

Market Monitor Report

Members Committee
June 19, 2017

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Monitoring Analytics

Failed Fuel Cost Policies

- **By May 12, 2017, PJM completed approval of all submitted fuel cost policies (479 policies).**
 - **457 passed the IMM's evaluation.**
 - **22 (5 percent) failed the IMM's evaluation.**
- **Of all units, 89 percent passed the IMM's evaluation.**
- **Of all units, 11 percent failed the IMM's evaluation.**

Failed Fuel Cost Policies

- **The IMM provided PJM and Market Sellers timely notice of its determination when policies failed the IMM's evaluation and associated detailed input.**
- **The remaining 11 percent failed the IMM's evaluation because they were not algorithmic, verifiable and systematic.**
- **The IMM communicated fuel cost policy results to FERC.**

Failed Fuel Cost Policies

- **General issues raised by the IMM:**
 - **Inadequate fuel cost development process.**
 - **Reliance on internal fuel cost estimates.**
 - **Not based on market data or third parties.**
 - **Not verifiable.**
 - **Unsupported natural gas hubs.**
 - **Unsupported adders.**
 - **Reliance on PPA terms that are inconsistent with short run marginal cost.**

New MIRA Module

- **MIRA is the application developed by the IMM to, among other functions, capture the inputs used by Market Sellers to develop cost-based energy offers.**

New MIRA Module

- **MIRA currently has three modules used to capture these inputs:**
 - **Fuel Policy Editing:** Contains the fuel cost policy documents.
 - **Fuel Policy Management:** Links fuel cost policies to units and contains inventory cost, fuel index information, emission data, fuel handling, pump efficiency and nuclear cost.
 - **PPOR (Power Plant Operating Reporting) Continuous:** Contains most inputs needed to reconstruct the three part cost offer. Heat input, start data, VOM, among others.

New MIRA Module

- **The new Cost Offer Assumptions module was designed to capture:**
 - **All inputs currently in Fuel Policy Management.**
 - **All inputs currently in PPOR Continuous.**
 - **Some inputs included in Fuel Cost Policy documents.**
 - **Additional inputs needed to cover varying scenarios.**

Cost Offer Assumptions Module

- **The Cost Offer Assumptions module in MIRA collects most of the inputs used in the development of cost-based offers in the PJM Energy Market.**

Cost Offer Assumptions Module

- **The module allows market participants to report offer components for multiple schedules per unit, and provides more detail than its predecessor module, the Power Plant Operations Report Continuous.**
- **The data are required for the IMM to reconstruct and verify market participants' cost-based offers.**

High LMPs in BGE Zone

- **The IMM responded to Maryland Public Service Commission's request to explain real time LMP price spikes in the BGE zone during the last six months of 2016**
- **The IMM identified 436 five minute intervals in that period during which prices spiked in the BGE zone**
- **The price spikes were primarily due to high shadow prices of violated transmission constraints in the BGE zone**

High LMPs in BGE Zone

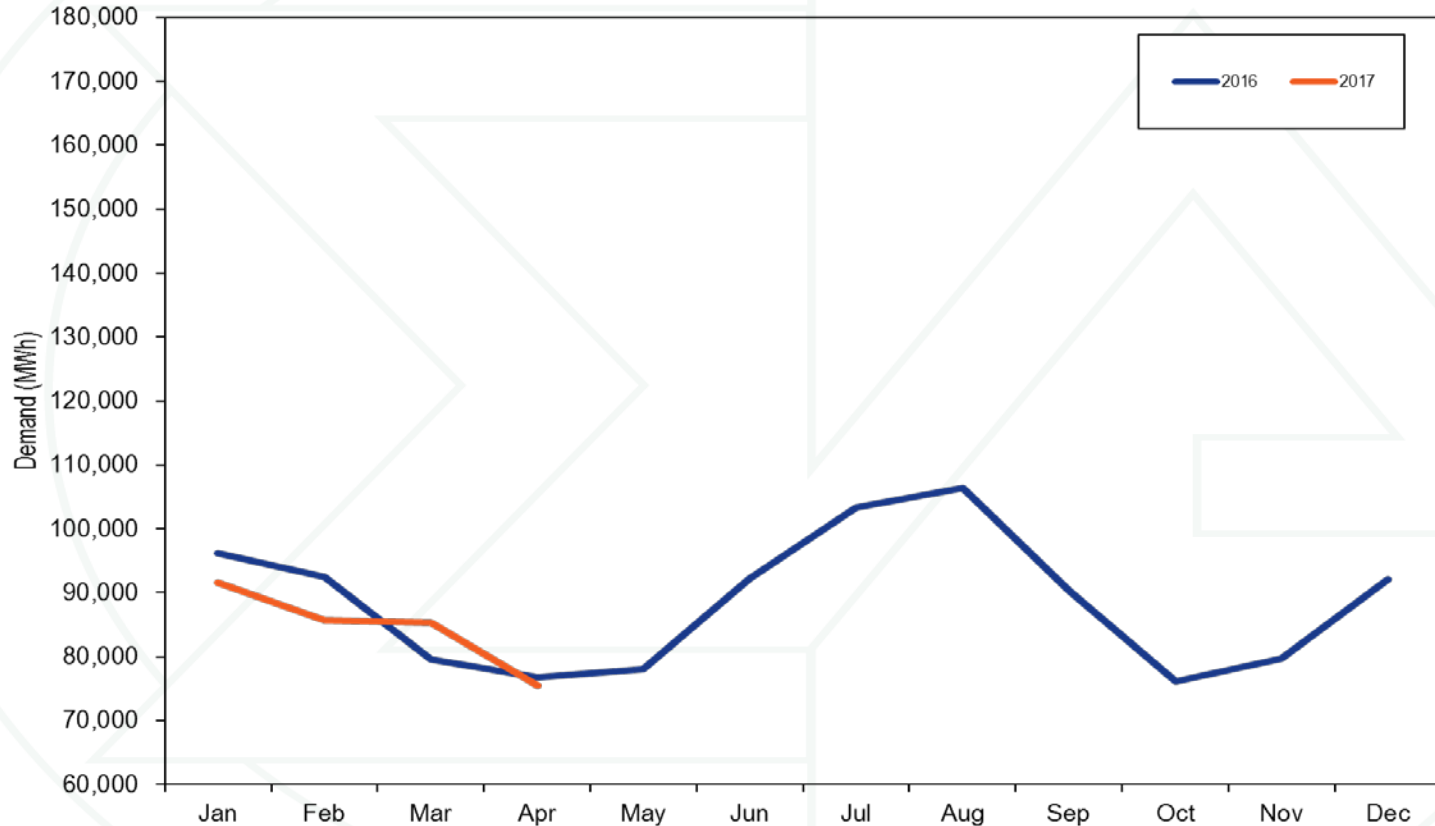
- **The relative shortage of generation resulted in power flow on transmission constraints that exceeded the operator adjusted constraint limits**
- **The shadow prices of transmission constraints are affected by transmission penalty factors**
- **The default transmission penalty factor used by PJM is \$2,000 per MWh**
- **There will be a problem statement introduced at the MIC related to transmission penalty factors**

LMP Spikes in BGE Between June 1, 2016 and December 31, 2016

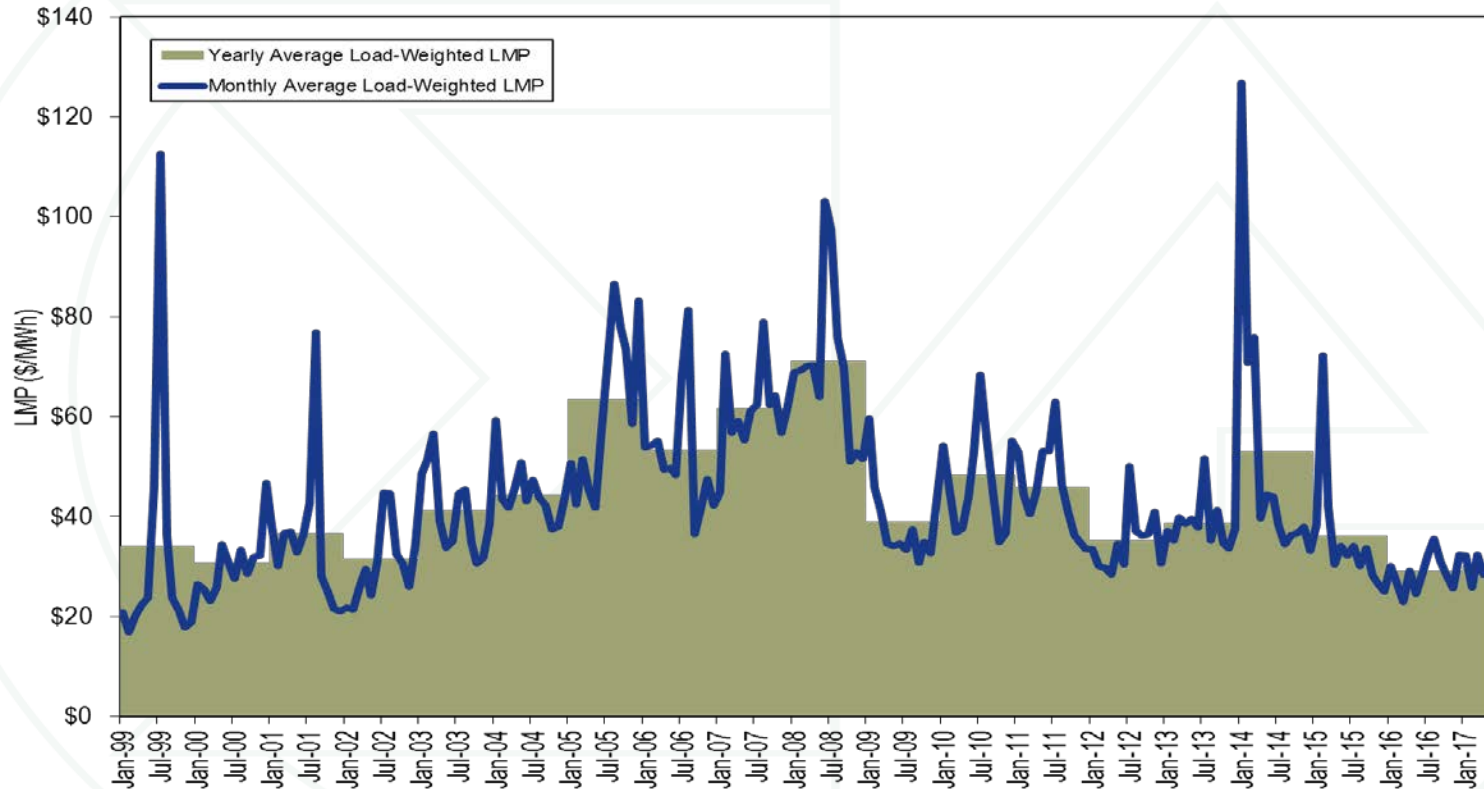
Contributing Factors for Price Spikes

| Contributing Factors for the Price Spikes | Number of Price Spikes |
|--|------------------------|
| Lowered line limit | 114 |
| Slow ramping | 30 |
| Two constraints with offsetting relief requirements | 27 |
| Lack of ramp to meet the increase in load | 20 |
| Real time load was higher than the cleared day ahead load | 16 |
| At least one unit on the constrained side not following the dispatch | 13 |
| Lack of ramp due to partial outage | 11 |
| Unforced Outage | 11 |
| Lack of generation to meet the load in the constrained region | 10 |
| Binding constraint with low priced generators but large contributing factors | 5 |
| Volatile load conditions | 3 |
| Dispatch temporarily suspended | 1 |

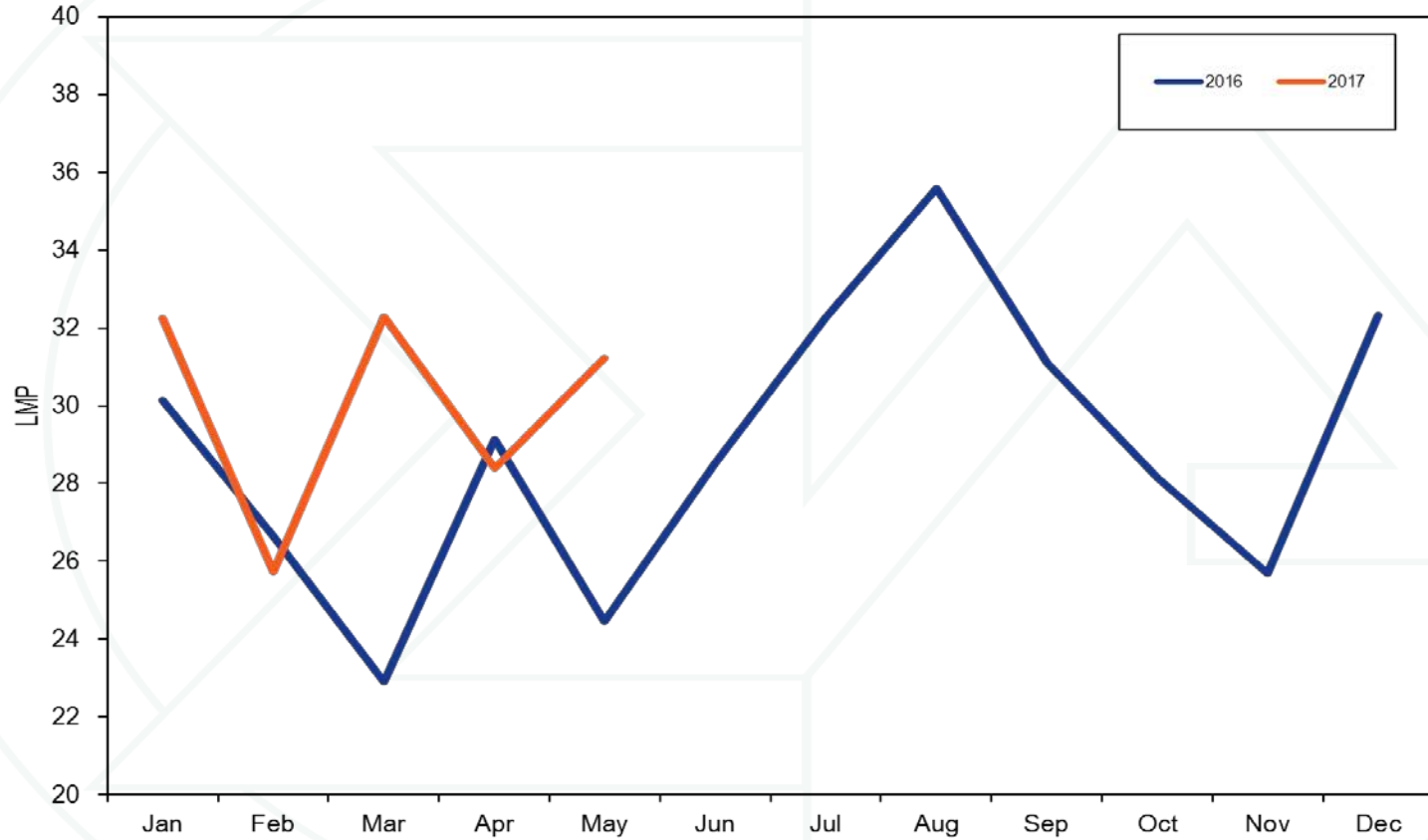
Real-Time Monthly Average Hourly Load



Real-Time Load-Weighted Average LMP



Real-Time Load-Weighted Average LMP



Energy Uplift Charges (Jan 2016 – May 2017)

| | 2016 Charges (Millions) | | | | | | 2017 Charges (Millions) | | | | | |
|-------------------|-------------------------|-----------|-------------------|------------------------|----------------------|---------|-------------------------|-----------|-------------------|------------------------|----------------------|--------|
| | Day-Ahead | Balancing | Reactive Services | Synchronous Condensing | Black Start Services | Total | Day-Ahead | Balancing | Reactive Services | Synchronous Condensing | Black Start Services | Total |
| Jan | \$7.4 | \$7.5 | \$0.0 | \$0.0 | \$0.0 | \$14.9 | \$2.6 | \$7.4 | \$1.25 | \$0.0 | \$0.0 | \$11.3 |
| Feb | \$7.6 | \$6.5 | \$0.0 | \$0.0 | \$0.0 | \$14.2 | \$2.0 | \$1.3 | \$3.3 | \$0.0 | \$0.0 | \$6.6 |
| Mar | \$6.4 | \$3.8 | \$0.2 | \$0.0 | \$0.0 | \$10.4 | \$0.6 | \$5.4 | \$1.4 | \$0.0 | \$0.0 | \$7.4 |
| Apr | \$3.0 | \$4.8 | \$0.2 | \$0.0 | \$0.0 | \$8.0 | \$0.5 | \$3.2 | \$1.3 | \$0.0 | \$0.0 | \$4.9 |
| May | \$2.8 | \$3.2 | \$0.1 | \$0.0 | \$0.0 | \$6.1 | \$0.9 | \$7.0 | \$1.3 | \$0.0 | \$0.0 | \$9.3 |
| Jun | \$4.6 | \$5.3 | \$0.1 | \$0.0 | \$0.1 | \$10.1 | | | | | | |
| Jul | \$3.6 | \$10.9 | \$0.1 | \$0.0 | \$0.0 | \$14.6 | | | | | | |
| Aug | \$2.4 | \$11.4 | \$0.0 | \$0.0 | \$0.0 | \$13.8 | | | | | | |
| Sep | \$2.9 | \$6.7 | \$0.1 | \$0.0 | \$0.0 | \$9.7 | | | | | | |
| Oct | \$3.6 | \$8.7 | \$0.3 | \$0.0 | \$0.0 | \$12.6 | | | | | | |
| Nov | \$5.7 | \$2.8 | \$1.0 | \$0.0 | \$0.1 | \$9.5 | | | | | | |
| Dec | \$7.3 | \$4.5 | \$0.4 | \$0.0 | \$0.0 | \$12.2 | | | | | | |
| Total (Jan - May) | \$27.2 | \$25.8 | \$0.5 | \$0.0 | \$0.1 | \$53.6 | \$6.7 | \$24.3 | \$8.5 | \$0.0 | \$0.1 | \$39.6 |
| Total | \$57.3 | \$76.0 | \$2.5 | \$0.0 | \$0.3 | \$136.1 | \$6.7 | \$24.3 | \$8.5 | \$0.0 | \$0.1 | \$39.6 |

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