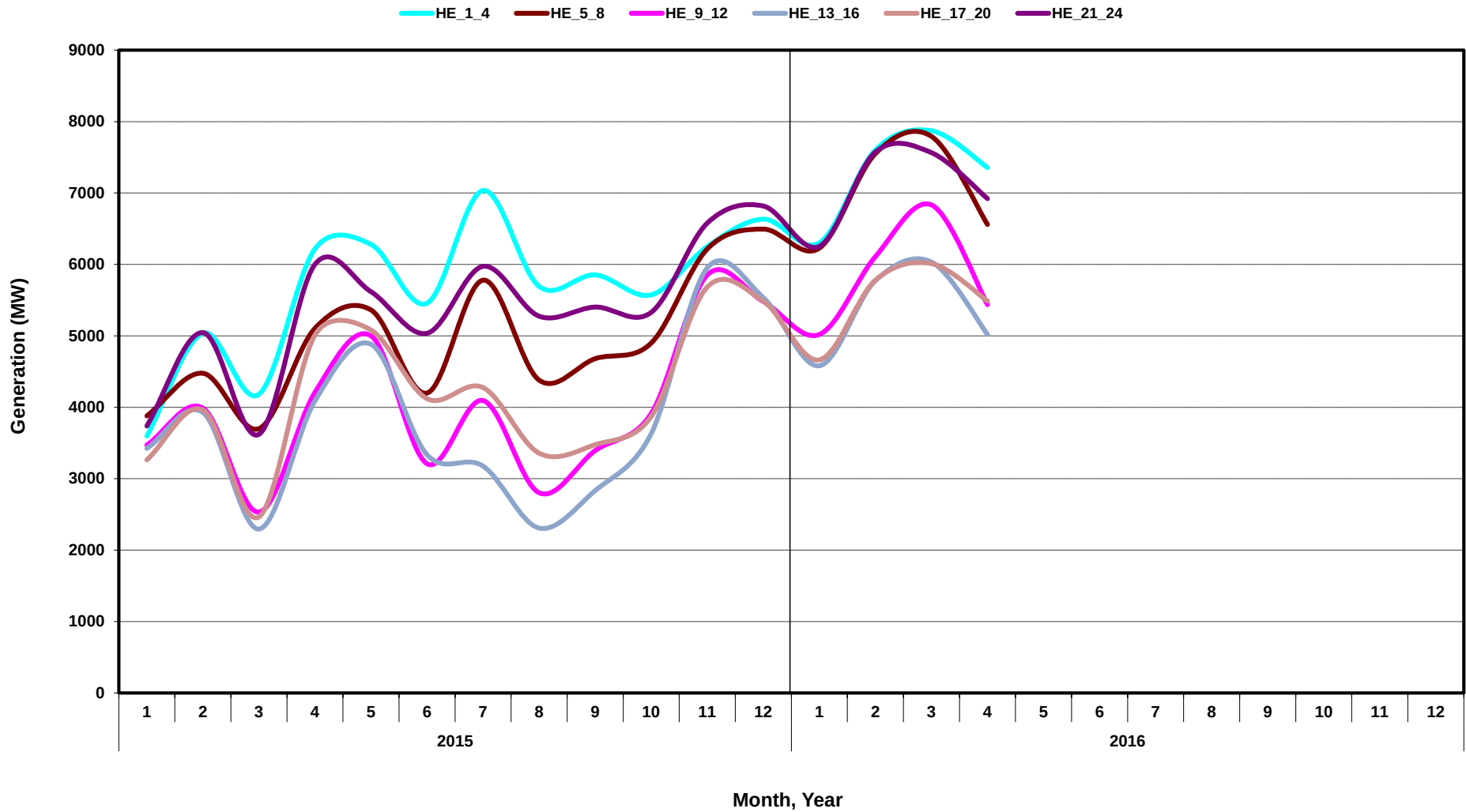
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Monthly Average of Wind Generation by Hour Ending



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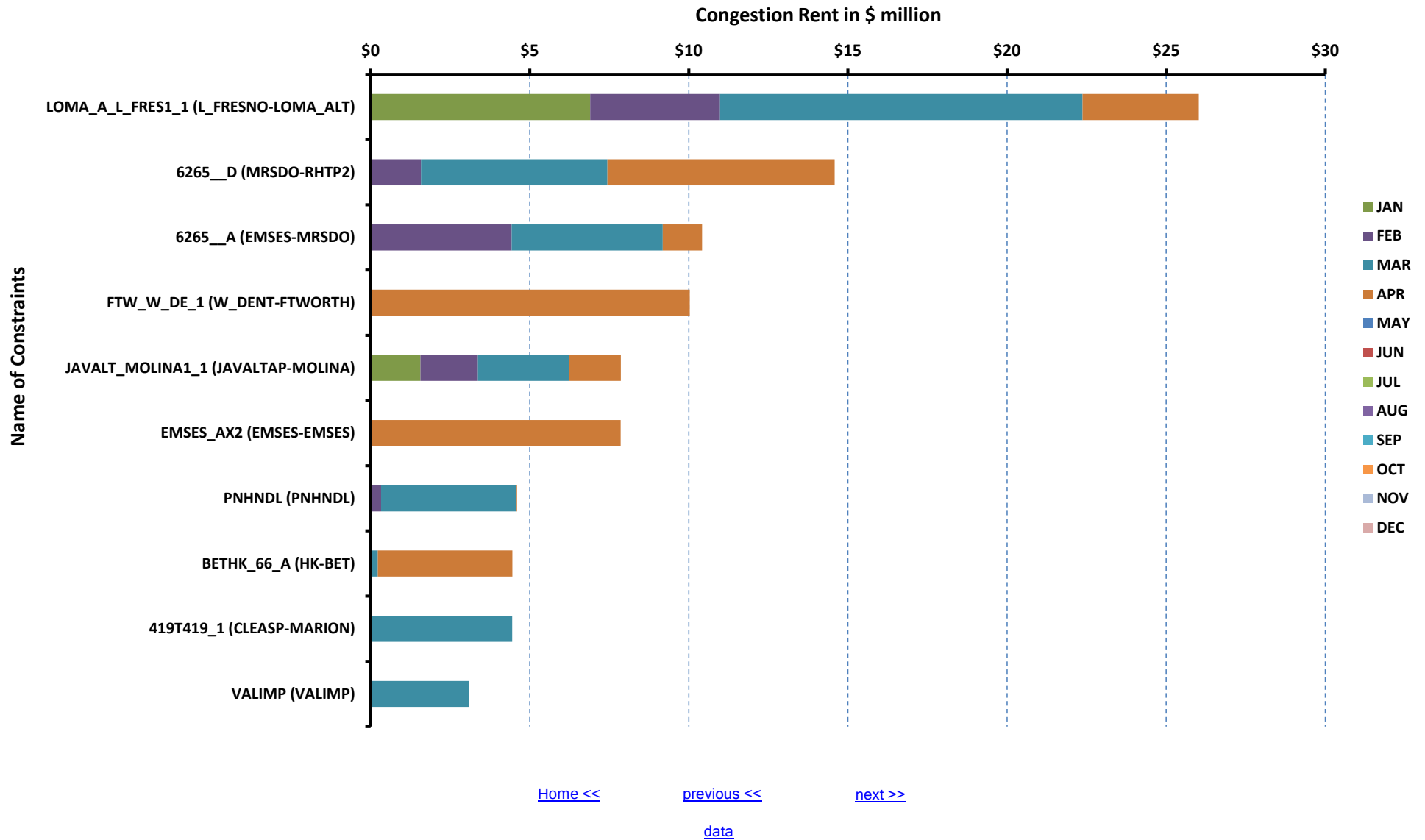
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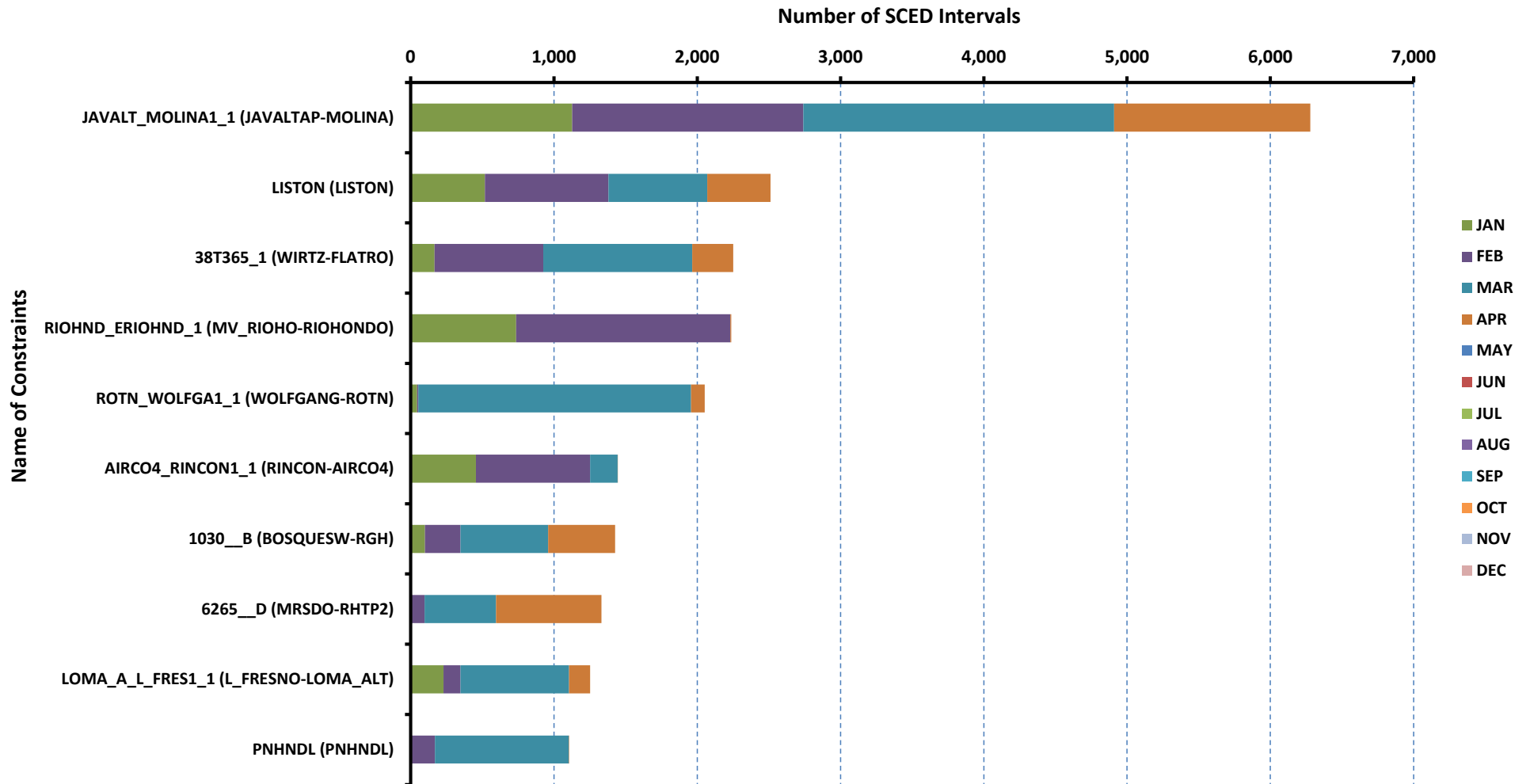
RT Congestion Constraint Rankings - 1

Top 10 Constraints by Total Congestion Rent



RT Congestion Constraint Rankings - 2

Top 10 Constraints by Binding Frequency



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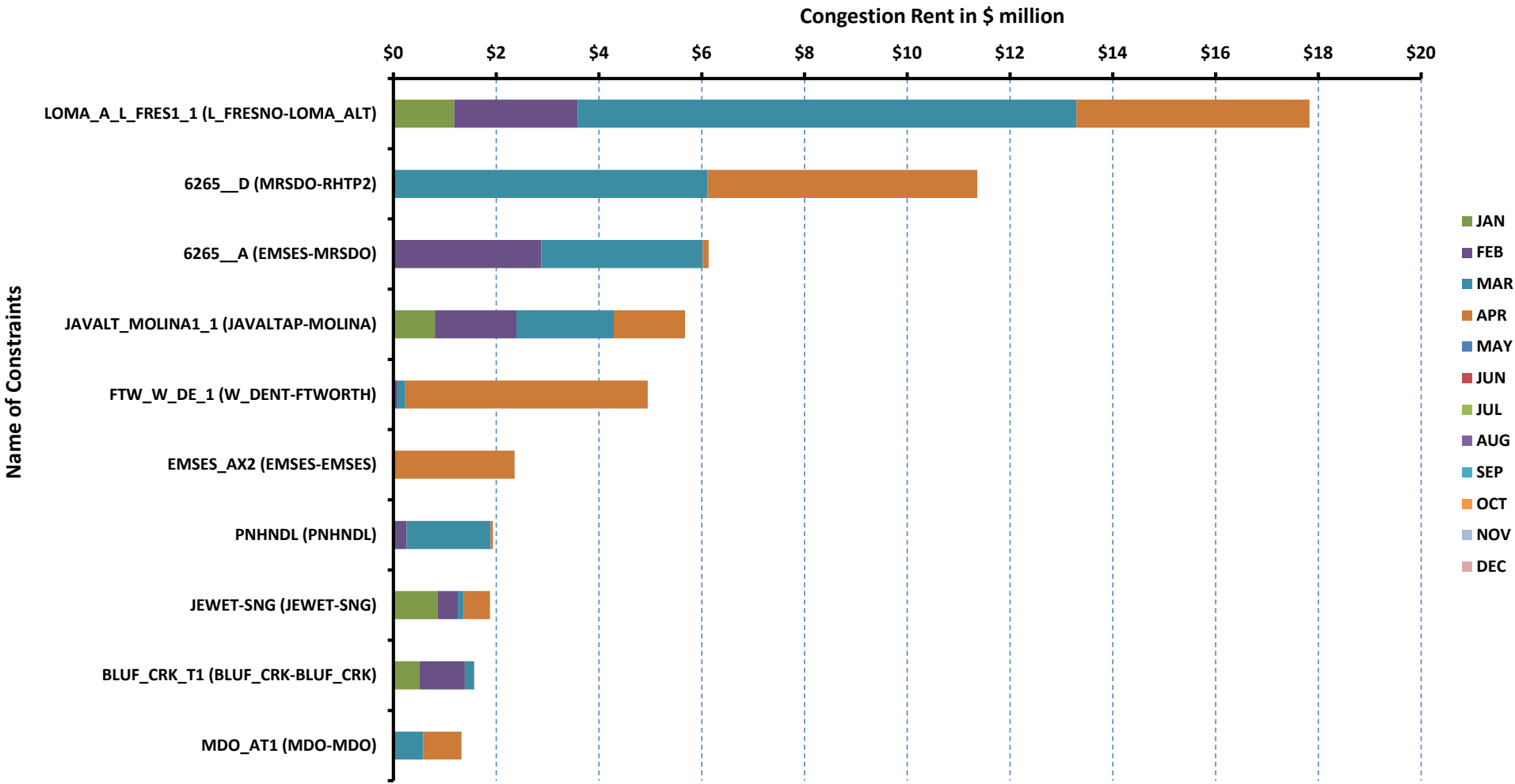
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DA Congestion Constraint Rankings - 1

Top 10 Constraints by Total Congestion Rent



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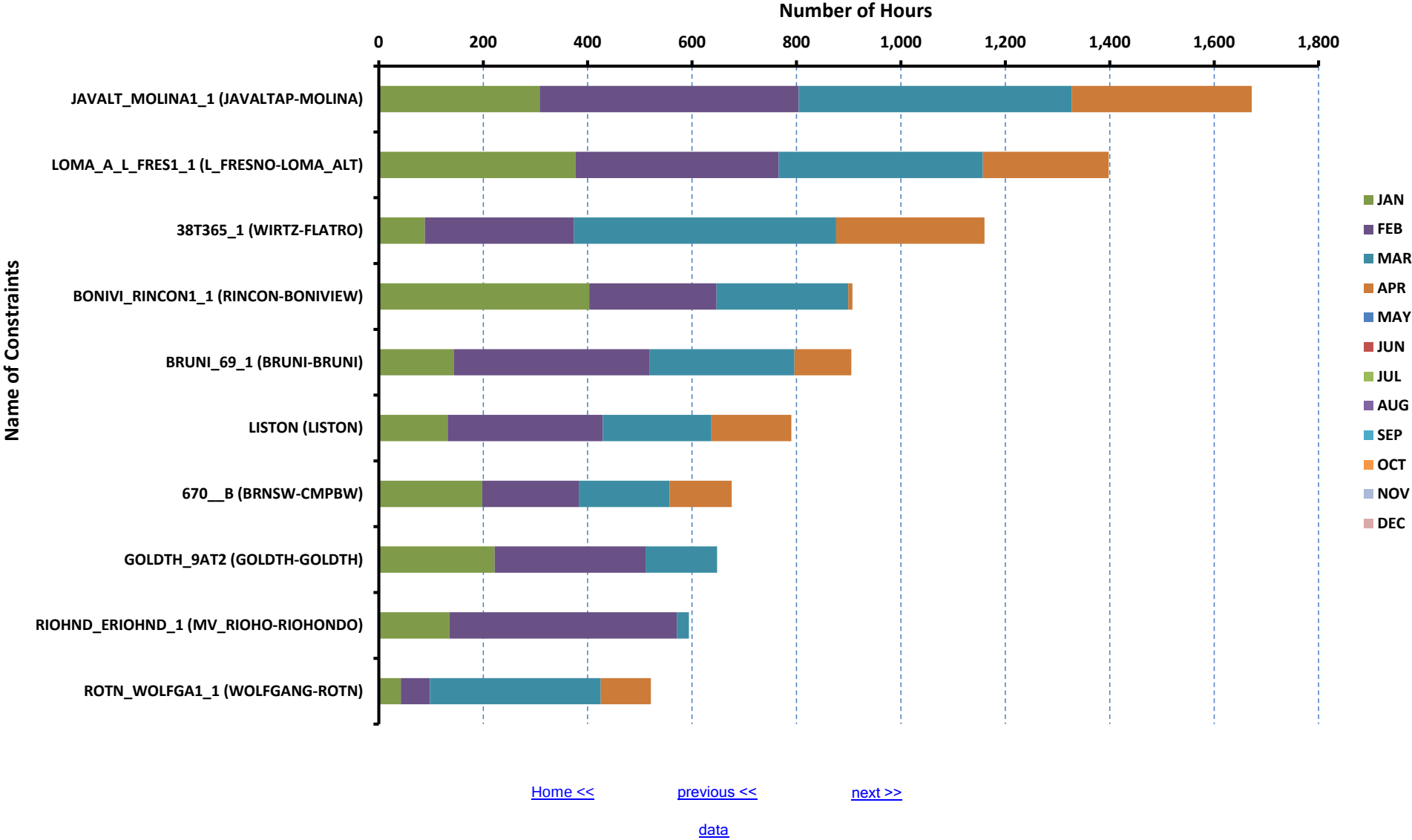
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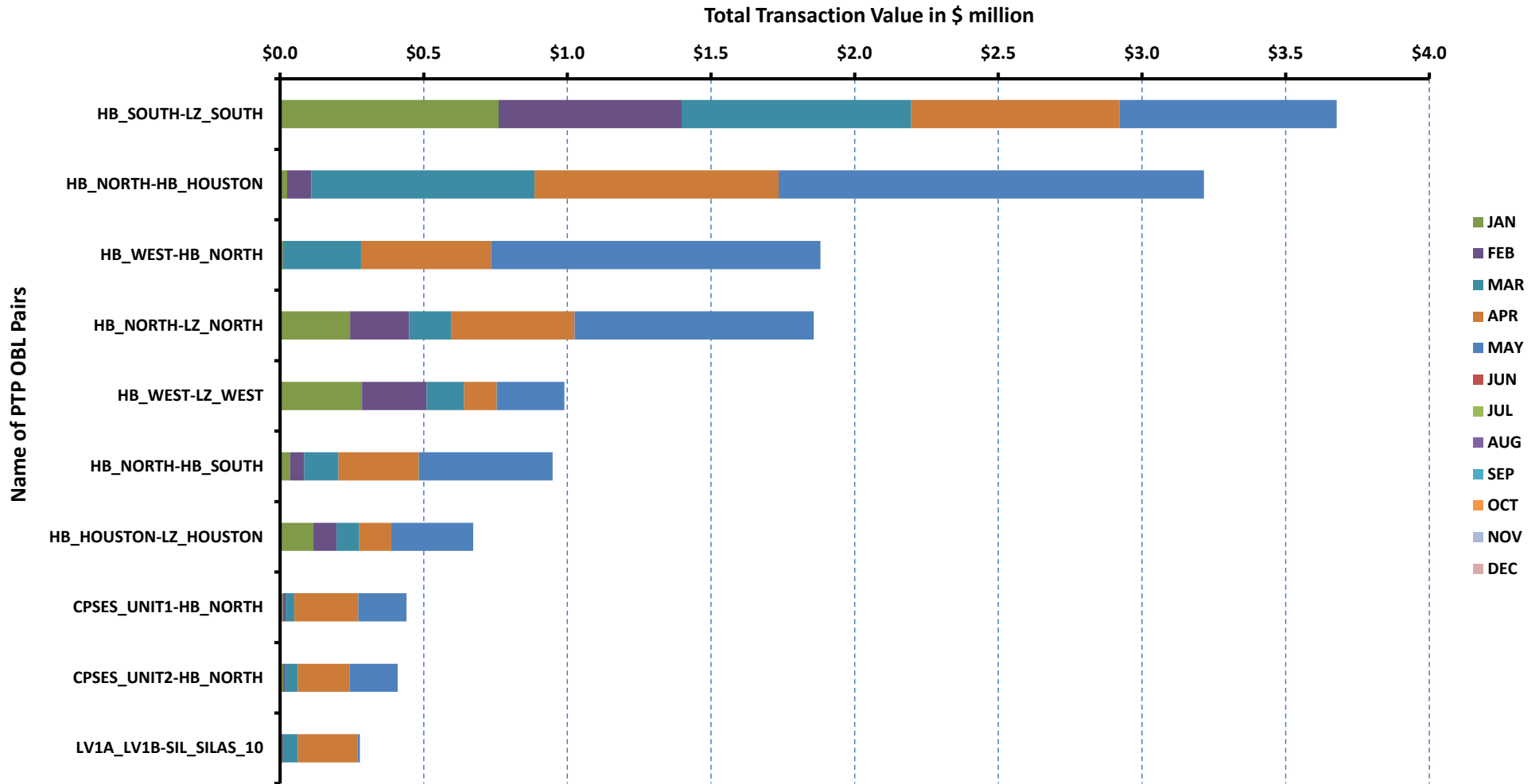
DA Congestion Constraint Rankings - 2

Top 10 Constraints by Binding Frequency



Top 10 CRR Pairs Ranked by Monthly Auction Values - 1

Top 10 PTP Obligations by Total Transaction Value



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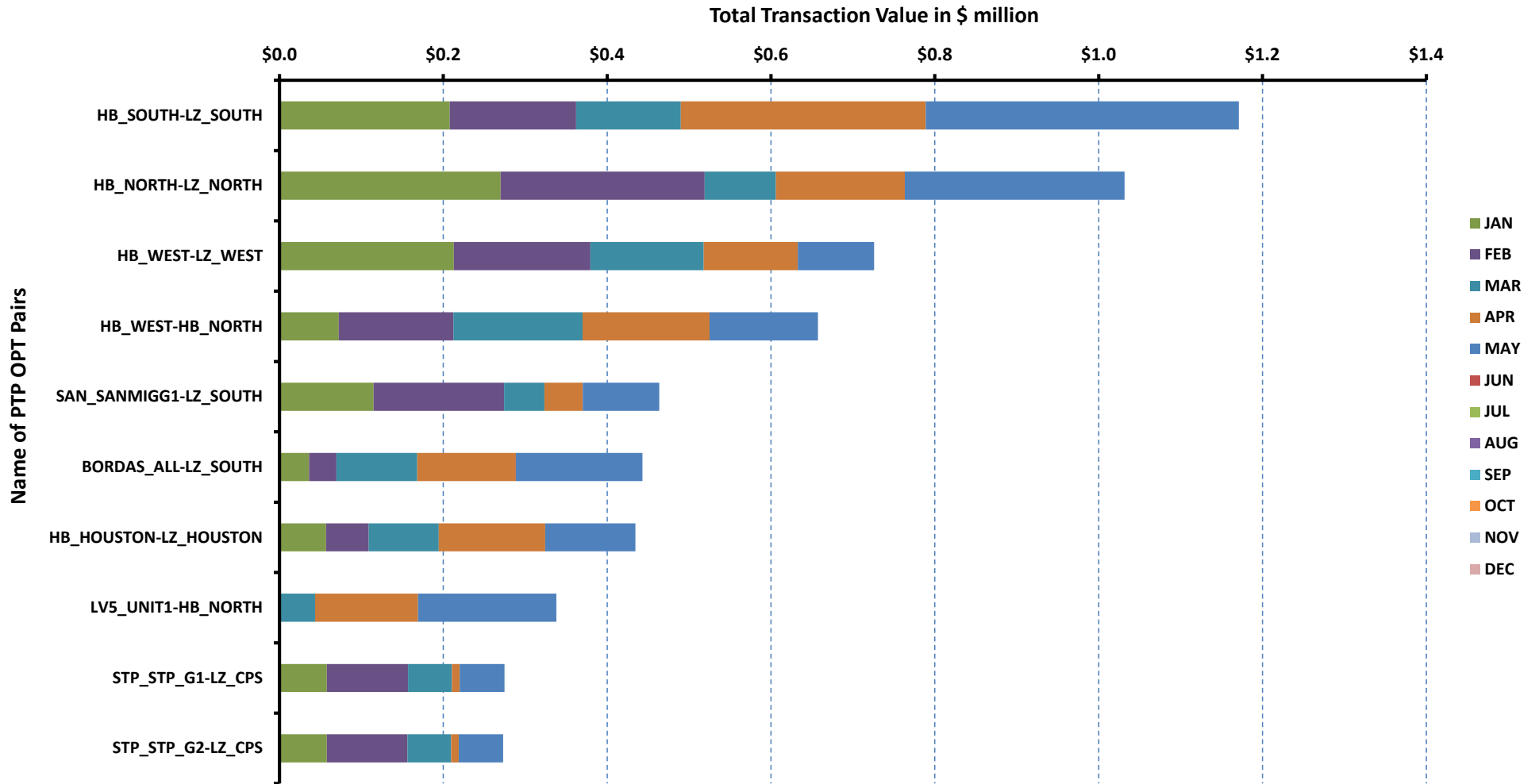
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Top 10 CRR Pairs Ranked by Monthly Auction Values - 2

Top 10 PTP Options by Total Transaction Value



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ERCOT-wide Avg. Energy Price - DA vs. RT			
year	month	dam_spp	rtm_spp
2015	1	\$ 26.35	\$ 24.97
	2	\$ 25.90	\$ 28.28
	3	\$ 27.88	\$ 29.14
	4	\$ 25.30	\$ 24.74
	5	\$ 25.78	\$ 30.84
	6	\$ 27.35	\$ 24.63
	7	\$ 33.20	\$ 30.14
	8	\$ 55.48	\$ 38.12
	9	\$ 26.87	\$ 25.33
	10	\$ 23.11	\$ 22.02
	11	\$ 20.07	\$ 19.58
	12	\$ 18.99	\$ 17.74
2016	1	\$ 19.85	\$ 18.96
	2	\$ 16.00	\$ 15.54
	3	\$ 18.18	\$ 20.29
	4	\$ 20.34	\$ 19.97
	5	\$ -	\$ -
	6	\$ -	\$ -
	7	\$ -	\$ -
	8	\$ -	\$ -
	9	\$ -	\$ -
	10	\$ -	\$ -
	11	\$ -	\$ -
	12	\$ -	\$ -

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Load Zone Load Statistics									
year	month	loadPEAK_Houston	loadPEAK_North	loadPEAK_South	loadPEAK_West	loadAVG_Houston	loadAVG_North	loadAVG_South	loadAVG_West
2015	1	12,803	23,814	16,491	4,339	9,538	14,918	10,830	3,496
	2	12,561	21,965	16,070	4,433	9,308	14,612	9,980	3,477
	3	12,235	21,950	15,837	4,372	8,827	12,810	9,182	3,318
	4	14,001	16,971	13,386	3,944	9,708	11,901	9,397	3,177
	5	15,128	20,253	14,926	4,199	10,879	12,956	10,381	3,265
	6	17,100	24,285	16,392	4,708	12,402	16,870	11,974	3,702
	7	18,236	26,878	18,084	5,043	13,643	18,882	13,232	3,958
	8	18,994	27,717	18,902	5,164	13,139	18,853	13,665	4,029
	9	16,361	25,718	17,631	4,876	11,726	16,837	12,322	3,782
	10	15,857	22,580	16,908	4,335	10,302	13,015	10,387	3,250
	11	13,116	16,102	13,252	3,893	9,074	11,890	9,087	3,260
	12	11,381	18,792	12,572	4,157	9,057	12,885	9,374	3,421
2016	1	11,994	19,818	14,739	4,162	9,365	14,157	9,953	3,535
	2	11,378	19,345	14,059	4,200	9,029	12,475	9,080	3,319
	3	13,316	16,242	12,948	3,701	9,176	11,445	8,930	3,183
	4	14,658	18,429	14,803	4,046	9,914	12,020	9,643	3,228
	5	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-
	12	-	-	-	-	-	-	-	-

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Load Zone Monthly Average Energy Price - DA vs. RT										
year	month	avgRTMp_Houston	avgRTMp_North	avgRTMp_South	avgRTMp_West	avgDAMp_Houston	avgDAMp_North	avgDAMp_South	avgDAMp_West	
2015	1	\$ 24.37	\$ 24.24	\$ 26.39	\$ 25.32	\$ 25.89	\$ 26.09	\$ 26.67	\$ 27.72	
	2	\$ 26.86	\$ 28.03	\$ 29.60	\$ 29.35	\$ 25.21	\$ 25.66	\$ 26.83	\$ 26.10	
	3	\$ 27.42	\$ 30.50	\$ 28.93	\$ 29.01	\$ 26.93	\$ 28.08	\$ 28.55	\$ 27.76	
	4	\$ 24.59	\$ 24.08	\$ 25.53	\$ 25.39	\$ 25.21	\$ 24.58	\$ 25.94	\$ 26.41	
	5	\$ 34.82	\$ 27.49	\$ 30.72	\$ 31.20	\$ 25.68	\$ 25.30	\$ 26.05	\$ 27.14	
	6	\$ 23.61	\$ 24.36	\$ 25.20	\$ 27.36	\$ 26.76	\$ 26.26	\$ 28.92	\$ 29.18	
	7	\$ 30.68	\$ 29.60	\$ 29.44	\$ 33.16	\$ 33.21	\$ 32.75	\$ 33.20	\$ 35.27	
	8	\$ 38.50	\$ 38.54	\$ 37.49	\$ 37.05	\$ 56.90	\$ 55.28	\$ 55.18	\$ 52.76	
	9	\$ 24.39	\$ 25.66	\$ 25.57	\$ 25.98	\$ 26.30	\$ 26.75	\$ 27.52	\$ 27.00	
	10	\$ 21.14	\$ 21.16	\$ 24.41	\$ 20.69	\$ 23.57	\$ 22.33	\$ 23.89	\$ 22.31	
	11	\$ 19.86	\$ 19.57	\$ 20.01	\$ 17.64	\$ 20.22	\$ 19.89	\$ 20.57	\$ 18.87	
	12	\$ 20.50	\$ 16.07	\$ 17.91	\$ 16.24	\$ 20.10	\$ 18.23	\$ 19.22	\$ 18.27	
2016	1	\$ 18.68	\$ 18.77	\$ 19.69	\$ 18.39	\$ 19.93	\$ 19.74	\$ 19.95	\$ 19.76	
	2	\$ 15.20	\$ 15.83	\$ 15.89	\$ 14.35	\$ 15.89	\$ 16.05	\$ 16.30	\$ 15.28	
	3	\$ 20.26	\$ 19.23	\$ 22.82	\$ 17.05	\$ 17.95	\$ 18.11	\$ 19.21	\$ 16.18	
	4	\$ 20.31	\$ 20.84	\$ 19.78	\$ 16.24	\$ 20.39	\$ 20.35	\$ 21.20	\$ 17.56	
	5	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	6	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	7	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	8	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	9	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	10	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	11	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	
	12	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	

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ERCOT-wide Monthly Implied Heat Rate - DA vs. RT						
year	month	gasprice	rtm_spp	HR_rtm	dam_spp	HR_dam
2015	1	\$ 2.92	\$ 24.97	8.54	\$ 26.35	9.01
	2	\$ 2.68	\$ 28.28	10.56	\$ 25.90	9.67
	3	\$ 2.70	\$ 29.14	10.80	\$ 27.88	10.33
	4	\$ 2.56	\$ 24.74	9.66	\$ 25.30	9.87
	5	\$ 2.80	\$ 30.84	11.03	\$ 25.78	9.22
	6	\$ 2.71	\$ 24.63	9.09	\$ 27.35	10.09
	7	\$ 2.83	\$ 30.14	10.66	\$ 33.20	11.74
	8	\$ 2.74	\$ 38.12	13.94	\$ 55.48	20.28
	9	\$ 2.61	\$ 25.33	9.69	\$ 26.87	10.28
	10	\$ 2.35	\$ 22.02	9.39	\$ 23.11	9.86
	11	\$ 2.05	\$ 19.58	9.55	\$ 20.07	9.78
	12	\$ 1.92	\$ 17.74	9.23	\$ 18.99	9.89
2016	1	\$ 2.21	\$ 18.96	8.58	\$ 19.85	8.98
	2	\$ 1.89	\$ 15.54	8.22	\$ 16.00	8.46
	3	\$ 1.67	\$ 20.29	12.12	\$ 18.18	10.86
	4	\$ 1.86	\$ 19.97	10.73	\$ 20.34	10.93
	5	\$ -	\$ -	-	\$ -	-
	6	\$ -	\$ -	-	\$ -	-
	7	\$ -	\$ -	-	\$ -	-
	8	\$ -	\$ -	-	\$ -	-
	9	\$ -	\$ -	-	\$ -	-
	10	\$ -	\$ -	-	\$ -	-
	11	\$ -	\$ -	-	\$ -	-
	12	\$ -	\$ -	-	\$ -	-

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Load Zone Monthly Implied Heat Rate - DA vs. RT									
year	month	HRdam_Houston	HRdam_South	HRdam_North	HRdam_West	HRrtm_Houston	HRrtm_South	HRrtm_North	HRrtm_West
2015	1	8.86	9.12	8.92	9.48	8.34	9.03	8.29	8.66
	2	9.41	10.02	9.58	9.75	10.03	11.05	10.47	10.96
	3	9.98	10.58	10.41	10.29	10.16	10.72	11.30	10.75
	4	9.84	10.12	9.59	10.31	9.60	9.96	9.40	9.91
	5	9.19	9.32	9.05	9.70	12.45	10.99	9.83	11.16
	6	9.87	10.67	9.69	10.76	8.71	9.30	8.99	10.09
	7	11.74	11.74	11.58	12.47	10.85	10.41	10.47	11.72
	8	20.80	20.17	20.21	19.29	14.08	13.70	14.09	13.55
	9	10.06	10.53	10.23	10.33	9.33	9.78	9.82	9.94
	10	10.05	10.19	9.52	9.51	9.02	10.41	9.02	8.82
	11	9.86	10.03	9.70	9.20	9.68	9.75	9.54	8.60
	12	10.47	10.01	9.49	9.51	10.67	9.32	8.36	8.46
2016	1	9.02	9.02	8.93	8.94	8.45	8.91	8.49	8.32
	2	8.41	8.62	8.49	8.08	8.04	8.41	8.38	7.59
	3	10.73	11.48	10.82	9.67	12.11	13.63	11.49	10.19
	4	10.95	11.39	10.93	9.43	10.91	10.63	11.20	8.72
	5	-	-	-	-	-	-	-	-
	6	-	-	-	-	-	-	-	-
	7	-	-	-	-	-	-	-	-
	8	-	-	-	-	-	-	-	-
	9	-	-	-	-	-	-	-	-
	10	-	-	-	-	-	-	-	-
	11	-	-	-	-	-	-	-	-
	12	-	-	-	-	-	-	-	-

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Daily ORDC Adders Average Values and Interval Duration								
YEAR	MONTH	DAY	PRICE_RS	PRICE_RDP	RS_CNT	RDP_CNT	RS_POS	RDP_POS
2016	4	1	\$ -	\$ -	0	0	80	90
2016	4	2	\$ 0.07	\$ -	14	0	80	90
2016	4	3	\$ 0.28	\$ -	5	0	80	90
2016	4	4	\$ 0.31	\$ 0.45	13	23	80	90
2016	4	5	\$ -	\$ 0.54	0	21	80	90
2016	4	6	\$ 0.91	\$ 0.74	11	25	80	90
2016	4	7	\$ -	\$ 0.86	0	10	80	90
2016	4	8	\$ 0.02	\$ 0.22	5	25	80	90
2016	4	9	\$ 0.04	\$ -	4	0	80	90
2016	4	10	\$ -	\$ -	0	0	80	90
2016	4	11	\$ 0.02	\$ 0.19	7	9	80	90
2016	4	12	\$ 0.25	\$ -	28	0	80	90
2016	4	13	\$ 0.01	\$ -	1	0	80	90
2016	4	14	\$ 0.31	\$ 0.23	26	21	80	90
2016	4	15	\$ -	\$ -	0	0	80	90
2016	4	16	\$ 0.01	\$ -	5	0	80	90
2016	4	17	\$ 0.13	\$ -	30	0	80	90
2016	4	18	\$ 0.84	\$ -	39	0	80	90
2016	4	19	\$ 3.13	\$ -	41	0	80	90
2016	4	20	\$ 3.61	\$ -	29	0	80	90
2016	4	21	\$ 0.02	\$ -	6	0	80	90
2016	4	22	\$ 0.11	\$ -	29	0	80	90
2016	4	23	\$ -	\$ -	0	0	80	90
2016	4	24	\$ -	\$ -	0	0	80	90
2016	4	25	\$ 0.11	\$ -	15	0	80	90
2016	4	26	\$ 0.13	\$ -	23	0	80	90
2016	4	27	\$ 2.51	\$ -	18	0	80	90
2016	4	28	\$ -	\$ -	0	0	80	90
2016	4	29	\$ 0.11	\$ -	21	0	80	90
2016	4	30	\$ 63.63	\$ 0.35	33	4	80	90
0	0	0	\$ -	\$ -	0	0	0	0

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Monthly Average of Ancillary Services Required MW					
year	month	ASMW_REGDN	ASMW_NSPIN	ASMW_RRS	ASMW_REGUP
2015	1	379	1,500	2,800	416
	2	370	1,500	2,800	425
	3	393	1,500	2,800	449
	4	396	1,500	2,800	450
	5	409	1,464	2,800	446
	6	458	1,915	2,616	483
	7	450	1,828	2,817	473
	8	422	1,897	2,579	437
	9	446	1,545	2,607	458
	10	424	1,768	2,817	435
	11	394	1,951	2,927	423
	12	371	1,949	2,840	400
2016	1	288	1,568	2,752	314
	2	289	1,882	2,872	318
	3	279	1,787	2,872	313
	4	296	1,503	2,835	330
	5	-	-	-	-
	6	-	-	-	-
	7	-	-	-	-
	8	-	-	-	-
	9	-	-	-	-
	10	-	-	-	-
	11	-	-	-	-
	12	-	-	-	-

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Hourly Average of Ancillary Services Required MW					
year	DELIVERY_HOUR	ASMW_REGDN	ASMW_NSPIN	ASMW_RRS	ASMW_REGUP
2015	1	449	1,592	2,826	463
	2	372	1,596	2,826	336
	3	318	1,680	2,872	314
	4	308	1,680	2,872	316
	5	363	1,680	2,872	367
	6	574	1,680	2,872	549
	7	432	1,696	2,793	766
	8	365	1,696	2,793	441
	9	369	1,696	2,793	472
	10	411	1,696	2,793	464
	11	408	1,701	2,709	498
	12	380	1,701	2,709	478
	13	356	1,701	2,709	428
	14	357	1,701	2,709	412
	15	343	1,746	2,693	369
	16	325	1,746	2,693	355
	17	338	1,746	2,693	362
	18	371	1,746	2,693	445
	19	461	1,747	2,709	452
	20	422	1,747	2,709	423
	21	415	1,747	2,709	391
	22	542	1,747	2,706	434
	23	602	1,596	2,826	547
	24	544	1,596	2,826	505
2016	1	319	1,034	2,951	304
	2	243	1,034	2,951	246
	3	219	1,532	2,950	228
	4	197	1,531	2,951	244
	5	266	1,531	2,951	321
	6	405	1,531	2,951	493
	7	350	2,272	2,779	633
	8	283	2,272	2,779	359
	9	253	2,272	2,779	347
	10	282	2,272	2,779	303
	11	257	2,122	2,752	309
	12	261	2,122	2,752	288
	13	254	2,122	2,752	274
	14	258	2,122	2,752	273
	15	257	1,592	2,780	248
	16	227	1,592	2,780	233
	17	210	1,592	2,780	253
	18	253	1,592	2,780	362
	19	300	1,546	2,779	369
	20	272	1,546	2,779	307
	21	306	1,546	2,779	295
	22	383	1,546	2,779	294
	23	458	1,034	2,951	353
	24	396	1,034	2,951	311

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Monthly Average Ancillary Services Price					
year	month	MCPC_REGDN	MCPC_NSPIN	MCPC_RRS	MCPC_REGUP
2015	1	\$ 5.49	\$ 1.84	\$ 6.47	\$ 7.10
	2	\$ 4.05	\$ 3.00	\$ 7.77	\$ 8.83
	3	\$ 6.04	\$ 6.26	\$ 11.27	\$ 12.39
	4	\$ 8.47	\$ 5.27	\$ 11.21	\$ 13.08
	5	\$ 7.78	\$ 4.63	\$ 8.84	\$ 8.58
	6	\$ 5.63	\$ 5.98	\$ 7.56	\$ 6.65
	7	\$ 4.01	\$ 8.69	\$ 12.37	\$ 10.00
	8	\$ 3.67	\$ 25.73	\$ 25.98	\$ 22.70
	9	\$ 4.25	\$ 2.70	\$ 7.13	\$ 6.93
	10	\$ 8.90	\$ 5.34	\$ 9.76	\$ 9.15
	11	\$ 6.67	\$ 4.84	\$ 11.28	\$ 10.60
	12	\$ 7.33	\$ 4.59	\$ 10.97	\$ 11.12
2016	1	\$ 4.10	\$ 2.62	\$ 8.05	\$ 6.69
	2	\$ 7.21	\$ 4.77	\$ 12.91	\$ 7.80
	3	\$ 8.47	\$ 6.06	\$ 11.39	\$ 9.34
	4	\$ 9.23	\$ 4.07	\$ 13.20	\$ 9.48
	5	\$ -	\$ -	\$ -	\$ -
	6	\$ -	\$ -	\$ -	\$ -
	7	\$ -	\$ -	\$ -	\$ -
	8	\$ -	\$ -	\$ -	\$ -
	9	\$ -	\$ -	\$ -	\$ -
	10	\$ -	\$ -	\$ -	\$ -
	11	\$ -	\$ -	\$ -	\$ -
	12	\$ -	\$ -	\$ -	\$ -

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Monthly Average A/S Cost per MWh Load					
year	month	AScost_REGDN	AScost_NSPIN	AScost_RRS	AScost_REGUP
2015	1	\$ 0.05	\$ 0.07	\$ 0.47	\$ 0.08
	2	\$ 0.04	\$ 0.12	\$ 0.58	\$ 0.10
	3	\$ 0.07	\$ 0.28	\$ 0.92	\$ 0.16
	4	\$ 0.10	\$ 0.23	\$ 0.92	\$ 0.17
	5	\$ 0.08	\$ 0.18	\$ 0.66	\$ 0.10
	6	\$ 0.06	\$ 0.25	\$ 0.44	\$ 0.07
	7	\$ 0.04	\$ 0.32	\$ 0.70	\$ 0.10
	8	\$ 0.03	\$ 0.98	\$ 1.35	\$ 0.20
	9	\$ 0.04	\$ 0.09	\$ 0.42	\$ 0.07
	10	\$ 0.10	\$ 0.26	\$ 0.74	\$ 0.11
	11	\$ 0.08	\$ 0.28	\$ 0.99	\$ 0.13
	12	\$ 0.08	\$ 0.26	\$ 0.90	\$ 0.13
2016	1	\$ 0.03	\$ 0.11	\$ 0.60	\$ 0.06
	2	\$ 0.06	\$ 0.26	\$ 1.09	\$ 0.07
	3	\$ 0.07	\$ 0.33	\$ 1.00	\$ 0.09
	4	\$ 0.08	\$ 0.18	\$ 1.08	\$ 0.09
	5	\$ -	\$ -	\$ -	\$ -
	6	\$ -	\$ -	\$ -	\$ -
	7	\$ -	\$ -	\$ -	\$ -
	8	\$ -	\$ -	\$ -	\$ -
	9	\$ -	\$ -	\$ -	\$ -
	10	\$ -	\$ -	\$ -	\$ -
	11	\$ -	\$ -	\$ -	\$ -
	12	\$ -	\$ -	\$ -	\$ -

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ERCOT-wide Cumulative PNM			
year	month	pnm	pnm_accum
2015	0	\$ -	\$ -
	1	\$ 1,009.59	\$ 1,009.59
	2	\$ 3,289.14	\$ 4,298.73
	3	\$ 3,800.54	\$ 8,099.27
	4	\$ 1,900.94	\$ 10,000.21
	5	\$ 4,578.64	\$ 14,578.85
	6	\$ 738.37	\$ 15,317.22
	7	\$ 2,945.67	\$ 18,262.89
	8	\$ 7,767.43	\$ 26,030.32
	9	\$ 1,612.54	\$ 27,642.86
	10	\$ 1,283.56	\$ 28,926.42
	11	\$ 1,529.59	\$ 30,456.01
	12	\$ 1,209.77	\$ 31,665.78
2016	0	\$ -	\$ -
	1	\$ 1,160.69	\$ 1,160.69
	2	\$ 720.57	\$ 1,881.26
	3	\$ 3,883.41	\$ 5,764.67
	4	\$ 2,389.99	\$ 8,154.66
	5	\$ -	\$ -
	6	\$ -	\$ -
	7	\$ -	\$ -
	8	\$ -	\$ -
	9	\$ -	\$ -
	10	\$ -	\$ -
	11	\$ -	\$ -
	12	\$ -	\$ -

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DA vs. RT Load Forecast Error by Hour Ending							
year	month	HE_1_4	HE_13_16	HE_17_20	HE_21_24	HE_5_8	HE_9_12
2015	1	336	(342)	(251)	93	137	75
	2	155	(718)	(639)	(325)	244	(334)
	3	(246)	(160)	(425)	(430)	(253)	(54)
	4	34	585	680	192	88	359
	5	18	330	761	350	(23)	114
	6	(219)	(317)	(166)	(338)	(167)	(364)
	7	(403)	490	587	126	(232)	136
	8	55	667	769	280	143	910
	9	(4)	130	81	114	129	171
	10	(78)	324	206	294	(161)	(13)
	11	(270)	(547)	(492)	(457)	(190)	(207)
	12	156	(270)	47	20	38	(128)
2016	1	455	14	371	163	473	142
	2	39	83	148	42	(36)	150
	3	31	288	300	89	(136)	(82)
	4	(271)	220	97	(82)	(320)	(147)
	5	-	-	-	-	-	-
	6	-	-	-	-	-	-
	7	-	-	-	-	-	-
	8	-	-	-	-	-	-
	9	-	-	-	-	-	-
	10	-	-	-	-	-	-
	11	-	-	-	-	-	-
	12	-	-	-	-	-	-

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Monthly Average of Wind Generation by Hour Ending							
year	month	HE_1_4	HE_13_16	HE_17_20	HE_21_24	HE_5_8	HE_9_12
2015	1	3,597	3,424	3,264	3,738	3,879	3,471
	2	5,036	3,927	3,961	5,045	4,476	3,988
	3	4,182	2,295	2,465	3,622	3,701	2,532
	4	6,218	4,090	5,011	6,002	5,105	4,209
	5	6,280	4,882	5,081	5,617	5,362	5,000
	6	5,457	3,335	4,120	5,036	4,199	3,209
	7	7,034	3,176	4,275	5,973	5,779	4,094
	8	5,692	2,309	3,357	5,275	4,380	2,803
	9	5,853	2,834	3,476	5,403	4,681	3,394
	10	5,574	3,631	3,871	5,329	4,899	3,913
	11	6,250	5,952	5,683	6,578	6,216	5,852
	12	6,634	5,535	5,484	6,817	6,494	5,481
2016	1	6,300	4,581	4,663	6,253	6,228	5,019
	2	7,602	5,772	5,779	7,573	7,552	6,109
	3	7,872	6,033	6,013	7,565	7,793	6,833
	4	7,356	5,020	5,488	6,921	6,559	5,437
	5	-	-	-	-	-	-
	6	-	-	-	-	-	-
	7	-	-	-	-	-	-
	8	-	-	-	-	-	-
	9	-	-	-	-	-	-
	10	-	-	-	-	-	-
	11	-	-	-	-	-	-
	12	-	-	-	-	-	-

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RT Congestion Constraint Rankings - Top 10 Constraints by Binding Frequency and Top 10 Constraints by Total Congestion Rent																
category	year	item	rankvar	rank	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
FREQ_EXIST	2016	JAVALT_MOLINA1_1 (JAVALTAP-MOLINA)	6,279	1	1,127	1,613	2,170	1,369	-	-	-	-	-	-	-	-
FREQ_EXIST	2016	LISTON (LISTON)	2,512	2	518	862	690	442	-	-	-	-	-	-	-	-
FREQ_EXIST	2016	38T365_1 (WIRTZ-FLATRO)	2,251	3	167	759	1,039	286	-	-	-	-	-	-	-	-
FREQ_EXIST	2016	RIOHND_ERIOHND_1 (MV_RIOHO-RIOHONDO)	2,238	4	736	1,495	-	7	-	-	-	-	-	-	-	-
FREQ_EXIST	2016	ROTN_WOLFGA1_1 (WOLFGANG-ROTN)	2,053	5	46	7	1,904	96	-	-	-	-	-	-	-	-
FREQ_EXIST	2016	AIRCO4_RINCON1_1 (RINCON-AIRCO4)	1,446	6	456	796	192	2	-	-	-	-	-	-	-	-
FREQ_EXIST	2016	1030_B (BOSQUESW-RGH)	1,427	7	100	248	612	467	-	-	-	-	-	-	-	-
FREQ_EXIST	2016	6265_D (MRSDO-RHTP2)	1,331	8	-	97	499	735	-	-	-	-	-	-	-	-
FREQ_EXIST	2016	LOMA_A_L_FRES1_1 (L_FRESNO-LOMA_ALT)	1,252	9	229	119	758	146	-	-	-	-	-	-	-	-
FREQ_EXIST	2016	PNHNDL (PNHNDL)	1,107	10	5	165	934	3	-	-	-	-	-	-	-	-
TOP10_RENT	2016	LOMA_A_L_FRES1_1 (L_FRESNO-LOMA_ALT)	\$ 26.03	1	\$ 6.90	\$ 4.08	\$ 11.39	\$ 3.65	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2016	6265_D (MRSDO-RHTP2)	\$ 14.58	2	\$ -	\$ 1.58	\$ 5.86	\$ 7.14	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2016	6265_A (EMSES-MRSDO)	\$ 10.42	3	\$ 0.00	\$ 4.43	\$ 4.75	\$ 1.24	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2016	FTW_W_DE_1 (W_DENT-FTWORTH)	\$ 10.03	4	\$ -	\$ -	\$ -	\$ 10.03	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2016	JAVALT_MOLINA1_1 (JAVALTAP-MOLINA)	\$ 7.86	5	\$ 1.57	\$ 1.81	\$ 2.86	\$ 1.63	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2016	EMSES_AX2 (EMSES-EMSES)	\$ 7.86	6	\$ -	\$ -	\$ -	\$ 7.86	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2016	PNHNDL (PNHNDL)	\$ 4.60	7	\$ 0.01	\$ 0.31	\$ 4.26	\$ 0.01	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2016	BETHK_66_A (HK-BET)	\$ 4.45	8	\$ -	\$ -	\$ 0.23	\$ 4.23	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2016	419T419_1 (CLEASP-MARION)	\$ 4.45	9	\$ -	\$ -	\$ 4.45	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2016	VALIMP (VALIMP)	\$ 3.09	10	\$ -	\$ -	\$ 3.09	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -

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DA Congestion Constraint Rankings - Top 10 Constraints by Binding Frequency and Top 10 Constraints by Total Congestion Rent																
category	year	item	rankvar	rank	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
FREQ_EXIST	2016	JAVALT_MOLINA1_1 (JAVALTAP-MOLINA)	1,672	1	308	496	523	345	-	-	-	-	-	-	-	-
FREQ_EXIST	2016	LOMA_A_L_FRES1_1 (L_FRESNO-LOMA_ALT)	1,398	2	377	389	391	241	-	-	-	-	-	-	-	-
FREQ_EXIST	2016	38T365_1 (WIRTZ-FLATRO)	1,160	3	88	286	502	284	-	-	-	-	-	-	-	-
FREQ_EXIST	2016	BONIVI_RINCON1_1 (RINCON-BONIVIEW)	907	4	403	244	252	8	-	-	-	-	-	-	-	-
FREQ_EXIST	2016	BRUNI_69_1 (BRUNI-BRUNI)	905	5	144	375	277	109	-	-	-	-	-	-	-	-
FREQ_EXIST	2016	LISTON (LISTON)	790	6	132	297	208	153	-	-	-	-	-	-	-	-
FREQ_EXIST	2016	670_B (BRNSW-CMPBW)	676	7	198	185	174	119	-	-	-	-	-	-	-	-
FREQ_EXIST	2016	GOLDTH_9AT2 (GOLDTH-GOLDTH)	648	8	222	289	137	-	-	-	-	-	-	-	-	-
FREQ_EXIST	2016	RIOHND_ERIOHND_1 (MV_RIOHO-RIOHONDO)	594	9	135	436	23	-	-	-	-	-	-	-	-	-
FREQ_EXIST	2016	ROTN_WOLFGA1_1 (WOLFGANG-ROTN)	521	10	42	56	327	96	-	-	-	-	-	-	-	-
TOP10_RENT	2016	LOMA_A_L_FRES1_1 (L_FRESNO-LOMA_ALT)	\$ 17.83	1	\$ 1.18	\$ 2.40	\$ 9.71	\$ 4.53	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2016	6265_D (MRSDO-RHTP2)	\$ 11.36	2	\$ -	\$ 0.02	\$ 6.10	\$ 5.25	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2016	6265_A (EMSES-MRSDO)	\$ 6.13	3	\$ 0.02	\$ 2.85	\$ 3.15	\$ 0.11	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2016	JAVALT_MOLINA1_1 (JAVALTAP-MOLINA)	\$ 5.67	4	\$ 0.81	\$ 1.58	\$ 1.90	\$ 1.39	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2016	FTW_W_DE_1 (W_DENT-FTWORTH)	\$ 4.95	5	\$ -	\$ 0.08	\$ 0.15	\$ 4.72	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2016	EMSES_AX2 (EMSES-EMSES)	\$ 2.36	6	\$ 0.00	\$ -	\$ -	\$ 2.36	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2016	PNHNDL (PNHNDL)	\$ 1.94	7	\$ 0.00	\$ 0.25	\$ 1.63	\$ 0.05	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2016	JEWET-SNG (JEWET-SNG)	\$ 1.88	8	\$ 0.86	\$ 0.39	\$ 0.11	\$ 0.51	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2016	BLUF_CRK_T1 (BLUF_CRK-BLUF_CRK)	\$ 1.57	9	\$ 0.51	\$ 0.88	\$ 0.18	\$ 0.00	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2016	MDO_AT1 (MDO-MDO)	\$ 1.33	10	\$ 0.00	\$ -	\$ 0.58	\$ 0.75	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -

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Top 10 CRR Pairs Ranked by Monthly Auction Values - Top 10 PTP Obligations by Total Transaction Values and Top 10 PTP Options by Total Transaction Values																	
ft	option	year	pair	total value	rank	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
N		2016	HB SOUTH-LZ SOUTH	\$ 3.68	1	\$ 0.76	\$ 0.64	\$ 0.80	\$ 0.72	\$ 0.76	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
N		2016	HB NORTH-HB HOUSTON	\$ 3.22	2	\$ 0.02	\$ 0.08	\$ 0.78	\$ 0.85	\$ 1.48	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
N		2016	HB WEST-HB NORTH	\$ 1.88	3	\$ 0.01	\$ 0.00	\$ 0.27	\$ 0.45	\$ 1.15	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
N		2016	HB NORTH-LZ NORTH	\$ 1.86	4	\$ 0.24	\$ 0.21	\$ 0.15	\$ 0.43	\$ 0.83	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
N		2016	HB WEST-LZ WEST	\$ 0.99	5	\$ 0.29	\$ 0.23	\$ 0.13	\$ 0.11	\$ 0.24	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
N		2016	HB NORTH-HB SOUTH	\$ 0.95	6	\$ 0.03	\$ 0.05	\$ 0.12	\$ 0.28	\$ 0.47	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
N		2016	HB HOUSTON-LZ HOUSTON	\$ 0.67	7	\$ 0.12	\$ 0.08	\$ 0.08	\$ 0.11	\$ 0.28	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
N		2016	CPSES UNIT1-HB NORTH	\$ 0.44	8	\$ 0.01	\$ 0.01	\$ 0.03	\$ 0.22	\$ 0.17	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
N		2016	CPSES UNIT2-HB NORTH	\$ 0.41	9	\$ 0.01	\$ 0.01	\$ 0.04	\$ 0.18	\$ 0.17	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
N		2016	LV1A LV1B-SIL SILAS 10	\$ 0.28	10	\$ 0.01	\$ 0.00	\$ 0.05	\$ 0.21	\$ 0.01	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Y		2016	HB SOUTH-LZ SOUTH	\$ 1.17	1	\$ 0.21	\$ 0.15	\$ 0.13	\$ 0.30	\$ 0.38	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Y		2016	HB NORTH-LZ NORTH	\$ 1.03	2	\$ 0.27	\$ 0.25	\$ 0.09	\$ 0.16	\$ 0.27	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Y		2016	HB WEST-LZ WEST	\$ 0.73	3	\$ 0.21	\$ 0.17	\$ 0.14	\$ 0.11	\$ 0.09	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Y		2016	HB WEST-HB NORTH	\$ 0.66	4	\$ 0.07	\$ 0.14	\$ 0.16	\$ 0.16	\$ 0.13	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Y		2016	SAN SANMIGG1-LZ SOUTH	\$ 0.46	5	\$ 0.11	\$ 0.16	\$ 0.05	\$ 0.05	\$ 0.09	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Y		2016	BORDAS ALL-LZ SOUTH	\$ 0.44	6	\$ 0.04	\$ 0.03	\$ 0.10	\$ 0.12	\$ 0.15	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Y		2016	HB HOUSTON-LZ HOUSTON	\$ 0.43	7	\$ 0.06	\$ 0.05	\$ 0.09	\$ 0.13	\$ 0.11	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Y		2016	LV5 UNIT1-HB NORTH	\$ 0.34	8	\$ -	\$ -	\$ 0.04	\$ 0.13	\$ 0.17	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Y		2016	STP STP G1-LZ CPS	\$ 0.27	9	\$ 0.06	\$ 0.10	\$ 0.05	\$ 0.01	\$ 0.05	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
Y		2016	STP STP G2-LZ CPS	\$ 0.27	10	\$ 0.06	\$ 0.10	\$ 0.05	\$ 0.01	\$ 0.05	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -

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