

MISO-PJM Interchange Transactions (October 26, 2012)

Types of Interchange Transactions

Interchange Transaction: An Interchange energy schedule or inter-BA energy schedule to move energy from one Balancing Authority to another using the NERC e-Tag system and the PJM EES system and MISO Physical Scheduling System.

Block Schedules

Most interchange transactions fall in the category of block schedule. A block schedule is requested between balancing authorities as a constant amount of power transfer (measured in MW) from a start time on a quarter hour to a stop time on another quarter hour. The MW value may change from one quarter hour to the next. As far as the market participant is concerned, the interchange transaction starts instantaneously on the quarter hour and instantaneously stops when scheduled¹.

Should a schedule be curtailed, the Reliability Coordinator sets new start, stop and MW values that may occur at any time but typically occur on the quarter hours.

Dynamic Transfers

NERC's paper discussing dynamic transfers discusses the two approaches, dynamic schedule and pseudo-tie. While the paper is geared toward transmission service providers and balancing authorities, it provides useful background and understanding for all. Appendix A to the NERC paper describes the ACE equation and how dynamic schedules and pseudo ties are accounted for in the equation.

Each dynamic transfer method enables market participants the ability to transact in the adjacent market while not being physically located in that RTO. In each case, telemetry for sourced generation or load is necessary to update the RTO's operations and markets systems. Both types require transmission service reservations.

Dynamic Schedules

Dynamic Schedules require a NERC tag be submitted for determination of tag impacts and potential curtailment to mitigate system congestion. Because dynamic schedules are tagged use of transmission service the proper modeling must be observable to the NERC IDC. For example the load served by a dynamic schedule must be included in the load forecast of the native load area with the supply being the tagged transfer unless an alternative agreement exists with the supply BA.

Dynamic schedules utilize transmission service to manage and financially account for the process of the transfer.

As outlined in PJM M41, Managing Interchange, an EES tagging special exception should be used to identify a generator associated with a Dynamic Schedule. This exception must be attached to the tag by placing it in the 'miscellaneous' column on the PJM Transmission Provider line of the 'physical path' portion of the tag.

¹ Balancing authority dispatchers in the Eastern Interconnection treat the interchange transactions as starting 5 minutes prior to scheduled start and linearly increasing to the full transfer amount 5 minutes after scheduled start.

The MISO Physical Scheduling System will validate that a MISO-market Commercial Pricing Node is used as the source or sink of the E-Tag. The generator or load name on system external to MISO is not required for PSS.

Pseudo-ties

Load served utilizing a pseudo tie would be included in load forecasts of the BA to which the load is pseudo tied. Generation or load utilizing a pseudo tie would be included in the balancing equation the BA to which the load is pseudo tied. Pseudo ties are managed as if the facilities were physically tied to the RTO footprint with physical circuits when none exist and are not tagged.

Table 1: Summary of Block, Dynamic and Pseudo-tie Scheduling

	Block	Dynamic	Pseudo-tie
TSR	Yes	Yes	Yes
eTag	Yes	Yes	No
Interchange Value	Tag sets interchange	Telemeter with/ eTag estimate	Telemeter
Ops Control	Native BA	Native BA	Attaining BA
Ancillary Services	Native BA	Native BA	Attaining BA
MISO Cap*	Qualifies	Qualifies	Qualifies
PJM Cap*	Qualifies	Qualifies	Qualifies

*This type of transaction may be used to qualify as a capacity resource.

Joint Owned Units

A Joint Owned Unit (JOU) refers to a generator for which the generation output is "owned" by multiple parties. In the area of Transmission Service, we are typically concerned with the subset of JOUs that have partial ownership internal and partial ownership external to PJM/MISO.

In the case of MISO/PJM, JOU is defined in the MISO-PJM JOA for purposes of the CMP and MFC and has a restricted definition - only units that are part owned by PJM and part by MISO members and are also pseudo-tied (dynamic scheduled) in part to each entity. See Joint Owned Units with MISO for more information on MISO-PJM JOA JOUs.

Scheduling

The NERC INT standards and NAESB WEQ-004 standards cover the industry wide reliability and business practices related to interchange transaction scheduling. Of course, MISO and PJM each implement variations and provide additional services.

Curtailling Interchange Transactions

Curtailments of PJM Capacity Resources

A Maximum Emergency event, or Capacity Deficiency, represents a system condition where generation responding to PJM price signals is not or is expected to not be sufficient to balance generation and load. Several corrective actions are available to PJM dispatchers to prevent this including (a) recalling PJM capacity resources (designated network resources) and (b) curtailing exports from PJM.

Of course, PJM cannot require external generators to provide generation to PJM unless those external units are PJM network resources. In such case, those resources must deliver to PJM when called. The converse is also true; network resources to other balancing authorities (i.e., delisted from PJM) that are located in PJM must be permitted to continue to deliver to the balancing authority to which they are designated. The export must be appropriately tagged as a capacity backed, and the delisted resource must be producing sufficient output to support the export.

In the case of an internal resource that is partially committed to PJM and partially committed to an external area, the generation owner must select where to deliver. If the participant fails to deliver the portion of capacity for which they are obligated to PJM, they will incur penalties associated with the capacity deficiency.

Ultimately, the generation owner must follow the direction of the Reliability Coordinator where they reside.

Curtailments of MISO Capacity Resources

The MISO Market Capacity Emergency Procedure for calling on external MISO capacity resources and curtailing exports from MISO is a multi-step process including the issuing of Alerts, Warnings, and Events (i.e. Energy Emergency Alert – reference the MISO Market Capacity Emergency Procedure RTO-EOP-002, Section 3.2-3.4:

Upon MISO Declaring a Maximum Generation Emergency Warning (Step 1), MISO instructs Market Participants with remaining available External Resources (Module E Registered Capacity Resources) that would be deliverable to Warning Area, given transmission constraints, to be scheduled into the MBAA for the Warning Area. MISO will provide instructions on the amount and time to schedule these External Resources into the Warning Area based on data provided. Market Participants are to report to the MISO RGD when this action is complete per the instructions.

Step 2, of the Maximum Generation Emergency Warning curtails non-firm energy sales from the defined Warning Area to BAs outside MISO's Market Area during the warning period. This includes any energy sales sourced by MISO Capacity Resources in the Warning Area, by non-Capacity Resources in the Warning Area that are not producing enough energy to support the energy sale, and by external BA Capacity Resources within MISO that are not producing enough energy to support the energy sale (MISO will also consider curtailing exports sourced from the Market in general as appropriate).

Step 3, MISO instructs TOPs to implement reconfiguration options that would increase transfer capability to the Warning Area.

MISO declaring a Maximum Generation Emergency Event includes committing demand resources, implementing maximum generator limits, load management procedures, and utilizing operating reserves as defined in Section 3.3 and 3.4 of the MISO Market Capacity Emergency Procedure RTO-EOP-002.

PJM Reference Material – Recall of Capacity Backed Resources

PJM Manual 11, Energy and Ancillary Services Market Operations

Attachment A, Interchange Energy Schedule Curtailment Order

Capacity Backed Exports are those transactions sourced from generators or portions of generators on the PJM system that are not designated as PJM installed capacity.

At Maximum Emergency, PJM will not recall any energy from a resource that is not included in PJM Installed Capacity. If a resource has been de-rated from summer peak capacity, any export that exceeds the pro-rated capacity not attributed to PJM will be reduced to that pro-rated level.

Example: Unit A has a summer rated capacity of 80 MW, where 60 MW is designated as installed capacity and 20 MW is not. A 20 MW export is scheduled from PJM. There is no outage on the unit. The full 20 MW export will be scheduled and cannot be curtailed during a PJM capacity emergency.

Example: Unit A has a summer rated capacity of 80 MW, where 60 MW is designated as installed capacity and 20 MW is not. If there is a 40 MW partial outage of the unit, 3/4 (or 60/80) of the remaining capacity is considered installed. 1/4, or 20/80, of the remaining capacity is available as non-installed capacity and will not be curtailed during a PJM Maximum Emergency. In this example 30 MW remains as PJM installed capacity and 10 MW remains available for capacity backed exports. If the owner of Unit A scheduled a 20 MW export, 10 MW could be recalled during PJM Maximum Emergency. At the conclusion of Maximum Emergency or at the conclusion of the outage, the export would be restored to the full 20 MW.

PJM Manual 13, Emergency Operations

Section 2.3.2 Real-Time Emergency Procedures (Warnings and Actions)

[Maximum Emergency] measures involve:

- loading generation that is restricted for reasons other than cost
- recalling non-capacity backed off-system sales
- purchasing emergency energy from participants / surrounding pools
- load relief measures

Step 1: Emergency Mandatory Load Management Reductions (Long Lead Time)...

Step 2: Emergency Mandatory Load Management Reductions (Short Lead Time)...

Step 3 (Real-time): Primary Reserve Warning...

Step 4 A (Real-time): Maximum Emergency Generation

The purpose of the Maximum Emergency Generation is to increase the PJM RTO generation above the maximum economic level. It is implemented whenever generation is needed that is greater than the highest incremental cost level.

PJM Actions

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PJM dispatcher determines the feasibility recalling off-system capacity sales that are recallable (network resources).

- PJM dispatch will determine any limiting transmission constraints internal to PJM that would impact the ability to cut transactions to a specific interface.
- PJM dispatch will identify off-system capacity sales associated with the identified interfaces.
- PJM dispatch will contact the sink Balancing Authority to determine the impact of transaction curtailment.
 - If the net result of cutting off-system capacity sales would put the sink Balancing Authority into load shed then PJM will not curtail the transactions unless it would prevent load shedding within PJM.
 - If the net result of cutting off-system capacity sales would put PJM in a more severe capacity emergency than it is in currently in due to reciprocal transaction curtailments from the sink Balancing Authority, PJM will not initiate curtailing the transactions.

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PJM Member Actions

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PJM Marketers recall off-system capacity sales that are recallable as directed by PJM dispatchers.

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NERC Standard EOP-002 for Recall of Network Resources

PJM capacity resources are generally synonymous with NERC network resources utilizing Network Integrated Transmission Service.

[Standard EOP-002-3.1](#): Capacity and Energy Emergencies, Attachment 1: Energy Emergency Alerts

Alert 2 — Load management procedures in effect

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2.6.3 Non-firm sales recalled and contractually interruptible loads and demand-side management curtailed. All non-firm sales have been recalled, contractually interruptible retail loads curtailed, and demand-side management activated within provisions of the agreements.

NERC Transmission Loading Relief (TLR)

TLR is addressed in [NAESB WEQ-008](#) and is outside the scope of this paper.

Appendix A: References

NERC

- Reliability Standards: <http://www.nerc.com/page.php?cid=2|20>

<u>Interchange Scheduling and Coordination (INT)</u>			
Number	Title/Summary	Date	
INT-001-3	<u>Interchange Information</u> To ensure that Interchange information is submitted to the NERC-identified reliability analysis service. [Archive]	10.09.2007	pdf
INT-003-3	<u>Interchange Transaction Implementation</u> To ensure Balancing Authorities confirm Interchange Schedules with Adjacent Balancing Authorities prior to implementing the schedules in their Area Control Error (ACE) equations. [Archive]	11.05.2009	pdf
INT-004-2	<u>Dynamic Interchange Transaction Modifications</u> To ensure Dynamic Transfers are adequately tagged to be able to determine their reliability impacts. [Archive]	10.09.2007	pdf
INT-005-3	<u>Interchange Authority Distributes Arranged Interchange</u> To ensure that the implementation of Interchange between Source and Sink Balancing Authorities is distributed by an Interchange Authority such that Interchange information is available for reliability assessments. [Archive]	10.29.2008	pdf
INT-006-3	<u>Response to Interchange Authority</u> To ensure that each Arranged Interchange is checked for reliability before it is implemented. [Archive]	10.29.2008	pdf
INT-007-1	<u>Interchange Confirmation</u> To ensure that each Arranged Interchange is checked for reliability before it is implemented. [Archive]	05.02.2006	pdf
INT-008-3	<u>Interchange Authority Distributes Status</u> To ensure that the implementation of Interchange between Source and Sink Balancing Authorities is coordinated by an Interchange Authority. [Archive]	10.29.2008	pdf

INT-009-1	Implementation of Interchange To ensure that the implementation of Interchange between Source and Sink Balancing Authorities is coordinated by an Interchange Authority such that the Balancing Authorities implement the Interchange exactly as agreed upon in the Interchange confirmation process. [Archive]	05.02.2006	pdf
INT-010-1	Interchange Coordination Exemptions Allow certain types of Interchange schedules to be initiated or modified by reliability entities, and to be exempt from compliance with other Interchange Standards under abnormal operating conditions. [Archive]		
EOP-002-3.1	Capacity and Energy Emergencies To ensure Reliability Coordinators and Balancing Authorities are prepared for capacity and energy emergencies. [Archive]	03.08.2012	pdf

- [Dynamic Transfer Reference Document](#)

NAESB WEQ Business Practice Standards

- WEQ Business Practices and Implementation Guides: http://naesb.org/weq/weq_standards.asp
- WEQ-008 Transmission Loading Relief (TLR)

PJM Controlling Documents

PJM Tariff and Agreements: <http://www.pjm.com/documents/agreements.aspx>

- Tariff: <http://www.pjm.com/documents/~media/documents/agreements/tariff.ashx>

PJM Manuals: <http://www.pjm.com/documents/manuals.aspx>

- M-2: Transmission Service Requests: <http://www.pjm.com/~media/documents/manuals/m02.ashx>
- M-13: Emergency Operations: <http://www.pjm.com/~media/documents/manuals/m13.ashx>
 - M-13, Section 2.3.2 (Real-time): Maximum Emergency Generation
- Manual 11, Attachment A: <http://www.pjm.com/~media/documents/manuals/m11.ashx>

PJM OASIS: <http://oasis.pjm.com>

- PJM Regional Practices:
 - Chapter 2: Energy Scheduling and Interchange Curtailment Order

MISO Controlling Documents

MISO Tariff and Agreements: <https://www.misoenergy.org/Library/Pages/Library.aspx>

MISO Reliability Operating Procedures:

<https://www.misoenergy.org/MarketsOperations/ReliabilityOperatingProcedures/Pages/ReliabilityOperatingProcedures.aspx>

- Transmission Service Requests: BPM-013 - Module B Business Practices Manual - <https://www.misoenergy.org/Library/BusinessPracticesManuals/Pages/BusinessPracticesManuals.aspx>
- Emergency Operating Procedures: <https://www.misoenergy.org/MarketsOperations/ReliabilityOperatingProcedures/Pages/EmergencyOperatingProcedures.aspx?ProcType=RTO-EOP>
- MISO Market Capacity Emergency Procedure RTO-EOP-002: <https://www.misoenergy.org/MarketsOperations/ReliabilityOperatingProcedures/Pages/EmergencyOperatingProcedures.aspx?ProcType=RTO-EOP>
- MISO OASIS: <http://oasis.midwestiso.org/OASIS/MISO>