# MISO-PJM JOA Biennial Review

Midcontinent ISO
PJM Interconnection
02/28/2018

# 1. Background

On January 4, 2011, Midcontinent Independent System Operator, Inc. (MISO) and PJM Interconnection, LLC (PJM) filed a joint Settlement Agreement to resolve two MISO complaints against PJM and one PJM complaint against MISO. On June 6, 2011, the Federal Energy Regulatory Commission (FERC) approved the Settlement, and accepted the proposed tariff revisions, effective the date of the order, subject to a compliance filing.

In the Settlement, MISO and PJM agreed to conduct a review of the processes and procedures used to implement the Joint Operating Agreement (JOA) between the two organizations. Accordingly, Utilicast, LLC was retained jointly by MISO and PJM to conduct this review. Utilicast completed the JOA Baseline Review report on January 20, 2012. This review found that both MISO and PJM were in conformance with the JOA provisions, but that there were opportunities for increased communication and documentation that might proactively prevent future conflicts. These items were detailed in a series of eighteen findings and recommendations.

The Settlement Agreement also specifies that beginning two years after the issuance of the JOA Baseline Review and every two years thereafter, MISO and PJM shall conduct a review of the changes made to each Party's processes used to implement the JOA since the previous review, or in the case of the first review, since the JOA Baseline Review. The first MISO-PJM Biennial Review was finalized on January 20, 2014, and addressed the following items: Change Management Logs, status of JOA baseline review recommendations, and FERC Orders.

This report is the third MISO-PJM JOA Biennial Review, and follows a similar format as the report published in 2016 with sections addressing the following items: Change Management Logs, status of 2016 MISO-PJM Biennial Review recommendations, and FERC filings.

The Change Management Log is a document which is jointly maintained by PJM and MISO and tracks systemic changes and process and procedure changes on an ongoing basis. That Log is detailed in section 2 of this report. The status of the recommendations included in the 2016 Biennial Review is discussed in Section 3. Section 4 covers the FERC Orders received relating to the MISO-PJM JOA that has been implemented since the 2016 Biennial Review.

# 2. Change Management Log

## 2.1. Change Management Log Summary

The following table is a summary of the implemented changes in processes or systems as detailed in the Change Management Log.

| Item | Name | Description | Status | Date |
|---|---|---|---|---|
| **1** | Ear Tag priority | If the tag associated with EAR is converted to Market Flow and excluded by the IDC, the Market Flow shall have a priority that is no higher than it would have been if the tag was not excluded by IDC. Before reporting MISO market flow to IDC, MISO will include EAR tag impact and EAR tag priority when dividing MISO market flow into priority buckets and the tag impact will be assigned to the same priority bucket as the corresponding EAR tag. | Approved | 6/01/2017 |
| **2** | MI-ONT PAR Data Exchange Enhancement | To support including the impacts of Michigan Ontario PAR interface (MOPI) in the MISO and PJM Market Flows, the MISO/PJM bulk data exchange is being extended. PJM will be making the same change to work with MISO's data exchange, but will be sending null data. | Approved | 7/28/2016 |
| 3 | MISO Relief Request Change | Change in the calculation to compare the MVA flow with the MVA rating which more aligns with MISO's market system and represents the amount of flow needed to mitigate the binding constraint. | Approved | 9/14/2017 |

## 2.2. Discussion

The Change Management Log is a jointly maintained document that details any system or process change related to the MISO/PJM Joint Operating Agreement. Each entry on the Change Management Log is agreed to by MISO and PJM, and it is used as a vehicle to ensure all parties are informed of changes that could potentially impact the implementation of the JOA. Items in the log are classified as open or closed. Open items are undergoing discussion or are in the process of being implemented. Closed items are assigned a status of approved if implemented. The Change Management Logs are discussed on a weekly basis and posted to the MISO and PJM websites on a quarterly basis.

The following section summarizes the implemented changes per the log:

1. Ear Tag Priority – Looking to address new NERC ORS guidelines on dynamic schedule tag exclusion, MISO implemented changes to include both the import and export of EAR in MISO market flow when reporting market flows to IDC. MISO also changed the MISO coordination test to include the impact of EAR unit.

2. MI-ONT PAR Data Exchange Enhancement – PJM MISO Bulk Data Exchange enhancements were needed to communicate the additional attributes of the MOPI impacts in the PJM and MISO Market Flows. These enhancements included adding additional columns to the M2M FLOWGATE DATA file that included flowgate specific, forward and reverse PAR Impact values, as well as flowgate specific Lake Erie Circulation (LEC) impacts. In addition, additional columns were added to the M2M PAR DATA file, including flags to indicate whether or not the interface was bypassed or regulating, as well as the absolute LEC.

9. MISO Relief Request (RR) Change – The MISO relief request has three parts, a physical flow, market flow, and an adder part. MISO is currently calculating the physical flow relief as RR = PhysicalFlow(MVA) – [EffectiveLimit(MVA) – BIAS], where EffectiveLimit is the flowgate limit multiplied by the binding percentage. MISO is proposing to change this portion of the equation to RR = PhysicalFlow(MVA) – EffectiveLimit(MVA). Currently, subtracting the Bias from the limit attempts to convert the MVA rating to a MW equivalent rating so there is headroom for any reactive power. When this MW limit is subtracted from the MVA flow it is comparing two dissimilar values, i.e. they are different units. This in effect asks for too much relief from the NMRTO. MISO believes that the best approach will be to compare the MVA flow with the MVA rating because that is in alignment with MISO's market system and represents the amount of flow reduction to mitigate the constraint binding.

# 3. Status of 2016 Biennial Review Recommendations and MISO/PJM Responses

In the 2016 JOA Biennial Review report, issued January 20, 2016, MISO and PJM staff identified multiple recommendations to improve the coordination of M2M activities between MISO and PJM. The following section summarizes the recommendations and their current status. When necessary, section 3.2 provides a narrative description of recommendation language and MISO's and PJM's responses to those recommendations and corresponding action items:

## 3.1 Summary

Topics are ordered based on Status in following table. Ongoing items are listed first and Completed items listed later.

The status Complete means the initial scope as identified by previous Biennial Review has been completed and any future scope of work will be developed as needed. Regardless of status, PJM and MISO are always looking to appropriately enhance any aspects of their joint coordination defined in the JOA.

| 2016 Biennial | Topic | 2016 Biennial Recommendation | Description | Status |
|---|---|---|---|---|
| **3.2.1** | Documentation | Continue Discussions on the following documents:<br>• Outage Coordination<br>• Dynamic Flowgate Procedure<br>• M2M Flowgate Process Document<br>• Less-than-Optimal Dispatch Procedures<br>• Flowgate Determination Guides | • Completed Documentation:<br>○ Dynamic Flowgate Procedure<br>○ Less-than-Optimal Dispatch Procedures<br>○ PJM-MISO Resettlement Guidelines<br>○ Flowgate Determination Guide<br>○ M2M Flowgate Process Document<br>○ MI-ONT PARS<br>○ DA M2M FFE Exchange<br>○ Market Flow Methodology<br>• Ongoing Documentation:<br>○ Outage Coordination | **Ongoing** |

| 2016 Biennial | Topic | 2016 Biennial Recommendation | Description | Status |
|---|---|---|---|---|
| **3.2.2** | Real Time Market Flow Determination | MISO and PJM will finalize the Market Flow Calculation methodology document. | MISO and PJM are working to complete a joint document that describes their market flow calculations. Targeted completion is Q2 2016. | Completed |
| **3.2.3** | Day-Ahead Energy Market Coordination | Revisit the JOA language regarding FFE sharing provisions. The two parties have been jointly working through the MISO/PJM JCM Initiative to develop a process that will allow this provision to be utilized through a coordinated study. MISO and PJM should continue to work towards their Q1 2016 completion date for the effort. | MISO and PJM have developed a process for establishing Day Ahead limits and sharing the Day Ahead FFE. Work in progress. Targeting implementation by Q1 2016 upon approval from FERC. | Completed |
| **3.2.4** | Pseudo-Tie Coordination | None | MISO and PJM have taken measures to update the JOA to incorporate provisions for Pseudo-Tie coordination as well as develop joint operating guides to address local reliability and modeling concerns. | New |
| **3.2.5** | Overlapping Congestion | None | MISO and PJM have developed a joint solution for the Pseudo-Tie Overlapping Congestion Issue. | New |

## 3.2 Discussion

### 3.2.1 Documentation

#### *3.2.1.1 2016 Biennial Report Recommendation:*

The recommendation coming from the latest report directs MISO and PJM to continue discussions on the following joint documents:

- Market Flow Methodology Document
- DA M2M FFE Exchange Document
- Outage Coordination Procedure
- Michigan-Ontario PARS Document

As Pseudo-Ties have impacted congestion management, the following documentation has been created by PJM and MISO to enhance the MISO-PJM Pseudo-Tie Coordination Process:

- Pseudo-Tied Units Operating Procedure
- Pseudo-Tied Units Benchmarking Procedure

#### *3.2.1.2 MISO and PJM Joint Response and Changes:*

MISO and PJM have identified a set of major documents that guide processes and procedures for the M2M process. These include:

***Completed Documents***
Data Exchange
After-the-Fact Review Procedure
Change Management Document
Less-than-Optimal Dispatch procedure
Flowgate Ownership Document
Flowgate Determination Guides
Generator Binding Thresholds
Dynamic Flowgate procedure
Flowgate Process Document
Market Flow Methodology Document
DA M2M FFE Exchange Document
Michigan-Ontario PARS Document
Pseudo-Tied Units Operating Procedure
Pseudo-Tied Units Benchmarking Procedure

***Ongoing (Under Development)***
Outage Coordination Procedure

With improved coordination and incremental changes, additional documents may be identified as needed. MISO and PJM continue to work together to identify new documents as well as to update existing documents to reflect the new changes.

MISO and PJM will continue discussions on all documents, with specific focus on the Outage

Coordination Procedure document.

A Market Flow Methodology Document has been created to ensure both parties understand the differences in logic that might exist in either calculation due to special circumstances. A Joint document describing how we coordinate the exchange of FFE has been created for use in the Day Ahead Markets.

#### *3.2.1.3 Future action items:*

In addition to the Outage Coordination Procedure, MISO and PJM will continue to enhance documentation and process guides as needed.

### 3.2.2 Real Time Market Flow Determination

#### *3.2.2.1 2016 Biennial Report Recommendation:*

MISO and PJM will finalize the Market Flow Calculation methodology document as covered in section 3.2.1.2.

#### *3.2.2.2 MISO and PJM joint response and changes:*

A Market Flow Calculation methodology document has been finished, noting the high level methodologies used to calculate market flow for each party. The document focuses on the general steps to calculate market flow that both parties adhere to, as well as special cases that exist for each party. It also includes how the Michigan-Ontario PARs are handed in the market flow calculation.

#### *3.2.2.3 Future action items:*

MISO-PJM will continue to enhance documentation as necessary.

### 3.2.3 Day-Ahead Energy Market Coordination

#### *3.2.3.1 2016 Biennial Report Recommendation:*

Revisit the JOA language regarding FFE sharing provisions. The two parties have been jointly working through the MISO/PJM JCM Initiative to develop a process that will allow this provision to be utilized through a coordinated study. MISO and PJM should continue to work towards their Q1 2016 completion date for the effort.

#### *3.2.3.2 MISO and PJM joint response and changes:*

MISO and PJM have developed a document to include guidelines for M2M flowgate identification. Pending FERC approval, PJM and MISO are targeting an implementation by Q1 2016.

#### *3.2.3.3 Future action items:*

Follow through with implementation upon FERC approval.

### 3.2.4 Pseudo-Tie Coordination

#### *3.2.4.1 2016 Biennial Report Recommendation:*

This is a new recommendation as of the 2018 Biennial Review.

#### *3.2.4.2 MISO and PJM joint response and changes:*

MISO and PJM have taken measures to update the JOA to incorporate provisions for Pseudo-Tie coordination as well as developed joint operating guides to address local reliability and modeling concerns.

#### *3.2.4.3 Future action items:*

MISO and PJM will continue to review and continuously improve the Pseudo-Tie coordination process.

### 3.2.5 Overlapping Congestion:

#### *3.2.5.1 2016 Biennial Report Recommendation:*

This is a new recommendation as of the 2018 Biennial Review.

#### *3.2.5.2 MISO and PJM joint response and changes:*

MISO and PJM have developed a joint solution for the Pseudo-Tie Overlapping Congestion Issue.

#### *3.2.5.3 Future action items:*

MISO and PJM have filed JOA changes and plan to file Tariff changes in early 2018. Pending FERC approval, PJM and MISO are targeting a Phase 1 implementation by Q1 2018 and Phase 2 implementation Q2 2018.

# 4. FERC Filings

This section includes FERC fillings that directly impact MISO-PJM Market-to-Market process.

## 4.1. Summary

| FERC Order | Description | Status |
|---|---|---|
| ER16-1485-000<br>ER16-1486-000 | Revisions to the MISO-PJM JOA regarding Michigan-Ontario PARs for congestion management - changes to how the PARs are modeled in the Market Flow and FFE calculations. | Effective July 28, 2016 |
| ER17-1305-000<br>ER17-1306-000 | Revisions to the MISO-PJM JOA for External Asynchronous Resources (EAR), information sharing, and coordination of M2M settlement practices. | Effective June 1, 2017 |
| ER17-2218-000<br>ER17-2218-001<br>ER17-2220-000<br>ER17-2220-001 | Revisions to the MISO-PJM JOA to improve the administration and coordination of Pseudo-Ties between MISO and PJM by incorporating into the JOA standard definitions, rules, and responsibilities between the two RTOs. | Effective October 1, 2017 |
| ER18-136-000<br>ER18-137-000 | Proposed revisions to the MISO-PJM JOA to address overlapping congestion charges to pseudo-tied generators. | Filed October 23, 2017<br>Effective March 1, 2018 |

## 4.2. Discussion

Each of the orders listed above were initiated to ensure consistency and enhance coordination between both RTOs.

ER16-1485-000 & ER16-1486-000

FERC Orders ER16-1485-000 & ER16-1486-000 propose to modify the JOA to add (1) a new flowgate test to identify M2M flowgates significantly impacted by the Michigan-Ontario PARs interface ("MOPI") when the PARs are regulating, (2) separate Market Flow and Firm Flow Entitlement calculations for MOPI M2M flowgates that include the impact of operating the Michigan-Ontario PARs on MOPI M2M flowgates, and (3) separate M2M settlement calculation for MOPI M2M flowgates, Market Flows, and Firm Flow Entitlements only when the Michigan-Ontario PARs are regulating.

ER17-1305-000 & ER17-1306-000

FERC Orders ER17-1305-000 & ER17-1306-000 propose to modify the JOA to (1) update the definition of Coordinated Flowgates to reflect that Coordinate Flowgates are determined by one of the five studies detailed in the CMP (previously four studies), (2) add a notification requirement between Parties when points of interconnection are added or removed, (3) add study 5 for EARs, (4) reflect that the impact of EARs will be included in the Market Flow calculation using the methodology selected in CMP, section 4.1.1, (5) address the prioritization that will occur when a tag associated with EARs is converted to Market Flow excluded by the IDC, and (6) provide that either RTO may adjust the FFE to align with M2M settlement rules for purposes of modeling the day-ahead or ARR/FTR markets.

ER17-2218-000/ER17-2018-001 & ER17-2220-000/ER17-2220-001

FERC Orders ER17-2218-000/ER17-2218-001 & ER17-2220-000/ER17-2220-001 propose to modify the JOA to (1) incorporate pro forma pseudo-tie agreements and a pseudo-tie reimbursement agreement, (2) clarify requirements to pseudo-tie and dynamically schedule units, and (3) address coordinated implementation and operation of pseudo-ties.

ER18-136-000 & ER18-137-000

FERC Orders ER18-136-000 & ER18-137-000 propose to modify the JOA to provide for a phased resolution of certain issues involving overlapping congestion charges affecting pseudo-tied generation in MISO and PJM.

# 5. Summary

MISO and PJM have completed our third biennial review per docket EL10-45-000, documenting the progress made from the initial recommendations stemming from the baseline review as well as additional recommendations identified by both parties as processes continue to evolve. In the past two years, MISO and PJM have focused tremendously on enhancing its documentation. The widespread introduction of Pseudo-Ties has meant the need for MISO and PJM to enhance their coordination and procedures to ensure reliable operation and reliable markets. Beyond this, MISO and PJM continue to strive in communication excellence and full compliance of their Joint Market Agreement. In dedication to this agreement, PJM and MISO have continued to utilize weekly coordination calls to address any weekly coordination issues, as well as bi-weekly calls that address high-priority items and longer term planning.

Going forward, MISO and PJM are working towards discussing and implementing significant ideas and improvements recommended through the Joint and Common Market (JCM) efforts to enhance the Market to Market process:

a. Pseudo-Tie modeling

b. Freeze Date Solution

c. M2M Coordination Enhancements

MISO and PJM have worked diligently in addressing and implementing the recommendations outset in the Baseline Review. The remaining pending recommendations are targeted for completion by the next biennial review. As more opportunities for improvement exist, both parties are committed to improving their adherence to the JOA through an evolving and enhanced communication process.

## 6. Acronym List

| | | |
|---|---|---|
| CMP | : | Congestion Management Process |
| DA | : | Day Ahead |
| eMFC | : | Enhanced Market Flow Calculator |
| ELMP | : | Extended Locational Marginal Pricing |
| EMS | : | Energy Management Systems |
| FERC | : | Federal Energy Regulatory Commission |
| FFE | : | Firm Flow Entitlements |
| FFL | : | Forward Flow limits |
| FTR | : | Forward Transmission Rights |
| GTL | : | Generator to load |
| ICAP | : | Installed Capacity |
| IDC | : | Interchange Distribution calculator |
| JCM | : | Joint Common Market |
| JOA | : | Joint Operating Agreement |
| M2M | : | Market to Market |
| MHEB | : | Manitoba Hydro Electric Board |
| MI-ONT PARS | : | Michigan Ontario Phase Angle Regulator transformers |
| MISO | : | Midcontinent Independent System Operator, Inc. |
| NMRTO | : | Non monitoring RTO |
| OA | : | Operating Agreement |
| OATT | : | Open Access Transmission Tariff |
| PARS | : | Phase Angle Regulator transformers |
| POD | : | Point of delivery |
| POR | : | Point of receipt |
| PTP | : | Point to Point |
| Q1 | : | Quarter 1 |
| QC | : | Quad City Units |
| RTO | : | Regional Transmission Organization |
| SPP | : | Southwest Power Pool |