



## **Item 5: Independent Market Monitor (IMM) Report**

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Board of Directors Meeting

ERCOT Public

August 13, 2019

# Today's topic

- Mid-year market review

# Lower electricity prices due to lower gas prices

## Real Time Prices

1H18: \$32.45/MWh

2018: \$35.63/MWh

1H19: \$27.81/MWh

~ 14% decrease

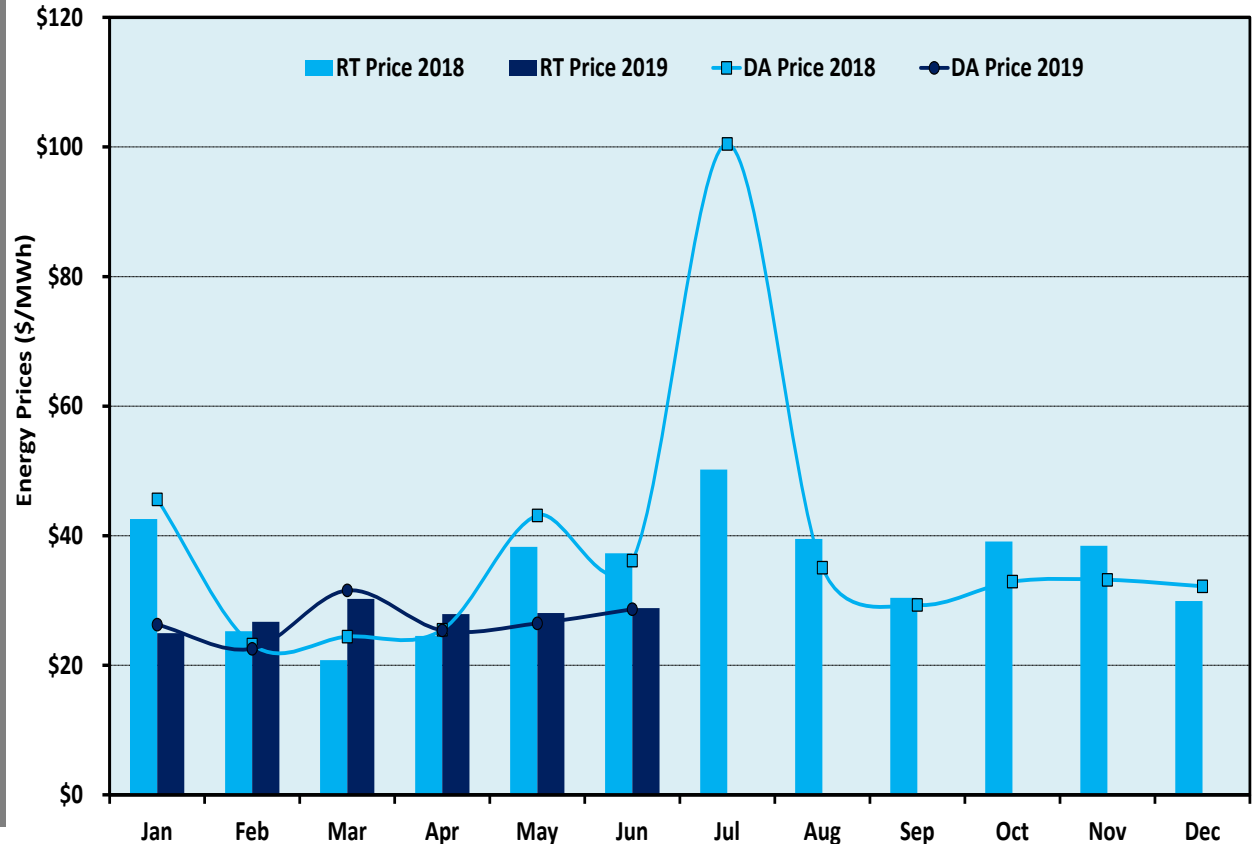
## Natural Gas Prices

1H18: \$3.03/MBtu

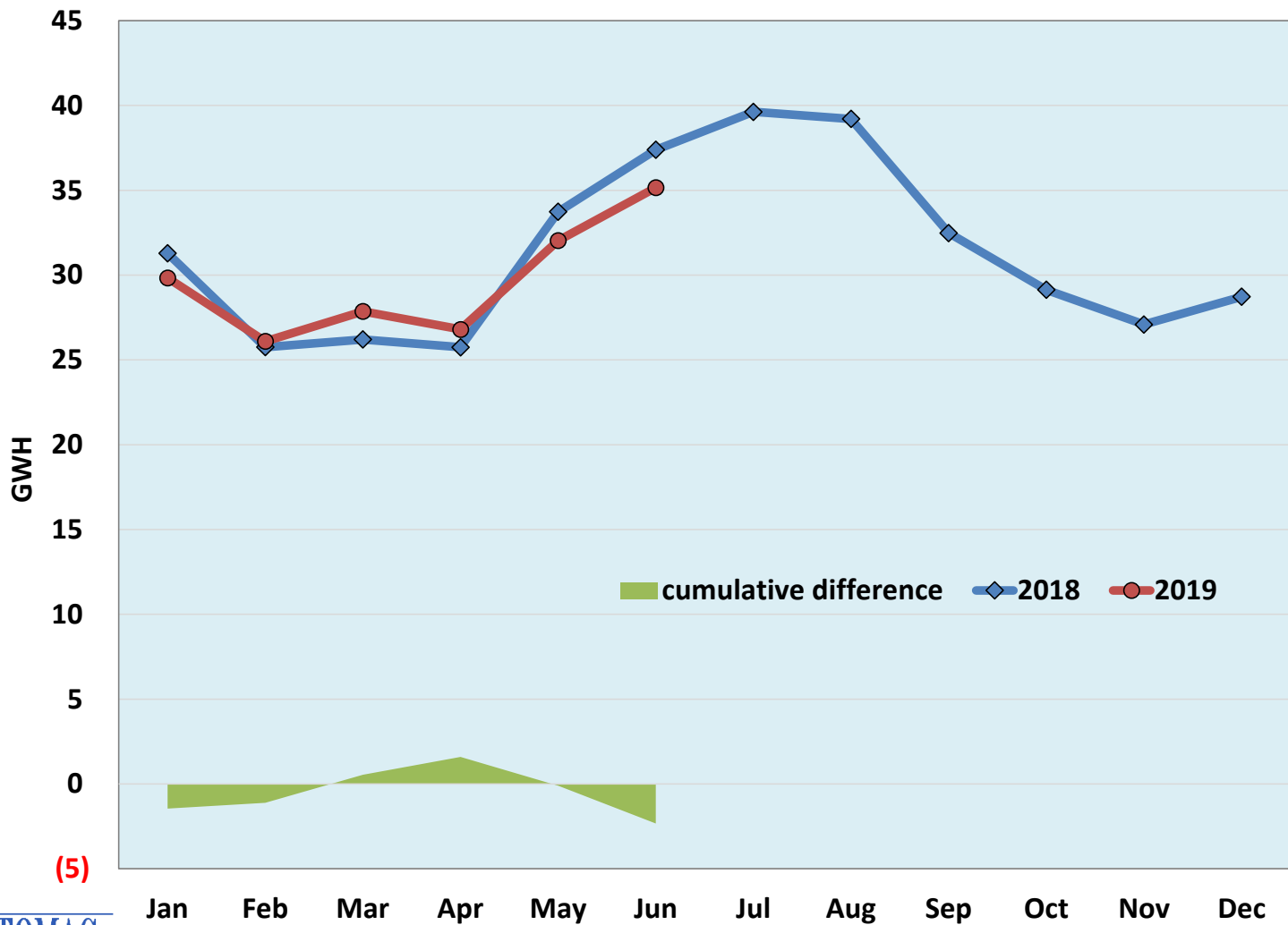
2018: \$3.22/MBtu

1H19: \$2.69/MBtu

~ 11% decrease

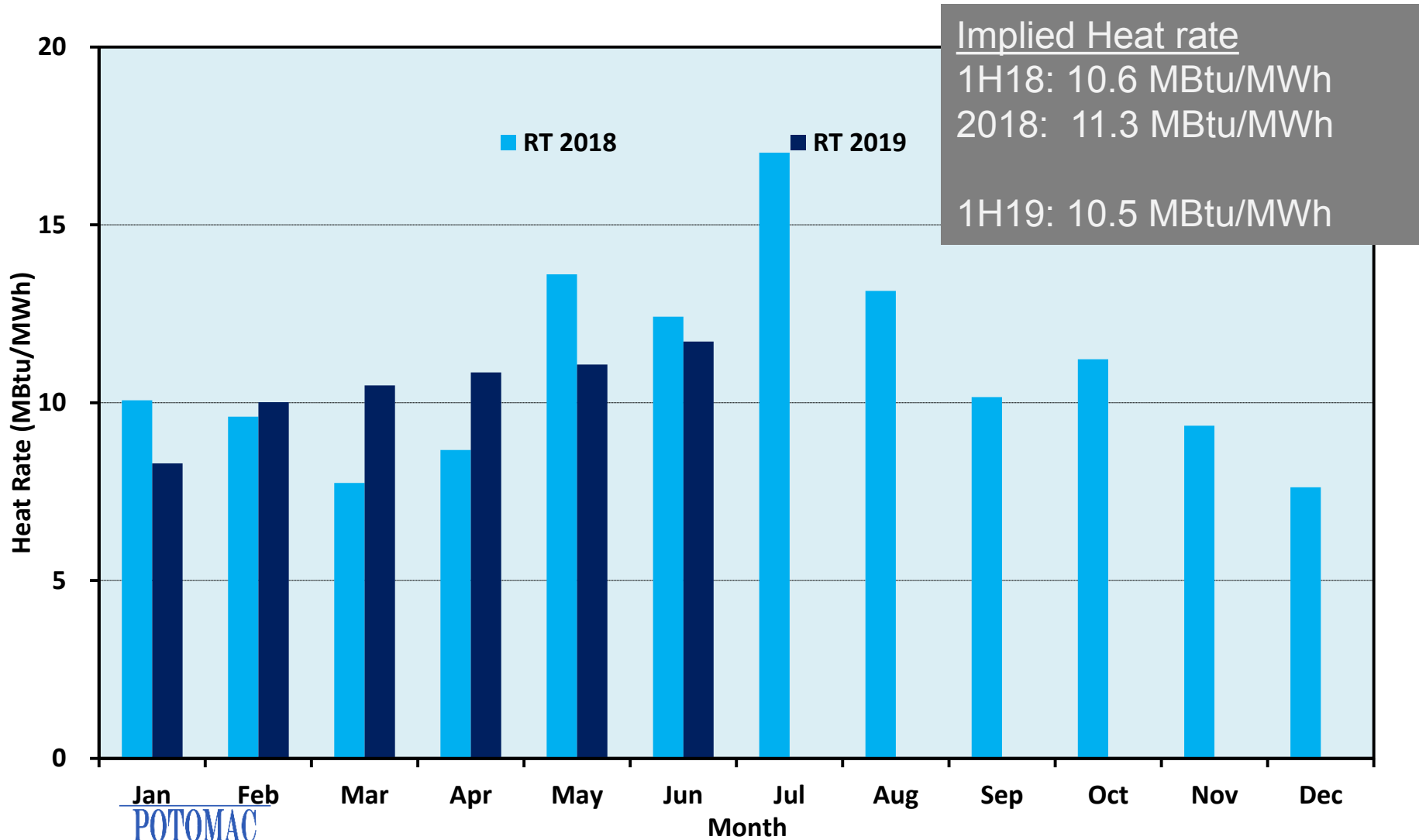


# Load in 2019 not much different than in 2018

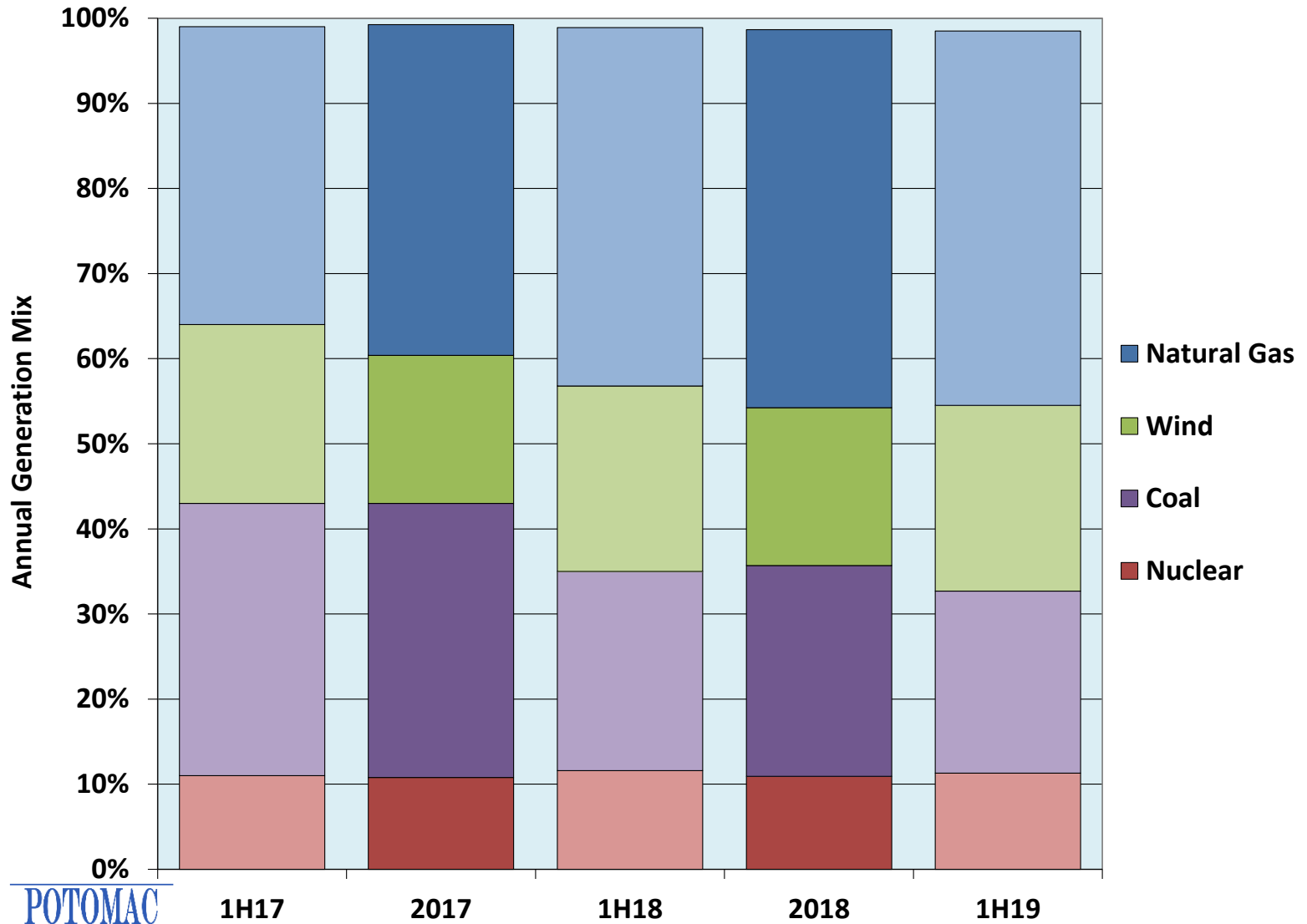


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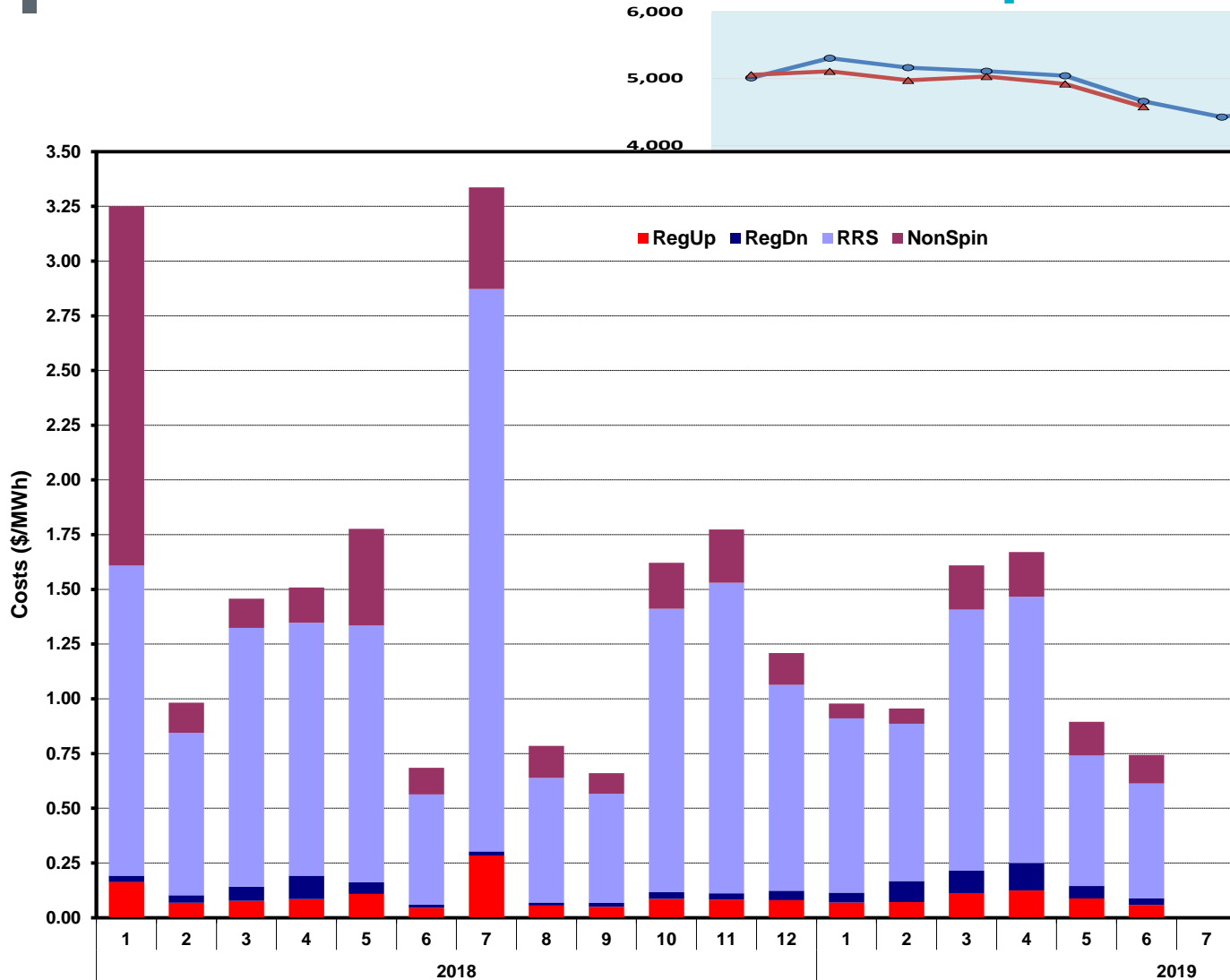
# Implied heat rate of RT prices unchanged



# Stable generation mix



# Lower A/S costs with similar quantities



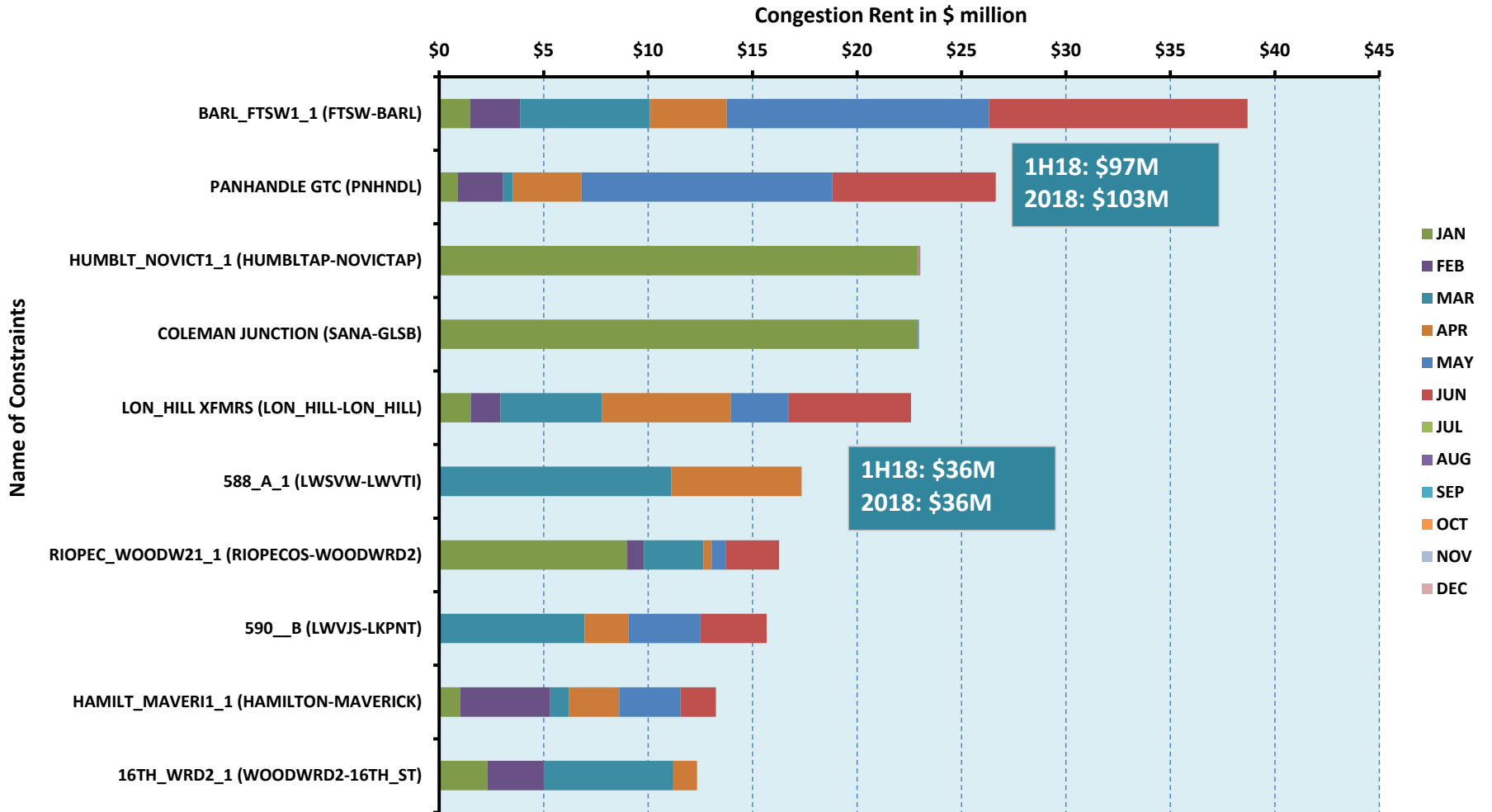
**A/S Costs**  
 1H18: \$1.61/MWh  
 2018: \$1.60/MWh  
  
 1H19: \$1.12/MWh  
 ~ 30% decrease

**Approximate A/S Quantities**  
 1H18: 5.0 GW  
 2018: 4.9 GW  
  
 1H19: 4.9 GW



# Significantly lower congestion costs in 2019

## Top 10 Constraints by Total Congestion Value - 2019





To the Public Utility Commission of Texas

# ERCOT Wholesale Electricity Market Monthly Report

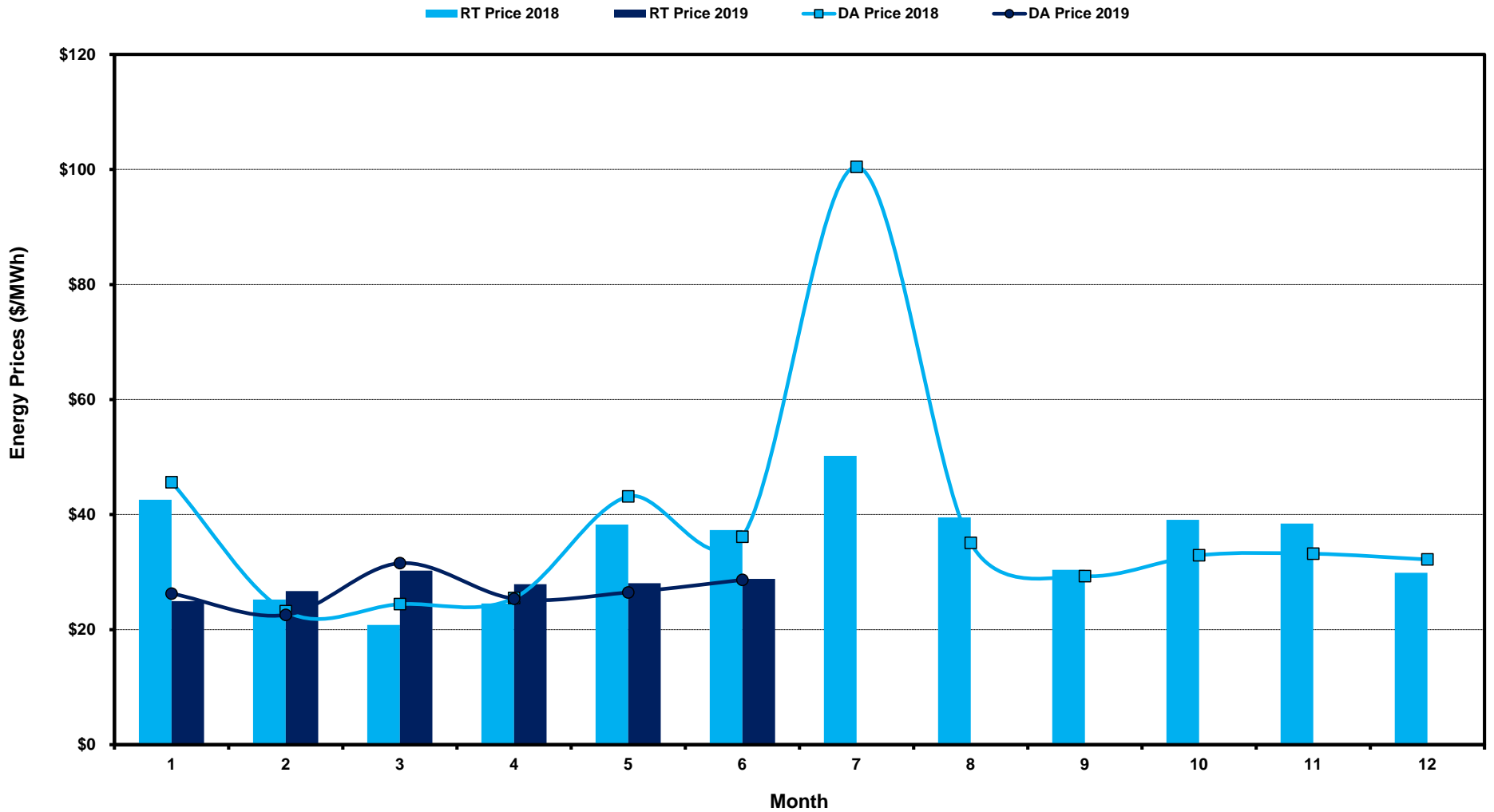
Wednesday, July 10, 2019

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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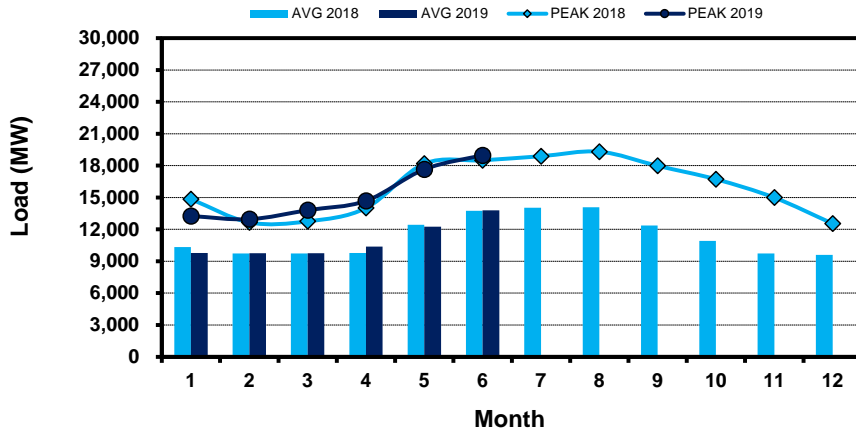
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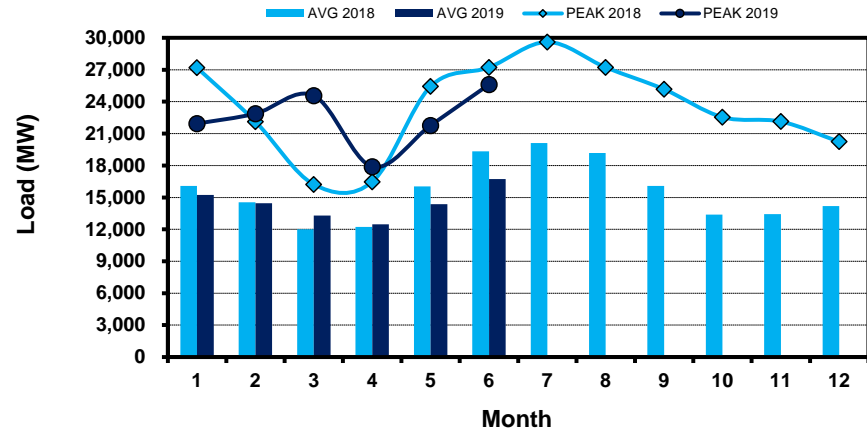
# Load Zone Load Statistics

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

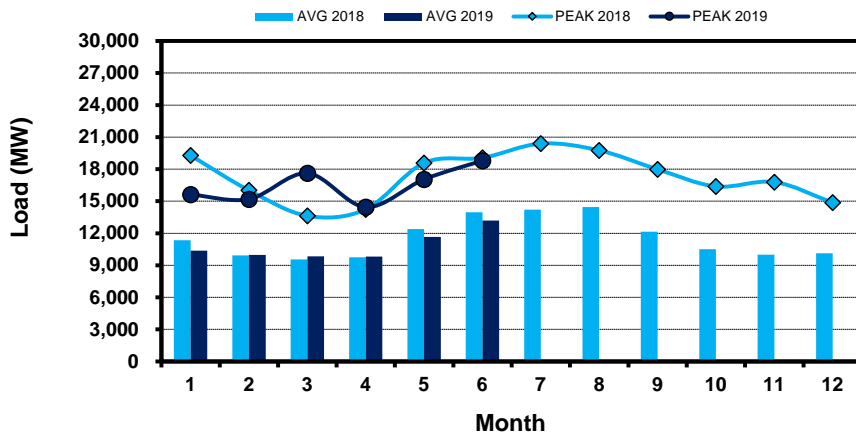
### Houston Zone



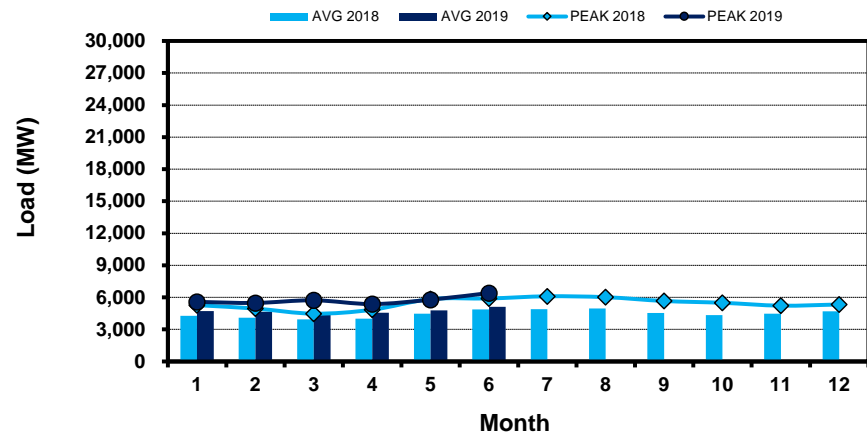
### North Zone



### South Zone



### West Zone



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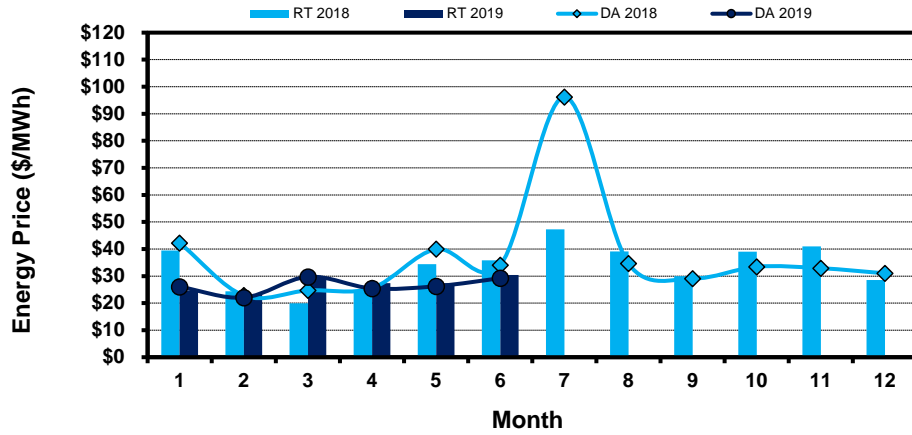
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**Note:** \* Zonal load zone definition vs. Nodal comparable load zone definition: LZ\_Houston=LZ\_Houston; LZ\_West=LZ\_West; LZ\_North=(LZ\_North,LZ\_RAYBN); LZ\_South=(LZ\_South,LZ\_CPS,LZ\_AEN,LZ\_LCRA)

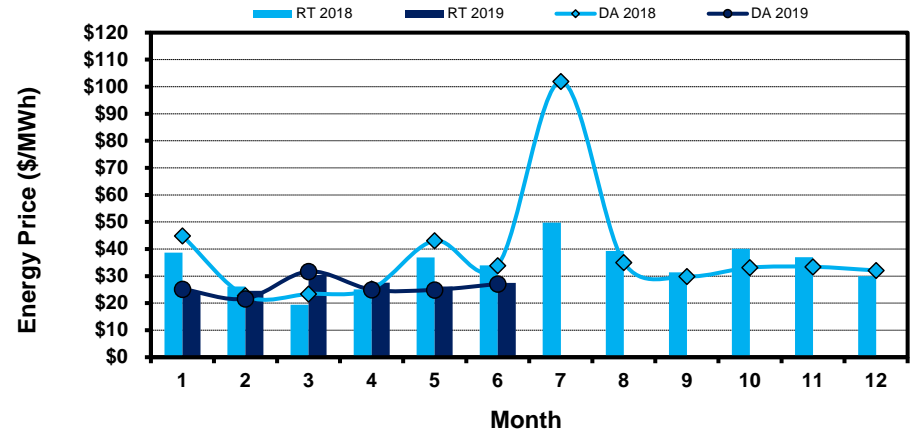
# Load Zone Monthly Average Energy Price DA vs RT

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

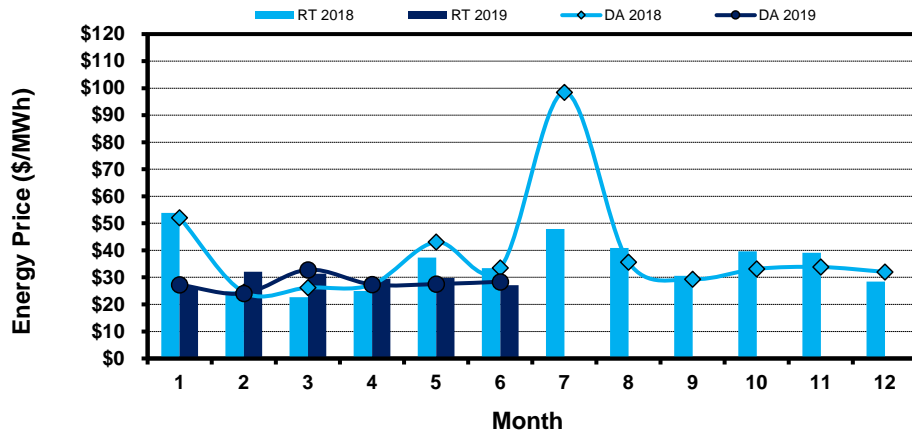
### Houston Zone



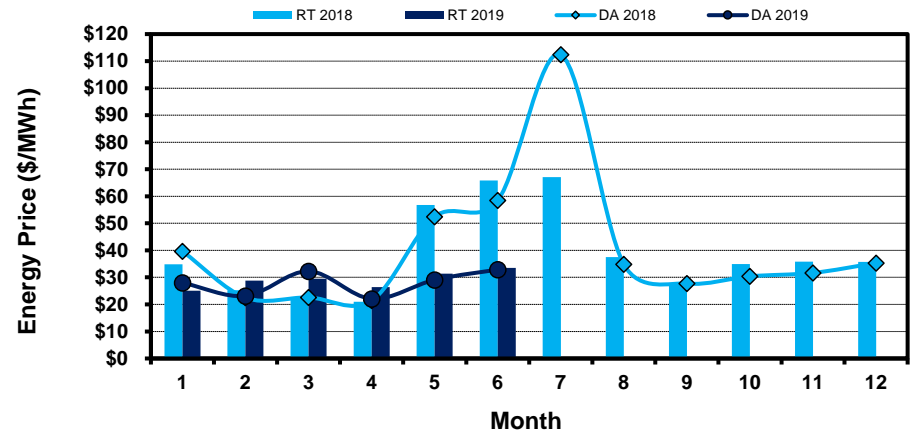
### North Zone



### South Zone



### West Zone



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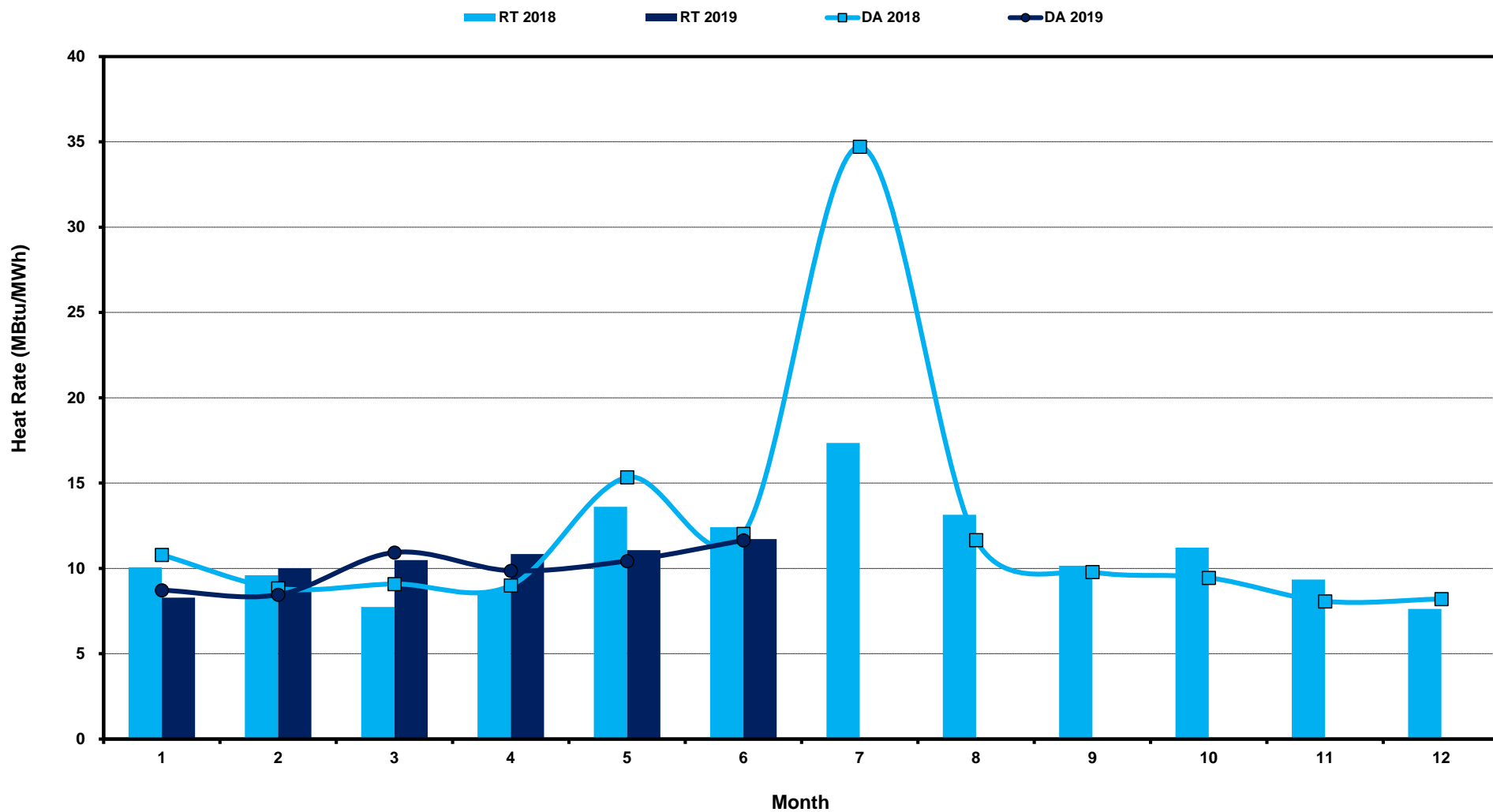
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**Note:** \* Zonal load zone definition vs. Nodal comparable load zone definition: LZ\_Houston=LZ\_Houston; LZ\_West=LZ\_West; LZ\_North=(LZ\_North,LZ\_RAYBN); LZ\_South=(LZ\_South,LZ\_CPS,LZ\_AEN,LZ\_LCRA)

# ERCOT-wide Monthly Implied Heat Rate DA vs RT

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



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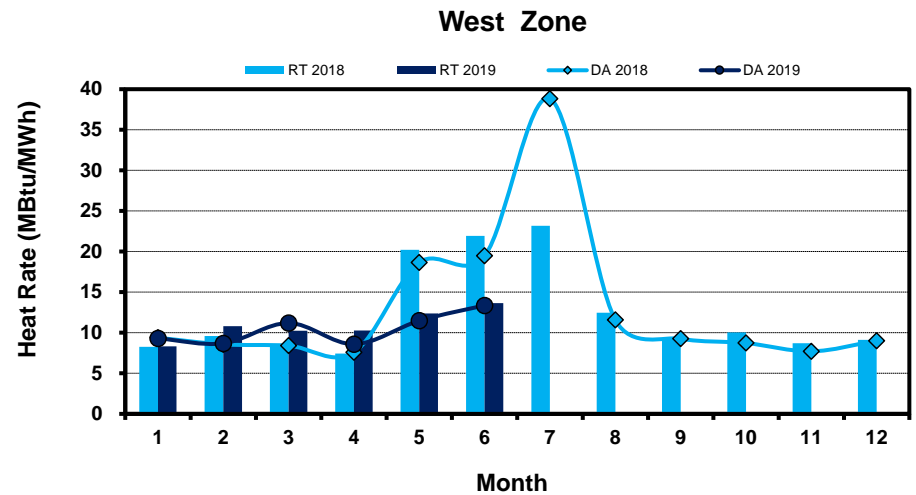
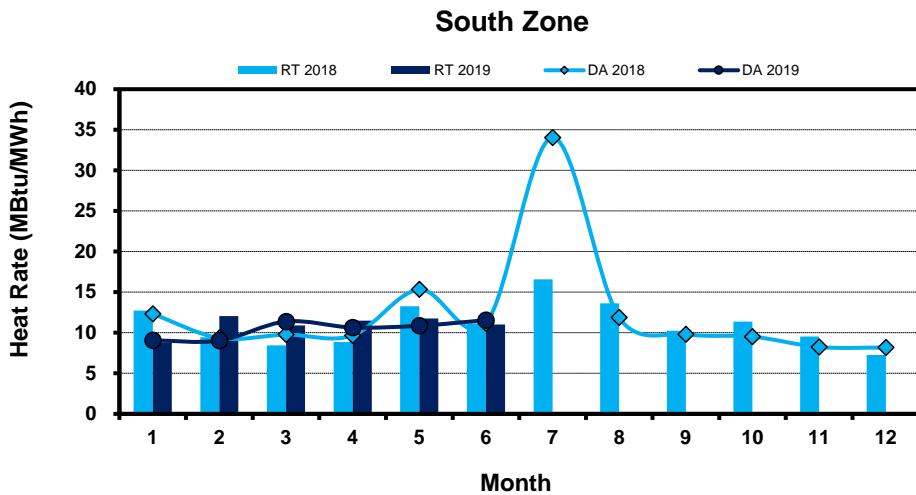
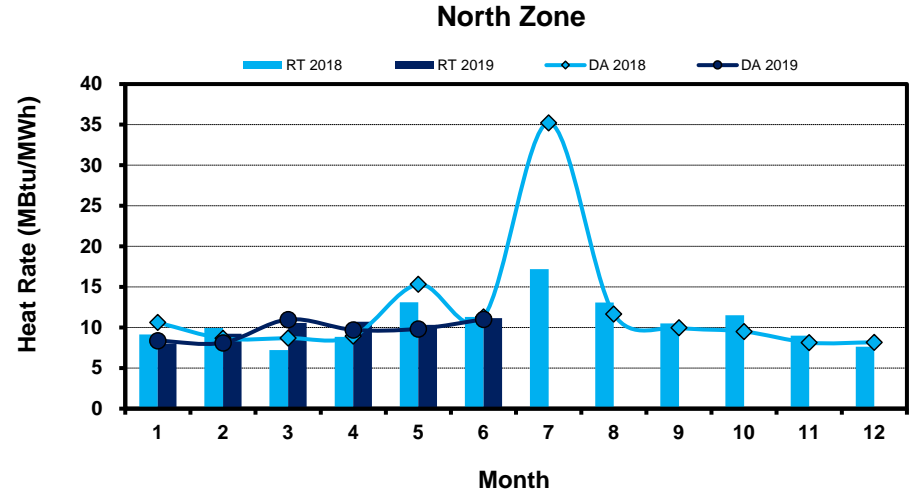
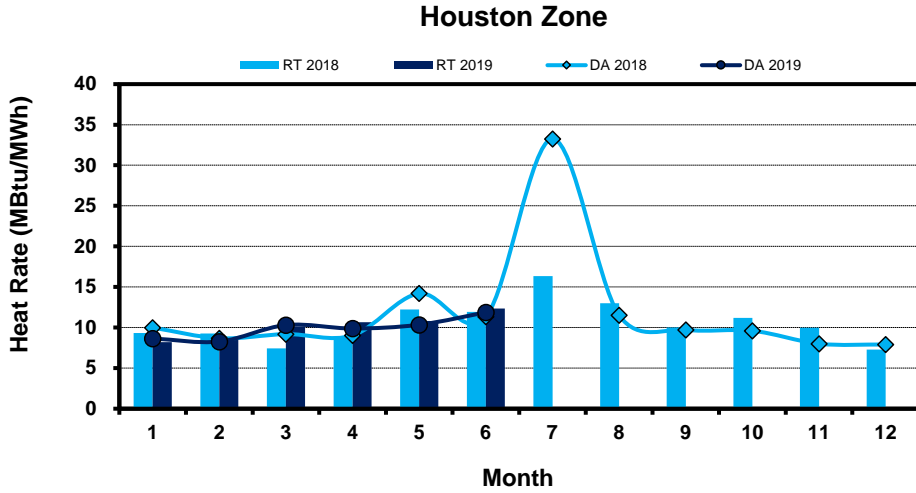
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# Load Zone Monthly Implied Heat Rate DA vs RT

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



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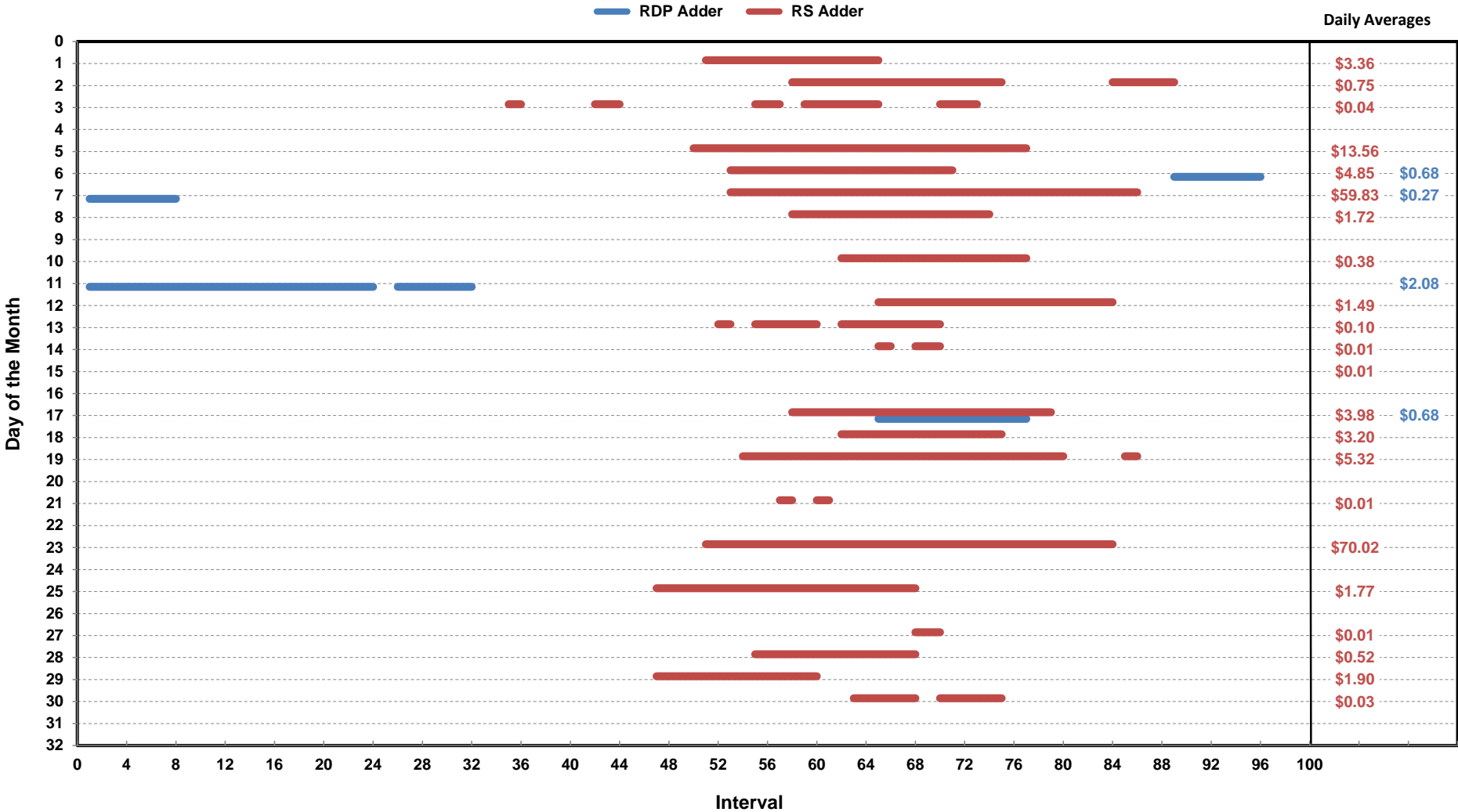
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**Note:** \* Zonal load zone definition vs. Nodal comparable load zone definition: LZ\_Houston=LZ\_Houston; LZ\_West=LZ\_West; LZ\_North=(LZ\_North,LZ\_RAYBN); LZ\_South=(LZ\_South,LZ\_CPS,LZ\_AEN,LZ\_LCRA)

# Daily ORDC Adders Average Values and Interval Duration Jun-2019



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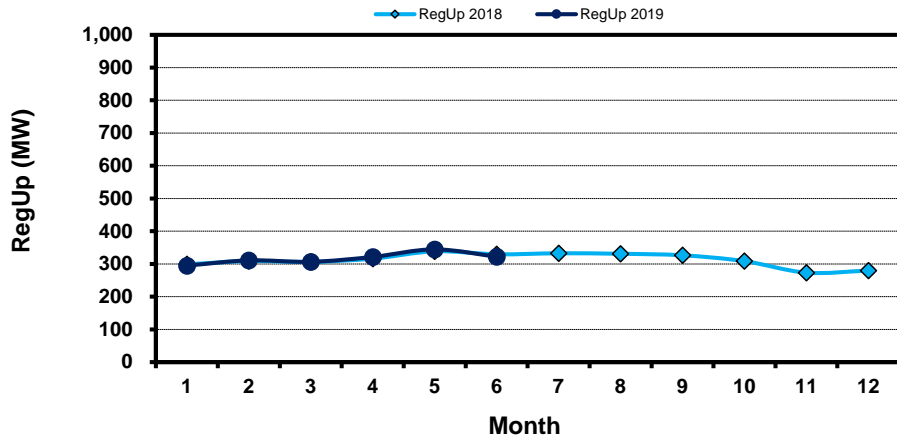
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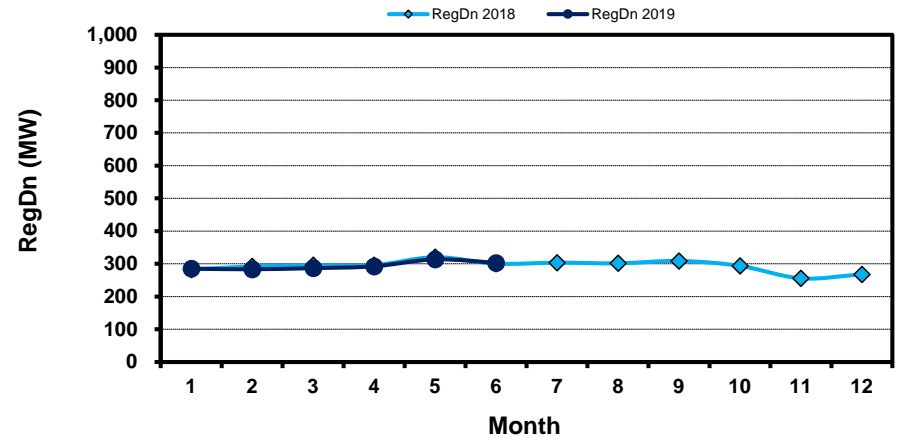
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# Monthly Average of Ancillary Services Required MW

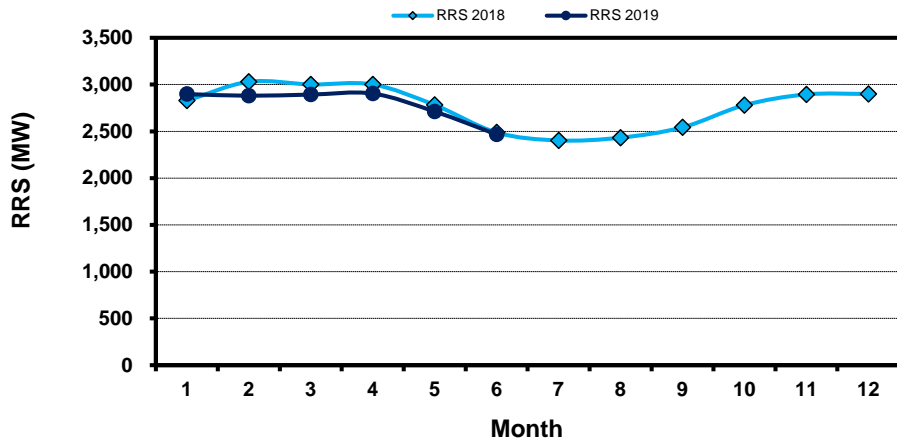
## Regulation Up



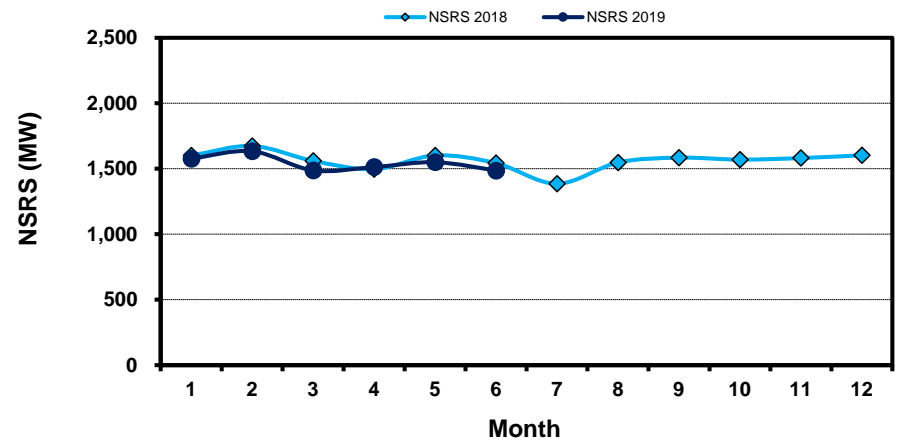
## Regulation Down



## Responsive Reserve



## Non-Spin Reserve



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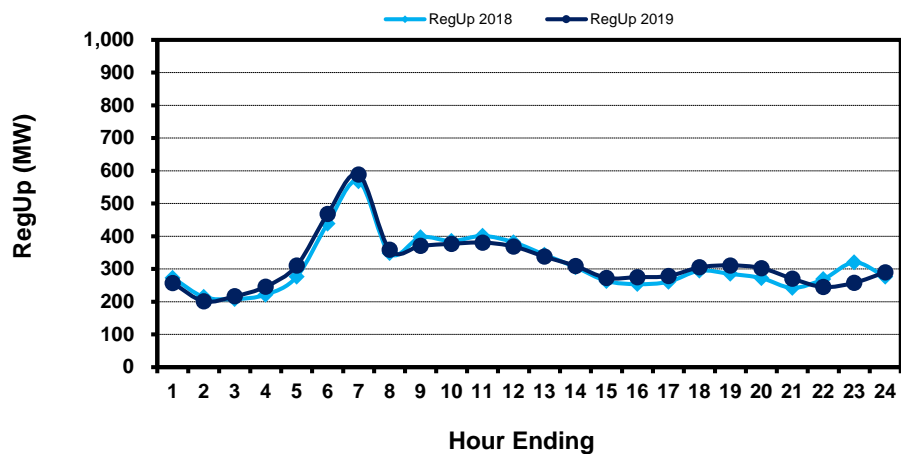
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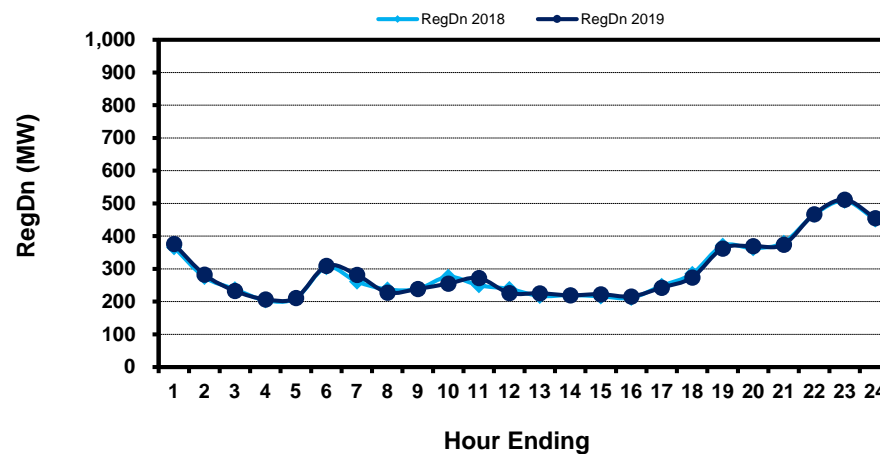


# Hourly Average of Ancillary Services Required MW

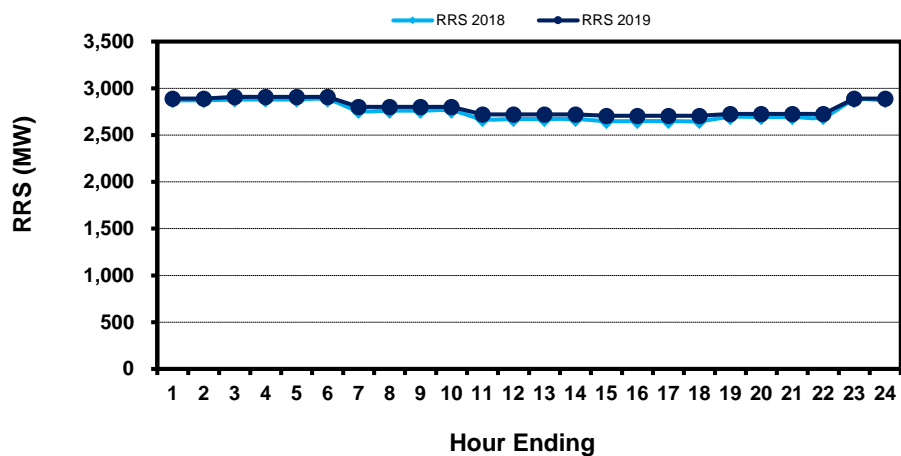
## Regulation Up



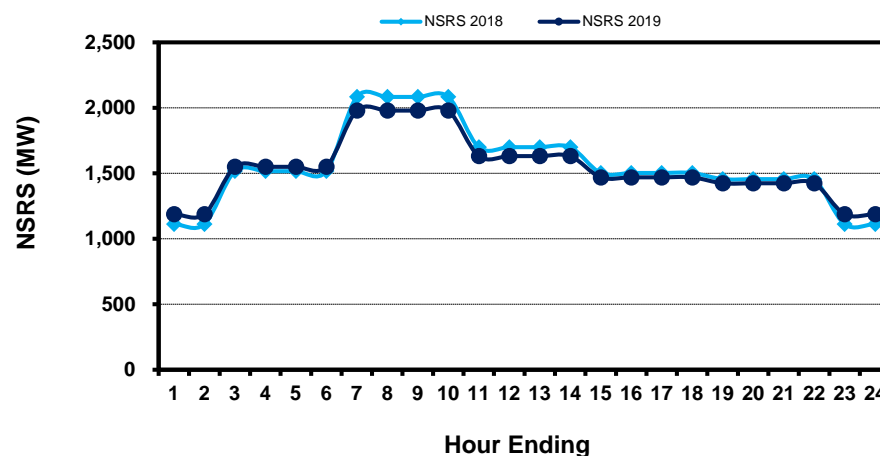
## Regulation Down



## Responsive Reserve



## Non-Spin Reserve



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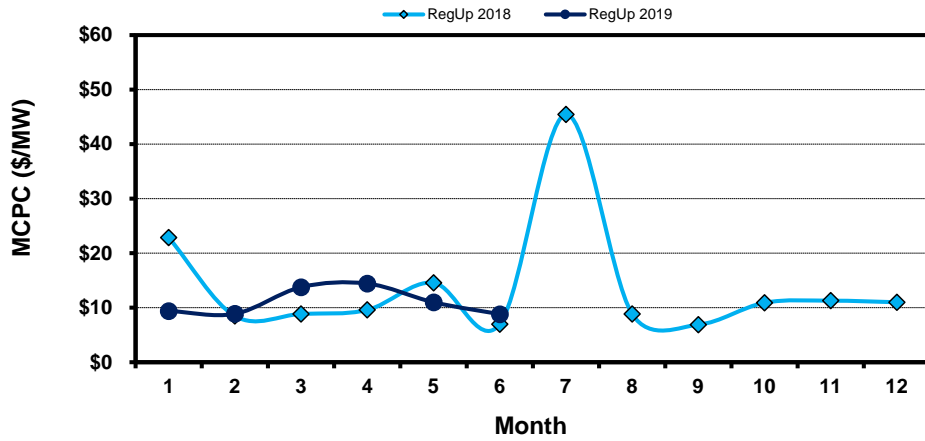
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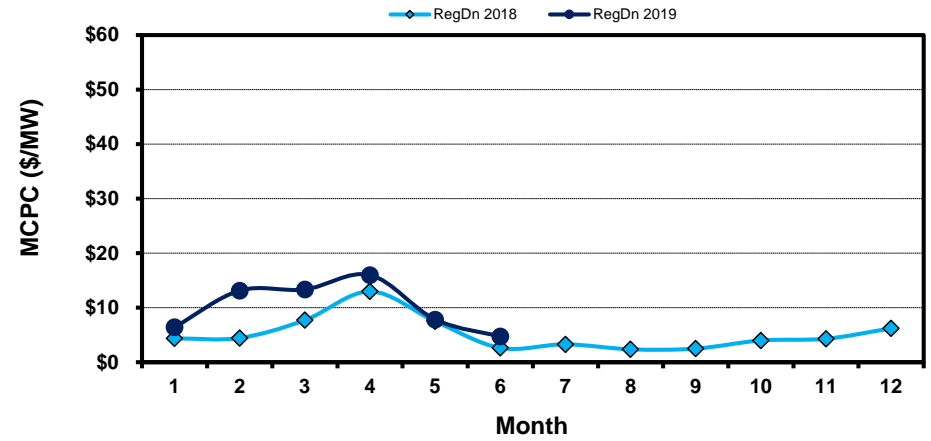
# Monthly Average Ancillary Services Price

(weighted by A/S Quantities Required)

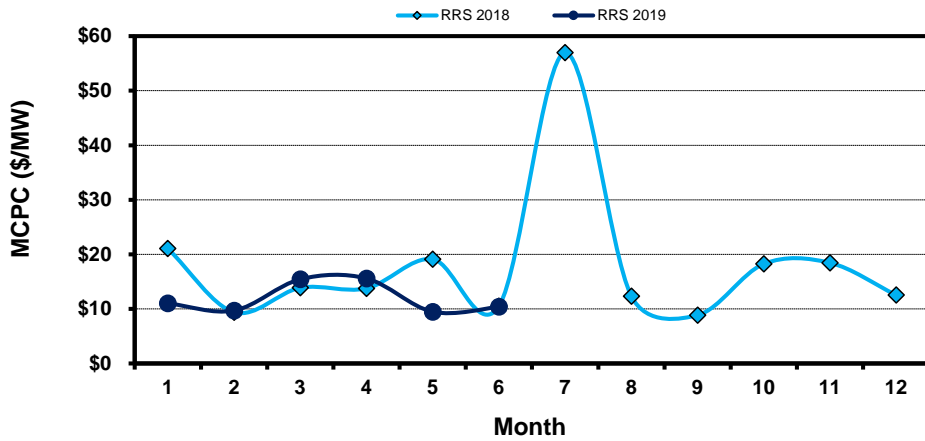
### Regulation Up



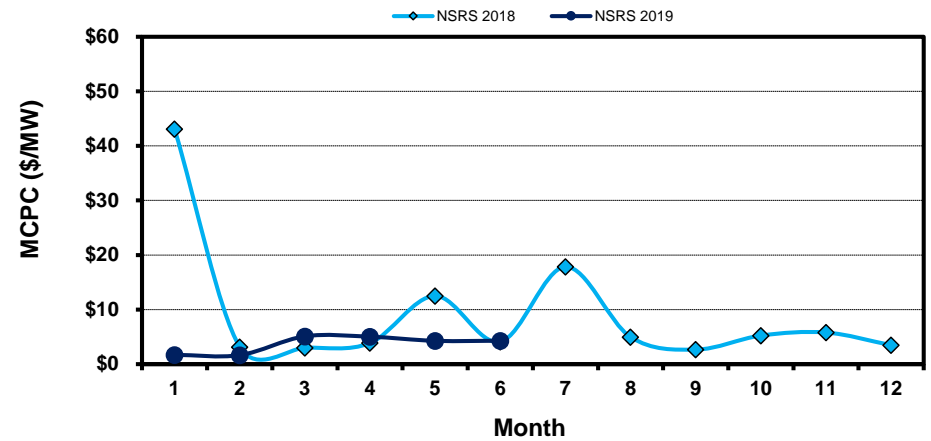
### Regulation Down



### Responsive Reserve



### Non-Spin Reserve



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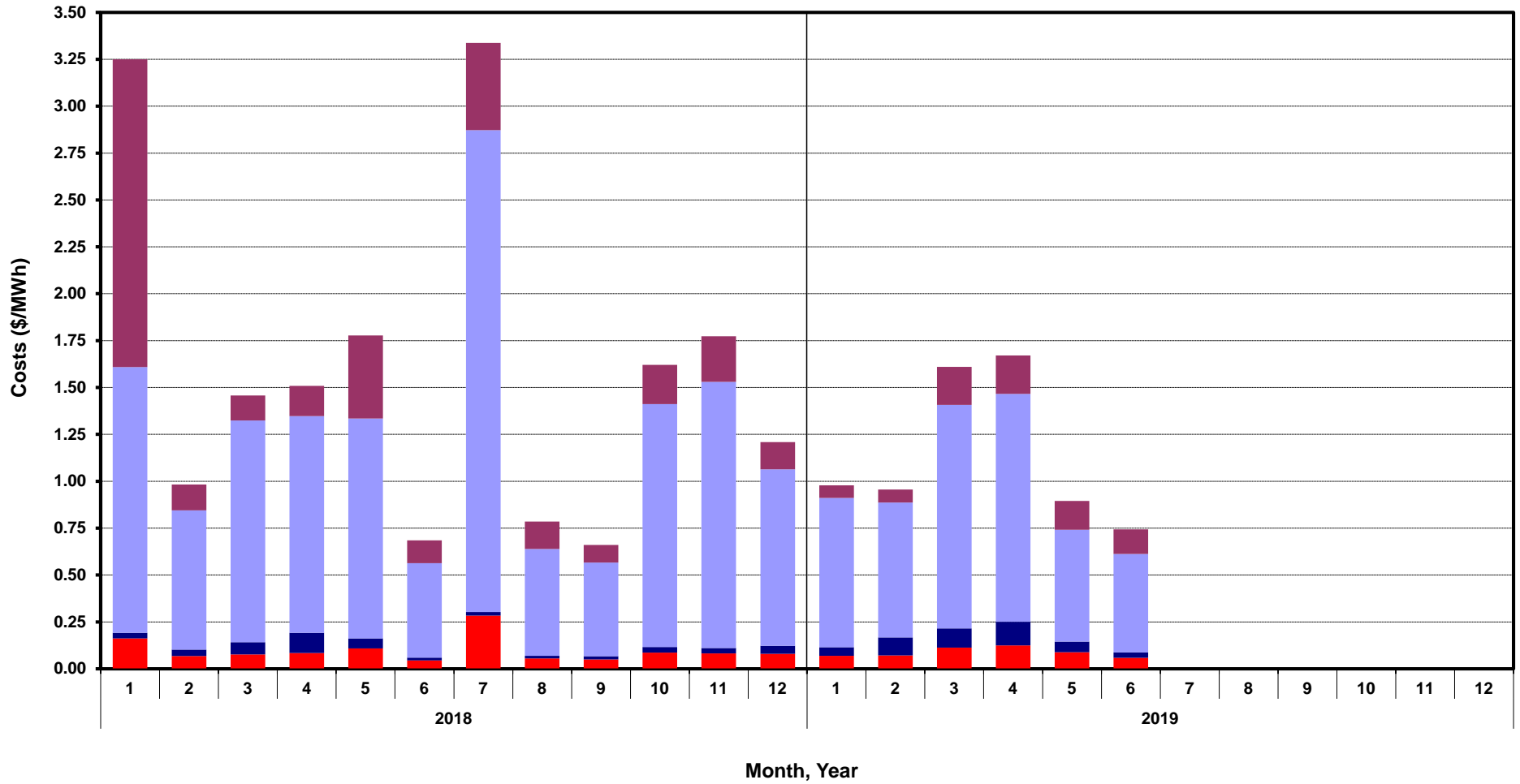
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# Monthly Average A/S Cost per MWh Load

RegUp RegDn RRS NonSpin



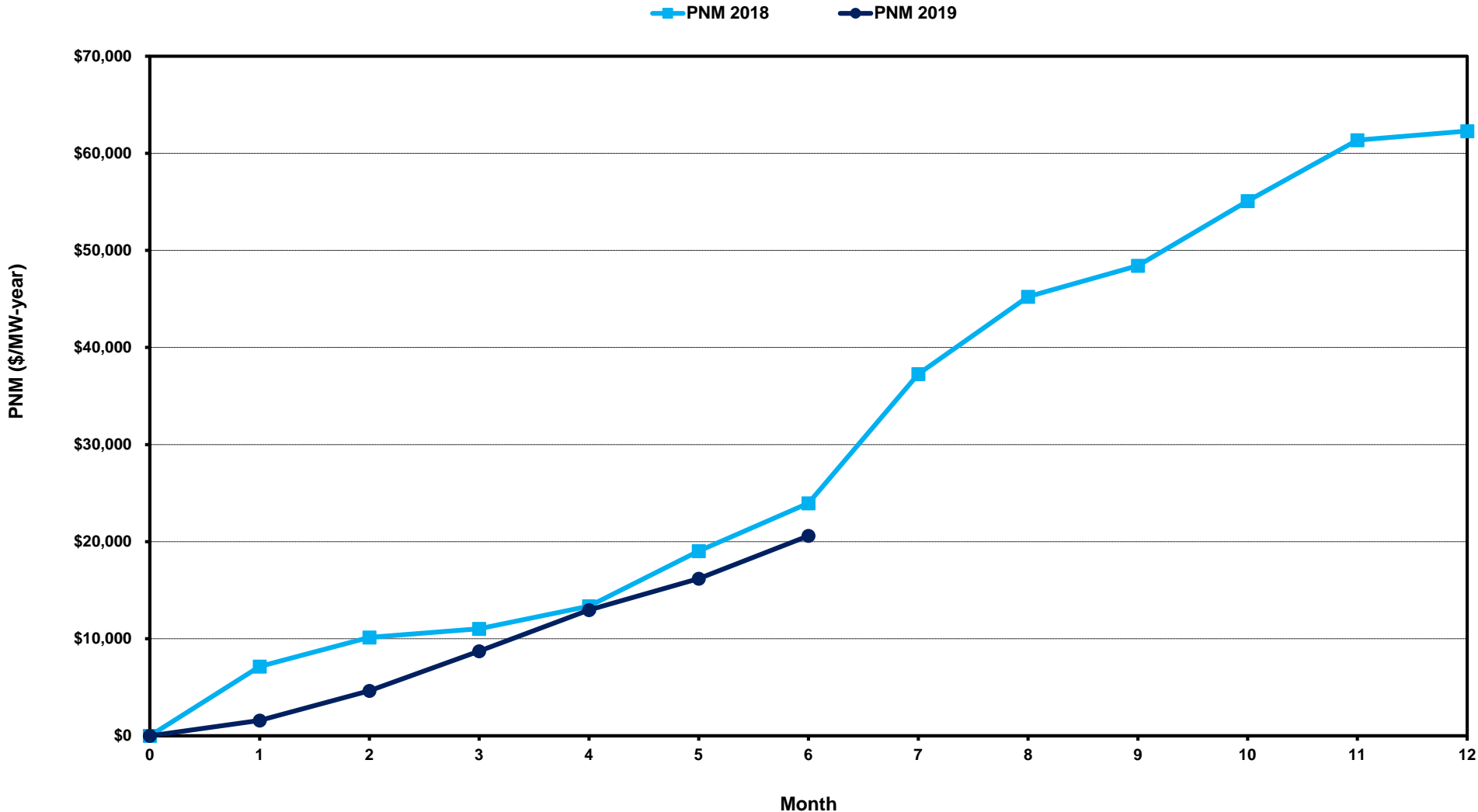
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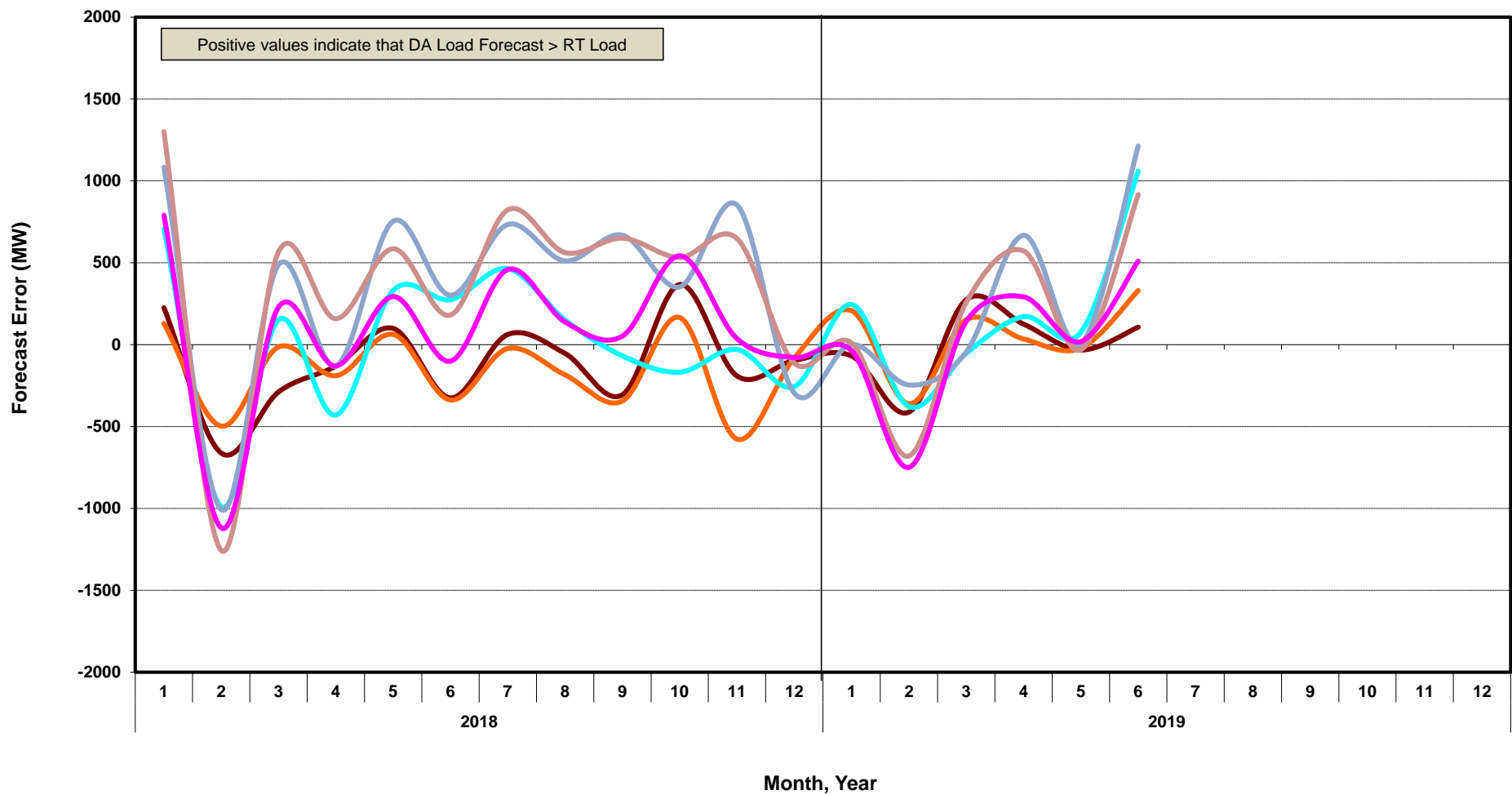
# ERCOT-wide Cumulative Peaker Net Margin



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# DA vs. RT Load Forecast Error by Hour Ending

HE\_1\_4   HE\_5\_8   HE\_9\_12   HE\_13\_16   HE\_17\_20   HE\_21\_24



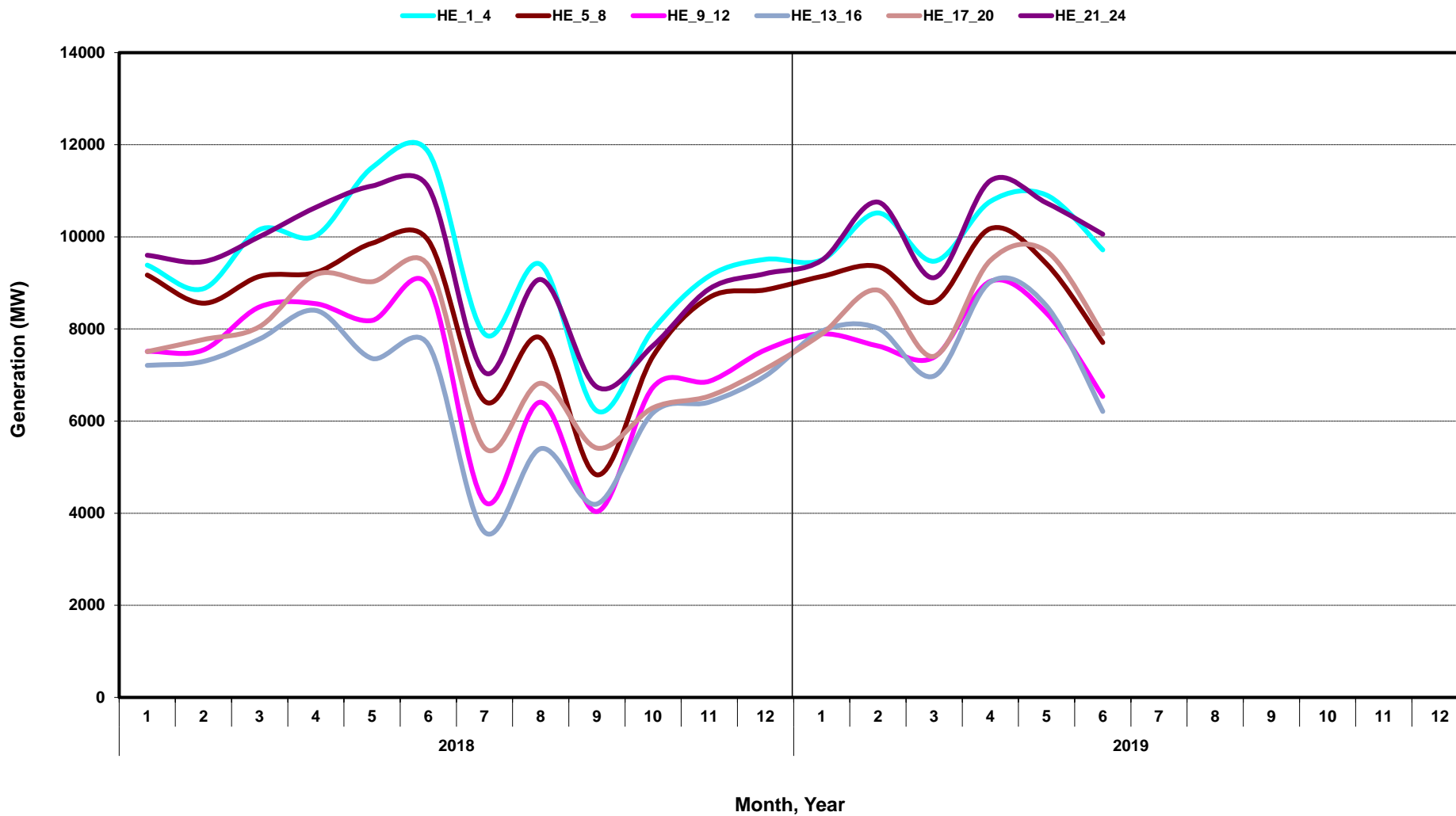
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# Monthly Average of Wind Generation by Hour Ending



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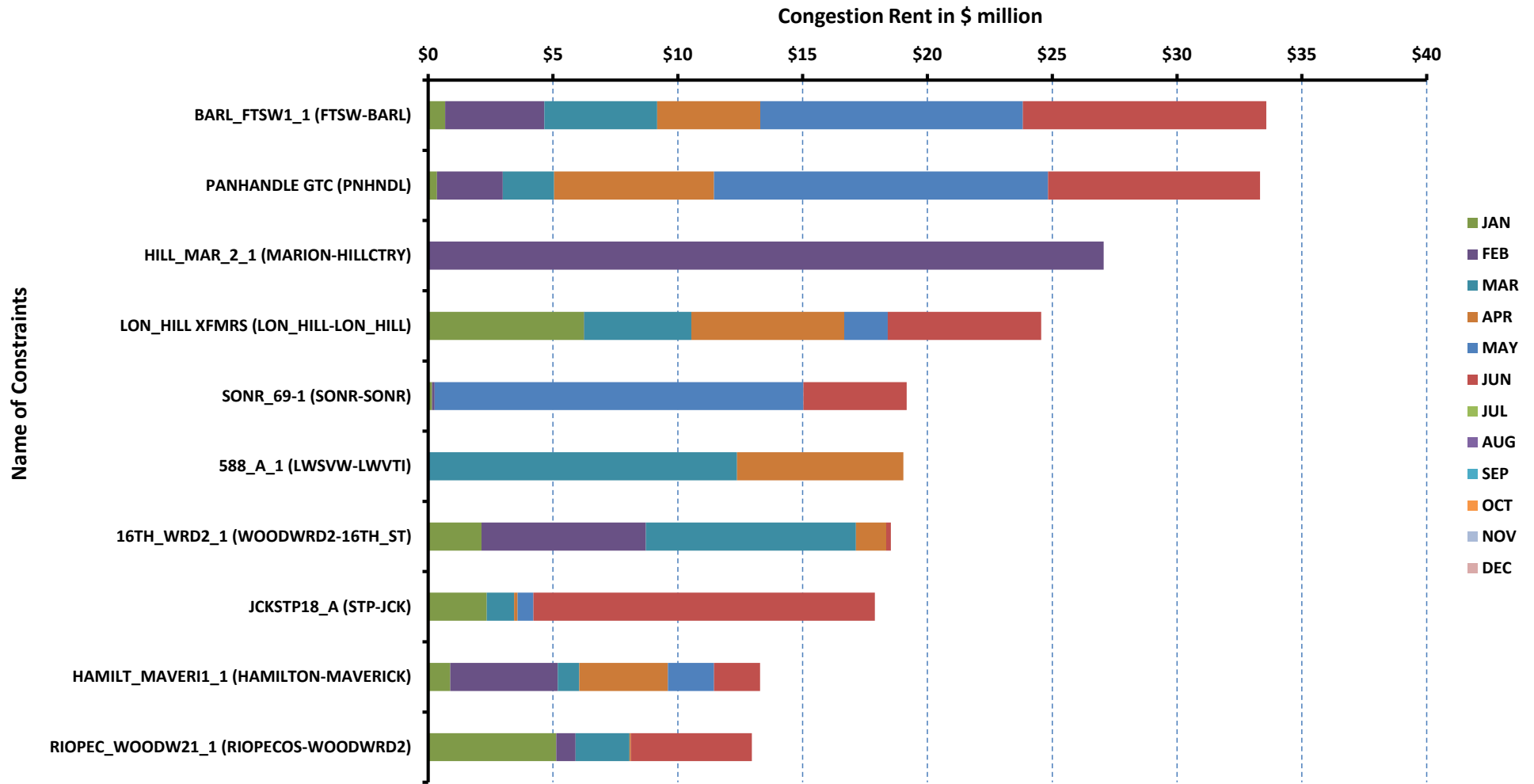
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# RT Congestion Constraint Rankings - 1

## Top 10 Constraints by Total Congestion Value - 2019



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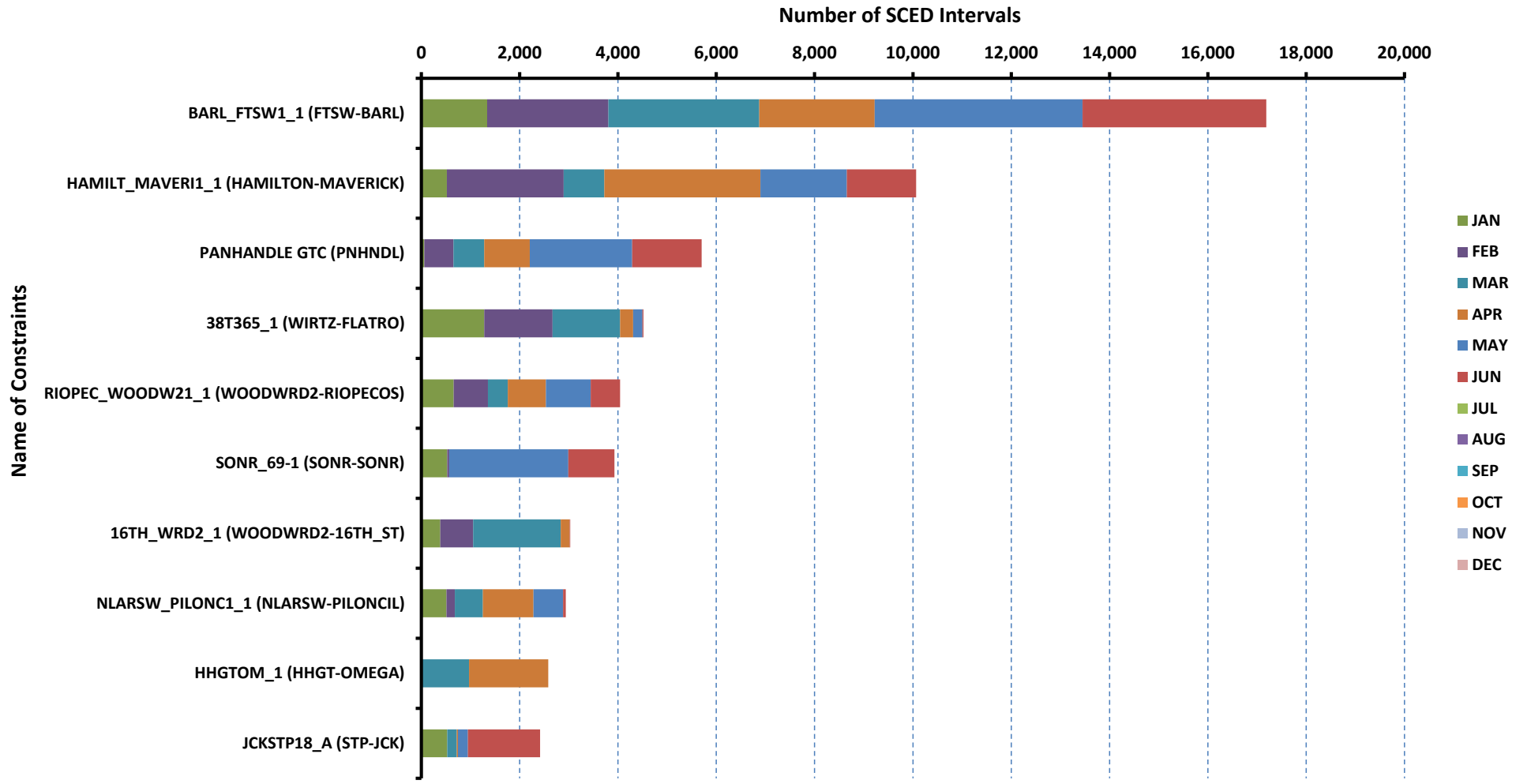
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# RT Congestion Constraint Rankings - 2

## Top 10 Constraints by Binding Frequency - 2019



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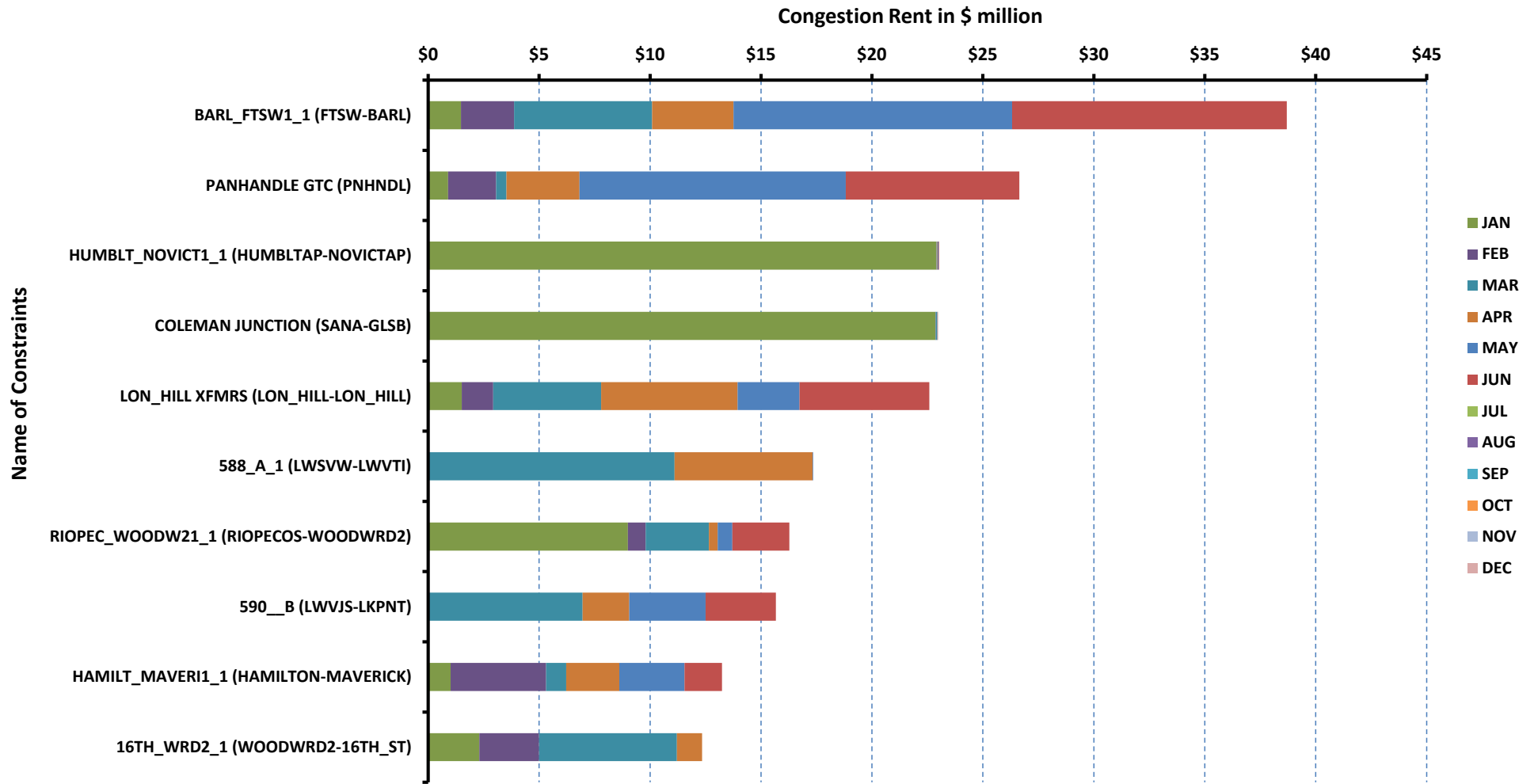
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# DA Congestion Constraint Rankings - 1

## Top 10 Constraints by Total Congestion Value - 2019



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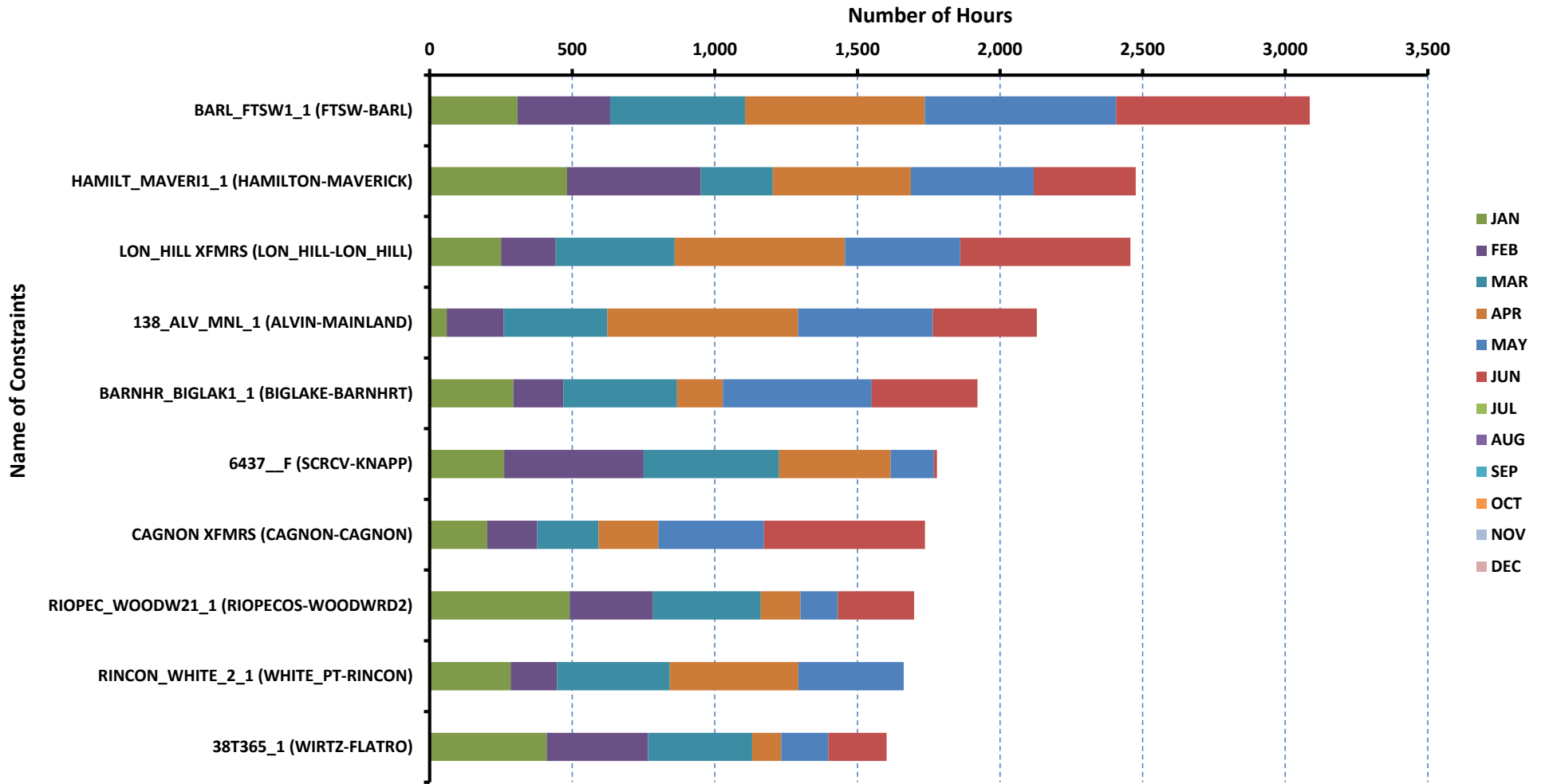
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# DA Congestion Constraint Rankings - 2

## Top 10 Constraints by Binding Frequency - 2019



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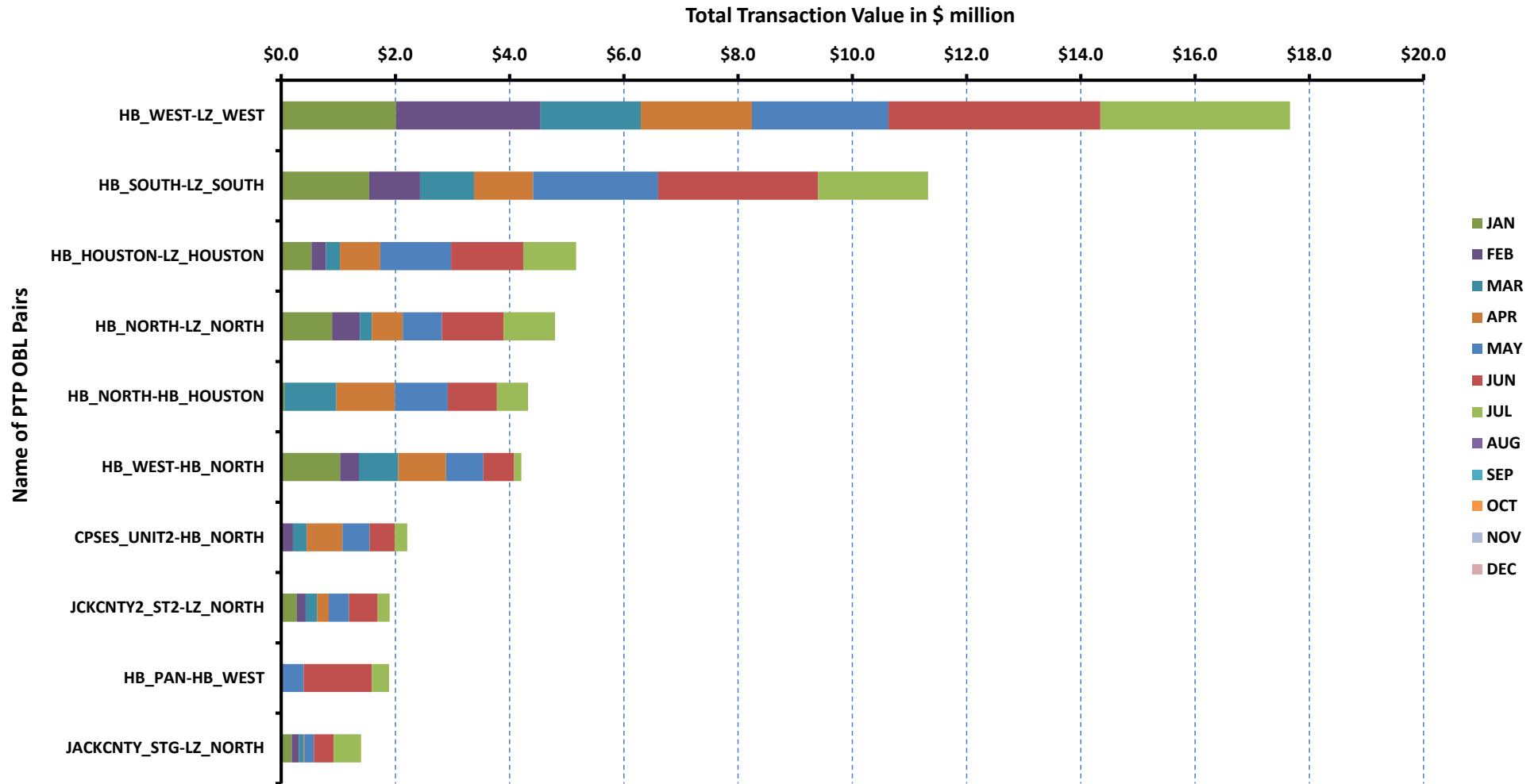
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# Top 10 CRR Pairs Ranked by Monthly Auction Values - 1

## Top 10 PTP Obligations by Total Transaction Value - 2019



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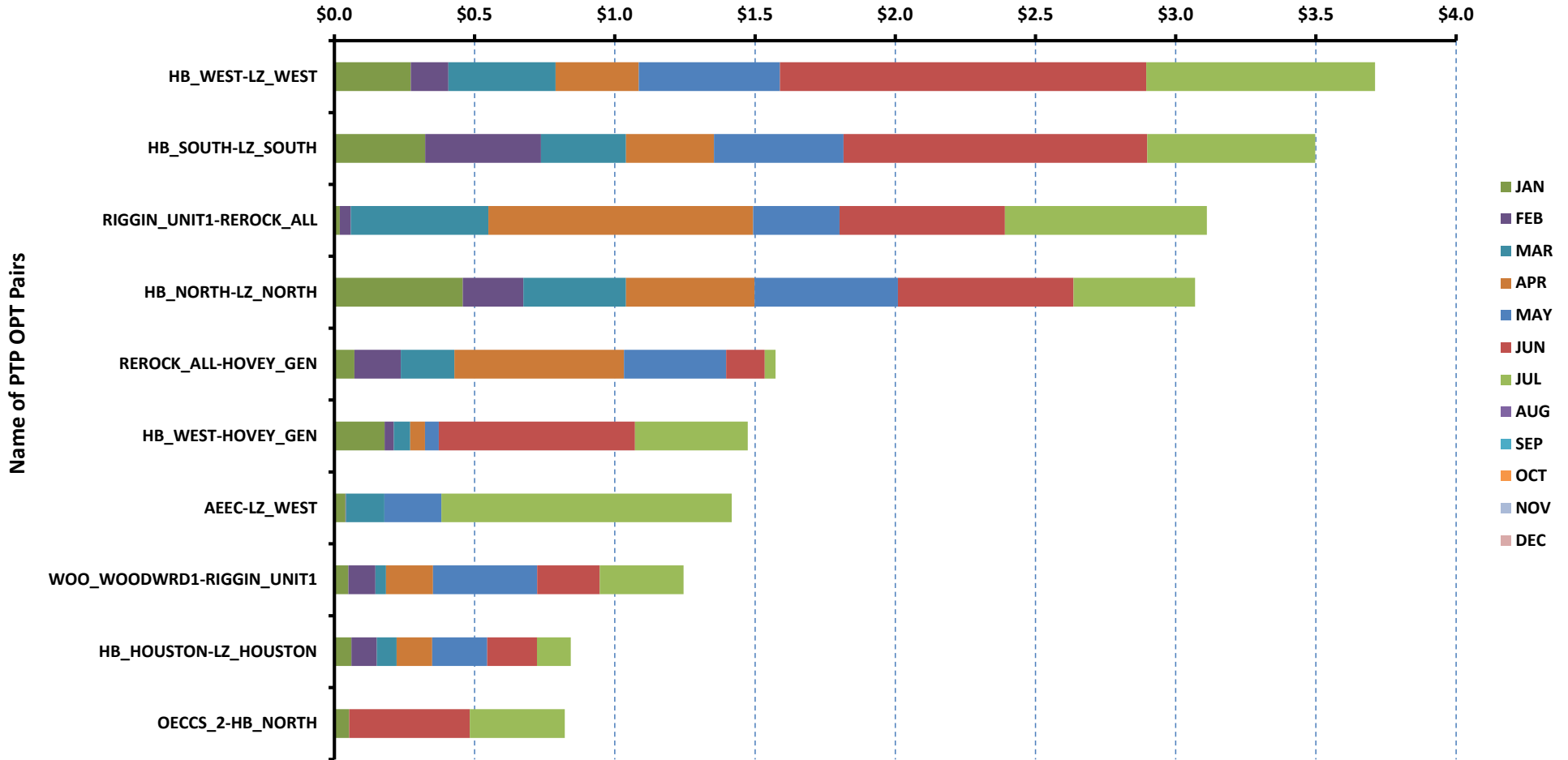
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# Top 10 CRR Pairs Ranked by Monthly Auction Values - 2

## Top 10 PTP Options by Total Transaction Value - 2019

Total Transaction Value in \$ million



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ERCOT-wide Avg. Energy Price - DA vs. RT			
year	month	dam_spp	rtm_spp
2018	1	\$ 45.63	\$ 42.56
	2	\$ 23.21	\$ 25.24
	3	\$ 24.42	\$ 20.80
	4	\$ 25.49	\$ 24.54
	5	\$ 43.15	\$ 38.28
	6	\$ 36.15	\$ 37.29
	7	\$ 100.46	\$ 50.22
	8	\$ 35.08	\$ 39.51
	9	\$ 29.31	\$ 30.40
	10	\$ 32.92	\$ 39.09
	11	\$ 33.19	\$ 38.44
	12	\$ 32.19	\$ 29.90
2019	1	\$ 26.27	\$ 24.96
	2	\$ 22.55	\$ 26.69
	3	\$ 31.55	\$ 30.25
	4	\$ 25.38	\$ 27.90
	5	\$ 26.46	\$ 28.07
	6	\$ 28.65	\$ 28.81
	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		
2018	1	14,841	27,183	19,284	5,270	10,346	16,082	11,354	4,263		
	2	12,660	22,124	16,019	4,952	9,740	14,553	9,933	4,101		
	3	12,755	16,224	13,632	4,474	9,738	12,000	9,549	3,934		
	4	14,008	16,467	14,236	4,842	9,773	12,219	9,759	4,009		
	5	18,179	25,425	18,585	5,840	12,436	16,042	12,382	4,477		
	6	18,501	27,219	19,059	5,898	13,746	19,328	13,975	4,872		
	7	18,885	29,606	20,395	6,101	14,046	20,118	14,207	4,890		
	8	19,311	27,221	19,761	6,017	14,083	19,181	14,463	4,965		
	9	17,980	25,161	17,984	5,661	12,364	16,072	12,140	4,532		
	10	16,718	22,540	16,381	5,492	10,919	13,391	10,514	4,336		
	11	14,989	22,127	16,793	5,224	9,739	13,438	9,986	4,462		
	12	12,545	20,233	14,873	5,332	9,601	14,187	10,136	4,685		
2019	1	13,256	21,937	15,623	5,577	9,786	15,227	10,366	4,716		
	2	12,957	22,873	15,196	5,480	9,746	14,466	9,964	4,658		
	3	13,808	24,569	17,618	5,728	9,760	13,293	9,836	4,553		
	4	14,685	17,893	14,451	5,371	10,374	12,469	9,822	4,555		
	5	17,652	21,762	17,049	5,784	12,253	14,375	11,657	4,772		
	6	18,969	25,605	18,791	6,409	13,787	16,727	13,186	5,126		
	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
2018	1	\$ 39.47	\$ 38.65	\$ 53.81	\$ 34.86	\$ 42.24	\$ 44.85	\$ 52.06	\$ 39.65
	2	\$ 24.34	\$ 26.14	\$ 24.82	\$ 25.22	\$ 22.81	\$ 22.74	\$ 24.57	\$ 22.50
	3	\$ 19.97	\$ 19.38	\$ 22.64	\$ 22.79	\$ 24.70	\$ 23.37	\$ 26.22	\$ 22.58
	4	\$ 24.84	\$ 25.06	\$ 25.02	\$ 21.02	\$ 25.55	\$ 25.28	\$ 27.35	\$ 21.42
	5	\$ 34.38	\$ 36.88	\$ 37.31	\$ 56.83	\$ 39.95	\$ 43.08	\$ 43.09	\$ 52.45
	6	\$ 35.79	\$ 33.97	\$ 33.39	\$ 65.89	\$ 34.05	\$ 33.91	\$ 33.53	\$ 58.47
	7	\$ 47.28	\$ 49.79	\$ 47.92	\$ 67.06	\$ 96.21	\$ 101.92	\$ 98.48	\$ 112.38
	8	\$ 39.07	\$ 39.32	\$ 40.89	\$ 37.46	\$ 34.63	\$ 35.04	\$ 35.67	\$ 34.80
	9	\$ 29.92	\$ 31.42	\$ 30.61	\$ 27.56	\$ 29.11	\$ 29.87	\$ 29.36	\$ 27.71
	10	\$ 38.98	\$ 40.11	\$ 39.61	\$ 34.97	\$ 33.45	\$ 33.12	\$ 33.15	\$ 30.40
	11	\$ 40.99	\$ 36.95	\$ 39.15	\$ 35.80	\$ 32.91	\$ 33.42	\$ 33.83	\$ 31.67
	12	\$ 28.56	\$ 29.93	\$ 28.42	\$ 35.76	\$ 31.02	\$ 32.07	\$ 32.04	\$ 35.32
2019	1	\$ 24.67	\$ 24.09	\$ 26.47	\$ 25.06	\$ 26.05	\$ 25.21	\$ 27.25	\$ 28.01
	2	\$ 23.30	\$ 24.58	\$ 32.08	\$ 28.80	\$ 22.05	\$ 21.64	\$ 24.07	\$ 23.14
	3	\$ 29.20	\$ 30.43	\$ 31.39	\$ 29.53	\$ 29.73	\$ 31.70	\$ 32.82	\$ 32.28
	4	\$ 27.42	\$ 27.57	\$ 29.52	\$ 26.42	\$ 25.42	\$ 24.98	\$ 27.36	\$ 22.09
	5	\$ 27.40	\$ 26.15	\$ 29.80	\$ 31.35	\$ 26.23	\$ 24.92	\$ 27.53	\$ 29.10
	6	\$ 30.38	\$ 27.44	\$ 27.08	\$ 33.53	\$ 29.22	\$ 27.09	\$ 28.39	\$ 32.85
	7	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	8	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	9	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	10	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	11	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
	12	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -

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ERCOT-wide Monthly Implied Heat Rate - DA vs. RT						
year	month	gasprice	rtn_spp	HR_rtn	dam_spp	HR_dam
2018	1	\$ 4.23	\$ 42.56	10.07	\$ 45.63	10.79
	2	\$ 2.63	\$ 25.24	9.61	\$ 23.21	8.83
	3	\$ 2.69	\$ 20.80	7.74	\$ 24.42	9.09
	4	\$ 2.83	\$ 24.54	8.67	\$ 25.49	9.00
	5	\$ 2.81	\$ 38.28	13.61	\$ 43.15	15.34
	6	\$ 3.00	\$ 37.29	12.42	\$ 36.15	12.03
	7	\$ 2.89	\$ 50.22	17.35	\$ 100.46	34.71
	8	\$ 3.01	\$ 39.51	13.14	\$ 35.08	11.67
	9	\$ 2.99	\$ 30.40	10.16	\$ 29.31	9.79
	10	\$ 3.48	\$ 39.09	11.22	\$ 32.92	9.45
	11	\$ 4.11	\$ 38.44	9.35	\$ 33.19	8.07
	12	\$ 3.92	\$ 29.90	7.62	\$ 32.19	8.21
2019	1	\$ 3.01	\$ 24.96	8.29	\$ 26.27	8.73
	2	\$ 2.67	\$ 26.69	10.01	\$ 22.55	8.46
	3	\$ 2.88	\$ 30.25	10.49	\$ 31.55	10.94
	4	\$ 2.57	\$ 27.90	10.85	\$ 25.38	9.87
	5	\$ 2.54	\$ 28.07	11.07	\$ 26.46	10.44
	6	\$ 2.46	\$ 28.81	11.72	\$ 28.65	11.65
	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
2018	1	9.99	12.31	10.61	9.38	9.34	12.73	9.14	8.25
	2	8.68	9.35	8.65	8.56	9.26	9.44	9.95	9.60
	3	9.19	9.76	8.70	8.40	7.43	8.42	7.21	8.48
	4	9.02	9.66	8.93	7.57	8.77	8.84	8.85	7.42
	5	14.20	15.32	15.32	18.65	12.22	13.27	13.11	20.20
	6	11.34	11.16	11.29	19.47	11.92	11.12	11.31	21.94
	7	33.25	34.03	35.22	38.83	16.34	16.56	17.20	23.17
	8	11.52	11.86	11.66	11.57	13.00	13.60	13.08	12.46
	9	9.73	9.81	9.98	9.26	10.00	10.23	10.50	9.21
	10	9.60	9.52	9.51	8.73	11.19	11.37	11.52	10.04
	11	8.01	8.23	8.13	7.70	9.97	9.52	8.99	8.71
	12	7.91	8.17	8.18	9.00	7.28	7.25	7.63	9.12
2019	1	8.65	9.05	8.37	9.30	8.19	8.79	8.00	8.32
	2	8.27	9.03	8.12	8.68	8.74	12.04	9.22	10.81
	3	10.31	11.38	10.99	11.19	10.12	10.88	10.55	10.24
	4	9.88	10.64	9.71	8.59	10.66	11.48	10.72	10.27
	5	10.35	10.86	9.83	11.48	10.81	11.76	10.31	12.36
	6	11.88	11.54	11.02	13.36	12.35	11.01	11.16	13.64
	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
2019	6	1	\$ 3.36	\$ -	15	0	80	90
2019	6	2	\$ 0.75	\$ -	24	0	80	90
2019	6	3	\$ 0.04	\$ -	20	0	80	90
2019	6	4	\$ -	\$ -	0	0	80	90
2019	6	5	\$ 13.56	\$ -	28	0	80	90
2019	6	6	\$ 4.85	\$ 0.68	19	8	80	90
2019	6	7	\$ 59.83	\$ 0.27	34	8	80	90
2019	6	8	\$ 1.72	\$ -	17	0	80	90
2019	6	9	\$ -	\$ -	0	0	80	90
2019	6	10	\$ 0.38	\$ -	16	0	80	90
2019	6	11	\$ -	\$ 2.08	0	31	80	90
2019	6	12	\$ 1.49	\$ -	20	0	80	90
2019	6	13	\$ 0.10	\$ -	17	0	80	90
2019	6	14	\$ 0.01	\$ -	5	0	80	90
2019	6	15	\$ 0.01	\$ -	1	0	80	90
2019	6	16	\$ -	\$ -	0	0	80	90
2019	6	17	\$ 3.98	\$ 0.68	22	13	80	90
2019	6	18	\$ 3.20	\$ -	14	0	80	90
2019	6	19	\$ 5.32	\$ -	30	0	80	90
2019	6	20	\$ -	\$ -	0	0	80	90
2019	6	21	\$ 0.01	\$ -	4	0	80	90
2019	6	22	\$ -	\$ -	0	0	80	90
2019	6	23	\$ 70.02	\$ -	34	0	80	90
2019	6	24	\$ -	\$ -	0	0	80	90
2019	6	25	\$ 1.77	\$ -	22	0	80	90
2019	6	26	\$ -	\$ -	0	0	80	90
2019	6	27	\$ 0.01	\$ -	4	0	80	90
2019	6	28	\$ 0.52	\$ -	15	0	80	90
2019	6	29	\$ 1.90	\$ -	14	0	80	90
2019	6	30	\$ 0.03	\$ -	12	0	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
2018	1	283	1,601	2,829	299
	2	292	1,674	3,030	309
	3	296	1,560	3,001	306
	4	296	1,497	3,001	316
	5	320	1,601	2,782	339
	6	301	1,543	2,488	330
	7	304	1,386	2,403	333
	8	302	1,548	2,433	331
	9	309	1,585	2,543	326
	10	294	1,570	2,780	309
	11	256	1,582	2,895	273
	12	268	1,603	2,900	280
2019	1	285	1,578	2,898	295
	2	283	1,634	2,881	311
	3	287	1,487	2,893	306
	4	292	1,513	2,904	321
	5	314	1,550	2,712	345
	6	303	1,486	2,467	322
	7	-	-	-	-
	8	-	-	-	-
	9	-	-	-	-
	10	-	-	-	-
	11	-	-	-	-
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Hourly Average of Ancillary Services Required MW					
year	DELIVERY_HOUR	ASMW_REGDN	ASMW_NSPIN	ASMW_RRS	ASMW_REGUP
2018	1	366	1,112	2,872	273
	2	275	1,112	2,872	215
	3	238	1,516	2,880	208
	4	204	1,516	2,880	221
	5	210	1,516	2,880	276
	6	305	1,516	2,880	439
	7	261	2,083	2,761	568
	8	237	2,083	2,761	348
	9	239	2,083	2,761	397
	10	276	2,083	2,761	385
	11	250	1,700	2,672	401
	12	239	1,700	2,672	382
	13	217	1,700	2,672	344
	14	220	1,700	2,672	306
	15	216	1,503	2,650	263
	16	212	1,503	2,650	254
	17	248	1,503	2,650	261
	18	285	1,503	2,650	295
	19	371	1,456	2,694	285
	20	363	1,456	2,694	272
	21	380	1,456	2,694	242
	22	465	1,456	2,694	269
	23	508	1,112	2,872	320
	24	451	1,112	2,872	276
2019	1	376	1,188	2,890	257
	2	283	1,188	2,890	201
	3	233	1,550	2,908	217
	4	207	1,550	2,908	246
	5	211	1,550	2,908	310
	6	309	1,550	2,908	469
	7	282	1,979	2,802	589
	8	228	1,979	2,802	359
	9	239	1,979	2,802	371
	10	255	1,979	2,802	377
	11	272	1,631	2,720	381
	12	226	1,631	2,720	369
	13	225	1,631	2,720	338
	14	219	1,631	2,720	309
	15	223	1,469	2,707	273
	16	216	1,469	2,707	275
	17	243	1,469	2,707	278
	18	274	1,469	2,707	305
	19	363	1,424	2,726	311
	20	369	1,424	2,726	303
	21	374	1,424	2,726	270
	22	467	1,424	2,726	245
	23	512	1,188	2,890	258
	24	455	1,188	2,890	290

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Monthly Average Ancillary Services Price					
year	month	MCPC_REGDN	MCPC_NSPIN	MCPC_RRS	MCPC_REGUP
2018	1	\$ 4.36	\$ 43.10	\$ 21.06	\$ 22.87
	2	\$ 4.45	\$ 3.14	\$ 9.40	\$ 8.48
	3	\$ 7.71	\$ 3.01	\$ 13.87	\$ 8.86
	4	\$ 12.98	\$ 3.86	\$ 13.76	\$ 9.59
	5	\$ 7.51	\$ 12.51	\$ 19.12	\$ 14.58
	6	\$ 2.62	\$ 4.10	\$ 10.51	\$ 6.98
	7	\$ 3.28	\$ 17.86	\$ 56.96	\$ 45.45
	8	\$ 2.37	\$ 4.98	\$ 12.34	\$ 8.85
	9	\$ 2.49	\$ 2.67	\$ 8.86	\$ 6.90
	10	\$ 3.99	\$ 5.24	\$ 18.25	\$ 10.91
	11	\$ 4.30	\$ 5.80	\$ 18.44	\$ 11.28
	12	\$ 6.21	\$ 3.48	\$ 12.53	\$ 11.00
2019	1	\$ 6.43	\$ 1.71	\$ 11.01	\$ 9.40
	2	\$ 13.14	\$ 1.66	\$ 9.70	\$ 8.88
	3	\$ 13.34	\$ 5.10	\$ 15.43	\$ 13.77
	4	\$ 16.00	\$ 5.03	\$ 15.59	\$ 14.42
	5	\$ 7.83	\$ 4.27	\$ 9.47	\$ 11.00
	6	\$ 4.76	\$ 4.30	\$ 10.39	\$ 8.82
	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
2018	1	\$ 0.03	\$ 1.64	\$ 1.42	\$ 0.16
	2	\$ 0.03	\$ 0.14	\$ 0.74	\$ 0.07
	3	\$ 0.06	\$ 0.13	\$ 1.18	\$ 0.08
	4	\$ 0.11	\$ 0.16	\$ 1.16	\$ 0.08
	5	\$ 0.05	\$ 0.44	\$ 1.17	\$ 0.11
	6	\$ 0.02	\$ 0.12	\$ 0.50	\$ 0.04
	7	\$ 0.02	\$ 0.46	\$ 2.57	\$ 0.28
	8	\$ 0.01	\$ 0.15	\$ 0.57	\$ 0.06
	9	\$ 0.02	\$ 0.09	\$ 0.50	\$ 0.05
	10	\$ 0.03	\$ 0.21	\$ 1.30	\$ 0.09
	11	\$ 0.03	\$ 0.24	\$ 1.42	\$ 0.08
	12	\$ 0.04	\$ 0.14	\$ 0.94	\$ 0.08
2019	1	\$ 0.05	\$ 0.07	\$ 0.80	\$ 0.07
	2	\$ 0.10	\$ 0.07	\$ 0.72	\$ 0.07
	3	\$ 0.10	\$ 0.20	\$ 1.19	\$ 0.11
	4	\$ 0.13	\$ 0.20	\$ 1.22	\$ 0.12
	5	\$ 0.06	\$ 0.15	\$ 0.60	\$ 0.09
	6	\$ 0.03	\$ 0.13	\$ 0.53	\$ 0.06
	7	\$ -	\$ -	\$ -	\$ -
	8	\$ -	\$ -	\$ -	\$ -
	9	\$ -	\$ -	\$ -	\$ -
	10	\$ -	\$ -	\$ -	\$ -
	11	\$ -	\$ -	\$ -	\$ -
	12	\$ -	\$ -	\$ -	\$ -

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ERCOT-wide Cumulative PNM			
year	month	pnm	pnm_accum
2018	0	\$ -	\$ -
	1	\$ 7,139.99	\$ 7,139.99
	2	\$ 3,011.86	\$ 10,151.85
	3	\$ 870.03	\$ 11,021.88
	4	\$ 2,333.76	\$ 13,355.64
	5	\$ 5,671.10	\$ 19,026.74
	6	\$ 4,930.69	\$ 23,957.43
	7	\$ 13,313.16	\$ 37,270.59
	8	\$ 7,965.15	\$ 45,235.74
	9	\$ 3,181.93	\$ 48,417.67
	10	\$ 6,676.58	\$ 55,094.25
	11	\$ 6,257.98	\$ 61,352.23
	12	\$ 941.00	\$ 62,293.23
2019	0	\$ -	\$ -
	1	\$ 1,594.61	\$ 1,594.61
	2	\$ 3,042.70	\$ 4,637.31
	3	\$ 4,087.75	\$ 8,725.06
	4	\$ 4,232.61	\$ 12,957.67
	5	\$ 3,234.19	\$ 16,191.86
	6	\$ 4,409.46	\$ 20,601.32
	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
2018	1	226	1,083	1,300	791	129	705
	2	(662)	(1,007)	(1,256)	(1,119)	(497)	(990)
	3	(289)	489	568	229	(14)	152
	4	(131)	(131)	158	(130)	(190)	(430)
	5	99	754	586	294	63	331
	6	(325)	302	181	(100)	(338)	275
	7	62	734	823	459	(23)	465
	8	(54)	511	562	138	(184)	150
	9	(306)	669	650	52	(344)	(68)
	10	367	352	532	543	166	(168)
	11	(191)	853	648	37	(577)	(30)
	12	(96)	(296)	(112)	(79)	(80)	(255)
2019	1	(69)	2	10	(37)	207	245
	2	(412)	(246)	(679)	(749)	(361)	(378)
	3	275	(45)	258	142	152	(52)
	4	125	668	573	292	35	171
	5	(32)	5	(31)	19	(21)	76
	6	107	1,213	916	510	330	1,059
	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
2018	1	9,387	7,209	7,508	9,601	9,171	7,514
	2	8,876	7,295	7,771	9,462	8,559	7,545
	3	10,159	7,784	8,052	10,006	9,143	8,480
	4	10,025	8,403	9,183	10,641	9,227	8,549
	5	11,505	7,360	9,027	11,105	9,862	8,186
	6	11,843	7,661	9,377	11,080	9,922	8,937
	7	7,895	3,590	5,418	7,058	6,434	4,248
	8	9,401	5,402	6,821	9,075	7,803	6,410
	9	6,222	4,201	5,415	6,741	4,833	4,036
	10	7,988	6,184	6,290	7,640	7,413	6,738
	11	9,151	6,413	6,543	8,872	8,685	6,866
	12	9,512	6,983	7,137	9,202	8,850	7,547
2019	1	9,500	7,954	7,892	9,491	9,141	7,897
	2	10,520	8,015	8,843	10,755	9,358	7,631
	3	9,471	6,980	7,408	9,114	8,585	7,389
	4	10,770	9,020	9,488	11,220	10,180	9,034
	5	10,907	8,497	9,689	10,736	9,414	8,343
	6	9,717	6,210	7,891	10,058	7,706	6,535
	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	2019	BARL_FTSW1_1 (FTSW-BARL)	17,187	1	1,340	2,467	3,067	2,346	4,230	3,737	-	-	-	-	-	-
FREQ_EXIST	2019	HAMILT_MAVERI1_1 (HAMILTON-MAVERICK)	10,064	2	520	2,373	827	3,178	1,756	1,410	-	-	-	-	-	-
FREQ_EXIST	2019	PANHANDLE_GTC (PNHNDL)	5,700	3	61	594	623	928	2,083	1,411	-	-	-	-	-	-
FREQ_EXIST	2019	38T365_1 (WIRTZ-FLATRO)	4,517	4	1,277	1,393	1,371	267	191	18	-	-	-	-	-	-
FREQ_EXIST	2019	RIOPEC_WOODW21_1 (WOODWRD2-RIOPECOS)	4,042	5	658	698	401	779	908	598	-	-	-	-	-	-
FREQ_EXIST	2019	SONR_69-1 (SONR-SONR)	3,929	6	528	37	-	-	2,423	941	-	-	-	-	-	-
FREQ_EXIST	2019	16TH_WRD2_1 (WOODWRD2-16TH_ST)	3,028	7	386	666	1,783	184	-	9	-	-	-	-	-	-
FREQ_EXIST	2019	NLARSW_PILONC1_1 (NLARSW-PILONCL)	2,938	8	511	171	569	1,031	601	55	-	-	-	-	-	-
FREQ_EXIST	2019	HHGTOM_1 (HHGT-OMEGA)	2,581	9	-	-	970	1,611	-	-	-	-	-	-	-	-
FREQ_EXIST	2019	JCKSTP18_A (STP-JCK)	2,415	10	526	-	196	23	201	1,469	-	-	-	-	-	-
TOP10_RENT	2019	BARL_FTSW1_1 (FTSW-BARL)	\$ 33.58	1	\$ 0.68	\$ 3.97	\$ 4.52	\$ 4.13	\$ 10.52	\$ 9.76	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2019	PANHANDLE_GTC (PNHNDL)	\$ 33.32	2	\$ 0.35	\$ 2.64	\$ 2.06	\$ 6.40	\$ 13.38	\$ 8.49	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2019	HILL_MAR_2_1 (MARION-HILLCTRY)	\$ 27.06	3	\$ -	\$ 27.06	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2019	LON_HILL_XFMRS (LON_HILL-LON_HILL)	\$ 24.56	4	\$ 6.25	\$ 0.00	\$ 4.29	\$ 6.12	\$ 1.75	\$ 6.15	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2019	SONR_69-1 (SONR-SONR)	\$ 19.17	5	\$ 0.15	\$ 0.10	\$ -	\$ -	\$ 14.77	\$ 4.14	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2019	588_A_1 (LWSVW-LWVTI)	\$ 19.04	6	\$ -	\$ -	\$ 12.37	\$ 6.67	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2019	16TH_WRD2_1 (WOODWRD2-16TH_ST)	\$ 18.53	7	\$ 2.13	\$ 6.59	\$ 8.41	\$ 1.21	\$ -	\$ 0.18	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2019	JCKSTP18_A (STP-JCK)	\$ 17.89	8	\$ 2.34	\$ -	\$ 1.10	\$ 0.14	\$ 0.63	\$ 13.68	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2019	HAMILT_MAVERI1_1 (HAMILTON-MAVERICK)	\$ 13.30	9	\$ 0.89	\$ 4.31	\$ 0.86	\$ 3.55	\$ 1.85	\$ 1.85	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2019	RIOPEC_WOODW21_1 (RIOPECOS-WOODWRD2)	\$ 12.97	10	\$ 5.13	\$ 0.77	\$ 2.16	\$ 0.06	\$ -	\$ 4.85	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -

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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	2019	BARL_FTSW1_1 (FTSW-BARL)	3,086	1	308	325	473	630	671	679	-	-	-	-	-	-
FREQ_EXIST	2019	HAMILT_MAVR1_1 (HAMILTON-MAVERICK)	2,476	2	482	469	252	484	431	358	-	-	-	-	-	-
FREQ_EXIST	2019	LON_HILL_XFMRS (LON_HILL-LON_HILL)	2,457	3	250	192	417	597	404	597	-	-	-	-	-	-
FREQ_EXIST	2019	138_ALV_MNL_1 (ALVIN-MAINLAND)	2,129	4	60	200	363	669	472	365	-	-	-	-	-	-
FREQ_EXIST	2019	BARNHR_BIGLAK1_1 (BIGLAKE-BARNHRT)	1,921	5	294	175	398	161	522	371	-	-	-	-	-	-
FREQ_EXIST	2019	6437_F (SCRCV-KNAPP)	1,779	6	261	489	475	391	152	11	-	-	-	-	-	-
FREQ_EXIST	2019	CAGNON_XFMRS (CAGNON-CAGNON)	1,737	7	202	175	215	210	370	565	-	-	-	-	-	-
FREQ_EXIST	2019	RIOPEC_WOODW21_1 (RIOPECOS-WOODWRD2)	1,699	8	491	292	378	139	131	268	-	-	-	-	-	-
FREQ_EXIST	2019	RINCON_WHITE_2_1 (WHITE_PT-RINCON)	1,662	9	284	163	395	451	369	-	-	-	-	-	-	-
FREQ_EXIST	2019	38T365_1 (WIRTZ-FLATRO)	1,602	10	410	356	365	102	165	204	-	-	-	-	-	-
TOP10_RENT	2019	BARL_FTSW1_1 (FTSW-BARL)	\$ 38.70	1	\$ 1.48	\$ 2.39	\$ 6.22	\$ 3.68	\$ 12.55	\$ 12.38	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2019	PANHNDL_GTC (PNHNDL)	\$ 26.64	2	\$ 0.89	\$ 2.17	\$ 0.47	\$ 3.29	\$ 12.00	\$ 7.82	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2019	HUMBLT_NOVICT1_1 (HUMBLTAP-NOVICTAP)	\$ 23.02	3	\$ 22.89	\$ 0.01	\$ 0.02	\$ 0.03	\$ 0.04	\$ 0.02	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2019	COLEMAN_JUNCTION (SANA-GLSB)	\$ 22.96	4	\$ 22.86	\$ 0.02	\$ 0.05	\$ 0.02	\$ 0.01	\$ 0.00	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2019	LON_HILL_XFMRS (LON_HILL-LON_HILL)	\$ 22.59	5	\$ 1.51	\$ 1.42	\$ 4.86	\$ 6.15	\$ 2.78	\$ 5.86	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2019	588_A_1 (LWSVW-LWVTI)	\$ 17.35	6	\$ -	\$ -	\$ 11.10	\$ 6.22	\$ 0.02	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2019	RIOPEC_WOODW21_1 (RIOPECOS-WOODWRD2)	\$ 16.27	7	\$ 9.00	\$ 0.80	\$ 2.85	\$ 0.40	\$ 0.66	\$ 2.57	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2019	590_B (LWVJS-LKPNT)	\$ 15.67	8	\$ -	\$ -	\$ 6.96	\$ 2.10	\$ 3.44	\$ 3.17	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2019	HAMILT_MAVR1_1 (HAMILTON-MAVERICK)	\$ 13.24	9	\$ 1.01	\$ 4.30	\$ 0.91	\$ 2.39	\$ 2.94	\$ 1.69	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -
TOP10_RENT	2019	16TH_WRD2_1 (WOODWRD2-16TH_ST)	\$ 12.34	10	\$ 2.30	\$ 2.70	\$ 6.20	\$ 1.14	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -	\$ -

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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																		
fr_option	year	pair	total_value	rank	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC		
N	2019	HB WEST-LZ WEST	\$ 17.66	1	\$ 2.01	\$ 2.53	\$ 1.75	\$ 1.95	\$ 2.39	\$ 3.71	\$ 3.32	\$ -	\$ -	\$ -	\$ -	\$ -		
N	2019	HB SOUTH-LZ SOUTH	\$ 11.32	2	\$ 1.54	\$ 0.89	\$ 0.95	\$ 1.03	\$ 2.19	\$ 2.80	\$ 1.92	\$ -	\$ -	\$ -	\$ -	\$ -		
N	2019	HB HOUSTON-LZ HOUSTON	\$ 5.16	3	\$ 0.53	\$ 0.25	\$ 0.25	\$ 0.70	\$ 1.24	\$ 1.27	\$ 0.92	\$ -	\$ -	\$ -	\$ -	\$ -		
N	2019	HB NORTH-LZ NORTH	\$ 4.79	4	\$ 0.89	\$ 0.49	\$ 0.21	\$ 0.54	\$ 0.69	\$ 1.08	\$ 0.90	\$ -	\$ -	\$ -	\$ -	\$ -		
N	2019	HB NORTH-HB HOUSTON	\$ 4.32	5	\$ 0.06	\$ 0.00	\$ 0.91	\$ 1.02	\$ 0.93	\$ 0.86	\$ 0.55	\$ -	\$ -	\$ -	\$ -	\$ -		
N	2019	HB WEST-HB NORTH	\$ 4.20	6	\$ 1.03	\$ 0.33	\$ 0.69	\$ 0.83	\$ 0.66	\$ 0.54	\$ 0.13	\$ -	\$ -	\$ -	\$ -	\$ -		
N	2019	CPSSES UNIT2-HB NORTH	\$ 2.21	7	\$ -	\$ 0.20	\$ 0.24	\$ 0.62	\$ 0.48	\$ 0.44	\$ 0.22	\$ -	\$ -	\$ -	\$ -	\$ -		
N	2019	JCKCNTY2_ST2-LZ NORTH	\$ 1.90	8	\$ 0.27	\$ 0.15	\$ 0.20	\$ 0.20	\$ 0.35	\$ 0.50	\$ 0.21	\$ -	\$ -	\$ -	\$ -	\$ -		
N	2019	HB PAN-HB WEST	\$ 1.89	9	\$ -	\$ -	\$ -	\$ -	\$ 0.39	\$ 1.19	\$ 0.30	\$ -	\$ -	\$ -	\$ -	\$ -		
N	2019	JACKCNTY_STG-LZ NORTH	\$ 1.40	10	\$ 0.19	\$ 0.13	\$ 0.08	\$ 0.01	\$ 0.17	\$ 0.35	\$ 0.48	\$ -	\$ -	\$ -	\$ -	\$ -		
Y	2019	HB WEST-LZ WEST	\$ 3.71	1	\$ 0.27	\$ 0.13	\$ 0.38	\$ 0.30	\$ 0.50	\$ 1.31	\$ 0.82	\$ -	\$ -	\$ -	\$ -	\$ -		
Y	2019	HB SOUTH-LZ SOUTH	\$ 3.50	2	\$ 0.32	\$ 0.41	\$ 0.30	\$ 0.31	\$ 0.46	\$ 1.08	\$ 0.60	\$ -	\$ -	\$ -	\$ -	\$ -		
Y	2019	RIGGIN_UNIT1-REROCK ALL	\$ 3.11	3	\$ 0.02	\$ 0.04	\$ 0.49	\$ 0.94	\$ 0.31	\$ 0.59	\$ 0.72	\$ -	\$ -	\$ -	\$ -	\$ -		
Y	2019	HB NORTH-LZ NORTH	\$ 3.07	4	\$ 0.46	\$ 0.22	\$ 0.37	\$ 0.46	\$ 0.51	\$ 0.63	\$ 0.43	\$ -	\$ -	\$ -	\$ -	\$ -		
Y	2019	REROCK_ALL-HOVEY GEN	\$ 1.57	5	\$ 0.07	\$ 0.17	\$ 0.19	\$ 0.60	\$ 0.36	\$ 0.14	\$ 0.04	\$ -	\$ -	\$ -	\$ -	\$ -		
Y	2019	HB WEST-HOVEY GEN	\$ 1.47	6	\$ 0.18	\$ 0.03	\$ 0.06	\$ 0.05	\$ 0.05	\$ 0.70	\$ 0.40	\$ -	\$ -	\$ -	\$ -	\$ -		
Y	2019	AEEC-LZ WEST	\$ 1.42	7	\$ 0.04	\$ 0.00	\$ 0.14	\$ -	\$ 0.20	\$ -	\$ 1.03	\$ -	\$ -	\$ -	\$ -	\$ -		
Y	2019	WOO_WOODWRD1-RIGGIN_UNIT1	\$ 1.24	8	\$ 0.05	\$ 0.10	\$ 0.04	\$ 0.17	\$ 0.37	\$ 0.22	\$ 0.30	\$ -	\$ -	\$ -	\$ -	\$ -		
Y	2019	HB HOUSTON-LZ HOUSTON	\$ 0.84	9	\$ 0.06	\$ 0.09	\$ 0.07	\$ 0.13	\$ 0.20	\$ 0.18	\$ 0.12	\$ -	\$ -	\$ -	\$ -	\$ -		
Y	2019	OECCS_2-HB NORTH	\$ 0.82	10	\$ 0.05	\$ -	\$ -	\$ -	\$ -	\$ 0.43	\$ 0.34	\$ -	\$ -	\$ -	\$ -	\$ -		

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