SCHEDULE [#]

Market-to-Market Coordination Process

DRAFT

Version 1.0

NYISO & PJM
Market-to-Market Coordination Schedule
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1 Overview of the Market-to-Market Coordination Process

The purpose of the M2M coordination process is to set forth the rules that apply to M2M coordination between PJM and NYISO and the associated settlements processes.

The fundamental philosophy of the PJM/NYISO M2M coordination process is to set up procedures to allow any transmission constraints that are significantly impacted by generation dispatch changes and/or Phase Angle Regulator ("PAR") control actions in both markets to be jointly managed in the security-constrained economic dispatch models of both RTOs. This joint management of transmission constraints near the market borders will provide the more efficient and lower cost transmission congestion management solution, while providing coordinated pricing at the market boundaries.

The M2M coordination process focuses on real-time market coordination to manage transmission limitations that occur on the M2M Flowgates in a more cost effective manner. Coordination between NYISO and PJM will include not only joint re-dispatch, but will also incorporate coordinated operation of the Ramapo PARs that are located at the NYISO – PJM interface. This real-time coordination will result in a more efficient economic dispatch solution across both markets to manage the real-time transmission constraints that impact both markets, focusing on the actual flows in real-time to manage constraints. Under this approach, the flow entitlements on the M2M Flowgates do not impact the physical dispatch; the flow entitlements are used in market settlements to ensure appropriate compensation based on comparison of the actual Market Flows to the flow entitlements.

2 M2M Flowgates

Only a subset of all transmission constraints that exist in either market will require coordinated congestion management. This subset of transmission constraints will be identified as M2M Flowgates. Flowgates eligible for the M2M coordination process are called M2M Flowgates. For the purposes of the M2M coordination process (in addition to the studies described in section 3 below) the following will be used in determining M2M Flowgates.

2.1 NYISO and PJM will only be performing the M2M coordination process on M2M Flowgates that are under the operational control of NYISO or PJM. NYISO and PJM will not be performing the M2M coordination process on Flowgates that are owned and controlled by third party entities.

2.2 The Parties will make reasonable efforts to lower their generator binding threshold to match the lower generator binding threshold utilized by the other Party. The generator and Ramapo PAR binding thresholds (the shift factor thresholds used to identify the resource(s) available to relieve a transmission constraint), will not be set below 3%, except by mutual consent. This requirement applies to M2M Flowgates. It is not an additional criterion for determination of M2M Flowgates.

2.3 For the purpose of determining whether a monitored element Flowgate is eligible for the M2M coordination process, a threshold for determining a significant GLDF or Ramapo PAR OTDF will take into account the number of monitored elements. Implementation of M2M Flowgates will ordinarily occur through mutual agreement.

2.4 All Flowgates eligible for M2M coordination will be included in the coordinated operations of the Ramapo PARs. Flowgates with significant GLDF will also be included in joint re-dispatch.

2.5 M2M Flowgates that are eligible for re-dispatch coordination are also eligible for coordinated operation of the Ramapo PARs. M2M Flowgates that are eligible for coordinated operation of the Ramapo PARs are not necessarily also eligible for re-dispatch coordination.

2.6 The NYISO shall post a list of all of the M2M Flowgates located in the NYCA on its web site. PJM shall post a list of all of the M2M Flowgates located in its Control Area on its web site.

3 M2M Flowgate Studies

To identify M2M Flowgates the Parties will perform an off-line study to determine if the significant GLDF for at least one generator within the Non-Monitoring RTO, or significant OTDF for at least one Ramapo PAR, on a potential M2M Flowgate within the Monitoring RTO is greater than or equal to the thresholds as described below. The study shall be based on an up-to-date, common, power flow model representation of the Eastern Interconnection, with all normally closed Transmission Facilities in-service. The transmission modeling assumptions used in the M2M Flowgate studies will be based on the same assumptions used for determining M2M Entitlements in Section 6 below.

3.1 Either Party may propose that a new M2M Flowgate be added at any time. The Parties will work together to perform the necessary studies within a reasonable timeframe.

3.2 The GLDF or Ramapo OTDF thresholds for M2M Flowgates with one or more monitored elements are defined as:

i. Single monitored element, 5% GLDF/Ramapo OTDF;

ii. Two monitored elements, 7.5% GLDF/Ramapo OTDF; and

iii. Three or more monitored elements, 10% GLDF/Ramapo OTDF.

3.3 For potential M2M Flowgates that pass the above Ramapo OTDF criteria, the Parties must still mutually agree to add each Flowgate as an M2M Flowgate for coordinated operation of the Ramapo PARs.

3.4 For potential M2M Flowgates that pass the above GLDF criteria, the Parties must still mutually agree to add each Flowgate as an M2M Flowgate for re-dispatch coordination.

3.5 The Parties can also mutually agree to add a M2M Flowgate that does not satisfy the above criteria.

4 Removal of M2M Flowgates

Removal of M2M Flowgates from the systems may be necessary under certain conditions including the following:

4.1 A M2M Flowgate is no longer valid when (a) a change is implemented that effects either Party's generation impacts causing the Flowgate to no longer pass the M2M Flowgate Studies, or (b) a change is implemented that affects the impacts from coordinated operation of the Ramapo PARs causing the Flowgate to no longer pass the M2M Flowgate Studies. The Parties must still mutually agree to remove a M2M Flowgate, such agreement not to be unreasonably withheld. Once a M2M Flowgate has been removed, it will no longer be eligible for M2M settlement.

4.2 A M2M Flowgate that does not satisfy the criteria set forth in Section 3.2 above, but that is created based on the mutual agreement of the Parties pursuant to Section 3.5 above, shall be removed two weeks after either Party provides a formal notice to the other Party that it withdraws its agreement to the M2M Flowgate, or at a later or earlier date that the Parties mutually agree upon. The formal notice must include an explanation of the reason(s) why the agreement to the M2M Flowgate was withdrawn.

4.3 The Parties can mutually agree to remove a M2M Flowgate from the M2M coordination process whether or not it passes the coordination tests. A M2M Flowgate should be removed when the Parties agree that the M2M coordination process is not, or will not be, an effective mechanism to manage congestion on that Flowgate.

5 Market Flow Determination

Each RTO will independently calculate its Market Flow for all M2M Flowgates using the equations set forth in this section. The Market Flow calculation is broken down into the following steps:

- Determine Shift Factors for M2M Flowgates

- Compute RTO Load and Losses (less imports)
- Compute RTO Generation (less exports)
- Compute RTO Generation to Load impacts on the Market Flow
- Compute RTO interchange scheduling impacts on the Market Flow
- Compute PAR impacts on the Market Flow
- Compute Market Flow

The method of incorporating the Rockland Electric Company ("RECo") load that was transferred from the NYISO to PJM in 2001 into the M2M Market Flows and M2M Entitlements is still undefined and will be addressed in a subsequent compliance filing. The Participating RTOs expect that they will be able to resolve the appropriate treatment of RECo load prior to implementation of the M2M coordination process. If it is not possible to timely reach agreement regarding how service to RECo load should be handled, then RECo will be excluded from both the M2M Market Flow and M2M Entitlements until this issue is resolved.

Comment [MAD1]: PJM and NYISO continue to discuss this language.

5.1 Determine Shift Factors for M2M Flowgates

The first step to determining the Market Flow on a M2M Flowgate is to calculate generator, load and PAR shift factors for the each of the M2M Flowgates. For real-time M2M coordination, the shift factors will be based on the real-time transmission system topology.

5.2 Compute RTO Load Served by RTO Generation

Using area load and losses for each load zone, compute the RTO Load, in MWs, by summing the load and losses for each load zone to determine the total zonal load for each RTO load zone.

$Zonal\_Total\_Load_{zone} = Load_{zone} + Losses_{zone}$, for each RTO load zone

Where:

zone =	the relevant RTO load zone;
$Zonal\_Total\_Load_{zone}$ =	the sum of the RTO's load and transmission losses for the zone;
$Load_{zone}$ =	the load within the zone; and
$Losses_{zone}$ =	the transmission losses for transfers through the zone.

Next, reduce the Zonal Loads by the scheduled line real-time import transaction schedules that sink in that particular load zone:

$$Zonal\_Reduced\_Load_{zone} = Zonal\_Total\_Load_{zone} - \sum_{scheduled\_lines=1}^{all} Import\_Schedules_{scheduled\_line,zone}$$

Where:

zone = the relevant RTO load zone;

scheduled_line = each of the transmission facilities identified in Table 1 below;

$Zonal\_Reduced\_Load_{zone}$ = the sum of the RTO's load and transmission losses in a zone reduced by the sum of import schedules over scheduled lines to the zone;

$Zonal\_Total\_Load_{zone}$ = the sum of the RTO's load and transmission losses for the zone; and

$Import\_Schedules_{scheduled\_line,zone}$ = import schedules over a scheduled line to a zone.

The real-time import schedules over scheduled lines will only reduce the load in the sink load zones identified in Table 1 below:

Table 1. List of Scheduled Lines

Scheduled Line	NYISO Load Zone	PJM Load Zone
Dennison Scheduled Line	North	Not Applicable
Cross-Sound Scheduled Line	Long Island	Not Applicable
Linden VFT Scheduled Line	New York City	Mid-Atlantic Control Zone
Neptune Scheduled Line	Long Island	Mid-Atlantic Control Zone
Northport – Norwalk Scheduled Line	Long Island	Not Applicable

Once import schedules over scheduled lines have been accounted for, it is then appropriate to reduce the net RTO Load by the remaining real-time import schedules at the proxies identified in Table 2 below:

Table 2. List of Proxies*

Proxy	Balancing Authorities Responsible
PJM shall post and maintain a list of its proxies on its OASIS website. PJM shall provide to NYISO notice of any new or deleted proxies prior to implementing such changes in its M2M software.	PJM
NYISO proxies are the Proxy Generator Buses that are not identified as Scheduled Lines in the table that is set forth in Section 4.4.4 of the NYISO's Market Services Tariff. The NYISO shall provide to PJM notice of any new of deleted proxies prior to implementing such changes in its M2M software.	NYISO

*Scheduled lines and proxies are mutually exclusive. Transmission Facilities that are components of a scheduled line are not also components of a proxy (and vice-versa).

$$RTO\_Net\_Load = \sum_{zone=1}^{all} Zonal\_Reduced\_Load_{zone}$$

Where:

zone = the relevant RTO load zone;

RTO_Net_Load = the sum of load and transmission losses for the entire RTO footprint reduced by the sum of import schedules over all scheduled lines; and

$Zonal\_Reduced\_Load_{zone}$ = the sum of the RTO's load and transmission losses in a zone reduced by the sum of import schedules over scheduled lines to the zone.

$$RTO\_Final\_Load = RTO\_Net\_Load - \sum_{proxy=1}^{all} Import\_Schedules_{proxy}$$

Where:

proxy = representations of defined sets of transmission facilities that (i) interconnect neighboring Balancing Authorities, (ii) are collectively scheduled, and (iii) are identified in Table 2 above;

RTO_Final_Load = the sum of the RTO's load and transmission losses for the entire RTO footprint, sequentially reduced by (i) the sum of import schedules over all scheduled lines, and (ii) the sum of all proxy import schedules;

RTO_Net_Load = the sum of load and transmission losses for the entire RTO footprint reduced by the sum of import schedules over all scheduled lines; and

$Import\_Schedules_{proxy}$ = the sum of import schedules at a given proxy.

Next, calculate the Zonal Load weighting factor for each RTO load zone:

$$Zonal\_Weighting_{zone} = \left(\frac{Zonal\_Reduced\_Load_{zone}}{RTO\_Net\_Load}\right)$$

Where:

zone = the relevant RTO load zone;

$Zonal\_Weighting_{zone}$ = the percentage of the RTO's load contained within the zone;

RTO_Net_Load = the sum of load and transmission losses for the entire RTO footprint reduced by the sum of import schedules over all scheduled lines; and

$Zonal\_Reduced\_Load_{zone}$ = the sum of the RTO's load and transmission losses in a zone reduced by the sum of import schedules over scheduled lines to the zone.

Using the Zonal Weighting Factor compute the zonal load reduced by RTO imports for each load zone:

$$Zonal\_Final\_Load_{zone} = Zonal\_Weighting_{zone} \times RTO\_Final\_Load$$

Where:

zone = the relevant RTO load zone;

$Zonal\_Final\_Load_{zone}$ = the final RTO load served by internal RTO generation in the zone;

$Zonal\_Weighting_{zone}$ = the percentage of the RTO's load contained within the zone; and

RTO_Final_Load = the sum of the RTO's load and transmission losses for the entire RTO footprint, sequentially reduced by (i) the sum of import schedules over all scheduled lines, and (ii) the sum of all proxy import schedules.

Using the Load Shift Factors ("LSFs") calculated above, compute the weighted RTOLSF for each M2M Flowgate as:

$$RTO\_LSF_{M2M\_Flowgate-m} = \sum_{zone=1}^{all} \left(LSF_{(zone,M2M\_Flowgate-m)} \times \left(\frac{Zonal\_Final\_Load_{zone}}{RTO\_Final\_Load} \right) \right)$$

Where:

M2M_Flowgate-m = the relevant flowgate;

zone = the relevant RTO load zone;

$RTO\_LSF_{M2M\_Flowgate-m}$ = the load shift factor for the entire RTO footprint on M2M Flowgate m;

$LSF_{(zone,M2M\_Flowgate-m)}$ = the load shift factor for the RTO zone on M2M Flowgate m;

$Zonal\_Final\_Load_{zone}$ = the final RTO load served by internal RTO generation in the zone; and

RTO_Final_Load = the sum of the RTO's load and transmission losses for the entire RTO footprint, sequentially reduced by (i) the sum of import schedules over all scheduled lines, and (ii) the sum of all proxy import schedules.

5.3 Compute RTO Generation Serving RTO Load

Using the real-time generation output in MWs, compute the Generation serving RTO Load. Sum the output of RTO generation within each load zone:

$RTO\_Gen_{zone} = \sum_{unit=1}^{all} Gen_{unit,zone}$, for each RTO load zone

Where:

zone = the relevant RTO load zone;

unit = the relevant generator;

RTO_Gen_{zone} = the sum of the RTO's generation in a zone; and

$Gen_{unit,zone}$ = the real-time output of the unit in a given zone.

Next, reduce the RTO generation located within a load zone by the scheduled line real-time export transaction schedules that source from that particular load zone:

$$RTO\_Reduced\_Gen_{zone} = RTO\_Gen_{zone} - \sum_{scheduled\_line=1}^{all} Export\_Schedules_{scheduled\_line,zone}$$

Where:

zone = the relevant RTO load zone;

scheduled_line = each of the transmission facilities identified in Table 1 above;

$RTO\_Reduced\_Gen_{zone}$ = the sum of the RTO's generation in a zone reduced by the sum of export schedules over scheduled lines from the zone; and

RTO_Gen_{zone} = the sum of the RTO's generation in a zone; and

$Export\_Schedules_{scheduled\_line,zone}$ = export schedules from a zone over a scheduled line.

The real-time export schedules over scheduled lines will only reduce the generation in the source zones identified in Table 1 above.

Once export schedules over scheduled lines are accounted for, it is then appropriate to reduce the net RTO generation by the remaining real-time export schedules at the proxies identified in Table 2 above.

$$RTO\_Net\_Gen = \sum_{zone=1}^{all} RTO\_Reduced\_Gen_{zone}$$

Where:

zone = the relevant RTO load zone;

RTO_Net_Gen = the sum of the RTO's generation reduced by the sum of export schedules over all scheduled lines; and

$RTO\_Reduced\_Gen_{zone}$ = the sum of the RTO's generation in a zone reduced by the sum of export schedules over scheduled lines from the zone.

$$RTO\_Final\_Gen = RTO\_Net\_Gen - \sum_{proxy=1}^{all} Export\_Schedules_{proxy}$$

Where:

proxy = representation of defined sets of transmission facilities that (i) interconnect neighboring Balancing Authorities, (ii) are collectively scheduled, and (iii) are identified in Table 2 above;

RTO_Final_Gen = the sum of the RTO's generation output for the entire RTO footprint, sequentially reduced by (i) the sum of export schedules over all scheduled lines, and (ii) the sum of all proxy export schedules;

RTO_Net_Gen = the sum of the RTO's generation reduced by the sum of export schedules over all scheduled lines; and

$Export\_Schedules_{proxy}$ = the sum of export schedules at a given proxy.

Finally, weight each generator's output by the reduced RTO generation:

$$Gen\_Final_{unit} = Gen_{unit} \times \frac{RTO\_Final\_Gen}{RTO\_Net\_Gen}$$

Where:

unit = the relevant generator;

Gen_Final_{unit} = the portion of each unit's output that is serving the RTO Net Load;

Gen_{unit} = the real-time output of the unit;

RTO_Final_Gen = the sum of the RTO's generation output for the entire RTO footprint, sequentially reduced by (i) the sum of export

schedules over all scheduled lines, and (ii) the sum of all proxy export schedules; and

RTO_Net_Gen = the sum of the RTO's generation reduced by the sum of export schedules over all scheduled lines.

5.4 Compute the RTO GTL for all M2M Flowgates

The generation-to-load flow for a particular M2M Flowgate, in MWs, will be determined as:

$$RTO\_GTL_{M2M\_Flowgate-m} = \sum_{unit=1}^{all} \left(Gen\_Final_{unit} \times \left(GSF_{(unit,M2M\_Flowgate-m)} - RTO\_LSF_{M2M\_Flowgate-m}\right)\right)$$

Where:

M2M_Flowgate-m = the relevant flowgate;

unit = the relevant generator;

$RTO\_GTL_{M2M\_Flowgate-m}$ = the generation to load flow for the entire RTO footprint on M2M Flowgate m;

Gen_Final_{unit} = the portion of each unit's output that is serving RTO Net Load;

$GSF_{(unit,M2M\_Flowgate-m)}$ = the generator shift factor for each unit on M2M Flowgate m; and

$RTO\_LSF_{M2M\_Flowgate-m}$ = the load shift factor for the entire RTO footprint on M2M Flowgate m.

5.5 Compute the RTO Interchange Scheduling Impacts for all M2M Flowgates

For each scheduling point that the participating RTO is responsible for, determine the net interchange schedule in MWs. Table 3 below identifies both the participating RTO that is responsible for each listed scheduling point, and the "type" assigned to each listed scheduling point.

Table 3. List of Scheduling Points

Scheduling Point	Scheduling Point Type	Participating RTO(s) Responsible
NYISO-PJM	common	NYISO and PJM

Linden VFT Scheduled Line	common	NYISO and PJM
Neptune Scheduled Line	common	NYISO and PJM
PJM shall post and maintain a list of its non-common scheduling points on its OASIS website. PJM shall provide to NYISO notice of any new or deleted non-common scheduling points prior to implementing such changes in its M2M software.	non-common	PJM
NYISO non-common scheduling points include all Proxy Generator Buses and Scheduled Lines listed in the table that is set forth in Section 4.4.4 of the NYISO's Market Services Tariff that are not identified in this Table 3 as common scheduling points. The NYISO shall provide to PJM notice of any new or deleted non-common scheduling points prior to implementing such changes in its M2M software.	non-common	NYISO

$$RTO\_Transfers_{sched\_pt} = Imports_{sched\_pt} + WheelsIn_{sched\_pt} - Exports_{sched\_pt} - WheelsOut_{sched\_pt}$$

Where:

sched_pt = the relevant scheduling point. A scheduling point can be either a proxy or a scheduled line;

$RTO\_Transfers_{sched\_pt}$ = the net interchange schedule at a scheduling point;

$Imports_{sched\_pt}$ = the import component of the interchange schedule at a scheduling point;

$WheelsIn_{sched\_pt}$ = the injection of wheels-through component of the interchange schedule at a scheduling point;

$Exports_{sched\_pt}$ = the export component of the interchange schedule at a scheduling point; and

$WheelsOut_{sched\_pt}$ = the withdrawal of wheels-through component of the interchange schedule at a scheduling point.

The equation below applies to all non-common scheduling points that only one of the participating RTOs is responsible for. *Parallel_Transfers* are applied to the Market Flow of the responsible participating RTO. For example, the *Parallel_Transfers* computed for the IESO-NYISO non-common scheduling point are applied to the NYISO Market Flow.

$$Parallel\_Transfers_{\text{M2M\_Flowgate-m}} = \sum_{\text{nc\_sched\_pt}=1}^{all} RTO\_Transfers_{\text{nc\_sched\_pt}} \times PTDF_{(\text{nc\_sched\_pt,M2M\_Flowgate-m})}$$

Where:

M2M_Flowgate-m = the relevant flowgate;

nc_sched_pt = the relevant non-common scheduling point. A non-common scheduling point can be either a proxy or a scheduled line. Non-common scheduling points are identified in Table 3, above;

$Parallel\_Transfers_{\text{M2M\_Flowgate-m}}$ = the flow on M2M Flowgate m due to the net interchange schedule at the non-common scheduling point;

$RTO\_Transfers_{\text{nc\_sched\_pt}}$ = the net interchange schedule at the non-common scheduling point, where a positive number indicates the import direction; and

$PTDF_{(\text{nc\_sched\_pt, M2M\_Flowgate-m})}$ = the power transfer distribution factor of the non-common scheduling point on M2M Flowgate m. For NYISO, the PTDF will equal the generator shift factor of the non-common scheduling point.

The equation below applies to common scheduling points that directly interconnect the participating RTOs. *Shared_Transfers* are applied to the Monitoring RTO's Market Flow only. NYISO to PJM transfers would be considered part of NYISO's Market Flow for NYISO-monitored Flowgates and part of PJM's Market Flow for PJM-monitored Flowgates.

$$Shared\_Transfers_{\text{M2M\_Flowgate-m}} = \sum_{\text{cmn\_sched\_pt}=1}^{all} RTO\_Transfers_{\text{cmn\_sched\_pt}} \times PTDF_{(\text{cmn\_sched\_pt,M2M\_Flowgate-m})}$$

Where:

M2M_Flowgate-m = the relevant flowgate;

cmn_sched_pt = the relevant common scheduling point. A common scheduling point can be either a proxy or a scheduled line. Common scheduling points are identified in Table 3, above;

$Shared\_Transfers_{M2M\_Flowgate\text{-}m}$ = the flow on M2M Flowgate m due to interchange schedules on the common scheduling point;

$RTO\_Transfers_{cmn\_sched\_pt}$ = the net interchange schedule at a common scheduling point, where positive indicates the import direction; and

$PTDF_{(cmn\_sched\_pt,\ M2M\_Flowgate\text{-}m)}$ = the generation shift factor of the common scheduling point on M2M Flowgate m. For NYISO, the PTDF will equal the generator shift factor of the common scheduling point.

5.6 Compute the PAR Effects on M2M Flowgates

For the PARs listed in Table 4 below, the RTOs will determine the generation-to-load flows and interchange schedules, in MWs, that each PAR is impacting.

Table 4. List of Phase Angle Regulators

PAR	Description	PAR Type	Actual Schedule	Target Schedule	Responsible Participating RTO(s)
1	RAMAPO PAR3500	common	From telemetry	From telemetry*	NYISO and PJM
2	RAMAPO PAR4500	common	From telemetry	From telemetry*	NYISO and PJM
3	FARRAGUT TR11	common	From telemetry	From telemetry†	NYISO and PJM
4	FARRAGUT TR12	common	From telemetry	From telemetry†	NYISO and PJM
5	GOETHSLN BK_1N	common	From telemetry	From telemetry†	NYISO and PJM
6	WALDWICK O2267	common	From telemetry	From telemetry†	NYISO and PJM
7	WALDWICK F2258	common	From telemetry	From telemetry†	NYISO and PJM
8	WALDWICK E2257	common	From telemetry	From telemetry†	NYISO and PJM
9	STLAWRNC PS_33	non-common	From telemetry	0	NYISO
10	STLAWRNC PS_34	non-	From telemetry	0	NYISO

		common			

*****Pursuant to the rules for implementing the M2M coordination process over the Ramapo PARs that are set forth in this M2M Schedule.

†Consistent with Schedule C to the Joint Operating Agreement between the Parties.

Compute the PAR control as the actual flow less the target flow across each PAR:

$$PAR\_Control_{par} = Actual\_MW_{par} - Target\_MW_{par}$$

Where:

par = each of the phase angle regulators listed in Table 4, above;

$PAR\_Control_{par}$ = the flow deviation on the pars;

$Actual\_MW_{par}$ = the actual flow on each of the pars, determined consistent with Table 4 above; and

$Target\_MW_{par}$ = the target flow that each of the pars should be achieving, determined in accordance with Table 4 above.

Common PARs

In the equations below, the Non-Monitoring RTO is credited for or responsible for *PAR_Impact* resulting from the common PAR effect on the Monitoring RTO's M2M Flowgates. The common PAR impact calculation only applies to the common PARs identified in Table 4 above.

Compute control deviation for all common PARs on M2M Flowgate m based on the $PAR\_Control_{par}$ MWs calculated above:

$$Cmn\_PAR\_Control_{M2M\_Flowgate-m} = \sum_{cmn\_par=1}^{all} \left(PAR\_OTDF_{(cmn\_par,M2M\_Flowgate-m)} \times PAR\_Control_{cmn\_par}\right)$$

Where:

M2M_Flowgate-m = the relevant flowgate;

cmn_par = each of the common phase angle regulators, modeled as Flowgates, identified in Table 4, above;

$Cmn\_PAR\_Control_{M2M\_Flowgate\text{-}m}$ = the sum of flow on M2M Flowgate m after accounting for the operation of common pars;

$PAR\_OTDF_{(cmn\_par,M2M\_Flowgate\text{-}m)}$ = the outage transfer distribution factor of each of the common pars on M2M Flowgate m; and

$PAR\_Control_{cmn\_par}$ = the flow deviation on each of the common pars.

Compute the impact of generation-to-load and interchange schedules across all common PARs on M2M Flowgate m as the Market Flow across each common PAR multiplied by that PAR's shift factor on M2M Flowgate m:

$$Cmn\_PAR\_MF_{M2M\_Flowgate-m} = \sum_{cmn\_par=1}^{all} \left(\begin{matrix} \left(PAR\_OTDF_{(cmn\_par,M2M\_Flowgate-m)}\right) \times \\ \left(RTO\_GTL_{cmn\_par} + Parallel\_Transfers_{cmn\_par}\right) \end{matrix} \right)$$

Where:

M2M_Flowgate-m = the relevant flowgate;

cmn_par = the set of common phase angle regulators, modeled as Flowgates, identified in Table 4 above;

$Cmn\_PAR\_MF_{M2M\_Flowgate\text{-}m}$ = the sum of flow on M2M Flowgate m due to the generation to load flows and interchange schedules on the common pars;

$PAR\_OTDF_{(cmn\_par,M2M\_Flowgate\text{-}m)}$ = the outage transfer distribution factor of each of the common pars on M2M Flowgate m;

$RTO\_GTL_{cmn\_par}$ = the generation to load flow for the Non-Monitoring RTO's entire footprint on each of the common pars; and

$Parallel\_Transfers_{cmn\_par}$ = the flow on each of the common pars caused by interchange schedules at non-common scheduling points.

Next, compute the impact of the common PAR effect for M2M Flowgate m as:

$$Cmn\_PAR\_Impact_{M2M\_Flowgate-m} = Cmn\_PAR\_MF_{M2M\_Flowgate-m} - Cmn\_PAR\_Control_{M2M\_Flowgate-m}$$

Where:

M2M_Flowgate-m = the relevant flowgate;

$Cmn\_PAR\_Impact_{M2M\_Flowgate\text{-}m}$ = potential flow on M2M Flowgate m that is affected by the operation of the common pars;

$Cmn\_PAR\_MF_{M2M\_Flowgate\text{-}m}$ = the sum of flow on M2M Flowgate m due to the generation to load and interchange schedules on the common pars; and

$Cmn\_PAR\_Control_{M2M\_Flowgate\text{-}m}$ = the sum of flow on M2M Flowgate m after accounting for the operation of common pars.

Non-Common PARs

For the equations below, the NYISO will be credited or responsible for *PAR_Impact* on all M2M Flowgates because the NYISO is the participating RTO that has input into the operation of these devices. The non-common PAR impact calculation only applies to the non-common PARs identified in Table 4 above..

Compute control deviation for all non-common PARs on M2M Flowgate m based on the PAR control MW above:

$$NC\_PAR\_Control_{M2M\_Flowgate-m} = \sum_{nc\_par=1}^{all} PAR\_OTDF_{(nc\_par,M2M\_Flowgate-m)} \times PAR\_Control_{nc\_par}$$

Where:

M2M_Flowgate-m = the relevant flowgate;

nc_par = each of the non-common phase angle regulators, modeled as Flowgates, identified in Table 4 above;

$NC\_PAR\_Control_{M2M\_Flowgate\text{-}m}$ = the sum of flow on M2M Flowgate m after accounting for the operation ofnon-common pars;

$PAR\_OTDF_{(nc\_par,M2M\_Flowgate\text{-}m)}$ = the outage transfer distribution factor of each of the non-common pars on M2M Flowgate m; and

$PAR\_Control_{nc\_par}$ = the sum of flow on each of the non-common pars after accounting for the operation of the non-common pars.

Compute the impact of generation-to-load and interchange schedules across all non-common PARs on M2M Flowgate m as the Market Flow across each PAR multiplied by that PAR's shift factor on M2M Flowgate m:

$$NC\_PAR\_MF_{M2M\_Flowgate-m} = \sum_{nc\_par=1}^{all} \left(\begin{matrix} \left(PAR\_OTDF_{nc\_par,M2M\_Flowgate-m}\right) \times \\ \left(RTO\_GTL_{nc\_par} + Parallel\_Transfers_{nc\_par}\right) \end{matrix} \right)$$

Where:

M2M_Flowgate-m = the relevant flowgate;

nc_par = the set of non-common phase angle regulators, modeled as Flowgates, identified in Table 4 above;

$NC\_PAR\_MF_{M2M\_Flowgate-m}$ = the sum of flow on M2M Flowgate m due to the generation to load flows and interchange schedules on the non-common pars;

$PAR\_OTDF_{(nc\_par,M2M\_Flowgate-m)}$ = the outage transfer distribution factor of each of the non-common pars on M2M Flowgate m;

$RTO\_GTL_{nc\_par}$ = the generation to load flow, as computed above where the M2M Flowgate m is one of the non-common pars, for the Non-Monitoring RTO's entire footprint on each of the non-common pars; and

$Parallel\_Transfers_{nc\_par}$ = the flow, as computed above where the M2M Flowgate m is one of the non-common pars, on each of the non-common pars caused by interchange schedules at non-common scheduling points.

Next, compute the non-common PAR impact for M2M Flowgate m as:

$$NC\_PAR\_Impact_{M2M\_Flowgate-m} = NC\_PAR\_MF_{M2M\_Flowgate-m} - NC\_PAR\_Control_{M2M\_Flowgate-m}$$

Where:

M2M_Flowgate-m = the relevant flowgate;

$NC\_PAR\_Impact_{M2M\_Flowgate-m}$ = the potential flow on M2M Flowgate m that is affected by the operation of non-common pars;

$NC\_PAR\_MF_{M2M\_Flowgate-m}$ = the sum of flow on M2M Flowgate m due to the generation to load and interchange schedules on the non-common pars; and

$NC\_PAR\_Control_{M2M\_Flowgate\text{-}m}$ = the sum of flow on M2M Flowgate m after accounting for the operation of non-common pars.

Aggregate all PAR Effects for Each M2M Flowgate

The total impacts from the PAR effects for M2M Flowgate m is:

$$PAR\_Impact_{M2M\_Flowgate-m} = PAR\_MF_{M2M\_Flowgate-m} - PAR\_Control_{M2M\_Flowgate-m}$$

Where:

M2M_Flowgate-m = the relevant flowgate;

$PAR\_Impact_{M2M\_Flowgate\text{-}m}$ = the flow on M2M Flowgate m that is affected after accounting for the operation of both common and non-common pars;

$PAR\_MF_{M2M\_Flowgate\text{-}m}$ = the sum of flow on M2M Flowgate m due to the generation to load and interchange schedules on both common and non-common pars; and

$PAR\_Control_{M2M\_Flowgate\text{-}m}$ = the sum of flow on M2M Flowgate m after accounting for the operation of both common and non-common pars.

5.7 Compute the RTO Aggregate Market Flow for all M2M Flowgates

With the *RTO_GTL* and *PAR_IMPACT* known, we can now compute the *RTO_MF* for all M2M Flowgates as:

$$RTO\_MF_{M2M\_Flowgate-m} = RTO\_GTL_{M2M\_Flowgate-m} + Parallel\_Transfers_{M2M\_Flowgate-m} + Shared\_Transfers_{M2M\_Flowgate-m} - PAR\_Impact_{M2M\_Flowgate-m}$$

Where:

M2M_Flowgate-m = the relevant flowgate;

$RTO\_MF_{M2M\_Flowgate\text{-}m}$ = the Market Flow caused by RTO generation dispatch and transaction scheduling on M2M Flowgate m after accounting for the operation of both the common and non-common pars;

$RTO\_GTL_{M2M\_Flowgate\text{-}m}$ = the generation to load flow for the entire RTO footprint on M2M Flowgate m;

$Parallel\_Transfers_{M2M\_Flowgate-m}$ =	the flow on M2M Flowgate m caused by interchange schedules that are not jointly scheduled by the participating RTOs;
$Shared\_Transfers_{M2M\_Flowgate-m}$ =	the flow on M2M Flowgate m caused by interchange schedules that are jointly scheduled by the participating RTOs; and
$PAR\_Impact_{M2M\_Flowgate-m}$ =	the flow on M2M Flowgate m that is affected after accounting for the operation of both the common and non-common pars.

6 M2M Entitlement Determination

Each Party shall calculate a M2M Entitlement on each M2M Flowgate and compare the results on a mutually agreed upon schedule.

The method of incorporating the Rockland Electric Company ("RECo") load that was transferred from the NYISO to PJM in 2001 into the M2M Market Flows and M2M Entitlements is still undefined and will be addressed in a subsequent compliance filing. The Participating RTOs expect that they will be able to resolve the appropriate treatment of RECo load prior to implementation of the M2M coordination process. If it is not possible to timely reach agreement regarding how service to RECo load should be handled, then RECo will be excluded from both the M2M Market Flow and M2M Entitlements until this issue is resolved.

Comment [MAD2]: PJM and NYISO continue to discuss this language.

6.1 M2M Entitlement Topology Model and Impact Calculation

The M2M Entitlement calculation shall be based on a static topological model to determine a non-Monitoring RTO's share of a M2M Flowgate's total capacity based on historic loop flows. The model must include the following items:

1. a static transmission and generation model;
2. generator, load, and PAR shift factors;
3. generator output and load from 2009 through 2011;
4. a PAR impact assumption that the PAR control is perfect; and
5. new or upgraded Transmission Facilities.

The Parties shall calculate the GLDFs using an IDC model that contains a mutually agreed upon static set of: (1) transmission lines that are modeled as in-service; (2) generators; and (3) loads. Using these GLDFs, generator output data from 2009 through 2011, and load data from 2009 through 2011, the Parties shall calculate each Party's MW impact on each M2M Flowgate for each hour in 2009, 2010, and 2011. Using these impacts, the Parties shall create a reference year consisting of four periods ("M2M Entitlement Periods") for each M2M Flowgate. The M2M Entitlement Periods are as follows:

1. M2M Entitlement Period 1: December, January, and February;
2. M2M Entitlement Period 2: March, April, and May;
3. M2M Entitlement Period 3: June, July, and August; and
4. M2M Entitlement Period 4: September, October, and November.

For each of the M2M Entitlement Periods listed above the Non-Monitoring RTO will calculate its M2M Entitlement on each M2M Flowgate for each hour of each day of a week (*i.e.*, for seven consecutive twenty-four hour periods) that will serve as the representative week for that M2M Entitlement Period. The M2M Entitlement for each day/hour, for each M2M Flowgate will be calculated by averaging the Non-Monitoring RTO's Market Flow on an M2M Flowgate for each particular day/hour of the week. To calculate the average the Non-Monitoring RTO shall use the Market Flow data for all of the like day/hours, that occurred in the M2M Entitlement Period, in each of the years 2009, 2010, and 2011. When determining M2M Settlements each Party will use the M2M Entitlement that corresponds to the hour of the week and to the M2M Entitlement Period for which the real-time Market Flow is being calculated.

6.2 M2M Entitlement Calculation

Each Party shall independently calculate the Non-Monitoring RTO's M2M Entitlement for all M2M Flowgates using the equations set forth in this section. The Parties shall mutually agree upon the initial M2M Entitlement calculations. Any disputes that arise in the M2M Entitlement calculations will be resolved in accordance with the dispute resolution procedures set forth in section 35.15 of the Agreement.

6.2.1 M2M Entitlement Calculation:

The following assumptions apply to the M2M Entitlement calculation:

1. the Parties shall calculate the values in this section using the M2M Entitlement Topology Model discussed in Section 6.1 above, unless otherwise stated; and
2. perfect PAR Control exists for the calculations.

Once the RefYrRawEntitlement has been calculated (using the formula below) for each hour of the years 2009, 2010 and 2011, the new M2M Entitlement will be determined for a representative week in each M2M Entitlement Period using the method established in Section 6.1 above. In the event of new or upgraded Transmission Facilities, Section 6.3 below sets forth the rules that will be used to adjust M2M Entitlements.

$$RefYrRawEntitlement_{M2M\_Flowgate-m} = RTO\_GTL_{M2M\_Flowgate-m} + Parallel\_Transfers_{M2M\_Flowgate-m} + Shared\_Transfers_{M2M\_Flowgate-m} + PAR\_Impact_{M2M\_Flowgate-m}$$

Where:

$$Parallel\_Transfers_{\text{M2M\_Flowgate-m}} = \sum_{\text{nc\_sched\_pt}=1}^{all} RTO\_Transfers_{\text{nc\_sched\_pt}} \times PTDF_{(\text{nc\_sched\_pt,M2M\_Flowgate}-\text{m})}$$

$$Shared\_Transfers_{\text{M2M\_Flowgate-m}} = 0$$

Where:

M2M_Flowgate-m = the relevant Flowgate;

$\text{Parallel\_Transfers}_{\text{M2M\_Flowgate-m}}$ = the flow on M2M Flowgate m due to the agreed set of external resources set forth in Section 6.2.2.1 below;

$\text{RTO\_Transfers}_{\text{nc\_sched\_pt}}$ = the agreed set of external resources set forth in Section 6.2.2.1 below; and

$\text{PTDF}_{(\text{nc\_sched\_pt, M2M\_Flowgate-m})}$ = the power transfer distribution factor of the agreed set of external resources on M2M Flowgate m. For NYISO, the PTDF will equal the generator shift factor of the external resource.

and

$$PAR\_Impact_{M2M\_Flowgate-m} = PAR\_MF_{M2M\_Flowgate-m} - PAR\_Control_{M2M\_Flowgate-m}$$

By assuming perfect PAR control, the *PAR_Control* variable in the previous equation is equal to zero, and the PAR Impacts equation simplifies to:

$$PAR\_Impact_{M2M\_Flowgate-m} = PAR\_MF_{M2M\_Flowgate-m}$$

Where:

M2M_Flowgate-m = the relevant Flowgate;

$\text{PAR\_MF}_{\text{M2M\_Flowgate-m}}$ = the generation to load flow across all PARs on M2M Flowgate m;

6.2.2 Treatment of Out-of-Area Capacity Resources and Representation of Ontario/Michigan PARs in the M2M Entitlement Calculation Process

The Parties are working to resolve several aspects of the M2M Entitlement Calculation. Two related unresolved issues are the appropriate modeling of out-of-area capacity resources and the Ontario/Michigan PARs (once those facilities enter service) in the M2M Entitlement calculation. The Parties are working to reach agreement on these two related aspects

of the entitlement calculation together. Sections 6.2.2.1 and 6.2.2.2 below set forth both (1) the rules that will apply if the Parties are able reach agreement on these two issues (with certain key terms left incomplete), and (2) how M2M Entitlements will be calculated if the Parties are not able to reach an agreement on these two related issues prior to implementation of the M2M coordination process. When agreement is reached, the Parties will submit a compliance filing to incorporate their proposed terms and conditions for the FERC's consideration.

6.2.2.1 Modeling of External Capacity Resources

The Parties are working to reach an agreement on an appropriate set of external resources to be included in the M2M Entitlement calculation. If the Parties are able to reach agreement on the related issues of the appropriate modeling of out-of-area capacity resources and of the Ontario/Michigan PARs in the system model that is used to perform the M2M Entitlement calculation, then the Parties will mutually agree upon the set of capacity resources located outside each RTO's Balancing Authority Area that will be included in the system model that is used to perform the M2M Entitlements calculation. This agreed set of resources will be used to calculate the $Parallel\_Transfers_{M2M\_Flowgate\text{-}m}$ term set forth in Section 6.2.1, above.

If the Parties are not able to reach agreement on the related issues of the appropriate modeling of out-of-area capacity resources and of the Ontario/Michigan PARs in the system model that is used to perform the M2M Entitlement calculation, then eExternal capacity resources will not be included in the M2M Entitlement calculation. Instead, each Balancing Authority's load will be served by that Balancing Authority's internal resources in the system model that is used to calculate M2M Entitlements and . In this case the $Parallel\_Transfers_{M2M\_Flowgate\text{-}m}$ term set forth in Section 6.2.1, above will be set equal to zero.

6.2.2.2 Modeling of the Ontario/Michigan PARs

The Parties are working to reach agreement on the appropriate modeling of the Ontario/Michigan PARs in the M2M Entitlement calculation. If the Parties are able to reach agreement on the related issues of the appropriate modeling of out-of-area capacity resources and of the Ontario/Michigan PARs in the system model that is used to perform the M2M Entitlement calculation, then the method set forth below will be used to determine which set of M2M Entitlements will be used in each M2M Entitlement Period.

For each M2M Entitlement Period two sets of M2M Entitlements will be calculated. In the first set of M2M Entitlements, the Ontario/Michigan interface will be represented as regulating (conforming actual power flows to scheduled power flows at the interface). In the second set of M2M Entitlements, the Ontario/Michigan interface will be represented as not regulating. The RTOs will retain both sets of M2M Entitlement results for future use.

Thirty days prior to the beginning of each M2M Entitlement Period the Parties will review the actual operating history of the Ontario/Michigan PARs for the immediately prior 12 months to determine when the Ontario/Michigan PARs adequately controlled actual power flows to match scheduled power flows.

If the Ontario/Michigan PARs were out-of-service or bypassed for an extended, consecutive period of one month or longer within the immediately prior 12 months, then the period during which the Ontario/Michigan PARs were out-of-service or bypassed will be excluded from the Ontario/Michigan PAR operating history and a determination regarding whether or not the PARs were regulating will be made based on the Ontario/Michigan PAR operating history that is available for the immediately prior 12 months. However, if the exclusion of period during which the Ontario/Michigan PARs were out-of-service or bypassed results in less than six months operating history being available in the immediately prior 12 months, then the M2M Entitlement set that reflects the modeling of the Ontario/Michigan PARs as not regulating will be used until there is at least six months operating history available for evaluation on the date that the Ontario/Michigan PAR operating history evaluation commences (thirty days prior to an upcoming upcoming M2M Entitlement Period).

If the Ontario/Michigan PAR operating history demonstrates that actual power flows at the Ontario/Michigan Interface were within 200 MWs of scheduled power flows in at least 65% of hours, then the M2M Entitlement set that reflects the modeling of the Ontario/Michigan PARs as regulating will be used for the upcoming M2M Entitlement Period. Otherwise, the M2M Entitlement set that reflects the modeling of the Ontario/Michigan PARs as not regulating will be used for the upcoming M2M Entitlement Period.

If any of the PARs at the Ontario/Michigan interface are out-of-service and expected to continue to be out-of-service for one month or more of an upcoming three month M2M Entitlement Period, then the M2M Entitlement set that reflects the modeling of the Ontario/Michigan PARs as non-regulating will be used for that M2M Entitlement Period.

The Parties may mutually agree to model the Ontario/Michigan PARs in a different manner than specified in this Section 6.2.2.2.

If the Parties are not able to reach agreement on the related issues of the appropriate modeling of out-of-area capacity resources and of the Ontario/Michigan PARs in the system model that is used to perform the M2M Entitlement calculation, then the Ontario/Michigan interface will be modeled as not regulating in the system model that is used to calculate M2M Entitlements.

Comment [MAD3]: PJM and NYISO continue to discuss this language.

6.3 M2M Entitlement Adjustment for New Transmission Facilities or Upgraded Transmission Facilities

This section sets forth the rules for incorporating new or upgraded Transmission Facilities, added after the reference year M2M Entitlements have been established, into the M2M Entitlement calculation.

If the cost of a new or upgraded Transmission Facility is borne solely by the Market Participants of the Monitoring RTO for the new or upgraded Transmission Facility, the Market Participants of the Monitoring RTO will exclusively benefit from the increase in transfer capability on the Monitoring RTO's Transmission Facilities. Therefore, the Non-Monitoring RTO's M2M Entitlements shall not increase as result of such new or upgraded Transmission Facilities. Moreover, a Monitoring RTO's M2M Entitlements shall not decrease as a result of such new or upgraded Transmission Facilities.

[PJM AND THE NYISO ARE STILL WORKING TO REACH AGREEMENT ON WHETHER AND HOW TO INCORPORATE SIGNIFICANT CHANGES IN TRANSMISSION SYSTEM TOPOLOGY THAT ARE NOT THE RESULT OF NEW TRANSMISSION FACILITIES BEING CONSTRUCTED IN EITHER PARTICIPATING RTO'S BALANCING AUTHORITY AREA(S) INTO THE M2M ENTITLEMENTS CALCULATION PROCESS.]

Comment [MAD4]: PJM and NYISO continue to discuss this language.

M2M Entitlement Adjustment Calculation for the Non-Monitoring RTO:

For all M2M Entitlement adjustments, the Non-Monitoring RTO is the non-funding market, and the Monitoring RTO is the funding market.

To the extent a Monitoring RTO's upgrade or new Transmission Facility results in reduced Non-Monitoring RTO's impacts on a Monitoring RTO's M2M Flowgate, the Non-Monitoring RTO's M2M Entitlement will be redistributed to ensure that the Non-Monitoring RTO's aggregate M2M Entitlements on all the Monitoring RTO's M2M Flowgates is not decreased.

The total Non-Monitoring RTO's circulation through the Monitoring RTO shall not result in net increased M2M Entitlement on the Monitoring RTO's system. Therefore, the following formula shall be computed for each hour of the years 2009, 2010, and 2011 to determine the pro-rata adjustment that shall be applied to each Monitoring RTO's M2M Flowgates. Once the NewRawEntitlement that incorporates the topology adjustment has been calculated (using the formula below) for each hour of the years 2009, 2010 and 2011, the new M2M Entitlement will be determined for a representative week in each M2M Entitlement Period using the method established in Section 6.1 above.

$$NewRawEntitlement_{M2M\ Flowgate\ m} = RefYrRawEntitlement_{M2M\ Flowgate\ m} \times \left(\frac{Ref\ Yr\ Circ}{New\ Circ}\right)$$

Where:

$NewRawEntitlement_{M2M\ Flowgate\ m}$ = the new topology adjusted Market Flow for M2M Flowgate m computed for each hour of the reference years (2009 through 2011) data and base model and adjusted for the new Transmission Facility;

$RefYrRawEntitlement_{M2M\ Flowgate\ m}$ = the Market Flow for M2M Flowgate m computed for each hour of the reference years (2009 through 2011) data and base model;

New Circ = the total calculated circulation through the Monitoring RTO that would occur on the new model if the reference years load and generator dispatch were applied. The New Circ shall not be less than the Ref Yr Circ; and

Ref Yr Circ = the total calculated Non-Monitoring RTO's circulation through the Monitoring RTO in the reference years.

The circulation is determined as follows:

1) Create a Flowgate for: (a) the tie lines without controllable devices between the PJM and NYISO interface; and (b) the tie lines without controllable devices between the NYISO and Ontario interface.

2) Calculate the impacts on all of the Flowgates created in the previous step.

    a. Reference Year Circulation (Ref Yr Circ):

        i. Calculate the impacts on the Flowgates created in step 1 above with the GLDFs described in section 6.1 above and the 2009 to 2011 generation and load data.

        ii. Sum all of the absolute value of the impacts on the Flowgates created in step 1 above divided by 2.

    b. New Circulation (New Circ):

        i. Compute the impacts on the Flowgates created in step 1 above with the current year GLDF (with any new or upgraded Transmission Facilities) and the 2009-2011 generation and load data.

        ii. Sum all of the absolute value of the impacts on the Flowgates created in step 1 above divided by 2.

7 Real-Time Energy Market Coordination

Operation of the Ramapo PARs and redispatch are used by the Parties in real-time operations to effectuate this M2M coordination process. Operation of the Ramapo PARs will permit the Parties to redirect energy to reduce the overall cost of managing transmission congestion and to converge the participating RTOs' cost of managing transmission congestion. Operation of the Ramapo PARs to manage transmission congestion requires cooperation

between the NYISO and PJM. Operation of the Ramapo PARs shall be coordinated with the operation of other PARs at the NYISO – PJM interface.

When a M2M Flowgate that is under the operational control of either NYISO or PJM and that is eligible for re-dispatch coordination, becomes binding in the Monitoring RTOs real-time security constrained economic dispatch, the Monitoring RTO will notify the Non-Monitoring RTO of the transmission constraint and will identify the appropriate M2M Flowgate that requires re-dispatch assistance. The Monitoring and Non-Monitoring RTOs will provide the economic value of the M2M Flowgate constraint (i.e., the Shadow Price) as calculated by their respective dispatch models. Using this information, the security-constrained economic dispatch of the Non-Monitoring RTO will include the M2M Flowgate constraint; the Monitoring RTO will evaluate the actual loading of the M2M Flowgate constraint and request that the Non-Monitoring RTO modify its Market Flow via redispatch if it can do so more efficiently than the Monitoring RTO (i.e., if the Non-Monitoring RTO has a lower Shadow Price for that M2M Flowgate than the Monitoring RTO).

An iterative coordination process will be supported by automated data exchanges in order to ensure the process is manageable in a real-time environment. The process of evaluating the Shadow Prices between the RTOs will continue until the Shadow Prices converge and an efficient redispatch solution is achieved. The continual interactive process over the following dispatch cycles will allow the transmission congestion to be managed in a coordinated, cost-effective manner by the RTOs. A more detailed description of this iterative procedure is discussed in Section 7.1 and the appropriate use of this iterative procedure is described in Section 8.

7.1 Real-Time Re-Dispatch Coordination Procedures

The following procedure will apply for managing redispatch for M2M Flowgates in the real-time Energy market:

1. M2M Flowgates shall be monitored per each RTO's internal procedures. When an M2M Flowgate is constrained to a defined limit (actual or contingency flow) by a non-transient constraint, the Monitoring RTO shall consider it as a M2M constraint; limits are verified and updated as required.
2. The Monitoring RTO initiates M2M, notifies the Non-Monitoring RTO of the M2M Flowgate that is subject to coordination and updates required information.
3. The Non-Monitoring RTO shall acknowledge receipt of the notification and one of the following shall occur:
    a. The Non-Monitoring RTO refuses to activate M2M:
        i. The Non-Monitoring RTO notifies the Monitoring RTO of the reason for refusal; and
        ii. The M2M State is set to "Refused"; or
    b. The Non-Monitoring RTO agrees to activate M2M:

i. Such an agreement shall be considered an initiation of the M2M process for operational and settlement purposes; and
ii. The M2M State is set to "Activated".

4. The Parties have agreed to transmit information required for the administration of this procedure, as per section 35.7.1 of the Agreement.
5. As Shadow Prices converge, the Monitoring RTO shall be responsible for the continuation or termination of the M2M process. Current and forecasted future system conditions shall be considered.[1]
6. Upon termination of M2M, the Monitoring RTO shall
   a. Notify the Non-Monitoring RTO; and
   b. Transmit M2M data to the Non-Monitoring RTO with the M2M State set to "Closed". The timestamp with this transmission shall be considered termination of the M2M process for operational and settlement purposes.

7.2 Real-Time Ramapo PAR Coordination

The Ramapo PARs will be operated to facilitate interchange schedules while minimizing regional congestion costs. When congestion is not present, the Ramapo PARs will be operated to achieve the target flow as established below in Section 7.2.1.

In order to preserve the long-term availability of the Ramapo PARs, a maximum of 20 taps per PAR per day, and a maximum of 400 taps per calendar month will normally be observed.

7.2.1 Ramapo Target Value

A Target Value for flow between the NYISO and PJM shall be determined for each Ramapo PAR (the 3500 PAR and the 4500 PAR) ("$Target_{Ramapo}$"). These Target Value shall be determined by a formula based on the net interchange schedule between the Parties and shall be used for settlement purposes as:

$$Target_{Ramapo} = \big((RamapoFactor \times PJM\_NYISO\_Schedule) + (WheelImbalance) + (RemainingImbalance)\big)$$

Where:

$Target_{Ramapo} =$ Calculated Target Value for the flow on each Ramapo PAR (PAR3500 and PAR4500);

$RamapoFactor =$ 61% of the net interchange schedule from PJM to NYISO over the AC tie lines distributed evenly across the in-service Ramapo PARs;

[1] Termination of M2M redispatch may be requested by either RTO in the event of a system emergency.

$WheelImbalance =$ As described in the wheel imbalance formula below, 72% multiplied by the imbalance of the 600/400 MW transactions described in Schedule C to the Agreement distributed evenly across the in-service Ramapo PARs;

$RemainingImbalance =$ As described in the remaining imbalance formula below, 28% multiplied by the imbalance of the JK/ABC transactions described in Schedule C to the Agreement distributed evenly across the in-service Ramapo PARs; and

$PJM\_NYISO\_Schedule =$ the net interchange schedule between PJM and NYISO over the AC tie lines.

The Participating RTOs agree to compute the *WheelImbalance* and *RemainingImbalance* terms above as set forth below.

The Participating RTOs (i) will mutually agree on the circumstances under which they will allow thirteen percent of PJM to New York interchange schedules to flow over the ABC and JK PARs (described in Appendix 3 of Schedule C to the Agreement), (ii) will only permit thirteen percent of PJM to New York interchange schedules to flow over the ABC and JK PARs when such treatment has been pre-coordinated between the Participating RTOs, and (iii) agree to exclude the Auto Correction Factor described in Schedule C to the Agreement from the actual ABC and JK flows when computing the *WheelImbalance* and *RemainingImbalance* terms.

Comment [MAD5]: PJM and NYISO continue to discuss this language.

The *WheelImbalance* is the distribution of actual flows over Ramapo that is incorporated in the Ramapo PAR Target Value when the actual flows on the ABC and JK PARs do not perfectly match the ABC and JK PARs desired flow.

$$WheelImbalance = 72\% \times \Big(\big(Actual_{JK\ PARs} - (RTE + Auto\ Correction\ Factor_{JK\ PARs})\big) - \big(Actual_{ABC\ PARs} - (RTE + Auto\ Correction\ Factor_{ABC\ PARs})\big)\Big)$$

Where:

$Actual_{JK\ PARs} =$ Telemetered real-time flow over the JK PARs, where positive indicates flows from NYISO to PJM;

$Actual_{ABC\ PARs} =$ Telemetered real-time flow over the ABC PARs, where positive indicates flows from PJM to NYISO;

$RTE =$ Con Edison real-time election pursuant to Schedule C to the Agreement, where positive indicates flows from the JK interface to the ABC interface;

$Auto\ Correction\ Factor_{JK\ PARs} =$ The JK PARs Auto Correction component of the JK PARs real-time desired flow as described in Schedule C to the Agreement, where positive indicates flows from NYISO to PJM; and

$Auto\ Correction\ Factor_{ABC\ PARs} =$ The ABC PARs Auto Correction component of the ABC PARs real-time desired flow as described in Schedule C to the Agreement, where positive indicates flows from PJM to NYISO.

The *RemainingImbalance* is the distribution of actual flows over the western free flow ties that is incorporated in the Ramapo PAR Target Value when the actual flows on the ABC and JK PARs do not perfectly match the ABC and JK PARs desired flow.

$$RemainingImbalance = 28\% \times \Big(\big(Actual_{JK\ PARs} - (RTE + Auto\ Correction\ Factor_{JK\ PARs})\big) - \big(Actual_{ABC\ PARs} - (RTE + Auto\ Correction\ Factor_{ABC\ PARs})\big)\Big)$$

Where:

$Actual_{JK\ PARs} =$ Telemetered real-time flow over the JK PARs, where positive indicates flows from NYISO to PJM;

$Actual_{ABC\ PARs} =$ Telemetered real-time flow over the ABC PARs, where positive indicates flows from PJM to NYISO;

$RTE =$ Con Edison real-time election pursuant to Schedule C to the Agreement, where positive indicates flows from the JK interface to the ABC interface;

$Auto\ Correction\ Factor_{JK\ PARs} =$ The JK PARs Auto Correction component of the JK PARs real-time desired flow as described in Schedule C to the Agreement, where positive indicates flows from NYISO to PJM; and

$Auto\ Correction\ Factor_{ABC\ PARs} =$ The ABC PARs Auto Correction component of the ABC PARs real-time desired flow as described in Schedule C to the Agreement, where positive indicates flows from PJM to NYISO.

7.2.2 Determination of the Cost of Congestion at Ramapo

The incremental cost of congestion relief provided by each Ramapo PAR shall be determined by each of the Parties. These costs shall be determined by multiplying each Party's Shadow Price on each of its M2M Flowgates by each Ramapo PAR's OTDF for the relevant M2M Flowgates.

The incremental cost of congestion relief provided by each Ramapo PAR shall be determined by the following formula:

$$Congestion\$_{(Ramapo,RTO)} =$$

$$\sum_{M2M\ Flowgates-m \in M2M\ Flowgates_{RTO}} \left(OTDF_{(M2M\ Flowgate-m,Ramapo)} \times Shadow\$_{M2M\ Flowgate-m}\right)$$

Where:

$Congestion\$_{(Ramapo,RTO)} =$	Cost of congestion at each Ramapo PAR for the relevant participating RTO;
$M2M\ Flowgates - m =$	Set of M2M Flowgates for the relevant participating RTO;
$OTDF_{(M2M\ Flowgate-m,Ramapo)} =$	The OTDF for each Ramapo PARs on M2M Flowgate–m; and
$Shadow\$_{M2M\ Flowgate-m} =$	The Shadow Price on the relevant participating RTO's M2M Flowgate m.

7.2.3 Desired PAR Redirect

If the NYISO congestion costs associated with the Ramapo PAR are greater than the PJM congestion costs associated with the Ramapo PAR, then hold or take taps into NYISO.

If the PJM congestion costs associated with the Ramapo PAR are greater than NYISO congestion costs associated with the Ramapo PAR, then hold or take taps into PJM.

8 Real-Time Energy Market Settlements

8.1 Information Used to Calculate M2M Settlements

For each M2M Flowgate there are two components of the M2M settlement, a redispatch component and a Ramapo PARs coordination component. Both M2M settlement components are defined below.

For the re-dispatch component, market settlements under this M2M Schedule will be calculated based on the following:

1. the Non-Monitoring RTO's real-time Market Flow on each M2M Flowgate compared to its M2M Entitlement for M2M Flowgates eligible for re-dispatch on each M2M Flowgate; and
2. the Shadow Price at each M2M Flowgate.

For the Ramapo PARs coordination component, Market settlements under this M2M Schedule will be calculated based on the following:

1. actual real-time flow on each of the Ramapo PARs compared to its target flow ($\text{Target}_{\text{Ramapo}}$);
2. Ramapo PAR OTDF for each M2M Flowgate; and
3. the Shadow Price at each M2M Flowgate.

8.2 Real-Time Redispatch Settlement:

If the M2M Flowgate is eligible for re-dispatch, then compute the real-time re-dispatch settlement for each interval as specified below.

When $RT\_MktFlow_{M2M\ Flowgate-m} > M2M\_Ent_{M2M\ Flowgate-m}$,

$$MonRTO\_Payment_{M2M\ Flowgate-m} = Mon\_Shadow\$_{M2M\ Flowgate-m} \times \left(RT\_MktFlow_{M2M\ Flowgate-m} - M2M\_Ent_{M2M\ Flowgate-m}\right)$$

When $RT\_MktFlow_{M2M\ Flowgate-m} < M2M\_Ent_{M2M\ Flowgate-m,}$,

$$Non\_Mon\_Payment_{M2M\ Flowgate-m} = Non\_Mon\_Shadow\$_{M2M\ Flowgate-m} \times \left(M2M\_Ent_{M2M\ Flowgate-m} - RT\_MktFlow_{M2M\ Flowgate-m}\right)$$

Where:

$Non\_MonRTO\_Payment_{M2M\ Flowgate-m}$ = M2M re-dispatch settlement, in the form of a payment to the Non-Monitoring RTO from the Monitoring RTO, for M2M Flowgate m;

$MonRTO\_Payment_{M2M\ Flowgate-m}$ = M2M re-dispatch settlement, in the form of a payment to the Monitoring RTO from the Non-Monitoring RTO, for M2M Flowgate m;

$RT\_MktFlow_{M2M\ Flowgate-m}$ = real-time RTO_MF for M2M Flowgate m;

$M2M\_Ent_{M2M\ Flowgate-m} =$ Non-Monitoring RTO M2M Entitlement for M2M Flowgate m;

$Mon\_Shadow\$_{M2M\ Flowgate-m} =$ Monitoring RTO's Shadow Price for M2M Flowgate m; and

$Non\_Mon\_Shadow\$_{M2M\ Flowgate-m} =$ Non-Monitoring RTO's Shadow Price for M2M Flowgate m.

8.3 Ramapo PARs Settlement

For each M2M Flowgate, compute the real-time Ramapo PAR settlement for each interval as specified below.

For each M2M Flowgate, when $Actual_{Ramapo} > Target_{Ramapo}$,

$$PJMPayment_{M2M\ Flowgate-m} = Shadow\$_{M2M\ Flowgate-m} \times OTDF_{(M2M\ Flowgate-m,Ramapo)} \times \left(Actual_{Ramapo} - Target_{Ramapo}\right)$$

For each M2M Flowgate, when $Actual_{Ramapo} < Target_{Ramapo}$,

$$NYPayment_{M2M\ Flowgate-m} = Shadow\$_{M2M\ Flowgate-m} \times OTDF_{(M2M\ Flowgate-m,Ramapo)} \times \left(Target_{Ramapo} - Actual_{Ramapo}\right)$$

Where:

$Actual_{Ramapo} =$ Measured real-time actual flow on each of the Ramapo PARs. For purposes of this equation, a positive value indicates a flow from PJM to the NYISO;

$Target_{Ramapo} =$ Calculated Target Value for the flow on each Ramapo PAR (PAR3500 and PAR4500) as described in Section 7.2.1 above. For purposes of this equation, a positive value indicates a flow from PJM to the NYISO;

$Shadow\$_{M2M\ Flowgate-m} =$ Shadow Price, as computed by the payee, for M2M Flowgate m;

$OTDF_{(M2M\ Flowgate-m,Ramapo)} =$ The OTDF for each Ramapo PARs for M2M Flowgate m;

$PJMPayment_{M2M\ Flowgate-m}$ = Ramapo PARs settlement, in the form of a payment to PJM from NYISO, for M2M Flowgate m; and

$NYPayment_{M2M\ Flowgate-m}$ = Ramapo PARs settlement, in the form of a payment to NYISO from PJM, for M2M Flowgate m.

8.4 Calculating a Combined M2M Settlement

The M2M settlement for each M2M Flowgate shall be the sum of the real-time redispatch settlement and Ramapo PARs settlement

If NYISO is the Monitoring RTO for the M2M Flowgate:

$$M2M\ Settlement_{M2M\ Flowgate\ m_i} = \left(\begin{matrix} MonRTO\ Payment_{M2M\ Flowgate\ m_i} - \\ Non\ MonRTO\ Payment_{M2M\ Flowgate\ m_i} + NYPayment_{\ M2M\ Flowgate\ m_i} \end{matrix} \right) \times {}^{s_i}/_{3600sec}$$

If PJM is the Monitoring RTO for the M2M Flowgate:

$$M2M\ Settlement_{M2M\ Flowgate\ m_i} = \left(\begin{matrix} MonRTO\ Payment_{M2M\ Flowgate\ m_i} - \\ Non\ MonRTO\ Payment_{M2M\ Flowgate\ m_i} + PJMPayment_{\ M2M\ Flowgate\ m_i} \end{matrix} \right) \times {}^{s_i}/_{3600sec}$$

Where:

$M2M\ Settlement_{M2M\ Flowgate\ m_i}$ = M2M settlement, defined as a payment from the Non-Monitoring RTO to the Monitoring RTO, for interval *i*; and

$Non\ MonRTO\ Payment_{M2M\ Flowgate\ m_i}$ = Non-Monitoring RTO payment to Monitoring RTO for congestion on M2M Flowgate m for interval *i*;

$MonRTO\ Payment_{M2M\ Flowgate\ m_i}$ = Monitoring RTO payment to Non-Monitoring RTO for congestion on M2M Flowgate m for interval *i*;

$PJMPayment_{\ M2M\ Flowgate\ m_i}$ = Ramapo PARs settlement, in the form of a payment to PJM from NYISO, for M2M Flowgate m for interval *i*;

$NYPayment_{\ M2M\ Flowgate\ m_i}$ = Ramapo PARs settlement, in the form of a payment to NYISO from PJM, for M2M Flowgate m for interval *i*; ands_i = number of seconds in interval *i*.

For the purpose of settlements calculations, each interval will be calculated separately and then integrated to an hourly value:

$$M2M\_Settlement_h = \sum_{M2M\ Flowgate\ m}^{all} \sum_{i=1}^{n} M2M\_Settlement_{M2M\ Flowgate\ m_i}$$

Where:

$M2M\_Settlement_h =$ M2M settlement for hour *h*; and

n = Number of intervals in hour *h*.

Section 10.1 of this M2M Schedule sets forth circumstances under which the M2M coordination process and M2M settlements may be temporarily suspended.

9. When One of the RTOs Does Not Have Sufficient Redispatch

Under the normal M2M coordination process, sufficient redispatch for a M2M Flowgate may be available in one RTO but not the other. When this condition occurs, in order to ensure an operationally efficient dispatch solution is achieved, the RTO without sufficient redispatch will redispatch all effective generation to control the M2M Flowgate to a "relaxed" Shadow Price limit. Then this RTO calculates the Shadow Price for the M2M Flowgate using the available redispatch which is limited by the maximum physical control action inside the RTO. Because the magnitude of the Shadow Price in this RTO cannot reach that of the other RTO with sufficient redispatch, unless further action is taken, there will be a divergence in Shadow Prices and the LMPs at the RTO border.

A special process is designed to enhance the price convergence under this condition. If the Non-Monitoring RTO cannot provide sufficient relief to reach the Shadow Price of the Monitoring RTO, the constraint relaxation logic will be deactivated. The Non-Monitoring RTO will then be able to use the Monitoring RTO's Shadow Price without limiting the Shadow Price to the maximum Shadow Price associated with a physical control action inside the Non-Monitoring RTO. With the M2M Flowgate Shadow Prices being the same in both RTOs, their resulting bus LMPs will converge in a consistent price profile.

10. Appropriate Use of the M2M Process

Under normal operating conditions, the Parties will model all M2M Flowgates in their respective real-time EMSs. M2M Flowgates will be controlled using M2M tools for coordinated redispatch and coordinated operation of the Ramapo PARs, and will be eligible for M2M settlements.

10.1 Qualifying Conditions for M2M Settlement

10.1.1 Purpose of M2M. M2M was established to address regional, not local issues. The intent is to implement the M2M coordination process and settle on such coordination where both Parties have significant impact.

10.1.2 Minimizing Less than Optimal Dispatch. The Parties agree that, as a general matter, they should minimize financial harm to one RTO that results from the M2M coordination process initiated by the other RTO that produces less than optimal dispatch.

10.1.3 Use M2M Whenever Binding a M2M Flowgate. During normal operating conditions, the M2M redispatch process will be initiated by the Monitoring RTO whenever an M2M Flowgate is constrained and therefore binding in its dispatch. Coordinated operation of the Ramapo PARs is the default condition and does not require initiation by either Party to occur.

10.1.4 Most Limiting Flowgate. Generally, controlling to the most limiting Flowgate provides the preferable operational and financial outcome. In principle and as much as practicable, the M2M coordination process will take place on the most limiting Flowgate, and to that Flowgate's actual limit (thermal, reactive, stability).

10.1.5 Abnormal Operating Conditions. A Party that is experiencing system conditions that require the system operators' immediate attention may temporarily delay implementation of the M2M redispatch process or cease an active M2M redispatch event until a reasonable time after the system condition that required the system operators' immediate attention is resolved.

10.1.6 Transient System Conditions. A Party that is experiencing intermittent congestion due to transient system conditions including, but not limited to, interchange ramping or transmission switching, is not required to implement the M2M redispatch process unless the congestion continues after the transient condition(s) have concluded.

10.1.7 Temporary Cessation of M2M Coordination Process Pending Review

a. If the net charges to a Party resulting from implementation of the M2M coordination process for a market-day exceed five hundred thousand dollars, then the Party that is responsible for paying the charges may (but is not required to) suspend implementation of this M2M coordination process until the Parties are able to complete a review to ensure that both the process and the calculation of settlements resulting from the M2M Coordination Process are occurring in a manner that is both (a) consistent with this M2M Coordination Schedule, and (b) producing a just and reasonable result. The Party requesting suspension must identify specific concerns that require investigation within one business day of requesting suspension of the M2M coordination process. If the Parties'

investigation of the identified concerns indicates that the M2M coordination process is (a) being implemented in a manner that is consistent with this M2M Coordination Schedule and (b) producing a just and reasonable result, then the M2M coordination process shall be re-initiated as quickly as practicable.

10.1.8 Suspension of M2M Settlement when a Request for Taps on Common PARs to Prevent Overuse is Refused. If a Party requests that taps be taken on any Common PAR to reduce the requesting Party's overuse of the other Party's transmission system, refusal by the other Party or its Transmission Owner(s) to permit taps to be taken to reduce overuse shall result in the Ramapo PAR settlement component of M2M being suspended for the requesting Party until the tap request is granted. The refusing Party shall not be relieved of any of its M2M settlement obligations.

10.2 After-the-Fact Review to Determine M2M Settlement

Based on the communication and data exchange that has occurred in real-time between the Parties, there will be an opportunity to review the use of the market-to-market process to verify it was an appropriate use of the market-to-market process and subject to M2M settlement. The Parties will initiate the review as necessary to apply these conditions and settlements adjustments.

10.3 Access to Data to Verify Market Flow Calculations

Each Party shall provide the other Party with data to enable the other Party independently to verify the results of the calculations that determine the M2M settlements under this M2M Coordination Schedule. A Party supplying data shall retain that data for two years from the date of the settlement invoice to which the data relates, unless there is a legal or regulatory requirement for a longer retention period. The method of exchange and the type of information to be exchanged pursuant to section 35.7.1 of the Agreement shall be specified in writing. The Parties will cooperate to review the data and mutually identify or resolve errors and anomalies in the calculations that determine the M2M settlements. If one Party determines that it is required to self report a potential violation to the Commission's Office of Enforcement regarding its compliance with this M2M Coordination Schedule, the reporting Party shall inform, and provide a copy of the self report to, the other Party. Any such report provided by one Party to the other shall be Confidential Information.

11 M2M Change Management Process

11.1 Notice

Prior to changing any process that implements this M2M Schedule, the Party desiring the change shall notify the other Party in writing or via email of the proposed change. The notice shall include a complete and detailed description of the proposed change, the reason for the

proposed change, and the impacts the proposed change is expected to have on the implementation of the M2M coordination process, including M2M settlements under this M2M Schedule.

11.2 Opportunity to Request Additional Information

Following receipt of the Notice described in Section 10.1, the receiving party may make reasonable requests for additional information/documentation from the other Party. Absent mutual agreement of the parties, the submission of a request for additional information under this Section shall not delay the obligation to timely note any objection pursuant to Section 10.3, below.

11.3 Objection to Change

Within ten business days after receipt of the Notice described in Section 10.1 (or within such longer period of time as the parties mutually agree), the receiving Party may notify in writing or via email the other Party of its disagreement with the proposed change. Any such notice must specifically identify and describe the concern(s) that required the receiving party to object to the described change.

11.4 Implementation of Change

The Party proposing a change to its implementation of the M2M coordination process shall not implement such change until (a) it receives written or email notification from the other Party that the other Party concurs with the change, or (b) the ten business day notice period specified in Section 10.3 expires, or (c) completion of any dispute resolution process initiated pursuant to this Agreement.