PJM M2M Market Flow Proposal

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1. Introduction

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 system. 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 that particular flowgate. PJM believes 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. Proper reflection of imports and exports on each system will more closely align actual real-time Market Flow utilized for real-time, flow-based settlements with calculated M2M Market Flow used in calculating payments between RTOs in the M2M process. Closer alignment of "Commercial Flow" (i.e., actual real-time Market Flow) and M2M Market Flow will ensure that M2M payments are reflective of actual conditions. Imports and exports are critical components of the M2M Market Flow calculation specifically because they have significant impacts on flowgates. However, there is a disconnect between the settlements conducted in the M2M process and the remainder of the LMP market settlements because transaction impacts are included in the Commercial Flow calculations used in the remainder of the LMP market settlements, but are excluded from the M2M Market Flow calculations.

The M2M settlement is based on Market Flow and Firm Flow Entitlement (FFE). As such, we can't change one without considering the impacts on the other. Likewise, we can't change the M2M Market Flow without discussing other energy flow values. There are three energy flow values to be addressed. M2M Market Flow is the energy flow calculated for M2M coordination. The second value is TLR Market Flow, which is intended to provide an IDC like calculation of impacts to flowgates for TLR relief requests. Currently, the M2M Market Flow and TLR market Flow are a single calculation. The third value is actual real-time Market Flow or Commercial Flow used in the remainder of the LMP market settlements.

2. M2M Market Flow

M2M Market Flow can be divided into Firm Market Flow and Non-Firm Market Flow. Firm Market Flow is considered as firm use of the transmission system for congestion management purposes and is equivalent to Firm Transmission Service. Non-Firm

Market Flow is considered as non-firm use of the transmission system for congestion management purposes and is equivalent to non-firm Transmission Service.

Section 4.1 of the JOA describes the existing M2M Market Flow calculation as follows:

The Market Flow calculation method is based on Generator Shift Factors (GSFs) of a market area's assigned generation and the Load Shift Factors (LSFs) of its load on a specific flowgate, relative to a system swing bus. The GSFs are calculated from a single bus location in the base case (e.g. the terminal bus of each generator) while the LSFs are defined as a general scaling of the market area's load. The Generator to Load Distribution Factor (GLDF) is determined through superposition by subtracting the LSF from the GSF. The determination of the Market Flow contribution of a unit to a specific flowgate is the product of the generator's GLDF multiplied by the actual output (in megawatts) of that generator. The total Market Flow on a specific flowgate is calculated in each direction; forward Market Flow is the sum of the positive Market Flow contributions of each generator within the market area, while reverse Market Flow is the sum of the negative Market Flow contributions of each generator within the market area.

Imports into or exports out of the market area are currently handled in the M2M Market Flow calculator as follows:

1. *When the actual generation of the market area exceeds the total load of that area, the market area is exporting energy. For export transactions, all units MW outputs will be proportionally offset in the market by the amount of the total market export excluding unit specific tagged transactions.*
2. *When the actual generation of the market area is less than the total load of the market area, that area is importing energy. For import transactions, all MWs of load will proportionally offset by the amount of the total market import excluding load specific tagged transactions.*

In actual operations, imports or exports along the PJM/MISO border impact actual real-time market flow, Commercial flow, on M2M flowgates more than on facilities located more internal to each RTO. The existing M2M Market Flow calculation does not accurately reflect these impacts specifically because, while the actual real-time market flow, Commercial flow, includes transaction impacts, the M2M Market Flow calculation proportionally reduces all generation or load across the RTO footprints (per the Slice of System approach) or reduces generation or load reflecting marginal generation participation of interchange (per the Marginal Zones approach) to account for the RTO imports or exports.

The Commercial Flow model utilizes Market Entity's respective interface injection/withdraws impacts to account for transactions and it is much more granular than the RTO import/export generation/load adjustments applied to M2M Market Flow. Furthermore, Commercial Flow includes transaction impact in the calculation as its sole objective is to capture the true market contributions on Flowgates. It is clear that there

is a deviation between Commercial Market Flow and M2M Market Flow. RTOs model transactions in their dispatch applications to ensure the commercial transaction impacts are captured. However, the CMP based M2M Market Flow calculation is less granular and introduces disparities. RTOs should capture transaction impacts (M2M Settlement Market Flow) and settle for transaction impacts (interface pricing) utilizing RTOs commercial flow transaction impact technique to ensure consistency. If this consistency is not introduced then the M2M payments will not accurately reflect RTOs nodal LMP settlement process, introducing inefficient settlement accounting..

3. Real-Time Balancing Congestion and M2M payments

Real-Time balancing congestion exists when the capability in the Real-Time market is different than the capability in the Day-ahead market. Balancing congestion exists on M2M flowgates when the Market Flow in the day-ahead market is different than the Market Flow in the real-time market. Market Flow is defined as the flow from generation, load, and transactions settled within the RTO. The relationship between Market Flow and balancing congestion can be defined as follows.

- If Day-ahead Market Flow = Real-time Market Flow than Balancing congestion equals zero.
- If Day-ahead Market Flow > Real-time Market Flow than Balancing congestion is negative
- If Day-ahead Market Flow < Real-time Market Flow than Balancing congestion is positive

The above relationships can be applied for M2M flowgates. However, the M2M payments should ultimately offset the positive or negative balancing congestion if the day-ahead flow is limited to the Firm Flow Entitlements (FFE). Therefore, if both RTOs limit Market Flow in the day-ahead market to the entitlements allowed then the M2M payments will be reflected appropriately. The relationships between balancing congestion and M2M payments should ideally result in a balanced net zero cost to both RTOs if the entitlements are honored in the day-ahead market. Below is the result of different scenarios assuming the Market Flow in actual real-time operations and M2M payment calculations are aligned. In these scenarios the day-ahead Market Flow equals the FFE.

Scenario 1: Real-Time MF > FFE/Day-ahead Market Flow

Result: Positive balancing congestion along with offsetting negative PJM M2M payment.

Scenario 2: Real-Time MF = FFE/Day-ahead Market Flow

Result: Zero balancing congestion along with zero M2M payment.

Scenario 3: Real-Time MF < FFE/Day-ahead Market Flow

Result: Negative balancing congestion along with positive M2M payment.

The net result is that in all scenarios the M2M payments will offset the balancing congestion impact if the Market Flow in real-time and in the M2M calculation are equal. However, the Market Flow calculations currently do not match between actual real-time operations and the M2M calculation as is demonstrated in the below Table 1.

Table 1: Differences between Actual Real-Time Market Flow and M2M calculation Market Flow for 2012/2013 Planning Period (Jun-Sep) associated with MISO M2M flowgates with payments < or > $100,000.

2012/2013 M2M Payments (JUN-SEP) for MISO Controlled flowgates (Payments > or < $100,000)				
Flowgate Name	M2M Payments	Average of M2M Market Flow (Transactions Removed via Slice of Sytem)	Average of Actual Real Time Market Flow (Transactions included via interface mapping)	% difference in market flow
Rantoul_RantlJct_138_flo_NChmpgn_Mahmet_Rsng_138	-$2,686,612	53.8	-4.1	-107.6%
Oak_Grove_Galesburg_flo_Nelson_ElectricJct	-$1,971,093	106.0	34.0	-67.9%
Monticello-East Winamac 138 kV l/o Rockport-Jefferson 765 kV	-$1,238,772	75.9	100.4	32.2%
Kenosha-Lakeview 138 PleasPr-Zion 345	-$736,150	126.0	75.2	-40.3%
Michigan City-Laporte 138 kV l/o Wilton Center-Dumont 765+Powerton 5/Joliet 7 (SPS)	-$575,501	119.3	41.4	-65.3%
Beaver_Channel_Albany_161_flo_Cordova_Nelson_345	-$393,057	114.2	69.4	-39.3%
Michigan City-Laporte 138kV (flo) Wilton Center 765kV	-$233,092	87.1	38.4	-55.9%
Edwards-Kewanee 138 l/o Lockport-Kendall 345	-$217,095	92.7	128.2	38.4%
Breed-Wheatland 345 kV line l/o Rockport-Jefferson 765 kV line	-$216,050	855.2	775.4	-9.3%
Monticello_East_Winamac_138_flo_Schahfer_Burr_Oak_345	-$195,761	61.5	59.9	-2.7%
Lakeview-Zion 138 kV line l/o Pleasant Prairie-Zion 345 kV line	-$194,071	130.8	60.7	-53.6%
Burr Oak 345/138 XFMR (flo) Burr Oak - Leesburg 345	-$153,168	46.9	17.6	-62.5%
Monroe-Wayne 345 l/o Monroe-Brownstown 1 345	-$134,943	5.0	31.8	537.3%
Prairie State-W Mt Vernon 345 kV l/o St Francis-Lutesville 345 kV	-$127,200	159.4	55.5	-65.2%
Davnprt-E. Calamus 161 l/o Quad Cities-Rock Crk 345	-$121,246	60.4	45.0	-25.6%
Arcadian-Zion 345 l/o Pleasant Prairie-Zion 345+Zion-Lakeview 138 (SPS)	$117,613	362.6	290.0	-20.0%
W Lafayette-Cumberland 138 kV l/o Westwood-Tippecanoe Labs 138 kV	$124,911	22.1	7.0	-68.1%
Lanesville 345/138-kV TX l/o Kincd-Lathm-Blue Mnd+Kincd-Pawnee+Latham TR1	$260,721	120.9	195.4	61.6%
BentnHrbr-Palisades345/Cook-Palisades345	$305,821	553.0	410.8	-25.7%
Roxana-Praxair 138 kV l/o Roxana-Mitchell Yard 138 kV	$317,345	-42.9	-55.1	28.6%
Marktown-Inland7t 138 l/o Marktown-Inland5t 138	$340,357	-5.1	-10.7	110.1%
Palisades-Roosevelt 345 l/o Palisades-Vergenne 345	$358,722	164.2	124.5	-24.2%

This inconsistency between the calculations of Market Flow in actual real-time operations and Market Flow in the M2M calculation can have the effect of “penalizing” an RTO for limiting the day-ahead market to the FFE (as the MISO/PJM JOA currently requires) because the market to market payment will not offset either the positive or negative balancing congestion associated with a flowgate. In fact, for current situations in which PJM or MISO have limited a flowgate in the day-ahead market to the FFE

value, the balancing congestion plus M2M payments do not offset each other. Therefore, either PJM or MISO may be honoring FFE values but are exposed to additional costs because of the Market Flow calculation differences between real-time and M2M. Table 2 shows some scenarios and the impact the differences in Market Flow calculations will cause. The zero total costs for scenarios 1-3 is what should be expected because the RTO honored the FFE in Day-ahead. The non-zero total costs for scenarios 4 or 5 is what typically happens because of the mismatch between actual real-time Market Flow and M2M Market Flow.

Table 2: Example Impacts of the Market Flow Calculation differences

Scenario	FFE	Day-ahead Market Flow	Real-Time Market Flow	M2M Market Flow	Real-time Shadow Price	Balancing Congestion	M2M Payment	Total costs (Balancing Congestion + M2M Payments)
1	20	20	30	30	$3,500	$35,000	($35,000)	$0
2	20	20	10	10	$3,500	($35,000)	$35,000	$0
3	20	20	20	20	$3,500	$0	$0	$0
4	20	20	**30**	**40**	$3,500	$35,000	($70,000)	($35,000)
5	20	20	**10**	**0**	$3,500	($35,000)	$70,000	$35,000

4. Firm Flow Entitlement Impact of Market Flow

The FFE and Market flow are compared to derive M2M payments and this is a significant driver for alignment of Market flow and FFE calculations.

Flowgate Allocation represents an entity's firm rights based on historical usage and is comprised of both Firm Flow generation to load impacts and Firm Point-to-Point (PtP) schedule impacts. Firm Flow Entitlements (FFE) reflects the firm limit on the net Market flow that a market entity can have for a Reciprocal Flowgate.

4.1 Overview of Firm Flow Entitlement

FFE is calculated from a blend of historic (NNL/allocation) and real-time (current PtP) components. The existing FFE calculation is as follows:

FFE = Forward FFL – Reverse FFL (FFL = Firm Flow Limit)

If 2DA Allocation > (DA GTL (DA NNL) + Current Firm PTP)

Forward FFL = DA GTL + (2DA Allocation – (DA GTL + Current Firm PTP Impact))

Else Forward FFL = MINIMUM (2DA Allocation, DA GTL)

Reverse FFL = MINIMUM (REVERSE 2DA Allocation, REVERSE DA GTL)

To translate the formula above, the FFE calculation recognizes that historic firm market flow is the sum of impacts from firm interchange across historic control area boundaries (between market Control Areas and with Control Areas outside the market footprint) plus impacts from internal Control Area Generation-to-Load (GtL). FFE recognizes that the internal Control Area to Control Area firm transactions become Generation-to-Load (GtL) in the market. As such, the Congestion Management Process (CMP) first assigns allocation to interchange transactions and then remaining allocation to firm up Market Flow, which the JOA refers to as firm market flow. FFE is that resultant firm market flow.

The FFE calculation further recognizes the disparity between market flow, which is a net value and the directional flow values used by the IDC. This is why we see comparison of forward and reverse allocation values. In some cases, the forward to reverse comparison logic maximizes FFE in the forward direction, which is the direction in which the flowgate is defined, the direction of the anticipated constraint and therefore, the direction important to the IDC.

5. Proposed Market Flow Calculation Change

PJM offers a proposal that will more closely align the M2M Market Flow calculation with the Real-time Commercial Market Flow calculation. Modifications will also need to be made to the Firm Flow Entitlement allocations as discussed in this document.

Proposed Method: Modify M2M Market Flow Calculator to more accurately mirror Real-time Commercial Market Flow

5.1 Transaction Schedules in the Market Flow Calculator

Interchange Energy Schedule impacts are a significant cause for the difference between M2M Market Flow and Real-time Commercial Market Flow.

The proposed method is a modification of the M2M Market Flow calculation to reflect the impact of imports and exports consistent with the Real-time Commercial Market Flow. This method involves mapping the OASIS tagged transaction Point of Receipt

(POR) and Point of Receipt (POR) locations to the appropriate source or sink interface pricing locations. PJM recommends developing a MISO-PJM common interface definition to eliminate over or under counting transfer impacts in RTOs market flow calculations. MISO and PJM will produce a common interface impact (shift factor) utilizing common interface generator bus injections, shift factor and weighting factors. Please refer to equation 1 given below.

Equation 1 – PJM-MISO Common Interface Impact (Shift Factor) calculation, where total generator busses add up to m

$$\text{PJM-MISO Common Interface Impact} = \frac{\sum_{n=1}^{m}(GSF_n * Weighting_n)}{\sum_{n=1}^{m}(Weighting_n)}$$

GSF = Generator Shift Factor (Impact) for each generator defined in the common interface
Weighting = Generator Weighting Factor

This method of calculating M2M Market Flows will ensure a granular nodal injection/withdraw impact calculation for generation-to-load and transaction contributions in the Market Flows. More importantly, the M2M Market Flow will align with the actual settled LMP Market Flow for internal congestion accounting and if a consistently modified FFE is honored in day-ahead, then the net balancing congestion plus M2M payments would drive closer to zero. In this method, each RTO will utilize the following logic to account for imports and exports.

RTO Exporting Area with interface composed of generators:	Reduction in generation for interface pricing nodes
RTO Exporting Area with interface composed of loads:	Increase in load for Interface pricing nodes
RTO Imported Area with interface composed of generation:	Increase in generation for Interface pricing nodes
RTO Imported Area with interface composed of loads:	Reduction in load for Interface pricing nodes

PJM has provided an example of this proposed method in the next section of this report.

Table 3 gives a comparison of an existing and proposed method for calculating the Market Flow in the M2M calculation.

Table 3: M2M Market Flow Calculation comparison for handling of Imports and Exports

	Existing Method	*Proposed Method*
Imports/Exports	Slice of system/Marginal Zone	Utilize actual LMP settlement locations for imports and exports
Description	All generation proportionally reduced for exports. All load proportionally reduced for imports	Imports and Exports mapped to Interface Pricing Locations and only Generation or Load adjusted that is part of the Interface
Advantages	Easy to apply	Market Flow better align with actual settled real-time Market Flow
		Balancing congestion + M2M payments close to zero if FFE honored in day-ahead
Disadvantages	Improper alignment with actual settled real-time Market Flow	Implementation may be more difficult
	Balancing congestion + M2M payments does not equal zero if FFE honored in day-ahead	

5.2 Align M2M and Commercial Market Flow Calculations

The Real-time Commercial Market Flow reflects the true, real-time impacts of the market dispatch on a flowgate and is different than the CMP defined Market Flow calculation.

The market flow and allocation (an input to FFE) are integral components of both the Congestion Management Process (CMP) Transmission Loading Relief process and Available Transfer Capability Calculation (TLR and ATC) and Interregional Coordination Process (ICP-M2M). The impacts to both systems should be considered because of the potential for M2M calculations to diverge from CMP calculations.

The CMP was developed primarily to support the Eastern Interconnection congestion management process, TLR via the IDC tool. Therefore, CMP is developed as a gen-to-

load (GtL) calculation where offsetting transactions, such as imports and exports, do not net. In addition, the TLR process is used to manage interchange transactions separately from internal generation serving internal load, GTL. The CMP has defined market flow to align with the Generation-to-Load, or GTL, in the historic allocation calculation and the zonal calculations of the IDC. This remains a reasonable methodology for the IDC tool and the TLR process.

The M2M process provides a superior solution for congestion management. The M2M process is intended to result in efficient dispatch across both markets and result in an equitable payment where current use of the system diverges from historic use. For this to work appropriately, the M2M calculations for Market Flow and FFE should align. Also, the market flow calculation in the M2M process should align with the real-time market flow in actual market operations and settlement calculations, Locational Marginal Price ("LMP"), such that a MW of M2M market flow equals a MW of real-time market flow.

It is clearly appropriate to use the commercial market calculations for M2M process, as they are more accurate and strictly align with the settlement associated with the re-dispatch actions.

Recognizing the differing purposes and utilization of the Market Flow calculation from the perspectives of both TLR and M2M congestion management process, it is clear that implementing a single Market Flow calculation to serve both purposes is disadvantageous. PJM proposes to (1) retain the current Market Flow and allocation calculations for TLR based congestion management and (2) modify the Market Flow calculation for M2M settlement.

Retaining the current systems for TLR process is appropriate. Differences between the TLR and M2M calculations is warranted given their different purposes and uses, and the M2M market flow calculation could be better aligned to commercial impacts in which market systems already calculates. The preferred approach would be to use the Real-time Commercial Market Flow by using the actual market calculations utilized in real-time settlements.

5.3 FFE and M2M Settlement

As explained in Section 3, real-time balancing congestion should be funded by M2M payments if the FFE values are honored. PJM is proposing FFE changes for M2M settlement purposes. Section 4.1 (overview of FFE) described the mechanism by which the current firm PTP transaction impacts are omitted when calculating FFE values to derive a Firm Generation-to-Load (GTL) Market Flow. Since PJM is proposing M2M

Market Flows to be equivalent to Real-Time Commercial flows, it is necessary to include Firm PTP transaction impacts when calculating FFE values.

Proposed M2M Market Flows will be impacted by real-time generation-to-load (GTL), current firm, and non-firm transaction impacts. If the proposed Market Flows are compared against proposed FFE (that includes Firm GTL and Firm PTP impacts), any deviations would be due to non-firm transactions that are scheduled, which will result in external congestion funds (or balancing congestion amounts). Scheduling party will be making M2M payments for non firm transactions and the balancing congestion amounts will offset by these payments.

Let us consider the following example:

9:45 AM:

MISO schedules 100 MW (non firm) to flow from PJM to MISO which results in an overload on MISO FG A.

MISO initiates FG A and PJM agrees to activate M2M coordination on FG A.

10:00 AM:

MISO Calculates:

MISO Shadow Price = -$100/MW

PJM Interface Price = $20/MW

MISO SMP = $40/MW

MISO's MISO-PJM Interface Shift factor = 0.2 (20% Hurt)

PJM Calculates:

PJM Shadow Price = -$100/MW

MISO Interface Price = $60/MW

PJM SMP = $40/MW

PJM's MISO-PJM Interface Shift factor= -0.2 (20% help)

PJM's Market Flow on FG A = 100 MW

PJM's FFE on FG A = 100 MW (80 MW GTL+20 MW PTP)

10:15 AM:

PJM Schedules 100 MW from MISO to PJM (non firm)

PJM's Market Flow on FG A = 100 MW + (-0.2*100 MW) = 80 MW

PJM's FG A FFE = 100 MW (no change in Firm PTP)

MISO's M2M Payment to PJM = (100 MW-80 MW)*$100/MW = $2000

PJM's Balancing Congestion amount = (80 MW -100 MW)*($100/MW) = -$2000

Therefore, as indicated in the above example, the balancing congestion amount which resulted from un-hedged (non firm) transactions were funded by M2M payments resulting in a net payment of $0.

If the Day-ahead GTL (FFE GTL) values are different from Real-Time GTL (M2M GTL) values, then the deviation from DA position will impact a GTL M2M payment from the deviating party to the reciprocal party in order to recover any un-hedged (GTL) real-time congestion.

In the context of TLR and preserving firm rights, PJM proposes to maintain the current allocations for TLR.

PJM proposes the following for the FFE equation:

FFE = Forward FFE – Reverse FFE

Forward FFE = Forward 2DA Allocation (Allocation Higher of Logic prevails)

If Forward 2DA Allocation > Forward DA GTL + Forward Firm TSR PtP

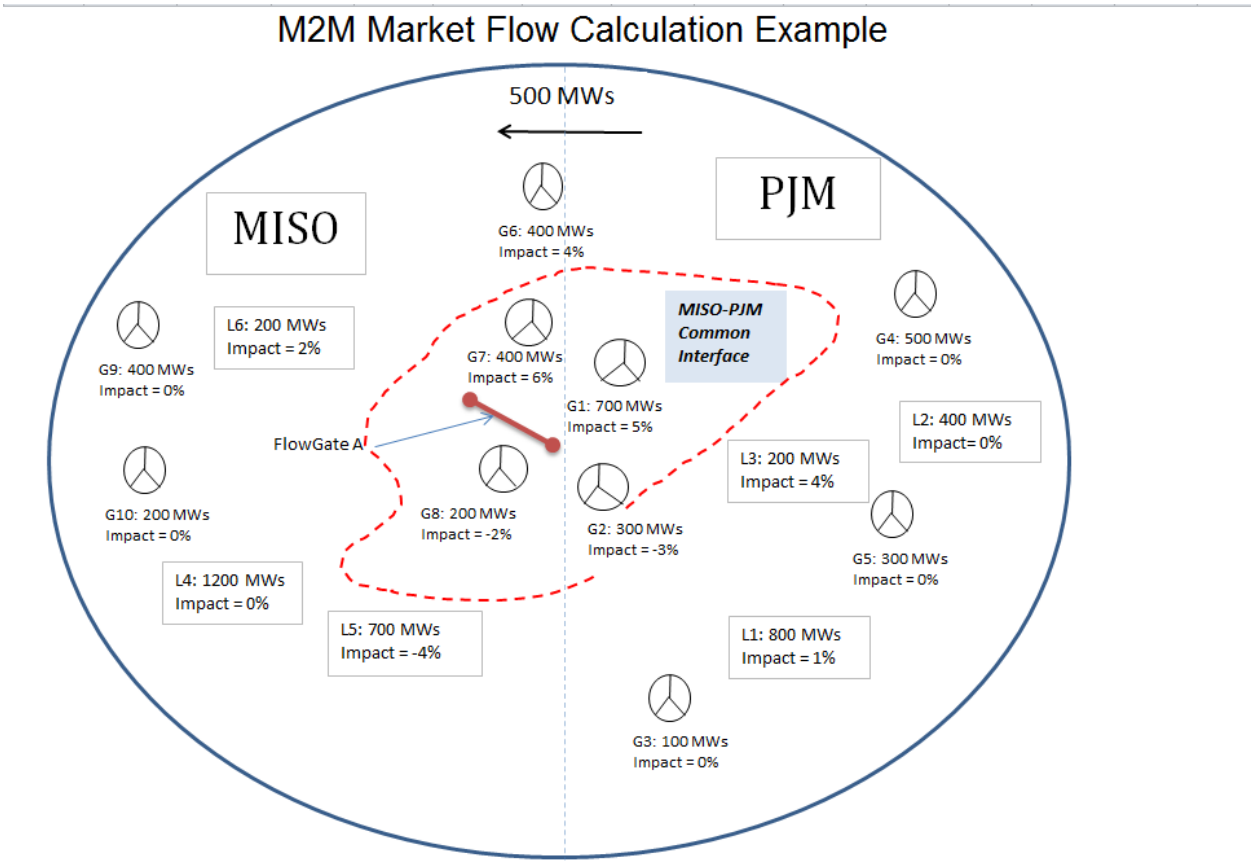
Else, Forward FFE = Forward DA GTL + Forward Firm TSR PtP

Reverse FFE = MINIMUM (Reverse 2DA Allocation, (Reverse DA GTL + Reverse Firm TSR PtP))

6. Example

The following example demonstrates the existing M2M Market Flow calculation along with the proposed M2M Market Flow calculation. Figure 1 displays an example of the MISO and PJM system assuming a common interface definition. It represents some generation and load on each system along with a transaction from PJM to MISO of 500 MWs. Flowgate A on the figure represents a joint M2M flowgate located on the MISO system. Each generator and load on the system impacts Flowgate A by the indicated percentage.

Figure 1: MISO/PJM Simplified System.



The total load, generation, imports, and exports from Figure 1 can be represented as shown in Table 4.

Table 4: Figure 1 Total System Parameters

	Load (MWs)	Gen (MWs)	Imports (MWs)	Exports (MWs)
MISO	2100	1600	500	0
PJM	1400	1900	0	500

The 500 MW transaction in this example is tagged for the market participant with an OASIS Point of Receipt (POR) of PJM and an OASIS Point of Delivery (POD) of MISO. In actual LMP settlements, the POR and POD will be mapped to LMP common interface pricing locations as shown in Table 5.

Table 5: Tagged Transaction OASIS to LMP pricing

	MWs	POR	POD	Type	PJM Tagged LMP pricing point	MISO tagged LMP Pricing point
Tag 1	500	PJM	MISO	PJM Export/MISO Import	MISO-PJM Com Int	MISO-PJM Com Int

The actual M2M Market Flow calculation for Figure 1 utilizes the Slice of System/Marginal Zone approach. In this report for simplicity sake, PJM assumes both Slice of System and Marginal Zone methods adjust generation and load at the same granularity, in practice Marginal Zone method is superior to Slice of System method since the Slice of System method adjust generation/load pro-rata regardless of the resources' marginal contributions to accommodate interchange, whereas Marginal Zone method will adjust generation/load based on resources' marginal contribution to accommodate interchange. Since the example treats Slice of System and Marginal Zone method at the same granularity, a pro-rata adjustment for generation and load is made to account for the 500MW interchange between MISO and PJM. The results, as shown in Figure 2, demonstrate that some load and generation locations that have zero impact are utilized in the market flow calculation and since these locations have zero impact, a portion of the 500 MW transaction inappropriately does not impact final flow.

Figure 2: Results of M2M Market Flow calculation utilizing existing Slice of System/Marginal Zone approach.

M2M Market Flow Calculation: Slice of System/Marginal Zone Approach

Area	Generator	Original MWs	Import or Export Change (MWs)	Final MWs	Flowgate Impact	M2M Market Flow Impact (MWs)
MISO	G6	400	0	400	4%	16
MISO	G7	400	0	400	6%	24
MISO	G8	200	0	200	-2%	-4
MISO	G9	400	0	400	0%	0
MISO	G10	200	0	200	0%	0
MISO	L4	1200	-285.7	914.3	0%	0
MISO	L5	700	-166.7	533.3	-4%	21.3
MISO	L6	200	-47.6	152.4	2%	-3.0
			MISO M2M Market Flow			54.3

Area	Generator	Original MWs	Import or Export Change (MWs)	Final MWs	Flowgate Impact	M2M Market Flow Impact (MWs)
PJM	G1	700	-184.2	515.8	5%	25.8
PJM	G2	300	-78.9	221.1	-3%	-6.6
PJM	G3	100	-26.3	73.7	0%	0.0
PJM	G4	500	-131.6	368.4	0%	0
PJM	G5	300	-78.9	221.1	0%	0
PJM	L1	800	0	800	1%	-8
PJM	L2	400	0	400	0%	0
PJM	L3	200	0	200	4%	-8
			PJM M2M Market Flow			11.2

Note: Load decreased for Importing RTO

The PJM proposal described in this document will more closely align the M2M Market Flow with actual Real-time Market Flow. This proposal would utilize the actual LMP settlements interface points for all transactions across the RTOs. This approach is demonstrated using Figure 1 and the mapped OASIS LMP interfaces. These LMP interface pricing points are utilized in actual settlements for valuing transactions. PJM

recommends both RTOs to adopt a common interface pricing point as illustrated in Figure 1. The common interface will capture the impact of physical inter-RTO tie line flows. It will be defined utilizing both PJM and MISO generator busses along with appropriate weighting factors for each generator busses to complement physical flows between the RTOs. MISO and PJM will calculate their respective common interface impacts by applying the common interface generator impacts, generator output and generator weightings to equation 1 presented in section 5.1. Figure 3 demonstrates the MISO-PJM common interface impact for the example in section 6.

Figure 3: MISO and PJM Common Interface Impact

Area	Generator	Flowgate Impact	Gen Weightin g	Common Interface Impact
MISO	G7	6%	25%	1.50%
MISO	G8	-2%	25%	-0.50%
PJM	G1	5%	25%	1.25%
PJM	G2	-3%	25%	-0.75%
	Total Common Interface Impact			1.50%

Finally, M2M Market Flows utilizing PJM's proposal could be illustrated for this example as shown in Figure 4. Notice that this approach only adjusts the flows associated with the common interface.

Figure 4: Results of M2M Market Flow calculation utilizing actual LMP settlement locations (nodal injection-withdraws)

Proposed Method: Map to settled LMP PJM-MISO Common Interface Pricing location

Area	Generator	Original MWs	Import or Export Change (MWs)	Final MWs	Flowgate Impact	M2M Market Flow Impact (MWs)
PJM-MISO	Com Int	0	500	500	2%	7.5
MISO	G6	400	0	400	4%	16
MISO	G7	400	0	400	6%	24
MISO	G8	200	0	200	-2%	-4
MISO	G9	400	0	400	0%	0
MISO	G10	200	0	200	0%	0
MISO	L4	1200	0	1200	0%	0
MISO	L5	700	0	700	-4%	28.0
MISO	L6	200	0	200	2%	-4.0
				0		
			MISO M2M Market Flow			67.5

Area	Generator	Original MWs	Import or Export Change (MWs)	Final MWs	Flowgate Impact	M2M Market Flow Impact (MWs)
PJM-MISO	Com Int	0	-500.0	-500	2%	-7.5
PJM	G1	700	0.0	700	5%	35.0
PJM	G2	300	0.0	300	-3%	-9.0
PJM	G3	100	0.0	100	0%	0.0
PJM	G4	500	0.0	500	0%	0.0
PJM	G5	300	0.0	300	0%	0.0
PJM	L1	800	0	800	1%	-8
PJM	L2	400	0	400	0%	0
PJM	L3	200	0	200	4%	-8
				0		
				PJM M2M Market Flow		2.5

Note: Importing RTO injects the appropriate amount of imports and Exporting RTO withdraws the appropriate amount of exports to model transactions between RTOs.

This method will accurately represent both nodal generation-to-load and transaction impacts associated with MISO and PJM's real-time dispatch. Therefore this approach to calculate M2M Market Flows will result in an enhanced alignment to RTOs commercial or real-time market flows utilized in the internal congestion (revenue) accounting.

7. Next Steps

PJM recommends that the proposal identified in this report be reviewed by MISO and stakeholders.