

To the Public Utility Commission of Texas

# ERCOT Wholesale Electricity Market Monthly Report

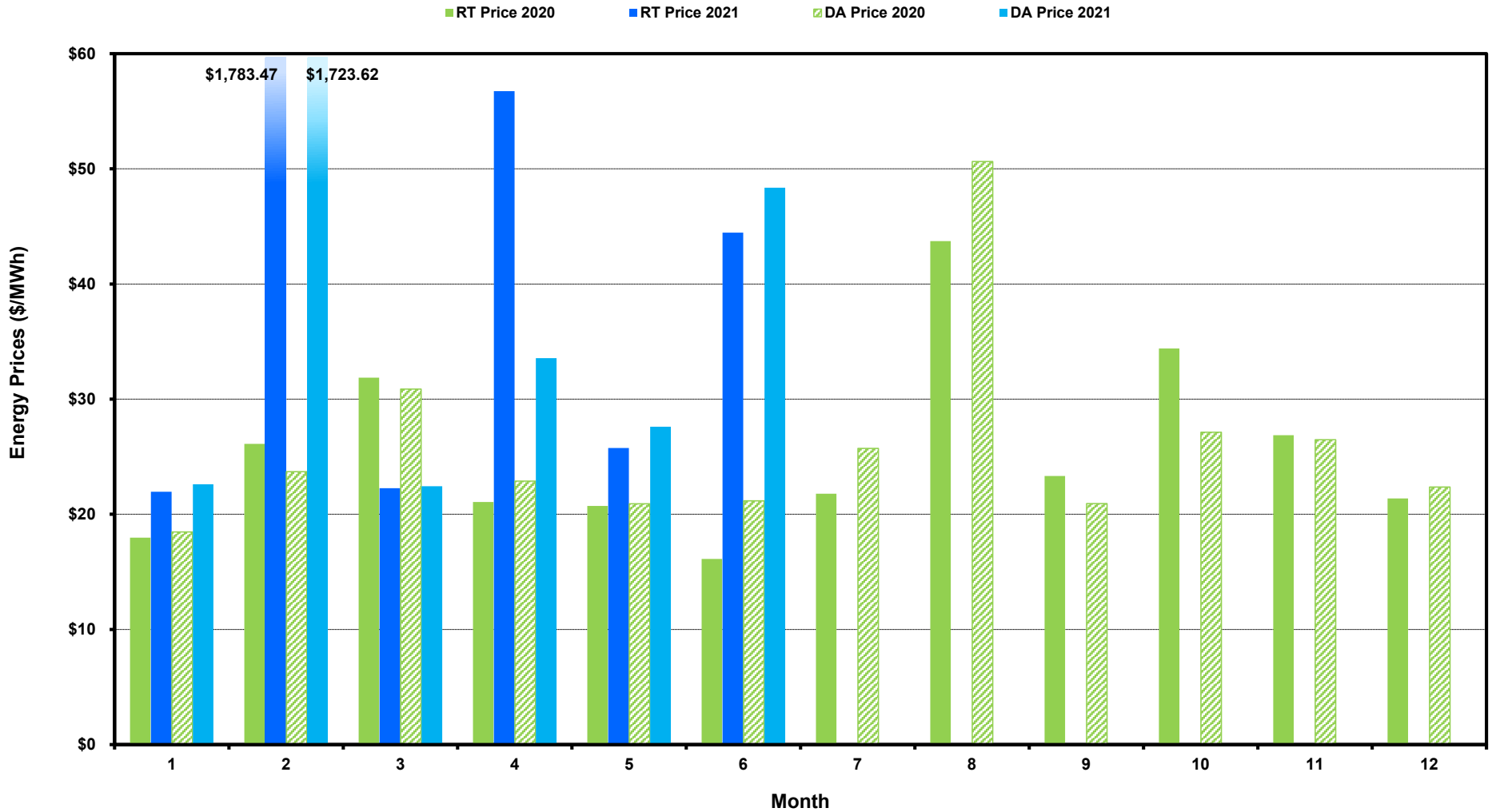
Monday, July 12, 2021

Potomac Economics, Ltd.  
Independent Market Monitor

|           |  |                       |                       |
|-----------|--|-----------------------|-----------------------|
| <b>1</b>  | <b>ERCOT-wide Average Energy Prices DA vs. RT</b>        | <a href="#">chart</a> | <a href="#">table</a> |
| <b>2</b>  | <b>Load Zone Load Statistics</b>                         | <a href="#">chart</a> | <a href="#">table</a> |
| <b>3</b>  | <b>Load Zone Monthly Average Energy Prices DA vs RT</b>  | <a href="#">chart</a> | <a href="#">table</a> |
| <b>4</b>  | <b>ERCOT-wide Monthly Implied Heat Rates DA vs RT</b>    | <a href="#">chart</a> | <a href="#">table</a> |
| <b>5</b>  | <b>Load Zone Monthly Implied Heat Rates DA vs RT</b>     | <a href="#">chart</a> | <a href="#">table</a> |
| <b>6</b>  | <b>Daily ORDC Reserve Adder Avg. Value and Duration</b>  | <a href="#">chart</a> | <a href="#">table</a> |
| <b>7</b>  | <b>Monthly Ancillary Services Required MW</b>            | <a href="#">chart</a> | <a href="#">table</a> |
| <b>8</b>  | <b>Hourly Average of Ancillary Services Required MW</b>  | <a href="#">chart</a> | <a href="#">table</a> |
| <b>9</b>  | <b>Monthly Average Ancillary Services Price</b>          | <a href="#">chart</a> | <a href="#">table</a> |
| <b>10</b> | <b>Monthly Average A/S Cost per MWh Load</b>             | <a href="#">chart</a> | <a href="#">table</a> |
| <b>11</b> | <b>Ercot-wide Cumulative Peaker Net Margin</b>           | <a href="#">chart</a> | <a href="#">table</a> |
| <b>12</b> | <b>DA vs. RT Load Forecast Error by Hour Ending</b>      | <a href="#">chart</a> | <a href="#">table</a> |
| <b>13</b> | <b>Monthly Average of Wind Generation by Hour Ending</b> | <a href="#">chart</a> | <a href="#">table</a> |
| <b>14</b> | <b>RT Constraint Rankings</b>                            |                       | <a href="#">table</a> |
|           | - Top 10 Constraints by Total Congestion Value           | <a href="#">chart</a> |                       |
|           | - Top 10 Constraints by Binding Frequency                | <a href="#">chart</a> |                       |
| <b>15</b> | <b>DA Constraint Rankings</b>                            |                       | <a href="#">table</a> |
|           | - Top 10 Constraints by Total Congestion Value           | <a href="#">chart</a> |                       |
|           | - Top 10 Constraints by Binding Frequency                | <a href="#">chart</a> |                       |
| <b>16</b> | <b>CRR Pairs by Monthly Auction Value Rankings</b>       |                       | <a href="#">table</a> |
|           | - Top 10 PTP Obligations by Total Transaction Value      | <a href="#">chart</a> |                       |
|           | - Top 10 PTP Options by Total Transaction Value          | <a href="#">chart</a> |                       |

# ERCOT-wide Average Energy Prices DA vs RT

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



[Home <<](#)

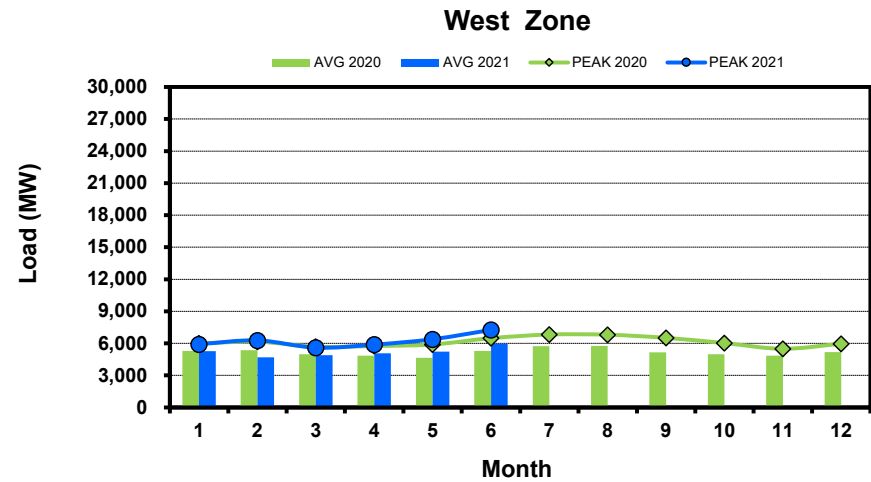
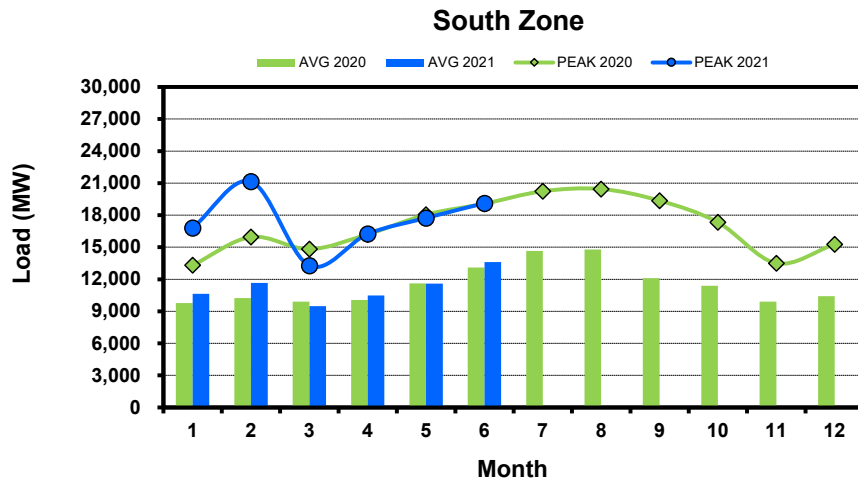
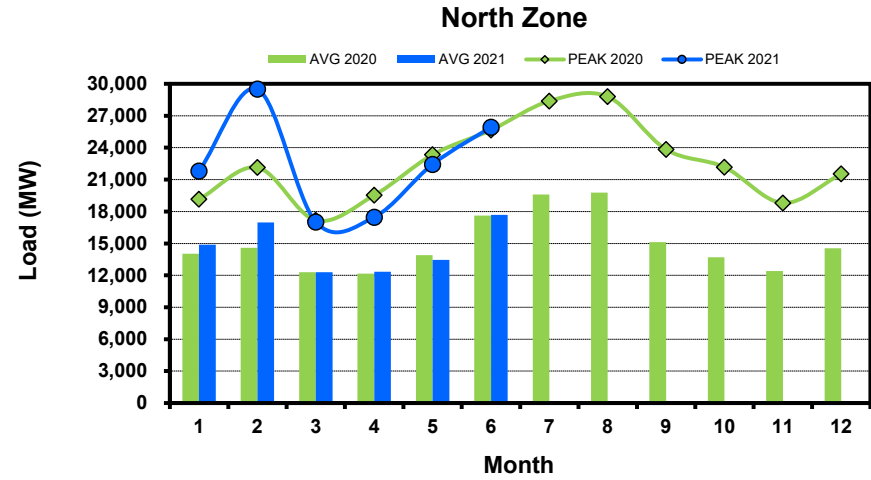
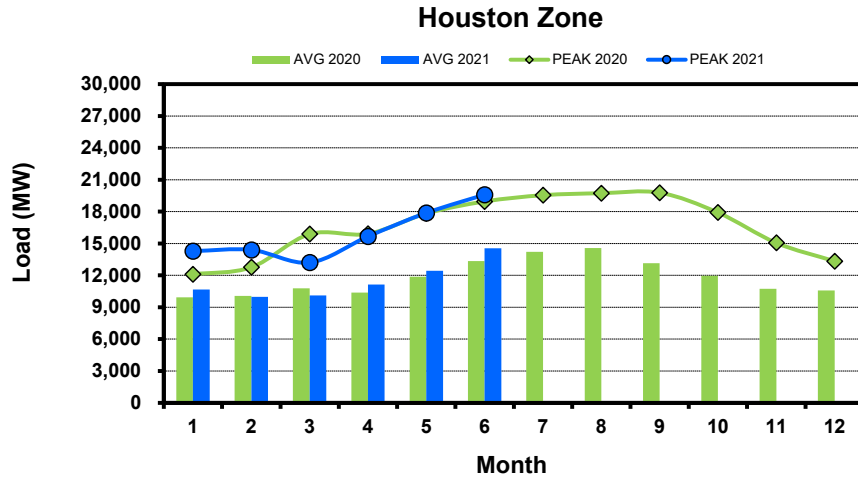
[previous <<](#)

[next >>](#)

[data](#)

# Load Zone Load Statistics

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



[Home <<](#)

[previous <<](#)

[next >>](#)

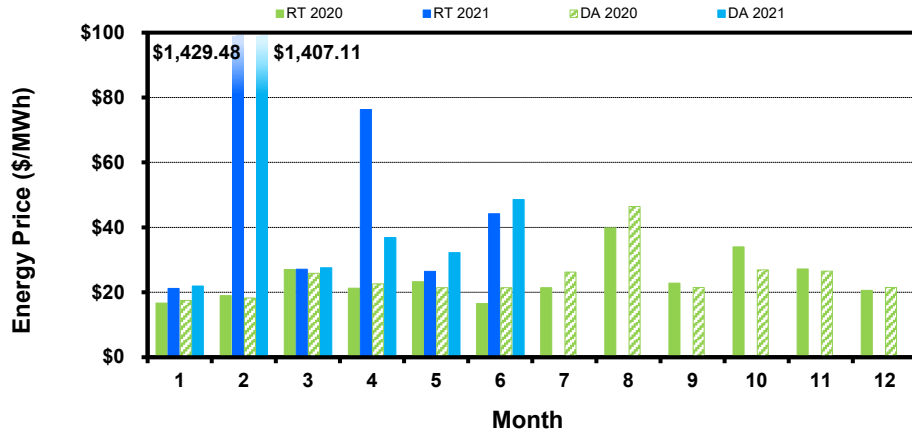
[data](#)

**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)

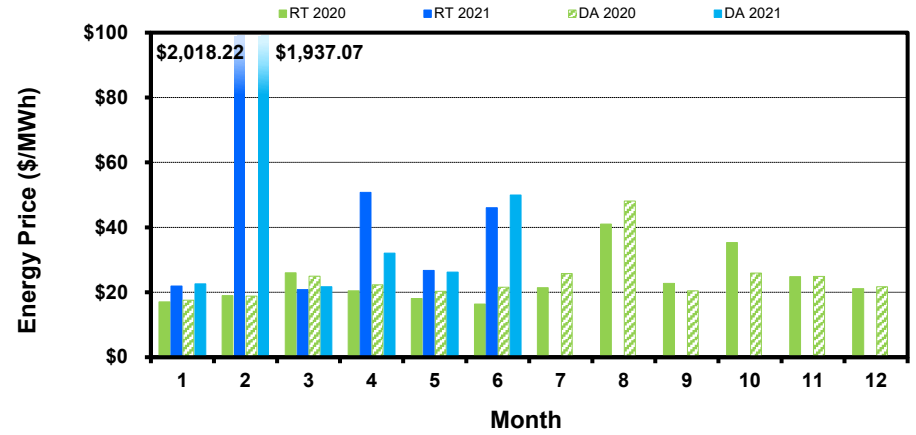
# Load Zone Monthly Average Energy Price DA vs RT

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

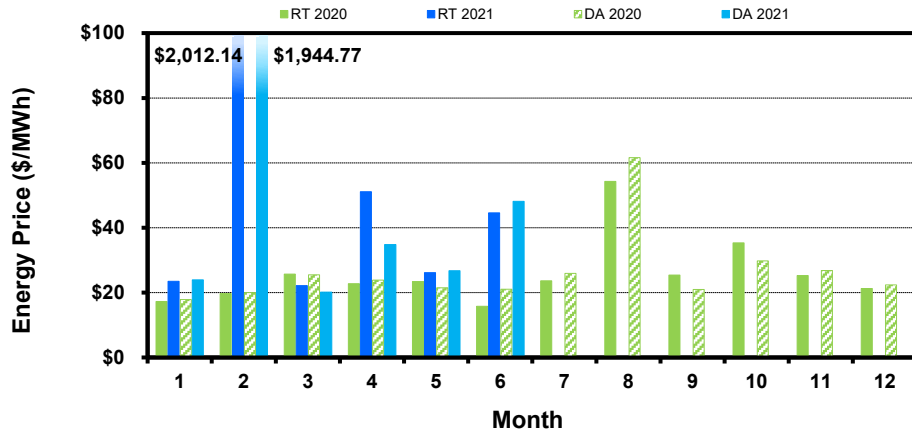
### Houston Zone



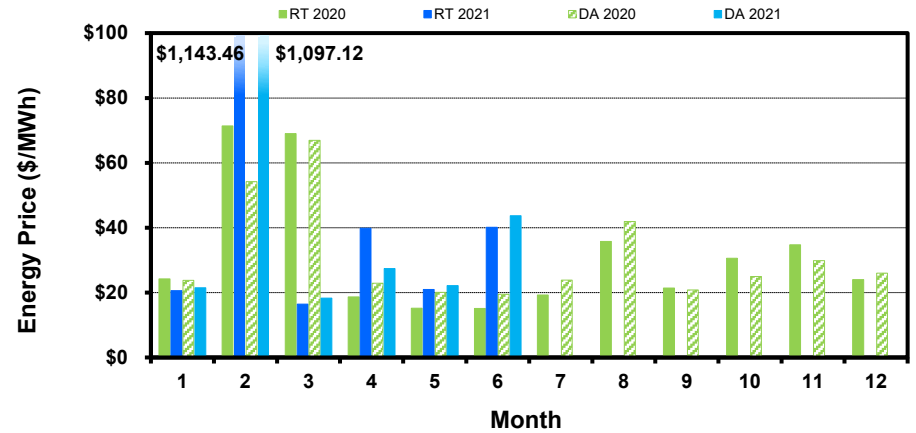
### North Zone



### South Zone



### West Zone



[Home <<](#)

[previous <<](#)

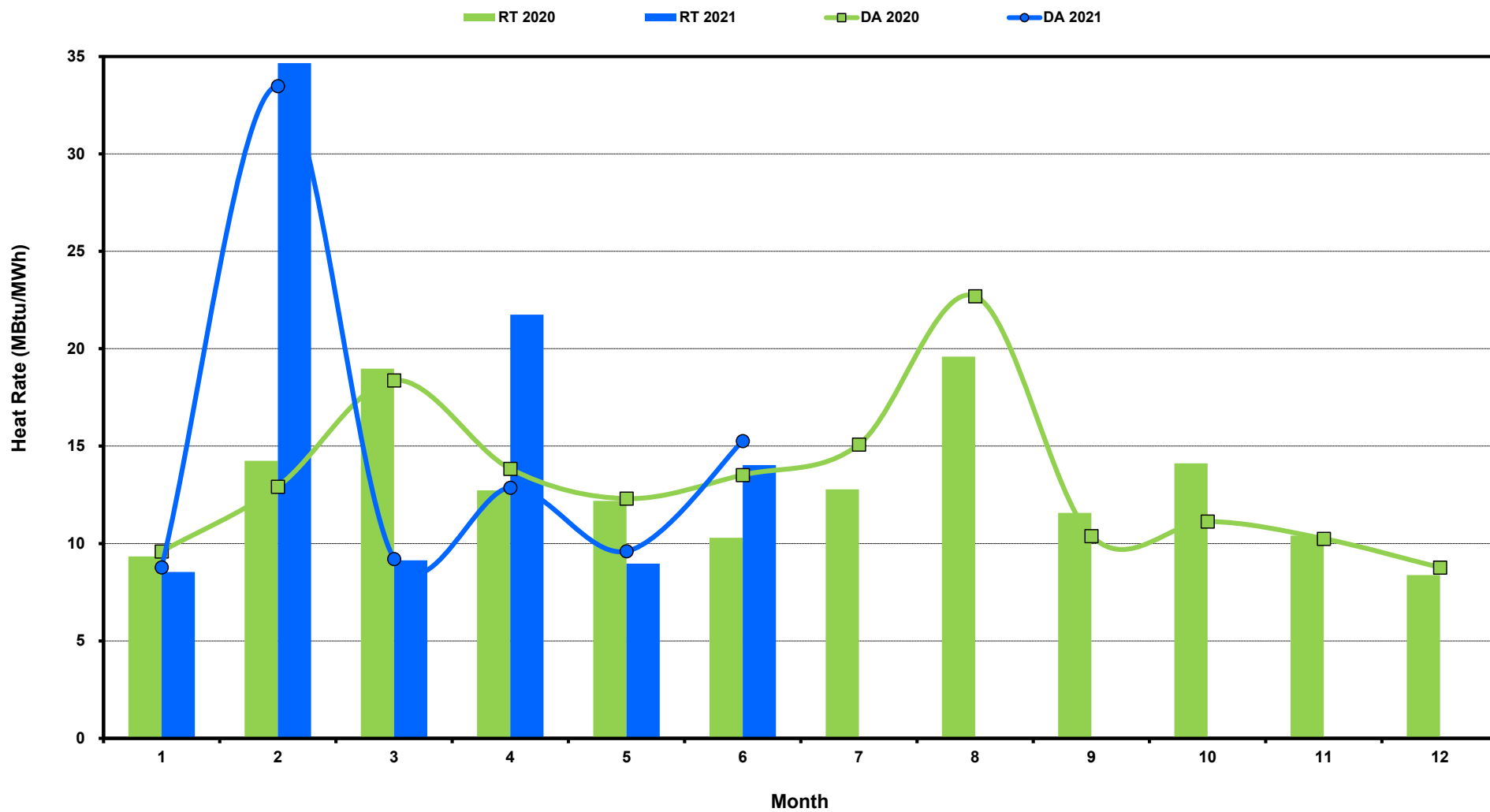
[next >>](#)

[data](#)

**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)



[Home <<](#)

[previous <<](#)

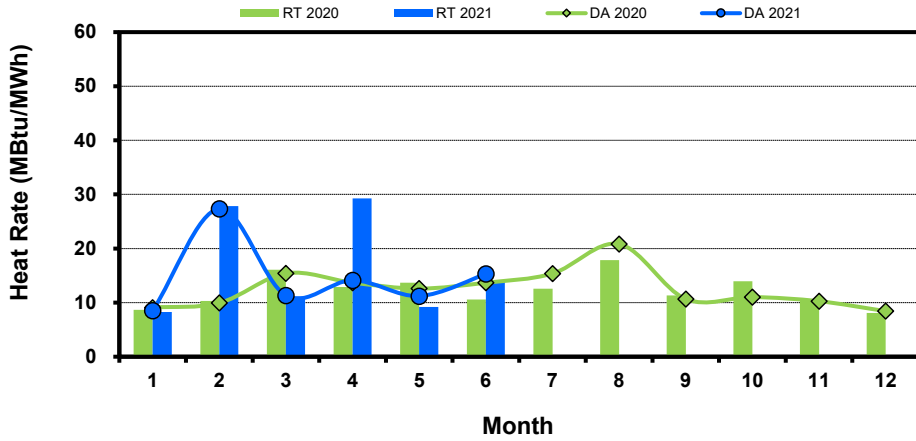
[next >>](#)

[data](#)

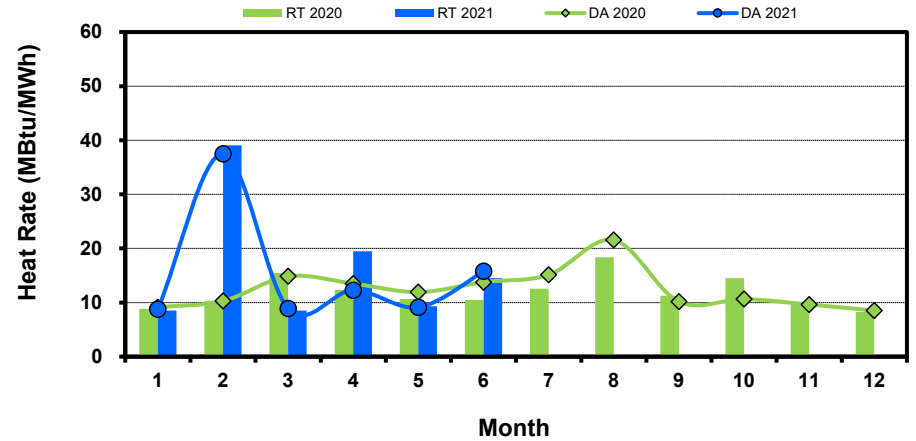
# Load Zone Monthly Implied Heat Rate DA vs RT

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

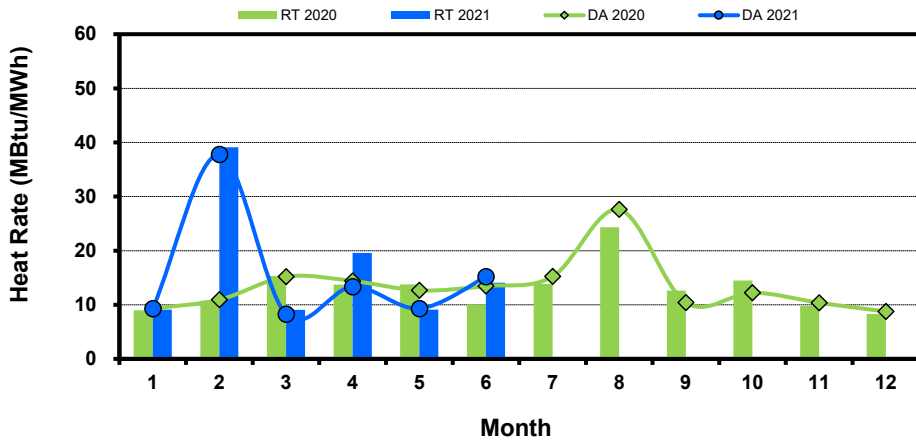
### Houston Zone



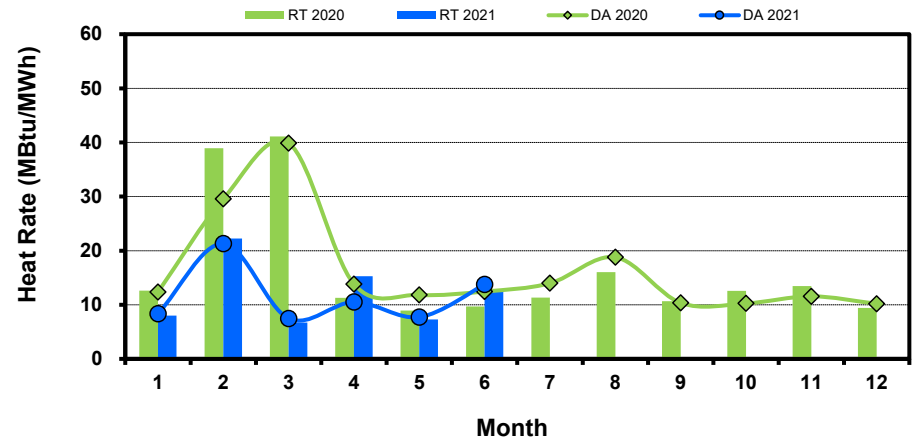
### North Zone



### South Zone



### West Zone



[Home <<](#)

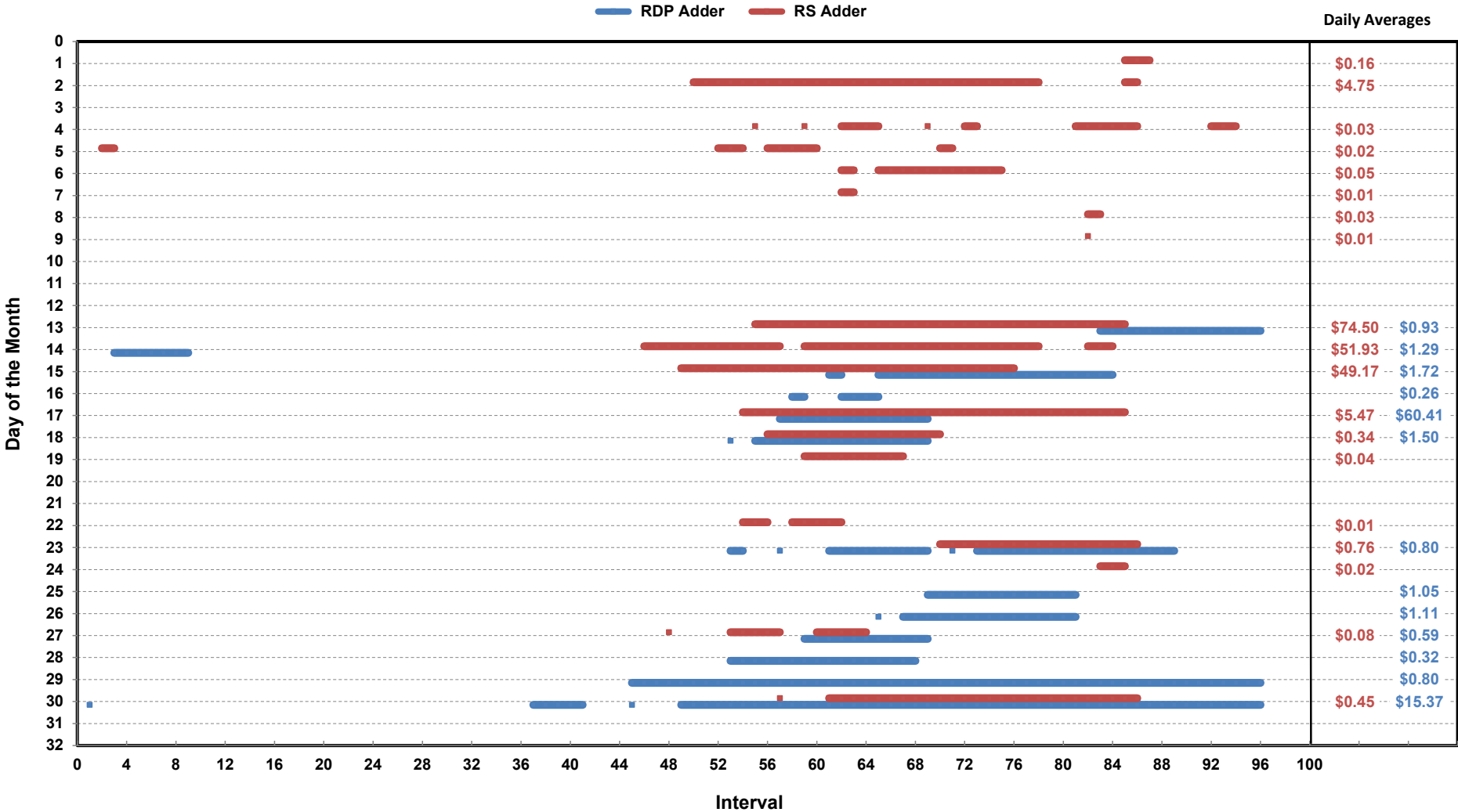
[previous <<](#)

[next >>](#)

[data](#)

**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-2021



[Home <<](#)

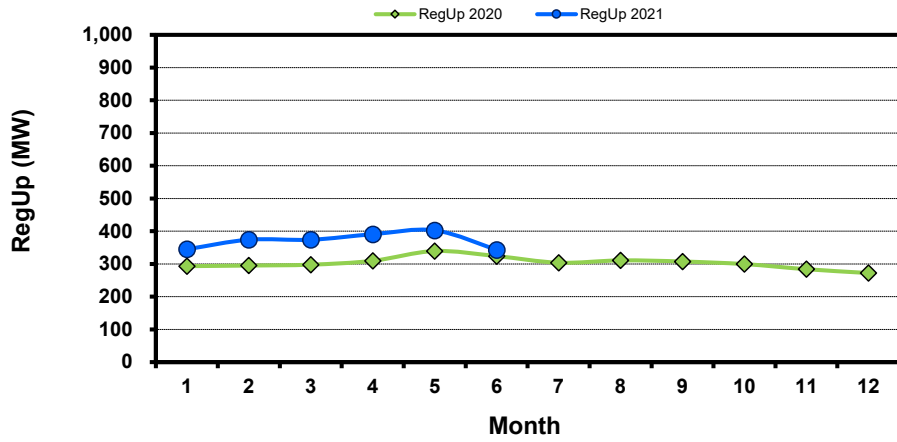
[previous <<](#)

[next >>](#)

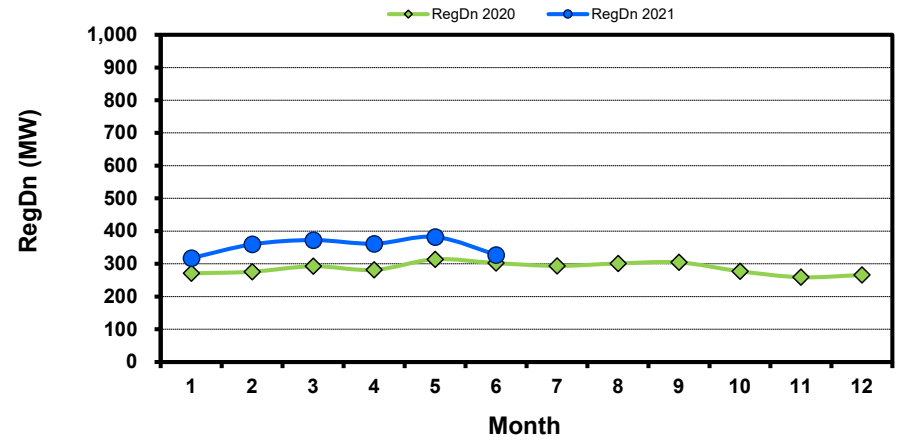
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# Monthly Average of Ancillary Services Required MW

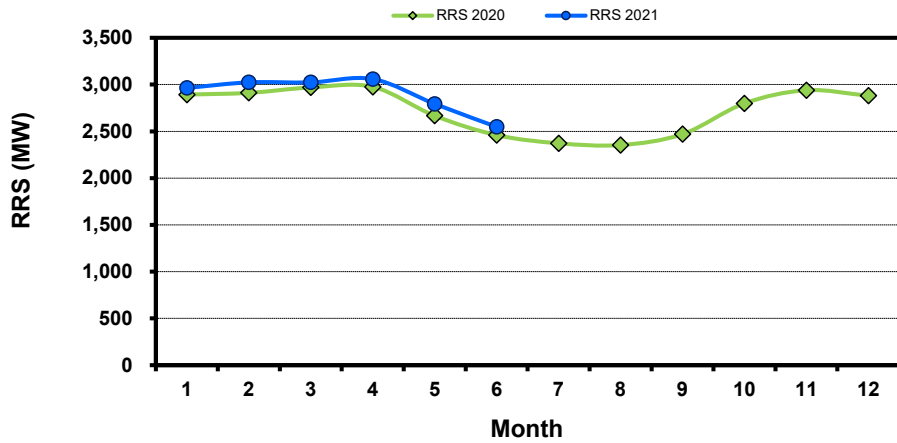
## Regulation Up



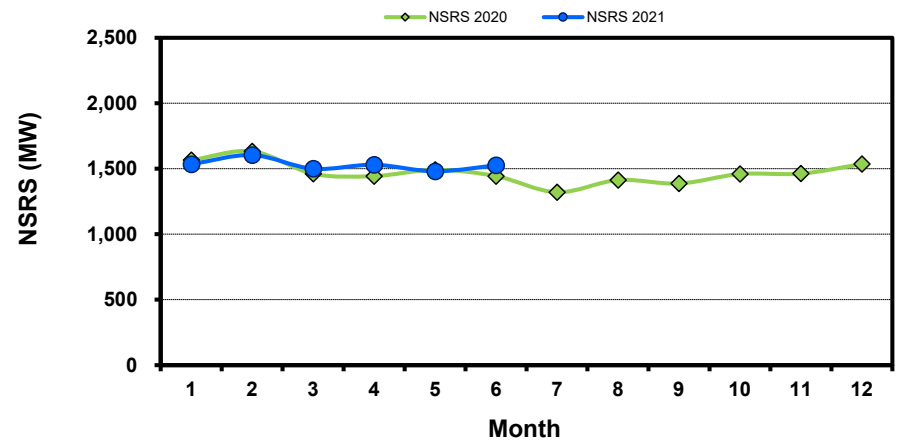
## Regulation Down



## Responsive Reserve



## Non-Spin Reserve



[Home <<](#)

[previous <<](#)

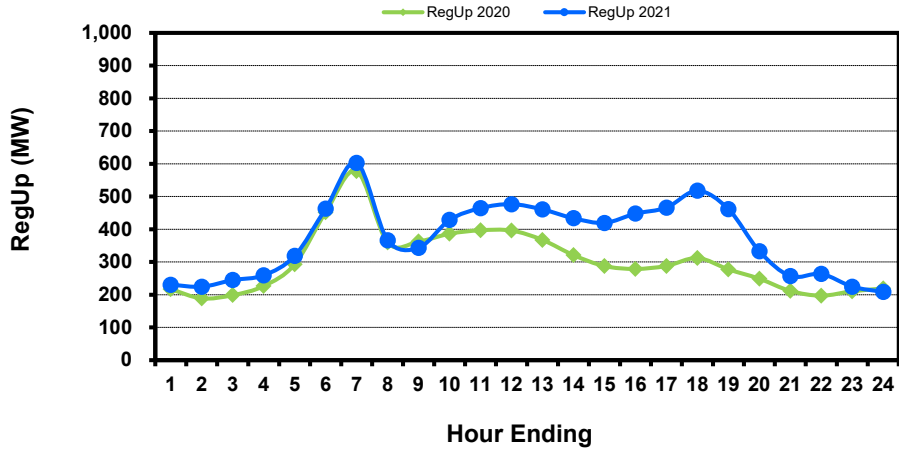
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[data](#)

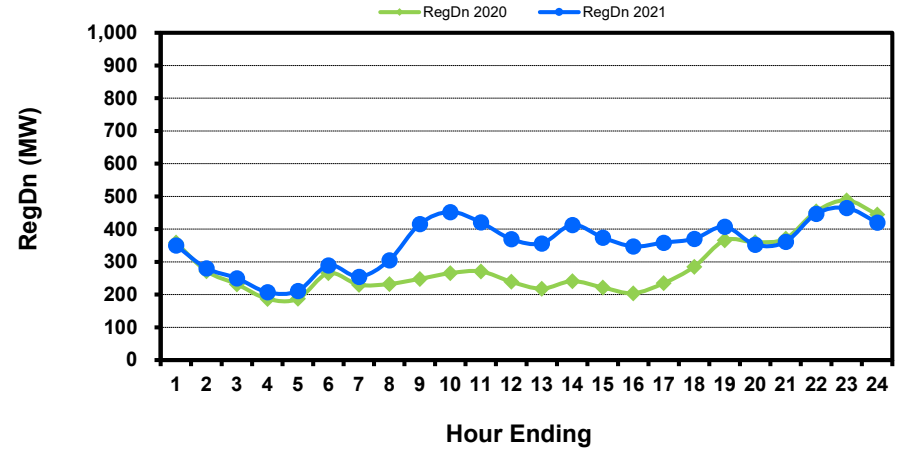


# Hourly Average of Ancillary Services Required MW

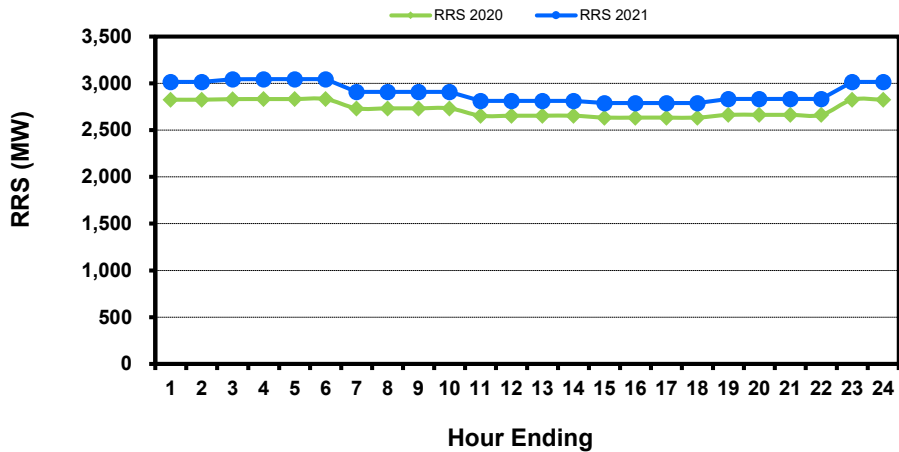
## Regulation Up



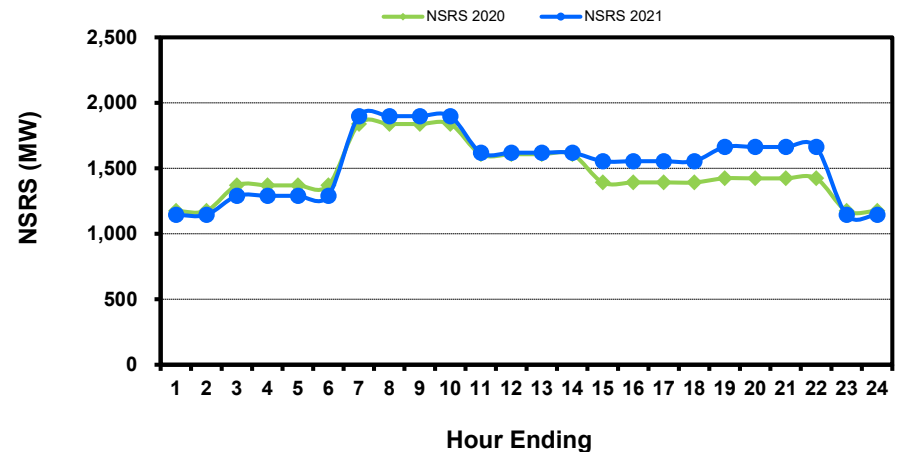
## Regulation Down



## Responsive Reserve



## Non-Spin Reserve



[Home <<](#)

[previous <<](#)

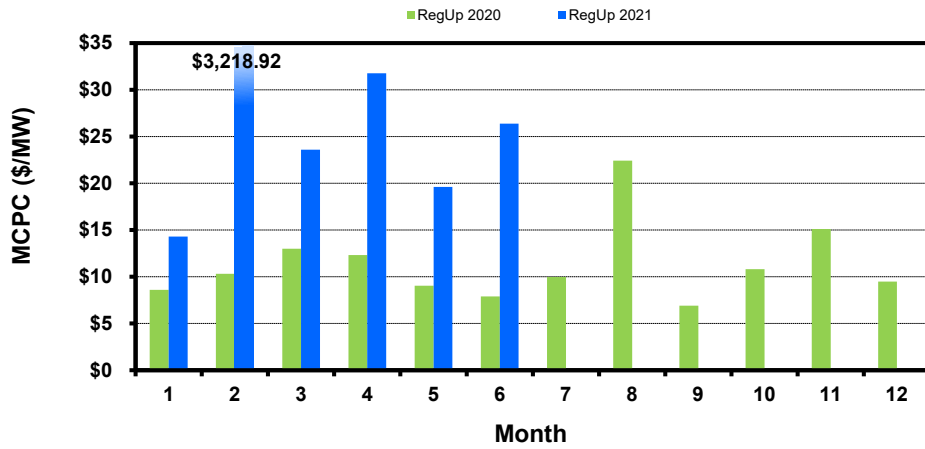
[next >>](#)

[data](#)

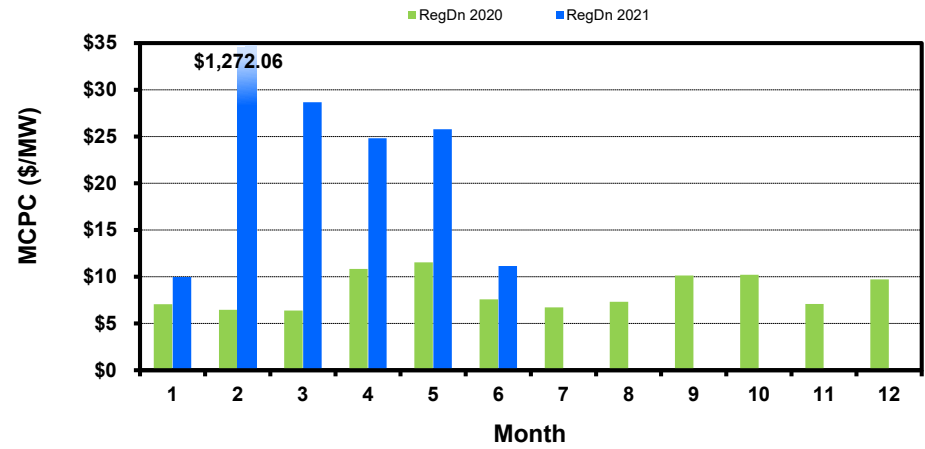
# Monthly Average Ancillary Services Price

(weighted by A/S Quantities Required)

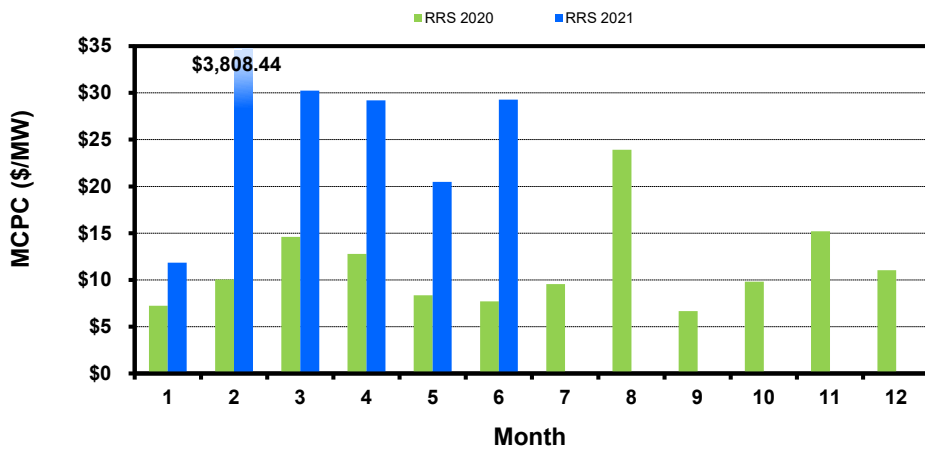
### Regulation Up



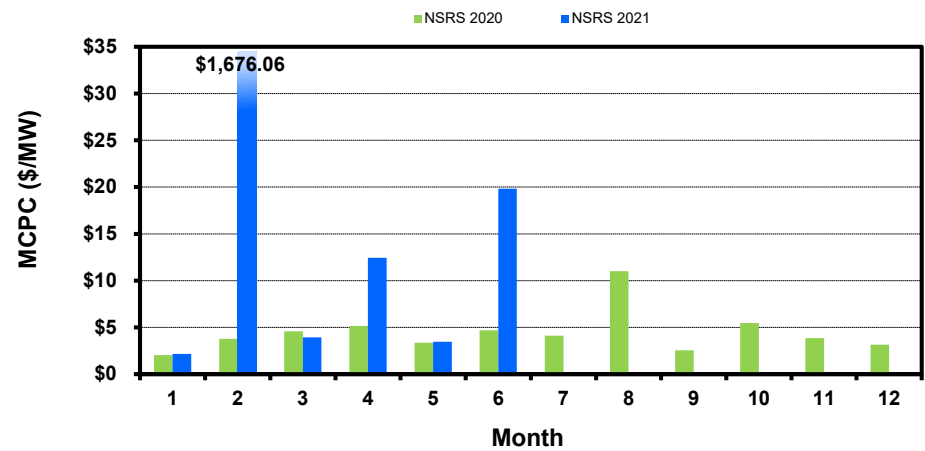
### Regulation Down



### Responsive Reserve



### Non-Spin Reserve



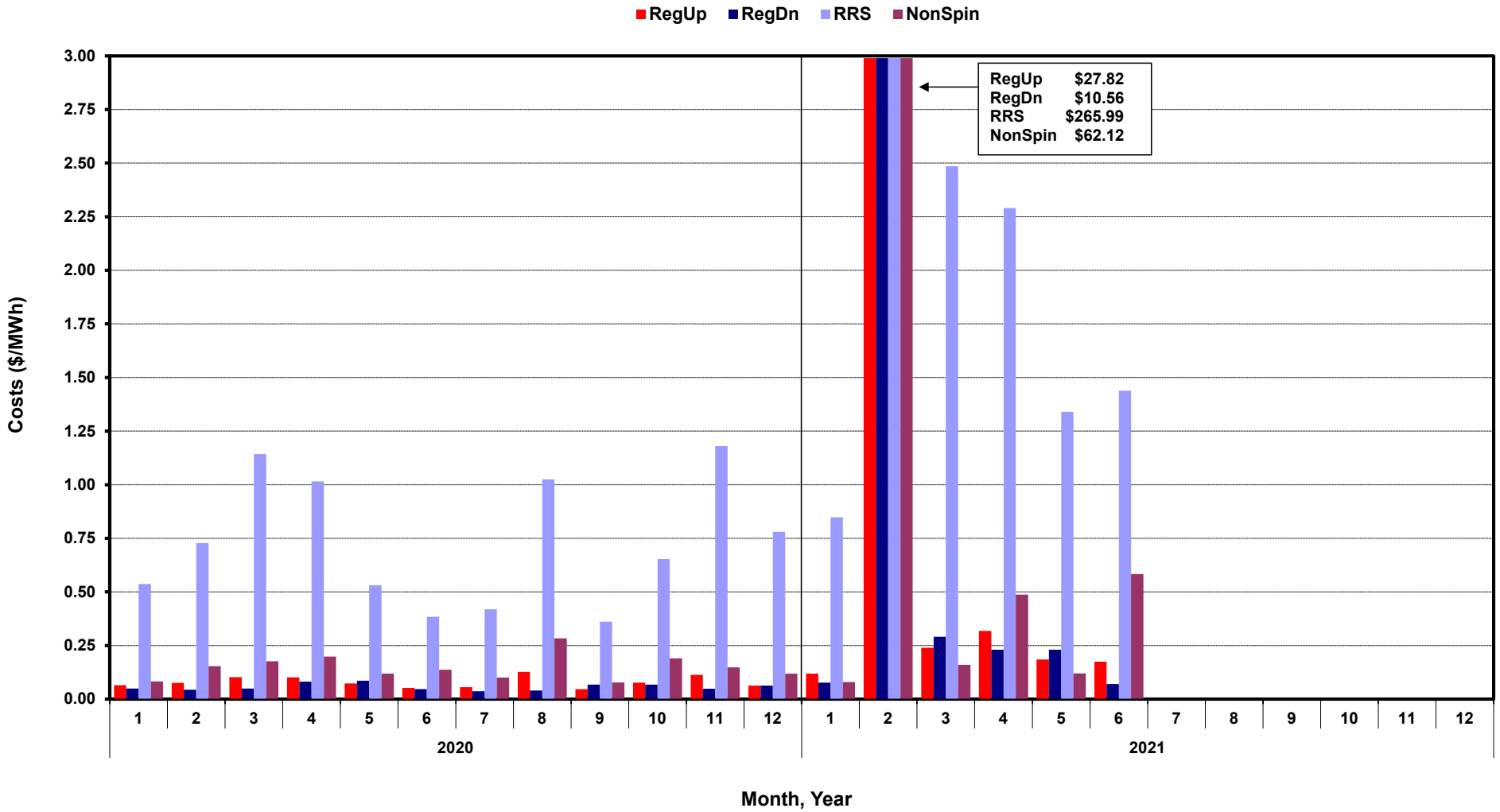
[Home <<](#)

[previous <<](#)

[next >>](#)

[data](#)

# Monthly Average A/S Cost per MWh Load



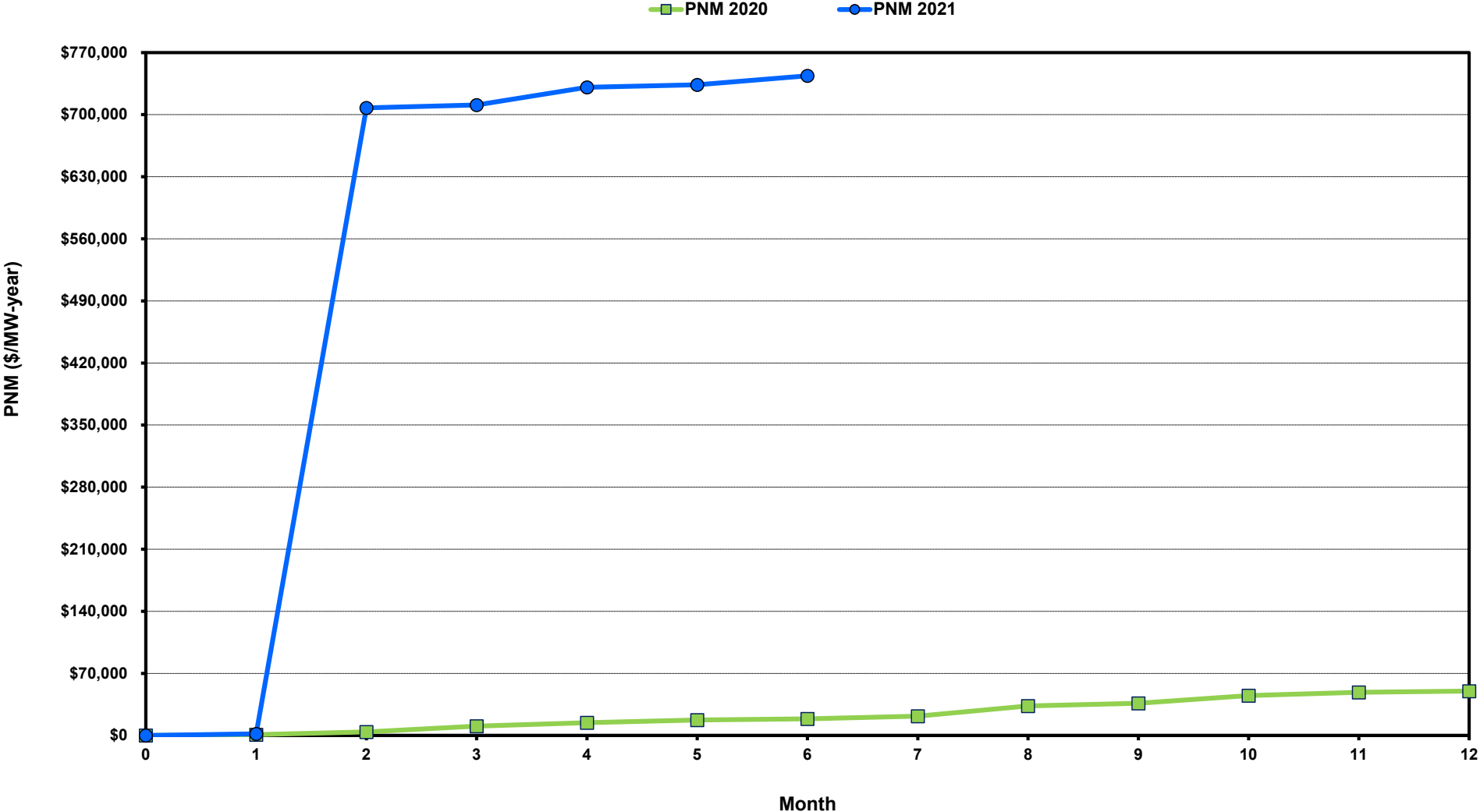
[Home <<](#)

[previous <<](#)

[next >>](#)

[data](#)

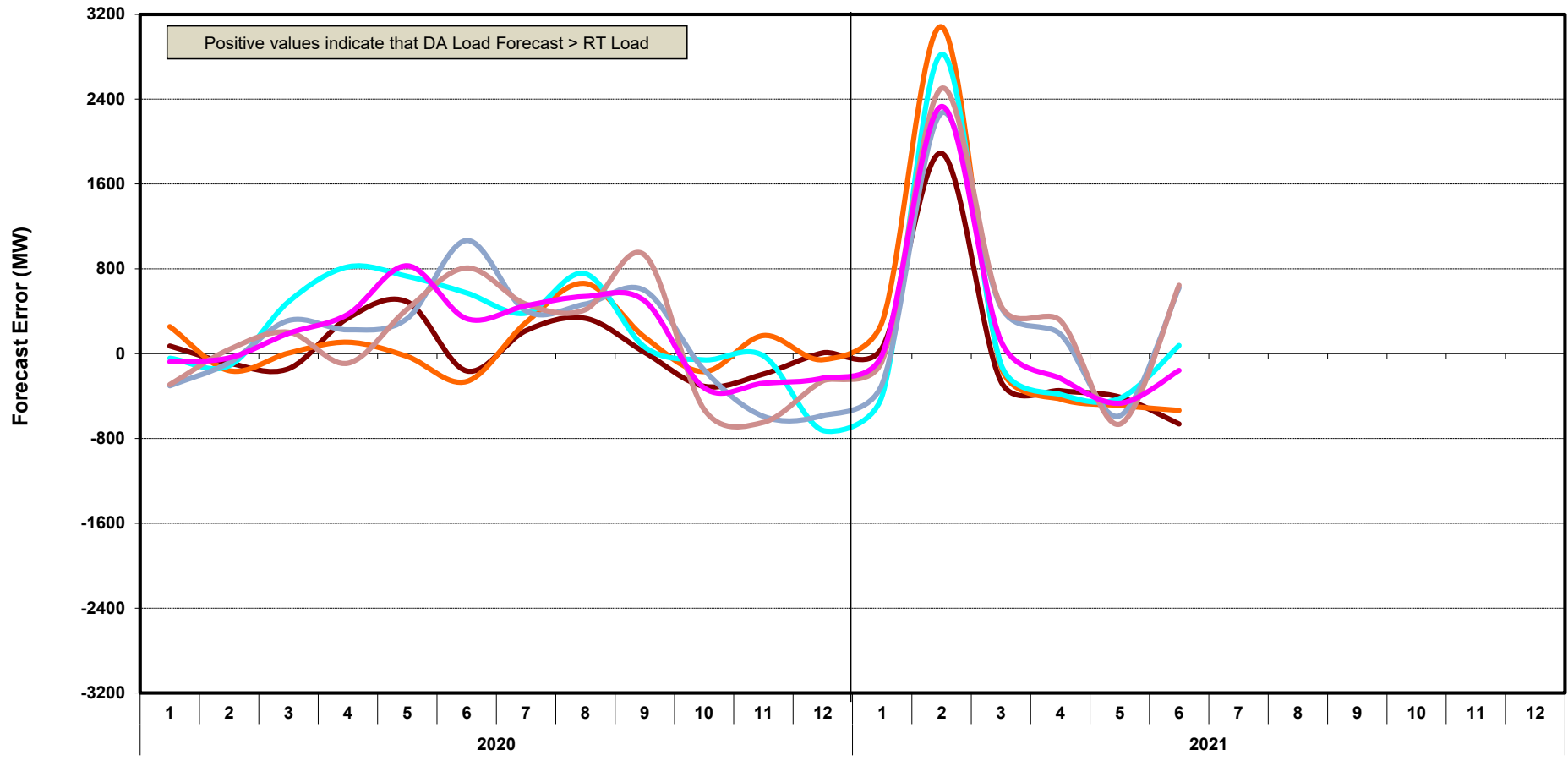
# ERCOT-wide Cumulative Peaker Net Margin



[Home <<](#)   [previous <<](#)   [next >>](#)  
[data](#)

# 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



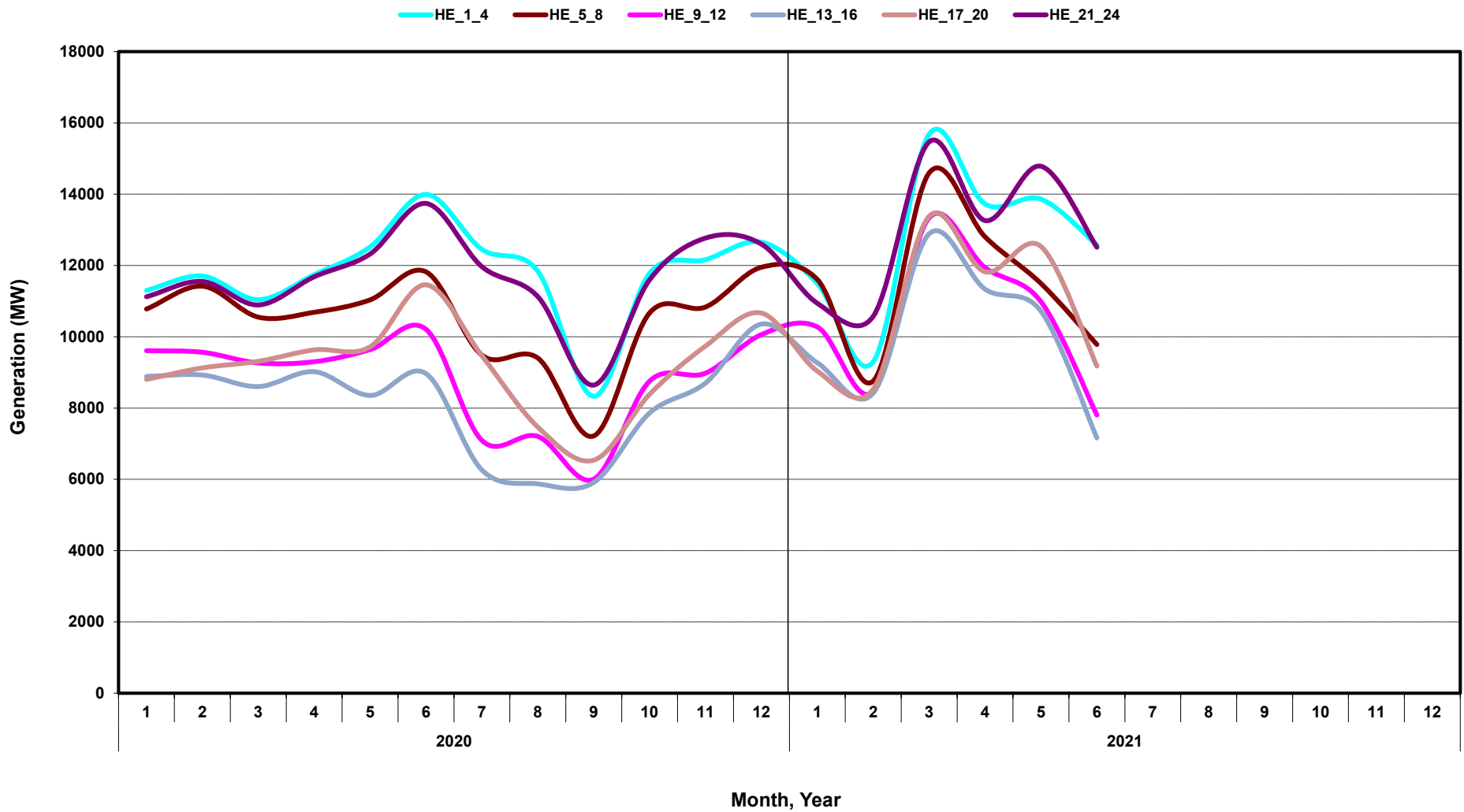
[Home <<](#)

[previous <<](#)

[next >>](#)

[data](#)

# Monthly Average of Wind Generation by Hour Ending



[Home <<](#)

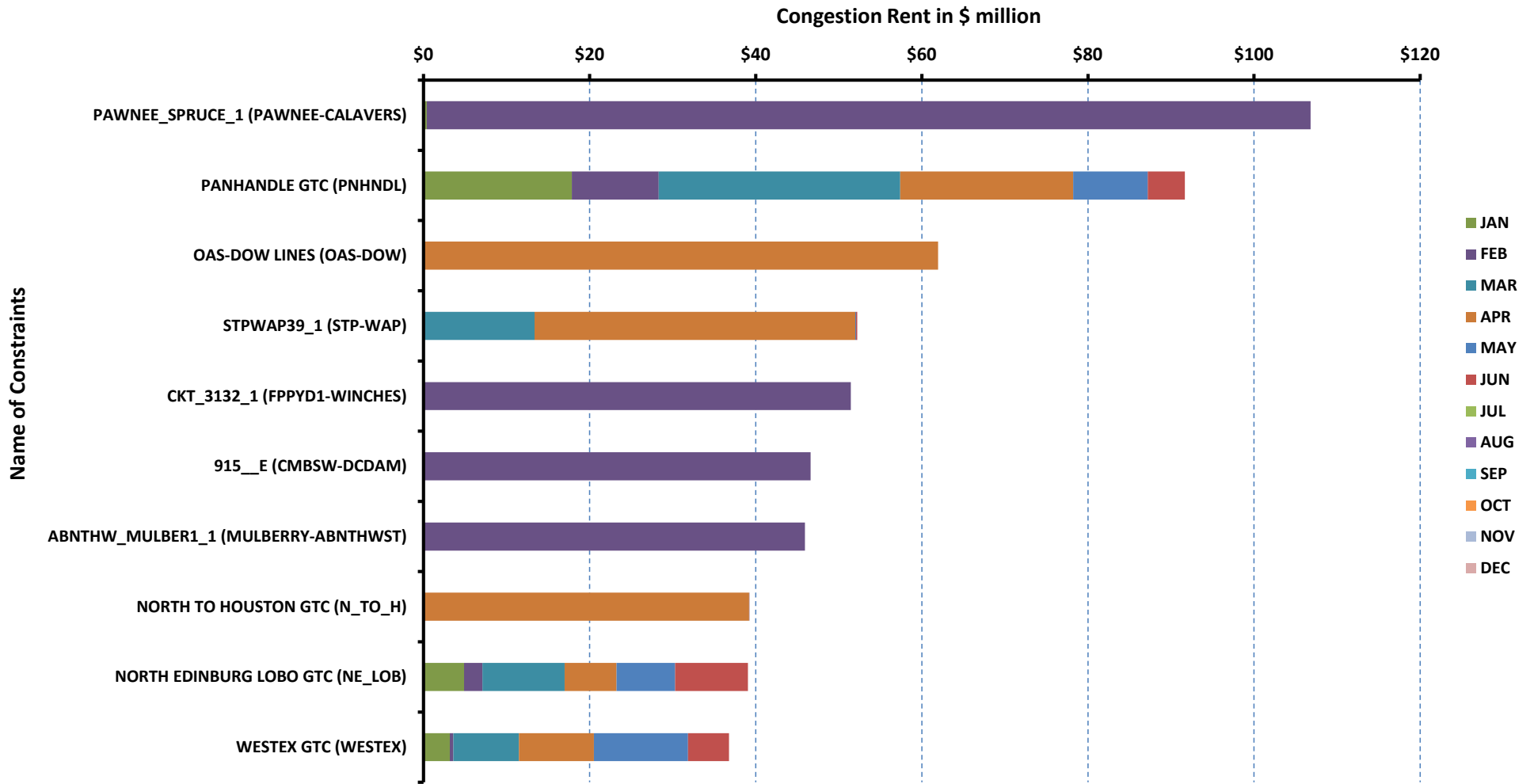
[previous <<](#)

[next >>](#)

[data](#)

# RT Congestion Constraint Rankings - 1

## Top 10 Constraints by Total Congestion Value - 2021



[Home <<](#)

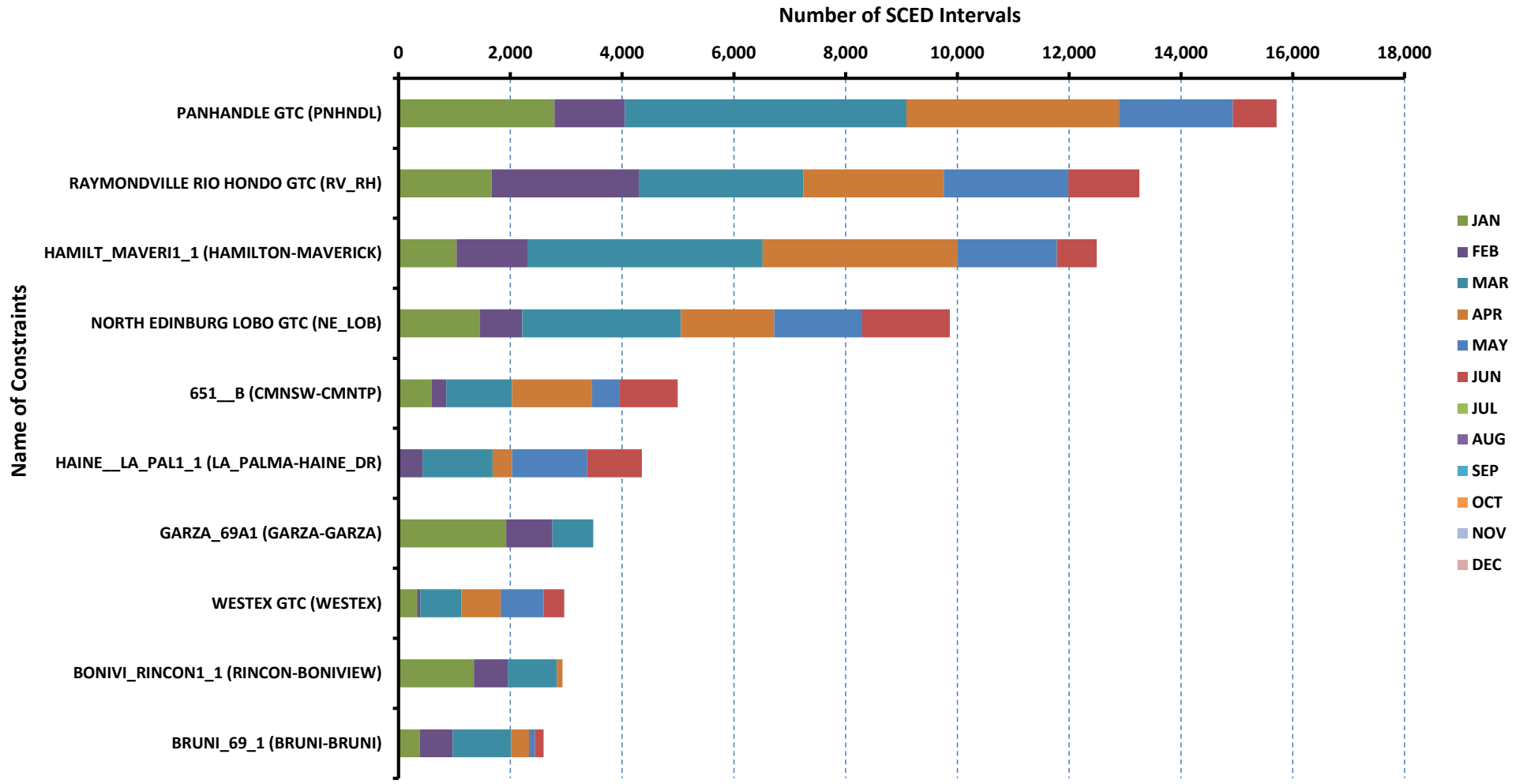
[previous <<](#)

[next >>](#)

[data](#)

# RT Congestion Constraint Rankings - 2

## Top 10 Constraints by Binding Frequency - 2021



[Home <<](#)

[previous <<](#)

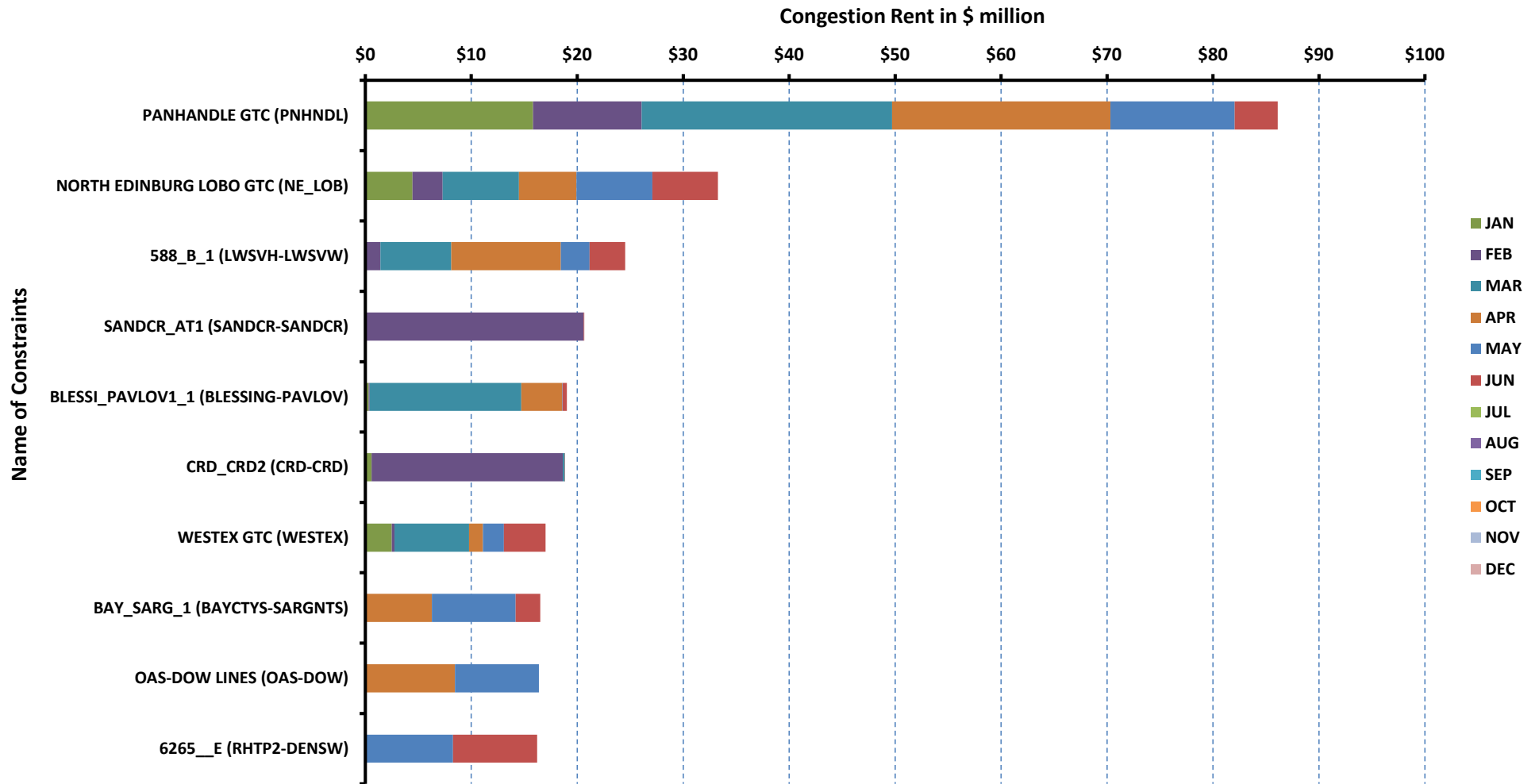
[next >>](#)

[data](#)



# DA Congestion Constraint Rankings - 1

## Top 10 Constraints by Total Congestion Value - 2021



[Home <<](#)

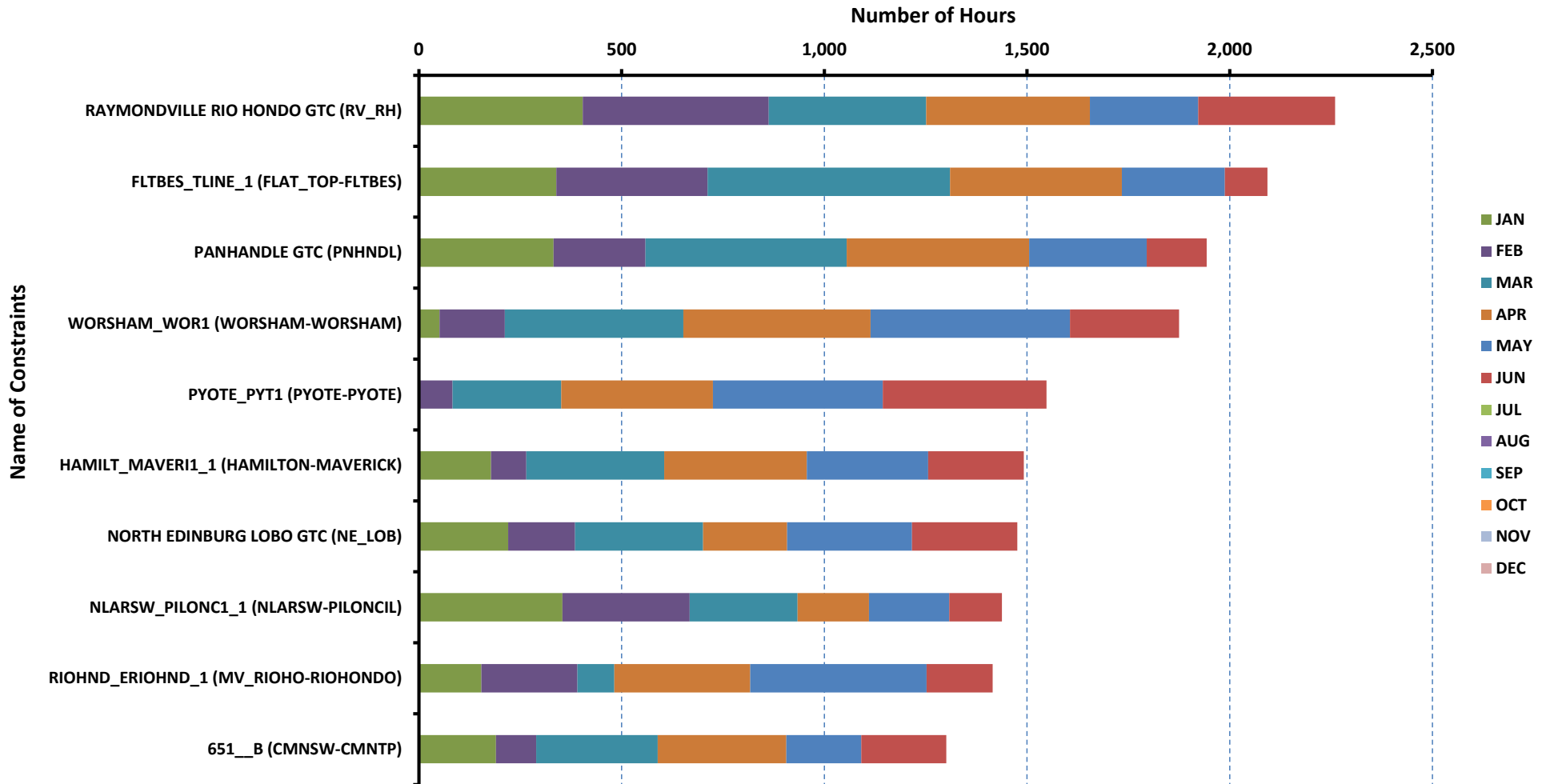
[previous <<](#)

[next >>](#)

[data](#)

# DA Congestion Constraint Rankings - 2

## Top 10 Constraints by Binding Frequency - 2021



[Home <<](#)

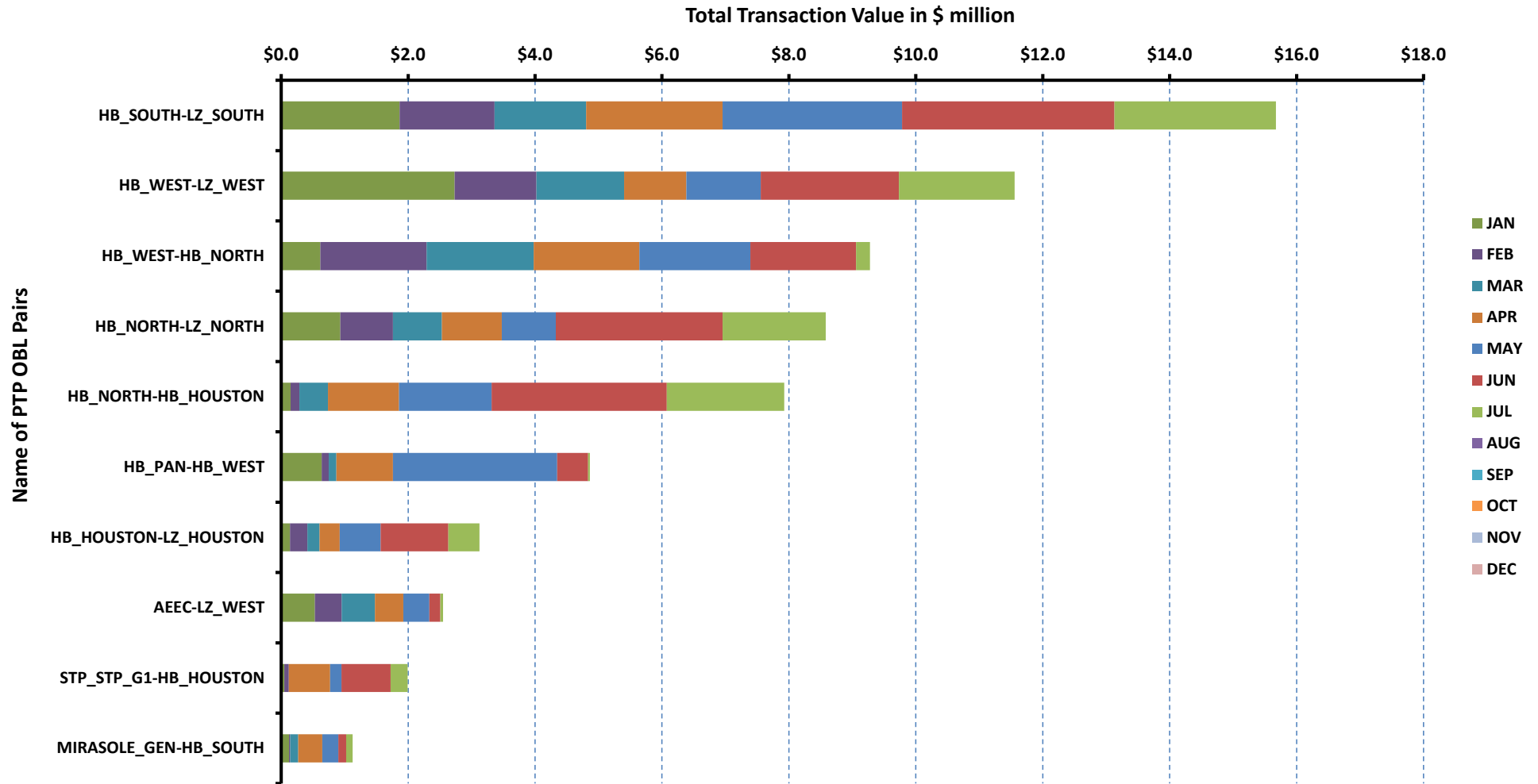
[previous <<](#)

[next >>](#)

[data](#)

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

## Top 10 PTP Obligations by Total Transaction Value - 2021



[Home <<](#)

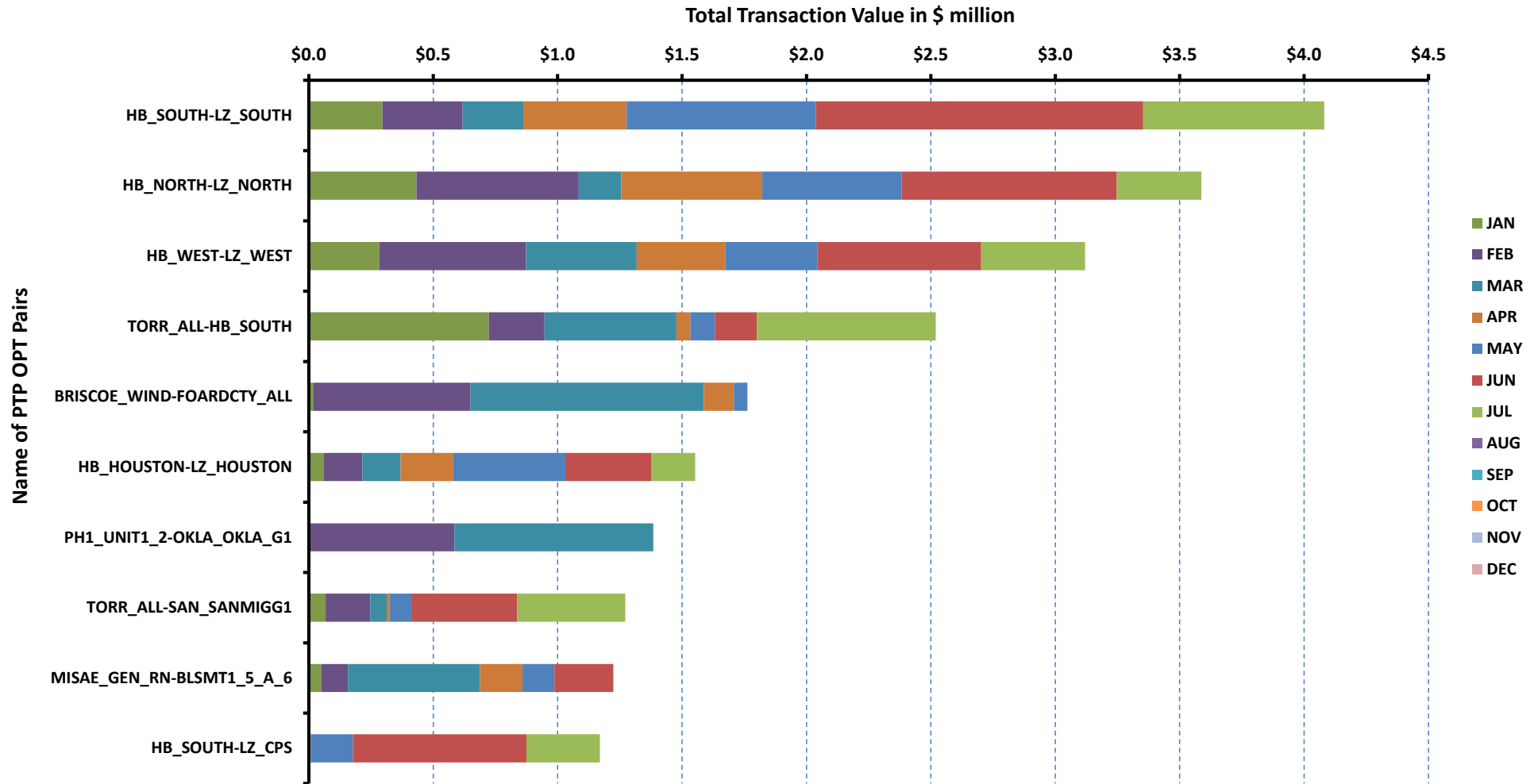
[previous <<](#)

[next >>](#)

[data](#)

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

## Top 10 PTP Options by Total Transaction Value - 2021



[Home <<](#)

[previous <<](#)

[next >>](#)

[data](#)

| ERCOT-wide Avg. Energy Price - DA vs. RT |       |             |             |
|--|-------|-------------|-------------|
| year                                     | month | dam_spp     | rtm_spp     |
| 2020                                     | 1     | \$ 18.46    | \$ 17.97    |
|  | 2     | \$ 23.69    | \$ 26.12    |
|  | 3     | \$ 30.87    | \$ 31.87    |
|  | 4     | \$ 22.89    | \$ 21.06    |
|  | 5     | \$ 20.92    | \$ 20.72    |
|  | 6     | \$ 21.18    | \$ 16.13    |
|  | 7     | \$ 25.72    | \$ 21.79    |
|  | 8     | \$ 50.64    | \$ 43.72    |
|  | 9     | \$ 20.93    | \$ 23.32    |
|  | 10    | \$ 27.12    | \$ 34.39    |
|  | 11    | \$ 26.47    | \$ 26.86    |
|  | 12    | \$ 22.37    | \$ 21.38    |
| 2021                                     | 1     | \$ 22.60    | \$ 21.96    |
|  | 2     | \$ 1,723.84 | \$ 1,784.28 |
|  | 3     | \$ 22.50    | \$ 22.34    |
|  | 4     | \$ 33.56    | \$ 56.74    |
|  | 5     | \$ 27.60    | \$ 25.76    |
|  | 6     | \$ 48.36    | \$ 44.46    |
|  | 7     | \$ -        | \$ -        |
|  | 8     | \$ -        | \$ -        |
|  | 9     | \$ -        | \$ -        |
|  | 10    | \$ -        | \$ -        |
|  | 11    | \$ -        | \$ -        |
|  | 12    | \$ -        | \$ -        |

[Home <<](#)

[previous <<](#)

[next >>](#)

[chart](#)

| Load Zone Load Statistics |       |                  |                |                |               |                 |               |               |              |   |  |
|---------------------------|-------|------------------|----------------|----------------|---------------|-----------------|---------------|---------------|--------------|---|--|
| year                      | month | loadPEAK_Houston | loadPEAK_North | loadPEAK_South | loadPEAK_West | loadAVG_Houston | loadAVG_North | loadAVG_South | loadAVG_West |   |  |
| 2020                      | 1     | 12,102           | 19,145         | 13,311         | 5,996         | 9,945           | 14,023        | 9,781         | 5,288        |   |  |
|                           | 2     | 12,763           | 22,127         | 15,953         | 6,150         | 10,077          | 14,586        | 10,236        | 5,351        |   |  |
|                           | 3     | 15,886           | 17,173         | 14,820         | 5,684         | 10,786          | 12,298        | 9,908         | 4,982        |   |  |
|                           | 4     | 15,909           | 19,521         | 16,210         | 5,750         | 10,385          | 12,167        | 10,063        | 4,840        |   |  |
|                           | 5     | 17,827           | 23,337         | 18,047         | 5,895         | 11,875          | 13,891        | 11,624        | 4,655        |   |  |
|                           | 6     | 18,953           | 25,649         | 19,077         | 6,485         | 13,351          | 17,610        | 13,092        | 5,293        |   |  |
|                           | 7     | 19,545           | 28,378         | 20,240         | 6,826         | 14,207          | 19,609        | 14,644        | 5,736        |   |  |
|                           | 8     | 19,732           | 28,793         | 20,448         | 6,809         | 14,569          | 19,780        | 14,786        | 5,765        |   |  |
|                           | 9     | 19,778           | 23,832         | 19,355         | 6,516         | 13,144          | 15,129        | 12,102        | 5,164        |   |  |
|                           | 10    | 17,911           | 22,168         | 17,330         | 6,027         | 11,965          | 13,695        | 11,390        | 4,976        |   |  |
|                           | 11    | 15,058           | 18,800         | 13,503         | 5,495         | 10,743          | 12,411        | 9,901         | 4,860        |   |  |
|                           | 12    | 13,333           | 21,525         | 15,283         | 5,961         | 10,584          | 14,545        | 10,421        | 5,191        |   |  |
| 2021                      | 1     | 14,285           | 21,804         | 16,813         | 5,924         | 10,659          | 14,878        | 10,631        | 5,262        |   |  |
|                           | 2     | 14,403           | 29,499         | 21,146         | 6,279         | 9,970           | 16,979        | 11,656        | 4,692        |   |  |
|                           | 3     | 13,207           | 17,017         | 13,283         | 5,598         | 10,111          | 12,292        | 9,481         | 4,892        |   |  |
|                           | 4     | 15,664           | 17,469         | 16,245         | 5,881         | 11,128          | 12,330        | 10,487        | 5,067        |   |  |
|                           | 5     | 17,877           | 22,435         | 17,737         | 6,387         | 12,439          | 13,462        | 11,589        | 5,229        |   |  |
|                           | 6     | 19,592           | 25,912         | 19,121         | 7,259         | 14,559          | 17,691        | 13,612        | 5,989        |   |  |
|                           | 7     | -                | -              | -              | -             | -               | -             | -             | -            | - |  |
|                           | 8     | -                | -              | -              | -             | -               | -             | -             | -            | - |  |
|                           | 9     | -                | -              | -              | -             | -               | -             | -             | -            | - |  |
|                           | 10    | -                | -              | -              | -             | -               | -             | -             | -            | - |  |
|                           | 11    | -                | -              | -              | -             | -               | -             | -             | -            | - |  |
|                           | 12    | -                | -              | -              | -             | -               | -             | -             | -            | - |  |

[Home <<](#)

[previous <<](#)

[next >>](#)

[chart](#)

| 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 |
| 2020   | 1     | \$ 16.65        | \$ 17.03      | \$ 17.27      | \$ 24.25     | \$ 17.48        | \$ 17.57      | \$ 17.87      | \$ 23.75     |
|  | 2     | \$ 18.94        | \$ 18.97      | \$ 19.71      | \$ 71.42     | \$ 18.21        | \$ 18.85      | \$ 20.04      | \$ 54.21     |
|  | 3     | \$ 27.03        | \$ 26.02      | \$ 25.72      | \$ 69.03     | \$ 25.88        | \$ 24.94      | \$ 25.51      | \$ 66.94     |
|  | 4     | \$ 21.29        | \$ 20.43      | \$ 22.73      | \$ 18.66     | \$ 22.63        | \$ 22.34      | \$ 23.83      | \$ 22.87     |
|  | 5     | \$ 23.27        | \$ 18.12      | \$ 23.42      | \$ 15.20     | \$ 21.41        | \$ 20.28      | \$ 21.50      | \$ 20.11     |
|  | 6     | \$ 16.54        | \$ 16.38      | \$ 15.76      | \$ 15.14     | \$ 21.42        | \$ 21.57      | \$ 21.07      | \$ 19.50     |
|  | 7     | \$ 21.44        | \$ 21.40      | \$ 23.62      | \$ 19.29     | \$ 26.21        | \$ 25.76      | \$ 25.93      | \$ 23.82     |
|  | 8     | \$ 39.86        | \$ 41.02      | \$ 54.24      | \$ 35.79     | \$ 46.46        | \$ 48.10      | \$ 61.57      | \$ 41.90     |
|  | 9     | \$ 22.80        | \$ 22.72      | \$ 25.43      | \$ 21.43     | \$ 21.48        | \$ 20.45      | \$ 20.95      | \$ 20.85     |
|  | 10    | \$ 34.02        | \$ 35.34      | \$ 35.30      | \$ 30.58     | \$ 26.86        | \$ 25.90      | \$ 29.79      | \$ 24.97     |
|  | 11    | \$ 27.19        | \$ 24.78      | \$ 25.28      | \$ 34.71     | \$ 26.49        | \$ 24.88      | \$ 26.78      | \$ 29.86     |
|  | 12    | \$ 20.61        | \$ 21.08      | \$ 21.24      | \$ 24.02     | \$ 21.50        | \$ 21.74      | \$ 22.33      | \$ 25.99     |
| 2021   | 1     | \$ 21.23        | \$ 21.92      | \$ 23.45      | \$ 20.58     | \$ 21.92        | \$ 22.57      | \$ 23.90      | \$ 21.47     |
|  | 2     | \$ 1,433.48     | \$ 2,010.57   | \$ 2,012.30   | \$ 1,144.30  | \$ 1,408.66     | \$ 1,930.75   | \$ 1,944.51   | \$ 1,096.49  |
|  | 3     | \$ 27.22        | \$ 20.85      | \$ 22.10      | \$ 16.43     | \$ 27.64        | \$ 21.77      | \$ 20.15      | \$ 18.25     |
|  | 4     | \$ 76.31        | \$ 50.80      | \$ 51.12      | \$ 39.86     | \$ 36.87        | \$ 32.06      | \$ 34.79      | \$ 27.42     |
|  | 5     | \$ 26.41        | \$ 26.72      | \$ 26.13      | \$ 20.93     | \$ 32.21        | \$ 26.20      | \$ 26.73      | \$ 22.18     |
|  | 6     | \$ 44.23        | \$ 46.02      | \$ 44.57      | \$ 40.14     | \$ 48.56        | \$ 50.00      | \$ 48.10      | \$ 43.66     |
|  | 7     | \$ -            | \$ -          | \$ -          | \$ -         | \$ -            | \$ -          | \$ -          | \$ -         |
|  | 8     | \$ -            | \$ -          | \$ -          | \$ -         | \$ -            | \$ -          | \$ -          | \$ -         |
|  | 9     | \$ -            | \$ -          | \$ -          | \$ -         | \$ -            | \$ -          | \$ -          | \$ -         |
|  | 10    | \$ -            | \$ -          | \$ -          | \$ -         | \$ -            | \$ -          | \$ -          | \$ -         |
|  | 11    | \$ -            | \$ -          | \$ -          | \$ -         | \$ -            | \$ -          | \$ -          | \$ -         |
|  | 12    | \$ -            | \$ -          | \$ -          | \$ -         | \$ -            | \$ -          | \$ -          | \$ -         |

[Home <<](#)

[previous <<](#)

[next >>](#)

[chart](#)

| ERCOT-wide Monthly Implied Heat Rate - DA vs. RT |       |          |             |        |             |        |
|--|-------|----------|-------------|--------|-------------|--------|
| year   | month | gasprice | rtm_spp     | HR_rtm | dam_spp     | HR_dam |
| 2020   | 1     | \$ 1.92  | \$ 17.97    | 9.34   | \$ 18.46    | 9.59   |
|  | 2     | \$ 1.83  | \$ 26.12    | 14.25  | \$ 23.69    | 12.92  |
|  | 3     | \$ 1.68  | \$ 31.87    | 18.98  | \$ 30.87    | 18.38  |
|  | 4     | \$ 1.65  | \$ 21.06    | 12.73  | \$ 22.89    | 13.84  |
|  | 5     | \$ 1.70  | \$ 20.72    | 12.19  | \$ 20.92    | 12.31  |
|  | 6     | \$ 1.57  | \$ 16.13    | 10.30  | \$ 21.18    | 13.52  |
|  | 7     | \$ 1.70  | \$ 21.79    | 12.78  | \$ 25.72    | 15.09  |
|  | 8     | \$ 2.23  | \$ 43.72    | 19.60  | \$ 50.64    | 22.70  |
|  | 9     | \$ 2.01  | \$ 23.32    | 11.58  | \$ 20.93    | 10.39  |
|  | 10    | \$ 2.44  | \$ 34.39    | 14.12  | \$ 27.12    | 11.13  |
|  | 11    | \$ 2.58  | \$ 26.86    | 10.40  | \$ 26.47    | 10.25  |
|  | 12    | \$ 2.55  | \$ 21.38    | 8.38   | \$ 22.37    | 8.77   |
| 2021   | 1     | \$ 2.57  | \$ 21.96    | 8.53   | \$ 22.60    | 8.78   |
|  | 2     | \$ 51.48 | \$ 1,784.28 | 34.66  | \$ 1,723.84 | 33.49  |
|  | 3     | \$ 2.44  | \$ 22.34    | 9.14   | \$ 22.50    | 9.21   |
|  | 4     | \$ 2.61  | \$ 56.74    | 21.75  | \$ 33.56    | 12.87  |
|  | 5     | \$ 2.87  | \$ 25.76    | 8.96   | \$ 27.60    | 9.61   |
|  | 6     | \$ 3.17  | \$ 44.46    | 14.03  | \$ 48.36    | 15.26  |
|  | 7     | \$ -     | \$ -        | -      | \$ -        | -      |
|  | 8     | \$ -     | \$ -        | -      | \$ -        | -      |
|  | 9     | \$ -     | \$ -        | -      | \$ -        | -      |
|  | 10    | \$ -     | \$ -        | -      | \$ -        | -      |
|  | 11    | \$ -     | \$ -        | -      | \$ -        | -      |
|  | 12    | \$ -     | \$ -        | -      | \$ -        | -      |

[Home <<](#)

[previous <<](#)

[next >>](#)

[chart](#)



| 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 |
| 2020  | 1     | 9.08          | 9.29        | 9.13        | 12.34      | 8.65          | 8.98        | 8.85        | 12.60      |
|   | 2     | 9.93          | 10.93       | 10.28       | 29.56      | 10.33         | 10.75       | 10.35       | 38.95      |
|   | 3     | 15.41         | 15.19       | 14.85       | 39.87      | 16.10         | 15.32       | 15.49       | 41.11      |
|   | 4     | 13.68         | 14.40       | 13.50       | 13.83      | 12.87         | 13.74       | 12.35       | 11.28      |
|   | 5     | 12.59         | 12.65       | 11.93       | 11.83      | 13.69         | 13.78       | 10.66       | 8.94       |
|   | 6     | 13.68         | 13.45       | 13.78       | 12.45      | 10.56         | 10.06       | 10.46       | 9.67       |
|   | 7     | 15.38         | 15.21       | 15.11       | 13.98      | 12.58         | 13.86       | 12.56       | 11.32      |
|   | 8     | 20.82         | 27.60       | 21.56       | 18.78      | 17.86         | 24.31       | 18.39       | 16.04      |
|   | 9     | 10.66         | 10.40       | 10.16       | 10.35      | 11.32         | 12.62       | 11.28       | 10.64      |
|   | 10    | 11.03         | 12.23       | 10.63       | 10.25      | 13.97         | 14.49       | 14.51       | 12.55      |
|   | 11    | 10.26         | 10.37       | 9.63        | 11.56      | 10.53         | 9.79        | 9.59        | 13.44      |
|   | 12    | 8.43          | 8.75        | 8.52        | 10.19      | 8.08          | 8.32        | 8.26        | 9.42       |
| 2021  | 1     | 8.52          | 9.29        | 8.77        | 8.34       | 8.25          | 9.11        | 8.52        | 8.00       |
|   | 2     | 27.36         | 37.77       | 37.51       | 21.30      | 27.85         | 39.09       | 39.06       | 22.23      |
|   | 3     | 11.31         | 8.25        | 8.91        | 7.47       | 11.14         | 9.05        | 8.53        | 6.73       |
|   | 4     | 14.13         | 13.33       | 12.29       | 10.51      | 29.25         | 19.60       | 19.47       | 15.28      |
|   | 5     | 11.21         | 9.30        | 9.12        | 7.72       | 9.19          | 9.09        | 9.30        | 7.28       |
|   | 6     | 15.32         | 15.18       | 15.78       | 13.78      | 13.96         | 14.06       | 14.52       | 12.67      |
|   | 7     | -             | -           | -           | -          | -             | -           | -           | -          |
|   | 8     | -             | -           | -           | -          | -             | -           | -           | -          |
|   | 9     | -             | -           | -           | -          | -             | -           | -           | -          |
|   | 10    | -             | -           | -           | -          | -             | -           | -           | -          |
|   | 11    | -             | -           | -           | -          | -             | -           | -           | -          |
|   | 12    | -             | -           | -           | -          | -             | -           | -           | -          |

[Home <<](#)

[previous <<](#)

[next >>](#)

[chart](#)

| Daily ORDC Adders Average Values and Interval Duration |       |     |          |           |        |         |        |         |
|--|-------|-----|----------|-----------|--------|---------|--------|---------|
| YEAR   | MONTH | DAY | PRICE_RS | PRICE_RDP | RS_CNT | RDP_CNT | RS_POS | RDP_POS |
| 2021   | 6     | 1   | \$ 0.16  | \$ -      | 3      | 0       | 80     | 90      |
| 2021   | 6     | 2   | \$ 4.75  | \$ -      | 31     | 0       | 80     | 90      |
| 2021   | 6     | 3   | \$ -     | \$ -      | 0      | 0       | 80     | 90      |
| 2021   | 6     | 4   | \$ 0.03  | \$ -      | 18     | 0       | 80     | 90      |
| 2021   | 6     | 5   | \$ 0.02  | \$ -      | 12     | 0       | 80     | 90      |
| 2021   | 6     | 6   | \$ 0.05  | \$ -      | 13     | 0       | 80     | 90      |
| 2021   | 6     | 7   | \$ 0.01  | \$ -      | 2      | 0       | 80     | 90      |
| 2021   | 6     | 8   | \$ 0.03  | \$ -      | 2      | 0       | 80     | 90      |
| 2021   | 6     | 9   | \$ 0.01  | \$ -      | 1      | 0       | 80     | 90      |
| 2021   | 6     | 10  | \$ -     | \$ -      | 0      | 0       | 80     | 90      |
| 2021   | 6     | 11  | \$ -     | \$ -      | 0      | 0       | 80     | 90      |
| 2021   | 6     | 12  | \$ -     | \$ -      | 0      | 0       | 80     | 90      |
| 2021   | 6     | 13  | \$ 74.50 | \$ 0.93   | 31     | 14      | 80     | 90      |
| 2021   | 6     | 14  | \$ 51.93 | \$ 1.29   | 35     | 7       | 80     | 90      |
| 2021   | 6     | 15  | \$ 49.17 | \$ 1.72   | 28     | 22      | 80     | 90      |
| 2021   | 6     | 16  | \$ -     | \$ 0.26   | 0      | 6       | 80     | 90      |
| 2021   | 6     | 17  | \$ 5.47  | \$ 60.41  | 32     | 13      | 80     | 90      |
| 2021   | 6     | 18  | \$ 0.34  | \$ 1.50   | 15     | 16      | 80     | 90      |
| 2021   | 6     | 19  | \$ 0.04  | \$ -      | 9      | 0       | 80     | 90      |
| 2021   | 6     | 20  | \$ -     | \$ -      | 0      | 0       | 80     | 90      |
| 2021   | 6     | 21  | \$ -     | \$ -      | 0      | 0       | 80     | 90      |
| 2021   | 6     | 22  | \$ 0.01  | \$ -      | 8      | 0       | 80     | 90      |
| 2021   | 6     | 23  | \$ 0.76  | \$ 0.80   | 17     | 30      | 80     | 90      |
| 2021   | 6     | 24  | \$ 0.02  | \$ -      | 3      | 0       | 80     | 90      |
| 2021   | 6     | 25  | \$ -     | \$ 1.05   | 0      | 13      | 80     | 90      |
| 2021   | 6     | 26  | \$ -     | \$ 1.11   | 0      | 16      | 80     | 90      |
| 2021   | 6     | 27  | \$ 0.08  | \$ 0.59   | 11     | 11      | 80     | 90      |
| 2021   | 6     | 28  | \$ -     | \$ 0.32   | 0      | 16      | 80     | 90      |
| 2021   | 6     | 29  | \$ -     | \$ 0.80   | 0      | 52      | 80     | 90      |
| 2021   | 6     | 30  | \$ 0.45  | \$ 15.37  | 27     | 55      | 80     | 90      |
| 0  | 0     | 0   | \$ -     | \$ -      | 0      | 0       | 0      | 0       |

[Home <<](#)

[previous <<](#)

[next >>](#)

[chart](#)

| Monthly Average of Ancillary Services Required MW |       |            |            |          |            |
|---|-------|------------|------------|----------|------------|
| year  | month | ASMW_REGDN | ASMW_NSPIN | ASMW_RRS | ASMW_REGUP |
| 2020  | 1     | 271        | 1,565      | 2,893    | 293        |
|   | 2     | 276        | 1,633      | 2,911    | 295        |
|   | 3     | 293        | 1,462      | 2,969    | 298        |
|   | 4     | 282        | 1,444      | 2,976    | 310        |
|   | 5     | 314        | 1,492      | 2,667    | 339        |
|   | 6     | 302        | 1,444      | 2,460    | 324        |
|   | 7     | 294        | 1,321      | 2,373    | 304        |
|   | 8     | 301        | 1,414      | 2,354    | 311        |
|   | 9     | 304        | 1,387      | 2,470    | 307        |
|   | 10    | 277        | 1,460      | 2,799    | 300        |
|   | 11    | 259        | 1,463      | 2,939    | 284        |
|   | 12    | 266        | 1,535      | 2,881    | 272        |
| 2021  | 1     | 317        | 1,535      | 2,964    | 345        |
|   | 2     | 360        | 1,604      | 3,024    | 374        |
|   | 3     | 373        | 1,500      | 3,023    | 374        |
|   | 4     | 362        | 1,531      | 3,059    | 391        |
|   | 5     | 382        | 1,481      | 2,794    | 403        |
|   | 6     | 327        | 1,527      | 2,548    | 343        |
|   | 7     | -          | -          | -        | -          |
|   | 8     | -          | -          | -        | -          |
|   | 9     | -          | -          | -        | -          |
|   | 10    | -          | -          | -        | -          |
|   | 11    | -          | -          | -        | -          |
|   | 12    | -          | -          | -        | -          |

[Home <<](#)

[previous <<](#)

[next >>](#)

[chart](#)

| Hourly Average of Ancillary Services Required MW |               |            |            |          |            |
|--|---------------|------------|------------|----------|------------|
| year   | DELIVERY_HOUR | ASMW_REGDN | ASMW_NSPIN | ASMW_RRS | ASMW_REGUP |
| 2020   | 1             | 360        | 1,175      | 2,825    | 217        |
|  | 2             | 272        | 1,175      | 2,825    | 189        |
|  | 3             | 232        | 1,370      | 2,831    | 199        |
|  | 4             | 187        | 1,369      | 2,832    | 226        |
|  | 5             | 187        | 1,369      | 2,832    | 293        |
|  | 6             | 266        | 1,369      | 2,832    | 452        |
|  | 7             | 230        | 1,838      | 2,733    | 578        |
|  | 8             | 233        | 1,838      | 2,733    | 360        |
|  | 9             | 248        | 1,838      | 2,733    | 363        |
|  | 10            | 265        | 1,838      | 2,733    | 386        |
|  | 11            | 271        | 1,608      | 2,654    | 397        |
|  | 12            | 239        | 1,608      | 2,654    | 396        |
|  | 13            | 218        | 1,608      | 2,654    | 367        |
|  | 14            | 241        | 1,608      | 2,654    | 321        |
|  | 15            | 222        | 1,392      | 2,634    | 288        |
|  | 16            | 204        | 1,392      | 2,634    | 279        |
|  | 17            | 235        | 1,392      | 2,634    | 288        |
|  | 18            | 285        | 1,392      | 2,634    | 312        |
|  | 19            | 366        | 1,423      | 2,663    | 277        |
|  | 20            | 360        | 1,423      | 2,663    | 249        |
|  | 21            | 371        | 1,423      | 2,663    | 212        |
|  | 22            | 454        | 1,423      | 2,663    | 197        |
|  | 23            | 488        | 1,175      | 2,825    | 211        |
|  | 24            | 445        | 1,175      | 2,825    | 219        |
| 2021   | 1             | 351        | 1,145      | 3,016    | 231        |
|  | 2             | 281        | 1,145      | 3,016    | 224        |
|  | 3             | 250        | 1,290      | 3,044    | 245        |
|  | 4             | 207        | 1,290      | 3,045    | 259        |
|  | 5             | 211        | 1,290      | 3,045    | 319        |
|  | 6             | 289        | 1,290      | 3,045    | 463        |
|  | 7             | 255        | 1,898      | 2,910    | 603        |
|  | 8             | 305        | 1,898      | 2,910    | 367        |
|  | 9             | 416        | 1,898      | 2,910    | 343        |
|  | 10            | 453        | 1,898      | 2,910    | 428        |
|  | 11            | 421        | 1,619      | 2,813    | 464        |
|  | 12            | 370        | 1,619      | 2,813    | 477        |
|  | 13            | 357        | 1,619      | 2,813    | 460        |
|  | 14            | 413        | 1,619      | 2,813    | 434        |
|  | 15            | 374        | 1,554      | 2,789    | 419        |
|  | 16            | 347        | 1,554      | 2,789    | 448        |
|  | 17            | 359        | 1,554      | 2,789    | 466        |
|  | 18            | 370        | 1,554      | 2,789    | 518        |
|  | 19            | 408        | 1,663      | 2,833    | 462        |
|  | 20            | 352        | 1,663      | 2,833    | 333        |
|  | 21            | 361        | 1,663      | 2,833    | 257        |
|  | 22            | 447        | 1,663      | 2,833    | 264        |
|  | 23            | 465        | 1,145      | 3,016    | 225        |
|  | 24            | 421        | 1,145      | 3,016    | 208        |

[Home <<](#)

[previous <<](#)

[next >>](#)

[chart](#)

| Monthly Average Ancillary Services Price |       |             |             |             |             |
|--|-------|-------------|-------------|-------------|-------------|
| year                                     | month | MCPC_REGDN  | MCPC_NSPIN  | MCPC_RRS    | MCPC_REGUP  |
| 2020                                     | 1     | \$ 7.06     | \$ 2.04     | \$ 7.24     | \$ 8.60     |
|  | 2     | \$ 6.46     | \$ 3.78     | \$ 10.06    | \$ 10.33    |
|  | 3     | \$ 6.39     | \$ 4.59     | \$ 14.60    | \$ 13.00    |
|  | 4     | \$ 10.83    | \$ 5.15     | \$ 12.78    | \$ 12.31    |
|  | 5     | \$ 11.54    | \$ 3.36     | \$ 8.37     | \$ 9.04     |
|  | 6     | \$ 7.57     | \$ 4.69     | \$ 7.70     | \$ 7.89     |
|  | 7     | \$ 6.73     | \$ 4.12     | \$ 9.56     | \$ 9.98     |
|  | 8     | \$ 7.32     | \$ 11.02    | \$ 23.91    | \$ 22.42    |
|  | 9     | \$ 10.12    | \$ 2.55     | \$ 6.66     | \$ 6.91     |
|  | 10    | \$ 10.22    | \$ 5.47     | \$ 9.81     | \$ 10.82    |
|  | 11    | \$ 7.10     | \$ 3.84     | \$ 15.21    | \$ 15.10    |
|  | 12    | \$ 9.71     | \$ 3.16     | \$ 11.03    | \$ 9.49     |
| 2021                                     | 1     | \$ 9.98     | \$ 2.16     | \$ 11.85    | \$ 14.31    |
|  | 2     | \$ 1,272.06 | \$ 1,676.26 | \$ 3,808.44 | \$ 3,218.92 |
|  | 3     | \$ 28.66    | \$ 3.93     | \$ 30.23    | \$ 23.61    |
|  | 4     | \$ 24.82    | \$ 12.43    | \$ 29.20    | \$ 31.78    |
|  | 5     | \$ 25.78    | \$ 3.45     | \$ 20.49    | \$ 19.60    |
|  | 6     | \$ 11.14    | \$ 19.82    | \$ 29.28    | \$ 26.37    |
|  | 7     | \$ -        | \$ -        | \$ -        | \$ -        |
|  | 8     | \$ -        | \$ -        | \$ -        | \$ -        |
|  | 9     | \$ -        | \$ -        | \$ -        | \$ -        |
|  | 10    | \$ -        | \$ -        | \$ -        | \$ -        |
|  | 11    | \$ -        | \$ -        | \$ -        | \$ -        |
|  | 12    | \$ -        | \$ -        | \$ -        | \$ -        |

[Home <<](#)

[previous <<](#)

[next >>](#)

[chart](#)

| Monthly Average A/S Cost per MWh Load |       |              |               |            |              |
|---------------------------------------|-------|--------------|---------------|------------|--------------|
| year                                  | month | AScost_REGDN | AScost_NSPIIN | AScost_RRS | AScost_REGUP |
| 2020                                  | 1     | \$ 0.05      | \$ 0.08       | \$ 0.54    | \$ 0.06      |
|                                       | 2     | \$ 0.04      | \$ 0.15       | \$ 0.73    | \$ 0.08      |
|                                       | 3     | \$ 0.05      | \$ 0.18       | \$ 1.14    | \$ 0.10      |
|                                       | 4     | \$ 0.08      | \$ 0.20       | \$ 1.02    | \$ 0.10      |
|                                       | 5     | \$ 0.09      | \$ 0.12       | \$ 0.53    | \$ 0.07      |
|                                       | 6     | \$ 0.05      | \$ 0.14       | \$ 0.38    | \$ 0.05      |
|                                       | 7     | \$ 0.04      | \$ 0.10       | \$ 0.42    | \$ 0.06      |
|                                       | 8     | \$ 0.04      | \$ 0.28       | \$ 1.03    | \$ 0.13      |
|                                       | 9     | \$ 0.07      | \$ 0.08       | \$ 0.36    | \$ 0.05      |
|                                       | 10    | \$ 0.07      | \$ 0.19       | \$ 0.65    | \$ 0.08      |
|                                       | 11    | \$ 0.05      | \$ 0.15       | \$ 1.18    | \$ 0.11      |
|                                       | 12    | \$ 0.06      | \$ 0.12       | \$ 0.78    | \$ 0.06      |
| 2021                                  | 1     | \$ 0.08      | \$ 0.08       | \$ 0.85    | \$ 0.12      |
|                                       | 2     | \$ 10.56     | \$ 62.11      | \$ 265.95  | \$ 27.81     |
|                                       | 3     | \$ 0.29      | \$ 0.16       | \$ 2.49    | \$ 0.24      |
|                                       | 4     | \$ 0.23      | \$ 0.49       | \$ 2.29    | \$ 0.32      |
|                                       | 5     | \$ 0.23      | \$ 0.12       | \$ 1.34    | \$ 0.18      |
|                                       | 6     | \$ 0.07      | \$ 0.58       | \$ 1.44    | \$ 0.17      |
|                                       | 7     | \$ -         | \$ -          | \$ -       | \$ -         |
|                                       | 8     | \$ -         | \$ -          | \$ -       | \$ -         |
|                                       | 9     | \$ -         | \$ -          | \$ -       | \$ -         |
|                                       | 10    | \$ -         | \$ -          | \$ -       | \$ -         |
|                                       | 11    | \$ -         | \$ -          | \$ -       | \$ -         |
|                                       | 12    | \$ -         | \$ -          | \$ -       | \$ -         |

[Home <<](#)

[previous <<](#)

[next >>](#)

[chart](#)

| ERCOT-wide Cumulative PNM |       |               |               |
|---------------------------|-------|---------------|---------------|
| year                      | month | pnm           | pnm_accum     |
| 2020                      | 0     | \$ -          | \$ -          |
|                           | 1     | \$ 948.71     | \$ 948.71     |
|                           | 2     | \$ 2,962.95   | \$ 3,911.66   |
|                           | 3     | \$ 6,596.00   | \$ 10,507.66  |
|                           | 4     | \$ 3,928.31   | \$ 14,435.97  |
|                           | 5     | \$ 2,971.45   | \$ 17,407.42  |
|                           | 6     | \$ 1,257.14   | \$ 18,664.56  |
|                           | 7     | \$ 3,082.86   | \$ 21,747.42  |
|                           | 8     | \$ 11,591.85  | \$ 33,339.27  |
|                           | 9     | \$ 3,063.07   | \$ 36,402.34  |
|                           | 10    | \$ 8,681.74   | \$ 45,084.08  |
|                           | 11    | \$ 3,520.43   | \$ 48,604.51  |
|                           | 12    | \$ 1,469.68   | \$ 50,074.19  |
| 2021                      | 0     | \$ -          | \$ -          |
|                           | 1     | \$ 1,930.83   | \$ 1,930.83   |
|                           | 2     | \$ 705,718.36 | \$ 707,649.19 |
|                           | 3     | \$ 3,356.50   | \$ 711,005.69 |
|                           | 4     | \$ 19,870.21  | \$ 730,875.90 |
|                           | 5     | \$ 2,917.28   | \$ 733,793.18 |
|                           | 6     | \$ 10,048.24  | \$ 743,841.42 |
|                           | 7     | \$ -          | \$ -          |
|                           | 8     | \$ -          | \$ -          |
|                           | 9     | \$ -          | \$ -          |
|                           | 10    | \$ -          | \$ -          |
|                           | 11    | \$ -          | \$ -          |
|                           | 12    | \$ -          | \$ -          |

[Home <<](#)

[previous <<](#)

[next >>](#)

[chart](#)

| 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 |
| 2020   | 1     | 73     | (303)    | (292)    | (76)     | 255    | (43)    |
|  | 2     | (89)   | (84)     | 40       | (39)     | (160)  | (113)   |
|  | 3     | (142)  | 313      | 202      | 192      | 5      | 490     |
|  | 4     | 335    | 225      | (90)     | 371      | 108    | 819     |
|  | 5     | 488    | 332      | 420      | 829      | (26)   | 729     |
|  | 6     | (163)  | 1,067    | 808      | 330      | (262)  | 573     |
|  | 7     | 218    | 403      | 467      | 452      | 294    | 382     |
|  | 8     | 333    | 468      | 415      | 540      | 662    | 754     |
|  | 9     | 12     | 596      | 930      | 497      | 155    | 62      |
|  | 10    | (308)  | (154)    | (527)    | (323)    | (169)  | (58)    |
|  | 11    | (192)  | (592)    | (648)    | (279)    | 171    | (20)    |
|  | 12    | 8      | (583)    | (257)    | (230)    | (57)   | (724)   |
| 2021   | 1     | 58     | (284)    | (66)     | (9)      | 302    | (394)   |
|  | 2     | 1,889  | 2,270    | 2,503    | 2,331    | 3,083  | 2,824   |
|  | 3     | (263)  | 440      | 452      | 119      | (125)  | (99)    |
|  | 4     | (349)  | 184      | 312      | (233)    | (428)  | (384)   |
|  | 5     | (410)  | (586)    | (665)    | (468)    | (489)  | (422)   |
|  | 6     | (663)  | 622      | 645      | (158)    | (535)  | 78      |
|  | 7     | -      | -        | -        | -        | -      | -       |
|  | 8     | -      | -        | -        | -        | -      | -       |
|  | 9     | -      | -        | -        | -        | -      | -       |
|  | 10    | -      | -        | -        | -        | -      | -       |
|  | 11    | -      | -        | -        | -        | -      | -       |
|  | 12    | -      | -        | -        | -        | -      | -       |

[Home <<](#)

[previous <<](#)

[next >>](#)

[chart](#)



| 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 |
| 2020  | 1     | 11,301 | 8,889    | 8,804    | 11,122   | 10,778 | 9,611   |
|   | 2     | 11,703 | 8,927    | 9,127    | 11,552   | 11,418 | 9,565   |
|   | 3     | 11,041 | 8,603    | 9,310    | 10,892   | 10,550 | 9,266   |
|   | 4     | 11,740 | 9,020    | 9,632    | 11,683   | 10,687 | 9,300   |
|   | 5     | 12,521 | 8,354    | 9,718    | 12,321   | 11,035 | 9,639   |
|   | 6     | 13,993 | 8,966    | 11,459   | 13,741   | 11,821 | 10,210  |
|   | 7     | 12,451 | 6,263    | 9,467    | 11,967   | 9,483  | 7,091   |
|   | 8     | 11,838 | 5,872    | 7,466    | 11,126   | 9,403  | 7,204   |
|   | 9     | 8,330  | 5,914    | 6,538    | 8,644    | 7,217  | 6,007   |
|   | 10    | 11,781 | 7,862    | 8,387    | 11,600   | 10,670 | 8,756   |
|   | 11    | 12,163 | 8,702    | 9,740    | 12,769   | 10,835 | 8,979   |
|   | 12    | 12,653 | 10,356   | 10,665   | 12,599   | 11,951 | 10,062  |
| 2021  | 1     | 11,491 | 9,270    | 9,037    | 10,939   | 11,606 | 10,274  |
|   | 2     | 9,300  | 8,420    | 8,532    | 10,575   | 8,759  | 8,461   |
|   | 3     | 15,685 | 12,889   | 13,380   | 15,467   | 14,598 | 13,338  |
|   | 4     | 13,724 | 11,336   | 11,823   | 13,261   | 12,803 | 11,939  |
|   | 5     | 13,861 | 10,718   | 12,533   | 14,784   | 11,494 | 10,984  |
|   | 6     | 12,577 | 7,161    | 9,179    | 12,511   | 9,782  | 7,803   |
|   | 7     | -      | -        | -        | -        | -      | -       |
|   | 8     | -      | -        | -        | -        | -      | -       |
|   | 9     | -      | -        | -        | -        | -      | -       |
|   | 10    | -      | -        | -        | -        | -      | -       |
|   | 11    | -      | -        | -        | -        | -      | -       |
|   | 12    | -      | -        | -        | -        | -      | -       |

[Home <<](#)

[previous <<](#)

[next >>](#)

[chart](#)

| 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  | 2021 | PANHANDLE GTC (PNHNDL)               | 15,712    | 1    | 2,790    | 1,257     | 5,042    | 3,801    | 2,037    | 785     | -    | -    | -    | -    | -    | -    |
| FREQ_EXIST  | 2021 | RAYMONDVILLE RIO HONDO GTC (RV_RH)   | 13,256    | 2    | 1,667    | 2,630     | 2,944    | 2,514    | 2,229    | 1,272   | -    | -    | -    | -    | -    | -    |
| FREQ_EXIST  | 2021 | HAMILT MAVERI1_1 (HAMILTON-MAVERICK) | 12,492    | 3    | 1,038    | 1,269     | 4,205    | 3,493    | 1,776    | 711     | -    | -    | -    | -    | -    | -    |
| FREQ_EXIST  | 2021 | NORTH EDINBURG LOBO GTC (NE_LOB)     | 9,864     | 4    | 1,455    | 758       | 2,837    | 1,671    | 1,575    | 1,568   | -    | -    | -    | -    | -    | -    |
| FREQ_EXIST  | 2021 | 651_B (CMNSW-CMNT)                   | 4,996     | 5    | 594      | 260       | 1,176    | 1,432    | 484      | 1,050   | -    | -    | -    | -    | -    | -    |
| FREQ_EXIST  | 2021 | HAIN LA PAL1_1 (LA PALMA-HAINE DR)   | 4,354     | 6    | -        | 428       | 1,255    | 348      | 1,346    | 977     | -    | -    | -    | -    | -    | -    |
| FREQ_EXIST  | 2021 | GARZA_69A1 (GARZA-GARZA)             | 3,484     | 7    | 1,928    | 825       | 731      | -        | -        | -       | -    | -    | -    | -    | -    | -    |
| FREQ_EXIST  | 2021 | WESTEX GTC (WESTEX)                  | 2,963     | 8    | 332      | 56        | 739      | 701      | 766      | 369     | -    | -    | -    | -    | -    | -    |
| FREQ_EXIST  | 2021 | BONIVI_RINCON1_1 (RINCON-BONIVIEW)   | 2,935     | 9    | 1,347    | 607       | 880      | 101      | -        | -       | -    | -    | -    | -    | -    | -    |
| FREQ_EXIST  | 2021 | BRUNI_69_1 (BRUNI-BRUNI)             | 2,597     | 10   | 378      | 592       | 1,044    | 320      | 105      | 158     | -    | -    | -    | -    | -    | -    |
| TOP10_RENT  | 2021 | PAWNEE_SPRUCE_1 (PAWNEE-CALAVERS)    | \$ 106.80 | 1    | \$ 0.39  | \$ 106.40 | \$ -     | \$ -     | \$ -     | \$ -    | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |
| TOP10_RENT  | 2021 | PANHANDLE GTC (PNHNDL)               | \$ 91.68  | 2    | \$ 17.87 | \$ 10.46  | \$ 29.06 | \$ 20.83 | \$ 8.98  | \$ 4.48 | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |
| TOP10_RENT  | 2021 | OAS-DOW LINES (OAS-DOW)              | \$ 61.96  | 3    | \$ -     | \$ -      | \$ -     | \$ 61.96 | \$ -     | \$ -    | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |
| TOP10_RENT  | 2021 | STPWAP39_1 (STP-WAP)                 | \$ 52.22  | 4    | \$ -     | \$ -      | \$ 13.37 | \$ 38.62 | \$ 0.10  | \$ 0.13 | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |
| TOP10_RENT  | 2021 | CKT_3132_1 (FPPYD1-WINCHES)          | \$ 51.44  | 5    | \$ -     | \$ 51.44  | \$ -     | \$ -     | \$ -     | \$ -    | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |
| TOP10_RENT  | 2021 | 915_E (CMBSW-DCDAM)                  | \$ 46.61  | 6    | \$ -     | \$ 46.61  | \$ -     | \$ -     | \$ -     | \$ -    | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |
| TOP10_RENT  | 2021 | ABNTHW_MULBER1_1 (MULBERRY-ABNTHWST) | \$ 45.93  | 7    | \$ -     | \$ 45.93  | \$ -     | \$ -     | \$ -     | \$ -    | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |
| TOP10_RENT  | 2021 | NORTH TO HOUSTON GTC (N_TO_H)        | \$ 39.26  | 8    | \$ -     | \$ -      | \$ 0.04  | \$ 39.17 | \$ 0.03  | \$ 0.02 | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |
| TOP10_RENT  | 2021 | NORTH EDINBURG LOBO GTC (NE_LOB)     | \$ 39.06  | 9    | \$ 4.89  | \$ 2.20   | \$ 9.90  | \$ 6.26  | \$ 7.04  | \$ 8.77 | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |
| TOP10_RENT  | 2021 | WESTEX GTC (WESTEX)                  | \$ 36.77  | 10   | \$ 3.17  | \$ 0.41   | \$ 7.90  | \$ 9.03  | \$ 11.33 | \$ 4.93 | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |

[Home <<](#)

[previous <<](#)

[next >>](#)

[chart 1](#)

[chart 2](#)

| 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  | 2021 | RAYMONDVILLE RIO HONDO GTC (RV RH)   | 2,260    | 1    | 404      | 459      | 388      | 404      | 267      | 338     | -    | -    | -    | -    | -    | -    |  |
| FREQ_EXIST  | 2021 | FLTBES TLINE 1 (FLAT_TOP-FLTBES)     | 2,093    | 2    | 339      | 373      | 598      | 424      | 254      | 105     | -    | -    | -    | -    | -    | -    |  |
| FREQ_EXIST  | 2021 | PANHANDLE GTC (PNHNDL)               | 1,943    | 3    | 332      | 227      | 496      | 450      | 290      | 148     | -    | -    | -    | -    | -    | -    |  |
| FREQ_EXIST  | 2021 | WORSHAM WOR1 (WORSHAM-WORSHAM)       | 1,875    | 4    | 51       | 161      | 440      | 462      | 492      | 269     | -    | -    | -    | -    | -    | -    |  |
| FREQ_EXIST  | 2021 | PYOTE PYT1 (PYOTE-PYOTE)             | 1,548    | 5    | -        | 83       | 268      | 374      | 419      | 404     | -    | -    | -    | -    | -    | -    |  |
| FREQ_EXIST  | 2021 | HAMILT MAVERI1_1 (HAMILTON-MAVERICK) | 1,492    | 6    | 178      | 87       | 340      | 352      | 299      | 236     | -    | -    | -    | -    | -    | -    |  |
| FREQ_EXIST  | 2021 | NORTH EDINBURG LOBO GTC (NE_LOB)     | 1,476    | 7    | 220      | 165      | 316      | 207      | 308      | 260     | -    | -    | -    | -    | -    | -    |  |
| FREQ_EXIST  | 2021 | NLARSW_PILONC1_1 (NLARSW-PILONCL)    | 1,438    | 8    | 354      | 314      | 266      | 176      | 198      | 130     | -    | -    | -    | -    | -    | -    |  |
| FREQ_EXIST  | 2021 | RIOHND_ERIOHND_1 (MV RIOHO-RIOHONDO) | 1,415    | 9    | 154      | 237      | 91       | 335      | 435      | 163     | -    | -    | -    | -    | -    | -    |  |
| FREQ_EXIST  | 2021 | 651_B (CMNSW-CMNTP)                  | 1,301    | 10   | 190      | 99       | 300      | 317      | 185      | 210     | -    | -    | -    | -    | -    | -    |  |
| TOP10_RENT  | 2021 | PANHANDLE GTC (PNHNDL)               | \$ 86.10 | 1    | \$ 15.82 | \$ 10.25 | \$ 23.63 | \$ 20.62 | \$ 11.72 | \$ 4.06 | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |  |
| TOP10_RENT  | 2021 | NORTH EDINBURG LOBO GTC (NE_LOB)     | \$ 33.28 | 2    | \$ 4.45  | \$ 2.84  | \$ 7.21  | \$ 5.42  | \$ 7.17  | \$ 6.19 | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |  |
| TOP10_RENT  | 2021 | 588_B_1 (LWSVH-LWSVW)                | \$ 24.52 | 3    | \$ -     | \$ 1.42  | \$ 6.89  | \$ 10.35 | \$ 2.70  | \$ 3.36 | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |  |
| TOP10_RENT  | 2021 | SANDCR_AT1 (SANDCR-SANDCR)           | \$ 20.66 | 4    | \$ -     | \$ 20.61 | \$ -     | \$ -     | \$ -     | \$ 0.05 | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |  |
| TOP10_RENT  | 2021 | BLESSI_PAVLOV1_1 (BLESSING-PAVLOV)   | \$ 19.02 | 5    | \$ 0.31  | \$ 0.09  | \$ 14.32 | \$ 3.86  | \$ 0.02  | \$ 0.41 | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |  |
| TOP10_RENT  | 2021 | CRD_CRD2 (CRD-CRD)                   | \$ 18.83 | 6    | \$ 0.58  | \$ 18.06 | \$ 0.18  | \$ 0.00  | \$ 0.00  | \$ 0.01 | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |  |
| TOP10_RENT  | 2021 | WESTEX GTC (WESTEX)                  | \$ 17.01 | 7    | \$ 2.49  | \$ 0.26  | \$ 7.04  | \$ 1.31  | \$ 1.98  | \$ 3.94 | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |  |
| TOP10_RENT  | 2021 | BAY_SARG_1 (BAYCTYS-SARGNTS)         | \$ 16.52 | 8    | \$ 0.02  | \$ -     | \$ -     | \$ 6.26  | \$ 7.90  | \$ 2.33 | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |  |
| TOP10_RENT  | 2021 | OAS-DOW LINES (OAS-DOW)              | \$ 16.37 | 9    | \$ -     | \$ -     | \$ -     | \$ 8.46  | \$ 7.91  | \$ -    | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |  |
| TOP10_RENT  | 2021 | 6265_E (RHTP2-DENSW)                 | \$ 16.22 | 10   | \$ -     | \$ -     | \$ 0.01  | \$ -     | \$ 8.26  | \$ 7.95 | \$ - | \$ - | \$ - | \$ - | \$ - | \$ - |  |

[Home <<](#)

[previous <<](#)

[next >>](#)

[chart 1](#)

[chart 2](#)

| 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   | 2021 | HB SOUTH-LZ SOUTH         | \$ 15.67    | 1    | \$ 1.87 | \$ 1.50 | \$ 1.44 | \$ 2.15 | \$ 2.83 | \$ 3.34 | \$ 2.55 | \$ - | \$ - | \$ - | \$ - | \$ - |  |  |
| N   | 2021 | HB WEST-LZ WEST           | \$ 11.56    | 2    | \$ 2.73 | \$ 1.29 | \$ 1.38 | \$ 0.98 | \$ 1.17 | \$ 2.18 | \$ 1.82 | \$ - | \$ - | \$ - | \$ - | \$ - |  |  |
| N   | 2021 | HB WEST-HB NORTH          | \$ 9.28     | 3    | \$ 0.62 | \$ 1.68 | \$ 1.69 | \$ 1.67 | \$ 1.75 | \$ 1.67 | \$ 0.22 | \$ - | \$ - | \$ - | \$ - | \$ - |  |  |
| N   | 2021 | HB NORTH-LZ NORTH         | \$ 8.58     | 4    | \$ 0.93 | \$ 0.83 | \$ 0.77 | \$ 0.94 | \$ 0.85 | \$ 2.63 | \$ 1.63 | \$ - | \$ - | \$ - | \$ - | \$ - |  |  |
| N   | 2021 | HB NORTH-HB HOUSTON       | \$ 7.93     | 5    | \$ 0.15 | \$ 0.14 | \$ 0.45 | \$ 1.12 | \$ 1.46 | \$ 2.76 | \$ 1.85 | \$ - | \$ - | \$ - | \$ - | \$ - |  |  |
| N   | 2021 | HB PAN-HB WEST            | \$ 4.86     | 6    | \$ 0.64 | \$ 0.11 | \$ 0.12 | \$ 0.89 | \$ 2.59 | \$ 0.49 | \$ 0.03 | \$ - | \$ - | \$ - | \$ - | \$ - |  |  |
| N   | 2021 | HB HOUSTON-LZ HOUSTON     | \$ 3.13     | 7    | \$ 0.14 | \$ 0.27 | \$ 0.19 | \$ 0.32 | \$ 0.65 | \$ 1.07 | \$ 0.49 | \$ - | \$ - | \$ - | \$ - | \$ - |  |  |
| N   | 2021 | AEEC-LZ WEST              | \$ 2.55     | 8    | \$ 0.53 | \$ 0.42 | \$ 0.52 | \$ 0.44 | \$ 0.41 | \$ 0.17 | \$ 0.04 | \$ - | \$ - | \$ - | \$ - | \$ - |  |  |
| N   | 2021 | STP STP G1-HB HOUSTON     | \$ 1.99     | 9    | \$ 0.05 | \$ 0.07 | \$ -    | \$ 0.65 | \$ 0.18 | \$ 0.77 | \$ 0.27 | \$ - | \$ - | \$ - | \$ - | \$ - |  |  |
| N   | 2021 | MIRASOLE GEN-HB SOUTH     | \$ 1.13     | 10   | \$ 0.12 | \$ 0.02 | \$ 0.13 | \$ 0.38 | \$ 0.25 | \$ 0.12 | \$ 0.10 | \$ - | \$ - | \$ - | \$ - | \$ - |  |  |
| Y   | 2021 | HB SOUTH-LZ SOUTH         | \$ 4.08     | 1    | \$ 0.30 | \$ 0.32 | \$ 0.24 | \$ 0.42 | \$ 0.76 | \$ 1.32 | \$ 0.73 | \$ - | \$ - | \$ - | \$ - | \$ - |  |  |
| Y   | 2021 | HB NORTH-LZ NORTH         | \$ 3.59     | 2    | \$ 0.43 | \$ 0.65 | \$ 0.17 | \$ 0.57 | \$ 0.56 | \$ 0.87 | \$ 0.34 | \$ - | \$ - | \$ - | \$ - | \$ - |  |  |
| Y   | 2021 | HB WEST-LZ WEST           | \$ 3.12     | 3    | \$ 0.28 | \$ 0.59 | \$ 0.44 | \$ 0.36 | \$ 0.37 | \$ 0.66 | \$ 0.42 | \$ - | \$ - | \$ - | \$ - | \$ - |  |  |
| Y   | 2021 | TORR ALL-HB SOUTH         | \$ 2.52     | 4    | \$ 0.72 | \$ 0.22 | \$ 0.53 | \$ 0.06 | \$ 0.10 | \$ 0.17 | \$ 0.72 | \$ - | \$ - | \$ - | \$ - | \$ - |  |  |
| Y   | 2021 | BRISCOE WIND-FOARDCTY ALL | \$ 1.76     | 5    | \$ 0.02 | \$ 0.63 | \$ 0.94 | \$ 0.12 | \$ 0.05 | \$ -    | \$ -    | \$ - | \$ - | \$ - | \$ - | \$ - |  |  |
| Y   | 2021 | HB HOUSTON-LZ HOUSTON     | \$ 1.55     | 6    | \$ 0.06 | \$ 0.16 | \$ 0.15 | \$ 0.21 | \$ 0.45 | \$ 0.34 | \$ 0.18 | \$ - | \$ - | \$ - | \$ - | \$ - |  |  |
| Y   | 2021 | PH1 UNIT1 2-OKLA OKLA G1  | \$ 1.38     | 7    | \$ 0.00 | \$ 0.58 | \$ 0.80 | \$ -    | \$ -    | \$ -    | \$ -    | \$ - | \$ - | \$ - | \$ - | \$ - |  |  |
| Y   | 2021 | TORR ALL-SAN SANMIGG1     | \$ 1.27     | 8    | \$ 0.07 | \$ 0.18 | \$ 0.07 | \$ 0.01 | \$ 0.09 | \$ 0.43 | \$ 0.43 | \$ - | \$ - | \$ - | \$ - | \$ - |  |  |
| Y   | 2021 | MISAE GEN RN-BLSMT1 5 A 6 | \$ 1.22     | 9    | \$ 0.05 | \$ 0.11 | \$ 0.53 | \$ 0.17 | \$ 0.13 | \$ 0.24 | \$ 0.00 | \$ - | \$ - | \$ - | \$ - | \$ - |  |  |
| Y   | 2021 | HB SOUTH-LZ CPS           | \$ 1.17     | 10   | \$ 0.00 | \$ 0.00 | \$ 0.00 | \$ 0.00 | \$ 0.17 | \$ 0.70 | \$ 0.30 | \$ - | \$ - | \$ - | \$ - | \$ - |  |  |

[Home <<](#)

[previous <<](#)

[chart 1](#)

[chart 2](#)