

**Proposed New Revisions to Attachment K-Appendix of the Tariff and
Schedule 1 of the Operating Agreement
LOC Credit Methodology
Markets and Reliability Committee Meeting
February 26, 2015**

3.2.3 Operating Reserves.

(f) A Market Seller's steam-electric generating unit or combined cycle unit operating in combined cycle mode that is pool scheduled (or self-scheduled, if operating according to 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 hourly integrated, 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 hourly in an amount equal to the product of (A) the deviation of the generation unit's output necessary to follow the Office of the Interconnection's signals and the generation unit's expected output level if it had been dispatched in economic merit order, times (B) the Locational Marginal Price at the generation bus for the generation unit, minus (C) the applicable offer for energy on which the generation unit was committed in the Real-time Energy Market, provided that the resulting outcome is greater than \$0.00 (this equation is represented as (A*B)-C).

The deviation of the generation unit's output is equal to the level of output for the unit determined according to the point on the scheduled offer curve on which the unit was operating corresponding to the hourly integrated real time Locational Marginal Price at the unit's bus and adjusted for any Regulation or Tier 2 Synchronized Reserve assignments and limited to the lesser of the unit's Economic Maximum or the unit's Maximum Facility Output, minus the actual hourly integrated output of the unit.

For pool-scheduled generation units, their applicable offer for energy is the offer on which the resource was committed. For self-scheduled generation units, their applicable offer for energy shall equal the real-time scheduled offer curve on which the unit was operating, unless such schedule was a price-based schedule and the offer associated with that price schedule is less than the cost-based offer provided for the unit, in which case the offer for the unit will be determined from the cost-based schedule.

~~{(LMPDMW - AG) x (URLMP - UB)}, where:~~

~~LMPDMW equals the level of output for the unit determined according to the point on the scheduled offer curve on which the unit was operating corresponding to the hourly integrated~~

~~real time LMP at the unit's bus and adjusted for any Regulation or Tier 2 Synchronized Reserve assignments and limited to the lesser of the unit's Economic Maximum or the unit's Maximum Facility Output;~~

~~AG equals the actual hourly integrated output of the unit;~~

~~URLMP equals the real time LMP at the unit's bus;~~

~~UB equals the unit offer for that unit for which output is reduced or suspended, determined according to the real time scheduled offer curve on which the unit was operating, unless such schedule was a price based schedule and the offer associated with that price schedule is less than the cost based offer provided for the unit, in which case the offer for the unit will be determined from the cost based schedule; and~~

~~where $URLMP - UB$ shall not be negative.~~

(f-1) A Market Seller's generation unit with a combined startup and notification time of less than or equal to two hours, and a minimum run time less than or equal to two hours ~~combustion turbine unit or combined cycle unit operating in simple cycle mode~~ that is pool-scheduled (or self-scheduled, if operating according to Section 1.10.3 (c) hereof), operated as requested by the Office of the Interconnection, shall be compensated for lost opportunity cost, and shall be limited to the lesser of the unit's Economic Maximum or the unit's Maximum Facility Output, if either of the following conditions occur. If a Market Seller's generation unit has a combined startup and notification time greater than two hours, or a minimum run time greater than two hours, and is not permitted to operate by the Office of the Interconnection in the Real-time Energy Market due to a transmission constraint or other reliability issue for a reliability reason, the condition specified in (ii) below will be applicable:

- (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 above for a steam unit or combined cycle unit operating in combined cycle mode.
- (ii) if the unit is scheduled to produce energy in the Day-ahead Energy Market, but the unit is not called on by PJM and does not operate in real time, then the Market Seller shall be credited hourly 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 generation unit, and (B) the Real-time Price at the generation bus for the generation unit, minus the sum of (C) the applicable offer for energy on which the generation unit was committed in the Day-ahead Energy

Market, inclusive of no-load costs, plus (D) the start-up cost, divided by the hours committed for each set of contiguous hours for which the unit was scheduled in Day-ahead Energy Market temporally contiguous commitment period (this equation is represented as (A*B)-(C+D)), or

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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 generation unit.

~~(i) $\{(URTLMP - UDALMP) \times DAG\}$, or (ii) $\{(URTLMP - UB) \times DAG\}$ where:~~

~~URTLMP equals the real time LMP at the unit's bus;~~

~~UDALMP equals the day-ahead LMP at the unit's bus;~~

~~DAG equals the day-ahead scheduled unit output for the hour;~~

~~UB equals the offer price for the unit, determined according to the schedule on which the unit was committed day-ahead, unless such schedule was a price-based schedule and the offer associated with that price schedule is less than the cost-based offer provided for the unit, in which case the offer for the unit will be determined from the cost-based schedule; and~~

~~where $URTLMP - UDALMP$ and $URTLMP - UB$ shall not be negative.~~

(f-2) A Market Seller's hydroelectric resource that is pool-scheduled (or self-scheduled, if operating according to 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's wind generating unit 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 generating units 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 hourly integrated, 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 hourly in an amount equal to the product of (A) the deviation of the generation unit's output necessary to follow the Office of the Interconnection's signals and the generation unit's expected output level if it had been dispatched in economic merit order, times (B) the Real-time Price at the generation bus for the generation unit, minus (C) the applicable offer for energy on which the generation unit was committed in the Real-time Energy Market, provided that the resulting outcome is greater than \$0.00 (this equation is represented as (A*B)-C).

The deviation of the generation unit's output is equal to the lesser of the PJM forecasted output for the unit or level of output for the unit determined according to the point on the scheduled offer curve on which the unit was operating corresponding to the hourly integrated real time Locational Marginal Price, and shall be limited to the lesser of the unit's Economic Maximum or the unit's Maximum Facility Output, minus the actual hourly integrated output of the unit.

For pool-scheduled generation units, their applicable offer for energy is the offer on which the resource was committed. For self-scheduled generation units, their applicable offer for energy shall equal the real-time scheduled offer curve on which the unit was operating, unless such schedule was a price-based schedule and the offer associated with that price schedule is less than the cost-based offer provided for the unit, in which case the offer for the unit will be determined from the cost-based schedule.

~~{(LMPDMW - AG) x (URTLMP - UB)}, where:~~

~~LMPDMW equals the lesser of the PJM forecasted output for the unit or level of output for the unit determined according to the point on the scheduled offer curve on which the unit was operating corresponding to the hourly integrated real time LMP, and shall be limited to the lesser of the unit's Economic Maximum or the unit's Maximum Facility Output;~~

~~AG equals the actual hourly integrated output of the unit;~~

~~URTLMP equals the real time LMP at the unit's bus;~~

~~UB equals the unit offer for that unit for which output is reduced or suspended, determined according to the real-time scheduled offer curve on which the unit was operating, unless such schedule was a price-based schedule and the offer associated with that price schedule is less than the cost-based offer provided for the unit, in which case the offer for the unit will be determined from the cost-based schedule; and~~

~~where $URTLMP - UB$ shall not be negative.~~

~~In the event the Office of the Interconnection experiences a technical problem or malfunction with its wind forecasting tool that results in an erroneous forecast for a wind resource during a period of time for which the wind resource is eligible for lost opportunity cost, the Office of the Interconnection and the Market Seller will attempt to reach a mutually agreeable forecast value for settlement purposes. If the Office of the Interconnection and the Market Seller do not come to mutual agreement on an acceptable forecast value, the Office of the Interconnection shall utilize the forecast value that it determines is appropriate.~~