DRAFT Capacity Deliverability Fact Finding Summary Report

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CAPACITY DELIVERABILITY FACT FINDING #1 AND 2 SUMMARY REPORT

1 Background

MISO and PJM identified that Stakeholders in both RTOs would benefit by aligning certain processes as if both RTO footprints were combined. This effort, established in 2005, was called the Joint and Common Market (JCM) initiative. The JCM initiative was initiated with a whitepaper which detailed benefits that could be gained by coordinating market operations and ensuring there are no impediments to trade in either, both, or between the markets. The JCM whitepaper reinforced that well-functioning, efficient, and competitive markets benefit customers because they:

1. Provide information about the value of energy to buyers and sellers active in the markets who, through their market actions, produce competitive prices.
2. Create incentives for efficient production.
3. Allocate scarce resources efficiently.
4. Create incentives for efficient investment where and when needed by highlighting scarcity through price signals.
5. Provide customers with new options and flexibility for meeting demand.
6. Allow many buyers and sellers to participate.
7. Minimize barriers to entry or to efficient utilization of the regional transmission system.
8. Enable effective mitigation of market power and/or manipulation.

Capacity Deliverability refers to enabling efficient capacity transactions across the seam through the extension of network service, or a similarly efficient transmission service. The end goal of the proposal is to facilitate the commitment of the least-cost set of resources to meet the resource adequacy requirements of the combined footprint subject to the limitations of the transmission system to deliver Capacity across the seam. More specifically, the concept would be to determine an aggregate amount of Capacity resources that could be deemed deliverable to both RTOs, prior to the execution of the RTOs' respective Capacity auctions such that the resources that economically clear in those auctions can be awarded Firm scheduling rights for the energy associated with their capacity commitments.

As part of the original JCM initiative, MISO and PJM conducted a joint deliverability study in 2006. The goal of the study was to evaluate the potential for combined deliverability of Network Resources within both RTOs to a combined RTO footprint. The methodology used the standard deliverability process employed by both RTOs at the time and applied it to the combined footprint as if it were one large market. This joint analysis concluded that over 95% of the generation in the combined footprint

was deliverable to load within the combined footprint. However, no further action was pursued at the time.

On July 16, 2012, MISO and PJM resumed the meeting of the JCM to continue working on a variety of seams issues based on priorities established by the joint set of RTO stakeholders. The JCM joint stakeholder group has met regularly since the re-initiation of the process, establishing a shared set of issues, priorities, key activities and deliverables.

At the June 20, 2013 meeting of the Federal Energy Regulatory Commission, the Organization of MISO States (OMS) and the Organization of PJM States, Inc. (OPSI) made a commitment to, among other issues being addressed through the JCM process, study issues pertaining to the capacity deliverability between the PJM and MISO seam. MISO and PJM collectively submitted a work plan to FERC on September 26, 2013 that included the capacity deliverability issue along with the other issues identified in the OMS/OPSI and the PJM/MISO Joint & Common market ("JCM") processes. Included in that work plan was the completion of a "fact-finding" analysis to further explore the issues associated with the Capacity Deliverability proposal and determine, through the results of the analysis and coordination with OMS, OPSI and the joint stakeholders, a path forward on the Capacity Deliverability issue.

The fact-finding task 1 included identifying and then implementing an agreed upon methodology for determining joint capacity deliverability to the combined MISO and PJM footprint. The joint capacity deliverability analysis was performed in a three tiered approach where both, MISO and PJM, performed the deliverability analysis as follows.

1. Step 1 –MISO and PJM performed the deliverability analysis for their respective generation fleet, to their own load, to determine how the results of the individual RTOs' generator deliverability tests would change if the tests were conducted on a more detailed system model of the two RTO footprints.
2. Step 2 – MISO and PJM performed the incremental deliverability analysis to determine how much of the other RTO's generation fleet was deliverable to the RTO performing the deliverability analysis.
3. Step 3- MISO and PJM performed the joint deliverability analysis to evaluate how much of the combined generation fleet in PJM and MISO could be deliverable to the combined MISO and PJM load footprint.

The fact Finding task 2 included the determination of total capacity transfer capability, in both directions, between MISO and PJM respectively, that can reliably bid into PJM's Capacity Market from MISO and vice versa. MISO and PJM have outlined steps to establish transmission system limitations for Capacity Export Limits from each MISO Local Resource Zone to PJM, Capacity Export Limit from MISO to PJM, Capacity

Import Limits into each MISO Local Resource Zone from PJM, Capacity Import Limit from PJM to MISO, and Capacity Import Limit into PJM from MISO.

The fact-finding plan also included identification of a methodology for determining a cost/benefit analysis of implementing any resolution to the identified issues with the Capacity Deliverability proposal. The methodology will be used to forecast costs and benefits at the wholesale level associated with proposed capacity deliverability solutions. The cost/benefit analysis began in October 2013 with an estimated completion date of the second quarter of 2014.

As the RTOs indicated in the work plan filed with FERC in September of 2013, this report also contains preliminary responses to the Capacity Deliverability issues identified in the work plan. This report also contains responses to the six (6) issues identified by OMS/OPSI in their presentation from the June 20, 2013 FERC meeting.

2 Overview of findings

The fact finding analyses related to Joint Deliverability under Fact Finding #1 although conducted independently, were coordinated between MISO and PJM. These analyses, combined with the identified potential benefits such as increased ability for the footprint to access least cost resources, increased certainty for resource owners and ensuring transmission investment is focused in the right areas, signal that further discussion of this topic is warranted. Additional discussion would be beneficial because the RTOs have identified a number of additional prerequisites that should be addressed to fully understand the costs and benefits of implementing a "networked" deliverability process.

The detailed results of the technical analyses are attached as appendices to this report. The following table illustrates a high level summary of the results of those analyses.

Table1. MISO Analysis Results for Joint Deliverability

Analysis Description	Generation (MW)	Approximate ER (MW)	Tested NR level (MW)	Calculated Restricted NR level (MW)	Calculated Deliverable Capacity Resources (MW)	Calculated Deliverable Capacity Resources (% of Tested NR)
MISO Generation	190,405	22,940	167,465	7,358	160,107	95.61%
PJM Generation	233,612	21,107	212,505	9	212,496	100.00%
MISO + PJM Joint Deliverability	424,017	44,047	379,970	7,367	372,603	98.06%

Table2. PJM Analysis Results for Joint Deliverability

Analysis Description	Generation (MW)	Approximate ER (MW)	Tested NR level (MW)	Calculated Restricted NR level (MW)	Calculated Deliverable Capacity Resources (MW)	Calculated Deliverable Capacity Resources (% of Tested NR)
PJM Generation	**231,569**	**21,107**	**210,462**	**1,684**	**208,778**	**99.2%**
MISO Generation	**167,079**	**0**	**167,079**	**10,359**	**156,720**	**93.8%**
MISO + PJM Joint Deliverability	**398,648**	**21,107**	**377,541**	**12,044**	**365,497**	**96.8%**

2.1 Implement methods for setting limits that respect the physical topology of the system

Transition to a "networked" deliverability process would require that limits be defined to ensure that the physical transmission limitations on the amount of Capacity that can be reliably transferred between the RTOs are respected. MISO has such a method in place to determine Capacity Import Limits and Capacity Export Limits through its Module E tariff process. For PJM, such a transition is dependent upon FERC approval of PJM's Capacity Import Limit filing, currently pending at the Commission in docket ER14-503. Further, PJM may determine that adjustments to the Capacity Import Limit analysis process may be required should a networked deliverability approach be adopted. Such adjustments may be necessary because the current PJM process relies on the fact that there is also a unit-specific deliverability test from each resource specifically to PJM load. If PJM and MISO are to transition to a "networked" approach to the unit-specific deliverability analysis, then the PJM Capacity Import Limit determination may need to adjust to take the networked deliverability analysis into account. MISO is evaluating whether additional modifications may be needed to its protocol as well. Additionally, the RTOs will need to agree to a methodology to reconcile differences between the limits calculated by the other RTOs and their own limit calculations. The limits, calculated as part of Fact Finding#2 analysis, were fairly similar for both RTOs, although not equal.

2.2 Implement operational protocols that respect capacity commitment

in order to implement a joint deliverability process, the RTOs must implement real time operational protocols such that they will treat energy deliveries from Capacity Resources physically located in their footprint but committed to loads in the other RTO's area with the same priority as their own internal Capacity Resources with respect to the transfer of that energy to the RTO to which the Capacity is dedicated. In other words, the exports of energy from such resources to the RTO to which the Capacity is dedicated would be treated with the same priority and using the same real-time operational protocols to access that energy, as all other Firm service, including native load is handled. This means for example that, unless a committed PJM Capacity Resource is forced out of service or otherwise unavailable, MISO will deliver energy to PJM in an amount equivalent to the Capacity commitment for each resource regardless of whether internal, MISO constraints prevent delivery of energy from that resource to PJM. The same would be true with respect to energy deliveries in the amount of committed Installed Capacity from PJM to MISO. The only exception would be that neither RTO would be required to take steps to ensure such energy delivery that the other RTO would not take to deliver energy from its own, internal resources to its load in emergency conditions.

2.3 Eligibility of resources to participate in auctions must reflect expected deliverability

In order to have confidence in the energy delivery from resources that are declared to be eligible to offer into PJM's RPM Capacity Market, such resources would need to pass the networked deliverability analysis. In other words, the amount of Capacity for which resources are qualified to deliver to the combined footprint load will be adjusted down to account for overloads that restrict unit deliverability. As a corollary, the resources (or portions of resources) physically located in one RTO that show "0MW" joint deliverability would not be qualified to offer into other RTO's Capacity Auctions. The RTOs also need to address what will happen if an external resource that was previously cleared in an auction, or otherwise designated as a capacity resource, subsequently is found to not be deliverable up to the previously cleared quantity in a subsequent analysis, and also what happens to units that have historically been jointly deliverable, although not committed in the other RTO's Capacity auction but are found not to be deliverable for future years prior to the execution of a PJM Capacity auction.

2.4 Transmission planning and cost allocation should appropriately reflect auction commitment and beneficiaries

Ongoing transmission system planning would need to be conducted such that Capacity Resources dedicated to the RTOs' loads, regardless of the RTO in which they are physically located, are maintained as deliverable to the load for the time period for which they are committed. Additional work is required to ensure alignment of regional transmission planning, interregional transmission planning, generator interconnection and transmission service analyses related to system upgrades. As the planning issues are worked through and the planning methods evolve, the RTOs must continue to ensure that cost allocation for upgrades necessary to maintain delivery of resources continues to provide appropriate matching of costs and beneficiaries.

2.5 Market to Market Processes should reflect joint deliverability construct

In the Market-to-Market(M2M) process, the RTOs should receive entitlements on each other's flowgates based on the delivery of the output of Capacity Resources committed to serve their respective loads. Currently, the RTOs receive flowgate entitlements based on the historic resources assumed to serve load in historic control areas (also known as Local Balancing Authorities or Control Zone within the RTO). The RTOs need to further discuss and evaluate options to change flowgate entitlement process such that it reflects capacity commitment of the resources as per the joint capacity construct.

2.6 Treatment of Existing Firm Transmission Service Reservations

The disposition of existing property rights to Firm transmission service would need to be determined. The concept of joint deliverability would be to assign Firm scheduling rights to resources that clear in the RTOs' Capacity auctions. Therefore, the treatment of existing Firm rights needs to be investigated.

3 Resolution of Open Issues Identified in the Work Plan

This section of the report provides the RTO staffs' responses to each of the Capacity Deliverability issues listed in the work plan. The issues are listed according to the numbers assigned in the work plan as a direct reference to the work plan document. The responses provide a description of what would be necessary to address each issue, together with the level of effort the RTO staffs believe would be required.

3.1 Issue 1: Preventing Transmission Cost Shifts

As discussed above, the RTOs believe this issue would be addressed by ensuring appropriate cost allocation for transmission upgrades required to maintain deliverability of resources in one RTO that are committed to serving load in the other RTO. In other words, cost allocation processes would need to ensure that if a resource's capacity was committed to the neighboring RTO, then cost allocation for any transmission upgrades required to maintain the deliverability of that resources to the RTO to which the resources is committed would be borne as appropriate by either the owner of the generation resource or loads in one or both RTOs. The RTOs would need to develop a process by which they determine whether transmission upgrades should be planned to provide or maintain joint deliverability of a given resource, as opposed to providing or maintaining deliverability to the physical host RTO's load only. Consideration of the entities to which such costs are allocated could be dependent on such factors such as the reason why a particular resources is not or is no longer deliverable to the load to which it is committed. Further work is required in this area to ensure understanding of how existing planning and cost allocation methods apply and whether there are unintended consequences which would require modifications to either. To the extent changes to cost allocation methods are required, that effort is expected to be challenging.

3.2 Issue 2: Dispatch Control Requirements:

PJM and MISO have resolved this issue. Pseudo-tying resources for which capacity is committed to another RTO is the preferred mechanism, however dynamic and block scheduling are also permitted.

The RTOs reviewed current practices and documentation surrounding External Resources. The RTOs observed that External Resources were currently participating in each market, and were meeting their must-offer obligations by pseudo-tying out of the native Balancing Authority area (i.e., altering the metered boundaries between Balancing Authorities) or transaction tags (which could by fixed or dynamic schedules).

In regard to curtailment, the RTOs noted that all Resources, internal or external, were subject to curtailment of energy delivery during congestion, either by security constrained dispatch (for internal or market-to-market constraints) or by Transmission Loading Relief (TLR) curtailments (which can affect schedules and internal market flows). The RTOs noted events were TLR curtailments have resulted in less efficient congestion management than security constrained re-dispatch, and thus the RTOs expressed preference for pseudo-tying of external resources over scheduling (tags). However, this is currently not a requirement for participation in either RTO's capacity construct, nor would development of a joint deliverability transmission product necessitate addition of new dispatch control requirements.

In summary, the RTOs have concluded that Issue #2 is not a barrier to the development of a joint deliverability transmission product.

3.3 Issue 3: Existing Generation Deliverability Assessment; Transmission Limitations

This is addressed via the completion of Fact-Finding steps 1 and 2 through the description and results of the RTOs' technical analysis included elsewhere in this report.

3.4 Issue 5: Day-Ahead Market Coordination

This issue could be addressed through the creation of operational procedures by which the RTO to which external Capacity Resources are committed will receive the energy associated with the quantity of committed Installed Capacity as long as the unit-specific resource is not forced out of service or otherwise unavailable. The physical host RTO would be responsible for providing the required quantity of energy from other resources if it were necessary to dispatch the committed resource down to manage constraints in the physical host RTO area. The only exception would be that neither RTO would be required to take steps to ensure such energy delivery that the other RTO would not take to deliver energy from its own, internal resources to its load in emergency conditions. While this issue was originally focused on the DA market coordination and those coordination efforts will continue through the JCM process regardless of the eventual disposition of the Capacity Deliverability issue, PJM and MISO staffs have determined that the most effective resolution of this issue for joint capacity deliverability would be focused on the real time markets and the operational procedures necessary to ensure delivery of energy from committed Capacity resources to the load to which they are committed. The RTO staffs believe that such processes and protocols could be

established with a reasonable amount of effort on the part of the RTO staffs.

3.5 Issue 6: Assess physical capabilities of existing transmission

This issue is addressed via Fact-Finding Steps 1 and 2 as further described in this report. PJM notes that its current processes do not include a determination of the quantity of Capacity exports from PJM that could reliably be supported beyond the current Firm ATC analysis used in the transmission reservation process. It may be necessary for PJM to develop a Capacity export methodology that could be applied by MISO in the execution of its Capacity auctions such that PJM could ensure that the real time operational protocols to ensure the delivery of energy from resources physically located in PJM to MISO could be reliably supported. MISO has such an export limit defined, but modifications may be required. And, both parties will need to agree on how to reconcile differences in our respective analysis results to arrive at a single number.

3.6 Issue 7: FERC Order 888/889 Compliance / Existing Transmission Rights

As indicated above, a mechanism to deal with existing property rights would be required. MISO originally proposed creating financial capacity rights for this purpose, but following further deliberation, the RTOs are unsure as to whether such financial capacity rights would address the Firm energy delivery capability associated with existing transmission rights. Rather, the RTO staffs feel that a process by which existing Firm transmission reservations are maintained may be the better course. Specifically, the calculated import and export limits developed by the RTOs would be reduced by the quantity of existing Firm reservations before the net limits are then presented to the respective Capacity auctions. In this manner, the previously reserved Firm service amounts would be respected and the residual quantities would be available for the Firm energy deliveries from the Capacity resources committed via the two auctions. The RTOs would also need to determine how the assignment of Firm energy delivery rights to cleared Capacity Resources would integrate with the Firm transmission service queue processes both RTOs currently administer. The RTO staffs recognize that these are very complex issues and would likely require significant effort on the part of the RTO staffs and stakeholders to resolve.

4 Responses to the OMS/OPSI Questions Posed During the June 20, 2013 FERC Open Meeting

4.1 Determine the possibility and significance of cost shifts between MISO and PJM

To the extent that cost allocation for transmission upgrades is treated properly, there should not be significant cost shifts between the two entities. The RTOs agree that further analysis needs to be done to understand whether the existing planning and cost allocation protocols maintain that alignment of costs and benefits in a joint deliverability context, or whether changes might need to be required to ensure ongoing alignment, given that joint deliverability analysis has never before been a component of either RTO's planning processes.

4.2 Consider the impact of any proposed or revised deliverability scheme on reliability

The RTOs believe that reliability must be maintained. As described above, in order to transition to a networked deliverability process, the RTOs would need to assure each other through operational processes that the energy associated with the Installed Capacity value of committed resources was provided to the RTO to which the Capacity Resource was committed on the same basis as energy from internal Capacity resources is delivered to internal load regardless of the presence of internal constraints in the physical host RTO. The up-front deliverability analysis must be sufficiently robust such that reliability is not negatively affected.

4.3 Consider whether further work on Capacity Deliverability is cost effective

The potential resolutions listed for the issues above indicate the level of effort that PJM believes would be required to achieve that resolution. While specific dollar amounts are not yet determined, the level of effort is an indication of whether the cost is likely to be significant. The level of effort required to address these issues must be compared to the potential benefits outlined below.

MISO believes it is worthwhile to spend more time fleshing out the issues identified to better understand the extent of challenges in the implementation of the proposed capacity deliverability protocol.

4.4 Conclude whether there is an overall incremental joint deliverability benefit over that which is currently occurring.

This question would need to be resolved through further investigation and development of the issues identified above.

4.5 Consider whether the revisions can be realistically and cost-effectively implemented.

This question would need to be resolved through further investigation and development of the issues identified above.

4.6 Determine the long-term rate impact on each RTO's retail customers

This will be extremely difficult to determine with any degree of accuracy. However, any process improvements that are achieved that allow Capacity Resources to offer into either RTO more efficiently and therefore result in the most economic set of resources committed to serve Capacity requirements should result in cost reduction to the load.

5 Potential Benefits to be gained from Pursuing Joint Deliverability

1. Joint deliverability will provide certainty with respect to Firm scheduling rights and elimination of the requirement to obtain Firm transmission service either prior to or subsequent to an RTO Capacity auction. Under the PJM rules, Firm service is not required to be obtained before a resource offers into an RPM auction, however it must be obtained prior to the Delivery Year if the resource clears in the auction. Within their respective footprints, Regional Transmission Organizations (RTO) created efficiencies by expanding the pool of generation resources available to load for capacity and energy under a single transmission tariff by using the "Network Service" transmission product. Joint Deliverability essentially extends this concept across the RTO seams. Under the Joint Deliverability concept, if a resource clears in a given Capacity auction and Firm service was not previously obtained, then Firm energy delivery would be granted by virtue of the resource's commitment as a Capacity Resource.

2. Joint deliverability may lower overall costs to consumers across the two RTOs by increasing the opportunity for the RTOs to procure the least-cost set of Capacity Resources with which to meet resource adequacy needs, subject to physical limitations on transmission system capability to support transfers of Capacity between the regions.

3. Joint deliverability may have the potential to send clear signals for transmission planning investments by providing the opportunity to determine the “correct”, or most cost-effective set of transmission upgrades. For example, if circumstances arose whereby upgrades would be identified via analysis of resource deliverability to individual footprint load, but would not be necessary to accommodate joint deliverability, then potentially some upgrades could be avoided with no detrimental impact to reliability.