Markets Report

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• PJM Wholesale Cost through March 2017 was $46.96/MWh, down from full-year 2016 costs of $47.49/MWh. (Slides 5 & 6)

• Operating Reserve cost contribution to wholesale energy costs remains at its lowest level in the 2011-2017 time period. (Slide 6)

• Load-weighted average LMP for 2017 was $30.38/MWh: (Slide 18)
  – March 2017 was $32.3/MWh, which is higher than March 2016 ($23) but lower than March 2015 ($42).

• In March, the sum of Heating and Cooling Degree Days was well below its historic average, but energy use was slightly higher than its historic average. (Slides 16-17)
• Total cleared MWh of virtual bids (INCs and DECs) have been slowly increasing since July 2015. After increases in December 2015 and January 2016, total cleared MWh of UTC transactions have been fluctuating around a new, higher level in 2016 and 2017. (Slides 27-32 and data appendix)
• FTR revenue adequacy for the month of March is 91%. The 2016-2017 Planning Year is fully funded. (Slides 33-36)
• March 2017 experienced below normal congestion for the fifth month in a row. (Slide 33)
• Regulation and Synchronized Reserve market costs have generally tracked with energy prices over time. (Slides 49-51)
Markets Report
Operating Reserve
Percent of Total CC, CT and Steam Hours with LMP < Offer
Beginning in December 2008, the daily Balancing Operating Reserves (BOR) rate was replaced with six different BOR rates: RTO BOR for Reliability Rate, RTO BOR for Deviations Rate, East BOR for Reliability Rate, East BOR for Deviations Rate, West BOR for Reliability Rate, West BOR for Deviations Rate.

Reliability rates are charged to all real-time load and exports, whereas deviation rates, as before, are charged only to real-time deviations. RTO rates are charged to the whole footprint, whereas East and West rate adders are charged based on location.
Reliability Balancing Operating Reserve Rates

$/MWh

RTO
East
West

MAR15 MAY15 AUG15 NOV15 FEB16 MAY16 AUG16 NOV16 MAR17
Energy Market

LMP Summary
• The weather parameter shown in the following slide is a monthly sum of daily Heating Degree Days (HDD) and Cooling Degree Days (CDD).

• Degree days represent a deviation from a baseline temperature, in this case 60 degrees for HDD and 65 degrees for CDD. As temperatures get more extreme, colder or hotter, either HDDs or CDDs, respectively, will increase.

• Typically, winter months will only record HDDs, while summer months will only record CDDs. Shoulder months may have both HDDs and CDDs.

• Degree Days are calculated using a daily load weighting that weights values from stations in each TO zone according to the zonal contribution to the RTO peak on that day.

• Average values use data from 1998 to the most recent complete year, in this case, 2015. Averages include load data for all of TO zones in the current RTO footprint.
Historic Average Weather and Energy versus Current Month

- **Current Month Total Energy**
- **Current Month HDD+CDD**
- **Average Monthly Total Energy**
- **Average Monthly HDD + CDD**

The graph shows the comparison of historical average weather and energy usage versus the current month. The y-axis represents TWh (Terawatt-hours) on a logarithmic scale, while the x-axis represents months from March 2016 to March 2017. The heating degree days plus cooling degree days are also indicated on the right y-axis.
Fuel Cost Adjusted LMP (Referenced to 1999 Fuel Prices)
In September 2014 the method for calculating LMP re-run intervals was changed to only include intervals that actually impacted LMP.
Demand Side Response Estimated Revenue

Capacity revenue prior to RPM implementation on 6-01-2007 estimated based on average daily ALM capacity credits and weighted average daily PJM capacity market clearing price.
Economic Demand Response Activity

*Data for the last few months are subject to significant change due to the settlement window.*
Total Registered MW in PJM's Economic Demand Response
Energy Market

Virtual Activity Summary
The following six charts depict trends in submitted and cleared virtual and up-to-congestion transactions, in terms of number and volume, into the PJM Energy Market. The first two of these charts show the submitted and cleared increment and decrement bids (virtual transactions or virtuals) and they are the same as what was previously being presented in this report. The two charts after them display the trends in submitted and cleared up-to-congestion transactions into the PJM Energy Market. The last two of these six charts combine the virtual and up-to-congestion transactions and show the sum of these two categories.

To clarify what a bid or transaction is, please consider the following example: An offer (increment, decrement or up-to-congestion) of 10 MW, valid for eight hours for a given day, is captured in the charts as eight submitted bids/transactions and 80 submitted MWh. If this offer fully clears for three of the hours it was submitted for, it shows in the charts as three cleared bids/transactions and 30 cleared MWh.
Up-To-Congestion Transactions - Total Volume

- Submitted MWh
- Cleared MWh

MWh (Millions)

<table>
<thead>
<tr>
<th>Month</th>
<th>MAR15</th>
<th>APR15</th>
<th>MAY15</th>
<th>JUN15</th>
<th>JUL15</th>
<th>AUG15</th>
<th>SEP15</th>
<th>OCT15</th>
<th>NOV15</th>
<th>DEC15</th>
<th>JAN16</th>
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<th>DEC16</th>
<th>JAN17</th>
<th>FEB17</th>
<th>MAR17</th>
</tr>
</thead>
</table>
INCs, DECs and Up-To-Congestion Transactions - Total Number

- Submitted Transactions
- Cleared Transactions

Number of Transactions (Millions)

- MAR15
- APR15
- MAY15
- JUN15
- JUL15
- AUG15
- SEP15
- OCT15
- NOV15
- DEC15
- JAN16
- FEB16
- MAR16
- APR16
- MAY16
- JUN16
- JUL16
- AUG16
- SEP16
- OCT16
- NOV16
- DEC16
- JAN17
- FEB17
- MAR17
Energy Market

Congestion and FTR Summary
FTR Revenue vs. FTR Target Allocation

![Graph showing FTR Revenue vs. FTR Target Allocation for different months from March 2015 to March 2017. The graph compares Total FTR Revenues (in dark blue) and Total FTR Targets (in light green). The x-axis represents the months, and the y-axis represents millions of dollars.](image-url)
<table>
<thead>
<tr>
<th>Period</th>
<th>Surplus / Underfunding</th>
<th>Payout Ratio</th>
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</thead>
<tbody>
<tr>
<td>March, 2017</td>
<td>$-4,594,382</td>
<td>91%</td>
</tr>
<tr>
<td>2017</td>
<td>$8,196,423</td>
<td>100%</td>
</tr>
<tr>
<td>2016/2017</td>
<td>$74,372,501</td>
<td>100%</td>
</tr>
</tbody>
</table>
Ten Most Heavily Congested Transmission Facilities - March, 2017

- Westwood 345/138 (MISO)
- Emilie-Falls 138 (PECO)
- Greentown 765/138 T2 (AEP)
- Greenfield-Lakeview 138 (ATSI)
- Byron-Cherry Valley 345 0622 6 (COMED)
- Nottingham Reactor 230 (PECO)
- Cherry Valley 345/138 TR82 (COMED)
- APSOUTH Interface (EHV)
- Conastone-Peach Bottom 500 (EHV)
- Bedington-Black Oak 500 (APS)
Energy Market

Interchange/Seams Summary
Monthly Average MISO Interface Pricing

$/MWh

- PJM MISO Price (RT)
- MISO PJM Price (RT)
- PJM MISO Price (DA)
- MISO PJM Price (DA)

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Hourly Difference Between PJM and MISO Real-Time Prices

Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

Average price difference for March = $-1.51
Percent of hours in which the direction of flow is consistent with price differentials = 55.65%

Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.
Hourly Difference Between PJM and MISO Day-Ahead Prices

Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

Average price difference for March = $-0.84
Hourly Difference Between PJM and NYISO Real-Time Prices

Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

Average price difference for March = $1.73
Percent of hours in which the direction of flow is consistent with price differentials = 43.28%
Hourly Difference Between PJM and NYISO Day-Ahead Prices

Positive values represent hours when the PJM price was higher. Negative values represent hours when the PJM price was lower.

Average price difference for March = $1.72
Negative M2M Credit represents PJM payment to MISO
PJM-NYISO Market-to-Market Coordination Settlement

- Negative M2M Credit represents PJM payment to NYISO

$ Millions

$2

$1

$0

$-1

$-2

$ Millions

MAR15 APR15 MAY15 JUN15 JUL15 AUG15 SEP15 OCT15 NOV15 DEC15 JAN16 FEB16 MAR16 APR16 MAY16 JUN16 JUL16 AUG16 SEP16 OCT16 NOV16 DEC16 JAN17 FEB17 MAR17

0%

1%

2%

-1%

-2%
Ancillary Service Market

Summary
Average Synchronous Condenser Payments equals the 36-month rolling average plus one standard deviation.
Average Synchronous Condenser Payments equals the 36-month rolling average plus one standard deviation.
DR Participation in PJM Synchronized Reserve Markets

![Chart showing total payments (in millions) and MWh cleared (in MWh) for different months from March 2015 to March 2017. The chart indicates fluctuations in both metrics with peaks and troughs across the period.]
Synchronized Reserve Market Daily Prices and Charges

- Total Daily Synchronized Reserve Charges ($ Millions)
- Minimum Hourly Price ($/MWh)
- Average Hourly Price ($/MWh)
- Maximum Hourly Price ($/MWh)