

JCM Drill Down Report

February 19, 2015

The purpose of this document is to provide a brief description of each component listed on the JCM Work Plan Timeline compiled by PJM and MISO. This Drill Down Report has been created in order to track the progress of the JCM stakeholder process as well as keep interested stakeholders informed regarding the progress of the stakeholder discussions. The Drill Down Report will be updated as necessary to reflect the status of this effort on an ongoing basis.

CATEGORY I: MARKET OPERATIONS

RTO-to-RTO Data Exchange and Transparency

Description: PJM and MISO have implemented regular posting of the information requested by the stakeholders through the JCM process. Therefore, this item is considered to be completed. However, the RTOs recognize that additional transparency initiatives may arise as the JCM process proceeds, and they will be addressed as needed.

Deliverable(s): Public posting of data, process documentation, etc. that provides market participants with information and insight into the operation of the market-to-market coordination process.

Timeline: ongoing

Status: This item has been completed. MISO and PJM Market-to-Market Hourly Settlement Data, Active Flowgates, and Firm Flow Entitlements is available at the MISO and PJM Joint and Common Market Website at: <http://www.miso-pjm.com/markets/jcm-settlement-data.aspx>

Day-Ahead Market Coordination

Description: This item deals with both the near-term, day-to-day coordination between the two RTOs' day-ahead market operators as well as the longer term issue of whether and how the day-ahead Firm Flow Entitlement (FFE) exchange provisions in the JOA should be updated or redesigned. Day-to-day coordination improvements have been identified by stakeholders as a high priority area for examination, and the RTOs have made significant progress in that area. Analysis of the

FFE exchange provisions of the JOA, how they could be implemented as they currently exist, and how they could be potentially redesigned to maximize economic benefits and efficient utilization of transmission facilities intended in the JOA is also a high priority issue, and addressing that issue will require significant RTO staff and stakeholder analysis and discussion.

Deliverables: Potential JOA and process changes specific to day-ahead market operation

Timeline: Given its complexity, this effort will likely extend into 2015 through the JCM stakeholder process, with potential implementation, if agreed to, in 2016.

Status: Day-to-day coordination improvements have been completed between the two RTO's day-ahead market operations. These coordination efforts include the coordination of flowgates and constraints for any know or expected system conditions relative to the timing of each RTOs Day-Ahead and FTR market auctions. Efforts are currently underway to coordinate and exchange flowgates on a monthly basis as well as the development of procedures to determine firm flow entitlements for non-monitoring RTO flowgates and exchange on a monthly basis. In addition, procedures for the coordination and the exchange of temporary constraints are currently under development.

Current initiatives are focusing on project execution of a robust MISO-PJM data exchange and a joint cost/benefit study in support of potential improvements to DA flowgate utilization on the seam (expected Q2-Q3 2015).

Transmission and Generator Outage Coordination

Description: Both RTOs recognized the opportunity to implement improved outage coordination. Additional coordination of outage schedules may allow the RTOs to reduce resulting congestion and provide additional transparency to market participants through modeling outages in their respective FTR auctions. Staffs are in the process of exchanging data, evaluating and validating potential impacts, and will report these results to stakeholders along with developing additional proposals as warranted for stakeholder consideration.

Deliverable(s): Potential process changes regarding outage information exchange or outage scheduling timelines pending analysis of costs/benefits.

Timeline: The goal is to reach resolution by February 2014, which will facilitate implementation of process changes prior to the PJM and MISO 2014/2015 annual ARR allocations and FTR auctions.

Status: Complete, with on-going monitoring. MISO and PJM provided a final update at the January 2014 JCM meeting and agreed that the enhanced coordination between FTR groups will further improve PJM's FTR funding. MISO Transmission Owners have agreed to submit planned transmission outage requests for critical facilities further in advance that will facilitate increased coordination of outage schedules amongst the RTOs and further improve funding. The RTOs have agreed to continue analysis of reasons for short-term flowgate requests and investigate ways to reduce the volume.

Interchange Scheduling Business Rule Alignment

Description: RTO staffs and stakeholders have indicated that market participants would have more flexibility in scheduling interchange between the PJM and MISO markets if the rules for submitting interchange schedules were better aligned. MISO has determined that a reduction of the real-time schedule notification deadline from 30 minutes to 20 minutes can be supported, which will align with PJM's current rule in that aspect. MISO plans to submit a compliance filing to FERC in the Order 764 docket that will clarify and solidify its current scheduling rules. PJM will approach its stakeholders to move to the MISO rules for intra-hour interchange scheduling and remove the 45-minute duration requirement if FERC approves the MISO filing.

Deliverable(s): MISO compliance filing in FERC Order 764 Docket; potential MISO and PJM interchange scheduling rule changes for improved alignment.

Timeline: MISO has implemented 20 minute notification period as of October 15, 2013. Per FERC's direction under Order 764 proceedings, MISO will allow intra-hour schedule changes along with intra-hour settlement process expected to be implemented in 2015. PJM has completed its compliance filing process with respect to FERC Order 764.

Status: Completed, pending implementation by MISO in 2015. MISO has implemented 20 minute notification period as of October 15, 2013. Per FERC's direction under Order 764 proceedings, MISO will allow intra-hour schedule changes along with intra-hour settlement process expected to be implemented in 2015. PJM has removed its minimum, 45-minute duration requirement as a result of compliance with FERC's orders in the 764 proceeding. Once MISO's changes are completed, PJM and MISO's scheduling rules will be aligned.

Freeze Date for Firm Flow Entitlement Calculations

Description: Certain components of the calculations utilized to determine the Firm Flow Entitlements that are in turn used to, among other things, determine market-to-market settlements rely on the establishment of a historic reference date on which Firm Point-to-Point reservations and Network resources are based. This historic reference date is known as the "freeze date" and is currently established as April 1, 2004 based on the date that PJM and MISO began market-to-market coordination. The RTOs and their stakeholders have agreed that the concept of using a freeze date, as well as what that specific date should be, should be revisited given that the period since the current freeze date is approaching 10 years. This is a very complex subject, and as such will require in-depth stakeholder education and discussion. Further, the alternatives to the current approach will be equally complex, as will determining the impacts of potentially moving to an alternative approach.

Deliverables: Potential JOA and Interregional Coordination Process (ICP) changes regarding the development of historic allocations of transmission capability.

Timeline: Given its complexity, the RTOs expect that discussion of this issue will extend through the end of 2015

Status: The RTOs, with inputs from stakeholders, are currently working with the Congestion Management Process Working Group (CMPWG) on Freeze Date Alternatives. The CMPWG approved guiding principles for freeze date replacement. The options under consideration (PJM-SPP and MISO proposals) are being compared and contrasted against the current approach. The CMPWG will discuss and test the proposed

options, and is targeting a recommendation to the CMPC in Q1 2015.

Interface Pricing

Description: The RTOs and stakeholders have identified opportunities for increasing the effectiveness of the interface prices that are established to price interchange between the RTOs. The RTO staffs have produced analysis of the current interface price performance, and will discuss proposals with stakeholders as to how the interface definitions could be updated to improve the effectiveness of the price signals provided to market participants.

Additionally, the MISO IMM has indicated a concern with respect to the inclusion of external constraint congestion impacts in interface prices. The RTOs agree that the identified issue is a high priority for investigation and if necessary, resolution.

Deliverable(s): Potential rule, JOA and/or Tariff changes regarding how interface prices are established and how congestion prices are included in interface price calculations.

Timeline: Given the complexity of this subject, additional JCM discussion is warranted given comments received on this subject, and the RTOs expect such discussion may extend through 2015.

Status: MISO and PJM staffs continue to evaluate options to resolve the issue of overstatement of external congestion value raised by the MISO IMM. MISO and PJM have formed the Interface Pricing Small Group to coordinate on the development of interface pricing design. Workshops were held on November 18th and December 16th.

Treatment of Ontario-ITC PARs in the Market-to-Market Process

Description: The Ontario-ITC PARs are currently modeled in the Market Flow and Firm Flow Entitlement calculations as free-flowing ties. Conversely, the PARs are modeled as open circuits in the Interchange Distribution Calculator (the industry tool used to determine transaction curtailments through the NERC TLR process) during times when they are determined to be adequately controlling flows across the interface. The RTOs have committed to work with the other Balancing Authorities

around Lake Erie to evaluate the performance of the PARs being able to manage Lake Erie loop flows after one year of operation to determine whether modeling in the Market Flow and Entitlement calculations should be changed to better reflect their actual operation.

Deliverable(s): Analysis of the performance of the PARs through the first year of operation; potential changes to how the PARs are modeled in the Market Flow and FFE calculations.

Timeline: The RTOs completed the analysis at the end of 2013, and are engaged in ongoing stakeholder discussion through the JCM process. The RTOs expect to be able to conclude this discussion by the fall of 2014.

Status: Complete, with implementation scheduled for 2015. MISO, PJM, and IESO have completed their review of the operational performance of the PARs on the Ontario-ITC PARs on the Michigan-Ontario interface in January 2014 and presented the findings of this review at the January 24, 2014 JCM meeting. MISO and PJM staffs evaluated options to include the modeling of Ontario-ITC PARs in the Market Flow and FFE calculations. MISO and PJM staffs have reached agreement and are now working through the implementation requirements and schedule.

Use of the Ontario-ITC PARs for Congestion Management

Description: The Ontario-ITC PARs are currently operated in a manner such that actual flows across the Ontario-ITC interface are aligned with the scheduled values to the greatest extent possible. The potential may exist to implement an alternative operating protocol for the Ontario-ITC PARs such that instead of the current operating protocol of the intent to match the flow across the interface to the scheduled amount, they could be operated to minimize congestion on facilities that experience flow impacts around Lake Erie. Analysis will be required to determine the costs and benefits of changing the current complex operating protocol, there are multiple entities around Lake Erie that will need to be involved in the analysis and discussion, and multiple regulatory authorities will need to approve any change to the operating protocol (FERC as well as the DOE).

Deliverable(s): Cost/benefit analysis of changing the operating protocol for the Ontario-ITC PARs; potential operating protocol changes pending the results of the cost/benefit analysis.

Timeline: The RTOs expect that the effort will extend through 2014, and plan for it to conclude in the Spring of 2015.

Status: This effort is currently on hold pending resolution of the treatment of the Ontario-ITC PARs in the M2M process.

Interchange Optimization

Description: Both MISO and PJM Independent Market Monitors have stated in their respective State-of-the-Market reports that real time interchange between PJM and MISO could be accomplished more efficiently and the Participants have not been fully effective in arbitraging the price differences in real time. Other analysis suggested that Participant scheduling in reaction to price differential leads to significant volatility of the energy transfers (Net Interchange) across the seam and creates operational challenges and market impacts. In addition, the RTO staffs have been analyzing instances where it appears that interchange between the markets could have been coordinated more efficiently. The results of that analysis, which were concluded in the Fall of 2013, has been utilized to develop recommendations as to how the RTOs could achieve more optimal coordination of interchange in the future. The work currently ongoing between PJM and NYISO with respect to Coordinated Transaction Scheduling will also inform the PJM/MISO JCM process on this issue.

Deliverable(s): Analysis of operating events; potential JOA and/or Tariff rule changes to implement procedures or market rules to better optimize interchange between PJM and MISO.

Timeline: The RTOs expect that the JCM effort on this issue can be concluded in November of 2014, with individual RTO stakeholder process continuing until February of 2015.

Status: MISO and PJM staffs have completed their analysis of historic operating events and have begun meetings to develop an Interchange Optimization proposal for consideration by MISO and PJM

stakeholders. MISO and PJM have held multiple workshops with stakeholders. A FERC filing is targeted for Q2 2015 and implementation in 2016.

Use of Commercial Flow in M2M Process

Deliverable(s): In the M2M process, Market Flow (MF) is the flow on a specified flowgate as a result of dispatch of generating resources serving market load within a Market-Based Operating Entity's market. The calculation of the Market Flow is important because it determines the flow contribution on each flowgate which ultimately is used for determining the M2M payments associated with under or over usage of the system. The Market Flow calculations specific to the treatment of imports and exports needs to be reexamined in order to ensure consistency with the flow-based pricing systems utilized by the RTOs, Commercial Flow ("CF"). Proper alignment of Commercial Flow with M2M Market Flow ensures that Balancing Congestion and M2M payments can offset each other when each RTO keeps to their entitlement values.

Timeline: Discussions will continue through 2015, and, if agreed to, implementation would be in 2016.

Status: PJM has developed a proposal that would change today's M2M settlement process that uses market flows, which does not include transactions. MISO is reviewing alternate proposals to address the alignment issues without altering the current settlement process as this issue is dependent on resolution of the Interface Pricing issue. Updates will be provided at future JCM meetings.

CATEGORY II: RESOURCE ADEQUACY

Capacity Deliverability (i.e. Network Service Coordination)

Description: RTO staffs will initiate the "fact-finding" effort through the JCM stakeholder process as requested by OPSI and OMS. Through the Fact-Finding requested by the states, the JCM process would make tangible progress on this issue and examine what changes would be necessary, and whether such changes would be cost beneficial, to enable units in one region to be deliverable in the adjoining region

without the need for multiple transmission service analysis to be performed once the deliverability analysis for a resource is completed. The fact-finding will ensure that issues are appropriately framed and narrowed by a date certain, such that solutions to those issues which are determined to be cost-beneficial to resolve are implemented on a to-be-determined schedule. After completion of the fact finding, the parties can agree whether they wish to undertake further work on this issue or whether either party wishes to present the remaining issues to FERC based on the fact finding record and JCM activities created through this process.

In an effort to address the items that were detailed in the OMS/OPSI filing in FERC docket AD12-16, as well as the OMS/OPSI presentation at the open FERC meeting on June 20, 2013, the fact-finding will begin with technical analysis of how the results of the unit-specific deliverability determination as it is currently conducted by the two RTOs would change if it were executed using an expanded network model that included a more detailed representation of the combined PJM/MISO footprint. This initial analysis will identify whether there are either additional constraints that need to be considered with respect to the deliverability of individual units to each RTO's load, or whether there is additional generation that could be deliverable to each footprint's load as a result of using an expanded, more detailed model.

The results of that technical analysis will then be expanded to determine if beneficial differences in results could be achieved by including generators in the other RTO's area in the studying RTO's deliverability analysis, in order to simulate enhanced energy market coordination. Groups of generators in the other RTO would be included in the studying RTO's Generator Deliverability Analysis as if it were generation in the RTO performing the analysis. That is, for these groups of other RTO generators, the RTO would change the static dispatch level currently in the model and instead set their dispatch level in the same manner as the RTO sets the dispatch level of its own modeled generators and will perform a deliverability analysis on these generators as well.

The initial groups selected for this analysis are those in the areas of generators in the other RTOs territory that are already Capacity Resources for the RTO performing the analysis, but that the analysis continue with other groups of generators throughout the other RTOs

footprint. This analysis would demonstrate whether additional generators in the other RTO, on a unit-specific basis, would be deliverable to the RTO performing the analysis should they request such qualification. It could also potentially reveal additional transmission constraints that should already be considered in the RTOs' current deliverability analyses. This second analysis would be informative because it would highlight whether updated assumptions in the Planning analysis would reveal areas where additional resources could potentially be certified as deliverable to load across the seam in order to maximize the transmission service that can be made available to facilitate Capacity transfers, should such transmission service be requested.

Third, the RTOs will analyze what it would take (including the costs and benefits of same) to move to a fully networked deliverability analysis to the combined footprint load and will conduct deliverability tests using this combined footprint load to reveal potential deliverability results under this methodology.

The results from these analyses would then be used to inform analysis of the benefits of conducting the generator deliverability tests with a more integrated approach taking into account all other energy and ancillary service market changes that may be required in order to implement such an approach. The output of these incrementally more complex analyses would be synthesized to develop responses to the six (6) critical issues identified in the OMS/OPSI filing, as well as the majority of the steps identified in the OMS/OPSI June 20, 2013 presentation.

The RTOs would also develop methodologies for determining the maximum quantity of Capacity that can reliably be committed from resources external to its footprint, as noted in the OMS/OPSI presentation.

PJM is conducting an analysis of the level of Capacity imports that can be reliably supported by physical transmission system capability in the RPM Capacity auctions. PJM is working with its stakeholders to develop a process by which to ensure that the quantity of external resources committed through RPM to serve PJM's Capacity requirements can reliably be imported with the planned transmission system. While this effort will proceed independent of the fact-finding

process described here, PJM will coordinate with MISO as this methodology is developed, and as MISO develops or refines its own methodology for the same purpose. Together, the three-step analysis described above and the two RTOs' Capacity import analysis will provide the technical analysis necessary to complete the fact-finding envisioned by OPSI/OMS. PJM and MISO will then work to identify the feasibility of changes required to market rules and operating protocols that would be required to implement the changes to the deliverability analysis that the fact-finding determines to be beneficial to pursue. Identification of these required changes will form the basis for the cost/benefit methodology that is the last step in the OMS/OPSI fact-finding process.

In the course of completing the technical analysis described above, PJM and MISO will also investigate and determine potential resolution for the following issues that were identified through the JCM process to date: Dispatch Control Requirements for External Resources, Existing Generation Deliverability Assessment; Transmission Limitations; Day-Ahead Market Coordination, and Assess Physical Transfer Capability of Existing Transmission

Deliverables: Written Report documenting the methodology and results from the deliverability analysis conducted on a detailed model of the combined RTO footprints as described in the three steps above; written answers to the questions and issues listed in the OMS/OPSI fact-finding request including discussion of feasibility of and requirements for changing the processes in either RTO to enable any changes identified in the deliverability analysis ; documentation responsive to the issues (numbers 2, 3, 4, 5, and 6 as indicated on the capacity deliverability work plan) listed above that were identified through the JCM process. Preliminary results and review of progress will be undertaken through the JCM process and related consultation with OPSI and OMS.

Timeline: The fact-finding effort and associated production of deliverables was completed in April, 2014. The RTOs will continue to update stakeholders with progress reports at each JCM meeting, and stakeholders will have the opportunity to provide feedback regarding analysis conducted at the point of each JCM meeting as well as feedback on the cost-benefit analysis and plan to move forward. If the fact-finding effort results in a product that is determined to be cost-beneficial to address, based on the RTO analysis and stakeholder input

and feedback, then the RTOs will work with stakeholders to develop proposals to resolve those issues by the Fall of 2014. Any agreed-upon resolutions will be, to the extent possible, implemented by the RTOs' respective Capacity auctions in the Spring of 2015.

Status: The analysis documented in the plan submitted to FERC is completed and a fact-finding report has been finalized. MISO and PJM were able to complete a coordinated study on deliverability despite the different approaches. The study indicates that more than 96% of MISO and PJM units are jointly deliverable to the aggregate MISO and PJM load footprint and the total transmission capability between the two systems is quite significant. After comparing with existing utilization the RTO's found that the transmission capability in the MISO to PJM direction is almost fully subscribed while the transmission capability in the PJM to MISO direction is minimally utilized for capacity. Therefore, there could be some potential benefit in the PJM to MISO direction. Based on the fact-find results future work will focus on efficiencies for PJM resources to serve MISO load.

CATEGORY III: TRANSMISSION PLANNING

Generation Interconnection and Transmission Service Request Queue Coordination

Description: The RTOs addressed improved coordination of these queue processes in 2012, and implemented changes to their respective business process manuals. The RTOs further agreed to revisit these processes after gaining experience with the improvements and recommend to the stakeholders whether further enhancements would be beneficial.

Deliverable(s): Potential additional changes to the RTOs' generation interconnection and transmission service request queue processes.

Timeline: Stakeholder review of the current processes was initiated in the Spring of 2014 and is scheduled to conclude in the Fall of 2014.

Status: Complete. MISO and PJM staff will continue to monitor the existing coordination and propose future enhancements, as necessary, at future JCM meetings.

Order 1000 Interregional Compliance and Regional Planning Coordination –

- Description:** Both RTOs submitted their Order 1000 interregional compliance filings on July 10, 2013. As such, the RTOs consider the Order 1000 component of the planning coordination effort to be complete until such time as further compliance requirements may be ordered by the FERC. In particular, the RTOs note that disagreement exists with respect to interregional cost allocation for cross-border reliability projects, and therefore it is likely that further filings will be required of one or both RTOs. Additionally, coordination of the RTO planning efforts will continue through the Interregional Planning Stakeholder Advisory Committee (IPSAC).
- Deliverable(s):** Stakeholder updates on Order 1000 compliance filings and on-going planning coordination activities.
- Timeline:** Ongoing - continuous updates will be provided to the JCM stakeholder group through standing agenda items at the JCM meetings.
- Status:** Efforts are currently in progress in response to Order 1000 compliance process requirements. These efforts include the exchange of models, contingencies and monitored elements. In addition, market efficiency planning efforts are also underway to address cross-border flowgate congestion. MISO and PJM will be addressing further Order 1000 interregional coordination and cost allocation compliance requirements in 2015.

Market Participant Funded Upgrades and ARR Requests

- Description:** The JCM effort on this issue has begun. The RTOs have previously addressed increased coordination in this area in 2012 and 2013 and filed resulting JOA changes in December of 2013.
- Deliverable(s):** Potential additional JOA and/or Tariff rule changes pending stakeholder review of the current processes.
- Timeline:** The RTOs initiated stakeholder education on this issue in January of 2014. Given the level of coordination that has already occurred in this area, the RTOs expect that the JCM stakeholder discussion can conclude in March of 2014. The Work Plan includes individual RTO stakeholder discussion through the Summer of 2014, in recognition that

further coordination steps may be identified through the JCM discussions that will require consideration by the individual stakeholder processes.

Status: Complete. Depending on discussions at the future JCM meetings, RTOs can recommence this issue to further enhance the coordination steps.

Cross Border Planning Projects

Description: The RTOs' current cross border planning process has not yet resulted in any projects. A review of the similarities and differences of the RTOs' regional and joint study processes will determine areas where more alignment would be beneficial. This review may encompass interconnections, retirements, models, coordination, metrics and assumptions.

Deliverable(s): Potential additional changes to the RTOs' planning practices and coordination.

Timeline: Stakeholder review of the current processes will be initiated with the Annual Issues Review in the Fall of 2014 and is scheduled to conclude in June of 2015.

Status: MISO, PJM and its stakeholders have been focused on lessons learned from the coordinated study that finished in 2014 without identification of a cross-border project and are working to identify "quick hit" projects to specific congestion problems along the seam. Updates will be provided at future JCM meetings.