Markets Report

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PJM Wholesale Cost through February 2017 was $45.60/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 $29.36/MWh: (Slide 18)
- February 2017 was $25.6/MWh, which is seasonally in line with February 2015 ($26) and far lower than February 2014 ($72.2).

In February, both energy and the sum of Heating and Cooling Degree Days were well below their historic averages. (Slides 16-17)
Executive Summary

- 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. (Slides 27-32 and data appendix)

- FTR revenue adequacy for the month of February is 90%. The 2016-2017 Planning Year is fully funded. (Slides 33-36)

- February 2017 experienced below normal congestion for the fourth 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

- CT
- CC
- Steam

FEB16 MAR16 APR16 MAY16 JUN16 JUL16 AUG16 SEP16 OCT16 NOV16 DEC16 JAN17 FEB17
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.
Deviations Balancing Operating Reserve Rates

$/MWh

FEB15  MAY15  AUG15  NOV15  FEB16  MAY16  AUG16  NOV16  FEB17

RTO
East
West
Energy Market

LMP Summary
Load-Weighted Average LMP

$/MWh

- FEB15: $72
- MAR15: $42
- APR15: $30
- MAY15: $34
- JUN15: $32
- JUL15: $35
- AUG15: $33
- SEP15: $33
- OCT15: $28
- NOV15: $27
- DEC15: $25
- JAN16: $30
- FEB16: $26
- MAR16: $23
- APR16: $29
- MAY16: $24
- JUN16: $29
- JUL16: $33
- AUG16: $36
- SEP16: $31
- OCT16: $28
- NOV16: $26
- DEC16: $33
- JAN17: $33
- FEB17: $26
• 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

Y-axis: TWh
X-axis: Months (Feb16 to Feb17)

Legend:
- Blue: Current Month Total Energy
- Green: Current Month HDD+CDD
- Black: Average Monthly Total Energy
- Yellow: Average Monthly HDD + CDD

Source: PJM©2017

Heat Degree Days + Cooling Degree Days

Values range from 0 to 1,250 on the y-axis and 0 to 1,000 on the x-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.
Energy Market

Demand Response Summary
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

MW

FEB15  MAY15  AUG15  NOV15  FEB16  MAY16  AUG16  NOV16  FEB17
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.
Virtual Bids (INC & DEC) - Total Number

Submitted Bids vs Cleared Bids

Number of Bids (Millions)
Virtual Bids (INCs & DECs) - Total Volume

- Submitted MWh
- Cleared MWh

MWh (Millions)

| Month  | FEB15 | MAR15 | APR15 | MAY15 | JUN15 | JUL15 | AUG15 | SEP15 | OCT15 | NOV15 | DEC15 | JAN16 | FEB16 | MAR16 | APR16 | MAY16 | JUN16 | JUL16 | AUG16 | SEP16 | OCT16 | NOV16 | DEC16 | JAN17 | FEB17 |
|--------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
Up-To-Congestion Transactions - Total Number

- Submitted Transactions
- Cleared Transactions

Number of Transactions (Millions)

- FEB15
- MAR15
- APR15
- MAY15
- JUN15
- JUL15
- AUG15
- SEP15
- OCT15
- NOV15
- DEC15
- JAN16
- FEB16
- MAR16
- APR16
- MAY16
- JUN16
- JUL16
- AUG16
- SEP16
- OCT16
- NOV16
- DEC16
- JAN17
- FEB17
INCs, DECs and Up-To-Congestion Transactions - Total Volume

- **Submitted MWh**
- **Cleared MWh**

**MWh (Millions)**

- **FEB15**
- **MAR15**
- **APR15**
- **MAY15**
- **JUN15**
- **JUL15**
- **AUG15**
- **SEP15**
- **OCT15**
- **NOV15**
- **DEC15**
- **FEB16**
- **MAR16**
- **APR16**
- **MAY16**
- **JUN16**
- **JUL16**
- **AUG16**
- **SEP16**
- **OCT16**
- **NOV16**
- **DEC16**
- **JAN17**
- **FEB17**
Energy Market

Congestion and FTR Summary
FTR Revenue vs. FTR Target Allocation

- **Total FTR Revenues**
- **Total FTR Targets**

$ Millions

- FEB15
- MAR15
- APR15
- MAY15
- JUN15
- JUL15
- AUG15
- SEP15
- OCT15
- NOV15
- DEC15
- JAN16
- FEB16
- MAR16
- APR16
- MAY16
- JUN16
- JUL16
- AUG16
- SEP16
- OCT16
- NOV16
- DEC16
- JAN17
- FEB17
<table>
<thead>
<tr>
<th>Period</th>
<th>Surplus / Underfunding</th>
<th>Payout Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>February, 2017</td>
<td>-$5,098,985</td>
<td>90%</td>
</tr>
<tr>
<td>2017</td>
<td>$12,030,301</td>
<td>100%</td>
</tr>
<tr>
<td>2016/2017</td>
<td>$78,206,379</td>
<td>100%</td>
</tr>
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Ten Most Heavily Congested Transmission Facilities - Overall, February

- Belvidere-15623 2 138 (COMED)
- Graceton-Safe Harbor (BGE)
- Emilie-Falls 138 (PECO)
- Brunner Island-Middletown Junction 230 (ME-PPL)
- Jenkins-Susquehanna 230 (PPL)
- Piney Grove XFORMER 138 (DPL)
- Westwood 345/138 (MISO)
- Cherry Valley 345/138 TR82 (COMED)
- Marengo-Woodstock 12205 (COMED)
- Nottingham 230 (PECO)
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)

FEB15  MAY15  AUG15  NOV15  FEB16  MAY16  AUG16  NOV16  FEB17
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 February = $-0.57
Percent of hours in which the direction of flow is consistent with price differentials = 65.77%
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 February = $-0.62
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 February = $1.42
Percent of hours in which the direction of flow is consistent with price differentials = 54.02%
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 February = $-0.76
Negative M2M Credit represents PJM payment to MISO
Negative M2M Credit represents PJM payment to NYISO.
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 Regulation Markets

- **Total Payments ($ Millions)**
- **MWh Cleared (MWh)**
DR Participation in PJM Synchronized Reserve Markets

- Total Payments ($ Millions)
- MWh Cleared (MWh)

$ Millions

FEB15  MAR15  APR15  MAY15  JUN15  JUL15  AUG15  SEP15  OCT15  NOV15  DEC15  JAN16  FEB16  MAR16  APR16  MAY16  JUN16  JUL16  AUG16  SEP16  OCT16  NOV16  DEC16  JAN17  FEB17

MWh

125,000
100,000
75,000
50,000
25,000
0