

### 3.2.3 Operating Reserves Energy Uplift.

#### (a) introduction

(a) A Market Seller's pool-scheduled resources ~~capable of providing Operating Reserves shall be credited as specified below for Energy Make Whole credits based on the applicable offer for the operation of such resource, provided that the resource was available for the entire time specified in the Offer Data for such resource. To the extent that Tariff, Attachment K Appendix, sections 3.2.3A, 3.2.3A.001, and 3.2.3A.01 and the parallel provision of Operating Agreement, Schedule 1, sections 3.2.3A, 3.2.3A.001, and 3.2.3A.01 does not meet the Minimum Synchronized Reserve Requirement, the Minimum Primary Reserve Requirement, and the Minimum 30-minute Reserve Requirement, the Office of the Interconnection shall schedule additional Operating Reserves pursuant to Tariff, Attachment K Appendix, section 1.7.17 and the parallel provision of Operating Agreement, Schedule 1, section 1.7.17, and Tariff, Attachment K Appendix, section 1.10 and the parallel provision of Operating Agreement, Schedule 1, section 1.10. In addition, the Office of the Interconnection shall schedule Operating Reserves pursuant to those sections to satisfy any unforeseen Operating Reserve requirements that are not reflected in the day-ahead market.~~

**Commented [A1]:** These additional headings have been added in for the purposes of navigation and allowing readers to jump between sections using the Navigation Pane. They will be removed before filing.

#### (b) calculation of Day-ahead energy make whole credits

(b) ~~Day-ahead Energy Make Whole credits~~The following determination shall be ~~made calculated in the following manner~~ for each pool-scheduled resource that is scheduled in the Day-ahead Energy Market ~~in the following manner~~: the total offered price for Start-up Costs and No-load Costs and energy, determined on the basis of the resource's scheduled output, shall be compared to the total value of that resource's energy – as determined by the Day-ahead Energy Market and the Day-ahead Prices applicable to the relevant generation bus in the Day-ahead Energy Market. PJM shall also (i) determine whether any resources were scheduled in the Day-ahead Energy Market to provide Black Start ~~S~~service, Reactive Services or transfer interface control during the Operating Day because they are known or expected to be needed to maintain system reliability in a Zone during the Operating Day in order to minimize the total cost of Operating Reserves associated with the provision of such services and reflect the most accurate possible expectation of real-time operating conditions in the day-ahead model, which resources would not have otherwise been committed in the day-ahead security-constrained dispatch and (ii) report on the day following the Operating Day the megawatt quantities scheduled in the Day-ahead Energy Market for the above-enumerated purposes for the entire RTO.

**Commented [A2]:** Moved to OATT Attachment K – Appendix, Section 1.10(e)

Except as provided in section 3.2.3(n) below, if the total offered price for Start-up Costs (shutdown costs for Economic Load Response Participant resources) and No-load Costs and energy summed over all Day-ahead Settlement Intervals exceeds the total value summed over all Day-ahead Settlement Intervals, the difference shall be credited to the Market Seller as day-ahead Energy Make Whole credits.

However, for the Day-ahead Settlement Intervals in which the resource is scheduled to provide energy in the Operating Day and the resource actually provides energy in at least one Real-time Settlement Interval in an hour that corresponds to such scheduled Day-ahead Settlement

Intervals, a resource's day-ahead Operating Reserve Energy Make Whole credit shall be reduced by the greater of zero or the difference of the resource's dDay-ahead Operating Reserve Energy Make Whole tTarget and the bBalancing Operating Reserve Energy Make Whole tTarget, as determined below.

A resource's dDay-ahead Operating Reserve Energy Make Whole tTarget shall be determined in accordance with the following equation:

$$(A + B) - C$$

Where:

A = Start-up Costs

B = the sum of day-ahead No-load Costs and energy over the applicable Real-time Settlement Intervals that correspond with Day-ahead Settlement Intervals in which the resource is scheduled. The day-ahead No-load Costs and energy are divided by twelve to determine the cost for each Real-time Settlement Interval.

C = the sum of the day-ahead revenues calculated for each Real-time Settlement Interval that corresponds with a Day-ahead Settlement Interval in which the resource is scheduled, where the day-ahead revenue for each such Real-time Settlement Interval equals the product of the megawatt amount of energy scheduled in the Day-ahead Energy Market and the Day-ahead Price at the applicable pricing point for the resource divided by twelve.

A resource's bBalancing Operating Reserve Energy Make Whole tTarget shall be determined in accordance with the following equation:

$$D - (E + F)$$

Where:

D = the Real-time Cost, as defined in subsection 3.2.3(e-2)(ii) of this section, sum of Start-up Costs and No-load Costs and the incremental cost of energy summed over all Real-time Settlement Intervals that correspond to the Day-ahead Settlement Intervals in which the resource was scheduled;

E = [(the megawatt amount of energy provided in the Real-time Energy Market minus the megawatt amount of energy scheduled in the Day-ahead Energy Market) multiplied by the Real-time Price at the applicable pricing point for the resource] plus the sum of the day-ahead revenues as determined in part C of the above formula for determining the Day-ahead Operating Reserve Energy Make Whole tTarget, summed over the applicable Real-time Settlement Intervals that correspond to the Day-ahead Settlement Intervals in which the resource was scheduled; and

**Commented [A3]:** The changes to D and F are not changes to the status quo calculation. The change in D is to clarify that this is the cost of the actual MW (same as today) as opposed to the cost of the TRLD MW. The change in F similarly clarifies that the revenues are actual revenues from other markets as calculated in 3.2.3 (e-2)(ii)

**Commented [A4]:** This is not a change resulting from the BOR proposal. Change is to clarify "as applicable" terminology consistent with same language in D.

F = the sum of all Other Market Revenues, as defined in subsection 3.2.3(e-2)(ii) of this section, earned for providing Secondary Reserves, Non-Synchronized Reserves, and Reactive Services over the applicable Real-time Settlement Intervals that correspond to the Day-ahead Settlement Intervals in which the resource was scheduled.

The Office of the Interconnection shall apply any balancing Operating Reserve credits allocated pursuant to this section 3.2.3(b) to real time deviations or real time load share plus exports, pursuant to Tariff, Attachment K Appendix, section 3.2.3(p) below, depending on whether the balancing Operating Reserve credits are related to resources scheduled during the reliability analysis for an Operating Day, or during the actual Operating Day. Allocation to real time load share under this subsection (b) shall not apply to Direct Charging Energy.

(i) — For resources scheduled by the Office of the Interconnection during the reliability analysis for an Operating Day, the associated balancing Operating Reserve credits shall be allocated based on the reason the resource was scheduled according to the following provisions:

(A) — If the Office of the Interconnection determines during the reliability analysis for an Operating Day that a resource was committed to operate in real time to augment the physical resources committed in the Day-ahead Energy Market to meet the forecasted real time load plus the Operating Reserve requirement, the associated balancing Operating Reserve credits, identified as RA Credits for Deviations, shall be allocated to real time deviations.

(B) — If the Office of the Interconnection determines during the reliability analysis for an Operating Day that a resource was committed to maintain system reliability, the associated balancing Operating Reserve credits, identified as RA Credits for Reliability, shall be allocated according to ratio share of real time load plus export transactions.

(C) — If the Office of the Interconnection determines during the reliability analysis for an Operating Day that a resource with a day-ahead schedule is required to deviate from that schedule to provide balancing Operating Reserves, the associated balancing Operating Reserve credits shall be segmented and separately allocated pursuant to subsections 3.2.3(b)(i)(A) or 3.2.3(b)(i)(B) hereof. Balancing Operating Reserve credits for such resources will be identified in the same manner as units committed during the reliability analysis pursuant to subsections 3.2.3(b)(i)(A) and 3.2.3(b)(i)(B) hereof.

(ii) — For resources scheduled during an Operating Day, the associated balancing Operating Reserve credits shall be allocated according to the following provisions:

(A) — If the Office of the Interconnection directs a resource to operate during an Operating Day to provide balancing Operating Reserves, the associated balancing Operating Reserve credits, identified as RT Credits for Reliability, shall

**Commented [A5]:** This language is largely redundant with language in section (p) below. The placement of this language in (b) causes confusion here because balancing Operating Reserve/Make Whole credits has not yet been described and (b) is focused on day-ahead Operating Reserve / Make Whole credits, which do not even use this allocation methodology.

The language in (p) below has been updated to reflect this wording on dividing credits into 'credits for reliability' and 'credits for deviation' buckets.

~~be allocated according to ratio share of load plus exports. The foregoing notwithstanding, credits will be applied pursuant to this section only if the LMP at the resource's bus does not meet or exceed the applicable offer of the resource for at least four 5-minute intervals during one or more discrete clock hours during each period the resource operated and produced MWs during the relevant Operating Day. If a resource operated and produced MWs for less than four 5-minute intervals during one or more discrete clock hours during the relevant Operating Day, the credits for that resource during the hour it was operated less than four 5-minute intervals will be identified as being in the same category (RT Credits for Reliability or RT Credits for Deviations) as identified for the Operating Reserves for the other discrete clock hours.~~

~~(B) — If the Office of the Interconnection directs a resource not covered by section 3.2.3(b)(ii)(A) hereof to operate in real-time during an Operating Day, the associated balancing Operating Reserve credits, identified as RT Credits for Deviations, shall be allocated according to real-time deviations from day-ahead schedules.~~

~~(iii) — PJM shall post on its Web site the aggregate amount of MWs committed that meet the criteria referenced in subsections (b)(i) and (b)(ii) hereof.~~

#### **(c) total cost of energy make whole in DA market**

(c) The sum of the foregoing credits calculated in accordance with section 3.2.3(b) plus any unallocated charges from section 3.2.3(h) and Tariff, Attachment K-Appendix, 5.1.7, and any shortfalls paid pursuant to the Market Settlement provision of the Day-ahead Economic Load Response Program, shall be the cost of ~~Operating Reserves~~Energy Make Whole credits in the Day-ahead Energy Market.

#### **(d) allocation of energy make whole in the DA market**

(d) The cost of ~~Operating Reserves~~Energy Make Whole credits in the Day-ahead Energy Market shall be allocated and charged to each Market Participant in proportion to the sum of its (i) scheduled load ((a) net of Behind The Meter Generation expected to be operating, but not to be less than zero; and (b) excluding Direct Charging Energy), accepted Decrement Bids in the Day-ahead Energy Market in megawatt-hours for that Operating Day and accepted Up-to Congestion Transactions in the Day-ahead Energy Market in megawatt-hours for the Operating Day at the sink of the transaction; and (ii) scheduled energy sales in the Day-ahead Energy Market from within the PJM Region to load outside such region in megawatt-hours for that Operating Day, but not including its bilateral transactions that are Dynamic Transfers to load outside such area pursuant to Tariff, Attachment K-Appendix, section 1.12, except to the extent PJM scheduled resources to provide Black Start service, Reactive Services or transfer interface control. The cost of ~~Operating Reserves~~Energy Make Whole credits in the Day-ahead Energy Market for resources scheduled to provide Black Start service for the Operating Day which resources would not have otherwise been committed in the day-ahead security constrained dispatch shall be allocated by ratio share of the monthly transmission use of each Network Customer or Transmission Customer serving Zone Load or Non-Zone Load, as determined in

accordance with the formulas contained in Tariff, Schedule 6A. The cost of Operating Reserves Energy Make Whole credits in the Day-ahead Energy Market for resources scheduled to provide Reactive Services or transfer interface control because they are known or expected to be needed to maintain system reliability in a Zone during the Operating Day and would not have otherwise been committed in the day-ahead security constrained dispatch shall be allocated and charged to each Market Participant in proportion to the sum of its real-time deliveries of energy to load ((a) net of operating Behind The Meter Generation; and (b) excluding Direct Charging Energy) in such Zone, served under Network Transmission Service, in megawatt-hours during that Operating Day, as compared to all such deliveries for all Market Participants in such Zone.

**Commented [A6]:** This is a clean up change to conform the tariff language with the calculation of real-time load plus exports as described within other sections of OATT Attachment K – Appendix, sections 3.2.3 and 3.2.3B.

#### (e) eligibility & segmentation for balancing energy make whole credits

(e) At the end of each Operating Day, the following determination shall be made for each synchronized pool-scheduled resource of each Market Seller that operates as requested by the Office of the Interconnection.

(i)

Pool-scheduled generation resources that operate for at least one Real-time Settlement Interval within the pool-scheduled commitment period are eligible for balancing Energy Make Whole credits as further detailed in this section and in the PJM Manuals. Balancing Energy Make Whole credits eligibility for Economic Load Response Participant resources is detailed in -Tariff, Attachment K-Appendix, section 3.2.3(o-1) of this section. A pool-scheduled generation resource's eligibility for balancing Energy Make Whole credits begins at the first Real-time Settlement Interval of a pool-scheduled commitment. The generation resource remains eligible for balancing Energy Make Whole credits until the later of:

**Commented [A7]:** This paragraph implements Design Component 1b: Eligibility During Commitment Period

Matrix Language:  
Eligibility begins at the first interval of PJM commitment for the run.

Once a resource is committed by PJM, it is eligible for BOR credits from the first interval of the PJM commitment until the later of the expiration of its DA commitment/min run time or when PJM releases it.  
One exception: If a unit trips, its eligibility will end at the later of when it trips or the end of its DA commitment/min run time.

- 1.) the Real-time Settlement Interval corresponding to the end of its Day-ahead Energy Market commitment or the end of its Minimum Run Time, as applicable

or

- 2.) the Real-time Settlement Interval when the resource is no longer running under the direction of the Office of the Interconnection.

**Commented [A8]:** This language covers the resource tripping, PJM releasing the unit, or the unit being taken over for company

Additionally, generation resource types with no soak process in the Start-up Cost are eligible for balancing Energy Make Whole credits for a pre-commitment period prior to the first Real-time Settlement Interval of the pool-scheduled commitment to account for ramping costs. The pre-commitment period begins with the Real-time Settlement Interval when a generation resource comes online but may not begin earlier than four Real-time Settlement Intervals (20 minutes) prior to the first Real-time Settlement Interval of the pool-scheduled commitment. However, a generation resource is only eligible for this pre-commitment period if the price and megawatt quantities submitted as part of its Incremental Energy Offer, using the lesser of the Final Offer or Committed Offer as determined using the Actual MWh during the pre-commitment period, are less than or equal to the price and megawatt quantities of its Incremental Energy Offer using the Committed Offer for the first hour of the commitment. Generation resource types with a soak process in the Start-up Cost are not eligible during the pre-commitment period.

**Commented [A9]:** This paragraph implements Design Component 1a: Eligibility During Ramp Up

Matrix Language:  
Status Quo for resources with a soak process.  
Resources without a soak process are eligible for make whole (capped at RT Eco Min MW) up to 20 minutes prior to start of commitment only if incremental energy offer price mw pairs remain less than or equal to the first hour of PJM commitment. (No need to check if resource is ramping during that 20 minutes)  
If deemed to be ineligible, incremental and no load costs will be ineligible for make whole however, start up costs will still be eligible for make whole payments in the first hour/interval of commitment based on the committed schedule.

Pool-scheduled generation resources that are released by the Office of Interconnection and ramping offline are additionally eligible for balancing Energy Make Whole credits for post-commitment Real-time Settlement Intervals until the Real-time Settlement Interval that the generation resource goes offline; however, eligibility shall not extend beyond the Real-time Settlement Interval in which the resource is no longer running under the direction of the Office of Interconnection plus the number of Real-time Settlement Intervals corresponding to the allowable ramp down period for the resource type, as specified in the PJM Manuals. However, a generation resource is only eligible for this post-commitment period if the price and megawatt quantities submitted as part of its Incremental Energy Offer, using the lesser of the Final Offer or Committed Offer as determined using the Actual MWh during the post-commitment period, is less than or equal to the price and megawatt quantities of its Incremental Energy Offer using the Committed Offer for the last hour of the commitment.

For each calendar day, pool-scheduled resources in the Real-time Energy Market shall be made whole for each of the following Segments: 1) the greater of their day-ahead schedule and minimum run time specified at the time of commitment (minimum down time specified at the time of commitment for Economic Load Response Participant resources); and 2) any block of Real-time Settlement Intervals the resource operates at PJM's direction in excess of the greater of its day-ahead schedule and minimum run time specified at the time of commitment (minimum down time specified at the time of commitment for Economic Load Response Participant resources). For each calendar day, and for each synchronized start of a generation resource or PJM-dispatched economic load reduction, there will be a maximum of two Segments for each resource. Segment 1 will be the greater of the day-ahead schedule and minimum run time specified at the time of commitment (minimum down time specified at the time of commitment for Economic Load Response Participant resources) and Segment 2 will include the remainder of the contiguous Real-time Settlement Intervals when the resource is operating at the direction of the Office of the Interconnection, provided that a segment is limited to the Operating Day in which it commenced and cannot include any part of the following Operating Day.

(ii)

The balancing Energy Make Whole credit calculation will be conducted on a segmented basis. For each Operating Day, and for each synchronized start of a generation resource or PJM-dispatched economic load reduction, there will be a maximum of two Segments for each resource.

The first Segment will be defined as the greater of the applicable day-ahead commitment and Minimum Run Time specified at the time of commitment (minimum down time specified at the time of commitment for Economic Load Response Participant resources).

Further, if a generation resource is no longer running under the direction of the Office of the Interconnection within 30 minutes after the end of the first Segment, the first Segment will also include the remainder of the Real-time Settlement Intervals in which the resource operated at the direction of the Office of the Interconnection.

**Commented [A10]:** This paragraph implements Design Component 1c: Eligibility During Ramp Down

Matrix Language:  
Remove universal 3 hour limit and replace with resource type-specific limit based on 90th percentile evaluation of historical shut down times.

- Coal Resources/Solid Fuel NUG/OIL/GAS Steam Resource = 120 Minutes,
- CT Resources = 30 Minutes,
- Combined Cycle Resources = 45 Minutes
- Wind/Solar/Pump Storage/Run of River - as specified as self scheduling notification times as documented in M11 Section 2.3.3 and Battery = 20 Minutes
- Nuclear = Not eligible

PJM and the IMM will perform analysis every two years utilizing historical shut down time data only for PJM or pool scheduled commitments. From this sample population, the 90th percentile shall be used to determine eligibility thresholds to be agreed upon by PJM and the IMM. This process shall be documented in manual 28. Analysis results will be shared with stakeholders prior to new thresholds becoming effective.

Resource is eligible if incremental energy offer price mw pairs remain less than or equal to the last hour of PJM commitment.

**Commented [A11]:** This paragraph has been reworded for clarity below. The existing language essentially defines the segments twice, which is unnecessary.

**Commented [A12]:** This paragraph implements Design Component 1d: Eligibility During Extensions

Matrix Language:  
If a unit is released within 30 minutes of end of DA commitment / min run, no new segment is created. This is considered a late or staggered release rather than a new extension. If unit is released > 30 min beyond end of DA commitment or min run, then it is considered an extension and a new segment begins.

The second Segment will be defined as any block of contiguous Real-time Settlement Intervals the resource runs under the direction of the Office of the Interconnection in excess of the first Segment.

Notwithstanding the foregoing, each Segment shall be limited to the Operating Day in which it commenced and cannot include any part of the following Operating Day.

~~A Generation Capacity Resource that operates outside of its unit-specific parameters will not receive Operating Reserve Credits nor be made whole for such operation when not dispatched by the Office of the Interconnection, unless the Market Seller of the Generation Capacity Resource can justify to the Office of the Interconnection that operation outside of such unit-specific parameters was the result of an actual constraint.~~

(iii)

If a Market Seller submits an offer parameter that exceeds the applicable approved parameter limit on a parameter-limited schedule for a generation resource and such parameter affects the MW dispatch level of the resource in a given settlement interval, the resource will remain eligible for the energy uplift credit calculation but shall not recover any costs incurred during the affected settlement intervals. If such parameter impacts the commitment decision in a manner that could lead to the Office of the Interconnection committing the generation resource to produce energy for longer than it otherwise would have, the resource will not be eligible for the energy uplift credit calculation for the commitment duration. A generation resource that is the subject to an offer parameter on a parameter-limited schedule that exceeds its approved parameter limits may still be eligible for energy uplift credits if the Market Seller of such resource can justify to the Office of the Interconnection that the need to operate outside of such unit-specific parameters was the result of an actual constraint.

**Commented [A13]:** This paragraph implements Design component 5: Violating Parameter Limits

Matrix Language:

If the violated parameter impacts the dispatch level of the resource in a given interval, the unit will remain eligible for the BOR credit calculation but losses will be set to zero.

If the violated parameter impacts the commitment decision in a way that could lead to running the unit for longer than it otherwise would have, the unit will become ineligible for the BOR credits for the commitment duration.

Retain Status Quo process that allows market participant to request to be made whole for any intervals in which they are not eligible to recover losses by providing justification for operating outside of the approved parameter limits

~~Such A~~ Market Seller shall provide to the Market Monitoring Unit and the Office of the Interconnection its request to receive ~~Operating Reserve Credits energy uplift credits and/or to be made whole~~ for such operation, along with documentation explaining in detail the reasons for operating its resource outside of its unit-specific parameters, within thirty calendar days following the issuance of the billing statement for the Operating Day. The Market Seller shall also respond to additional requests for information from the Market Monitoring Unit and the Office of the Interconnection. The Market Monitoring Unit shall evaluate such request for compensation and provide its determination of whether there was an exercise of market power to the Office of the Interconnection by no later than twenty-five calendar days after receiving the Market Seller's request for compensation. The Office of the Interconnection shall make its determination whether the Market Seller justified that it is entitled to receive ~~Operating Reserve Credits energy uplift credits and/or to be made whole~~ for such operation of its resource for the day(s) in question, by no later than thirty calendar days after receiving the Market Seller's request for compensation.

(iv)

Nuclear generation resources shall not be eligible for ~~Operating Reserve~~ energy uplift payments unless: 1) the Office of the Interconnection directs such resources to reduce output, in which case,



such units shall be compensated in accordance with Tariff, Attachment K-Appendix, section 3.2.3(f) and the parallel provision of Operating Agreement, Schedule 1, section 3.2.3(f); or 2) the resource submits a request for a risk premium to the Market Monitoring Unit under the procedures specified in Tariff, Attachment M – Appendix, section II.B. A nuclear generation resource (i) must submit a risk premium consistent with its agreement under such process, or, (ii) if it has not agreed with the Market Monitoring Unit on an appropriate risk premium, may submit its own determination of an appropriate risk premium to the Office of the Interconnection, subject to acceptance by the Office of the Interconnection, with or without prior approval from the Commission.

#### (e-1) Tracking Ramp Limited Desired

The Tracking Ramp Limited Desired (TRLD) metric is used in the calculation of balancing Energy Make Whole credits and generator deviation charges as a representation of the level at which the resource would be desired if operating as requested by the Office of the Interconnection. There are two Tracking Ramp Limited Desired metrics, one measured in MW (power) and the other measured in MWh (energy), each of which are calculated as described below and as further detailed in the PJM Manuals. The Tracking Ramp Limited Desired MWh (energy) calculated for each Real-time Settlement Interval shall be used in the calculation of balancing Energy Make Whole credits and generator deviations. The Tracking Ramp Limited Desired MWh (energy) value represents the expected energy produced between the start of the Real-time Settlement Interval and the end of the Real-time Settlement Interval.

For purposes of this Tariff, Attachment K-Appendix, section 3.2.3, the minimum operating limit used herein shall be the Economic Minimum unless the Office of the Interconnection has declared Minimum Generation Emergency conditions, in which case it shall be the emergency minimum. Also, the maximum operating limit shall be the Economic Maximum unless the Office of the Interconnection has declared Maximum Emergency conditions, in which case it shall be the emergency maximum.

##### (i)

The Tracking Ramp Limited Desired MW (power) calculation starts at time  $t_0$ , which is when a generation resource is first expected by the Office of Interconnection to be online or when a generation resource is dispatchable, while honoring soak time differences, as further detailed in the PJM Manuals.

The Tracking Ramp Limited Desired MW (power) metric will be calculated as follows. For the Real-time Settlement Interval equal to  $t_0$ .

If a generation resource does not have a soak process and is directed to come online as soon as possible,

TRLD MW (power) = 0

**Commented [A14]:** This section maps to Design Component 6: MW Used for Desired.

See the details on the 'Component 6 Option Details' tab of the matrix.



Otherwise,

TRLD MW (power)

= Max [Min (LMP Desired MW, Dispatch MW), Tracking Desired Economic Minimum]

Where:

LMP Desired MW = the generation resource's expected output level based on its Final Offer at the Real-time Locational Marginal Price from the dispatch run at the applicable pricing point

Dispatch MW = energy dispatch signal MW from the dispatch run

Tracking Desired Economic Minimum = the generation resource's minimum operating limit, as specified in Tariff, Attachment K-Appendix, section 3.2.3(e-1), unless any of the following conditions occur.

- If a resource is requested to increase output due to a transmission constraint or other reliability issue, Tracking Desired Economic Minimum = the lower limit from the manual dispatch instruction as directed by the Office of the Interconnection.
- If the resource's minimum operating limit increases by more than 5% of the resource's minimum operating limit at the time of commitment, the minimum operating limit at the time of commitment will be used.

For each Real-time Settlement Interval after the resource's initial start time,  $t_0$ , Tracking Ramp Limited Desired MW (power) shall be calculated as follows:

$$\text{TRLD MW}_t(\text{power}) = \text{TRLD MW}_{t-1} \pm \text{Ramp}_t$$

Where:

$t$  = Start time of Real-time Settlement Interval for which the metric is being calculated

Ramp = Increase or decrease in MW calculated using the Real-time Locational Marginal Price from the dispatch run at the applicable pricing point, the resource's Final Offer, and the ramp rate parameters. The increase or decrease in MW is restricted by the most limiting of the following parameters among the ramp rate, the Tracking Desired Economic Minimum, and the Tracking Desired Economic Maximum, where:

Tracking Desired Economic Minimum = defined above in the calculation for TRLD MW <sub>$t_0$</sub>

Tracking Desired Economic Maximum = the generation resource's maximum operating limit unless any one of the following conditions occur:

- If a resource is requested to decrease output due to a transmission constraint or other reliability issue, Tracking Desired Economic Maximum = the upper limit from the manual dispatch instruction as directed by the Office of the Interconnection.

**Commented [A15]:** This implements Design Component 3a: Use of Fixed Gen Flag and Design Component 4: Offering Limited Dispatchable Range

Matrix Language:

Component 3: Use of Fixed Gen Flag does not make a unit ineligible for Balancing Operating Reserve Make Whole Credits. The Fixed Gen Flag is ignored in the calculation of the Tracking Desired MW which is used to calculate the uplift the unit would be owed if it was following dispatch. Tracking Desired MW will use the submitted economic limits.

Component 4:

Generators that clamp their limits are defined as those that reduce their applicable maximum operating limit or increase their applicable minimum operating limit in real-time as compared to the time of their DA or RT commitment by more than 5%.

If a generator clamps their applicable minimum or maximum operating limit (see design component 4), the Tracking Desired MW is calculated using the reopened limits (that is, the minimum of the Min MW at the time of the commitment and RT Min MW and the maximum of the Max MW at the time of commitment and RT Max (min of the mins, max of the maxes)).

**Commented [A16]:** Same comment as above for Tracking Desired Economic Minimum. This maps to Design Components 3 and 4.

- If a resource's maximum operating limit decreases by more than 5% of the resource's maximum operating limit at the time of commitment, the maximum operating limit at the time of commitment will be used.

The Tracking Ramp Limited Desired MW (power) value will be adjusted, as specified below, if the resource has a regulation or reserve assignment and is unable to provide such assignment while generating the initial Tracking Ramp Limited Desired MW due to the resource's applicable operating parameters.

- If the Tracking Ramp Limited Desired MW is above the highest MW point at which the resource can provide the Regulation or reserve assignments, the Tracking Ramp Limited Desired MW will be lowered to the highest point at which it can provide the assignment(s) based on the resource's applicable operating parameters.
- If the Tracking Ramp Limited Desired MW is below the lowest MW point at which the resource can provide the Regulation assignment, the Tracking Ramp Limited Desired MW will be increased to the lowest point at which it can provide the regulation assignment based on the resource's applicable operating parameters.

This adjusted Tracking Ramp Limited Desired MW value is used in calculating the Tracking Ramp Limited Desired MW (power) for subsequent intervals.

(ii)

An unadjusted Tracking Ramp Limited Desired MW (power) that excludes the impact of Regulation and reserve assignments or manual dispatch instructions is also calculated for conversion to an unadjusted Tracking Ramp Limited Desired MWh (energy) metric which is used in the Other Market Revenue and Opportunity Cost Owed calculations described in subsection 3.2.3(c-2)(i). The unadjusted Tracking Ramp Limited Desired MW (power) metric will be calculated as follows.

For the Real-time Settlement Interval equal to  $t_0$ , the unadjusted Tracking Ramp Limited Desired MW (power) equals the Tracking Ramp Limited Desired MW (power) <sub>$t_0$</sub>  as calculated in subsection (i) directly above excluding the impact of regulation and reserve assignments or manual dispatch instructions.

For each Real-time Settlement Interval after the start time,  $t_0$ , the unadjusted Tracking Ramp Limited Desired MW (power) shall be calculated as follows:

$$\text{unadjusted TRLD MW}_t (\text{power}) = \text{unadjusted TRLD MW}_{t-1} \pm \text{Ramp}_t$$

Where:

$t$  = Start time of Real-time Settlement Interval for which the metric is being calculated

Ramp = Increase or decrease in MW calculated using the Real-time Locational Marginal Price from the dispatch run at the applicable pricing point, the resource's Final Offer, and the ramp rate parameters. The increase or decrease in MW is restricted by the most limiting parameter among the ramp rate, the unadjusted economic minimum, and the unadjusted economic maximum, where:

unadjusted economic minimum = minimum operating limit for the Real-time Settlement Interval unless such minimum operating limit increased by more than 5% of the resource's minimum operating limit at the time of commitment, in which case the minimum operating limit at the time of commitment shall be used.

unadjusted economic maximum = maximum operating limit for the Real-time Settlement Interval unless such maximum operating limit decreased by more than 5% of the resource's maximum operating limit at the time of commitment, in which case the maximum operating limit at the time of commitment shall be used.

(iii)

The Tracking Ramp Limited Desired MW (power) calculations in Tariff, Attachment K-Appendix, section 3.2.3(e-1)(i) and (ii) above will continue until the resource goes offline; however, if a generation resource trips or is taken offline at the request of the Market Seller prior to the later of the end of the Day-ahead Energy Market commitment or the end of the Minimum Run Time, the values will continue to be calculated per the calculations defined above until the later of the end of the Day-ahead Energy Market commitment or the end of the Minimum Run Time.

Further, once the Office of the Interconnection releases a generation resource to go offline, provided that the resource actually goes offline following such direction, the Tracking Ramp Limited Desired MW shall be calculated using only the ramp down parameters such that the Tracking Ramp Limited Desired MW is incrementally ramped down to its minimum output, irrespective of the real-time LMP. During this time period, the unadjusted Tracking Ramp Limited Desired MW (power) will equal the Tracking Ramp Limited Desired MW (power) unless the resource has been manually dispatched offline, in which case the unadjusted Tracking Ramp Limited Desired MW (power) will continue as specified above in Tariff, Attachment K-Appendix, section 3.2.3(e-1)(ii) until the manual dispatch instruction ends.

TRLD MW<sub>t</sub> (power) =

Max (TRLD MW<sub>t-1</sub> – Down Ramp<sub>t</sub>, Tracking Desired Economic Minimum<sub>t</sub>)

Where Down Ramp = Decrease in MW utilizing the resource's down ramp rate parameter.

(iv)

The Tracking Ramp Limited Desired MW (power) and unadjusted Tracking Ramp Limited Desired MW (power) metrics will be converted to the Tracking Ramp Limited Desired MWh (energy) metrics that shall be used in the calculation of balancing Energy Make Whole credits

and generator deviations. For all Real-time Settlement Intervals prior to the start time of the Tracking Ramp Limited Desired MW (power) calculations,  $t_0$  as defined above, both the Tracking Ramp Limited Desired MWh (energy) and the unadjusted Tracking Ramp Limited Desired MWh (energy) shall be equal to the resource's Actual MWh for that Real-time Settlement Interval. For purposes of this section, Actual MWh equals the Revenue Data for Settlements determined for each Real-time Settlement Interval in accordance with Operating Agreement, Schedule 1, section 3.1.A.

For each Real-time Settlement Interval after the Office of the Interconnection releases a generation resource to go offline and the resource's Actual MWh is below the minimum operating limit, the Tracking Ramp Limited Desired MWh (energy) and the unadjusted Tracking Ramp Limited Desired MWh (energy) shall be equal to Actual MWh of the resource.

For all other Real-time Settlement Intervals, the Tracking Ramp Limited Desired MWh (energy) shall equal the expected energy produced between the start of the Real-time Settlement Interval and the end of the Real-time Settlement Interval based on the Tracking Ramp Limited Desired MW (power) at the start and at the end of the Real-time Settlement Interval and the resource's ramping capability, as further described in the PJM Manuals. The unadjusted Tracking Ramp Limited Desired MWh (energy) shall equal the expected energy produced between the start of the Real-time Settlement Interval and the end of the Real-time Settlement Interval based on the unadjusted Tracking Ramp Limited Desired MW (power) at the start and at the end of the Real-time Settlement Interval and the resource's ramping capability, as further described in the PJM Manuals.

(v)

The Tracking Ramp Limited Desired MW (power) and MWh (energy) values described above in subsections Tariff, Attachment K-Appendix, section 3.2.3(e-1)(i) and (ii), as may be qualified by (iii), and (iv) of this section may be further adjusted as described in the PJM Manuals to account for instances where the Office of the Interconnection is unable to dispatch the system using the real-time security constrained economic dispatch system and/or where the real-time security-constrained economic dispatch application is providing dispatch signals inconsistent with the resource's offer data, or other abnormal dispatch scenarios.

#### **(e-2) Balancing Energy Make Whole Credit**

For generating resources, balancing Energy Make Whole credits received pursuant to this section shall be equal to the lesser of the tracking desired balancing Energy Make Whole credit, as calculated in Step 1 below in Tariff, Attachment K-Appendix, section 3.2.3(e-2)(i), and the actual balancing Energy Make Whole credit, as calculated in Step 2 below in Tariff, Attachment K-Appendix, section 3.2.3(e-2)(ii), for each Segment in the Operating Day, except as provided in this Tariff, Attachment K-Appendix, section 3.2.3(m). Balancing Energy Make Whole credits for Economic Load Response Participant resources shall be equal to the credits as determined in Tariff, Attachment K-Appendix, section 3.3.A. ~~positive difference between a resource's Total Operating Reserve Offer, and the total value of the resource's energy in the Day-ahead Energy Market plus any credit or charge for quantity deviations, at PJM dispatch direction (excluding~~

**Commented [A17]:** The following language was removed and replaced with new language to reflect the shift to the Step 1, Step 2, Step 3 methodology.

This implements Design Component 2: Impact of deviating from dispatch on the Operating Reserve Make Whole Credit Calculation

Matrix Language:

Make Whole is limited to the amount of uplift the unit would have received if it followed the Tracking Desired MWh. This is determined by calculating uplift using Tracking Desired MWh (Step 1 calculation), and then calculating it again using actual RT MWh (Step 2 calculation). The resource receives a credit equal to the lesser of the two for the segment (Step 3 calculation).  $\min[(\text{Cost @ TRLD} - \text{Value @ TRLD}), (\text{Cost @ Actual} - \text{Value @ Actual})]$

quantity deviations caused by an increase in the Market Seller's Real-time Offer), from the Day-ahead Energy Market during the Operating Day at the real-time LMP(s) applicable to the relevant generation bus in the Real-time Energy Market. The foregoing notwithstanding, credits for Segment 2 shall exclude start-up (shutdown costs for Economic Load Response Participant resources) costs for generation resources.

Except as provided in section 3.2.3(m), if the total offered price exceeds the total value, the difference less any credit as determined pursuant to section 3.2.3(b), and less the absolute value of any negative Synchronized Reserve lost opportunity cost credit, as determined in section 3.2.3A(f)(iv) below, and less the absolute value of any negative Non-Synchronized Reserve lost opportunity cost credit determined in section 3.2.3.A.001(d)(iii) below, and less any amounts credited for providing Reactive Services as specified in section 3.2.3B, and less the absolute value of any negative Secondary Reserve lost opportunity cost credit, as determined in section 3.2.3A.01(f)(iv) below, and plus the sum of the Market Revenue Neutrality Offsets for Synchronized Reserve, Non-Synchronized Reserve, and Secondary Reserve, shall be credited to the Market Seller.

Synchronized Reserve, Non-Synchronized Reserve, and Secondary Reserve credits applied against Operating Reserve credits pursuant to this section shall be netted against the Operating Reserve credits earned in the corresponding Real-time Settlement Interval(s) in which the Synchronized Reserve, Non-Synchronized Reserve, and Secondary Reserve credits accrued, provided that for condensing combustion turbines, Synchronized Reserve credits will be netted against the total Operating Reserve credits accrued during each Real-time Settlement Interval the unit operates in condensing and generation mode.

#### (c-2)(i) step 1 calculation

##### (i)

Step 1: Calculate balancing Energy Make Whole credit for the Segment using Tracking Ramp Limited Desired MWh.

Tracking Balancing Energy Make Whole Credit = A – B

Where

$A = -1 \times \sum_t \text{Tracking Balancing Net Revenue}_t$

Where t = the eligible Real-time Settlement Intervals in the applicable Segment

B = Day-ahead Energy Make Whole Credit as determined pursuant to section 3.2.3(b) if the Segment is the first Segment. For all other Segments, B = 0.

Tracking Balancing Energy Make Whole Credit shall not be less than zero.

The Tracking Balancing Net Revenue for each Real-time Settlement Interval in the Segment shall be calculated in accordance with the following equation:

$\text{Tracking Balancing Net Revenue}_t = (\text{DA Revenue}_t + \text{Balancing Revenue}_t + \text{Other Market Revenue}_t + \text{Opportunity Cost Owed}_t) - \text{Real-time Cost}_t$

Where

Where

$t$  = the Real-time Settlement Interval

DA Revenue = Day-ahead Energy Market Revenue for the Real-time Settlement Interval in accordance with the following equation:

$$\text{Day-ahead Scheduled MWh} \times \text{Day-ahead LMP}$$

Balancing Revenue = Balancing Energy Market Revenue in accordance with the following equation:

$$(\text{Tracking Ramp Limited Desired MWh} - \text{Day-ahead Scheduled MWh}) \times \text{Real-time LMP} - \text{Company Responsible Negative Revenues}$$

Where: Company Responsible Negative Revenues = any negative balancing revenues in excess of the Day-ahead Energy Market revenue that results from the Market Participant's actions reducing the resource's flexibility as further specified in the PJM Manuals. This is calculated as:

$$\text{MW unavailable due to limited flexibility} \times \text{Min}(\text{Day-ahead LMP} - \text{Real-Time LMP}, 0)$$

$$\text{Other Market Revenue} = \text{SR} + \text{SecR} + \text{NSR} + \text{Reactive} + \text{LOC} + \text{Reg}$$

Where

$\text{SR}$  = any potential credits for providing Synchronized Reserve determined in accordance with the credit calculations in Tariff, Attachment K-Appendix, section 3.2.3A(b) less the resource's Synchronized Reserve offer price, in dollars, included in the resource's Synchronized Reserve potential lost opportunity cost credit in Tariff, Attachment K-Appendix, section 3.2.3A(f)(iv).

$\text{SecR}$  = any potential credits for providing Secondary Reserve determined in accordance with the credit calculations in Tariff, Attachment K-Appendix, section 3.2.3A.01(b)

$\text{NSR}$  = any amounts credited for providing Non-Synchronized Reserve as specified in Tariff, Attachment K-Appendix, section 3.2.3A.001(b)

Reactive = any potential credits for providing Reactive Services determined in accordance with the credit calculations in Tariff, Attachment K-Appendix, section 3.2.3B

LOC = any potential lost opportunity cost credits determined in Tariff, Attachment K-Appendix, sections 3.2.3(f) – 3.2.3(f-6).

**Commented [A18]:** Company Responsible Negative Revenues in the Step 1 calculation reflects the following elements of the proposal:

Design component 4a: Offering Limited Dispatchable Range

If a resource would have been dispatched higher or lower based on the committed limits (the original dispatchable range) than where it was dispatched in RT, any losses associated with the reduction in dispatchable range will be excluded from the BOR Credit which is calculated using the Tracking Desired MWh (Step 1 calculation).

Design component 2g: Adjustment for Flexible Resources

If a Flexible Resource that was PJM committed in DA is offline in RT and is deemed ineligible for LOC credits based on changes in its parameters or an increase in its offer per the rules in M28, any buy back in excess of the DA revenue will not be made whole and is the responsibility of the market participant.

**Commented [A19]:** 'Other Market Revenue' implements Design component 2c: Revenues that Offset Balancing Operating Reserve Credits

Matrix Language:

Status quo plus all opportunity costs recognized through other markets / settlement calculations (regulation, synch reserve, secondary reserve, reactive, energy LOC for manual dispatch, etc.) will also be included in the revenue to offset costs. For all of these offsetting revenues, the amount included in the step 1 calculation will be the amount the resource would receive if it operated consistent with the TRLD MW.

**Commented [A20]:** DA and Balancing Synch Reserve Market Clearing Price Credits plus LOC credits minus DA and RT synch reserve offer cost

**Commented [A21]:** DA and Balancing Secondary Reserve Market Clearing Price Credits plus LOC credits. Secondary Reserve has a \$0 offer price, so no offer cost considered.

**Commented [A22]:** DA and Balancing Non-Synch Reserve Market Clearing Price Credit plus LOC Credit for any buy back). NSR has \$0 offer price and \$0 opp cost.

Reg = any potential Regulation opportunity cost amounts determined in accordance with the calculations for use in settlements in Tariff, Attachment K-Appendix, section 3.2.2.

Opportunity Cost Owed = the sum of the potential opportunity costs owed for Synchronized Reserve, Non-Synchronized Reserve, and Secondary Reserve as determined in accordance with Sections 3.2.3A(f)(iv), 3.2.3A.001(d)(iii) and 3.2.3A.01(f)(iv), respectively.

For the purposes of the above Other Market Revenue and Opportunity Cost Owed calculations, the potential credits and costs are determined using the calculations referenced above and the assumption that the resource was increased or decreased from the unadjusted Tracking Ramp Limited Desired MWh in order to provide the assignment or PJM directed MWs as further described in the PJM Manuals.

Real-time Cost = (Incremental Offer + No Load Cost + Start-Up Cost)  
Where

Incremental Offer = Real-time incremental energy offer, in dollars, based on the area under the incremental energy offer curve calculated using the Tracking Ramp Limited Desired MWh

No Load = Real-time No-load Cost

Start-Up = Real-time Start-Up Cost, if t is a Real-time Settlement Interval in the first Segment

The offer used for calculating Real-time Cost shall be the lesser of the Committed Offer or Final Offer based on the offer with the lowest total cost for the hour.

The above Balancing Revenue and Real-time Cost calculations shall be further modified for Real-time Settlement Intervals preceding the start of the commitment for generation resource types with no soak process in the Start-up Cost by capping the Tracking Ramp Limited Desired MWh (energy) at the minimum operating limit for such interval.

The above Balancing Revenue and Real-time Cost calculations shall be reduced by the costs incurred and revenues received in the applicable Real-time Settlement Intervals for generation resource types with a soak process in the Start-up Cost when the Tracking Ramp Limited Desired MWh (energy) indicates the unit is not dispatchable by the Office of the Interconnection during a Real-time Settlement Interval when it was scheduled to be dispatchable since those costs and revenues may already be included in the start-up cost as further defined in the PJM Manuals.

**Commented [A23]:** This implements Design Component 2a: MW and Cost used in defining the COSTS to be made whole

Matrix Language:  
Step 1 calculation - Tracking RLD MWh; Offer cost used is the cost from the lesser of the committed or final offer.

**Commented [A24]:** This paragraph implements the following bolded portion of Design component 1a – Eligibility During Ramp Up

Matrix Language:  
Resources without a soak process are eligible for make whole (**capped at RT Eco Min MW**) up to 20 minutes prior to start of commitment only if incremental energy offer price mw pairs remain less than or equal to the first hour of PJM commitment. (No need to check if resource is ramping during that 20 minutes)

**Commented [A25]:** This paragraph implements Design Component 2f: Adjustments to prevent double counting of soak costs and revenues

Matrix Language:  
When a unit is soaking during hours it was scheduled to be dispatchable and is eligible for uplift, the costs incurred and revenues received must be removed from the calculation since they are included in the startup cost.  
• This additional adjustment is necessary since eligibility will now start at the beginning of the commitment rather than when the unit hits Eco Min. This prevents double counting of revenues and costs.  
• **This applies to step 1 anytime the TRLD MWh indicate that the unit is not dispatchable.**  
• This applies to step 2 anytime the Actual MWh indicate that the unit is not dispatchable.



During Real-time Settlement Intervals where a Flexible Resource is self-scheduled and was committed by the Office of the Interconnection in the Day-ahead Energy Market for the same Real-time Settlement Interval, the above calculation will use the Tracking Balancing Net Revenues that the resource would have received if it had followed PJM real-time commitment instructions and remained offline; provided that if the unit is taken over by company to run as self-scheduled prior to the Minimum Run Time of a pool scheduled commitment elapsing, this shall only apply to those Real-time Settlement Intervals beyond the Minimum Run Time.

**Commented [A26]:** This paragraph implements Design Component 2g: Adjustments for Flexible Resources

Matrix Language:

If a Flexible Resource that was PJM committed in DA and self-schedules in RT before or after a RT PJM commitment period (min run time), the Step 1 calculation will use the net revenues the resource would have received if it had followed PJM commitment instructions and remained offline during the intervals where the unit was self-scheduled.

The Step 2 calculation will reflect the unit's actual operation.

## (e-2)(ii) step 2 calculation

(ii)

Step 2: Calculate balancing Energy Make Whole credits for the Segment using Actual MWh.

Actual Balancing Energy Make Whole Credit = A – B

Where

$A = -1 \times \sum_t \text{Actual Balancing Net Revenue}_t$

Where t = the eligible Real-time Settlement Intervals in the applicable Segment

B = Day-ahead Energy Make Whole Credit as determined pursuant to section 3.2.3(b) if the Segment is the first Segment; else, 0

where Actual Balancing Energy Make Whole Credit shall not be less than zero.

The Actual Balancing Net Revenue for each Real-time Settlement Interval in the Segment shall be calculated in accordance with the following equation. For purposes of this section, the Actual MWh equals the Revenue Data for Settlements determined for each Real-time Settlement Interval in accordance with Operating Agreement, Schedule 1, section 3.1.A

Actual Balancing Net Revenue<sub>t</sub> = (DA Revenue<sub>t</sub> + Balancing Revenue<sub>t</sub> + Other Market Revenue<sub>t</sub>) - Real-time Cost<sub>t</sub>

Where

t = the Real-time Settlement Interval

DA Revenue = Day-ahead Energy Market Revenue for the Real-time Settlement Interval in accordance with the following equation:

Day-ahead Scheduled MWh × Day-ahead LMP

Balancing Revenue = Balancing Energy Market Revenue for the Real-time Settlement Interval in accordance with the following equation:

(Actual MWh – Day-ahead Scheduled MWh) × Real-time LMP – Company Responsible Negative Revenues

Where: Company Responsible Negative Revenues = any negative balancing revenues in excess of the DA revenue based on the Market Participant's actions reducing flexibility as further specified in the PJM Manuals. This is calculated as:

MW unavailable due to limited flexibility × Min (Day-ahead LMP — Real-Time LMP, 0)

Other Market Revenue = SR + SecR + NSR + Reactive + LOC + Reg

Where:

SR = any amounts credited for providing Synchronized Reserve equal to the credits as determined in Tariff, Attachment K-Appendix, section 3.2.3A-(b) less the resource's Synchronized Reserve offer price, in dollars, included in the resource's Synchronized Reserve lost opportunity cost credit calculation in Tariff, Attachment K-Appendix, section 3.2.3A-(f)(iv)

SecR = any amounts credited for providing Secondary Reserve as determined in Tariff, Attachment K-Appendix, section 3.2.3A.01 (b)

NSR = any amounts credited for providing Non-Synchronized Reserve as determined in Tariff, Attachment K-Appendix, section 3.2.3A.001-(b)

Reactive = any amounts credited for providing Reactive Services as determined in Tariff, Attachment K-Appendix, section 3.2.3B

LOC = any lost opportunity costs credits as determined in Tariff, Attachment K-Appendix, sections 3.2.3(f) – 3.2.3(f-6); and

Reg = any Regulation opportunity cost amounts as calculated for use in purposes of settlements in Tariff, Attachment K-Appendix, section 3.2.2

Real-time Cost = (Incremental Offer + No Load + Start-Up)

Incremental Offer = Real-time incremental energy offer, in dollars, based on the area under the incremental energy offer curve calculated using the Actual MWh

No Load = Real-time No-load Cost

Start-Up = Real-time Start-Up Cost, if t is within the first Segment

The offer used for calculating Real-time Cost shall be the Final Offer for the hour.

The above Balancing Revenue and Real-time Cost calculations shall be reduced by the costs incurred and revenues received in the applicable Real-time Settlement Intervals for generation

**Commented [A27]:** Company Responsible Negative Revenues in the Step 2 calculation implements the following elements of the proposal:

Design Component 2g - Adjustment for Flexible Resources:

Matrix Language:

If a Flexible Resource that was PJM committed in DA is offline in RT and is deemed ineligible for LOC credits based on changes in its parameters or an increase in its offer per the rules in M28, any buy back in excess of the DA revenue will not be made whole and is the responsibility of the market participant. This is consistent with the status quo since resources currently are not made whole for intervals where they are offline.

**Commented [A28]:** 'Other Market Revenue' implements Design Component 2e - Revenues that Offset Balancing Operating Reserve Credits

Matrix Language:

Status quo plus all opportunity costs recognized through other markets / settlement calculations (regulation, synch reserve, secondary reserve, reactive, energy LOC for manual dispatch, etc.) will also be included in the revenue to offset costs. For all of these offsetting revenues, the amount included in the step 2 calculation will be the amount the resource actually received.

**Commented [A29]:** This means Synch Reserve Market Clearing Price Credits plus LOC credits minus synch reserve offer price

**Commented [A30]:** This implements Design Component 2a: MW and Cost used in defining the COSTS to be made whole

Matrix Language:

Step 2 calculation - Actual RT MWh; Offer cost used is from the final offer.

**Commented [A31]:** This paragraph implements Design Component 2f: Adjustments to prevent double counting of soak costs and revenues

Matrix Language:

When a unit is soaking during hours it was scheduled to be dispatchable and is eligible for uplift, the costs incurred and revenues received must be removed from the calculation since they are included in the startup cost.

- This additional adjustment is necessary since eligibility will now start at the beginning of the commitment rather than when the unit hits Eco Min. This prevents double counting of revenues and costs.
- This applies to step 1 anytime the TRLD MWh indicate that the unit is not dispatchable.
- This applies to step 2 anytime the Actual MWh indicate that the unit is not dispatchable.

resources with a soak process in the Start-up Cost when the Actual MWh indicate the resource is not dispatchable by the Office of the Interconnection during a Real-time Settlement Intervals when it was scheduled to be dispatchable by the Office of the Interconnection since those costs and revenues may already be included in the Start-Up Cost.

The above Balancing Revenue and Real-time Cost calculation shall be further modified for Real-time Settlement Intervals preceding the start of the commitment for generation resource types with no soak process in the Start-up Cost, by capping the Actual MWh at the minimum operating limit for each such interval.

#### (e-2)(iii) credit during market suspension

(iii)

In the event of a real-time Market Suspension, if the Office of the Interconnection and the Market Monitoring Unit determine that the generation resource was not following dispatch instructions, the generation resource shall be ineligible for balancing Energy Make Whole credits. If the generation resource is eligible during a real-time Market Suspension, the balancing Energy Market Whole credit shall be equal to the actual balancing Energy Make Whole credit, as determined in subsection 3.2.3(e-2)(ii) of this section.

#### (e-2)(iv) make whole for import transactions

(iv)

A price-sensitive pool-scheduled import transaction shall receive balancing Energy Make Whole credits equal to the positive difference between a transaction's offer, and the total value of the transaction's energy in the Day-ahead Energy Market plus any credit or charge for quantity deviations from the Day-ahead Energy Market at the real-time LMP(s) applicable to the sink of the transaction summed over all Real-time Settlement Intervals in the Operating Day.

#### (f) lost opportunity cost

(f) A Market Seller of a unit not defined in subsection (f-1), (f-2), or (f-4) hereof (or self-scheduled, if operating according to Tariff, Attachment K-Appendix, section 1.10.3(c) hereof), the output of which is reduced or suspended at the request of the Office of the Interconnection due to a transmission constraint or other reliability issue, and for which the real-time LMP at the unit's bus is higher than the unit's offer corresponding to the level of output requested by the Office of the Interconnection (as indicated either by the desired MWs of output from the unit determined by PJM's unit dispatch system or as directed by the PJM dispatcher through a manual override), shall be credited for each Real-time Settlement Interval in an amount equal to the product of (A) the LOC Deviation times (B) the Locational Marginal Price at the generation bus for the generating unit, minus (C) the Total Lost Opportunity Cost Offer, provided that the resulting outcome is greater than \$0.00. This equation is represented as (A\*B)

**Commented [A32]:** This paragraph implements the following bolded portion of Design Component 1a: Eligibility During Ramp Up

Matrix Language:  
Resources without a soak process are eligible for make whole (capped at RT Eco Min MW) up to 20 minutes prior to start of commitment only if incremental energy offer price mw pairs remain less than or equal to the first hour of PJM commitment. (No need to check if resource is ramping during that 20 minutes)

**Commented [A33]:** This implements Design Component 12: Market Suspension

Matrix Language:  
In the event of a market suspension, if PJM and the IMM determined the unit was not following dispatch instructions, the unit will be ineligible for uplift.  
+  
Document Status Quo:  
1) Unit gets made-whole to Actual RT MWh (use Step 2 only)

**Commented [A34]:** This is not a change from the status quo. This preserves the original language for import transaction make whole credits, which appeared in the text struck from the beginning of new section 3.2.3 (e-2). A single calculation previously applied to all pool-scheduled resources, which includes import transactions. The calculation for generation resources has now changed to the Step 1, Step 2, Step 3 methodology. The calculation for import transactions remains the same and has been moved here to the end of (e-2).

- C. A Market Seller of a unit defined in subsection (f-1), (f-2), (f-3), (f-4), or (f-5) that is reduced using a generator output constraint to honor a stability limitation is not eligible for credits under this section 3.2.3(f) for the MWh reduction associated with honoring the stability limit. If the Office of the Interconnection declares a Market Suspension, per Operating Agreement, Schedule 1, section 1.11.6, where the suspension is greater than twenty-four (24) consecutive hours, resources will not be compensated for lost opportunity costs.

(f-1) With the exception of Market Sellers of Flexible Resources that submit a Real-time Offer greater than their resource's Committed Offer in the Day-ahead Energy Market, a Market Seller of a Flexible Resource shall be compensated for lost opportunity cost, and shall be limited to the lesser of the unit's Economic Maximum or the unit's Generation Resource Maximum Output, if either of the following conditions occur:

- (i) if the unit output is reduced at the direction of the Office of the Interconnection and the real time LMP at the unit's bus is higher than the unit's offer corresponding to the level of output requested by the Office of the Interconnection (as directed by the PJM dispatcher), then the Market Seller shall be credited in a manner consistent with that described in section 3.2.3 (f).
- (ii) If the unit is scheduled to produce energy in the Day-ahead Energy Market for a Day-ahead Settlement Interval, but the unit is not called on by the Office of the Interconnection and does not operate in the corresponding Real-time Settlement Interval(s), then the Market Seller shall be credited in an amount equal to the higher of:
  - 1) the product of (A) the amount of megawatts committed in the Day-ahead Energy Market for the generating unit, and (B) the Real-time Price at the generation bus for the generating unit, minus the sum of (C) the Total Lost Opportunity Cost Offer plus No-load Costs, plus (D) the Start-up Cost, divided by the Real-time Settlement Intervals committed for each set of contiguous hours for which the unit was scheduled in Day-ahead Energy Market. This equation is represented as  $(A*B) - (C+D)$ . The startup cost, (D), shall be excluded from this calculation if the unit operates in real time following the Office of the Interconnection's direction during any portion of the set of contiguous hours for which the unit was scheduled in Day-ahead Energy Market, or
  - 2) the Real-time Price at the unit's bus minus the Day-ahead Price at the unit's bus, multiplied by the number of megawatts committed in the Day-ahead Energy Market for the generating unit.

(f-2) A Market Seller of a hydroelectric resource that is pool-scheduled (or self-scheduled, if operating according to Tariff, Attachment K-Appendix, section 1.10.3(c) hereof), the output of which is altered at the request of the Office of the Interconnection from the schedule submitted by the owner, due to a transmission constraint or other reliability issue, shall be compensated for lost opportunity cost in the same manner as provided in sections 3.2.2(d) and 3.2.3A(f) and further detailed in the PJM Manuals.

(f-3) If a Market Seller believes that, due to specific pre-existing binding commitments to which it is a party, and that properly should be recognized for purposes of this section, the above calculations do not accurately compensate the Market Seller for opportunity cost associated with following PJM dispatch instructions and reducing or suspending a unit's output due to a transmission constraint or other reliability issue, then the Office of the Interconnection, the Market Monitoring Unit and the individual Market Seller will discuss a mutually acceptable, modified amount of opportunity cost compensation, taking into account the specific circumstances binding on the Market Seller. Following such discussion, if the Office of the Interconnection accepts a modified amount of opportunity cost compensation, the Office of the Interconnection shall invoice the Market Seller accordingly. If the Market Monitoring Unit disagrees with the modified amount of opportunity cost compensation, as accepted by the Office of the Interconnection, it will exercise its powers to inform the Commission staff of its concerns.

(f-4) A Market Seller of a wind or solar generating unit, Hybrid Resource or Energy Storage Resource Model Participant that is pool-scheduled or self-scheduled, has SCADA capability to transmit and receive instructions from the Office of the Interconnection, has provided data and established processes to follow PJM basepoints pursuant to the requirements for wind or solar generating units, Hybrid Resource or Energy Storage Resource Model Participant as further detailed in this Agreement, the Tariff and the PJM Manuals, and which is operating as requested by the Office of the Interconnection, the output of which is reduced or suspended at the request of the Office of the Interconnection due to a transmission constraint or other reliability issue, and for which the real-time LMP at the unit's bus is higher than the unit's offer corresponding to the level of output requested by the Office of the Interconnection (as indicated either by the desired MWs of output from the unit determined by PJM's unit dispatch system or as directed by the PJM dispatcher through a manual override), shall be credited for each Real-time Settlement Interval in an amount equal to the product of (A) the LOC Deviation times (B) the Real-time Price at the generation bus for the generating unit, minus (C) the Total Lost Opportunity Cost Offer, provided that the resulting outcome is greater than \$0.00. This equation is represented as  $(A*B) - C$ . An Energy Storage Resource Model Participant or a Hybrid Resource instructed to increase charging at the request of the Office of the Interconnection due to a transmission constraint or other reliability issue, shall be compensated for the increase in charging in the same manner as provided in sections 3.2.3(e). A unit in the Energy Storage Resource Participation Model or a Hybrid Resource instructed to reduce charging at the request of the Office of the Interconnection due to a transmission constraint or other reliability issue, is not eligible for compensation under section 3.2.3(f-4).

(f-5) If a Market Participant of an Energy Storage Resource Model Participant or a Hybrid Resource believes that the above calculations in this section 3.2.3 do not accurately compensate the Market Participant for opportunity costs associated with following PJM manual

dispatch instructions to modify a unit's charging or discharging due to a transmission constraint or other reliability issue, then the Office of the Interconnection, the Market Monitoring Unit and the individual Market Participant will discuss a mutually acceptable, modified amount of opportunity cost compensation, taking into account the specific circumstances binding on the Market Participant. Following such discussion, if the Office of the Interconnection accepts a modified amount of opportunity cost compensation, the Office of the Interconnection shall invoice the Market Participant accordingly. If the Market Monitoring Unit disagrees with the modified amount of opportunity cost compensation, as accepted by the Office of the Interconnection, it will exercise its powers to inform the Commission staff of its concerns.

(f-6)

(i) A Market Seller of a pool-scheduled resource or a dispatchable self-scheduled resource shall receive Dispatch Differential Lost Opportunity Cost credits as calculated under subsection (iv) below if the resource is dispatched to provide energy in the Real-time Energy Market, provided such resource is not committed to provide real-time ancillary services (Regulation, reserves, reactive service) or instructed to reduce or suspend output due to a transmission constraint or other reliability issue pursuant to Tariff, Attachment K-Appendix, section 3.2.3(f-1) through Tariff, Attachment K-Appendix, section (f-4).

(ii) PJM will calculate the revenue above cost for the pricing run for each Real-time Settlement Interval in accordance with the following equation:

$$(A \times B) - C$$

Where:

A = the resource's expected output level based on its resource parameters at the Real-time Price at the applicable pricing point;

B = the Real-time Price at the applicable pricing point; and

C = the sum of the resource's Real-time Energy Market offer integrated under the Final Offer for the resource's expected output level based on its resource parameters at the Real-time Price at the applicable pricing point.

(iii) PJM will calculate the revenue above cost for the dispatch run for each Real-time Settlement Interval in accordance with the following equation:

$$(\text{greater of } A \text{ and } B) - (\text{lesser of } C \text{ and } D)$$

Where:

A = the product of the amount of megawatts of energy dispatched in the Real-time Energy Market dispatch run for the resource in that Real-time Settlement Interval and the Real-time Price at the applicable pricing point;

B = the product of the amount of megawatts of energy the resource actually provided in that Real-time Settlement Interval and the Real-time Price at the applicable pricing point;

C = the resource's Real-time Energy Market offer integrated under the Final Offer for the amount of megawatts dispatched in the Real-time Energy Market dispatch run;

D = the resource's Real-time Energy Market offer integrated under the Final Offer for the amount of megawatts the resource actually provided in that Real-time Settlement Interval.

(iv) The Dispatch Differential Lost Opportunity Cost credit shall equal the greater of (A) the difference between the revenue above cost based on the pricing run determined in subsection (f-5)(ii) and the revenue above cost based on the dispatch run determined in subsection (f-5)(iii) or (B) zero.

(v) For each hour in an Operating Day, the total cost of the Dispatch Differential Lost Opportunity Cost credits shall be allocated and charged to each Market Participant in proportion to the sum of its (i) deliveries of energy to load ((a) net of operating Behind The Meter Generation, but not to be less than zero; and (b) excluding Direct Charging Energy) in the PJM Region, served under Network Transmission Service, in megawatt-hours; and (ii) deliveries of energy sales from within the PJM Region to load outside such region in megawatt-hours but not including its bilateral transactions that are Dynamic Transfers to load outside the PJM Region pursuant to Tariff, Attachment K-Appendix, section 1.12, as compared to the sum of all such deliveries for all Market Participants.

#### (g) allocation of LOC and other uplift

(g) The sum of the foregoing credits in Tariff, Attachment K-Appendix, section 3.2.3(f-4) through Tariff, Attachment K-Appendix, section 3.2.3(f-5), plus any cancellation fees paid in accordance with Tariff, Attachment K-Appendix, section 1.10.2(d), such cancellation fees to be applied to the Operating Day for which the unit was scheduled, plus any shortfalls paid pursuant to the Market Settlement provision of the real-time Economic Load Response Program, plus any balancing Energy Make Whole Credits paid to pool-scheduled import transactions, less any payments received from another Control Area for Operating Reserves for energy uplift shall be the cost of Operating Reserves uplift for the Real-time Energy Market in each Operating Day allocated to each Market Participant's pro rata share of the daily total of hourly deviations in the RTO region, determined pursuant to Tariff, Attachment K-Appendix, section 3.2.3(h). If the Office of the Interconnection declares a Market Suspension, per Tariff, Attachment K-Appendix, section 1.11.6, the Office of the Interconnection shall allocate the charges to the pro rata share of the sum of its (i) deliveries of energy to load ((a) net of operating Behind The Meter Generation, but not to be less than zero; and (b) excluding Direct Charging Energy) in the PJM Region, served under Network Transmission Service, in megawatt-hours; and (ii) deliveries of energy sales from within the PJM Region to load outside such region in megawatt-hours but not including its bilateral transactions that are Dynamic Transfers to load outside the PJM Region pursuant to Tariff, Attachment K-Appendix, section 1.12.

**Commented [A35]:** Clarifying change to include Bal Energy Make whole for pool-scheduled transactions in total credits allocated to RTO wide deviations. No change to current methodology.

**Commented [A36]:** Clarifying change to incorporate Market Suspension rule for charge allocation currently located only in (p) as well as standard tariff language used to define real-time load plus exports.



#### (h) total daily deviation calculation

(h) ~~The cost of Operating Reserves for the Real-time Energy Market for each Operating Day, except those associated with the scheduling of units for Black Start service or testing of Black Start Units as provided in Tariff, Schedule 6A, shall be allocated and charged to~~ Each Market Participant's ~~based on their~~ daily total of hourly deviations are determined in accordance with the following equation:

$$\sum_h (A + B + C)$$

Where:

h = the hours in the applicable Operating Day;

A = For each Real-time Settlement Interval in an hour, the sum of the absolute value of the withdrawal deviations (in MW) between the quantities scheduled in the Day-ahead Energy Market and the Market Participant's energy withdrawals (net of operating Behind The Meter Generation) in the Real-time Energy Market, except as noted in subsection (h)(ii) below and in the PJM Manuals divided by the number of Real-time Settlement Intervals for that hour. The summation of each Real-time Settlement Interval's withdrawal deviation in an hour will be the Market Participant's total hourly withdrawal deviations. Market Participant bilateral transactions that are Dynamic Transfers to load outside the PJM Region pursuant to Tariff, Attachment K-Appendix, section 1.12 are not included in the determination of withdrawal deviations;

B = For each Real-time Settlement Interval in an hour, the sum of the absolute value of generation deviations (in MW and not including deviations in Behind The Meter Generation) as determined in subsection (o) divided by the number of Real-time Settlement Intervals for that hour;

C = For each Real-time Settlement Interval in an hour, the sum of the absolute value of the injection deviations (in MW) between the quantities scheduled in the Day-ahead Energy Market and the Market Participant's energy injections in the Real-time Energy Market divided by the number of Real-time Settlement Intervals for that hour. The summation of the injection deviations for each Real-time Settlement Interval in an hour will be the Market Participant's total hourly injection deviations. The determination of injection deviations does not include generation resources.

The Revenue Data for Settlements determined for each Real-time Settlement Interval in accordance with Tariff, Attachment K-Appendix, section 3.1A shall be used in determining the real-time withdrawal deviations, generation deviations and injection deviations ~~used to calculate Operating Reserve~~ under this subsection (eh).

~~The costs associated with scheduling of units for Black Start service or testing of Black Start Units shall be allocated by ratio share of the monthly transmission use of each Network Customer~~

**Commented [A37]:** Charges are now defined in (q) below. This section now addresses solely the calculation of the daily total of hourly deviations so this quantity can be later referenced in (q) below.

**Commented [A38]:** Corrects an incorrect reference in the existing tariff language.

**Commented [A39]:** This language was moved to subsection (p) below.

~~or Transmission Customer serving Zone Load or Non-Zone Load, as determined in accordance with the formulas contained in Tariff, Schedule 6A.~~

The foregoing notwithstanding, netting deviations shall be allowed for each Real-time Settlement Interval in accordance with the following provisions:

(i) Generation resources with multiple units located at a single bus shall be able to offset deviations in accordance with the PJM Manuals to determine the net deviation MW at the relevant bus.

(ii) Demand deviations will be assessed by comparing all day-ahead demand transactions, which include the components referenced in Tariff, Attachment K-Appendix, section 3.2.3(d) regarding the cost of Energy Make Whole credits Operating Reserves in the Day-ahead Energy Market, at a single transmission zone, hub, or interface against the real-time demand transactions at that same transmission zone, hub, or interface; except that the positive values of demand deviations, as set forth in the PJM Manuals, will not be assessed Operating Reserve charges in the event of a Primary Reserve or Synchronized Reserve shortage in real-time or where PJM initiates the request for emergency load reductions in real-time in order to avoid a Primary Reserve or Synchronized Reserve shortage.

(iii) Supply deviations will be assessed by comparing all day-ahead transactions at a single transmission zone, hub, or interface against the real-time transactions at that same transmission zone, hub, or interface.

(iv) Bilateral transactions inside the PJM Region, as defined in Operating Agreement, Schedule 4 Tariff, Attachment K-Appendix, section 1.7.10, will not be included in the determination of Supply or Demand deviations.

Deviations as calculated above shall be deviations in the RTO region and shall be subject to charges for the RTO region determined in accordance with Tariff, Attachment K-Appendix, section 3.2.3(q)(iii). Furthermore, Deviations that occur within a single Zone shall be associated with the Eastern or Western rRegion, as defined in Tariff, Attachment K-Appendix, section 3.2.3(q) below, and shall be subject to charges determined for such the regional balancing Operating Reserve rate determined in accordance with Tariff, Attachment K-Appendix, section 3.2.3(q)(iii). Deviations at a hub shall be associated with the Eastern or Western rRegion if all the buses that define the hub are located in the region. Deviations at an Interface Pricing Point shall be associated with whichever region, the Eastern or Western rRegion, with which the majority of the buses that define that Interface Pricing Point are most closely electrically associated. If deviations at interfaces and hubs are associated with the Eastern or Western region, they shall be subject to charges determined for such region in accordance with Tariff, Attachment K-Appendix, section 3.2.3(q)(iii). the regional balancing Operating Reserve rate. Demand and supply deviations shall be based on total activity in a Zone, including all aggregates and hubs defined by buses that are wholly contained within the same Zone.

**Commented [A40]:** Relocated this language from further below for readability. Highlighted language in these paragraphs are modifications in addition to the move, solely to conform with the standards for referencing other tariff sections and for renaming of Operating Reserves to Energy Make Whole.

**Commented [A41]:** The new structure in (q) now specifically outlines how charges are assessed. This sentence was added to clarify that all deviations are associated with the RTO and subject to RTO region charges. In addition to RTO region charges, deviations may be associated with the East or West region and subject to the East or West region charges if meets one of the qualifications described. This is a clarification of the status quo – not a change.

~~The foregoing notwithstanding, netting deviations shall be allowed for each Real-time Settlement Interval in accordance with the following provisions:~~

~~(i) — Generation resources with multiple units located at a single bus shall be able to offset deviations in accordance with the PJM Manuals to determine the net deviation MW at the relevant bus.~~

~~(ii) — Demand deviations will be assessed by comparing all day ahead demand transactions, which include the components referenced in section 3.2.3(d) regarding the cost of Operating Reserves in the Day-ahead Energy Market, at a single transmission zone, hub, or interface against the real-time demand transactions at that same transmission zone, hub, or interface; except that the positive values of demand deviations, as set forth in the PJM Manuals, will not be assessed Operating Reserve charges in the event of a Primary Reserve or Synchronized Reserve shortage in real-time or where PJM initiates the request for emergency load reductions in real-time in order to avoid a Primary Reserve or Synchronized Reserve shortage.~~

~~(iii) — Supply deviations will be assessed by comparing all day ahead transactions at a single transmission zone, hub, or interface against the real-time transactions at that same transmission zone, hub, or interface.~~

~~(iv) — Bilateral transactions inside the PJM Region, as defined in Operating Agreement, Schedule 1, section 1.7.10, will not be included in the determination of Supply or Demand deviations.~~

#### (i) (i) (k) uplift for synchronous condensing

(i) At the end of each Operating Day, Market Sellers shall be credited for Condense Startup Cost and Condense Energy Use times the real-time LMP for synchronous condensing for purposes other than providing Synchronized Reserve, Secondary Reserve, or Reactive Services, as well as the credits calculated as specified in Section 3.2.3(b) for those generators committed solely for the purpose of providing synchronous condensing for purposes other than providing Synchronized Reserve, Secondary Reserve, or Reactive Services, at the request of the Office of the Interconnection.

(j) The sum of the foregoing credits as specified in section 3.2.3(i) shall be the cost of Operating Reserves energy uplift for synchronous condensing for the PJM Region for purposes other than providing Synchronized Reserve, Secondary Reserve, or Reactive Services, or in association with post-contingency operation for the Operating Day and shall be separately determined for the PJM Region.

(k) The cost of Operating Reserves energy uplift for synchronous condensing for purposes other than providing Synchronized Reserve, Secondary Reserve, or Reactive Services,

or in association with post-contingency operation for each Operating Day shall be allocated and charged to each Market Participant in proportion to the sum of its (i) deliveries of energy to load ((a) net of operating Behind The Meter Generation, but not to be less than zero; and (b) excluding Direct Charging Energy) in the PJM Region, served under Network Transmission Service, in megawatt-hours during that Operating Day; and (ii) deliveries of energy sales from within the PJM Region to load outside such region in megawatt-hours during that Operating Day, but not including its bilateral transactions that are Dynamic Transfers to load outside the PJM Region pursuant to Tariff, Attachment K-Appendix, section 1.12, as compared to the sum of all such deliveries for all Market Participants.

#### (l) (m) (n) provisions during Max Gen Emergencies and Alerts

(l) For any Operating Day in either, as applicable, the Day-ahead Energy Market or the Real-time Energy Market for which, for all or any part of such Operating Day, the Office of the Interconnection: (i) declares a Maximum Generation Emergency; (ii) issues an alert that a Maximum Generation Emergency may be declared (“Maximum Generation Emergency Alert”); or (iii) schedules units based on the anticipation of a Maximum Generation Emergency or a Maximum Generation Emergency Alert, the ~~Operating Reserves~~Energy Make Whole credit otherwise provided by section 3.2.3.(b) or section 3.2.3(e-2) in connection with market-based offers shall be limited as provided in subsections (n) or (m), respectively. The Office of the Interconnection shall provide timely notice on its internet site of the commencement and termination of any of the actions described in subsection (i), (ii), or (iii) of this subsection (l) (collectively referred to as “MaxGen Conditions”). Following the posting of notice of the commencement of a MaxGen Condition, a Market Seller may elect to submit a cost-based offer in accordance with Operating Agreement, Schedule 2, in which case subsections (m) and (n) shall not apply to such offer; provided, however, that such offer must be submitted in accordance with the deadlines in Tariff, Attachment K-Appendix, section 1.10 for the submission of offers in the Day-ahead Energy Market or Real-time Energy Market, as applicable. Submission of a cost-based offer under such conditions shall not be precluded by Tariff, Attachment K-Appendix, section 1.9.7(b); provided, however, that the Market Seller must return to compliance with Tariff, Attachment K-Appendix, section 1.9.7(b) when it submits its bid for the first Operating Day after termination of the MaxGen Condition.

(m) For the Real-time Energy Market, if the Effective Offer Price (as defined below) for a market-based offer is greater than \$1,000/MWh and greater than the Market Seller’s lowest available and applicable cost-based offer, the Market Seller shall not receive any credit for ~~Operating Reserves~~Energy Make Whole. For purposes of this subsection (m), the Effective Offer Price shall be the amount that, absent subsections (l) and (m), would have been credited for ~~Operating Reserves~~Energy Make Whole for such Operating Day pursuant to section 3.2.3(e-2) plus the Real-time Energy Market revenues for the Real-time Settlement Intervals that the offer is economic divided by the megawatt hours of energy provided during the Real-time Settlement Intervals that the offer is economic. The Real-time Settlement Intervals that the offer is economic shall be: (i) the Real-time Settlement Intervals that the offer price for energy is less than or equal to the Real-time Price for the relevant generation bus, (ii) the Real-time Settlement Intervals in which the offer for energy is greater than Locational Marginal Price and the unit is operated at the direction of the Office of the Interconnection that are in addition to any Real-time Settlement Intervals required due to the ~~Minimum Run~~ Minimum Run Time or other operating constraint of

the unit, and (iii) for any unit with a ~~Minimum Run Time~~ of one hour or less and with more than one start available per day, any hours the unit operated at the direction of the Office of the Interconnection.

(n) For the Day-ahead Energy Market, if notice of a MaxGen Condition is provided prior to 11:00 a.m. on the day before the Operating Day for which transactions are being scheduled and the Effective Offer Price for a market-based offer is greater than \$1,000/MWh and greater than the Market Seller's lowest available and applicable cost-based offer, the Market Seller shall not receive any credit for ~~Operating Reserves~~Energy Make Whole. If notice of a MaxGen Condition is provided after 11:00 a.m. on the day before the Operating Day for which transactions are being scheduled and the Effective Offer Price is greater than \$1,000/MWh, the Market Seller shall receive credit for ~~Operating Reserves~~Energy Make Whole determined in accordance with section 3.2.3(b), subject to the limit on total compensation stated below. If the Effective Offer Price is less than or equal to \$1,000/MWh, regardless of when notice of a MaxGen Condition is provided, the Market Seller shall receive credit for ~~Operating Reserves~~Energy Make Whole determined in accordance with section 3.2.3(b), subject to the limit on total compensation stated below. For purposes of this subsection (n), the Effective Offer Price shall be the amount that, absent subsections (l) and (n), would have been credited for ~~Operating Reserves~~Energy Make Whole for such Operating Day divided by the megawatt hours of energy offered during the Specified Hours, plus the offer for energy during such hours. The Specified Hours shall be the lesser of: (1) the minimum run hours stated by the Market Seller in its Offer Data; and (2) either (i) for steam-electric generating units and for combined-cycle units when such units are operating in combined-cycle mode, the six consecutive hours of highest Day-ahead Price during such Operating Day when such units are running or (ii) for combustion turbine units and for combined-cycle units when such units are operating in combustion turbine mode, the two consecutive hours of highest Day-ahead Price during such Operating Day when such units are running. Notwithstanding any other provision in this subsection, the total compensation to a Market Seller on any Operating Day that includes a MaxGen Condition shall not exceed \$1,000/MWh during the Specified Hours, where such total compensation in each such hour is defined as the amount that, absent subsections (l) and (n), would have been credited for ~~Operating Reserves~~Energy Make Whole for such Operating Day pursuant to section 3.2.3(b) divided by the Specified Hours, plus the Day-ahead Price for such hour, and no ~~Operating Reserves~~Energy Make Whole payments shall be made for any other hour of such Operating Day. If a unit operates in real time at the direction of the Office of the Interconnection consistently with its day-ahead clearing, then subsection (m) does not apply.

#### (o) generator deviation calculation

(o) ~~Dispatchable pool-scheduled generation resources and dispatchable self-scheduled generation resources that follow dispatch shall not be assessed balancing Operating Reserve deviations. Pool-scheduled generation resources and dispatchable self-scheduled All generation resources that do not follow dispatch shall be assessed balancing Operating Reserve deviations in accordance with the calculations described below and in the PJM Manuals.~~

~~The Office of the Interconnection shall calculate a ramp limited desired MW value for generation resources where the economic minimum and economic maximum are at least as far apart in real time as they are in day-ahead according to the following parameters:~~

**Commented [A42]:** This section has been reworded to enhance readability and to reflect the change from using three different desired MWh values to using the Tracking Ramp Limited Desired MWh metric.

This implements Design Component 6: MW used for Desired MW and When Each One is Used

(i) — real time economic minimum  $\leq$  105% of day-ahead economic minimum or day-ahead economic minimum plus 5 MW, whichever is greater.

(ii) — real time economic maximum  $\geq$  95% day-ahead economic maximum or day-ahead economic maximum minus 5 MW, whichever is lower.

The ramp-limited desired MW value for a generation resource shall be equal to:

$$Ramp\_Request_t = (Dispatch\_target_{t-1} - AOutput_{t-1}) / (LAtime_{t-1})$$

$$RL\_Desired_t = AOutput_{t-1} + (Ramp\_Request_t * Case\_Eff\_time_{t-1})$$

where:

1. — Dispatch target = Dispatch Signal for the previous approved Dispatch case
2. — AOutput = Unit's achievable target MW at case solution time as defined in the PJM Manuals
3. — LAtime = Dispatch look ahead time
4. — Case\_Eff\_time = Time between signal changes
5. — RL\_Desired = Ramp limited desired MW

To determine if a generation resource is following dispatch the Office of the Interconnection shall determine the unit's MW off dispatch and % off dispatch by using the lesser of the difference between the actual output and the dispatch signal or the actual output and ramp-limited desired MW value for each Real-time Settlement Interval. If the dispatch signal and the ramp-limited desired MW for the resource are unavailable, the Office of the Interconnection will determine the unit's MW off dispatch and % off dispatch by calculating the lesser of the difference between the actual output and the dispatch LMP-Desired MW for each Real-time Settlement Interval.

A pool-scheduled or dispatchable self-scheduled resource is considered to be following dispatch if its actual output is between its ramp-limited desired MW value and dispatch signal, or if its % off dispatch is  $\leq$  10, or its Real-time Settlement Interval MWh is within 5% of the Real-time Settlement Interval ramp-limited desired MW. A self-scheduled generator must also be dispatched above economic minimum. The degree of deviations for resources that are not following dispatch shall be determined for each Real-time Settlement Interval in accordance with the following provisions:

- A dispatchable self-scheduled resource that is not dispatched above economic minimum shall be assessed balancing Operating Reserve deviations according to the following formula: Real-time Settlement Interval MWh — Day Ahead MWh.

- A resource that is dispatchable day-ahead but is Fixed Gen in real-time shall be assessed balancing Operating Reserve deviations according to the following formula:  $\text{Real-time Settlement Interval MWh} - \text{dispatch LMP Desired MW}$ .
- Pool-scheduled generators that are not following dispatch shall be assessed balancing Operating Reserve deviations according to the following formula:  $\text{Real-time Settlement Interval MWh} - \text{Ramp Limited Desired MW}$ .
- If a resource's real-time economic minimum is greater than its day-ahead economic minimum by 5% or 5 MW, whichever is greater, or its real-time economic maximum is less than its Day-Ahead economic maximum by 5% or 5 MW, whichever is lower, and dispatch LMP Desired MWh for the Real-time Settlement Interval is either below the real-time economic minimum or above the real-time economic maximum, then balancing Operating Reserve deviations for the resource shall be assessed according to the following formula:  $\text{Real-time Settlement Interval MWh} - \text{dispatch LMP Desired MWh}$ .
- If a resource is not following dispatch and its % Off Dispatch is  $\leq 20\%$ , balancing Operating Reserve deviations shall be assessed according to the following formula:  $\text{Real-time Settlement Interval MWh} - \text{Ramp Limited Desired MW}$ . If deviation value is within 5% of Ramp Limited Desired MW, balancing Operating Reserve deviations shall not be assessed.
- If a resource is not following dispatch and its % off Dispatch is  $> 20\%$ , balancing Operating Reserve deviations shall be assessed according to the following formula:  $\text{Real-time Settlement Interval MWh} - \text{dispatch LMP Desired MWh}$ .
- If a resource is not following dispatch, and the resource has tripped, for the Real-time Settlement Interval the resource tripped and the Real-time Settlement Intervals it remains offline throughout its day-ahead schedule balancing Operating Reserve deviations shall be assessed according to the following formula:  $\text{Real-time Settlement Interval MWh} - \text{Day Ahead MWh}$ .
- For resources that are not dispatchable in both the Day-ahead and Real-time Energy Markets balancing Operating Reserve deviations shall be assessed according to the following formula:  $\text{Real-time Settlement Interval MWh} - \text{Day Ahead MWh}$ .

Generation resource deviations are calculated as the difference between a resource's Actual MWh, (which for purposes of this section is defined as the Revenue Data for Settlements), and Tracking Ramp Limited Desired MWh for each Real-time Settlement Interval except for the scenarios where day-ahead scheduled MWh are used in the calculation as defined below.

A generation resource shall not be assessed deviations for the Real-time Settlement Interval if its deviation percentage  $\leq 0.10$  (10 percent).



$$\text{Deviation Percentage} = \text{Abs} \left[ 1 - \frac{\text{Tracking Ramp Limited Desired MWh}}{\text{Actual MWh}} \right]$$

If the Actual MWh is equal to zero, the deviation percentage is equal to 1 (100 percent).

Generation resource deviations are calculated as the difference between a resource's Real-time Settlement Interval MWh and day-ahead scheduled MWh, rather than Tracking Ramp Limited Desired MWh, when a resource is non-dispatchable for any Real-time Settlement Interval. For purposes of this provision, a resource will be considered non-dispatchable when any of the following conditions occur:

- The generation resource is not dispatchable in the Day-ahead Energy Market and is not dispatchable in the Real-time Energy Market. For purposes of the generation resource deviation calculation, not dispatchable is defined as intervals when the minimum operating limit is equal to the maximum operating limit, or intervals when a generation resource elects to provide a fixed output using the fixed generation parameter, or other not dispatchable processes as defined in the PJM Manuals. All hydro resources are considered non-dispatchable unless operated as a dispatchable resource by the Office of the Interconnection.
- The self-scheduled generation resource is not dispatchable due to a limited dispatchable range. A dispatchable range is considered limited when the following equation is true:
  - Abs(maximum operating limit – minimum operating limit) <= 10% of Abs(minimum operating limit).
- The dispatchable self-scheduled generation resource has a Tracking Ramp Limited Desired MWh <= the minimum operating limit, except when the resource is desired at that level due to a Minimum Generation Emergency declaration or event.
- A generation resource is online and Tracking Ramp Limited Desired MWh is unable to be calculated due to unavailable schedules or offer parameters.

A generation resource shall not be assessed deviations for the Real-time Settlement Interval if its day-ahead deviation percentage is <= 0.05 (5%).

$$\text{Day – ahead Deviation Percentage} = \text{Abs} \left[ 1 - \frac{\text{Day – ahead Scheduled MWh}}{\text{Actual MWh}} \right]$$

If the Actual MWh is equal to zero, the day-ahead deviation percentage is equal to 1 (100 percent).

A generation resource shall not be assessed deviations in a Real-time Settlement Interval if any of the following conditions occur for that interval:

- The resource is assigned pool-scheduled Regulation.
- The resource is assigned pool-scheduled Real-time Synchronized Reserves as a synchronous condenser.

**Commented [A43]:** This implements Design Component 6e: When DA MW is used on the deviation side

Matrix Language:

Status Quo minus scenario B in status quo. Scenario B (generator with DA schedule that either trips or does not run in real-time) will be assessed against Tracking RLD MWh.

**Commented [A44]:** This implements Design Component 9a: Scenarios where units are automatically exempt from deviations

Matrix Language:

All exceptions remain except the following that are struck out:

Units are exempt from deviation charges when:

1. Assigned regulation
2. ~~Backed down for real time synchronized reserves and operating below DA-MW~~
3. Assigned real time synchronized reserves in condensing mode
4. Assigned real time non-synchronized reserves
5. ~~Backed down for real time secondary reserves and operating below DA-MW~~
6. Assigned real time secondary reserves in condensing mode
7. Responding to a synchronized reserve event and assigned real time synchronized reserves
8. ~~Manually dispatched (up or down) due to reliability / constraint control / reactive~~
9. For flexible resources, committed day ahead, not scheduled by PJM in real time
10. ~~Units operating below 110% of eco min during min gen event~~

Despite removal of these exemptions, units that fall within the percentage or MW deviation thresholds defined in component 9 above continue to be exempt.

- The resource is assigned pool-scheduled Real-time Secondary Reserves as a synchronous condenser.
- The resource is assigned pool-scheduled Real-time Non-Synchronized Reserves.
- The resource is assigned Real-time Synchronized Reserves and responded during a Synchronized Reserve Event.
- Flexible Resources that are committed in the Day-ahead Energy Market and not committed by the Office of the Interconnection in the Real-time Energy Market and the resource is offline.
- The resource is manually dispatched by the Office of the Interconnection and the manual instruction is not reflected in the Tracking Ramp Limited Desired MWh.

Deviations of generation resources with multiple units located at a single bus shall be netted for each Real-time Settlements Interval as described in Tariff, Attachment K-Appendix, section 3.2.3(h)(i).

If a resource has an ~~an sum-hourly average~~ of the absolute value of generator deviations ~~for an hour~~ that is less than 5 MWh, then the resource shall not be assessed ~~balancing Operating Reserve generation resource~~ deviations for each Real-time Settlement Interval in that hour. This calculation shall be done after netting is applied, where applicable.

For the purpose of this section 3.2.3(o), a generation resource is considered to be following dispatch if it is not assessed deviations or has a deviation equal to zero in a Real-time Settlement Interval, as determined above and prior to any netting pursuant to section 3.2.3(h)(i) or for hourly averages pursuant to this section.

**Commented [A45]:** The use of the term “following dispatch” has been removed in the deviation language above. We now speak more plainly to whether deviations are being assessed or not. However, the Market Revenue Neutrality Offset provisions in the Synch Reserve, Non-Synch Reserve and Secondary Reserve sections of the tariff (3.2.3A, 3.2.3A.01 and 3.2.3A.001) reference that units are ineligible for the offset when “not following dispatch as described in section 3.2.3(o)”. Therefore, this paragraph has been added to specify the conditions under which a unit is not eligible for the Market Revenue Neutrality Offset. This is not a change from the status quo.

#### (o-1) load response deviation calculation & eligibility

(o-1) Dispatchable Economic Load Response Participant resources that follow dispatch shall not be assessed ~~balancing Operating Reserve~~ deviations. Economic load reduction resources that do not follow dispatch shall be assessed ~~balancing Operating Reserve~~ deviations as described in this subsection and as further specified in the PJM Manuals.

The Desired MW quantity for such resources for each hour shall be the hourly integrated MW quantity to which the load reduction resource was dispatched for each hour (where the hourly integrated value is the average of the dispatched values as determined by the Office of the Interconnection for the resource for each hour).

If the actual reduction quantity for the load reduction resource for a given hour deviates by no more than 20% above or below the Desired MW quantity, then no ~~balancing Operating Reserve~~ deviation will accrue for that hour. If the actual reduction quantity for the load reduction resource for a given hour is outside the 20% bandwidth, the ~~balancing Operating Reserve~~ deviations will accrue for that hour in the amount of the absolute value of (Desired MW – actual reduction quantity) and charged as defined in Tariff, Attachment K-Appendix, section 3.3A. For those hours where the actual reduction quantity is within the 20% bandwidth specified above, the

load reduction resource will be eligible to be made whole for the total value of its offer as defined in Tariff, Attachment K-Appendix, section 3.3A. Hours for which the actual reduction quantity is outside the 20% bandwidth will not be eligible for the make-whole payment. If at least one hour is not eligible for make-whole payment based on the 20% criteria, then the resource will also not be made whole for its shutdown cost.

**(p) bucketing make whole credits by reason**

(p) The Office of the Interconnection shall ~~allocate the charges assessed~~ apply any balancing Energy Make Whole credits determined pursuant to Tariff, Attachment K-Appendix section 3.2.3(h)(e-2), except those associated with the scheduling of units for Black Start Service or testing of Black Start Service Units as provided in Tariff, Schedule 6A, to real-time deviations ~~from day-ahead schedules determined pursuant to section 3.2.3(h)~~ or real-time load share-plus exports, depending on whether the balancing Operating Reserve Energy Make Whole credits are related to resources scheduled during the reliability analysis for an Operating Day, or during the actual Operating Day. ~~Allocation to real-time load share under this subsection (p) shall not apply to Direct Charging Energy. If the Office of the Interconnection declares a Market Suspension, per Operating Agreement, section 1.11.6, the Office of the Interconnection shall allocate the charges to the ratio share of real-time load plus export transactions~~

**Commented [A46]:** Sections (p) and (b) had nearly identical language regarding the Balancing Operating Reserve Cost Allocation methodology. The purpose of this language is to state how the credits calculated in (e-2) are bucketed into credits for Reliability and credits for Deviations so that they can be later allocated as charges to the appropriate type of activity. The section (b) language spoke more directly to this bucketing and has therefore been retained and the language in (p) has been edited to match the language previously in (b).

The allocation of these buckets of credits as charges is now more clearly defined in paragraph (q) below.

(i) For resources scheduled by the Office of the Interconnection during the reliability analysis for an Operating Day, the associated balancing Operating Reserve charges Energy Make Whole credits shall be allocated based on the reason the resource was scheduled according to the following provisions:

(A) If the Office of the Interconnection determines during the reliability analysis for an Operating Day that a resource was committed to operate in real-time to augment the physical resources committed in the Day-ahead Energy Market to meet the forecasted real-time load plus the Operating Reserve requirement, the associated balancing Operating Reserve charges Energy Make Whole credits, identified as reliability analysis credits for deviations, shall be allocated to ~~real-time deviations from day-ahead schedules determined pursuant to Tariff, Attachment K-Appendix section 3.2.3(h)~~.

(B) If the Office of the Interconnection determines during the reliability analysis for an Operating Day that a resource was committed to maintain system reliability, the associated balancing Operating Reserve charges Energy Make Whole credits, identified as reliability analysis credits for reliability, shall be allocated according to ratio share of real time load plus export transactions.

(C) If the Office of the Interconnection determines during the reliability analysis for an Operating Day that a resource with a day-ahead schedule is required to deviate from that schedule to provide balancing Operating Reserves, the associated balancing Operating Reserve charges Energy Make

Whole credits shall be identified in the same manner as units committed during the reliability analysis pursuant to subsections 3.2.3(p)(i)(A) and 3.2.3(p)(i)(B) hereof shall be allocated pursuant to (A) or (B) above.

(ii) For resources scheduled during an Operating Day, the associated balancing ~~Operating Reserve charges~~ Energy Make Whole credits shall be allocated according to the following provisions:

(A) If the Office of the Interconnection directs a resource to operate during an Operating Day to provide balancing Operating Reserves, the associated balancing ~~Operating Reserve charges~~ Energy Make Whole credits, identified as real-time credits for reliability, shall be allocated according to ratio share of load plus exports. The foregoing notwithstanding, ~~charges will be assessed credits will be applied~~ pursuant to this section only if the LMP at the resource's bus does not meet or exceed the applicable offer of the resource for at least four 5-minute intervals during one or more discrete clock hours during each period the resource operated and produced MWs during the relevant Operating Day. If a resource operated and produced MWs for less than four 5-minute intervals during one or more discrete clock hours during the relevant Operating Day, ~~the charges the credits~~ for that resource during the hour it was operated less than four 5-minute intervals will be identified as being in the same category (real-time credits for reliability or real-time credits for deviations) as identified for the Operating Reserves for the other discrete clock hours.

(B) If the Office of the Interconnection directs a resource not covered by Tariff, Attachment K-Appendix, section 3.2.3(p)(ii)(A) ~~hereof~~ to operate in real-time during an Operating Day, the associated balancing ~~Operating reserve charges~~ Energy Make Whole credits, identified as real-time credits for deviations, shall be allocated ~~according to real-time deviations from day-ahead schedules~~ determined pursuant to Tariff, Attachment K-Appendix, section 3.2.3(h).

(iii) PJM shall post on its Web site the aggregate amount of MWs committed that meet the criteria referenced in Tariff, Attachment K-Appendix, sections 3.2.3(p)(i) and (p)(ii).

The costs associated with scheduling of units for Black Start Service or testing of Black Start Service units shall be allocated by ratio share of the monthly transmission use of each Network Customer or Transmission Customer serving Zonal load or non-Zonal load, as determined in accordance with the formulas contained in Tariff, Schedule 6A.

**Commented [A47]:** This paragraph was relocated from subsection (h)

#### (q) regional buckets and balancing uplift charges

(q)

(i) Balancing Energy Make Whole credits for reliability or deviations as determined in Tariff, Attachment K-Appendix, section 3.2.3(p) shall be

**Commented [A48]:** Restructured (q) to clarify how charges are determined for each market participant in q and how the rates are calculated in q-1. There are no changes to the status quo.

assigned to the Eastern or Western region if the credit paid to the generator is due to transmission constraints that occur on transmission system capacity equal to or less than 345kv. Balancing Energy Make Whole credits for reliability or deviations not assigned to the Eastern or Western region shall be assigned to the RTO region. The Office of the Interconnection shall determine regional balancing Operating Reserve rates for the Western and Eastern Regions of the PJM Region. For the purposes of this section, the Western rRegion shall be the AEP, APS, ComEd, Duquesne, Dayton, ATSI, DEOK, EKPC, OVEC transmission Zones, and the Eastern rRegion shall be the AEC, BGE, Dominion, PENELEC, PEPCO, ME, PPL, JCPL, PECO, DPL, PSEG, RE transmission Zones.

- (ii) The total balancing Energy Make Whole credits for reliability in each region shall be allocated as charges to each Market Participant's pro rata share of real-time load plus export transactions in such region. For purposes of this Tariff, Attachment K-Appendix, section 3.2.3(q), a Market Participant's real-time load plus export transactions shall be equal to the daily total of (i) real-time deliveries of energy to load in the relevant region ((a) net of operating Behind The Meter Generation, but not to be less than zero; and (b) excluding Direct Charging Energy), served under Network Transmission Service, in megawatt-hours during that Operating Day; and (ii) real-time deliveries of energy sales from within the PJM Region to load outside the PJM Region in megawatt-hours during that Operating Day, but not including its bilateral transactions that are Dynamic Transfers to load outside the PJM Region pursuant to Tariff, Attachment K-Appendix, section 1.12.
- (iii) The total balancing Energy Make Whole credits for deviations in the Eastern region and the Western region shall be allocated as charges to each Market Participant's pro rata share of the daily total of hourly deviations in the relevant region as determined pursuant to Tariff, Attachment K-Appendix, section 3.2.3(h). The total balancing Energy Make Whole credits for deviations in the RTO region plus the total credits as determined in Tariff, Attachment K-Appendix, section 3.2.3(g) shall be allocated as charges to each Market Participant's pro rata share of the daily total of hourly deviations in the RTO region as determined pursuant to Tariff, Attachment K-Appendix, section 3.2.3(h). If the Office of the Interconnection declares a Market Suspension, per Operating Agreement, Schedule 1, section 1.11.6, the Office of the Interconnection shall allocate deviation charges to the ratio share of real-time load plus export transactions pursuant to Tariff, Attachment K-Appendix, section 3.2.3(q)(ii).

**(q-1) Uplift rates**

**Commented [A49]:** Clarifying changes for readability and consistency with terminology used elsewhere. No change to the status quo.

- (i) ~~The~~ Regional balancing ~~Operating Reserve~~ uplift rates shall be determined in accordance with the following provisions:

~~(i) —~~ The Office of the Interconnection shall calculate regional adder rates for the Eastern and Western ~~r~~Regions. Regional adder rates ~~for reliability~~ shall be equal to the total balancing ~~Operating Reserve~~Energy Make Whole credits ~~paid to generators for transmission constraints that occur on transmission system capacity equal to or less than 345kv. The regional adder rates shall be separated into for reliability in the region divided by the total real-time load plus export transactions in the relevant region in accordance with Tariff, Attachment K-Appendix, section 3.2.3(q)(ii). and deviation charges, which shall be allocated to real-time load or real-time deviations, respectively.~~ Whether the underlying credits are designated as reliability or deviation charges shall be determined in accordance with ~~Tariff, Attachment K-Appendix, section 3.2.3(p).~~ ~~Allocation to real-time load share under this subsection (q)(i) shall not apply to Direct Charging Energy.~~

~~Regional adder rates for deviations shall be equal to the total balancing Energy Make Whole credits for deviations in the region divided by the daily total of hourly deviations in the relevant region in accordance with Tariff, Attachment K-Appendix, section 3.2.3(q)(iii).~~

(ii) The Office of the Interconnection shall calculate RTO balancing ~~Operating Reserve~~ uplift rates. RTO balancing ~~Operating Reserve~~uplift rates ~~for reliability~~ shall be equal to ~~the total~~ balancing ~~Operating Reserve~~Energy Make Whole credits ~~for reliability in the RTO region divided by the total real-time load plus export transactions in the RTO region in accordance with section (q)(ii). RTO balancing uplift rates for deviations shall be equal to the total balancing Energy Make Whole credits for deviations in the RTO region plus the total credits as determined in Tariff, Attachment K-Appendix, section 3.2.3(g) divided by the daily total of hourly deviations in the RTO region as determined pursuant to Tariff, Attachment K-Appendix, section 3.2.3(h). except those associated with the scheduling of units for Black Start service or testing of Black Start Units as provided in Tariff, Schedule 6A, in excess of the regional adder rates calculated pursuant to Tariff, Attachment K-Appendix, section 3.2.3(q)(i). The RTO balancing Operating Reserve rates shall be separated into reliability and deviation charges, which shall be allocated to real-time load or real-time deviations, respectively.~~ Whether the underlying credits are allocated as reliability or deviation charges shall be determined in accordance with ~~Tariff, Attachment K-Appendix, section 3.2.3(p).~~ ~~Allocation to real-time load share under this subsection (q)(ii) shall not apply to Direct Charging Energy.~~

(iii) Reliability and deviation regional balancing ~~Operating Reserve~~uplift rates shall be determined by summing the relevant RTO balancing ~~Operating Reserve~~Energy Make Whole rates and regional adder rates.

(iv) ~~If the Eastern and/or Western Regions do not have regional adder rates, the relevant regional balancing Operating Reserve~~Energy Make Whole ~~rate shall be the reliability and/or deviation RTO balancing Operating Reserve~~Energy Make Whole ~~rate.~~

**(r) Make Whole for Offers > \$1000**

(r) Market Sellers that incur incremental operating costs for a generation resource that are either greater than \$1,000/MWh as determined in accordance with the Market Seller's PJM-approved Fuel Cost Policy, Operating Agreement, Schedule 2 and PJM Manual 15, but are not verified at the time of dispatch of the resource under Tariff, Attachment K-Appendix, section 6.4.3, or greater than \$2,000/MWh as determined in accordance with the Market Seller's PJM-approved Fuel Cost Policy, Operating Agreement, Schedule 2, and PJM Manual 15, will be eligible to receive credit for ~~Operating Reserves~~Energy Make Whole upon review of the Market Monitoring Unit and the Office of the Interconnection, and approval of the Office of the Interconnection. Market Sellers must submit to the Office of the Interconnection and the Market Monitoring Unit all relevant documentation demonstrating the calculation of costs greater than \$2,000/MWh, and costs greater than \$1,000/MWh which were not verified at the time of dispatch of the resource under Tariff, Attachment K-Appendix, section 6.4.3. The Office of the Interconnection must approve any ~~Operating Reserve~~Energy Make Whole credits paid to a Market Seller under this subsection (r).